Description of Device Parameters

**Proline t-mass 300**

**HART**

Thermal mass flowmeter
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1 About this document

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

It is used to perform tasks that require detailed knowledge of the function of the device:
- Commissioning measurements under difficult conditions
- Optimal adaptation of the measurement to difficult conditions
- Detailed configuration of the communication interface
- Error diagnostics in difficult cases

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

1.3 Using this document

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

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

**Factory setting**
- Default setting ex works

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

1.4 Symbols used

1.4.1 Symbols for certain types of information

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Tip" /></td>
<td>Indicates additional information.</td>
</tr>
<tr>
<td><img src="image" alt="Reference to documentation" /></td>
<td>Reference to documentation</td>
</tr>
<tr>
<td><img src="image" alt="Reference to page" /></td>
<td>Reference to page</td>
</tr>
<tr>
<td><img src="image" alt="Reference to graphic" /></td>
<td>Reference to graphic</td>
</tr>
<tr>
<td><img src="image" alt="Operation via local display" /></td>
<td>Operation via local display</td>
</tr>
<tr>
<td><img src="image" alt="Operation via operating tool" /></td>
<td>Operation via operating tool</td>
</tr>
<tr>
<td><img src="image" alt="Write-protected parameter" /></td>
<td>Write-protected parameter</td>
</tr>
</tbody>
</table>
1.4.2 Symbols in graphics

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 2, 3 ...</td>
<td>Item numbers</td>
<td>A, B, C, ...</td>
<td>Views</td>
</tr>
<tr>
<td>A·A, B·B, C·C, ...</td>
<td>Sections</td>
<td></td>
<td></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>t-mass F 300</td>
<td>BA01992D</td>
</tr>
<tr>
<td>t-mass I 300</td>
<td>BA01993D</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>Information on the Pressure Equipment Directive</td>
<td>SD01614D</td>
</tr>
<tr>
<td>Functional Safety Manual</td>
<td>SD02483D</td>
</tr>
<tr>
<td>Remote display and operating module DKX001</td>
<td>SD01763D</td>
</tr>
<tr>
<td>Radio approvals for WLAN interface for A309/A310 display module</td>
<td>SD01793D</td>
</tr>
<tr>
<td>Web server</td>
<td>SD02485D</td>
</tr>
<tr>
<td>Heartbeat Technology</td>
<td>SD02477D</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>
</tr>
</thead>
<tbody>
<tr>
<td>Locking status (0004)</td>
</tr>
<tr>
<td>Access status (0005)</td>
</tr>
<tr>
<td>Enter access code (0003)</td>
</tr>
<tr>
<td>Direct access (0106)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display</td>
</tr>
<tr>
<td>Configuration backup</td>
</tr>
<tr>
<td>Diagnostic handling</td>
</tr>
<tr>
<td>Administration</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured values</td>
</tr>
<tr>
<td>System units</td>
</tr>
<tr>
<td>Process parameters</td>
</tr>
<tr>
<td>Measurement mode</td>
</tr>
<tr>
<td>Sensor adjustment</td>
</tr>
<tr>
<td>Zero point adjustment</td>
</tr>
<tr>
<td>External compensation</td>
</tr>
<tr>
<td>In-situ adjustment</td>
</tr>
<tr>
<td>Calibration</td>
</tr>
</tbody>
</table>
Overview of the Expert operating menu

- **Input**
  - Current input 1 to n → 104
  - Status input 1 to n → 107

- **Output**
  - Current output 1 to n → 110
  - Pulse/frequency/switch output 1 to n → 117
  - Relay output 1 to n → 134

- **Communication**
  - HART input → 139
  - HART output → 144
  - Web server → 159
  - Diagnostic configuration → 162
  - WLAN settings

- **Application**
  - Reset all totalizers (2806) → 174
  - Totalizer 1 to n → 175

- **Diagnostics**
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  - Timestamp (0667) → 181
  - Previous diagnostics (0690) → 181
  - Timestamp (0672) → 182
  - Operating time from restart (0653) → 182
  - Operating time (0652) → 182
  - Diagnostic list → 183
Overview of the Expert operating menu

Proline t-mass 300 HART

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- Device information → 188
- Main electronic module + I/O module 1 → 192
- Sensor electronic module (ISEM) → 193
- I/O module 2 → 194
- I/O module 3 → 195
- Display module → 197
- Minimum/maximum values → 198
- Data logging → 200
- Heartbeat → 207
- Simulation → 207
- I/O configuration → 216
  - I/O module 1 to n terminal numbers (3902–1 to n) → 216
  - I/O module 1 to n information (3906–1 to n) → 216
  - I/O module 1 to n type (3901–1 to n) → 217
  - Apply I/O configuration (3907) → 217
  - I/O alteration code (2762) → 218
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>
</tr>
</thead>
<tbody>
<tr>
<td>Direct access (0106)</td>
</tr>
<tr>
<td>Locking status (0004)</td>
</tr>
<tr>
<td>Access status (0005)</td>
</tr>
<tr>
<td>Enter access code (0003)</td>
</tr>
<tr>
<td>System</td>
</tr>
<tr>
<td>Sensor</td>
</tr>
<tr>
<td>I/O configuration</td>
</tr>
<tr>
<td>Input</td>
</tr>
<tr>
<td>Output</td>
</tr>
<tr>
<td>Communication</td>
</tr>
<tr>
<td>Application</td>
</tr>
<tr>
<td>Diagnostics</td>
</tr>
</tbody>
</table>

Locking status

**Navigation**

Expert → Locking status (0004)

**Description**

Displays the active write protection.

**User interface**

- Hardware locked
- SIL locked
- Temporarily locked
Additional information

User interface

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

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

Selection

<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 parameter (→ 12) 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 PCB board. This locks write access to the parameters (e.g. via local display or operating tool).</td>
</tr>
<tr>
<td>SIL locked (priority 2)</td>
<td>The SIL mode is enabled. 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>

Access status

Navigation

Expert → Access status (0005)

Description

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

User interface

- Operator
- Maintenance

Additional information

Description

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

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

Display

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

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

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.

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

Navigation  
Expert → System

3.1.1 "Display" submenu

Navigation  
Expert → System → Display
Display language

Navigation

Expert → System → Display → Display language (0104)

Prerequisite

A local display is provided.

Description

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

Selection

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

Factory setting

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

* Visibility depends on order options or device settings
Format display

Navigation

Expert → System → Display → Format display (0098)

Prerequisite

A local display is provided.

Description

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

Selection

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

Additional information

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

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

"1 value, max. size" option

\[
\begin{array}{c|c}
\text{m} & 900.00 \\
\text{l/h} & 1 \text{ l/h}
\end{array}
\]

"1 bargraph + 1 value" option

\[
\begin{array}{c|c|c}
\text{m} & 900.00 \\
\text{kg/h} & 1 \text{ kg/l}
\end{array}
\]

"2 values" option

\[
\begin{array}{c|c|c}
\text{m} & 900.00 \\
\text{kg/h} & 1 \text{ l/h}
\end{array}
\]

"1 value large + 2 values" option

\[
\begin{array}{c|c|c|c}
\text{m} & 900.00 \\
\text{kg/h} & 900.00 \\
\text{l/h} & 1.0 \text{ kg/l}
\end{array}
\]

"4 values" option

\[
\begin{array}{c|c|c|c}
\text{m} & 900.00 \\
\text{kg/h} & 900.00 \\
\text{l/h} & 1.0 \text{ kg/l}
\end{array}
\]

A0013103
Description of Device Parameters

Proline t-mass 300 HART

### Value 1 display

**Navigation**

![Expert ➔ System ➔ Display ➔ Value 1 display (0107)]

**Prerequisite**

A local display is provided.

**Description**

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

**Selection**

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

**Additional information**

**Description**

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

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

**Dependency**

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

### 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

* Visibility depends on order options or device settings
Additional information  

*Description*

The **Format display** parameter (→ 16) is used to specify that the measured value is to be displayed as a bar graph.

*User entry*

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

### 100% bargraph value 1

**Navigation**  

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

**Prerequisite**  

A local display is provided.

**Description**  

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

**User entry**  

Signed floating-point number

**Factory setting**  

Depends on country and nominal diameter → 219

**Additional information**  

*Description*

The **Format display** parameter (→ 16) is used to specify that the measured value is to be displayed as a bar graph.

*User entry*

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

### Decimal places 1

**Navigation**  

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

**Prerequisite**  

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

**Description**  

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

**Selection**  

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

**Additional information**  

*Description*

This setting does not affect the measuring or computational accuracy of the device. The arrow displayed between the measured value and the unit indicates that the device computes with more digits than are shown on the local display.
Value 2 display

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

**Prerequisite**
A local display is provided.

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

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

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

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

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

Decimal places 2

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

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

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

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

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

Value 3 display

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

**Prerequisite**
A local display is provided.

**Description**
Use this function to select one of the measured values shown on the local display.
Selection
For the picklist, see the **Value 1 display** parameter (→ 18)

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

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

*Selection*

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

---

### 0% bargraph value 3

**Navigation**

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

**Prerequisite**

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

**Description**

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

**User entry**

Signed floating-point number

**Additional information**

*Description*

The **Format display** parameter (→ 16) is used to specify that the measured value is to be displayed as a bar graph.

**User entry**

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

---

### 100% bargraph value 3

**Navigation**

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

**Prerequisite**

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

**Description**

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

**User entry**

Signed floating-point number
Additional information  

**Description**

The Format display parameter (→ 16) is used to specify that the measured value is to be displayed as a bar graph.

**User entry**

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

---

**Decimal places 3**

**Navigation**

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

**Prerequisite**

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

**Description**

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

**Selection**

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

**Additional information**

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

---

**Value 4 display**

**Navigation**

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

**Prerequisite**

A local display is provided.

**Description**

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

**Selection**

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

**Additional information**

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

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

**Selection**

The unit of the displayed measured value is taken from the System units submenu (→ 54).
**Decimal places 4**

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

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

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

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

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

**Display interval**

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

**Prerequisite**
A local display is provided.

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

**User entry**
1 to 10 s

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

- The Value 1 display parameter (→ 18) to Value 4 display parameter (→ 22) are used to specify which measured values are shown on the local display.
- The display format of the displayed measured values is specified using the Format display parameter (→ 16).

**Display damping**

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

**Prerequisite**
A local display is provided.

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

Proline t-mass 300 HART

User entry

0.0 to 999.9 s

Additional information

User entry

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

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

Header

Navigation

Expert → System → Display → Header (0097)

Prerequisite

A local display is provided.

Description

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

Selection

- Device tag
- Free text

Additional information

Description

The header text only appears during normal operation.

1) Position of the header text on the display

Selection

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

Header text

Navigation

Expert → System → Display → Header text (0112)

Prerequisite

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

Description

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

---

1) proportional transmission behavior with first order delay
User entry
Max. 12 characters such as letters, numbers or special characters (e.g. @, %, /)

Additional information
Description
The header text only appears during normal operation.

1  Position of the header text on the display

User entry
The number of characters displayed depends on the characters used.

Separator

Navigation
Expert → System → Display → Separator (0101)

Prerequisite
A local display is provided.

Description
Use this function to select the decimal separator.

Selection
• . (point)
• , (comma)

Factory setting
. (point)

Contrast display

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

Prerequisite
A local display is provided.

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

User entry
20 to 80 %

Factory setting
Depends on the display
Description of Device Parameters

Proline t-mass 300 HART

Backlight

Navigation

Expert → System → Display → Backlight (0111)

Prerequisite

One of the following conditions is met:

- Order code for "Display; operation", option F "4-line, illum.; touch control"
- Order code for "Display; operation", option G "4-line, illum.; touch control +WLAN"
- Order code for "Display; operation", option O "Separate 4-line display, illum.; 10m/30ft cable; touch control"

Description

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

Selection

- Disable
- Enable

3.1.2 "Configuration backup" submenu

Navigation

Expert → System → Config. backup

Operating time

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

User interface

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

Additional information

User interface

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

**Navigation**

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

**Description**

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

**User interface**

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

---

**Configuration management**

**Navigation**

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

**Description**

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

**Selection**

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

**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>Execute backup</td>
<td>A backup copy of the current device configuration is saved from the HistoROM backup to the memory of the device. The backup copy includes the transmitter data of the device. The following message appears on local display: Backup active, please wait!</td>
</tr>
<tr>
<td>Restore</td>
<td>The last backup copy of the device configuration is restored from the device memory to the device's HistoROM backup. The backup copy includes the transmitter data of the device. The following message appears on local display: Restore active! Do not interrupt power supply!</td>
</tr>
<tr>
<td>Compare</td>
<td>The device configuration saved in the device memory is compared with the current device configuration of the HistoROM backup. The following message appears on local display: Comparing files. The result can be viewed in Comparison result parameter.</td>
</tr>
<tr>
<td>Clear backup data</td>
<td>The backup copy of the device configuration is deleted from the memory of the device. The following message appears on local display: Deleting file</td>
</tr>
</tbody>
</table>

* Visibility depends on order options or device settings

---

**HistoROM**

A HistoROM is a ‘non-volatile’ device memory in the form of an EEPROM.
Backup state

Navigation

Er  Expert → System → Config. backup → Backup state (2759)

Description
Displays the status of the data backup process.

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

Comparison result

Navigation

Er  Expert → System → Config. backup → Compar. result (2760)

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

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

Additional information

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

Selection

<table>
<thead>
<tr>
<th>Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Settings identical</td>
<td>The current device configuration of the HistoROM is identical to the backup copy in the device memory.</td>
</tr>
<tr>
<td></td>
<td>If the transmitter configuration of another device has been transmitted to the device via HistoROM in the Configuration management parameter, the current device configuration of the HistoROM is only partially identical to the backup copy in the device memory: The settings for the transmitter are not identical.</td>
</tr>
<tr>
<td>Settings not identical</td>
<td>The current device configuration of the HistoROM is not identical to the backup copy in the device memory.</td>
</tr>
<tr>
<td>No backup available</td>
<td>There is no backup copy of the device configuration of the HistoROM in the device memory.</td>
</tr>
<tr>
<td>Backup settings corrupt</td>
<td>The current device configuration of the HistoROM is corrupt or not compatible with the backup copy in the device memory.</td>
</tr>
</tbody>
</table>
Options | Description
--- | ---
Check not done | The device configuration of the HistoROM has not yet been compared to the backup copy in the device memory.
Dataset incompatible | The backup copy in the device memory is not compatible with the device.

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

### 3.1.3 "Diagnostic handling" submenu

**Navigation**

Expert → System → Diagn. handling

<table>
<thead>
<tr>
<th>Diagnostic handling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alarm delay (0651)</td>
</tr>
</tbody>
</table>

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

The diagnostic message is reset without a time delay.

**User entry**

0 to 60 s

**Additional information**

**Result**

This setting affects the following diagnostic messages:

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

"Diagnostic behavior" submenu

Each item of diagnostic information is assigned a specific diagnostic behavior at the factory. The user can change this assignment for specific diagnostic information in the **Diagnostic behavior** submenu (→ 29).
The following options are available in the Assign behavior of diagnostic no. xxx parameters:

<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 (→ 187) (Event list submenu) 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.

**Navigation**


[1] For a list of all the diagnostic events, see the Operating Instructions for the device.
Assign behavior of diagnostic no. 144 (Sensor drift)

Navigation
Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 144 (0631)

Description
Use this function to change the diagnostic behavior of the 144 Sensor drift diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Additional information
Detailed description of the options available for selection: → 30

Assign behavior of diagnostic no. 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 302 Device verification active diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Additional information
Detailed description of the options available for selection: → 30

Assign behavior of diagnostic no. 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.
Description of Device Parameters

Selection

- Off
- Alarm
- Warning
- Logbook entry only

Additional information

Selection

Detailed description of the options available for selection: → 30

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

Navigation

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

Prerequisite

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

Description

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

Selection

- Off
- Alarm
- Warning
- Logbook entry only

Additional information

Detailed description of the options available for selection: → 30

Assign behavior of diagnostic no. 443 (Pulse output)

Navigation

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

Prerequisite

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

Description

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

Selection

- Off
- Alarm
- Warning
- Logbook entry only

Additional information

Selection

Detailed description of the options available for selection: → 30
<table>
<thead>
<tr>
<th><strong>Assign behavior of diagnostic no. 444 (Current input 1 to n)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Navigation</strong></td>
</tr>
<tr>
<td><strong>Prerequisite</strong></td>
</tr>
<tr>
<td><strong>Description</strong></td>
</tr>
</tbody>
</table>
| **Selection** | - Off  
- Alarm  
- Warning  
- Logbook entry only |
| **Additional information** | Detailed description of the options available for selection: →  30 |

<table>
<thead>
<tr>
<th><strong>Assign behavior of diagnostic no. 832 (Electronic temperature too high)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Navigation</strong></td>
</tr>
<tr>
<td><strong>Description</strong></td>
</tr>
</tbody>
</table>
| **Selection** | - Off  
- Alarm  
- Warning  
- Logbook entry only |
| **Additional information** | Detailed description of the options available for selection: →  30 |

<table>
<thead>
<tr>
<th><strong>Assign behavior of diagnostic no. 833 (Electronic temperature too low)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Navigation</strong></td>
</tr>
<tr>
<td><strong>Description</strong></td>
</tr>
</tbody>
</table>
| **Selection** | - Off  
- Alarm  
- Warning  
- Logbook entry only |
| **Additional information** | Selection  
Detailed description of the options available for selection: →  30 |
Assign behavior of diagnostic no. 834 (Process temperature too high)

**Navigation**

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

**Description**

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

**Selection**

- Off
- Alarm
- Warning
- Logbook entry only

**Additional information**

Detailed description of the options available for selection: → 30

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

**Navigation**

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

**Description**

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

**Selection**

- Off
- Alarm
- Warning
- Logbook entry only

**Additional information**

Detailed description of the options available for selection: → 30

Assign behavior of diagnostic no. 842 (Process limit)

**Navigation**

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

**Description**

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

**Selection**

- Off
- Alarm
- Warning
- Logbook entry only

**Additional information**

Detailed description of the options available for selection: → 30
Assign behavior of diagnostic no. 976 (Mass flow out of calibrated range)

**Navigation**
Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 976 (0629)

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

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

**Additional information**
Detailed description of the options available for selection: → 30

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

**Navigation**
Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 977 (0627)

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

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

**Additional information**
Detailed description of the options available for selection: → 30

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

**Navigation**
Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 979 (0630)

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

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

**Additional information**
Detailed description of the options available for selection: → 30
3.1.4 "Administration" submenu

Navigation

Expert → System → Administration

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Define access code</td>
</tr>
<tr>
<td></td>
<td>→ 36</td>
</tr>
<tr>
<td></td>
<td>Reset access code</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Device reset (0000)</td>
</tr>
<tr>
<td></td>
<td>→ 39</td>
</tr>
<tr>
<td></td>
<td>Transmitter identifier (2765)</td>
</tr>
<tr>
<td></td>
<td>→ 39</td>
</tr>
<tr>
<td></td>
<td>Activate SW option (0029)</td>
</tr>
<tr>
<td></td>
<td>→ 40</td>
</tr>
<tr>
<td></td>
<td>Software option overview (0015)</td>
</tr>
<tr>
<td></td>
<td>→ 40</td>
</tr>
</tbody>
</table>

"Define access code" wizard

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

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

Navigation

Expert → System → Administration → Def. access code

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Define access code</td>
</tr>
<tr>
<td></td>
<td>→ 36</td>
</tr>
<tr>
<td></td>
<td>Confirm access code</td>
</tr>
<tr>
<td></td>
<td>→ 37</td>
</tr>
</tbody>
</table>

**Define access code**

**Description**

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

**User entry**

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

**Additional information**

*Description*

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

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

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

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

**User entry**

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

**Factory setting**

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

**Confirm access code**

<table>
<thead>
<tr>
<th>Navigation</th>
<th>Expert → System → Administration → Def. access code → Confirm code</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td>Enter the defined release code a second time to confirm the release code.</td>
</tr>
<tr>
<td><strong>User entry</strong></td>
<td>Max. 16-digit character string comprising numbers, letters and special characters</td>
</tr>
</tbody>
</table>

**"Reset access code" submenu**

<table>
<thead>
<tr>
<th>Navigation</th>
<th>Expert → System → Administration → Reset acc. code</th>
</tr>
</thead>
<tbody>
<tr>
<td>▶ Reset access code</td>
<td></td>
</tr>
<tr>
<td>Operating time (0652)</td>
<td>→ 38</td>
</tr>
<tr>
<td>Reset access code (0024)</td>
<td>→ 38</td>
</tr>
</tbody>
</table>
Description of Device Parameters

Operating time

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

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

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

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

Reset access code

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

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

User entry
Character string comprising numbers, letters and special characters

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

User entry
The reset code can only be entered via:
- Web browser
- DeviceCare, FieldCare (via interface CDI RJ45)
- Fieldbus
Additional parameters in the "Administration" submenu

**Device reset**

**Navigation**

Expert → System → Administration → Device reset (0000)

**Description**

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

**Selection**

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

**Additional information**

**Selection**

<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>To delivery settings</td>
<td>Every parameter for which a customer-specific default setting was ordered is reset to this customer-specific value. All other parameters are reset to the factory setting.</td>
</tr>
<tr>
<td>Restart device</td>
<td>The restart resets every parameter whose data are in the volatile memory (RAM) to the factory setting (e.g. measured value data). The device configuration remains unchanged.</td>
</tr>
<tr>
<td>Restore S-DAT backup</td>
<td>Restore the data that are saved on the S-DAT. The data record is restored from the electronics memory to the S-DAT.</td>
</tr>
</tbody>
</table>

* This option is displayed only in an alarm condition.

**Transmitter identifier**

**Navigation**

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

**Description**

Select transmitter identifier.

**User interface**

- Unknown
- 500
- 300

**Factory setting**

300

* Visibility depends on order options or device settings
Activate SW option

**Navigation**

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

**Description**

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

**User entry**

Max. 10-digit string consisting of numbers.

**Factory setting**

Depends on the software option ordered

**Additional information**

**Description**

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

**User entry**

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

**NOTE!**

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

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

- Before you enter a new activation code, make a note of the current activation code.
- Enter the new activation code provided by Endress+Hauser when the new software option was ordered.
- If the code entered is incorrect or invalid, enter the old activation code.
- Have your Endress+Hauser sales organization check the new activation code remembering to specify the serial number or ask for the code again.

**Example for a software option**

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

**Web browser**

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

---

Software option overview

**Navigation**

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

**Description**

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

- Extended HistoROM *
- SIL *
- Second gas
- Heartbeat Monitoring *
- Heartbeat Verification *

Additional information

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

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

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

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

"Second gas" option
Order code for "Application package", option EV "Second gas group"

3.2 "Sensor" submenu

Navigation  
Expert → Sensor

* Visibility depends on order options or device settings
3.2.1 "Measured values" submenu

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

- **Measured values**
  - Process variables  
    - Mass flow (1838)  
    - Corrected volume flow (1847)  
    - Volume flow (1850)  
    - FAD volume flow (1851)  
    - Energy flow (1852)  
    - Heat flow (1872)  
    - Temperature (1853)  
    - Density (1854)  
    - Process pressure (17343)  
    - 2nd temperature heat flow (17344)  
    - Flow velocity (1857)  
    - Mach number (17302)
  - System values  
  - Totalizer  
  - Input values  
  - Output values

"Process variables" submenu

**Navigation**  

- **Process variables**
  - Mass flow (1838)  
  - Corrected volume flow (1847)  
  - Volume flow (1850)  
  - FAD volume flow (1851)  
  - Energy flow (1852)  
  - Heat flow (1872)  
  - Temperature (1853)  
  - Density (1854)  
  - Process pressure (17343)  
  - 2nd temperature heat flow (17344)  
  - Flow velocity (1857)  
  - Mach number (17302)
Power coefficient fluctuation (12112) → 46
Level of flow fluctuation (12113) → 47

Mass flow

Navigation

Description
Displays the mass flow that is currently measured.

User interface
Signed floating-point number

Additional information
Dependency
The unit is taken from the Mass flow unit parameter (→ 55)

Corrected volume flow

Navigation

Description
Displays the corrected volume flow that is currently calculated.

User interface
Signed floating-point number

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

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

Volume flow

Navigation

Description
Displays the volume flow that is currently measured.

User interface
Signed floating-point number

Additional information
Dependency
The unit is taken from the Volume flow unit parameter (→ 57)
FAD volume flow

Navigation  

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

Description  
Displays the FAD volume flow that is currently measured.

User interface  
Signed floating-point number

Additional information  
Dependency
The unit is taken from the FAD volume flow unit parameter (→ 58).

Energy flow

Navigation  

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

Description  
Shows the energy flow currently calculated.

User interface  
Signed floating-point number

Additional information  
Dependency
The unit is taken from the Energy flow unit parameter (→ 59).

Heat flow

Navigation  

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

Description  
Shows the heat flow currently calculated.

User interface  
Signed floating-point number

Additional information  
Dependency
The unit is taken from the Energy flow unit parameter (→ 59).

2) Free Air Delivery
Temperature

**Navigation**

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

**User interface**
Signed floating-point number

**Additional information**
- **Dependency**
  - The unit is taken from the **Temperature unit** parameter (→ 62)

Density

**Navigation**

**Description**
Shows the density currently calculated.

**User interface**
Signed floating-point number

**Additional information**
- **Dependency**
  - The unit is taken from the **Density unit** parameter (→ 61)

Process pressure

**Navigation**

**Description**
Shows depending on the setting the entered or external process pressure.

**User interface**
Signed floating-point number

**Additional information**
- **Dependency**
  - The unit is taken from the **Pressure unit** parameter (→ 62)

2nd temperature heat flow

**Navigation**

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

**Description**
Displays the 2nd temperature for heat flow calculation. The temperature can be an external value or a fixed, entered value.
### Flow velocity

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Shows the flow velocity currently calculated.</td>
</tr>
<tr>
<td>User interface</td>
<td>Signed floating-point number</td>
</tr>
<tr>
<td>Additional information</td>
<td>Dependency</td>
</tr>
<tr>
<td></td>
<td>The unit is taken from the Velocity unit parameter (→ 63)</td>
</tr>
</tbody>
</table>

### Mach number

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Shows the Mach number currently calculated. For the calculation the density and the pressure are required.</td>
</tr>
<tr>
<td>User interface</td>
<td>Signed floating-point number</td>
</tr>
</tbody>
</table>

### Power coefficient fluctuation

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Indicates the standard deviation of the unprocessed sensor signal.</td>
</tr>
<tr>
<td>User interface</td>
<td>Signed floating-point number</td>
</tr>
<tr>
<td>Factory setting</td>
<td>0 to 1</td>
</tr>
<tr>
<td>Additional information</td>
<td>Unit: normalized value.</td>
</tr>
</tbody>
</table>
Level of flow fluctuation

**Navigation**

**Description**
Indicates the process stability via peak value determination.

**User interface**
Signed floating-point number

**Factory setting**
0 to 1

**Additional information**
U: normalized value.

"System values" submenu

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

<table>
<thead>
<tr>
<th>System values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronic temperature (17301)</td>
</tr>
</tbody>
</table>

Electronic temperature

**Navigation**
Expert → Sensor → Measured val. → System values → Electronic temp. (17301)

**Description**
Indication of the current temperature of the electronics.

**User interface**
Signed floating-point number

"Totalizer" submenu

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

<table>
<thead>
<tr>
<th>Totalizer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Totalizer value 1 to n (0911–1 to n)</td>
</tr>
<tr>
<td>Totalizer overflow 1 to n (0910–1 to n)</td>
</tr>
</tbody>
</table>
Totalizer value 1 to n

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

**Description**  
Displays the current totalizer reading.

**User interface**  
Signed floating-point number

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

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

**User interface**

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

*Example*
Calculation of the current totalizer reading when the value exceeds the 7-digit display range of the operating tool:
- Value in the **Totalizer value 1** parameter: 1968457 kg
- Value in **Totalizer overflow 1** parameter: $1 \cdot 10^7$ (1 overflow) = 10000000 [kg]
- Current totalizer reading: 11968457 kg

Totalizer overflow 1 to n

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

**Description**  
Displays the current totalizer overflow.

**User interface**  
Integer with sign

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

**User interface**

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

**Example**

Calculation of the current totalizer reading when the value exceeds the 7-digit display range of the operating tool:
- Value in the **Totalizer value 1** parameter: 1968457 kg
- Value in **Totalizer overflow 1** parameter: $2 \cdot 10^7$ (2 overflows) = 20000000 [kg]
- Current totalizer reading: 21968457 kg

**"Input values" submenu**

**Navigation**

Expert → Sensor → Measured val. → Input values

- **Input values**
  - Current input 1 to n
  - Value status input 1 to n

**'Current input 1 to n' submenu**

**Navigation**

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

- **Current input 1 to n**
  - Measured values 1 to n (1603–1 to n)
  - Measured current 1 to n (1604–1 to n)

**Measured values 1 to n**

**Navigation**

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

**Description**

Displays the current input value.

**User interface**

Signed floating-point number
Measured current 1 to n

**Navigation**

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

**Description**

Displays the current value of the current input.

**User interface**

0 to 22.5 mA

"Value status input 1 to n" submenu

**Navigation**

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

**Value status input**

**Navigation**

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

**Description**

Displays the current input signal level.

**User interface**

- High
- Low

"Output values" submenu

**Navigation**

Expert → Sensor → Measured val. → Output values

- Value current output 1 to n
- Pulse/frequency/switch output 1 to n
- Relay output 1 to n
"Value current output 1 to n" submenu

Navigation

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

Output current 1 to n

Output current 1 to n (0361–1 to n) →  51

Measured current 1 to n (0366–1 to n) →  51

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

User interface
0 to 22.5 mA

Measured current 1 to n

Navigation

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

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

User interface
0 to 30 mA

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

Navigation

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

Pulse output 1 to n (0456–1 to n) →  52

Switch status 1 to n (0461–1 to n) →  53
Output frequency 1 to n

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

Prerequisite  
In the Operating mode parameter (→ 119), the Frequency option is selected.

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

User interface  
0.0 to 12,500.0 Hz

Pulse output 1 to n

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

Prerequisite  
The Pulse option is selected in the Operating mode parameter (→ 119) parameter.

Description  
Displays the pulse frequency currently output.

User interface  
Positive floating-point number

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

![Pulse Output Diagram]

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

The output behavior can be reversed via the Invert output signal parameter (→ 133) i.e. the transistor does not conduct for the duration of the pulse.

In addition, the behavior of the output in the event of a device alarm (Failure mode parameter (→ 122)) can be configured.
Switch status 1 to n

Navigation

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

Prerequisite

The Switch option is selected in the Operating mode parameter (→ 119).

Description

Displays the current switch status of the status output.

User interface

- Open
- Closed

Additional information

User interface

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

'Relay output 1 to n’ submenu

Navigation

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

Switch status (0801–1 to n) →  53
Switch cycles (0815–1 to n) →  54
Max. switch cycles number (0817–1 to n) →  54

Switch status

Navigation

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

Description

Displays the current status of the relay output.

User interface

- Open
- Closed
Additional information

User interface

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

Switch cycles

Navigation

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

Description
Displays all the switch cycles performed.

User interface
Positive integer

Max. switch cycles number

Navigation

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

Description
Displays the maximum number of guaranteed switch cycles.

User interface
Positive integer

3.2.2 "System units" submenu

Navigation
Expert → Sensor → System units

<table>
<thead>
<tr>
<th>System units</th>
<th>→</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass flow unit (0554)</td>
<td>55</td>
</tr>
<tr>
<td>Mass unit (0574)</td>
<td>56</td>
</tr>
<tr>
<td>Corrected volume flow unit (0558)</td>
<td>56</td>
</tr>
<tr>
<td>Corrected volume unit (0575)</td>
<td>57</td>
</tr>
<tr>
<td>Volume flow unit (0553)</td>
<td>57</td>
</tr>
<tr>
<td>Volume unit (0563)</td>
<td>58</td>
</tr>
<tr>
<td>FAD volume flow unit (0601)</td>
<td>58</td>
</tr>
</tbody>
</table>
**Description of Device Parameters**

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

## Mass flow unit

**Navigation**

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

**Description**

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

**Selection**

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

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

**Factory setting**

Country-specific:
- kg/h
- lb/h
**Description of Device Parameters**

**Proline t-mass 300 HART**

**Additional information**

*Result*

The selected unit applies for:

**Mass flow** parameter (→ 43)

*Selection*

For an explanation of the abbreviated units: → 221

---

**Mass unit**

**Navigation**

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

**Description**

Use this function to select the unit for the mass.

**Selection**

*SI units*  
- g
- kg
- t

*US units*  
- lb
- STon

**Factory setting**

Country-specific:  
- kg
- lb

**Additional information**

*Selection*

For an explanation of the abbreviated units: → 221

---

**Corrected volume flow unit**

**Navigation**

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

**Description**

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

**Selection**

*SI units*  
- Nl/s
- Nl/min
- Nl/h
- Nl/d
- Nm³/s
- Nm³/min
- Nm³/h
- Nm³/d
- Sl/s
- Sl/min
- Sl/h
- Sl/d
- Sm³/s
- Sm³/min
- Sm³/h
- Sm³/d

*US units*  
- Sft³/s
- Sft³/min
- Sft³/h
- Sft³/d
**Corrected volume unit**

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

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

**Selection**
- **SI units**
  - Nl
  - Nm³
  - Sl
  - Sm³
- **US units**
  - Sft³

**Factory setting**
Country-specific:
- Nm³/h
- Sft³/h

**Additional information**
Selection
For an explanation of the abbreviated units: →  221

---

**Volume flow unit**

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

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

**Selection**
- **SI units**
  - m³/s
  - m³/min
  - m³/h
  - m³/d
  - l/s
  - l/min
  - l/h
  - l/d
- **US units**
  - ft³/s
  - ft³/min
  - ft³/h
  - ft³/d

**Factory setting**
Country-specific:
- l/h
- ft³/h

---

**Endress+Hauser**
Description of Device Parameters

Proline t-mass 300 HART

Volume unit

Navigation

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

Description

Use this function to select the unit for the volume.

Selection

<table>
<thead>
<tr>
<th>SI units</th>
<th>US units</th>
</tr>
</thead>
<tbody>
<tr>
<td>m³</td>
<td>ft³</td>
</tr>
<tr>
<td>l</td>
<td></td>
</tr>
</tbody>
</table>

Factory setting

Country-specific:

- ft³
- m³

Additional information

Selection

For an explanation of the abbreviated units: → 221

FAD volume flow unit

Navigation

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

Description

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

Selection

<table>
<thead>
<tr>
<th>SI units</th>
<th>US units</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 FAD/s</td>
<td>cf FAD/s</td>
</tr>
<tr>
<td>1 FAD/min</td>
<td>cf FAD/min</td>
</tr>
<tr>
<td>1 FAD/h</td>
<td>cf FAD/h</td>
</tr>
<tr>
<td>1 FAD/d</td>
<td>cf FAD/d</td>
</tr>
<tr>
<td>m³ FAD/s</td>
<td></td>
</tr>
<tr>
<td>m³ FAD/min</td>
<td></td>
</tr>
<tr>
<td>m³ FAD/h</td>
<td></td>
</tr>
<tr>
<td>m³ FAD/d</td>
<td></td>
</tr>
</tbody>
</table>

Factory setting

Country-specific:

- m³ FAD/h
- cf FAD/min

Additional information

Result

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

Selection

For an explanation of the abbreviated units: → 221

Free air delivery
**FAD volume unit**

**Navigation**

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

**Description**

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

**Selection**

- SI units
  - l FAD
  - m³ FAD

- US units
  - cf FAD

**Factory setting**

Country-specific:
- m³ FAD
- cf FAD

**Additional information**

Selection

For an explanation of the abbreviated units: → 221

---

**Energy flow unit**

**Navigation**

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

**Description**

Use this function to select the unit for the energy flow.
Selection

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

**Imperial units**
- Btu/s
- Btu/min
- Btu/h
- Btu/day
- MBtu/s
- MBtu/min
- MBtu/h
- MBtu/d
- MMBtu/s
- MMBtu/min
- MMBtu/h
- MMBtu/d

**Factory setting**
- Country-specific:
  - kW
  - Btu/h

**Additional information**

*Selection*

For an explanation of the abbreviated units: →  221

---

**Energy unit**

**Navigation**

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

**Description**

Use this function to select the unit for energy.

**Selection**

**SI units**
- kWh
- MWh
- GWh
- kJ
- MJ
- GJ
- kcal
- Mcal
- Gcal

**Imperial units**
- Btu
- MBtu
- MMBtu
Factory setting

Country-specific:
- kWh
- Btu

Additional information

Selection

For an explanation of the abbreviated units: \( \rightarrow 221 \)

Calorific value unit

Navigation

Expert → Sensor → System units → Cal. value unit (0552)

Description

Use this function to select the unit for the calorific value.

Selection

<table>
<thead>
<tr>
<th>SI units</th>
<th>Imperial units</th>
</tr>
</thead>
<tbody>
<tr>
<td>kJ/Nm³</td>
<td>Btu/Sm³</td>
</tr>
<tr>
<td>kWh/Nm³</td>
<td>MBtu/Sm³</td>
</tr>
<tr>
<td>kWh/Sm³</td>
<td>Btu/Sft³</td>
</tr>
<tr>
<td>kJ/Sm³</td>
<td>MBtu/Sft³</td>
</tr>
</tbody>
</table>

Factory setting

Country-specific:
- kWh/Nm³
- Btu/Sft³

Additional information

Density unit

Navigation

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

Description

Use this function to select the unit for the density.

Selection

<table>
<thead>
<tr>
<th>SI units</th>
<th>US units</th>
</tr>
</thead>
<tbody>
<tr>
<td>g/cm³</td>
<td>lb/ft³</td>
</tr>
<tr>
<td>kg/dm³</td>
<td></td>
</tr>
<tr>
<td>kg/l</td>
<td></td>
</tr>
<tr>
<td>kg/m³</td>
<td></td>
</tr>
</tbody>
</table>

Factory setting

Country-specific:
- kg/m³
- lb/ft³

Additional information

Selection

For an explanation of the abbreviated units: \( \rightarrow 221 \)
Temperature unit

Navigation

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

Description

Use this function to select the unit for the temperature.

Selection

<table>
<thead>
<tr>
<th>SI units</th>
<th>US units</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>°F</td>
</tr>
<tr>
<td>K</td>
<td>°R</td>
</tr>
</tbody>
</table>

Factory setting

Country-specific:
- °C
- °F

Additional information

Result

The selected unit applies for:
- Temperature parameter (→ 45)
- FAD temperature parameter
- Reference combustion temperature parameter
- Reference temperature parameter
- Maximum value parameter
- Minimum value parameter
- Maximum value parameter
- Minimum value parameter

Selection

For an explanation of the abbreviated units: → 221

Pressure unit

Navigation

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

Description

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

Selection

<table>
<thead>
<tr>
<th>SI units</th>
<th>US units</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPa a</td>
<td>psi a</td>
</tr>
<tr>
<td>kPa a</td>
<td></td>
</tr>
<tr>
<td>bar a</td>
<td></td>
</tr>
<tr>
<td>mbar a</td>
<td></td>
</tr>
</tbody>
</table>

Factory setting

Country-specific:
- bar a
- psi a
Additional information

Result

The unit is taken from:
- FAD pressure parameter
- Reference pressure parameter

Selection

For an explanation of the abbreviated units: → 221

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

US units

m/s

ft/s

Factory setting

Country-specific:
- m/s
- ft/s

Length unit

Navigation

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

Description

Use this function to select the unit of length.

Selection

SI units

US units

m

ft

mm

in

Factory setting

Country-specific:
- mm
- in

Additional information

Result

The selected unit applies for:
- Duct internal height parameter
- Insertion depth parameter
- Pipe inner diameter parameter
- Mounting set height parameter
- Pipe wall thickness parameter
- Duct internal width parameter

Selection

For an explanation of the abbreviated units: → 221
Date/time format

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

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

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

Additional information
Selection

For an explanation of the abbreviated units: → 221

3.2.3 "Process parameters" submenu

Navigation

Flow override (1839)
Flow damping (1802)
Temperature damping (1822)
Sensitivity (17032)
Low flow cut off

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
Additional information

Flow override is active

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

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

Flow damping

Navigation

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

Description

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

User entry

0 to 999.9 s

Additional information

- The damping is performed by a PT1 element 5).

User entry

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

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

Result

The damping affects the following variables of the device:

- Outputs → 110
- Low flow cut off → 66
- Totalizers → 175

Temperature damping

Navigation


Description

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

User entry

0 to 999.9 s

5) Proportional behavior with first-order lag
Additional information

Description

The damping is performed by a PT1 element 6).

User entry

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

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

Sensitivity

Navigation


Description

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

User entry

1 to 9

"Low flow cut off" submenu

Navigation

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

Assign process variable (1837)

On value low flow cutoff (1805)

Off value low flow cutoff (1804)

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.

6) Proportional behavior with first-order lag
Selection

- Off
- Mass flow
- Volume flow
- Corrected volume flow
- FAD volume flow

On value low flow cutoff

**Navigation**

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

**Prerequisite**

A process variable is selected in the **Assign process variable** parameter (→ 66).

**Description**

Use this function to enter a switch-on value for low flow cut off. Low flow cut off is activated if the value entered is not equal to 0 (→ 67).

**User entry**

Positive floating-point number

**Factory setting**

Depends on country and nominal diameter (→ 219)

**Additional information**

Dependency

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

Off value low flow cutoff

**Navigation**

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

**Prerequisite**

A process variable is selected in the **Assign process variable** parameter (→ 66).

**Description**

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

**User entry**

0 to 100.0 %

* Visibility depends on order options or device settings
Additional information

Example

![Graph showing flow, time, hysteresis, and low flow cut off statuses.]

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

3.2.4 "Measurement mode" submenu

Navigation  
Expert → Sensor → Measurement mode

- Measurement mode
  - Measurement application (17350)
    → 68
  - Calorific value type (3101)
    → 69
  - Active gas (17001)
    → 69
  - Gas
    → 69
  - Second gas
    → 77
  - Reference conditions
    → 84

Measurement application

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

Description  
Select measurement application.

Selection  
- Air or compressed air  
- Gas or gas mixture  
- Energy
**Calorific value type**

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

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

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

**Selection**  
- Gross calorific value mass  
- Net calorific value mass

---

**Active gas**

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

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

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

**Selection**  
- Gas  
- Second gas

---

"Gas" submenu

**Navigation**  
Expert → Sensor → Measurement mode → Gas

| Gas |  
| Select gas type | → 70  
| Gas | → 71  
| Special gas name | → 71  
| Gas composition | → 71  
| Mol% Air | → 72  
| Mol% Ar | → 72  
| Mol% C2H4 | → 72  
| Mol% C2H6 | → 73 |
### Select gas type

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<th>Page</th>
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</thead>
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<tr>
<td>Mol% C3H8</td>
<td>73</td>
</tr>
<tr>
<td>Mol% CH4</td>
<td>73</td>
</tr>
<tr>
<td>Mol% Cl2</td>
<td>73</td>
</tr>
<tr>
<td>Mol% CO</td>
<td>73</td>
</tr>
<tr>
<td>Mol% CO2</td>
<td>74</td>
</tr>
<tr>
<td>Mol% H2</td>
<td>74</td>
</tr>
<tr>
<td>Mol% H2O</td>
<td>74</td>
</tr>
<tr>
<td>Mol% H2S</td>
<td>74</td>
</tr>
<tr>
<td>Mol% HCl</td>
<td>74</td>
</tr>
<tr>
<td>Mol% He</td>
<td>75</td>
</tr>
<tr>
<td>Mol% n-C4H10</td>
<td>75</td>
</tr>
<tr>
<td>Mol% Kr</td>
<td>75</td>
</tr>
<tr>
<td>Mol% N2</td>
<td>75</td>
</tr>
<tr>
<td>Mol% Ne</td>
<td>75</td>
</tr>
<tr>
<td>Mol% NH3</td>
<td>76</td>
</tr>
<tr>
<td>Mol% O2</td>
<td>76</td>
</tr>
<tr>
<td>Mol% O3</td>
<td>76</td>
</tr>
<tr>
<td>Mol% Xe</td>
<td>76</td>
</tr>
</tbody>
</table>

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

**Description**  
Select measured gas type.

**Selection**  
- Single gas
- Gas mixture
- Special gas

* Visibility depends on order options or device settings
### Gas

**Navigation**

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

**Prerequisite**

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

**Description**

Select measured gas.

**Selection**

- Air
- Ammonia NH3
- Argon Ar
- Butane C4H10
- Carbon dioxide CO2
- Carbon monoxide CO
- Chlorine Cl2
- Ethane C2H6
- Ethylene C2H4
- Helium He
- Hydrogen H2
- Hydrogen chloride HCl
- Hydrogen sulfide H2S
- Krypton Kr
- Methane CH4
- Neon Ne
- Nitrogen N2
- Oxygen O2
- Ozone O3
- Propane C3H8
- Xenon Xe

---

### Special gas name

**Navigation**

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

**Prerequisite**

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

**Description**

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

**User interface**

- 

**Factory setting**

- 

---

### Gas composition

**Navigation**

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

**Prerequisite**

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

- Air
- Hydrogen H2
- Helium He
- Neon Ne
- Argon Ar
- Krypton Kr
- Xenon Xe
- Nitrogen N2
- Oxygen O2
- Chlorine Cl2
- Ammonia NH3
- Carbon monoxide CO
- Carbon dioxide CO2
- Hydrogen sulfide H2S
- Hydrogen chloride HCl
- Methane CH4
- Propane C3H8
- Ethane C2H6
- Butane C4H10
- Ethylene C2H4
- Water
- Ozone O3

Mol% Air

| Navigation | Expert → Sensor → Measurement mode → Gas → Mol% Air (3170) |
|------------|--|---|
| Description | Air |
| User entry | 0 to 100 % |

Mol% Ar

| Navigation | Expert → Sensor → Measurement mode → Gas → Mol% Ar (3112) |
|------------|--|---|
| Description | Ar = Argon |
| User entry | 0 to 100 % |

Mol% C2H4

| Navigation | Expert → Sensor → Measurement mode → Gas → Mol% C2H4 (3114) |
|------------|--|---|
| Description | C2H4 = ethylene |
User entry 0 to 100 %

Mol% C2H6

Navigation  Expert → Sensor → Measurement mode → Gas → Mol% C2H6 (3115)
Description C2H6 = ethane
User entry 0 to 100 %

Mol% C3H8

Navigation  Expert → Sensor → Measurement mode → Gas → Mol% C3H8 (3116)
Description C3H8 = propane
User entry 0 to 100 %

Mol% CH4

Description CH4 = methane
User entry 0 to 100 %

Mol% Cl2

Navigation  Expert → Sensor → Measurement mode → Gas → Mol% Cl2 (3118)
Description Cl2 = chlorine
User entry 0 to 100 %

Mol% CO

Navigation  Expert → Sensor → Measurement mode → Gas → Mol% CO (3119)
Description CO = carbon monoxide
### Description of Device Parameters

**Proline t-mass 300 HART**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>User entry</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mol% CO2</strong></td>
<td>CO₂ = carbon dioxide</td>
<td>0 to 100 %</td>
</tr>
<tr>
<td><strong>Mol% H₂</strong></td>
<td>H₂ = hydrogen</td>
<td>0 to 100 %</td>
</tr>
<tr>
<td><strong>Mol% H₂O</strong></td>
<td>H₂O = water</td>
<td>0 to 20 %</td>
</tr>
<tr>
<td><strong>Mol% H₂S</strong></td>
<td>H₂S = hydrogen sulfide</td>
<td>0 to 100 %</td>
</tr>
<tr>
<td><strong>Mol% HCl</strong></td>
<td>HCl = hydrogen chloride</td>
<td></td>
</tr>
</tbody>
</table>
User entry 0 to 100 %

Mol% He

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

Mol% i-C4H10

Navigation Expert → Sensor → Measurement mode → Gas → Mol% i-C4H10 (3126)
Description i-C_4H_{10} = isobutane
User entry 0 to 100 %

Mol% Kr

Navigation Expert → Sensor → Measurement mode → Gas → Mol% Kr (3128)
Description Kr = krypton
User entry 0 to 100 %

Mol% N2

Navigation Expert → Sensor → Measurement mode → Gas → Mol% N2 (3129)
Description N_2 = nitrogen
User entry 0 to 100 %

Mol% Ne

Navigation Expert → Sensor → Measurement mode → Gas → Mol% Ne (3137)
Description Ne = neon
Description of Device Parameters

Proline t-mass 300 HART

User entry

0 to 100 %

Mol% NH₃

Navigation

Expert → Sensor → Measurement mode → Gas → Mol% NH₃ (3138)

Description

NH₃ = ammonia

User entry

0 to 100 %

Mol% O₂

Navigation

Expert → Sensor → Measurement mode → Gas → Mol% O₂ (3139)

Description

O₂ = oxygen

User entry

0 to 100 %

Mol% O₃

Navigation

Expert → Sensor → Measurement mode → Gas → Mol% O₃ (3174)

Prerequisite

Mixture only possible with O₂.

- O₃: 65 to 100 %
- O₂: 0 to 35 %

Description

Enter amount of substance for the gas mixture.

User entry

65 to 100 %

Mol% Xe

Navigation

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

Description

Xe = xenon

User entry

0 to 100 %
“Second gas” submenu

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

<table>
<thead>
<tr>
<th>Option</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select gas type</td>
<td>78</td>
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<tr>
<td>Gas</td>
<td>78</td>
</tr>
<tr>
<td>Special gas name</td>
<td>79</td>
</tr>
<tr>
<td>Gas composition</td>
<td>79</td>
</tr>
<tr>
<td>Mol% Air</td>
<td>80</td>
</tr>
<tr>
<td>Mol% Ar</td>
<td>80</td>
</tr>
<tr>
<td>Mol% C2H4</td>
<td>80</td>
</tr>
<tr>
<td>Mol% C2H6</td>
<td>80</td>
</tr>
<tr>
<td>Mol% C3H8</td>
<td>80</td>
</tr>
<tr>
<td>Mol% CH4</td>
<td>81</td>
</tr>
<tr>
<td>Mol% Cl2</td>
<td>81</td>
</tr>
<tr>
<td>Mol% CO</td>
<td>81</td>
</tr>
<tr>
<td>Mol% CO2</td>
<td>81</td>
</tr>
<tr>
<td>Mol% H2</td>
<td>81</td>
</tr>
<tr>
<td>Mol% H2O</td>
<td>82</td>
</tr>
<tr>
<td>Mol% H2S</td>
<td>82</td>
</tr>
<tr>
<td>Mol% HCl</td>
<td>82</td>
</tr>
<tr>
<td>Mol% He</td>
<td>82</td>
</tr>
<tr>
<td>Mol% i-C4H10</td>
<td>82</td>
</tr>
<tr>
<td>Mol% Kr</td>
<td>83</td>
</tr>
<tr>
<td>Mol% N2</td>
<td>83</td>
</tr>
<tr>
<td>Mol% Ne</td>
<td>83</td>
</tr>
</tbody>
</table>
Select gas type

**Navigation**

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

**Description**

Select measured gas type.

**Selection**

- Single gas
- Gas mixture
- Special gas *

---

Gas

**Navigation**

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

**Prerequisite**

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

**Description**

Select measured gas.

**Selection**

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

* Visibility depends on order options or device settings
Special gas name

Navigation

Prerequisite Special gas option application package is available.

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

User interface -

Factory setting -

Gas composition

Navigation

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

Description Select measured gas mixture.

Selection

- Air
- Hydrogen H2
- Helium He
- Neon Ne
- Argon Ar
- Krypton Kr
- Xenon Xe
- Nitrogen N2
- Oxygen O2
- Chlorine Cl2
- Ammonia NH3
- Carbon monoxide CO
- Carbon dioxide CO2
- Hydrogen sulfide H2S
- Hydrogen chloride HCl
- Methane CH4
- Propane C3H8
- Ethane C2H6
- Butane C4H10
- Ethylene C2H4
- Water
- Ozone O3
### Description of Device Parameters

#### Proline t-mass 300 HART

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Navigation</th>
<th>Description</th>
<th>User entry</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mol% Air</strong></td>
<td><img src="image" alt="Expert → Sensor → Measurement mode → Second gas → Mol% Air (3170)" /></td>
<td>Air</td>
<td>0 to 100 %</td>
</tr>
<tr>
<td><strong>Mol% Ar</strong></td>
<td><img src="image" alt="Expert → Sensor → Measurement mode → Second gas → Mol% Ar (3112)" /></td>
<td>Ar = Argon</td>
<td>0 to 100 %</td>
</tr>
<tr>
<td><strong>Mol% C(_2)H(_4)</strong></td>
<td><img src="image" alt="Expert → Sensor → Measurement mode → Second gas → Mol% C(_2)H(_4) (3114)" /></td>
<td>(C(_2)H(_4)) = ethylene</td>
<td>0 to 100 %</td>
</tr>
<tr>
<td><strong>Mol% C(_2)H(_6)</strong></td>
<td><img src="image" alt="Expert → Sensor → Measurement mode → Second gas → Mol% C(_2)H(_6) (3115)" /></td>
<td>(C(_2)H(_6)) = ethane</td>
<td>0 to 100 %</td>
</tr>
<tr>
<td><strong>Mol% C(_3)H(_8)</strong></td>
<td><img src="image" alt="Expert → Sensor → Measurement mode → Second gas → Mol% C(_3)H(_8) (3116)" /></td>
<td>(C(_3)H(_8)) = propane</td>
<td>0 to 100 %</td>
</tr>
</tbody>
</table>
**Mol% CH₄**

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

**Description**  
CH₄ = methane

**User entry**  
0 to 100 %

**Mol% Cl₂**

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

**Description**  
Cl₂ = chlorine

**User entry**  
0 to 100 %

**Mol% CO**

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

**Description**  
CO = carbon monoxide

**User entry**  
0 to 100 %

**Mol% CO₂**

**Navigation**  
Expert → Sensor → Measurement mode → Second gas → Mol% CO₂ (3120)

**Description**  
CO₂ = carbon dioxide

**User entry**  
0 to 100 %

**Mol% H₂**

**Navigation**  
Expert → Sensor → Measurement mode → Second gas → Mol% H₂ (3121)

**Description**  
H₂ = hydrogen

**User entry**  
0 to 100 %
<table>
<thead>
<tr>
<th>Description of Device Parameters</th>
<th>Proline t-mass 300 HART</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Mol% H2O</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Navigation</strong></td>
<td>Expert → Sensor → Measurement mode → Second gas → Mol% H2O (3122)</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>H2O = water</td>
</tr>
<tr>
<td><strong>User entry</strong></td>
<td>0 to 20 %</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mol% H2S</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Navigation</strong></td>
<td>Expert → Sensor → Measurement mode → Second gas → Mol% H2S (3123)</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>H2S = hydrogen sulfide</td>
</tr>
<tr>
<td><strong>User entry</strong></td>
<td>0 to 100 %</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mol% HCl</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Navigation</strong></td>
<td>Expert → Sensor → Measurement mode → Second gas → Mol% HCl (3124)</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>HCl = hydrogen chloride</td>
</tr>
<tr>
<td><strong>User entry</strong></td>
<td>0 to 100 %</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mol% He</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Navigation</strong></td>
<td>Expert → Sensor → Measurement mode → Second gas → Mol% He (3125)</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>He = helium</td>
</tr>
<tr>
<td><strong>User entry</strong></td>
<td>0 to 100 %</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mol% i-C4H10</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Navigation</strong></td>
<td>Expert → Sensor → Measurement mode → Second gas → Mol% i-C4H10 (3126)</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>i-C4H10 = isobutane</td>
</tr>
<tr>
<td><strong>User entry</strong></td>
<td>0 to 100 %</td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------</td>
</tr>
<tr>
<td><strong>Mol% Kr</strong></td>
<td>Kr = krypton</td>
</tr>
<tr>
<td><strong>Mol% N2</strong></td>
<td>N₂ = nitrogen</td>
</tr>
<tr>
<td><strong>Mol% Ne</strong></td>
<td>Ne = neon</td>
</tr>
<tr>
<td><strong>Mol% NH₃</strong></td>
<td>NH₃ = ammonia</td>
</tr>
<tr>
<td><strong>Mol% O₂</strong></td>
<td>O₂ = oxygen</td>
</tr>
</tbody>
</table>
**Mol% O3**

**Navigation**

Expert → Sensor → Measurement mode → Second gas → Mol% O3 (3174)

**Prerequisite**

Mixture only possible with O2.
- O3: 65 to 100 %
- O2: 0 to 35 %

**Description**

Enter amount of substance for the gas mixture.

**User entry**

65 to 100 %

---

**Mol% Xe**

**Navigation**

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

**Description**

Xe = xenon

**User entry**

0 to 100 %

---

"Reference conditions" submenu

**Navigation**

Expert → Sensor → Measurement mode → Ref. conditions

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<td>Reference pressure (3146)</td>
<td>85</td>
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<tr>
<td>Reference temperature (3147)</td>
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<tr>
<td>FAD conditions (3173)</td>
<td>85</td>
</tr>
<tr>
<td>FAD pressure (3175)</td>
<td>86</td>
</tr>
<tr>
<td>FAD temperature (3176)</td>
<td>86</td>
</tr>
<tr>
<td>Reference combustion temperature (3165)</td>
<td>86</td>
</tr>
<tr>
<td>Reference combustion temperature (3143)</td>
<td>86</td>
</tr>
</tbody>
</table>
Reference conditions

**Navigation**

Expert → Sensor → Measurement mode → Ref. conditions → Ref. conditions (3155)

**Description**

Select reference conditions for calculation of the corrected volume flow.

**Selection**

- 1013.25 mbara, 0 °C
- 1013.25 mbara, 15 °C
- 1013.25 mbara, 20 °C
- 1013.25 mbara, 25 °C
- 1000 mbara, 0 °C
- 1000 mbara, 15 °C
- 1000 mbara, 20 °C
- 1000 mbara, 25 °C
- 14.696 psia, 59 °F
- 14.696 psia, 60 °F
- User-defined

Reference pressure

**Navigation**

Expert → Sensor → Measurement mode → Ref. conditions → Ref. pressure (3146)

**Prerequisite**

The Others option is selected in the Reference conditions parameter (→ 85).

**Description**

Select reference conditions for the corrected volume flow.

**User entry**

0 to 250 bar a

Reference temperature

**Navigation**

Expert → Sensor → Measurement mode → Ref. conditions → Ref. temperature (3147)

**Prerequisite**

The Others option is selected in the Reference conditions parameter (→ 85).

**Description**

Select reference conditions for the corrected volume flow.

**User entry**

−200 to 450 °C

FAD conditions

**Navigation**

Expert → Sensor → Measurement mode → Ref. conditions → FAD conditions (3173)

**Prerequisite**

The Air or compressed air option is selected in the Measurement application parameter (→ 68) parameter.
### Description of Device Parameters

**Proline t-mass 300 HART**

| Description | Select reference conditions for the calculation of the FAD density (FAD = free air delivery). |
| Selection   | - 1000 mbara, 20 °C  
- 14.504 psia, 68 °F  
- User-defined |

#### FAD pressure

**Navigation**

Expert → Sensor → Measurement mode → Ref. conditions → FAD pressure (3175)

**Prerequisite**

- The **Air or compressed air** option is selected in the **Measurement application** parameter (→ 68) parameter.  
- The **User-defined** option is selected in the **FAD conditions** parameter parameter.

**Description**

Enter reference pressure for the calculation of the FAD density (FAD = free air delivery).

**User entry**

0 to 250 bar a

#### FAD temperature

**Navigation**

Expert → Sensor → Measurement mode → Ref. conditions → FAD temperature (3176)

**Prerequisite**

- The **Air or compressed air** option is selected in the **Measurement application** parameter (→ 68) parameter.  
- The **User-defined** option is selected in the **FAD conditions** parameter parameter.

**Description**

Enter reference temperature for the calculation of the FAD density (FAD = free air delivery).

**User entry**

–200 to 450 °C

#### Reference combustion temperature

**Navigation**

Expert → Sensor → Measurement mode → Ref. conditions → Ref. comb. temp. (3143)

**Prerequisite**

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

**Description**

Enter reference combustion temperature to calculate the natural gas energy value.

**User entry**

–200 to 450 °C
3.2.5 "Sensor adjustment" submenu

*Navigation*  

**Installation direction**

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

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

*Selection*  
- Flow in arrow direction
- Flow against arrow direction

*Additional information*  
*Description*

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

**Installation factor**

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

*Description*  
Enter factor to compensate the mounting-related measurement error.

*User entry*  
0.01 to 100.0
Pipe shape

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

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

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

**Selection**
- Circular
- Rectangular

Pipe inner diameter

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

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

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

**User entry**
0.050 to 5 m

Duct height

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

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

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

**User entry**
0.050 to 5 m

Duct width

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

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

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

**User entry**
0.050 to 5 m
Pipe wall thickness

Navigation Expert → Sensor → Sensor adjustm. → Wall thickness (17340)
Description Enter the pipe wall thickness.
User entry 0 to 1 m

Mounting set height

Description Enter mounting set height.
User entry 0 to 1 m

Insertion depth

Description Shows calculated insertion depth of the sensor.
User interface Positive floating-point number

3.2.6 "Zero point adjustment" submenu


Zero point adjustment

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

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

**Description**
Start zero point adjustment.

**Selection**
- Cancel
- Start

**Zeropoint adjust state**

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

**User interface**
- Busy
- Zero point adjust failure
- Ok

**Progress**

**Navigation**
- Diagnostics → HBT → Perform.verific. → Progress (2808)
- Expert → Diagnostics → HBT → Perform.verific. → Progress (2808)
- Expert → Sensor → Zero point adj. → Progress (2808)

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

**User interface**
0 to 100 %

**3.2.7 "External compensation" submenu**

**Navigation**

- **External compensation**
  - Pressure compensation (17326)
  - Pressure (17325)
  - External pressure (17341)
  - Input type 2nd temperature heat flow (17327)
Pressure compensation

**Navigation**

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

**Description**

Select pressure compensation type.

**Selection**

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

Pressure

**Navigation**

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

**Description**

Enter fixed value for the process pressure.

**User entry**

0.1 to 40 bar a

External pressure

**Navigation**


**Description**

Shows the external process pressure value.

**User interface**

0.1 to 40 bar a

* Visibility depends on order options or device settings
**Input type 2nd temperature heat flow**

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

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

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

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

**Delta heat calculation**

**Navigation**

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

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

**Selection**
- Off
- Upstream
- Downstream

**2nd temperature heat flow**

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

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

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

**User entry**
233.15 to 453.15 °C

**Factory setting**
293.15 °C

* Visibility depends on order options or device settings
External 2nd temperature heat flow

**Navigation**

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

**Prerequisite**

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

**Description**

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

**User interface**

Signed floating-point number

---

Gas compensation

**Navigation**

Expert → Sensor → External comp. → Gas compensation (17003)

**Description**

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

**Selection**

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

---

Gas component

**Navigation**

Expert → Sensor → External comp. → Gas component (17005)

**Description**

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

**Selection**

- Air
- Oxygen O2
- Ozone O3
- Nitrogen N2
- Methane CH4
- Hydrogen H2
- Helium He
- Hydrogen chloride HCl
- Hydrogen sulfide H2S
- Ethylene C2H4
- Carbon dioxide CO2
- Carbon monoxide CO
- Chlorine Cl2
- Butane C4H10
- Propane C3H8
- Ethane C2H6

* Visibility depends on order options or device settings
Mol%

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

Description
Enter amount of substance for the gas mixture.

User interface
0 to 100 %

3.2.8 "In-situ adjustment“ submenu

Navigation
Expert → Sensor → In-situ adjust.

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

Navigation

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

Description

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

Selection

- No
- Yes

Input type reference value

Navigation

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

Description

Select input type for the reference value.

Selection

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

Delete values

Navigation

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

Description

Delete previous adjustment values and descriptions.

Selection

- No
- Yes

* Visibility depends on order options or device settings
**Confirm**

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

**Description**  
Confirm deletion.

**Selection**  
- No
- Yes

---

**Select flow reference**

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

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

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

---

**Stability check**

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

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

**Selection**  
- No
- Yes

---

**Actual flow value**

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

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

**User interface**  
-2000 to 2000 %

* Visibility depends on order options or device settings
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<td><strong>Navigation</strong></td>
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<tr>
<td><strong>Navigation</strong></td>
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<td><strong>Description</strong></td>
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</table>
User entry -  
Factory setting -  

Description 2

Navigation  
Expert → Sensor → In-situ adjust. → Description 2 (17358)

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

User entry -  
Factory setting -  

Description 3

Navigation  
Expert → Sensor → In-situ adjust. → Description 3 (17357)

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

User entry -  
Factory setting -  

Description 4

Navigation  
Expert → Sensor → In-situ adjust. → Description 4 (17002)

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

User entry -  
Factory setting -  

"Adjustment values in use" submenu

Navigation  
Expert → Sensor → In-situ adjust. → Values in use
Gas description 1/2

**Navigation**

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

**Description**

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

**User interface**

- 

**Factory setting**

-
## Description of Device Parameters

### Proline t-mass 300 HART

#### Gas description 2/2

**Navigation**

Expert → Sensor → In-situ adjust. → Values in use → Gas descrip. 2/2 (17362)

**Description**

Shows the 2nd part of the description of the set gas used in the in-situ adjustment.

**User interface**

-

**Factory setting**

-

#### Flow value 1

**Navigation**

Expert → Sensor → In-situ adjust. → Values in use → Flow value 1 (17368)

**Description**

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

**User interface**

–2000 to 2000 %

#### Flow value 2

**Navigation**

Expert → Sensor → In-situ adjust. → Values in use → Flow value 2 (17369)

**Description**

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

**User interface**

–2000 to 2000 %

#### Flow value 3

**Navigation**

Expert → Sensor → In-situ adjust. → Values in use → Flow value 3 (17370)

**Description**

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

**User interface**

–2000 to 2000 %
Flow value 4

Navigation

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

User interface
−2 000 to 2 000 %

Flow value 5

Navigation

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

User interface
−2 000 to 2 000 %

Flow value 6

Navigation

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

User interface
−2 000 to 2 000 %

Flow value 7

Navigation

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

User interface
−2 000 to 2 000 %

Flow value 8

Navigation

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

-2000 to 2000 %

Flow value 9

Navigation

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

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

User interface

-2000 to 2000 %

Flow value 10

Navigation

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

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

User interface

-2000 to 2000 %

Flow value 11

Navigation

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

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

User interface

-2000 to 2000 %

Flow value 12

Navigation

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

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

User interface

-2000 to 2000 %
### Flow value 13

**Navigation**  
Expert → Sensor → In-situ adjust. → Values in use → Flow value 13 (17380)

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

**User interface**  
−2 000 to 2 000 %

### Flow value 14

**Navigation**  
Expert → Sensor → In-situ adjust. → Values in use → Flow value 14 (17381)

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

**User interface**  
−2 000 to 2 000 %

### Flow value 15

**Navigation**  
Expert → Sensor → In-situ adjust. → Values in use → Flow value 15 (17382)

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

**User interface**  
−2 000 to 2 000 %

### Flow value 16

**Navigation**  
Expert → Sensor → In-situ adjust. → Values in use → Flow value 16 (17383)

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

**User interface**  
−2 000 to 2 000 %
3.2.9 "Calibration" submenu

**Navigation**

Expert → Sensor → Calibration

**Nominal diameter**

**Prerequisite**

Only available with t-mass F.

**Description**

Displays the nominal diameter of the sensor.

**User interface**

DNxx / x"

**Factory setting**

Depends on the size of the sensor

**Additional information**

- The value is also specified on the sensor nameplate.

3.3 "Input" submenu

**Navigation**

Expert → Input

3.3.1 "Current input 1 to n" submenu

**Navigation**

Expert → Input → Current input 1 to n
### Terminal number

**Navigation**

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

**Description**

Displays the terminal numbers used by the current input module.

**User interface**

- Not used
- 24-25 (I/O 2)
- 22-23 (I/O 3)

**Additional information**

*Not used* option

The current input module does not use any terminal numbers.

### Signal mode

**Navigation**

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

**Prerequisite**

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

**Description**

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

**Selection**

- Passive
- Active *

**Factory setting**

Active

* Visibility depends on order options or device settings
Current span

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

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

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

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

Additional information
Examples
Sample values for the current range: Current span parameter (→ 112)

0/4 mA value

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

Description
Enter 4 mA value.

User entry
Signed floating-point number

Additional information
Current input behavior
The current input behaves differently depending on the settings configured in the following parameters:
- Current span (→ 106)
- Failure mode (→ 107)

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

20 mA value

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

Description
Enter 20 mA value.

User entry
Signed floating-point number

Factory setting
Depends on country and nominal diameter
Additional information

Configuration examples

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

Failure mode

Usage

Expert → Input → Current input 1 to n → Failure mode (1601–1 to n)

Description

Use this function to select the input behavior when measuring a current outside the configured Current span parameter (→ 106).

Selection

- Alarm
- Last valid value
- Defined value

Additional information

Options

- Alarm
  An error message is set.
- Last valid value
  The last valid measured value is used.
- Defined value
  A user-defined measured value is used (Failure value parameter (→ 107)).

Failure value

Usage

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

Prerequisite

In the Failure mode parameter (→ 107), the Defined value option is selected.

Description

Use this function to enter the value that the device uses if it does not receive an input signal from the external device, or if the input signal is invalid.

User entry

Signed floating-point number

3.3.2 "Status input 1 to n" submenu

Usage

Expert → Input → Status input 1 to n
Terminal number

**Navigation**

Expert → Input → Status input 1 to n → Terminal no. (1358–1 to n)

**Description**

Displays the terminal numbers used by the status input module.

**User interface**

- Not used
- 24-25 (I/O 2)
- 22-23 (I/O 3)

**Additional information**

*Not used* option

The status input module does not use any terminal numbers.

Assign status input

**Navigation**

Expert → Input → Status input 1 to n → Assign stat.inp. (1352–1 to n)

**Description**

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

**Selection**

- Off
- Reset totalizer 1
- Reset totalizer 2
- Reset totalizer 3
- Reset all totalizers
- Flow override
- Gas group *
- Zero point adjustment

* Visibility depends on order options or device settings
Additional information

Selection

- Off
  The status input is switched off.
- Reset totalizer 1…3
  The individual totalizers are reset.
- Reset all totalizers
  All totalizers are reset.
- Flow override
  The Flow override (→ 64) is activated.

Note on the Flow override (→ 64):

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

Value status input

Navigation

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

Description

Displays the current input signal level.

User interface

- High
- Low

Active level

Navigation

Expert → Input → Status input 1 to n → Active level (1351–1 to n)

Description

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

Selection

- High
- Low

Response time status input

Navigation

Expert → Input → Status input 1 to n → Response time (1354–1 to n)

Description

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

User entry

5 to 200 ms
3.4  "Output" submenu

Navigation:  Expert → Output

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<td>▶ Relay output 1 to n → 134</td>
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</table>

3.4.1  "Current output 1 to n" submenu

Navigation:  Expert → Output → Curr.output 1 to n

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<th>▶ Current output 1 to n</th>
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</tbody>
</table>
Terminal number

**Navigation**

Expert → Output → Curr.output 1 to n → Terminal no. (0379–1 to n)

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

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

**Additional information**

*Not used* option
The current output module does not use any terminal numbers.

Signal mode

**Navigation**

Expert → Output → Curr.output 1 to n → Signal mode (0377–1 to n)

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

**Selection**
- Active *
- Passive *

**Factory setting**
Active

Assign current output 1 to n

**Navigation**

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

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

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

* Visibility depends on order options or device settings
Current span

Navigation
Expert → Output → Curr.output 1 to n → Current span (0353–1 to n)

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

Selection
- 4...20 mA NAMUR (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)
- 4...20 mA (4...20.5 mA)
- 0...20 mA (0...20.5 mA)
- Fixed current

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

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

"Fixed current" option
- This option is used for a HART Multidrop network.
- It can only be used for the 4…20 mA HART current output (current output 1).
- The current value is set via the Fixed current parameter (→ 113).

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

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

Selection

<table>
<thead>
<tr>
<th>Selection</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>4...20 mA NAMUR (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>
**Fixed current**

**Navigation**
Expert → Output → Curr.output 1 to n → Fixed current (0365–1 to n)

**Prerequisite**
The **Fixed current** option is selected in the **Current span** parameter (→ 112).

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

**User entry**
0 to 22.5 mA

**Factory setting**
22.5 mA

---

**0/4 mA value**

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

**Prerequisite**
In the **Current span** parameter (→ 112), one of the following options is selected:
- 4...20 mA NAMUR (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)
- 4...20 mA (4... 20.5 mA)
- 0...20 mA (0... 20.5 mA)

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

**User entry**
Signed floating-point number

**Additional information**

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

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

**Current output behavior**
The current output behaves differently depending on the settings configured in the following parameters:
- **Current span** (→ 112)
- **Failure mode** (→ 115)

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

**Configuration example**
In the **Forward flow**
- **0/4 mA value** parameter (→ 113) = not equal to zero flow (e.g. –250 kg/h)
- **20 mA value** parameter (→ 114) = not equal to zero flow (e.g. +750 kg/h)
- Calculated current value = 8 mA at zero flow
Navigation
Expert → Output → Curr.output 1 to n → 20 mA value (0372–1 to n)

Prerequisite
In the Current span parameter (→ 112), one of the following options is selected:
- 4...20 mA NAMUR (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)
- 4...20 mA (4... 20.5 mA)
- 0...20 mA (0... 20.5 mA)

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

User entry
Signed floating-point number

Factory setting
Depends on country and nominal diameter → 219

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

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

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

Configuration examples
Observe the configuration examples for the 0/4 mA value parameter (→ 113).
Damping output 1 to n

Navigation

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

Prerequisite

A process variable is selected in the Assign current output parameter (→ 111) and one of the following options is selected in the Current span parameter (→ 112):
- 4...20 mA NAMUR (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)
- 4...20 mA (4... 20.5 mA)
- 0...20 mA (0... 20.5 mA)

Description

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

User entry

0.0 to 999.9 s

Additional information

User entry

Use this function to enter a time constant (PT1 element 7) for current output damping:
- If a low time constant is entered, the current output reacts particularly quickly to fluctuating measured variables.
- On the other hand, the current output reacts more slowly if a high time constant is entered.

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

Failure mode

Navigation

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

Prerequisite

A process variable is selected in the Assign current output parameter (→ 111) and one of the following options is selected in the Current span parameter (→ 112):
- 4...20 mA NAMUR (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)
- 4...20 mA (4... 20.5 mA)
- 0...20 mA (0... 20.5 mA)

Description

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

Selection

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

7) proportional transmission behavior with first order delay
**Additional information**

*Description*

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

*Min.* option

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

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

*Max.* option

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

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

*Last valid value* option

The current output adopts the last measured value that was valid before the device alarm occurred.

*Actual value* option

The current output adopts the measured value on the basis of the current flow measurement; the device alarm is ignored.

*Defined value* option

The current output adopts a defined measured value.

The measured value is defined via the **Failure current** parameter (→ 116).

---

**Failure current**

**Navigation**

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

**Prerequisite**

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

**Description**

Use this function to enter a fixed value that the current output adopts in the event of a device alarm.

**User entry**

0 to 22.5 mA

**Factory setting**

22.5 mA

---

**Output current 1 to n**

**Navigation**

Expert → Output → Curr.output 1 to n → Output curr. 1 to n (0361–1 to n)

**Description**

Displays the current value currently calculated for the current output.

**User interface**

3.59 to 22.5 mA
Measured current 1 to n

Navigation

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

Description

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

User interface

0 to 30 mA

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

Navigation

Expert → Output → PFS output 1 to n

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<td>Pulse output 1 to n</td>
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</table>
### Terminal number

#### Navigation

Expert → Output → PFS output 1 to n → Terminal no. (0492–1 to n)

#### Description

Displays the terminal numbers used by the pulse/frequency/switch output module.

#### User interface

- Not used
- 24-25 (I/O 2)
- 22-23 (I/O 3)

#### Additional information

"Not used" option

The pulse/frequency/switch output module does not use any terminal numbers.
Signal mode

Navigation
Expert → Output → PFS output 1 to n → Signal mode (0490–1 to n)

Description
Use this function to select the signal mode for the pulse/frequency/switch output.

Selection
- Passive
- Active
- Passive NAMUR

Operating mode

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

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

Selection
- Pulse
- Frequency
- Switch

Additional information

"Pulse" option
Quantity-dependent pulse with configurable pulse width
The pulses are never shorter than the set duration.
Example
- Flow rate approx. 100 g/s
- Pulse value 0.1 g
- Pulse width 0.05 ms
- Pulse rate 1 000 Impuls/s

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

 Visibility depends on order options or device settings
Example
- Flow rate approx. 100 g/s
- Max. frequency 10 kHz
- Flow rate at max. frequency 1000 g/s
- Output frequency approx. 1000 Hz

\[ \text{Flow-proportional frequency output} \]

“Switch” option
Contact for displaying a condition (e.g. alarm or warning if a limit value is reached)
Example
Alarm response without alarm

\[ \text{No alarm, high level} \]

Example
Alarm response in case of alarm

\[ \text{Alarm, low level} \]

Assign pulse output 1 to n

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

Prerequisite
The Pulse option is selected in the Operating mode parameter (→ 119) parameter.

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

Selection
- Off
- Mass flow
- Corrected volume flow
- FAD volume flow *
- Volume flow
- Energy flow *
- Heat flow *

**Pulse scaling**

**Navigation**

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

**Prerequisite**

The Pulse option is selected in the Operating mode parameter (→ 119) and a process variable is selected in the Assign pulse output parameter (→ 120).

**Description**

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

**User entry**

Positive floating point number

**Factory setting**

Depends on country and nominal diameter

**Additional information**

*User entry*

Weighting of the pulse output with a quantity.

- The lower the pulse value, the better the resolution.
- The higher the frequency of the pulse response.

**Pulse width**

**Navigation**

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

**Prerequisite**

The Pulse option is selected in the Operating mode parameter (→ 119) and a process variable is selected in the Assign pulse output parameter (→ 120).

**Description**

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

**User entry**

0.05 to 2,000 ms

**Additional information**

*Description*

- Define how long a pulse is (duration).
- The maximum pulse rate is defined by \( f_{\text{max}} = 1 / (2 \times \text{pulse width}) \).
- 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.

* Visibility depends on order options or device settings
**Description of Device Parameters**

**Proline t-mass 300 HART**

---

**Failure mode**

- **Navigation**: Expert → Output → PFS output 1 to n → Failure mode (0480–1 to n)

- **Prerequisite**: The Pulse option is selected in the Operating mode parameter (→ 119) and a process variable is selected in the Assign pulse output parameter (→ 120).

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

- **Selection**:  
  - Actual value  
  - No pulses

- **Additional information**: Description

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

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

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

---

**Example**

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

---

**Diagram**

- **Diagram Description**:
  - **B**: Pulse width entered
  - **P**: Pauses between the individual pulses

---

**Endress+Hauser**
**Pulse output 1 to n**

**Navigation**

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

**Prerequisite**

The **Pulse** option is selected in the **Operating mode** parameter (→ 119) parameter.

**Description**

Displays the pulse frequency currently output.

**User interface**

Positive floating-point number

**Additional information**

* 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.

![Diagram of NC and NO contacts](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 (→ 133) i.e. the transistor does not conduct for the duration of the pulse.

In addition, the behavior of the output in the event of a device alarm (**Failure mode** parameter (→ 122)) can be configured.

**Assign frequency output**

**Navigation**

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

**Prerequisite**

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

**Description**

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

**Selection**

- Off
- Temperature
- Mass flow
- Corrected volume flow
- FAD volume flow*
- Volume flow
- Energy flow*
- Heat flow*
- Density

* Visibility depends on order options or device settings
Flow velocity  
Pressure  
2nd temperature delta heat*  
Electronic temperature

**Minimum frequency value**

**Navigation**

Expert → Output → PFS output 1 to n → Min. freq. value (0453–1 to n)

**Prerequisite**

The Frequency option is selected in the Operating mode parameter (→ 119) and a process variable is selected in the Assign frequency output parameter (→ 123).

**Description**

Use this function to enter the minimum frequency.

**User entry**

0.0 to 10000.0 Hz

**Maximum frequency value**

**Navigation**

Expert → Output → PFS output 1 to n → Max. freq. value (0454–1 to n)

**Prerequisite**

The Frequency option is selected in the Operating mode parameter (→ 119) and a process variable is selected in the Assign frequency output parameter (→ 123).

**Description**

Use this function to enter the end value frequency.

**User entry**

0.0 to 10000.0 Hz

**Measuring value at minimum frequency**

**Navigation**

Expert → Output → PFS output 1 to n → Val. at min.freq (0476–1 to n)

**Prerequisite**

The Frequency option is selected in the Operating mode parameter (→ 119) and a process variable is selected in the Assign frequency output parameter (→ 123).

**Description**

Use this function to enter the measured value for the start value frequency.

**User entry**

Signed floating-point number

**Factory setting**

Depends on country and nominal diameter

**Additional information**

Dependency

The entry depends on the process variable selected in the Assign frequency output parameter (→ 123).

* Visibility depends on order options or device settings
### Measuring value at maximum frequency

**Navigation**

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

**Prerequisite**

The **Frequency** option is selected in the **Operating mode** parameter (→ 119) and a process variable is selected in the **Assign frequency output** parameter (→ 123).

**Description**

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

**User entry**

Signed floating-point number

**Factory setting**

Depends on country and nominal diameter

**Additional information**

*Description*

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

*Dependency*

The entry depends on the process variable selected in the **Assign frequency output** parameter (→ 123).

### Damping output 1 to n

**Navigation**

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

**Description**

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

**User entry**

0 to 999.9 s

**Additional information**

*User entry*

Use this function to enter a time constant (PT1 element 8) for frequency output damping:

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

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

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

---

8) proportional transmission behavior with first order delay
Description of Device Parameters

**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**

Description

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

- Damping of pulse/frequency/switch output → 115
- Depending on the measured variable assigned to the output.

**Flow damping**

**Failure mode**

**Navigation**

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

**Prerequisite**

The Frequency option is selected in the Operating mode parameter (→ 119) and a process variable is selected in the Assign frequency output parameter (→ 123).

**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

**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 (→ 127) 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 (→ 119) and a process variable is selected in the Assign frequency output parameter (→ 123).

**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

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 (→ 119), 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 (→ 119) parameter.

**Description**

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

**Selection**

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

* Visibility depends on order options or device settings
Additional information

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

Assign diagnostic behavior

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

Prerequisite
- In the Operating mode parameter (→ 119), the Switch option is selected.
- In the Switch output function parameter (→ 127), the Diagnostic behavior option is selected.

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

Selection
- Alarm
- Alarm or warning
- Warning

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

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

Assign limit

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

Prerequisite
- The Switch option is selected in the Operating mode parameter (→ 119).
- The Limit option is selected in the Switch output function parameter (→ 127).
Description
Use this function to select a process variable for the limit function.

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

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

| 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

* Visibility depends on order options or device settings
Switch-on value

**Navigation**

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

**Prerequisite**

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

**Description**

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

**User entry**

Signed floating-point number

**Factory setting**

Depends on country and nominal diameter
**Additional information**

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

*Dependency*

The unit depends on the process variable selected in the Assign limit parameter (→ 128).

---

**Switch-off value**

*Navigation*

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

*Prerequisite*

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

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

*User entry*
Signed floating-point number

*Additional information*  

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

*Dependency*

The unit depends on the process variable selected in the Assign limit parameter (→ 128).

---

**Assign status**

*Navigation*

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

*Prerequisite*

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

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

*Selection*

- Off
- Low flow cut off

*Additional information*  

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

**Navigation**

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

**Prerequisite**

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

**Description**

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

**User entry**

0.0 to 100.0 s

---

**Switch-off delay**

**Navigation**

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

**Prerequisite**

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

**Description**

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

**User entry**

0.0 to 100.0 s

---

**Failure mode**

**Navigation**

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

**Description**

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

**Selection**

- Actual status
- Open
- Closed

**Additional information**

**Options**

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

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

Prerequisite
The Switch option is selected in the Operating mode parameter (→ 119).

Description
Displays the current switch status of the status output.

User interface
- Open
- Closed

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

Invert output signal

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

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

Selection
- No
- Yes

Additional information
Selection
No option (passive - negative)

![Graph of No option](image)

Yes option (passive - positive)

![Graph of Yes option](image)
### "Relay output 1 to n" submenu

**Navigation**

Expert → Output → Relay output 1 to n

<table>
<thead>
<tr>
<th>Feature</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal number (0812–1 to n)</td>
<td>134</td>
</tr>
<tr>
<td>Relay output function (0804–1 to n)</td>
<td>135</td>
</tr>
<tr>
<td>Assign limit (0807–1 to n)</td>
<td>135</td>
</tr>
<tr>
<td>Assign diagnostic behavior (0806–1 to n)</td>
<td>136</td>
</tr>
<tr>
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<td>136</td>
</tr>
<tr>
<td>Switch-off value (0809–1 to n)</td>
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</tr>
<tr>
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<td>137</td>
</tr>
<tr>
<td>Switch-on value (0810–1 to n)</td>
<td>137</td>
</tr>
<tr>
<td>Switch-on delay (0814–1 to n)</td>
<td>138</td>
</tr>
<tr>
<td>Failure mode (0811–1 to n)</td>
<td>138</td>
</tr>
<tr>
<td>Switch status (0801–1 to n)</td>
<td>138</td>
</tr>
<tr>
<td>Powerless relay status (0816–1 to n)</td>
<td>139</td>
</tr>
</tbody>
</table>

#### Terminal number

**Navigation**

Expert → Output → Relay output 1 to n → Terminal no. (0812–1 to n)

**Description**

Displays the terminal numbers used by the relay output module.

**User interface**

- Not used
- 24-25 (I/O 2)
- 22-23 (I/O 3)

**Additional information**

*Not used* option

The relay output module does not use any terminal numbers.
**Relay output function**

**Navigation**

Expert → Output → Relay output 1 to n → Relay outp.func. (0804–1 to n)

**Description**

Use this function to select an output function for the relay output.

**Selection**

- Closed
- Open
- Diagnostic behavior
- Limit
- Flow direction check
- Digital Output

**Additional information (Selection)**

- Closed
  The relay output is permanently switched on (closed, conductive).
- Open
  The relay output is permanently switched off (open, non-conductive).
- Diagnostic behavior
  Indicates if the diagnostic event is present or not. Is used to output diagnostic information and to react to it appropriately at the system level.
- Limit
  Indicates if a specified limit value has been reached for the process variable. Is used to output diagnostic information relating to the process and to react to it appropriately at the system level.
- Flow direction check
  Indicates the flow direction (forward or reverse flow).
- Digital Output
  Indicates the device status depending on whether empty pipe detection or low flow cut off is selected.

**Assign limit**

**Navigation**

Expert → Output → Relay output 1 to n → Assign limit (0807–1 to n)

**Prerequisite**

The Limit option is selected in the Relay output function parameter (→ 135).

**Description**

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

**Selection**

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

* Visibility depends on order options or device settings
Description of Device Parameters

- Totalizer 1
- Totalizer 2
- Totalizer 3

### Assign diagnostic behavior

**Navigation**

 commune Expert → Output → Relay output 1 to n → Assign diag. beh (0806–1 to n)

**Prerequisite**

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

**Description**

Use this function to select the category of the diagnostic events that are displayed for the relay output.

**Selection**

- Alarm
- Alarm or warning
- Warning

**Additional information**

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

**Selection**

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

### Assign status

**Navigation**

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

**Prerequisite**

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

**Description**

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

**Selection**

- Off
- Low flow cut off

### Switch-off value

**Navigation**

 commune Expert → Output → Relay output 1 to n → Switch-off value (0809–1 to n)

**Prerequisite**

In the **Relay output function** parameter (→ 135), the **Limit** option is selected.
<table>
<thead>
<tr>
<th><strong>Description</strong></th>
<th>Use this function to enter the measured value for the switch-off point.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>User entry</strong></td>
<td>Signed floating-point number</td>
</tr>
<tr>
<td><strong>Additional information</strong></td>
<td>Use this function to enter the limit value for the switch-off value (process variable &lt; switch-off value = open, non-conductive).</td>
</tr>
</tbody>
</table>

- **Dependency**
  - The unit is dependent on the process variable selected in the **Assign limit** parameter (→ 135).

### Switch-off delay

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

### Switch-on value

<table>
<thead>
<tr>
<th><strong>Navigation</strong></th>
<th>Expert → Output → Relay output 1 to n → Switch-on value (0810–1 to n)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prerequisite</strong></td>
<td>The <strong>Limit</strong> option is selected in the <strong>Relay output function</strong> parameter (→ 135) parameter.</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>Use this function to enter the measured value for the switch-on point.</td>
</tr>
<tr>
<td><strong>User entry</strong></td>
<td>Signed floating-point number</td>
</tr>
<tr>
<td><strong>Factory setting</strong></td>
<td>Depends on country and nominal diameter</td>
</tr>
<tr>
<td><strong>Additional information</strong></td>
<td>Use this function to enter the limit value for the switch-on value (process variable &gt; switch-on value = closed, conductive).</td>
</tr>
</tbody>
</table>

- **Dependency**
  - The unit is dependent on the process variable selected in the **Assign limit** parameter (→ 135).
### Switch-on delay

**Navigation**

Expert → Output → Relay output 1 to n → Switch-on delay (0814–1 to n)

**Prerequisite**

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

**Description**

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

**User entry**

0.0 to 100.0 s

### Failure mode

**Navigation**

Expert → Output → Relay output 1 to n → Failure mode (0811–1 to n)

**Description**

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

**Selection**

- Actual status
- Open
- Closed

**Additional information**

In the event of a device alarm, faults are ignored and the current behavior of the input value is output by the relay output. The **Actual status** option behaves in the same way as the current input value.

- Open
  - In the event of a device alarm, the relay output's transistor is set to **non-conductive**.

- Closed
  - In the event of a device alarm, the relay output's transistor is set to **conductive**.

### Switch status

**Navigation**

Expert → Output → Relay output 1 to n → Switch status (0801–1 to n)

**Description**

Displays the current status of the relay output.

**User interface**

- Open
- Closed

**Additional information**

In the event of a device alarm, the relay output is not conductive.

- Closed
  - The relay output is conductive.
### Powerless relay status

**Navigation**

Expert → Output → Relay output 1 to n → Powerless relay (0816–1 to n)

**Description**

Use this function to select the quiescent state for the relay output.

**Selection**

- Open
- Closed

**Additional information**

*Selection*

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

### 3.5 "Communication" submenu

**Navigation**

Expert → Communication

![Diagram of Communication submenu]

3.5.1 "HART input" submenu

**Navigation**

Expert → Communication → HART input

![Diagram of HART input submenu]

Endress+Hauser
"Configuration" submenu

**Navigation**

Expert → Communication → HART input → Configuration

<table>
<thead>
<tr>
<th>Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capture mode (7001)</td>
</tr>
<tr>
<td>Device ID (7007)</td>
</tr>
<tr>
<td>Device type (7008)</td>
</tr>
<tr>
<td>Manufacturer ID (7009)</td>
</tr>
<tr>
<td>Burst command (7006)</td>
</tr>
<tr>
<td>Slot number (7010)</td>
</tr>
<tr>
<td>Timeout (7005)</td>
</tr>
<tr>
<td>Failure mode (7011)</td>
</tr>
<tr>
<td>Failure value (7012)</td>
</tr>
</tbody>
</table>

**Capture mode**

**Navigation**

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

**Description**

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

**Selection**

- Off
- Burst network
- Master network

**Additional information**

*Burst network* option

The device records data transmitted via burst in the network.

*Master network* option

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

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

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

**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

**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 (→  140), 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 (→  140).

**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

**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 (→ 140).

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

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

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

Slot number

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

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

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

User entry
1 to 8

Additional information
User entry

<table>
<thead>
<tr>
<th>Slot</th>
<th>Command</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PV</td>
<td>HART variable (slot 1)</td>
</tr>
<tr>
<td>1</td>
<td>PV</td>
<td>HART variable (slot 1)</td>
</tr>
<tr>
<td>2</td>
<td>SV</td>
<td>HART variable (slot 2)</td>
</tr>
<tr>
<td>3</td>
<td>TV</td>
<td>HART variable (slot 3)</td>
</tr>
<tr>
<td>4</td>
<td>QV</td>
<td>HART variable (slot 4)</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 (→ 140).

**Description**

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

**User entry**

1 to 120 s

**Additional information**

*Description*

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

---

**Failure mode**

**Navigation**

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

**Prerequisite**

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

**Description**

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

**Selection**

- Alarm
- Last valid value
- Defined value

**Additional information**

*Options*

- Alarm
  
  An error message is set.
- Last valid value
  
  The last valid measured value is used.
- Defined value
  
  A user-defined measured value is used: (**Failure value** parameter (→ 143)).

---

**Failure value**

**Navigation**

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

**Prerequisite**

The following conditions are met:

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

**Description**

Use this function to enter the measured value to be used if no data are recorded within the maximum permitted interval.
User entry
Signed floating-point number

"Input" submenu

Navigation
Expert → Communication → HART input → Input

Value

Navigation
Expert → Communication → HART input → Input → Value (7003)

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

User interface
Signed floating-point number

Status

Navigation
Expert → Communication → HART input → Input → Status (7004)

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

User interface
- Manual/Fixed
- Good
- Poor accuracy
- Bad

3.5.2 "HART output" submenu

Navigation
Expert → Communication → HART output
"Configuration" submenu

**Navigation**

Expert → Communication → HART output → Configuration

**Configuration**

- HART short tag (0220)
- Device tag (0215)
- HART address (0219)
- No. of preambles (0217)
- Fieldbus writing access (0273)

**HART short tag**

**Navigation**

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

**Description**

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

**User entry**

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

**Device tag**

**Navigation**

Expert → Communication → HART output → Configuration → Device tag (0215)

**Description**

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

**User entry**

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

**Navigation**

Expert → Communication → HART output → Configuration → HART address (0219)

**Description**

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

**User entry**

0 to 63

**Additional information**

*Description*

For addressing in a HART Multidrop network, the **Fixed current** option must be set in the **Current span** parameter (→  112) (current output 1).

### No. of preambles

**Navigation**

Expert → Communication → HART output → Configuration → No. of preambles (0217)

**Description**

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

**User entry**

2 to 20

**Additional information**

*User entry*

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

### Fieldbus writing access

**Navigation**

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

**Description**

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

**Selection**

- Read + write
- Read only

**Additional information**

*Description*

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

**Selection**

- Read + write  
  The parameters are readable and writable.
- Read only  
  The parameters are only readable.
“Burst configuration 1 to n” submenu

Navigation

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

Burst mode 1 to n

<table>
<thead>
<tr>
<th>Burst configuration 1 to n</th>
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</thead>
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<td>Burst mode 1 to n (2032–1 to n)</td>
</tr>
<tr>
<td>Burst command 1 to n (2031–1 to n)</td>
</tr>
<tr>
<td>Burst variable 0 (2033)</td>
</tr>
<tr>
<td>Burst variable 1 (2034)</td>
</tr>
<tr>
<td>Burst variable 2 (2035)</td>
</tr>
<tr>
<td>Burst variable 3 (2036)</td>
</tr>
<tr>
<td>Burst variable 4 (2037)</td>
</tr>
<tr>
<td>Burst variable 5 (2038)</td>
</tr>
<tr>
<td>Burst variable 6 (2039)</td>
</tr>
<tr>
<td>Burst variable 7 (2040)</td>
</tr>
<tr>
<td>Burst trigger mode (2044–1 to n)</td>
</tr>
<tr>
<td>Burst trigger level (2043–1 to n)</td>
</tr>
<tr>
<td>Min. update period (2042–1 to n)</td>
</tr>
<tr>
<td>Max. update period (2041–1 to n)</td>
</tr>
</tbody>
</table>

Burst mode 1 to n

Navigation

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

Description

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

Selection

- Off
- On
**Additional information**  
**Options**

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

---

**Burst command 1 to n**

**Navigation**

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

**Description**

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

**Selection**

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

---

**Additional information**  

**Selection**

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

*"Command 33" option*

The HART device variables are defined via Command 107.

**Commands**

- Information about the defined details of the command: HART specifications
- The measured variables (HART device variables) are assigned to the dynamic variables in the **Output** submenu (→ 110).

---

**Burst variable 0**

**Navigation**

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

**Description**

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

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

Additional information

**Selection**

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

---

**Burst variable 1**

**Navigation**

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

**Description**

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

**Selection**

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

---

**Burst variable 2**

**Navigation**

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

**Description**

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

**Selection**

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

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

**Navigation**

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

**Description**

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

**Selection**

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

### Burst variable 4

**Navigation**

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

**Description**

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

**Selection**

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

### Burst variable 5

**Navigation**

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

**Description**

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

**Selection**

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

### Burst variable 6

**Navigation**

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

**Description**

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

**Selection**

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

### Burst variable 7

**Navigation**

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

**Description**

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

See the Burst variable 0 parameter (→ 148).

Burst trigger mode

Navigation

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

Description

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

Selection

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

Additional information

Selection

- Continuous
  The message is sent continuously, at least at intervals corresponding to the time frame specified in the Burst min period parameter (→ 152).
- Window
  The message is sent if the specified measured value has changed by the value in the Burst trigger level parameter (→ 151).
- Rising
  The message is sent if the specified measured value exceeds the value in the Burst trigger level parameter (→ 151).
- Falling
  The message is sent if the specified measured value drops below the value in the Burst trigger level parameter (→ 151).
- On change
  The message is sent if a measured value changes in the burst message.

Burst trigger level

Navigation

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

Description

For entering the burst trigger value.

User entry

Signed floating-point number

Additional information

Description

Together with the option selected in the Burst trigger mode parameter (→ 151) the burst trigger value determines the time of burst message X.

* Visibility depends on order options or device settings
**Description of Device Parameters**

**Proline t-mass 300 HART**

---

### Min. update period

**Navigation**

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

**Description**

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

**User entry**

Positive integer

---

### Max. update period

**Navigation**

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

**Description**

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

**User entry**

Positive integer

---

**"Information" submenu**

**Navigation**

- Expert → Communication → HART output → Information

<table>
<thead>
<tr>
<th>Device revision (0204)</th>
<th>→ 153</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device ID (0221)</td>
<td>→ 153</td>
</tr>
<tr>
<td>Device type (0209)</td>
<td>→ 153</td>
</tr>
<tr>
<td>Manufacturer ID (0259)</td>
<td>→ 154</td>
</tr>
<tr>
<td>HART revision (0205)</td>
<td>→ 154</td>
</tr>
<tr>
<td>HART descriptor (0212)</td>
<td>→ 154</td>
</tr>
<tr>
<td>HART message (0216)</td>
<td>→ 154</td>
</tr>
<tr>
<td>Hardware revision (0206)</td>
<td>→ 154</td>
</tr>
<tr>
<td>Software revision (0224)</td>
<td>→ 155</td>
</tr>
<tr>
<td>HART date code (0202)</td>
<td>→ 155</td>
</tr>
</tbody>
</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**
0x1

**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**
0x1160 (for t-mass 300/500)

**Additional information**
- Description
  - The device type is specified by the manufacturer. It is needed to assign the appropriate device description file (DD) to the device.
### Manufacturer ID

**Navigation**  
Expert → Communication → HART output → Information → Manufacturer ID (0259)

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

**User interface**  
2-digit hexadecimal number

**Factory setting**  
0x11 (for Endress+Hauser)

### HART revision

**Navigation**  
Expert → Communication → HART output → Information → HART revision (0205)

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

**User interface**  
5 to 7

### 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. @, %, /)

### 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. @, %, /)

### 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**

### Software revision

**Navigation**

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

**Description**

Displays the software revision of the measuring device.

**User interface**

0 to 255

### HART date code

**Navigation**

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

**Description**

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

**User entry**

Date entry format: yyyy-mm-dd

**Additional information**

*Example*

Device installation date

### "Output" submenu

**Navigation**

Expert → Communication → HART output → Output

<table>
<thead>
<tr>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assign PV (0234)</td>
</tr>
<tr>
<td>Primary variable (PV) (0201)</td>
</tr>
<tr>
<td>Assign SV (0235)</td>
</tr>
<tr>
<td>Secondary variable (SV) (0226)</td>
</tr>
<tr>
<td>Assign TV (0236)</td>
</tr>
<tr>
<td>Tertiary variable (TV) (0228)</td>
</tr>
<tr>
<td>Assign QV (0237)</td>
</tr>
<tr>
<td>Quaternary variable (QV) (0203)</td>
</tr>
</tbody>
</table>
### Assign PV

**Navigation**

Navigate to **Expert → Communication → HART output → Output → Assign PV (0234)**

**Description**

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

**Selection**

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

### Primary variable (PV)

**Navigation**

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

**Description**

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

**User interface**

Signed floating-point number

**Additional information**

* **User interface**

The measured value displayed depends on the process variable selected in the Assign PV parameter (→ 156).

* **Dependency**

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

### Assign SV

**Navigation**

Navigate to **Expert → Communication → HART output → Output → Assign SV (0235)**

**Description**

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

* Visibility depends on order options or device settings
Selection
- Mass flow
- Corrected volume flow
- FAD volume flow*
- Volume flow
- Temperature
- Density
- Flow velocity
- Pressure
- Energy flow*
- Heat flow*
- 2nd temperature delta heat*
- Electronic temperature
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Current input 1*
- Current input 2*
- Current input 3*
- HART input

Secondary variable (SV)

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

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

User interface
Signed floating-point number

Additional information
User interface
The measured value displayed depends on the process variable selected in the Assign SV parameter (→ 156).

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

Assign TV

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

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

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

* Visibility depends on order options or device settings
Tertiary variable (TV)

**Navigation**

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

**Description**

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

**User interface**

Signed floating-point number

**Additional information**

*User interface*

The measured value displayed depends on the process variable selected in the **Assign TV** parameter (→ 157).

*Dependency*

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

Assign QV

**Navigation**

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

**Description**

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

**Selection**

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

* Visibility depends on order options or device settings
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 (→ 158).

Dependency

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

3.5.3 "Web server" submenu

Navigation
Expert → Communication → Web server

<table>
<thead>
<tr>
<th>Web server language (7221)</th>
<th>→ 160</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAC address (7214)</td>
<td>→ 160</td>
</tr>
<tr>
<td>DHCP client (7212)</td>
<td>→ 161</td>
</tr>
<tr>
<td>IP address (7209)</td>
<td>→ 161</td>
</tr>
<tr>
<td>Subnet mask (7211)</td>
<td>→ 161</td>
</tr>
<tr>
<td>Default gateway (7210)</td>
<td>→ 161</td>
</tr>
</tbody>
</table>

* Visibility depends on order options or device settings
**Web server language**

**Navigation**

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

**Description**

Use this function to select the Web server language setting.

**Selection**

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

**MAC address**

**Navigation**

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

**Description**

Displays the MAC address of the measuring device.

**User interface**

Unique 12-digit character string comprising letters and numbers

**Factory setting**

Each measuring device is given an individual address.

**Additional information**

*Example*

For the display format

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

* Visibility depends on order options or device settings

9) Media Access Control
DHCP client

**Navigation**

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

**Description**

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

**Selection**

- Off
- On

**Additional information**

*Result*

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

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

**IP address**

**Navigation**

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

**Description**

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

**User entry**

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

**Subnet mask**

**Navigation**

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

**Description**

Display or enter the subnet mask.

**User entry**

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

**Default gateway**

**Navigation**

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

**Description**

Display or enter the Default gateway (→ 161).

**User entry**

4 octet: 0 to 255 (in the particular octet)
Web server functionality

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

Selection
- Off
- HTML Off
- On

Additional information
Description
Once disabled, the Web server functionality can only be re-enabled via 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

Description
Use this function to select the format of the login page.

Selection
- Without header
- With header

3.5.4 "Diagnostic configuration" submenu
For a list of all the diagnostic events, see the Operating Instructions for the device

Assign a category to the particular diagnostic event:

<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>
</tbody>
</table>
| Out of specification (S) | The device is being operated.  
                          | - Outside its technical specification limits (e.g. outside the process temperature range)  
                          | - Outside of the configuration carried out by the user (e.g. maximum flow in parameter 20 mA value) |
### Description of Device Parameters

<table>
<thead>
<tr>
<th>Category</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<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.</td>
</tr>
</tbody>
</table>

1) Condensed status according to NAMUR recommendation NE107

**Navigation**

Expert → Communication → Diag. config.

#### Event category 144 (Sensor drift)

**Navigation**

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

**Description**

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

**Selection**

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

**Additional information**

For a detailed description of the event categories available for selection: → 162
**Event category 441 (Current output 1 to n)**

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

**Description**
Use this function to select a category for the **441 Current output 1 to n** diagnostic message.

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

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

---

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

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

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

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

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

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

---

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

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

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

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

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

**Additional information**
For a detailed description of the event categories available for selection: → 162
Event category 832 (Electronic temperature too high)

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

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

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

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

Event category 833 (Electronic temperature too low)

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

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

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

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

Event category 834 (Process temperature too high)

Navigation
Expert → Communication → Diag. config. → Event category 834 (0227)

Description
Use this option to select a category for the 834 Process temperature too high diagnostic message.

Selection
• Failure (F)
• Function check (C)
• Out of specification (S)
• Maintenance required (M)
• No effect (N)
Event category 835 (Process temperature too low)

Navigation
Expert → Communication → Diag. config. → Event category 835 (0229)

Description
Use this option to select a category for the 835 Process temperature too low diagnostic message.

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

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)

Event category 979 (Unstable process conditions)

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

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

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

Additional information

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

Event category 976 (Mass flow out of calibrated range)

Navigation

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

Description

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

Selection

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

Additional information

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

3.5.5 “WLAN settings” submenu

Navigation

Expert → Communication → WLAN settings

<table>
<thead>
<tr>
<th>WLAN settings</th>
</tr>
</thead>
<tbody>
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<td>WLAN (2702)</td>
</tr>
<tr>
<td>WLAN mode (2717)</td>
</tr>
<tr>
<td>SSID name (2714)</td>
</tr>
<tr>
<td>Network security (2705)</td>
</tr>
<tr>
<td>Security identification (2718)</td>
</tr>
<tr>
<td>User name (2715)</td>
</tr>
<tr>
<td>WLAN password (2716)</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
### WLAN mode

**Navigation**
- Expert → Communication → WLAN settings → WLAN mode (2717)
- Setup → Advanced setup → WLAN settings → WLAN mode (2717)

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

**Selection**
- WLAN access point
- WLAN Client

### SSID name

**Navigation**
- Expert → Communication → WLAN settings → SSID name (2714)
- Setup → Advanced setup → WLAN settings → SSID name (2714)
- Setup → Advanced setup → 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 *

**Additional information**

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

* Visibility depends on order options or device settings
## Security identification

### Navigation

- Expert → Communication → WLAN settings → Sec. identific. (2718)
- Setup → Advanced setup → WLAN settings → Sec. identific. (2718)
- Setup → Advanced setup → 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)
- Setup → Advanced setup → WLAN settings → User name (2715)
- Setup → Advanced setup → 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)
- Setup → Advanced setup → WLAN settings → WLAN password (2716)
- Setup → Advanced setup → WLAN settings → WLAN password (2716)

### Description

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

### User entry

- 

### Factory setting

- 

---

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**WLAN IP address**

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

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

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

---

**WLAN MAC address**

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

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

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

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

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

---

**WLAN subnet mask**

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

**Description**
Use this function to enter the subnet mask.

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

---

**WLAN passphrase**

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

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

---

10) Media Access Control
Description of Device Parameters

Proline t-mass 300 HART

Description
Use this function to enter the network key.

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)
Setup → Advanced setup → WLAN settings → Assign SSID name (2708)
Setup → Advanced setup → WLAN settings → Assign SSID name (2708)

Description
Use this function to select which name is used for the SSID.

Selection
• Device tag
• 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 (→ 172).
• The WLAN access point option is selected in the WLAN mode parameter (→ 169).

Description
Use this function to enter a user-defined SSID name.

User entry
Max. 32-digit character string comprising numbers, letters and special characters

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
Additional information

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

Select antenna

| Navigation | Expert → Communication → WLAN settings → Select antenna (2713) |
|Description | Use this function to select whether the external or internal antenna is used for reception. |
|Selection | External antenna, Internal antenna |

Connection state

| Navigation | Expert → Communication → WLAN settings → Connection state (2722) |
|Description | The connection status is displayed. |
|User interface | Connected, Not connected |

Received signal strength

| Navigation | Expert → Communication → WLAN settings → Rec.sig.strength (2721) |
|Description | Displays the signal strength received. |
|User interface | Low, Medium, High |

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 (#15)

### IP address domain name server

**Navigation**
Expert → Communication → WLAN settings → IP address DNS (2720)

**Description**
Use this function to enter the IP address of the domain name server.

**User interface**
Character string comprising numbers, letters and special characters (#15)

---

### 3.6 "Application" submenu

**Navigation**
Expert → Application

![Application menu](#)

- Reset all totalizers (2806)  →  174
- Totalizer 1 to n  →  175

---

### 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

**Additional information**

<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 (0914-1 to n) → 175
Unit totalizer 1 to n (0915-1 to n) → 176
Totalizer operation mode (0908-1 to n) → 177
Control Totalizer 1 to n (0912-1 to n) → 178
Preset value 1 to n (0913-1 to n) → 178
Failure mode (0901-1 to n) → 179
Assign gas (0906-1 to n) → 179

Assign process variable

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

Selection
- Off
- Mass flow
- Corrected volume flow
- FAD volume flow
- Volume flow
- Energy flow
- Heat flow

Additional information

If the option selected is changed, the device resets the totalizer to 0.

Selection
If the Off option is selected, only Assign process variable parameter (→ 175) is still displayed in the Totalizer 1 to n submenu. All other parameters in the submenu are hidden.
**Navigation**

Expert → Application → Totalizer 1 to n → Unit totalizer 1 to n (0915–1 to n)

**Prerequisite**

A process variable is selected in the **Assign process variable** parameter (→ 175) of the **Totalizer 1 to n** submenu.

**Description**

Use this function to select the process variable unit for the Totalizer 1 to n (→ 175).

**Selection**

<table>
<thead>
<tr>
<th>SI units</th>
<th>US units</th>
</tr>
</thead>
<tbody>
<tr>
<td>g*</td>
<td>oz*</td>
</tr>
<tr>
<td>kg*</td>
<td>lb*</td>
</tr>
<tr>
<td>t*</td>
<td>STon*</td>
</tr>
</tbody>
</table>

* Visibility depends on order options or device settings

or

<table>
<thead>
<tr>
<th>SI units</th>
<th>US units</th>
</tr>
</thead>
<tbody>
<tr>
<td>m³*</td>
<td>ft³*</td>
</tr>
<tr>
<td>l*</td>
<td>Mft³*</td>
</tr>
</tbody>
</table>

* Visibility depends on order options or device settings

or

<table>
<thead>
<tr>
<th>SI units</th>
<th>US units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nl*</td>
<td>Sft³*</td>
</tr>
<tr>
<td>Nm³*</td>
<td>Sft³*</td>
</tr>
<tr>
<td>Sl*</td>
<td>Sft³*</td>
</tr>
<tr>
<td>Sm³*</td>
<td>Sft³*</td>
</tr>
</tbody>
</table>

* Visibility depends on order options or device settings

or

<table>
<thead>
<tr>
<th>SI units</th>
<th>US units</th>
</tr>
</thead>
<tbody>
<tr>
<td>m³ FAD*</td>
<td>cf FAD*</td>
</tr>
<tr>
<td>l FAD*</td>
<td></td>
</tr>
</tbody>
</table>

* Visibility depends on order options or device settings

or
SI units
- kWh*
- MWh*
- GWh*
- kJ*
- MJ*
- GJ*
- kcal*
- Mcal*
- Gcal*

Imperial units
- Btu*
- MBtu*
- MMBtu*

* Visibility depends on order options or device settings

or

Other units
None*

* Visibility depends on order options or device settings

Additionl information
Description
The unit is selected separately for each totalizer. It is independent of the selection made in the **System units** submenu (→ 54).

Selection
The selection is dependent on the process variable selected in the **Assign process variable** parameter (→ 175).

Totalizer operation mode

Navigation
Expert → Application → Totalizer 1 to n → Operation mode (0908–1 to n)

Prerequisite
A process variable is selected in the **Assign process variable** parameter (→ 175) of the **Totalizer 1 to n** submenu.

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

Selection
- Net flow total
- Forward flow total
- Reverse flow total

Additional information
Selection
- Net flow total
  Flow values in the forward and reverse flow direction are totalized and balanced against one another. Net flow is registered in the flow direction.
- Forward flow total
  Only the flow in the forward flow direction is totalized.
- Reverse flow total
  Only the flow in the reverse flow direction is totalized (= reverse flow quantity).
Control Totalizer 1 to n

Navigation

Expert → Application → Totalizer 1 to n → Control Tot. 1 to n (0912–1 to n)

Prerequisite

A process variable is selected in the Assign process variable parameter (→ 175) of the Totalizer 1 to n submenu.

Description

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

Selection

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

Additional information

<table>
<thead>
<tr>
<th>Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Totalize</td>
<td>The totalizer is started or continues running.</td>
</tr>
<tr>
<td>Reset + hold</td>
<td>The totaling process is stopped and the totalizer is reset to 0.</td>
</tr>
<tr>
<td>Preset + hold</td>
<td>The totaling process is stopped and the totalizer is set to its defined start value from the Preset value parameter.</td>
</tr>
<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>
<tr>
<td>Hold</td>
<td>Totalizing is stopped.</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 (→ 175) of the Totalizer 1 to n submenu.

Description

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

User entry

Signed floating-point number

Additional information

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

Example

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

**Navigation**

Expert → Application → Totalizer 1 to n → Failure mode (0901–1 to n)

**Prerequisite**

A process variable is selected in the Assign process variable parameter (→ 175) of the Totalizer 1 to n submenu.

**Description**

Use this function to select how a totalizer behaves in the event of a device alarm.

**Selection**

- Stop
- Actual value
- Last valid value

**Additional information**

Description

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

Selection

- Stop
  The totalizer is stopped in the event of a device alarm.
- Actual value
  The totalizer continues to count based on the actual measured value; the device alarm is ignored.
- Last valid value
  The totalizer continues to count based on the last valid measured value before the device alarm occurred.

### Assign gas (Only with order code for "Application package", option EV "Second gas group")

**Navigation**

Expert → Application → Totalizer 1 to n → Assign gas (0906–1 to n)

**Description**

Select the gas that the totalizer uses. This gas is only totalized when it is currently active (‘Active gas’ parameter).

**Selection**

- Both gases
- Gas
- Second gas

**Factory setting**

- Both gases option (only with order code for 'Application package', option EV "Second gas group")
- Gas
### 3.7 "Diagnostics" submenu

**Navigation**  
Expert → Diagnostics

<table>
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<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual diagnostics (0691)</td>
<td>181</td>
</tr>
<tr>
<td>Timestamp (0667)</td>
<td>181</td>
</tr>
<tr>
<td>Previous diagnostics (0690)</td>
<td>181</td>
</tr>
<tr>
<td>Timestamp (0672)</td>
<td>182</td>
</tr>
<tr>
<td>Operating time from restart (0653)</td>
<td>182</td>
</tr>
<tr>
<td>Operating time (0652)</td>
<td>182</td>
</tr>
<tr>
<td>Diagnostic list</td>
<td>183</td>
</tr>
<tr>
<td>Event logbook</td>
<td>187</td>
</tr>
<tr>
<td>Device information</td>
<td>188</td>
</tr>
<tr>
<td>Main electronic module + I/O module 1</td>
<td>192</td>
</tr>
<tr>
<td>Sensor electronic module (ISEM)</td>
<td>193</td>
</tr>
<tr>
<td>I/O module 2</td>
<td>194</td>
</tr>
<tr>
<td>I/O module 3</td>
<td>195</td>
</tr>
<tr>
<td>Display module</td>
<td>197</td>
</tr>
<tr>
<td>Minimum/maximum values</td>
<td>198</td>
</tr>
<tr>
<td>Data logging</td>
<td>200</td>
</tr>
<tr>
<td>Heartbeat</td>
<td>207</td>
</tr>
<tr>
<td>Simulation</td>
<td>207</td>
</tr>
</tbody>
</table>
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 (→ 183).
  - 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 electronic 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 (→ 181).

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.
Description of Device Parameters

Proline t-mass 300 HART

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 electronic 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 (→ 181).

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>
<tr>
<th>Diagnostic list</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostics 1 (0692)  →  183</td>
</tr>
<tr>
<td>Diagnostics 2 (0693)  →  184</td>
</tr>
<tr>
<td>Diagnostics 3 (0694)  →  185</td>
</tr>
<tr>
<td>Diagnostics 4 (0695)  →  185</td>
</tr>
<tr>
<td>Diagnostics 5 (0696)  →  186</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:

- F271 Main electronic failure
- F276 I/O module failure

---

### Timestamp

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

**Description**  
Displays the operating time when the diagnostic message with the highest priority occurred.
### Description of Device Parameters

**Proline t-mass 300 HART**

<table>
<thead>
<tr>
<th><strong>User interface</strong></th>
<th>Days (d), hours (h), minutes (m) and seconds (s)</th>
</tr>
</thead>
</table>

**Additional information**  
*Display*  
- The diagnostic message can be viewed via the **Diagnostics 1** parameter (→ 183).

#### Example

- For the display format: 24d12h13m00s

---

<table>
<thead>
<tr>
<th><strong>Diagnostics 2</strong></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>Navigation</strong></th>
<th>Expert → Diagnostics → Diagnostic list → Diagnostics 2 (0693)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>Description</strong></th>
<th>Displays the current diagnostics message with the second-highest priority.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>User interface</strong></th>
<th>Symbol for diagnostic behavior, diagnostic code and short message.</th>
</tr>
</thead>
</table>

| **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

-  F271 Main electronic failure
-  F276 I/O module failure

---

<table>
<thead>
<tr>
<th><strong>Timestamp</strong></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>Navigation</strong></th>
<th>Expert → Diagnostics → Diagnostic list → Timestamp</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>Description</strong></th>
<th>Displays the operating time when the diagnostic message with the second-highest priority occurred.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>User interface</strong></th>
<th>Days (d), hours (h), minutes (m) and seconds (s)</th>
</tr>
</thead>
</table>

| **Additional information** | *Display*  
  - The diagnostic message can be viewed via the **Diagnostics 2** parameter (→ 184).  

#### 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:  
- ☢F271 Main electronic failure  
- ☢F276 I/O module failure

### Timestamp

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

**Description**  
Displays the operating time when the diagnostic message with the 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 (→  185).

*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:
- \[\text{F271 Main electronic failure}\]
- \[\text{F276 I/O module failure}\]

### Timestamp

**Navigation**

[Expert → Diagnostics → Diagnostic list → Timestamp]

**Description**

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

**User interface**

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

**Additional information**

**Display**

The diagnostic message can be viewed via the **Diagnostics 4** parameter (→ \[\text{185}\]).

**Example**

For the display format:

\[24d12h13m00s\]

### Diagnostics 5

**Navigation**

[Expert → Diagnostics → Diagnostic list → Diagnostics 5 (0696)]

**Description**

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

**User interface**

Symbol for diagnostic behavior, diagnostic code and short message.

**Additional information**

**Display**

Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the \[\text{key}\].

**Examples**

For the display format:
- \[\text{F271 Main electronic failure}\]
- \[\text{F276 I/O module failure}\]
### Timestamp

**Navigation**

[Expert → Diagnostics → Diagnostic list → Timestamp]

**Description**

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

**User interface**

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

**Additional information**

*Display*

The diagnostic message can be viewed via the **Diagnostics 5** parameter (→ 186).

*Example*

For the display format: 24d12h13m00s

### 3.7.2 "Event logbook" submenu

**Navigation**

[Expert → Diagnostics → Event logbook]

**Filter options**

**Navigation**

[Expert → Diagnostics → Event logbook → Filter options]

**Description**

Use this function to select the category whose event messages are displayed in the event list of the operating tool.

**Selection**

- All
- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- Information (I)
### Additional information

**Description**

The status signals are categorized in accordance with VDI/VDE 2650 and NAMUR Recommendation NE 107:
- F = Failure
- C = Function Check
- S = Out of Specification
- M = Maintenance Required

### 3.7.3 "Device information" submenu

**Navigation**  
Expert → Diagnostics → Device info

<table>
<thead>
<tr>
<th>▶ Device information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device tag (0011) → 188</td>
</tr>
<tr>
<td>Serial number (0009) → 189</td>
</tr>
<tr>
<td>Firmware version (0010) → 189</td>
</tr>
<tr>
<td>Device name (0020) → 190</td>
</tr>
<tr>
<td>Order code (0008) → 190</td>
</tr>
<tr>
<td>Extended order code 1 (0023) → 190</td>
</tr>
<tr>
<td>Extended order code 2 (0021) → 190</td>
</tr>
<tr>
<td>Extended order code 3 (0022) → 191</td>
</tr>
<tr>
<td>Configuration counter (0233) → 191</td>
</tr>
<tr>
<td>ENP version (0012) → 191</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. The name is displayed in the header.

**User interface**

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

- **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**

- The Firmware version is also located:
  - On the title page of the Operating instructions
  - On the transmitter nameplate
Device name

Navigation  
Expert → Diagnostics → Device info → Device name (0020)

Description  
Displays the name of the transmitter. It can also be found on the nameplate of the transmitter.

User interface  
Character string comprising numbers, letters and special characters (#16)

Order code

Navigation  
Expert → Diagnostics → Device info → Order code (0008)

Description  
Displays the device order code.

User interface  
Character string composed of letters, numbers and certain punctuation marks (e.g. /).

Additional information  
Description  
The order code is generated from the extended order code through a process of reversible transformation. The extended order code indicates the attributes for all the device features in the product structure. The device features are not directly readable from the order code.

Uses of the order code
- To order an identical spare device.
- To identify the device quickly and easily, e.g. when contacting Endress+Hauser.

Extended order code 1

Navigation  
Expert → Diagnostics → Device info → Ext. order cd. 1 (0023)

Description  
Displays the first part of the extended order code.

On account of length restrictions, the extended order code is split into a maximum of 3 parameters.

User interface  
Character string

Additional information  
Description  
The extended order code indicates the version of all the features of the product structure for the measuring device and thus uniquely identifies the measuring device.

Extended order code 2

Navigation  
Expert → Diagnostics → Device info → Ext. order cd. 2 (0021)

Description  
Displays the second part of the extended order code.
User interface
Character string

Additional information
For additional information, see Extended order code 1 parameter (→ 190)

Extended order code 3

Navigation
Expert → Diagnostics → Device info → Ext. order cd. 3 (0022)

Description
Displays the third part of the extended order code.

User interface
Character string

Additional information
For additional information, see Extended order code 1 parameter (→ 190)

Configuration counter

Navigation
Expert → Diagnostics → Device info → Config. counter (0233)

Description
Displays the number of parameter modifications for the device. When the user changes a parameter setting, this counter is incremented.

User interface
0 to 65,535

ENP version

Navigation
Expert → Diagnostics → Device info → ENP version (0012)

Description
Displays the version of the electronic nameplate.

User interface
Character string

Additional information
Description
This electronic nameplate stores a data record for device identification that includes more data than the nameplates attached to the outside of the device.
3.7.4 "Main electronic module + I/O module 1" submenu

**Navigation**

Expert → Diagnostics → Mainboard I/O1

<table>
<thead>
<tr>
<th>Function</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Software revision</td>
<td>192</td>
</tr>
<tr>
<td>Build no. software</td>
<td>192</td>
</tr>
<tr>
<td>Bootloader revision</td>
<td>192</td>
</tr>
</tbody>
</table>

---

**Software revision**

**Navigation**

Expert → Diagnostics → Mainboard I/O1 → Software rev. (0072)

**Description**

Use this function to display the software revision of the module.

**User interface**

Positive integer

---

**Build no. software**

**Navigation**

Expert → Diagnostics → Mainboard I/O1 → Build no. softw. (0079)

**Description**

Use this function to display the software build number of the module.

**User interface**

Positive integer

---

**Bootloader revision**

**Navigation**

Expert → Diagnostics → Mainboard I/O1 → Bootloader rev. (0073)

**Description**

Use this function to display the bootloader revision of the software.

**User interface**

Positive integer
3.7.5  "Sensor electronic module (ISEM)" submenu

**Navigation**  
Expert → Diagnostics → Sens. electronic

**Software revision**

Use this function to display the software revision of the module.

**User interface**  
Positive integer

**Build no. software**

Use this function to display the software build number of the module.

**User interface**  
Positive integer

**Bootloader revision**

Use this function to display the bootloader revision of the software.

**User interface**  
Positive integer
3.7.6 "I/O module 2" submenu

**Navigation**  
Expert → Diagnostics → I/O module 2

<table>
<thead>
<tr>
<th>I/O module 2 terminal numbers (3902–2)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Software revision (0072)</td>
<td>→ 194</td>
</tr>
<tr>
<td>Build no. software (0079)</td>
<td>→ 194</td>
</tr>
<tr>
<td>Bootloader revision (0073)</td>
<td>→ 195</td>
</tr>
</tbody>
</table>

**I/O module 2 terminal numbers**

**Navigation**  
Expert → Diagnostics → I/O module 2 → I/O 2 terminals (3902–2)

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

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

**Software revision**

**Navigation**
- Expert → Diagnostics → Display module → Software rev. (0072)
- Expert → Diagnostics → I/O module → Software rev. (0072)
- Expert → Diagnostics → Sens. electronic → Software rev. (0072)
- Expert → Diagnostics → Main elec.+I/O1 → Software rev. (0072)
- Expert → Diagnostics → Mainboard I/O1 → Software rev. (0072)

**Description**  
Use this function to display the software revision of the module.

**User interface**  
Positive integer

**Build no. software**

**Navigation**  
Expert → Diagnostics → I/O module → Build no. softw. (0079)

**Description**  
Use this function to display the software build number of the module.
**User interface**
Positive integer

**Bootloader revision**

**Navigation**

Expert → Diagnostics → I/O module → Bootloader rev. (0073)

**Description**
Use this function to display the bootloader revision of the software.

**User interface**
Positive integer

---

### 3.7.7 "I/O module 3" submenu

**Navigation**

Expert → Diagnostics → I/O module 3

**I/O module 3 terminal numbers**

**Navigation**

Expert → Diagnostics → I/O module 3 → I/O 3 terminals (3902–3)

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

**User interface**
- Not used
- 26–27 (I/O 1)
- 24–25 (I/O 2)
- 22–23 (I/O 3)
Software revision

**Navigation**
- Expert → Diagnostics → Display module → Software rev. (0072)
- Expert → Diagnostics → I/O module → Software rev. (0072)
- Expert → Diagnostics → Sens. electronic → Software rev. (0072)
- Expert → Diagnostics → Main. elec.+I/O1 → Software rev. (0072)
- Expert → Diagnostics → Mainboard I/O1 → Software rev. (0072)

**Description**
Use this function to display the software revision of the module.

**User interface**
Positive integer

Build no. software

**Navigation**
- Expert → Diagnostics → Display module → Build no. softw. (0079)
- Expert → Diagnostics → I/O module → Build no. softw. (0079)
- Expert → Diagnostics → Sens. electronic → Build no. softw. (0079)
- Expert → Diagnostics → Main elec.+I/O1 → Build no. softw. (0079)
- Expert → Diagnostics → Mainboard I/O1 → Build no. softw. (0079)

**Description**
Use this function to display the software build number of the module.

**User interface**
Positive integer

Bootloader revision

**Navigation**
- Expert → Diagnostics → Display module → Bootloader rev. (0073)
- Expert → Diagnostics → I/O module → Bootloader rev. (0073)
- Expert → Diagnostics → Sens. electronic → Bootloader rev. (0073)
- Expert → Diagnostics → Main elec.+I/O1 → Bootloader rev. (0073)
- Expert → Diagnostics → Mainboard I/O1 → Bootloader rev. (0073)

**Description**
Use this function to display the bootloader revision of the software.

**User interface**
Positive integer
### 3.7.8 "Display module" submenu

**Navigation**

![Navigate to Expert → Diagnostics → Display module](image)

**Description**

Use this function to display the software revision of the module.

**User interface**

Positive integer

---

#### Software revision

**Navigation**

![Navigate to Expert → Diagnostics → Display module → Software rev. (0072)](image)

**Description**

Use this function to display the software revision of the module.

**User interface**

Positive integer

---

#### Build no. software

**Navigation**

![Navigate to Expert → Diagnostics → Display module → Build no. softw. (0079)](image)

**Description**

Use this function to display the software build number of the module.

**User interface**

Positive integer

---

#### Bootloader revision

**Navigation**

![Navigate to Expert → Diagnostics → Display module → Bootloader rev. (0073)](image)

**Description**

Use this function to display the bootloader revision of the software.

**User interface**

Positive integer
3.7.9 "Minimum/maximum values" submenu

**Navigation**

![Expert → Diagnostics → Min/max val.]

**Reset min/max values**

- **Navigation**
  - ![Expert → Diagnostics → Min/max val. → Reset min/max (17015)]

- **Description**
  - Select measured variable whose minimum value and maximum value are to be reset.

- **Selection**
  - Main electronic temperature (→ 198)
  - Medium temperature (→ 199)

**"Main electronic temperature" submenu**

**Navigation**

![Expert → Diagnostics → Min/max val. → Main elect.temp.]

**Maximum value**

- **Navigation**
  - ![Expert → Diagnostics → Min/max val. → Main elect.temp. → Maximum value (17321)]

- **Description**
  - Shows the highest previously measured temperature for the main electronic module in the transmitter.

- **User interface**
  - Signed floating-point number
### Minimum value

**Navigation**

Expert → Diagnostics → Min/max val. → Main elect.temp. → Minimum value (17322)

**Description**

Shows the lowest previously measured temperature for the main electronic module in the transmitter.

**User interface**

Signed floating-point number

### "Medium temperature" submenu

**Navigation**

Expert → Diagnostics → Min/max val. → Medium temp.

<table>
<thead>
<tr>
<th>Medium temperature</th>
<th>Maximum value (17324)</th>
<th>Minimum value (17323)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>→ 199</td>
<td>→ 199</td>
</tr>
</tbody>
</table>

### Maximum value

**Navigation**

Expert → Diagnostics → Min/max val. → Medium temp. → Maximum value (17324)

**Description**

Shows the highest previously measured medium temperature.

**User interface**

Signed floating-point number

### Minimum value

**Navigation**

Expert → Diagnostics → Min/max val. → Medium temp. → Minimum value (17323)

**Description**

Shows the lowest previously measured medium temperature.

**User interface**

Signed floating-point number
3.7.10  "Data logging" submenu

**Navigation**

Expert → Diagnostics → Data logging

---

**Assign channel 1 (0851)**

**Prerequisite**

The Extended HistOROM application package is available.

**Description**

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

---

**Display channel 1**

**Display channel 2**

**Display channel 3**

**Display channel 4**
Selection

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

Additional information

Description

A total of 1000 measured values can be logged. This means:
- 1000 data points if 1 logging channel is used
- 500 data points if 2 logging channels are used
- 333 data points if 3 logging channels are used
- 250 data points if 4 logging channels are used

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

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

Assign channel 2

Navigation

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

Prerequisite

The Extended HistoROM application package is available.

The software options currently enabled are displayed in the Software option overview parameter (→ 40).

Description

Options for the assignment of a process variable to the data logging channel.

Selection

Picklist, see Assign channel 1 parameter (→ 200)
Assign channel 3

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

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

**Description**
Options for the assignment of a process variable to the data logging channel.

**Selection**
Picklist, see Assign channel 1 parameter (→ 200)

Assign channel 4

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

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

**Description**
Options for the assignment of a process variable to the data logging channel.

**Selection**
Picklist, see Assign channel 1 parameter (→ 200)

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
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).

\[ T_{\text{log}} = 1000 \times 1 \text{ s} = 1000 \text{ s} \approx 15 \text{ min} \]
\[ T_{\text{log}} = 1000 \times 10 \text{ s} = 10000 \text{ s} \approx 3 \text{ h} \]
\[ T_{\text{log}} = 1000 \times 80 \text{ s} = 80000 \text{ s} \approx 1 \text{ d} \]
\[ T_{\text{log}} = 1000 \times 3600 \text{ s} = 3600000 \text{ s} \approx 41 \text{ d} \]

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

Additional information

Selection

- Cancel
  The data is not cleared. All the data is retained.
- Clear data
  The logging data is cleared. The logging process starts from the beginning.

Data logging

Navigation  
Expert → Diagnostics → Data logging → Data logging (0860)

Description

Use this function to select the data logging method.

Selection

- Overwriting
- Not overwriting
**Additional information**

*Selection*

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

---

**Logging delay**

**Navigation**

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

**Prerequisite**

In the **Data logging** parameter (→ 203), the **Not overwriting** option is selected.

**Description**

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

**User entry**

0 to 999 h

**Additional information**

*Description*

Once measured value logging has been started with the **Data logging control** parameter (→ 204), 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 (→ 203), the **Not overwriting** option is selected.

**Description**

Use this function to start and stop measured value logging.

**Selection**

- None
- Delete + start
- Stop

**Additional information**

*Selection*

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

---

**Data logging status**

**Navigation**

Expert → Diagnostics → Data logging → Data log. status (0858)

**Prerequisite**

In the **Data logging** parameter (→ 203), the **Not overwriting** option is selected.
Description
Displays the measured value logging status.

User interface
- Done
- Delay active
- Active
- Stopped

Additional information
Selection
- Done
  Measured value logging has been performed and completed successfully.
- Delay active
  Measured value logging has been started but the logging interval has not yet elapsed.
- Active
  The logging interval has elapsed and measured value logging is active.
- Stopped
  Measured value logging is stopped.

Entire logging duration

Navigation
Expert → Diagnostics → Data logging → Logging duration (0861)

Prerequisite
In the Data logging parameter (→ 203), the Not overwriting option is selected.

Description
Displays the total logging duration.

User interface
Positive floating-point number

"Display channel 1" submenu

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

Display channel 1

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

Prerequisite
The Extended HistOROM application package is available.

Description
Displays the measured value trend for the logging channel in the form of a chart.
Additional information

Description

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

"Display channel 2" submenu

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

Display channel 2

Prerequisite
A process variable is defined in the Assign channel 2 parameter.

Description
See the Display channel 1 parameter → 205

"Display channel 3" submenu

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

Display channel 3

Prerequisite
A process variable is defined in the Assign channel 3 parameter.

Description
See the Display channel 1 parameter → 205
"Display channel 4" submenu

Navigation

Expert → Diagnostics → Data logging → Displ.channel 4

Display channel 4

Prerequisite

A process variable is defined in the Assign channel 4 parameter.

Description

See the Display channel 1 parameter → 205

3.7.11 "Heartbeat" submenu

For detailed information on the parameter descriptions for the Heartbeat Verification+Monitoring refer to the Special Documentation for the device → 7

Navigation

Expert → Diagnostics → Heartbeat

Heartbeat Technology

3.7.12 "Simulation" submenu

Navigation

Expert → Diagnostics → Simulation

Simulation

Assign simulation process variable (1810) → 208

Process variable value (1811) → 209

Current input 1 to n simulation (1608–1 to n) → 209

Value current input 1 to n (1609–1 to n) → 210

Status input simulation 1 to n (1355–1 to n) → 210
### Assign simulation process variable

#### Navigation

[mdi_expert] Expert → Diagnostics → Simulation → Assign proc.var. (1810)

#### Description

Use this function to select a process variable for the simulation process that is activated. The display alternates between the measured value and a diagnostic message of the ‘Function check’ category (C) while simulation is in progress.

#### Selection

- Off
- Temperature
- Mass flow
- Corrected volume flow
- FAD volume flow

* Visibility depends on order options or device settings
- Volume flow
- Energy flow*
- Heat flow*
- Density
- Flow velocity

**Additional information**

**Description**

The simulation value of the process variable selected is defined in the **Process variable value** parameter (→ 209).

**Process variable value**

**Navigation**

Expert → Diagnostics → Simulation → Proc. var. value (1811)

**Prerequisite**

A process variable is selected in the **Assign simulation process variable** parameter (→ 208).

**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

**Additional information**

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

**Current input 1 to n simulation**

**Navigation**

Expert → Diagnostics → Simulation → Curr.inp 1 to n sim. (1608–1 to n)

**Description**

Option for switching simulation of the current input on and off. The display alternates between the measured value and a diagnostic message of the ‘Function check’ category (C) while simulation is in progress.

The desired simulation value is defined in the **Value current input 1 to n** parameter.

**Selection**

- Off
- On

**Additional information**

- 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.

* Visibility depends on order options or device settings
**Value current input 1 to n**

**Navigation**
- Expert → Diagnostics → Simulation → Value curr.inp 1 to n (1609–1 to n)

**Prerequisite**
In the **Current input 1 to n simulation** parameter, the **On** option is selected.

**Description**
Use this function to enter the current value for the simulation. In this way, users can verify the correct configuration of the current input and the correct function of upstream feed-in units.

**User entry**
0 to 22.5 mA

**Status input simulation 1 to n**

**Navigation**
- Expert → Diagnostics → Simulation → Status inp.sim 1 to n (1355–1 to n)

**Description**
Use this function to switch simulation of the status input on and off. The display alternates between the measured value and a diagnostic message of the ‘Function check’ category (C) while simulation is in progress.

**Selection**
- Off
- On

**Additional information**
- Description
  
The desired simulation value is defined in the **Input signal level** parameter (→ 210).

**Selection**
- Off
  
  Simulation for the status input is switched off. The device is in normal measuring mode or another process variable is being simulated.
- On
  
  Simulation for the status input is active.

**Input signal level 1 to n**

**Navigation**
- Expert → Diagnostics → Simulation → Signal level 1 to n (1356–1 to n)

**Prerequisite**
In the **Status input simulation** parameter (→ 210), the **On** option is selected.

**Description**
Use this function to select the signal level for the simulation of the status input. In this way, users can verify the correct configuration of the status input and the correct function of upstream feed-in units.

**Selection**
- High
- Low
Current output 1 to n simulation

**Navigation**

Expert → Diagnostics → Simulation → Curr.out. 1 to n sim. (0354–1 to n)

**Description**

Use this function to switch simulation of the current output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

**Selection**

- Off
- On

**Additional information**

*Description*

The desired simulation value is defined in the **Value current output 1 to n** parameter.

*Selection*

- Off
  Current simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
- On
  Current simulation is active.

Value current output 1 to n

**Navigation**

Expert → Diagnostics → Simulation → Value curr.out 1 to n (0355–1 to n)

**Prerequisite**

In the **Current output 1 to n simulation** parameter, the **On** option is selected.

**Description**

Use this function to enter a current value for the simulation. In this way, users can verify the correct adjustment of the current output and the correct function of downstream switching units.

**User entry**

3.59 to 22.5 mA

**Additional information**

*Dependency*

The input range is dependent on the option selected in the **Current span** parameter (→ 112).

Frequency output simulation 1 to n

**Navigation**

Expert → Diagnostics → Simulation → FreqOutputSim 1 to n (0472–1 to n)

**Prerequisite**

In the **Operating mode** parameter (→ 119), the **Frequency** option is selected.

**Description**

Use this function to switch simulation of the frequency output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.
Description of Device Parameters

Proline t-mass 300 HART

Selection

- Off
- On

Additional information

**Description**

The desired simulation value is defined in the **Frequency value 1 to n** parameter.

**Selection**

- Off
  Frequency simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
- On
  Frequency simulation is active.

**Frequency value 1 to n**

**Navigation**

Expert → Diagnostics → Simulation → Freq value 1 to n (0473–1 to n)

**Prerequisite**

In the **Frequency output simulation 1 to n** parameter, the **On** option is selected.

**Description**

Use this function to enter a frequency value for the simulation. In this way, users can verify the correct adjustment of the frequency output and the correct function of downstream switching units.

**User entry**

0.0 to 12500.0 Hz

**Pulse output simulation 1 to n**

**Navigation**

Expert → Diagnostics → Simulation → Puls.outp.sim. 1 to n (0458–1 to n)

**Prerequisite**

In the **Operating mode** parameter (→ 119), the **Pulse** option is selected.

**Description**

Use this function to switch simulation of the pulse output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

**Selection**

- Off
- Fixed value
- Down-counting value
Additional information

**Description**

* The desired simulation value is defined in the **Pulse value 1 to n** parameter.

**Selection**

- **Off**
  
  Pulse simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.

- **Fixed value**
  
  Pulses are continuously output with the pulse width specified in the **Pulse width** parameter (→ 121).

- **Down-counting value**
  
  The pulses specified in the **Pulse value** parameter (→ 213) are output.

---

**Pulse value 1 to n**

<table>
<thead>
<tr>
<th>Navigation</th>
<th>Expert → Diagnostics → Simulation → Pulse value 1 to n (0459–1 to n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prerequisite</td>
<td>In the <strong>Pulse output simulation 1 to n</strong> parameter, the <strong>Down-counting value</strong> option is selected.</td>
</tr>
</tbody>
</table>

**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 65535

---

**Switch output simulation 1 to n**

<table>
<thead>
<tr>
<th>Navigation</th>
<th>Expert → Diagnostics → Simulation → Switch sim. 1 to n (0462–1 to n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prerequisite</td>
<td>In the <strong>Operating mode</strong> parameter (→ 119), the <strong>Switch</strong> option is selected.</td>
</tr>
</tbody>
</table>

**Description**

Use this function to switch simulation of the switch output on and off. The display alternates between the measured value and a diagnostic message of the 'Function check' category (C) while simulation is in progress.

**Selection**

- **Off**
- **On**

**Additional information**

**Description**

* The desired simulation value is defined in the **Switch status 1 to n** parameter.

**Selection**

- **Off**
  
  Switch simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.

- **On**
  
  Switch simulation is active.
**Switch status 1 to n**

**Navigation**
Expert → Diagnostics → Simulation → Switch status 1 to n (0463–1 to n)

**Description**
Use this function to select a switch value for the simulation. In this way, users can verify the correct adjustment of the switch output and the correct function of downstream switching units.

**Selection**
- Open
- Closed

**Additional information**

- **Selection**
  - Open
    Switch simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
  - Closed
    Switch simulation is active.

**Relay output 1 to n simulation**

**Navigation**
Expert → Diagnostics → Simulation → Relay out. 1 to n sim (0802–1 to n)

**Description**
Use this function to switch simulation of the relay output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

**Selection**
- Off
- On

**Additional information**

**Description**
The desired simulation value is defined in the **Switch status 1 to n** parameter.

- **Selection**
  - Off
    Relay simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
  - On
    Relay simulation is active.

**Switch status 1 to n**

**Navigation**
Expert → Diagnostics → Simulation → Switch status 1 to n (0803–1 to n)

**Prerequisite**
The **On** option is selected in the **Switch output simulation 1 to n** parameter.

**Description**
Use this function to select a relay value for the simulation. In this way, users can verify the correct adjustment of the relay output and the correct function of downstream switching units.
Selection
- Open
- Closed

Additional information
Selection
- Open
  Relay simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
- Closed
  Relay simulation is active.

Device alarm simulation

Navigation
Expert → Diagnostics → Simulation → Dev. alarm sim. (0654)

Description
Use this function to switch the device alarm on and off.

Selection
- Off
- On

Additional information
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 (→ 215).

Selection
- Sensor
- Electronics
- Configuration
- Process

Diagnostic event simulation

Navigation
Expert → Diagnostics → Simulation → Diag. event sim. (0737)

Description
Use this function to select a diagnostic event for the simulation process that is activated.

Selection
- Off
- Diagnostic event picklist (depends on the category selected)
Additional information

For the simulation, you can choose from the diagnostic events of the category selected in the Diagnostic event category parameter (→ 215).

3.8 "I/O configuration" submenu

Navigation

Expert → I/O config.

I/O module 1 to n terminal numbers

**Navigation**

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

**Description**

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

**User interface**

- Not used
- 26-27 (I/O 1)
- 24-25 (I/O 2)
- 22-23 (I/O 3)

I/O module 1 to n information

**Navigation**

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

**Description**

Displays information about the plugged in I/O module.

**User interface**

- Not plugged
- Invalid
- Not configurable
- Configurable
- HART
**Additional information**

- **'Not plugged' option**
  The I/O module is not plugged in.

- **'Invalid' option**
  The I/O module is not plugged correctly.

- **'Not configurable' option**
  The I/O module is not configurable.

- **'Configurable' option**
  The I/O module is configurable.

- **'Fieldbus' option**
  The I/O module is configured for HART.

**I/O module 1 to n type**

**Navigation**

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

**Prerequisite**

For the following order code:

- "Output; input 2", option D "Configurable I/O initial setting off"
- "Output; input 3", option D "Configurable I/O initial setting off"

**Description**

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

**Selection**

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

**Apply I/O configuration**

**Navigation**

- Expert → I/O config. → Apply I/O config (3907)

**Description**

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

**Selection**

- No
- Yes

* Visibility depends on order options or device settings
### I/O alteration code

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<th>Expert → I/O config. → I/O alterat.code (2762)</th>
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</thead>
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<tr>
<td>Description</td>
<td>Use this function to enter the ordered activation code to activate the I/O configuration change.</td>
</tr>
<tr>
<td>User entry</td>
<td>Positive integer</td>
</tr>
</tbody>
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| Additional information | **Description**  
The I/O configuration is changed in the **I/O module type** parameter (→ 217). |
4 Country-specific factory settings

4.1 SI units

Not valid for USA and Canada.

4.1.1 System units

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<th>SI unit</th>
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</thead>
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<td>m³/h option</td>
</tr>
<tr>
<td>Volume</td>
<td>m³ option</td>
</tr>
<tr>
<td>Mass flow</td>
<td>kg/h option</td>
</tr>
<tr>
<td>Mass</td>
<td>kg option</td>
</tr>
<tr>
<td>Corrected volume flow</td>
<td>Nm³/h option</td>
</tr>
<tr>
<td>Corrected volume</td>
<td>Nm³ option</td>
</tr>
<tr>
<td>FAD volume flow</td>
<td>m³ FAD/h option</td>
</tr>
<tr>
<td>FAD volume</td>
<td>m³ FAD option</td>
</tr>
<tr>
<td>Density</td>
<td>kg/m³ option</td>
</tr>
<tr>
<td>Reference density</td>
<td>kg/Nm³</td>
</tr>
<tr>
<td>Temperature</td>
<td>°C option</td>
</tr>
<tr>
<td>Length</td>
<td>mm option</td>
</tr>
<tr>
<td>Pressure</td>
<td>bar a option</td>
</tr>
</tbody>
</table>

4.1.2 Full scale values

The full scale values depend on the medium type, nominal diameter and rectifier.

The factory settings apply to the following parameters:

- 20 mA value (full scale value of the current output)
- 100% bar graph value 1

4.1.3 Output current span

| Current output 1 to n       | 4 to 20 mA NAMUR |

4.1.4 On value low flow cut off

The switch-on point depends on the type of medium and the nominal diameter.

4.2 US units

Only valid for USA and Canada.

4.2.1 System units

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<thead>
<tr>
<th>Unit</th>
<th>US unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume flow</td>
<td>ft³/h option</td>
</tr>
<tr>
<td>Volume</td>
<td>ft³ option</td>
</tr>
<tr>
<td>Mass flow</td>
<td>lb/h option</td>
</tr>
</tbody>
</table>
4.2.2 Full scale values
The full scale values depend on the medium type, nominal diameter and rectifier.

The factory settings apply to the following parameters:
- 20 mA value (full scale value of the current output)
- 100% bar graph value 1

4.2.3 Output current span

4.2.4 On value low flow cut off
The switch-on point depends on the type of medium and the nominal diameter.
5  Explanation of abbreviated units

5.1  SI units

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<th>Units</th>
<th>Explanation</th>
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</thead>
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<td>Density</td>
<td>g/cm³</td>
<td>Gram/volume unit</td>
</tr>
<tr>
<td></td>
<td>kg/l, kg/dm³, kg/m³</td>
<td>Kilogram/volume unit</td>
</tr>
<tr>
<td>Pressure</td>
<td>kPa a, MPa a</td>
<td>Kilopascal, megapascal (absolute)</td>
</tr>
<tr>
<td></td>
<td>bar</td>
<td>Bar</td>
</tr>
<tr>
<td></td>
<td>mbar a</td>
<td>Millibar (absolute)</td>
</tr>
<tr>
<td>FAD volume</td>
<td>1 FAD, m³ FAD</td>
<td>FAD liter, FAD cubic meter</td>
</tr>
<tr>
<td>FAD volume flow</td>
<td>1 FAD/s, 1 FAD/min, 1 FAD/h, 1 FAD/d</td>
<td>FAD liter/time unit</td>
</tr>
<tr>
<td></td>
<td>m³ FAD/s, m³ FAD/min, m³ FAD/h, m³ FAD/d</td>
<td>FAD cubic meter/time unit</td>
</tr>
<tr>
<td>Length</td>
<td>mm, m</td>
<td>Millimeter, meter</td>
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<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, g/h, g/d</td>
<td>Gram/time unit</td>
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<tr>
<td></td>
<td>kg/s, kg/min, kg/h, kg/d</td>
<td>Kilogram/time unit</td>
</tr>
<tr>
<td></td>
<td>t/s, t/min, t/h, t/d</td>
<td>Metric ton/time unit</td>
</tr>
<tr>
<td>Corrected volume</td>
<td>Nl, Nm³, Sl, Sm³</td>
<td>Normal liter, normal cubic meter, standard liter, standard cubic meter</td>
</tr>
<tr>
<td>Corrected volume flow</td>
<td>Nl/s, Nl/min, Nl/h, Nl/d</td>
<td>Normal liter/time unit</td>
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<tr>
<td></td>
<td>Nm³/s, Nm³/min, Nm³/h, Nm³/d</td>
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<td>Sl/s, Sl/min, Sl/h, Sl/d</td>
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<tr>
<td></td>
<td>Sm³/s, Sm³/min, Sm³/h, Sm³/d</td>
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<td>Temperature</td>
<td>°C, K</td>
<td>Celsius, Kelvin</td>
</tr>
<tr>
<td>Volume</td>
<td>m³</td>
<td>Cubic meters</td>
</tr>
<tr>
<td>Volume flow</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>Time</td>
<td>s, m, h, d, y</td>
<td>Second, minute, hour, day, year</td>
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</table>

5.2  US units

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<th>Process variable</th>
<th>Units</th>
<th>Explanation</th>
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</thead>
<tbody>
<tr>
<td>Density</td>
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<td>Pound/cubic foot</td>
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<tr>
<td>FAD volume</td>
<td>ft³ FAD</td>
<td>FAD cubic foot</td>
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<tr>
<td>FAD volume flow</td>
<td>cf FAD/s, cf FAD/min, cf FAD/h, cf FAD/d</td>
<td>FAD cubic foot/time unit</td>
</tr>
<tr>
<td>FAD volume flow</td>
<td>ft³ FAD/s, ft³ FAD/min, ft³ FAD/h, ft³ FAD/d</td>
<td>FAD cubic foot/time unit</td>
</tr>
<tr>
<td>Length</td>
<td>in, ft</td>
<td>Inch, foot</td>
</tr>
<tr>
<td>Mass</td>
<td>lb, ton</td>
<td>Pound, standard ton</td>
</tr>
<tr>
<td>lb/s, lb/min, lb/h, lb/d</td>
<td>Pound/time unit</td>
<td></td>
</tr>
<tr>
<td>Process variable</td>
<td>Units</td>
<td>Explanation</td>
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<tr>
<td>-------------------------------</td>
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<td>------------------------------</td>
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<tr>
<td>STon/s, STon/min, STon/h, STon/d</td>
<td>Standard ton/time unit</td>
<td></td>
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<tr>
<td>Mass flow</td>
<td>lb/s, lb/min, lb/h, lb/d</td>
<td>Pound/time unit</td>
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<tr>
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<td>ton/s, ton/min, ton/h, ton/d</td>
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<td>Sft³</td>
<td>Standard cubic foot</td>
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<td>Corrected volume flow</td>
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<td>Volume</td>
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<td>Cubic foot</td>
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<tr>
<td>Volume flow</td>
<td>ft³/s, ft³/min, ft³/h, ft³/d</td>
<td>Cubic foot/time unit</td>
</tr>
<tr>
<td>Time</td>
<td>s, m, h, d, y</td>
<td>Second, minute, hour, day, year</td>
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<td></td>
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