Description of Device Parameters

Proline Promass 100

HART

Coriolis 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

![Sample graphic for the schematic layout of the operating menu](image)
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="#" alt="Tip" /></td>
<td>Indicates additional information.</td>
</tr>
<tr>
<td><img src="#" alt="Reference to documentation" /></td>
<td>Reference to documentation</td>
</tr>
<tr>
<td><img src="#" alt="Reference to page" /></td>
<td>Reference to page</td>
</tr>
<tr>
<td><img src="#" alt="Reference to graphic" /></td>
<td>Reference to graphic</td>
</tr>
<tr>
<td><img src="#" alt="Operation via local display" /></td>
<td>Operation via local display</td>
</tr>
<tr>
<td><img src="#" alt="Operation via operating tool" /></td>
<td>Operation via operating tool</td>
</tr>
<tr>
<td><img src="#" 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>Promass A 100</td>
<td>BA01187D</td>
</tr>
<tr>
<td>Promass E 100 (8E1B**,...)</td>
<td>BA01167D</td>
</tr>
<tr>
<td>Promass E 100 (8E1C**,...)</td>
<td>BA01713D</td>
</tr>
<tr>
<td>Promass F 100</td>
<td>BA01168D</td>
</tr>
<tr>
<td>Promass G 100</td>
<td>BA01346D</td>
</tr>
<tr>
<td>Promass H 100</td>
<td>BA01189D</td>
</tr>
<tr>
<td>Promass I 100</td>
<td>BA01190D</td>
</tr>
<tr>
<td>Promass O 100</td>
<td>BA01191D</td>
</tr>
<tr>
<td>Promass P 100</td>
<td>BA01192D</td>
</tr>
<tr>
<td>Promass S 100</td>
<td>BA01193D</td>
</tr>
<tr>
<td>Promass X 100</td>
<td>BA01194D</td>
</tr>
</tbody>
</table>

1.5.2 Supplementary device-dependent documentation

Special Documentation

<table>
<thead>
<tr>
<th>Content</th>
<th>Documentation code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information on the Pressure Equipment Directive</td>
<td>SD01614D</td>
</tr>
<tr>
<td>Concentration Measurement</td>
<td>SD01152D</td>
</tr>
<tr>
<td>Heartbeat Technology</td>
<td>SD01153D</td>
</tr>
<tr>
<td>Web server</td>
<td>SD01820D</td>
</tr>
</tbody>
</table>
## Overview of the Expert operating menu

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

<table>
<thead>
<tr>
<th>Expert</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct access</td>
<td>→ 10</td>
</tr>
<tr>
<td>Locking status</td>
<td>→ 11</td>
</tr>
<tr>
<td>Access stat.disp</td>
<td>→ 12</td>
</tr>
<tr>
<td>Access stat.tool</td>
<td>→ 12</td>
</tr>
<tr>
<td>Ent. access code</td>
<td>→ 13</td>
</tr>
<tr>
<td>System</td>
<td>→ 13</td>
</tr>
<tr>
<td>Display</td>
<td>→ 13</td>
</tr>
<tr>
<td>Diagn. handling</td>
<td>→ 33</td>
</tr>
<tr>
<td>Administration</td>
<td>→ 27</td>
</tr>
<tr>
<td>Sensor</td>
<td>→ 42</td>
</tr>
<tr>
<td>Measured val.</td>
<td>→ 42</td>
</tr>
<tr>
<td>System units</td>
<td>→ 53</td>
</tr>
<tr>
<td>Process param.</td>
<td>→ 68</td>
</tr>
<tr>
<td>Measurement mode</td>
<td>→ 76</td>
</tr>
<tr>
<td>External comp.</td>
<td>→ 78</td>
</tr>
<tr>
<td>Calculated value</td>
<td>→ 80</td>
</tr>
<tr>
<td>Sensor adjustm.</td>
<td>→ 83</td>
</tr>
<tr>
<td>Calibration</td>
<td>→ 90</td>
</tr>
<tr>
<td>Supervision</td>
<td>→ 91</td>
</tr>
</tbody>
</table>
## Overview of the Expert operating menu

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output</td>
<td>92</td>
</tr>
<tr>
<td>- Curr. output 1</td>
<td>92</td>
</tr>
<tr>
<td>- PFS output 1</td>
<td>107</td>
</tr>
<tr>
<td>Communication</td>
<td>131</td>
</tr>
<tr>
<td>- HART input</td>
<td>132</td>
</tr>
<tr>
<td>- HART output</td>
<td>137</td>
</tr>
<tr>
<td>- Web server</td>
<td>154</td>
</tr>
<tr>
<td>- Diag. config.</td>
<td>157</td>
</tr>
<tr>
<td>Application</td>
<td>164</td>
</tr>
<tr>
<td>- Reset all tot.</td>
<td>164</td>
</tr>
<tr>
<td>- Totalizer 1 to n</td>
<td>165</td>
</tr>
<tr>
<td>- Viscosity</td>
<td>170</td>
</tr>
<tr>
<td>- Concentration</td>
<td>170</td>
</tr>
<tr>
<td>Diagnostics</td>
<td>170</td>
</tr>
<tr>
<td>- Actual diagnos.</td>
<td>171</td>
</tr>
<tr>
<td>- Prev. diagnos.</td>
<td>171</td>
</tr>
<tr>
<td>- Time fr. restart</td>
<td>172</td>
</tr>
<tr>
<td>- Operating time</td>
<td>172</td>
</tr>
<tr>
<td>- Diagnostic list</td>
<td>173</td>
</tr>
<tr>
<td>- Event logbook</td>
<td>177</td>
</tr>
<tr>
<td>- Device info</td>
<td>178</td>
</tr>
<tr>
<td>- Min/max val.</td>
<td>182</td>
</tr>
<tr>
<td>- Heartbeat</td>
<td>191</td>
</tr>
<tr>
<td>- Simulation</td>
<td>192</td>
</tr>
</tbody>
</table>
Description of device parameters

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

### Direct access

#### Navigation

- **Expert** → Direct access

#### Prerequisite

There is a local display with operating elements.

#### Description

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

#### User entry

0 to 65535

#### Additional information

**User entry**

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

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

Locking status

Navigation
- Expert → Locking status

Description
Displays the active write protection.

User interface
- Hardware locked
- Temp. 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>Hardware locked (priority 1)</td>
<td>The write protection switch (DIP switch) for locking the hardware is activated on the main electronic module. This locks write access to the parameters.</td>
</tr>
<tr>
<td>Temp. locked (priority 2)</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 stat.disp

Navigation

Expert → Access stat.disp

Prerequisite

A local display is provided.

Description

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

User interface

- Operator
- Maintenance

Factory setting

Operator

Additional information

Description

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

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

For information about the Ent. access code parameter: see the 'Disabling write protection via the access code' section of the Operating Instructions for the device.

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

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.

Access stat.tool

Navigation

Expert → Access stat.tool

Description

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

User interface

- Operator
- Maintenance

Factory setting

Maintenance

Additional information

Description

Access authorization can be modified via the Ent. 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.
Ent. access code

Navigation

Ent. access code

Description

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

User entry

0 to 9999

3.1 "System" submenu

Navigation

System →  13

Diagn. handling →  33

Administration →  27

3.1.1 "Display" submenu

Navigation

Display →  14

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0% bargraph 1 →  18

100% bargraph 1 →  19

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Value 2 display →  19

Decimal places 2 →  20

Value 3 display →  20
### Display language

#### Navigation

Expert → System → Display → Display language

#### 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 (Ru) *
- Svenska *
- Türkçe *
- 中文 (Chinese) *
- 日本語 (Japanese) *

* Visibility depends on order options or device settings
Format display

Navigation

Expert → System → Display → Format display

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.
- Bargr. + 1 value
- 2 values
- Val. large+2val.
- 4 values

Factory setting

1 value, max.

Additional information

Description

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

- The Value 1 display parameter (→ 17) to Value 4 display parameter (→ 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).

* Visibility depends on order options or device settings
Possible measured values shown on the local display:

*"1 value, max." option*

"Bargr. + 1 value" option

*"2 values' option*

"Val. large+2val." option

*"4 values' option*
Value 1 display

Navigation

Expert → System → Display → Value 1 display

Prerequisite

A local display is provided.

Description

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

Selection

- Mass flow
- Volume flow
- Correct. vol. flow
- Target mass flow *
- Carrier mass fl. *
- Density
- Ref. density
- Concentration *
- Dynam. viscosity *
- Kinematic visc. *
- TempCompDynVisc *
- TempCompKinVisc *
- Temperature
- Carr. pipe temp. *
- Electronic temp.
- Osc. freq. 0
- Osc. freq. 1 *
- Freq. fluct. 0
- Freq. fluct. 1 *
- Osc. ampl. 0 *
- Osc. ampl. 1 *
- Freq. fluct. 0
- Osc. damping 0
- Osc. damping 1 *
- Damping fluct 0
- Damping fluct 1
- Signal asymmetry
- Exc. current 0
- Exc. current 1 *
- Sensor integrity *
- None
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Curr. output 1

Factory setting

Mass flow

* Visibility depends on order options or device settings
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 (→  15) is used to specify how many measured
values are displayed simultaneously and how.

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

Selection
• Oscil. frequency option
  Displays the current oscillation frequency of the measuring tubes. This frequency
depends on the density of the medium.
• Oscil. amplitude option
  Displays the relative oscillation amplitude of the measuring tubes in relation to the
preset value. This value is 100 % under optimum conditions.
• Oscil. damping option
  Displays the current oscillation damping. Oscillation damping is an indicator of the
sensor's current need for excitation power.
• Signal asymmetry option
  Displays the relative difference between the oscillation amplitude at the inlet and outlet
of the sensor. The measured value is the result of production tolerances of the sensor
coils and should remain constant over the life time of a sensor.

0% bargraph 1

Navigation  Expert → System → Display → 0% bargraph 1

Prerequisite
A local display is provided.

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

User entry
Signed floating-point number

Factory setting
Country-specific:
• 0 kg/h
• 0 lb/min

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

User entry
The unit of the displayed measured value is taken from the System units submenu
(→  53).
100% bargraph 1

**Navigation**
Expert → System → Display → 100% bargraph 1

**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 → 199

**Additional information**
*Description*

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

*User entry*

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

---

Decimal places 1

**Navigation**
Expert → System → Display → Decimal places 1

**Prerequisite**
A measured value is specified in the Value 1 display parameter (→ 17).

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

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

**Factory setting**
x.xx

**Additional information**
*Description*

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

---

Value 2 display

**Navigation**
Expert → System → Display → Value 2 display

**Prerequisite**
A local display is provided.
### Description of device parameters

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

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

**Factory setting**
None

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

![Info icon] The **Format display** parameter (→ 15) is used to specify how many measured values are displayed simultaneously and how.

*Dependency*
![Info icon] The unit of the displayed measured value is taken from the **System units** submenu (→ 53).

### Decimal places 2

**Navigation**
Expert → System → Display → Decimal places 2

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

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

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

**Factory setting**
x.xx

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

### Value 3 display

**Navigation**
Expert → System → Display → Value 3 display

**Prerequisite**
A local display is provided.

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

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

**Factory setting**
None
Additional information

Description

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

The Format display parameter (→ 15) is used to specify how many measured values are displayed simultaneously and how.

Selection

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

0% bargraph 3

Navigation

Expert → System → Display → 0% bargraph 3

Prerequisite

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

Description

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

User entry

Signed floating-point number

Factory setting

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

Additional information

Description

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

User entry

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

100% bargraph 3

Navigation

Expert → System → Display → 100% bargraph 3

Prerequisite

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

Description

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

User entry

Signed floating-point number

Factory setting

0
Additional information  

**Description**

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

**User entry**

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

**Decimal places 3**

**Navigation**

Expert → System → Display → Decimal places 3

**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
- .xx
- .xxx
- .xxxx
- .xxxxx

**Factory setting**

x.xx

**Additional information**

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

**Value 4 display**

**Navigation**

Expert → System → Display → Value 4 display

**Prerequisite**

A local display is provided.

**Description**

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

**Selection**

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

**Factory setting**

None
Additional information

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

The Format display parameter (→ 15) is used to specify how many measured values are displayed simultaneously and how.

Selection

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

Decimal places 4

Navigation

Expert → System → Display → Decimal places 4

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

Factory setting

x.xx

Additional information

Description

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

Display interval

Navigation

Expert → System → Display → Display interval

Prerequisite

A local display is provided.

Description

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

User entry

1 to 10 s

Factory setting

5 s
Additional information

Description

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

- The Value 1 display parameter (→ 17) to Value 4 display parameter (→ 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 (→ 15).

Display damping

Navigation

Expert → System → Display → Display damping

Prerequisite

A local display is provided.

Description

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

User entry

0.0 to 999.9 s

Factory setting

0.0 s

Additional information

User entry

Use this function to enter a time constant (PT1 element 1) for display damping:

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

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

Header

Navigation

Expert → System → Display → Header

Prerequisite

A local display is provided.

Description

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

Selection

- Device tag
- Free text

Factory setting

Device tag

Additional information

Description

The header text only appears during normal operation.

---

1) proportional transmission behavior with first order delay
1  Position of the header text on the display

Selection

- Device tag
  Is defined in the **Device tag** parameter (→ 179).
- Free text
  Is defined in the **Header text** parameter (→ 25).

Header text

**Navigation**

Expert → System → Display → Header text

**Prerequisite**

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

**Description**

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

**User entry**

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

**Factory setting**

----------

**Additional information**

**Description**

The header text only appears during normal operation.

User entry

The number of characters displayed depends on the characters used.

Separator

**Navigation**

Expert → System → Display → Separator

**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

Prerequisite

A local display is provided.

Description

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

User entry

20 to 80 %

Factory setting

Depends on the display

Backlight

Navigation

Expert → System → Display → Backlight

Description

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

Selection

- Disable
- Enable

Factory setting

Enable

Access stat.disp

Navigation

Expert → System → Display → Access stat.disp

Prerequisite

A local display is provided.

Description

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

User interface

- Operator
- Maintenance

Factory setting

Operator
Additional information

Description

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

- Access authorization can be modified via the **Ent. access code** parameter (→ 27).

- For information about the **Ent. access code** parameter: see the 'Disabling write protection via the access code' section of the Operating Instructions for the device.

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

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.

3.1.2 "Administration" submenu

Navigation

[Expert → System → Administration]

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<tr>
<td>Activate SW opt.</td>
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<tr>
<td>SW option overv.</td>
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</table>

"Def. access code" wizard

- The **Def. access code** wizard (→ 27) is only available when operating via the local display or Web browser.

  - If operating via the operating tool, the **Def. access code** parameter (→ 30) can be found directly in the Administration submenu. There is no **Confirm code** parameter if the device is operated via the operating tool.

Navigation

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

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<th>► Def. access code</th>
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<tbody>
<tr>
<td>Def. access code</td>
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<tr>
<td>Confirm code</td>
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</tbody>
</table>
Description of device parameters

**Def. access code**

**Navigation**

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

**Description**

Use this function to enter a user-specific release code to restrict write-access to the parameters. This protects the configuration of the device against any inadvertent changes via the local display or Web browser.

**User entry**

0 to 9 999

**Factory setting**

0

**Additional information**

*Description*

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

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

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

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

**Navigation**

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

**Description**

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

**User entry**

0 to 9 999

**Factory setting**

0
"Reset access code" submenu

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

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<tr>
<td>Reset acc. code</td>
<td>→ 29</td>
<td></td>
</tr>
</tbody>
</table>

**Operating time**

**Navigation**
Expert → Diagnostics → Operating time

**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 acc. code**

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

**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

**Factory setting**
0x00

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

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

Proline Promass 100 HART

---

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

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<tr>
<td><strong>User entry</strong></td>
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<tr>
<td><strong>Factory setting</strong></td>
</tr>
</tbody>
</table>

---

**Device reset**

| **Navigation** | Expert → System → Administration → Device reset |
| **Description** | Use this function to choose whether to reset the device configuration - either entirely or in part - to a defined state. |
| **Selection** | • Cancel <br>• To delivery set. <br>• Restart device |
| **Factory setting** | Cancel |
Additional information   
**Selection**

<table>
<thead>
<tr>
<th>Options</th>
<th>Description</th>
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<tbody>
<tr>
<td>Cancel</td>
<td>No action is executed and the user exits the parameter.</td>
</tr>
</tbody>
</table>
| To delivery set.    | 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.  
   | This option is not visible if no customer-specific settings have been ordered.                                                              |
| Restart device      | The restart resets every parameter whose data are in the volatile memory (RAM) to the factory setting (e.g. measured value data). The device configuration remains unchanged. |

**Activate SW opt.**

**Navigation**

Expert → System → Administration → Activate SW opt.

**Description**

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

**User entry**

Max. 10-digit string consisting of numbers.

**Factory setting**

Depends on the software option ordered

**Additional information**

*Description*

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

*User entry*

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

**NOTE!**

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

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

- Before you enter a new activation code, make a note of the current activation code.
- Enter the new activation code provided by Endress+Hauser when the new software option was ordered.
- Once the activation code has been entered, check if the new software option is displayed in the SW option overv. parameter (→ 32).
  - The new software option is active if it is displayed.
  - If the new software option is not displayed or all software options have been deleted, the code entered was either incorrect or invalid.
- If the code entered is incorrect or invalid, enter the old activation code.
Have your Endress+Hauser sales organization check the new activation code remembering to specify the serial number or ask for the code again.

*Example for a software option*

Order code for “Application package”, option **EB** ‘Heartbeat Verification + Monitoring’

The software options currently enabled are displayed in the **SW option overv.** parameter (→ 32).

*Web browser*

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

### SW option overv.

#### Navigation

Expert → System → Administration → SW option overv.

#### Description

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

#### User interface

- HBT Verification
- HBT Monitoring
- Concentration
- Viscosity

#### Additional information

Description

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

*‘HBT Verification’ option and ‘HBT Monitoring’ option*

Order code for ‘Application package’, option **EB** ‘Heartbeat Verification + Monitoring’

*‘Concentration’ option*

Order code for ‘Application package’, option **ED** ‘Concentration’ and option **EE** ‘Special density’

*‘Viscosity’ option*

Only available for Promass I.

Order code for ‘Application package’, option **EG** ‘Viscosity’
3.1.3 "Diagn. handling" submenu

**Navigation**

Expert → System → Diagn. handling

**Description**

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

The diagnostic message is reset without a time delay.

**User entry**

0 to 60 s

**Factory setting**

0 s

**Additional information**

This setting affects the following diagnostic messages:

- 046 Sensor limit
- 140 Sensor sig.asym.
- 144 MeasErrorTooHigh
- 190 Special event 1
- 191 Special event 5
- 192 Special event 9
- 830 Sensor temp.
- 831 Sensor temp.
- 832 Electronic temp.
- 833 Electronic temp.
- 834 Process temp.
- 835 Process temp.
- 843 Process limit
- 862 Partly filled
- 910 Tube not oscill.
- 912 Medium inhomog.
- 913 Medium unsuitab.
- 944 MonitoringFailed
- 990 Special event 4
- 991 Special event 8
- 992 Special event 12
"Diagn. behavior" submenu

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

Modifying the diagnostic behavior of a diagnostic event. Each diagnostic event is assigned a certain diagnostic behavior at the factory. The user can change this assignment for certain diagnostics events.

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

- **Off** option
  The device continues to measure. The diagnostic event is ignored; it is neither entered into the Event logbook, nor is a diagnostic message generated.

- **Alarm** option
  The device continues to measure. The signal outputs assume the specified alarm condition. A diagnostic message is generated.

- **Warning** option
  The device continues to measure. A diagnostic message is generated.

- **Logbook only** option
  The device continues to measure. The diagnostic message is entered in the Event logbook submenu (→ 177) (Event list submenu (→ 177)) only and is not displayed in alternation with the measured value display.

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

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<tr>
<td>Diagnostic no. 948</td>
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</table>
Diagnostic no. 441 (Curr.output 1)

**Navigation**

Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 441

**Description**

Option for changing the diagnostic behavior of the diagnostic message **441 Curr.output 1**.

**Selection**

- Off
- Alarm
- Warning
- Logbook only

**Factory setting**

Warning

**Additional information**

For a detailed description of the options available, see → 34

Diagnostic no. 442 (Freq. output)

**Navigation**

Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 442

**Prerequisite**

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

**Description**

Use this function to change the diagnostic behavior of the diagnostic message **442 Freq. output**.

**Selection**

- Off
- Alarm
- Warning
- Logbook only

**Factory setting**

Warning

**Additional information**

Selection

For a detailed description of the options available, see → 34
**Diagnostic no. 443 (Pulse output)**

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

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

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

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

**Factory setting**
Warning

**Additional information**
For a detailed description of the options available, see → 34

---

**Diagnostic no. 140 (Sensor sig.asym.)**

**Navigation**
Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 140

**Description**
Use this function to change the diagnostic behavior of the diagnostic message **140 Sensor sig.asym.**.

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

**Factory setting**
Warning

**Additional information**
For a detailed description of the options available, see → 34

---

**Diagnostic no. 046 (Sensor limit)**

**Navigation**
Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 046

**Description**
Option for changing the diagnostic behavior of the diagnostic message **046 Sensor limit**.

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

**Factory setting**
Warning
Additional information

For a detailed description of the options available, see →  34

Diagnostic no. 144 (MeasErrorTooHigh)

Navigation  

Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 144

Description

Option for changing the diagnostic behavior of the diagnostic message 144 MeasErrorTooHigh.

Selection

• Off
• Alarm
• Warning
• Logbook only

Factory setting  

Alarm

Additional information

For a detailed description of the options available, see →  34

Diagnostic no. 832 (Electronic temp.)

Navigation  

Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 832

Description

Use this function to change the diagnostic behavior of the diagnostic message 832 Electronic temp..

Selection

• Off
• Alarm
• Warning
• Logbook only

Factory setting  

Warning

Additional information

For a detailed description of the options available, see →  34

Diagnostic no. 833 (Electronic temp.)

Navigation  

Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 833

Description

Use this function to change the diagnostic behavior of the diagnostic message 833 Electronic temp..

Selection

• Off
• Alarm
• Warning
• Logbook only
### Diagnostic no. 834 (Process temp.)

- **Navigation:**
  
  ![Diagram](Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 834)

- **Description:**
  
  Use this function to change the diagnostic behavior of the diagnostic message **834 Process temp.**.

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

- **Factory setting:**
  
  Warning

- **Additional information:**
  
  For a detailed description of the options available, see → 34

### Diagnostic no. 835 (Process temp.)

- **Navigation:**
  
  ![Diagram](Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 835)

- **Description:**
  
  Use this function to change the diagnostic behavior of the diagnostic message **835 Process temp.**.

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

- **Factory setting:**
  
  Warning

- **Additional information:**
  
  For a detailed description of the options available, see → 34

### Diagnostic no. 912 (Medium inhomog.)

- **Navigation:**
  
  ![Diagram](Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 912)

- **Description:**
  
  Option for changing the diagnostic behavior of the diagnostic message **912 Medium inhomog.**.
Description of device parameters

Selection
- Off
- Alarm
- Warning
- Logbook only

Factory setting
Warning

Additional information
For a detailed description of the options available, see → 34

Diagnostic no. 913 (Medium unsuitab.)

Navigation
Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 913

Description
Option for changing the diagnostic behavior of the diagnostic message 913 Medium unsuitab.

Selection
- Off
- Alarm
- Warning
- Logbook only

Factory setting
Warning

Additional information
For a detailed description of the options available, see → 34

Diagnostic no. 944 (MonitoringFailed)

Navigation
Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 944

Description
Option for changing the diagnostic behavior of the diagnostic message 944 MonitoringFailed.

Selection
- Off
- Alarm
- Warning
- Logbook only

Factory setting
Warning

Additional information
For a detailed description of the options available, see → 34
### Diagnostic no. 948 (Oscill. damping)

**Navigation**
Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 948

**Description**
Option for changing the diagnostic behavior of the diagnostic message **948 Oscill. damping**.

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

**Factory setting**
Warning

**Additional information**
For a detailed description of the options available, see → 34

---

### Diagnostic no. 192 (Special event 9)

**Navigation**
Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 192

**Description**
Option for changing the diagnostic behavior of the diagnostic message **192 Special event 9**.

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

**Factory setting**
Warning

**Additional information**
For a detailed description of the options available, see → 34

---

### Diagnostic no. 374 (Sensor electron.)

**Navigation**
Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 374

**Description**
Option for changing the diagnostic behavior of the diagnostic message **374 Sensor electron.**

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

**Factory setting**
Warning

**Additional information**
For a detailed description of the options available, see → 34
Diagnostic no. 392 (Special event 10)

Navigation
 hann Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 392

Description
 Option for changing the diagnostic behavior of the diagnostic message 392 Special event 10.

Selection
 • Off
 • Alarm
 • Warning
 • Logbook only

Factory setting
 Warning

Additional information
 For a detailed description of the options available, see →  34

Diagnostic no. 592 (Special event 11)

Navigation
 hann Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 592

Description
 Option for changing the diagnostic behavior of the diagnostic message 592 Special event 11.

Selection
 • Off
 • Alarm
 • Warning
 • Logbook only

Factory setting
 Warning

Additional information
 For a detailed description of the options available, see →  34

Diagnostic no. 992 (Special event 12)

Navigation
 hann Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 992

Description
 Option for changing the diagnostic behavior of the diagnostic message 992 Special event 12.

Selection
 • Off
 • Alarm
 • Warning
 • Logbook only

Factory setting
 Warning
3.2 "Sensor" submenu

**Navigation**

[Expert → Sensor]

- Measured val. → 42
- System units → 53
- Process param. → 68
- Measurement mode → 76
- External comp. → 78
- Calculated value → 80
- Sensor adjustm. → 83
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3.2.1 "Measured val." submenu

**Navigation**

[Expert → Sensor → Measured val.]

- Process variab. → 43
- Totalizer → 49
- Output values → 51
"Process variab." submenu

**Navigation**


**Description**

Displays the mass flow that is currently measured.
### Volume flow

**Navigation**  

**Description**  
Displays the volume flow currently calculated.

**User interface**  
Signed floating-point number

**Additional information**  
*Description*

The volume flow is calculated from the mass flow currently measured and the density currently measured.

*Dependency*

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

### Correct.vol.flow

**Navigation**  

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

**User interface**  
Signed floating-point number

**Additional information**  
*Dependency*

The unit is taken from the **Cor.volflow unit** parameter (→ 57)

### Density

**Navigation**  

**Description**  
Displays the density currently measured.

**User interface**  
Signed floating-point number

**Additional information**  
*Dependency*

The unit is taken from the **Density unit** parameter (→ 59)
Ref. density

Navigation

Description
Displays the reference density currently calculated.

User interface
Signed floating-point number

Additional information
Dependency
- The unit is taken from the Ref. dens. unit parameter (→ 60)

Temperature

Navigation

Description
Displays the medium temperature currently measured.

User interface
Signed floating-point number

Additional information
Dependency
- The unit is taken from the Temperature unit parameter (→ 60)

Pressure value

Navigation

Description
Displays the fixed or external pressure value.

User interface
Signed floating-point number

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

Dynam. viscosity

Navigation

Prerequisite
For the following order code:
"Application package", option EG "Viscosity"

- The software options currently enabled are displayed in the SW option overv. parameter (→ 32).
Description of device parameters

Proline Promass 100 HART

**Description**
Displays the dynamic viscosity currently calculated.

**User interface**
Signed floating-point number

**Additional information**

*Dependency*

The unit is taken from the **Dyn. visc. unit** parameter.

---

### Kinematic visc.

**Navigation**


**Prerequisite**
For the following order code:

'Application package', option **EG** 'Viscosity'

The software options currently enabled are displayed in the **SW option overv.** parameter (→ 32).

**Description**
Displays the kinematic viscosity currently calculated.

**User interface**
Signed floating-point number

**Additional information**

*Dependency*

The unit is taken from the **Kin. visc. unit** parameter.

---

### TempCompDynVisc

**Navigation**

![Diagram](Expert → Sensor → Measured val. → Process variab. → TempCompDynVisc)

**Prerequisite**
For the following order code:

'Application package', option **EG** 'Viscosity'

The software options currently enabled are displayed in the **SW option overv.** parameter (→ 32).

**Description**
Displays the temperature compensation currently calculated for the viscosity.

**User interface**
Signed floating-point number

**Additional information**

*Dependency*

The unit is taken from the **Dyn. visc. unit** parameter.
**TempCompKinVisc**

**Navigation**


**Prerequisite**

For the following order code:
"Application package", option **EG** "Viscosity"

![Note] The software options currently enabled are displayed in the **SW option overv.** parameter (→ 32).

**Description**

Displays the temperature compensation currently calculated for the kinetic viscosity.

**User interface**

Signed floating-point number

**Additional information**

**Dependency**

![Note] The unit is taken from the **Kin. visc. unit** parameter.

---

**Concentration**

**Navigation**


**Prerequisite**

For the following order code:
"Application package", option **ED** "Concentration"

![Note] The software options currently enabled are displayed in the **SW option overv.** parameter (→ 32).

**Description**

Displays the concentration currently calculated.

**User interface**

Signed floating-point number

**Additional information**

**Dependency**

![Note] The unit is taken from the **Concentr. unit** parameter.

---

**Target mass flow**

**Navigation**


**Prerequisite**

With the following conditions:
- Order code for "Application package", option **ED** "Concentration"
- The **WT-%** option or the **User conc.** option is selected in the **Concentr. unit** parameter.

![Note] The software options currently enabled are displayed in the **SW option overv.** parameter (→ 32).

**Description**

Displays the mass flow currently measured for the target medium.

**User interface**

Signed floating-point number
Additional information  
Dependency

The unit is taken from the Mass flow unit parameter (→  54)

Carrier mass fl.

Navigation


Prerequisite

With the following conditions:
- Order code for "Application package", option ED 'Concentration'
- The WT-% option or the User conc. option is selected in the Concentr. unit parameter.

The software options currently enabled are displayed in the SW option overv. parameter (→  32).

Description

Displays the mass flow currently measured for the carrier medium.

User interface

Signed floating-point number

Additional information  
Dependency

The unit is taken from the Mass flow unit parameter (→  54)

Targ.corr.vol.fl

Navigation


User interface

Signed floating-point number

Factory setting

0 Nl/h

Carr.corr.vol.fl

Navigation


User interface

Signed floating-point number

Factory setting

0 Nl/h

Target vol. flow

Navigation


User interface

Signed floating-point number
Proline Promass 100 HART

Factory setting

0 l/h

Carrier vol. fl.

Navigation


User interface

Signed floating-point number

Factory setting

0 l/h

"Totalizer" submenu

Navigation

Expert → Sensor → Measured val. → Totalizer

Totalizer

Totalizer val. 1 to n

→ 49

Tot. overflow 1 to n

→ 50

Totalizer val. 1 to n

Prerequisite

One of the following options is selected in the Assign variable parameter (→ 165) of the Totalizer 1 to n submenu:

• Volume flow
• Mass flow
• Correct.vol.flow
• Target mass flow *
• Carrier mass fl.*

Description

Displays the current totalizer reading.

User interface

Signed floating-point number

* Visibility depends on order options or device settings
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 Tot. 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 (→  169).

User interface
The value of the process variable totalized since measuring began can be positive or negative. This depends on the settings in the Operation mode parameter (→  167).

The unit of the selected process variable is specified for the totalizer in the Unit totalizer parameter (→  166).

Example
Calculation of the current totalizer reading when the value exceeds the 7-digit display range of the operating tool:
- Value in the Totalizer val. 1 parameter: 1,968,457 m³
- Value in the Tot. overflow 1 parameter: 1 \cdot 10^7 (1 overflow) = 10,000,000 [m³]
- Current totalizer reading: 11,968,457 m³

Tot. overflow 1 to n

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

Prerequisite
One of the following options is selected in the Assign variable parameter (→  165) of the Totalizer 1 to n submenu:
- Volume flow
- Mass flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *

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.

* Visibility depends on order options or device settings
The current totalizer value is therefore the sum of the overflow value and the totalizer value from the **Totalizer val. 1 to n** parameter.

**User interface**

The unit of the selected process variable is specified for the totalizer in the **Unit totalizer** parameter (→ 166).

**Example**

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

- Value in the **Totalizer val. 1** parameter: 1968457 m³
- Value in the **Tot. overflow 1** parameter: \(2 \times 10^7\) (2 overflows) = 20 000 000 [m³]
- Current totalizer reading: 21 968 457 m³

**"Output values" submenu**

**Navigation**

Expert → Sensor → Measured val. → Output values

<table>
<thead>
<tr>
<th>Output values</th>
<th></th>
</tr>
</thead>
<tbody>
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<td>Measur. curr. 1</td>
<td>→ 51</td>
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<tr>
<td>Pulse output 1</td>
<td>→ 52</td>
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<tr>
<td>Output freq. 1</td>
<td>→ 52</td>
</tr>
<tr>
<td>Switch status 1</td>
<td>→ 53</td>
</tr>
</tbody>
</table>

**Output curr. 1**

**Navigation**

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

**Description**

Displays the current value currently calculated for the current output.

**User interface**

0 to 22.5 mA

**Measur. curr. 1**

**Navigation**

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

**Description**

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

Proline Promass 100 HART

User interface 0 to 30 mA

Pulse output 1

Navigation

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

Prerequisite

In the Operating mode parameter (→ 108), the Pulse option is selected.

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.
- The Value per pulse parameter (→ 110) and Pulse width parameter (→ 111) can be used to define the value (i.e. the measured value amount that corresponds to a pulse) and the duration of the pulse.

The output behavior can be reversed via the Invert outp.sig. parameter (→ 131) 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 (→ 112)) can be configured.

Output freq. 1

Navigation

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

Prerequisite

In the Operating mode parameter (→ 108), 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 status 1

Navigation

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

Prerequisite

The Switch option is selected in the Operating mode parameter (→ 108).

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.

3.2.2 "System units" submenu

Navigation

Expert → Sensor → System units

<table>
<thead>
<tr>
<th>System units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass flow unit</td>
</tr>
<tr>
<td>Mass unit</td>
</tr>
<tr>
<td>Volume flow unit</td>
</tr>
<tr>
<td>Volume unit</td>
</tr>
<tr>
<td>Corr. volflow unit</td>
</tr>
<tr>
<td>Corr. vol. unit</td>
</tr>
<tr>
<td>Density unit</td>
</tr>
<tr>
<td>Ref. dens. unit</td>
</tr>
<tr>
<td>Temperature unit</td>
</tr>
<tr>
<td>Pressure unit</td>
</tr>
<tr>
<td>Date/time format</td>
</tr>
<tr>
<td>User-spec. units</td>
</tr>
</tbody>
</table>
Mass flow unit

Navigation
Expert → Sensor → System units → Mass flow unit

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

Selection

<table>
<thead>
<tr>
<th>SI units</th>
<th>US units</th>
</tr>
</thead>
<tbody>
<tr>
<td>g/s</td>
<td>oz/s</td>
</tr>
<tr>
<td>g/min</td>
<td>oz/min</td>
</tr>
<tr>
<td>g/h</td>
<td>oz/h</td>
</tr>
<tr>
<td>g/d</td>
<td>oz/d</td>
</tr>
<tr>
<td>kg/s</td>
<td>lb/s</td>
</tr>
<tr>
<td>kg/min</td>
<td>lb/min</td>
</tr>
<tr>
<td>kg/h</td>
<td>lb/h</td>
</tr>
<tr>
<td>kg/d</td>
<td>lb/d</td>
</tr>
<tr>
<td>t/s</td>
<td>STon/s</td>
</tr>
<tr>
<td>t/min</td>
<td>STon/min</td>
</tr>
<tr>
<td>t/h</td>
<td>STon/h</td>
</tr>
<tr>
<td>t/d</td>
<td>STon/d</td>
</tr>
</tbody>
</table>

Custom-specific units
- User mass/s
- User mass/min
- User mass/h
- User mass/d

Factory setting
Country-specific:
- kg/h (DN > 150 (6\(^{\circ}\)): t/h)
- lb/min

Additional information

Result
The selected unit applies for:
- Target mass flow parameter (→ 47)
- Carrier mass fl. parameter (→ 48)
- Mass flow parameter (→ 43)

Selection
For an explanation of the abbreviated units: → 205

Customer-specific units
- The unit for the customer-specific mass is specified in the Mass text parameter (→ 63).

Mass unit

Navigation
Expert → Sensor → System units → Mass unit

Description
Use this function to select the unit for the mass.
### 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>

**Custom-specific units**

User mass

### Factory setting

Country-specific:
- kg (DN > 150 (6”): t)
- lb

### Additional information

**Selection**

For an explanation of the abbreviated units: → 205

**Customer-specific units**

The unit for the customer-specific mass is specified in the Mass text parameter (→ 63).

---

### Volume flow unit

**Navigation**

Expert → Sensor → System units → Volume flow unit

**Description**

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

- **SI units**
  - cm³/s
  - cm³/min
  - cm³/h
  - cm³/d
  - dm³/s
  - dm³/min
  - dm³/h
  - dm³/d
  - m³/s
  - m³/min
  - m³/h
  - m³/d
  - l/s
  - l/min
  - l/h
  - l/d
  - hl/s
  - hl/min
  - hl/h
  - hl/d
  - Ml/s
  - Ml/min
  - Ml/h
  - Ml/d

- **US units**
  - af/s
  - af/min
  - af/h
  - af/d
  - ft³/s
  - ft³/min
  - ft³/h
  - ft³/d
  - fl oz/s (us)
  - fl oz/min (us)
  - fl oz/h (us)
  - fl oz/d (us)
  - gal/s (us)
  - gal/min (us)
  - gal/h (us)
  - gal/d (us)
  - kgal/s (us)
  - kgal/min (us)
  - kgal/h (us)
  - kgal/d (us)
  - bbl/s (us; liq.)
  - bbl/min (us; liq.)
  - bbl/h (us; liq.)
  - bbl/d (us; liq.)
  - bbl/s (us; beer)
  - bbl/min (us; beer)
  - bbl/h (us; beer)
  - bbl/d (us; beer)
  - bbl/s (us; oil)
  - bbl/min (us; oil)
  - bbl/h (us; oil)
  - bbl/d (us; oil)
  - bbl/s (us; tank)
  - bbl/min (us; tank)
  - bbl/h (us; tank)
  - bbl/d (us; tank)

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

- **Custom-specific units**
  - User vol./s
  - User vol./min
  - User vol./h
  - User vol./d

### Factory setting

- **Country-specific:**
  - l/h (DN > 150 (6’): m³/h)
  - gal/min (us)
Additional information

Result
The selected unit applies for:
Volume flow parameter (→ 44)

Selection
For an explanation of the abbreviated units: → 205

Customer-specific units
The unit for the customer-specific volume is specified in the Volume text parameter (→ 64).

Volume unit

Navigation
Expert → Sensor → System units → Volume unit

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

Selection
SI units
- cm³
- dm³
- m³
- ml
- l
- hl
- Ml Mega

US units
- af
- ft³
- fl oz (us)
- gal (us)
- kgal (us)
- Mgal (us)

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

Custom-specific units
User vol.

Factory setting
Country-specific:
- l (DN > 150 (6\): m³)
- gal (us)

Additional information
Selection
For an explanation of the abbreviated units: → 205

Customer-specific units
The unit for the customer-specific volume is specified in the Volume text parameter (→ 64).

Cor.volflow unit

Navigation
Expert → Sensor → System units → Cor.volflow unit

Description
Use this function to select the unit for the corrected volume flow.
Description of device parameters

Proline Promass 100 HART

Selection

SI units
• NL/s
• NL/min
• NL/h
• NL/d
• Nm³/s
• Nm³/min
• Nm³/h
• Nm³/d
• Sm³/s
• Sm³/min
• Sm³/h
• Sm³/d

US units
• Sft³/s
• Sft³/min
• Sft³/h
• Sft³/d
• Sg/min (us)
• Sgal/h (us)
• Sgal/d (us)
• Sbbl/s (us;liq.)
• Sbbl/min (us;liq.)
• Sbbl/h (us;liq.)
• Sbbl/d (us;liq.)
• Sg/min (imp)
• Sagal/h (imp)
• Sg/min (imp)

Custom-specific units
• UserCrVol./s
• UserCrVol./min
• UserCrVol./h
• UserCrVol./d

Factory setting

Country-specific:
• NL/h (DN > 150 (6’): Nm³/h)
• Sft³/min

Additional information

The selected unit applies for:
Correct. vol. flow parameter (→ 44)

Selection

For an explanation of the abbreviated units: → 205

Corr. vol. unit

Navigation

Expert → Sensor → System units → Corr. vol. unit

Description

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

Selection

SI units
• NL
• Nm³
• Sm³

US units
• Sft³
• Sgal (us)
• Sbbl (us;liq.)

Imperial units
• Sg (imp)

Custom-specific units
UserCrVol.

Factory setting

Country-specific:
• NL (DN > 150 (6’): Nm³)
• Sft³
Additional information  

Selection

For an explanation of the abbreviated units: → 205

Density unit

Navigation  

Expert → Sensor → System units → Density unit

Description

Use this function to select the unit for the density.

Selection

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

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

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

**Custom-specific units**  

User dens.

Factory setting

Country-specific:
- kg/l
- lb/ft³

Additional information

Result

The selected unit applies for:

-Density parameter (→ 44)

Selection

- SD = specific density
  The specific density is the ratio of the medium density to the water density at a water temperature of +4 °C (+39 °F), +15 °C (+59 °F), +20 °C (+68 °F).
- SG = specific gravity
  The specific gravity is the ratio of the medium density to the water density at a water temperature of +4 °C (+39 °F), +15 °C (+59 °F), +20 °C (+68 °F).

For an explanation of the abbreviated units: → 205

Customer-specific units

The unit for the customer-specific density is specified in the Density text parameter (→ 66).
**Ref. dens. unit**

**Navigation**
Expert → Sensor → System units → Ref. dens. unit

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

**Selection**

**SI units**
- kg/Nm³
- kg/Nl
- g/Scm³
- kg/Sm³

**US units**
- lb/Sft³

**Factory setting**
Country-dependent
- kg/Nl
- lb/Sft³

**Additional information**

**Result**
The selected unit applies for:
- Ext. ref. density parameter (→ 81)
- Fix ref. density parameter (→ 82)
- Ref. density parameter (→ 45)

**Selection**

For an explanation of the abbreviated units: → 205

---

**Temperature unit**

**Navigation**
Expert → Sensor → System units → Temperature unit

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

**Selection**

**SI units**
- °C
- K

**US units**
- °F
- °R

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

**Additional information**

**Result**
The selected unit applies for:
- Maximum value parameter (→ 184)
- Minimum value parameter (→ 183)
- Maximum value parameter (→ 184)
- Minimum value parameter (→ 184)
- Maximum value parameter (→ 186)
- Minimum value parameter (→ 185)
- External temp. parameter (→ 80)
Pressure unit

**Navigation**

[Expert → Sensor → System units → Pressure unit]

**Description**

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

**Selection**

*SI units*
- Pa
- kPa
- MPa
- bar

*US units*
- psi

*Custom-specific units*
- User pres.

**Factory setting**

Country-specific:
- bar
- psi

**Additional information**

*Result*

The unit is taken from:
- Pressure value parameter (→ 79)
- External press. parameter (→ 79)
- Pressure value parameter (→ 45)

**Selection**

For an explanation of the abbreviated units: → 205

*Customer-specific units*

The unit for the customer-specific energy is defined in the Pressure text parameter (→ 67).

Date/time format

**Navigation**

[Expert → Sensor → System units → Date/time format]

**Description**

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

Proline Promass 100 HART

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

Factory setting
dd.mm.yy hh:mm

Additional information
Selection
For an explanation of the abbreviated units: → 205

"User-spec. units" submenu

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

>User-spec. units

- Mass text → 63
- Mass offset → 63
- Mass factor → 63
- Volume text → 64
- Volume offset → 64
- Volume factor → 65
- Corr. vol. text → 65
- Corr vol. offset → 65
- Cor.vol factor → 66
- Density text → 66
- Density offset → 66
- Density factor → 66
- Pressure text → 67
- Pressure offset → 67
- Pressure factor → 67
### Mass text

**Navigation**

Expert → Sensor → System units → User-spec. units → Mass text

**Description**

Use this function to enter a text for the user-specific unit of mass and mass flow. The corresponding time units (s, min, h, d) for mass flow are generated automatically.

**User entry**

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

**Factory setting**

User mass

**Additional information**

**Result**

The defined unit is shown as an option in the choose list of the following parameters:

- **Mass flow unit** parameter (→ 54)
- **Mass unit** parameter (→ 54)

**Example**

If the text CENT for "centner" is entered, the following options are displayed in the picklist for the **Mass flow unit** parameter (→ 54):

- CENT/s
- CENT/min
- CENT/h
- CENT/d

### Mass offset

**Navigation**

Expert → Sensor → System units → User-spec. units → Mass offset

**Description**

Use this function to enter the zero point shift for the user-specific mass and mass flow unit.

**User entry**

Signed floating-point number

**Factory setting**

0

**Additional information**

**Description**

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

### Mass factor

**Navigation**

Expert → Sensor → System units → User-spec. units → Mass factor

**Description**

Use this function to enter a quantity factor (without time) for the user-specific mass and mass flow unit.

**User entry**

Signed floating-point number
Description of device parameters

Factory setting

1.0

Additional information

Example

Mass of 1 Zentner = 50 kg → 0.02 Zentner = 1 kg → entry: 0.02

Volume text

Navigation

Expert → Sensor → System units → User-spec. units → Volume text

Description

Use this function to enter a text for the user-specific unit of volume and volume flow. The corresponding time units (s, min, h, d) for volume flow are generated automatically.

User entry

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

Factory setting

User vol.

Additional information

Result

The defined unit is shown as an option in the choose list of the following parameters:

- **Volume flow unit** parameter (→ 55)
- **Volume unit** parameter (→ 57)

Example

If the text GLAS is entered, the choose list of the **Volume flow unit** parameter (→ 55) shows the following options:

- GLAS/s
- GLAS/min
- GLAS/h
- GLAS/d

Volume offset

Navigation

Expert → Sensor → System units → User-spec. units → Volume offset

Description

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

User entry

Signed floating-point number

Factory setting

0

Additional information

Description

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

**Navigation**

Expert → Sensor → System units → User-spec. units → Volume factor

**Description**

Use this function to enter a quantity factor (without time) for the user-specific volume and volume flow unit.

**User entry**

Signed floating-point number

**Factory setting**

1.0

Corr. vol. text

**Navigation**

Expert → Sensor → System units → User-spec. units → Corr. vol. text

**Description**

Use this function to enter a text for the user-specific unit of the corrected volume and corrected volume flow. The corresponding time units (s, min, h, d) for mass flow are generated automatically.

**User entry**

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

**Factory setting**

UserCrVol.

**Additional information**

*Result*

The defined unit is shown as an option in the choose list of the following parameters:

- Corr.volflow unit parameter (→ 57)
- Corr. vol. unit parameter (→ 58)

*Example*

If the text GLAS is entered, the choose list of the Corr.volflow unit parameter (→ 57) shows the following options:

- GLAS/s
- GLAS/min
- GLAS/h
- GLAS/d

Corr vol. offset

**Navigation**

Expert → Sensor → System units → User-spec. units → Corr. vol. offset

**Description**

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

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

**User entry**

Signed floating-point number

**Factory setting**

0
### Cor. vol. factor

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

**Description**  
Use this function to enter a quantity factor (without time) for the user-specific corrected volume unit and corrected volume flow unit.

**User entry**  
Signed floating-point number

**Factory setting**  
1.0

### Density text

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

**Description**  
Use this function to enter a text or the user-specific unit of density.

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

**Factory setting**  
User dens.

**Additional information**  
**Result**  
The defined unit is shown as an option in the choose list of the Density unit parameter (→ 59).

**Example**  
Enter text “CE_L” for centners per liter

### Density offset

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

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

**User entry**  
Signed floating-point number

**Factory setting**  
0

### Density factor

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

**Description**  
Use this function to enter a quantity factor for the user-specific density unit.
<table>
<thead>
<tr>
<th><strong>User entry</strong></th>
<th>Signed floating-point number</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Factory setting</strong></td>
<td>1.0</td>
</tr>
</tbody>
</table>

**Pressure text**

**Navigation**

Expert → Sensor → System units → User-spec. units → Pressure text

**Description**

Use this function to enter a text for the user-specific pressure unit.

**User entry**

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

**Factory setting**

User pres.

**Additional information**

The defined unit is shown as an option in the choose list of the **Pressure unit** parameter (→  61).

**Pressure offset**

**Navigation**

Expert → Sensor → System units → User-spec. units → Pressure offset

**Description**

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

**User entry**

Signed floating-point number

**Factory setting**

0

**Pressure factor**

**Navigation**

Expert → Sensor → System units → User-spec. units → Pressure factor

**Description**

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

**User entry**

Signed floating-point number

**Factory setting**

1.0

**Additional information**

*Example*

1 Dyn/cm² = 0.1 Pa → 10 Dyn/cm² = 1 Pa → user entry: 10
3.2.3 "Process param." submenu

**Navigation**

Expert → Sensor → Process param. → Flow damping

**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 100.0 s

**Factory setting**

0 s

**Additional information**

*Description*

The damping is performed by a PT1 element 2).

*User entry*

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

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

*Result*

The damping affects the following variables of the device:
- Outputs → 92
- Low flow cut off → 70
- Totalizers → 165

---

2) Proportional behavior with first-order lag
Density damping

Navigation  
Expert → Sensor → Process param. → Density damping

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

User entry  
0 to 999.9 s

Factory setting  
0 s

Additional information  

Description

The damping is performed by a PT1 element 3).

User entry

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

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

Temp. damping

Navigation  
Expert → Sensor → Process param. → Temp. damping

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

Factory setting  
0 s

Additional information  

Description

The damping is performed by a PT1 element 4).

User entry

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

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

3) Proportional behavior with first-order lag
4) Proportional behavior with first-order lag
Flow override

**Navigation**


**Description**

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

**Selection**

- Off
- On

**Factory setting**

Off

**Additional information**

*Result*

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

*Description*

**Flow override is active**

- The diagnostic message diagnostic message \( \Delta C453 \) Flow override is displayed.
- Output values
  - Output: Value at zero flow
  - Temperature: proceeding output
  - Totalizers 1-3: Stop being totalized

*Result*

Positive zero return can also be enabled via the Status input: Assign stat.inp. parameter.

"Low flow cut off" submenu

**Navigation**

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

<table>
<thead>
<tr>
<th>Assign variable</th>
<th>70</th>
</tr>
</thead>
<tbody>
<tr>
<td>On value</td>
<td>71</td>
</tr>
<tr>
<td>Off value</td>
<td>71</td>
</tr>
<tr>
<td>Pres. shock sup.</td>
<td>72</td>
</tr>
</tbody>
</table>

**Assign variable**

**Navigation**

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

**Description**

Use this function to select the process variable for low flow cutoff detection.
Selection
- Off
- Mass flow
- Volume flow
- Correct.vol.flow

Factory setting
Mass flow

On value

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

Prerequisite
One of the following options is selected in the Assign variable parameter (→ 70):
- Mass flow
- Volume flow
- Correct.vol.flow

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 → 71.

User entry
Positive floating-point number

Factory setting
Depends on country and nominal diameter → 200

Additional information
Dependency
The unit depends on the process variable selected in the Assign variable parameter (→ 70).

Off value

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

Prerequisite
One of the following options is selected in the Assign variable parameter (→ 70):
- Mass flow
- Volume flow
- Correct.vol.flow

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→ 71.

User entry
0 to 100.0 %

Factory setting
50 %
**Description of device parameters**

**Proline Promass 100 HART**

---

### Additional information

**Example**

![Diagram](image.png)

- **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

---

**Pres. shock sup.**

**Navigation**


**Prerequisite**

One of the following options is selected in the **Assign variable** parameter (→ 70):

- Mass flow
- Volume flow
- Correct.vol.flow

**Description**

Use this function to enter the time interval for signal suppression (= active pressure shock suppression).

**User entry**

0 to 100 s

**Factory setting**

0 s

**Additional information**

**Pressure shock suppression is enabled**

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

**Pressure shock suppression is disabled**

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

**Example**

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

Q  Flow  
t  Time  
A  Drip  
B  Pressure shock  
C  Pressure shock suppression active as specified by the time entered  
D  Pressure shock suppression inactive  
1  Valve closes  
2  Flow falls below the on-value of the low flow cut off: pressure shock suppression is activated  
3  The time entered has elapsed; pressure shock suppression is deactivated  
4  The actual flow value is now displayed and output  
5  On value for low flow cut off  
6  Off value for low flow cut off

"Partial pipe det" submenu

Navigation  
Expert → Sensor → Process param. → Partial pipe det

<table>
<thead>
<tr>
<th>Partial pipe det</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Assign variable</td>
<td>→  74</td>
</tr>
<tr>
<td>Low value</td>
<td>→  74</td>
</tr>
<tr>
<td>High value</td>
<td>→  74</td>
</tr>
<tr>
<td>Response time</td>
<td>→  75</td>
</tr>
<tr>
<td>Max. damping</td>
<td>→  75</td>
</tr>
</tbody>
</table>
**Assign variable**

**Navigation**  
Expert → Sensor → Process param. → Partial pipe det → Assign variable

**Description**  
Use this function to select a process variable to detect empty or partially filled measuring tubes.  
For gas measurement: Deactivate monitoring due to low gas density.

**Selection**  
- Off
- Density
- Ref. density

**Factory setting**  
Off

**Low value**

**Navigation**  
Expert → Sensor → Process param. → Partial pipe det → Low value

**Prerequisite**  
One of the following options is selected in the Assign variable parameter (→ 74):  
- Density
- Ref. density

**Description**  
Use this function to enter a lower limit value to enable detection of empty or partially filled measuring tubes. If the measured density falls below this value, monitoring is enabled.

**User entry**  
Signed floating-point number

**Factory setting**  
200

**Additional information**  
*User entry*

The lower limit value must be less than the upper limit value defined in the High value parameter (→ 74).

*Limit value*

If the displayed value is outside the limit value, the measuring device displays the diagnostic message **S862 Partly filled**.

**High value**

**Navigation**  
Expert → Sensor → Process param. → Partial pipe det → High value

**Prerequisite**  
One of the following options is selected in the Assign variable parameter (→ 74):  
- Density
- Ref. density
### Description

Use this function to enter an upper limit value to enable detection of empty or partially filled measuring tubes. If the measured density exceeds this value, detection is enabled.

**User entry**
Signed floating-point number

**Factory setting**
6000

**Additional information**

*User entry*

The upper limit value must be greater than the lower limit value defined in the **Low value** parameter (→ 74).

- The unit depends on the process variable selected in the **Assign variable** parameter (→ 74).

**Limit value**

- If the displayed value is outside the limit value, the measuring device displays the diagnostic message **ΔS862 Partly filled**.

### Response time

**Navigation**

ensation → Process param. → Partial pipe det → Response time

**Prerequisite**

One of the following options is selected in the **Assign variable** parameter (→ 74):
- Density
- Ref.density

**Description**

Use this function to enter the minimum length of time (debouncing time) the signal must be present for the diagnostic message **ΔS862 Partly filled** to be triggered if the measuring pipe is empty or partially full.

**User entry**

0 to 100 s

**Factory setting**

1 s

### Max. damping

**Navigation**

ensation → Process param. → Partial pipe det → Max. damping

**Prerequisite**

One of the following options is selected in the **Assign variable** parameter (→ 74):
- Density
- Ref.density

**Description**

Use this function to enter a damping value to enable detection of empty or partially filled measuring tubes.

**User entry**

Positive floating-point number

**Factory setting**

0
Additional information

Description

If oscillation damping exceeds the specified value, the measuring device presumes that the pipe is partially filled and the flow signal is set to 0. The measuring device displays the diagnostic message \textit{S862 Partly filled}. In the case of non-homogeneous media or air pockets, the damping of the measuring tubes increases.

User entry

- Damping is disabled if 0 is entered (factory setting).
- Damping is enabled if the value entered is greater than 0.
- The value entered depends on application-specific influence variables, such as the medium, nominal diameter, sensor etc.

Example

- If the pipe is filled normally the value of the oscillation damping is 500.
- If the pipe is partially filled the value of the oscillation damping is > 5000.
- A practical damping value would then be 2000: enter 2000 as the value.

3.2.4 "Measurement mode" submenu

Navigation

\hspace{1cm} Expert \rightarrow Sensor \rightarrow Measurement mode

\begin{center}
\begin{tabular}{|l|}
\hline
\hspace{1cm} Measurement mode \\
\hline
Select medium \rightarrow 76 \\
Select gas type \rightarrow 77 \\
Sound velocity \rightarrow 77 \\
Temp. coeff. SV \rightarrow 78 \\
\hline
\end{tabular}
\end{center}

Select medium

Navigation

\hspace{1cm} Expert \rightarrow Sensor \rightarrow Measurement mode \rightarrow Select medium

Description

Use this function to select the type of medium.

Selection

Liquid

Factory setting

Liquid
Select gas type

**Navigation**

[Expert → Sensor → Measurement mode → Select gas type]

**Prerequisite**

The **Gas** option is selected in the **Select medium** parameter (→ 76).

**Description**

Use this function to select the type of gas for the measuring application.

**Selection**

- Air
- Ammonia NH3
- Argon Ar
- Sulf. hex.fl.SF6
- Oxygen O2
- Ozone O3
- Nitrog. ox. NOx
- Nitrogen N2
- Nitrous ox. N2O
- Methane CH4
- Hydrogen H2
- Helium He
- Hydrog.chlor.HCl
- Hydrog.sulf. H2S
- Ethylene C2H4
- Carbon diox. CO2
- Carbon monox. CO
- Chlorine Cl2
- Butane C4H10
- Propane C3H8
- Propylene C3H6
- Ethane C2H6
- Others

**Factory setting**

Methane CH4

**Additional information**

*Description*

The gas type needs to be selected so that it is possible to comply with accuracy specifications in gas applications.

Sound velocity

**Navigation**

[Expert → Sensor → Measurement mode → Sound velocity]

**Prerequisite**

In the **Select gas type** parameter (→ 77), the **Others** option is selected.

**Description**

Use this function to enter the sound velocity of the gas at 0 °C (+32 °F).

**User entry**

1 to 99999.9999 m/s

**Factory setting**

415.0 m/s
**Temp. coeff. SV**

**Navigation**

Navigate to Expert → Sensor → Measurement mode → Temp. coeff. SV

**Prerequisite**

The Others option is selected in the Select gas type parameter (→ 77).

**Description**

Use this function to enter a temperature coefficient for the sound velocity of the gas.

**User entry**

Positive floating-point number

**Factory setting**

0 (m/s)/K

---

### 3.2.5 "External comp." submenu

**Navigation**

Navigate to Expert → Sensor → External comp.

**Description**

Use this function to select the process variable which is taken from an external device.

**Selection**

- Off
- Pressure
- Temperature

**Factory setting**

Off
### Pressure compen.

**Navigation**


**Description**

Use this function to select the type of pressure compensation.

**Selection**

- Off
- Fixed value
- External value

**Factory setting**

Off

**Additional information**

*Selection*

- Fixed value
  A fixed pressure value is used for compensation: *Pressure value* parameter (→ 79)
- External value
  The pressure value read in via HART is used for compensation.
- **Current input 1** option, **Current input 2** option
  The pressure value read in via the current input is used for compensation.

### Pressure value

**Navigation**

Expert → Sensor → External comp. → Pressure value

**Prerequisite**

The **Fixed value** option is selected in the Pressure compen. parameter (→ 79).

**Description**

Use this function to enter a value for the process pressure that is used for pressure correction.

**User entry**

Positive floating-point number

**Factory setting**

0 bar

**Additional information**

*User entry*

The unit is taken from the Pressure unit parameter (→ 61)

---

### External press.

**Navigation**


**Prerequisite**

The **External value** option is selected in the Pressure compen. parameter (→ 79).

**Description**

Use this function to enter an external pressure value.

**User interface**

Positive floating-point number

**Factory setting**

0 bar
External temp.

**Additional information**  
*User entry*

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

**Navigation**  

**Prerequisite**  
In the **External value** parameter (→ 78), the **Temperature** option is selected.

**Description**  
Use this function to enter the external temperature.

**User entry**  
-273.15 to 99999 °C

**Factory setting**  
Country-specific:

- 0 °C
- +32 °F

**Additional information**  
*Description*

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

---

### 3.2.6 "Calculated value" submenu

**Navigation**  
Expert → Sensor → Calculated value

- **Calculated value**
  - **Corr. vol.flow.**  → 80

**"Corr. vol.flow." submenu**

**Navigation**  

- **Corr. vol.flow.**  → 81
  - **Ext. ref.density**  → 81
  - **Fix ref.density**  → 82
  - **Ref. temperature**  → 82

**Navigation**


**Description**

Use this function to select the reference density for calculating the corrected volume flow.

**Selection**

- Fix ref. density
- Calc ref density
- Ref. dens API 53

**Factory setting**

Calc ref density

**Additional information**

The **Ref. dens API 53** option is suitable only for applications involving LPG\(^5\), where the flow rate is measured on the basis of the corrected volume flow.

Selecting this option means that the reference density is used, taking into account the values in table 53 E of API MPMS section 11.2. Temperature measurement (measured internally or read into the device from an external source) and density measurement take place during operation while the medium is flowing. The mass flow is divided by the reference density to give the corrected volume flow and is issued as an output signal.

Ext. ref. density

**Navigation**

Expert → Sensor → Calculated value → Corr. vol. flow → Ext. ref. density

**Description**

Displays the reference density which is read in externally, e.g. via the current input, HART input.

**User interface**

Floating point number with sign

**Additional information**

**Dependency**

The unit is taken from the **Ref. dens. unit** parameter (→ 60)

\(^5\) liquefied petroleum gas
Fix ref. density

Navigation

Prerequisite
The Fix ref. density option is selected in the Corr. vol.flow. parameter (→ 81) parameter.

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

User entry
Positive floating-point number

Factory setting
1 kg/Nl

Additional information
Dependency
The unit is taken from the Ref. dens. unit parameter (→ 60)

Ref. temperature

Navigation

Prerequisite
The Calc ref density option is selected in the Corr. vol.flow. parameter (→ 81).

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

User entry
–273.15 to 99999 °C

Factory setting
Country-specific:
- +20 °C
- +68 °F

Additional information
Dependency
The unit is taken from the Temperature unit parameter (→ 60)

Reference density calculation

\[
\rho_n = \rho \cdot (1 + \alpha \cdot \Delta t + \beta \cdot \Delta t^2)
\]

- \(\rho_n\): reference density
- \(\rho\): fluid density currently measured
- \(t\): fluid temperature currently measured
- \(t_N\): reference temperature at which the reference density is calculated (e.g. 20 °C)
- \(\Delta t\): \(t - t_N\)
- \(\alpha\): linear expansion coefficient of the fluid, unit = \([1/K]\); K = Kelvin
- \(\beta\): square expansion coefficient of the fluid, unit = \([1/K^2]\)
### Linear exp coeff

**Navigation**

Expert → Sensor → Calculated value → Corr. vol.flow. → Linear exp coeff

**Prerequisite**

The **Calc ref density** option is selected in the **Corr. vol.flow.** parameter (→ 81) parameter.

**Description**

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

**User entry**

Signed floating-point number

**Factory setting**

0.0

### Square exp coeff

**Navigation**


**Prerequisite**

The **Calc ref density** option is selected in the **Corr. vol.flow.** parameter (→ 81) parameter.

**Description**

For fluid with a non-linear expansion pattern: use this function to enter a quadratic, fluid-specific expansion coefficient for calculating the reference density.

**User entry**

Signed floating-point number

**Factory setting**

0.0

---

### 3.2.7 "Sensor adjustm." submenu

**Navigation**


- **Sensor adjustm.**
  - Install. direct. → 84
  - **Zero point adj.** → 84
  - **Variable adjust** → 85
Install. direct.

Navigation


Description

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

Selection

• In arrow direct.
• Against arrow

Factory setting

In arrow direct.

Additional information

Description

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

“Zero point adj.” submenu

• It is generally not necessary to perform zero point adjustment.
• However, this function may be needed in some applications with low flow and strict accuracy requirements.
• A zero point adjustment cannot increase repeatability.
• The following conditions should be met to perform a zero point adjustment successfully without the adjustment finishing in an error:
  – The real flow must be 0.
  – The pressure must be at least 15 psi g.
• The adjustment takes a maximum of 60 s. The more stable the conditions, the faster the adjustment is completed.
• This function can also be used to check the health of the measuring device.
  A healthy measuring device has a maximum zero point deviation of ±100 compared to the factory setting of the measuring device (calibration report).

Navigation


Zero point adj.

Navigation


Description

Use this function to select the start of the zero point adjustment.

Observe conditions → 84.
Selection

- Cancel
- Busy
- Zero adjust fail
- Start

Factory setting
Cancel

Additional information

Description

- Cancel
  If zero point adjustment has failed, select this option to cancel zero point adjustment.
- Busy
  Is displayed during zero point adjustment.
- Zero adjust fail
  Is displayed if zero point adjustment has failed.
- Start
  Select this option to start zero point adjustment.

Progress

Navigation


Description
The progress of the process is indicated.

User interface
0 to 100%

"Variable adjust" submenu

Navigation

Expert → Sensor → Sensor adjustm. → Variable adjust

<table>
<thead>
<tr>
<th>Variable adjust</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass flow offset</td>
<td>→ 86</td>
</tr>
<tr>
<td>Mass flow factor</td>
<td>→ 86</td>
</tr>
<tr>
<td>Vol. flow offset</td>
<td>→ 86</td>
</tr>
<tr>
<td>Vol. flow factor</td>
<td>→ 87</td>
</tr>
<tr>
<td>Density offset</td>
<td>→ 87</td>
</tr>
<tr>
<td>Density factor</td>
<td>→ 87</td>
</tr>
<tr>
<td>Corr. vol offset</td>
<td>→ 88</td>
</tr>
<tr>
<td>Corr. vol factor</td>
<td>→ 88</td>
</tr>
</tbody>
</table>
### Description of device parameters

#### Proline Promass 100 HART

- **Ref.dens. offset**
  - → 88

- **Ref.dens. factor**
  - → 89

- **Temp. offset**
  - → 89

- **Temp. factor**
  - → 89

---

### Mass flow offset

**Navigation**

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

**User entry**
Signed floating-point number

**Factory setting**
0 kg/s

**Additional information**
*Description*
Corrected value = (factor × value) + offset

---

### Mass flow factor

**Navigation**

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

**User entry**
Positive floating-point number

**Factory setting**
1

**Additional information**
*Description*
Corrected value = (factor × value) + offset

---

### Vol. flow offset

**Navigation**

**Description**
Use this function to enter the zero point shift for the volume flow trim. The volume flow unit on which the shift is based is m³/s.
Proline Promass 100 HART

Description of device parameters

User entry
Signed floating-point number

Factory setting
0 m³/s

Additional information

Vol. flow factor

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

User entry
Positive floating-point number

Factory setting
1

Additional information

Density offset

Description
Use this function to enter the zero point shift for the density trim. The density unit on which the shift is based is kg/m³.

User entry
Signed floating-point number

Factory setting
0 kg/m³

Additional information

Density factor

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

User entry
Positive floating-point number
**Corr. vol offset**

**Navigation**

**Description**
Use this function to enter the zero point shift for the corrected volume flow trim. The corrected volume flow unit on which the shift is based is 1 Nm³/s.

**User entry**
Signed floating-point number

**Factory setting**
0 Nm³/s

**Additional information**
Corrected value = (factor × value) + offset

---

**Corr. vol factor**

**Navigation**

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

**User entry**
Positive floating-point number

**Factory setting**
1

**Additional information**
Corrected value = (factor × value) + offset

---

**Ref.dens. offset**

**Navigation**
Expert → Sensor → Sensor adjustm. → Variable adjust → Ref.dens. offset

**Description**
Use this parameter to enter the zero point shift for the reference density trim. The reference density unit on which the shift is based is 1 kg/Nm³.

**User entry**
Signed floating-point number

**Factory setting**
0 kg/Nm³
**Ref. dens. factor**

**Navigation**

Expert → Sensor → Sensor adjustm. → Variable adjust → Ref. dens. factor

**Description**

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

**User entry**

Positive floating-point number

**Factory setting**

1

**Additional information**

Description

Corrected value = (factor × value) + offset

---

**Temp. offset**

**Navigation**

Expert → Sensor → Sensor adjustm. → Variable adjust → Temp. offset

**Description**

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

**User entry**

Signed floating-point number

**Factory setting**

0 K

**Additional information**

Description

Corrected value = (factor × value) + offset

---

**Temp. factor**

**Navigation**

Expert → Sensor → Sensor adjustm. → Variable adjust → Temp. factor

**Description**

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

**User entry**

Positive floating-point number

**Factory setting**

1
Additional information

Description

Corrected value = (factor × value) + offset

3.2.8 "Calibration" submenu

Navigation

Expert → Sensor → Calibration

Cal. factor

Description
Displays the current calibration factor for the sensor.

User interface
Signed floating-point number

Factory setting
Depends on nominal diameter and calibration.

Zero point

Description
Use this function to enter the zero point correction value for the sensor.

User entry
Signed floating-point number

Factory setting
Depends on nominal diameter and calibration.
Nominal diameter

**Navigation**

Expert → Sensor → Calibration → Nominal diameter

**Description**

Displays the nominal diameter of the sensor.

**User interface**

DNxx / x"

**Factory setting**

Depends on the size of the sensor

**Additional information**

*Description*

The value is also specified on the sensor nameplate.

---

C0 to 5

**Navigation**

Expert → Sensor → Calibration → C0 to 5

**Description**

Displays the current density coefficients C0 to 5 of the sensor.

**User interface**

Signed floating-point number

**Factory setting**

0

---

3.2.9 "Supervision" submenu

**Navigation**

Expert → Sensor → Supervision

Limit tube damp.

**Navigation**

Expert → Sensor → Supervision → Limit tube damp.

**Description**

Use this function to enter a limit value for measuring tube damping.

**User entry**

Positive floating-point number

**Factory setting**

Positive floating-point number
Additional information

Limit value

- If the displayed value is outside the limit value, the measuring device displays the diagnostic message **Tube damp. high**.
- For detecting inhomogeneous media, for example...

### 3.3 "Output" submenu

**Navigation**

- Expert → Output

#### 3.3.1 "Current output 1" submenu

**Navigation**

- Expert → Output → Curr.output 1

- **Assign curr.**
- **Current span**
- **Fixed current**
- **0/4 mA value**
- **20 mA value**
- **Measuring mode**
- **Damping out.**
- **Response time**
- **Failure mode**
- **Failure current**
- **Output curr. 1**
- **Measur. curr. 1**
Assign curr.

**Navigation**

[专家模式] → 输出 → Curr.output 1 → Assign curr.

**Description**

使用此功能来选择当前输出的工艺变量。

- Description of the options Oscil. frequency, Oscil. amplitude, Oscil. damping and Signal asymmetry: Value 1 display parameter (→ 页 17)

**Selection**

- Off
- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow
- Carrier mass fl.
- Density
- Ref.density
- Concentration
- Dyn. viscosity
- Kinematic visc.
- TempCompDynVisc
- TempCompKinVisc
- Temperature
- Carr. pipe temp.
- Electronic temp.
- Osc. freq. 0
- Osc. freq. 1
- Osc. ampl. 0
- Osc. ampl. 1
- Freq. fluct. 0
- Freq. fluct. 1
- Osc. damping 0
- Osc. damping 1
- Damping fluct 0
- Damping fluct 1
- Signal asymmetry
- Exc. current 0
- Exc. current 1
- Sensor integrity

**Factory setting**

- Mass flow

Current span

**Navigation**

[专家模式] → 输出 → Curr.output 1 → Current span

**Description**

使用此功能来选择工艺值输出的电流范围以及信号报警的上、下限。

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

Proline Promass 100 HART

Selection

- 4...20 mA NAMUR
- 4...20 mA US
- 4...20 mA
- 0...20 mA
- Fixed current

Factory setting

Country-specific:

- 4...20 mA NAMUR
- 4...20 mA US

Additional information

Description

- In the event of a device alarm, the current output adopts the value specified in the Failure mode parameter (→ 105).
- If the measured value is outside the measuring range, the diagnostic message \( \triangle S441 \text{ Curr.output 1} \) is displayed.
- The measuring range is specified via the 0/4 mA value parameter (→ 95) and 20 mA value parameter (→ 97).

"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 (→ 95).

Example

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

<table>
<thead>
<tr>
<th>Selection</th>
<th>1 (mA)</th>
<th>2 (mA)</th>
<th>3 (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4...20 mA NAMUR</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</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</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</td>
<td>0 to 20.5 mA</td>
<td>&lt; 0 mA</td>
<td>&gt; 21.95 mA</td>
</tr>
</tbody>
</table>

If the flow exceeds or falls below the upper or lower signal on alarm level, the diagnostic message \( \triangle S441 \text{ Curr.output 1} \) is displayed.
### Fixed current

**Navigation**  
Expert → Output → Curr.output 1 → Fixed current  

**Prerequisite**  
The Fixed current option is selected in the Current span parameter (→ 93).  

**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 → 0/4 mA value  

**Prerequisite**  
One of the following options is selected in the Current span parameter (→ 93):  
- 4...20 mA NAMUR  
- 4...20 mA US  
- 4...20 mA  
- 0...20 mA  

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

**User entry**  
Signed floating-point number  

**Factory setting**  
Country-specific:  
- 0 kg/h  
- 0 lb/min  

**Additional information**  
**Description**  
Positive and negative values are permitted depending on the process variable assigned in the Assign curr. parameter (→ 93). 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 (→ 97).  

**Dependency**  
The unit depends on the process variable selected in the Assign curr. parameter (→ 93).  

**Current output behavior**  
The current output behaves differently depending on the settings configured in the following parameters:  
- Current span (→ 93)  
- Measuring mode (→ 97)  
- Failure mode (→ 105)  

**Configuration examples**  
Some examples of parameter settings and their effect on the current output are given in the following section.
Configuration example A
Measuring mode with **Forward flow** option
- **0/4 mA value** parameter (→ 95) = not equal to zero flow (e.g. -250 m³/h)
- **20 mA value** parameter (→ 97) = not equal to zero flow (e.g. +750 m³/h)
- Calculated current value = 8 mA at zero flow

The operational range of the measuring device is defined by the values entered for the **0/4 mA value** parameter (→ 95) and **20 mA value** parameter (→ 97). If the effective flow exceeds or falls below this operational range, the diagnostic message **△S441 Curr.output 1** is displayed.

Configuration example B
Measuring mode with **Forward/Reverse** option

The current output signal is independent of the direction of flow (absolute amount of the measured variable). The values for the **0/4 mA value** parameter (→ 95) and **20 mA value** parameter (→ 97) must have the same sign. The value for the **20 mA value** parameter (→ 97) (e.g. reverse flow) corresponds to the mirrored value for the **20 mA value** parameter (→ 97) (e.g. forward flow).

Configuration example C
Measuring mode with **Rev. flow comp.** option
If flow is characterized by severe fluctuations (e.g. when using reciprocating pumps), flow components outside the measuring range are buffered, balanced and output after a maximum delay of 60 s → 97.
20 mA value

Navigation

Expert → Output → Curr.output 1 → 20 mA value

Prerequisite

One of the following options is selected in the Current span parameter (→ 93):

- 4...20 mA NAMUR
- 4...20 mA US
- 4...20 mA
- 0...20 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 (→ 199)

Additional information

Description

Positive and negative values are permitted depending on the process variable assigned in the Assign curr. parameter (→ 93). 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 (→ 95).

Dependency

The unit depends on the process variable selected in the Assign curr. parameter (→ 93).

Example

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

If the Forward/Reverse option is selected in the Measuring mode parameter (→ 97), different signs cannot be entered for the values of the 0/4 mA value parameter (→ 95) and 20 mA value parameter (→ 97). The diagnostic message S441 Curr.output 1 is displayed.

Configuration examples

Observe the configuration examples for the 0/4 mA value parameter (→ 95).

Measuring mode

Navigation

Expert → Output → Curr.output 1 → Measuring mode

Prerequisite

One of the following options is selected in the Assign curr. parameter (→ 93):

- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *

* Visibility depends on order options or device settings
Density
Ref.density
Concentration
Dynam. viscosity
Kinematic visc.
TempCompDynVisc
TempCompKinVisc
Temperature
Carr. pipe temp.
Electronic temp.
Osc. freq. 0
Osc. freq. 1
Osc. ampl. 0
Osc. ampl. 1
Freq. fluct. 0
Freq. fluct. 1
Osc. damping 0
Osc. damping 1
Osc.damp.fluct 0
Osc.damp.fluct 1
Signal asymmetry
Exc. current 0
Exc. current 1
HBSI

Detailed description of the options Oscil. frequency, Oscil. amplitude, Oscil. damping and Signal asymmetry: Value 1 display parameter (→ 17)

One of the following options is selected in the Current span parameter (→ 93):
4...20 mA NAMUR
4...20 mA US
4...20 mA
0...20 mA

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

Selection
Forward flow
Forward/Reverse
Rev. flow comp.

Factory setting
Forward flow

Additional information
The process variable that is assigned to the current output via the Assign curr. parameter (→ 93) is displayed below the parameter.

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

* Visibility depends on order options or device settings
The flow components outside the scaled measuring range are taken into account for signal output as follows:

- Both values are defined such that they are not equal to zero flow e.g.:
  - 0/4 mA current value = -5 m³/h
  - 20 mA current value = 10 m³/h
- If the effective flow exceeds or falls below this measuring range, the diagnostic message \( \Delta S441 \text{ Curr.output 1} \) is displayed.

'Forward/Reverse' option

<table>
<thead>
<tr>
<th></th>
<th>Current</th>
<th>Flow</th>
<th>1 Value assigned to the 0/4 mA current</th>
<th>2 Forward flow</th>
<th>3 Reverse flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- The current output signal is independent of the direction of flow (absolute amount of the measured variable). The values for the 0/4 mA value parameter (→ 95) and 20 mA value parameter (→ 97) must have the same sign.
- The value for the 20 mA value parameter (→ 97) (e.g. reverse flow) corresponds to the mirrored value for the 20 mA value parameter (→ 97) (e.g. forward flow).

'Rev. flow comp.' option

The Rev. flow comp. option is primarily used to compensate for abrupt reverse flow which can occur in connection with positive displacement pumps as a result of wear or high viscosity. The reverse flows are recorded in a buffer and balanced against forward flow the next time flow is in the forward direction.

If buffering cannot be processed within approx. 60 s, the diagnostic message \( \Delta S441 \text{ Curr.output 1} \) is displayed.

Flow values can aggregate in the buffer in the event of prolonged and unwanted fluid reverse flow. However, these flows are not taken into consideration by the current output configuration, i.e. the reverse flow is not compensated.

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

Examples of how the current output behaves

Example 1

Defined measuring range: lower range value and upper range value with the same sign
Description of device parameters

Proline Promass 100 HART

2 Measuring range

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

With the following flow response:

3 Flow response

Q Flow
t Time

With **Forward flow** option

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

With **Forward/Reverse** option

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

With **Rev. flow comp.** option
Flow components outside the span are buffered, balanced and output after a maximum delay of 60 s.

\[ I = A \]

$S = A$

**Example 2**

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

\[ I \] Current
\[ t \] Time
\[ S \] Flow components saved
\[ A \] Balancing of saved flow components

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

\[ Q \] Flow
\[ t \] Time
\[ 1 \] Lower range value (value assigned to 0/4 mA current)
\[ 2 \] Upper range value (value assigned to 20 mA current)

With **Forward flow** option

- a (−): The flow components outside the scaled measuring range cannot be taken into account for signal output.
  The diagnostic message **ΔS441 Curr.output 1** is displayed.
- b (− -): The current output signal is proportional to the process variable assigned.
Description of device parameters

**Proline Promass 100 HART**

I [mA] vs. t

With **Forward/Reverse** option

This option is not possible in this case as the values for the **0/4 mA value** parameter (→  95) and **20 mA value** parameter (→  97) have different signs.

With **Rev. flow comp.** option

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

**Damping out.**

**Navigation**

Expert → Output → Curr.output 1 → Damping out.

**Prerequisite**

One of the following options is selected in the **Assign curr.** parameter (→  93):

- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow
- Carrier mass fl.
- Density
- Ref.density
- Concentration
- Dynam. viscosity
- Kinematic visc.
- TempCompDynVisc
- TempCompKinVisc
- Temperature
- Carr. pipe temp.
- Electronic temp.
- Osc. freq. 0

* Visibility depends on order options or device settings
Proline Promass 100 HART

Description of device parameters

- Osc. freq. 1 *
- Osc. ampl. 0 *
- Osc. ampl. 1 *
- Freq. fluct. 0
- Freq. fluct. 1 *
- Osc. damping 0
- Osc. damping 1 *
- Osc.damp.fluct 0
- Osc.damp.fluct 1 *
- Signal asymmetry
- Exc. current 0
- Exc. current 1 *
- HBSI *

**Detailed description of the options Oscil. frequency, Oscil. amplitude, Oscil. damping and Signal asymmetry: Value 1 display** parameter (→ 17)

One of the following options is selected in the **Current span** parameter (→ 93):
- 4...20 mA NAMUR
- 4...20 mA US
- 4...20 mA
- 0...20 mA

**Description**

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

**User entry**

0.0 to 999.9 s

**Factory setting**

1.0 s

**Additional information**

Use this function to enter a time constant (PT1 element 6) 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).

---

**Response time**

**Navigation**

Expert → Output → Curr.output 1 → Response time

**Prerequisite**

One of the following options is selected in the **Assign curr.** parameter (→ 93):
- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl.
- Density
- Ref.density
- Concentration *

* Visibility depends on order options or device settings

6) Proportional transmission behavior with first order delay
Description of device parameters

- Dynam. viscosity *
- Kinematic visc.
- TempCompDynVisc *
- TempCompKinVisc *
- Temperature
- Carr. pipe temp. *
- Electronic temp.
- Osc. freq. 0
- Osc. freq. 1 *
- Osc. ampl. 0 *
- Osc. ampl. 1 *
- Freq. fluct. 0
- Freq. fluct. 1 *
- Osc. damping 0
- Osc. damping 1 *
- Osc.damp.fluct 0
- Osc.damp.fluct 1 *
- Signal asymmetry
- Exc. current 0
- Exc. current 1 *
- HBSI *

Detailed description of the options Oscil. frequency, Oscil. amplitude, Oscil. damping and Signal asymmetry: Value 1 display parameter (→ 17)

One of the following options is selected in the Current span parameter (→ 93):
- 4...20 mA NAMUR
- 4...20 mA US
- 4...20 mA
- 0...20 mA

Description
Displays the response time. This specifies how quickly the current output reaches the measured value change of 63 % of 100 % of the measured value change.

User interface
Positive floating-point number

Additional information

The response time is made up of the time specified for the following dampings:
- Current output damping → 102
  and
- Depending on the measured variable assigned to the output.
  - Flow damping
  or
  - Density damping
  or
  - Temperature damping

* Visibility depends on order options or device settings
Failure mode

Navigation

Expert → Output → Curr.output 1 → Failure mode

Prerequisite

One of the following options is selected in the Assign curr. parameter (→ 93):

• Mass flow
• Volume flow
• Correct.vol.flow
• Target mass flow *
• Carrier mass fl. *
• Density
• Ref.density
• Concentration *
• Dynam. viscosity *
• Kinematic visc.
• TempCompDynVisc *
• TempCompKinVisc *
• Temperature
• Carr. pipe temp. *
• Electronic temp.
• Osc. freq. 0
• Osc. freq. 1 *
• Osc. ampl. 0 *
• Osc. ampl. 1 *
• Freq. fluct. 0
• Freq. fluct. 1 *
• Osc. damping 0
• Osc. damping 1 *
• Osc.damp.fluct 0
• Osc.damp.fluct 1 *
• Signal asymmetry
• Exc. current 0
• Exc. current 1 *
• HBSI *

Detailed description of the options Oscil. frequency, Oscil. amplitude, Oscil. damping and Signal asymmetry: Value 1 display parameter (→ 17)

One of the following options is selected in the Current span parameter (→ 93):

• 4...20 mA NAMUR
• 4...20 mA US
• 4...20 mA
• 0...20 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

Factory setting

Max.

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

**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.

*Min.* option

The signal on alarm level is defined via the **Current span** parameter (→ 93).

*Max.* option

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

*Max.* option

The signal on alarm level is defined via the **Current span** parameter (→ 93).

*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.

*Defined value* option

The measured value is defined via the **Failure current** parameter (→ 106).

---

**Failure current**

**Navigation**

Expert → Output → Curr.output 1 → Failure current

**Prerequisite**

The **Defined value** option is selected in the **Failure mode** parameter (→ 105).

**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 curr. 1**

**Navigation**

Expert → Output → Curr.output 1 → Output curr. 1

**Description**

Displays the current value currently calculated for the current output.

**User interface**

0 to 22.5 mA
Measur. curr. 1

Navigation

Expert → Output → Curr.output 1 → Measur. curr. 1

Description

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

User interface

0 to 30 mA

3.3.2 "PFS output" submenu

Navigation

Expert → Output → PFS output

<table>
<thead>
<tr>
<th>PFS output 1</th>
</tr>
</thead>
<tbody>
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</tr>
<tr>
<td>Assign pulse</td>
</tr>
<tr>
<td>Value per pulse</td>
</tr>
<tr>
<td>Pulse width</td>
</tr>
<tr>
<td>Measuring mode</td>
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<tr>
<td>Failure mode</td>
</tr>
<tr>
<td>Pulse output 1</td>
</tr>
<tr>
<td>Assign freq.</td>
</tr>
<tr>
<td>Min. freq. value</td>
</tr>
<tr>
<td>Max. freq. value</td>
</tr>
<tr>
<td>Val. at min.freq</td>
</tr>
<tr>
<td>Val. at max.freq</td>
</tr>
<tr>
<td>Measuring mode</td>
</tr>
<tr>
<td>Damping out.</td>
</tr>
<tr>
<td>Response time</td>
</tr>
<tr>
<td>Failure mode</td>
</tr>
</tbody>
</table>
Description of device parameters

Operating mode

Navigation
Expert → Output → PFS output 1 → Operating mode

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

Selection
- Pulse
- Frequency
- Switch

Factory setting
Pulse

Additional information
"Pulse" option
- Quantity-dependent pulse with configurable pulse width
- Whenever a specific mass, volume, corrected volume, target mass or carrier mass is reached (pulse value), a pulse is output, the duration of which was set previously (pulse width).
- The pulses are never shorter than the set duration.
Example
- Flow rate approx. 100 g/s
- Pulse value 0.1 g
- Pulse width 0.05 ms
- Pulse rate 1000 Impuls/s

\[ B < P \]

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

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

'Frequency' option

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

An output frequency is output that is proportional to the value of a process variable, such as mass flow, volume flow, corrected volume flow, target mass flow, carrier mass flow, density, reference density, concentration, dynamic viscosity, kinematic viscosity, temperature-compensated dynamic viscosity, temperature-compensated kinematic viscosity, temperature, carrier tube temperature, electronic temperature, vibration frequency, frequency fluctuation, oscillation amplitude, oscillation damping, oscillation damping fluctuation, signal asymmetry or excitation current.

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

\[ U[V] \]

6 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

\[ U[V] \]

7 No alarm, high level
Assign pulse

Navigation

Expert → Output → PFS output 1 → Assign pulse

Prerequisite

The Pulse option is selected in the Operating mode parameter (→ 108).

Description

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

Selection

- Off
- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *

Factory setting

Off

Value per pulse

Navigation

Expert → Output → PFS output 1 → Value per pulse

Prerequisite

In the Operating mode parameter (→ 108), the Pulse option is selected, and one of the following options is selected in the Assign pulse parameter (→ 110):

- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *

Description

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

User entry

Signed floating-point number

Factory setting

Depends on country and nominal diameter → 200

* Visibility depends on order options or device settings
Additional information  
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 → Pulse width

Prerequisite
In the Operating mode parameter (→ 108), the Pulse option is selected, and one of the following options is selected in the Assign pulse parameter (→ 110):
- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *

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

User entry
0.05 to 2.000 ms

Factory setting
100 ms

Additional information  
Description
- Define how long a pulse is (duration).
- The maximum pulse rate is defined by \( f_{\text{max}} = \frac{1}{2 \times \text{pulse width}} \).
- 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 diagnostic message \( S443 \text{ Pulse output 1} \).

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

* Visibility depends on order options or device settings
**Measuring mode**

**Navigation**  
Expert → Output → PFS output 1 → Measuring mode

**Prerequisite**  
In the Operating mode parameter (→  108) the Pulse option is selected and in the Assign pulse parameter (→  110) one of the following options is selected:
- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *

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

**Selection**  
- Forward flow
- Forward/Reverse
- Reverse flow
- Rev. flow comp.

**Factory setting**  
Forward flow

**Additional information**  
**Selection**
- Forward flow
  Positive flow is output, negative flow is not output.
- Forward/Reverse
  Positive and negative flow are output (absolute value), but a distinction is not made between positive and negative flow.
- Reverse flow
  Negative flow is output, positive flow is not output.
- Rev. flow comp.
  The flow components outside the span are buffered, balanced and output after a maximum delay of 60 s.

For a detailed description of the options available, see the Measuring mode parameter (→  97)

**Examples**

For a detailed description of the configuration examples, see the Measuring mode parameter (→  97)

---

**Failure mode**

**Navigation**  
Expert → Output → PFS output 1 → Failure mode

**Prerequisite**  
In the Operating mode parameter (→  108), the Pulse option is selected, and one of the following options is selected in the Assign pulse parameter (→  110):
- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *

* Visibility depends on order options or device settings
**Description**  
Use this function to select the failure mode of the pulse output in the event of a device alarm.

**Selection**  
- Actual value  
- No pulses

**Factory setting**  
No pulses

**Additional information**  
*Description*

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

*Selection*

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

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

### Pulse output 1

**Navigation**  
Expert → Output → PFS output 1 → Pulse output 1

**Prerequisite**  
In the **Operating mode** parameter (→ 108), the **Pulse** option is selected.

**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.
- The **Value per pulse** parameter (→ 110) and **Pulse width** parameter (→ 111) can be used to define the value (i.e. the measured value amount that corresponds to a pulse) and the duration of the pulse.

![Graph showing pulse output behavior](image)

<table>
<thead>
<tr>
<th>0</th>
<th>Non-conductive</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Conductive</td>
</tr>
<tr>
<td>NC</td>
<td>NC contact (normally closed)</td>
</tr>
<tr>
<td>NO</td>
<td>NO contact (normally open)</td>
</tr>
</tbody>
</table>
The output behavior can be reversed via the **Invert outp.sig.** parameter (→ 131) 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 (→ 112)) can be configured.

### Assign freq.

**Navigation**

Expert → Output → PFS output 1 → Assign freq.

**Prerequisite**

The **Frequency** option is selected in the **Operating mode** parameter (→ 108).

**Description**

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

**Detailed description of the options** Oscil. frequency, Oscil. amplitude, Oscil. damping and Signal asymmetry: Value 1 display parameter (→ 17)

**Selection**

- Off
- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *
- Density
- Ref.density
- Concentration *
- Dynam. viscosity *
- Kinematic visc.
- TempCompDynVisc *
- TempCompKinVisc *
- Temperature
- Carr. pipe temp.
- Electronic temp.
- Osc. freq. 0
- Osc. freq. 1 *
- Freq. fluct. 0
- Freq. fluct. 1 *
- Osc. ampl. 0 *
- Osc. ampl. 1 *
- Osc. damping 0
- Osc. damping 1 *
- Damping fluct 0
- Damping fluct 1 *
- Signal asymmetry
- Exc. current 0
- Exc. current 1 *

**Factory setting**

Off

* Visibility depends on order options or device settings
Min. freq. value

Navigation

Expert → Output → PFS output 1 → Min. freq. value

Prerequisite

In the Operating mode parameter (→ 108), the Frequency option is selected, and one of the following options is selected in the Assign freq. parameter (→ 114):

- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *
- Density
- Ref. density
- Concentration *
- Dyn. viscosity *
- Kinematic visc.
- TempCompDynVisc *
- TempCompKinVisc *
- Temperature
- Carr. pipe temp. *
- Electronic temp.
- Osc. freq. 0
- Osc. freq. 1 *
- Freq. fluct. 0
- Freq. fluct. 1 *
- Osc. ampl. 0 *
- Osc. ampl. 1 *
- Osc. damping 0
- Osc. damping 1 *
- Osc.damp.fluct 0
- Osc.damp.fluct 1 *
- Signal asymmetry
- Exc. current 0
- Exc. current 1 *

Detailed description of the options Oscil. frequency, Oscil. amplitude, Oscil. damping and Signal asymmetry. Value 1 display parameter (→ 17)

Description

Use this function to enter the start value frequency.

User entry

0.0 to 10000.0 Hz

Factory setting

0.0 Hz

* Visibility depends on order options or device settings
## Max. freq. value

**Navigation**

Expert → Output → PFS output 1 → Max. freq. value

**Prerequisite**

In the Operating mode parameter (→ 108), the Frequency option is selected, and one of the following options is selected in the Assign freq. parameter (→ 114):
- Mass flow
- Volume flow
- Correct. vol. flow
- Target mass flow *
- Carrier mass fl. *
- Density
- Ref. density
- Concentration *
- Dynam. viscosity *
- Kinematic visc.
- TempCompDynVisc *
- TempCompKinVisc *
- Temperature
- Carr. pipe temp. *
- Electronic temp.
- Osc. freq. 0
- Osc. freq. 1 *
- Freq. fluct. 0
- Freq. fluct. 1 *
- Osc. ampl. 0 *
- Osc. ampl. 1 *
- Osc. damping 0
- Osc. damping 1 *
- Osc. damp. fluct 0
- Osc. damp. fluct 1 *
- Signal asymmetry
- Exc. current 0
- Exc. current 1 *

* Visibility depends on order options or device settings

**Description**

Use this function to enter the end value frequency.

**User entry**

0.0 to 10000.0 Hz

**Factory setting**

10000.0 Hz
**Val. at min.freq**

**Navigation**

Expert → Output → PFS output 1 → Val. at min.freq

**Prerequisite**

In the **Operating mode** parameter (→ 108), the **Frequency** option is selected, and one of the following options is selected in the **Assign freq.** parameter (→ 114):

- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *
- Density
- Ref.density
- Concentration *
- Dynam. viscosity *
- Kinematic visc.
- TempCompDynVisc *
- TempCompKinVisc *
- Temperature
- Carr. pipe temp. *
- Electronic temp.
- Osc. freq. 0
- Osc. freq. 1 *
- Freq. fluct. 0
- Freq. fluct. 1 *
- Osc. ampl. 0 *
- Osc. ampl. 1 *
- Osc. damping 0
- Osc. damping 1 *
- Osc.damp.fluct 0
- Osc.damp.fluct 1 *
- Signal asymmetry
- Exc. current 0
- Exc. current 1 *

Detailed description of the options **Oscil. frequency**, **Oscil. amplitude**, **Oscil. damping** and **Signal asymmetry**: **Value 1 display** parameter (→ 17)

**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 freq.** parameter (→ 114).

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

## Val. at max.freq

### Navigation

[Endress+Hauser](#)  
Expert → Output → PFS output 1 → Val. at max.freq

### Prerequisite

In the **Operating mode** parameter (→ 108), the **Frequency** option is selected, and one of the following options is selected in the Assign freq. parameter (→ 114):

- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *
- Density
- Ref.density
- Concentration *
- Dynam. viscosity *
- Kinematic visc.
- TempCompDynVisc *
- TempCompKinVisc *
- Temperature
- Carr. pipe temp. *
- Electronic temp.
- Osc. freq. 0
- Osc. freq. 1 *
- Freq. fluct. 0
- Freq. fluct. 1 *
- Osc. ampl. 0 *
- Osc. ampl. 1 *
- Osc. damping 0
- Osc. damping 1 *
- Osc.damp.fluct 0
- Osc.damp.fluct 1 *
- Signal asymmetry
- Exc. current 0
- Exc. current 1 *

Detailed description of the options Oscil. frequency, Oscil. amplitude, Oscil. damping and Signal asymmetry: Value 1 display parameter (→ 17)

### 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 measured value for the end value frequency. The selected process variable is output as a proportional frequency.

**Dependency**

The entry depends on the process variable selected in the Assign freq. parameter (→ 114).

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

Measuring mode

Navigation

Expert → Output → PFS output 1 → Measuring mode

Prerequisite

In the Operating mode parameter (→ 108) the Frequency option is selected and in the Assign freq. parameter (→ 114) one of the following options is selected:
- Mass flow
- Volume flow
- Correct . vol . flow
- Target mass flow
- Carrier mass fl.
- Density
- Ref . density
- Concentration
- Dynam . viscosity
- Kinematic visc.
- Temp . CompDynVisc
- Temp . CompKinVisc
- Temperature
- Carr . pipe temp.
- Electronic temp.
- Osc . freq . 0
- Osc . freq . 1
- Freq . fluct . 0
- Freq . fluct . 1
- Osc . ampl . 0
- Osc . ampl . 1
- Osc . damping 0
- Osc . damping 1
- Osc . damp . fluct 0
- Osc . damp . fluct 1
- Signal asymmetry
- Exc . current 0
- Exc . current 1

Detailed description of the options Oscil . frequency, Oscil . amplitude, Oscil . damping and Signal asymmetry: Value 1 display parameter (→ 17)

Description

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

Selection

- Forward flow
- Forward/Reverse
- Rev . flow comp.

Factory setting

Forward flow

Additional information

Selection

For a detailed description of the options available, see the Measuring mode parameter (→ 97)

Examples

For a detailed description of the configuration examples, see the Measuring mode parameter (→ 97)

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

Expert → Output → PFS output 1 → Damping out.

**Prerequisite**

In the **Operating mode** parameter (→ 108) the **Frequency** option is selected and in the **Assign freq.** parameter (→ 114) one of the following options is selected:

- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *
- Density
- Ref. density
- Concentration *
- Dynam. viscosity *
- Kinematic visc.
- TempCompDynVisc *
- TempCompKinVisc *
- Temperature
- Carr. pipe temp. *
- Electronic temp.
- Osc. freq. 0
- Osc. freq. 1 *
- Freq. fluct. 0
- Freq. fluct. 1 *
- Osc. ampl. 0 *
- Osc. ampl. 1 *
- Osc. damping 0
- Osc. damping 1 *
- Osc.damp.fluct 0
- Osc.damp.fluct 1 *
- Signal asymmetry
- Exc. current 0 *
- Exc. current 1 *

Detailed description of the options Oscil. frequency, Oscil. amplitude, Oscil. damping and Signal asymmetry: Value 1 display parameter (→ 17)

**Description**

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

**User entry**

0 to 999.9 s

**Factory setting**

0.0 s

**Additional information**

* User entry

Use this function to enter a time constant (PT1 element?) 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).

* Visibility depends on order options or device settings
7) proportional transmission behavior with first order delay
The frequency output is subject to separate damping that is independent of all preceding time constants.

### Response time

**Navigation**

Expert → Output → PFS output 1 → Response time

**Prerequisite**

In the Operating mode parameter (→ 108) the Frequency option is selected and in the Assign freq. parameter (→ 114) one of the following options is selected:

- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *
- Density
- Ref. density
- Concentration *
- Dynam. viscosity *
- Kinematic visc.
- TempCompDynVisc *
- TempCompKinVisc *
- Temperature
- Carr. pipe temp. *
- Electronic temp.
- Osc. freq. 0
- Osc. freq. 1 *
- Freq. fluct. 0
- Freq. fluct. 1 *
- Osc. ampl. 0 *
- Osc. ampl. 1 *
- Osc. damping 0
- Osc. damping 1 *
- Osc.damp.fluct 0
- Osc.damp.fluct 1 *
- Signal asymmetry
- Exc. current 0
- Exc. current 1 *

Detailed description of the options Oscil. frequency, Oscil. amplitude, Oscil. damping and Signal asymmetry: Value 1 display parameter (→ 17)

**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

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

Additional information

Description

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

- Damping of pulse/frequency/switch output → 102 and
- Depending on the measured variable assigned to the output.
  - Flow damping
  or
  - Density damping
  or
  - Temperature damping

Failure mode

Navigation

Expert → Output → PFS output 1 → Failure mode

Prerequisite

In the Operating mode parameter (→ 108), the Frequency option is selected, and one of the following options is selected in the Assign freq. parameter (→ 114):

- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl.
- Density
- Ref.density
- Concentration *
- Dynam. viscosity *
- Kinematic visc.
- TempCompDynVisc *
- TempCompKinVisc *
- Temperature
- Carr. pipe temp. *
- Electronic temp.
- Osc. freq. 0
- Osc. freq. 1 *
- Freq. fluct. 0
- Freq. fluct. 1 *
- Osc. ampl. 0 *
- Osc. ampl. 1 *
- Osc. damping 0
- Osc. damping 1 *
- Osc.damp.fluct 0
- Osc.damp.fluct 1 *
- Signal asymmetry
- Exc. current 0
- Exc. current 1 *

Detailed description of the options Oscil. frequency, Oscil. amplitude, Oscil. damping and Signal asymmetry. Value 1 display parameter (→ 17)

Description

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

* Visibility depends on order options or device settings
Selection

- Actual value
- Defined value
- 0 Hz

Factory setting

0 Hz

Additional information

Selection

- Actual value
  In the event of a device alarm, the frequency output continues on the basis of the current flow measurement. The device alarm is ignored.
- Defined value
  In the event of a device alarm, the frequency output continues on the basis of a predefined value. The Failure freq. (→ 123) 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 freq.

Navigation

Expert → Output → PFS output 1 → Failure freq.

Prerequisite

In the Operating mode parameter (→ 108), the Frequency option is selected, and one of the following options is selected in the Assign freq. parameter (→ 114):

- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *
- Density
- Ref.density
- Concentration *
- Dynam. viscosity *
- Kinematic visc.
- TempCompDynVisc *
- TempCompKinVisc *
- Temperature
- Carr. pipe temp. *
- Electronic temp.
- Osc. freq. 0
- Osc. freq. 1 *
- Freq. fluct. 0
- Freq. fluct. 1 *
- Osc. ampl. 0 *
- Osc. ampl. 1 *
- Osc. damping 0
- Osc. damping 1 *
- Osc.damp.fluct 0

* Visibility depends on order options or device settings
### Osc.damp.fluct 1
- Visibility depends on order options or device settings
- Signal asymmetry
- Exc. current 0
- Exc. current 1

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

**User entry**
0.0 to 12 500.0 Hz

**Factory setting**
0.0 Hz

### Output freq. 1

**Navigation**
- Expert → Output → PFS output 1 → Output freq. 1

**Prerequisite**
In the Operating mode parameter (→ 108), 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 out funct

**Navigation**
- Expert → Output → PFS output 1 → Switch out funct

**Prerequisite**
The Switch option is selected in the Operating mode parameter (→ 108).

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

**Selection**
- Off
- On
- Diag. behavior
- Limit
- Fl. direct.check
- Status

**Factory setting**
Off

---

* 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).
- Diag. 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.
- Fl. direct.check
  Indicates the flow direction (forward or reverse flow).
- Status
  Indicates the device status depending on whether empty pipe detection or low flow cut off is selected.

Assign diag. beh

Navigation

Expert → Output → PFS output 1 → Assign diag. beh

Prerequisite

- In the Operating mode parameter (→ 108), the Switch option is selected.
- In the Switch out funct parameter (→ 124), the Diag. behavior option is selected.

Description

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

Selection

- Alarm
- Alarm or warning
- Warning

Factory setting

Alarm

Additional information

Description

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

Selection

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

Navigation

Expert → Output → PFS output 1 → Assign limit

Prerequisite

- The **Switch** option is selected in the **Operating mode** parameter (→ 108).
- The **Limit** option is selected in the **Switch out funct** parameter (→ 124).

Description

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

Selection

- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow
- Carrier mass fl. 
- Density
- Ref. density
- Dynam. viscosity
- Concentration
- Kinematic visc.
- TempCompDynVisc
- TempCompKinVisc
- Temperature
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Meas. tube damp.

Factory setting

Mass flow

Additional information

**Description**

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

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

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

* Visibility depends on order options or device settings
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

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

Switch-on value

**Navigation**
Expert → Output → PFS output 1 → Switch-on value

**Prerequisite**
- In the Operating mode parameter (→ 108), the Switch option is selected.
- In the Switch out funct parameter (→ 124), the Limit option is selected.

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

**User entry**
Signed floating-point number
### Factory setting

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

### Additional information

**Description**

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

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

**Dependency**

The unit depends on the process variable selected in the **Assign limit** parameter (→ 126).

### Switch-off value

#### Navigation

Expert → Output → PFS output 1 → Switch-off value

#### Prerequisite

- In the Operating mode parameter (→ 108), the Switch option is selected.
- In the Switch out funct parameter (→ 124), the Limit option is selected.

#### Description

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

#### User entry

Signed floating-point number

#### Factory setting

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

#### Additional information

**Description**

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

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

**Dependency**

The unit depends on the process variable selected in the **Assign limit** parameter (→ 126).

### Assign dir.check

#### Navigation

Expert → Output → PFS output 1 → Assign dir.check

#### Prerequisite

- The Switch option is selected in the Operating mode parameter (→ 108).
- The Fl. direct.check option is selected in the Switch out funct parameter (→ 124).

#### Description

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

- Off
- Volume flow
- Mass flow
- Correct.vol.flow

Factory setting
Mass flow

Assign status

Navigation
Expert → Output → PFS output 1 → Assign status

Prerequisite
- The Switch option is selected in the Operating mode parameter (→ 108).
- The Status option is selected in the Switch out funct parameter (→ 124).

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

Selection
- Partial pipe det
- Low flow cut off

Factory setting
Partial pipe det

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 → Switch-on delay

Prerequisite
- The Switch option is selected in the Operating mode parameter (→ 108).
- The Limit option is selected in the Switch out funct parameter (→ 124).

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

User entry
0.0 to 100.0 s

Factory setting
0.0 s

Switch-off delay

Navigation
Expert → Output → PFS output 1 → Switch-off delay

Prerequisite
- The Switch option is selected in the Operating mode parameter (→ 108).
- The Limit option is selected in the Switch out funct parameter (→ 124).

Description
Use this function to enter a delay time for switching off the switch output.
### User entry
0.0 to 100.0 s

### Factory setting
0.0 s

### Failure mode

**Navigation**
Expert → Output → PFS output 1 → Failure mode

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

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

**Factory setting**
Open

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

### Switch status 1

**Navigation**
Expert → Output → PFS output 1 → Switch status 1

**Prerequisite**
The Switch option is selected in the Operating mode parameter (→ 108).

**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 outp.sig.

Navigation
Expert → Output → PFS output 1 → Invert outp.sig.

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

Selection
• No
• Yes

Factory setting
No

Additional information
Selection
No option (passive - negative)

Yes option (passive - positive)

3.4 "Communication" submenu

Navigation
Expert → Communication

- HART input → 132
- HART output → 137
- Web server → 154
- Diag. config. → 157
3.4.1 "HART input" submenu

**Navigation**

Expert → Communication → HART input

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<th>► HART Input</th>
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</thead>
<tbody>
<tr>
<td>► Configuration → 132</td>
</tr>
<tr>
<td>► Input → 136</td>
</tr>
</tbody>
</table>

"Configuration" submenu

**Navigation**

Expert → Communication → HART input → Configuration

<table>
<thead>
<tr>
<th>► Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capture mode → 132</td>
</tr>
<tr>
<td>Device ID → 133</td>
</tr>
<tr>
<td>Device type → 133</td>
</tr>
<tr>
<td>Manufacturer ID → 134</td>
</tr>
<tr>
<td>Burst command → 134</td>
</tr>
<tr>
<td>Slot number → 135</td>
</tr>
<tr>
<td>Timeout → 135</td>
</tr>
<tr>
<td>Failure mode → 135</td>
</tr>
<tr>
<td>Failure value → 136</td>
</tr>
</tbody>
</table>

**Capture mode**

**Navigation**

Expert → Communication → HART input → Configuration → Capture mode

**Description**

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

**Selection**

- Off
- Burst network
- Master network

**Factory setting**

Off
**Additional information**  

*Burst network* option

The device records data transmitted via burst in the network.

An external pressure sensor must be in the burst mode.

*Master network* option

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

### Device ID

**Navigation**  

Expert → Communication → HART input → Configuration → Device ID

**Prerequisite**  

The Master network option is selected in the Capture mode parameter → 132.

**Description**  

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

**User entry**  

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

**Factory setting**  

0

**Additional information**  

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

### Device type

**Navigation**  

Expert → Communication → HART input → Configuration → Device type

**Prerequisite**  

In the Capture mode parameter → 132, 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

Prerequisite  
The Master network option is selected in the Capture mode parameter (→ 132).

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

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

Factory setting  
0

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

Burst command

Navigation  
Expert → Communication → HART input → Configuration → Burst command

Prerequisite  
The Burst network option or the Master network option are selected in the Capture mode parameter (→ 132).

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

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

Factory setting  
Command 1

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

**Navigation**

Navigate to Expert → Communication → HART input → Configuration → Slot number

**Prerequisite**

The Burst network option or the Master network option is selected in the Capture mode parameter (→ 132).

**Description**

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

**User entry**

1 to 4

**Factory setting**

1

**Additional information**

<table>
<thead>
<tr>
<th>Slot</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PV</td>
</tr>
<tr>
<td>2</td>
<td>SV</td>
</tr>
<tr>
<td>3</td>
<td>TV</td>
</tr>
<tr>
<td>4</td>
<td>QV</td>
</tr>
</tbody>
</table>

**Timeout**

**Navigation**

Navigate to Expert → Communication → HART input → Configuration → Timeout

**Prerequisite**

The Burst network option or the Master network option is selected in the Capture mode parameter (→ 132).

**Description**

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

**User entry**

1 to 120 s

**Factory setting**

5 s

**Additional information**

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

**Failure mode**

**Navigation**

Navigate to Expert → Communication → HART input → Configuration → Failure mode

**Prerequisite**

In the Capture mode parameter (→ 132), the Burst network option or Master network option is selected.
Description

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

Selection

- Alarm
- Last valid value
- Defined value

Factory setting

Alarm

Additional information

Options

- Alarm
  An error message is set.
- Last valid value
  The last valid measured value is used.
- Defined value
  A user-defined measured value is used: (Failure value parameter (→ 136)).

Failure value

Navigation  
Expert → Communication → HART input → Configuration → Failure value

Prerequisite

The following conditions are met:

- In the Capture mode parameter (→ 132), the Burst network option or Master network option is selected.
- In the Failure mode parameter (→ 135), the Defined value option is selected.

Description

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

User entry

Signed floating-point number

Factory setting

0

"Input" submenu

Navigation  
Expert → Communication → HART input → Input

<table>
<thead>
<tr>
<th>Input</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
</tr>
<tr>
<td>Status</td>
</tr>
</tbody>
</table>
Value

Navigation  
†† Expert → Communication → HART input → Input → Value

Description  
Displays the value of the device variable recorded by the HART input.

User interface  
0 to 99999.9999 °C

Additional information  
Dependency

The unit is taken from the Temperature unit parameter († † 60)

Status

Navigation  
†† Expert → Communication → HART input → Input → Status

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

3.4.2 "HART output" submenu

Navigation  
†† Expert → Communication → HART output

<table>
<thead>
<tr>
<th>★ HART output</th>
</tr>
</thead>
<tbody>
<tr>
<td>★ Configuration</td>
</tr>
<tr>
<td>★ Burst config.</td>
</tr>
<tr>
<td>★ Information</td>
</tr>
<tr>
<td>★ Output</td>
</tr>
</tbody>
</table>
"Configuration" submenu

**Navigation**  
Expert → Communication → HART output → Configuration

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
<th>User entry</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>HART short tag</td>
<td>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.</td>
<td>Max. 8 characters: A to Z, 0 to 9 and certain special characters (e.g. punctuation marks, @, %).</td>
<td>PROMASS</td>
</tr>
<tr>
<td>Device tag</td>
<td>Use this function to enter the name for the measuring point.</td>
<td>Max. 32 characters, such as letters, numbers or special characters (e.g. @, %, /).</td>
<td>Promass</td>
</tr>
<tr>
<td>HART address</td>
<td>Use this function to enter the address via which the data exchange takes place via HART protocol.</td>
<td>0 to 63</td>
<td></td>
</tr>
</tbody>
</table>

**Navigation**  
Expert → Communication → HART output → Configuration → HART short tag

**Navigation**  
Expert → Communication → HART output → Configuration → Device tag

**Navigation**  
Expert → Communication → HART output → Configuration → HART address
For addressing in a HART Multidrop network, the **Fixed current** option must be set in the **Current span** parameter (→ 93) (current output 1).

**No. of preambles**

**Navigation**

Expert → Communication → HART output → Configuration → No. of preambles

**Description**

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

**User entry**

2 to 20

**Factory setting**

5

**Additional information**

User entry

As every modem component can "swallow" a byte, 2-byte preambles at least must be defined.

"Burst configuration 1 to n" submenu

**Navigation**

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

Navigation

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

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

Selection
- Off
- On

Factory setting
Off

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

Burst command 1 to n

Navigation

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

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

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

Factory setting
Command 2
Additional information  Selection

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

"Command 33" option

The HART device variables are defined via Command 107.

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

- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *
- Density
- Ref.density
- Concentration *
- Dynam. viscosity *
- Kinematic visc.
- TempCompDynVisc *
- TempCompKinVisc *
- Temperature
- Totalizer 1...3
- HBSI *
- Pressure
- HART input
- Percent of range
- Measur. curr.
- Primary var (PV)
- Second.var(SV)
- Tertiary var(TV)
- Quaterna.var(QV)

Commands

- Information about the defined details of the command: HART specifications
- The measured variables (HART device variables) are assigned to the dynamic variables in the Output submenu (→ 92).

* Visibility depends on order options or device settings
**Burst variable 0**

**Navigation**

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

**Description**

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

**Selection**

- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow
- Carrier mass fl.
- Density
- Ref.density
- Concentration
- Dynam. viscosity
- Kinematic visc.
- TempCompDynVisc
- TempCompKinVisc
- Temperature
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Sensor integrity
- Pressure
- HART input
- Percent of range
- Measur. curr.
- Primary var (PV)
- Second.var(SV)
- Tertiary var(TV)
- Quaterna.var(QV)
- Not used

**Factory setting**

Volume flow

**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

**Description**

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

**Selection**

See the **Burst variable 0** parameter (→ 142).

**Factory setting**

Not used

---

* Visibility depends on order options or device settings
Burst variable 2

**Navigation**
Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 2

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

**Selection**
See the Burst variable 0 parameter (→ 142).

**Factory setting**
Not used

Burst variable 3

**Navigation**
Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 3

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

**Selection**
See the Burst variable 0 parameter (→ 142).

**Factory setting**
Not used

Burst variable 4

**Navigation**
Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 4

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

**Selection**
See the Burst variable 0 parameter (→ 142).

**Factory setting**
Not used

Burst variable 5

**Navigation**
Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 5

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

**Selection**
See the Burst variable 0 parameter (→ 142).

**Factory setting**
Not used
### Burst variable 6

**Navigation**  
Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 6

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

**Selection**  
See the Burst variable 0 parameter (→ 142).

**Factory setting**  
Not used

### Burst variable 7

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

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

**Selection**  
See the Burst variable 0 parameter (→ 142).

**Factory setting**  
Not used

### Trigger mode

**Navigation**  
Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Trigger mode

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

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

**Factory setting**  
Continuous
Additional information  

Options
- Continuous
  The message is sent continuously, at least at intervals corresponding to the time frame specified in the Burst min per parameter (→ 145).
- Window
  The message is sent if the specified measured value has changed by the value in the Trigger level parameter (→ 145).
- Rising
  The message is sent if the specified measured value exceeds the value in the Trigger level parameter (→ 145).
- Falling
  The message is sent if the specified measured value drops below the value in the Trigger level parameter (→ 145).
- On change
  The message is sent if a measured value changes in the burst message.

Trigger level

Navigation  
Diagram  
Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Trigger level

Description  
For entering the burst trigger value.

User entry  
Positive floating-point number

Additional information  
Description
Together with the option selected in the Trigger mode parameter (→ 144) the burst trigger value determines the time of burst message X.

Min. upd. per.

Navigation  
Diagram  
Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Min. upd. per.

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

User entry  
Positive integer

Factory setting  
1000 ms
**Max. upd. per.**

**Navigation**

Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Max. upd. per.

**Description**

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

**User entry**

Positive integer

**Factory setting**

2 000 ms

---

**"Information" submenu**

**Navigation**

Expert → Communication → HART output → Information

<table>
<thead>
<tr>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device revision</td>
</tr>
<tr>
<td>Device ID</td>
</tr>
<tr>
<td>Device type</td>
</tr>
<tr>
<td>Manufacturer ID</td>
</tr>
<tr>
<td>HART revision</td>
</tr>
<tr>
<td>HART descriptor</td>
</tr>
<tr>
<td>HART message</td>
</tr>
<tr>
<td>Hardware rev.</td>
</tr>
<tr>
<td>Software rev.</td>
</tr>
<tr>
<td>HART date code</td>
</tr>
</tbody>
</table>

---

**Device revision**

**Navigation**

Expert → Communication → HART output → Information → Device revision

**Description**

Displays the device revision with which the device is registered with the HART Communication Foundation.
## Proline Promass 100 HART

### Description of device parameters

<table>
<thead>
<tr>
<th>User interface</th>
<th>2-digit hexadecimal number</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Factory setting</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>Additional information</strong></td>
<td><strong>Description</strong></td>
</tr>
<tr>
<td></td>
<td>The device revision is needed to assign the appropriate device description file (DD) to the device.</td>
</tr>
</tbody>
</table>

### Device ID

<table>
<thead>
<tr>
<th><strong>Navigation</strong></th>
<th>Expert → Communication → HART output → Information → Device ID</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td>Use this function to view the device ID for identifying the measuring device in a HART network.</td>
</tr>
<tr>
<td><strong>User interface</strong></td>
<td>6-digit hexadecimal number</td>
</tr>
<tr>
<td><strong>Additional information</strong></td>
<td><strong>Description</strong></td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
</tbody>
</table>

### Device type

<table>
<thead>
<tr>
<th><strong>Navigation</strong></th>
<th>Expert → Communication → HART output → Information → Device type</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td>Displays the device type with which the measuring device is registered with the HART Communication Foundation.</td>
</tr>
<tr>
<td><strong>User interface</strong></td>
<td>2-digit hexadecimal number</td>
</tr>
<tr>
<td><strong>Factory setting</strong></td>
<td>0x4A (for Promass 100)</td>
</tr>
<tr>
<td><strong>Additional information</strong></td>
<td><strong>Description</strong></td>
</tr>
<tr>
<td></td>
<td>The device type is specified by the manufacturer. It is needed to assign the appropriate device description file (DD) to the device.</td>
</tr>
</tbody>
</table>

### Manufacturer ID

<table>
<thead>
<tr>
<th><strong>Navigation</strong></th>
<th>Expert → Communication → HART output → Information → Manufacturer ID</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td>Use this function to view the manufacturer ID with which the measuring device is registered with the HART Communication Foundation.</td>
</tr>
<tr>
<td><strong>User interface</strong></td>
<td>2-digit hexadecimal number</td>
</tr>
<tr>
<td>Description of device parameters</td>
<td>Proline Promass 100 HART</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>--------------------------</td>
</tr>
</tbody>
</table>

**Factory setting**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factory setting</td>
<td>0x11 (for Endress+Hauser)</td>
</tr>
</tbody>
</table>

**HART revision**

**Navigation**

Expert → Communication → HART output → Information → HART revision

**Description**

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

**User interface**

5 to 7

**Factory setting**

7

**HART descriptor**

**Navigation**

Expert → Communication → HART output → Information → HART descriptor

**Description**

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

**User entry**

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

**Factory setting**

Promass 100

**HART message**

**Navigation**

Expert → Communication → HART output → Information → HART message

**Description**

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

**User entry**

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

**Factory setting**

Promass 100

**Hardware rev.**

**Navigation**

Expert → Communication → HART output → Information → Hardware rev.

**Description**

Displays the hardware revision of the measuring device.

**User interface**

0 to 255

**Factory setting**

1
Software rev.

Navigation  


Description  
Displays the software revision of the measuring device.

User interface  
0 to 255

Factory setting  
2

HART date code

Navigation  

Expert → Communication → HART output → Information → HART date code

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

User entry  
Date entry format: yyyy-mm-dd

Factory setting  
2009-07-20

Additional information  
Example
Device installation date

"Output" submenu

Navigation  

Expert → Communication → HART output → Output

| Output |  
|-------|---
| Assign PV | → 150  
| Primary var (PV) | → 150  
| Assign SV | → 151  
| Second var(SV) | → 151  
| Assign TV | → 152  
| Tertiary var(TV) | → 152  
| Assign QV | → 153  
| Quaterna var(QV) | → 153  

Endress+Hauser
### Assign PV

**Navigation**

Expert → Communication → HART output → Output → Assign PV

**Description**

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

**Selection**

- Off
- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl.
- Density
- Ref.density
- Concentration *
- Dynam. viscosity *
- Kinematic visc.
- TempCompDynVisc *
- TempCompKinVisc *
- Temperature
- Carr. pipe temp. *
- Electronic temp.
- Osc. freq. 0
- Osc. freq. 1 *
- Osc. ampl. 0 *
- Osc. ampl. 1 *
- Freq. fluct. 0
- Freq. fluct. 1 *
- Osc. damping 0
- Osc. damping 1 *
- Damping fluct 0
- Damping fluct 1 *
- Signal asymmetry
- Exc. current 0
- Exc. current 1 *
- Sensor integrity

**Factory setting**

Mass flow

**Additional information**

* Detailed description of the options Oscil. frequency, Oscil. amplitude, Oscil. damping and Signal asymmetry: Value 1 display parameter (→ 17)

### Primary var (PV)

**Navigation**

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

**Description**

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

* Visibility depends on order options or device settings
User interface
Signed floating-point number

Additional information

The measured value displayed depends on the process variable selected in the Assign PV parameter (→  150).

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

Assign SV

Navigation
Expert → Communication → HART output → Output → Assign SV

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

Selection
- Mass flow
- Volume flow
- Correct.vol.flow*
- Target mass flow*
- Carrier mass fl.
- Density
- Ref.density
- Concentration*
- Dynam. viscosity*
- Kinematic visc.
- TempCompDynVisc*
- TempCompKinVisc*
- Temperature
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Sensor integrity

Factory setting
Totalizer 1

Second.var(SV)

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

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

User interface
Signed floating-point number

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

*User interface*

The measured value displayed depends on the process variable selected in the **Assign SV** parameter (→ 151).

*Dependency*

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

---

**Assign TV**

**Navigation**

.getObject(Expert) → Communication → HART output → Output → Assign TV

**Description**

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

**Selection**

- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow
- Carrier mass fl.
- Density
- Ref.density
- Concentration
- Dynam. viscosity
- Kinematic visc.
- TempCompDynVisc
- TempCompKinVisc
- Temperature
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Sensor integrity

**Factory setting**

Density

---

**Tertiary var(TV)**

**Navigation**

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

**Description**

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

**User interface**

Positive floating-point number

---

* Visibility depends on order options or device settings
Additional information  

User interface  
The measured value displayed depends on the process variable selected in the Assign TV parameter (→ 152).

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

Assign QV  

Navigation  
Expert → Communication → HART output → Output → Assign QV

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

Selection  
- Mass flow  
- Volume flow  
- Correct.vol.flow  
- Target mass flow  
- Carrier mass fl.  
- Density  
- Ref.density  
- Concentration  
- Dynam. viscosity  
- Kinematic visc.  
- TempCompDynVisc  
- TempCompKinVisc  
- Temperature  
- Totalizer 1  
- Totalizer 2  
- Totalizer 3  
- Sensor integrity

Factory setting  
Temperature

Quaterna.var(QV)  

Navigation  
Expert → Communication → HART output → Output → Quaterna.var(QV)

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

User interface  
0 to 99999.9999 °C

* Visibility depends on order options or device settings
Additional information  

*User interface*

The measured value displayed depends on the process variable selected in the **Assign QV** parameter (→ 153).

*Dependency*

The unit of the displayed measured value is taken from the **System units** submenu (→ 153).

---

### 3.4.3 "Web server" submenu

**Navigation**

[Expert] → [Communication] → [Web server]

**Description**

Use this function to select the Web server language setting.

**Selection**

- English
- Deutsch
- Français
- Español
- Italiano
- Nederlands
- Portuguesa
- Polski
- русский язык(Ru)
- Svenska
- Türkçe
- 中文 (Chinese)

* Visibility depends on order options or device settings
MAC Address

Navigation  
Expert → Communication → Web server → MAC Address

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

DHCP client

Navigation  
Expert → Communication → Configuration → DHCP client
  Setup → Communication → DHCP client

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

Selection  
- Off
- On

Factory setting  
Off

Additional information  
Result
If the DHCP client functionality of the Web server is activated, the IP address (→ 156), Subnet mask (→ 156) and Default gateway (→ 156) are set automatically.

Identification is via the MAC address of the measuring device.

Visibility depends on order options or device settings

Media Access Control
### IP address

**Navigation**  
Expert → Communication → Web server → IP address

**Description**  
Displays the IP address of the device's web server.

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

**Factory setting**  
192.168.1.212

### Subnet mask

**Navigation**  
Expert → Communication → Web server → Subnet mask

**Description**  
Displays the subnet mask.

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

**Factory setting**  
255.255.255.0

### Default gateway

**Navigation**  
Expert → Communication → Web server → Default gateway

**Description**  
Displays the default gateway.

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

**Factory setting**  
0.0.0.0

### Webserver funct.

**Navigation**  
Expert → Communication → Web server → Webserver funct.

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

**Selection**  
- Off
- On

**Factory setting**  
On
Additional information

Description

Once disabled, the Webserver funct. can only be re-enabled via the local display or the operating tool FieldCare.

Selection

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

3.4.4 "Diag. config." submenu

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

Assign a category to the particular diagnostic event:

- **Failure (F)** option
  
  A device error has occurred. The measured value is no longer valid.

- **Funct. check (C)** option
  
  The device is in service mode (e.g. during a simulation).

- **Out of spec. (S)** option
  
  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)

- **Mainten. req. (M)** option
  
  Maintenance is required. The measured value is still valid.

- **No effect (N)** option
  
  Has no effect on the condensed status.

Navigation

Expert → Communication → Diag. config.

<table>
<thead>
<tr>
<th>Event category</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Event category 046</td>
<td>→ 158</td>
</tr>
<tr>
<td>Event category 140</td>
<td>→ 158</td>
</tr>
<tr>
<td>Event category 274</td>
<td>→ 159</td>
</tr>
<tr>
<td>Event category 441</td>
<td>→ 159</td>
</tr>
<tr>
<td>Event category 442</td>
<td>→ 159</td>
</tr>
<tr>
<td>Event category 443</td>
<td>→ 160</td>
</tr>
<tr>
<td>Event category 832</td>
<td>→ 160</td>
</tr>
</tbody>
</table>
### Event category 046 (Sensor limit)

**Navigation**  
Expert → Communication → Diag. config. → Event category 046

**Description**  
Use this function to assign a category to the diagnostic message **046 Sensor limit**.

**Selection**  
- Failure (F)  
- Funct. check (C)  
- Out of spec. (S)  
- Mainten. req. (M)  
- No effect (N)

**Factory setting**  
Out of spec. (S)

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

### Event category 140 (Sensor sig.asym.)

**Navigation**  
Expert → Communication → Diag. config. → Event category 140

**Description**  
Use this function to assign a category to the diagnostic message **140 Sensor sig.asym.**

**Selection**  
- Failure (F)  
- Funct. check (C)  
- Out of spec. (S)  
- Mainten. req. (M)  
- No effect (N)

**Factory setting**  
Out of spec. (S)
Additional information

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

**Event category 274 (Main electronic)**

**Navigation**

Expert → Communication → Diag. config. → Event category 274

**Description**

Use this function to assign a category to the diagnostic message 274 Main electronic.

**Selection**

- Failure (F)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req. (M)
- No effect (N)

**Factory setting**

Out of spec. (S)

**Additional information**

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

**Event category 441 (Curr.output 1)**

**Navigation**

Expert → Communication → Diag. config. → Event category 441

**Description**

Use this option to select a category for the diagnostic message 441 Curr. output 1.

**Selection**

- Failure (F)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req. (M)
- No effect (N)

**Factory setting**

Out of spec. (S)

**Additional information**

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

**Event category 442 (Freq. output)**

**Navigation**

Expert → Communication → Diag. config. → Event category 442

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

**Description**

Use this function to select the category assigned to diagnostic message 442 Freq. output.
**Selection**
- Failure (F)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req. (M)
- No effect (N)

**Factory setting**
Out of spec. (S)

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

---

**Event category 443 (Pulse output)**

**Navigation**
Expert → Communication → Diag. config. → Event category 443

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

**Description**
Use this function to select the category assigned to diagnostic message 443 Pulse output.

**Selection**
- Failure (F)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req. (M)
- No effect (N)

**Factory setting**
Out of spec. (S)

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

---

**Event category 832 (Electronic temp.)**

**Navigation**
Expert → Communication → Diag. config. → Event category 832

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

**Selection**
- Failure (F)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req. (M)
- No effect (N)

**Factory setting**
Out of spec. (S)

**Additional information**
For a detailed description of the event categories available for selection:
Event category 830 (Sensor temp.)

Navigation

Expert → Communication → Diag. config. → Event category 830

Prerequisite

- Order code for "Application package", option EB "Heartbeat Verification + Monitoring"
- If the carrier tube temperature is provided:
  - Promass F
  - Promass G
  - Promass H
  - Promass I
  - Promass O
  - Promass P
  - Promass S
  - Promass X

Description

Use this function to assign a category to the diagnostic message 830 Sensor temp..

Selection

- Failure (F)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req. (M)
- No effect (N)

Factory setting

Out of spec. (S)

Additional information

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

---

Event category 831 (Sensor temp.)

Navigation

Expert → Communication → Diag. config. → Event category 831

Prerequisite

- Order code for "Application package", option EB "Heartbeat Verification + Monitoring"
- If the carrier tube temperature is provided:
  - Promass F
  - Promass G
  - Promass H
  - Promass I
  - Promass O
  - Promass P
  - Promass S
  - Promass X

Description

Use this function to assign a category to the diagnostic message 831 Sensor temp..

Selection

- Failure (F)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req. (M)
- No effect (N)

Factory setting

Out of spec. (S)
Additional information

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

**Event category 833 (Electronic temp.)**

**Navigation**

Expert → Communication → Diag. config. → Event category 833

**Description**

Use this option to select a category for the diagnostic message 833 Electronic temp.

**Selection**

- Failure (F)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req. (M)
- No effect (N)

**Factory setting**

Out of spec. (S)

**Additional information**

Selection

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

**Event category 834 (Process temp.)**

**Navigation**

Expert → Communication → Diag. config. → Event category 834

**Description**

Use this option to select a category for the diagnostic message 834 Process temp.

**Selection**

- Failure (F)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req. (M)
- No effect (N)

**Factory setting**

Out of spec. (S)

**Additional information**

Selection

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

**Event category 835 (Process temp.)**

**Navigation**

Expert → Communication → Diag. config. → Event category 835

**Description**

Use this option to select a category for the diagnostic message 835 Process temp.
Selection
- Failure (F)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req. (M)
- No effect (N)

Factory setting
Out of spec. (S)

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

Event category 862 (Empty pipe)

Navigation  
Expert → Communication → Diag. config. → Event category 862

Description  
Use this option to select a category for the diagnostic message 862 Empty pipe.

Selection
- Failure (F)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req. (M)
- No effect (N)

Factory setting  
Out of spec. (S)

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

Event category 912 (Medium inhomog.)

Navigation  
Expert → Communication → Diag. config. → Event category 912

Description  
Use this function to assign a category to the diagnostic message 912 Medium inhomog.

Selection
- Failure (F)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req. (M)
- No effect (N)

Factory setting  
Out of spec. (S)

Additional information  
For a detailed description of the event categories available for selection:
Event category 913 (Medium unsuitab.)

Navigation

Expert → Communication → Diag. config. → Event category 913

Description

Use this function to assign a category to the diagnostic message 913 Medium unsuitab..

Selection

- Failure (F)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req. (M)
- No effect (N)

Factory setting

Out of spec. (S)

Additional information

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

3.5 "Application" submenu

Navigation

Expert → Application

Reset all tot.

Navigation

Expert → Application → Reset all tot.

Description

Use this function to reset all totalizers to the value 0 and restart the totaling process. This deletes all the flow values previously totalized.

Selection

- Cancel
- Reset + totalize

Factory setting

Cancel
### Additional information

#### Selection

<table>
<thead>
<tr>
<th>Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancel</td>
<td>No action is executed and the user exits the parameter.</td>
</tr>
<tr>
<td>Reset + totalize</td>
<td>Resets all totalizers to 0 and restarts the totaling process. This deletes all the flow values previously totalized.</td>
</tr>
</tbody>
</table>

#### 3.5.1 "Totalizer 1 to n" submenu

**Navigation**

Expert → Application → Totalizer 1 to n

<table>
<thead>
<tr>
<th>▶ Totalizer 1 to n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assign variable</td>
</tr>
<tr>
<td>Unit totalizer</td>
</tr>
<tr>
<td>Operation mode</td>
</tr>
<tr>
<td>Control Tot. 1 to n</td>
</tr>
<tr>
<td>Preset value 1 to n</td>
</tr>
<tr>
<td>Failure mode</td>
</tr>
</tbody>
</table>

### Assign variable

**Navigation**

Expert → Application → Totalizer 1 to n → Assign variable

**Description**

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

**Selection**

- Off
- Volume flow
- Mass flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *

**Factory setting**

Mass flow

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

Proline Promass 100 HART

Additional information

Description

- If the option selected is changed, the device resets the totalizer to 0.

Selection

- If the Off option is selected, only Assign variable parameter (→ 165) is still displayed in the Totalizer 1 to n submenu. All other parameters in the submenu are hidden.

Unit totalizer

Navigation

- Expert → Application → Totalizer 1 to n → Unit totalizer

Prerequisite

One of the following options is selected in the Assign variable parameter (→ 165) of the Totalizer 1 to n submenu:
- Volume flow
- Mass flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl.

Description

- Use this function to select the process variable unit for the Totalizer 1 to n (→ 165).

Selection

SI units
- g
- kg
- t

US units
- oz
- lb
- STon

Custom-specific units
- User mass

or

SI units
- cm³
- dm³
- m³
- ml
- l
- hl
- Ml Mega

US units
- fl oz (us)
- gal (us)
- kgal (us)
- Mgal (us)

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

Custom-specific units
- User vol.

or

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

#### SI units
- Nl
- Nm³
- Sl
- Sm³

#### US units
- Sft³
- Sgal (us)
- Sbbl (us; liq.)

#### Imperial units
- Sgal (imp)

#### Custom-specific units
- UserCrVol.

#### Factory setting
Country-specific:
- kg
- lb

#### Additional information
**Description**
The unit is selected separately for each totalizer. It is independent of the selection made in the System units submenu (→ 53).

**Selection**
The selection is dependent on the process variable selected in the Assign variable parameter (→ 165).

### Operation mode

#### Navigation
Expert → Application → Totalizer 1 to n → Operation mode

#### Prerequisite
One of the following options is selected in the Assign variable parameter (→ 165) of the Totalizer 1 to n submenu:
- Volume flow
- Mass flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *

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

#### Selection
- Net flow total
- Forward total
- Reverse total

#### Factory setting
Net flow total

#### Additional information
**Selection**
- Net flow total
  Flow values in the forward and reverse flow direction are totalized and balanced against one another. Net flow is registered in the flow direction.
- Forward total
  Only the flow in the forward flow direction is totalized.
- Reverse total
  Only the flow in the reverse flow direction is totalized (= reverse flow quantity).

* Visibility depends on order options or device settings
Control Tot. 1 to n

Navigation

Expert → Application → Totalizer 1 to n → Control Tot. 1 to n

Prerequisite

One of the following options is selected in the Assign variable parameter (→ 165) of the Totalizer 1 to n submenu:
- Volume flow
- Mass flow
- Correct.vol.flow
- Target mass flow*
- Carrier mass fl.*

Description

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

Selection

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

Factory setting

Totalize

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>
</tbody>
</table>

Preset value 1 to n

Navigation

Expert → Application → Totalizer 1 to n → Preset value 1 to n

Prerequisite

One of the following options is selected in the Assign variable parameter (→ 165) of the Totalizer 1 to n submenu:
- Volume flow
- Mass flow
- Correct.vol.flow
- Target mass flow*
- Carrier mass fl.*

Description

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

User entry

Signed floating-point number

* Visibility depends on order options or device settings
**Factory setting**

Country-specific:
- 0 kg
- 0 lb

**Additional information**

*Entry*

The unit of the selected process variable is specified for the totalizer in the **Unit totalizer** parameter (→ § 166).

*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

**Prerequisite**

One of the following options is selected in the **Assign variable** parameter (→ § 165) of the **Totalizer 1 to n** submenu:
- Volume flow
- Mass flow
- Correct.vol.flow
- Target mass flow*
- Carrier mass fl.*

**Description**

Use this function to select how a totalizer behaves in the event of a device alarm.

**Selection**

- Stop
- Actual value
- Last valid value

**Factory setting**

Stop

**Additional information**

*Description*

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

*Selection*

- Stop
  - The totalizer is stopped in the event of a device alarm.
- Actual value
  - The totalizer continues to count based on the actual 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.

* Visibility depends on order options or device settings
3.5.2  "Viscosity" submenu

Only available for Promass I.

For detailed information on the parameter descriptions for the Viscosity application package, refer to the Special Documentation for the device.

Navigation  

Expert → Application → Viscosity

- Viscosity
  - Viscos. damping
  - Temp. compensat.
  - Dynam. viscosity
  - Kinematic visc.

3.5.3  "Concentration" submenu

For detailed information on the parameter descriptions for the Concentration application package, refer to the Special Documentation for the device.

Navigation  

Expert → Application → Concentration

- Concentration

3.6  "Diagnostics" submenu

Navigation  

Expert → Diagnostics

- Diagnostics
  - Actual diagnos. → 171
  - Prev.diagnostics → 171
  - Time fr. restart → 172
  - Operating time → 172
  - Diagnostic list → 173
  - Event logbook → 177
  - Device info → 178
  - Min/max val. → 182
# Actual diagnos.

**Navigation**

- Expert → Diagnostics → Actual diagnos.

**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 (→ 173).
  
  **Example**
  
  For the display format:
  
  ![F271 Main electronic](#)

## 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 diagnos. parameter (→ 171).
  
  **Example**
  
  For the display format:
  
  24d12h13m00s

## Prev.diagnostics

**Navigation**

- Expert → Diagnostics → Prev.diagnostics

**Prerequisite**

Two diagnostic events have already occurred.
### Description of device parameters

#### Proline Promass 100 HART

**Description**
Displays the diagnostic message that occurred before the current message.

**User interface**
Symbol for diagnostic behavior, diagnostic code and short message.

**Additional information**

*Example*

For the display format:

- **F271 Main electronic**

---

### 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 `Prev.diagnostics` parameter (→ 171).

*Example*

For the display format:

- **24d12h13m00s**

---

### Time fr. restart

**Navigation**

- Expert → Diagnostics → Time fr. restart

**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

**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.

3.6.1 "Diagnostic list" submenu

Navigation
Expert → Diagnostics → Diagnostic list

<table>
<thead>
<tr>
<th>Diagnostic list</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostics 1</td>
</tr>
<tr>
<td>Diagnostics 2</td>
</tr>
<tr>
<td>Diagnostics 3</td>
</tr>
<tr>
<td>Diagnostics 4</td>
</tr>
<tr>
<td>Diagnostics 5</td>
</tr>
</tbody>
</table>

Diagnostics 1

Navigation
Expert → Diagnostics → Diagnostic list → Diagnostics 1

Description
Displays the current diagnostics message with the highest priority.

User interface
Symbol for diagnostic behavior, diagnostic code and short message.

Additional information

Examples
For the display format:
- ☒F271 Main electronic
- ☒F276 I/O module

Timestamp

Navigation
Expert → Diagnostics → Diagnostic list → Timestamp

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

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

*Display*

The diagnostic message can be viewed via the **Diagnostics 1** parameter (→ 173).

*Example*

For the display format:

24d12h13m00s

---

**Diagnostics 2**

**Navigation**

Expert → Diagnostics → Diagnostic list → Diagnostics 2

**Description**

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

**User interface**

Symbol for diagnostic behavior, diagnostic code and short message.

**Additional information**

*Examples*

For the display format:

- ☠F271 Main electronic
- ☠F276 I/O module

---

**Timestamp**

**Navigation**

Expert → Diagnostics → Diagnostic list → Timestamp

**Description**

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

**User interface**

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

**Additional information**

*Display*

The diagnostic message can be viewed via the **Diagnostics 2** parameter (→ 174).

*Example*

For the display format:

24d12h13m00s

---

**Diagnostics 3**

**Navigation**

Expert → Diagnostics → Diagnostic list → Diagnostics 3

**Description**

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

**User interface**

Symbol for diagnostic behavior, diagnostic code and short message.
Additional information  

Examples  
For the display format:  
- F271 Main electronic  
- F276 I/O module

Timestamp

Navigation  
Diagram  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 (→ 174).

Example
For the display format:
24d12h13m00s

Diagnostics 4

Navigation  
Diagram  Diagram  Expert → Diagnostics → Diagnostic list → Diagnostics 4

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

User interface  
Symbol for diagnostic behavior, diagnostic code and short message.

Additional information  
Examples  
For the display format:  
- F271 Main electronic  
- F276 I/O module

Timestamp

Navigation  
Diagram  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 (→ 175).

*Example*

For the display format:

24d12h13m00s

### Diagnostics 5

<table>
<thead>
<tr>
<th>Navigation</th>
<th>➤ ➤  Expert → Diagnostics → Diagnostic list → Diagnostics 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Displays the current diagnostics message with the fifth-highest priority.</td>
</tr>
<tr>
<td>User interface</td>
<td>Symbol for diagnostic behavior, diagnostic code and short message.</td>
</tr>
<tr>
<td>Additional information</td>
<td><strong>Examples</strong></td>
</tr>
</tbody>
</table>

For the display format:

- ☐F271 Main electronic
- ☐F276 I/O module

### Timestamp

<table>
<thead>
<tr>
<th>Navigation</th>
<th>➤  Expert → Diagnostics → Diagnostic list → Timestamp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Displays the operating time when the diagnostic message with the fifth-highest priority occurred.</td>
</tr>
<tr>
<td>User interface</td>
<td>Days (d), hours (h), minutes (m) and seconds (s)</td>
</tr>
<tr>
<td>Additional information</td>
<td><strong>Display</strong></td>
</tr>
</tbody>
</table>

The diagnostic message can be viewed via the **Diagnostics 5** parameter (→ 176).

*Example*

For the display format:

24d12h13m00s
3.6.2 "Event logbook" submenu

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)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req. (M)
- Information (I)

Factory setting
All

Additional information
The status signals are categorized in accordance with VDI/VDE 2650 and NAMUR Recommendation NE 107:
- F = Failure
- C = Function Check
- S = Out of Specification
- M = Maintenance Required

"Event list" submenu

The Event list submenu is only displayed if operating via the local display.
If operating via the FieldCare operating tool, the event list can be read out with a separate FieldCare module.
If operating via the Web browser, the event messages can be found directly in the Event logbook submenu.

Navigation  
 Expert → Diagnostics → Event logbook → Event list
Event list

Navigation

Expert → Diagnostics → Event logbook → Event list

Description

Displays the history of event messages of the category selected in the Filter options parameter.

User interface

- For a "Category I" event message
  Information event, short message, symbol for event recording and operating time when error occurred
- For a "Category F, C, S, M" event message (status signal)
  Diagnostics code, short message, symbol for event recording and operating time when error occurred

Additional information

Description

A maximum of 20 event messages are displayed in chronological order.

The following symbols indicate whether an event has occurred or has ended:

- ☒: Occurrence of the event
- ☐: End of the event

Examples

For the display format:

- I1091 Configuration modified
  ☒ 24d12h13m00s
- F271 Main electronic
  ☒ 01d04h12min30s

HistoROM

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

3.6.3 "Device info" submenu

Navigation

Expert → Diagnostics → Device info

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Device tag</td>
<td>→ 179</td>
</tr>
<tr>
<td>Serial number</td>
<td>→ 179</td>
</tr>
<tr>
<td>Firmware version</td>
<td>→ 179</td>
</tr>
<tr>
<td>Device name</td>
<td>→ 180</td>
</tr>
</tbody>
</table>
Device tag

**Navigation**

Expert → Diagnostics → Device info → Device tag

**Description**

Displays a unique name for the measuring point so it can be identified quickly within the plant.

**User interface**

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

**Factory setting**

Promass 100

Serial number

**Navigation**

Expert → Diagnostics → Device info → Serial number

**Description**

Displays the serial number of the measuring device.

The number can be found on the nameplate of the sensor and transmitter.

**User interface**

A maximum of 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

**Description**

Displays the device firmware version installed.
### User interface
Character string in the format xx.yy.zz

### Additional information
Display

- The Firmware version is also located:
  - On the title page of the Operating instructions
  - On the transmitter nameplate

### Device name

<table>
<thead>
<tr>
<th>Navigation</th>
<th>Expert → Diagnostics → Device info → Device name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Displays the name of the transmitter. It can also be found on the nameplate of the transmitter.</td>
</tr>
<tr>
<td>User interface</td>
<td>Max. 32 characters such as letters or numbers.</td>
</tr>
<tr>
<td>Factory setting</td>
<td>Promass 100</td>
</tr>
</tbody>
</table>

### Order code

<table>
<thead>
<tr>
<th>Navigation</th>
<th>Expert → Diagnostics → Device info → Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Displays the device order code.</td>
</tr>
<tr>
<td>User interface</td>
<td>Character string composed of letters, numbers and certain punctuation marks (e.g. /).</td>
</tr>
<tr>
<td>Additional information</td>
<td>Description</td>
</tr>
<tr>
<td></td>
<td>The order code can be found on the nameplate of the sensor and transmitter in the 'Order code' field.</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>Uses of the order code</td>
</tr>
<tr>
<td></td>
<td>- To order an identical spare device.</td>
</tr>
<tr>
<td></td>
<td>- To identify the device quickly and easily, e.g. when contacting Endress+Hauser.</td>
</tr>
</tbody>
</table>

### Ext. order cd. 1

<table>
<thead>
<tr>
<th>Navigation</th>
<th>Expert → Diagnostics → Device info → Ext. order cd. 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Displays the first part of the extended order code.</td>
</tr>
<tr>
<td></td>
<td>On account of length restrictions, the extended order code is split into a maximum of 3 parameters.</td>
</tr>
<tr>
<td>User interface</td>
<td>Character string</td>
</tr>
</tbody>
</table>
The extended order code indicates the version of all the features of the product structure for the measuring device and thus uniquely identifies the measuring device.

The extended order code can also be found on the nameplate of the sensor and transmitter in the "Ext. ord. cd." field.

---

**Ext. order cd. 2**

**Navigation**

Expert → Diagnostics → Device info → Ext. order cd. 2

**Description**

Displays the second part of the extended order code.

**User interface**

Character string

**Additional information**

For additional information, see Ext. order cd. 1 parameter (→ 180)

---

**Ext. order cd. 3**

**Navigation**

Expert → Diagnostics → Device info → Ext. order cd. 3

**Description**

Displays the third part of the extended order code.

**User interface**

Character string

**Additional information**

For additional information, see Ext. order cd. 1 parameter (→ 180)

---

**Config. counter**

**Navigation**

Expert → Diagnostics → Device info → Config. counter

**Description**

Displays the number of parameter modifications for the device. When the user changes a parameter setting, this counter is incremented.

**User interface**

0 to 65535

---

**ENP version**

**Navigation**

Expert → Diagnostics → Device info → ENP version

**Description**

Displays the version of the electronic nameplate.

**User interface**

Character string
Factory setting 2.02.00

Additional information

*Description*
This electronic nameplate stores a data record for device identification that includes more data than the nameplates attached to the outside of the device.

### 3.6.4 "Min/max val." submenu

**Navigation**

- Expert → Diagnostics → Min/max val.

<table>
<thead>
<tr>
<th>Min/max val.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reset min/max                          → 182</td>
</tr>
<tr>
<td>Electronic temp. → 183</td>
</tr>
<tr>
<td>Medium temp. → 184</td>
</tr>
<tr>
<td>Carr. pipe temp. → 185</td>
</tr>
<tr>
<td>Oscil. frequency → 186</td>
</tr>
<tr>
<td>Tors. oscil. freq. → 187</td>
</tr>
<tr>
<td>Oscil. amplitude → 188</td>
</tr>
<tr>
<td>Tor. osc. amp. → 188</td>
</tr>
<tr>
<td>Oscil. damping → 189</td>
</tr>
<tr>
<td>Tors. oscil. damp. → 190</td>
</tr>
<tr>
<td>Signal asymmetry → 191</td>
</tr>
</tbody>
</table>

**Reset min/max**

**Navigation**

- Expert → Diagnostics → Min/max val. → Reset min/max

**Description**
Use this function to select measured variables whose minimum, maximum and average measured values are to be reset.
Proline Promass 100 HART

Description of device parameters

Selection

- Cancel
- Oscil. amplitude
- Osc. ampl. 1
- Oscil. damping
- Tors.oscil.damp.
- Oscil. frequency
- Tors.oscil.freq.
- Signal asymmetry

Factory setting

Cancel

Additional information

Selection

Detailed description of the options Oscil. frequency, Oscil. amplitude, Oscil. damping and Signal asymmetry: Value 1 display parameter (→ 17)

"Electronic temp." submenu

Navigation

Expert → Diagnostics → Min/max val. → Electronic temp.

Electronic temp.

Minimum value

→ 183

Maximum value

→ 184

Minimum value

Navigation

Expert → Diagnostics → Min/max val. → Electronic temp. → Minimum value

Description

Displays the lowest previously measured temperature value of the main electronics module.

User interface

Signed floating-point number

Additional information

Dependency

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

* Visibility depends on order options or device settings
Maximum value

**Navigation**
Expert → Diagnostics → Min/max val. → Electronic temp. → Maximum value

**Description**
Displays the highest previously measured temperature value of the main electronics module.

**User interface**
Signed floating-point number

**Additional information**
*Dependency*

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

"Medium temp." submenu

**Navigation**
Expert → Diagnostics → Min/max val. → Medium temp.

**Minimum value**

**Navigation**
Expert → Diagnostics → Min/max val. → Medium temp. → Minimum value

**Description**
Displays the lowest previously measured medium temperature value.

**User interface**
Signed floating-point number

**Additional information**
*Dependency*

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

**Maximum value**

**Navigation**
Expert → Diagnostics → Min/max val. → Medium temp. → Maximum value

**Description**
Displays the highest previously measured medium temperature value.

**User interface**
Signed floating-point number
Additional information

Dependency

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

"Carr. pipe temp." submenu

Navigation

Expert → Diagnostics → Min/max val. → Carr. pipe temp.

Minimum value

Prerequisite

Only available for:
- Promass A
- Promass F
- PromassG
- Promass H
- Promass I
- Promass O
- Promass P
- PromassQ
- Promass S
- Promass X

For the following order code
"Application package", option EB "Heartbeat Verification + Monitoring"

Description

Displays the lowest previously measured temperature value of the carrier pipe.

User interface

Signed floating-point number

Additional information

Dependency

The unit is taken from the Temperature unit parameter (→ 60)
Description of device parameters

Proline Promass 100 HART

Maximum value

Navigation

Expert → Diagnostics → Min/max val. → Carr. pipe temp. → Maximum value

Prerequisite

Only available for:
• Promass A
• Promass F
• Promass G
• Promass H
• Promass I
• Promass O
• Promass P
• Promass Q
• Promass S
• Promass X

For the following order code
*Application package*, option EB "Heartbeat Verification + Monitoring"

Description

Displays the highest previously measured temperature value of the carrier pipe.

User interface

Signed floating-point number

Additional information

Dependency

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

"Oscil. frequency" submenu

Navigation

Expert → Diagnostics → Min/max val. → Oscil. frequency

<table>
<thead>
<tr>
<th>Oscil. frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum value    → 186</td>
</tr>
<tr>
<td>Maximum value    → 187</td>
</tr>
</tbody>
</table>

Minimum value

Navigation

Expert → Diagnostics → Min/max val. → Oscil. frequency → Minimum value

Description

Displays the lowest previously measured oscillation frequency.

User interface

Signed floating-point number
**Maximum value**

**Navigation**

Expert → Diagnostics → Min/max val. → Oscil. frequency → Maximum value

**Description**

Displays the highest previously measured oscillation frequency.

**User interface**

Signed floating-point number

"Tors.oscil.freq." submenu

**Navigation**

Expert → Diagnostics → Min/max val. → Tors.oscil.freq.

<table>
<thead>
<tr>
<th>Minimum value</th>
<th>→</th>
<th>187</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum value</td>
<td>→</td>
<td>187</td>
</tr>
</tbody>
</table>

**Minimum value**

**Navigation**

Expert → Diagnostics → Min/max val. → Tors.oscil.freq. → Minimum value

**Prerequisite**

Only available for Promass I.

For the following order code:
"Application package", option EB "Heartbeat Verification + Monitoring"

**Description**

Displays the lowest previously measured torsion oscillation frequency.

**User interface**

Signed floating-point number

**Maximum value**

**Navigation**

Expert → Diagnostics → Min/max val. → Tors.oscil.freq. → Maximum value

**Prerequisite**

Only available for Promass I.

For the following order code:
"Application package", option EB "Heartbeat Verification + Monitoring"

**Description**

Displays the highest previously measured torsion oscillation frequency.
User interface

Signed floating-point number

"Oscil. amplitude" submenu

Navigation

Expert → Diagnostics → Min/max val. → Oscil. amplitude

<table>
<thead>
<tr>
<th>Oscil. amplitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum value</td>
</tr>
<tr>
<td>Maximum value</td>
</tr>
</tbody>
</table>

Minimum value

Navigation

Expert → Diagnostics → Min/max val. → Oscil. amplitude → Minimum value

Description
Displays the lowest previously measured oscillation amplitude.

User interface
Signed floating-point number

Maximum value

Navigation

Expert → Diagnostics → Min/max val. → Oscil. amplitude → Maximum value

Description
Displays the highest previously measured oscillation amplitude.

User interface
Signed floating-point number

"Tor. osc. amp." submenu

Navigation

Expert → Diagnostics → Min/max val. → Tor. osc. amp.

<table>
<thead>
<tr>
<th>Tor. osc. amp.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum value</td>
</tr>
<tr>
<td>Maximum value</td>
</tr>
</tbody>
</table>
**Minimum value**

**Navigation**  
Expert → Diagnostics → Min/max val. → Tor. osc. amp. → Minimum value

**Prerequisite**  
Only available for Promass I.

For the following order code:  
'Application package', option EB 'Heartbeat Verification + Monitoring'

**Description**  
Displays the lowest previously measured torsion oscillation amplitude.

**User interface**  
Signed floating-point number

---

**Maximum value**

**Navigation**  
Expert → Diagnostics → Min/max val. → Tor. osc. amp. → Maximum value

**Prerequisite**  
Only available for Promass I.

For the following order code:  
'Application package', option EB 'Heartbeat Verification + Monitoring'

**Description**  
Displays the highest previously measured torsion oscillation amplitude.

**User interface**  
Signed floating-point number

---

**"Oscil. damping" submenu**

**Navigation**  
Expert → Diagnostics → Min/max val. → Oscil. damping

**Minimum value**  
Minimum value → 189

**Maximum value**  
Maximum value → 190

---

**Minimum value**

**Navigation**  
Expert → Diagnostics → Min/max val. → Oscil. damping → Minimum value

**Description**  
Displays the lowest previously measured oscillation damping.

**User interface**  
Signed floating-point number
## Maximum value

### Navigation
Expert → Diagnostics → Min/max val. → Oscil. damping → Maximum value

### Description
Displays the highest previously measured oscillation damping.

### User interface
Signed floating-point number

### "Tors.oscil.damp." submenu

#### Navigation
Expert → Diagnostics → Min/max val. → Tors.oscil.damp.

#### Minimum value

| Minimum value | → 190 |

#### Maximum value

| Maximum value | → 190 |

---

## Minimum value

### Navigation
Expert → Diagnostics → Min/max val. → Tors.oscil.damp. → Minimum value

### Prerequisite
Only available for Promass I.
For the following order code:
'Application package', option **EB** 'Heartbeat Verification + Monitoring'

### Description
Displays the lowest previously measured torsion oscillation damping.

### User interface
Signed floating-point number

---

## Maximum value

### Navigation
Expert → Diagnostics → Min/max val. → Tors.oscil.damp. → Maximum value

### Prerequisite
Only available for Promass I.
For the following order code:
'Application package', option **EB** 'Heartbeat Verification + Monitoring'

### Description
Displays the highest previously measured torsion oscillation damping.
**User interface**
Signed floating-point number

---

**"Signal asymmetry" submenu**

*Navigation*

Expert → Diagnostics → Min/max val. → Signal asymmetry

<table>
<thead>
<tr>
<th>Signal asymmetry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum value</td>
</tr>
<tr>
<td>Maximum value</td>
</tr>
</tbody>
</table>

---

**Minimum value**

*Navigation*

Expert → Diagnostics → Min/max val. → Signal asymmetry → Minimum value

*Description*
Displays the lowest previously measured signal asymmetry.

*User interface*
Signed floating-point number

---

**Maximum value**

*Navigation*

Expert → Diagnostics → Min/max val. → Signal asymmetry → Maximum value

*Description*
Displays the highest previously measured signal asymmetry.

*User interface*
Signed floating-point number

---

**3.6.5 "Heartbeat" submenu**

For detailed information on the parameter descriptions for the Heartbeat Verification+Monitoring application package, refer to the Special Documentation for the device

*Navigation*

Expert → Diagnostics → Heartbeat

<table>
<thead>
<tr>
<th>Heartbeat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perform.verif.</td>
</tr>
</tbody>
</table>
3.6.6 "Simulation" submenu

**Navigation**  
Expert → Diagnostics → Simulation

**Assign proc.var.**

**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
- Mass flow
- Volume flow
- Correct.vol.flow
- Density
- Ref.density
- Temperature
- Dynam. viscosity *
- Kinematic visc.
- TempCompDynVisc *
- TempCompKinVisc *
- Concentration *
- Target mass flow *
- Carrier mass fl.

Factory setting

Off

Additional information

**Description**

The simulation value of the process variable selected is defined in the **Value proc. var.** parameter (→ 193).

**Value proc. var.**

**Navigation**

Expert → Diagnostics → Simulation → Value proc. var.

**Prerequisite**

One of the following options is selected in the **Assign proc.var.** parameter (→ 192):

- Mass flow
- Volume flow
- Correct.vol.flow
- Density
- Ref.density
- Temperature
- Dynam. viscosity *
- Kinematic visc.
- TempCompDynVisc *
- TempCompKinVisc *
- Concentration *
- Target mass flow *
- Carrier mass fl.

**Description**

Use this function to enter a simulation value for the selected process variable. Subsequent measured value processing and the signal output use this simulation value. In this way, users can verify whether the measuring device has been configured correctly.

**User entry**

Depends on the process variable selected

**Factory setting**

0

**Additional information**

**Entry**

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

* Visibility depends on order options or device settings
Sim.curr.out. 1

Navigation
Expert → Diagnostics → Simulation → Sim.curr.out. 1

Description
Use this function to switch simulation of the current output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category while simulation is in progress.

Selection
- Off
- On

Factory setting
Off

Additional information

Description
The desired simulation value is specified in the Value curr.out 1 parameter (→ 194).

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 curr.out 1

Navigation
Expert → Diagnostics → Simulation → Value curr.out 1

Prerequisite
In the Sim.curr.out. 1 parameter, the On option is selected.

Description
Use this function to enter a current value for the simulation. In this way, users can verify the correct adjustment of the current output and the correct function of downstream switching units.

User entry
0 to 22.5 mA

Frequency sim. 1

Navigation
Expert → Diagnostics → Simulation → Frequency sim. 1

Prerequisite
In the Operating mode parameter (→ 108), 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 while simulation is in progress.

Selection
- Off
- On
### Factory setting

**Off**

### Additional information

**Description**

The desired simulation value is defined in the **Freq. value** parameter (→ 195).

**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.

#### Freq. value 1

<table>
<thead>
<tr>
<th>Navigation</th>
<th>Expert → Diagnostics → Simulation → Freq. value 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prerequisite</td>
<td>In the <strong>Frequency sim.</strong> parameter (→ 194), the <strong>On</strong> option is selected.</td>
</tr>
<tr>
<td>Description</td>
<td>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.</td>
</tr>
<tr>
<td>User entry</td>
<td>0.0 to 12 500.0 Hz</td>
</tr>
</tbody>
</table>

#### Pulse sim. 1

<table>
<thead>
<tr>
<th>Navigation</th>
<th>Expert → Diagnostics → Simulation → Pulse sim. 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prerequisite</td>
<td>In the <strong>Operating mode</strong> parameter (→ 108), the <strong>Pulse</strong> option is selected.</td>
</tr>
<tr>
<td>Description</td>
<td>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.</td>
</tr>
<tr>
<td><strong>Selection</strong></td>
<td></td>
</tr>
<tr>
<td>- <strong>Off</strong></td>
<td></td>
</tr>
<tr>
<td>- <strong>Fixed value</strong></td>
<td></td>
</tr>
<tr>
<td>- <strong>Down-count. val.</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Factory setting</strong></td>
<td>Off</td>
</tr>
</tbody>
</table>
Additional information

Description

The desired simulation value is defined in the **Pulse value** parameter (→ 196).

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 (→ 111).
- **Down-count. val.**
  The pulses specified in the **Pulse value** parameter (→ 196) are output.

---

Pulse value 1

**Navigation**

Expert → Diagnostics → Simulation → Pulse value 1

**Prerequisite**

In the **Pulse sim.** parameter (→ 195), the **Down-count. val.** option is selected.

**Description**

Use this function to enter a pulse value for the simulation. In this way, users can verify the correct adjustment of the pulse output and the correct function of downstream switching units.

**User entry**

0 to 65535

---

Switch sim. 1

**Navigation**

Expert → Diagnostics → Simulation → Switch sim. 1

**Prerequisite**

In the **Operating mode** parameter (→ 108), the **Switch** option is selected.

**Description**

Use this function to switch simulation of the switch output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

**Selection**

- **Off**
- **On**

**Factory setting**

Off
Additional information  

Description  

The desired simulation value is defined in the Switch status parameter (→ 197).

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

Navigation  

Expert → Diagnostics → Simulation → Switch status 1

Prerequisite  

In the Switch sim. parameter (→ 196) Switch sim. 1 to n parameter Switch sim. 1 to n parameter, the On option is selected.

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.

Sim. alarm

Navigation  

Expert → Diagnostics → Simulation → Sim. alarm

Description  

Use this function to switch the device alarm on and off.

Selection  

- Off  
- On  

Factory setting  

Off

Additional information  

Description  

The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.
**Event category**

**Navigation**  
Expert → Diagnostics → Simulation → Event category

**Description**  
Use this function to select the category of the diagnostic events that are displayed for the simulation in the **Sim. diag. event** parameter (→ 198).

**Selection**  
- Sensor
- Electronics
- Configuration
- Process

**Factory setting**  
Process

**Sim. diag. event**

**Navigation**  
Expert → Diagnostics → Simulation → Sim. diag. event

**Description**  
Use this function to select a diagnostic event for the simulation process that is activated.

**Selection**  
- Off
- Diagnostic event picklist (depends on the category selected)

**Factory setting**  
Off

**Additional information**  
*Description*  
For the simulation, you can choose from the diagnostic events of the category selected in the **Event category** parameter (→ 198).
4 Country-specific factory settings

4.1 SI units

Not valid for USA and Canada.

4.1.1 System units

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass</td>
<td>kg</td>
</tr>
<tr>
<td>Mass flow</td>
<td>kg/h</td>
</tr>
<tr>
<td>Volume</td>
<td>l</td>
</tr>
<tr>
<td>Volume flow</td>
<td>l/h</td>
</tr>
<tr>
<td>Corrected volume</td>
<td>Nl</td>
</tr>
<tr>
<td>Corrected volume flow</td>
<td>Nl/h</td>
</tr>
<tr>
<td>Density</td>
<td>kg/l</td>
</tr>
<tr>
<td>Reference density</td>
<td>kg/Nl</td>
</tr>
<tr>
<td>Temperature</td>
<td>°C</td>
</tr>
<tr>
<td>Pressure</td>
<td>bar a</td>
</tr>
</tbody>
</table>

4.1.2 Full scale values

The factory settings applie to the following parameters:
- 20 mA value (full scale value of the current output)
- 100% bar graph value 1

<table>
<thead>
<tr>
<th>Nominal diameter [mm]</th>
<th>[kg/h]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>4</td>
<td>90</td>
</tr>
<tr>
<td>8</td>
<td>400</td>
</tr>
<tr>
<td>15</td>
<td>1300</td>
</tr>
<tr>
<td>15 FB</td>
<td>3600</td>
</tr>
<tr>
<td>25</td>
<td>3600</td>
</tr>
<tr>
<td>25 FB</td>
<td>9000</td>
</tr>
<tr>
<td>40</td>
<td>9000</td>
</tr>
<tr>
<td>40 FB</td>
<td>14000</td>
</tr>
<tr>
<td>50</td>
<td>14000</td>
</tr>
<tr>
<td>50 FB</td>
<td>36000</td>
</tr>
<tr>
<td>80</td>
<td>36000</td>
</tr>
<tr>
<td>100</td>
<td>60000</td>
</tr>
<tr>
<td>150</td>
<td>130 t/h</td>
</tr>
<tr>
<td>250</td>
<td>360 t/h</td>
</tr>
<tr>
<td>350</td>
<td>650 t/h</td>
</tr>
</tbody>
</table>
4.1.3 Output current span

| Current output 1 | 4 to 20 mA NAMUR |

4.1.4 Pulse value

<table>
<thead>
<tr>
<th>Nominal diameter [mm]</th>
<th>[kg/p]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.001</td>
</tr>
<tr>
<td>2</td>
<td>0.01</td>
</tr>
<tr>
<td>4</td>
<td>0.01</td>
</tr>
<tr>
<td>8</td>
<td>0.1</td>
</tr>
<tr>
<td>15</td>
<td>0.1</td>
</tr>
<tr>
<td>15 FB</td>
<td>1</td>
</tr>
<tr>
<td>25</td>
<td>1</td>
</tr>
<tr>
<td>25 FB</td>
<td>1</td>
</tr>
<tr>
<td>40</td>
<td>1</td>
</tr>
<tr>
<td>40 FB</td>
<td>10</td>
</tr>
<tr>
<td>50</td>
<td>10</td>
</tr>
<tr>
<td>50 FB</td>
<td>10</td>
</tr>
<tr>
<td>80</td>
<td>10</td>
</tr>
<tr>
<td>100</td>
<td>10</td>
</tr>
<tr>
<td>150</td>
<td>100</td>
</tr>
<tr>
<td>250</td>
<td>100</td>
</tr>
<tr>
<td>350</td>
<td>100</td>
</tr>
</tbody>
</table>

4.1.5 On value low flow cut off

The switch-on point depends on the type of medium and the nominal diameter.

<table>
<thead>
<tr>
<th>Nominal diameter [mm]</th>
<th>On-value for liquid [kg/h]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.08</td>
</tr>
<tr>
<td>2</td>
<td>0.4</td>
</tr>
<tr>
<td>4</td>
<td>1.8</td>
</tr>
<tr>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>15</td>
<td>26</td>
</tr>
<tr>
<td>15 FB</td>
<td>72</td>
</tr>
<tr>
<td>25</td>
<td>72</td>
</tr>
<tr>
<td>25 FB</td>
<td>180</td>
</tr>
<tr>
<td>40</td>
<td>180</td>
</tr>
<tr>
<td>40 FB</td>
<td>300</td>
</tr>
<tr>
<td>50</td>
<td>300</td>
</tr>
<tr>
<td>50 FB</td>
<td>720</td>
</tr>
<tr>
<td>80</td>
<td>720</td>
</tr>
<tr>
<td>100</td>
<td>1200</td>
</tr>
<tr>
<td>Nominal diameter [mm]</td>
<td>On-value for liquid [kg/h]</td>
</tr>
<tr>
<td>----------------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>150</td>
<td>2.6 t/h</td>
</tr>
<tr>
<td>250</td>
<td>7.2 t/h</td>
</tr>
<tr>
<td>350</td>
<td>13 t/h</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nominal diameter [mm]</th>
<th>Switch-on value for gas [kg/h]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.02</td>
</tr>
<tr>
<td>2</td>
<td>0.1</td>
</tr>
<tr>
<td>4</td>
<td>0.45</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>15</td>
<td>6.5</td>
</tr>
<tr>
<td>15 FB</td>
<td>18</td>
</tr>
<tr>
<td>25</td>
<td>18</td>
</tr>
<tr>
<td>25 FB</td>
<td>45</td>
</tr>
<tr>
<td>40</td>
<td>45</td>
</tr>
<tr>
<td>40 FB</td>
<td>75</td>
</tr>
<tr>
<td>50</td>
<td>75</td>
</tr>
<tr>
<td>50 FB</td>
<td>180</td>
</tr>
<tr>
<td>80</td>
<td>180</td>
</tr>
<tr>
<td>100</td>
<td>300</td>
</tr>
<tr>
<td>150</td>
<td>650</td>
</tr>
<tr>
<td>250</td>
<td>1.8 t/h</td>
</tr>
<tr>
<td>350</td>
<td>3.25 t/h</td>
</tr>
</tbody>
</table>

### 4.2 US units

Only valid for USA and Canada.

#### 4.2.1 System units

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass</td>
<td>lb</td>
</tr>
<tr>
<td>Mass flow</td>
<td>lb/min</td>
</tr>
<tr>
<td>Volume</td>
<td>gal (us)</td>
</tr>
<tr>
<td>Volume flow</td>
<td>gal/min (us)</td>
</tr>
<tr>
<td>Corrected volume</td>
<td>ft³</td>
</tr>
<tr>
<td>Corrected volume flow</td>
<td>ft³/min</td>
</tr>
<tr>
<td>Density</td>
<td>lb/ft³</td>
</tr>
<tr>
<td>Reference density</td>
<td>lb/ft³</td>
</tr>
<tr>
<td>Temperature</td>
<td>°F</td>
</tr>
<tr>
<td>Pressure</td>
<td>psi a</td>
</tr>
</tbody>
</table>
## 4.2.2 Full scale values

The factory settings apply to the following parameters:
- 20 mA value (full scale value of the current output)
- 100% bar graph value 1

<table>
<thead>
<tr>
<th>Nominal diameter [in]</th>
<th>[lb/min]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2₄</td>
<td>0.15</td>
</tr>
<tr>
<td>1/₁₂</td>
<td>0.75</td>
</tr>
<tr>
<td>1/₈</td>
<td>3.3</td>
</tr>
<tr>
<td>3/₈</td>
<td>15</td>
</tr>
<tr>
<td>½</td>
<td>50</td>
</tr>
<tr>
<td>½ FB</td>
<td>130</td>
</tr>
<tr>
<td>1</td>
<td>130</td>
</tr>
<tr>
<td>1 FB</td>
<td>330</td>
</tr>
<tr>
<td>1½</td>
<td>330</td>
</tr>
<tr>
<td>1½ FB</td>
<td>550</td>
</tr>
<tr>
<td>2</td>
<td>550</td>
</tr>
<tr>
<td>2 FB</td>
<td>1300</td>
</tr>
<tr>
<td>3</td>
<td>1300</td>
</tr>
<tr>
<td>4</td>
<td>2200</td>
</tr>
<tr>
<td>6</td>
<td>4800</td>
</tr>
<tr>
<td>10</td>
<td>13000</td>
</tr>
<tr>
<td>14</td>
<td>23500</td>
</tr>
</tbody>
</table>

## 4.2.3 Output current span

### Current output 1

| 4 to 20 mA US |

## 4.2.4 Pulse value

<table>
<thead>
<tr>
<th>Nominal diameter [in]</th>
<th>[lb/p]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2₄</td>
<td>0.002</td>
</tr>
<tr>
<td>1/₁₂</td>
<td>0.02</td>
</tr>
<tr>
<td>1/₈</td>
<td>0.02</td>
</tr>
<tr>
<td>3/₈</td>
<td>0.2</td>
</tr>
<tr>
<td>½</td>
<td>0.2</td>
</tr>
<tr>
<td>½ FB</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>1 FB</td>
<td>2</td>
</tr>
<tr>
<td>1½</td>
<td>2</td>
</tr>
<tr>
<td>1½ FB</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>2 FB</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>20</td>
</tr>
</tbody>
</table>
### 4.2.5 On value low flow cut off

The switch-on point depends on the type of medium and the nominal diameter.

<table>
<thead>
<tr>
<th>Nominal diameter [in]</th>
<th>On-value for liquid [lb/min]</th>
</tr>
</thead>
<tbody>
<tr>
<td>¹/₂₄</td>
<td>0.003</td>
</tr>
<tr>
<td>¹/₁₂</td>
<td>0.015</td>
</tr>
<tr>
<td>¹/₈</td>
<td>0.066</td>
</tr>
<tr>
<td>³/₈</td>
<td>0.3</td>
</tr>
<tr>
<td>½</td>
<td>1</td>
</tr>
<tr>
<td>½ FB</td>
<td>2.6</td>
</tr>
<tr>
<td>1</td>
<td>2.6</td>
</tr>
<tr>
<td>1 FB</td>
<td>6.6</td>
</tr>
<tr>
<td>1½</td>
<td>6.6</td>
</tr>
<tr>
<td>1½ FB</td>
<td>11</td>
</tr>
<tr>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>2 FB</td>
<td>26</td>
</tr>
<tr>
<td>3</td>
<td>26</td>
</tr>
<tr>
<td>4</td>
<td>44</td>
</tr>
<tr>
<td>6</td>
<td>95</td>
</tr>
<tr>
<td>10</td>
<td>260</td>
</tr>
<tr>
<td>¹/₄</td>
<td>470</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nominal diameter [in]</th>
<th>Switch-on value for gas [lb/min]</th>
</tr>
</thead>
<tbody>
<tr>
<td>¹/₂₄</td>
<td>0.001</td>
</tr>
<tr>
<td>¹/₁₂</td>
<td>0.004</td>
</tr>
<tr>
<td>¹/₈</td>
<td>0.016</td>
</tr>
<tr>
<td>³/₈</td>
<td>0.075</td>
</tr>
<tr>
<td>½</td>
<td>0.25</td>
</tr>
<tr>
<td>½ FB</td>
<td>0.65</td>
</tr>
<tr>
<td>1</td>
<td>0.65</td>
</tr>
<tr>
<td>1 FB</td>
<td>1.65</td>
</tr>
<tr>
<td>1½</td>
<td>1.65</td>
</tr>
<tr>
<td>1½ FB</td>
<td>2.75</td>
</tr>
<tr>
<td>2</td>
<td>2.75</td>
</tr>
<tr>
<td>2 FB</td>
<td>6.5</td>
</tr>
<tr>
<td>Nominal diameter [in]</td>
<td>Switch-on value for gas [lb/min]</td>
</tr>
<tr>
<td>----------------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>3</td>
<td>6.5</td>
</tr>
<tr>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>6</td>
<td>23.75</td>
</tr>
<tr>
<td>10</td>
<td>65</td>
</tr>
<tr>
<td>14</td>
<td>117.5</td>
</tr>
</tbody>
</table>
5  Explanation of abbreviated units

5.1  SI units

<table>
<thead>
<tr>
<th>Process variable</th>
<th>Units</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density</td>
<td>g/cm³, g/m³</td>
<td>Gram/volume unit</td>
</tr>
<tr>
<td></td>
<td>kg/dm³, kg/l, kg/m³</td>
<td>Kilogram/volume unit</td>
</tr>
<tr>
<td>SD4°C, SD15°C, SD20°C</td>
<td>Specific density: The specific density is the ratio of the density of the fluid to the density of water at a water temperature of 4 °C (39 °F), 15 °C (59 °F), 20 °C (68 °F).</td>
<td></td>
</tr>
<tr>
<td>SGA4°C, SG15°C, SG20°C</td>
<td>Specific gravity: The specific gravity is the ratio of the density of the fluid to the density of water at a water temperature of 4 °C (39 °F), 15 °C (59 °F), 20 °C (68 °F).</td>
<td></td>
</tr>
<tr>
<td>Pressure</td>
<td>Pa a, kPa a, MPa a</td>
<td>Pascal, kilopascal, megapascal (absolute)</td>
</tr>
<tr>
<td></td>
<td>bar</td>
<td>Bar</td>
</tr>
<tr>
<td></td>
<td>Pa g, kPa g, MPa g</td>
<td>Pascal, kilopascal, megapascal (relative/gauge)</td>
</tr>
<tr>
<td></td>
<td>bar g</td>
<td>Bar (relative/gauge)</td>
</tr>
<tr>
<td>Mass</td>
<td>g, kg, t</td>
<td>Gram, kilogram, metric ton</td>
</tr>
<tr>
<td>Mass flow</td>
<td>g/s, g/min, g/h, g/d</td>
<td>Gram/time unit</td>
</tr>
<tr>
<td></td>
<td>kg/s, kg/min, kg/h, kg/d</td>
<td>Kilogram/time unit</td>
</tr>
<tr>
<td></td>
<td>t/s, t/min, t/h, t/d</td>
<td>Metric ton/time unit</td>
</tr>
<tr>
<td>Ref. density</td>
<td>kg/Nm³, kg/Nl, g/Sm³, kg/Sm³</td>
<td>Kilogram, gram/standard volume unit</td>
</tr>
<tr>
<td>Corrected volume</td>
<td>Nl, Nm³, Sm³</td>
<td>Normal liter, normal cubic meter, standard cubic meter</td>
</tr>
<tr>
<td>Correct. vol. flow</td>
<td>Nl/s, Nl/min, Nl/h, Nl/d</td>
<td>Normal liter/time unit</td>
</tr>
<tr>
<td></td>
<td>Nm³/s, Nm³/min, Nm³/h, Nm³/d</td>
<td>Normal cubic meter/time unit</td>
</tr>
<tr>
<td></td>
<td>Sm³/s, Sm³/min, Sm³/h, Sm³/d</td>
<td>Standard cubic meter/time unit</td>
</tr>
<tr>
<td>Temperature</td>
<td>°C, K</td>
<td>Celsius, Kelvin</td>
</tr>
<tr>
<td>Volume</td>
<td>cm³, dm³, m³</td>
<td>Cubic centimeter, cubic decimeter, cubic meter</td>
</tr>
<tr>
<td></td>
<td>ml, l, hl, Ml Mega</td>
<td>Milliliter, liter, hectoliter, megaliter</td>
</tr>
<tr>
<td>Volume flow</td>
<td>cm³/s, cm³/min, cm³/h, cm³/d</td>
<td>Cubic centimeter/time unit</td>
</tr>
<tr>
<td></td>
<td>dm³/s, dm³/min, dm³/h, dm³/d</td>
<td>Cubic decimeter/time unit</td>
</tr>
<tr>
<td></td>
<td>m³/s, m³/min, m³/h, m³/d</td>
<td>Cubic meter/time unit</td>
</tr>
<tr>
<td></td>
<td>ml/s, ml/min, ml/h, ml/d</td>
<td>Milliliter/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></td>
<td>hl/s, hl/min, hl/h, hl/d</td>
<td>Hectoliter/time unit</td>
</tr>
<tr>
<td></td>
<td>Ml/s, Ml/min, Ml/h, Ml/d</td>
<td>Megaliter/time unit</td>
</tr>
<tr>
<td>Time</td>
<td>s, m, h, d, y</td>
<td>Second, minute, hour, day, year</td>
</tr>
</tbody>
</table>

5.2  US units

<table>
<thead>
<tr>
<th>Process variable</th>
<th>Units</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density</td>
<td>lb/ft³, lb/gal (us)</td>
<td>Pound/cubic foot, pound/gallon</td>
</tr>
<tr>
<td></td>
<td>lb/bbl (us;lq.), lb/bbl (us;beer), lb/bbl (us;oil), lb/bbl (us;tank)</td>
<td>Pound/volume unit</td>
</tr>
<tr>
<td>Process variable</td>
<td>Units</td>
<td>Explanation</td>
</tr>
<tr>
<td>------------------</td>
<td>-------</td>
<td>-------------</td>
</tr>
<tr>
<td>Pressure</td>
<td>psi a</td>
<td>Pounds per square inch (absolute)</td>
</tr>
<tr>
<td></td>
<td>psi g</td>
<td>Pounds per square inch (gauge)</td>
</tr>
<tr>
<td>Mass</td>
<td>oz, lb, STon</td>
<td>Ounce, pound, standard ton</td>
</tr>
<tr>
<td>Mass flow</td>
<td>oz/s, oz/min, oz/h, oz/d</td>
<td>Ounce/time unit</td>
</tr>
<tr>
<td></td>
<td>lb/s, lb/min, lb/h, lb/d</td>
<td>Pound/time unit</td>
</tr>
<tr>
<td></td>
<td>STon/s, STon/min, STon/h, STon/d</td>
<td>Standard ton/time unit</td>
</tr>
<tr>
<td>Ref. density</td>
<td>lb/Sft³</td>
<td>Weight unit/standard volume unit</td>
</tr>
<tr>
<td>Corrected volume</td>
<td>Sft³, Sgal (us), Sbbl (us;liq.)</td>
<td>Standard cubic foot, standard gallon, standard barrel</td>
</tr>
<tr>
<td>Correct. vol. flow</td>
<td>Sft³/s, Sft³/min, Sft³/h, Sft³/d</td>
<td>Standard cubic foot/time unit</td>
</tr>
<tr>
<td></td>
<td>Sgal/s (us), Sgal/min (us), Sgal/h (us), Sgal/d (us)</td>
<td>Standard gallon/time unit</td>
</tr>
<tr>
<td></td>
<td>Sbbl/s (us;liq.), Sbbl/min (us;liq.), Sbbl/h (us;liq.), Sbbl/d (us;liq.)</td>
<td>Barrel/time unit (normal liquids)</td>
</tr>
<tr>
<td>Temperature</td>
<td>°F, °R</td>
<td>Fahrenheit, Rankine</td>
</tr>
<tr>
<td>Volume</td>
<td>af</td>
<td>Acre foot</td>
</tr>
<tr>
<td></td>
<td>ft³</td>
<td>Cubic foot</td>
</tr>
<tr>
<td></td>
<td>fl oz (us), gal (us), kgal (us), Mgal (us)</td>
<td>Fluid ounce, gallon, kilogallon, million gallon</td>
</tr>
<tr>
<td></td>
<td>bbl (us;liq.), bbl (us;beer), bbl (us;oil), bbl (us;tank)</td>
<td>Barrel (normal liquids), barrel (beer), barrel (petrochemicals), barrel (filling tanks)</td>
</tr>
<tr>
<td>Volume flow</td>
<td>af/s, af/min, af/h, af/d</td>
<td>Acre foot/time unit</td>
</tr>
<tr>
<td></td>
<td>ft³/s, ft³/min, ft³/h, ft³/d</td>
<td>Cubic foot/time unit</td>
</tr>
<tr>
<td></td>
<td>fl oz (us), fl oz/min (us), fl oz/h (us), fl oz/d (us)</td>
<td>Fluid ounce/time unit</td>
</tr>
<tr>
<td></td>
<td>gal/s (us), gal/min (us), gal/h (us), gal/d (us)</td>
<td>Gallon/time unit</td>
</tr>
<tr>
<td></td>
<td>kgal/s (us), kgal/min (us), kgal/h (us), kgal/d (us)</td>
<td>Kilogallon/time unit</td>
</tr>
<tr>
<td></td>
<td>Mgal/s (us), Mgal/min (us), Mgal/h (us), Mgal/d (us)</td>
<td>Million gallon/time unit</td>
</tr>
<tr>
<td></td>
<td>bbl/s (us;liq.), bbl/min (us;liq.), bbl/h (us;liq.), bbl/d (us;liq.)</td>
<td>Barrel/time unit (normal liquids)</td>
</tr>
<tr>
<td></td>
<td>bbl/s (us;beer), bbl/min (us;beer), bbl/h (us;beer), bbl/d (us;beer)</td>
<td>Barrel/time unit (beer)</td>
</tr>
<tr>
<td></td>
<td>Beer: 31.0 gal/bbl</td>
<td></td>
</tr>
<tr>
<td></td>
<td>bbl/s (us;oil), bbl/min (us;oil), bbl/h (us;oil), bbl/d (us;oil)</td>
<td>Barrel/time unit (petrochemicals)</td>
</tr>
<tr>
<td></td>
<td>Petrochemicals: 42.0 gal/bbl</td>
<td></td>
</tr>
<tr>
<td></td>
<td>bbl/s (us;tank), bbl/min (us;tank), bbl/h (us;tank), bbl/d (us;tank)</td>
<td>Barrel/time unit (filling tank)</td>
</tr>
<tr>
<td></td>
<td>Filling tanks: 55.0 gal/bbl</td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>s, m, h, d, y</td>
<td>Second, minute, hour, day, year</td>
</tr>
<tr>
<td></td>
<td>am, pm</td>
<td>Ante meridiem (before midday), post meridiem (after midday)</td>
</tr>
</tbody>
</table>
## 5.3 Imperial units

<table>
<thead>
<tr>
<th>Process variable</th>
<th>Units</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density</td>
<td>lb/gal (imp), lb/bbl (imp;beer),</td>
<td>Pound/volume unit</td>
</tr>
<tr>
<td></td>
<td>lb/bbl (imp;oil)</td>
<td></td>
</tr>
<tr>
<td>Corrected volume</td>
<td>Sgal (imp)</td>
<td>Standard gallon</td>
</tr>
<tr>
<td>Correct.vol.flow</td>
<td>Sgal/s (imp), Sgal/min (imp),</td>
<td>Standard gallon/time unit</td>
</tr>
<tr>
<td></td>
<td>Sgal/h (imp), Sgal/d (imp)</td>
<td></td>
</tr>
<tr>
<td>Volume</td>
<td>gal (imp), Mgal (imp)</td>
<td>Gallon, mega gallon</td>
</tr>
<tr>
<td></td>
<td>bbl (imp;beer), bbl (imp;oil)</td>
<td>Barrel (beer), barrel (petrochemicals)</td>
</tr>
<tr>
<td>Volume flow</td>
<td>gal/s (imp), gal/min (imp), gal/h (imp),</td>
<td>Gallon/time unit</td>
</tr>
<tr>
<td></td>
<td>gal/d (imp)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mgal/s (imp), Mgal/min (imp),</td>
<td>Mega gallon/time unit</td>
</tr>
<tr>
<td></td>
<td>Mgal/h (imp), Mgal/d (imp)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>bbl/s (imp;beer), bbl/min (imp;beer), bbl/h (imp;beer), bbl/d (imp;beer)</td>
<td>Barrel/time unit (beer)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Beer: 36.0 gal/bbl</td>
</tr>
<tr>
<td></td>
<td>bbl/s (imp;oil), bbl/min (imp;oil), bbl/h (imp;oil), bbl/d (imp;oil)</td>
<td>Barrel/time unit (petrochemicals)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Petrochemicals: 34.97 gal/bbl</td>
</tr>
<tr>
<td>Time</td>
<td>s, m, h, d, y</td>
<td>Second, minute, hour, day, year</td>
</tr>
<tr>
<td></td>
<td>am, pm</td>
<td>Ante meridiem (before midday), post meridiem (after midday)</td>
</tr>
</tbody>
</table>
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