Description of Device Parameters **Proline t-mass T 150 HART**

Thermal Mass Flowmeter



GP01032D/06/EN/01.15

71302091 Valid as of version 01.00.zz (Device firmware)





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1 Document information

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.

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

This document lists the submenus and their parameters according to the structure of the **Expert** menu ($\rightarrow \textcircled{B}$ 8) menu that are available once the **"Operator" user role** or the **"Maintenance" user role** is enabled.



I Sample graphic

For information on the arrangement of the parameters according to the structure of the **Operation** menu, **Setup** menu, **Diagnostics** menu (→ 🖺 112), along with a brief description, see the Operating Instructions for the device.



🖻 2 Sample graphic

For information about the operating philosophy, see the "Operating philosophy" chapter in the device's Operating Instructions

1.3.2 Structure of a parameter description

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

| Complete parameter name | Write-protected parameter | = 🛱 |
|-------------------------|---|-------|
| Navigation | Navigation path to the parameter via the local display (direct access code) 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 the display and in the operating tool. | ar on |
| Prerequisite | The parameter is only available under these specific conditions | |
| Description | Description of the parameter function | |
| Selection | List of the individual options for the parameter • Option 1 • Option 2 | |
| User entry | Input range for the parameter | |
| User interface | Display value/data for the parameter | |
| Factory setting | Default setting ex works | |
| Additional information | Additional explanations (e.g. in examples): On individual options On display values/data On the input range On the factory setting | |

• On the parameter function

1.4 Symbols used

1.4.1 Symbols for certain types of information

| Symbol | Meaning |
|--------|--|
| i | Tip Indicates additional information. |
| ĺÌ | Reference to documentation |
| | Reference to page |
| | Reference to graphic |
| | Operation via local display |
| | Operation via operating tool |
| Â | Write-protected parameter |

1.4.2 Symbols in graphics

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

2 Overview of the Expert operating menu

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

| ₹ Expert | | |
|---------------------|--|--------|
| Direct access (010) | 6) | → 🗎 10 |
| Locking status (00 | 04) | → 🗎 11 |
| Access status displ | ay (0091) | → 🗎 11 |
| Enter access code (| (0092) | → 🗎 13 |
| ► System | | → 🗎 13 |
| | ► Display | → 🗎 13 |
| | ► Configuration backup display | → 🗎 26 |
| | ► Diagnostic handling | → 🗎 29 |
| | ► Administration | → 🗎 34 |
| ► Sensor | | → 🗎 39 |
| | ► Measured values | → 🗎 39 |
| | ► System units | → 🗎 45 |
| | Process parameters | → 🗎 54 |
| | ► Sensor adjustment | → 🗎 57 |
| | ► Calibration | → 🗎 71 |
| ► Input | | → 🗎 71 |
| | ► Status input | → 🗎 72 |
| ► Output | | → 🗎 73 |
| | ► Current output | → 🗎 73 |
| | ► Pulse/frequency/switch output | → 🗎 81 |

| ► Communication | → 🗎 98 |
|------------------------------------|---------|
| ► HART output | → 🗎 99 |
| ► Application | → 🗎 108 |
| ► Totalizer | → 🗎 108 |
| ► CIP/SIP | → 🗎 111 |
| ► Diagnostics | → 🗎 112 |
| Actual diagnostics (0691) | → 🗎 112 |
| Previous diagnostics (0690) | → 🗎 113 |
| Operating time from restart (0653) | → 🗎 114 |
| Operating time (0652) | → 🗎 114 |
| ► Diagnostic list | → 🗎 115 |
| ► Event loqbook | → 🗎 119 |
| ► Device information | → 🗎 121 |
| ► Data logging | → 🗎 125 |
| Min/max values | → 🖻 121 |
| | |
| ► Simulation | → 目 133 |

3 Description of device parameters

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

| ∓ Expert | | | |
|---------------------|-----------|----------|---------|
| Direct access (010 | 6) |] . | → 🖺 10 |
| Locking status (00 | 04) |] . | → 🖺 11 |
| Access status displ | ay (0091) |] | → 🗎 11 |
| Enter access code | 0092) |] . | → 🖺 13 |
| ► System | |] . | → 🗎 13 |
| ► Sensor | |] . | → 🖺 39 |
| ► Input | |] . | → 🗎 71 |
| ► Output | |] . | → 🗎 73 |
| ► Communication | 1 |] . | → 🗎 98 |
| ► Application | |] . | → 🖺 108 |
| ► Diagnostics | | -] . | → 🗎 112 |

Direct access Navigation Expert → Direct access (0106)

DescriptionInput of the access code to enable direct access to the desired parameter via the local
display. For this reason, each parameter is assigned a parameter number that appears in
the navigation view on the right in the header of the selected parameter.

User entry 0 to 65535

æ

| Additional information | User entry |
|------------------------|---|
| | The direct access code consists of a 4-digit number and the channel number, which identifies the channel of a process variable: e.g. 0914-1 |
| | |

- The leading zeros in the direct access code do not have to be entered. Example: Input of **"914"** instead of **"0914"**
 - If no channel number is entered, channel 1 is jumped to automatically.
 Example: Enter 0914 → Assign process variable parameter
 - If a different channel is jumped to: Enter the direct access code with the corresponding channel number.

Example: Enter **0914-3** → **Assign process variable** parameter

| Locking status | |
|------------------------|---|
| Navigation | Image: Barbon Status (0004) Image: Barbon Status (0004) |
| Description | Use this function to view the active write protection. |
| User interface | Hardware lockedTemporarily 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 selected. |
| | If additional write protection is active, this restricts the current access authorization even further. The write protection status can be viewed via the Locking status parameter ($\rightarrow \cong 11$). |
| | "Hardware locked" option (priority 1) |
| | The DIP switch for hardware locking is activated on the main electronics module. This locks write access to the parameters (e.g. via local display or operating tool). |
| | 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. |
| | "Temporarily locked" option (priority 2) |
| | Write access to the parameters is temporarily locked on account of internal processes running in the device (e.g. data upload/download, reset etc.). Once the internal processing has been completed, the parameters can be changed once again. |
| | |
| Access status display | |
| Navigation | Image: Barbon Statement → Access stat.disp (0091) |
| Prerequisite | A local display is provided. |

Use this function to view the access authorization to the parameters via the local display.

Description

| User interface | OperatorMaintenance |
|------------------------|---|
| Factory setting | Operator |
| Additional information | Description |
| | If the \mathbb{B} -symbol appears in front of a parameter, it cannot be modified via the local display with the current access authorization. |
| | The access authorization can be modified via the Enter access code parameter $(\rightarrow \cong 13)$. |
| | For information on the Enter access code parameter ($\rightarrow \square 13$), see the "Disabling write protection via access code" section of the Operating Instructions for the device |
| | If additional write protection is active, this restricts the current access authorization even further. The write protection status can be viewed via the Locking status parameter (→ 🗎 11). |
| | User interface |
| | 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 status tooling

| Navigation | Expert \rightarrow Access stat.tool (0005) |
|------------------------|---|
| Description | Use this function to view the access authorization to the parameters via the operating tool. |
| User interface | OperatorMaintenance |
| Factory setting | Maintenance |
| Additional information | Description |
| | The access authorization can be modified via the Enter access code parameter $(\rightarrow \cong 13)$. |
| | If additional write protection is active, this restricts the current access authorization even further. The write protection status can be viewed via the Locking status parameter (→ 🗎 11). |
| | Display |
| | Information on access authorization is provided in the "User roles and associated |

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

| Enter access code | |
|-------------------|---|
| Navigation | ■ Expert \rightarrow Ent. access code (0092) |
| Description | Use this function to enter the user-specific release code to remove parameter write protection on the local display. |
| User entry | 0 to 9 999 |
| Enter access code | |
| Navigation | Expert \rightarrow Ent. access code (0003) |
| Description | Use this function to enter the user-specific release code to remove parameter write protection in the operating tool. |
| User entry | 0 to 9 999 |

3.1 "System" submenu

Navigation

 $\blacksquare \Box \quad \text{Expert} \rightarrow \text{System}$

| ► System | |
|--------------------------------|--------|
| ► Display | → 🗎 13 |
| ► Configuration backup display | → 🗎 26 |
| ► Diagnostic handling | → 🗎 29 |
| ► Administration | → 🗎 34 |

3.1.1 "Display" submenu

Navigation $\blacksquare \boxminus$ Expert \rightarrow System \rightarrow Display

| ► Display | | | |
|-----------|---------------------|---|--------|
| Lar | aguage (0104) | | → 🖺 14 |
| For | mat display (0098) | I | → 🗎 15 |
| Val | ue 1 display (0107) | | → 🖺 17 |

| 0% bargraph value 1 (0123) | → 🖺 17 |
|------------------------------|--------|
| 100% bargraph value 1 (0125) | → 🖺 18 |
| Decimal places 1 (0095) | → 🗎 18 |
| Value 2 display (0108) | → 🗎 18 |
| Decimal places 2 (0117) | → 🖺 19 |
| Value 3 display (0110) | → 🗎 19 |
| 0% bargraph value 3 (0124) | → 🗎 20 |
| 100% bargraph value 3 (0126) | → 🖹 20 |
| Decimal places 3 (0118) | → 🖹 21 |
| Value 4 display (0109) | → 🖹 21 |
| Decimal places 4 (0119) | → 🖺 22 |
| Display interval (0096) | → 🗎 22 |
| Display damping (0094) | → 🖺 23 |
| Header (0097) | → 🖺 23 |
| Header text (0112) | → 🖺 24 |
| Separator (0101) | → 🖹 24 |
| Contrast display (0105) | → 🖺 25 |
| Backlight (0111) | → 🗎 25 |
| Access status display (0091) | → 🗎 25 |
| | |

Language

Navigation $\blacksquare \blacksquare$ Expert \rightarrow System \rightarrow Display \rightarrow Language (0104)

Prerequisite A local display is provided.

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

Selection

- English
- Deutsch * Français^{*}
- Español^{*} Italiano *
- Nederlands²
- Portuguesa
- Polski '
- русский язык (Russian) *
- Svenska
- Türkçe
- •中文 (Chinese)*
- 日本語 (Japanese)*
- 한국어 (Korean)
- ُ (Arabic) الْعَرَبِيّة •
- Bahasa Indonesia *
- ภาษาไทย (Thai)
- tiếng Việt (Vietnamese) *
- čeština (Czech)

Factory setting

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

| Format display | |
|------------------------|--|
| Navigation | Image: Barbon System → Display → Format display (0098) |
| Prerequisite | A local display is provided. |
| Description | Use this function to select how the measured value is shown on the local display. |
| Selection | 1 value, max. size 1 bargraph + 1 value 2 values 1 value large + 2 values 4 values |
| Factory setting | 1 value, max. size |
| Additional information | <i>Description</i> The display format (size, bar graph etc.) and number of measured values displayed simultaneously (1 to 4) can be configured. This setting only applies to normal operation. |
| | The Value 1 display parameter (→ ■ 17) to Value 4 display parameter (→ ■ 21) are used to specify which measured values are shown on the local display and in what order. If more measured values are specified than the display mode selected permits, then the values alternate on the device display. The display time until the next change is configured via the Display interval parameter (→ ■ 22). |

^{*} Visibility depends on order options or device settings

Possible measured values shown on the local display:

"1 value, max. size" option



"1 bargraph + 1 value" option

| XXXXXXXXX | |
|--------------------------|---------------|
| Ůᠿ 900.001 ਗ਼ 0 | /h 0 % |
| | A0016530 |

"2 values" option

| XXXXXXXXX | { | |
|-----------|---------------|--|
| U O | 900.00 l/h | |
| đđ | 60.00 % | |
| | | |

🛃 3

"1 value large + 2 values" option

| | XXXXXXXX | |
|---|---|------|
| 1 | ① 900.00 l/h | |
| | (1) 60.00% (1) 5.98kWh/Nm ³ | |
| | | ۵001 |

"4 values" option

| | **** | |
|----------------------|---|--|
| 0 0 μ() Σ() | 900.00 l/h 60.00 % 5.98 kWh/Nm ³ 213.94 l | |

A

Value 1 display

| Navigation | Image: Expert → System → Display → Value 1 display (0107) |
|------------------------|---|
| 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 | Volume flow Mass flow Temperature Totalizer 1 Current output |
| Factory setting | Volume flow |
| Additional information | Description If several measured values are displayed at once, the measured value selected here will be the first value to be displayed. The value is only displayed during normal operation. Image: 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 |
| | $(\rightarrow \cong 45).$ |

| 0% bargraph value 1 | | |
|------------------------|---|------------|
| Navigation | ■ Expert → System → Display → 0% bargraph 1 (0123) | |
| Prerequisite | A local display is provided. | |
| Description | Use this function to enter the 0% bar graph value to be shown on the display for the measured value 1. | |
| User entry | Signed floating-point number | |
| Factory setting | Country-specific: • 0 l/h • 0 gal/min (us) | |
| Additional information | Description The Format display parameter (→ 15) is used to specify that the measured valies to be displayed as a bar graph. User entry The unit of the displayed measured value is taken from the System units submer | alue nu |

A

100% bargraph value 1

| Navigation | Image: Barbon System → Display → 100% bargraph 1 (0125) |
|------------------------|---|
| Prerequisite | A local display is provided. |
| Description | Use this function to enter the 100% bar graph value to be shown on the display for the measured value 1. |
| User entry | Signed floating-point number |
| Factory setting | Depends on country and nominal diameter $ ightarrow 	extsf{B}$ 140 |
| Additional information | Description |
| | The Format display parameter ($\rightarrow \cong 15$) 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 $(\rightarrow \cong 45)$. |

| Decimal places 1 | | A |
|------------------------|--|----------|
| Navigation | ■ Expert → System → Display → Decimal places 1 (0095) | |
| Prerequisite | A measured value is specified in the Value 1 display parameter ($\Rightarrow \implies$ 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 In this setting does not affect the measuring or computational accuracy of the deviation of 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. | ice. |

| Value 2 display | | |
|-----------------|---|--|
| Navigation | Image: Barbon System → Display → Value 2 display (0108) | |
| 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 ($\rightarrow \cong 17$) |
| Factory setting | None |
| Additional information | Description |
| | If several measured values are displayed at once, the measured value selected here will be the second value to be displayed. The value is only displayed during normal operation. |
| | The Format display parameter ($\rightarrow \cong 15$) 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 $(\rightarrow \cong 45)$. |

| Decimal places 2 | | ß |
|------------------------|--|-----|
| Navigation | Image: Barbon System → Display → Decimal places 2 (0117) | |
| Prerequisite | A measured value is specified in the Value 2 display parameter ($\rightarrow \square$ 18). | |
| 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 devi 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. | ce. |

| Navigation | Image: Expert → System → Display → Value 3 display (0110) |
|-----------------|--|
| 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 | Picklist, see Value 1 display parameter ($\rightarrow \square$ 17) |
| Factory setting | None |

Value 3 display

A

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 ($\rightarrow \cong 15$) 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 (→ 🗎 45).

| 0% bargraph value 3 | | Ê |
|------------------------|---|------------|
| Navigation | Image: Barbon System → Display → 0% bargraph 3 (0124) | |
| Prerequisite | A selection has been made in the Value 3 display parameter ($\rightarrow \ igoplus 19$). | |
| 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 l/h • 0 gal/min (us) | |
| Additional information | Description The Format display parameter (→ 15) is used to specify that the measured valies to be displayed as a bar graph. User entry The unit of the displayed measured value is taken from the System units submered value is taken from taken from the System units submered value is taken from take | alue nu |

| a |
|---------------------|
| |
| |
| the display for the |
| |
| |
| |

Description



The **Format display** parameter ($\rightarrow \cong 15$) 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 (→ 🖺 45).

| Decimal places 3 | | Ê |
|------------------------|--|-----|
| Navigation | Image: Barbon System → Display → Decimal places 3 (0118) | |
| Prerequisite | A measured value is specified in the Value 3 display parameter ($\rightarrow \square$ 19). | |
| Description | Use this function to select the number of decimal places for measured value 3. | |
| Selection | X X.X X.XX X.XXX X.XXXX | |
| Factory setting | X.XX | |
| Additional information | Description This setting does not affect the measuring or computational accuracy of the devi 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. | ce. |

| Value 4 display | | |
|-----------------|---|---|
| Navigation | Image: Barbon System → Display → Value 4 display (0109) | |
| 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 | Picklist, see Value 1 display parameter (→ 🗎 17) | |
| Factory setting | None | |

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 ($\rightarrow \square 15$) 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 (→ 🗎 45).

| Decimal places 4 | | â |
|------------------------|--|------|
| Navigation | Image: Barbon System → Display → Decimal places 4 (0119) | |
| Prerequisite | A measured value is specified in the Value 4 display parameter ($\rightarrow \cong 21$). | |
| Description | Use this function to select the number of decimal places for measured value 4. | |
| Selection | X X.X X.XX X.XXX X.XXXX | |
| Factory setting | X.XX | |
| Additional information | Description This setting does not affect the measuring or computational accuracy of the devi 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. | .ce. |

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

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 ($\rightarrow \cong 17$) to Value 4 display parameter ($\rightarrow \boxtimes 21$)

- are used to specify which measured values are shown on the local display.

| Display damping | | |
|------------------------|---|---|
| Navigation | Image: Barbon System → Display → Display damping (0094) | |
| Prerequisite | A local display is provided. | |
| Description | Use this function to enter 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 | |
| | A time constant is entered: 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. | J |

| Header | | Ê |
|------------------------|--|---|
| Navigation | □ Expert → System → Display → Header (0097) | |
| Prerequisite | A local display is provided. | |
| Description | Use this function to select the contents of the header of the local display. | |
| Selection | Device tagFree text | |
| Factory setting | Device tag | |
| Additional information | Description | |
| | The header text only appears during normal operation. | |



1 Position of the header text on the display

Selection

- Device tag
- Is defined in the **Device tag** parameter ($\rightarrow \square 122$).
- Free text
- Is defined in the **Header text** parameter ($\rightarrow \cong 24$).

| Header text | | ß |
|------------------------|---|---|
| Navigation | Image: Boost and Boos | |
| Prerequisite | The Free text option is selected in the Header parameter ($\rightarrow \cong 23$). | |
| 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 | <i>Description</i> The header text only appears during normal operation. | |



1 Position of the header text on the display

User entry

The number of characters displayed depends on the characters used.

| Separator | | Â |
|--------------|---|---|
| Navigation | Image: Boost and Boos | |
| Prereguisite | A local display is provided. | |

Selection

| Description | Use this function to select the decimal separator. |
|-------------|--|
| | |

| ■. | (point) |
|----|---------|
| ■, | (comma) |
| | |

Factory setting . (point)

| Contrast display | |
|------------------------|--|
| | |
| Navigation | □ Expert → System → Display → Contrast display (0105) |
| Prerequisite | A local display is provided. |
| Description | Use this function to enter a value to adapt the display contrast to the ambient conditions (e.g. the lighting or viewing angle). |
| User entry | 20 to 50 % |
| Factory setting | Depends on the display |
| Additional information | Set the contrast via the push-buttons: |
| | Brighter: Press and hold down the □ E keys simultaneously. Darker: Press and hold down the ± E keys simultaneously. |

| Backlight | |
|-----------------|---|
| Navigation | Image: Backlight (0111) Image: Backlight (0111) |
| Prerequisite | Order code for "Display; operation", option E "SD03 4-line, illum.; touch control + data backup function" |
| Description | Use this function to switch the backlight of the local display on and off. |
| Selection | DisabledEnabled |
| Factory setting | Disabled |

Access status display

| Navigation | Image: Barbon System → Display → Access stat.disp (0091) |
|--------------|--|
| Prerequisite | A local display is provided. |
| Description | Displays the access authorization to the parameters via the local display. |

| User interface | OperatorMaintenance |
|------------------------|--|
| 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. |
| | The access authorization can be modified via the Enter access code parameter $(\rightarrow \cong 13)$. |
| | For information on the Enter access code parameter ($\rightarrow \square 13$), see the "Disabling write protection via access code" section of the Operating Instructions for the device |
| | If additional write protection is active, this restricts the current access authorization even further. The write protection status can be viewed via the Locking status parameter ($\rightarrow \implies 11$). |
| | Display |
| | 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 "Configuration backup display" submenu



Operating time

| Navigation | Image: Expert → System → Conf.backup disp → Operating time (0652) |
|------------------------|---|
| Description | Use this function to display the length of time the device has been in operation. |
| User interface | Days (d), hours (h), minutes (m) and seconds (s) |
| Additional information | <i>User interface</i> The maximum number of days is 9999, which is equivalent to 27 years. |

| Last backup | |
|----------------|---|
| Navigation | ■ Expert → System → Conf.backup disp → Last backup (0102) |
| Prerequisite | A local display is provided. |
| Description | Use this function to display the time since a backup copy of the data was last saved to the display module. |
| User interface | Days (d), hours (h), minutes (m) and seconds (s) |

| Configuration manageme | ent | |
|------------------------|---|-------------------------------|
| Navigation | Image: Boost and Boos | |
| Prerequisite | A local display is provided. | |
| Description | Use this function to select an action to save the data to the display module. | |
| Selection | Cancel Execute backup Restore Duplicate Compare Clear backup data | |
| Factory setting | Cancel | |
| Additional information | Description Configuration via the local display is disabled while the action is performed. For information on the status message in the operating tool, see: Backup state parameter (→ ≅ 28) | |
| | Selection Cancel No action is executed and the user exits the parameter. Execute backup A backup copy of the current device configuration in the HistoROM is saved to the display module of the device. The backup copy includes the transmitter data of th device. The following message appears on local display: Backup active, please wait! Restore The last backup copy of the device configuration is copied from the display modul the HistoROM of the device. The backup copy comprises the transmitter data of th device. The following message appears on local display: Restore active! Do not interrupt p supply! | e e e to ne oower |

- Duplicate
 - The transmitter configuration from another device is duplicated to the device using the display module.
 - The following message appears on local display: Copy active! Do not interrupt power supply!
- Compare
 - The device configuration saved in the display module is compared to the current device configuration of the HistoROM.
 - The following message appears on local display: Comparing files
 - The result can be viewed in **Comparison result** parameter ($\rightarrow \square 28$).
- Clear backup data
 - The backup copy of the device configuration is deleted from the display module of the device.
 - The following message appears on local display: Deleting file

HistoROM

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

| Backup state | |
|-----------------|---|
| Navigation | ■ Expert → System → Conf.backup disp → Backup state (0121) |
| Prerequisite | A local display is provided. |
| Description | Use this function to view the status of the data backup process. |
| User interface | None Store in progress Restore in progress Import in progress Delete in progress Compare in progress |
| Factory setting | None |
| | |

| Navigation | ■ Expert → System → Conf.backup disp → Compar. result (0103) |
|----------------|--|
| Prerequisite | A local display is provided. |
| Description | Use this function to view the last result of comparing the current device configuration to the backup copy in the display module. |
| User interface | Settings identical Settings not identical No backup available Backup settings corrupt Check not done Dataset incompatible |

Factory setting

Check not done

Additional information

Description

The comparison is started via the **Compare** option in the **Configuration management** parameter ($\rightarrow \triangleq 27$).

Selection

- Settings identical
 - The current device configuration of the HistoROM is identical to the backup copy in the display module.
 - If the transmitter configuration of another device has been copied to the device via the display module and the **Duplicate** option in the **Configuration management** parameter (→ 🗎 27), the current device configuration of the HistoROM only partly matches the backup copy in the display module: The settings for the transmitter are not identical.
- Settings not identical
 - The current device configuration of the HistoROM is not identical to the backup copy in the display module.
- No backup available

There is no backup copy of the device configuration of the HistoROM in the display module.

Backup settings corrupt

The current device configuration of the HistoROM is corrupt or not compatible with the backup copy in the display module.

- Check not done The device configuration of the HistoROM has not yet been compared to the backup copy in the display module.
- Dataset incompatible
- The backup copy in the display module is not compatible with the device.

HistoROM

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

3.1.3 "Diagnostic handling" submenu

Navigation $\square \square$ Expert \rightarrow System \rightarrow Diagn. handling

| ► Diagnostic handling | |
|-----------------------|--------|
| Alarm delay (0651) | → 🗎 30 |
| ► Diagnostic behavior | → 🗎 30 |

| Alarm delay | | A |
|------------------------|---|---|
| Navigation | Image: Barbon System → Diagn. handling → Alarm delay (0651) | |
| Description | Use this function to enter the time interval until the device generates a diagnostic message. | |
| | The diagnostic message is reset without a time delay. | |
| User entry | 0 to 60 s | |
| Factory setting | 0 s | |
| Additional information | | |

"Diagnostic behavior" submenu

Each item of diagnostic information is assigned a specific diagnostic behavior at the factory. The user can change this assignment for specific diagnostic information in the **Diagnostic behavior** submenu ($\Rightarrow \square 30$).

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

| Options | Description |
|--------------------|--|
| Alarm | The device stops measurement. The signal outputs and totalizers assume the defined alarm condition. A diagnostic message is generated. |
| Warning | The device continues to measure. The signal outputs and totalizers are not affected. A diagnostic message is generated. |
| Logbook entry only | The device continues to measure. The diagnostic message is displayed only in the Event logbook submenu ($\rightarrow \textcircled{B}$ 119) (Event list submenu ($\rightarrow \textcircled{B}$ 120)) and is not displayed in alternation with the operational display. |
| Off | The diagnostic event is ignored, and no diagnostic message is generated or entered. |

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

Navigation

□ Expert → System → Diagn. handling → Diagn. behavior

| ► Diagnostic behavior | |
|---|--------------|
| Assign behavior of diagnostic no. 441 (0657) | → 🗎 31 |
| Assign behavior of diagnostic no. 442 (0658) | → 🗎 31 |
| Assign behavior of diagnostic no. 443 (0659) | → <a> 32 |

| Assign behavior of diagnostic no. 832 (0675) | → 🗎 32 |
|---|--------|
| Assign behavior of diagnostic no. 833 (0676) | → 🗎 32 |
| Assign behavior of diagnostic no. 834 (0677) | → 🗎 33 |
| Assign behavior of diagnostic no. 835 (0678) | → 🗎 33 |
| Assign behavior of diagnostic no. 862 (0679) | → 🗎 34 |

| Assign behavior of diagnostic no. 441 (Current output 1) | | |
|--|---|--|
| Navigation | Image: Barbon System → Diagn. handling → Diagn. behavior → Diagnostic no. 441 (0657) | |
| Description | Option for changing the diagnostic behavior of the diagnostic message 441 Current output 1 . | |
| Selection | Off Alarm Warning Logbook entry only | |
| Factory setting | Warning | |
| Additional information | For a detailed description of the options available, see $\rightarrow \square$ 30 | |

| Assign behavior of diagnostic no. 442 (Frequency output) | | A |
|--|---|----------------|
| Navigation | Image: Barbon System → Diagn. handling → Diagn. behavior → Diagnostic | no. 442 (0658) |
| Prerequisite | The measuring device has a pulse/frequency/switch output. | |
| Description | Option for changing the diagnostic behavior of the diagnostic message 442 output . | Frequency |
| Selection | Off Alarm Warning Logbook entry only | |
| Factory setting | Warning | |

For a detailed description of the options available, see $\rightarrow \cong 30$

| Assign behavior of diagnostic no. 443 (Pulse output) | |
|--|--|
| Navigation | Image: Barbon System → Diagn. handling → Diagn. behavior → Diagnostic no. 443 (0659) |
| Prerequisite | The measuring device has a pulse/frequency/switch output. |
| Description | Option for changing the diagnostic behavior of the diagnostic message 443 Pulse output. |
| Selection | Off Alarm Warning Logbook entry only |
| Factory setting | Warning |
| Additional information | For a detailed description of the options available, see $\rightarrow \cong 30$ |

| Assign behavior of diagnostic no. 832 (Electronic temperature too high) | | £ |
|---|--|----|
| Navigation | Image: Barbon System → Diagn. handling → Diagn. behavior → Diagnostic no. 832 (067) | 5) |
| Description | Option for changing the diagnostic behavior of the diagnostic message 832 Electronic temperature too high . | |
| Selection | Off Alarm Warning Logbook entry only | |
| Factory setting | Warning | |
| Additional information | For a detailed description of the options available, see $\rightarrow \square 30$ | |

| Assign behavior of diagnos | tic no. | 833 (Electronic temperature too low) | Â |
|----------------------------|---------|--|------------|
| | | | |
| Navigation | 8 2 | Expert \rightarrow System \rightarrow Diagn. handling \rightarrow Diagn. behavior \rightarrow Diagnostic no. 8 | 333 (0676) |

DescriptionOption for changing the diagnostic behavior of the diagnostic message 833 Electronic
temperature too low.

| Selection | Off Alarm Warning Logbook entry only |
|------------------------|---|
| Factory setting | Warning |
| Additional information | For a detailed description of the options available, see $\rightarrow \equiv 30$ |

| Assign behavior of diagnostic no. 834 (Process temperature too high) | | £ |
|--|--|-----------|
| Navigation | Image: Barbon System → Diagn. handling → Diagn. behavior → Diagnostic no. 834 | '± (0677) |
| Description | Option for changing the diagnostic behavior of the diagnostic message 834 Proces temperature too high . | S |
| Selection | Off Alarm Warning Logbook entry only | |
| Factory setting | Warning | |
| Additional information | For a detailed description of the options available, see $\rightarrow \cong 30$ | |

| Assign behavior of diagnostic no. 835 (Process temperature too low) | |
|---|--|
| Navigation | Image: Barbon System → Diagn. handling → Diagn. behavior → Diagnostic no. 835 (0678) |
| Description | Option for changing the diagnostic behavior of the diagnostic message 835 Process temperature too low . |
| Selection | Off Alarm Warning Logbook entry only |
| Factory setting | Warning |
| Additional information | For a detailed description of the options available, see $\rightarrow \cong 30$ |

| Assign behavior of diagnostic no. 862 (Empty pipe) | |
|--|--|
| Navigation | Image: Barbon Amplitude Amplitud |
| Description | Use this function to change the diagnostic behavior of the diagnostic message 862 Empty pipe . |
| Selection | Off Alarm Warning Logbook entry only |
| Factory setting | Off |
| Additional information | For a detailed description of the options available, see $\rightarrow \cong 30$ |

3.1.4 "Administration" submenu

```
Navigation
```

 $\textcircled{B} \boxminus \quad \text{Expert} \rightarrow \text{System} \rightarrow \text{Administration}$

| ► Administration | |
|---------------------------------|----------|
| ► Define access code |] → 🗎 34 |
| Device reset (0000) |] → 🗎 36 |
| Activate SW option (0029) |) → 🗎 37 |
| Software option overview (0015) |) → 🗎 38 |
| Reset write protection (0019) |) → 🗎 38 |

"Define access code" wizard

The **Define access code** wizard ($\rightarrow \cong 34$) is only available when operating via the local display.

If operating via the operating tool, the **Define access code** parameter ($\rightarrow \implies$ 36) can be found directly in the **Administration** submenu. There is no **Confirm access code** parameter if the device is operated via the operating tool.

Navigation $\begin{array}{ccc} \mbox{Expert} ightarrow \mbox{System} ightarrow \mbox{Administration} ightarrow \mbox{Def.} access code \end{array}$

| ► Define access code | |
|----------------------|--------|
| Define access code | → 🗎 35 |
| Confirm access code | → 🗎 35 |

| Define access code | |
|------------------------|--|
| Navigation | ■ Expert → System → Administration → Def. access code → Def. access code |
| Description | Use this function to enter a user-specific release code to restrict write-access to the parameters. This protects the configuration of the device against any inadvertent changes via the local display. |
| User entry | 0 to 9999 |
| Factory setting | 0 |
| Additional information | Description |
| | The write protection affects all parameters in the document marked with the 🗟 symbol. |
| | On the local display, the 🖻 symbol in front of a parameter indicates that the parameter is write-protected. |
| | Once the access code has been defined, write-protected parameters can only be modified if the access code is entered in the Enter access code parameter ($\rightarrow \cong 13$). |
| | 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. |
| | |
| | |

| Navigation | | Expert \rightarrow System \rightarrow Administration \rightarrow Def. access code \rightarrow Confirm code |
|-------------|--------|--|
| Description | Enter | the defined release code a second time to confirm the release code. |
| User entry | 0 to 9 | 999 |

Confirm access code

Â

Factory setting

0

Additional parameters in the "Administration" submenu

| Define access code | |
|------------------------|---|
| Navigation | Expert \rightarrow System \rightarrow Administration \rightarrow Def. access code |
| Description | Use this function to enter a user-specific release code to restrict write-access to the parameters. This protects the configuration of the device against any inadvertent changes via the operating tool. |
| User entry | 0 to 9 999 |
| Factory setting | 0 |
| Additional information | Description |
| | The write protection affects all parameters in the document marked with the 🕅 symbol. |
| | Once the access code has been defined, write-protected parameters can only be modified if the access code is entered in the Enter access code parameter ($\rightarrow \cong 13$) |
| | 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 |

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

| Device reset | Â |
|-----------------|--|
| Navigation | Image: Barbon System → Administration → Device reset (0000) |
| Description | Use this function to choose whether to reset the device configuration - either entirely or in part - to a defined state. |
| Selection | Cancel To factory defaults To delivery settings Restart device |
| Factory setting | Cancel |
Additional information "Cancel" option

No action is executed and the user exits the parameter.

"To factory defaults" option

Every parameter is reset to its factory setting.

"To delivery settings" option

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" option

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 option | ٦ |
|------------------------|---|
| Navigation | Image: Barbon System → Administration → Activate SW opt. (0029) |
| Description | Use this function to enter an activation code to enable an additional, ordered software option. |
| User entry | Max. 10-digit string consisting of numbers. |
| Factory setting | Depends on the software option ordered |
| Additional information | Description |
| | If a measuring device was ordered with an additional software option, the activation code is programmed in the device at the factory. |
| | User entry |
| | To activate a software option subsequently, please contact your Endress+Hauser sales organization. |
| | NOTE! |
| | The activation code is linked to the serial number of the measuring device and varies according to the device and software option. |
| | If an incorrect or invalid code is entered, this results in the loss of software options that have already been activated. |
| | ▶ Before you enter a new activation code, make a note of the current activation code . |
| | Enter the new activation code provided by Endress+Hauser when the new software option was ordered. |
| | ▶ Once the activation code has been entered, check if the new software option is displayed in the Software option overview parameter ($\rightarrow \square 38$). |
| | 🛏 The new software option is active if it is displayed. |
| | └╾ If the new software option is not displayed or all software options have been deleted, the code entered was either incorrect or invalid. |
| | \blacktriangleright If the code entered is incorrect or invalid, enter the old activation code . |

► Have your Endress+Hauser sales organization check the new activation code remembering to specify the serial number or ask for the code again.

Example for a software option

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

The software options currently enabled are displayed in the **Software option overview** parameter ($\rightarrow \cong 38$).

Software option overview

| Navigation | Image: Expert → System → Administration → SW option overv. (0015) |
|------------------------|---|
| Description | Displays all the software options that are enabled in the device. |
| User interface | Extended HistoROM 4-20 mA HART output Pulse/frequency/switch output Status input |
| Additional information | Description |
| | Displays all the options that are available if ordered by the customer. |
| | "Extended HistoROM" option |
| | Order code for "Application package", option EA "Extended HistoROM" |
| | "4-20 mA HART output" option |
| | Order code for "Output; input" |
| | Option A "4-20mA HARI" Option B "4-20mA HART, pul./freg./switch.output" |
| | Option Q "4-20mA HART, pul./freq./switch; status input" |
| | "Pulse/frequency/switch output" option |
| | Order code for "Output; input" |
| | Option B "4-20mA HART, pul./treq./switch output" Option K "Pulse/freq./switch output" |
| | Option Q "4-20mA HART, pul./freq./switch; status input" |
| | "Status input" option |
| | Order code for "Output; input", option Q "4-20mA HART, pul./freq./switch; status input" |

| Reset write protection | | |
|------------------------|---|-------|
| Navigation | Image: Barbon System → Administration → Res. write prot. (0019) | |
| Description | The functionality of this parameter is not available for the t-mass 150 measuring dev | vice. |

3.2 "Sensor" submenu

| Navigation | $\textcircled{B} \sqsubseteq \text{Expert} \rightarrow \text{Sensor}$ | |
|------------|---|--------|
| ► Sensor | | |
| | ► Measured values | → 🗎 39 |
| | ► System units | → 🗎 45 |
| | ► Process parameters | → 🗎 54 |
| | ► Sensor adjustment | → 🗎 57 |
| | ► Calibration | → 🗎 71 |

3.2.1 "Measured values" submenu

Navigation \square Expert \rightarrow Sensor \rightarrow Measured val.

| ► Measured values | |
|---------------------|--------|
| ► Process variables | → 🗎 39 |
| ► Totalizer | → 🗎 41 |
| ► Input values | → 🗎 42 |
| ► Output values | → 🗎 43 |

"Process variables" submenu

| Navigation | $\textcircled{B} \boxminus \text{Expert} \rightarrow \text{Sensor} \rightarrow \text{Measure}$ | red val. → Process variab. |
|-----------------|--|----------------------------|
| ► Process varia | bles | |
| | Volume flow (1850) | → 🖺 40 |
| | Mass flow (1838) | → 🗎 40 |
| | Temperature (1853) | → 🗎 40 |

| Volume flow | |
|------------------------|---|
| Navigation | ■ Expert \rightarrow Sensor \rightarrow Measured val. \rightarrow Process variab. \rightarrow Volume flow (1850) |
| Prerequisite | The following conditions are met: The Enabled option is selected in the Operating mode parameter (→ |
| Description | Displays the volume flow that is currently measured. |
| User interface | Signed floating-point number |
| Additional information | Dependency |
| | The unit is taken from the Volume flow unit parameter ($\rightarrow \equiv 45$) |

| Mass flow | |
|------------------------|---|
| Navigation | Image: Barbon And Antiperiod |
| Prerequisite | The following conditions are met: The Enabled option is selected in the Operating mode parameter (→ ≦ 59). The Mass flow option is selected in the Flow reference in use parameter (→ ≦ 60). |
| Description | Displays the mass flow that is currently measured. |
| User interface | Signed floating-point number |
| Additional information | Dependency |
| | The unit is taken from the Mass flow unit parameter ($\rightarrow \square 48$) |

| Temperature | |
|------------------------|---|
| Navigation | ■ Expert → Sensor → Measured val. → Process variab. → Temperature (1853) |
| Description | Displays the temperature currently measured. |
| User interface | Signed floating-point number |
| Additional information | Dependency 1 The unit is taken from the Temperature unit parameter ($\rightarrow \cong 49$) |

"Totalizer" submenu

Navigation

| ► Totalizer | | |
|-------------|---------------------------|--------|
| | Totalizer value (0911) | → 🖺 41 |
| | Totalizer overflow (0910) | → 🖺 42 |

| Totalizer value | | A |
|------------------------|---|------------------|
| Navigation | Image: Barbon And Antiperiod | |
| Prerequisite | One of the following options is selected in the Assign process variable parameter (→ 108) of the Totalizer submenu: Volume flow Mass flow | |
| Description | Displays the current totalizer reading. | |
| User interface | Signed floating-point number | |
| Additional information | Description | |
| | As it is only possible to display a maximum of 7 digits in the operating tool, the current counter value is the sum of the totalizer value and the overflow value from the Totalizer Overflow parameter ($\rightarrow \square 42$) if the display range is exceeded. | ıt zer |
| | In the event of an error, the totalizer adopts the mode defined in the Failure mode parameter ($\rightarrow \square 111$). | de |
| | User interface | |
| | The unit of the selected process variable is specified for the totalizer in the Unit totalizer parameter ($\rightarrow \cong 109$). | |

Example

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

- Value in the **Totalizer value 1** parameter: 1968457 m³
- Value in the **Totalizer overflow 1** parameter: $1 \cdot 10^7$ (1 overflow) = 10000000 [m³]
- Current totalizer reading: 11968457 m³

Totalizer overflow A Navigation 82 Expert \rightarrow Sensor \rightarrow Measured val. \rightarrow Totalizer \rightarrow Tot. overflow (0910) Prerequisite One of the following options is selected in the Assign process variable parameter $(\rightarrow \square 108)$ of the **Totalizer** submenu: Volume flow Mass flow Description Displays the current totalizer overflow. User interface Integer with sign Additional information Description If the current totalizer reading has more than 7 digits, which is the maximum value range of the operating tool that can be displayed, the value above this range is output as an overflow. The current totalizer value is therefore the sum of the overflow value and the totalizer value from the **Totalizer value** parameter ($\rightarrow \triangleq 41$) Display The unit of the selected process variable is specified for the totalizer in the **Unit** H totalizer parameter ($\rightarrow \square 109$). Example Calculation of the current totalizer reading when the value exceeds the 7-digit display range of the operating tool: • Value in the Totalizer value 1 parameter: 1968457 m³ • Value in the **Totalizer overflow 1** parameter: $2 \cdot 10^7$ (2 overflows) = 20000000 [m³] Current totalizer reading: 21968457 m³ "Input values" submenu Navigation \blacksquare \blacksquare Expert → Sensor → Measured val. → Input values ► Input values Value status input (1353) → 🗎 42

Value status input

| Navigation | ■ Expert → Sensor → Measured val. → Input values → Val. status inp. (1353) |
|--------------|---|
| Prerequisite | For the following order code: "Output; input", option Q "4-20mA HART, pul./freq./switch; status input" |
| Description | Displays the current input signal level. |

User interface

HighLow

"Output values" submenu

Navigation $\blacksquare \blacksquare$ Expert \rightarrow Sensor \rightarrow Measured val. \rightarrow Output values

| ► Output values | |
|-------------------------|--------|
| Output current (0361) | → 🗎 43 |
| Pulse output (0456) | → 🗎 43 |
| Output frequency (0471) | → 🗎 44 |
| Switch status (0461) | → 🗎 44 |

| Output current | | |
|---|--|--|
| Navigation | Image: Barbon Amplitude Sector Amplitude | |
| Description | Displays the actual calculated value of the output current. | |
| User interface 3.59 to 22.5 mA | | |
| Pulse output | | |
| Navigation | Image: Barbon Sensor → Measured val. → Output values → Pulse output (0456) | |
| Prerequisite | In the Operating mode parameter ($\rightarrow \cong$ 83), 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 (→ 🗎 85) and Pulse width parameter (→ 🗎 85) can be used to define the value (i.e. the measured value amount that corresponds to a | |



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

The output behavior can be reversed via the **Invert output signal** parameter ($\Rightarrow \textcircled{B} 98$) 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 ($\rightarrow \cong 86$)) can be configured.

| Output frequency | | | |
|------------------|---|--|--|
| Navigation | ■ Expert → Sensor → Measured val. → Output values → Output freq. (0471) | | |
| Prerequisite | In the Operating mode parameter ($\rightarrow \implies$ 83), the Frequency option is selected. | | |
| Description | Displays the actual value of the output frequency which is currently measured. | | |
| User interface | 0.0 to 1250.0 Hz | | |
| Switch status | | | |
| Navigation | ■ Expert → Sensor → Measured val. → Output values → Switch status (0461) | | |
| Prerequisite | In the Operating mode parameter ($\rightarrow \implies$ 83), the Switch option is selected. | | |
| Description | Displays the current switch status of the status output. | | |
| User interface | OpenClosed | | |

Additional information

Selection

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

3.2.2 "System units" submenu

Navigation

 $\blacksquare \Box \quad \text{Expert} \rightarrow \text{Sensor} \rightarrow \text{System units}$

| ► System units | |
|-------------------------|----------|
| Volume flow unit (0553) |) → 🗎 45 |
| Volume unit (0563) |] → 🗎 47 |
| Mass flow unit (0554) |] → 🖺 48 |
| Mass unit (0574) |) → 🗎 48 |
| Density unit (0555) |) → 🗎 49 |
| Temperature unit (0557) |) → 🖺 49 |
| Length unit (0551) |) → 🖺 50 |
| ► User-specific units |] → 🗎 51 |

| Volume flow unit | |
|------------------|--|
| | |

Navigation

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

Description

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

Imperial units

gal/s (imp)

gal/h (imp)

gal/d (imp)

Mgal/s (imp)

Mgal/h (imp)

Mgal/d (imp)

bbl/s (imp;oil)

bbl/h (imp;oil)

bbl/d (imp;oil)

• bbl/min (imp;oil)

Mgal/min (imp)

gal/min (imp)

Selection

SI units ■ 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
- cm³/s
- cm³/min
- cm³/h
- cm³/d
- ml/s
- ml/min
- ∎ ml/h
- ml/d
- Ml/s
- Ml/min
- Ml/h
- Ml/d

- US units
- ft³/s
- ft³/min
- ft³/h
- ft³/d
- qal/s (us)
- gal/min (us)
- gal/h (us)
- gal/d (us)
- fl oz/s (us)
- fl oz/min (us)
- fl oz/h (us)
- fl oz/d (us)
- af/s
- af/min
- ∎ af/h
- af/d
- kgal/s (us)
- kgal/min (us)
- kqal/h (us)
- kqal/d (us)
- Mgal/s (us)
- Mgal/min (us)
- Mgal/IIIII (us
- Mgal/h (us)
- Mgal/d (us)
- bbl/s (us;liq.)
- bbl/min (us;liq.)
- bbl/h (us;liq.)
- bbl/d (us;liq.)
- bbl/s (us;beer)
- bbl/min (us;beer)
- bbl/h (us;beer)
- bbl/d (us;beer)
- bbl/s (us;tank)
- bbl/min (us;tank)
- bbl/h (us;tank)
- bbl/d (us:tank)
- bbl/s (us:oil)
- bbl/min (us;oil)
- bbl/h (us;oil)
- bbl/d (us;oil)

Custom-specific units

- User vol./s
- User vol./min
- User vol./h
- User vol./d

Factory setting

- Country-specific: l/h
- gal/min (us)

- .

Additional information

The selected unit applies for:

- Volume flow parameter
- Volume flow parameter ($\rightarrow \triangleq 40$)

Selection

Result

For an explanation of the abbreviated units: $\rightarrow \cong 143$

Customer-specific units

The unit for the customer-specific volume is specified in the **User volume text** parameter ($\rightarrow \square 51$).

| Volume unit | | | |
|------------------------|---|--|--|
| Navigation | Image: Barbon And Sector And | | |
| Description | Use this function to select the unit for the volume. | | |
| Selection | SI units • dm ³ • m ³ • l • hl • cm ³ • ml • Ml Mega | US units ft ³ gal (us) fl oz (us) af kgal (us) Mgal (us) bbl (us;liq.) bbl (us;teer) bbl (us;tank) bbl (us;oil) | Imperial units • gal (imp) • Mgal (imp) • bbl (imp;oil) |
| | <i>Custom-specific units</i> User vol. | | |
| Factory setting | Country-specific: • l • gal (us) | | |
| Additional information | Selection For an explanation | on of the abbreviated units: $ ightarrow$ (| 聲 143 |
| | Customer-specific uni | ts | |



The unit for the customer-specific volume is specified in the **User volume text** parameter ($\rightarrow \cong 51$).

Â

| Mass flow unit | | | Ŕ |
|------------------------|--|--|--|
| Navigation | Image: Barbor → Sensor → S | → System units → Mass flow | w unit (0554) |
| Description | Use this function to select the unit for the mass flow. | | |
| Selection | SI units g/s g/min g/h g/d kg/s kg/min kg/h kg/d t/s t/min t/h t/h t/d Custom-specific units User mass/s User mass/h User mass/d | US units oz/s oz/min oz/h oz/d lb/s lb/min lb/h lb/d STon/s STon/min STon/h STon/d | Imperial units • LTon/s • LTon/h • LTon/d |
| Factory setting | Country-specific: kg/h lb/min | | |
| Additional information | ResultThe selected unit appliesMass flow parameter (-SelectionImage: SelectionImage: Selection <td>s for: →</td> <td>▶ 🗎 143 cified in the User mass text parameter</td> | s for: → | ▶ 🗎 143 cified in the User mass text parameter |
| Mass unit | | | Ê |

| Navigation | ■ Expert → Sensor → System units → Mass unit (0574) |
|-------------|---|
| Description | Use this function to select the unit for the mass. |

| Selection | SI units • g • kg • t | US units • oz • lb • STon | Imperial units LTon |
|------------------------|---|--|------------------------------------|
| | <i>Custom-specific units</i> User mass | | |
| Factory setting | Country-specific: • kg • lb | | |
| Additional information | Selection For an explanation of th | e abbreviated units: $\rightarrow \square 143$ | |
| | Customer-specific units | | |
| | The unit for the custome $(\rightarrow \cong 52)$. | er-specific mass is specified in t | he User mass text parameter |

| Density unit | | | Ê |
|--------------|--|---|---|
| Navigation | $□$ $□$ Expert \rightarrow Ser | nsor \rightarrow System units \rightarrow Density unit (0555) | |
| Description | Use this function to select the unit for the density. | | |
| Selection | SI units • g/cm ³ • kg/dm ³ • kg/l • kg/m ³ | US units lb/ft ³ | |

| Factory setting | Country-specific: • kg/m ³ • lb/ft ³ |
|------------------------|--|
| Additional information | Selection |
| | For an explanation of the abbreviated units: $\rightarrow \square 143$ |

| Temperature unit | | | Â |
|------------------|---|---|---|
| Navigation | | nsor \rightarrow System units \rightarrow Temperature unit (0557) | |
| Description | Use this function to select the unit for the temperature. | | |
| Selection | SI units ■ °C ■ K | US units ● °F ● °R | |

| Factory setting | Country-specific: ■ °C ■ °F |
|------------------------|--|
| Additional information | Result The selected unit applies for: • Temperature parameter ($\rightarrow \cong 40$) • Maximum value parameter ($\rightarrow \cong 131$) • Minimum value parameter ($\rightarrow \boxtimes 131$) • Maximum value parameter ($\rightarrow \boxtimes 132$) • Minimum value parameter ($\rightarrow \boxtimes 132$) |
| | Selection For an explanation of the abbreviated units: $\rightarrow \square 143$ |

| Length unit | | | |
|------------------------|---|---|--|
| Navigation | | nsor \rightarrow System units \rightarrow Length unit (0551) | |
| Description | Use this function to | Use this function to select the unit of length. | |
| Selection | SI units • mm • m | US units • in • ft | |
| Factory setting | Country-specific: • mm • in | | |
| Additional information | Effect The selected unit a • Insertion depth • Pipe inner diam • Mounting set he • Pipe wall thickn Selection For an explana | pplies for: parameter ($\rightarrow \ \ \ 58$) eter parameter eight parameter ($\rightarrow \ \ 58$) less parameter ($\rightarrow \ \ 57$) ation of the abbreviated units: $\rightarrow \ \ 143$ | |

| Date/time format | |
|------------------|--|
| Navigation | Image: Barbon → System units → Date/time format (2812) |
| Description | Use this function to select the desired time format for calibration history. |

A

| Selection | dd.mm.yy hh:mm dd.mm.yy hh:mm am/pm mm/dd/yy hh:mm mm/dd/yy hh:mm am/pm | |
|------------------------|--|--|
| Factory setting | dd.mm.yy hh:mm | |
| Additional information | Selection For an explanation of the abbreviated units: $\rightarrow \cong 143$ | |

"User-specific units" submenu

Navigation \blacksquare Expert \rightarrow Sensor \rightarrow System units \rightarrow User-spec. units



| User volume text | | æ |
|------------------|---|-------|
| Navigation | Image: Barbon And Section 10 | |
| Description | Use this function to enter a text for the user-specific unit of volume and volume flow corresponding time units (s, min, h, d) for volume flow are generated automatically. | . The |
| 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 ($\Rightarrow \cong 45$)
 - Volume unit parameter ($\Rightarrow \cong 47$)

Example

If the text GLAS is entered, the choose list of the **Volume flow unit** parameter ($\Rightarrow \triangleq 45$) shows the following options:

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

| User volume offset | Â |
|------------------------|---|
| Navigation | Image: Barbon And Section 2 System units → User-spec. units → Volume offset (0569) |
| 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 |
| | Yalue in user-specific unit = (factor × value in base unit) + offset |

| User volume factor | 8 |
|--------------------|--|
| Navigation | Image: Barbon And Sector And Sector System units → User-spec. units → Volume factor (0568) |
| 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 |

| User mass text | | Ê |
|----------------|--|---|
| Navigation | ■ Expert → Sensor → System units → User-spec. units → Mass text (0560) | |
| 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. | õ |

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

Factory settingUser mass

Additional information

Example

Result

If the text GLAS is entered, the following options are displayed in the picklist for the **Mass** flow unit parameter ($\rightarrow \triangleq 48$):

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

| User mass offset | Â |
|------------------------|---|
| Navigation | Image: Barbon And Section 2 System units → User-spec. units → Mass offset (0562) |
| Description | Use this function to enter the offset for adapting the user-specific mass unit and mass flow unit (without time). |
| User entry | Signed floating-point number |
| Factory setting | 0 |
| Additional information | Description |
| | Yalue in user-specific unit = (factor × value in base unit) + offset |

| User mass factor | |
|------------------|---|
| Navigation | Image: Barbon And Section 1 and Section 2 and Section |
| 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 |
| Factory setting | 1.0 |

"Process parameters" submenu 3.2.3

| Navigation | 8 2 | Expert \rightarrow Sensor \rightarrow Process param. |
|------------|-----|--|



| Flow override | |
|------------------------|---|
| Navigation | Image: Barbon And Sensor → Process param. → Flow override (1839) |
| Description | Use this function to select whether to interrupt the evaluation of measured values. This is useful for the cleaning processes of a pipeline, for example. |
| Selection | OffOn |
| Factory setting | Off |
| Additional information | <i>Result</i> This setting affects all the functions and outputs of the measuring device. |
| | Description Flow override is active ■ The diagnostic message AC453 Flow override is displayed |

- Output values
 - Output: Value at zero flow

 - Temperature: proceeding output
 Totalizers 1-3: Stop being totalized

| Flow damping | |
|-----------------|--|
| Navigation | ■ Expert → Sensor → Process param. → Flow damping (1802) |
| Description | Use this function to enter a time constant for flow damping. Reduction of the variability of the flow measured value (in relation to interference). For this purpose, the depth of the flow filter is adjusted: when the filter setting increases, the reaction time of the device also increases. |
| User entry | 0 to 999.9 s |
| Factory setting | 0 s |

Additional information

User entry

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

Result

- The damping affects the following variables of the device: Outputs →

 73
 - - Low flow cut off $\rightarrow \square 55$
 - Totalizers → 🗎 108

"Low flow cut off" submenu

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

| ► Low flow cut off | | | |
|----------------------------------|--------|--|--|
| Assign process variable (1837) | → 🗎 55 | | |
| On value low flow cutoff (1805) | → 🗎 55 | | |
| Off value low flow cutoff (1804) | → 🗎 56 | | |

| Assign process variable | | ß |
|-------------------------|---|---|
| Navigation | ■ Expert → Sensor → Process param. → Low flow cut off → Assign variable (1837) | |
| Description | Use this function to select the process variable for low flow cutoff detection. | |
| Selection | OffVolume flowMass flow | |
| Factory setting | Volume flow | |

| On value low flow cutoff | | Â |
|--------------------------|---|---|
| Navigation | ■ Expert → Sensor → Process param. → Low flow cut off → On value (1805) | |
| Prerequisite | One of the following options is selected in the Assign process variable parameter (→ | |

| 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 $0 \rightarrow \square 56$. |
|------------------------|--|
| User entry | Signed floating-point number |
| Factory setting | Depends on country and nominal diameter $\rightarrow \ \bigspace{140}$ |
| Additional information | Dependency The unit depends on the process variable selected in the Assign process variable parameter ($\rightarrow \cong 55$). |

| Off value low flow cutoff | |
|---------------------------|--|
| | |

| Navigation | ■ Expert → Sensor → Process param. → Low flow cut off → Off value (1804) |
|------------------------|--|
| Prerequisite | One of the following options is selected in the Assign process variable parameter (→ 🗎 55): ■ Volume flow ■ Mass 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 $\rightarrow \cong 55$. |
| User entry | 0 to 100.0 % |
| Factory setting | 50 % |
| Additional information | Example |
| | 0 2 2 |



Q Flow

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

3.2.4 "Sensor adjustment" submenu

Navigation \square Expert \rightarrow Sensor \rightarrow Sensor adjustm.

| ► Sensor adjustment | |
|-------------------------|--------|
| ► Installation settings | → 🗎 57 |
| ► In-situ adjustment | → 🗎 59 |

"Installation settings" submenu

Navigation \square Expert \rightarrow Sensor \rightarrow Sensor adjustm. \rightarrow Install.settings

| ► Installation settings | | |
|----------------------------|--------|--|
| Installation factor (3470) | → 🗎 57 | |
| Pipe wall thickness (3409) | → 🗎 57 | |
| Mounting set height (3435) | → 🗎 58 | |
| Insertion depth (3406) | → 🗎 58 | |

| Installation factor | | Ê |
|---------------------|---|--------|
| Navigation | ■ Expert → Sensor → Sensor adjustm. → Install.settings → Install. factor (3470) | |
| Prerequisite | The Disabled option is selected in the Operating mode parameter ($ ightarrow$ [$ ightarrow$ 59) param | ieter. |
| Description | Use this function to enter the installation factor. | |
| User entry | 0 to 9 999 | |
| Factory setting | 1 | |

| Pipe wall thickness | | ß |
|---------------------|---|---|
| Navigation | Image: Barbon Sensor → Sensor adjustm. → Install.settings → Wall thickness (3409) | |
| Prerequisite | The sensor is an insert version. | |
| Description | Use this function to enter the pipe wall thickness. | |
| User entry | 2 to 999.9 mm | |

Factory setting

4.5 mm

Dependency

Additional information

The unit is taken from the **Length unit** parameter ($\rightarrow \cong 50$)

| Mounting set height | | Â |
|------------------------|--|---|
| Navigation | ■ Expert → Sensor → Sensor adjustm. → Install.settings → Mounting set ht. (3435) |) |
| Prerequisite | The sensor is an insert version. | |
| Description | Use this function to enter the mounting set height. | |
| User entry | 0 to 999 mm | |
| Factory setting | 106 mm | |
| Additional information | Description | |
| | | |



For more detailed information on determining the mounting set height, please see the Operating Instructions for the device, section "Insertion depth"

Dependency

🚹 The unit is taken from the **Length unit** parameter (ightarrow 🖺 50)

Insertion depth Navigation B B Expert → Sensor → Sensor adjustm. → Install.settings → Insertion depth (3406) Prerequisite The sensor is an insert version.

| Description | Displays the calculated insertion depth of the sensor. | |
|------------------------|---|--|
| User interface | 0 to 999 000 mm | |
| Factory setting | 50 mm | |
| Additional information | Description Fixed insertion depth 8 mm (0.31 in) ±2 mm (0.08 in) For more detailed information on determining the insertion depth, please see the Operating Instructions for the device, section "Insertion depth" | |
| | Dependency for the Length unit parameter ($\Rightarrow \equiv 50$) | |

"In-situ adjustment" submenu

Navigation

| ► In-situ adjustment | | |
|----------------------------|--------|--|
| Operating mode (3400) | → 🗎 59 | |
| ► Adjustment values in use | → 🗎 60 | |
| ► New adjustment | → 🗎 64 | |

Operating mode

A

| Navigation | ■ Expert → Sensor → Sensor adjustm. → In-situ adjust. → Operating mode (3400) |
|-----------------|---|
| Description | Use this function to activate/deactivate in-situ adjustment. |
| Selection | DisabledEnabled |
| Factory setting | Disabled |

"Adjustment values in use" submenu

Navigation

Image: Sensor → Sensor adjustm. → In-situ adjust. → Values in use

| ► Adjustment values in use | |
|----------------------------|----------|
| Flow reference in use |) → 🗎 60 |
| Flow reference value 1 | → 🗎 61 |
| Power coefficient 1 | → 🗎 61 |
| Flow reference value 2 | → 🗎 61 |
| Power coefficient 2 |) → 🗎 61 |
| Flow reference value 3 |) → 🖺 62 |
| Power coefficient 3 | → 🗎 62 |
| Flow reference value 4 |) → 🗎 62 |
| Power coefficient 4 |) → 🗎 62 |
| Flow reference value 5 |) → 🗎 62 |
| Power coefficient 5 | → 🗎 63 |
| Flow reference value 6 | → 🗎 63 |
| Power coefficient 6 | → 🗎 63 |
| Flow reference value 7 | → 🗎 63 |
| Power coefficient 7 | → 🗎 64 |
| Flow reference value 8 | → 🗎 64 |
| Power coefficient 8 | → 🗎 64 |

Flow reference in use

NavigationImage: Expert → Sensor → Sensor adjustm. → In-situ adjust. → Values in use → Flow ref. in use (3440)

Description

Use this function to select the flow reference value used.

| User interface | Volume flowMass flowVolume flow | |
|------------------------|---|--|
| Factory setting | | |
| Flow reference value 1 | | |
| Navigation | Image: Barbor → Sensor adjustm. → In-situ adjust. → Values in use → Flow ref. val. 1 (3401) | |
| Description | Displays the Flow reference value 1 ($ ightarrow 	extsf{B}$ 61) defined for the adjustment. | |
| User interface | Signed floating-point number | |
| Power coefficient 1 | | |
| Navigation | Image Sensor → Sensor adjustm. → In-situ adjust. → Values in use → Power coeff. 1 (3425) | |
| Description | Displays the Power coefficient 1 defined for the adjustment. | |
| User interface | Positive floating-point number | |
| Flow reference value 2 | | |
| Navigation | Image: Expert → Sensor → Sensor adjustm. → In-situ adjust. → Values in use → Flow ref. val. 2 (3418) | |
| Description | Displays the Flow reference value 2 defined for the adjustment. | |
| User interface | Signed floating-point number | |
| Power coefficient 2 | | |
| Navigation | Image: Barbon Sensor → Sensor adjustm. → In-situ adjust. → Values in use → Power coeff. 2 (3426) | |
| Description | Displays the Power coefficient 2 defined for the adjustment. | |

User interface Positive floating-point number

| Flow reference value 3 | | |
|------------------------|---|--|
| Navigation | Image: Barbon Sensor → Sensor adjustm. → In-situ adjust. → Values in use → Flow ref. val. 3 (3419) | |
| Description | Displays the Flow reference value 3 defined for the adjustment. | |
| User interface | Signed floating-point number | |
| Power coefficient 3 | | |
| Navigation | Image: Expert → Sensor → Sensor adjustm. → In-situ adjust. → Values in use → Power coeff. 3 (3427) | |
| Description | Displays the Power coefficient 3 defined for the adjustment. | |
| User interface | Positive floating-point number | |
| Flow reference value 4 | | |
| Navigation | Image: Expert → Sensor → Sensor adjustm. → In-situ adjust. → Values in use → Flow ref. val. 4 (3420) | |
| Description | Displays the Flow reference value 4 defined for the adjustment. | |
| User interface | Signed floating-point number | |
| Power coefficient 4 | | |
| Navigation | Image: Expert → Sensor → Sensor adjustm. → In-situ adjust. → Values in use → Power coeff. 4 (3428) | |
| Description | Displays the Power coefficient 4 defined for the adjustment. | |
| User interface | Positive floating-point number | |
| Flow reference value 5 | | |
| Navigation | Image: Expert → Sensor → Sensor adjustm. → In-situ adjust. → Values in use → Flow ref. val. 5 (3421) | |
| Description | Displays the Flow reference value 5 defined for the adjustment. | |

User interface S

Signed floating-point number

| Power coefficient 5 | | |
|------------------------|---|--|
| Navigation | Image: Expert → Sensor → Sensor adjustm. → In-situ adjust. → Values in use → Power coeff. 5 (3429) | |
| Description | Displays the Power coefficient 5 defined for the adjustment. | |
| User interface | Positive floating-point number | |
| Flow reference value 6 | | |
| Navigation | Image: Expert → Sensor → Sensor adjustm. → In-situ adjust. → Values in use → Flow ref. val. 6 (3422) | |
| Description | Displays the Flow reference value 6 defined for the adjustment. | |
| User interface | Signed floating-point number | |
| Power coefficient 6 | | |
| Navigation | Image: Expert → Sensor → Sensor adjustm. → In-situ adjust. → Values in use → Power coeff. 6 (3430) | |
| Description | Displays the Power coefficient 6 defined for the adjustment. | |
| User interface | Positive floating-point number | |
| Flow reference value 7 | | |
| Navigation | Image: Boost and Sensor → Sensor adjust: → In-situ adjust. → Values in use → Flow ref. val. 7 (3423) | |
| Description | Displays the Flow reference value 7 defined for the adjustment. | |
| User interface | Signed floating-point number | |

Power coefficient 7

| Navigation | Image: Expert → Sensor → Sensor adjustm. → In-situ adjust. → Values in use → Power coeff. 7 (3431) | |
|----------------|---|--|
| Description | Displays the Power coefficient 7 defined for the adjustment. | |
| User interface | Positive floating-point number | |
| | | |

Flow reference value 8

| Navigation | Expert → Sensor → Sensor adjustm. → In-situ adjust. → Values in use → Flow ref. val. 8 (3424) |
|----------------|--|
| Description | Displays the Flow reference value 8 defined for the adjustment. |
| User interface | Signed floating-point number |

Power coefficient 8

NavigationExpert → Sensor → Sensor adjustm. → In-situ adjust. → Values in use → Power coeff.
8 (3432)DescriptionDisplays the Power coefficient 8 defined for the adjustment.User interfacePositive floating-point number

"New adjustment" submenu

Navigation $\blacksquare \blacksquare$ Expert \rightarrow Sensor \rightarrow Sensor adjustm. \rightarrow In-situ adjust. \rightarrow New
adjustment

| ► New adjustment | | |
|------------------------------|--------|--|
| Select flow reference (3382) | → 🗎 65 | |
| ► Perform adjustment | → 🗎 65 | |
| ► Use adjustment | → 🗎 70 | |

| Select flow reference | | æ |
|-----------------------|---|----|
| Navigation | Expert → Sensor → Sensor adjustm. → In-situ adjust. → New adjustment → Selection flow ref. (3382) | ct |
| Description | Use this function to select the process variable used as flow reference value for the adjustment. | |
| Selection | Volume flowMass flow | |
| Factory setting | Volume flow | |

"Perform adjustment" submenu

Navigation

| ► Perform adjustment | | |
|-------------------------------|--------|--|
| Clear values (3529) | → 🗎 66 | |
| Flow reference value 1 (3384) | → 🗎 66 | |
| Power coefficient 1 (3392) | → 🗎 66 | |
| Flow reference value 2 (3385) | → 🗎 67 | |
| Power coefficient 2 (3393) | → 🗎 67 | |
| Flow reference value 3 (3386) | → 🗎 67 | |
| Power coefficient 3 (3394) | → 🗎 67 | |
| Flow reference value 4 (3387) | → 🗎 68 | |
| Power coefficient 4 (3395) | → 🗎 68 | |
| Flow reference value 5 (3388) | → 🗎 68 | |
| Power coefficient 5 (3396) | → 🗎 68 | |
| Flow reference value 6 (3389) | → 🗎 69 | |
| Power coefficient 6 (3397) | → 🗎 69 | |
| Flow reference value 7 (3390) | → 🗎 69 | |

| Power coefficient 7 (3398) |) → 🗎 69 |
|-------------------------------|----------|
| Flow reference value 8 (3391) | → 🗎 70 |
| Power coefficient 8 (3399) |) → 🗎 70 |

| Clear values | |
|--|---|
| Navigation | Image: Barbon And Sensor → Sensor adjustm. → In-situ adjust. → New adjustment → Perform adjust. → Clear values (3529) |
| Description | Use this function to delete the existing adjustment values. |
| Selection | CancelClear values |
| Factory setting | Cancel |
| | |
| Flow reference value 1 | |
| Navigation | Image: Barbon Amplitude Sensor → Sensor adjustm. → In-situ adjust. → New adjustment → Perform adjust. → Flow ref. val. 1 (3384) |
| Description | Use this function to enter a flow rate used as reference for flow point 1. |
| User entry | Signed floating-point number |
| Factory setting | 0 l/h |
| | |
| Power coefficient 1 | ۵ |
| Navigation | Expert → Sensor → Sensor adjustm. → In-situ adjust. → New adjustment → Perform adjust. → Power coeff. 1 (3392) |
| Description Displays the automatically assigned power coefficient 1 which is directly proport the flow: heater power/measured temperature difference. | |
| User interface | Positive floating-point number |

| Flow reference value 2 | | |
|---|--|--|
| Navigation | Expert → Sensor → Sensor adjustm. → In-situ adjust. → New adjustment → Perform adjust. → Flow ref. val. 2 (3385) | |
| Description | Use this function to enter a flow rate used as reference for flow point 2. | |
| User entry | Signed floating-point number | |
| Factory setting | 0 l/h | |
| Power coefficient 2 | [| |
| Navigation | Expert → Sensor → Sensor adjustm. → In-situ adjust. → New adjustment → Perform adjust. → Power coeff. 2 (3393) | |
| Description | Displays the automatically assigned power coefficient 2 which is directly proportional to the flow: heater power/measured temperature difference. | |
| User interface | Positive floating-point number | |
| Flow reference value 3 | [| |
| Navigation | Expert → Sensor → Sensor adjustm. → In-situ adjust. → New adjustment → Perform adjust. → Flow ref. val. 3 (3386) | |
| Description | Use this function to enter a flow rate used as reference for flow point 3. | |
| User entry Signed floating-point number | | |
| Factory setting | 0 l/h | |
| Power coefficient 3 | [| |
| Navigation | In-situ adjust. → New adjustment → Perform adjust. → Power coeff. 3 (3394) | |
| Description | ription Displays the automatically assigned power coefficient 3 which is directly proportional to the flow: heater power/measured temperature difference. | |
| User interface | Positive floating-point number | |

| Flow reference value 4 | ۵ |
|------------------------|---|
| Navigation | Expert → Sensor → Sensor adjustm. → In-situ adjust. → New adjustment → Perform adjust. → Flow ref. val. 4 (3387) |
| Description | Use this function to enter a flow rate used as reference for flow point 4. |
| User entry | Signed floating-point number |
| Factory setting | 0 l/h |
| Power coefficient 4 | ۵ |
| Navigation | Expert → Sensor → Sensor adjustm. → In-situ adjust. → New adjustment → Perform adjust. → Power coeff. 4 (3395) |
| Description | Displays the automatically assigned power coefficient 4 which is directly proportional to the flow: heater power/measured temperature difference. |
| User interface | Positive floating-point number |
| | |
| Flow reference value 5 | Â |
| Navigation | Image: Expert → Sensor → Sensor adjustm. → In-situ adjust. → New adjustment → Perform adjust. → Flow ref. val. 5 (3388) |
| Description | Use this function to enter a flow rate used as reference for flow point 5. |
| User entry | Signed floating-point number |
| Factory setting | 0 l/h |
| | |
| Power coefficient 5 | ۵ |
| Navigation | Expert → Sensor → Sensor adjustm. → In-situ adjust. → New adjustment → Perform adjust. → Power coeff. 5 (3396) |
| Description | Displays the automatically assigned power coefficient 5 which is directly proportional to the flow: heater power/measured temperature difference. |
| User interface | Positive floating-point number |

| Flow reference value 6 | | |
|------------------------|---|--|
| Navigation | ■ Expert → Sensor → Sensor adjustm. → In-situ adjust. → New adjustment → Perform adjust. → Flow ref. val. 6 (3389) | |
| Description | Use this function to enter a flow rate used as reference for flow point 6. | |
| User entry | Signed floating-point number | |
| Factory setting | 0 l/h | |
| Power coefficient 6 | | |
| Navigation | Image Series Sensor → Sensor adjustm. → In-situ adjust. → New adjustment → Perform adjust. → Power coeff. 6 (3397) | |
| Description | Displays the automatically assigned power coefficient 6 which is directly proportional to the flow: heater power/measured temperature difference. | |
| User interface | Positive floating-point number | |
| Flow reference value 7 | | |
| Navigation | Image Series Sensor → Sensor adjustm. → In-situ adjust. → New adjustment → Perform adjust. → Flow ref. val. 7 (3390) | |
| Description | Use this function to enter a flow rate used as reference for flow point 7. | |
| User entry | Signed floating-point number | |
| Factory setting | 0 l/h | |
| Power coefficient 7 | | |
| Navigation | In-situ adjust. → New adjustment → Performadjust. → Power coeff. 7 (3398) | |
| Description | cription Displays the automatically assigned power coefficient 7 which is directly proportional to the flow: heater power/measured temperature difference. | |
| User interface | Positive floating-point number | |

| Flow reference value 8 | | Â |
|---|---|-----------|
| Navigation | In-situ adjust. → New adjustment - adjust. → Flow ref. val. 8 (3391) | → Perform |
| Description | Use this function to enter a flow rate used as reference for flow point 8. | |
| User entry Signed floating-point number | | |
| Factory setting | 0 l/h | |
| Power coefficient 8 | | Â |
| Navigation | Expert → Sensor → Sensor adjustm. → In-situ adjust. → New adjustment - adjust. → Power coeff. 8 (3399) | → Perform |

| Description | Displays the automatically assigned power coefficient 8 which is directly proportional to |
|-------------|---|
| | the flow: heater power/measured temperature difference. |

| User interface | Positive floating-point number |
|----------------|--------------------------------|
|----------------|--------------------------------|

"Use adjustment" submenu

| ► Use adjustment | |
|----------------------|--------|
| Data validity (3434) | → 🗎 70 |
| Apply (3528) | → 🗎 71 |

| Data validity | | |
|----------------|--|--|
| Navigation | Image: Expert → Sensor → Sensor adjustm. → In-situ adjust. → New adjustment → Use adjustment → Data validity (3434) | |
| Description | Displays whether the performed adjustment is usable. | |
| User interface | Ok Too few points Invalid pair of values Values too close Out of range | |

| Apply | | |
|-----------------|--|---|
| Navigation | Expert → Sensor → Sensor adjustm. → In-situ adjust. → New adjustment → Use adjustment → Apply (3528) | 1 |
| Prerequisite | In the Data validity parameter ($\rightarrow \cong 70$) the Ok option is displayed. | |
| Description | Use this function to select whether the new adjustment values are to be used. | |
| Selection | CancelOk | |
| Factory setting | Cancel | |

3.2.5 "Calibration" submenu

Navigation \square Expert \rightarrow Sensor \rightarrow Calibration

| ► Calibration | | | |
|---------------|------------------------------|---|--------|
| | Calibration date/time (3436) |] | → 🗎 71 |

| Calibration date/time | |
|------------------------|--|
| Navigation | Image: Expert → Sensor → Calibration → Cal date/time (3436) |
| Description | Displays the date of the last factory calibration of the measuring device. |
| User interface | Format: dd.mm.yyyy |
| Additional information | <i>Description</i> The date remains unchanged in the case of onsite calibration. |

3.3 "Input" submenu

 Navigation

 Expert → Input

 Input

 Status input

 T2

3.3.1 "Status input" submenu



Image: Boost and Description: Status and Descriptian: Status and Descriptian: Status and Descript



| Assign status input | | |
|---------------------|---|--|
| Navigation | ■ Expert → Input → Status input → Assign stat.inp. (1352) | |
| Description | Use this function to select the function for the status input. | |
| Selection | Off Reset totalizer 1 Flow override CIP/SIP mode | |
| Factory setting | Off | |

| Value status input | |
|--------------------|---|
| Navigation | Image: Bar and Ba |
| Prerequisite | For the following order code: "Output; input", option Q "4-20mA HART, pul./freq./switch; status input" |
| Description | Displays the current input signal level. |
| User interface | HighLow |
| Active level | | |
|-----------------|--|--|
| Navigation | | |
| Description | Use this function to determine the input signal level at which the assigned function is activated. | |
| Selection | HighLow | |
| Factory setting | High | |

| Response time status input | | |
|----------------------------|--|------|
| Navigation | ■ Expert → Input → Status input → Response time (1354) | |
| Description | Use this function to enter the minimum time period for which the input signal level n be present before the selected function is activated. | nust |
| User entry | 5 to 200 ms | |
| Factory setting | 50 ms | |

3.4 "Output" submenu

Navigation $\square \square$ Expert \rightarrow Output

| ► Output | | |
|----------|-------------------------------|--------|
| | ► Current output | → 🗎 73 |
| | Pulse/frequency/switch output | → 🖺 81 |

3.4.1 "Current output 1" submenu

Navigation \square Expert \rightarrow Output \rightarrow Curr.output 1

| ► Current output | |
|------------------------------|--------|
| Assign current output (0359) | → 🗎 74 |
| Current span (0353) | → 🗎 74 |
| Fixed current (0365) | → 🗎 75 |

| 4 mA value (0367) | → 🖺 76 |
|-------------------------|--------|
| 20 mA value (0372) | → 🗎 77 |
| Damping output (0363) | → 🗎 77 |
| Response time (0378) | → 🗎 78 |
| Failure mode (0364) | → 🗎 79 |
| Failure current (0352) | → 🗎 80 |
| Output current (0361) | → 🗎 80 |
| Start-up mode (0368) | → 🗎 80 |
| Start-up current (0369) | → 🖺 81 |
| | |

| Assign current output | |
|-----------------------|--|
| | |

| Navigation | Image: Barbon Structure → Curr.output → Assign curr. (0359) | |
|-----------------|--|---|
| Description | Use this function to select a process variable for the current output. | |
| Selection | Volume flowMass flowTemperature | |
| Factory setting | Volume flow | |
| | | |
| Current span | | £ |
| Navigation | Image: Barbon Structure → Curr.output → Current span (0353) | |
| Description | Use this function to select the current range for the process value output and the upper and lower level for signal on alarm. | |
| Selection | 420 mA NAMUR 420 mA US 420 mA Fixed current | |
| Factory setting | Country-specific: • 420 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 ($\rightarrow \cong 79$).
 - If the measured value is outside the measuring range, the diagnostic message ▲S441 Current output 1 is displayed.
 - The measuring range is specified via the 4 mA value parameter (→
 ^(→) 76) and 20 mA value parameter (→
 ^(→) 77).

"Fixed current" option

The current value is set via the **Fixed current** parameter ($\rightarrow \square 75$).

Example

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



I Current

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

Selection

| Selection | 1 | 2 | 3 |
|--------------|-------------------|----------|------------|
| 420 mA NAMUR | 3.8 to 20.5 mA | < 3.6 mA | > 21.95 mA |
| 420 mA US | 3.9 to 20.8 mA US | < 3.6 mA | > 21.95 mA |
| 420 mA | 4 to 20.5 mA | < 3.6 mA | > 21.95 mA |



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

Fixed current

| Navigation | Image: Barbon Structure Curr.output → Fixed current (0365) |
|------------------------|---|
| Prerequisite | In the Current span parameter ($\Rightarrow \square 74$), the Fixed current option is selected. |
| Description | Use this function to enter a constant current value for the current output. |
| User entry | 3.59 to 22.5 mA |
| Factory setting | 4 mA |
| Additional information | Example |
| | This setting can be used for HART multidrop, for example. |

A

| 4 mA value | ۵ |
|------------------------|---|
| Navigation | Image: Second state of the second state o |
| Prerequisite | One of the following options is selected in the Current span parameter (→) 74): • 420 mA NAMUR • 420 mA US • 420 mA |
| Description | Use this function to enter a value for the 4 mA current. |
| User entry | Signed floating-point number |
| Factory setting | 0 l/h |
| Additional information | Description |
| | Positive and negative values are permitted depending on the process variable assigned in the Assign current output parameter ($\rightarrow \square 74$). 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 ($\rightarrow \square 77$). |
| | Dependency |
| | The unit depends on the process variable selected in the Assign current output parameter ($\rightarrow \square 74$). |
| | Current output behavior |
| | The current output behaves differently depending on the settings configured in the following parameters: • Current span ($\rightarrow \cong 74$) • Failure mode ($\rightarrow \cong 79$) |
| | Configuration examples |
| | A configuration example and its effect on the current output is explained in the following section. |
| | Configuration example In Forward flow • 4 mA value parameter ($\Rightarrow \boxtimes 76$) = not equal to zero flow (e.g250 m ³ /h) • 20 mA value parameter ($\Rightarrow \boxtimes 77$) = not equal to zero flow (e.g. +750 m ³ /h) • Calculated current value = 8 mA at zero flow |
| | I [mA] 20 4 $-250 0$ $+750$ 1 |

Q Flow

I Current

1 Measuring range is exceeded or undershot

The operational range of the measuring device is defined by the values entered for the **4 mA value** parameter ($\rightarrow \square 76$) and **20 mA value** parameter ($\rightarrow \square 77$). If the effective

flow exceeds or falls below this operational range, the diagnostic message \triangle S441 Current **output 1** is displayed.

| 20 mA value | |
|------------------------|---|
| | |
| Navigation | Image: Barbon Structure And |
| Prerequisite | One of the following options is selected in the Current span parameter (→) 74): • 420 mA NAMUR • 420 mA US • 420 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 $\rightarrow 	extsf{B}$ 140 |
| Additional information | Description |
| | Positive and negative values are permitted depending on the process variable assigned in the Assign current output parameter ($\rightarrow \square 74$). In addition, the value can be greater than or smaller than the value assigned for the 4 mA current in the 4 mA value parameter ($\rightarrow \square 76$). |
| | Dependency |
| | The unit depends on the process variable selected in the Assign current output parameter ($\rightarrow \square 74$). |
| | Example |
| | Value assigned to 4 mA = -250 m³/h Value assigned to 20 mA = +750 m³/h Calculated current value = 8 mA (at zero flow) |
| | Configuration examples |
| | Pay attention to the configuration examples for 4 mA value parameter ($\rightarrow \square 76$). |
| Damping output | ۵ |
| Navigation | \square Expert \rightarrow Output \rightarrow Curr output \rightarrow Damping out (0363) |

Prerequisite

Mass flow

Temperature

| | One of the following options is selected in the Current span parameter (→ P 74): 420 mA NAMUR 420 mA US 420 mA |
|------------------------|---|
| Description | Use this function to enter the reaction time of the current output signal to fluctuations in the measured value caused by process conditions. |
| User entry | 0.0 to 999.9 s |
| Factory setting | 1.0 s |
| Additional information | User entry Use this function to enter a time constant: 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. |

| Response time | |
|------------------------|---|
| Navigation | Image: Barbon Structure → Curr.output → Response time (0378) |
| Prerequisite | One of the following options is selected in the Assign current output parameter (→ 74): Volume flow Mass flow Temperature |
| | One of the following options is selected in the Current span parameter (→ P 74): 420 mA NAMUR 420 mA US 420 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 | Description |
| | The response time is made up of the time specified for the following dampings: Current output damping → ⁽¹⁾ ⁽²⁾ ⁽ |

Flow damping

| Failure mode | Â |
|------------------------|---|
| Navigation | Image: Barbon Structure Curr.output → Failure mode (0364) |
| Prerequisite | One of the following options is selected in the Assign current output parameter (→ Provide 74): Volume flow Mass flow Temperature |
| | One of the following options is selected in the Current span parameter (→ 🗎 74): • 420 mA NAMUR • 420 mA US • 420 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. |
| Additional information | Description In 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. In the signal on alarm level is defined via the Current span parameter (→ 10 74). "Max." option The current output adopts the value of the upper level for signal on alarm. In the current output adopts the value of the upper level for signal on alarm. In the current output adopts the value of the upper level for signal on alarm. In the signal on alarm level is defined via the Current span parameter (→ 10 74). |
| | "Last valid value" option |

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

"Actual value" option

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

"Defined value" option

The current output adopts a defined measured value.

The measured value is defined via the **Failure current** parameter ($\rightarrow \cong 80$).

| Failure current | | |
|-----------------|--|---|
| Navigation | Image: Barbon Structure Curr.output → Failure current (0352) | |
| Prerequisite | In the Failure mode parameter ($\rightarrow \cong$ 79), the Defined value option is selected. | |
| Description | Use this function to enter a fixed value that the current output adopts in the event of a device alarm. | a |
| User entry | 3.59 to 22.5 mA | |
| Factory setting | 22.5 mA | |

| Output current 1 | |
|------------------|---|
| Navigation | Image: Barbon Structure And |
| Description | Displays the current value currently calculated for the current output. |
| User interface | 3.59 to 22.5 mA |

| Start-up mode | | |
|-----------------|---|--|
| Navigation | Image: Boundary Start → Curr.output → Start-up mode (0368) | |
| Prerequisite | In the Current span parameter (→ Provide 74), one of the following options is selected: 420 mA NAMUR 420 mA US 420 mA | |
| Description | Use this function to select the current value that the current output adopts during the device start-up phase as long as no measured value is present. | |
| Selection | Min.Max.Defined value | |
| Factory setting | Min. | |

 Additional information
 "Min." option

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

 Image: The signal on alarm level is defined via the Current span parameter (→ ■ 74).

"Max." option

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

The signal on alarm level is defined via the **Current span** parameter ($\rightarrow \square 74$).

"Defined value" option

The current output outputs a defined current value.

The current value is defined via the **Start-up current** parameter ($\rightarrow \cong 81$).

| Start-up current | | |
|------------------|--|-------|
| Navigation | Image: Barbon Start → Curr.output → Start-up current (0369) | |
| Prerequisite | The Defined value option is selected in the Start-up mode parameter ($\rightarrow \square 80$). | |
| Description | Use this function to enter a fixed current value that the current output adopts durin device start-up phase as long as no measured value is present. | g the |
| User entry | 3.59 to 22.5 mA | |
| Factory setting | 3.6 mA | |
| Factory setting | 3.6 mA | |

3.4.2 "Pulse/frequency/switch output" submenu

Navigation \square Expert \rightarrow Output \rightarrow PFS output

| ► Pulse/frequency/switch output | |
|---------------------------------|--------|
| Operating mode (0469) | → 🗎 83 |
| Assign pulse output (0460) | → 🗎 84 |
| Value per pulse (0455) | → 🗎 85 |
| Pulse width (0452) | → 🗎 85 |
| Failure mode (0480) | → 🗎 86 |
| Pulse output (0456) | → 🗎 87 |

| Assign frequency output (0478) |] | → 🖺 87 |
|-----------------------------------|-----|-----------------|
| | | |
| Minimum frequency value (0453) | | → 🖺 88 |
| | 1 | _ |
| Maximum frequency value (0454) | | → 🖺 88 |
| Moscuring value at minimum | | _> |
| frequency (0476) | | / 🗏 09 |
| | | |
| Measuring value at maximum | | → 🖺 89 |
| frequency (0475) | | |
| Demoning cutrust (0(77) | | \ 🖹 00 |
| Damping output (0477) | | 7 |
| Pagpanga tima (0/191) |] | → 🖹 Q∩ |
| | | / 🖬)// |
| Failure mode (0451) |] . | → 🖺 91 |
| | | |
| Failure frequency (0474) | | → 🗎 91 |
| | | |
| Output frequency (0471) | | → 🖺 92 |
| | _ | |
| Switch output function (0481) | | → 🗎 92 |
| | 1 | |
| Assign diagnostic behavior (0482) | | → 🖺 92 |
| | 1 | |
| Assign limit (0483) | | → 曽93 |
| | | ۱ (۲) ОГ |
| Switch-on value (0466) | | 7 = 90 |
| Switch-off value (0464) | | → 🖺 95 |
| Switch on value (0101) | | |
| Assign status (0485) |] | → 🖺 96 |
| | | |
| Switch-on delay (0467) | | → 🖺 96 |
| | | |
| Switch-off delay (0465) | | → 🖺 97 |
| | | |
| Failure mode (0486) | | → 🗎 97 |
| | - | |
| Switch status (0461) | | → 🖺 97 |
| | 1 | _ |
| Invert output signal (0470) | | → 🗎 98 |
| | | |

| Operating mode | ۵ |
|------------------------|--|
| Navigation | Image: Expert → Output → PFS output → Operating mode (0469) |
| Description | Use this function to select the operating mode of the output as a pulse, frequency or switch output. |
| Selection | PulseFrequencySwitch |
| Factory setting | Pulse |
| Additional information | "Pulse" option Quantity-dependent pulse with configurable pulse width Whenever a specific volume or mass is reached (pulse value), a pulse is output, the duration of which was set previously (pulse width). The pulses are never shorter than the set duration. Example Flow rate approx. 100 g/s Pulse value 0.1 g Pulse width 0.05 ms Pulse rate 1000 Impuls/s |
| | U[V] B < P |



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

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

"Frequency" option

Example

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

A0026883



■ 5 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



🖻 6 🛛 No alarm, high level

Example

Alarm response in case of alarm



7 Alarm, low level

| Assign pulse output | | |
|---------------------|--|--|
| Navigation | Image: Barbon Struct → PFS output → Assign pulse (0460) | |
| Prerequisite | The Pulse option is selected in the Operating mode parameter ($\rightarrow \cong 83$) parameter. | |
| Description | Use this function to select the process variable for the pulse output. | |
| Selection | Off Volume flow Mass flow | |
| Factory setting | Off | |

| Value per pulse | | ß |
|------------------------|--|---|
| Navigation | Image: Barbon Struct → PFS output → Value per pulse (0455) | |
| Prerequisite | The Pulse option is selected in the Operating mode parameter (→ ≅ 83) and one of the following options is selected in the Assign pulse output parameter (→ ≅ 84): Volume flow Mass flow | õ |
| 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 $\rightarrow \ \ 140$ | |
| Additional information | <i>User entry</i> 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 → Pulse width (0452) | |
| Prerequisite | The Pulse option is selected in the Operating mode parameter (→ ≅ 83) and one of following options is selected in the Assign pulse output parameter (→ ≅ 84): Volume flow Mass flow | the |
| Description | Use this function to enter the duration of the output pulse. | |
| User entry | 0.5 to 2 000 ms | |
| Factory setting | 100 ms | |
| Additional information | Description | |
| | Define how long a pulse is (duration). The maximum pulse rate is defined by f_{max} = 1 / (2 × pulse width). The interval between two pulses lasts at least as long as the set pulse width. The maximum flow is defined by Q_{max} = f_{max} × pulse value. If the flow exceeds these limit values, the measuring device displays the diagnostic message △S443 Pulse output 1 to n. | |



В Pulse width entered

Pauses between the individual pulses Р

Example

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

| Failure mode | 8 |
|------------------------|---|
| Navigation | Image: Barbon Struct → PFS output → Failure mode (0480) |
| Prerequisite | The Pulse option is selected in the Operating mode parameter (→ ■ 83) and one of the following options is selected in the Assign pulse output parameter (→ ■ 84): Volume flow Mass flow |
| Description | Use this function to select the failure mode of the pulse output in the event of a device alarm. |
| Selection | Actual valueNo pulses |
| Factory setting | No pulses |
| Additional information | <i>Description</i> 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

| Navigation | ■ Expert \rightarrow Output \rightarrow PFS output \rightarrow Pulse output (0456) |
|------------------------|--|
| Prerequisite | In the Operating mode parameter ($\rightarrow \cong$ 83), the Pulse option is selected. |
| Description | Displays the pulse frequency currently output. |
| User interface | Positive floating-point number |
| Additional information | DescriptionThe 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.



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

The output behavior can be reversed via the **Invert output signal** parameter ($\Rightarrow \triangleq 98$) 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 ($\rightarrow \square 86$)) can be configured.

| Assign frequency output | | |
|-------------------------|--|-------|
| Navigation | ■ Expert \rightarrow Output \rightarrow PFS output \rightarrow Assign freq. (0478) | |
| Prerequisite | The Frequency option is selected in the Operating mode parameter ($ ightarrow$ [$ ightarrow$ 83) parameter | eter. |
| Description | Use this function to select the process variable for the frequency output. | |

Maximum frequency value

| Selection | Off Volume flow Mass flow Temperature |
|-------------------------|--|
| Factory setting | Off |
| Minimum frequency value | |
| Navigation | Image: Barbon Structure → PFS output → Min. freq. value (0453) |
| Prerequisite | The Frequency option is selected in the Operating mode parameter (→ B 83) and one of the following options is selected in the Assign frequency output parameter (→ B 87): Volume flow Mass flow Temperature |
| Description | Use this function to enter the start value frequency. |
| User entry | 0.0 to 1000.0 Hz |
| Factory setting | 0.0 Hz |

| Navigation | ■ Expert → Output → PFS output → Max. freq. value (0454) |
|-----------------|--|
| Prerequisite | The Frequency option is selected in the Operating mode parameter (→ B 83) and one of the following options is selected in the Assign frequency output parameter (→ B 87): Volume flow Mass flow Temperature |
| Description | Use this function to enter the end value frequency. |
| User entry | 0.0 to 1000.0 Hz |
| Factory setting | 1 000.0 Hz |

ß

Measuring value at minimum frequency A Navigation ■ Expert \rightarrow Output \rightarrow PFS output \rightarrow Val. at min.freq (0476) Prerequisite The **Frequency** option is selected in the **Operating mode** parameter ($\rightarrow \implies 83$) and one of the following options is selected in the **Assign frequency output** parameter ($\rightarrow \cong 87$): Volume flow Mass flow Temperature Use this function to enter the measured value for the start value frequency. Description Signed floating-point number User entry Depends on country and nominal diameter **Factory setting** Additional information Dependency The entry depends on the process variable selected in the Assign frequency output parameter ($\rightarrow \blacksquare 87$).

| Measuring value at maxis | Measuring value at maximum frequency | |
|--------------------------|--|--|
| Navigation | Image: Barbon Struct → PFS output → Val. at max.freq (0475) | |
| Prerequisite | The Frequency option is selected in the Operating mode parameter (→ ● 83 the following options is selected in the Assign frequency output parameter (Volume flow Mass flow Temperature | 3) and one of $\rightarrow 	Brianglesize{1}{3}$ 87): |
| Description | Use this function to enter the measured value for the end value frequency. | |
| User entry | Signed floating-point number | |
| Factory setting | Depends on country and nominal diameter | |
| Additional information | Description | |
| | Use this function to enter the maximum measured value at the maximum free selected process variable is output as a proportional frequency. | quency. The |
| | Dependency | |
| | The entry depends on the process variable selected in the Assign frequent parameter ($\rightarrow \cong 87$). | ncy output |

| Damping output | ٦ |
|------------------------|--|
| Navigation | Image: Barbon Struct → Damping out. (0477) |
| Prerequisite | The Frequency option is selected in the Operating mode parameter (→ ≅ 83) and one of the following options is selected in the Assign frequency output parameter (→ ≅ 87): Volume flow Mass flow Temperature |
| Description | Use this function to enter 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 | <i>Description</i> Use this function to enter a time constant (PT1 element) for frequency output damping. The frequency output is subject to separate damping that is independent of all preceding |
| | Use this function to enter a time constant (PT1 element) for frequency output damping. The frequency output is subject to separate damping that is independent of all precedin time constants. |

| Response time | |
|------------------------|--|
| | |
| Navigation | Image: Expert → Output → PFS output → Response time (0491) |
| Prerequisite | The Frequency option is selected in the Operating mode parameter (→ B 83) and one of the following options is selected in the Assign frequency output parameter (→ B 87): Volume flow Mass flow Temperature |
| Description | Displays the response time. This specifies how quickly the pulse/frequency/switch output reaches the measured value change of 63 % of 100 % of the measured value change. |
| User interface | Positive floating-point number |
| Additional information | Description |
| | The response time is made up of the time specified for the following dampings: Damping of pulse/frequency/switch output → 77 and Depending on the measured variable assigned to the output. |

Flow damping

| Failure mode | ඕ |
|------------------------|--|
| Navigation | Image: Barbon Struct → PFS output → Failure mode (0451) |
| Prerequisite | The Frequency option is selected in the Operating mode parameter (→ B 83) and one of the following options is selected in the Assign frequency output parameter (→ B 87): Volume flow Mass flow Temperature |
| Description | Use this function to select the failure mode of the frequency output in the event of a device alarm. |
| Selection | Actual valueDefined value0 Hz |
| Factory setting | 0 Hz |
| Additional information | Selection Actual value In the event of a device alarm, the frequency output continues on the basis of the current flow measurement. The device alarm is ignored. Defined value In the event of a device alarm, the frequency output continues on the basis of a predefined value. The Failure frequency (→ ● 91) 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. O Hz In the event of a device alarm, the frequency output is "switched off". NOTICE! A device alarm is a measuring device error that must be taken seriously. It can affect the measurement quality such that the quality can no longer be guaranteed. The Actual value option is only recommended if it can be guaranteed that all possible alarm conditions will not affect the measurement quality. |

| Failure frequency | |
|-------------------|--|
| Navigation | Image: Barbon Structure PFS output → Failure freq. (0474) |
| Prerequisite | The Frequency option is selected in the Operating mode parameter (→ ≅ 83) and one of the following options is selected in the Assign frequency output parameter (→ ≅ 87): Volume flow Mass flow Temperature |
| 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 1250.0 Hz |
| Factory setting | 0.0 Hz |

| Output frequency | |
|------------------|---|
| Navigation | \square Export \rightarrow Output \rightarrow DES output \rightarrow Output frog (0/71) |
| Navigation | Se Expert / Output / FFS output / Output fred. (04/1) |
| Prerequisite | In the Operating mode parameter ($\Rightarrow \boxtimes 83$), the Frequency option is selected. |
| Description | Displays the actual value of the output frequency which is currently measured. |
| User interface | 0.0 to 1250.0 Hz |

Switch output function

A

| Navigation | Image: Second struct → Control of the second struct (Figure 1) and the second struct (Second struct + Second struct + Sec |
|------------------------|---|
| Prerequisite | In the Operating mode parameter ($\rightarrow \cong 83$) the Switch option is selected. |
| Description | Use this function to select a function for the switch output. |
| Selection | Off On Diagnostic behavior Limit Status |
| Factory setting | Off |
| Additional information | Selection Off The switch output is permanently switched off (open, non-conductive). On The switch output is permanently switched on (closed, conductive). Diagnostic behavior Indicates if the diagnostic event is present or not. Is used to output diagnostic information and to react to it appropriately at the system level. Limit Indicates if a specified limit value has been reached for the process variable. Is used to output diagnostic information relating to the process and to react to it appropriately at the system level. Status Indicates the device status depending on whether empty pipe detection or low flow cut off is selected. |

Assign diagnostic behavior

| Navigation | ■ Expert → Output → PFS output → Assign diag. beh (0482) |
|--------------|---|
| Prerequisite | The Switch option is selected in the Operating mode parameter (→ ■ 83). The Diagnostic behavior option is selected in the Switch output function parameter (→ ■ 92). |

A

| Description | Use this function to select the diagnostic event category that is displayed for the switch output. |
|------------------------|--|
| Selection | AlarmAlarm or warningWarning |
| Factory setting | Alarm |
| Additional information | <i>Description</i> If no diagnostic event is pending, the switch output is closed and conductive. |
| | Options |
| | 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. |

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 | Image: Barbon Struct → PFS output → Assign limit (0483) |
| Prerequisite | The Switch option is selected in the Operating mode parameter (→ |
| Description | Use this function to select a process variable for the limit function. |
| Selection | Volume flow Mass flow Temperature Totalizer 1 |
| Factory setting | Volume flow |
| Additional information | Description |
| | Process variable > Switch-on value: transistor is conductive Process variable < Switch-off value: transistor is non-conductive |



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

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

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



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

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

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



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

| Switch-on value | | |
|------------------------|---|--|
| Navigation | Image: Barbon Struct → Control Prescription Structure Image: Expert → Output → PFS output → Switch-on value (0466) | |
| Prerequisite | The Switch option is selected in the Operating mode parameter (→ ≅ 83). The Limit option is selected in the Switch output function parameter (→ ≅ 92). | |
| Description | Use this function to enter the measured value for the switch-on point. | |
| User entry | Signed floating-point number | |
| Factory setting | 0 l/h | |
| Additional information | Description Use this function to enter the limit value for the switch-on value (process variable > switch-on value = closed, conductive). i When using a hysteresis: Switch-on value > Switch-off value. Dependency i The unit depends on the process variable selected in the Assign limit parameter (→ ≅ 93). | |

| Switch-off value | | |
|------------------|---|--|
| Navigation | Image: Barbon Structure And Amage: Barbon Structure Amage: Barbon Structu | |
| Prerequisite | The Switch option is selected in the Operating mode parameter (→ ≅ 83). The Limit option is selected in the Switch output function parameter (→ ≅ 92). | |
| Description | Use this function to enter the measured value for the switch-off point. | |

| User entry | Signed floating-point number |
|------------------------|---|
| Factory setting | 0 l/h |
| 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 $(\rightarrow \cong 93)$. |

| Assign status | | Â |
|------------------------|--|---|
| Navigation | Image: Barbon Status (0485) Image: Barbon Status (0485) | |
| Prerequisite | The Switch option is selected in the Operating mode parameter (→ ≅ 83). The Status option is selected in the Switch output function parameter (→ ≅ 92). | |
| Description | Use this function to select a device status for the switch output. | |
| Selection | Partially filled pipe detectionLow flow cut off | |
| Factory setting | Low flow cut off | |
| Additional information | Options | |
| | If empty pipe detection or low flow cut off are enabled, the output is conductive. Otherwise, the switch output is non-conductive. | |

| Switch-on delay | | Ê |
|-----------------|---|---|
| Navigation | Image: Barbon Sector Sect | |
| Prerequisite | The Switch option is selected in the Operating mode parameter (→ ≅ 83). The Limit option is selected in the Switch output function parameter (→ ≅ 92). | |
| 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 | Image: Barbon Struct → Cutput → PFS output → Switch-off delay (0465) | |
| Prerequisite | The Switch option is selected in the Operating mode parameter (→ ≅ 83). The Limit option is selected in the Switch output function parameter (→ ≅ 92). | |
| 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 | Image: Boost and Boos | |
| Description | Use this function to select a failsafe mode for the switch output in the event of a devic alarm. | e |
| Selection | Actual statusOpenClosed | |
| Factory setting | Open | |
| Additional information | Options Actual status In the event of a device alarm, faults are ignored and the current behavior of the inp value is output by the switch output. The Actual status option behaves in the same 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. | out way 'e . |

| Switch status | |
|----------------|---|
| Navigation | □ Expert → Output → PFS output → Switch status (0461) |
| Prerequisite | The Switch option is selected in the Operating mode parameter ($\rightarrow \cong 83$). |
| Description | Displays the current switch status of the status output. |
| User interface | OpenClosed |

Additional information User interface

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

| Invert output signal | | |
|------------------------|--|--|
| Navigation | Image: Barbon Barbon Struct → PFS output → Invert outp.sig. (0470) | |
| Description | Use this function to select whether to invert the output signal. | |
| Selection | NoYes | |
| Factory setting | No | |
| Additional information | Selection No option (passive - negative) | |

Yes option (passive - positive)

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"Communication" submenu 3.5

Navigation □ □ Expert → Communication

| ► Communication | | | |
|-----------------|---------------|--|--------|
| | ► HART output | | → 🗎 99 |

3.5.1 "HART output" submenu

Navigation \square Expert \rightarrow Communication \rightarrow HART output

| ► HART output | |
|-----------------|-----------|
| ► Configuration | → 🗎 99 |
| ► Information |) → 🗎 101 |
| ► Output |) → 🗎 105 |

"Configuration" submenu

Navigation $\blacksquare \blacksquare$ Expert \rightarrow Communication \rightarrow HART output \rightarrow Configuration

| ► Configuration | |
|-------------------------|-----------|
| Burst mode (0208) |) → 🗎 99 |
| Burst command (0207) |) → 🗎 100 |
| HART short tag (0220) |) → 🗎 100 |
| Device tag (0215) |] → 🗎 100 |
| HART address (0219) |] → 🗎 101 |
| No. of preambles (0217) |] → 🗎 101 |

| Burst mode | |
|------------------------|--|
| Navigation | ■ Expert → Communication → HART output → Configuration → Burst mode (0208) |
| Description | Use this function to select whether to activate or deactivate the HART burst mode for burst message X. |
| Selection | OffOn |
| Factory setting | Off |
| Additional information | Selection Off 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 | | Ê |
|------------------------|---|---|
| Navigation | Image: Expert → Communication → HART output → Configuration → Burst command (0207) | |
| 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 Command 33: Read out the dynamic HART variables including the related unit. | |

| HART short tag | | Â |
|-----------------|--|-----|
| Navigation | Image: Barbon And State St | |
| Description | Use this function to enter a brief description for the measuring point. This can be edite and displayed via HART protocol or using the local display. | d |
| User entry | Max. 8 characters: A-Z, 0-9 and certain special characters (e.g. punctuation marks, @, | %). |
| Factory setting | T-MASS | |

| Device tag | | Ê |
|-----------------|---|---|
| Navigation | Image: Bar and the second state of the se | |
| Description | Use this function to enter the name for the measuring point. | |
| User entry | Max. 32 characters such as letters, numbers or special characters (e.g. $@$, %, /). | |
| Factory setting | t-mass | |

No. of preambles

æ

| HART address | |
|-----------------|---|
| Navigation | Image: Barbon And Communication → HART output → Configuration → HART address (0219 |
| Description | Use this function to enter the address via which the data exchange takes place via HART protocol. |
| User entry | 0 to 63 |
| Factory setting | 0 |
| | |

| Navigation | Image: Expert → Communication → HART output → Configuration → No. of preambles (0217) |
|------------------------|---|
| Description | Use this function to enter the number of preambles in the HART protocol. |
| User entry | 2 to 20 |
| Factory setting | 5 |
| Additional information | User entry |
| | As every modem component can "swallow" a byte, 2-byte preambles at least must be defined. |

"Information" submenu

Navigation

 $\blacksquare \blacksquare \quad \text{Expert} \rightarrow \text{Communication} \rightarrow \text{HART output} \rightarrow \text{Information}$

| ► Information | | | |
|---------------|------------------------|---|---------|
| | Device revision (0204) | | → 🗎 102 |
| | Device ID (0221) | | → 🗎 102 |
| | Device type (0222) |] | → 🗎 102 |
| | Manufacturer ID (0223) |] | → 🗎 103 |
| | HART revision (0205) | | → 🗎 103 |
| | HART descriptor (0212) | | → 🗎 103 |
| | HART message (0216) | | → 🗎 103 |

| Hardware revision (0206) | → 🗎 104 |
|--------------------------|---------|
| Software revision (0224) | → 🗎 104 |
| HART date code (0202) | → 🗎 104 |

| Device revision | |
|------------------------|---|
| Navigation | ■ Expert → Communication → HART output → Information → Device revision (0204) |
| Description | Use this function to view the device revision with which the device is registered with the HART Communication Foundation. |
| User interface | 2-digit hexadecimal number |
| Factory setting | 0x01 |
| Additional information | Description |
| | The device revision is needed to assign the appropriate device description file (DD) to the device. |

| Device ID | |
|------------------------|--|
| Navigation | \square Expert → Communication → HART output → Information → Device ID (0221) |
| Description | Use this function to view the device ID for identifying the measuring device in a HART network. |
| User interface | 6-digit hexadecimal number |
| Additional information | Description |
| | In addition to the device type and manufacturer ID, the device ID is part of the unique ID. Each HART device is uniquely identified by the unique device ID. |

| Device type | |
|-----------------------------------|--|
| Navigation | ■ Expert → Communication → HART output → Information → Device type (0222) |
| Description | Displays the device type with which the measuring device is registered with the HART Communication Foundation. |
| User interface | 2-digit hexadecimal number |
| Factory setting | 0x68 (for t-mass T 150) |
| User interface Factory setting | 2-digit hexadecimal number 0x68 (for t-mass T 150) |

Additional information

Description

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

| Manufacturer ID | |
|-----------------|---|
| Navigation | Image: Barry Barry And State St |
| Description | Use this function to view the manufacturer ID with which the measuring device is registered with the HART Communication Foundation. |
| User interface | 2-digit hexadecimal number |
| Factory setting | 0x11 (for Endress+Hauser) |
| HART revision | |
| Navigation | Image: Barry |
| Description | Use this function to display the HART protocol revision of the measuring device. |
| User interface | 5 to 7 |
| Factory setting | 6 |
| HART descriptor | 8 |
| Navigation | Image: Barbon And Antipathan |
| 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 | t-mass L T 150 |
| HART message | ۵ |
| Navigation | Image: Barbon And Antipactic |

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 t-mass L T 150

Hardware revision

| Navigation | Image: Expert → Communication → HART output → Information → Hardware rev. (0206) |
|-----------------|--|
| Description | Displays the hardware revision of the measuring device. |
| User interface | 0 to 255 |
| Factory setting | 1 |

| Software revision | |
|-------------------|---|
| Navigation | ■ Expert → Communication → HART output → Information → Software rev. (0224) |
| Description | Displays the software revision of the measuring device. |
| User interface | 0 to 255 |
| Factory setting | 1 |

HART date code

| Navigation | ■ Expert → Communication → HART output → Information → HART date code (0202) |
|------------------------|--|
| Description | Use this function to enter the date information for individual use. |
| User entry | Date entry format: yyyy-mm-dd |
| Factory setting | 2009-07-20 |
| Additional information | Example |
| | Device installation date |

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"Output" submenu

Navigation

Image: Barbon State State

| ► Output | | | |
|----------|-------------------------------|---|---------|
| As | sign PV (0234) |] | → 🖺 105 |
| Pri | mary variable (PV) (0201) |] | → 🖺 105 |
| As | sign SV (0235) |] | → 🗎 106 |
| Sec | condary variable (SV) (0226) |] | → 🖺 106 |
| As | sign TV (0236) |] | → 🖺 106 |
| Te | rtiary variable (TV) (0228) |] | → 🗎 107 |
| As | sign QV (0237) |] | → 🗎 107 |
| Qu | aternary variable (QV) (0203) | | → 🗎 107 |

| Assign PV | | Ê |
|-----------------------|---|---|
| Navigation | ■ Expert → Communication → HART output → Output → Assign PV (0234) | |
| Description | Use this function to select a measured variable (HART device variable) for the primary dynamic variable (PV). | |
| Selection | Volume flowMass flowTemperature | |
| Factory setting | Volume flow | |
| Primary variable (PV) | | |
| Navigation | Image: Barbon Structure <td></td> | |

| Description | Displays the current measured value of the primary dynamic variable (PV) |
|-------------|--|
|-------------|--|

User interface Signed floating-point number

Additional information

User interface

The measured value displayed depends on the process variable selected in the **Assign PV** parameter ($\rightarrow \triangleq 105$).

Dependency

The unit of the displayed measured value is taken from the **System units** submenu $(\rightarrow \cong 45)$.

| Assign SV | Â |
|-----------------|---|
| Navigation | □ Expert → Communication → HART output → Output → Assign SV (0235) |
| Description | Use this function to select a measured variable (HART device variable) for the secondary dynamic variable (SV). |
| Selection | Volume flow Mass flow Temperature Totalizer |
| Factory setting | Totalizer |

Secondary variable (SV)Navigation \blacksquare Expert \rightarrow Communication \rightarrow HART output \rightarrow Output \rightarrow Second.var(SV) (0226)DescriptionDisplays the current measured value of the secondary dynamic variable (SV).User interfaceSigned floating-point numberAdditional informationUser interface
The measured value displayed depends on the process variable selected in the Assign SV
parameter ($\rightarrow \blacksquare 106$).Dependency \blacksquare The unit of the displayed measured value is taken from the System units submenu
($\rightarrow \blacksquare 45$).

| Assign TV | | £ |
|-------------|--|---|
| Navigation | ■ Expert → Communication → HART output → Output → Assign TV (0236) | |
| Description | Use this function to select a measured variable (HART device variable) for the tertiary (third) dynamic variable (TV). | |

| Selection | Volume flowMass flowTemperature |
|------------------------|---|
| | Totalizer |
| Factory setting | Temperature |
| | |
| Tertiary variable (TV) | |
| | |
| Navigation | Image: Expert → Communication → HART output → Output → Tertiary var(TV) (0228) |
| Description | Displays the current measured value of the tertiary dynamic variable (TV). |
| User interface | 0 to 99 999.9999 °C |
| Additional information | User interface |
| | The measured value displayed depends on the process variable selected in the Assign TV parameter ($\rightarrow \square 106$). |
| | Dependency |
| | The unit of the displayed measured value is taken from the System units submenu $(\Rightarrow \cong 45)$. |

| Assign OV | | |
|-----------------|--|----------|
| | | |
| Navigation | Image: Barbon Structure Communication → HART output → Output → Assign QV (0237) | |
| Description | Use this function to select a measured variable (HART device variable) for the qua (fourth) dynamic variable (QV). | aternary |
| Selection | Volume flow Mass flow Temperature Totalizer | |
| Factory setting | Totalizer | |

| Quaternary variable (QV) | | | |
|--------------------------|--|--|--|
| Navigation | \blacksquare = Expert → Communication → HART output → Output → Quaterna.var(QV) (0203) | | |
| Description | Displays the current measured value of the quaternary dynamic variable (QV). | | |
| User interface | Signed floating-point number | | |

Additional information

User interface

The measured value displayed depends on the process variable selected in the Assign QV parameter ($\rightarrow \square 107$).

Dependency



"Application" submenu 3.6

| Navigation | $ \blacksquare \blacksquare \text{Expert} \rightarrow \text{Application} $ | |
|---------------|---|---------|
| ► Application | | |
| | ► Totalizer | → 🗎 108 |
| | ► CIP/SIP | → 🗎 111 |

3.6.1 "Totalizer" submenu

Navigation □ □ Expert \rightarrow Application \rightarrow Totalizer

| ► Totalizer | |
|-------------------------|---------|
| Assign process variable | → 🗎 108 |
| Unit totalizer | → 🗎 109 |
| Control Totalizer | → 🗎 110 |
| Preset value | → 🗎 110 |
| Failure mode | → 🗎 111 |

| Assign process variable | |
|-------------------------|--|

Navigation \blacksquare Expert → Application → Totalizer → Assign variable (0914) Description Use this function to select a process variable for the Totalizer . Selection Off Volume flow

Mass flow
A

| Factory setting | Volume flow |
|------------------------|---|
| Additional information | <i>Description</i> If the option selected is changed, the device resets the totalizer to 0. |
| | Selection |

If the **Off** option is selected, only **Assign process variable** parameter ($\rightarrow \square$ 108) is still displayed in the **Totalizer** submenu. All other parameters in the submenu are hidden.

| Unit totalizer | | | |
|----------------------------|--|--|--|
| Navigation Prerequisite | Expert → Application → Totalizer → Unit totalizer (0915) One of the following options is selected in the Assign process variable parameter (→ 108)Totalizer submenu: Volume flow Mass flow | | |
| Description | Use this function to selec | t the unit for the process va | ariable for Totalizer (→ 🗎 41). |
| Selection | SI units 9 g • kg • t <i>Custom-specific units</i> User mass | US units • oz • lb • STon | Imperial units LTon |
| | or | | |
| | SI units • cm ³ • dm ³ • m ³ • ml • l • hl • Ml Mega | US units af ft ³ fl oz (us) gal (us) kgal (us) Mgal (us) bbl (us;liq.) bbl (us;beer) bbl (us;oil) bbl (us;tank) | Imperial units • gal (imp) • Mgal (imp) • bbl (imp;oil) |
| | <i>Custom-specific units</i> User vol. | | |
| Factory setting | Country-specific: • m ³ • ft ³ | | |
| Additional information | Selection The selection is independ variable parameter ($\rightarrow \square$ | ent of the process variable 108). | selected in the Assign process |

| Control Totalizer | |
|------------------------|--|
| Navigation | Image: Second state in the second state is a second state of the second state is a second state of the second state is a second state of the |
| Prerequisite | One of the following options is selected in the Assign process variable parameter (→ 108) of the Totalizer submenu: Volume flow Mass flow |
| Description | Use this function to select the control of the totalizer value. |
| Selection | Totalize Reset + hold Preset + hold Reset + totalize Preset + totalize |
| Factory setting | Totalize |
| Additional information | Selection Totalize The totalizer is started or continues totalizing with the current counter reading. Reset + hold The totaling process is stopped and the totalizer is reset to 0. Preset + hold The totaling process is stopped and the totalizer is set to its defined start value from the Preset value parameter (→ 110). Reset + totalize The totalizer is reset to 0 and the totaling process is restarted. Preset + totalize The totalizer is set to the defined start value from the Preset value parameter (→ 110) and the totaling process is restarted. |

| Preset value | |
|-----------------|---|
| Navigation | ■ Expert \rightarrow Application \rightarrow Totalizer \rightarrow Preset value (0913) |
| Prerequisite | One of the following options is selected in the Assign process variable parameter (→ 108) of the Totalizer submenu: Volume flow Mass flow |
| Description | Use this function to enter a start value for the Totalizer . |
| User entry | Signed floating-point number |
| Factory setting | 0 m ³ |



The unit of the selected process variable is specified for the totalizer in the **Unit totalizer** parameter ($\Rightarrow \triangleq 109$).

Example

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

| | 2 |
|---|---|
| Image: Expert → Application → Totalizer → Failure mode (0901) | |
| One of the following options is selected in the Assign process variable parameter (→ 108) of the Totalizer submenu: Volume flow Mass flow | |
| Use this function to select how a totalizer behaves in the event of a device alarm. | |
| StopActual valueLast valid value | |
| Stop | |
| Description It is setting does not affect the failsafe mode of the outputs. This is specified in separate parameters. Selection Stop Totalizing is stopped when a device alarm occurs. 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. | s e |
| | Expert → Application → Totalizer → Failure mode (0901) One of the following options is selected in the Assign process variable parameter (→ ■ 108) of the Totalizer submenu: Volume flow Mass flow Use this function to select how a totalizer behaves in the event of a device alarm. Stop Actual value Last valid value Stop Description This setting does not affect the failsafe mode of the outputs. This is specified in separate parameters. Selection Stop Actual value Last valid use Last valid use Stop This setting does not affect the failsafe mode of the outputs. This is specified in separate parameters. Selection Stop 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. |

3.6.2 "CIP/SIP" submenu

Navigation \square Expert \rightarrow Application \rightarrow CIP/SIP

| ► CIP/SIP | | | |
|-----------|--------------|---|---------|
| | CIP/SIP mode |] | → 🗎 112 |

| CIP/SIP mode | |
|------------------------|--|
| Navigation | ■ Expert → Application → CIP/SIP → CIP/SIP mode (3536) |
| Description | Use this function to activate and deactivate CIP/SIP mode. |
| Selection | OffOn |
| Factory setting | Off |
| Additional information | SIP process: max. +130 °C (+266 °F) for one hour max. |

3.7 "Diagnostics" submenu

| Navigation | |
|-------------|---------|
| πανισαιιστι | <u></u> |

Expert \rightarrow Diagnostics

| ► Diagnostics | |
|------------------------------------|---------|
| Actual diagnostics (0691) | → 🗎 112 |
| Previous diagnostics (0690) | → 🗎 113 |
| Operating time from restart (0653) | → 🗎 114 |
| Operating time (0652) | → 🗎 114 |
| ► Diagnostic list | → 🗎 115 |
| ► Event logbook | → 🗎 119 |
| ► Device information | → 🗎 121 |
| ► Data logging | → 🗎 125 |
| ► Min/max values | → 🗎 131 |
| ► Simulation | → 🗎 133 |

Actual diagnostics

Navigation

 \blacksquare Expert → Diagnostics → Actual diagnos. (0691)

Prerequisite

A diagnostic event has occurred.

DescriptionDisplays the current diagnostic message. If two or more messages occur simultaneously,
the message with the highest priority is shown on the display.User interfaceSymbol for diagnostic behavior, diagnostic code and short message.Additional informationDisplayImage: Comparison of the priority is shown on the display.Image: Comparison of the priority is shown on the display.Additional informationImage: Comparison of the priority is shown on the priority is shown on the priority is shown on the display.Image: Comparison of the priority is shown on the display.Image: Comparison of the priority is shown on the display.Image: Comparison of the priority is shown on the display.Image: Comparison of the priority is shown on the display.Image: Comparison of the priority is shown on the display.Image: Comparison of the priority is shown on the display.Image: Comparison of the priority is shown on the display.Image: Comparison of the priority is shown on the display.Image: Comparison of the priority is shown on the display.Image: Comparison of the priority is shown on the display.Image: Comparison of the priority is shown on the display.Image: Comparison of the priority is shown on the display.Image: Comparison of the priority is shown on the display.Image: Comparison of the priority is shown on the display.Image: Comparison of the priority is shown on the display.Image: Comparison of the priority is shown on the display.Image: Comparison of the priority is shown on the display.Image: Comparison of the priority is shown on the display.</

the diagnostic message can be accessed via the \mathbb{E} key.

Example

For the display format: ✤F271 Main electronic failure

| Timestamp | |
|------------------------|---|
| Navigation | □ Expert \rightarrow Diagnostics \rightarrow Timestamp |
| Description | Displays the operating time when the current diagnostic message occurred. |
| User interface | Days (d), hours (h), minutes (m) and seconds (s) |
| Additional information | Display The diagnostic message can be viewed via the Actual diagnostics parameter $(\rightarrow \cong 112)$. |
| | <i>Example</i> For the display format: 24d12h13m00s |

Previous diagnostics Navigation Image: Expert → Diagnostics → Prev.diagnostics (0690) Prerequisite Two diagnostic events have already occurred. Description Displays the diagnostic message that occurred before the current message. User interface Symbol for diagnostic behavior, diagnostic code and short message. Additional information Display Image: Image:

For the display format: ✤F271 Main electronic failure

| Timestamp | |
|------------------------|--|
| Navigation | □ Expert \rightarrow Diagnostics \rightarrow Timestamp |
| Description | Displays the operating time when the last diagnostic message before the current message occurred. |
| User interface | Days (d), hours (h), minutes (m) and seconds (s) |
| Additional information | Display The diagnostic message can be viewed via the Previous diagnostics parameter $(\rightarrow \cong 113)$. |
| | Example |
| | For the display format: 24d12h13m00s |

Operating time from restart

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

Operating time

| Navigation | ■ Expert \rightarrow Diagnostics \rightarrow Operating time (0652) |
|------------------------|---|
| Description | Use this function to display the length of time the device has been in operation. |
| User interface | Days (d), hours (h), minutes (m) and seconds (s) |
| Additional information | <i>User interface</i> The maximum number of days is 9999, which is equivalent to 27 years. |

3.7.1 "Diagnostic list" submenu

Navigation 🛛 🗐 🖾 Expe

 $\blacksquare \blacksquare \quad \text{Expert} \rightarrow \text{Diagnostics} \rightarrow \text{Diagnostic list}$

| ► Diagnostic list | |
|----------------------|---------|
| Diagnostics 1 (0692) | → 🗎 115 |
| Diagnostics 2 (0693) | → 🗎 116 |
| Diagnostics 3 (0694) | → 🗎 117 |
| Diagnostics 4 (0695) | → 🗎 117 |
| Diagnostics 5 (0696) | → 🗎 118 |

| Diagnostics 1 | |
|------------------------|---|
| Navigation | Image: Barbon Structure |
| Description | Displays the current diagnostics message with the highest priority. |
| User interface | Symbol for diagnostic behavior, diagnostic code and short message. |
| Additional information | Display I Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the 🗉 key. |
| | Examples For the display format: |

▲S442 Frequency output
♦F276 I/O module failure

| Timestamp | |
|----------------|--|
| Navigation | $ \blacksquare \text{Expert} \rightarrow \text{Diagnostics} \rightarrow \text{Diagnostic list} \rightarrow \text{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) |

Display

The diagnostic message can be viewed via the **Diagnostics 1** parameter ($\rightarrow \square 115$).

Example For the display format: 24d12h13m00s

| Diagnostics 2 | |
|------------------------|--|
| Navigation | Image: Boostimes and the second state of |
| Description | Displays the current diagnostics message with the second-highest priority. |
| User interface | Symbol for diagnostic behavior, diagnostic code and short message. |
| Additional information | Display I Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the 🗉 key. |
| | Examples |
| | For the display format: ■ |

■ SF276 I/O module failure

| Timestamp | |
|------------------------|---|
| Navigation | Expert \rightarrow Diagnostics \rightarrow Diagnostic list \rightarrow 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 116 The diagnostic message can be viewed via the Diagnostics 2 parameter ($\rightarrow \cong 116$). |
| | Example |
| | For the display format: |

24d12h13m00s

| Diagnostics 3 | |
|------------------------|---|
| Navigation | Image: Barbon Structure Structu |
| Description | Displays the current diagnostics message with the third-highest priority. |
| User interface | Symbol for diagnostic behavior, diagnostic code and short message. |
| Additional information | Display Via the local display: the time stamp and corrective measures referring to the cause of the diagnestic measures can be accessed via the E key. |
| | Examples For the display format: |

- ▲S442 Frequency output
 ♦F276 I/O module failure

| Timestamp | |
|------------------------|---|
| Navigation | □ Expert → Diagnostics → Diagnostic list → Timestamp |
| Description | Displays the operating time when the diagnostic message with the third-highest priority occurred. |
| User interface | Days (d), hours (h), minutes (m) and seconds (s) |
| Additional information | Display The diagnostic message can be viewed via the Diagnostics 3 parameter ($\rightarrow \cong 117$). |
| | Example |

For the display format: 24d12h13m00s

| Diagnostics 4 | |
|----------------|--|
| Navigation | Image: Boostics → Diagnostic list → Diagnostics 4 (0695) |
| Description | Displays the current diagnostics message with the fourth-highest priority. |
| User interface | Symbol for diagnostic behavior, diagnostic code and short message. |

Display



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

Examples

For the display format:

- ▲S442 Frequency output
- ⊗F276 I/O module failure

| Timestamp | |
|------------------------|--|
| Navigation | □ Expert → Diagnostics → Diagnostic list → Timestamp |
| Description | Displays the operating time when the diagnostic message with the fourth-highest priority occurred. |
| User interface | Days (d), hours (h), minutes (m) and seconds (s) |
| Additional information | Display The diagnostic message can be viewed via the Diagnostics 4 parameter ($\rightarrow \cong 117$). |
| | Example |

For the display format: 24d12h13m00s

| Diagnostics 5 | |
|------------------------|---|
| Navigation | Image: Barbon Structure |
| Description | Displays the current diagnostics message with the fifth-highest priority. |
| User interface | Symbol for diagnostic behavior, diagnostic code and short message. |
| Additional information | Display It is the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the E key. |

Examples

For the display format:

- ▲S442 Frequency output
- SF276 I/O module failure

| Timestamp | |
|------------------------|---|
| Navigation | ■ Expert → Diagnostics → Diagnostic list → Timestamp |
| Description | Displays the operating time when the diagnostic message with the fifth-highest priority occurred. |
| User interface | Days (d), hours (h), minutes (m) and seconds (s) |
| Additional information | Display 1 The diagnostic message can be viewed via the Diagnostics 5 parameter ($\Rightarrow \square 118$). |
| | Example For the display format: |

24d12h13m00s

3.7.2 "Event logbook" submenu

Navigation

Expert \rightarrow Diagnostics \rightarrow Event logbook

| ► Event logbook | | |
|-----------------|-----------------------|---------|
| | Filter options (0705) | → 🗎 119 |
| | ► Event list | → 🗎 120 |

| Filter options | <u>ه</u> |
|-----------------|---|
| Navigation | ■ Expert → Diagnostics → Event logbook → Filter options (0705) |
| Description | Use this function to select the category whose event messages are displayed in the event list of the local display. |
| Selection | All Failure (F) Function check (C) Out of specification (S) Maintenance required (M) Information (I) |
| Factory setting | All |

Description

The status signals are categorized in accordance with VDI/VDE 2650 and NAMUR Recommendation NE 107:

- F = Failure
- C = Function Check
- S = Out of Specification
- M = Maintenance Required

| Filter options | ۵ |
|------------------------|---|
| Navigation | □ Expert → Diagnostics → Event logbook → Filter options |
| Description | Use this function to select the category whose event messages are displayed in the event list of the operating tool. |
| Selection | All Failure (F) Function check (C) Out of specification (S) Maintenance required (M) Information (I) |
| Factory setting | All |
| Additional information | Description The status signals are categorized in accordance with VDI/VDE 2650 and NAMUR Recommendation NE 107: F = Failure C = Function Check S = Out of Specification M = Maintenance Required |
| | "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. Navigation Expert → Diagnostics → Event logbook → Event list 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 ($\rightarrow \square 119$). |
| 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. |
| | If the advanced HistoROM function is enabled in the device, the event list can contain up to 100 entries. |
| | The following symbols indicate whether an event has occurred or has ended: ■ ①: Occurrence of the event ■ ④: End of the event |
| | Examples |
| | For the display format: I1091 Configuration modified 24d12h13m00s ▲S442 Frequency output ①1d04h12min30s |
| | Additional information, such as remedial measures, can be retrieved via the 🗉 key. |
| | HistoROM |
| | A HistoROM is a "non-volatile" device memory in the form of an EEPROM. |
| | To order the HistoROM advanced capabilities application package, see the "Accessories" section of the "Technical Information" document. |

3.7.3 "Device information" submenu

Navigation \square Expert \rightarrow Diagnostics \rightarrow Device info

| ► Device information | | |
|-------------------------|---------|--|
| Device tag (0011) | → 🗎 122 | |
| Serial number (0009) | → 🗎 122 | |
| Firmware version (0010) | → 🗎 123 | |



| Device tag | |
|------------------------|---|
| Navigation | Image: Barbon Structure |
| Description | Displays a unique name for the measuring point so it can be identified quickly within the plant. The name is displayed in the header. |
| User interface | Max. 32 characters such as letters, numbers or special characters (e.g. @, %, /) |
| Factory setting | t-mass L T 150 |
| Additional information | User interface |
| | |

🗟 8 Header text

The number of characters displayed depends on the characters used.

| Serial number | |
|----------------|--|
| Navigation | Image: Barbon Serial number (0009) Image: Barbon Serial number (0009) |
| Description | Displays the serial number of the measuring device. The number can be found on the nameplate of the sensor and transmitter. |
| User interface | A maximum of 11-digit character string comprising letters and numbers. |

A0013375

| Des | cription |
|-----|----------|
| | |

Uses of the serial number

To identify the measuring device quickly, e.g. when contacting Endress+Hauser.
To obtain specific information on the measuring device using the Device Viewer: www.endress.com/deviceviewer

| Firmware version | |
|------------------------|--|
| Navigation | ■ Expert → Diagnostics → Device info → Firmware version (0010) |
| Description | Displays the device firmware version installed. |
| User interface | Character string in the format xx.yy.zz |
| Additional information | <i>Display</i> The Firmware version is also located: • On the title page of the Operating instructions |

• On the transmitter nameplate

| Device name | | |
|------------------------|---|----------|
| Navigation | | |
| Description | Displays the name of the transmitter. It can also be found on the nameplate of the transmitter. | |
| User interface | t-mass T 150 | |
| Order code | | <u></u> |
| Navigation | Image: Barbon Structure <td></td> | |
| Description | Displays the device order code. | |
| User interface | Character string composed of letters, numbers and certain punctuation marks (e.g. /). | |
| Additional information | Description | |
| | The order code can be found on the nameplate of the sensor and transmitter in the "Order code" field. | |
| | The order code is generated from the extended order code through a process of reversibl transformation. The extended order code indicates the attributes for all the device feature | e res |

in the product structure. The device features are not directly readable from the order code.

Uses of the order code

- To order an identical spare device.
- To identify the device quickly and easily, e.g. when contacting Endress+Hauser.

£

Extended order code 1

| Navigation | Image: Second states and the second states are as a second state of the second states are as a second stat |
|------------------------|---|
| Description | Displays the first part of the extended order code. On account of length restrictions, the extended order code is split into a maximum of 3 parameters. |
| User interface | Character string |
| Additional information | Description The extended order code indicates the version of all the features of the product structure for the measuring device and thus uniquely identifies the measuring device. The extended order code can also be found on the nameplate of the sensor and transmitter in the "Ext. ord. cd." field. |

| â |
|---|
| |
| |
| |
| |
| |

| Extended order code 3 | | £ |
|------------------------|--|---|
| Navigation | Image: Barbon Structure Structure Image: Barbon Structure Structure Image: Barbon Structure Image: | |
| Description | For displaying the third part of the extended order code. | |
| User interface | Character string | |
| Additional information | For additional information, see Extended order code 1 parameter ($\Rightarrow \square 124$) | |

| TINTO | • |
|-------|---------|
| LIND | TOPCION |
| LINE | VELSION |
| | |

| Navigation | Image: Second states a second state states a second state states a second state states a second state state states a second state state states a second state state s |
|----------------|---|
| 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. Configuration counter

| Description | Displays the number of parameter modifications for the device. When the user changes a parameter setting, this counter is incremented. |
|-------------|--|

■ Expert \rightarrow Diagnostics \rightarrow Device info \rightarrow Config. counter (0233)

User interface 0 to 65535

Navigation

3.7.4 "Data logging" submenu

Navigation

■ Expert → Diagnostics → Data logging

| ► Data logging | |
|---------------------------|---------|
| Assign channel 1 (0851) | → 🗎 126 |
| Assign channel 2 (0852) | → 🗎 126 |
| Assign channel 3 (0853) | → 🗎 127 |
| Assign channel 4 (0854) | → 🗎 127 |
| Logging interval (0856) | → 🗎 127 |
| Clear logging data (0855) | → 🗎 128 |
| ► Display channel 1 | → 🗎 128 |
| ► Display channel 2 | → 🗎 129 |
| Display channel 3 | → 🗎 130 |
| ► Display channel 4 | → 🗎 130 |

| Assign channel 1 | | |
|------------------------|---|-------|
| Navigation | Image: Barbon Structure <th></th> | |
| Prerequisite | The Extended HistoROM application package is available. | |
| | The software options currently enabled are displayed in the Software option overview parameter ($\rightarrow \square 38$). | |
| Description | Use this function to select a process variable for the data logging channel. | |
| Selection | Off Volume flow Mass flow Temperature Current output | |
| Factory setting | Off | |
| Additional information | Description A total of 1000 measured values can be logged. This means: 1000 data points if 1 logging channel is used 500 data points if 2 logging channels are used 333 data points if 3 logging channels are used 250 data points if 4 logging channels are used 250 data points if 4 logging channels are used Once the maximum number of data points is reached, the oldest data points in the data are cyclically overwritten in such a way that the last 1000, 500, 333 or 250 measured values are always in the log (ring memory principle). The log contents are cleared if the option selected is changed. | a log |

| Assign channel 2 | | |
|------------------|---|--|
| Navigation | Image: Barbon Strain Stra | |
| Prerequisite | The Extended HistoROM application package is available. The software options currently enabled are displayed in the Software option overview parameter ($\rightarrow \cong 38$). | |
| Description | Options for the assignment of a process variable to the data logging channel. | |
| Selection | Picklist, see Assign channel 1 parameter (→ 🗎 126) | |
| Factory setting | Off | |

| Assign channel 3 | | £ |
|------------------|---|---|
| | | |
| Navigation | Image: Second Seco | |
| Prerequisite | The Extended HistoROM application package is available. | |
| | The software options currently enabled are displayed in the Software option overview parameter ($\rightarrow \cong 38$). | |
| Description | Options for the assignment of a process variable to the data logging channel. | |
| Selection | Picklist, see Assign channel 1 parameter ($\rightarrow \square$ 126) | |
| Factory setting | Off | |
| | | |
| Assign channel 4 | | A |
| | | |
| Navigation | ■ Expert → Diagnostics → Data logging → Assign chan. 4 (0854) | |
| Prerequisite | The Extended HistoROM application package is available. | |
| | The software options currently enabled are displayed in the Software option overview parameter ($\rightarrow \square 38$). | |

| Logging interval | | Â |
|------------------|---|---|
| Navigation | Image: Barbon State | |
| Prerequisite | The Extended HistoROM application package is available. | |
| | The software options currently enabled are displayed in the Software option overview parameter ($\rightarrow \square 38$). | |
| Description | Use this function to enter the logging interval t_{log} for data logging. | |
| User entry | 1.0 to 3 600.0 s | |

Picklist, see **Assign channel 1** parameter ($\rightarrow \square 126$)

Options for the assignment of a process variable to the data logging channel.

Factory setting 10.0 s

Description

Factory setting

Off

Selection

Description

This defines the interval between the individual data points in the data log, and thus the maximum loggable process time T_{log}:

- If 1 logging channel is used: $T_{log} = 1000 \times t_{log}$ If 2 logging channels are used: $T_{log} = 500 \times t_{log}$
- If 3 logging channels are used: $T_{log} = 333 \times t_{log}$
- If 4 logging channels are used: $T_{log} = 250 \times t_{log}$

Once this time elapses, the oldest data points in the data log are cyclically overwritten such that a time of Tlog always remains in the memory (ring memory principle).

The log contents are cleared if the length of the logging interval is changed. -

Example

If 1 logging channel is used:

- $T_{log} = 1000 \times 1 \text{ s} = 1\ 000 \text{ s} \approx 15 \text{ min}$
- $T_{log}^{109} = 1000 \times 10 \text{ s} = 10\ 000 \text{ s} \approx 3 \text{ h}$
- $T_{log} = 1000 \times 80 \text{ s} = 80\ 000 \text{ s} \approx 1 \text{ d}$
- $T_{log} = 1000 \times 3600 \text{ s} = 3600000 \text{ s} \approx 41 \text{ d}$

| Clear logging data | | |
|------------------------|---|--|
| Navigation | Image: Expert → Diagnostics → Data logging → Clear logging (0855) | |
| Prerequisite | The Extended HistoROM application package is available. | |
| | The software options currently enabled are displayed in the Software option overview parameter ($\rightarrow \cong 38$). | |
| Description | Option to clear the entire logging data. | |
| Selection | CancelClear data | |
| Factory setting | Cancel | |
| Additional information | Selection | |
| | Cancel The data is not cleared. All the data is retained. Clear data The logging data is cleared. The logging process starts from the beginning. | |

"Display channel 1" submenu

Navigation Expert \rightarrow Diagnostics \rightarrow Data logging \rightarrow Displ.channel 1

| ► Display channel 1 | | |
|---------------------|-------------------|-----------|
| | Display channel 1 |) → 🖺 129 |

| Display channel 1 | |
|------------------------|--|
| Navigation | ■ Expert → Diagnostics → Data logging → Displ.channel 1 |
| Prerequisite | The Extended HistoROM application package is available. |
| | The software options currently enabled are displayed in the Software option overview parameter ($\rightarrow \cong 38$). |
| | One of the following options is selected in the Assign channel 1 parameter (→ ¹ 126): Volume flow Mass flow Temperature Current output |
| Description | Displays the measured value trend for the logging channel in the form of a chart. |
| Additional information | Description |
| | \$* //XXXXXXXX 175.77 40.69 l/h -100s 0 |

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

"Display channel 2" submenu

Navigation \blacksquare Expert \rightarrow Diagnostics \rightarrow Data logging \rightarrow Displ.channel 2

| ► Display channel 2 | | |
|---------------------|-------------------|-----------|
| | Display channel 2 |) → 🖺 129 |

| Display channel 2 | | |
|-------------------|---|--|
| Navigation | ■ Expert \rightarrow Diagnostics \rightarrow Data logging \rightarrow Displ.channel 2 | |
| Prerequisite | A process variable is defined in the Assign channel 2 parameter. | |
| Description | See the Display channel 1 parameter $\rightarrow \bigoplus 129$ | |

"Display channel 3" submenu

Navigation \blacksquare Expert \rightarrow Diagnostics \rightarrow Data logging \rightarrow Displ.channel 3

| ► Display channel 3 | | |
|---------------------|-------------------|-----------|
| | Display channel 3 |) → 🖺 130 |

Display channel 3

| Navigation | Expert → Diagnostics → Data logging → Displ.channel 3 | |
|--------------|---|--|
| Prerequisite | A process variable is defined in the Assign channel 3 parameter. | |
| Description | See the Display channel 1 parameter $\rightarrow \triangleq 129$ | |

"Display channel 4" submenu

Navigation \blacksquare Expert \rightarrow Diagnostics \rightarrow Data logging \rightarrow Displ.channel 4

| ► Display channel 4 | | |
|---------------------|-------------------|---------|
| | Display channel 4 | → 🗎 130 |

Display channel 4

NavigationImage: Expert → Diagnostics → Data logging → Displ.channel 4PrerequisiteA process variable is defined in the Assign channel 4 parameter.DescriptionSee the Display channel 1 parameter → Image: 129

3.7.5 "Min/max values" submenu

Navigation $\blacksquare \blacksquare$ Expert \rightarrow Diagnostics \rightarrow Min/max val.

| ► Min/max values | |
|--------------------------|---------|
| ► Electronic temperature | → 🗎 131 |
| ► Process temperature | → 🗎 132 |

"Electronic temperature" submenu

Navigation $\blacksquare \Box$ Expert \rightarrow Diagnostics \rightarrow Min/max val. \rightarrow Electronic temp.

| ► Electronic temperature | |
|--------------------------|---------|
| Minimum value (3445) | → 🗎 131 |
| Maximum value (3444) | → 🗎 131 |

| Minimum value | |
|------------------------|--|
| Navigation | ■ Expert → Diagnostics → Min/max val. → Electronic temp. → Minimum value (3445) |
| Description | Displays the lowest previously measured temperature value of the main electronics module. |
| User interface | –273.15 to 726.75 °C |
| Additional information | Dependency The unit is taken from the Temperature unit parameter ($\Rightarrow \square 49$) |

| Maximum value | | |
|----------------|--|--|
| Navigation | ■ Expert → Diagnostics → Min/max val. → Electronic temp. → Maximum value (3444) | |
| Description | Displays the highest previously measured temperature value of the main electronics module. | |
| User interface | -273.15 to 726.75 °C | |

Dependency The unit is taken from the **Temperature unit** parameter ($\Rightarrow \square 49$)

"Process temperature" submenu

Navigation $\blacksquare \blacksquare$ Expert \rightarrow Diagnostics \rightarrow Min/max val. \rightarrow Process temp.

| [| ► Process temperature | |
|---|-----------------------|---------|
| | Minimum value (3447) | → 🗎 132 |
| | Maximum value (3446) | → 🗎 132 |

| Minimum value | | |
|------------------------|--|--|
| Navigation | Image: Barbon Structure And Antipactics → Min/max val. → Process temp. → Minimum value (3447) | |
| Description | Displays the lowest previously measured process temperature. | |
| User interface | –273.15 to 726.75 °C | |
| Additional information | Dependency The unit is taken from the Temperature unit parameter ($\rightarrow \cong 49$) | |

| Maximum value | | |
|------------------------|---|--|
| Navigation | Image: Barbon Structure | |
| Description | Displays the highest previously measured process temperature. | |
| User interface | −273.15 to 726.75 °C | |
| Additional information | Dependency The unit is taken from the Temperature unit parameter ($\rightarrow \square 49$) | |

3.7.6 "Simulation" submenu

Navigation

 $\blacksquare \blacksquare \quad \text{Expert} \rightarrow \text{Diagnostics} \rightarrow \text{Simulation}$

| ► Simulation | | |
|--------------|---|-----------|
| | Assign simulation process variable (1810) | → 🗎 133 |
| | Value process variable (1811) |) → 🗎 134 |
| | Simulation status input (1355) |) → 🗎 134 |
| | Input signal level (1356) |) → 🗎 135 |
| | Simulation current output 1 (0354–1) |) → 🗎 135 |
| | Value current output 1 (0355–1) |) → 🗎 135 |
| | Frequency simulation (0472) |) → 🗎 136 |
| | Frequency value (0473) |) → 🗎 136 |
| | Pulse simulation (0458) |) → 🗎 137 |
| | Pulse value (0459) |) → 🗎 137 |
| | Switch output simulation (0462) |) → 🗎 137 |
| | Switch status (0463) |) → 🗎 138 |
| | Simulation device alarm (0654) | → 🗎 138 |
| | Diagnostic event category (0738) |) → 🗎 139 |
| | Simulation diagnostic event (0737) |) → 🗎 139 |

| Assign simulation process variable | | 1 |
|------------------------------------|---|---|
| Navigation | Image: Barbon Simulation → Assign proc.var. (1810) | |
| Description | Use this function to select a process variable for the simulation process that is activated. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress. | |
| Selection | Off Volume flow Mass flow Temperature | |

Factory setting

Off Description

Additional information

The simulation value of the process variable selected is defined in the Value process variable parameter ($\rightarrow \cong 134$).

| Value process variable | |
|------------------------|--|
| Navigation | □ Expert → Diagnostics → Simulation → Value proc. var. (1811) |
| Description | Use this function to enter a simulation value for the selected process variable. Subsequent measured value processing and the signal output use this simulation value. In this way, users can verify whether the measuring device has been configured correctly. |
| User entry | Depends on the process variable selected |
| Factory setting | 0 |
| Additional information | User entry |
| | The unit of the displayed measured value is taken from the System units submenu $(\rightarrow \cong 45)$. |

| Simulation status input | Â |
|-------------------------|---|
| Navigation | Image: Barbon Simulation → Sim. status inp. (1355) |
| Prerequisite | For the following order code: "Output; input", option Q "4-20mA HART, pul./freq./switch; status input" |
| Description | Use this function to switch simulation of the status input on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress. |
| Selection | OffOn |
| Factory setting | Off |
| Additional information | Description If the desired simulation value is defined in the Input signal level parameter (→ 135). Selection Off Simulation for the status input is switched off. The device is in normal measuring mode or another process variable is being simulated. On Simulation for the status input is active. |

| Input signal level | | ß |
|--------------------------|--|----|
| Navigation | Image: Barbon Simulation → Signal level (1356) | |
| Prerequisite | In the Simulation status input parameter ($\rightarrow 	extsf{B}	extsf{134}$), the On option is selected. | |
| Description | Use this function to select the signal level for the simulation of the status input. In this way, users can verify the correct configuration of the status input and the correct functi of upstream feed-in units. | on |
| Selection | HighLow | |
| Factory setting | High | |
| Simulation current outpu | t 1 | Ê |
| Navigation | ■ Expert → Diagnostics → Simulation → Sim.curr.out. 1 (0354–1) | |
| Description | Use this function to switch simulation of the current output on and off. The display alternates between the measured value and a diagnostic message of the "Function check category (C) while simulation is in progress. | k" |
| Selection | OffOn | |
| Factory setting | Off | |
| Additional information | Description The desired simulation value is specified in the Value current output 1 parameter ($\rightarrow \cong 135$). Selection | |
| | Off Current simulation is switched off. The device is in normal measuring mode or anothe process variable is being simulated. On Current simulation is active. | er |

| Value current output 1 | | A |
|------------------------|--|-----|
| Navigation | Image: Barbon Simulation → Value curr.out 1 (0355–1) | |
| Prerequisite | In the Simulation current output 1 parameter, the On option is selected. | |
| Description | Use this function to enter a current value for the simulation. In this way, users can ver the correct adjustment of the current output and the correct function of downstream switching units. | ify |

```
3.59 to 22.5 mA
```

| Frequency simulation | |
|------------------------|---|
| Navigation | Image: Barbon Simulation → Frequency sim. (0472) |
| Prerequisite | In the Operating mode parameter ($\rightarrow \cong$ 83), the Frequency option is selected. |
| Description | Use this function to switch simulation of the frequency output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress. |
| Selection | OffOn |
| Factory setting | Off |
| Additional information | Description The desired simulation value is defined in the Frequency value parameter $(\rightarrow \cong 136)$. |
| | Selection Off Frequency simulation is switched off. The device is in normal measuring mode or another process variable is being simulated. On Frequency simulation is active. |

| Frequency value | |
|-----------------|---|
| Navigation | Image: Barbon Simulation → Freq. value (0473) |
| Prerequisite | In the Frequency simulation parameter ($\rightarrow \square$ 136), the On option is selected. |
| Description | Use this function to enter a frequency value for the simulation. In this way, users can verify the correct adjustment of the frequency output and the correct function of downstream switching units. |
| User entry | 0.0 to 1250.0 Hz |
| Factory setting | 0.0 Hz |

| Pulse simulation | |
|------------------------|---|
| Navigation | Image: Barbon Simulation → Pulse sim. (0458) |
| Prerequisite | In the Operating mode parameter ($\rightarrow \cong$ 83), the Pulse option is selected. |
| Description | Use this function to switch simulation of the pulse output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress. |
| Selection | OffFixed valueDown-counting value |
| Factory setting | Off |
| Additional information | Description If the desired simulation value is defined in the Pulse value parameter (→ ≅ 137). 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 (→ |

| ■ Expert \rightarrow Diagnostics \rightarrow Simulation \rightarrow Pulse value (0459) |
|---|
| In the Pulse simulation parameter ($\rightarrow \square$ 137), the Down-counting value option is selected. |
| 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. |
| 0 to 65 535 |
| |

| Switch output simulation | | £ |
|--------------------------|---|---|
| Navigation | Image: Simulation → Switch sim. (0462) (0462) | |
| Prerequisite | In the Operating mode parameter ($\rightarrow \square$ 83), 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 | OffOn |
| Factory setting | Off |
| Additional information | <i>Description</i> The desired simulation value is defined in the Switch status parameter ($\rightarrow \cong 138$). |
| | 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 | |
|------------------------|--|
| Navigation | Image: Barbon Simulation → Switch status (0463) |
| Prerequisite | In the Switch output simulation parameter ($\rightarrow \cong 137$), 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 | OpenClosed |
| Factory setting | Open |
| 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. |

| Simulation device alarm | | |
|-------------------------|--|--|
| Navigation | Image: Barbon Simulation → Sim. alarm (0654) | |
| Description | Use this function to switch the device alarm on and off. | |

| Selection | OffOn |
|------------------------|---|
| Factory setting | Off |
| Additional information | Description |
| | The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress. |

| Diagnostic event category | |
|---------------------------|---|
| Navigation | ■ Expert → Diagnostics → Simulation → Event category (0738) |
| Description | Use this function to select the category of the diagnostic events that are displayed for the simulation in the Simulation diagnostic event parameter ($\rightarrow \square$ 139). |
| Selection | Sensor Electronics Configuration Process |
| Factory setting | Sensor |

| Simulation diagnostic event | | |
|-----------------------------|---|--|
| Navigation | Image: Barbon Simulation → Sim. diag. event (0737) | |
| Description | Use this function to select a diagnostic event for the simulation process that is activated. | |
| Selection | OffDiagnostic event picklist (depends on the category selected) | |
| Factory setting | Off | |
| Additional information | Description | |
| | For the simulation, you can choose from the diagnostic events of the category selected in the Diagnostic event category parameter ($\rightarrow \cong 139$). | |

4 Country-specific factory settings

4.1 SI units

🚹 Not valid for USA and Canada.

4.1.1 System units

| Volume flow | l/h |
|-------------|-------------------|
| Volume | 1 |
| Mass flow | kg/h |
| Mass | kg |
| Density | kg/m ³ |
| Temperature | °C |
| Length | mm |

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

t-mass T

| DN [mm] | [l/h] |
|------------|--------|
| 50 | 35200 |
| 150 | 317000 |

4.1.3 Output current span

```
    Current output 1
    4 to 20 mA NAMUR
```

4.1.4 Pulse value

t-mass T

| Nominal diameter [mm] | [1] |
|--------------------------|-----|
| 50 | 1 |
| 150 | 100 |

4.1.5 On value low flow cut off

The switch-on point depends on the type of medium and the nominal diameter.

t-mass T

| Nominal diameter [mm] | [1/h] |
|--------------------------|-------|
| 50 | 352 |
| 150 | 3170 |

4.2 US units

Only valid for USA and Canada.

4.2.1 System units

| Volume flow | gal/min (us) |
|-------------|--------------------|
| Volume | gal (us) |
| Mass flow | lb/min |
| Mass | lb |
| Density | lb/ft ³ |
| Temperature | °F |
| Length | in |

4.2.2 Full scale values

1 The factory settings applie to the following parameters:

- 20 mA value (full scale value of the current output)
- 100% bar graph value 1

t-mass T

| DN [in] | [gal(us)/h] |
|------------|-------------|
| 2 | 9300 |
| 6 | 84000 |

4.2.3 Output current span

| Current output 1 | 4 to 20 mA US | |
|------------------|---------------|--|
|------------------|---------------|--|

4.2.4 Pulse value

t-mass T

| Nominal diameter [in] | [gal(us)] |
|--------------------------|-----------|
| 2 | 5 |
| 6 | 50 |

4.2.5 On value low flow cut off

The switch-on point depends on the type of medium and the nominal diameter.

t-mass T

| Nominal diameter [in] | [gal(us)/h] |
|--------------------------|-------------|
| 2 | 93 |
| 6 | 840 |

5 Explanation of abbreviated units

5.1 SI units

| Process variable | Units | Explanation |
|------------------|--|--|
| Density | g/cm ³ | Gram/volume unit |
| | kg/l, kg/dm³, kg/m³ | Kilogram/volume unit |
| Length | mm, m | Millimeter, meter |
| Mass | g, kg, t | Gram, kilogram, metric ton |
| Mass flow | g/s, g/min, g/h, g/d | Gram/time unit |
| | kg/s, kg/min, kg/h, kg/d | Kilogram/time unit |
| | t/s, t/min, t/h, t/d | Metric ton/time unit |
| Temperature | °С, К | Celsius, Kelvin |
| Volume | cm ³ , dm ³ , m ³ | Cubic centimeter, cubic decimeter, cubic meter |
| | ml, l, hl, Ml Mega | Milliliter, liter, hectoliter, megaliter |
| Volume flow | cm ³ /s, cm ³ /min, cm ³ /h, cm ³ /d | Cubic centimeter/time unit |
| | dm³/s, dm³/min, dm³/h, dm³/d | Cubic decimeter/time unit |
| | m ³ /s, m ³ /min, m ³ /h, m ³ /d | Cubic meter/time unit |
| | ml/s, ml/min, ml/h, ml/d | Milliliter/time unit |
| | l/s, l/min, l/h, l/d | Liter/time unit |
| | hl/s, hl/min, hl/h, hl/d | Hectoliter/time unit |
| | Ml/s, Ml/min, Ml/h, Ml/d | Megaliter/time unit |
| Time | s, m, h, d, y | Second, minute, hour, day, year |

5.2 US units

| Process variable | Units | Explanation |
|-------------------|--|--|
| Density | lb/ft ³ | Pound/cubic foot |
| Length in, ft | | Inch, foot |
| Mass oz, lb, STon | | Ounce, pound, standard ton |
| Mass flow | oz/s, oz/min, oz/h, oz/d | Ounce/time unit |
| | lb/s, lb/min, lb/h, lb/d | Pound/time unit |
| | STon/s, STon/min, STon/h, STon/d | Standard ton/time unit |
| Temperature | °F, °R | Fahrenheit, Rankine |
| Volume | af | Acre foot |
| | ft ³ | Cubic foot |
| | fl oz (us), gal (us), kgal (us), Mgal (us) | Fluid ounce, gallon, kilogallon, million gallon |
| | bbl (us;liq.), bbl (us;beer), bbl (us;oil), bbl (us;tank) | Barrel (normal liquids), barrel (beer), barrel (petrochemicals), barrel (filling tanks) |
| Volume flow | af/s, af/min, af/h, af/d | Acre foot/time unit |
| | ft ³ /s, ft ³ /min, ft ³ /h, ft ³ /d | Cubic foot/time unit |
| | fl oz/s (us), fl oz/min (us), fl oz/h (us), fl oz/d (us) | Fluid ounce/time unit |

| Process variable | Units | Explanation |
|------------------|---|---|
| | gal/s (us), gal/min (us), gal/h (us), gal/d (us) | Gallon/time unit |
| | kgal/s (us), kgal/min (us), kgal/h (us), kgal/d (us) | Kilogallon/time unit |
| | Mgal/s (us), Mgal/min (us), Mgal/h (us), Mgal/d (us) | Million gallon/time unit |
| | bbl/s (us;liq.), bbl/min (us;liq.), bbl/h (us;liq.), bbl/d (us;liq.) | Barrel/time unit (normal liquids) Normal liquids: 31.5 gal/bbl |
| | bbl/s (us;beer), bbl/min (us;beer), bbl/h (us;beer), bbl/d (us;beer) | Barrel /time unit (beer) Beer: 31.0 gal/bbl |
| | bbl/s (us;oil), bbl/min (us;oil), bbl/h (us;oil), bbl/d (us;oil) | Barrel/time unit (petrochemicals) Petrochemicals: 42.0 gal/bbl |
| | bbl/s (us;tank), bbl/min (us;tank), bbl/h (us;tank), bbl/d (us;tank) | Barrel/time unit (filling tank) Filling tanks: 55.0 gal/bbl |
| Time | s, m, h, d, y | Second, minute, hour, day, year |
| | am, pm | Ante meridiem (before midday), post meridiem (after midday) |

5.3 Imperial units

| Process variable | Units | Explanation |
|------------------|---|--|
| Mass | LTon | Long ton |
| Mass flow | LTon/s, LTon/min, LTon/h, LTon/d | Long ton/time unit |
| Volume | gal (imp), Mgal (imp) | Gallon, mega gallon |
| | bbl (imp;oil) | Barrel (petrochemicals) |
| Volume flow | gal/s (imp), gal/min (imp), gal/h (imp), gal/d (imp) | Gallon/time unit |
| | Mgal/s (imp), Mgal/min (imp), Mgal/h (imp), Mgal/d (imp) | Mega gallon/time unit |
| | bbl/s (imp;oil), bbl/min (imp;oil), bbl/h (imp;oil), bbl/d (imp;oil) | Barrel/time unit (petrochemicals) Petrochemicals: 34.97 gal/bbl |
| Time | s, m, h, d, y | Second, minute, hour, day, year |
| | am, pm | Ante meridiem (before midday), post meridiem (after midday) |
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