Description of Device Parameters
Prosonic Flow Heat

Ultrasonic time-of-flight flowmeter

Endress+Hauser [EH]

People for Process Automation
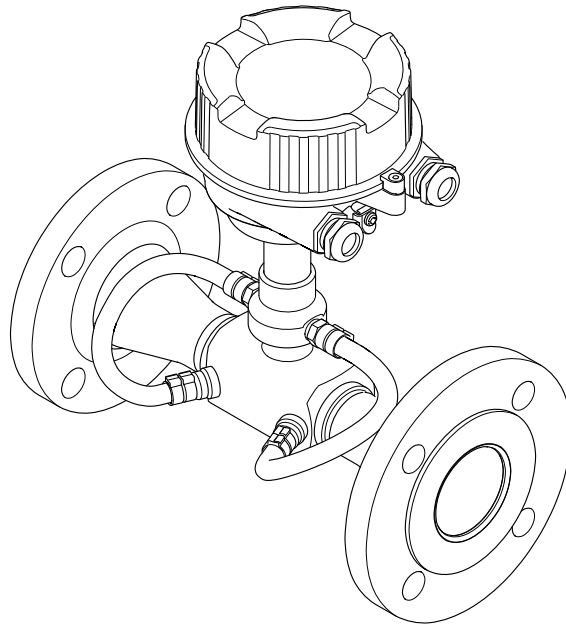
Table of contents

1   About this document

1.1   Document function

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

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

1.2   Target group

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

1.3   Using this document

1.3.1   Information on the document structure

The document lists the submenus and their parameters according to the structure from the **Expert** menu (→ 🖺 8), which is displayed when the **"Maintenance" user role** is enabled.
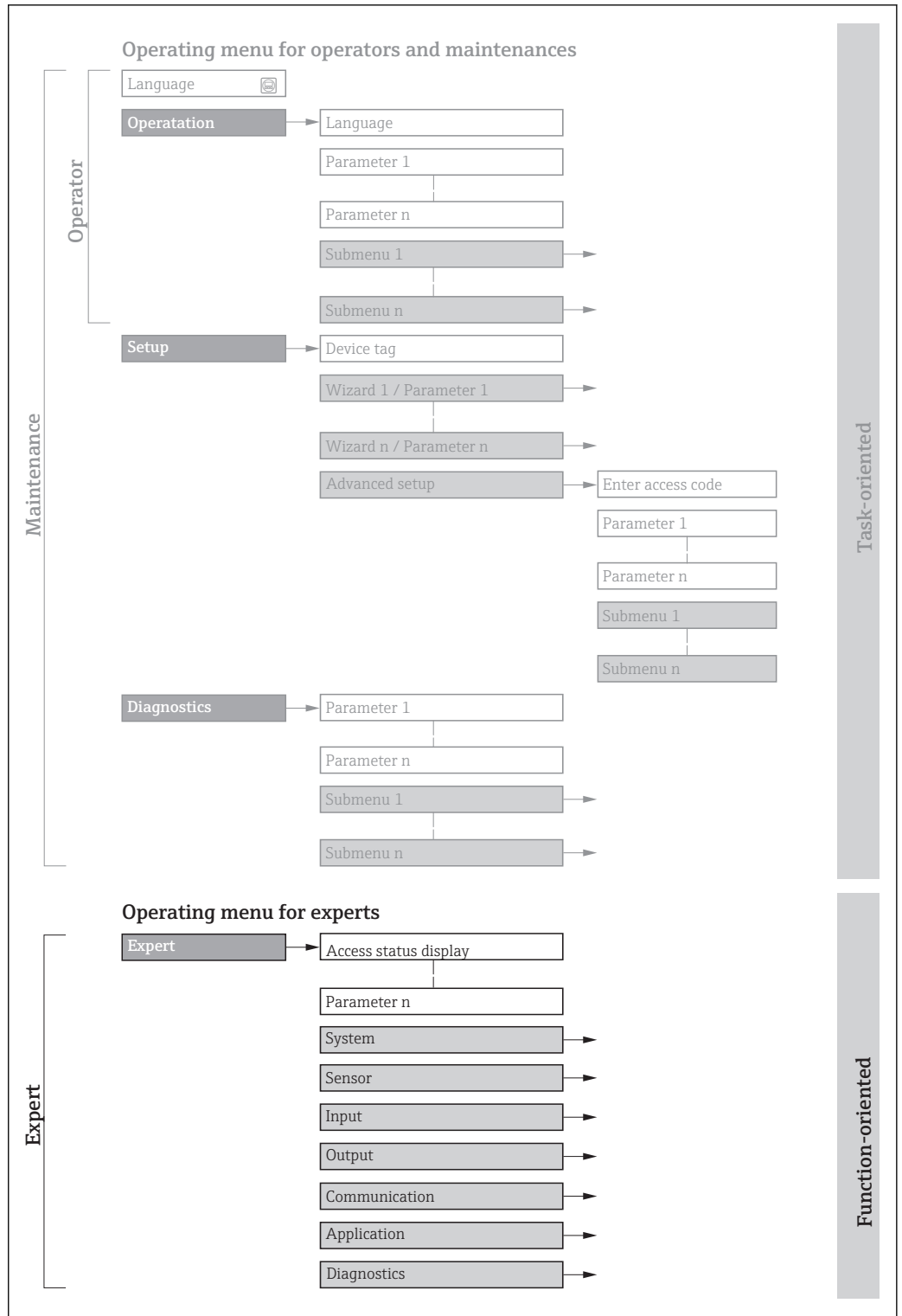
■ 1   Sample graphic for the schematic layout of the operating menu

Additional information regarding:
- The arrangement of the parameters according to the menu structure of the **Operation** menu, **Setup** menu, **Diagnostics** menu with a brief description: Operating Instructions
- Operating concept of the operating menus: Operating Instructions

1.3.2   Structure of a parameter description

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

Complete parameter name	Write-protected parameter = 🔒

Navigation	🖥	Navigation path to the parameter via the operating tool The names of the menus, submenus and parameters are displayed in abbreviated format.
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.
📖	Reference to documentation
📄	Reference to page
🖼	Reference to graphic
🖥	Operation via operating tool
🔒	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		

1.5   Documentation

1.5.1   Standard documentation

Operating Instructions

Measuring device	Documentation code
Prosonic Flow E Heat	BA01793D

1.5.2   Supplementary device-dependent documentation

Special documentation

Contents	Documentation code
Information on the Pressure Equipment Directive	SD01614D
RFID TAG	SD01565D

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	
Locking status (0004)	→ 🖹 10
Access stat.tool (0005)	→ 🖹 11
Ent. access code (0003)	→ 🖹 11
▶ System	→ 🖹 11
▶ Diagn. handling	→ 🖹 12
▶ Administration	→ 🖹 18
▶ Sensor	→ 🖹 19
▶ Measured val.	→ 🖹 19
▶ System units	→ 🖹 25
▶ Process param.	→ 🖹 31
▶ Sensor adjustm.	→ 🖹 35
▶ Calibration	→ 🖹 38
▶ Output	→ 🖹 41
▶ PFS output 1	→ 🖹 41
▶ Application	→ 🖹 52
Reset all tot. (2806)	→ 🖹 52
▶ Totalizer 1 to n	→ 🖹 53
▶ Diagnostics	→ 🖹 58
Actual diagnos. (0691)	→ 🖹 58
Timestamp (0667)	→ 🖹 59
Prev.diagnostics (0690)	→ 🖹 59

Timestamp (0672)	→ 🖺	59
Time fr. restart (0653)	→ 🖺	60
Operating time (0652)	→ 🖺	60
▸ Diagnostic list	→ 🖺	60
▸ Event logbook	→ 🖺	64
▸ Device info	→ 🖺	66
▸ Mainboard module	→ 🖺	69
▸ Simulation	→ 🖺	70

3   Description of device parameters

In the following section, the parameters are listed according to the menu structure of the operating tool.

⟆ Expert		
Locking status (0004)	→ 🕮	10
Access stat.tool (0005)	→ 🕮	11
Ent. access code (0003)	→ 🕮	11
▶ System	→ 🕮	11
▶ Sensor	→ 🕮	19
▶ Output	→ 🕮	41
▶ Application	→ 🕮	52
▶ Diagnostics	→ 🕮	58

Locking status

Navigation   ▤   Expert → Locking status (0004)

Description   Displays the active write protection.

User interface   • CT act.-all par.
                          • Temp. locked

Additional information   *Display*

If two or more types of write protection are active, all the active types of write protection are displayed in the operating tool.

📖   Detailed information on access authorization is provided in the "User roles and associated access authorization" and "Operating concept" sections of the Operations Instructions for the device → 🕮 7

Selection

Options	Description
CT act.-all par.	Write access to all parameters is locked (via the operating tool).
Temp. locked	Write access to the parameters is temporarily locked on account of internal processes running in the device (e.g. data upload/download, reset etc.). Once the internal processing has been completed, the parameters can be changed once again.

Access stat.tool

Navigation	▤ Expert → Access stat.tool (0005)
Description	Displays the access authorization to the parameters via the operating tool.
User interface	• Operator • Maintenance
Factory setting	Maintenance
Additional information	*Description*

    ℹ️ Access authorization can be modified via the **Ent. access code** parameter (→ 🖹 11).

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

Display

    📖 Detailed information on access authorization is provided in the "User roles and associated access authorization" and "Operating concept" sections of the Operations Instructions for the device → 🖹 7
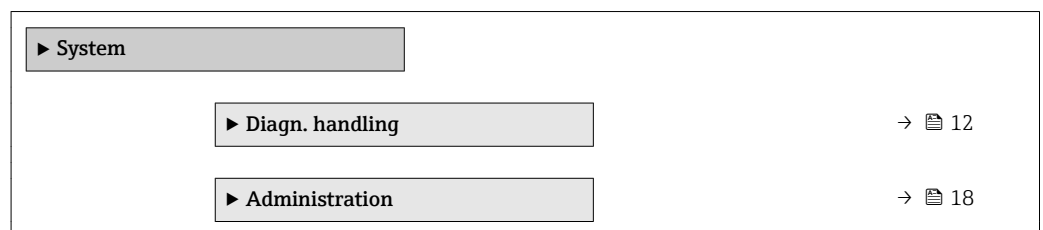

Ent. access code

Navigation	▤ Expert → Ent. access code (0003)
Description	Use this function to enter the user-specific release code to remove parameter write protection.
User entry	0 to 9 999

3.1   "System" submenu

Navigation   ▤   Expert → System

▸ System	
▸ Diagn. handling	→ 🖹 12
▸ Administration	→ 🖹 18

3.1.1   "Diagn. handling" submenu

Navigation   🔲   Expert → System → Diagn. handling

▸ Diagn. handling		
	Alarm delay (0651)	→ 📖 12
	▸ Diagn. behavior	→ 📖 12

Alarm delay   🔊

Navigation	🔲 Expert → System → Diagn. handling → Alarm delay (0651)
Description	Use this function to enter the time interval until the device generates a diagnostic message.
	ℹ️ The diagnostic message is reset without a time delay.
User entry	0 to 60 s
Factory setting	0 s
Additional information	*Result*

This setting affects the following diagnostic messages:
- 832 Electronic temp.
- 833 Electronic temp.
- 834 Process temp.
- 835 Process temp.

"Diagn. 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 **Diagn. behavior** submenu (→ 📖 12).

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.

Options	Description
Logbook only	
Off	The diagnostic event is ignored, and no diagnostic message is generated or entered.

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

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

▸ Diagn. behavior

Diagnostic no. 302 (0742)	→ 🖺 13
Diagnostic no. 832 (0675)	→ 🖺 14
Diagnostic no. 833 (0676)	→ 🖺 14
Diagnostic no. 834 (0677)	→ 🖺 14
Diagnostic no. 835 (0678)	→ 🖺 15
Diagnostic no. 840 (0680)	→ 🖺 15
Diagnostic no. 442 (0658)	→ 🖺 16
Diagnostic no. 443 (0659)	→ 🖺 16
Diagnostic no. 125 (0775)	→ 🖺 16
Diagnostic no. 124 (0774)	→ 🖺 17
Diagnostic no. 160 (0776)	→ 🖺 17
Diagnostic no. 881 (0724)	→ 🖺 17

Diagnostic no. 302 (Verific. active)   🔒

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

Description   Option for changing the diagnostic behavior of the diagnostic message **302 Verific. active**.

Selection   • Off
• Alarm
• Warning
• Logbook only

Factory setting   Warning

Additional information   ℹ️ Detailed description of the options available for selection: → 🗎 12

Diagnostic no. 832 (Electronic temp.)   🔒

Navigation	▤ Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 832 (0675)
Description	Option for changing the diagnostic behavior of the diagnostic message **832 Electronic temp.**.
Selection	• Off • Alarm • Warning • Logbook only
Factory setting	Warning
Additional information	*Selection* ℹ️ Detailed description of the options available for selection: → 🗎 12

Diagnostic no. 833 (Electronic temp.)   🔒

Navigation	▤ Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 833 (0676)
Description	Option for changing the diagnostic behavior of the diagnostic message **833 Electronic temp.**.
Selection	• Off • Alarm • Warning • Logbook only
Factory setting	Warning
Additional information	*Selection* ℹ️ Detailed description of the options available for selection: → 🗎 12

Diagnostic no. 834 (Process temp.)   🔒

Navigation	▤ Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 834 (0677)
Description	Option for changing the diagnostic behavior of the diagnostic message **834 Process temp.**.

Selection	• Off
	• Alarm
	• Warning
	• Logbook only

Factory setting   Warning

Additional information   *Selection*

    ℹ Detailed description of the options available for selection: → 🖹 12

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

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

Description   Option for changing the diagnostic behavior of the diagnostic message **835 Process temp.**.

Selection	• Off
	• Alarm
	• Warning
	• Logbook only

Factory setting   Warning

Additional information   *Selection*

    ℹ Detailed description of the options available for selection: → 🖹 12

Diagnostic no. 841 (Sensor range)   🔒

Navigation	🖳 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 840 (0680)

Description   Option for changing the diagnostic behavior of the diagnostic message **841 Sensor range**.

Selection	• Off
	• Alarm
	• Warning
	• Logbook only

Factory setting   Warning

Additional information   ℹ Detailed description of the options available for selection: → 🖹 12

Diagnostic no. 442 (Freq. output)   🔒

Navigation	⊠ Expert → 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 Freq. output**.
Selection	• Off • Alarm • Warning • Logbook only
Factory setting	Warning
Additional information	*Selection* ℹ️ Detailed description of the options available for selection: → 🖹 12

Diagnostic no. 443 (Pulse output)   🔒

Navigation	⊠ Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 443 (0659)
Prerequisite	The measuring device has a pulse/frequency/switch output.
Description	Option for changing the diagnostic behavior of the diagnostic message **443 Pulse output**.
Selection	• Off • Alarm • Warning • Logbook only
Factory setting	Warning
Additional information	*Selection* ℹ️ Detailed description of the options available for selection: → 🖹 12

Diagnostic no. 125 (Rel. sound vel.)   🔒

Navigation	⊠ Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 125 (0775)
Description	Option for changing the diagnostic behavior of the diagnostic message **125 Rel. sound vel.**.
Selection	• Off • Alarm • Warning • Logbook only

Factory setting	Warning
Additional information	ℹ️ Detailed description of the options available for selection: → 🖹 12

Diagnostic no. 124 (Rel.sig.strength) 🔒

Navigation	🖊 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 124 (0774)
Description	Option for changing the diagnostic behavior of the diagnostic message **124 Rel.sig.strength**.
Selection	• Off • Alarm • Warning • Logbook only
Factory setting	Warning
Additional information	ℹ️ Detailed description of the options available for selection: → 🖹 12

Diagnostic no. 160 (Signal path off) 🔒

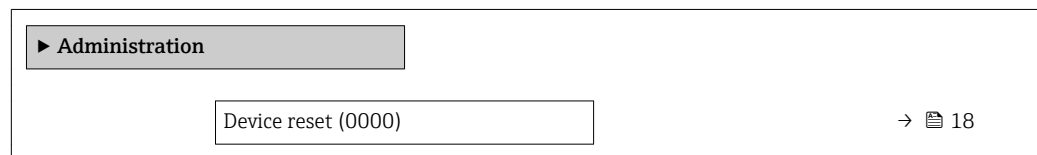| Navigation	🖊 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 160 (0776)
Description	Option for changing the diagnostic behavior of the diagnostic message **160 Signal path off**.
Selection	• Off • Alarm • Warning • Logbook only
Factory setting	Warning
Additional information	ℹ️ Detailed description of the options available for selection: → 🖹 12

Diagnostic no. 881 (Sen.sig. path 1 to n) 🔒

Navigation	🖊 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 881 (0724)
Description	Option for changing the diagnostic behavior of the diagnostic message **881 Sen.sig. path 1 to n**.

Selection	• Off
	• Alarm
	• Warning
	• Logbook only

| Factory setting | Warning |

Additional information   ℹ️ Detailed description of the options available for selection: → 🕮 12

3.1.2   "Administration" submenu

Navigation   📖   Expert → System → Administration

```
┌─────────────────────────────────────────────────────────────────────────┐
│  ▶ Administration                                                         │
│                                                                           │
│                         Device reset (0000)                    → 🕮 18    │
└─────────────────────────────────────────────────────────────────────────┘
```

Device reset   🔒

| Navigation | 📖   Expert → System → Administration → Device reset (0000) |

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

Selection	• Cancel
	• To delivery set.
	• Restart device
	• Rest.S-DATBackup

| Factory setting | Cancel |

Additional information   *Selection*

Options	Description
Cancel	No action is executed and the user exits the parameter.
To delivery set.	Every parameter for which a customer-specific default setting was ordered is reset to this customer-specific value. All other parameters are reset to the factory setting. ℹ️ This option is not visible if no customer-specific settings have been ordered.
Restart device	The restart resets every parameter whose data are in the volatile memory (RAM) to the factory setting (e.g. measured value data). The device configuration remains unchanged.

3.2 "Sensor" submenu

Navigation   ▣   Expert → Sensor

```
‣ Sensor
                    ‣ Measured val.                              →  🗎 19
                    ‣ System units                              →  🗎 25
                    ‣ Process param.                            →  🗎 31
                    ‣ External comp.
                    ‣ Sensor adjustm.                           →  🗎 35
                    ‣ Calibration                               →  🗎 38
```

3.2.1 "Measured val." submenu

Navigation   ▣   Expert → Sensor → Measured val.

```
‣ Measured val.
                    ‣ Process variab.                           →  🗎 19
                    ‣ System values                             →  🗎 21
                    ‣ Totalizer                                 →  🗎 23
```

"Process variab." submenu

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

```
‣ Process variab.
                    Volume flow (1838)                          →  🗎 20
                    Mass flow (1847)                            →  🗎 20
                    Sound velocity (1850)                       →  🗎 20
                    Flow velocity (1852)                        →  🗎 20
                    Temperature (1853)                          →  🗎 21
```

Volume flow

Navigation	⊟ Expert → Sensor → Measured val. → Process variab. → Volume flow (1838)
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 (→ 🖺 25)

Mass flow

Navigation	⊟ Expert → Sensor → Measured val. → Process variab. → Mass flow (1847)
Description	Displays the mass flow currently calculated.
User interface	Signed floating-point number
Additional information	*Dependency*
	The unit is taken from the **Mass flow unit** parameter (→ 🖺 27)

Sound velocity

Navigation	⊟ Expert → Sensor → Measured val. → Process variab. → Sound velocity (1850)
Description	Displays the sound velocity currently measured.
User interface	Signed floating-point number

Flow velocity

Navigation	⊟ Expert → Sensor → Measured val. → Process variab. → Flow velocity (1852)
Description	Displays the flow velocity currently measured.
User interface	Signed floating-point number

Temperature

Navigation	🖳⊟ Expert → Sensor → Measured val. → Process variab. → Temperature (1853)
Description	Displays the medium temperature currently measured.
User interface	Signed floating-point number
Additional information	*Dependency*

  ℹ️ The unit is taken from the **Temperature unit** parameter (→ 🗎 28)

"System values" submenu

Navigation   🖳⊟   Expert → Sensor → Measured val. → System values

```
▶ System values

        Signal strength (2914)              → 🗎 21

        Asymmetry (2913)                    → 🗎 22

        SNR (2917)                          → 🗎 22

        Turbulence (2907)                   → 🗎 23
```

Signal strength

Navigation	🖳⊟ Expert → Sensor → Measured val. → System values → Signal strength (2914)
Description	Use this function to display the current signal strength.
User interface	Signed floating-point number
Additional information	*Description*

A drop in the signal strength over time can be an indicator of deposit buildup on the converter or high ultrasonic damping in the gas. A very fast drop is an indication of a high concentration of CO_2.

Acceptance rate

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

Asymmetry

Navigation	▣ Expert → Sensor → Measured val. → System values → Asymmetry (2913)
Prerequisite	The **Dual path sensor** option is selected in the **Path conf.** parameter parameter.
Description	Use this function to display the asymmetry of the measured values between signal path 1 and signal path 2.
User interface	Signed floating-point number
Factory setting	0 %
Additional information	*Limit values*
	If the value 0 is displayed, both measured values are the same. The higher the displayed value, the greater the difference between the two measured values of the signal paths.

SNR

Navigation	▣ Expert → Sensor → Measured val. → System values → SNR (2917)
Description	Use this function to display the current signal-to-noise ratio.
User interface	Signed floating-point number
Additional information	*Description*
	A low value or a drop in the signal to noise ratio over time is an indicator of poor signal quality. A very fast drop is an indication of a high concentration of CO_2.

Turbulence	

Navigation	🔲 Expert → Sensor → Measured val. → System values → Turbulence (2907)
Description	Use this function to display the current turbulence.
User interface	Signed floating-point number

Reynolds number	

Navigation	🔲 Expert → Sensor → Measured val. → System values → Reynolds number (2908)
Description	Displays the Reynolds number.
User interface	Signed floating-point number

Profile factor	

Navigation	🔲 Expert → Sensor → Measured val. → System values → Profile factor (2909)
Description	Displays the profile factor.
	The profile factor describes the correction factor applied based on the flow profile present. The more the profile deviates from even distribution, the smaller the factor.
	The profile factor is used to calculate the flow rate.
User interface	Signed floating-point number

"Totalizer" submenu

Navigation   🔲   Expert → Sensor → Measured val. → Totalizer

▶ Totalizer	
Totalizer val. 1 to n (0911–1 to n)	→ 🖺 24
Tot. overflow 1 to n (0910–1 to n)	→ 🖺 24

Totalizer val. 1 to n	🔒

Navigation	🔲 Expert → Sensor → Measured val. → Totalizer → Totalizer val. 1 to n (0911–1 to n)
Prerequisite	One of the following options is selected in the **Assign variable** parameter (→ 🗎 53) of the **Totalizer 1 to n** 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 **Tot. overflow 1 to n** parameter if the display range is exceeded. ℹ️ In the event of an error, the totalizer adopts the mode defined in the **Failure mode** parameter (→ 🗎 56). *User interface* The value of the process variable totalized since measuring began can be positive or negative. This depends on the settings in the **Operation mode** parameter (→ 🗎 55). ℹ️ The unit of the selected process variable is specified for the totalizer in the **Unit totalizer** parameter (→ 🗎 54). *Example* Calculation of the current totalizer reading when the value exceeds the 7-digit display range of the operating tool: • Value in the **Totalizer val. 1** parameter: $1\,968\,457$ m³ • Value in the **Tot. overflow 1** parameter: $1 \cdot 10^7$ (1 overflow) = $10\,000\,000$ [m³] • Current totalizer reading: $11\,968\,457$ m³

Tot. overflow 1 to n	🔒

Navigation	🔲 Expert → Sensor → Measured val. → Totalizer → Tot. overflow 1 to n (0910–1 to n)
Prerequisite	One of the following options is selected in the **Assign variable** parameter (→ 🗎 53) of the **Totalizer 1 to n** submenu: • Volume flow • Mass flow
Description	Displays the current totalizer overflow.
User interface	Integer with sign
Additional information	*Description* If the current totalizer reading exceeds 7 digits, which is the maximum value range that can be displayed by the operating tool, the value above this range is output as an overflow.

The current totalizer value is therefore the sum of the overflow value and the totalizer value from the **Totalizer val. 1 to n** parameter.

User interface

ⓘ The unit of the selected process variable is specified for the totalizer in the **Unit totalizer** parameter (→ 🕮 54).

Example

Calculation of the current totalizer reading when the value exceeds the 7‑digit display range of the operating tool:
- Value in the **Totalizer val. 1** parameter: $1\,968\,457$ m^3
- Value in the **Tot. overflow 1** parameter: $2 \cdot 10^7$ (2 overflows) = $20\,000\,000$ [m^3]
- Current totalizer reading: $21\,968\,457$ m^3

3.2.2   "System units" submenu

Navigation   🖥   Expert → Sensor → System units

▸ System units	
Volume flow unit (0553)	→ 🕮 25
Volume unit (0563)	→ 🕮 27
Mass flow unit (0554)	→ 🕮 27
Mass unit (0574)	→ 🕮 28
Temperature unit (0557)	→ 🕮 28
Length unit (0551)	→ 🕮 29
Velocity unit (0566)	→ 🕮 29
Density unit (0555)	→ 🕮 30
Kin. visc. unit (0578)	→ 🕮 30
Date/time format (2812)	→ 🕮 31

Volume flow unit   🔒

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

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

Selection

SI units	*US units*	*Imperial units*
▪ cm³/s	▪ af/s	▪ gal/s (imp)
▪ cm³/min	▪ af/min	▪ gal/min (imp)
▪ cm³/h	▪ af/h	▪ gal/h (imp)
▪ cm³/d	▪ af/d	▪ gal/d (imp)
▪ dm³/s	▪ ft³/s	▪ Mgal/s (imp)
▪ dm³/min	▪ ft³/min	▪ Mgal/min (imp)
▪ dm³/h	▪ ft³/h	▪ Mgal/h (imp)
▪ dm³/d	▪ ft³/d	▪ Mgal/d (imp)
▪ m³/s	▪ fl oz/s (us)	▪ bbl/s (imp;beer)
▪ m³/min	▪ fl oz/min (us)	▪ bbl/min (imp;beer)
▪ m³/h	▪ fl oz/h (us)	▪ bbl/h (imp;beer)
▪ m³/d	▪ fl oz/d (us)	▪ bbl/d (imp;beer)
▪ ml/s	▪ gal/s (us)	▪ bbl/s (imp;oil)
▪ ml/min	▪ gal/min (us)	▪ bbl/min (imp;oil)
▪ ml/h	▪ gal/h (us)	▪ bbl/h (imp;oil)
▪ ml/d	▪ gal/d (us)	▪ bbl/d (imp;oil)
▪ l/s	▪ kgal/s (us)	
▪ l/min	▪ kgal/min (us)	
▪ l/h	▪ kgal/h (us)	
▪ l/d	▪ kgal/d (us)	
▪ hl/s	▪ Mgal/s (us)	
▪ hl/min	▪ Mgal/min (us)	
▪ hl/h	▪ Mgal/h (us)	
▪ hl/d	▪ Mgal/d (us)	
▪ Ml/s	▪ bbl/s (us;liq.)	
▪ Ml/min	▪ bbl/min (us;liq.)	
▪ Ml/h	▪ bbl/h (us;liq.)	
▪ Ml/d	▪ bbl/d (us;liq.)	
	▪ bbl/s (us;beer)	
	▪ bbl/min (us;beer)	
	▪ bbl/h (us;beer)	
	▪ bbl/d (us;beer)	
	▪ bbl/s (us;oil)	
	▪ bbl/min (us;oil)	
	▪ bbl/h (us;oil)	
	▪ bbl/d (us;oil)	
	▪ bbl/s (us;tank)	
	▪ bbl/min (us;tank)	
	▪ bbl/h (us;tank)	
	▪ bbl/d (us;tank)	

Factory setting

Country-specific:
▪ m³/h
▪ ft³/min

Additional information

Result

The selected unit applies for:
Volume flow parameter (→ 🖺 20)

Selection

ℹ️ For an explanation of the abbreviated units: → 🖺 77

Volume unit	🔒

Navigation	🖥 Expert → Sensor → System units → Volume unit (0563)
Description	Use this function to select the unit for the volume.

Selection

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

Factory setting	Country-specific: • dm³ • ft³
Additional information	*Selection* ℹ For an explanation of the abbreviated units: → 🔲 77

Mass flow unit	🔒

Navigation	🖥 Expert → Sensor → System units → Mass flow unit (0554)
Description	Use this function to select the unit for the mass flow.

Selection

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

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

Additional information   *Result*

                            The selected unit applies for:
                            Mass flow parameter

                            Selection
                            ℹ️ For an explanation of the abbreviated units: → 🔖 77

Mass unit   🔒

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

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

Selection   *SI units*   *US units*
                            • g   • oz
                            • kg   • lb
                            • t   • STon

Factory setting   Country-specific:
                            • kg
                            • lb

Additional information   *Selection*
                            ℹ️ For an explanation of the abbreviated units: → 🔖 77

Temperature unit   🔒

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

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

Selection   *SI units*   *US units*
                            • ℃   • ℉
                            • K   • ℉R

Factory setting   Country-specific:
                            • ℃
                            • ℉

Additional information	*Result*

The selected unit applies for:
• Temperature (→ 🕮 21)
• Maximum value
• Minimum value
• Maximum value
• Minimum value

Selection

ℹ️ For an explanation of the abbreviated units: → 🕮 77

Length unit   🔒

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

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

Selection	*SI units*	*US units*
	• m	• ft
	• mm	• in
	• µm	

Factory setting	Country-specific:
	• mm
	• in

Additional information	*Selection*

ℹ️ For an explanation of the abbreviated units: → 🕮 77

Velocity unit   🔒

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

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

Selection	*SI units*	*US units*
	m/s	ft/s

Factory setting	Country-specific:
	• m/s
	• ft/s

Additional information	*Result*
	The selected unit applies for:

- Flow velocity (→ 🖹 20)
- Sound velocity (→ 🖹 20)
- Maximum value
- Minimum value
- Maximum value
- Minimum value

Selection

ℹ️ For an explanation of the abbreviated units: → 🖹 77

Density unit 🔒

Navigation	🖩 Expert → Sensor → System units → Density unit (0555)
Description	Use this function to select the unit for the density.

Selection	*SI units*	*US units*	*Imperial units*
	• g/cm³	• lb/ft³	• lb/gal (imp)
	• g/m³	• lb/gal (us)	• lb/bbl (imp;beer)
	• kg/l	• lb/bbl (us;liq.)	• lb/bbl (imp;oil)
	• kg/dm³	• lb/bbl (us;beer)	
	• kg/m³	• lb/bbl (us;oil)	
	• SD4℃	• lb/bbl (us;tank)	
	• SD15℃		
	• SD20℃		
	• SG4℃		
	• SG15℃		
	• SG20℃		

Factory setting	Country-specific:
	• kg/l
	• lb/ft³

Additional information	*Selection*

ℹ️ For an explanation of the abbreviated units: → 🖹 77

Kin. visc. unit 🔒

Navigation	🖩 Expert → Sensor → System units → Kin. visc. unit (0578)
Description	Use this function to select the unit for the kinematic viscosity.

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

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

Date/time format	🔒

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

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

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

Factory setting   dd.mm.yy hh:mm

Additional information   *Selection*

                             ℹ️ For an explanation of the abbreviated units: → 🖹 77

3.2.3   "Process param." submenu

Navigation   ⊟   Expert → Sensor → Process param.

▶ Process param.	
Flow override (1839)	→ 🖹 32
Flow damping (1802)	→ 🖹 32
Temp. damping (1886)	→ 🖹 33
▶ Low flow cut off	→ 🖹 33

Flow override	🔒

Navigation	🔳 Expert → Sensor → Process param. → Flow override (1839)
Description	Use this function to select whether to interrupt the evaluation of measured values. This is useful for the cleaning processes of a pipeline, for example.
Selection	• Off • On
Factory setting	Off
Additional information	*Result*

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

Description

Flow override is active
• The diagnostic message diagnostic message ⚠️**C453 Flow override** is displayed.
• Output values
   – Output: Value at zero flow
   – Temperature: proceeding output
   – Totalizers 1-3: Stop being totalized

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

Flow damping	🔒

Navigation	🔳 Expert → Sensor → Process param. → Flow damping (1802)
Description	Use this function to enter a time constant for flow damping (PT1 element). Reduction of the variability of the flow measured value (in relation to interference). For this purpose, the depth of the flow filter is adjusted: when the filter setting increases, the reaction time of the device also increases.
User entry	0 to 999.9 s
Factory setting	0 s

Additional information   *Description*

The damping is performed by a PT1 element [1].

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

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

Result

The damping affects the following variables of the device:
- Outputs
  - Low flow cut off → 🖺 33
- Totalizers → 🖺 53

Temp. damping   🔒

Navigation   🖳   Expert → Sensor → Process param. → Temp. damping (1886)

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

User entry   0 to 999.9 s

Factory setting   10 s

"Low flow cut off" submenu

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

▶ Low flow cut off	
Assign variable (1837)	→ 🖺 34
On value (1805)	→ 🖺 34
Off value (1804)	→ 🖺 34

---

1) Proportional behavior with first-order lag

Assign variable	🔒

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

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

Selection	• Off
	• Volume flow
	• Mass flow

Factory setting	Off

On value	🔒

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

Prerequisite	In the **Assign variable** parameter (→ 🕮 34), one of the following options is selected:
	• Volume flow
	• Mass flow

Description	Use this function to enter a switch-on value for low flow cut off. Low flow cut off is activated if the value entered is not equal to 0 → 🕮 34.

User entry	Positive floating-point number

Factory setting	Depends on country and nominal diameter

Additional information	*Dependency*
	ℹ️ The unit depends on the process variable selected in the **Assign variable** parameter (→ 🕮 34).

Off value	🔒

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

Prerequisite	In the **Assign variable** parameter (→ 🕮 34), one of the following options is selected:
	• 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→ 🕮 34.

User entry	0 to 100.0 %

Factory setting	50 %

Additional information   *Example*
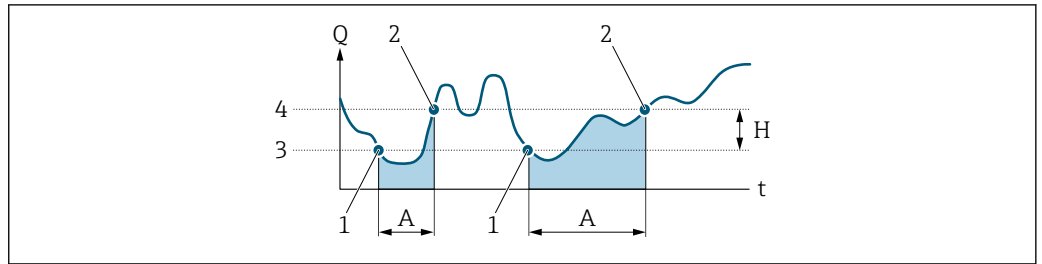
Q   *Flow*
t   *Time*
H   *Hysteresis*
A   *Low flow cut off active*
1   *Low flow cut off is activated*
2   *Low flow cut off is deactivated*
3   *On value entered*
4   *Off value entered*

3.2.4   "Sensor adjustm." submenu

*Navigation*   Expert → Sensor → Sensor adjustm.

| ► Sensor adjustm.	
	► Variable adjust	→ 🖺 35

"Process variable adjustment" submenu

Navigation   Expert → Sensor → Sensor adjustm. → Variable adjust

► Variable adjust	
	Vol. flow offset (1831)	→ 🖺 36
	Vol. flow factor (1832)	→ 🖺 36
	Mass flow offset (1841)	→ 🖺 36
	Mass flow factor (1846)	→ 🖺 37
	S. veloc. offset (1848)	→ 🖺 37
	S. veloc. factor (1849)	→ 🖺 37

Vol. flow offset 🔒

Navigation	🔲 Expert → Sensor → Sensor adjustm. → Variable adjust → Vol. flow offset (1831)
Description	Use this function to enter the zero point shift for the volume flow trim. The volume flow unit on which the shift is based is m³/s.
User entry	Signed floating-point number
Factory setting	0 l/h
Additional information	*Description*
	ℹ️ Corrected value = (factor × value) + offset

Vol. flow factor 🔒

Navigation	🔲 Expert → Sensor → Sensor adjustm. → Variable adjust → Vol. flow factor (1832)
Description	Use this function to enter a quantity factor (without time) for the volume flow. This multiplication factor is applied over the volume flow range.
User entry	Positive floating-point number
Factory setting	1
Additional information	*Description*
	ℹ️ Corrected value = (factor × value) + offset

Mass flow offset 🔒

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

Mass flow factor	🔒

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

S. veloc. offset	🔒

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

S. veloc. factor	🔒

Navigation	🖳 Expert → Sensor → Sensor adjustm. → Variable adjust → S. veloc. factor (1849)
Description	Use this function to enter a quantity factor (without time) for the sound velocity. This multiplication factor is applied over the sound velocity range.
User entry	Positive floating-point number
Factory setting	1
Additional information	*Description*
	ℹ️ Corrected value = (factor × value) + offset

3.2.5   "Calibration" submenu

Navigation   🖥   Expert → Sensor → Calibration

► Calibration	
Nominal diameter (2807)	→ 🕮 38
Cal. factor (2920)	→ 🕮 38
Zero point (2921)	→ 🕮 38

Nominal diameter

Navigation	🖥 Expert → Sensor → Calibration → Nominal diameter (2807)
Description	Displays the nominal diameter of the sensor.
User interface	DNxx / x"
Factory setting	Depends on the size of the sensor
Additional information	*Description*

ℹ The value is also specified on the sensor nameplate.

Cal. factor

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

Zero point

Navigation	🖥 Expert → Sensor → Calibration → Zero point (2921)
Description	Displays the current zero point correction value for the sensor.
User interface	Signed floating-point number

Factory setting   0

"Recalibration" submenu

Navigation   📟   Expert → Sensor → Calibration → Recalibration

▶ Recalibration		
Year (2846)	→	39
Month (2845)	→	39
Day (2842)	→	40
Hour (2843)	→	40
AM/PM (2813)	→	40
Minute (2844)	→	41

Year

Navigation   📟   Expert → Sensor → Calibration → Recalibration → Year (2846)

Prerequisite   ℹ️   Can be edited if Heartbeat Verification is not active.

Description   Use this function to enter the year of recalibration.

User entry   9 to 99

Factory setting   10

Month

Navigation   📟   Expert → Sensor → Calibration → Recalibration → Month (2845)

Prerequisite   ℹ️   Can be edited if Heartbeat Verification is not active.

Description   Use this function to select the month of recalibration.

Selection	• January
	• February
	• March
	• April
	• May
	• June
	• July
	• August
	• September
	• October
	• November
	• December

Factory setting	January

Day	🔒

Navigation	🖥 Expert → Sensor → Calibration → Recalibration → Day (2842)

Prerequisite	ℹ Can be edited if Heartbeat Verification is not active.

Description	Use this function to enter the day of the month of recalibration.

User entry	1 to 31 d

Factory setting	1 d

Hour	🔒

Navigation	🖥 Expert → Sensor → Calibration → Recalibration → Hour (2843)

Prerequisite	ℹ Can be edited if Heartbeat Verification is not active.

Description	Use this function to enter the hour of recalibration.

User entry	0 to 23 h

Factory setting	12 h

AM/PM	🔒

Navigation	🖥 Expert → Sensor → Calibration → Recalibration → AM/PM (2813)

Prerequisite	ℹ Can be edited if Heartbeat Verification is not active.

In the **Date/time format** parameter (2812) (→ 🖺 31), the **dd.mm.yy am/pm** option or the **mm/dd/yy am/pm** option is selected.

Description   Use this function to enter the morning (**AM** option) or afternoon (**PM** option) time format for counting based on the 12-hour clock.

Selection   • AM
                     • PM

Factory setting   AM

Minute	🔒

Navigation   🖳   Expert → Sensor → Calibration → Recalibration → Minute (2844)

Prerequisite   ℹ️   Can be edited if Heartbeat Verification is not active.

Description   Use this function to enter the minutes of recalibration.

User entry   0 to 59 min

Factory setting   0 min

3.3   "Output" submenu

Navigation   🖳   Expert → Output

▸ Output	
▸ PFS output 1	→ 🖺 41

3.3.1   "PFS output" submenu

Navigation   🖳   Expert → Output → PFS output

▸ PFS output 1	
Operating mode (0469–1)	→ 🖺 42
Assign pulse 1 (0460–1)	→ 🖺 43
Value per pulse (0455–1)	→ 🖺 44
Pulse width (0452–1)	→ 🖺 44

Measuring mode (0457–1)	→	45
Failure mode (0480–1)	→	46
Pulse output 1 (0456–1)	→	46
Assign freq. (0478–1)	→	47
Min. freq. value (0453–1)	→	47
Max. freq. value (0454–1)	→	48
Val. at min.freq (0476–1)	→	48
Val. at max.freq (0475–1)	→	49
Measuring mode (0479–1)	→	49
Damping out. 1 (0477–1)	→	50
Response time (0491–1)	→	50
Failure mode (0451–1)	→	51
Failure freq. (0474–1)	→	52
Output freq. 1 (0471–1)	→	52

Operating mode

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

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

Selection   • Pulse
                         • Frequency

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
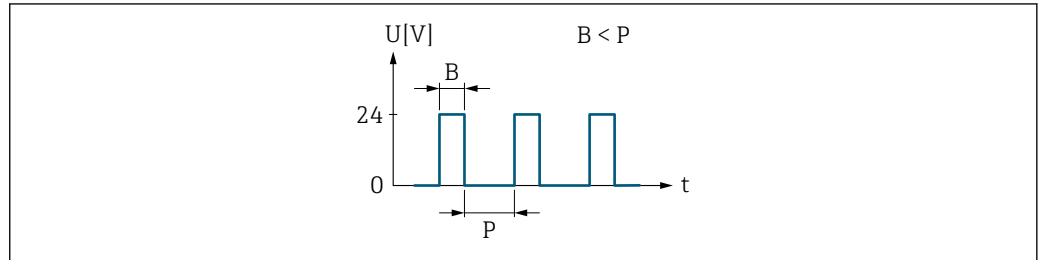
⊞ 2   Quantity-proportional pulse (pulse value) with pulse width to be configured

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

"Frequency" option

Flow-proportional frequency output with 1:1 on/off ratio
An output frequency is output that is proportional to the value of a process variable, such as volume flow, mass flow, temperature, sound velocity, flow velocity, acceptance rate, signal asymmetry, turbulence, signal strength or signal-to-noise ratio.

Example
- Flow rate approx. 100 g/s
- Max. frequency 10 kHz
- Flow rate at max. frequency 1000 g/s
- Output frequency approx. 1000 Hz
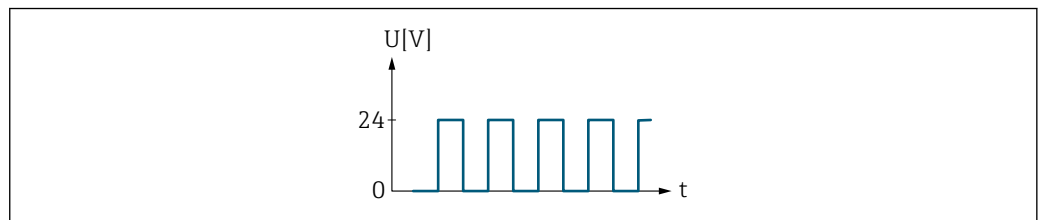
⊞ 3   Flow-proportional frequency output

Assign pulse 1	🔒

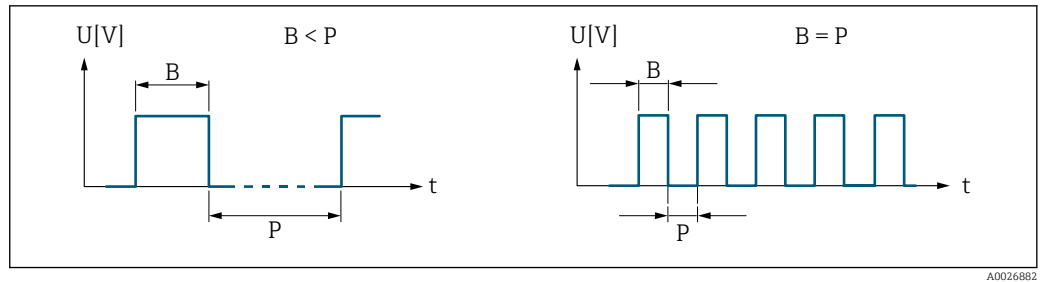|	
Navigation	▣ Expert → Output → PFS output 1 → Assign pulse 1 (0460–1)
Prerequisite	The **Pulse** option is selected in the **Operating mode** parameter (→ 🖺 42) parameter.
Description	Use this function to select the process variable for the pulse output.
Selection	• Off • Volume flow • Mass flow
Factory setting	Off

Value per pulse	🔒

Navigation	🔲 Expert → Output → PFS output 1 → Value per pulse (0455–1)
Prerequisite	In the **Operating mode** parameter (→ 🖺 42), the **Pulse** option is selected, and one of the following options is selected in the **Assign pulse** parameter (→ 🖺 43): • Volume flow • Mass flow
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→ 🖺 75
Additional information	*User entry* Weighting of the pulse output with a quantity. The lower the pulse value, the • better the resolution. • the higher the frequency of the pulse response.

Pulse width	🔒

Navigation	🔲 Expert → Output → PFS output 1 → Pulse width (0452–1)
Prerequisite	In the **Operating mode** parameter (→ 🖺 42), the **Pulse** option is selected, and one of the following options is selected in the **Assign pulse** parameter (→ 🖺 43): • Volume flow • Mass flow
Description	Use this function to enter the duration of the output pulse.
User entry	0.05 to 2 000 ms
Factory setting	100 ms
Additional information	*Description* • Define how long a pulse is (duration). • The maximum pulse rate is defined by $f_{max} = 1 / (2 \times \text{pulse width})$. • The interval between two pulses lasts at least as long as the set pulse width. • The maximum flow is defined by $Q_{max} = f_{max} \times \text{pulse value}$. • If the flow exceeds these limit values, the measuring device displays the diagnostic message ⚠S443 **Pulse output 1**.

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

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

Measuring mode	🔒

Navigation   🖩 Expert → Output → PFS output 1 → Measuring mode (0457–1)

Prerequisite   In the **Operating mode** parameter (→ 🗎 42), the **Pulse** option is selected, and one of the following options is selected in the **Assign pulse** parameter (→ 🗎 43):
- Volume flow
- Mass flow

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

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

Factory setting   Forward flow

Additional information   *Selection*

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

ℹ️ For a detailed description of the options available, see the **Measuring mode** parameter

Examples

ℹ️ For a detailed description of the configuration examples, see the **Measuring mode** parameter

| Failure mode | 🔓 |

Navigation	☐ Expert → Output → PFS output 1 → Failure mode (0480–1)
Prerequisite	In the **Operating mode** parameter (→ 🖹 42), the **Pulse** option is selected, and one of the following options is selected in the **Assign pulse** parameter (→ 🖹 43): • 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 value • No pulses
Factory setting	No pulses

Additional information	*Description*
	
	The dictates of safety render it advisable to ensure that the pulse output shows a predefined behavior in the event of a device alarm.
	
	Selection
	
	• Actual value
	  In the event of a device alarm, the pulse output continues on the basis of the current flow measurement. The fault is ignored.
	• No pulses
	  In the event of a device alarm, the pulse output is "switched off".
	
	NOTICE! A device alarm is a measuring device error that must be taken seriously. It can affect the measurement quality such that the quality can no longer be guaranteed. The **Actual value** option is only recommended if it can be guaranteed that all possible alarm conditions will not affect the measurement quality.

| Pulse output 1 | |

Navigation	☐ Expert → Output → PFS output 1 → Pulse output 1 (0456–1)
Prerequisite	The **Pulse** option is selected in the **Operating mode** parameter (→ 🖹 42) parameter.
Description	Displays the pulse frequency currently output.
User interface	Positive floating-point number
Additional information	*Description* • The pulse output is an open collector output. • This is configured at the factory in such a way that the transistor is conductive for the duration of the pulse (NO contact) and is safety-oriented. • The **Value per pulse** parameter (→ 🖹 44) and **Pulse width** parameter (→ 🖹 44) can be used to define the value (i.e. the measured value amount that corresponds to a pulse) and the duration of the pulse.
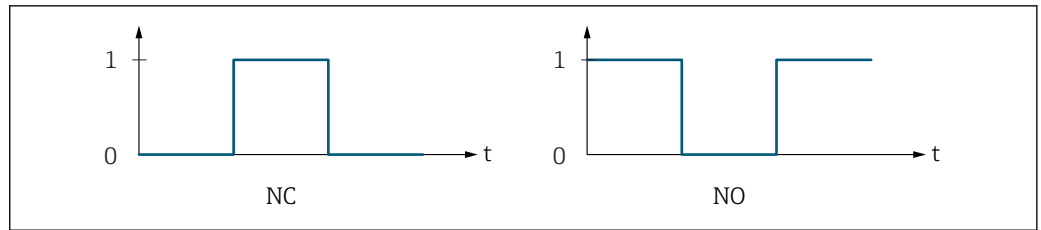
0   Non-conductive
1   Conductive
NC NC contact (normally closed)
NO NO contact (normally open)

The output behavior can be reversed via the **Invert outp.sig.** parameter 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 (→ 🖺 46)) can be configured.

Assign freq.   🔒

Navigation   ☒   Expert → Output → PFS output 1 → Assign freq. (0478–1)

Prerequisite   The **Frequency** option is selected in the **Operating mode** parameter (→ 🖺 42) parameter.

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

Selection   • Off
                         • Volume flow
                         • Mass flow
                         • Temperature

Factory setting   Off

Min. freq. value   🔒

Navigation   ☒   Expert → Output → PFS output 1 → Min. freq. value (0453–1)

Prerequisite   In the **Operating mode** parameter (→ 🖺 42), the **Frequency** option is selected, and one
                         of the following options is selected in the **Assign freq.** parameter (→ 🖺 47):
                         • Volume flow
                         • Mass flow
                         • Sound velocity
                         • Flow velocity
                         • Temperature

Description   Use this function to enter the start value frequency.

User entry   0.0 to 10 000.0 Hz

Factory setting   0.0 Hz

Max. freq. value	🔒

Navigation	☐ Expert → Output → PFS output 1 → Max. freq. value (0454–1)
Prerequisite	In the **Operating mode** parameter (→ 🖺 42), the **Frequency** option is selected, and one of the following options is selected in the **Assign freq.** parameter (→ 🖺 47): • Volume flow • Mass flow • Sound velocity • Flow velocity • Temperature
Description	Use this function to enter the end value frequency.
User entry	0.0 to 10 000.0 Hz
Factory setting	10 000.0 Hz

Val. at min.freq	🔒

Navigation	☐ Expert → Output → PFS output 1 → Val. at min.freq (0476–1)
Prerequisite	In the **Operating mode** parameter (→ 🖺 42), the **Frequency** option is selected, and one of the following options is selected in the **Assign freq.** parameter (→ 🖺 47): • Volume flow • Mass flow • Sound velocity • Flow velocity • Temperature
Description	Use this function to enter the measured value for the start value frequency.
User entry	Signed floating-point number
Factory setting	Depends on country and nominal diameter
Additional information	*Dependency* The entry depends on the process variable selected in the **Assign freq.** parameter (→ 🖺 47).

Val. at max.freq	🖩

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

Prerequisite	In the **Operating mode** parameter (→ 🖺 42), the **Frequency** option is selected, and one of the following options is selected in the **Assign freq.** parameter (→ 🖺 47): • Volume flow • Mass flow • Sound velocity • Flow velocity • Temperature

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

User entry	Signed floating-point number

Factory setting	Depends on country and nominal diameter

Additional information	*Description* Use this function to enter the maximum measured value at the maximum frequency. The selected process variable is output as a proportional frequency. *Dependency* ℹ️ The entry depends on the process variable selected in the **Assign freq.** parameter (→ 🖺 47).

Measuring mode	🖩

| Navigation	🖵 Expert → Output → PFS output 1 → Measuring mode (0479–1)

Prerequisite	In the **Operating mode** parameter (→ 🖺 42), the **Frequency** option is selected, and one of the following options is selected in the **Assign freq.** parameter (→ 🖺 47): • Volume flow • Mass flow • Sound velocity • Flow velocity • Temperature [*] • Acceptance rate [*] • Signal strength [*] • SNR [*] • Turbulence [*] • Signal asymmetry [*]

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

Selection	• Forward flow • Forward/Reverse • Rev. flow comp.

---

* Visibility depends on order options or device settings

Factory setting   Forward flow

Damping out. 1   ⌂

Navigation	⊟ Expert → Output → PFS output 1 → Damping out. 1 (0477–1)
Prerequisite	In the **Operating mode** parameter (→ 🖺 42), the **Frequency** option is selected, and one of the following options is selected in the **Assign freq.** parameter (→ 🖺 47): • Volume flow • Mass flow
Description	Use this function to enter a time constant for the reaction time of the output signal to fluctuations in the measured value.
User entry	0 to 999.9 s
Factory setting	0.0 s
Additional information	*User entry* Use this function to enter a time constant (PT1 element [2]) for frequency output damping: • If a low time constant is entered, the current output reacts particularly quickly to fluctuating measured variables. • On the other hand, the current output reacts more slowly if a high time constant is entered. ℹ **Damping is switched off if 0 is entered (factory setting).** The frequency output is subject to separate damping that is independent of all preceding time constants.

Response time

Navigation	⊟ Expert → Output → PFS output 1 → Response time (0491–1)
Prerequisite	In the **Operating mode** parameter (→ 🖺 42), the **Frequency** option is selected, and one of the following options is selected in the **Assign freq.** parameter (→ 🖺 47): • Volume flow • Mass flow • Sound velocity • Flow velocity • Temperature [*] • Acceptance rate [*] • Signal strength [*] • SNR [*] • Turbulence [*] • Signal asymmetry [*]

---

2)   proportional transmission behavior with first order delay

*   Visibility depends on order options or device settings

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
  and
- Depending on the measured variable assigned to the output.
  - Flow damping
    or
  - Temperature damping

Failure mode

Navigation	Expert → Output → PFS output 1 → Failure mode (0451–1)
Prerequisite	In the **Operating mode** parameter (→ 🖺 42), the **Frequency** option is selected, and one of the following options is selected in the **Assign freq.** parameter (→ 🖺 47): • Volume flow • Mass flow
Description	Use this function to select the failure mode of the frequency output in the event of a device alarm.
Selection	• Actual value • Defined value • 0 Hz
Factory setting	0 Hz
Additional information	*Selection*

- Actual value
  In the event of a device alarm, the frequency output continues on the basis of the current flow measurement. The device alarm is ignored.
- Defined value
  In the event of a device alarm, the frequency output continues on the basis of a predefined value. The Failure freq. (→ 🖺 52) replaces the current measured value, making it possible to bypass the device alarm. The actual measurement is switched off for the duration of the device alarm.
- 0 Hz
  In the event of a device alarm, the frequency output is "switched off".

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

Failure freq.	🔒

Navigation	☐ Expert → Output → PFS output 1 → Failure freq. (0474–1)
Prerequisite	In the **Operating mode** parameter (→ 🗎 42), the **Frequency** option is selected, and one of the following options is selected in the **Assign freq.** parameter (→ 🗎 47): • Volume flow • Mass flow
Description	Use this function to enter the value for the frequency output in the event of a device alarm in order to bypass the alarm.
User entry	0.0 to 12 500.0 Hz
Factory setting	0.0 Hz

Output freq. 1	

Navigation	☐ Expert → Output → PFS output 1 → Output freq. 1 (0471–1)
Prerequisite	In the **Operating mode** parameter (→ 🗎 42), the **Frequency** option is selected.
Description	Displays the actual value of the output frequency which is currently measured.
User interface	0.0 to 12 500.0 Hz

3.4   "Application" submenu

Navigation   ☐   Expert → Application

▶ Application		
Reset all tot. (2806)	→	🗎 52
▶ Totalizer 1 to n	→	🗎 53

Reset all tot.	

Navigation	☐ Expert → Application → Reset all tot. (2806)
Description	Use this function to reset all totalizers to the value **0** and restart the totaling process. This deletes all the flow values previously totalized.

Selection   • Cancel
                            • Reset + totalize

Factory setting   Cancel

Additional information   *Selection*

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

3.4.1 "Totalizer 1 to n" submenu

Navigation   ▣   Expert → Application → Totalizer 1 to n

```
▶ Totalizer 1 to n

        Assign variable (0914–1 to n)              → 🗎 53

        Unit totalizer 1 to n (0915–1 to n)        → 🗎 54

        Operation mode (0908–1 to n)               → 🗎 55

        Control Tot. 1 to n (0912–1 to n)          → 🗎 55

        Preset value 1 to n (0913–1 to n)          → 🗎 56

        Failure mode (0901–1 to n)                 → 🗎 56
```

Assign variable   🔒

Navigation   ▣   Expert → Application → Totalizer 1 to n → Assign variable (0914–1 to n)

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

Selection   • Off
                            • Volume flow
                            • Mass flow

Factory setting   Volume flow

Additional information	*Description*
	ℹ️ If the option selected is changed, the device resets the totalizer to 0.
	Selection
	If the **Off** option is selected, only **Assign variable** parameter (→ 🖺 53) is still displayed in the **Totalizer 1 to n** submenu. All other parameters in the submenu are hidden.

Unit totalizer 1 to n   🔒

Navigation	☐ Expert → Application → Totalizer 1 to n → Unit totalizer 1 to n (0915–1 to n)
Prerequisite	One of the following options is selected in the **Assign variable** parameter (→ 🖺 53) of the **Totalizer 1 to n** submenu: • Volume flow • Mass flow
Description	Use this function to select the process variable unit for the Totalizer 1 to n (→ 🖺 53).

Selection

SI units
- g
- kg
- t

US units
- oz
- lb
- STon

or

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

US units
- af
- ft³
- 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;beer)
- bbl (imp;oil)

Factory setting	Country-specific: • m³ • ft³
Additional information	*Description*
	ℹ️ The unit is selected separately for each totalizer. It is independent of the selection made in the **System units** submenu (→ 🖺 25).
	Selection
	The selection is dependent on the process variable selected in the **Assign variable** parameter (→ 🖺 53).

Operation mode	⊘

Navigation	⊟ Expert → Application → Totalizer 1 to n → Operation mode (0908–1 to n)
Prerequisite	One of the following options is selected in the **Assign variable** parameter (→ 🖺 53) of the **Totalizer 1 to n** submenu: • Volume flow • Mass flow
Description	Use this function to select how the totalizer summates the flow.
Selection	• Net flow total • Forward total • Reverse total
Factory setting	Net flow total
Additional information	*Selection* • Net flow total Flow values in the forward and reverse flow direction are totalized and balanced against one another. Net flow is registered in the flow direction. • Forward total Only the flow in the forward flow direction is totalized. • Reverse total Only the flow in the reverse flow direction is totalized (= reverse flow quantity).

Control Tot. 1 to n	

Navigation	⊟ Expert → Application → Totalizer 1 to n → Control Tot. 1 to n (0912–1 to n)
Prerequisite	One of the following options is selected in the **Assign variable** parameter (→ 🖺 53) of the **Totalizer 1 to n** submenu: • Volume flow • Mass flow
Description	Use this function to select the control of totalizer value 1-3.
Selection	• Totalize • Reset + hold • Preset + hold • Reset + totalize • Preset+totalize • Hold
Factory setting	Totalize
Additional information	*Selection*

Options	Description
Totalize	The totalizer is started or continues running.
Reset + hold	The totaling process is stopped and the totalizer is reset to 0.

Options	Description
Preset + hold	The totaling process is stopped and the totalizer is set to its defined start value from the **Preset value** parameter.
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 and the totaling process is restarted.

Preset value 1 to n

Navigation	☐☒ Expert → Application → Totalizer 1 to n → Preset value 1 to n (0913–1 to n)
Prerequisite	One of the following options is selected in the **Assign variable** parameter (→ 🖺 53) of the **Totalizer 1 to n** submenu: • Volume flow • Mass flow
Description	Use this function to enter a start value for the Totalizer 1 to n.
User entry	Signed floating-point number
Factory setting	Country-specific: • 0 m³ • 0 ft³
Additional information	*User entry* ℹ The unit of the selected process variable is specified for the totalizer in the **Unit totalizer** parameter (→ 🖺 54). *Example* This configuration is suitable for applications such as iterative filling processes with a fixed batch quantity.

Failure mode   🔒

Navigation	☐☒ Expert → Application → Totalizer 1 to n → Failure mode (0901–1 to n)
Prerequisite	One of the following options is selected in the **Assign variable** parameter (→ 🖺 53) of the **Totalizer 1 to n** submenu: • Volume flow • Mass flow
Description	Use this function to select how a totalizer behaves in the event of a device alarm.
Selection	• Stop • Actual value • Last valid value
Factory setting	Stop

Additional information *Description*

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

Selection

- Stop
  The totalizer is stopped in the event of a device alarm.
- Actual value
  The totalizer continues to count based on the actual measured value; the device alarm is
  ignored.
- Last valid value
  The totalizer continues to count based on the last valid measured value before the device
  alarm occurred.

3.4.2 "Inventory count." submenu

Navigation   ▣   Expert → Application → Inventory count.

```
▶ Inventory count.

      Unit (0974)                                                 → 🖺 57
```
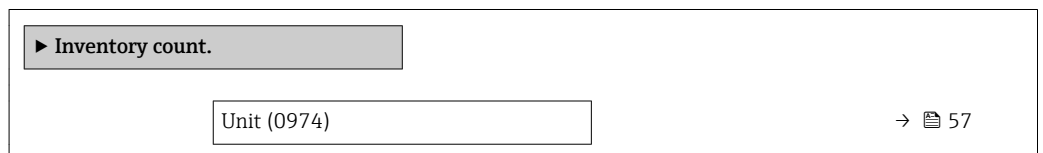
Unit	

Navigation   ▣   Expert → Application → Inventory count. → Unit (0974)

Description   Displays the unit of the inventory counter.

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

Additional information *Description*

ℹ The parameter cannot be configured or reset.

3.5   "Diagnostics" submenu

Navigation   ⊠   Expert → Diagnostics

‣ Diagnostics	
Actual diagnos. (0691)	→ 🖺 58
Timestamp (0667)	→ 🖺 59
Prev.diagnostics (0690)	→ 🖺 59
Timestamp (0672)	→ 🖺 59
Time fr. restart (0653)	→ 🖺 60
Operating time (0652)	→ 🖺 60
‣ Diagnostic list	→ 🖺 60
‣ Event logbook	→ 🖺 64
‣ Device info	→ 🖺 66
‣ Mainboard module	→ 🖺 69
‣ Simulation	→ 🖺 70

Actual diagnos.

Navigation   ⊠   Expert → Diagnostics → Actual diagnos. (0691)

Prerequisite   A diagnostic event has occurred.

Description   Displays the current diagnostic message. If two or more messages occur simultaneously, the message with the highest priority is shown on the display.

User interface   Symbol for diagnostic behavior, diagnostic code and short message.

Additional information   *Display*

🛈 Additional pending diagnostic messages can be viewed in the **Diagnostic list** submenu (→ 🖺 60).

Example

For the display format:
⊗F271 Main electronics

Timestamp

Navigation	▣	Expert → Diagnostics → Timestamp
Description		Displays the operating time when the current diagnostic message occurred.
User interface		Days (d), hours (h), minutes (m) and seconds (s)
Additional information		*Display*

The diagnostic message can be viewed via the **Actual diagnos.** parameter (→ 🖺 58).

Example

For the display format:
24d12h13m00s

Prev.diagnostics

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

For the display format:
⊗F271 Main electronics

Timestamp

Navigation	▣	Expert → Diagnostics → Timestamp
Description		Displays the operating time when the last diagnostic message before the current message occurred.
User interface		Days (d), hours (h), minutes (m) and seconds (s)
Additional information		*Display*

The diagnostic message can be viewed via the **Prev.diagnostics** parameter (→ 🖺 59).

Example

For the display format:
24d12h13m00s

Time fr. restart

Navigation   ⊟   Expert → Diagnostics → Time fr. restart (0653)

Description   Use this function to display the time the device has been in operation since the last device restart.

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

Operating time

Navigation   ⊟   Expert → Diagnostics → Operating time (0652)

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

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

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

3.5.1   "Diagnostic list" submenu

Navigation   ⊟   Expert → Diagnostics → Diagnostic list

▶ Diagnostic list	
Diagnostics 1 (0692)	→ 🗎 61
Timestamp (0683)	→ 🗎 61
Diagnostics 2 (0693)	→ 🗎 61
Timestamp (0684)	→ 🗎 62
Diagnostics 3 (0694)	→ 🗎 62
Timestamp (0685)	→ 🗎 62
Diagnostics 4 (0695)	→ 🗎 63
Timestamp (0686)	→ 🗎 63

Diagnostics 5 (0696)	→ 🖺 63
Timestamp (0687)	→ 🖺 64

Diagnostics 1

Navigation	⊟ Expert → Diagnostics → Diagnostic list → Diagnostics 1 (0692)
Description	Displays the current diagnostics message with the highest priority.
User interface	Symbol for diagnostic behavior, diagnostic code and short message.
Additional information	*Examples* For the display format: ⊗F276 I/O module

Timestamp

Navigation	⊟ Expert → Diagnostics → Diagnostic list → Timestamp
Description	Displays the operating time when the diagnostic message with the highest priority occurred.
User interface	Days (d), hours (h), minutes (m) and seconds (s)
Additional information	*Display* ℹ The diagnostic message can be viewed via the **Diagnostics 1** parameter (→ 🖺 61). *Example* For the display format: 24d12h13m00s

Diagnostics 2

Navigation	⊟ Expert → Diagnostics → Diagnostic list → Diagnostics 2 (0693)
Description	Displays the current diagnostics message with the second-highest priority.
User interface	Symbol for diagnostic behavior, diagnostic code and short message.
Additional information	*Examples* For the display format: ⊗F276 I/O module

Timestamp

Navigation	🗗 Expert → Diagnostics → Diagnostic list → Timestamp
Description	Displays the operating time when the diagnostic message with the second-highest priority occurred.
User interface	Days (d), hours (h), minutes (m) and seconds (s)
Additional information	*Display*

🛈 The diagnostic message can be viewed via the **Diagnostics 2** parameter (→ 📖 61).

Example

For the display format:
24d12h13m00s

Diagnostics 3

|	
Navigation	🗗 Expert → Diagnostics → Diagnostic list → Diagnostics 3 (0694)
Description	Displays the current diagnostics message with the third-highest priority.
User interface	Symbol for diagnostic behavior, diagnostic code and short message.
Additional information	*Examples*

For the display format:
⊗F276 I/O module

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 (→ 📖 62).

Example

For the display format:
24d12h13m00s

Diagnostics 4

Navigation	⊟	Expert → Diagnostics → Diagnostic list → Diagnostics 4 (0695)
Description		Displays the current diagnostics message with the fourth-highest priority.
User interface		Symbol for diagnostic behavior, diagnostic code and short message.
Additional information		*Examples*

For the display format:
⊗F276 I/O module

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 (→ 🕮 63).

Example

For the display format:
24d12h13m00s

Diagnostics 5

Navigation	⊟	Expert → Diagnostics → Diagnostic list → Diagnostics 5 (0696)
Description		Displays the current diagnostics message with the fifth-highest priority.
User interface		Symbol for diagnostic behavior, diagnostic code and short message.
Additional information		*Examples*

For the display format:
⊗F276 I/O module

Timestamp

Navigation	⊞ Expert → Diagnostics → Diagnostic list → Timestamp
Description	Displays the operating time when the diagnostic message with the fifth-highest priority occurred.
User interface	Days (d), hours (h), minutes (m) and seconds (s)
Additional information	*Display*

The diagnostic message can be viewed via the **Diagnostics 5** parameter (→ 🖺 63).

Example

For the display format:
24d12h13m00s

3.5.2   "Event logbook" submenu

Navigation   ⊞   Expert → Diagnostics → Event logbook

```
► Event logbook

        Filter options (0656)                                  → 🖺 64
```
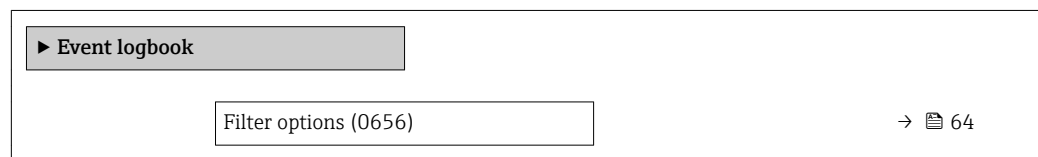
Filter options   🔒

Navigation	⊞ Expert → Diagnostics → Event logbook → Filter options
Description	Use this function to select the category whose event messages are displayed in the event list of the operating tool.
Selection	▪ All ▪ Failure (F) ▪ Funct. check (C) ▪ Out of spec. (S) ▪ Mainten. req.(M) ▪ Information (I)
Factory setting	All

Additional information   *Description*

ℹ️   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

ℹ️   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	→ 🔖 65
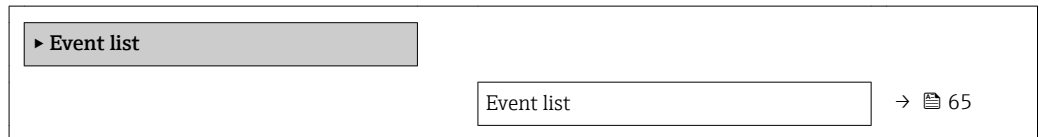
Event list

Navigation   🖳   Expert → Diagnostics → Event logbook → Event list

Description   Displays the history of event messages of the category selected in the **Filter options**
                        parameter.

User interface   • For a "Category I" event message
                          Information event, short message, symbol for event recording and operating time when
                          error occurred
                        • For a "Category F, C, S, M" event message (status signal)
                          Diagnostics code, short message, symbol for event recording and operating time when
                          error occurred

Additional information   *Description*

                        A maximum of 20 event messages are displayed in chronological order.

The following symbols indicate whether an event has occurred or has ended:
- ↻: Occurrence of the event
- ↺: End of the event

Examples

For the display format:
I1091 Configuration modified
↻ 24d12h13m00s

HistoROM

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

3.5.3   "Device info" submenu

Navigation   ▣   Expert → Diagnostics → Device info

```
┌─────────────────────────────────────────────────────────────────────────────┐
│  ▶ Device info                                                                │
│                                                                               │
│              ┌──────────────────────────────────┐                            │
│              │  Device tag                       │                            │
│              └──────────────────────────────────┘                            │
│                                                                               │
│              ┌──────────────────────────────────┐                            │
│              │  Serial number                    │                            │
│              └──────────────────────────────────┘                            │
│                                                                               │
│              ┌──────────────────────────────────┐                            │
│              │  Firmware version                 │                            │
│              └──────────────────────────────────┘                            │
│                                                                               │
│              ┌──────────────────────────────────┐                            │
│              │  Device name                      │                            │
│              └──────────────────────────────────┘                            │
│                                                                               │
│              ┌──────────────────────────────────┐                            │
│              │  Order code                       │                            │
│              └──────────────────────────────────┘                            │
│                                                                               │
│              ┌──────────────────────────────────┐                            │
│              │  Ext. order cd. 1                 │                            │
│              └──────────────────────────────────┘                            │
│                                                                               │
│              ┌──────────────────────────────────┐                            │
│              │  Ext. order cd. 2                 │                            │
│              └──────────────────────────────────┘                            │
│                                                                               │
│              ┌──────────────────────────────────┐                            │
│              │  Ext. order cd. 3                 │                            │
│              └──────────────────────────────────┘                            │
│                                                                               │
│              ┌──────────────────────────────────┐                            │
│              │  ENP version                      │                            │
│              └──────────────────────────────────┘                            │
└─────────────────────────────────────────────────────────────────────────────┘
```

Device tag	ⓐ

Navigation	▣	Expert → Diagnostics → Device info → Device tag (0011)

Description	Displays a unique name for the measuring point so it can be identified quickly within the plant.

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

Factory setting   Prosonic Flow E Heat

Serial number

Navigation   📟   Expert → Diagnostics → Device info → Serial number (0009)

Description   Displays the serial number of the measuring device.

ℹ️ The number can be found on the nameplate of the sensor and transmitter.

User interface   Max. 11-digit character string comprising letters and numbers.

Additional information *Description*

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

Firmware version

Navigation   📟   Expert → Diagnostics → Device info → Firmware version (0010)

Description   Displays the device firmware version installed.

User interface   Character string in the format xx.yy.zz

Additional information *Display*

ℹ️ The Firmware version is also located:
• On the title page of the Operating instructions
• On the transmitter nameplate

Device name

Navigation   📟   Expert → Diagnostics → Device info → Device name (0013)

Description   Displays the name of the transmitter. It can also be found on the nameplate of the
transmitter.

User interface   Max. 32 characters such as letters or numbers.

Factory setting   Pros.Flow E Heat

Order code	🔒

Navigation	⊟ Expert → Diagnostics → Device info → Order code (0008)
Description	Displays the device order code.
User interface	Character string composed of letters, numbers and certain punctuation marks (e.g. /).
Additional information	*Description*

> The order code can be found on the nameplate of the sensor and transmitter in the "Order code" field.

The order code is generated from the extended order code through a process of reversible transformation. The extended order code indicates the attributes for all the device features in the product structure. The device features are not directly readable from the order code.

> **Uses of the order code**
> • To order an identical spare device.
> • To identify the device quickly and easily, e.g. when contacting Endress+Hauser.

Ext. order cd. 1	🔒

Navigation	⊟ Expert → Diagnostics → Device info → Ext. order cd. 1 (0023)
Description	Displays the first part of the extended order code.
	On account of length restrictions, the extended order code is split into a maximum of 3 parameters.
User interface	Character string
Additional information	*Description*

The extended order code indicates the version of all the features of the product structure for the measuring device and thus uniquely identifies the measuring device.

> The extended order code can also be found on the nameplate of the sensor and transmitter in the "Ext. ord. cd." field.

Ext. order cd. 2	🔒

Navigation	⊟ Expert → Diagnostics → Device info → Ext. order cd. 2 (0021)
Description	Displays the second part of the extended order code.
User interface	Character string
Additional information	For additional information, see **Ext. order cd. 1** parameter (→ 🖺 68)

Ext. order cd. 3	🔒

Navigation	🖥 Expert → Diagnostics → Device info → Ext. order cd. 3 (0022)
Description	Displays the third part of the extended order code.
User interface	Character string
Additional information	For additional information, see **Ext. order cd. 1** parameter (→ 🖹 68)

Config. counter

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

ENP version

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

3.5.4   "Mainboard module" submenu

Navigation   🖥   Expert → Diagnostics → Mainboard module

```
► Mainboard module

        Software rev.                                              → 🖹 70
```
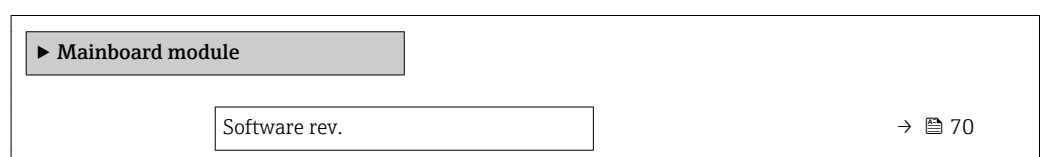
	Build no. softw.	→ 🗏 70
	Bootloader rev.	→ 🗏 70

Software rev.

Navigation   🔲   Expert → Diagnostics → Mainboard module → Software rev. (0072)

Description   Use this function to display the software revision of the module.

User interface   Positive integer

Build no. softw.

Navigation   🔲   Expert → Diagnostics → Mainboard module → Build no. softw. (0079)

Description   Displays the software build number of the module.

User interface   Positive integer

Bootloader rev.

Navigation   🔲   Expert → Diagnostics → Mainboard module → Bootloader rev. (0073)

Description   Displays the bootloader revision of the software.

User interface   Positive integer

3.5.5   "Simulation" submenu

Navigation   🔲   Expert → Diagnostics → Simulation

▸ Simulation		
	Assign proc.var. (1810)	→ 🗏 71
	Proc. var. value (1811)	→ 🗏 71
	FreqOutputSim 1 (0472–1)	→ 🗏 72

Freq value 1 (0473–1)	→ 🖹 72
Puls.outp.sim. 1 (0458–1)	→ 🖹 73
Pulse value 1 (0459–1)	→ 🖹 73
Dev. alarm sim. (0654)	→ 🖹 73
Diag. event sim. (0737)	→ 🖹 74

Assign proc.var.   🔒

Navigation	🔲 Expert → Diagnostics → Simulation → Assign proc.var. (1810)
Description	Use this function to select a process variable for the simulation process that is activated.
Selection	• Off • Volume flow • Mass flow • Sound velocity • Flow velocity • Temperature
Factory setting	Off
Additional information	*Description*

ℹ The simulation value of the process variable selected is defined in the **Proc. var. value** parameter (→ 🖹 71).

Proc. var. value   🔒

Navigation	🔲 Expert → Diagnostics → Simulation → Proc. var. value (1811)
Prerequisite	In the **Assign proc.var.** parameter (→ 🖹 71), one of the following options is selected: • Volume flow • Mass flow • Sound velocity • Flow velocity • Temperature *
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

---

* Visibility depends on order options or device settings

| Factory setting | 0 |

Additional information   *User entry*

ℹ️ The unit of the displayed measured value is taken from the **System units** submenu
(→ 🗎 25).

FreqOutputSim 1   🔒

| Navigation | 🖥 | Expert → Diagnostics → Simulation → FreqOutputSim 1 (0472–1) |

Prerequisite   In the **Operating mode** parameter (→ 🗎 42), the **Frequency** option is selected.

Description   Use this function to switch simulation of the frequency output on and off. The display
alternates between the measured value and a diagnostic message of the "Function check"
category (C) while simulation is in progress.

Selection   • Off
                         • On

Factory setting   Off

Additional information   *Description*

ℹ️ The desired simulation value is defined in the .

Selection

• Off
Frequency simulation is switched off. The device is in normal measuring mode or
another process variable is being simulated.
• On
Frequency simulation is active.

Freq value 1   🔒

| Navigation | 🖥 | Expert → Diagnostics → Simulation → Freq value 1 (0473–1) |

Prerequisite   In the , the **On** option is selected.

Description   Use this function to enter a frequency value for the simulation. In this way, users can verify
the correct adjustment of the frequency output and the correct function of downstream
switching units.

User entry   0.0 to 12 500.0 Hz

Puls.outp.sim. 1	🔒

Navigation	⊟ Expert → Diagnostics → Simulation → Puls.outp.sim. 1 (0458–1)
Prerequisite	In the **Operating mode** parameter (→ 🖺 42), the **Pulse** option is selected.
Description	Use this function to switch simulation of the pulse output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.
Selection	• Off • Fixed value • Down-count. val.
Factory setting	Off
Additional information	*Description* ℹ️ The desired simulation value is defined in the . *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 (→ 🖺 44). • Down-count. val. The pulses specified in the **Pulse value** parameter (→ 🖺 73) are output.

Pulse value 1	🔒

Navigation	⊟ Expert → Diagnostics → Simulation → Pulse value 1 (0459–1)
Prerequisite	In the , the **Down-count. val.** option is selected.
Description	Use this function to enter a pulse value for the simulation. In this way, users can verify the correct adjustment of the pulse output and the correct function of downstream switching units.
User entry	0 to 65 535

Dev. alarm sim.	🔒

Navigation	⊟ Expert → Diagnostics → Simulation → Dev. alarm sim. (0654)
Description	Use this function to switch the device alarm on and off.

Selection	• Off
	• On

Factory setting	Off

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 **Diag. event sim.** parameter (→ 🖺 74).

Selection	• Sensor
	• Electronics
	• Configuration
	• Process

Factory setting	Sensor

Diag. event sim.   🔒

Navigation	⊞ Expert → Diagnostics → Simulation → Diag. event sim. (0737)

Description	Use this function to select a diagnostic event for the simulation process that is activated.

Selection	• Off
	• Diagnostic event picklist (depends on the category selected)

Factory setting	Off

Additional information	*Description*
	For the simulation, you can choose from the diagnostic events of the category selected in the **Event category** parameter (→ 🖺 74).

4   Country-specific factory settings

4.1   SI units

ℹ️ Not valid for USA and Canada.

4.1.1   System units

Mass	kg
Mass flow	kg/h
Volume	m³
Volume flow	m³/h
Velocity	m/s
Temperature	℃
Length	mm

4.1.2   Pulse value

Nominal diameter [mm]	[dm³/pulse]
50	3
65	4
80	6
100	10
150	25

4.2   US units

ℹ️ Only valid for USA and Canada.

4.2.1   System units

Mass	lb
Mass flow	lb/min
Volume	ft³
Volume flow	ft³/min
Velocity	ft/s
Temperature	℉
Length	in

4.2.2   Pulse value

Nominal diameter [in]	[gal/pulse]
2	0.8
2 ½	1.1
3	1.6
4	2.6
6	6.6

5   Explanation of abbreviated units

5.1   SI units

Process variable	Units	Explanation
Velocity	m/s	Meter/time unit
Mass	g, kg, t	Gram, kilogram, metric ton
Mass flow	g/s, g/min	Gram/time unit
	kg/s, kg/min, kg/h, kg/d	Kilogram/time unit
	t/h, t/d	Metric ton/time unit
Temperature	℃ , K	Celsius, Kelvin
Volume	cm³, dm³, m³	Cubic centimeter, cubic decimeter, cubic meter
	ml, l	Milliliter, liter
Volume flow	dm³/s, dm³/min, dm³/h, dm³/d	Cubic decimeter/time unit
	m³/s, m³/min, m³/h, m³/d	Cubic meter/time unit
	l/s, l/min, l/h, l/d	Liter/time unit
Time	m, h, d, y	Minute, hour, day, year

5.2   US units

Process variable	Units	Explanation
Velocity	ft/s	Foot/time unit
Mass	oz, lb, STon	Ounce, pound, standard ton
Mass flow	oz/s, oz/min	Ounce/time unit
	lb/s, lb/min, lb/h, lb/d	Pound/time unit
	STon/h, STon/d	Standard ton/time unit
Temperature	℉, ℉R	Fahrenheit, Rankine
Volume	ft³	Cubic foot
Volume flow	ft³/s, ft³/min, ft³/h, ft³/d	Cubic foot/time unit
Time	m, h, d, y	Minute, hour, day, year
	am, pm	Ante meridiem (before midday), post meridiem (after midday)

5.3   Imperial units

Process variable	Units	Explanation
Volume	bbl (imp;beer)	Barrel (beer)
Volume flow	bbl/s (imp;beer), bbl/min (imp;beer), bbl/h (imp;beer), bbl/d (imp;beer)	Barrel /time unit (beer) Beer: 36.0 gal/bbl
Time	m, h, d, y	Minute, hour, day, year
	am, pm	Ante meridiem (before midday), post meridiem (after midday)

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