Description of Device Parameters
Proline Prosonic Flow W 400

Ultrasonic time-of-flight flowmeter
HART

HART
COMMUNICATION PROTOCOL

Endress+Hauser [EH]

People for Process Automation
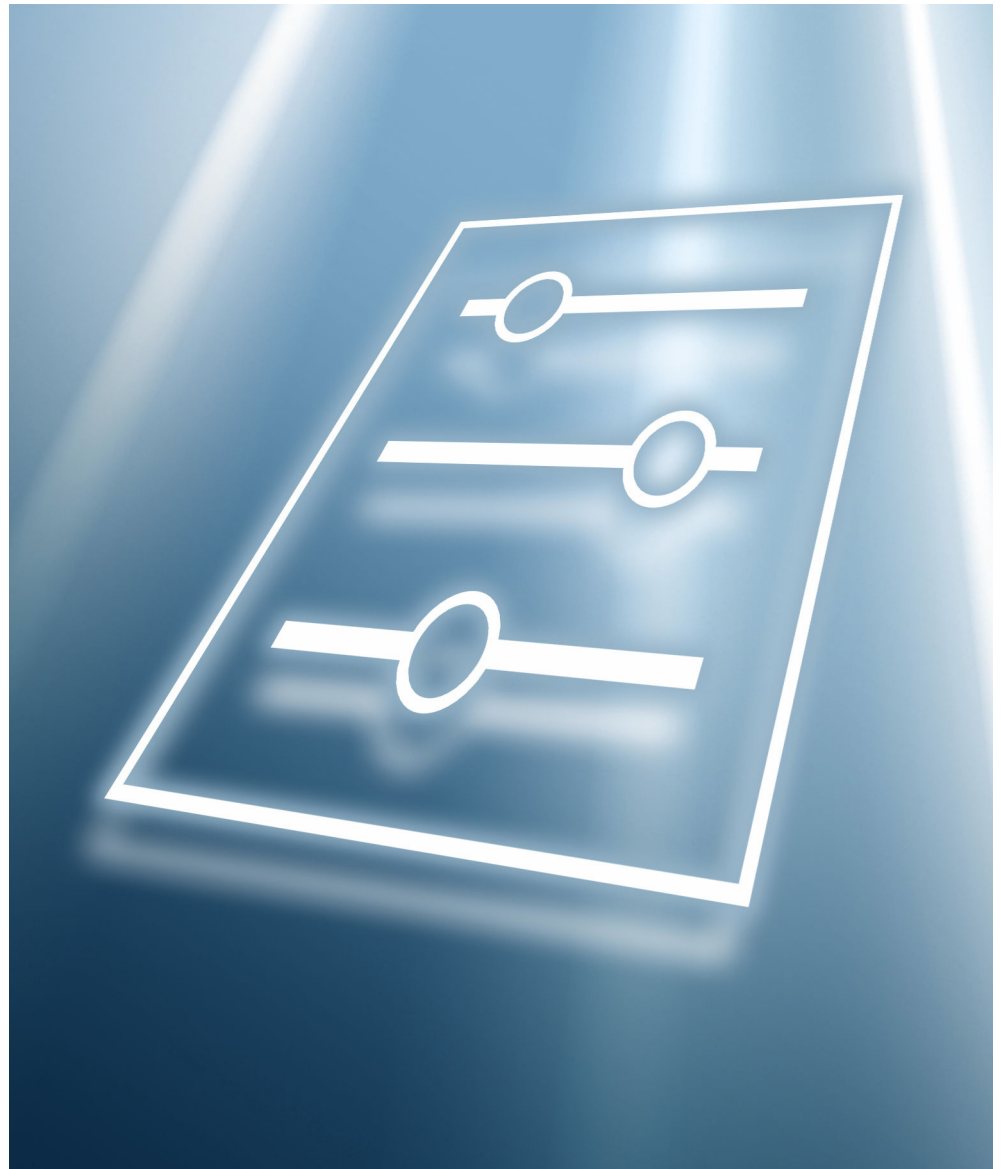
Table of contents

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.

Operating menu for operators and maintenances

Language

Operation → Language

Parameter 1

Parameter n

Submenu 1

Submenu n

Operator

Setup → Device tag

Wizard 1 / Parameter 1

Wizard n / Parameter n

Advanced setup → Enter access code

Parameter 1

Parameter n

Submenu 1

Submenu n

Diagnostics → Parameter 1

Parameter n

Submenu 1

Submenu n

Maintenance

Task-oriented

Operating menu for experts

Expert → Access status display

Parameter n

System

Sensor

Input

Output

Communication

Application

Diagnostics

Expert

Function-oriented

A0029160-EN

⊞ 1   Sample graphic for the schematic layout of the operating menu

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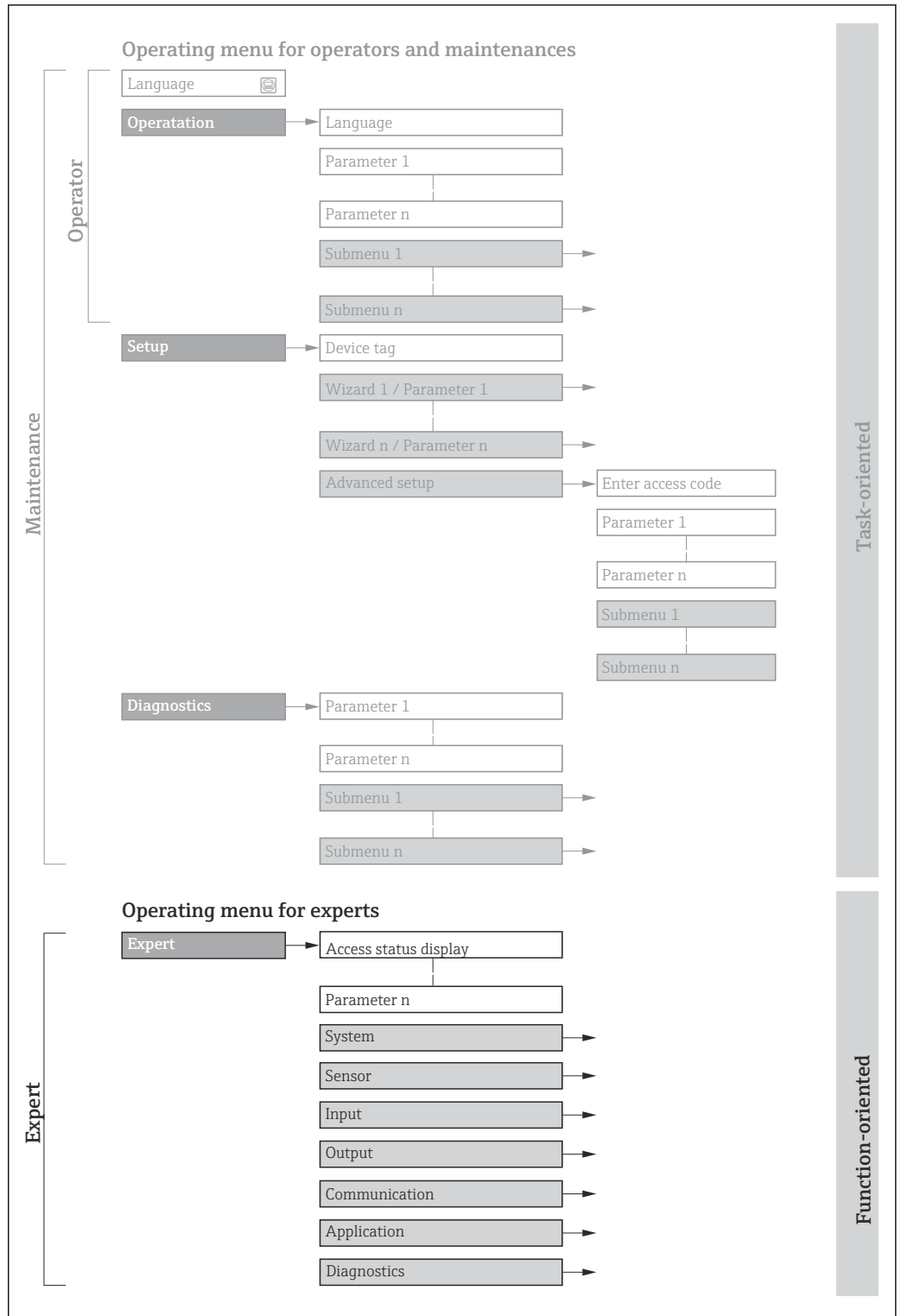- The arrangement of the parameters according to the menu structure of the **Operation** menu, **Setup** menu, **Diagnostics** menu with a brief description: Operating Instructions
- Operating concept of the operating menus: Operating Instructions

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 local display (direct access code) or web browser
	🔲 Navigation path to the parameter via the operating tool
	The names of the menus, submenus and parameters are abbreviated to the form in which they appear on the display and in the operating tool.
Prerequisite	The parameter is only available under these specific conditions
Description	Description of the parameter function
Selection	List of the individual options for the parameter
	• Option 1
	• Option 2
User entry	Parameter entry range
Display	Display value/data of the parameter
Factory setting	Default setting ex works
Additional information	Additional explanations (e.g. in examples):
	• For individual options
	• For display value/data
	• For the input range
	• For the factory setting
	• For the parameter function

1.4   Symbols used

1.4.1   Symbols for certain types of information

Symbol	Meaning
ℹ️	**Tip** Indicates additional information.
📖	Reference to documentation
📄	Reference to page
🖼️	Reference to graphic
🖥️ A0028662	Operation via local display
💻 A0028663	Operation via operating tool
🔒 A0028665	Write-protected parameter

1.4.2   Symbols in graphics

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 W 400	BA02086D

1.5.2   Supplementary device-dependent documentation

Special Documentation

Content	Documentation code
Radio approvals for WLAN interface for A309/A310 display module	SD01793D
FlowDC	SD02691D
Heartbeat Technology	SD02712D

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.

| ▸ Heartbeat Technology | → 🖺 180 |
| ▸ Simulation | → 🖺 190 |

▸ Simulation   → 🖺

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.

Direct access   🔒

Navigation	⌾ Expert → Direct access (0106)
Description	Use this function to enter the access code to enable direct access to the desired parameter via the local display. A parameter number is assigned to each parameter for this purpose.
User entry	0 to 65 535
Additional information	*User entry* The direct access code consists of a 5-digit number (at maximum) and the channel number, which identifies the channel of a process variable: e.g. 00914-2. In the navigation view, this appears on the right-hand side in the header of the selected parameter.

1   Direct access code

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

---

Locking status
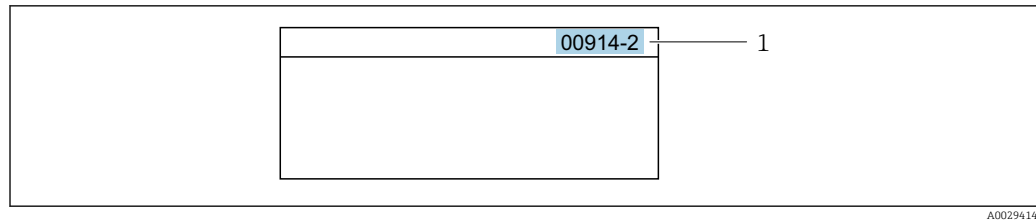
Navigation	Expert → Locking status (0004)
Description	Displays the active write protection.
User interface	• Hardware locked • Temporarily locked
Additional information	*Display*

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

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

Options

Options	Description
None	The access authorization displayed in the **Access status display** parameter (→ 📄 26) applies . Only appears on local display.
Hardware locked (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) .
Temporarily 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.

User role	
Navigation	Expert → User role (0005)
Description	Displays the access authorization to the parameters via the operating tool or Web browser.
User interface	• Operator • Maintenance
Factory setting	Maintenance
Additional information	*Description*

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

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

User interface

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

Enter access code	
Navigation	Expert → Ent. access code (0003)
Description	Use this function to enter the user-specific release code to remove parameter write protection.
User entry	Max. 16-digit character string comprising numbers, letters and special characters

3.1   "System" submenu

Navigation   Expert → System

▶ System	
▶ Display	→ 🖹 14
▶ Diagnostic handling	→ 🖹 27
▶ Administration	→ 🖹 34

3.1.1   "Display" submenu

Navigation   🖳🖵   Expert → System → Display

▸ Display		
Display language (0104)	→ 🖺	15
Format display (0098)	→ 🖺	15
Value 1 display (0107)	→ 🖺	18
0% bargraph value 1 (0123)	→ 🖺	18
100% bargraph value 1 (0125)	→ 🖺	19
Decimal places 1 (0095)	→ 🖺	19
Value 2 display (0108)	→ 🖺	20
Decimal places 2 (0117)	→ 🖺	20
Value 3 display (0110)	→ 🖺	21
0% bargraph value 3 (0124)	→ 🖺	21
100% bargraph value 3 (0126)	→ 🖺	22
Decimal places 3 (0118)	→ 🖺	22
Value 4 display (0109)	→ 🖺	22
Decimal places 4 (0119)	→ 🖺	23
Display interval (0096)	→ 🖺	23
Display damping (0094)	→ 🖺	24
Header (0097)	→ 🖺	24
Header text (0112)	→ 🖺	25
Separator (0101)	→ 🖺	25
Contrast display (0105)	→ 🖺	26
Backlight (0111)	→ 🖺	26

Display language

Navigation	🖩🖳 Expert → System → Display → Display language (0104)
Prerequisite	A local display is provided.
Description	Use this function to select the configured language on the local display.
Selection	• English • Deutsch • Français • Español • Italiano • Nederlands • Portuguesa • Polski • русский язык (Russian) • Svenska • Türkçe • 中文 (Chinese) • 日本語 (Japanese) • 한국어 (Korean) • tiếng Việt (Vietnamese) * • čeština (Czech)
Factory setting	English (alternatively, the ordered language is preset in the device)

Format display

Navigation	🖩🖳 Expert → System → Display → Format display (0098)
Prerequisite	A local display is provided.
Description	Use this function to select how the measured value is shown on the local display.
Selection	• 1 value, max. size • 1 bargraph + 1 value • 2 values • 1 value large + 2 values • 4 values
Factory setting	1 value, max. size

---

* Visibility depends on order options or device settings

Additional information   *Description*

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

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

Possible measured values shown on the local display:

"1 value, max. size" option

XXXXXXXXX
900.00
l/h

A0016529
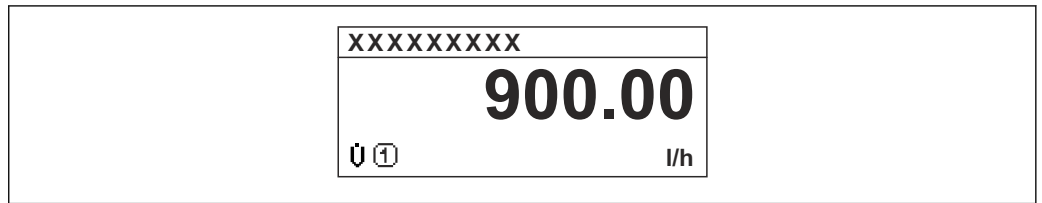
"1 bargraph + 1 value" option

XXXXXXXXX
900.00 l/h
60.00
%

A0016530

"2 values" option

XXXXXXXXX
900.00
l/h
60.00
%

A0016531
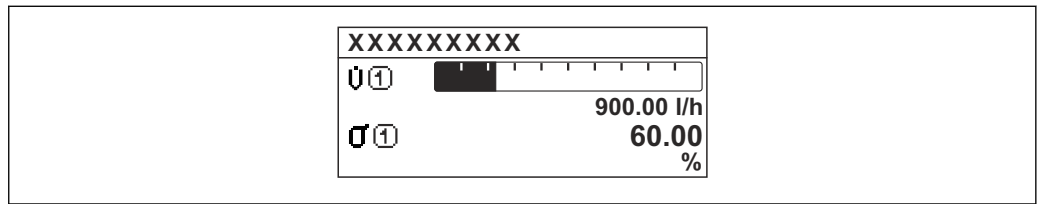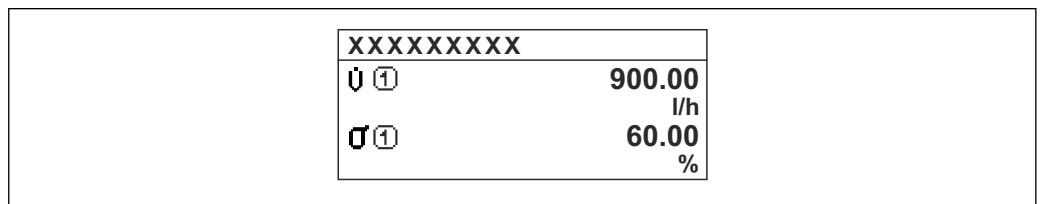
🖼 *2*

"1 value large + 2 values" option

XXXXXXXXX
900.00
l/h
60.00%
5.98kWh/Nm³

A0016532

"4 values" option

XXXXXXXXX
900.00 l/h
60.00 %
5.98 kWh/Nm³
213.94 l

A0016533
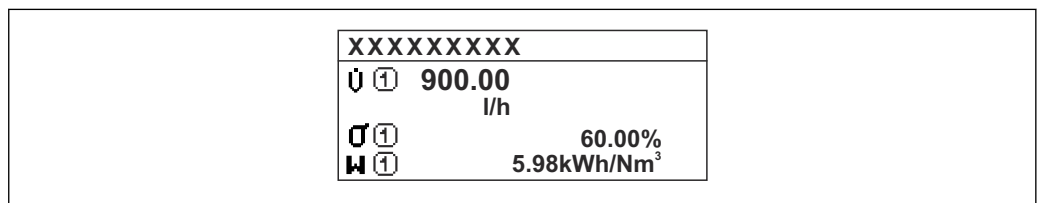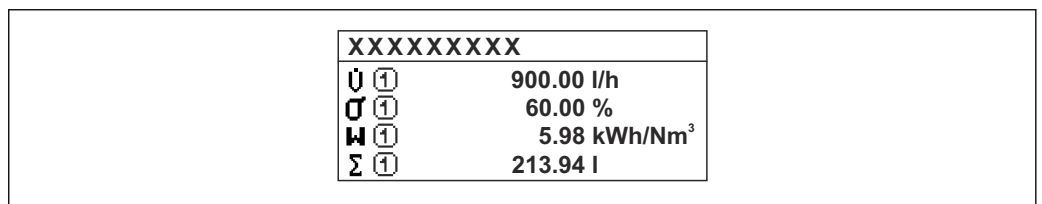
Value 1 display	🔒

Navigation	🔘🖵 Expert → System → Display → Value 1 display (0107)

Prerequisite	A local display is provided.

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

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

Factory setting	Volume flow

Additional information	*Description* If several measured values are displayed one below the other, the measured value selected here will be the first value to be displayed. The value is only displayed during normal operation. ℹ️ The **Format display** parameter (→ 🖿 15) is used to specify how many measured values are displayed simultaneously and how. *Dependency* ℹ️ The unit of the displayed measured value is taken from the **System units** submenu (→ 🖿 47).

0% bargraph value 1	🔒

Navigation	🔘🖵 Expert → System → Display → 0% bargraph 1 (0123)

Prerequisite	A local display is provided.

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

User entry	Signed floating-point number

Factory setting	Country-specific

---

* Visibility depends on order options or device settings

Additional information	*Description*
	ℹ️ The **Format display** parameter (→ 📄 15) is used to specify that the measured value is to be displayed as a bar graph.
	User entry
	ℹ️ The unit of the displayed measured value is taken from the **System units** submenu (→ 📄 47).

100% bargraph value 1   🔒

| Navigation	🔘🖳 Expert → System → Display → 100% bargraph 1 (0125)
Prerequisite	A local display is provided.
Description	Use this function to enter the 100% bar graph value to be shown on the display for the measured value 1.
User entry	Signed floating-point number
Factory setting	Depends on country and nominal diameter
Additional information	*Description*
	ℹ️ The **Format display** parameter (→ 📄 15) is used to specify that the measured value is to be displayed as a bar graph.
	User entry
	ℹ️ The unit of the displayed measured value is taken from the **System units** submenu (→ 📄 47).

Decimal places 1   🔒

Navigation	🔘🖳 Expert → System → Display → Decimal places 1 (0095)
Prerequisite	A measured value is specified in the **Value 1 display** parameter (→ 📄 18).
Description	Use this function to select the number of decimal places for measured value 1.
Selection	• x • x.x • x.xx • x.xxx • x.xxxx
Factory setting	x.xx
Additional information	*Description*
	ℹ️ This setting does not affect the accuracy of the device for measuring or calculating the value.

Value 2 display	🔒

Navigation	🔘🖳 Expert → System → Display → Value 2 display (0108)
Prerequisite	A local display is provided.
Description	Use this function to select a measured value that is shown on the local display.
Selection	For the picklist, see **Value 1 display** parameter (→ 🖺 18)
	or
	For the picklist, see **Value 1 display** parameter (→ 🖺 18)
Factory setting	None
Additional information	*Description*
	If several measured values are displayed one below the other, 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 (→ 🖺 15) is used to specify how many measured values are displayed simultaneously and how.
	Dependency
	🛈 The unit of the displayed measured value is taken from the **System units** submenu (→ 🖺 47).

Decimal places 2	🔒

| Navigation	🔘🖳 Expert → System → Display → Decimal places 2 (0117)
Prerequisite	A measured value is specified in the **Value 2 display** parameter (→ 🖺 20).
Description	Use this function to select the number of decimal places for measured value 2.
Selection	▪ x ▪ x.x ▪ x.xx ▪ x.xxx ▪ x.xxxx
Factory setting	x.xx
Additional information	*Description*
	🛈 This setting does not affect the accuracy of the device for measuring or calculating the value.

Value 3 display	🔒

Navigation	🎛🖥 Expert → System → Display → Value 3 display (0110)
Prerequisite	A local display is provided.
Description	Use this function to select a measured value that is shown on the local display.
Selection	For the picklist, see **Value 1 display** parameter (→ 🖺 18)
Factory setting	None
Additional information	*Description* If several measured values are displayed one below the other, the measured value selected here will be the third value to be displayed. The value is only displayed during normal operation. ℹ The **Format display** parameter (→ 🖺 15) is used to specify how many measured values are displayed simultaneously and how. *Options* ℹ The unit of the displayed measured value is taken from the **System units** submenu (→ 🖺 47).

0% bargraph value 3	🔒

Navigation	🎛🖥 Expert → System → Display → 0% bargraph 3 (0124)
Prerequisite	A selection was made in the **Value 3 display** parameter (→ 🖺 21).
Description	Use this function to enter the 0% bar graph value to be shown on the display for the measured value 3.
User entry	Signed floating-point number
Factory setting	Country-specific
Additional information	*Description* ℹ The **Format display** parameter (→ 🖺 15) is used to specify that the measured value is to be displayed as a bar graph. *User entry* ℹ The unit of the displayed measured value is taken from the **System units** submenu (→ 🖺 47).

100% bargraph value 3	🔒

Navigation	🔘🖥 Expert → System → Display → 100% bargraph 3 (0126)
Prerequisite	A selection was made in the **Value 3 display** parameter (→ 📖 21).
Description	Use this function to enter the 100% bar graph value to be shown on the display for the measured value 3.
User entry	Signed floating-point number
Factory setting	0
Additional information	*Description*

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

User entry

> ℹ️ The unit of the displayed measured value is taken from the **System units** submenu (→ 📖 47).

Decimal places 3	🔒

Navigation	🔘🖥 Expert → System → Display → Decimal places 3 (0118)
Prerequisite	A measured value is specified in the **Value 3 display** parameter (→ 📖 21).
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*

> ℹ️ This setting does not affect the accuracy of the device for measuring or calculating the value.

Value 4 display	🔒

Navigation	🔘🖥 Expert → System → Display → Value 4 display (0109)
Prerequisite	A local display is provided.
Description	Use this function to select a measured value that is shown on the local display.

Selection	For the picklist, see **Value 1 display** parameter (→ 🗏 18)
Factory setting	None
Additional information	*Description*

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

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

Options

🛈 The unit of the displayed measured value is taken from the **System units** submenu (→ 🗏 47).

### Decimal places 4 🔒

Navigation	🗇🖩 Expert → System → Display → Decimal places 4 (0119)
Prerequisite	A measured value is specified in the **Value 4 display** parameter (→ 🗏 22).
Description	Use this function to select the number of decimal places for measured value 4.
Selection	• x • x.x • x.xx • x.xxx • x.xxxx
Factory setting	x.xx
Additional information	*Description*

🛈 This setting does not affect the accuracy of the device for measuring or calculating the value.

Display interval

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

Additional information   *Description*

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

                           ⓘ • The **Value 1 display** parameter (→ 📄 18)...**Value 4 display** parameter (→ 📄 22)
                                 are used to specify which measured values are shown on the local display.
                              • The display format for the measured values displayed is defined in the **Format
                                 display** parameter (→ 📄 15).

Display damping   🔒

Navigation   🔘🔲 Expert → System → Display → Display damping (0094)

Prerequisite   A local display is provided.

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

User entry   0.0 to 999.9 s

Factory setting   0.0 s

Additional information   *User entry*

                          Use this function to enter a time constant (PT1 element [1]) for display damping:
                          • At a low time constant, the display reacts quickly to fluctuating measured variables.
                          • If a high time constant is entered, the display reacts more slowly.

                          ⓘ The damping is not active if the value **0** (factory setting) is entered.

Header   🔒
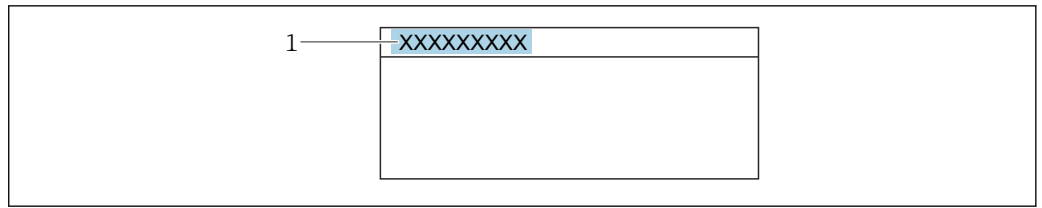
Navigation   🔘🔲 Expert → System → Display → Header (0097)

Prerequisite   A local display is provided.

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

Selection   • Device tag
                          • Free text

Factory setting   Device tag

Additional information   *Description*

                          The header text only appears during normal operation.

---

1)   proportional transmission behavior with first order delay

1   *Position of the header text on the display*

Selection

- Device tag
  Is defined in the **Device tag** parameter (→ 🖺 167).
- Free text
  Is defined in the **Header text** parameter (→ 🖺 25).

Header text	🔒

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

Prerequisite	The **Free text** option is selected in the **Header** parameter (→ 🖺 24).

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

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

Factory setting	------------

Additional information	*Description*

The header text only appears during normal operation.
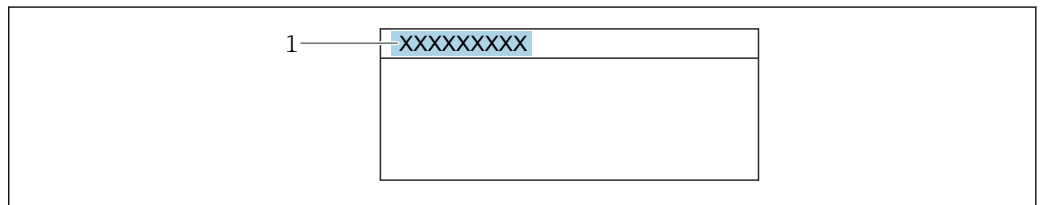
1   *Position of the header text on the display*

User entry

The number of characters displayed depends on the characters used.

Separator	🔒

Navigation	🖩🖥 Expert → System → Display → Separator (0101)

Prerequisite	A local display is provided.

Description	Use this function to select the decimal separator.

Selection	• . (point) • , (comma)

Factory setting	. (point)

Contrast display

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

Prerequisite	A local display is provided.

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

User entry	20 to 80 %

Factory setting	50 %

Backlight

Navigation	🔲🔲 Expert → System → Display → Backlight (0111)

Prerequisite	A local display is provided.

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

Selection	• Disable • Enable

Factory setting	Enable

Access status display

Navigation	🔲🔲 Expert → System → Display → Access stat.disp (0091)

Prerequisite	A local display is provided.

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

User interface	• Operator • Maintenance

Factory setting	Operator

Additional information   *Description*

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

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

📖   For information about the **Enter access code** parameter: see the "Disabling write protection via the access code" section of the Operating Instructions for the device

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

User interface

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

3.1.2   "Diagnostic handling" submenu

Navigation   ⌦▣   Expert → System → Diagn. handling

▸ Diagnostic handling	
Alarm delay (0651)	→ 🔖 27
▸ **Diagnostic behavior**	→ 🔖 27
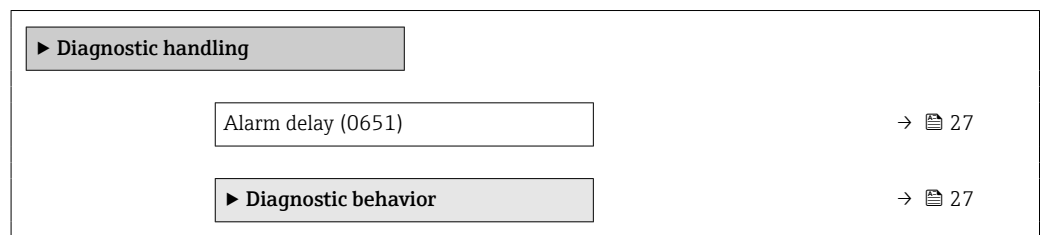
Alarm delay   ⌦

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

"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 (→ 🔖 27).

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. The background lighting changes to red.
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 only displayed in the **Event logbook** submenu (**Event list** submenu) and is not displayed in alternating sequence 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 → 🖩 7

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

▶ Diagnostic behavior

Assign behavior of diagnostic no. 019 (0635)	→ 🖩 29
Assign behavior of diagnostic no. 160 (0776)	→ 🖩 29
Assign behavior of diagnostic no. 302 (0742)	→ 🖩 29
Assign behavior of diagnostic no. 441 (0657)	→ 🖩 30
Assign behavior of diagnostic no. 442 (0658)	→ 🖩 30
Assign behavior of diagnostic no. 443 (0659)	→ 🖩 31
Assign behavior of diagnostic no. 832 (0675)	→ 🖩 31
Assign behavior of diagnostic no. 833 (0676)	→ 🖩 31
Assign behavior of diagnostic no. 841 (0680)	→ 🖩 32
Assign behavior of diagnostic no. 842 (0638)	→ 🖩 32
Assign behavior of diagnostic no. 870 (0726)	→ 🖩 32

Assign behavior of diagnostic no. 930 (0639)	→ 🗎	33
Assign behavior of diagnostic no. 931 (0640)	→ 🗎	33

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

Navigation	🖉🖳 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 019 (0635)
Description	Use this function to change the diagnostic behavior of the ⚠S019 Device initialization active diagnostic message.
Selection	• Off • Alarm • Warning • Logbook entry only
Factory setting	Warning
Additional information	🛈 For a detailed description of the options available: → 🗎 28

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

Navigation	🖉🖳 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 160 (0776)
Description	Use this function to change the diagnostic behavior of the 160 Signal path switched off diagnostic message.
Selection	• Off • Alarm • Warning • Logbook entry only
Factory setting	Warning
Additional information	🛈 For a detailed description of the options available: → 🗎 28

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

Navigation	🖉🖳 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 302 (0742)
Description	Use this function to change the diagnostic behavior of the 302 Device verification active diagnostic message.

Selection	• Off
	• Warning
	• Logbook entry only

Factory setting	Warning

Additional information	For a detailed description of the options available: → 🗎 28

Assign behavior of diagnostic no. 441 (Current output 1 to n)

| Navigation	🗟🖳 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 441 (0657)

Description	Use this function to change the diagnostic behavior of the **441 Current output 1 to n** diagnostic message.

Selection	• Off
	• Alarm
	• Warning
	• Logbook entry only

Factory setting	Warning

Additional information	*Selection*
	For a detailed description of the options available: → 🗎 28

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

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

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

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

Selection	• Off
	• Alarm
	• Warning
	• Logbook entry only

Factory setting	Warning

Additional information	For a detailed description of the options available: → 🗎 28

Assign behavior of diagnostic no. 443 (Pulse output)

Navigation	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 443 (0659)
Prerequisite	The measuring device has a pulse/frequency/switch output.
Description	Use this function to change the diagnostic behavior of the **443 Pulse output** diagnostic message.
Selection	• Off • Alarm • Warning • Logbook entry only
Factory setting	Warning
Additional information	*Selection* For a detailed description of the options available: → 🖺 28

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

Navigation	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 832 (0675)
Description	Use this function to change the diagnostic behavior of the **832 Electronics temperature too high** diagnostic message.
Selection	• Off • Alarm • Warning • Logbook entry only
Factory setting	Warning
Additional information	For a detailed description of the options available: → 🖺 28

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

Navigation	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 833 (0676)
Description	Use this function to change the diagnostic behavior of the **833 Electronics temperature too low** diagnostic message.
Selection	• Off • Alarm • Warning • Logbook entry only

Factory setting	Warning

Additional information	*Selection*

For a detailed description of the options available: → 🖺 28

Assign behavior of diagnostic no. 841   🔒

Navigation	🖩🖳 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 841 (0680)

Description	Use this function to change the diagnostic behavior of the △S841 **Flow velocity too high** diagnostic message.

Selection	• Off • Alarm • Warning • Logbook entry only

Factory setting	Warning

Additional information	For a detailed description of the options available: → 🖺 28

Assign behavior of diagnostic no. 842 (Process limit)   🔒

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

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

Selection	• Off • Alarm • Warning • Logbook entry only

Factory setting	Off

Additional information	For a detailed description of the options available: → 🖺 28

Assign behavior of diagnostic no. 870 (Measuring inaccuracy increased)   🔒

Navigation	🖩🖳 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 870 (0726)

Description	Use this function to change the diagnostic behavior of the **870 Measuring inaccuracy increased** diagnostic message.

Selection	• Off
	• Alarm
	• Warning
	• Logbook entry only

| Factory setting | Off |

| Additional information | *Selection* |
| | For a detailed description of the options available: → 🗎 28 |

Assign behavior of diagnostic no. 930 (Process fluid)　　　　　　　　　　　　　　🔒

| Navigation | 🞕🖳　Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 930 (0639) |

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

Selection	• Off
	• Alarm
	• Warning
	• Logbook entry only

| Factory setting | Alarm |

| Additional information | For a detailed description of the options available: → 🗎 28 |

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

| Navigation | 🞕🖳　Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 931 (0640) |

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

Selection	• Off
	• Alarm
	• Warning
	• Logbook entry only

| Factory setting | Alarm |

| Additional information | For a detailed description of the options available: → 🗎 28 |

Assign behavior of diagnostic no. 953 (Asymmetry noise signal too high path 1 to n)	🔒

Navigation	🔘🖥 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 953 (0636)
Description	Use this function to change the diagnostic behavior of the △M953 **Asymmetry noise signal too high path 1 to n** diagnostic message.
Selection	• Off • Alarm • Warning • Logbook entry only
Factory setting	Warning
Additional information	ℹ️ For a detailed description of the options available: → 🖺 28

3.1.3   "Administration" submenu

Navigation   🔘🖥 Expert → System → Administration

▸ Administration		
	⏵ Define access code	→ 🖺 34
	▶ Reset access code	→ 🖺 36
	Device reset (0000)	→ 🖺 37
	Activate SW option (0029)	→ 🖺 37
	Software option overview (0015)	→ 🖺 38

"Define access code" wizard

ℹ️ The **Define access code** wizard (→ 🖺 34) is only available when operating via the local display or Web browser.

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

Navigation   Expert → System → Administration → Def. access code

▶ 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 or Web browser.
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.

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

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

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

User entry

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

Factory setting

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

Confirm access code   🔒

Navigation	Expert → System → Administration → Def. access code → Confirm code
Description	Enter the defined release code a second time to confirm the release code.
User entry	0 to 9999

Factory setting   0

"Reset access code" submenu

Navigation   🔘🖳   Expert → System → Administration → Reset acc. code

▶ Reset access code	
Operating time (0652)	→ 🖺 36
Reset access code (0024)	→ 🖺 36
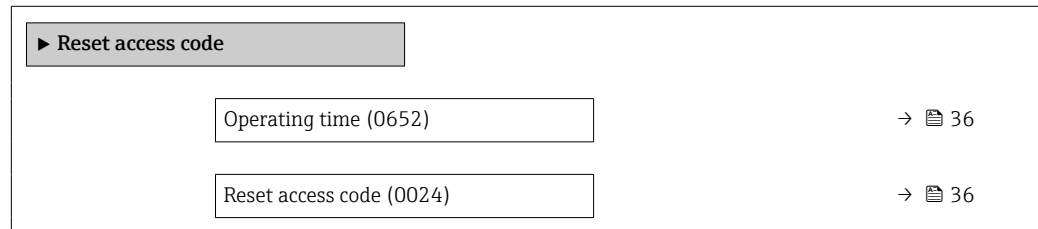
Operating time

Navigation   🔘🖳   Expert → System → Administration → Reset acc. code → Operating time (0652)

Description   Displays the length of time the device has been in operation.

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

Additional information   *Indication*

                            Maximum number of days: 9 999 (corresponds to approx. 27 years and 5 months)

Reset access code

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

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

User entry   Character string comprising numbers, letters and special characters

Factory setting   0x00

Additional information   *Description*

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

User entry

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

Additional parameters in the "Administration" submenu

Device reset   🔒

Navigation   ‖‖ ‖   Expert → System → Administration → Device reset (0000)

Description   Reset the device configuration - either entirely or in part - to a defined state.

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

Factory setting   Cancel

Additional information   *Selection*

Options	Description
Cancel	No action is executed and the user exits the parameter.
To delivery settings	Every parameter for which a customer-specific default setting was ordered is reset to the customer-specific value. All other parameters are reset to the factory setting.
Restart device	The restart resets every parameter with data stored in volatile memory (RAM) to the factory setting (e.g. measured value data). The device configuration remains unchanged.

Activate SW option   🔒

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

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

User entry   Max. 10-digit string of numbers.

---

*   Visibility depends on order options or device settings

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.

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

Entering the activation code

🛈 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 (→ 🔖 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.

‣ 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 (→ 🔖 38).

Web browser

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

Software option overview

Navigation	🖩🖵 Expert → System → Administration → SW option overv. (0015)
Description	Displays all the software options that are enabled in the device.
User interface	• Extended HistoROM • PFS output 2 + status input • Heartbeat Monitoring • Heartbeat Verification • Flow disturbance compensation or

Additional information	*Description*

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

"Extended HistoROM" option

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

"PFS output 2 + status input" option

Order code for "Output; input", option **I** "4-20mA HART, 2x pul./freq./switch output; status input"

"Heartbeat Verification" option and "Heartbeat Monitoring" option

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

"Flow disturbance compensation" option

This option is available by default if 2 sensor pairs have been ordered.

3.2   "Sensor" submenu

Navigation   🖩🖳   Expert → Sensor

‣ Sensor	
‣ Measured values	→ 🖺 39
‣ System units	→ 🖺 47
‣ Measuring point 1	→ 🖺 54
‣ Installation status	→ 🖺 64
‣ Process parameters	→ 🖺 66
‣ External compensation	→ 🖺 70
‣ Sensor adjustment	→ 🖺 74
‣ Calibration	→ 🖺 79

3.2.1   "Measured values" submenu

Navigation   🖩🖳   Expert → Sensor → Measured val.

‣ Measured values	
‣ Process variables	→ 🖺 40

▶ System values	→ 🖺 42
▶ Totalizer	→ 🖺 44
▶ Input values	→ 🖺 44
▶ Output values	→ 🖺 45

"Process variables" submenu

Navigation   �👁🖳 Expert → Sensor → Measured val. → Process variab.

▶ Process variables		
	Volume flow (1838)	→ 🖺 40
	Mass flow (1847)	→ 🖺 40
	Flow velocity (1852)	→ 🖺 41
	Sound velocity (1850)	→ 🖺 41
	Density (1851)	→ 🖺 42
	Temperature (1853)	→ 🖺 41

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 (→ 🖺 48)

Mass flow

Navigation   �👁🖳 Expert → Sensor → Measured val. → Process variab. → Mass flow (1847)

Description   Displays the mass flow that is currently calculated.

User interface	Signed floating-point number

Additional information	*Dependency*
	The unit is taken from the **Mass flow unit** parameter (→ 🖺 50)

Flow velocity

Navigation	🆎🔲 Expert → Sensor → Measured val. → Process variab. → Flow velocity (1852)

Description	Displays the average flow velocity that is currently calculated.

User interface	Signed floating-point number

Additional information	*Dependency*
	The unit is taken from the **Velocity unit** parameter (→ 🖺 51)

Sound velocity

Navigation	🆎🔲 Expert → Sensor → Measured val. → Process variab. → Sound velocity (1850)

Description	Displays the sound velocity that is currently measured.

User interface	Signed floating-point number

Additional information	*Dependency*
	The unit is taken from the **Velocity unit** parameter (→ 🖺 51)

Temperature

Navigation	🆎🔲 Expert → Sensor → Measured val. → Process variab. → Temperature (1853)

Prerequisite	Temperature is not entered as a fixed value.

Description	Displays the medium temperature that is currently measured.

User interface	Signed floating-point number

Additional information	*Dependency*
	The unit is taken from the **Temperature unit** parameter (→ 🖺 52)

Density	

Navigation   @@ Expert → Sensor → Measured val. → Process variab. → Density (1851)

Prerequisite   A fixed density is not entered.

Description   Displays the density that is currently calculated.

User interface   Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Density unit** parameter (→ 🖺 52)

"System values" submenu

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

▶ System values	
Signal strength (2914)	→ 🖺 42
Signal to noise ratio (2917)	→ 🖺 43
Acceptance rate (2912)	→ 🖺 43
Turbulence (2907)	→ 🖺 43

Signal strength	

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

Description   Displays the current signal strength.

User interface   Signed floating-point number

Additional information *Description*

A drop in the signal strength over time can be an indicator of process changes, such as the development of deposits in the measuring pipe at the measuring point. , e.g. buildup of deposits in the measuring pipe at the measuring point. This can only be quantified by performing a direct process comparison with different deposit layer thicknesses and associated signal strengths.

Signal to noise ratio

Navigation	�@🖳 Expert → Sensor → Measured val. → System values → SNR (2917)
Description	Displays the current signal to noise ratio.
User interface	Signed floating-point number
Additional information	*Description*

A low value or a drop in the signal to noise ratio over time is an indicator of poor signal quality.

Acceptance rate

Navigation	�@🖳 Expert → Sensor → Measured val. → System values → Acceptance rate (2912)
Description	Displays the ratio of the number of ultrasonic signals accepted for flow calculation and the total number of ultrasonic signals emitted.

Multipath measuring devices only: Displays the minimum of all acceptance rates measured.

User interface	0 to 100 %

Turbulence

Navigation	�@🖳 Expert → Sensor → Measured val. → System values → Turbulence (2907)
Description	Displays the current turbulence.
User interface	Signed floating-point number
Additional information	*Description*

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

"Totalizer" submenu

Navigation   Expert → Sensor → Measured val. → Totalizer

► Totalizer		
	Totalizer 1 to n value (0911–1 to n)	→ 🗎 44
	Totalizer 1 to n overflow (0910–1 to n)	→ 🗎 44
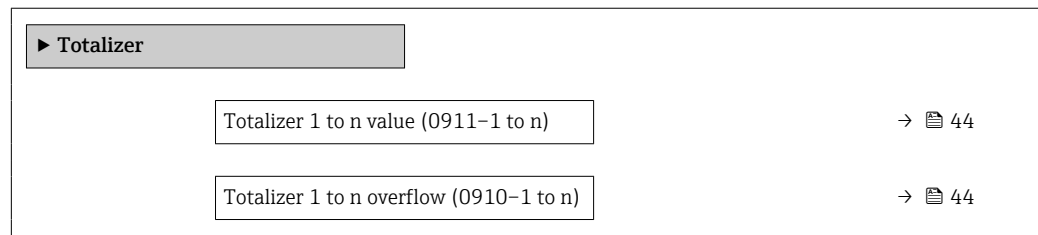
Totalizer 1 to n value

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

Description   Displays the current totalizer counter value.

User interface   Signed floating-point number

Factory setting   0 l

Totalizer 1 to n overflow   🔒

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

Description   Displays the current totalizer overflow.

User interface   –32 000.0 to 32 000.0

Factory setting   0

"Input values" submenu

Navigation   Expert → Sensor → Measured val. → Input values

► Input values		
	Value status input (1353)	→ 🗎 45
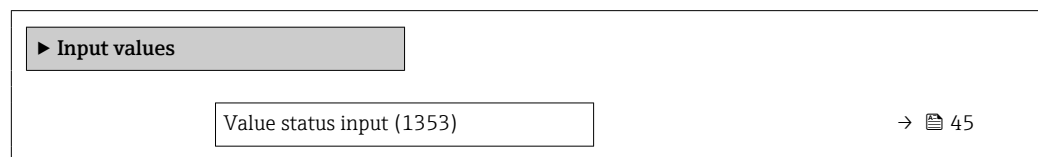
Value status input

Navigation   Expert → Sensor → Measured val. → Input values → Val.stat.inp. (1353)

Prerequisite   For the following order code:
                        "Output; input", option I "4-20mA HART, 2x pul./freq./switch output; status input"

Description   Displays the current input signal level.

User interface   • High
                        • Low

"Output values" submenu

Navigation   Expert → Sensor → Measured val. → Output values

```
▶ Output values
                    Output current (0361)                → 🗎 45

                    Measured current (0366)              → 🗎 46

                    Pulse output (0456)                  → 🗎 46

                    Output frequency (0471)              → 🗎 47

                    Switch state (0461)                  → 🗎 47

                    Output frequency (0471)              → 🗎 47

                    Pulse output (0456)                  → 🗎 46

                    Switch state (0461)                  → 🗎 47
```

Output current

Navigation   Expert → Sensor → Measured val. → Output values → Output curr. (0361)

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

User interface   0 to 22.5 mA

Measured current	

Navigation	🎯🖳 Expert → Sensor → Measured val. → Output values → Measur. curr. (0366)
Description	Displays the actual measured value of the output current.
User interface	0 to 30 mA

Pulse output 1 to n	

Navigation	🎯🖳 Expert → Sensor → Measured val. → Output values → Pulse output (0456)
	🎯🖳 Expert → Sensor → Measured val. → Output values → Pulse output (0456)
Prerequisite	The **Pulse** option is selected in the **Operating mode** parameter (→ 🗎 96) 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 (→ 🗎 98) and **Pulse width** parameter (→ 🗎 99) 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   Normally closed
NO   Normally opened

The output behavior can be reversed via the **Invert output signal** parameter (→ 🗎 112) 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 (→ 🗎 100)) can be configured.

Output frequency 1 to n

Navigation	🎛️🖥️ Expert → Sensor → Measured val. → Output values → Output freq. (0471) 🎛️🖥️ Expert → Sensor → Measured val. → Output values → Output freq. (0471)
Prerequisite	In the **Operating mode** parameter (→ 🖺 96), the **Frequency** option is selected.
Description	Displays the actual value of the output frequency which is currently measured.
User interface	0.0 to 12 500.0 Hz

Switch state 1 to n

Navigation	🎛️🖥️ Expert → Sensor → Measured val. → Output values → Switch state (0461) 🎛️🖥️ Expert → Sensor → Measured val. → Output values → Switch state (0461)
Prerequisite	In the **Operating mode** parameter (→ 🖺 96), the **Switch** option is selected.
Description	Displays the current switch status of the status output.
User interface	• Open • Closed

Additional information	*Selection*
	
	• Open
	  The switch output is not conductive.
	• Closed
	  The switch output is conductive.

3.2.2 "System units" submenu

Navigation   🎛️🖥️ Expert → Sensor → System units

```
► System units
```

Volume flow unit (0553)	→ 🖺 48
Volume unit (0563)	→ 🖺 50
Mass flow unit (0554)	→ 🖺 50
Mass unit (0574)	→ 🖺 51
Velocity unit (0566)	→ 🖺 51

Temperature unit (0557)	→ 🗎 52
Density unit (0555)	→ 🗎 52
Kinematic viscosity unit (0578)	→ 🗎 53
Length unit (0551)	→ 🗎 53
Date/time format (2812)	→ 🗎 54

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
• cm³/s
• cm³/min
• cm³/h
• cm³/d
• dm³/s
• dm³/min
• dm³/h
• dm³/d
• m³/s
• m³/min
• m³/h
• m³/d
• ml/s
• ml/min
• ml/h
• ml/d
• l/s
• l/min
• l/h
• l/d
• hl/s
• hl/min
• hl/h
• hl/d
• Ml/s
• Ml/min
• Ml/h
• Ml/d
• af/s
• af/min
• af/h
• af/d
• ft³/s
• ft³/min
• ft³/h
• ft³/d

- Mft³/s
- Mft³/min
- Mft³/h
- Mft³/d
- fl oz/s (us)
- fl oz/min (us)
- fl oz/h (us)
- fl oz/d (us)
- gal/s (us)
- gal/min (us)
- gal/h (us)
- gal/d (us)
- Mgal/s (us)
- Mgal/min (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;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)
- gal/s (imp)
- gal/min (imp)
- gal/h (imp)
- gal/d (imp)
- Mgal/s (imp)
- Mgal/min (imp)
- Mgal/h (imp)
- Mgal/d (imp)
- bbl/s (imp;beer)
- bbl/min (imp;beer)
- bbl/h (imp;beer)
- bbl/d (imp;beer)
- bbl/s (imp;oil)
- bbl/min (imp;oil)
- bbl/h (imp;oil)
- bbl/d (imp;oil)
- kgal/s (us)
- kgal/min (us)
- kgal/h (us)
- kgal/d (us)

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

Additional information	*Result*
	The selected unit applies to: **Volume flow** parameter (→ 📖 40)
	Selection
	ℹ️ For an explanation of the abbreviated units: → 📖 199

Volume unit	🔒

Navigation	🖥️🖲️ Expert → Sensor → System units → Volume unit (0563)
Description	Use this function to select the unit for the volume.
Selection	• cm³ • dm³ • m³ • ml • l • hl • Ml • af • ft³ • Mft³ • fl oz (us) • gal (us) • kgal (us) • Mgal (us) • bbl (us;oil) • bbl (us;liq.) • bbl (us;beer) • bbl (us;tank) • gal (imp) • Mgal (imp) • bbl (imp;beer) • bbl (imp;oil)
Factory setting	Country-specific: • m³ • ft³
Additional information	*Selection*
	ℹ️ For an explanation of the abbreviated units: → 📖 199

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
	▪ g/h	▪ oz/h
	▪ g/d	▪ oz/d
	▪ kg/s	▪ lb/s
	▪ kg/min	▪ lb/min
	▪ kg/h	▪ lb/h
	▪ kg/d	▪ lb/d
	▪ t/s	▪ STon/s
	▪ t/min	▪ STon/min
	▪ t/h	▪ STon/h
	▪ t/d	▪ STon/d

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

Additional information   *Result*

                          The selected unit applies to:
                          Mass flow parameter

                          Selection

                          For an explanation of the abbreviated units: → 199

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*

                          For an explanation of the abbreviated units: → 199

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	Depends on country: • m/s • ft/s

Additional information   *Effect*

The selected unit applies to:
• Flow velocity (→ 🖺 41)
• Sound velocity (→ 🖺 41)

Options

ℹ️ For an explanation of the abbreviated units: → 🖺 199

Temperature unit 🔒

Navigation	🔘🔲 Expert → Sensor → System units → Temperature unit (0557)

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

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

Factory setting	Country-specific: • ℃ • ℉

Additional information   *Result*

The selected unit applies to:
• Temperature (→ 🖺 41)
• Electronic temperature
• External temperature
• Reference temperature

Selection

ℹ️ For an explanation of the abbreviated units: → 🖺 199

Density unit 🔒

Navigation	🔘🔲 Expert → Sensor → System units → Density unit (0555)

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

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

Factory setting

Country-specific:
• kg/dm³
• lb/ft³

Additional information

Selection

For an explanation of the abbreviated units: → 🕮 199

Kinematic viscosity unit 🔒

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

Selection

SI units
• cSt
• St
• mm²/s
• m²/s

Factory setting

Country-specific:
• m²/s
• cSt

Length unit 🔒

Navigation	🗐🗄 Expert → Sensor → System units → Length unit (0551)
Description	Use this function to select the unit of length of.

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

Factory setting

Country-specific:
• mm
• in

Additional information	*Selection*

   ℹ️ For an explanation of the abbreviated units: → 🖹 199

Date/time format   🔒

Navigation	🖩🖵 Expert → Sensor → System units → Date/time format (2812)
Description	Use this function to select the desired time format for calibration history.
Selection	• dd.mm.yy hh:mm • dd.mm.yy hh:mm am/pm • mm/dd/yy hh:mm • mm/dd/yy hh:mm am/pm
Factory setting	dd.mm.yy hh:mm
Additional information	*Options*

   ℹ️ For an explanation of the abbreviated units: → 🖹 199

3.2.3   "Measuring point " submenu

Navigation   🖩🖵   Expert → Sensor → Meas. point

▶ Measuring point 1		
	Measuring point configuration (5675–1)	→ 🖹 55
	Medium (2926–1)	→ 🖹 56
	Medium temperature (3053–1)	→ 🖹 56
	Sound velocity (2929–1)	→ 🖹 56
	Viscosity (2932–1)	→ 🖹 57
	Pipe material (2927–1)	→ 🖹 57
	Pipe sound velocity (2933–1)	→ 🖹 58
	Pipe dimensions (2943–1)	→ 🖹 58
	Pipe circumference (2934–1)	→ 🖹 58

Measuring point configuration   🔒

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

Description   Use this function to enter the measuring point configuration.

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

Factory setting	Depending on the sensor version

Medium	🔒

Navigation	🔘🔲 Expert → Sensor → Meas. point 1 → Medium (2926–1)

Description	Select the medium.

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

Factory setting	Water

Medium temperature	🔒

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

Description	Enter the medium temperature for the installation.

User entry	–200 to 550 ℃

Factory setting	20 ℃

Sound velocity	🔒

Navigation	🔘🔲 Expert → Sensor → Meas. point 1 → Sound velocity (2929–1)

Prerequisite	The **User-specific liquid** option is selected in **Medium** parameter (→ 📖 56).

---

*   Visibility depends on order options or device settings

Description	Enter the sound velocity of the medium.

> 🛈 If the sound velocity is not known, it can be determined with the following tools:
> • Endress+Hauser sound velocity sensor sets
> • Prosonic Flow 93T with sound velocity sensors
> • Iterative measurement of sound velocity and distance adjustment of sensor distance using flow sensors

User entry	200 to 3 000 m/s
Factory setting	1 482.4 m/s

Viscosity   🔒

Navigation	🔘🖳 Expert → Sensor → Meas. point 1 → Viscosity (2932–1)
Prerequisite	The **User-specific liquid** option is selected in **Medium** parameter (→ 🔖 56).
Description	Enter medium viscosity at installation temperature.
User entry	0.01 to 10 000 mm²/s
Factory setting	1 mm²/s

Pipe material   🔒

Navigation	🔘🖳 Expert → Sensor → Meas. point 1 → Pipe material (2927–1)
Description	Select pipe material.
Selection	• Carbon steel • Ductile cast iron • Stainless steel • 1.4301 (UNS S30400) • 1.4401 (UNS S31600) • 1.4550 (UNS S34700) • Hastelloy C • PVC • PE • LDPE • HDPE • GRP • PVDF • PA • PP • PTFE • Pyrex glass • Asbestos cement • Copper • Unknown pipe material

Factory setting   Stainless steel

Pipe sound velocity   🔒

Navigation   🔘🔲 Expert → Sensor → Meas. point 1 → Pipe sound vel. (2933–1)

Prerequisite   The **Unknown pipe material** option is selected in the **Pipe material** parameter (→ 🖺 57).

Description   Enter sound velocity of pipe material.

User entry   800.0 to 3 800.0 m/s

Factory setting   3 120.0 m/s

Pipe dimensions   🔒

Navigation   🔘🔲 Expert → Sensor → Meas. point 1 → Pipe dimensions (2943–1)

Description   Select if pipe dimensions are defined by diameter or circumference.

Selection   • Diameter
                       • Pipe circumference

Factory setting   Diameter

Pipe circumference   🔒

Navigation   🔘🔲 Expert → Sensor → Meas. point 1 → Pipe circumfer. (2934–1)

Prerequisite   The **Pipe circumference** option is selected in the **Pipe dimensions** parameter (→ 🖺 58).

Description   Define the pipe circumference.

User entry   30 to 62 800 mm

Factory setting   314.159 mm

Pipe outer diameter   🔒

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

Prerequisite   The **Diameter** option is selected in **Pipe dimensions** parameter (→ 🖺 58).

Description	Define the outer diameter of the pipe.
User entry	0 to 20 000 mm
Factory setting	100 mm

Pipe wall thickness   🔒

Navigation	�🔲 Expert → Sensor → Meas. point 1 → Wall thickness (2916–1)
Description	Enter the pipe wall thickness.
User entry	Positive floating point number
Factory setting	3 mm

Liner material   🔒

Navigation	�🔲 Expert → Sensor → Meas. point 1 → Liner material (2928–1)
Description	Select liner material.
Selection	• None • Cement • Rubber • Epoxy resin • Unknown liner material
Factory setting	None

Liner sound velocity   🔒

Navigation	�🔲 Expert → Sensor → Meas. point 1 → Liner sound vel. (2936–1)
Prerequisite	The **Unknown liner material** option is selected in the **Liner material** parameter (→ 🔖 59).
Description	Define the sound velocity of liner material.
User entry	800.0 to 3 800.0 m/s
Factory setting	2 400.0 m/s

Liner thickness	🔒

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

Prerequisite	One of the following options is selected in the **Liner material** parameter (→ 🗎 59): • Cement • Rubber • Epoxy resin • Unknown liner material

Description	Define the thickness of liner.

User entry	0 to 100 mm

Factory setting	0 mm

Sensor type	🔒

Navigation	🔘🖥 Expert → Sensor → Meas. point 1 → Sensor type (2924–1)

Description	Select sensor type.

Selection	• C-030-A • C-050-A • C-100-A • C-100-B • C-100-C • C-200-A • C-200-B • C-200-C • C-500-A

Factory setting	As per order

Signal filter	🔒

Navigation	🔘🖥 Expert → Sensor → Meas. point 1 → Signal filter (3011–1)

Description	Switch the signal filter on or off. The signal filter is an adaptive filter that is applied to the raw flow signal.

Selection	• Off • On

Factory setting	On

Sensor coupling	🔒

Navigation	🔘🔲 Expert → Sensor → Meas. point 1 → Sensor coupling (2957–1)

Prerequisite	The following option is selected in **Sensor type** parameter (→ 🗎 60):

- C-030-A
- C-050-A
- C-100-A
- C-100-B
- C-100-C
- C-200-A
- C-200-B
- C-200-C
- C-500-A

Description	Select coupling medium.

Selection	• Coupling pad
	• Coupling paste

Factory setting	Coupling pad

Mounting type	🔒

Navigation	🔘🔲 Expert → Sensor → Meas. point 1 → Mounting type (2938–1)

Description	Select the number of traverses (number of times the signal passes through the medium).

Selection	• 1 traverse
	• 2 traverses
	• 3 traverses
	• 4 traverses
	• Automatic

Factory setting	2 traverses

Additional information	*Options*

- 1 traverse
  The signal traverses the medium directly from one sensor to another.
- 2 traverses
  The signal traverses the medium twice. The sensors are mounted on the same side of the pipe and the signal is reflected once before it reaches the second transducer.
- 3 traverses
  The signal traverses the medium three times. The sensors are mounted on the opposite side of the pipe and the signal is reflected twice before it reaches the second transducer.
- 4 traverses
  The signal traverses the medium four times. The sensors are mounted on the same side of the pipe and the signal is reflected three times before it reaches the second transducer.
- Automatic

Cable length   🔒

Navigation	🖩🗔 Expert → Sensor → Meas. point 1 → Cable length (2939–1)
Description	Enter length of sensor cables.
User entry	0 to 200 000 mm
Factory setting	As per order

FlowDC inlet configuration   🔒

Navigation	🖩🗔 Expert → Sensor → Meas. point 1 → FlowDC inl. conf (3049–1)
Prerequisite	The **1 measuring point - 2 signal paths** option is selected in **Measuring point configuration** parameter (→ 🕮 55).
Description	Select FlowDC inlet configuration.
Selection	• Off • Single elbow • Double elbow • Double elbow 3D • 45° bend • 2 x 45° bend • Concentric diameter change • Other *
Factory setting	Off

Intermediate pipe length   🔒

Navigation	🖩🗔 Expert → Sensor → Meas. point 1 → Interm. pipe l. (2945–1)
Prerequisite	The **1 measuring point - 2 signal paths** option is selected in **Measuring point configuration** parameter (→ 🕮 55).
Description	Enter the length of the intermediate pipe between the two bends.
User entry	Positive floating-point number
Factory setting	0 mm

---

* Visibility depends on order options or device settings

Inlet diameter	🔒

Navigation	🎛️🖥️ Expert → Sensor → Meas. point 1 → Inlet diameter (3054–1)
Prerequisite	• The **1 measuring point - 2 signal paths** option is selected in the **Measuring point configuration** parameter (→ 🖺 55). • The **Concentric diameter change** option is selected in the **Inlet configuration** parameter (→ 🖺 62).
Description	Enter the outer diameter of the pipe before the cross-section change. For convenience, the same measuring pipe wall thickness as for the clamp-on system is applied.
User entry	1 to 10 000 mm
Factory setting	88.9 mm

Transition length	🔒

Navigation	🎛️🖥️ Expert → Sensor → Meas. point 1 → Transit. length (3065–1)
Prerequisite	• In the **Measuring point configuration** parameter (→ 🖺 55), the **1 measuring point - 2 signal paths** option is selected. • In the **Inlet configuration** parameter (→ 🖺 62), the **Concentric diameter change** option is selected.
Description	Enter the length of the concentric change in diameter .
User entry	0 to 20 000 mm
Factory setting	0 mm

Inlet run	🔒

Navigation	🎛️🖥️ Expert → Sensor → Meas. point 1 → Inlet run (3050–1)
Prerequisite	The **1 measuring point - 2 signal paths** option is selected in **Measuring point configuration** parameter (→ 🖺 55).
Description	Enter length of the available straight inlet run.
User entry	0 to 300 000 mm
Factory setting	0 mm

Relative sensor position

Navigation	🖩🖵 Expert → Sensor → Meas. point 1 → Rel. sensor pos. (2985–1)
Prerequisite	The **1 measuring point - 2 signal paths** option is selected in the **Measuring point configuration** parameter (→ 📄 55) and the **Off** option is not selected in **FlowDC inlet configuration** parameter (→ 📄 62).
Description	Shows the correct position for the sensor.
User interface	• 90° • 180°

Result sensor type / mounting type

Navigation	🖩🖵 Expert → Sensor → Meas. point 1 → Sensor/mounting (2946–1)
Description	Shows the selected sensor type and (if applicable automatically) selected mounting type.
User interface	e.g. **C-100-A** option / **(2) V-mounting** option

---

Result sensor distance / measuring aid

Navigation	🖩🖵 Expert → Sensor → Meas. point 1 → Dist./meas. aid (2947–1)
Description	Shows the calculated sensor distance and vernier or wire length (if applicable) required for installation.
User interface	e.g. 201.3 mm / B 21

3.2.4 "Installation status" submenu

Navigation 🖩🖵 Expert → Sensor → Install. status

▸ **Installation status**		
	Installation status (2958)	→ 📄 65
	Signal strength (2914)	→ 📄 65
	Signal to noise ratio (2917)	→ 📄 66

Sound velocity (2915)	→ 🖹 66
Sound velocity deviation (2986)	→ 🖹 66

Installation status

Navigation	🖩🖳 Expert → Sensor → Install. status → Install. status (2958)
Description	Displays the device status after installation according to the displayed measured values. • **Good** option: No further optimization required Signal strength > 40 dB, SNR > 35, sound velocity deviation (measured to expected) < 2% • **Acceptable** option: Measuring performance ok, optimize if possible. You should always aim for the status **Good** option. Signal strength > 25 dB, SNR > 35, sound velocity deviation (measured to expected) < 3% • **Bad** option: Optimization is required. Poor and unstable measuring performance. ℹ️ Check the following points to optimize the sensor installation: • Number of traverses, change if necessary (e.g. from 2 traverses to 1 traverse) • Sensor distance • Alignment of sensors • Sufficient coupling medium available (coupling pad or coupling gel) • Check the measuring point parameters in the configuration
User interface	• Good • Acceptable • Bad
Factory setting	Good

Signal strength

Navigation	🖩🖳 Expert → Sensor → Install. status → Signal strength (2914)
Description	Displays 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 process changes, such as the development of deposits in the measuring pipe at the measuring point. , e.g. buildup of deposits in the measuring pipe at the measuring point. This can only be quantified by performing a direct process comparison with different deposit layer thicknesses and associated signal strengths.

Signal to noise ratio	

Navigation	🅸🅴 Expert → Sensor → Install. status → SNR (2917)
Description	Displays the current signal to noise ratio.
User interface	Signed floating-point number
Additional information	*Description*
	A low value or a drop in the signal to noise ratio over time is an indicator of poor signal quality.

Sound velocity	

Navigation	🅸🅴 Expert → Sensor → Install. status → Sound velocity (2915)
Description	Displays the sound velocity that is currently measured.
	The difference between the configured sound velocity and the measured sound velocity should not be > 2%.
User interface	Signed floating-point number

Sound velocity deviation	

Navigation	🅸🅴 Expert → Sensor → Install. status → SoundVelocDeviat (2986)
Description	Shows the deviation of the installation sound velocity from the measured sound velocity.
User interface	Signed floating-point number
Factory setting	0 %

3.2.5 "Process parameters" submenu

Navigation   🅸🅴 Expert → Sensor → Process param.

▶ Process parameters	
Flow override (1839)	→ 🖺 67
Flow damping (1802)	→ 🖺 67

Sound velocity damping (1888)	→ 🖺	68
Density damping (1889)	→ 🖺	68
Temperature damping (1886)	→ 🖺	68
▶ Low flow cut off	→ 🖺	69

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	*Effect*

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

Description

Flow override is active
• The **453 Flow override** diagnostic message is output.
• Output values
  • Output: value at zero flow
  • Temperature: continues to be output
  • Sound velocity: continues to be output
  • Totalizer 1...3: stop being totalized

ℹ The **Flow override** option can also be activated in the **Status input** submenu: **Assign status input** parameter (→ 🖺 80).

Flow damping   🔒

Navigation	🔘🖥 Expert → Sensor → Process param. → Flow damping (1802)
Description	Use this function to enter a time constant for flow damping (PT1 element). Reduction of the variability of the flow measured value (in relation to interference). For this purpose, the depth of the flow filter is adjusted: when the filter setting increases, the reaction time of the device also increases.
User entry	0 to 999.9 s
Factory setting	1 s

Additional information	*Description*
	The damping is performed by a PT1 element [2].
	User entry
	• Value = 0: no damping
	• Value > 0: damping is increased
	Damping is switched off if **0** is entered (factory setting).
	Effect
	The damping affects the following variables of the device:
	• Outputs → 🖺 82
	• Low flow cut off → 🖺 69
	• Totalizers → 🖺 152

Sound velocity damping

Navigation	🖩🖳 Expert → Sensor → Process param. → Sound vel. damp. (1888)
Description	Use this function to enter the time constant for sound velocity damping. Reduction of the variability of the measured sound velocity or sound velocity measured value (in relation to interference). For this purpose, the depth of the sound velocity filter is adjusted: when the filter setting increases, the reaction time of the device also increases.
User entry	0 to 999.9 s
Factory setting	1 s

Density damping

Navigation	🖩🖳 Expert → Sensor → Process param. → Density damping (1889)
Description	Use this function to enter the time constant for density damping.
User entry	0 to 999.9 s
Factory setting	0 s

Temperature damping

Navigation	🖩🖳 Expert → Sensor → Process param. → Temp. damping (1886)
Description	Use this function to enter the time constant for temperature damping.

---

2)　Proportional behavior with first-order lag

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 process variable (1837)	→ 🗎 69
	On value low flow cutoff (1805)	→ 🗎 69
	Off value low flow cutoff (1804)	→ 🗎 70

Assign process variable 🔒

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

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

Selection	• Off • Volume flow • Mass flow • Flow velocity

Factory setting	Flow velocity

On value low flow cutoff 🔒

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

Prerequisite	A process variable is selected in the **Assign process variable** parameter (→ 🗎 69).

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 → 🗎 70.

User entry	Positive floating-point number

Factory setting	0.3 m/s

Additional information   *Dependency*

The unit depends on the process variable selected in the **Assign process variable** parameter (→ 🖹 69).

Off value low flow cutoff   🔒

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

Prerequisite   A process variable is selected in the **Assign process variable** parameter (→ 🖹 69).

Description   Use this function to enter a switch-off value for low flow cut off. The switch-off value is entered as a positive hysteresis from the switch-on value→ 🖹 69.

User entry   0 to 100.0 %

Factory setting   50 %

Additional information   *Example*
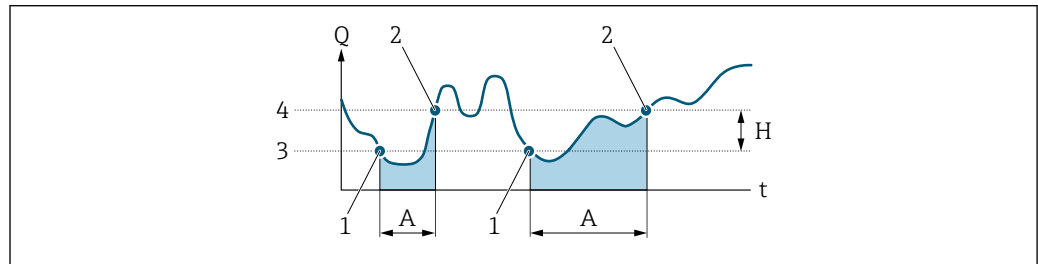
A0012887

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*

3.2.6   "External compensation" submenu

Navigation   🔲🔳 Expert → Sensor → External comp.

► External compensation	
Temperature compensation (3025)	→ 🖹 71
External value (3058)	→ 🖹 72
Fixed value (2925)	→ 🖹 71

Density source (3048)	→ 🖹 72
External value (3060)	→ 🖹 72
Fixed density (3171)	→ 🖹 72
Linear expansion coefficient (3153)	→ 🖹 73
Square expansion coefficient (3172)	→ 🖹 73
Fixed reference density (3178)	→ 🖹 73
Reference temperature (3147)	→ 🖹 74

Temperature compensation   🔒

Navigation	🖩🖵 Expert → Sensor → External comp. → Temp. compensat. (3025)
Prerequisite	The **Calculated value** option is selected in the **Density source** parameter (→ 🖹 72).
Description	Select temperature mode for temperature compensation.
Selection	• Fixed value • External value
Factory setting	Fixed value

Fixed value   🔒

Navigation	🖩🖵 Expert → Sensor → External comp. → Fixed value (2925)
Prerequisite	The **Fixed value** option is selected in **Temperature compensation** parameter (→ 🖹 71).
Description	Enter a fixed value for the process temperature.
User entry	−50 to 550 ℃
Factory setting	20 ℃

External value

Navigation	◎◲ Expert → Sensor → External comp. → External value (3058)
Description	Shows the process temperature read from the external device.
User interface	–273.15 to 99999 ℃
Factory setting	–

Density source

Navigation	◎◲ Expert → Sensor → External comp. → Density source (3048)
Description	Select the density source for the mass calculation.
Selection	• Fixed value • External density • Calculated value
Factory setting	Fixed value

External value

Navigation	◎◲ Expert → Sensor → External comp. → External value (3060)
Prerequisite	The **External density** option is selected in the **Density source** parameter (→ 🖺 72).
Description	Shows the density read from the external device.
User interface	Positive floating-point number
Factory setting	0 kg/m³

Fixed density

Navigation	◎◲ Expert → Sensor → External comp. → Fixed density (3171)
Prerequisite	The **Fixed density** option is selected in the **Density source** parameter (→ 🖺 72).
Description	Enter fixed value for medium density.
User entry	0.01 to 15000 kg/m³
Factory setting	1000 kg/m³

Linear expansion coefficient	🔒

Navigation	🖩🖥 Expert → Sensor → External comp. → Linear exp coeff (3153)
Prerequisite	The **Calculated value** option is selected in the **Density source** parameter (→ 🖺 72).
Description	Use this function to enter a linear, medium-specific expansion coefficient for calculating the density.
User entry	$1.0 \cdot 10^{-6}$ to $2.0 \cdot 10^{-3}$
Factory setting	$2.06 \cdot 10^{-4}$

Square expansion coefficient	🔒

Navigation	🖩🖥 Expert → Sensor → External comp. → Square exp coeff (3172)
Prerequisite	The **Calculated value** option is selected in the **Density source** parameter (→ 🖺 72).
Description	For media with a non-linear expansion pattern: use this function to enter a quadratic, medium-specific expansion coefficient for calculating the density.
User entry	$1.0 \cdot 10^{-6}$ to $2.0 \cdot 10^{-3}$
Factory setting	$2.06 \cdot 10^{-4}$

Fixed reference density	🔒

Navigation	🖩🖥 Expert → Sensor → External comp. → Fix ref.density (3178)
Prerequisite	The **Calculated value** option is selected in the **Density source** parameter (→ 🖺 72).
Description	Use this function to enter a fixed value for the reference density.
User entry	0.01 to 15 000 kg/m³
Factory setting	1 000 kg/m³
Additional information	*Reference density calculation*

$$\rho = \rho_N \cdot (1 + \alpha \cdot \Delta t + \beta \cdot \Delta t^2)$$

A0044558

- ρ: currently used density for mass flow calculation
- ρ_N: reference density
- t: currently read-in or fixed temperature according to the setting in the **Temperature compensation** parameter (→ 🖺 71)

- t_N: reference temperature at which the reference density applies (e.g. 20 °C)
- Δt: $t - t_N$
- α: linear expansion coefficient of the medium, unit = [1/K]; K = Kelvin
- β: square expansion coefficient of the medium, unit = $[1/K^2]$

Reference temperature

Navigation	Expert → Sensor → External comp. → Ref. temperature (3147)
Prerequisite	The **Calculated value** option is selected in the **Density source** parameter (→ 🖹 72).
Description	Enter the reference temperature at which the reference density applies.
User entry	−200 to 450 °C
Factory setting	20 °C

3.2.7 "Sensor adjustment" submenu

Navigation   Expert → Sensor → Sensor adjustm.

▶ Sensor adjustment	
Installation direction (1809)	→ 🖹 74
▶ Process variable adjustment	→ 🖹 75

Installation direction

Navigation	Expert → Sensor → Sensor adjustm. → Install. direct. (1809)
Description	Use this function to change the sign of the medium flow direction.
Selection	• Forward flow • Reverse flow
Factory setting	Forward flow

"Process variable adjustment" submenu

Navigation   ◵▣ Expert → Sensor → Sensor adjustm. → Variable adjust

▸ Process variable adjustment		
Volume flow offset (1831)	→ ▤	75
Volume flow factor (1832)	→ ▤	76
Mass flow offset (1841)	→ ▤	76
Mass flow factor (1846)	→ ▤	76
Sound velocity offset (1848)	→ ▤	77
Sound velocity factor (1849)	→ ▤	77
Density offset (1866)	→ ▤	77
Density factor (1867)	→ ▤	78
Temperature offset (1870)	→ ▤	78
Temperature factor (1871)	→ ▤	78

Volume 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. The value is entered in the selected volume flow unit.

User entry   Signed floating-point number

Factory setting   0 m³/h

Additional information   *Description*

    ℹ Corrected value = (factor × value) + offset

Volume 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. The value is entered in the selected mass flow unit.
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

Sound velocity offset	🔒

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

Sound velocity 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*
	ℹ Corrected value = (factor × value) + offset

Density offset	🔒

Navigation	🔘🖥 Expert → Sensor → Sensor adjustm. → Variable adjust → Density offset (1866)
Description	Use this function to enter the zero point shift for the energy flow trim. The energy flow unit on which the shift is based is 1 W.
User entry	Signed floating-point number
Factory setting	0 kg/m³
Additional information	*Description*
	ℹ Corrected value = (factor × value) + offset

Density factor	🔒

Navigation	🔘🖥 Expert → Sensor → Sensor adjustm. → Variable adjust → Density factor (1867)
Description	Use this function to enter a quantity factor (without time) for the energy flow. This multiplication factor is applied over the energy flow range.
User entry	Positive floating-point number
Factory setting	1
Additional information	*Description*
	ℹ Corrected value = (factor × value) + offset

Temperature offset	🔒

Navigation	🔘🖥 Expert → Sensor → Sensor adjustm. → Variable adjust → Temp. offset (1870)
Prerequisite	The **Calculated value** option is selected in the **Density source** parameter (→ 🖹 72) and the **External value** option is selected in the **Temperature compensation** parameter (→ 🖹 71).
Description	Use this function to enter the zero point shift for the temperature trim. The temperature unit on which the shift is based is K.
User entry	Signed floating-point number
Factory setting	0
Additional information	*Description*
	ℹ Corrected value = (factor × value) + offset

Temperature factor	🔒

Navigation	🔘🖥 Expert → Sensor → Sensor adjustm. → Variable adjust → Temp. factor (1871)
Prerequisite	The **Calculated value** option is selected in the **Density source** parameter (→ 🖹 72) and the **External value** option is selected in the **Temperature compensation** parameter (→ 🖹 71).
Description	Use this function to enter a quantity factor for the temperature. In each case, this factor refers to the temperature in K.
User entry	Positive floating-point number
Factory setting	1

Additional information   *Description*

    📘 Corrected value = (factor × value) + offset

3.2.8   "Calibration" submenu

Navigation   🖳🖳 Expert → Sensor → Calibration

► Calibration		
Calibration factor (2920)	→	🖺 79
Zero point (2921)	→	🖺 79
Nominal diameter (2807)	→	🖺 79
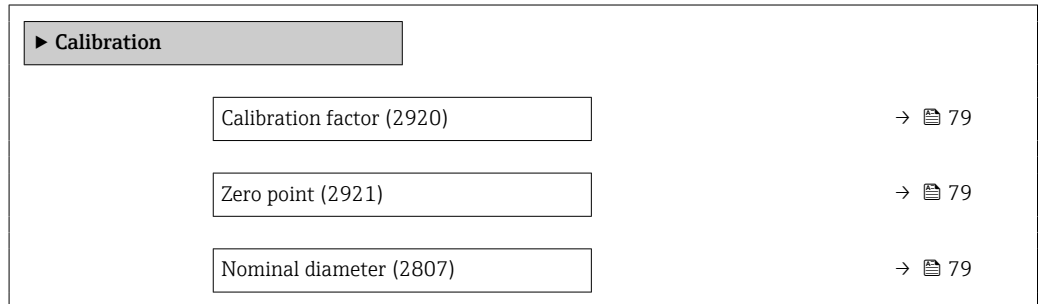
Calibration factor

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

Description   Displays the current calibration factor for the sensor.

User interface   Signed floating-point number

Factory setting   1

Zero point

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

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

User interface   Signed floating-point number

Factory setting   0

Nominal diameter

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

Description   Displays the nominal diameter of the sensor.

User interface   --------------

Factory setting   --------------

3.3   "Input" submenu

Navigation   🔲🔲   Expert → Input

▶ Input	
▶ Status input	→ 🖹 80
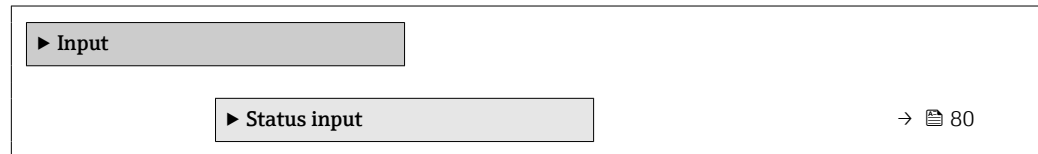
3.3.1   "Status input 1 to n" submenu

Navigation   🔲🔲   Expert → Input → Status input 1 to n

▶ Status input	
Assign status input (1352)	→ 🖹 80
Value status input (1353)	→ 🖹 81
Active level (1351)	→ 🖹 81
Response time status input (1354)	→ 🖹 81
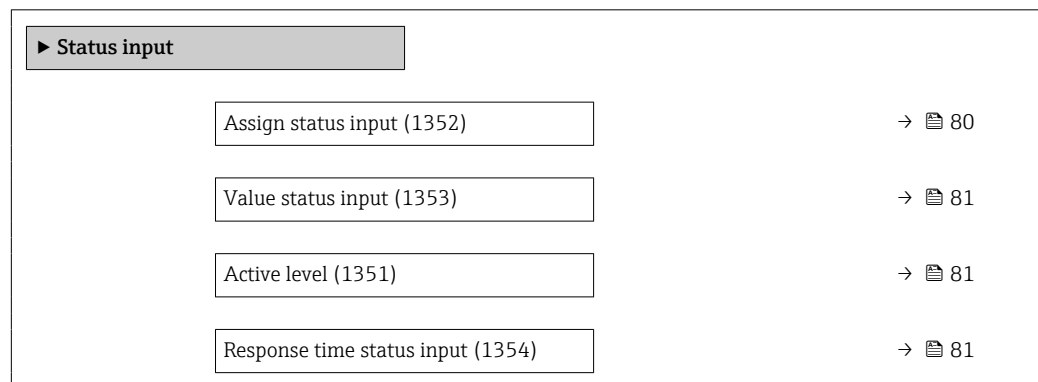
Assign status input   🔒

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
                               • Reset totalizer 2
                               • Reset totalizer 3
                               • Reset all totalizers
                               • Flow override

Factory setting   Off

Additional information	*Options*
	• Off
	The status input is switched off.
	• Reset totalizer 1...3
	The individual totalizers are reset.
	• Reset all totalizers
	All totalizers are reset.
	• Flow override
	The Flow override (→ 🗎 67) is activated.

> ℹ️ Note on the Flow override (→ 🗎 67):
> • The Flow override (→ 🗎 67) is enabled as long as the level is at the status input (continuous signal).
> • All other assignments react to a change in level (pulse) at the status input.

Value status input

Navigation	🖩🖵 Expert → Input → Status input → Val.stat.inp. (1353)
Prerequisite	For the following order code:
	"Output; input", option **I** "4-20mA HART, 2x pul./freq./switch output; status input"
Description	Displays the current input signal level.
User interface	• High
	• Low

Active level   🔒

Navigation	🖩🖵 Expert → Input → Status input → Active level (1351)
Description	Use this function to determine the input signal level at which the assigned function is activated.
Selection	• High
	• Low
Factory setting	High

Response time status input   🔒

Navigation	🖩🖵 Expert → Input → Status input → Response time (1354)
Description	Use this function to enter the minimum time period for which the input signal level must be present before the selected function is activated.
User entry	5 to 200 ms

Factory setting   50 ms

3.4   "Output" submenu

Navigation   🔲🔲   Expert → Output

‣ Output		
	‣ Current output 1	→ 🖺 82
	‣ Pulse/frequency/switch output 1 to n	→ 🖺 95

3.4.1   "Current output 1" submenu

Navigation   🔲🔲   Expert → Output → Curr.output 1

‣ Current output 1	
Process variable current output (0359–1)	→ 🖺 83
Current range output (0353–1)	→ 🖺 83
Fixed current (0365–1)	→ 🖺 84
Lower range value output (0367–1)	→ 🖺 85
Upper range value output (0372–1)	→ 🖺 86
Measuring mode current output (0351–1)	→ 🖺 87
Damping current output (0363–1)	→ 🖺 91
Failure behavior current output (0364–1)	→ 🖺 92
Failure current (0352–1)	→ 🖺 93
Output current (0361–1)	→ 🖺 93
Measured current (0366–1)	→ 🖺 94

Process variable current output	🔒

Navigation	🧭🖥️ Expert → Output → Curr.output 1 → Proc.var. outp (0359–1)
Description	Use this function to select a process variable for the current output.
Selection	• Off * • Volume flow • Mass flow • Flow velocity • Sound velocity • Temperature • Density • Signal strength * • Signal to noise ratio * • Acceptance rate * • Turbulence * • Electronics temperature
Factory setting	Volume flow

Current range output	🔒

Navigation	🧭🖥️ Expert → Output → Curr.output 1 → Curr.range out (0353–1)
Description	Select current range for process value output and upper/lower level for alarm signal.
Selection	• 4...20 mA NE (3.8...20.5 mA) • 4...20 mA US (3.9...20.8 mA) • 4...20 mA (4...20.5 mA) • 0...20 mA (0...20.5 mA) • Fixed value
Factory setting	Depends on country: • 4...20 mA NE (3.8...20.5 mA) • 4...20 mA US (3.9...20.8 mA)

---

* Visibility depends on order options or device settings

Additional information *Description*

- In the event of a device alarm, the current output adopts the value specified in the **Failure mode** parameter (→ 🖺 92).
- If the measured value is outside the measuring range, the ⚠S441 **Current output 1** diagnostic message is displayed.
- The measuring range is specified via the **0/4 mA value** parameter (→ 🖺 85) and **20 mA value** parameter (→ 🖺 86).

"Fixed current" option

- This option is used for a HART Multidrop network.
- It can only be used for the 4...20 mA HART current output (current output 1).
- The current value is set via the **Fixed current** parameter (→ 🖺 84).

Example

Shows the relationship between the current range for the output of the process value and the two signal on alarm levels:
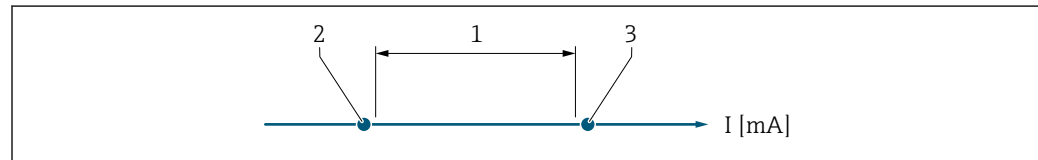
1   Current range for process value
2   Lower level for signal on alarm
3   Upper level for signal on alarm

Selection

Selection	1	2	3
4...20 mA NE (3.8...20.5 mA)	3.8 to 20.5 mA	< 3.6 mA	> 21.95 mA
4...20 mA US (3.9...20.8 mA)	3.9 to 20.8 mA US	< 3.6 mA	> 21.95 mA
4...20 mA (4...20.5 mA)	4 to 20.5 mA	< 3.6 mA	> 21.95 mA
0...20 mA (0...20.5 mA)	0 to 20.5 mA	0 mA	> 21.95 mA

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

Fixed current   🔒

Navigation   🖩🖥 Expert → Output → Curr.output 1 → Fixed current (0365–1)

Prerequisite   The **Fixed current** option is selected in the **Current span** parameter (→ 🖺 83).

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

User entry   0 to 22.5 mA

Factory setting   22.5 mA

Lower range value output	🔒

| Navigation	🗗🖳 Expert → Output → Curr.output 1 → Low.range outp (0367–1)
Prerequisite	In **Current span** parameter (→ 🗐 83), one of the following options is selected: • 4…20 mA NE (3.8…20.5 mA) • 4…20 mA US (3.9…20.8 mA) • 4…20 mA (4…20.5 mA) • 0…20 mA (0…20.5 mA)
Description	Use this function to enter a value for the 0/4 mA current.
User entry	Signed floating-point number
Factory setting	Depends on country: • m³/h • ft³/h
Additional information	*Description* Positive and negative values are permitted depending on the process variable assigned in the **Assign current output** parameter (→ 🗐 83). 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 (→ 🗐 86). *Dependency* ℹ The unit depends on the process variable selected in the **Assign current output** parameter (→ 🗐 83). *Current output behavior* The current output behaves differently depending on the settings configured in the following parameters: • Current span (→ 🗐 83) • Measuring mode (→ 🗐 87) • Failure mode (→ 🗐 92) *Configuration examples* Some examples of parameter settings and their effect on the current output are given in the following section. **Configuration example A** Measurement mode with **Forward flow** option • **0/4 mA value** parameter (→ 🗐 85) = not equal to zero flow (e.g. −250 m³/h) • **20 mA value** parameter (→ 🗐 86) = not equal to zero flow (e.g. +750 m³/h) • Calculated current value = 8 mA at zero flow *Q Flow* *I Current* *1 Measuring range is exceeded or undershot*
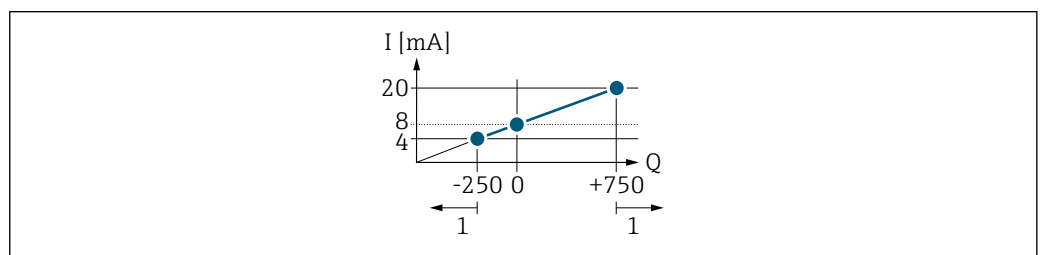
The operational range of the measuring device is defined by the values entered for the **0/4 mA value** parameter (→ 🖺 85) and **20 mA value** parameter (→ 🖺 86). If the effective flow exceeds or falls below this operational range, the △**S441 Current output 1** diagnostic message is output.

Configuration example B
Measurement mode with **Forward/Reverse flow** option
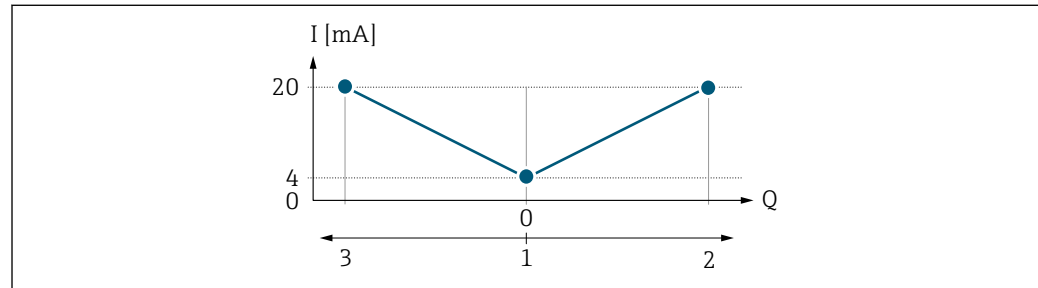
I   *Current*
Q   *Flow*
1   *Value assigned to 0/4 mA current*
2   *Forward flow*
3   *Reverse flow*

The current output signal is independent of the direction of flow (absolute amount of the measured variable). The values for the **0/4 mA value** parameter (→ 🖺 85) and **20 mA value** parameter (→ 🖺 86) must have the same algebraic sign. The value for the **20 mA value** parameter (→ 🖺 86) (e.g. reverse flow) corresponds to the mirrored value for the **20 mA value** parameter (→ 🖺 86) (e.g. flow).

Configuration example C
Measurement mode with **Reverse flow compensation** option
If flow is characterized by severe fluctuations (e.g. when using reciprocating pumps), flow components outside the measuring range are buffered, balanced and output after a maximum delay of 60 s → 🖺 87.

Upper range value output	🅰

Navigation	🆇🖥 Expert → Output → Curr.output 1 → Upp.range outp (0372–1)
Prerequisite	In **Current span** parameter (→ 🖺 83), one of the following options is selected: • 4...20 mA NE (3.8...20.5 mA) • 4...20 mA US (3.9...20.8 mA) • 4...20 mA (4...20.5 mA) • 0...20 mA (0...20.5 mA)
Description	Use this function to enter a value for the 20 mA current..
User entry	Signed floating-point number
Factory setting	Depends on country and nominal diameter
Additional information	*Description* Positive and negative values are permitted depending on the process variable assigned in the **Assign current output** parameter (→ 🖺 83). In addition, the value can be greater

than or smaller than the value assigned for the 0/4 mA current in the **0/4 mA value** parameter (→ 🗎 85).

Dependency

ℹ The unit depends on the process variable selected in the **Assign current output** parameter (→ 🗎 83).

Example

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

If the **Forward/Reverse flow** option is selected in the **Measuring mode** parameter (→ 🗎 87), different algebraic signs cannot be entered for the values for the **0/4 mA value** parameter (→ 🗎 85) and **Upper range value output** parameter (→ 🗎 86). The ⚠S441 **Current output 1** diagnostic message is displayed.

Configuration examples

ℹ Observe the configuration examples for the **0/4 mA value** parameter (→ 🗎 85).

Measuring mode current output	🔒

Navigation	🔲🔲 Expert → Output → Curr.output 1 → Output mode (0351–1)
Prerequisite	One of the following options is selected in the **Current span** parameter (→ 🗎 83): • 4...20 mA NE (3.8...20.5 mA) • 4...20 mA US (3.9...20.8 mA) • 4...20 mA (4...20.5 mA) • 0...20 mA (0...20.5 mA)
Description	Use this function to select the measuring mode for the current output.
Selection	• Forward flow • Forward/Reverse flow * • Reverse flow compensation
Factory setting	Forward flow
Additional information	*Description* ℹ The process variable that is assigned to the current output via the **Assign current output** parameter (→ 🗎 83) is displayed below the parameter. *"Forward flow" option* The current output signal is proportional to the process variable assigned. The measuring range is defined by the values that are assigned to the 0/4 mA and 20 mA current value.

---

* Visibility depends on order options or device settings

The flow components outside the scaled measuring range are taken into account for signal output as follows:
Both values are defined such that they are not equal to zero flow e.g.:

- 0/4 mA current value = −5 m³/h
- 20 mA current value = 10 m³/h

"Forward/Reverse flow" option
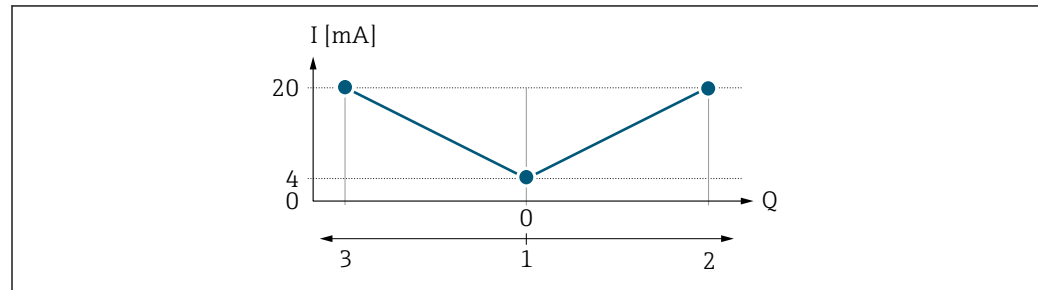
A0013758

I   Current
Q   Flow
1   Value assigned to 0/4 mA current
2   Forward flow
3   Reverse flow

- The current output signal is independent of the direction of flow (absolute amount of the measured variable). The values for the **0/4 mA value** parameter (→ 🖺 85) and **20 mA value** parameter (→ 🖺 86) must have the same sign.
- The value for the **20 mA value** parameter (→ 🖺 86) (e.g. reverse flow) corresponds to the mirrored value for the **20 mA value** parameter (→ 🖺 86) (e.g. forward flow).

"Reverse flow compensation" option

The **Reverse flow compensation** option is primarily used to compensate for intermittent reverse flow that can arise with displacement pumps due to wear or high-viscosity medium. The reverse flow is recorded in a buffer memory and offset against the next forward flow.

In the event of prolonged and undesired reverse flow, flow values can accumulate in the buffer memory. Due to the configuration of the current output, these values are not factored in, however, i.e. there is no compensation for the reverse flow.

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

Examples of how the current output behaves

Example 1

Defined measuring range: lower range value and upper range value with the **same** sign
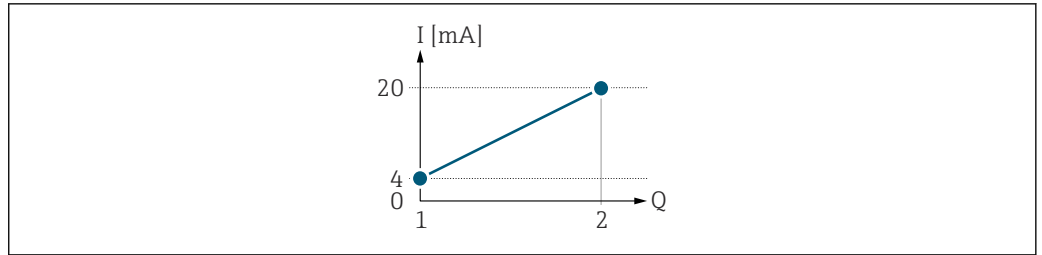
A0028084

☒ *3   Measuring range*

I   Current
Q   Flow
1   Lower range value (Value assigned to 0/4 mA current)
2   Upper range value (end of measuring range output)

With the following flow response:
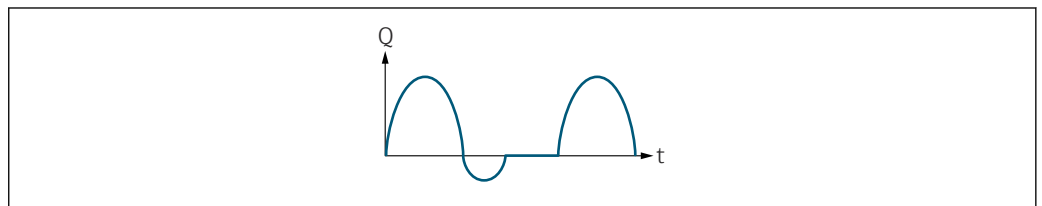
A0028091

☒ *4   Flow response*

Q   Flow
t   Time

With **Forward flow** option

The current output signal is proportional to the process variable assigned. The flow components outside the scaled measuring range are not taken into account for signal output:.
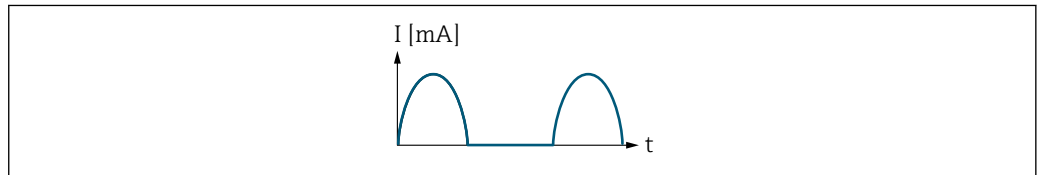
A0028092

I   Current
t   Time

With **Forward/Reverse flow** option

The current output signal is independent of the direction of flow.
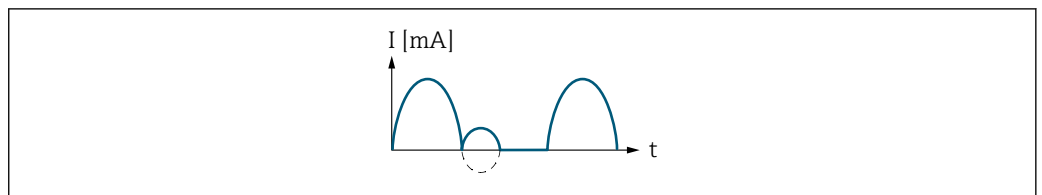
A0028093

I   Current
t   Time

With **Reverse flow compensation** option

Flow components outside the measuring span are buffered, balanced and output after a maximum delay of 60 s.
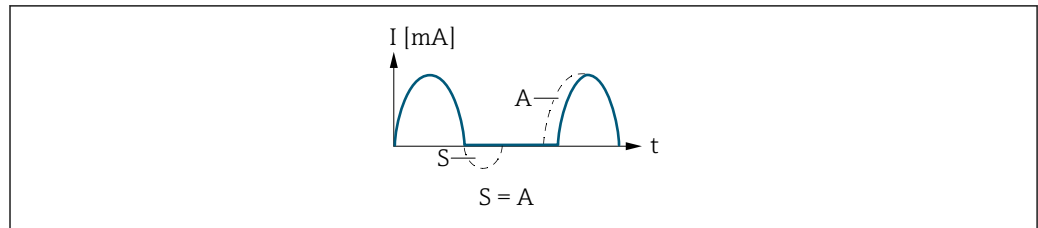
A0028094

I *Current*
t *Time*
S *Flow components saved*
A *Balancing of saved flow components*

Example 2

Defined measuring range: lower range value and upper range value with **different** signs
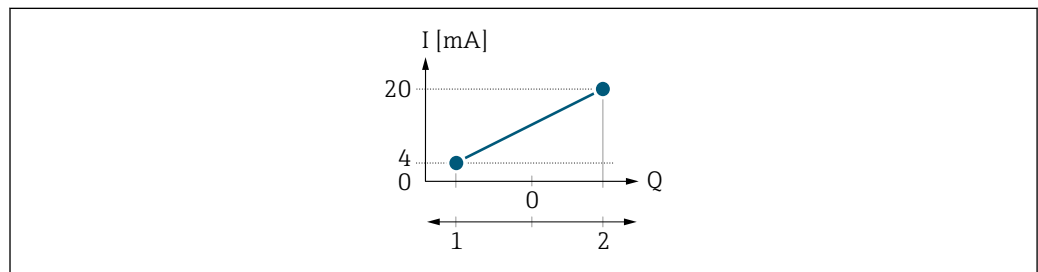
A0028095

🖻 *5* *Measuring range*

I *Current*
Q *Flow*
1 *Lower range value (Value assigned to 0/4 mA current)*
2 *Upper range value (end of measuring range output)*

With flow a (—) outside, b (- -) inside the measuring range
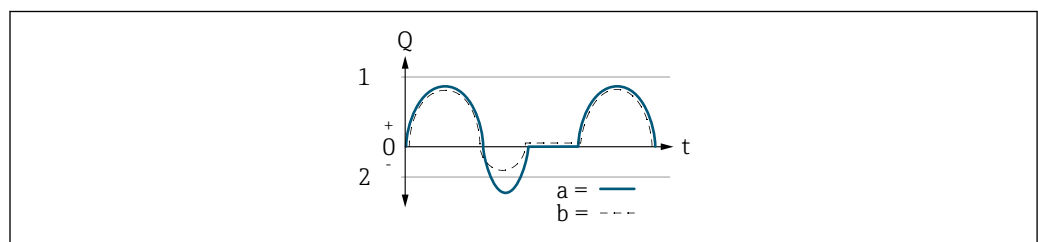
A0028098

Q *Flow*
t *Time*
1 *Lower range value (Value assigned to 0/4 mA current)*
2 *Upper range value (end of measuring range output)*

With **Forward flow** option

- a (—): The flow components outside the scaled measuring range cannot be taken into account for signal output.
- b (- -): The current output signal is proportional to the process variable assigned.
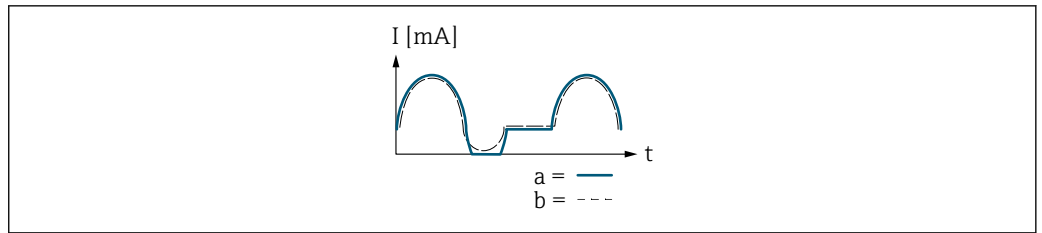
I   Current

t   Time

With **Forward/Reverse flow** option

This option cannot be selected here since the values for the **0/4 mA value** parameter (→ 🖺 85) and **20 mA value** parameter (→ 🖺 86) have different signs.

With **Reverse flow compensation** option

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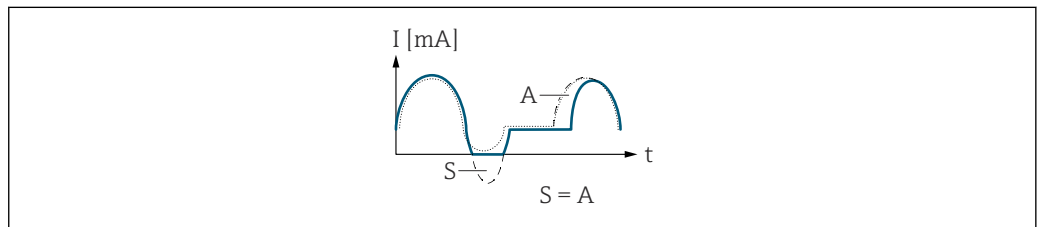
I   Current

t   Time

S   Flow components saved

A   Balancing of saved flow components

Damping current output	🔒

Navigation	🔘🖳 Expert → Output → Curr.output 1 → Damp.curr.outp (0363–1)
Prerequisite	A process variable is selected in the **Assign current output** parameter (→ 🖺 83) and one of the following options is selected in the **Current span** parameter (→ 🖺 83): • 4…20 mA NE (3.8…20.5 mA) • 4…20 mA US (3.9…20.8 mA) • 4…20 mA (4…20.5 mA) • 0…20 mA (0…20.5 mA)
Description	Use this function to enter a time constant for the reaction time of the current output signal to fluctuations in the measured value caused by process conditions.
User entry	0.0 to 999.9 s
Factory setting	1.0 s

Additional information	*User entry*

Use this function to enter a time constant (PT1 element [3]) for current output damping:
- If a low time constant is entered, the current output reacts quickly to fluctuating measured variables.
- If a high time constant is entered, the current output reacts more slowly.

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

Failure behavior current output 🔒

Navigation	🔲🔳 Expert → Output → Curr.output 1 → Failure behav. (0364–1)
Prerequisite	A process variable is selected in the **Assign current output** parameter (→ 📄 83) and one of the following options is selected in the **Current span** parameter (→ 📄 83): • 4...20 mA NE (3.8...20.5 mA) • 4...20 mA US (3.9...20.8 mA) • 4...20 mA (4...20.5 mA) • 0...20 mA (0...20.5 mA)
Description	Use this function to select the value of the current output in the event of a device alarm.
Selection	• Min. • Max. • Last valid value • Actual value • Fixed value
Factory setting	Max.

---

3)   proportional transmission behavior with first order delay

Additional information	*Description*

ℹ️ 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.

ℹ️ The signal on alarm level is defined via the **Current span** parameter (→ 📄 83).

"Max." option

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

ℹ️ The signal on alarm level is defined via the **Current span** parameter (→ 📄 83).

"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.

ℹ️ The measured value is defined via the **Failure current** parameter (→ 📄 93).

Failure current   🔒

Navigation	🔘🖳 Expert → Output → Curr.output 1 → Fail. current (0352–1)
Prerequisite	The **Defined value** option is selected in the **Failure mode** parameter (→ 📄 92).
Description	Use this function to enter a fixed value that the current output adopts in the event of a device alarm.
User entry	0 to 22.5 mA
Factory setting	22.5 mA

Output current 1

Navigation	🔘🖳 Expert → Output → Curr.output 1 → Output curr. 1 (0361–1)
Description	Displays the current value currently calculated for the current output.
User interface	0 to 22.5 mA

Measured current	

Navigation	〓〓 Expert → Output → Curr.output 1 → Measur. curr. (0366–1)
Description	Displays the actual measured value of the output current.
User interface	0 to 30 mA

Trim	🔒

Navigation	〓〓 Expert → Output → Curr.output 1 → Trim (0362–1)
Description	Select adjustment mode for trim.
Selection	• Off • 4 mA • 20 mA • Calculate • Reset
Factory setting	Off

20mA trim value	🔒

Navigation	〓〓 Expert → Output → Curr.output 1 → 20mA trim value (0356–1)
Description	Enter upper measured value for trim (around 20 mA).
User entry	18 to 22 mA
Factory setting	20 mA

4mA trim value	🔒

Navigation	〓〓 Expert → Output → Curr.output 1 → 4mA trim value (0357–1)
Description	Enter lower measured value for the trim (around 4 mA).
User entry	3 to 5 mA
Factory setting	4 mA

Status	
Navigation	🔘🖥 Expert → Output → Curr.output 1 → Status (0360–1)
Description	Shows the status of the last output current (OutValue).
User interface	0 to 255
Factory setting	0

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

Navigation   🔘🖥 Expert → Output → PFS output 1 to n

```
┌──────────────────────────────────┐
│ ▶ Pulse/frequency/switch output  │
│   1 to n                         │
└──────────────────────────────────┘
```

Operating mode (0469–1 to n)	→ 🔖 96
Assign pulse output (0460–1 to n)	→ 🔖 98
Pulse scaling (0455–1 to n)	→ 🔖 98
Pulse width (0452–1 to n)	→ 🔖 99
Measuring mode (0457–1 to n)	→ 🔖 99
Failure mode (0480–1 to n)	→ 🔖 100
Pulse output (0456–1 to n)	→ 🔖 101
Assign frequency output (0478–1 to n)	→ 🔖 101
Minimum frequency value (0453–1 to n)	→ 🔖 102
Maximum frequency value (0454–1 to n)	→ 🔖 102
Measuring value at minimum frequency (0476–1 to n)	→ 🔖 102
Measuring value at maximum frequency (0475–1 to n)	→ 🔖 103
Measuring mode (0479–1 to n)	→ 🔖 103
Damping output (0477–1 to n)	→ 🔖 104

Response time (0491–1 to n)	→ 🗎	104
Failure mode (0451–1 to n)	→ 🗎	105
Failure frequency (0474–1 to n)	→ 🗎	105
Output frequency (0471–1 to n)	→ 🗎	106
Switch output function (0481–1 to n)	→ 🗎	106
Assign diagnostic behavior (0482–1 to n)	→ 🗎	106
Assign limit (0483–1 to n)	→ 🗎	107
Switch-on value (0466–1 to n)	→ 🗎	109
Switch-off value (0464–1 to n)	→ 🗎	109
Assign flow direction check (0484–1 to n)	→ 🗎	110
Assign status (0485–1 to n)	→ 🗎	110
Switch-on delay (0467–1 to n)	→ 🗎	111
Switch-off delay (0465–1 to n)	→ 🗎	111
Failure mode (0486–1 to n)	→ 🗎	111
Switch state (0461–1 to n)	→ 🗎	112
Invert output signal (0470–1 to n)	→ 🗎	112

Operating mode   🔂

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

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

Selection   • Pulse *
                           • Frequency *
                           • Switch *

Factory setting   Pulse

---

* Visibility depends on order options or device settings

Additional information

"Pulse" option

Quantity-dependent pulse with configurable pulse width
- Whenever a specific mass or volume 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
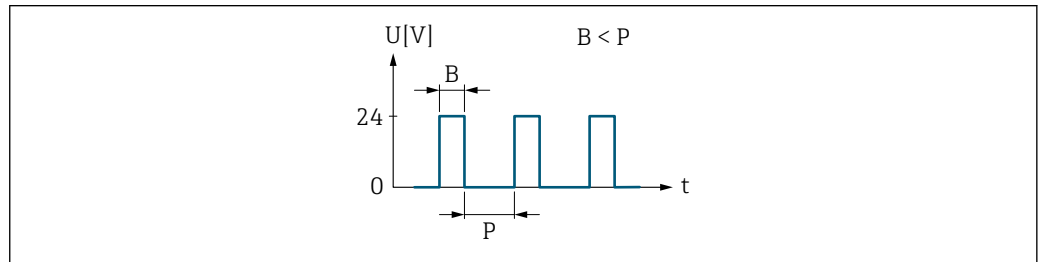
6 Quantity-proportional pulse (pulse value) with pulse width to be configured

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, 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
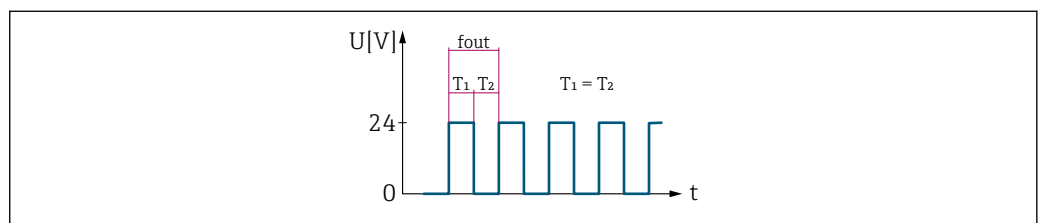
7 Flow-proportional frequency output

"Switch" option

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

Example
Alarm response without alarm
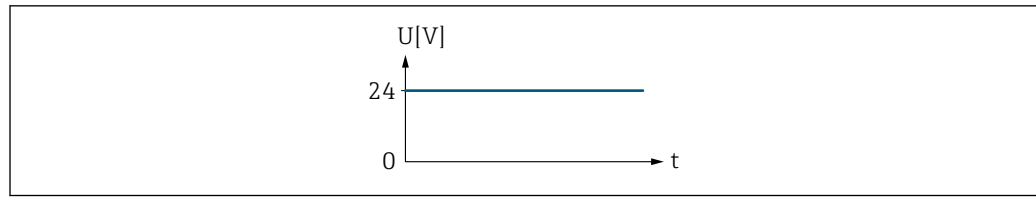
8   No alarm, high level

Example
Alarm response in case of alarm
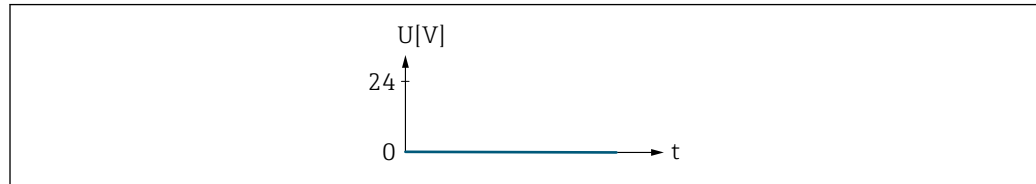
9   Alarm, low level

Assign pulse output

Navigation	Expert → Output → PFS output 1 to n → Assign pulse (0460–1 to n)
Prerequisite	The **Pulse** option is selected in **Operating mode** parameter (→ 🖹 96).
Description	Use this function to select the process variable for the pulse output.
Selection	• Off • Volume flow • Mass flow
Factory setting	Off

Pulse scaling

Navigation	Expert → Output → PFS output 1 to n → Pulse scaling (0455–1 to n)
Prerequisite	The **Pulse** option is selected in the **Operating mode** parameter (→ 🖹 96) and a process variable is selected in the **Assign pulse output** parameter (→ 🖹 98).
Description	Use this function to enter the value for the measured value that a pulse is equivalent to.
User entry	Positive floating point number
Factory setting	Depends on country and nominal diameter
Additional information	*User entry* Weighting of the pulse output with a quantity.

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

Pulse width	🔒

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

Prerequisite   The **Pulse** option is selected in the **Operating mode** parameter (→ 🖺 96) and a process variable is selected in the **Assign pulse output** parameter (→ 🖺 98).

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 **443 Pulse output 1 to n** diagnostic message.
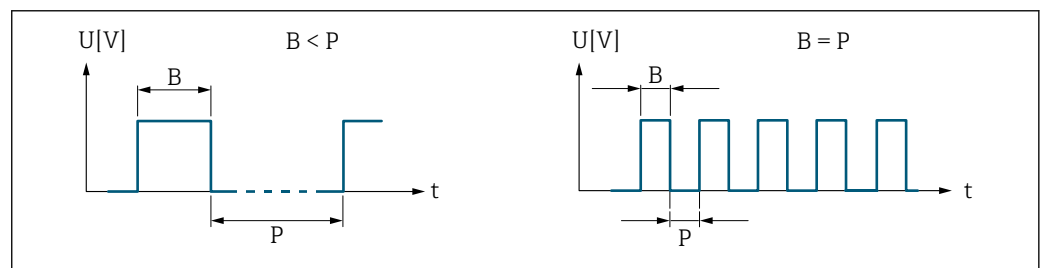
B   Pulse width entered
P   Pauses between the individual pulses

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 to n → Measuring mode (0457–1 to n)

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

Selection	• Forward flow • Forward/Reverse flow • Reverse flow • Reverse flow compensation
Factory setting	Forward flow
Additional information	*Options*

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

> For a detailed description of the options available, see the **Measuring mode** parameter (→ 🖹 87)

Examples

> For a detailed description of the configuration examples, see the **Measuring mode** parameter (→ 🖹 87)

Failure mode   🔒

| Navigation	🔀🖥 Expert → Output → PFS output 1 to n → Failure mode (0480–1 to n)
Prerequisite	The **Pulse** option is selected in the **Operating mode** parameter (→ 🖹 96) and a process variable is selected in the **Assign pulse output** parameter (→ 🖹 98).
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.

Options

• 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 indicates a serious fault with the measuring device. The measurement quality may possibly be influenced and may no longer be guaranteed. The

Actual value option is only recommended if it is ensured that all possible alarm conditions do not influence the measurement quality.

Pulse output	

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

Prerequisite   The **Pulse** option is selected in the **Operating mode** parameter (→ 🖺 96) 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 (→ 🖺 98) and **Pulse width** parameter (→ 🖺 99) can be used to define the value (i.e. the measured value amount that corresponds to a pulse) and the duration of the pulse.

A0028726

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 (→ 🖺 112) 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 (→ 🖺 100)) can be configured.

Assign frequency output	🔒

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

Prerequisite   The **Frequency** option is selected in **Operating mode** parameter (→ 🖺 96).

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

Selection   • Off
                      • Volume flow
                      • Mass flow

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

Factory setting   Off

Minimum frequency value   🔒

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

Prerequisite   The **Frequency** option is selected in the **Operating mode** parameter (→ 🗎 96) and a
                         process variable is selected in the **Assign frequency output** parameter (→ 🗎 101).

Description   Use this function to enter the minimum frequency.

User entry   0.0 to 10 000 Hz

Factory setting   0.0 Hz

Maximum frequency value   🔒

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

Prerequisite   The **Frequency** option is selected in the **Operating mode** parameter (→ 🗎 96) and a
                         process variable is selected in the **Assign frequency output** parameter (→ 🗎 101).

Description   Use this function to enter the end value frequency.

User entry   0.0 to 10 000 Hz

Factory setting   10 000 Hz

Measuring value at minimum frequency   🔒

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

Prerequisite   The **Frequency** option is selected in the **Operating mode** parameter (→ 🗎 96) and a
                         process variable is selected in the **Assign frequency output** parameter (→ 🗎 101).

---

*   Visibility depends on order options or device settings

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

User entry	Signed floating-point number

Factory setting	Depends on country and nominal diameter

Additional information	*Dependency*

The entry depends on the process variable selected in the **Assign frequency output** parameter (→ 🖺 101).

Measuring value at maximum frequency

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

Prerequisite	The **Frequency** option is selected in the **Operating mode** parameter (→ 🖺 96) and a process variable is selected in the **Assign frequency output** parameter (→ 🖺 101).

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

User entry	Signed floating-point number

Factory setting	Depends on country and nominal diameter

Additional information	*Description*

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

Dependency

The entry depends on the process variable selected in the **Assign frequency output** parameter (→ 🖺 101).

Measuring mode

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

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

Selection	• Forward flow • Forward/Reverse flow • Reverse flow compensation

Factory setting	Forward flow

Additional information	*Options*

For a detailed description of the options available, see the **Measuring mode** parameter (→ 🖺 87)

Examples

For a detailed description of the configuration examples, see the **Measuring mode** parameter (→ 🖺 87)

Damping output   🔒

Navigation	🔷🖳 Expert → Output → PFS output 1 to n → Damping out. (0477–1 to n)
Description	Use this function to enter a time constant for the reaction time of the output signal to fluctuations in the measured value.
User entry	0 to 999.9 s
Factory setting	0.0 s
Additional information	*User entry*

Use this function to enter a time constant (PT1 element [4]) for frequency output damping:
- If a low time constant is entered, the current output reacts particularly quickly to fluctuating measured variables.
- On the other hand, the current output reacts more slowly if a high time constant is entered.

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

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

Response time

Navigation	🔷🖳 Expert → Output → PFS output 1 to n → Response time (0491–1 to n)
Description	Displays the response time. This specifies how quickly the pulse/frequency/switch output reaches 63 % of 100 % of the measured value change when the measured value changes.
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 → 🖺 91
  and
- Depending on the measured variable assigned to the output.
  Flow damping

---

4)   proportional transmission behavior with first order delay

Failure mode	🔒

Navigation	�’🔲 Expert → Output → PFS output 1 to n → Failure mode (0451–1 to n)
Prerequisite	The **Frequency** option is selected in the **Operating mode** parameter (→ 🖺 96) and a process variable is selected in the **Assign frequency output** parameter (→ 🖺 101).
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	*Options*

• 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 (→ 🖺 105) 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 indicates a serious fault with the measuring device. The measurement quality may possibly be influenced and may no longer be guaranteed. The **Actual value** option is only recommended if it is ensured that all possible alarm conditions do not influence the measurement quality.

Failure frequency	🔒

Navigation	🔲🔲 Expert → Output → PFS output 1 to n → Failure freq. (0474–1 to n)
Prerequisite	In the **Operating mode** parameter (→ 🖺 96), the **Frequency** option is selected, in the **Assign frequency output** parameter (→ 🖺 101) a process variable is selected, and in the **Failure mode** parameter (→ 🖺 105), the **Defined value** option is selected.
Description	Enter frequency output value in alarm condition.
User entry	0.0 to 12 500.0 Hz
Factory setting	0.0 Hz

Output frequency

Navigation	🔧🖥 Expert → Output → PFS output 1 to n → Output freq. (0471–1 to n)
Prerequisite	In the **Operating mode** parameter (→ 🗎 96), the **Frequency** option is selected.
Description	Displays the actual value of the output frequency which is currently measured.
User interface	0.0 to 12 500.0 Hz

Switch output function   🔒

Navigation	🔧🖥 Expert → Output → PFS output 1 to n → Switch out funct (0481–1 to n)
Prerequisite	The **Switch** option is selected in the **Operating mode** parameter (→ 🗎 96).
Description	Use this function to select a function for the switch output.
Selection	• Off • On • Diagnostic behavior • Limit • Flow direction check • Status
Factory setting	Off
Additional information	*Options* • Off The switch output is permanently switched off (open, non-conductive). • On The switch output is permanently switched on (closed, conductive). • Diagnostic behavior Indicates if the diagnostic event is present or not. Is used to output diagnostic information and to react to it appropriately at the system level. • Limit Indicates if a specified limit value has been reached for the process variable. Is used to output diagnostic information relating to the process and to react to it appropriately at the system level. • Status Displays the device status low flow cut off is selected.

Assign diagnostic behavior   🔒

Navigation	🔧🖥 Expert → Output → PFS output 1 to n → Assign diag. beh (0482–1 to n)
Prerequisite	• In the **Operating mode** parameter (→ 🗎 96), the **Switch** option is selected. • In the **Switch output function** parameter (→ 🗎 106), the **Diagnostic behavior** option is selected.

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

Selection	• Alarm • Alarm or warning • Warning

Factory setting	Alarm

Additional information	*Description*

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

Selection

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

Assign limit   🔒

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

Prerequisite	• The **Switch** option is selected in **Operating mode** parameter (→ 🗎 96). • The **Limit** option is selected in **Switch output function** parameter (→ 🗎 106).

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

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

Factory setting	Volume flow

---

* Visibility depends on order options or device settings

Additional information   *Description*

Behavior of status output when Switch-on value > Switch-off value:
- Process variable > Switch-on value: transistor is conductive
- Process variable < Switch-off value: transistor is non-conductive
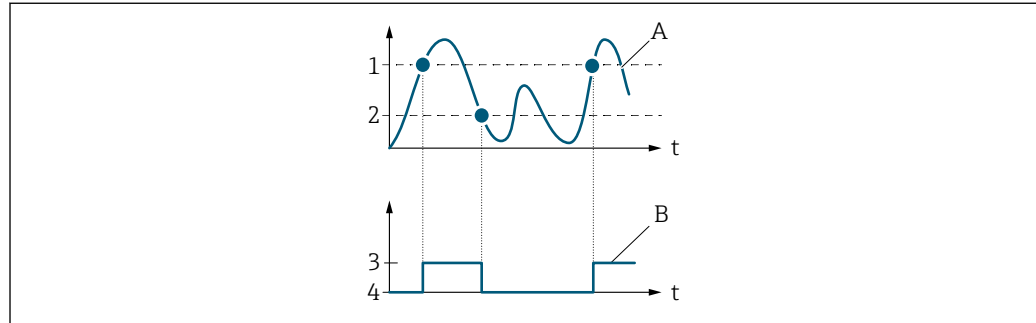
1   Switch-on value
2   Switch-off value
3   Conductive
4   Non-conductive
A   Process variable
B   Status output

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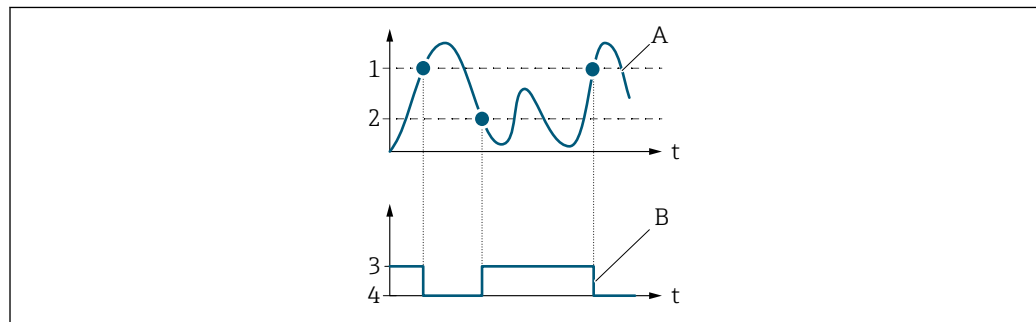
1   Switch-off value
2   Switch-on value
3   Conductive
4   Non-conductive
A   Process variable
B   Status output

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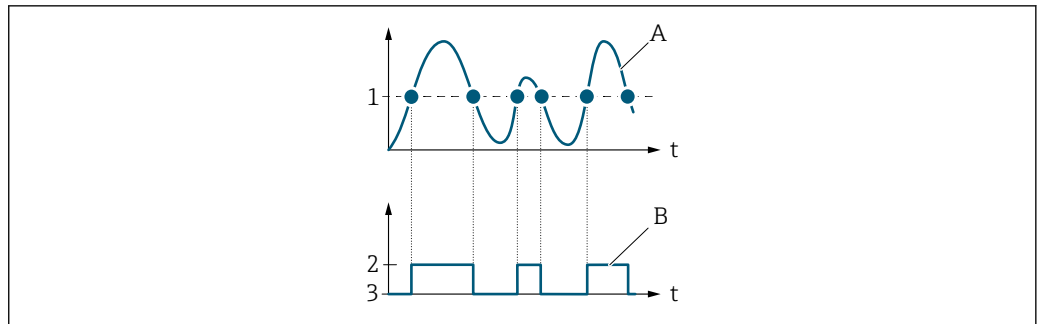
1 Switch-on value = Switch-off value
2 Conductive
3 Non-conductive
A Process variable
B Status output

Switch-on value

Navigation	◫◱ Expert → Output → PFS output 1 to n → Switch-on value (0466–1 to n)
Prerequisite	• The **Switch** option is selected in the **Operating mode** parameter (→ 🖺 96). • The **Limit** option is selected in the **Switch output function** parameter (→ 🖺 106).
Description	Use this function to enter the measured value for the switch-on point.
User entry	Signed floating-point number
Factory setting	Depends on country
Additional information	*Description* Use this function to enter the limit value for the switch-on value (process variable > switch-on value = closed, conductive). ℹ️ When using a hysteresis: Switch-on value > Switch-off value. *Dependency* ℹ️ The unit depends on the process variable selected in the **Assign limit** parameter (→ 🖺 107).

Switch-off value

Navigation	◫◱ Expert → Output → PFS output 1 to n → Switch-off value (0464–1 to n)
Prerequisite	• The **Switch** option is selected in the **Operating mode** parameter (→ 🖺 96). • The **Limit** option is selected in the **Switch output function** parameter (→ 🖺 106).
Description	Use this function to enter the measured value for the switch-off point.
User entry	Signed floating-point number

Factory setting	Depends on country

Additional information	*Description*

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

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

Dependency

ℹ️ The unit depends on the process variable selected in the **Assign limit** parameter (→ 🖹 107).

Assign flow direction check 🔒

Navigation	🔲🖥 Expert → Output → PFS output 1 to n → Assign dir.check (0484–1 to n)
Prerequisite	• The **Switch** option is selected in the **Operating mode** parameter (→ 🖹 96). • The **Flow direction check** option is selected in the **Switch output function** parameter (→ 🖹 106).
Description	Use this function to select a process variable for monitoring the flow direction.
Selection	
Factory setting	Volume flow

Assign status 🔒

Navigation	🔲🖥 Expert → Output → PFS output 1 to n → Assign status (0485–1 to n)
Prerequisite	• The **Switch** option is selected in **Operating mode** parameter (→ 🖹 96). • The **Status** option is selected in **Switch output function** parameter (→ 🖹 106).
Description	Select the device function whose status you want to display.
Selection	• Off • Low flow cut off
Factory setting	Low flow cut off
Additional information	*Options*

When the switch-on point for the selected device function is reached, the output is switched on (closed, conductive). Otherwise, the output is non-conductive.

Switch-on delay	🔒

Navigation	🔁🔲 Expert → Output → PFS output 1 to n → Switch-on delay (0467–1 to n)
Prerequisite	• The **Switch** option is selected in the **Operating mode** parameter (→ 🖺 96). • The **Limit** option is selected in the **Switch output function** parameter (→ 🖺 106).
Description	Use this function to enter a delay time for switching on the switch output.
User entry	0.0 to 100.0 s
Factory setting	0.0 s

Switch-off delay	🔒

Navigation	🔁🔲 Expert → Output → PFS output 1 to n → Switch-off delay (0465–1 to n)
Prerequisite	• The **Switch** option is selected in the **Operating mode** parameter (→ 🖺 96). • The **Limit** option is selected in the **Switch output function** parameter (→ 🖺 106).
Description	Use this function to enter a delay time for switching off the switch output.
User entry	0.0 to 100.0 s
Factory setting	0.0 s

Failure mode	🔒

Navigation	🔁🔲 Expert → Output → PFS output 1 to n → Failure mode (0486–1 to n)
Description	Use this function to select a failsafe mode for the switch output in the event of a device alarm.
Selection	• Actual status • Open • Closed
Factory setting	Open
Additional information	*Options* • Actual status In the event of a device alarm, faults are ignored and the current behavior of the input value is output by the switch output. The **Actual status** option behaves in the same way as the current input value. • Open In the event of a device alarm, the switch output's transistor is set to **non-conductive**. • Closed In the event of a device alarm, the switch output's transistor is set to **conductive**.

| Switch state | |

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

Prerequisite   The **Switch** option is selected in the **Operating mode** parameter (→ 🖹 96).

Description   Displays the current switch status of the status output.

User interface   • Open
                        • Closed

Additional information   *User interface*

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

| Invert output signal | 🔒 |

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

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

Selection   • No
                        • Yes

Factory setting   No

Additional information   *Selection*

                        No option (passive - negative)

A0026693
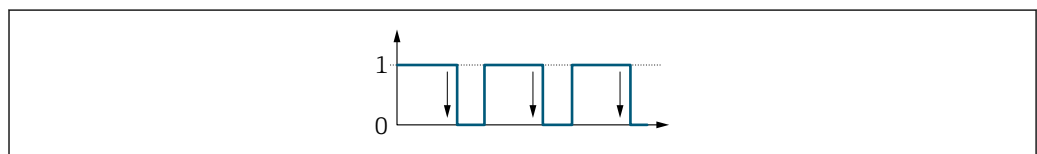
                        Yes option (passive - positive)

A0026692
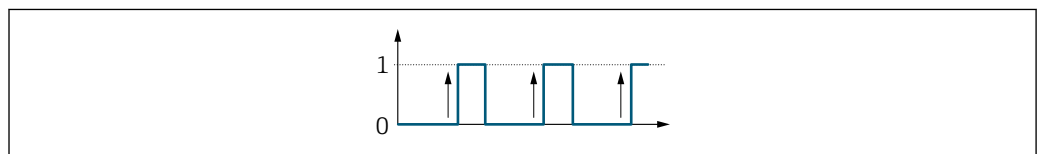
3.5 "Communication" submenu

Navigation   Expert → Communication

```
‣ Communication

        ‣ HART input                                    → 🖺 113

        ‣ HART output                                   → 🖺 119

        ‣ Web server                                    → 🖺 135

        ‣ Diagnostic configuration                      → 🖺 138

        ‣ WLAN settings                                 → 🖺 145
```

3.5.1 "HART input" submenu

Navigation   Expert → Communication → HART input

```
‣ HART input

        ‣ Configuration                                 → 🖺 113

        ‣ Input                                         → 🖺 118
```

"Configuration" submenu

Navigation   Expert → Communication → HART input → Configuration

```
‣ Configuration

        Capture mode (7001)                             → 🖺 114

        Device ID (7007)                                → 🖺 114

        Device type (7008)                              → 🖺 115

        Manufacturer ID (7009)                          → 🖺 115

        Burst command (7006)                            → 🖺 115

        Slot number (7010)                              → 🖺 116

        Timeout (7005)                                  → 🖺 116
```

Failure mode (7011)	→ 🖹 117
Failure value (7012)	→ 🖹 117

Capture mode

Navigation	🖴🖳 Expert → Communication → HART input → Configuration → Capture mode (7001)
Description	Use this function to select the capture mode via burst or master communication.
Selection	• Off • Burst network • Master network
Factory setting	Off
Additional information	*"Burst network" option* The device records data transmitted via burst in the network. ℹ An external pressure sensor must be in the burst mode. *"Master network" option* In this case, the device must be located in a HART network in which a HART master (control) queries the measured values of the up to 64 network participants. The device reacts only to the responses of a specific device in the network. Device ID, device type, manufacturer ID and the HART commands used by the master must be defined.

Device ID

Navigation	🖴🖳 Expert → Communication → HART input → Configuration → Device ID (7007)
Prerequisite	The **Master network** option is selected in the **Capture mode** parameter (→ 🖹 114).
Description	Use this function to enter the device ID of the HART slave device whose data are to be recorded.
User entry	6-digit value: • Via local operation: enter as hexadecimal or decimal number • Via operating tool: enter as decimal number
Factory setting	0
Additional information	ℹ In addition to the device ID and manufacturer ID, the device type is part of the unique ID. Each HART device is uniquely identified by the unique device ID.

Device type	🔒

Navigation	🎛🖥 Expert → Communication → HART input → Configuration → Device type (7008)
Prerequisite	In the **Capture mode** parameter (→ 🖺 114), the **Master network** option is selected.
Description	Use this function to enter the device type of the HART slave device whose data are to be recorded.
User entry	2-digit hexadecimal number
Factory setting	0x00
Additional information	ℹ️ In addition to the device ID and manufacturer ID, the device type is part of the unique ID. Each HART device is uniquely identified by the unique device ID.

Manufacturer ID	🔒

Navigation	🎛🖥 Expert → Communication → HART input → Configuration → Manufacturer ID (7009)
Prerequisite	The **Master network** option is selected in the **Capture mode** parameter (→ 🖺 114).
Description	Use this function to enter the manufacturer ID of the HART slave device whose data are to be recorded.
User entry	2-digit value: • Via local operation: enter as hexadecimal or decimal number • Via operating tool: enter as decimal number
Factory setting	0
Additional information	ℹ️ In addition to the device ID and manufacturer ID, the device type is part of the unique ID. Each HART device is uniquely identified by the unique device ID.

Burst command	🔒

Navigation	🎛🖥 Expert → Communication → HART input → Configuration → Burst command (7006)
Prerequisite	The **Burst network** option or the **Master network** option are selected in the **Capture mode** parameter (→ 🖺 114).
Description	Use this function to select the burst command to be recorded.
Selection	• Command 1 • Command 3 • Command 9 • Command 33

Factory setting	Command 1

Additional information	*Selection*

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

Slot number   🔒

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

Prerequisite	The **Burst network** option or the **Master network** option is selected in the **Capture mode** parameter (→ 🖺 114).

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

User entry	1 to 8

Factory setting	1

Additional information	*User entry*

Slot	Command			
	1	3	9	33
1	PV	PV	HART variable (slot 1)	HART variable (slot 1)
2	–	SV	HART variable (slot 2)	HART variable (slot 2)
3	–	TV	HART variable (slot 3)	HART variable (slot 3)
4	–	QV	HART variable (slot 4)	HART variable (slot 4)
5	–	–	HART variable (slot 5)	–
6	–	–	HART variable (slot 6)	–
7	–	–	HART variable (slot 7)	–
8	–	–	HART variable (slot 8)	–

Timeout   🔒

Navigation	🔘🖥 Expert → Communication → HART input → Configuration → Timeout (7005)

Prerequisite	The **Burst network** option or the **Master network** option is selected in the **Capture mode** parameter (→ 🖺 114).

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

User entry	1 to 120 s

Factory setting	5 s

Additional information	*Description*

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

Failure mode   🔒

Navigation	🔘🖥 Expert → Communication → HART input → Configuration → Failure mode (7011)

Prerequisite	In the **Capture mode** parameter (→ 🕮 114), the **Burst network** option or **Master network** option is selected.

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

Selection	• Alarm • Last valid value • Defined value

Factory setting	Alarm

Additional information	*Options*

> • Alarm
> An error message is set.
> • Last valid value
> The last valid measured value is used.
> • Defined value
> A user-defined measured value is used: (**Failure value** parameter (→ 🕮 117)).

Failure value   🔒

Navigation	🔘🖥 Expert → Communication → HART input → Configuration → Failure value (7012)

Prerequisite	The following conditions are met: • In the **Capture mode** parameter (→ 🕮 114), the **Burst network** option or **Master network** option is selected. • In the **Failure mode** parameter (→ 🕮 117), the **Defined value** option is selected.

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

User entry	Signed floating-point number

Factory setting	0

Additional information   *Dependency*

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

"Input" submenu

Navigation   Expert → Communication → HART input → Input

┌───┐
│ **▶ Input**   │
│   │
│   Value (7003)   → 🗎 118   │
│   │
│   Status (7004)   → 🗎 118   │
└───┘
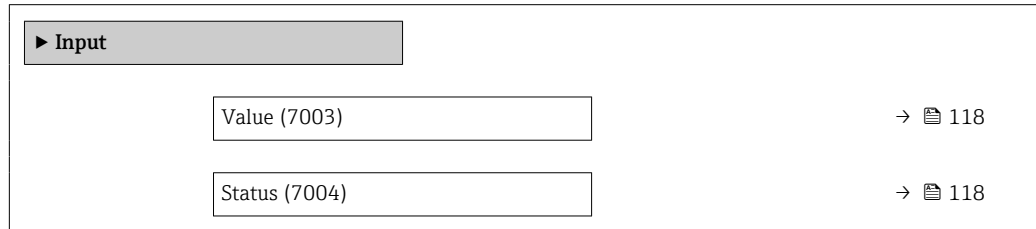
Value

Navigation   Expert → Communication → HART input → Input → Value (7003)

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

User interface   Signed floating-point number

Status

Navigation   Expert → Communication → HART input → Input → Status (7004)

Description   Displays the value of the device variable recorded by the HART input in accordance with
                        the HART specification.

User interface   • Manual/Fixed
                        • Good
                        • Poor accuracy
                        • Bad

Additional information *Description*

                        If the measuring device reads in an invalid pressure measured value, the ⊗**F882 Input
                        signal** diagnostic message is output

3.5.2 "HART output" submenu

Navigation 🖩🖵 Expert → Communication → HART output

```
┌─────────────────────────────────────────────────────────────────┐
│ ‣ HART output                                                     │
│                                                                   │
│              ┌──────────────────────────────────┐                │
│              │ ‣ Configuration                  │     → 🖺 119    │
│              └──────────────────────────────────┘                │
│              ┌──────────────────────────────────┐                │
│              │ ‣ Burst configuration            │     → 🖺 121    │
│              └──────────────────────────────────┘                │
│              ┌──────────────────────────────────┐                │
│              │ ‣ Information                     │     → 🖺 128    │
│              └──────────────────────────────────┘                │
│              ┌──────────────────────────────────┐                │
│              │ ‣ Output                         │     → 🖺 131    │
│              └──────────────────────────────────┘                │
└─────────────────────────────────────────────────────────────────┘
```

"Configuration" submenu

Navigation 🖩🖵 Expert → Communication → HART output → Configuration

```
┌─────────────────────────────────────────────────────────────────┐
│ ‣ Configuration                                                   │
│                                                                   │
│              ┌──────────────────────────────────┐                │
│              │ HART short tag (0220)             │     → 🖺 119    │
│              └──────────────────────────────────┘                │
│              ┌──────────────────────────────────┐                │
│              │ Device tag (0215)                 │     → 🖺 120    │
│              └──────────────────────────────────┘                │
│              ┌──────────────────────────────────┐                │
│              │ HART address (0219)               │     → 🖺 120    │
│              └──────────────────────────────────┘                │
│              ┌──────────────────────────────────┐                │
│              │ No. of preambles (0217)           │     → 🖺 120    │
│              └──────────────────────────────────┘                │
│              ┌──────────────────────────────────┐                │
│              │ Fieldbus writing access (0273)    │     → 🖺 121    │
│              └──────────────────────────────────┘                │
└─────────────────────────────────────────────────────────────────┘
```

HART short tag   🔒

Navigation 🖩🖵 Expert → Communication → HART output → Configuration → HART short tag (0220)

Description Use this function to enter a brief description for the measuring point. This can be edited and displayed via HART protocol or using the local display.

User entry Max. 8 characters: A to Z, 0 to 9 and certain special characters (e.g. punctuation marks, @, %).

Factory setting PROSONIC

Device tag   🔒

Navigation	🔘🔲 Expert → Communication → HART output → Configuration → Device tag (0215)
Description	Use this function to enter the name for the measuring point.
User entry	Max. 32 characters, such as letters, numbers or special characters (e.g. @, %, /).
Factory setting	Prosonic Flow

HART address   🔒

Navigation	🔘🔲 Expert → Communication → HART output → Configuration → HART address (0219)
Description	Use this function to enter the address via which the data exchange takes place via HART protocol.
User entry	0 to 63
Factory setting	0
Additional information	*Description*
	For addressing in a HART Multidrop network, the **Fixed current** option must be set in the **Current span** parameter (→ 🔲 83) (current output 1).

No. of preambles   🔒

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

Fieldbus writing access	🔒

Navigation   🔧🖥 Expert → Communication → HART output → Configuration → Fieldb.writ.acc. (0273)

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

Selection   • Read + write
                                  • Read only

Factory setting   Read + write

Additional information   *Description*

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

                                  Selection

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

"Burst configuration 1 to n" submenu

Navigation   🔧🖥 Expert → Communication → HART output → Burst config.
                   → Burst config. 1 to n

► Burst configuration 1 to n	
Burst mode 1 to n (2032–1 to n)	→ 🔖 122
Burst command 1 to n (2031–1 to n)	→ 🔖 122
Burst variable 0 (2033)	→ 🔖 123
Burst variable 1 (2034)	→ 🔖 124
Burst variable 2 (2035)	→ 🔖 124
Burst variable 3 (2036)	→ 🔖 125
Burst variable 4 (2037)	→ 🔖 125
Burst variable 5 (2038)	→ 🔖 125
Burst variable 6 (2039)	→ 🔖 125
Burst variable 7 (2040)	→ 🔖 126

Burst trigger mode (2044–1 to n)	→ 🖹 126
Burst trigger level (2043–1 to n)	→ 🖹 127
Min. update period (2042–1 to n)	→ 🖹 127
Max. update period (2041–1 to n)	→ 🖹 127

Burst mode 1 to n   🔒

Navigation	🎛🖥 Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst mode 1 to n (2032–1 to n)
Description	Use this function to select whether to activate the HART burst mode for burst message X.
Selection	• Off • On
Factory setting	Off
Additional information	*Options*

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

Burst command 1 to n   🔒

Navigation	🎛🖥 Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst command 1 to n (2031–1 to n)
Description	Use this function to select the HART command that is sent to the HART master.
Selection	• Command 1 • Command 2 • Command 3 • Command 9 • Command 33 • Command 48
Factory setting	Command 2

Additional information   *Selection*

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

"Command 33" option

The HART device variables are defined via Command 107.

The following measured variables (HART device variables) can be read out:
- Volume flow
- Mass flow
- Temperature *
- Totalizer 1...3
- Sound velocity
- Flow velocity
- Acceptance rate *
- Turbulence *
- Signal strength *
- Signal to noise ratio *
- Percent of range
- Measured current
- Primary variable (PV)
- Secondary variable (SV)
- Tertiary variable (TV)
- Quaternary variable (QV)

Commands

| | - Information about the defined details of the command: HART specifications
- The measured variables (HART device variables) are assigned to the dynamic variables in the **Output** submenu (→ 🗎 82).

| **Burst variable 0** | 🔒 |

Navigation   🖩🖫 Expert → Communication → HART output → Burst config. → Burst config. 1 to n
                            → Burst variable 0 (2033)

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

Selection
- Not used
- Volume flow
- Mass flow
- Flow velocity
- Sound velocity

---

*   Visibility depends on order options or device settings

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

| Factory setting | Volume flow |

Additional information   *Options*

If a burst message is not configured, the **Not used** option is set.

Burst variable 1

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

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

Selection   See the **Burst variable 0** parameter (→ 🖺 123).

Factory setting   Not used

Burst variable 2

| Navigation | Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 2 (2035) |

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

Selection   See the **Burst variable 0** parameter (→ 🖺 123).

Factory setting   Not used

---

*   Visibility depends on order options or device settings

Burst variable 3   🔒

Navigation	🆚🔳 Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 3 (2036)
Description	For HART command 9 and 33: select the HART device variable or the process variable.
Selection	See the **Burst variable 0** parameter (→ 🖺 123).
Factory setting	Not used

Burst variable 4   🔒

Navigation	🆚🔳 Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 4 (2037)
Description	For HART command 9: select the HART device variable or the process variable.
Selection	See the **Burst variable 0** parameter (→ 🖺 123).
Factory setting	Not used

Burst variable 5   🔒

Navigation	🆚🔳 Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 5 (2038)
Description	For HART command 9: select the HART device variable or the process variable.
Selection	See the **Burst variable 0** parameter (→ 🖺 123).
Factory setting	Not used

Burst variable 6   🔒

Navigation	🆚🔳 Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 6 (2039)
Description	For HART command 9: select the HART device variable or the process variable.
Selection	See the **Burst variable 0** parameter (→ 🖺 123).
Factory setting	Not used

Burst variable 7		🔒

Navigation	🖩🗒 Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 7 (2040)
Description	For HART command 9: select the HART device variable or the process variable.
Selection	See the **Burst variable 0** parameter (→ 🗎 123).
Factory setting	Not used

Burst trigger mode		🔒

Navigation	🖩🗒 Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Trigger mode (2044–1 to n)
Description	Use this function to select the event that triggers burst message X.
Selection	• Continuous • Window * • Rising * • Falling * • On change
Factory setting	Continuous
Additional information	*Selection* • Continuous The message is sent continuously, at least at intervals corresponding to the time frame specified in the **Burst min period** parameter (→ 🗎 127). • Window The message is sent if the specified measured value has changed by the value in the **Burst trigger level** parameter (→ 🗎 127). • Rising The message is sent if the specified measured value exceeds the value in the **Burst trigger level** parameter (→ 🗎 127). • Falling The message is sent if the specified measured value drops below the value in the **Burst trigger level** parameter (→ 🗎 127). • On change The message is sent if a measured value changes in the burst message.

---

*   Visibility depends on order options or device settings

Burst trigger level	🔒

Navigation	🎛🖥 Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Trigger level (2043–1 to n)
Description	For entering the burst trigger value.
User entry	Signed floating-point number
Additional information	*Description*
	Together with the option selected in the **Burst trigger mode** parameter (→ 🖺 126) the burst trigger value determines the time of burst message X.

Min. update period	🔒

Navigation	🎛🖥 Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Min. upd. per. (2042–1 to n)
Description	Use this function to enter the minimum time span between two burst commands of burst message X.
User entry	Positive integer
Factory setting	1 000 ms

Max. update period	🔒

Navigation	🎛🖥 Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Max. upd. per. (2041–1 to n)
Description	Use this function to enter the maximum time span between two burst commands of burst message X.
User entry	Positive integer
Factory setting	2 000 ms

"Information" submenu

Navigation   🔘🖥 Expert → Communication → HART output → Information

▸ Information	
Device revision (0204)	→ 🗎 128
Device ID (0221)	→ 🗎 129
Device type (0209)	→ 🗎 129
Manufacturer ID (0259)	→ 🗎 129
HART revision (0205)	→ 🗎 129
HART descriptor (0212)	→ 🗎 130
HART message (0216)	→ 🗎 130
Hardware revision (0206)	→ 🗎 130
Software revision (0224)	→ 🗎 130
HART date code (0202)	→ 🗎 131

Device revision

Navigation   🔘🖥 Expert → Communication → HART output → Information → Device revision (0204)

Description   Displays the device revision with which the device is registered with the HART
                            Communication Foundation.

User interface   2-digit hexadecimal number

Factory setting   2

Additional information *Description*

                            ℹ The device revision is needed to assign the appropriate device description file (DD) to
                               the device.

Device ID

Navigation	⊡⊡ Expert → Communication → HART output → Information → Device ID (0221)
Description	Use this function to view the device ID for identifying the measuring device in a HART network.
User interface	6-digit hexadecimal number
Additional information	*Description*

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

Device type

Navigation	⊡⊡ Expert → Communication → HART output → Information → Device type (0209)
Description	Displays the device type used to register the measuring device with the HART Communication Foundation
User interface	Hexadecimal number
Factory setting	0x69 (for Prosonic Flow W 400)
Additional information	*Description*

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

Manufacturer ID

Navigation	⊡⊡ Expert → Communication → HART output → Information → Manufacturer ID (0259)
Description	Use this function to view the manufacturer ID with which the measuring device is registered with the HART Communication Foundation.
User interface	2-digit hexadecimal number
Factory setting	0x11 (for Endress+Hauser)

HART revision

Navigation	⊡⊡ Expert → Communication → HART output → Information → HART revision (0205)
Description	Use this function to display the HART protocol revision of the measuring device.

User interface	5 to 7
Factory setting	7

HART descriptor 🔒

Navigation	🖩🖵 Expert → Communication → HART output → Information → HART descriptor (0212)
Description	Use this function to enter a description for the measuring point. This can be edited and displayed via HART protocol or using the local display.
User entry	Max. 16 characters, such as letters, numbers or special characters (e.g. @, %, /)
Factory setting	Pros. Flow 400

HART message 🔒

Navigation	🖩🖵 Expert → Communication → HART output → Information → HART message (0216)
Description	Use this function to enter a HART message which is sent via the HART protocol when requested by the master.
User entry	Max. 32 characters, such as letters, numbers or special characters (e.g. @, %, /)
Factory setting	Pros. Flow 400

Hardware revision

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

Software revision

Navigation	🖩🖵 Expert → Communication → HART output → Information → Software rev. (0224)
Description	Displays the software revision of the measuring device.
User interface	0 to 255

Factory setting　　　2

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

"Output" submenu

Navigation　　　🔘▤　Expert → Communication → HART output → Output

▸ Output		
Assign PV (0234)	→ 🔖 132	
Primary variable (PV) (0201)	→ 🔖 132	
Assign SV (0235)	→ 🔖 132	
Secondary variable (SV) (0226)	→ 🔖 133	
Assign TV (0236)	→ 🔖 133	
Tertiary variable (TV) (0228)	→ 🔖 134	
Assign QV (0237)	→ 🔖 134	
Quaternary variable (QV) (0203)	→ 🔖 135	

Assign PV	🔒

Navigation	🔘🖥 Expert → Communication → HART output → Output → Assign PV (0234)

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

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

Factory setting	Volume flow

Primary variable (PV)	

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

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

User interface	Signed floating-point number

| Additional information | *Display*

The measured value displayed depends on the process variable selected in the **Assign PV** parameter (→ 🔲 132).

Dependency

The unit of the displayed measured value is taken from the **System units** submenu (→ 🔲 47). |
|---|---|

Assign SV	🔒

Navigation	🔘🖥 Expert → Communication → HART output → Output → Assign SV (0235)

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

---

* Visibility depends on order options or device settings

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

Factory setting	Totalizer 1

Secondary variable (SV)

Navigation	😑😑 Expert → Communication → HART output → Output → Second.var(SV) (0226)
Description	Displays the current measured value of the secondary dynamic variable (SV).
User interface	Signed floating-point number
Additional information	*Display*
	The measured value displayed depends on the process variable selected in the **Assign SV** parameter (→ 🔲 132).
	Dependency
	ℹ The unit of the displayed measured value is taken from the **System units** submenu (→ 🔲 47).

Assign TV

Navigation	😑😑 Expert → Communication → HART output → Output → Assign TV (0236)
Description	Use this function to select a measured variable (HART device variable) for the tertiary (third) dynamic variable (TV).
Selection	• Volume flow
	• Mass flow
	• Flow velocity
	• Sound velocity
	• Temperature
	• Density
	• Electronics temperature

---

* Visibility depends on order options or device settings

  - Signal strength *
  - Signal to noise ratio *
  - Acceptance rate *
  - Turbulence *
  - Totalizer 1
  - Totalizer 2
  - Totalizer 3
  - HART input

Factory setting	Totalizer 2

Tertiary variable (TV)

Navigation	🖩🖳 Expert → Communication → HART output → Output → Tertiary var(TV) (0228)
Description	Displays the current measured value of the tertiary dynamic variable (TV).
User interface	Signed floating-point number

Additional information   *Display*

The measured value displayed depends on the process variable selected in the **Assign TV** parameter (→ 🖺 133).

Dependency

🛈 The unit of the displayed measured value is taken from the **System units** submenu (→ 🖺 47).

Assign QV   🔒

Navigation	🖩🖳 Expert → Communication → HART output → Output → Assign QV (0237)
Description	Use this function to select a measured variable (HART device variable) for the quaternary (fourth) dynamic variable (QV).
Selection	• Volume flow
	• Mass flow
	• Flow velocity
	• Sound velocity
	• Temperature
	• Density
	• Electronics temperature
	• Signal strength *
	• Signal to noise ratio *
	• Acceptance rate *
	• Turbulence *
	• Totalizer 1

---

* Visibility depends on order options or device settings

- Totalizer 2
- Totalizer 3
- HART input

Factory setting   Totalizer 3

Quaternary variable (QV)

Navigation   @@ Expert → Communication → HART output → Output → Quaterna.var(QV) (0203)

Description   Displays the current measured value of the quaternary dynamic variable (QV).

User interface   Signed floating-point number

Additional information   *Display*

The measured value displayed depends on the process variable selected in the **Assign QV**
parameter (→ 🖺 134).

Dependency

🛈 The unit of the displayed measured value is taken from the **System units** submenu
(→ 🖺 47).

3.5.3   "Web server" submenu

Navigation   @@ Expert → Communication → Web server

▶ Web server	
Web server language (7221)	→ 🖺 136
MAC address (7214)	→ 🖺 136
DHCP client (7212)	→ 🖺 136
IP address (7209)	→ 🖺 137
Subnet mask (7211)	→ 🖺 137
Default gateway (7210)	→ 🖺 137
Web server functionality (7222)	→ 🖺 138
Login page (7273)	→ 🖺 138

Web server language

Navigation	Expert → Communication → Web server → Webserv.language (7221)
Description	Use this function to select the language configured for the Web server.

Selection

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

Factory setting   English

MAC address

Navigation	Expert → Communication → Web server → MAC Address (7214)
Description	Displays the MAC [5] address of the measuring device.
User interface	Unique 12-digit character string comprising letters and numbers
Factory setting	Each measuring device is given an individual address.

Additional information   *Example*

For the display format
00:07:05:10:01:5F

DHCP client	🔒

Navigation	Expert → Communication → Web server → DHCP client (7212)
Description	Use this function to activate and deactivate the DHCP client functionality.

---

*   Visibility depends on order options or device settings
5)   Media Access Control

Selection	• Off
	• On

Factory setting	On

Additional information   *Effect*

If the DHCP client functionality of the web server is selected, the IP address (→ 🖹 137), Subnet mask (→ 🖹 137) and Default gateway (→ 🖹 137) are set automatically.

> • Identification is via the MAC address of the measuring device.
> • The IP address (→ 🖹 137) in the **IP address** parameter (→ 🖹 137) is ignored as long as the **DHCP client** parameter (→ 🖹 136) is active. This is also the case, in particular, if the DHCP server cannot be reached. The IP address (→ 🖹 137) in the parameter of the same name is only used if the **DHCP client** parameter (→ 🖹 136) is inactive.

IP address

Navigation	🖲🖳 Expert → Communication → Web server → IP address (7209)
Description	Display or enter the IP address of the Web server integrated in the measuring device.
User entry	4 octet: 0 to 255 (in the particular octet)
Factory setting	192.168.1.212

Subnet mask

Navigation	🖲🖳 Expert → Communication → Web server → Subnet mask (7211)
Description	Display or enter the subnet mask.
User entry	4 octet: 0 to 255 (in the particular octet)
Factory setting	255.255.255.0

Default gateway

Navigation	🖲🖳 Expert → Communication → Web server → Default gateway (7210)
Description	Display or enter the Default gateway (→ 🖹 137).
User entry	4 octet: 0 to 255 (in the particular octet)
Factory setting	0.0.0.0

Web server functionality	⬔

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

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

Selection	• Off • On

Factory setting	On

Additional information	*Description*

ⓘ Once disabled, the Web server functionality can only be enabled again via the FieldCare operating tool or the DeviceCare operating tool.

Selection

Option	Description
Off	• The Web server is completely disabled. • Port 80 is locked.
On	• The complete Web server functionality is available. • JavaScript is used. • The password is transferred in an encrypted state. • Any change to the password is also transferred in an encrypted state.

Login page	⬔

Navigation	◉◻ Expert → Communication → Web server → Login page (7273)

Description	Use this function to select the format of the login page.

Selection	• Without header • With header

Factory setting	With header

3.5.4 "Diagnostic configuration" submenu

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

Assign a category to the particular diagnostic event:

Category	Meaning
Failure (F)	A device error has occurred. The measured value is no longer valid.
Function check (C)	The device is in the service mode (e.g. during a simulation).

Category	Meaning
Out of specification (S)	The device is being operated: • Outside its technical specification limits (e.g. outside the process temperature range) • Outside of the configuration carried out by the user (e.g. maximum flow in parameter 20 mA value)
Maintenance required (M)	Maintenance is required. The measured value remains valid.
No effect (N)	Has no effect on the condensed status [1].

1) Condensed status according to NAMUR recommendation NE 107

Navigation   ⌷⌷   Expert → Communication → Diag. config.

‣ **Diagnostic configuration**

Event category 019 (0277)	→ 🖹 139
Event category 160 (0272)	→ 🖹 140
Event category 441 (0210)	→ 🖹 140
Event category 442 (0230)	→ 🖹 141
Event category 443 (0231)	→ 🖹 141
Event category 832 (0218)	→ 🖹 141
Event category 833 (0225)	→ 🖹 142
Event category 841 (0267)	→ 🖹 142
Event category 842 (0295)	→ 🖹 143
Event category 870 (0250)	→ 🖹 143
Event category 930 (0296)	→ 🖹 144
Event category 931 (0297)	→ 🖹 144

Event category 019 (Device initialization active)   🔒

Navigation   ⌷   Expert → Communication → Diag. config. → Event category 019 (0277)

Description   Use this function to assign a category to the ⚠S019 **Device initialization active** diagnostic message.

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

Factory setting	Out of specification (S)

Additional information	For a detailed description of the event categories available for selection: → 🖺 138

Event category 160 (Signal path switched off)

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

Description	Use this function to select a category for the **160 Signal path switched off** diagnostic message.

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

Factory setting	Maintenance required (M)

Additional information	For a detailed description of the event categories available for selection: → 🖺 138

Event category 441 (Current output 1 to n)

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

Description	Use this function to select a category for the **441 Current output 1 to n** diagnostic message.

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

Factory setting	Out of specification (S)

Additional information	For a detailed description of the event categories available for selection: → 🖺 138

Event category 442 (Frequency output 1 to n) 🔒

Navigation	☷ Expert → Communication → Diag. config. → Event category 442 (0230)
Prerequisite	The pulse/frequency/switch output is available.
Description	Use this function to select a category for the **442 Frequency output 1 to n** diagnostic message.
Selection	• Failure (F) • Function check (C) • Out of specification (S) • Maintenance required (M) • No effect (N)
Factory setting	Out of specification (S)
Additional information	For a detailed description of the event categories available for selection: → 138

Event category 443 (Pulse output 1 to n) 🔒

Navigation	☷ Expert → Communication → Diag. config. → Event category 443 (0231)
Prerequisite	The pulse/frequency/switch output is available.
Description	Use this function to select a category for the **443 Pulse output 1 to n** diagnostic message.
Selection	• Failure (F) • Function check (C) • Out of specification (S) • Maintenance required (M) • No effect (N)
Factory setting	Out of specification (S)
Additional information	For a detailed description of the event categories available for selection: → 138

Event category 832 (Electronics temperature too high) 🔒

Navigation	☷ Expert → Communication → Diag. config. → Event category 832 (0218)
Description	Use this function to select a category for the **832 Electronics temperature too high** diagnostic message.

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

Factory setting	Out of specification (S)

Additional information	*Selection*
	For a detailed description of the event categories available for selection: → 📄 138

Event category 833 (Electronics temperature too low)

Navigation	🔲 Expert → Communication → Diag. config. → Event category 833 (0225)

Description	Use this option to select a category for the **833 Electronics temperature too low** diagnostic message.

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

Factory setting	Out of specification (S)

Additional information	*Selection*
	For a detailed description of the event categories available for selection: → 📄 138

Event category 841 (Flow velocity too high)

Navigation	🔲 Expert → Communication → Diag. config. → Event category 841 (0267)

Description	Use this function to assign a category to the ⚠S841 **Flow velocity too high** diagnostic message.

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

Factory setting	Out of specification (S)

Additional information	For a detailed description of the event categories available for selection: → 📄 138

Event category 842 (Process limit)   🔒

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

Description	Use this function to assign a category to the **842 Process limit** diagnostic message.

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

Factory setting	Out of specification (S)

Additional information	*Selection*

ℹ️ For a detailed description of the event categories available for selection: → 🖺 138

Event category 870 (Measuring inaccuracy increased)   🔒

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

Description	Use this function to select a category for the **870 Measuring inaccuracy increased** diagnostic message.

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

Factory setting	No effect (N)

Additional information	*Selection*

ℹ️ For a detailed description of the event categories available for selection: → 🖺 138

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

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

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

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

Factory setting	Maintenance required (M)

Additional information	For a detailed description of the event categories available for selection: → 🖹 138

Event category 930 (Process fluid) 🔒

Navigation	〇🔲 Expert → Communication → Diag. config. → Event category 930 (0296)

Description	Use this function to select a category for the ⚠S930 **Process fluid** diagnostic message.

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

Factory setting	Out of specification (S)

Additional information	*Selection*
	For a detailed description of the event categories available for selection: → 🖹 138

Event category 931 (Process fluid) 🔒

Navigation	〇🔲 Expert → Communication → Diag. config. → Event category 931 (0297)

Description	Use this function to select a category for the ⚠S931 **Process fluid** diagnostic message.

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

Factory setting	Out of specification (S)

Additional information	*Selection*
	For a detailed description of the event categories available for selection: → 🖹 138

3.5.5   "WLAN settings" wizard

Navigation   ▣   Expert → Communication → WLAN settings

‣ WLAN settings	
WLAN (2702)	→ 🖺 146
WLAN mode (2717)	→ 🖺 146
SSID name (2714)	→ 🖺 146
Network security (2705)	→ 🖺 146
Security identification (2718)	→ 🖺 147
User name (2715)	→ 🖺 147
WLAN password (2716)	→ 🖺 148
WLAN IP address (2711)	→ 🖺 148
WLAN MAC address (2703)	→ 🖺 149
WLAN subnet mask (2709)	→ 🖺 149
WLAN MAC address (2703)	→ 🖺 149
WLAN passphrase (2706)	→ 🖺 150
WLAN MAC address (2703)	→ 🖺 149
Assign SSID name (2708)	→ 🖺 150
SSID name (2707)	→ 🖺 150
2.4 GHz WLAN channel (2704)	→ 🖺 151
Select antenna (2713)	→ 🖺 151
Connection state (2722)	→ 🖺 148
Received signal strength (2721)	→ 🖺 148
WLAN IP address (2711)	→ 🖺 148
Gateway IP address (2719)	→ 🖺 149
IP address domain name server (2720)	→ 🖺 149

WLAN	🔒

Navigation	🔘🖳 Expert → Communication → WLAN settings → WLAN (2702)
Description	Use this function to enable and disable the WLAN connection.
Selection	• Disable • Enable
Factory setting	Enable

WLAN mode	🔒

Navigation	🔘🖳 Expert → Communication → WLAN settings → WLAN mode (2717)
Description	Use this function to select the WLAN mode.
Selection	WLAN access point
Factory setting	WLAN access point

SSID name	🔒

Navigation	🔘🖳 Expert → Communication → WLAN settings → SSID name (2714)
Prerequisite	The client is activated.
Description	Use this function to enter the user-defined SSID name (max. 32 characters) of the WLAN network.
User entry	–
Factory setting	–

Network security	🔒

Navigation	🔘🖳 Expert → Communication → WLAN settings → Network security (2705)
Description	Use this function to select the type of security for the WLAN interface.

Selection	• Unsecured • WPA2-PSK • EAP-PEAP with MSCHAPv2 * • EAP-PEAP MSCHAPv2 no server authentic. * • EAP-TLS *

Factory setting	WPA2-PSK

Additional information	*Selection* • Unsecured Access the WLAN connection without identification. • WPA2-PSK Access the WLAN connection with a network key. • EAP-PEAP with MSCHAPv2 Access the WLAN connection with a password-based authentication protocol. • EAP-PEAP MSCHAPv2 no server authentic. Access the WLAN connection with a password-based protocol without server authentication. • EAP-TLS Access the WLAN connection with a certificate-based, two-way authentication of the client and network.

Security identification

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

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

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

User name   🔒

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

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

User entry	–

Factory setting	–

---

*   Visibility depends on order options or device settings

WLAN password	🔒

Navigation	🔘🖳 Expert → Communication → WLAN settings → WLAN password (2716)
Description	Use this function to enter the WLAN password for the WLAN network.
User entry	–
Factory setting	–

Connection state

Navigation	🔘 Expert → Communication → WLAN settings → Connection state (2722)
Description	The connection status is displayed.
User interface	• Connected • Not connected
Factory setting	Not connected

Received signal strength

Navigation	🔘🖳 Expert → Communication → WLAN settings → Rec.sig.strength (2721)
Description	Displays the signal strength received.
User interface	• Low • Medium • High
Factory setting	High

WLAN IP address	🔒

Navigation	🔘🖳 Expert → Communication → WLAN settings → WLAN IP address (2711)
Description	Use this function to enter the IP address of the measuring device's WLAN connection.
User entry	4 octet: 0 to 255 (in the particular octet)
Factory setting	192.168.1.212

Gateway IP address

Navigation	⊞⊡ Expert → Communication → WLAN settings → Gateway IP addr. (2719)
Description	Use this function to enter the IP address of the gateway.
User interface	Character string comprising numbers, letters and special characters
Factory setting	192.168.1.212

IP address domain name server

Navigation	⊞⊡ Expert → Communication → WLAN settings → IP address DNS (2720)
Description	Use this function to enter the IP address of the domain name server.
User interface	Character string comprising numbers, letters and special characters
Factory setting	192.168.1.212

WLAN subnet mask   🔒

Navigation	⊞⊡ Expert → Communication → WLAN settings → WLAN subnet mask (2709)
Description	Use this function to enter the subnet mask.
User entry	4 octet: 0 to 255 (in the particular octet)
Factory setting	255.255.255.0

WLAN MAC address

Navigation	⊞⊡ Expert → Communication → WLAN settings → WLAN MAC address (2703)
Description	Displays the MAC [6] address of the measuring device.
User interface	Unique 12-digit character string comprising letters and numbers
Factory setting	Each measuring device is given an individual address.
Additional information	*Example* For the display format

---

6)   Media Access Control

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

WLAN passphrase

Navigation	🖫🖳 Expert → Communication → WLAN settings → WLAN passphrase (2706)
Prerequisite	The **WPA2-PSK** option is selected in the **Security type** parameter (→ 🖺 146).
Description	Use this function to enter the network key.
User entry	8 to 32-digit character string comprising numbers, letters and special characters (without spaces)
Factory setting	Serial number of the measuring device (e.g. L100A802000)

Assign SSID name

Navigation	🖫🖳 Expert → Communication → WLAN settings → Assign SSID name (2708)
Description	Use this function to select which name is used for the SSID [7].
Selection	• Device tag • User-defined
Factory setting	User-defined

Additional information	*Selection*
	
	• Device tag
	  The device tag name is used as the SSID.
	• User-defined
	  A user-defined name is used as the SSID.

SSID name

Navigation	🖫🖳 Expert → Communication → WLAN settings → SSID name (2707)
Prerequisite	• The **User-defined** option is selected in the **Assign SSID name** parameter (→ 🖺 150). • The **WLAN access point** option is selected in the **WLAN mode** parameter (→ 🖺 146).
Description	Use this function to enter a user-defined SSID name.
User entry	Max. 32-digit character string comprising numbers, letters and special characters

---

7)	Service Set Identifier

Factory setting   EH_device designation_last 7 digits of the serial number (e.g.
                                   EH_Prosonic_Flow_400_A802000)

Select antenna   🔒

Navigation   🖩🖵 Expert → Communication → WLAN settings → Select antenna (2713)

Description   Use this function to select whether the external or internal antenna is used for reception.

Selection   • External antenna
                              • Internal antenna

Factory setting   Internal antenna

2.4 GHz WLAN channel   🔒

Navigation   🖩🖵 Expert → Communication → WLAN settings → WLAN channel (2704)

Description   Use this function to enter the 2.4 GHz WLAN channel.

User entry   1 to 11

Factory setting   6

Additional information   *Description*

                              • It is only necessary to enter a 2.4 GHz WLAN channel if multiple WLAN devices are
                                in use.
                              • If just one measuring device is in use, it is recommended to keep the factory setting.

3.6   "Application" submenu

Navigation   🖩🖵   Expert → Application

┌───┐
│ ▸ Application   │
│   │
│   Reset all totalizers (2806)   → 🖹 152   │
│   │
│   ▸ Totalizer 1 to n   → 🖹 152   │
└───┘

Reset all totalizers

Navigation $\text{\textcircled{\scriptsize B}\textcircled{\scriptsize B}}$ 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 previously aggregated flow values.

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 previously aggregated flow values.

3.6.1   "Totalizer 1 to n" submenu

Navigation $\text{\textcircled{\scriptsize B}\textcircled{\scriptsize B}}$ Expert → Application → Totalizer 1 to n

```
► Totalizer 1 to n

        Assign process variable 1 to n              →  🗎 152
        (0914–1 to n)

        Process variable unit 1 to n                →  🗎 153
        (0915–1 to n)

        Totalizer 1 to n operation mode             →  🗎 154
        (0908–1 to n)

        Totalizer 1 to n control (0912–1 to n)      →  🗎 154

        Preset value 1 to n (0913–1 to n)           →  🗎 155

        Totalizer 1 to n failure behavior           →  🗎 156
        (0901–1 to n)
```

Assign process variable 1 to n	🔒

Navigation $\text{\textcircled{\scriptsize B}\textcircled{\scriptsize B}}$ Expert → Application → Totalizer 1 to n → AssignVariab. 1 to n (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.

Options

If the **Off** option is selected, only the **Assign process variable** parameter (→ 🖺 152) is still displayed in the **Totalizer 1 to n** submenu. All other parameters in the submenu are hidden.

Process variable unit 1 to n   🔒

Navigation	🖩🖳 Expert → Application → Totalizer 1 to n → VariableUnit 1 to n (0915–1 to n)

Prerequisite	A process variable is selected in the **Assign process variable** parameter (→ 🖺 152) of the **Totalizer 1 to n** submenu.

Description	Use this function to select the process variable unit for the Totalizer 1 to n (→ 🖺 152).

Selection	• g * • kg * • t * • oz * • lb * • STon * • cm³ * • dm³ * • m³ * • ml * • l * • hl * • Ml Mega * • af * • ft³ * • Mft³ * • Mft³ * • fl oz (us) * • gal (us) * • kgal (us) * • Mgal (us) * • bbl (us;liq.) * • bbl (us;beer) * • bbl (us;oil) * • bbl (us;tank) * • gal (imp) * • Mgal (imp) *

---

*   Visibility depends on order options or device settings

• bbl (imp;beer) *
• bbl (imp;oil) *
• None *

Factory setting   Depends on country:
                       • 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 (→ 🗎 47).

Options

The selection is dependent on the process variable selected in the **Assign process variable**
parameter (→ 🗎 152).

Totalizer 1 to n operation mode   🔒

Navigation   🔘🖥 Expert → Application → Totalizer 1 to n → Operat. mode 1 to n (0908–1 to n)

Prerequisite   A process variable is selected in the **Assign process variable** parameter (→ 🗎 152) of the
                       Totalizer 1 to n submenu.

Description   Use this function to select how the totalizer summates the flow.

Selection   • Net
                       • Forward
                       • Reverse

Factory setting   Net flow total

Additional information *Selection*

                       • Net flow total
                         Flow values in the forward and reverse flow direction are totalized and balanced against
                         one another. Net flow is registered in the flow direction.
                       • Forward flow total
                         Only the flow in the forward flow direction is totalized.
                       • Reverse flow total
                         Only the flow in the reverse flow direction is totalized (= reverse flow quantity).

Totalizer 1 to n control

Navigation   🔘🖥 Expert → Application → Totalizer 1 to n → Tot. 1 to n control (0912–1 to n)

Prerequisite   A process variable is selected in the **Assign process variable** parameter (→ 🗎 152) of the
                       Totalizer 1 to n submenu.

---

*   Visibility depends on order options or device settings

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.
Preset + hold [1]	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 [1]	The totalizer is set to the defined start value in the **Preset value** parameter and the totaling process is restarted.

1)   Visible depending on the order options or device settings

Preset value 1 to n

Navigation	圆圖 Expert → Application → Totalizer 1 to n → Preset value 1 to n (0913–1 to n)
Prerequisite	A process variable is selected in the **Assign process variable** parameter (→ 🖺 152) of the **Totalizer 1 to n** submenu.
Description	Use this function to enter a start value for the Totalizer 1 to n.
User entry	Signed floating-point number
Factory setting	Depends on country: • 0 m³ • 0 ft³
Additional information	*User entry*

ℹ️ The unit of the selected process variable is defined in the **Unit totalizer** parameter (→ 🖺 153) for the totalizer.

Example

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

Totalizer 1 to n failure behavior	🔒

Navigation	�“🔲 Expert → Application → Totalizer 1 to n → FailureBehav. 1 to n (0901–1 to n)
Prerequisite	A process variable is selected in the **Assign process variable** parameter (→ 🔖 152) of the **Totalizer 1 to n** submenu.
Description	Use this function to select how a totalizer behaves in the event of a device alarm.
Selection	• Hold • Continue • Last valid value + continue
Factory setting	Stop

Additional information	*Description*
	
	ℹ️ This setting does not affect the failsafe mode of other totalizers and the outputs. This is specified in separate parameters.
	
	Selection
	
	• Stop
	  The totalizer is stopped in the event of a device alarm.
	• Actual value
	  The totalizer continues to count based on the actual (current) measured value; the device alarm is ignored.
	• Last valid value
	  The totalizer continues to count based on the last valid measured value before the device alarm occurred.

3.6.2   "Inventory counter" submenu

Navigation   �“🔲 Expert → Application → Inventory count.

```
▶ Inventory counter

         Unit (0974)                                          →  🔖 156
```
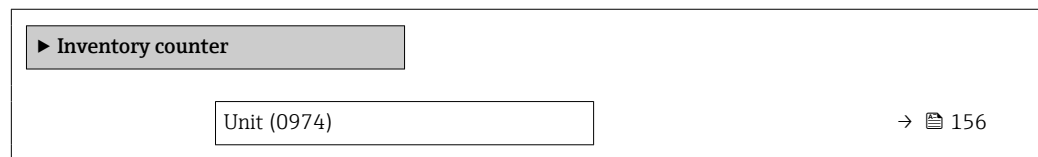
Unit	

Navigation	�“🔲 Expert → Application → Inventory count. → Unit (0974)
Description	Displays the unit of the inventory counter.

User interface	*SI units*	*US units*	*Imperial units*
	• cm³	• ft³	• gal (imp)
	• dm³	• af	• 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*

The parameter cannot be configured or reset.

3.7 "Diagnostics" submenu

Navigation   Expert → Diagnostics

Switch state 1 to n (0463–1 to n)	→ 🖹 196
Device alarm simulation (0654)	→ 🖹 196
Diagnostic event category (0738)	→ 🖹 197
Diagnostic event simulation (0737)	→ 🖹 197

Actual diagnostics

Navigation	🆇🖳　Expert → Diagnostics → Actual diagnos. (0691)
Prerequisite	A diagnostic event has occurred.
Description	Displays the current diagnostic message. If two or more messages occur simultaneously, the message with the highest priority is shown on the display.
User interface	Symbol for diagnostic behavior, diagnostic code and short message.
Additional information	*Display*

🛈 Additional pending diagnostic messages can be viewed in the **Diagnostic list** submenu (→ 🖹 162).

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

Example

For the display format:
⊗F271 Main electronic failure

Previous diagnostics

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

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

Example

For the display format:
⊗F271 Main electronic failure

Operating time from restart

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

Operating time

Navigation	🖩🖵 Expert → Diagnostics → Operating time (0652)
Description	Displays the length of time the device has been in operation.
User interface	Days (d), hours (h), minutes (m) and seconds (s)
Additional information	*Indication*
	Maximum number of days: 9 999 (corresponds to approx. 27 years and 5 months)

3.7.1 "Diagnostic list" submenu

Navigation 🖩🖵 Expert → Diagnostics → Diagnostic list

```
▶ Diagnostic list
```

Diagnostics 1 (0692)	→ 🖺 162
Diagnostics 2 (0693)	→ 🖺 163
Diagnostics 3 (0694)	→ 🖺 164
Diagnostics 4 (0695)	→ 🖺 165
Diagnostics 5 (0696)	→ 🖺 166

Diagnostics 1

Navigation	🖩🖵 Expert → Diagnostics → Diagnostic list → Diagnostics 1 (0692)
Description	Displays the current diagnostics message with the highest priority.

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

| Additional information | *Display* |

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

Examples

For the display format:
- ⚠S442 Frequency output
- ⊗F276 I/O module failure

Timestamp 1

| Navigation | 🖳 | Expert → Diagnostics → Diagnostic list → Timestamp |

| Description | Displays the operating time when the diagnostic message with the highest priority occurred. |

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

| Additional information | *Display* |

     The diagnostic message can be viewed via the **Diagnostics 1** parameter (→ 🕮 162).

Example

For the display format:
24d12h13m00s

Diagnostics 2

| Navigation | 🖲🖳 | Expert → Diagnostics → Diagnostic list → Diagnostics 2 (0693) |

| Description | Displays the current diagnostics message with the second-highest priority. |

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

| Additional information | *Display* |

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

Examples

For the display format:
- ⚠S442 Frequency output
- ⊗F276 I/O module failure

Timestamp 2	

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

🛈 The diagnostic message can be viewed via the **Diagnostics 2** parameter (→ 🖺 163).

Example

For the display format:
24d12h13m00s

Diagnostics 3	

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

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

Examples

For the display format:
• ⚠S442 Frequency output
• ⊗F276 I/O module failure

Timestamp 3	

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

Additional information   *Display*

                           The diagnostic message can be viewed via the **Diagnostics 3** parameter (→ 🖺 164).

                           Example

                           For the display format:
                           24d12h13m00s

Diagnostics 4

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

Additional information   *Display*

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

                           Examples

                           For the display format:
                           • ⚠S442 Frequency output
                           • ⊗F276 I/O module failure

Timestamp 4

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

Additional information   *Display*

                           The diagnostic message can be viewed via the **Diagnostics 4** parameter (→ 🖺 165).

                           Example

                           For the display format:
                           24d12h13m00s

Diagnostics 5	

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

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

Examples

For the display format:
- △S442 Frequency output
- ⊗F276 I/O module failure

Timestamp 5	

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 (→ 🖺 166).

Example

For the display format:
24d12h13m00s

3.7.2   "Device information" submenu

Navigation   🖩🖳   Expert → Diagnostics → Device info

▸ Device information		
	Device tag (0011)	→ 🖺 167
	Serial number (0009)	→ 🖺 167
	Firmware version (0010)	→ 🖺 168

Device name (0013)	→ 🖺 168
Order code (0008)	→ 🖺 168
Extended order code 1 (0023)	→ 🖺 169
Extended order code 2 (0021)	→ 🖺 169
Extended order code 3 (0022)	→ 🖺 169
Configuration counter (0233)	→ 🖺 170
ENP version (0012)	→ 🖺 170

Device tag

Navigation 🖩🖳 Expert → Diagnostics → Device info → Device tag (0011)

Description Displays a unique name for the measuring point so it can be identified quickly within the plant. It is displayed in the header.

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

Factory setting Prosonic Flow

Additional information *User interface*
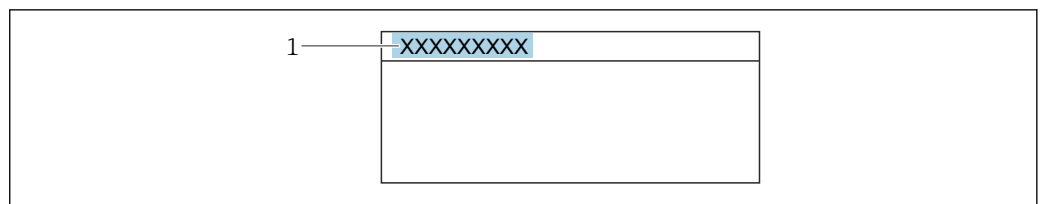
1 Position of the header text on the display

The number of characters displayed depends on the characters used.

Serial number

Navigation 🖩🖳 Expert → Diagnostics → Device info → Serial number (0009)

Description Displays the serial number of the measuring device.

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

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

Additional information   *Description*

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

Firmware version

Navigation   🔲🔳 Expert → Diagnostics → Device info → Firmware version (0010)

Description   Displays the device firmware version installed.

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

Additional information *Display*

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

Device name

Navigation   🔲🔳 Expert → Diagnostics → Device info → Device name (0013)

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

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

Factory setting   Pros. Flow 400

Order code   🔒

Navigation   🔲🔳 Expert → Diagnostics → Device info → Order code (0008)

Description   Displays the device order code

User interface   Character string composed of letters, numbers and certain punctuation marks (e.g. /).

Additional information *Description*

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

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

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

Extended order code 1   🔒

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

Extended order code 2   🔒

Navigation	🔘🔲 Expert → Diagnostics → Device info → Ext. order cd. 2 (0021)
Description	Displays the second part of the extended order code.
User interface	Character string
Additional information	For additional information, see **Extended order code 1** parameter (→ 🔖 169)

Extended order code 3   🔒

Navigation	🔘🔲 Expert → Diagnostics → Device info → Ext. order cd. 3 (0022)
Description	Displays the third part of the extended order code.
User interface	Character string
Additional information	For additional information, see **Extended order code 1** parameter (→ 🔖 169)

Configuration counter

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

ENP version

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

3.7.3   "Main electronic module + I/O module 1" submenu

Navigation   🔘🔳 Expert → Diagnostics → Mainboard module

```
► Main electronic module

          Firmware version (0072)                        → 🖹 170

          Build no. software (0079)                       → 🖹 171

          Bootloader revision (0073)                      → 🖹 171
```

Firmware version

Navigation	🔘🔳 Expert → Diagnostics → Main elec. mod. → Firmware version (0072)
Description	Use this function to display the software revision of the module.
User interface	Positive integer

Build no. software

Navigation   ⓘⓔ   Expert → Diagnostics → Main elec. mod. → Build no. softw. (0079)

Description   Use this function to display the software build number of the module.

User interface   Positive integer

Bootloader revision

Navigation   ⓘⓔ   Expert → Diagnostics → Main elec. mod. → Bootloader rev. (0073)

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

User interface   Positive integer

3.7.4 "Sensor electronic module (ISEM)" submenu

Navigation   ⓘⓔ   Expert → Diagnostics → Sens. electronic

```
▶ Sensor electronic module (ISEM)

              Firmware version (0072)                        → 🖹 171

              Build no. software (0079)                      → 🖹 172

              Bootloader revision (0073)                     → 🖹 172
```

Firmware version

Navigation   ⓘⓔ   Expert → Diagnostics → Sens. electronic → Firmware version (0072)

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

User interface   Positive integer

Build no. software

Navigation   🖳🖳 Expert → Diagnostics → Sens. electronic → Build no. softw. (0079)

Description   Use this function to display the software build number of the module.

User interface   Positive integer

Bootloader revision

Navigation   🖳🖳 Expert → Diagnostics → Sens. electronic → Bootloader rev. (0073)

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

User interface   Positive integer

3.7.5   "Display module" submenu

Navigation   🖳🖳 Expert → Diagnostics → Display module

▶ **Display module**	
Firmware version (0072)	→ 🖹 172
Build no. software (0079)	→ 🖹 173
Bootloader revision (0073)	→ 🖹 173

Firmware version

Navigation   🖳🖳 Expert → Diagnostics → Display module → Firmware version (0072)

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

User interface   Positive integer

Build no. software	
Navigation	🗐🗐 Expert → Diagnostics → Display module → Build no. softw. (0079)
Description	Use this function to display the software build number of the module.
User interface	Positive integer

Bootloader revision	
Navigation	🗐🗐 Expert → Diagnostics → Display module → Bootloader rev. (0073)
Description	Use this function to display the bootloader revision of the software.
User interface	Positive integer

3.7.6 "Data logging" submenu

Navigation   🗐🗐 Expert → Diagnostics → Data logging

▸ Data logging	
Assign channel 1 (0851)	→ 🖺 174
Assign channel 2 (0852)	→ 🖺 174
Assign channel 3 (0853)	→ 🖺 175
Assign channel 4 (0854)	→ 🖺 175
Logging interval (0856)	→ 🖺 175
Clear logging data (0855)	→ 🖺 176
Data logging (0860)	→ 🖺 176
Logging delay (0859)	→ 🖺 177
Data logging control (0857)	→ 🖺 177
Data logging status (0858)	→ 🖺 178
Entire logging duration (0861)	→ 🖺 178

Assign channel 1	🔒

Navigation	🕮🖳 Expert → Diagnostics → Data logging → Assign chan. 1 (0851)

Prerequisite	The **Extended HistoROM** application package is available.

ℹ️ The software options currently enabled are displayed in the **Software option overview** parameter (→ 🖺 38).

Description	Use this function to assign a process variable to the data logging channel.

Selection	• Off
	• Volume flow
	• Mass flow
	• Flow velocity
	• Sound velocity
	• Temperature
	• Density
	• Signal strength *
	• Signal to noise ratio *
	• Acceptance rate *
	• Turbulence *
	• Electronics temperature
	• Current output 1

Factory setting	Off

Additional information	*Description*

A total of 1000 measured values can be logged. This means:
• 1000 data points if 1 logging channel is used
• 500 data points if 2 logging channels are used
• 333 data points if 3 logging channels are used
• 250 data points if 4 logging channels are used

Once the maximum number of data points is reached, the oldest data points in the data log are cyclically overwritten in such a way that the last 1000, 500, 333 or 250 measured values are always in the log (ring memory principle).

ℹ️ The log contents are cleared if the option selected is changed.

Assign channel 2	🔒

Navigation	🕮🖳 Expert → Diagnostics → Data logging → Assign chan. 2 (0852)

Prerequisite	The **Extended HistoROM** application package is available.

ℹ️ The software options currently enabled are displayed in the **Software option overview** parameter (→ 🖺 38).

Description	Use this function to assign a process variable to the logging channel.

Selection	For the picklist, see **Assign channel 1** parameter (→ 🖺 174)

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

Factory setting	Off

Assign channel 3   🔒

Navigation	🗐🗉 Expert → Diagnostics → Data logging → Assign chan. 3 (0853)
Prerequisite	The **Extended HistoROM** application package is available.
	ℹ The software options currently enabled are displayed in the **Software option overview** parameter (→ 🖺 38).
Description	Use this function to assign a process variable to the logging channel.
Selection	For the picklist, see **Assign channel 1** parameter (→ 🖺 174)
Factory setting	Off

Assign channel 4   🔒

Navigation	🗐🗉 Expert → Diagnostics → Data logging → Assign chan. 4 (0854)
Prerequisite	The **Extended HistoROM** application package is available.
	ℹ The software options currently enabled are displayed in the **Software option overview** parameter (→ 🖺 38).
Description	Use this function to assign a process variable to the logging channel.
Selection	For the picklist, see **Assign channel 1** parameter (→ 🖺 174)
Factory setting	Off

Logging interval   🔒

Navigation	🗐🗉 Expert → Diagnostics → Data logging → Logging interval (0856)
Prerequisite	The **Extended HistoROM** application package is available.
	ℹ The software options currently enabled are displayed in the **Software option overview** parameter (→ 🖺 38).
Description	Use this function to enter the logging interval T_{log} for data logging.
User entry	0.1 to 3 600.0 s
Factory setting	1.0 s

Additional information   *Description*

This defines the interval between the individual data points in the data log, and thus the maximum loggable process time T_{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 T_{log} 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:
- $T_{log} = 1000 \times 1\ s = 1\ 000\ s \approx 15\ min$
- $T_{log} = 1000 \times 10\ s = 10\ 000\ s \approx 3\ h$
- $T_{log} = 1000 \times 80\ s = 80\ 000\ s \approx 1\ d$
- $T_{log} = 1000 \times 3\ 600\ s = 3\ 600\ 000\ s \approx 41\ d$

Clear logging data

Navigation	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 (→ 🖻 38).

Description	Use this function to clear the entire logging data.
Selection	• Cancel • Clear data
Factory setting	Cancel
Additional information	*Selection*

- Cancel
  The data is not cleared. All the data is retained.
- Clear data
  The logging data is cleared. The logging process starts from the beginning.

Data logging

Navigation	Expert → Diagnostics → Data logging → Data logging (0860)
Description	Use this function to select the data logging method.
Selection	• Overwriting • Not overwriting

Factory setting	Overwriting

Additional information	*Selection*

• Overwriting
The device memory applies the FIFO principle.
• Not overwriting
Data logging is canceled if the measured value memory is full (single shot).

Logging delay

Navigation	🔀🖳 Expert → Diagnostics → Data logging → Logging delay (0859)

Prerequisite	In the **Data logging** parameter (→ 🖺 176), the **Not overwriting** option is selected.

Description	Use this function to enter the time delay for measured value logging.

User entry	0 to 999 h

Factory setting	0 h

Additional information	*Description*

Once data logging has been started with the **Data logging control** parameter (→ 🖺 177), the device does not save any data for the duration of the delay time entered.

Data logging control

Navigation	🔀🖳 Expert → Diagnostics → Data logging → Data log.control (0857)

Prerequisite	In the **Data logging** parameter (→ 🖺 176), the **Not overwriting** option is selected.

Description	Use this function to start and stop measured value logging.

Selection	• None • Delete + start • Stop

Factory setting	None

Additional information	*Selection*

• None
Initial measured value logging status.
• Delete + start
All the measured values recorded for all the channels are deleted and measured value logging starts again.
• Stop
Measured value logging is stopped.

Data logging status	

Navigation	🔘🖳 Expert → Diagnostics → Data logging → Data log. status (0858)
Prerequisite	In the **Data logging** parameter (→ 🖺 176), the **Not overwriting** option is selected.
Description	Displays the measured value logging status.
User interface	• Done • Delay active • Active • Stopped
Factory setting	Done

Additional information	*Selection*
	
	• Done
	  Measured value logging has been performed and completed successfully.
	• Delay active
	  Measured value logging has been started but the logging interval has not yet elapsed.
	• Active
	  The logging interval has elapsed and measured value logging is active.
	• Stopped
	  Measured value logging is stopped.

Entire logging duration	

Navigation	🔘🖳 Expert → Diagnostics → Data logging → Logging duration (0861)
Prerequisite	In the **Data logging** parameter (→ 🖺 176), the **Not overwriting** option is selected.
Description	Displays the total logging duration.
User interface	Positive floating-point number
Factory setting	0 s

"Display channel 1" submenu

Navigation   🖳 Expert → Diagnostics → Data logging → Displ.channel 1

▸ Display channel 1		
	Display channel 1	→ 🖺 179

Display channel 1	

Navigation	⌂ Expert → Diagnostics → Data logging → Displ.channel 1

Prerequisite	The **Extended HistoROM** application package is available.
	ℹ The software options currently enabled are displayed in the **Software option overview** parameter (→ 🖺 38).

Description	Displays the measured value trend for the logging channel in the form of a chart.

Additional information	*Description*
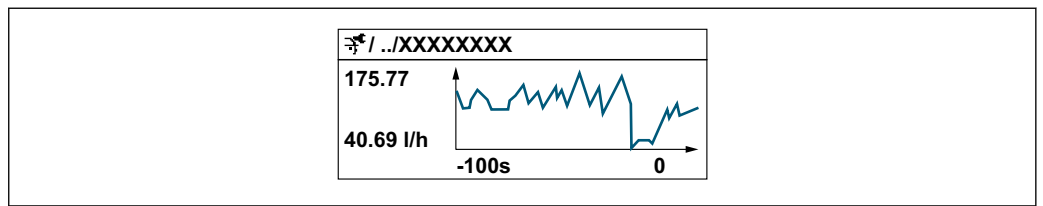
🖼 10   Chart of a measured value trend

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

"Display channel 2" submenu

Navigation   ⌂   Expert → Diagnostics → Data logging → Displ.channel 2

▸ Display channel 2		
	Display channel 2	→ 🖺 179

Display channel 2	

Navigation	⌂ Expert → Diagnostics → Data logging → Displ.channel 2

Prerequisite	A process variable is specified in the **Assign channel 2** parameter.

Description	See the **Display channel 1** parameter → 🖺 179

"Display channel 3" submenu

Navigation   ⊞   Expert → Diagnostics → Data logging → Displ.channel 3

▸ Display channel 3		
	Display channel 3	→ 🗎 180

Display channel 3

Navigation   ⊞   Expert → Diagnostics → Data logging → Displ.channel 3

Prerequisite   A process variable is specified in the **Assign channel 3** parameter.

Description   See the **Display channel 1** parameter → 🗎 179

"Display channel 4" submenu

Navigation   ⊞   Expert → Diagnostics → Data logging → Displ.channel 4

▸ Display channel 4		
	Display channel 4	→ 🗎 180

Display channel 4

Navigation   ⊞   Expert → Diagnostics → Data logging → Displ.channel 4

Prerequisite   A process variable is specified in the **Assign channel 4** parameter.

Description   See the **Display channel 1** parameter → 🗎 179

3.7.7   "Heartbeat Technology" submenu

For detailed information on the parameter descriptions for the **Heartbeat Verification+Monitoring**: Special Documentation for the device → 🗎 7

Navigation   ⊟   Expert → Diagnostics → Heartbeat Techn.

▸ Heartbeat Technology

▸ Heartbeat base settings	→ 🖺 181
▸ Performing verification	→ 🖺 181
▸ Verification results	→ 🖺 187

"Heartbeat base settings" submenu

Navigation   🖩🖳   Expert → Diagnostics → Heartbeat Techn. → Base settings

▸ Heartbeat base settings	
Plant operator (2754)	→ 🖺 181
Location (2755)	→ 🖺 181

Plant operator   🔒

Navigation   🖩🖳   Expert → Diagnostics → Heartbeat Techn. → Base settings → Plant operator (2754)

Description   Use this function to enter the plant operator.

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

Location   🔒

Navigation   🖩🖳   Expert → Diagnostics → Heartbeat Techn. → Base settings → Location (2755)

Description   Use this function to enter the location.

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

"Performing verification" wizard

Navigation   🖩🖳   Expert → Diagnostics → Heartbeat Techn. → Perform.verific.

| ▸ Performing verification | |
| Year (2846) | → 🖺 182 |

Month (2845)	→ 🖹 182
Day (2842)	→ 🖹 183
Hour (2843)	→ 🖹 183
AM/PM (2813)	→ 🖹 184
Minute (2844)	→ 🖹 184
Verification mode (12105)	→ 🖹 184
External device information (12101)	→ 🖹 185
Start verification (12127)	→ 🖹 185
Progress (2808)	→ 🖹 185
Measured values (12102)	→ 🖹 186
Output values (12103)	→ 🖹 186
Status (12153)	→ 🖹 186
Verification result (12149)	→ 🖹 187

Year 🔒

Navigation   🎛🖥 Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → 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   21

Month 🔒

Navigation   🎛🖥 Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → 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 → Diagnostics → Heartbeat Techn. → Perform.verific. → Day (2842)
Prerequisite	ℹ️ 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 → Diagnostics → Heartbeat Techn. → Perform.verific. → Hour (2843)
Prerequisite	ℹ️ 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 → Diagnostics → Heartbeat Techn. → Perform.verific. → AM/PM (2813)
Prerequisite	ℹ️ Can be edited if Heartbeat Verification is not active.
	The **dd.mm.yy hh:mm am/pm** option or the **mm/dd/yy hh:mm am/pm** option is selected in the **Date/time format** parameter (2812) (→ 🖺 54).
Description	Use this function to select the time entry in the morning (**AM** option) or afternoon (**PM** option) in the case of 12-hour notation.
Selection	• AM • PM
Factory setting	AM

Minute 🔒

Navigation	🖩🔲 Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → 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

Verification mode 🔒

Navigation	🖩🔲 Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Verificat. mode (12105)
Prerequisite	Can be edited if the verification status is not active.
Description	Select verification mode.
	Standard verification: Verification is performed automatically by the device and without manual checking of external measured variables.
	Extended verification: Similar to internal verification but with the entry of external measured variables (see also "Measured values" parameter).
Selection	• Standard verification • Extended verification
Factory setting	Standard verification

External device information	🔒

Navigation	🎛️🖵 Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Ext. device info (12101)
Prerequisite	With the following conditions: • The **Extended verification** option is selected in the **Verification mode** parameter (→ 🗎 184). • Can be edited if Heartbeat Verification is not active.
Description	Record measuring equipment for extended verification.
User entry	Free text entry
Factory setting	–

Start verification	🔒

Navigation	🎛️🖵 Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Start verificat. (12127)
Description	Start the verification. To carry out a complete verification, select the selection parameters individually. Once the external measured values have been recorded, verification is started using the **Start** option.
Selection	• Cancel • Start • Start with testkit * • Output 1 low value * • Output 1 high value * • Frequency output 1 * • Pulse output 1 * • Frequency output 2 * • Pulse output 2 *
Factory setting	Cancel

Progress	

Navigation	🎛️🖵 Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Progress (2808)
Description	The progress of the process is indicated.
User interface	0 to 100 %

---

* Visibility depends on order options or device settings

Measured values	🔒

Navigation	🖩🔲 Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Measured val. (12102)

Prerequisite

One of the following options is selected in the **Start verification** parameter (→ 🖺 185):
• Output 1 low value
• Output 1 high value
• Output 2 low value
• Output 2 high value
• Frequency output 1
• Pulse output 1
• Frequency output 2
• Pulse output 2

Description

Use this function to enter the measured values (actual values) for the external measured variables:.

• Current output: Output current in [mA]
• Pulse/frequency output: Output frequency in [Hz]

User entry

Signed floating-point number

Factory setting

0

Output values

Navigation	🖩🔲 Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Output values (12103)

Description

Displays the simulated output values (target values) for the external measured variables:.

Pulse/frequency output: Output frequency in [Hz].

User interface

Signed floating-point number

Factory setting

0

Status

Navigation	🖩🔲 Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Status (12153)

Description

Displays the current status of the verification.

User interface

• Done
• Busy
• Failed
• Not done

Factory setting

Done

Verification result

Navigation	🔲🖥 Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Verific. result (12149)
Description	Displays the overall result of the verification.
	ℹ Detailed description of the classification of the results:
User interface	• Not supported • Passed • Not done • Failed
Factory setting	Not done

"Verification results" submenu

Navigation   🔲🖥 Expert → Diagnostics → Heartbeat Techn. → Verific. results

▸ Verification results	
Date/time (manually entered) (12142)	→ 🔖 187
Verification ID (12141)	→ 🔖 188
Operating time (12126)	→ 🔖 188
Verification result (12149)	→ 🔖 188
Sensor (12152)	→ 🔖 189
Sensor electronic module (ISEM) (12151)	→ 🔖 189
I/O module (12145)	→ 🔖 189
System status (12109)	→ 🔖 190

Date/time (manually entered)

Navigation	🔲🖥 Expert → Diagnostics → Heartbeat Techn. → Verific. results → Date/time (12142)
Prerequisite	The verification has been performed.

Description	Date and time.
User interface	dd.mmmm.yyyy; hh:mm
Factory setting	1 January 2010; 12:00

Verification ID

Navigation	🗄️🖳 Expert → Diagnostics → Heartbeat Techn. → Verific. results → Verification ID (12141)
Prerequisite	The verification has been performed.
Description	Displays consecutive numbering of the verification results in the measuring device.
User interface	0 to 65 535
Factory setting	0

Operating time

Navigation	🗄️🖳 Expert → Diagnostics → Heartbeat Techn. → Verific. results → Operating time (12126)
Prerequisite	The verification has been performed.
Description	Indicates how long the device has been in operation up to the verification.
User interface	Days (d), hours (h), minutes (m), seconds (s)
Factory setting	–

Verification result

Navigation	🗄️🖳 Expert → Diagnostics → Heartbeat Techn. → Verific. results → Verific. result (12149)
Description	Displays the overall result of the verification.
	ℹ️ Detailed description of the classification of the results:
User interface	• Not supported • Passed • Not done • Failed
Factory setting	Not done

Sensor	
Navigation	🔘🔲 Expert → Diagnostics → Heartbeat Techn. → Verific. results → Sensor (12152)
Prerequisite	The **Failed** option was shown in the **Overall result** parameter (→ 📖 187).
Description	Displays the result for the sensor.
	ℹ️ Detailed description of the classification of the results:
User interface	• Not supported • Passed • Not done • Failed
Factory setting	Not done

Sensor electronic module (ISEM)	
Navigation	🔘🔲 Expert → Diagnostics → Heartbeat Techn. → Verific. results → Sens. electronic (12151)
Prerequisite	In the **Overall result** parameter (→ 📖 187), the **Failed** option was displayed.
Description	Shows the overall result for the "sensor electronic module" test group.
User interface	• Not supported • Passed • Not done • Failed
Factory setting	Not done

I/O module	
Navigation	🔘🔲 Expert → Diagnostics → Heartbeat Techn. → Verific. results → I/O module (12145)
Prerequisite	The **Failed** option was shown in the **Overall result** parameter (→ 📖 187).
Description	Displays the result for I/O module monitoring of the I/O module.
	• For pulse output: Accuracy of pulses (for external verification only) • For frequency output: Accuracy of frequency (for external verification only)
	ℹ️ Detailed description of the classification of the results:

User interface	• Not supported
	• Passed
	• Not done
	• Failed

Factory setting   Not done

System status	

Navigation	🔀🔲 Expert → Diagnostics → Heartbeat Techn. → Verific. results → System status (12109)

Prerequisite   The **Failed** option was shown in the **Overall result** parameter (→ 🖺 187).

Description   Displays the system condition. Tests the measuring device for active errors.

ℹ️ Detailed description of the classification of the results:

User interface	• Not supported
	• Passed
	• Not done
	• Failed

Factory setting   Not done

3.7.8   "Simulation" submenu

Navigation   🔀🔲   Expert → Diagnostics → Simulation

▸ Simulation	
Assign simulation process variable (1810)	→ 🖺 191
Process variable value (1811)	→ 🖺 191
Status input 1 simulation (1355–1)	→ 🖺 192
Input signal level 1 (1356–1)	→ 🖺 192
Current output 1 simulation (0354–1)	→ 🖺 193
Current output value (0355)	→ 🖺 193
Frequency output 1 to n simulation (0472–1 to n)	→ 🖺 194

Frequency output 1 to n value (0473–1 to n)	→ 🗎	194
Pulse output simulation 1 to n (0458–1 to n)	→ 🗎	194
Pulse value 1 to n (0459–1 to n)	→ 🗎	195
Switch output simulation 1 to n (0462–1 to n)	→ 🗎	195
Switch state 1 to n (0463–1 to n)	→ 🗎	196
Device alarm simulation (0654)	→ 🗎	196
Diagnostic event category (0738)	→ 🗎	197
Diagnostic event simulation (0737)	→ 🗎	197

Assign simulation process variable   🔒

Navigation	🗖🗐 Expert → Diagnostics → Simulation → Assign proc.var. (1810)
Description	Use this function to select a process variable for the simulation process that is activated. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.
Selection	• Off • Volume flow • Mass flow • Flow velocity • Sound velocity • Temperature • Density
Factory setting	Off
Additional information	*Description*

The simulation value of the process variable selected is defined in the **Process variable value** parameter (→ 🗎 191).

Process variable value   🔒

Navigation	🗖🗐 Expert → Diagnostics → Simulation → Proc. var. value (1811)
Prerequisite	A process variable is selected in the **Assign simulation process variable** parameter (→ 🗎 191).

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 (→ 🖺 47).

Status input 1 simulation 🔒

Navigation	🔘🖳 Expert → Diagnostics → Simulation → Status inp 1 sim (1355–1)
Prerequisite	For the following order code: "Output; input", option I "4-20mA HART, 2x pul./freq./switch output; status input"
Description	Use this function to switch simulation of the status input on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.
Selection	• Off • On
Factory setting	Off
Additional information	*Description*

The desired simulation value is defined in the **Input signal level** parameter (→ 🖺 192).

Selection

• Off
Simulation for the status input is switched off. The device is in normal measuring mode or another process variable is being simulated.
• On
Simulation for the status input is active.

Input signal level 1 🔒

Navigation	🔘🖳 Expert → Diagnostics → Simulation → Signal level 1 (1356–1)
Prerequisite	In the **Status input simulation** parameter (→ 🖺 192), the **On** option is selected.
Description	Use this function to select the signal level for the simulation of the status input. In this way, users can verify the correct configuration of the status input and the correct function of upstream feed-in units.

Selection	• High
	• Low

Current output 1 simulation   🔒

Navigation	🎛🖥 Expert → Diagnostics → Simulation → Curr.outp 1 sim. (0354–1)
Description	Use this function to switch simulation of the current output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.
Selection	• Off
	• On
Factory setting	Off

Additional information	*Description*
	ℹ️ The desired simulation value is specified in the **Value current output 1** parameter (→ 🔖 193).
	Selection
	• Off Current simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
	• On Current simulation is active.

Value current output 1   🔒

Navigation	🎛🖥 Expert → Diagnostics → Simulation → Curr.outp val. (0355)
	🎛🖥 Expert → Diagnostics → Simulation → Value curr.out 1 (0355–1)
Prerequisite	In the **Current output 1 simulation** parameter, the **On** option is selected.
Description	Use this function to enter a current value for the simulation. In this way, users can verify the correct adjustment of the current output and the correct function of downstream switching units.
User entry	0 to 22.5 mA

Additional information	*User entry*
	ℹ️ The value must be entered with a period (.) as the separator.

Frequency output 1 to n simulation

Navigation	🖩🖳 Expert → Diagnostics → Simulation → Freq.outp 1 to n sim. (0472–1 to n)
Prerequisite	In the **Operating mode** parameter (→ 🗎 96), 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* ℹ The desired simulation value is defined in the **Frequency value 1 to n** parameter. *Selection* • Off Frequency simulation is switched off. The device is in normal measuring mode or another process variable is being simulated. • On Frequency simulation is active.

Frequency output 1 to n value

Navigation	🖩🖳 Expert → Diagnostics → Simulation → Freq.outp 1 to n val. (0473–1 to n)
Prerequisite	In the **Frequency simulation 1 to n** parameter, the **On** option is selected.
Description	Use this function to enter a frequency value for the simulation. In this way, users can verify the correct adjustment of the frequency output and the correct function of downstream switching units.
User entry	0.0 to 12 500.0 Hz

Pulse output simulation 1 to n

Navigation	🖩🖳 Expert → Diagnostics → Simulation → Puls.outp.sim. 1 to n (0458–1 to n)
Prerequisite	In the **Operating mode** parameter (→ 🗎 96), the **Pulse** option is selected.
Description	Use this function to switch simulation of the pulse output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

Selection	• Off
	• Fixed value
	• Down-counting value

Factory setting	Off

Additional information	*Description*

The desired simulation value is defined in the **Pulse value 1 to n** parameter.

Selection

• Off
Pulse simulation is switched off. The device is in normal measuring mode or another
process variable is being simulated.
• Fixed value
Pulses are continuously output with the pulse width specified in the **Pulse width**
parameter (→ 🖺 99).
• Down-counting value
The pulses specified in the **Pulse value** parameter (→ 🖺 195) are output.

Pulse value 1 to n   🔒

Navigation	🔘🖳 Expert → Diagnostics → Simulation → Pulse value 1 to n (0459–1 to n)

Prerequisite	In the **Pulse output simulation 1 to n** parameter, the **Down-counting value** option is selected.

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

User entry	0 to 65 535

Switch output simulation 1 to n   🔒

Navigation	🔘🖳 Expert → Diagnostics → Simulation → Switch sim. 1 to n (0462–1 to n)

Prerequisite	In the **Operating mode** parameter (→ 🖺 96), the **Switch** option is selected.

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

Selection	• Off
	• On

Factory setting	Off

Additional information   *Description*

                          The desired simulation value is defined in the **Switch state 1 to n** parameter.

                          Selection

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

Switch state 1 to n

Navigation   Expert → Diagnostics → Simulation → Switch state 1 to n (0463–1 to n)

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

Selection   • Open
                         • Closed

Additional information   *Selection*

                          • Open
                            Switch simulation is switched off. The device is in normal measuring mode or another
                            process variable is being simulated.
                          • Closed
                            Switch simulation is active.

Device alarm simulation

Navigation   Expert → Diagnostics → Simulation → Dev. alarm sim. (0654)

Description   Use this function to switch the device alarm on and off.

Selection   • Off
                         • On

Factory setting   Off

Additional information   *Description*

                          The display alternates between the measured value and a diagnostic message of the
                          "Function check" category (C) while simulation is in progress.

Diagnostic event category	🔒

Navigation	⚙️ Expert → Diagnostics → Simulation → Event category (0738)
Description	Use this function to select the category of the diagnostic events that are displayed for the simulation in the **Diagnostic event simulation** parameter (→ 🖺 197).
Selection	• Sensor • Electronics • Configuration • Process
Factory setting	Process

Diagnostic event simulation	🔒

Navigation	⚙️🖳 Expert → Diagnostics → Simulation → Diagnostic event (0737)
Description	Use this function to select a diagnostic event for the simulation process that is activated.
Selection	• Off • Diagnostic event picklist (depends on the category selected)
Factory setting	Off
Additional information	*Description*
	For the simulation, you can choose from the diagnostic events of the category selected in the **Diagnostic event category** parameter (→ 🖺 197).

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	°C

4.1.2   Output current span

Output	Current range
Current output 1	4 to 20 mA NAMUR

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	°F

4.2.2   Output current span

Output	Current range
Current output 1	4 to 20 mA US

5 Explanation of abbreviated units

5.1 SI units

Process variable	Units	Explanation
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
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
Density	kg/l	Kilogram/liter
Velocity	m/s	Meter/time unit
Kinematic viscosity	m2/s	Square meter/second
Temperature	℃ , K	Celsius, Kelvin
Length	mm	Millimeters
Time	m, h, d, y	Minute, hour, day, year

5.2 US units

Process variable	Units	Explanation
Volume	ft³	Cubic foot
Volume flow	ft³/s, ft³/min, ft³/h, ft³/d	Cubic 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
Density	lb/ft³	Pound/cubic foot
Velocity	ft/s	Foot/time unit
Kinematic viscosity	cSt	Centistokes
Temperature	℉, ℛ	Fahrenheit, Rankine
Length	in	Inch
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)

Index

71645363

www.addresses.endress.com

Endress+Hauser

People for Process Automation