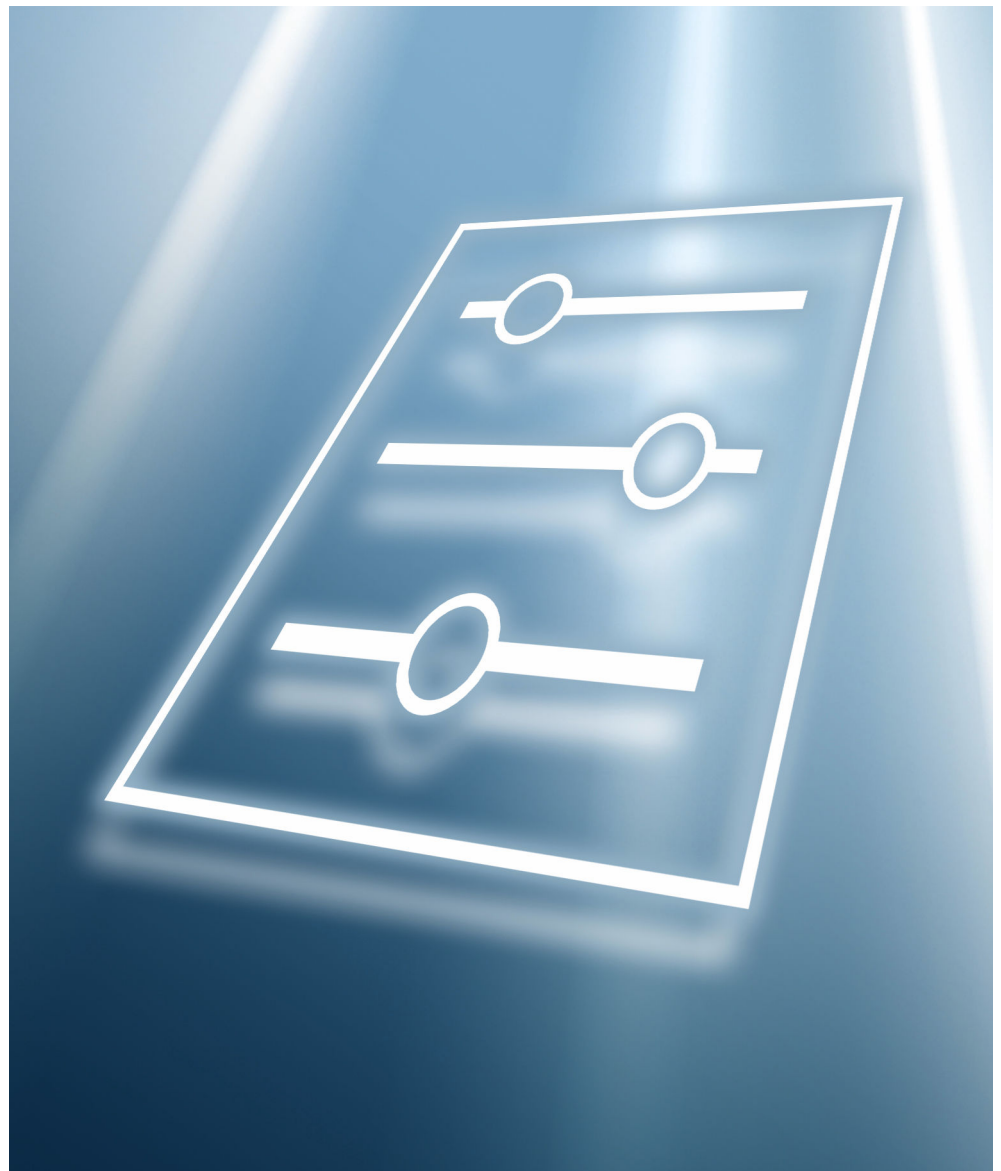# Description of Device Parameters
Proline Teqwave M 300

Total solids measurement via microwave transmission
HART

HART
COMMUNICATION PROTOCOL

Endress+Hauser

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 operating menu.

1.2   Target group

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

1.3   Using this document

1.3.1   Information on the document structure

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

Operatation → Language

Parameter 1

Parameter n

Submenu 1

Submenu n

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

Operating menu for experts

Expert → Access status display

Parameter n

System

Sensor

Input

Output

Communication

Application

Diagnostics

Operator

Maintenance

Expert

Task-oriented

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 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
Options		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):
		• On individual options
		• On display values/data
		• On the input range
		• On the factory setting
		• On the parameter function

1.4 Symbols used

1.4.1 Symbols for certain types of information

Symbol	Meaning
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

Technical information

Device	Documentation code
Proline Teqwave MW 300	TI01763D

Operating instructions

Device	Documentation code
Proline Teqwave MW 300 HART	BA02320D

1.5.2   Supplementary device-dependent documentation

Special documentation

Contents	Documentation code
Heartbeat Verification application package (HART)	SD03168D

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.

▶ Main electronic module + I/O module 1	→ 🕮	161
▶ Sensor electronic module (ISEM)	→ 🕮	162
▶ I/O module 2	→ 🕮	163
▶ I/O module 3	→ 🕮	164
▶ Display module	→ 🕮	165
▶ Data logging	→ 🕮	166
▶ Min/max values	→ 🕮	174
▶ Heartbeat Technology	→ 🕮	178
▶ Simulation	→ 🕮	179

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.

Navigation   ⊞⊟   Expert

⌐⊩ **Expert**	
Locking status	→ 🖺 11
User role	→ 🖺 12
Enter access code	→ 🖺 13
▸ System	→ 🖺 13
▸ Sensor	→ 🖺 45
▸ I/O configuration	→ 🖺 66
▸ Input	→ 🖺 68
▸ Output	→ 🖺 73
▸ Communication	→ 🖺 109
▸ Application	→ 🖺 146
▸ Diagnostics	→ 🖺 150

Locking status

Navigation   ⊞⊟   Expert → Locking status

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** parameter (→ 📄 12) applies . Only appears on local display.
Hardware locked (priority 1)	The DIP switch for hardware locking is activated on the PCB board. This locks write access to the parameters (e.g. via local display or operating tool) .
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

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

User interface   ▪ Maintenance
                          ▪ Service

Factory setting   Maintenance

Additional information   *Description*

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

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

---

Enter access code

Navigation ⌨▣ Expert → Ent. access code

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                              → 🗎 13

          ▸ Configuration backup                 → 🗎 32

          ▸ Diagnostic handling                  → 🗎 35

          ▸ Administration                        → 🗎 41
```

3.1.1 "Display" submenu

Navigation ⌨▣ Expert → System → Display

```
▸ Display

          Format display                         → 🗎 14

          Value 1 display                        → 🗎 17

          0% bargraph value 1                    → 🗎 17

          100% bargraph value 1                  → 🗎 18

          Decimal places 1                       → 🗎 18

          Value 2 display                        → 🗎 19

          Decimal places 2                       → 🗎 19

          Value 3 display                        → 🗎 20
```

0% bargraph value 3	→ 🖹 20	
100% bargraph value 3	→ 🖹 21	
Decimal places 3	→ 🖹 21	
Value 4 display	→ 🖹 22	
Decimal places 4	→ 🖹 22	
Display language	→ 🖹 23	
Display interval	→ 🖹 29	
Display damping	→ 🖹 29	
Header	→ 🖹 30	
Header text	→ 🖹 30	
Separator	→ 🖹 31	
Backlight	→ 🖹 32	

Format display

Navigation   🖳🖳   Expert → System → Display → Format display

Prerequisite   A local display is provided.

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

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

Factory setting   1 value, max. size

Additional information   *Description*

The display format (size, bar graph) and number of simultaneously displayed measured values (1 to 8) can be configured. This setting only applies to normal operation.

- The **Value 1 display** parameter (→ 🗏 17)...**Value 8 display** parameter (→ 🗏 28) 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 (→ 🗏 29).

Possible measured values shown on the local display:

"1 value, max. size" option

A0054319
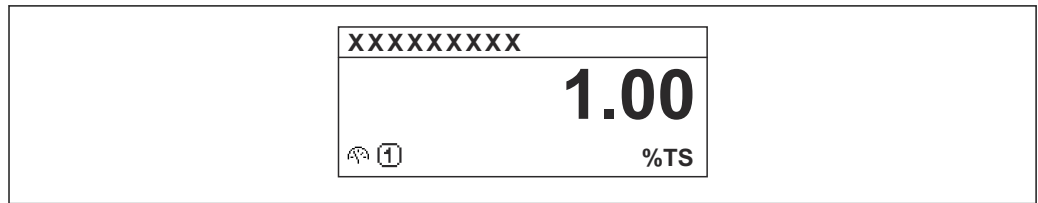
"1 bargraph + 1 value" option

A0054322

"2 values" option

A0054323
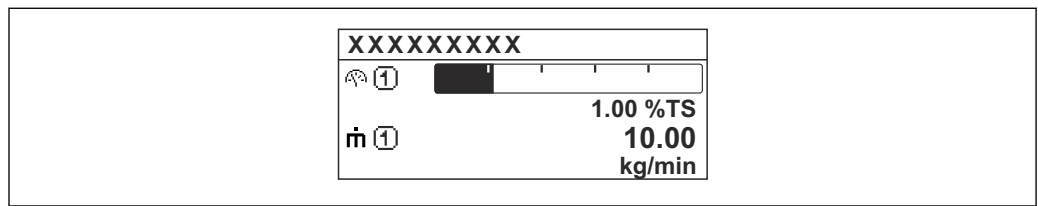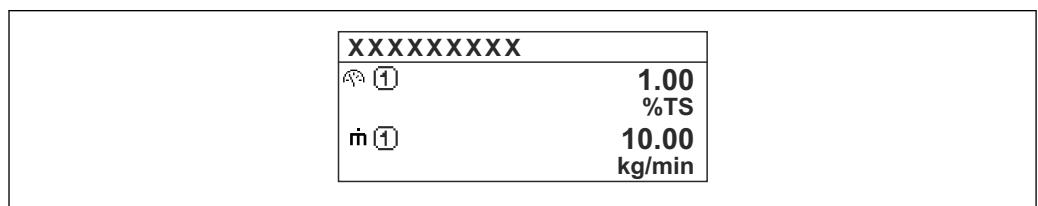
"1 value large + 2 values" option

A0054324

"4 values" option

A0054328
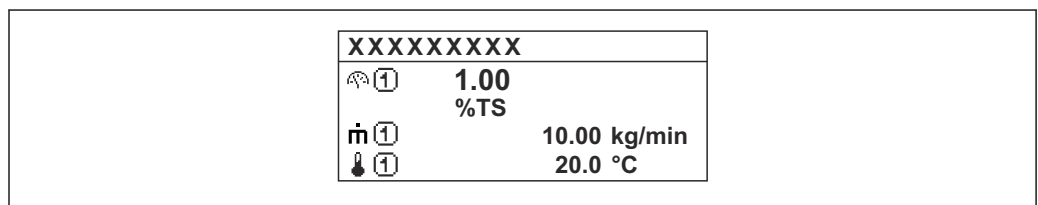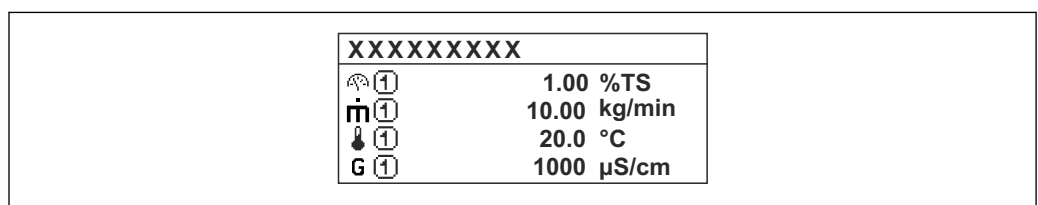
Value 1 display	🔒

Navigation	🔘🔲 Expert → System → Display → Value 1 display
Prerequisite	• A local display is provided. • The **Load rate** option is only available if the volume flow of the medium is read in via the Current input 1 to n (→ 🔖 49) or the fieldbus.
Description	Use this function to select a measured value that is shown on the local display.
Selection	• Total solids • Temperature • Electronics temperature • Conductivity • Corrected conductivity • Load rate [*] • Totalizer 1 [*] • Current output 1 [*] • Current output 2 [*] • Current output 3 [*] • Current output 4 [*]
Factory setting	Total solids
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 (→ 🔖 14) 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 (→ 🔖 54).

0% bargraph value 1	🔒

Navigation	🔘🔲 Expert → System → Display → 0% bargraph 1
Prerequisite	A local display is provided.
Description	Use this function to enter the 0% bar graph value to be shown on the display for the measured value 1.
User entry	Signed floating-point number
Factory setting	0 %TS

---

[*]   Visibility depends on order options or device settings

Additional information   *Description*

    The **Format display** parameter (→ 🖺 14) is used to specify that the measured value is to be displayed as a bar graph.

User entry

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

100% bargraph value 1   🔒

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

    The **Format display** parameter (→ 🖺 14) is used to specify that the measured value is to be displayed as a bar graph.

User entry

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

Decimal places 1   🔒

Navigation	🔘🖥 Expert → System → Display → Decimal places 1
Prerequisite	A measured value is specified in the **Value 1 display** parameter (→ 🖺 17).
Description	Use this function to select the number of decimal places for measured value 1.
Selection	▪ x ▪ x.x ▪ x.xx ▪ x.xxx ▪ x.xxxx
Factory setting	x.xx

Additional information   *Description*

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

Value 2 display	🔒

Navigation	🖩🖵 Expert → System → Display → Value 2 display

Prerequisite	• A local display is provided. • The **Load rate** option is only available if the volume flow of the medium is read in via the Current input 1 to n (→ 🕮 49) or the fieldbus.

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

Selection	• None • Total solids • Temperature • Electronics temperature • Conductivity • Corrected conductivity • Load rate * • Totalizer 1 * • Current output 1 * • Current output 2 * • Current output 3 * • Current output 4 *

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.

ℹ️ The **Format display** parameter (→ 🕮 14) 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 (→ 🕮 54).

Decimal places 2	🔒

Navigation	🖩🖵 Expert → System → Display → Decimal places 2

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

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

Selection	• x • x.x • x.xx • x.xxx • x.xxxx

---

* Visibility depends on order options or device settings

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	⓸⓵ Expert → System → Display → Value 3 display
Prerequisite	• A local display is provided. • The **Load rate** option is only available if the volume flow of the medium is read in via the Current input 1 to n (→ 🗎 49) or the fieldbus.
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 (→ 🗎 17)
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.
	The **Format display** parameter (→ 🗎 14) 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 (→ 🗎 54).

0% bargraph value 3

Navigation	⓸⓵ Expert → System → Display → 0% bargraph 3
Prerequisite	A selection was made in the **Value 3 display** parameter (→ 🗎 20).
Description	Use this function to enter the 0% bar graph value to be shown on the display for the measured value 3.
User entry	Signed floating-point number
Factory setting	0

Additional information	*Description*

ℹ The **Format display** parameter (→ 🗎 14) 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 (→ 🗎 54).

## 100% bargraph value 3																	🔒

Navigation	◉◉ Expert → System → Display → 100% bargraph 3

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

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

User entry	Signed floating-point number

Factory setting	0

Additional information	*Description*

ℹ The **Format display** parameter (→ 🗎 14) 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 (→ 🗎 54).

## Decimal places 3																	🔒

Navigation	◉◉ Expert → System → Display → Decimal places 3

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

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

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

Factory setting	x.xx

Additional information	*Description*

ℹ 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
Prerequisite	• A local display is provided. • The **Load rate** option is only available if the volume flow of the medium is read in via the Current input 1 to n (→ 🖺 49) or the fieldbus.
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 (→ 🖺 17)
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.

ℹ️ The **Format display** parameter (→ 🖺 14) is used to specify how many measured values are displayed simultaneously and how.

Options

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

Decimal places 4	🔒

Navigation	🖩🖵 Expert → System → Display → Decimal places 4
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*

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

Display language	

Navigation	⊞⊟ Expert → System → Display → Display language

Prerequisite	A local display is provided.

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

Selection	• English
	• Deutsch
	• Français
	• Español
	• Italiano
	• Nederlands
	• Portuguesa
	• Polski
	• русский язык (Russian)
	• Svenska
	• Türkçe
	• 中文 (Chinese)
	• 日本語 (Japanese)
	• 한국어 (Korean)
	• čeština (Czech)

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

Value 5 display	🔒

Navigation	⊞⊟ Expert → System → Display → Value 5 display

Prerequisite	• A local display is provided.
	• The **Load rate** option is only available if the volume flow of the medium is read in via the Current input 1 to n (→ 🖹 49) or the fieldbus.

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 (→ 🖹 17)

Factory setting	None

Additional information	*Description*
	If several measured values are displayed one below the other, the measured value selected here will be the fifth value to be displayed. The value is only displayed during normal operation.
	ℹ The **Format display** parameter (→ 🖹 14) 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 (→ 🖹 54).

0% bargraph value 5

Navigation	ⓘⓘ Expert → System → Display → 0% bargraph 5
Prerequisite	An option was selected in the **Value 5 display** parameter (→ 🕮 23).
Description	Use this function to enter the 0% bar graph value to be shown on the display for the measured value 5.
User entry	Signed floating-point number
Factory setting	0
Additional information	*Description*

    ℹ️ The **Format display** parameter (→ 🕮 14) 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 (→ 🕮 54).

100% bargraph value 5

Navigation	ⓘⓘ Expert → System → Display → 100% bargraph 5
Prerequisite	An option was selected in the **Value 5 display** parameter (→ 🕮 23).
Description	Use this function to enter the 100% bar graph value to be shown on the display for the measured value 5.
User entry	Signed floating-point number
Factory setting	0
Additional information	*Description*

    ℹ️ The **Format display** parameter (→ 🕮 14) 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 (→ 🕮 54).

Decimal places 5

Navigation	ⓘⓘ Expert → System → Display → Decimal places 5
Prerequisite	A measured value is specified in the **Value 5 display** parameter (→ 🕮 23).

| Description | Use this function to select the number of decimal places for measured value 5. |

| Selection | ▪ x
▪ x.x
▪ x.xx
▪ x.xxx
▪ x.xxxx
▪ x.xxxxx
▪ x.xxxxxx |

| Factory setting | x.xx |

| Additional information | *Description* |

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

Value 6 display   🔒

| Navigation | 🖩🖵 Expert → System → Display → Value 6 display |

| Prerequisite | ▪ A local display is provided.
▪ The **Load rate** option is only available if the volume flow of the medium is read in via the Current input 1 to n (→ 🖺 49) or the fieldbus. |

| 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 (→ 🖺 17) |

| Factory setting | None |

| Additional information | *Description* |

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

The **Format display** parameter (→ 🖺 14) 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 (→ 🖺 54).

Decimal places 6   🔒

| Navigation | 🖩🖵 Expert → System → Display → Decimal places 6 |

| Prerequisite | A measured value is specified in the **Value 6 display** parameter (→ 🖺 25). |

| Description | Use this function to select the number of decimal places for measured value 6. |

Selection	• x
	• x.x
	• x.xx
	• x.xxx
	• x.xxxx
	• x.xxxxx
	• x.xxxxxx

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 7 display   🔒

Navigation	🔧🖥️ Expert → System → Display → Value 7 display

Prerequisite	• A local display is provided.
	• The **Load rate** option is only available if the volume flow of the medium is read in via the Current input 1 to n (→ 🖪 49) or the fieldbus.

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 (→ 🖪 17)

Factory setting	None

Additional information   *Description*

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

ℹ️ The **Format display** parameter (→ 🖪 14) is used to specify how many measured values are displayed simultaneously and how.

Options

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

0% bargraph value 7   🔒

Navigation	🔧🖥️ Expert → System → Display → 0% bargraph 7

Prerequisite	An option was selected in the **Value 7 display** parameter (→ 🖪 26).

Description	Use this function to enter the 0% bar graph value to be shown on the display for the measured value 7.

User entry	Signed floating-point number

| Factory setting | 0 |

Additional information   *Description*

The **Format display** parameter (→ 🔲 14) is used to specify that the measured value is to be displayed as a bar graph.

User entry

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

100% bargraph value 7   🔒

| Navigation | 🔘🖳 Expert → System → Display → 100% bargraph 7 |

| Prerequisite | An option was selected in the **Value 7 display** parameter (→ 🔲 26). |

| Description | Use this function to enter the 100% bar graph value to be shown on the display for the measured value 7. |

| User entry | Signed floating-point number |

| Factory setting | 0 |

Additional information   *Description*

The **Format display** parameter (→ 🔲 14) is used to specify that the measured value is to be displayed as a bar graph.

User entry

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

Decimal places 7   🔒

| Navigation | 🔘🖳 Expert → System → Display → Decimal places 7 |

| Prerequisite | A measured value is specified in the **Value 7 display** parameter (→ 🔲 26). |

| Description | Use this function to select the number of decimal places for measured value 7. |

Selection
- x
- x.x
- x.xx
- x.xxx
- x.xxxx
- x.xxxxx
- x.xxxxxx

| Factory setting | x.xx |

Additional information   *Description*

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

Value 8 display

Navigation   ⊞⊟   Expert → System → Display → Value 8 display

Prerequisite   ▪ A local display is provided.
▪ The **Load rate** option is only available if the volume flow of the medium is read in via the Current input 1 to n (→ 🖺 49) or the fieldbus.

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 (→ 🖺 17)

Factory setting   None

Additional information   *Description*

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

    The **Format display** parameter (→ 🖺 14) 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 (→ 🖺 54).

Decimal places 8

Navigation   ⊞⊟   Expert → System → Display → Decimal places 8

Prerequisite   A measured value is specified in the **Value 8 display** parameter (→ 🖺 28).

Description   Use this function to select the number of decimal places for measured value 8.

Selection   ▪ x
▪ x.x
▪ x.xx
▪ x.xxx
▪ x.xxxx
▪ x.xxxxx
▪ x.xxxxxx

Factory setting   x.xx

Additional information   *Description*

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

Display interval

Navigation   ◰◱ Expert → System → Display → Display interval

Prerequisite   A local display is provided.

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

User entry   1 to 10 s

Factory setting   5 s

Additional information *Description*

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

ℹ • The **Value 1 display** parameter (→ 🖩 17)...**Value 8 display** parameter (→ 🖩 28) 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 (→ 🖩 14).

Display damping   🔒

Navigation   ◰◱ Expert → System → Display → Display damping

Prerequisite   A local display is provided.

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

User entry   0.0 to 999.9 s

Factory setting   0.0 s

Additional information *User entry*

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

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

---

[1]   proportional transmission behavior with first order delay

Header	🔒

Navigation	🖩🖥 Expert → System → Display → Header
Prerequisite	A local display is provided.
Description	Use this function to select the contents of the header of the local display.
Selection	• Device tag • Free text
Factory setting	Device tag
Additional information	*Description* The header text only appears during normal operation.
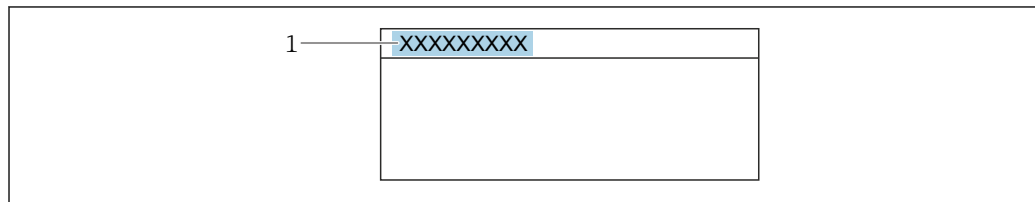
1   Position of the header text on the display

Selection

• Device tag
  Is defined in the **Device tag** parameter (→ 🖺 158).
• Free text
  Is defined in the **Header text** parameter (→ 🖺 30).

Header text	🔒

Navigation	🖩🖥 Expert → System → Display → Header text
Prerequisite	The **Free text** option is selected in the **Header** parameter (→ 🖺 30).
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.
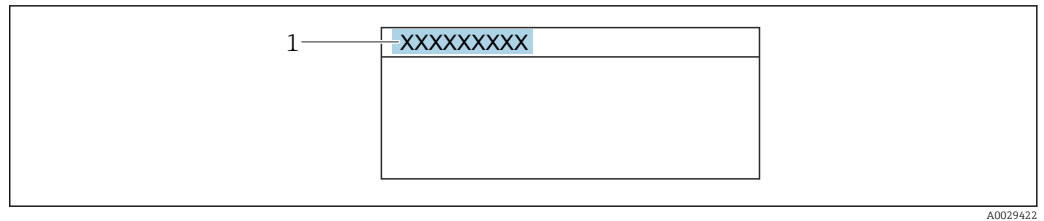
1   Position of the header text on the display

User entry

The number of characters displayed depends on the characters used.

Separator

Navigation	Expert → System → Display → Separator
Prerequisite	A local display is provided.
Description	Use this function to select the decimal separator.
Selection	• . (point) • , (comma)
Factory setting	. (point)

Contrast display

Navigation	Expert → System → Display → Contrast display
Prerequisite	A local display is provided.
Description	Use this function to enter a value to adapt the display contrast to the ambient conditions (e.g. the lighting or viewing angle).
User entry	20 to 80 %
Factory setting	Depends on the display

Backlight

Navigation   ⓘⓔ Expert → System → Display → Backlight

Prerequisite   One of the following conditions is met:
- Order code for "Display; operation", option **F** "4-line, illum.; touch control"
- Order code for "Display; operation", option **G** "4-line, illum.; touch control +WLAN"
- Order code for "Display; operation", option **O** "Remote display 4-line illuminated; 10m/ 30ft cable; touch control"

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

Selection   • Disable
                              • Enable

Factory setting   Enable

3.1.2   "Configuration backup" submenu

Navigation   ⓘⓔ Expert → System → Config. backup

► Configuration backup	
Operating time	→ 🖹 32
Last backup	→ 🖹 33
Configuration management	→ 🖹 33
Backup state	→ 🖹 34
Comparison result	→ 🖹 34

Operating time

Navigation   ⓘⓔ Expert → System → Config. backup → Operating time

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)

Last backup

Navigation   ⓘ�   Expert → System → Config. backup → Last backup

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

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

Configuration management   ⓐ

Navigation   ⓘⓂ   Expert → System → Config. backup → Config. managem.

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

Selection   • Cancel
                            • Execute backup
                            • Restore *
                            • Compare *
                            • Clear backup data

Factory setting   Cancel

Additional information   *Selection*

Options	Description
Cancel	No action is executed and the user exits the parameter.
Execute backup	A backup copy of the current device configuration is saved from the HistoROM backup to the memory of the device. The backup copy includes the transmitter data of the device. The following message appears on local display: Backup active, please wait!
Restore	The last backup copy of the device configuration is restored from the device memory to the device's HistoROM backup. The backup copy includes the transmitter data of the device. The following message appears on local display: Restore active! Do not interrupt power supply!
Compare	The device configuration saved in the device memory is compared with the current device configuration of the HistoROM backup. The following message appears on local display: Comparing files The result can be viewed in **Comparison result** parameter.
Clear backup data	The backup copy of the device configuration is deleted from the memory of the device. The following message appears on local display: Deleting file

HistoROM

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

---

*   Visibility depends on order options or device settings

Backup state

Navigation	Expert → System → Config. backup → Backup state
Description	Displays the status of the data backup process.
User interface	• None • Backup in progress • Restoring in progress • Delete in progress • Compare in progress • Restoring failed • Backup failed
Factory setting	None

Comparison result

Navigation	Expert → System → Config. backup → Compar. result
Description	Displays the last result of the comparison of the data records in the device memory and in the HistoROM.
User interface	• Settings identical • Settings not identical • No backup available • Backup settings corrupt • Check not done • Dataset incompatible
Factory setting	Check not done
Additional information	*Description*

The comparison is started via the **Compare** option in the **Configuration management** parameter (→ 🖺 33).

Options

Options	Description
Settings identical	The current device configuration of the HistoROM is not identical to the backup copy in the device memory. If the transformer configuration of another device has been transmitted to the device via HistoROM in **Configuration management** parameter, the current device configuration of the HistoROM is only partially identical to the backup copy in the device memory: The settings for the transmitter are not identical.
Settings not identical	The current device configuration of the HistoROM is not identical to the backup copy in the device memory.
No backup available	There is no backup copy of the device configuration of the HistoROM in the device memory.
Backup settings corrupt	The current device configuration of the HistoROM is corrupt or not compatible with the backup copy in the device memory.

Options	Description
Check not done	The device configuration of the HistoROM has not yet been compared to the backup copy in the device memory.
Dataset incompatible	The backup copy in the device memory is not compatible with the device.

HistoROM

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

3.1.3 "Diagnostic handling" submenu

Navigation   Expert → System → Diagn. handling

▸ Diagnostic handling	
Alarm delay	→ 🖹 35
▸ Diagnostic behavior	→ 🖹 36
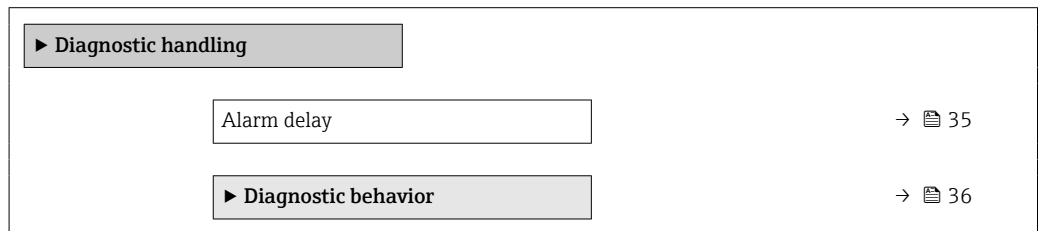
Alarm delay   🔒

Navigation   Expert → System → Diagn. handling → Alarm delay

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

🛈 The diagnostic message is reset without a time delay.

User entry   0 to 60 s

Factory setting   0 s

Additional information *Effect*

This setting affects the following diagnostic messages:
- 832 Electronics temperature too high
- 833 Electronics temperature too low
- 834 Process temperature too high
- 835 Process temperature too low
- 881 Signal to noise ratio too low
- 907 Permittivity out of specification
- 908 Volume fraction out of specification
- 909 Conductivity out of specification

"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 (→ 🖺 36).

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 (→ 🖺 155) (**Event list** submenu (→ 🖺 156)) 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

Navigation   🔄🖥   Expert → System → Diagn. handling → Diagn. behavior

▸ Diagnostic behavior	
Assign behavior of diagnostic no. 441	→ 🖺 37
Assign behavior of diagnostic no. 442	→ 🖺 37
Assign behavior of diagnostic no. 443	→ 🖺 37
Assign behavior of diagnostic no. 444	→ 🖺 38
Assign behavior of diagnostic no. 302	→ 🖺 38
Assign behavior of diagnostic no. 832	→ 🖺 38
Assign behavior of diagnostic no. 833	→ 🖺 39
Assign behavior of diagnostic no. 834	→ 🖺 39
Assign behavior of diagnostic no. 835	→ 🖺 40

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

Navigation	🖥🖳 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no.441
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	ℹ For a detailed description of the options available: → 🖺 36

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

Navigation	🖥🖳 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no.442
Prerequisite	The measuring device has a pulse/frequency/switch output.
Description	Use this function to change the diagnostic behavior of the **442 Frequency output 1 to n** diagnostic message.
Selection	• Off • Alarm • Warning • Logbook entry only
Factory setting	Warning
Additional information	ℹ For a detailed description of the options available: → 🖺 36

Assign behavior of diagnostic no. 443 (Pulse output 1 to n)   🔒

Navigation	🖥🖳 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no.443
Prerequisite	The measuring device has a pulse/frequency/switch output.
Description	Use this function to change the diagnostic behavior of the **443 Pulse 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: → 🖺 36

Assign behavior of diagnostic no. 444 (Current input 1 to n)

Navigation	🖩🖳 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no.444

Prerequisite	The device has one current input.

Description	Use this function to change the diagnostic behavior of the **444 Current input 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: → 🖺 36

Assign behavior of diagnostic no. 302

Navigation	🖩🖳 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no.302

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: → 🖺 36

Assign behavior of diagnostic no. 832

Navigation	🖩🖳 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no.832

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	ℹ️ For a detailed description of the options available: → 🖺 36

Assign behavior of diagnostic no. 833 🔒

Navigation	🎛️🖥️ Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no.833

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	ℹ️ For a detailed description of the options available: → 🖺 36

Assign behavior of diagnostic no. 834 🔒

Navigation	🎛️🖥️ Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no.834

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

Selection	• Off
	• Alarm
	• Warning
	• Logbook entry only

Factory setting	Warning

Additional information	ℹ️ For a detailed description of the options available: → 🖺 36

Assign behavior of diagnostic no. 835   🔒

| Navigation	🔲🖳 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no.835
Description	Use this function to change the diagnostic behavior of the **835 Process temperature too low** diagnostic message.
Selection	• Off • Alarm • Warning • Logbook entry only
Factory setting	Warning
Additional information	🛈 For a detailed description of the options available: → 🕮 36

Assign behavior of diagnostic no. 907   🔒

Navigation	🔲🖳 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no.907
Description	Use this function to change the diagnostic behavior of the **907 Permittivity out of specification** diagnostic message.
Selection	• Off • Alarm • Warning • Logbook entry only
Factory setting	Warning
Additional information	🛈 For a detailed description of the options available: → 🕮 36

Assign behavior of diagnostic no. 908   🔒

Navigation	🔲🖳 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no.908
Description	Use this function to change the diagnostic behavior of the **908 Volume fraction out of specification** diagnostic message.
Selection	• Off • Alarm • Warning • Logbook entry only
Factory setting	Warning

Additional information

ℹ️ For a detailed description of the options available: → 🖹 36

3.1.4   "Administration" submenu

Navigation   🖩🖵   Expert → System → Administration

‣ Administration	
‣ Define access code	→ 🖹 41
‣ Reset access code	→ 🖹 42
Device reset	→ 🖹 43
Transmitter identifier	→ 🖹 44
Activate SW option	→ 🖹 44
Software option overview	→ 🖹 45

"Define access code" wizard

ℹ️ The **Define access code** wizard (→ 🖹 41) 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	→ 🖹 41
Confirm access code	→ 🖹 42

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 device configuration against any inadvertent modifications via the local display, Web browser, FieldCare or DeviceCare (via CDI-RJ45 service interface).

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

Additional information   *Description*

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

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

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

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

"Reset access code" submenu

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

▶ Reset access code	
Operating time	→ 🗎 42
Reset access code	→ 🗎 43

Operating time

Navigation	🔘🖳 Expert → System → Administration → Reset acc. code → Operating time
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 |

| 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*
	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 |

| 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 |

---

* Visibility depends on order options or device settings

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.
Restore S-DAT backup	Restores the data that is saved on the S-DAT. Additional information: This function can be used to resolve the memory issue "083 Memory content inconsistent" or to restore the S-DAT data when a new S-DAT has been installed.
	This option is displayed only in an alarm condition.

Transmitter identifier

Navigation   Expert → System → Administration → Transm. identif.

Description   Select transmitter identifier.

User interface   • Unknown
                          • 500
                          • 300

Factory setting   300

Activate SW option

Navigation   Expert → System → Administration → Activate SW opt.

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

User entry   Max. 10-digit string of numbers.

Factory setting   Depends on the software option ordered

Additional information   *Description*

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

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.

▸ If the code entered is incorrect or invalid, enter the old activation code .

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

Example for a software option

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

Web browser

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

Software option overview

Navigation	◨▤ Expert → System → Administration → SW option overv.
Description	Displays all the software options that are enabled in the device.
User interface	
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"

3.2   "Sensor" submenu

Navigation   ◨▤   Expert → Sensor

▸ Sensor	
▸ Measured values	→ 🖺 46
▸ System units	→ 🖺 54
▸ Process parameters	→ 🖺 57
▸ External process variables	→ 🖺 61

| ► Sensor adjustment | → 🖺 62 |
| ► Factory adjustment | → 🖺 65 |

3.2.1   "Measured values" submenu

Navigation   🗟🖳   Expert → Sensor → Measured val.

► Measured values	
► Process variables	→ 🖺 46
► Totalizer	→ 🖺 48
► Input values	→ 🖺 49
► Output values	→ 🖺 50

"Process variables" submenu

Navigation   🗟🖳   Expert → Sensor → Measured val. → Process variab.

► Process variables	
Total solids	→ 🖺 46
Temperature	→ 🖺 47
Electronics temperature	→ 🖺 47
Conductivity	→ 🖺 47
Corrected conductivity	→ 🖺 47
Load rate	→ 🖺 47

Total solids

Navigation   🗟🖳   Expert → Sensor → Measured val. → Process variab. → Total solids

Description   Shows total solids (fraction of total weight or concentration per volume unit).

User interface   Signed floating-point number

Temperature

Navigation	🔘🖳 Expert → Sensor → Measured val. → Process variab. → Temperature
Description	Shows the medium temperature currently measured.
User interface	Signed floating-point number

Electronics temperature

Navigation	🔘🖳 Expert → Sensor → Measured val. → Process variab. → Electronics temp
Description	Shows the electronics temperature currently measured.
User interface	Signed floating-point number

Conductivity

Navigation	🔘🖳 Expert → Sensor → Measured val. → Process variab. → Conductivity
Description	Shows the conductivity currently measured.
User interface	Floating-point number

Corrected conductivity

Navigation	🔘🖳 Expert → Sensor → Measured val. → Process variab. → CorrConductivity
Description	Shows the conductivity measured compensated for temperature.
User interface	Floating-point number

Load rate

Navigation	🔘🖳 Expert → Sensor → Measured val. → Process variab. → Load rate
Prerequisite	The volume flow of the medium is read in via the Current input 1 to n (→ 🖺 49) or the fieldbus.
Description	Shows the total solids flow rate.

User interface   Signed floating-point number

"Totalizer" submenu

Navigation   Expert → Sensor → Measured val. → Totalizer

▸ Totalizer		
Totalizer 1 value	→ 🖺 48	
Totalizer 1 overflow	→ 🖺 48	
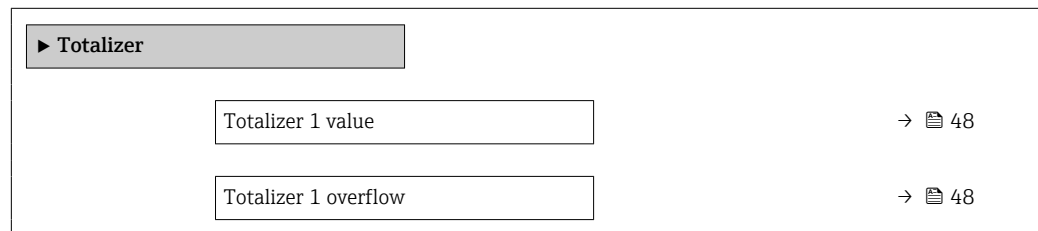
Totalizer 1 value

Navigation   Expert → Sensor → Measured val. → Totalizer → Tot. 1 value

Description   Displays the current totalizer reading.

User interface   Signed floating-point number

Additional information   *Description*

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

ℹ In the event of an error, the totalizer adopts the mode defined in the **Failure mode** parameter (→ 🖺 149).

Display

ℹ The unit of the selected process variable is defined in the **Unit totalizer** parameter (→ 🖺 147) for the totalizer.

Totalizer 1 overflow   🔒

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

Description   Displays the current totalizer overflow.

User interface   Integer with sign

Additional information   *Description*

If the current totalizer reading exceeds 7 digits, which is the maximum value range that can be displayed by the operating tool, the value above this range is output as an overflow.

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

Display

The unit of the selected process variable is defined in the **Unit totalizer** parameter (→ 🗎 147) for the totalizer.

"Input values" submenu

Navigation   🖩🗔   Expert → Sensor → Measured val. → Input values

```
▸ Input values

        ▸ Current input 1 to n                              →  🗎 49

        ▸ Value status input 1 to n                         →  🗎 50
```

"Current input 1 to n" submenu

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

```
▸ Current input 1 to n

            Measured values 1 to n                          →  🗎 49

            Measured current 1 to n                         →  🗎 50
```

Measured values 1 to n

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

Description   Displays the current input value.

User interface   Signed floating-point number

Measured current 1 to n

Navigation   🔘🔲 Expert → Sensor → Measured val. → Input values → Current input 1 to n → Measur.
                            curr. 1 to n

Description   Displays the current value of the current input.

User interface   0 to 22.5 mA

"Value status input 1 to n" submenu

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

► Value status input 1 to n	
Value status input	→ 🖺 50

Value status input

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

Description   Displays the current input signal level.

User interface   • High
                            • Low

"Output values" submenu
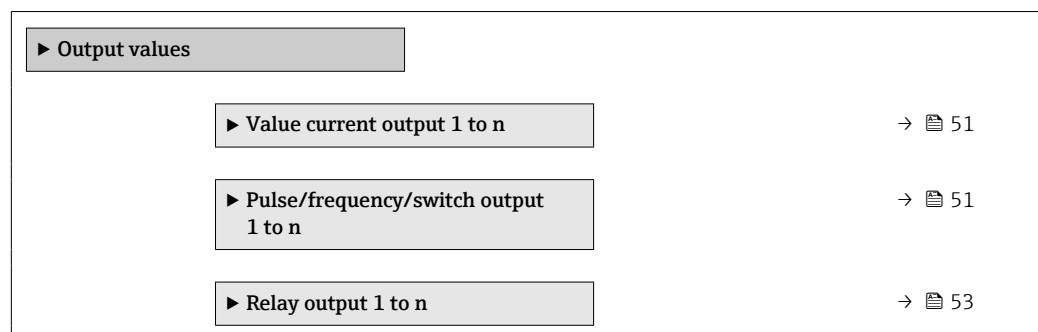
Navigation   🔘🔲 Expert → Sensor → Measured val. → Output values

► Output values	
► Value current output 1 to n	→ 🖺 51
► Pulse/frequency/switch output 1 to n	→ 🖺 51
► Relay output 1 to n	→ 🖺 53

"Value current output 1 to n" submenu

Navigation   ▣▣ Expert → Sensor → Measured val. → Output values → Current
                          output 1 to n

```
▸ Value current output 1 to n
```
Output current	→ 🖹 51
Measured current	→ 🖹 51

Output current

Navigation   ▣▣ Expert → Sensor → Measured val. → Output values → Current output 1 to n
                          → Output curr.

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 → Current output 1 to n
                          → Measur. curr.

Description   Displays the actual measured value of the output current.

User interface   0 to 30 mA

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

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

```
▸ Pulse/frequency/switch output
  1 to n
```
Output frequency	→ 🖹 52
Pulse output	→ 🖹 52
Switch state	→ 🖹 53

Output frequency

Navigation	�🔲 Expert → Sensor → Measured val. → Output values → PFS output 1 to n → Output freq.
Prerequisite	In the **Operating mode** parameter (→ 🔲 87), the **Frequency** option is selected.
Description	Displays the actual value of the output frequency which is currently measured.
User interface	0.0 to 12 500.0 Hz

Pulse output

Navigation	�🔲 Expert → Sensor → Measured val. → Output values → PFS output 1 to n → Pulse output
Prerequisite	The **Pulse** option is selected in the **Operating mode** parameter (→ 🔲 87) 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.

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 (→ 🔲 103) 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 (→ 🔲 91)) can be configured.

Switch state

Navigation	Expert → Sensor → Measured val. → Output values → PFS output 1 to n → Switch state
Prerequisite	The **Switch** option is selected in the **Operating mode** parameter (→ 🖹 87).
Description	Displays the current switch status of the status output.
User interface	• Open • Closed
Additional information	*User interface* • Open The switch output is not conductive. • Closed The switch output is conductive.

"Relay output 1 to n" submenu

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

► Relay output 1 to n	
Switch state	→ 🖹 53
Switch cycles	→ 🖹 54
Max. switch cycles number	→ 🖹 54

Switch state

Navigation	Expert → Sensor → Measured val. → Output values → Relay output 1 to n → Switch state
Description	Displays the current status of the relay output.
User interface	• Open • Closed
Additional information	*User interface* • Open The relay output is not conductive. • Closed The relay output is conductive.

Switch cycles

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

Description   Displays all the switch cycles performed.

User interface   Positive integer

Max. switch cycles number

Navigation   Expert → Sensor → Measured val. → Output values → Relay output 1 to n → Max.
                                cycles no.

Description   Displays the maximum number of guaranteed switch cycles.

User interface   Positive integer

3.2.2   "System units" submenu

Navigation   Expert → Sensor → System units

▶ System units	
Total solids unit	→ 🖪 55
Density unit	→ 🖪 55
Mass flow unit	→ 🖪 55
Mass unit	→ 🖪 56
Volume flow unit	→ 🖪 56
Temperature unit	→ 🖪 56
Conductivity unit	→ 🖪 57
Date/time format	→ 🖪 57

Total solids unit

Navigation	🖴🖵 Expert → Sensor → System units → TotalSolidsUnit
Description	Select total solids unit.

Selection	*SI units*	*US units*
	• %TS	• lb/gal (us)
	• ppm	• lb/ft³
	• g/l	
	• mg/l	
	• kg/m³	
	• mg/cm³	

Factory setting	Depends on country

Density unit

Navigation	🖴🖵 Expert → Sensor → System units → Density unit
Description	Select density unit.

Selection	*SI units*	*US units*
	• g/l	• lb/gal (us)
	• mg/l	• lb/ft³
	• kg/m³	
	• mg/cm³	

Factory setting	Depends on country

Mass flow unit

Navigation	🖴🖵 Expert → Sensor → System units → Mass flow unit
Prerequisite	The volume flow of the medium is read in via the Current input 1 to n (→ 🖹 49).
Description	Select mass flow unit.

Selection	*SI units*	*US units*
	• kg/h	• oz/h
	• kg/d	• oz/d
	• t/h	• lb/h
	• t/d	• lb/d
		• STon/h
		• STon/d

Factory setting	Depends on country

Mass unit	🔒

Navigation	🔘🖵 Expert → Sensor → System units → Mass unit

Prerequisite	The volume flow of the medium is read in via the Current input 1 to n (→ 🕮 49) or the fieldbus.

Description	Select mass unit.

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

Factory setting	Depends on country

Volume flow unit	🔒

Navigation	🔘🖵 Expert → Sensor → System units → Volume flow unit

Prerequisite	The volume flow of the medium is read in via the Current input 1 to n (→ 🕮 49).

Description	Select volume flow unit.

Selection	*SI units* • l/h • l/s • dm³/min • m³/h • m³/s

Factory setting	l/h

Temperature unit	🔒

Navigation	🔘🖵 Expert → Sensor → System units → Temperature unit

Description	Select temperature unit.

Selection	*SI units* • °C • K	*US units* • °F • °R

Factory setting	Depends on country

Conductivity unit	🔒

Navigation   🖩🖳   Expert → Sensor → System units → Conductiv. unit

Description   Select conductivity unit.

Selection   *SI units*
- nS/cm
- µS/cm
- µS/m
- µS/mm
- mS/m
- mS/cm
- S/cm
- S/m

Factory setting   µS/cm

Date/time format	🔒

Navigation   🖩🖳   Expert → Sensor → System units → Date/time format

Description   Select date and time format.

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

3.2.3   "Process parameters" submenu

Navigation   🖩🖳 Expert → Sensor → Process param.

▶ Process parameters	
Temperature damping	→ 🖺 58
Conductivity damping	→ 🖺 58
Total solids override	→ 🖺 58
▶ Total solids monitoring	→ 🖺 58
▶ Partially filled pipe detection	→ 🖺 60

Temperature damping	⌐⌐

Navigation	⌐⌐⌐ Expert → Sensor → Process param. → Temp. damping
Description	Enter a time constant for damping (PT1 element) of the temperature measured value. Damping reduces the effect of measured value fluctuations.
User entry	0 to 999.9 s
Factory setting	0 s

Conductivity damping	⌐⌐

Navigation	⌐⌐⌐ Expert → Sensor → Process param. → Conduct. damping
Description	Enter a time constant for damping (PT1 element) of the conductivity measured value. Damping reduces the effect of measured value fluctuations.
User entry	0 to 999.9 s
Factory setting	0 s

Total solids override	⌐⌐

Navigation	⌐⌐⌐ Expert → Sensor → Process param. → TotalSolOverride
Description	If suppression of the total solids measurement is enabled (**On** option), zero is output for the measured value. This is suitable for the cleaning processes for the pipeline, for example.
Selection	• Off • On
Factory setting	Off

"Total solids monitoring" submenu

Navigation   ⌐⌐⌐ Expert → Sensor → Process param. → TotSolidsMonitor

► Total solids monitoring	
Assign process variable	→ 🖺 59

Lower range limit	→ 🖹 59
Upper range limit	→ 🖹 59
Response time	→ 🖹 60

Assign process variable   🔏

Navigation   🖾🖳 Expert → Sensor → Process param. → TotSolidsMonitor → Assign variable

Description   Select the process variable for total solids monitoring.

Selection   • Off
                              • Total solids

Factory setting   Total solids

Lower range limit   🔏

Navigation   🖾🖳 Expert → Sensor → Process param. → TotSolidsMonitor → LowerRangeLimit

Description   Enter the lower limit value for the measuring range of the total solids.

User entry   Signed floating-point number

Factory setting   −1 %TS

Upper range limit   🔏

Navigation   🖾🖳 Expert → Sensor → Process param. → TotSolidsMonitor → UpperRangeLimit

Description   Enter the upper limit value for the measuring range of the total solids.

User entry   Signed floating-point number

Factory setting   51 %TS

Response time	🔒

Navigation	🎛️🖥️ Expert → Sensor → Process param. → TotSolidsMonitor → Response time

Description   Enter a delay until the diagnostic message is generated in the event the measuring range is exceeded.

User entry   0 to 100 s

Factory setting 60 s

"Partially filled pipe detection" submenu

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

▶ Partially filled pipe detection	
Partially filled pipe detection	→ 🖹 60
Response time	→ 🖹 61

Partially filled pipe detection	

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

Description   If activated, a diagnostic message is generated if the antennas are no longer in full contact with the medium.

Selection   • Off
                     • On

Factory setting Off

Threshold	🔒

Navigation	🎛️🖥️ Expert → Sensor → Process param. → Partial pipe det → Threshold

Description   Enter threshold for partially filled pipe detection. If the measured value drops below the threshold, a diagnostic message is generated.

User entry   Decibel as negative floating point number

Factory setting −6 dB

Response time	
Navigation	🆁🅴 Expert → Sensor → Process param. → Partial pipe det → Response time
Description	Enter a delay until the diagnostic message is generated in the event the pipe is detected as partially filled.
User entry	0 to 20.0 s
Factory setting	3 s

3.2.4   "External compensation" submenu

> *Navigation*   🆁🅴   Expert → Sensor → External comp.

```
► External process variables

        Volume flow source                          →  🗎 61

        Volume flow                                 →  🗎 61
```
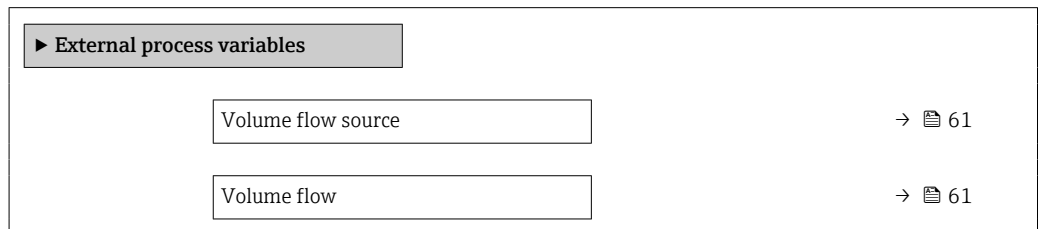
Volume flow source	🔒
Navigation	🆁🅴 Expert → Sensor → ExternalProcVar. → VolumeFlowSource
Description	Select the input via which the measured value of the volume flow is read in. The volume flow is used to calculate the load rate.
Selection	• Off • Current input 1 * • Current input 2 * • Current input 3 * • External value
Factory setting	Off

Volume flow	
Navigation	🆁🅴 Expert → Sensor → ExternalProcVar. → Volume flow
Description	Shows the volume flow reported by the external measuring device.

---

*   Visibility depends on order options or device settings

User entry   Signed floating-point number

3.2.5   "Sensor adjustment" submenu

Navigation   🗟🗐   Expert → Sensor → Sensor adjustm.

▶ Sensor adjustment	
Measuring interval	→ 🗎 62
▶ Process variable adjustment	→ 🗎 62

Measuring interval   🔒

Navigation   🗟🗐   Expert → Sensor → Sensor adjustm. → Measur. interval

Description   Displays the interval between two measuring periods.

User interface   0 to 10000 ms

"Process variable adjustment" submenu

Navigation   🗟🗐   Expert → Sensor → Sensor adjustm. → Variable adjust

▶ Process variable adjustment	
Temperature offset	→ 🗎 63
Temperature factor	→ 🗎 63
Conductivity offset	→ 🗎 63
Conductivity factor	→ 🗎 63
Corrected conductivity offset	→ 🗎 64
Corrected conductivity factor	→ 🗎 64
Electronics temperature offset	→ 🗎 64
Electronics temperature factor	→ 🗎 64

Load rate offset	→ 🖺 65
Load rate factor	→ 🖺 65

Temperature offset 🔒

Navigation	🗝🗐 Expert → Sensor → Sensor adjustm. → Variable adjust → Temp. offset
Description	Enter the offset by which to shift the zero point for temperature.
User entry	Signed floating-point number
Factory setting	0

Temperature factor 🔒

Navigation	🗝🗐 Expert → Sensor → Sensor adjustm. → Variable adjust → Temp. factor
Description	Enter the multiplication factor to apply to the temperature value.
User entry	Positive floating-point number
Factory setting	1

Conductivity offset 🔒

Navigation	🗝🗐 Expert → Sensor → Sensor adjustm. → Variable adjust → Conduct. offset
Description	Enter the offset by which to shift the zero point for conductivity.
User entry	Signed floating-point number
Factory setting	0

Conductivity factor 🔒

Navigation	🗝🗐 Expert → Sensor → Sensor adjustm. → Variable adjust → Conduct. factor
Description	Enter the multiplication factor to apply to the conductivity value.
User entry	Positive floating-point number

Factory setting   1

Corrected conductivity offset   🔒

Navigation   📟🖥 Expert → Sensor → Sensor adjustm. → Variable adjust → Corr.cond.offset

Description   Enter the offset by which to shift the zero point for the corrected conductivity.

User entry   Signed floating-point number

Factory setting   0

Corrected conductivity factor   🔒

Navigation   📟🖥 Expert → Sensor → Sensor adjustm. → Variable adjust → Corr.cond.factor

Description   Enter the multiplication factor to apply to the corrected conductivity value.

User entry   Positive floating-point number

Factory setting   1

Electronics temperature offset   🔒

Navigation   📟🖥 Expert → Sensor → Sensor adjustm. → Variable adjust → ElectrTempOffset

Description   Enter the offset by which to shift the zero point for the electronics temperature.

User entry   Signed floating-point number

Factory setting   0

Electronics temperature factor   🔒

Navigation   📟🖥 Expert → Sensor → Sensor adjustm. → Variable adjust → ElectrTempFactor

Description   Enter the multiplication factor to apply to the electronics temperature.

User entry   Positive floating-point number

Factory setting   1

Load rate offset	🔒

Navigation	🎛️🖥️ Expert → Sensor → Sensor adjustm. → Variable adjust → Load rate offset
Prerequisite	The volume flow of the medium is read in via the Current input 1 to n (→ 🕮 49).
Description	Enter the offset by which to shift the zero point for the load rate.
User entry	Signed floating-point number
Factory setting	0

Load rate factor	🔒

Navigation	🎛️🖥️ Expert → Sensor → Sensor adjustm. → Variable adjust → Load rate factor
Prerequisite	The volume flow of the medium is read in via the Current input 1 to n (→ 🕮 49).
Description	Enter the multiplication factor to apply to the load rate value.
User entry	Positive floating-point number
Factory setting	1

3.2.6   "Factory adjustment" submenu

Navigation   🎛️🖥️ Expert → Sensor → FactoryAdjustm.

```
► Factory adjustment

        Nominal diameter                    → 🕮 65

        Date/time                           → 🕮 66
```

Nominal diameter	

Navigation	🎛️🖥️ Expert → Sensor → FactoryAdjustm. → Nominal diameter
Description	Shows the nominal diameter of the sensor.
User interface	Character string comprising numbers, letters and special characters

Date/time	🔒

Navigation   🎛🖥 Expert → Sensor → FactoryAdjustm. → Date/time

Description   Shows the date and time of the factory adjustment.

User interface   Character string comprising numbers, letters and special characters

3.3   "I/O configuration" submenu

Navigation   🎛🖥   Expert → I/O config.

```
► I/O configuration
                    ┌──────────────────────────────────────┐
                    │ I/O module 1 to n terminal numbers    │  → 🖺 66
                    └──────────────────────────────────────┘
                    ┌──────────────────────────────────────┐
                    │ I/O module 1 to n information         │  → 🖺 66
                    └──────────────────────────────────────┘
                    ┌──────────────────────────────────────┐
                    │ I/O module 1 to n type                │  → 🖺 67
                    └──────────────────────────────────────┘
                    ┌──────────────────────────────────────┐
                    │ Apply I/O configuration               │  → 🖺 67
                    └──────────────────────────────────────┘
                    ┌──────────────────────────────────────┐
                    │ I/O alteration code                   │  → 🖺 68
                    └──────────────────────────────────────┘
```

I/O module 1 to n terminal numbers

Navigation   🎛🖥 Expert → I/O config. → I/O 1 to n terminals

Description   Displays the terminal numbers used by the I/O module.

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

I/O module 1 to n information

Navigation   🎛🖥 Expert → I/O config. → I/O 1 to n info

Description   Displays information about the plugged in I/O module.

User interface	• Not plugged
	• Invalid
	• Not configurable
	• Configurable
	• HART

Additional information   *"Not plugged" option*

The I/O module is not plugged in.

"Invalid" option

The I/O module is not plugged correctly.

"Not configurable" option

The I/O module is not configurable.

"Configurable" option

The I/O module is configurable.

"Fieldbus" option

The I/O module is configured for HART.

I/O module 1 to n type   🔒

Navigation   🔘🔲 Expert → I/O config. → I/O 1 to n type

Prerequisite   For the following order code:
                        • "Output; input 2", option **D** "Configurable I/O initial setting off"
                        • "Output; input 3", option **D** "Configurable I/O initial setting off"

Description   Use this function to select the I/O module type for the configuration of the I/O module.

Selection   • Off
                        • Current output [*]
                        • Current input [*]
                        • Status input [*]
                        • Pulse/frequency/switch output [*]
                        • Relay output [*]

Factory setting   Off

Apply I/O configuration   🔒

Navigation   🔘🔲 Expert → I/O config. → Apply I/O config

Description   Use this function to activate the newly configured I/O module type.

---

* Visibility depends on order options or device settings

Selection	• No
	• Yes

Factory setting   No

I/O alteration code	🔒

Navigation   🔘🖥 Expert → I/O config. → I/O alterat.code

Description   Use this function to enter the ordered activation code to activate the I/O configuration change.

User entry   Positive integer

Factory setting   0

Additional information   *Description*

The I/O configuration is changed in the **I/O module type** parameter (→ 🔖 67).

3.4   "Input" submenu

Navigation   🔘🖥 Expert → Input

▸ Input	
▸ Current input 1 to n	→ 🔖 68
▸ Status input 1 to n	→ 🔖 71

3.4.1   "Current input 1 to n" submenu

Navigation   🔘🖥 Expert → Input → Current input 1 to n

▸ Current input 1 to n	
Terminal number	→ 🔖 69
Signal mode	→ 🔖 69
Current span	→ 🔖 69
0/4 mA value	→ 🔖 70
20 mA value	→ 🔖 70

| Failure mode | → 🖹 71 |
| Failure value | → 🖹 71 |

Terminal number

| Navigation | 🎛🖥 Expert → Input → Current input 1 to n → Terminal no. |

| Description | Displays the terminal numbers used by the current input module. |

| User interface | • Not used
• 24-25 (I/O 2)
• 22-23 (I/O 3) |

| Additional information | *"Not used" option*
The current input module does not use any terminal numbers. |

Signal mode   🔒

| Navigation | 🎛🖥 Expert → Input → Current input 1 to n → Signal mode |

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

| Selection | • Passive
• Active * |

| Factory setting | Passive |

## Current span   🔒

| Navigation | 🎛🖥 Expert → Input → Current input 1 to n → Current span |

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

| Selection | • 4...20 mA (4...20.5 mA)
• 4...20 mA NE (3.8...20.5 mA)
• 4...20 mA US (3.9...20.8 mA)
• 0...20 mA (0...20.5 mA) |

---

* Visibility depends on order options or device settings

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

Additional information	*Examples*

Sample values for the current range: **Current span** parameter (→ 🖺 75)

0/4 mA value

Navigation	🆎🖳 Expert → Input → Current input 1 to n → 0/4 mA value

Description	Enter 4 mA value.

User entry	Signed floating-point number

Factory setting	0 % TS

Additional information	*Current input behavior*

The current input behaves differently depending on the settings configured in the following parameters:
• Current span (→ 🖺 69)
• Failure mode (→ 🖺 71)

Configuration examples

Pay attention to the configuration examples for **4 mA value** parameter (→ 🖺 77).

20 mA value

Navigation	🆎🖳 Expert → Input → Current input 1 to n → 20 mA value

Description	Enter 20 mA value.

User entry	Signed floating-point number

Factory setting	12 %TS

Additional information	*Configuration examples*

Pay attention to the configuration examples for **4 mA value** parameter (→ 🖺 77).

Failure mode	🔒

Navigation	⌨⌨ Expert → Input → Current input 1 to n → Failure mode

Description	Use this function to select the input behavior when measuring a current outside the configured **Current span** parameter (→ 📘 69).

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 (→ 📘 71)).

Failure value	🔒

Navigation	⌨⌨ Expert → Input → Current input 1 to n → Failure value

Prerequisite	In the **Failure mode** parameter (→ 📘 71), the **Defined value** option is selected.

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

User entry	Signed floating-point number

Factory setting	0

3.4.2   "Status input 1 to n" submenu

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

```
▶ Status input 1 to n
```

Terminal number	→ 📘 72
Assign status input	→ 📘 72
Value status input	→ 📘 73

| Active level | → 🖺 73 |
| Response time status input | → 🖺 73 |

Terminal number

Navigation	🖩🗔 Expert → Input → Status input 1 to n → Terminal no.
Description	Displays the terminal numbers used by the status input module.
User interface	• Not used • 24-25 (I/O 2) • 22-23 (I/O 3)
Additional information	*"Not used" option* The status input module does not use any terminal numbers.

Assign status input   🔒

Navigation	🖩🗔 Expert → Input → Status input 1 to n → Assign stat.inp.
Description	Use this function to select the function for the status input.
Selection	• Off • Reset totalizer 1 • Flow override
Factory setting	Off

Additional information	*Options*
	
	• Off
	The status input is switched off.
	• Reset totalizer 1
	The totalizer is reset.
	• Flow override
	The Flow override is activated.
	
	🛈 Note on the Flow override:
	  • The Flow override is enabled as long as the level is at the status input (continuous signal).
	  • All other assignments react to a change in level (pulse) at the status input.

Value status input

Navigation	ⓘⓔ Expert → Input → Status input 1 to n → Val.stat.inp.

Description   Displays the current input signal level.

User interface   • High
                            • Low

Active level   ⓐ

Navigation	ⓘⓔ Expert → Input → Status input 1 to n → Active level

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 1 to n → Response time

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

3.5   "Output" submenu

Navigation   ⓘⓔ Expert → Output

▶ Output	
▶ Current output 1 to n	→ 🗏 74
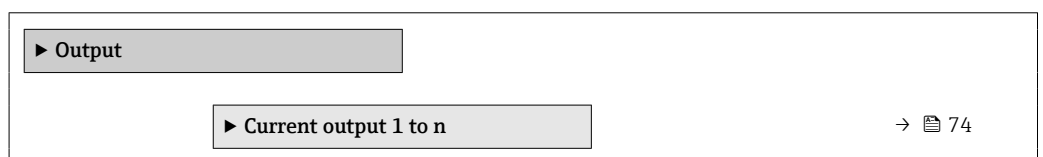
▶ Pulse/frequency/switch output 1 to n		→ 🗎 85
▶ Relay output 1 to n		→ 🗎 103

3.5.1 "Current output 1 to n" submenu

Navigation 🔍🖳 Expert → Output → Curr.output 1 to n

▶ Current output 1 to n		
	Terminal number	→ 🗎 74
	Signal mode	→ 🗎 75
	Process variable current output	→ 🗎 75
	Current range output	→ 🗎 75
	Fixed current	→ 🗎 76
	Lower range value output	→ 🗎 77
	Upper range value output	→ 🗎 78
	Measuring mode current output	→ 🗎 78
	Damping current output	→ 🗎 83
	Failure behavior current output	→ 🗎 83
	Failure current	→ 🗎 84
	Output current	→ 🗎 84
	Measured current	→ 🗎 85

Terminal number

Navigation   🔍🖳 Expert → Output → Curr.output 1 to n → Terminal no.

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

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

Additional information   *"Not used" option*

                                The current output module does not use any terminal numbers.

Signal mode   🔒

Navigation   🖩🖳 Expert → Output → Curr.output 1 to n → Signal mode

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

Selection   • Active *
                                • Passive *

Factory setting   Active

Process variable current output   🔒

Navigation   🖩🖳 Expert → Output → Curr.output 1 to n → Proc.var. outp

Prerequisite   The **Load rate** option is only available if the volume flow of the medium is read in via the
                                Current input 1 to n (→ 🔖 49) or the fieldbus.

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

Selection   • Off
                                • Total solids
                                • Temperature
                                • Electronics temperature
                                • Conductivity
                                • Corrected conductivity
                                • Load rate *

Factory setting   Total solids

Current range output   🔒

Navigation   🖩🖳 Expert → Output → Curr.output 1 to n → Curr.range out

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

---

*   Visibility depends on order options or device settings

Factory setting   Depends on country:
- 4...20 mA NE (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)

Additional information   *Description*

   • In the event of a device alarm, the current output adopts the value specified in the
   Failure mode parameter (→ 🖹 83).
   • The measuring range is specified via the **Lower range value output** parameter
   (→ 🖹 77) and **Upper range value output** parameter (→ 🖹 78).

"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 (→ 🖹 76).

Example

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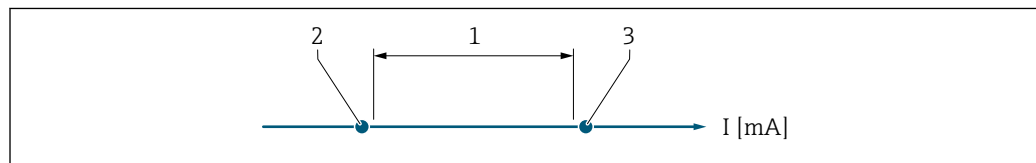
1   Current range for process value
2   Lower level for signal on alarm
3   Upper level for signal on alarm

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

**Fixed current**   🔒

Navigation   🖩🖳   Expert → Output → Curr.output 1 to n → Fixed current

Prerequisite   The **Fixed current** option is selected in the **Current span** parameter (→ 🖹 75).

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 to n → Low.range outp
Prerequisite	In **Current span** parameter (→ 🖺 75), 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 start of measuring range.
User entry	Floating point number with sign
Factory setting	0 %TS
Additional information	*Description* Positive and negative values are permitted depending on the process variable assigned in the **Assign current output** parameter (→ 🖺 75). In addition, the value can be greater than or smaller than the value assigned for the 20 mA current in the **Upper range value output** parameter (→ 🖺 78). *Dependency* ℹ The unit depends on the process variable selected in the **Assign current output** parameter (→ 🖺 75). *Current output behavior* The current output behaves differently depending on the settings configured in the following parameters: • Current span (→ 🖺 75) • Failure mode (→ 🖺 83) *Configuration examples* A0013757 *Q Flow* *I Current* *1 Measuring range is exceeded or undershot*
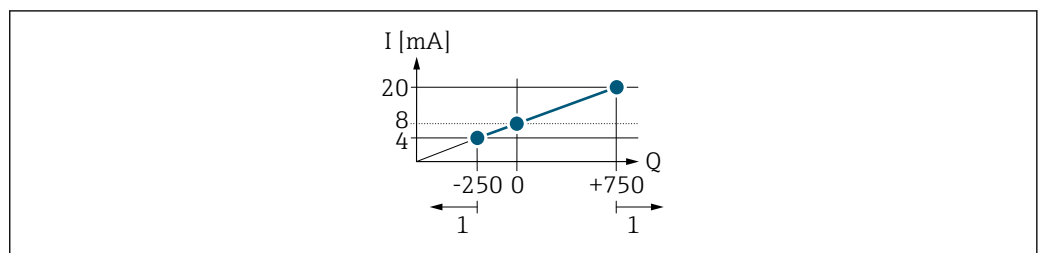
Upper range value output	🔒

Navigation	🏠🖥 Expert → Output → Curr.output 1 to n → Upp.range outp
Prerequisite	In **Current span** parameter (→ 🖿 75), 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 end of measuring range.
User entry	Floating point number with sign
Factory setting	12 %TS
Additional information	*Description* Positive and negative values are permitted depending on the process variable assigned in the **Assign current output** parameter (→ 🖿 75). In addition, the value can be greater than or smaller than the value assigned for the 0/4 mA current in the **Lower range value output** parameter (→ 🖿 77). *Dependency* ℹ The unit depends on the process variable selected in the **Assign current output** parameter (→ 🖿 75). *Example* *Configuration examples* ℹ Pay attention to the configuration examples for the **Lower range value output** parameter (→ 🖿 77).

Measuring mode current output	🔒

Navigation	🏠🖥 Expert → Output → Curr.output 1 to n → Output mode
Prerequisite	The following option is selected in the **Process variable current output** parameter (→ 🖿 75): Load rate One of the following options is selected in the **Current span** parameter (→ 🖿 75): • 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*

The process variable that is assigned to the current output via the **Assign current output** parameter (→ 🖺 75) 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 **Lower range value output** parameter (→ 🖺 77) and the **Upper range value output** parameter (→ 🖺 78).

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.:
• Start of measuring range = –50 kg/h
• End of measuring range = 100 kg/h

"Forward/Reverse flow" option
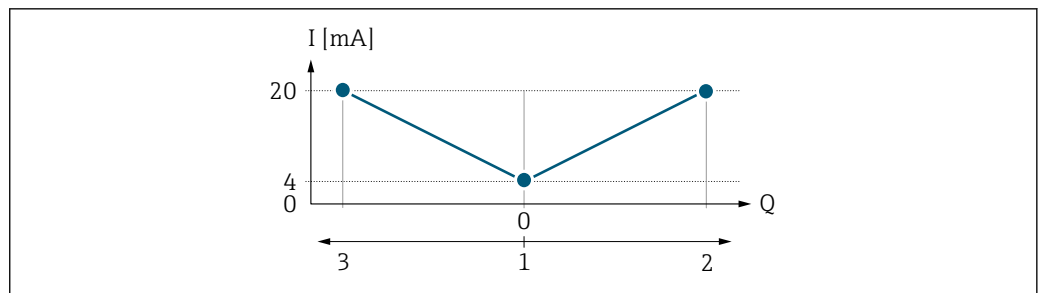
I   Current
Q   Flow
1   Start of measuring range output (0/4 mA)
2   Forward flow
3   Reverse flow

• The current output signal is independent of the direction of flow (absolute amount of the measured variable). The values for the **Lower range value output** parameter (→ 🖺 77) and **Upper range value output** parameter (→ 🖺 78) must have the same sign.
• The value for the **Upper range value output** parameter (→ 🖺 78) (e.g. reverse flow) corresponds to the mirrored value for the **Upper range value output** parameter (→ 🖺 78) (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.

---

*   Visibility depends on order options or device settings

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
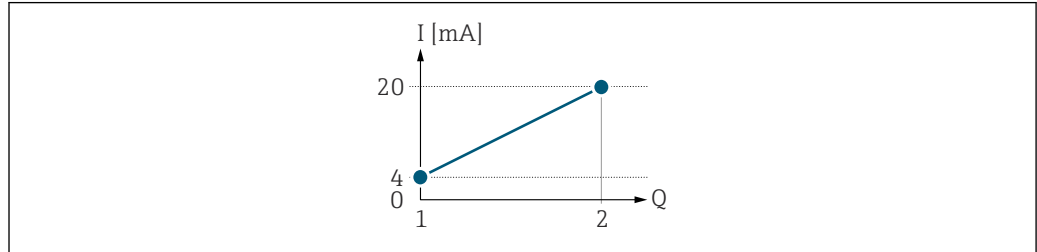
A0028084

⊡ *2   Measuring range*

I   Current
Q   Flow
1   Lower range value (Start of measuring range output)
2   Upper range value (end of measuring range output)

With the following flow response:
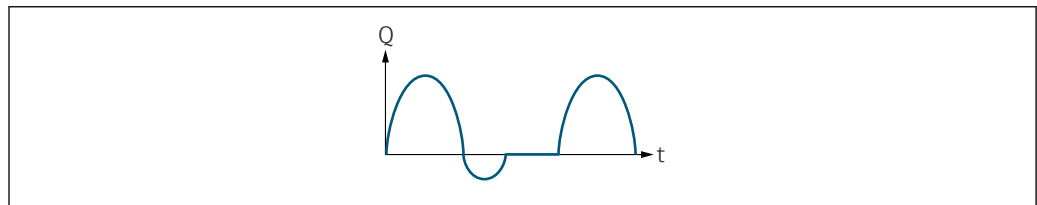
A0028091

⊡ *3   Flow response*

Q   Flow
t   Time

With **Forward flow** option

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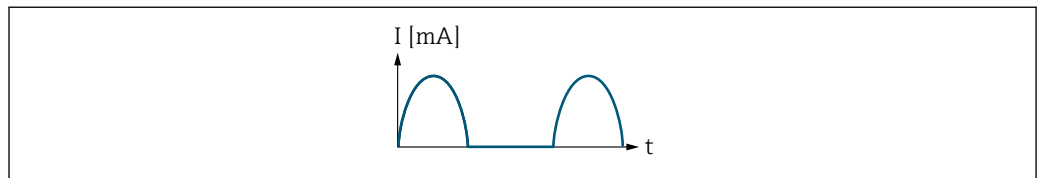
A0028092

I   Current
t   Time

With **Forward/Reverse flow** option

The current output signal is independent of the direction of flow.
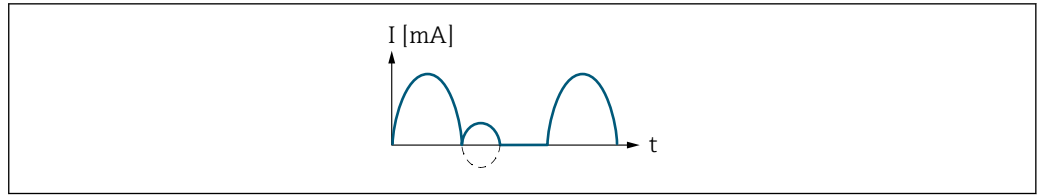
I *Current*
t *Time*

With **Reverse flow compensation** option

Flow components outside the measuring span are buffered, balanced and output after a maximum delay of 60 s.
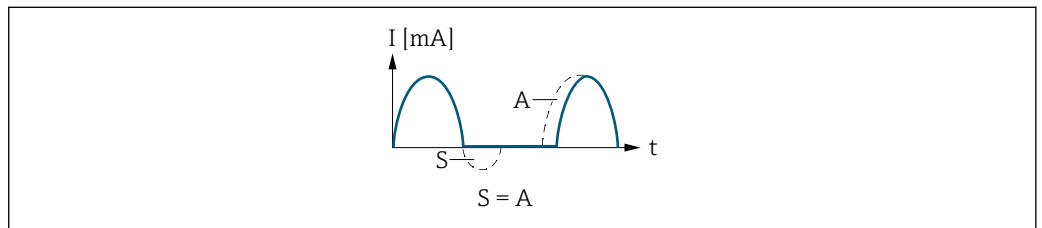
I *Current*
t *Time*
S *Flow components saved*
A *Balancing of saved flow components*

Example 2

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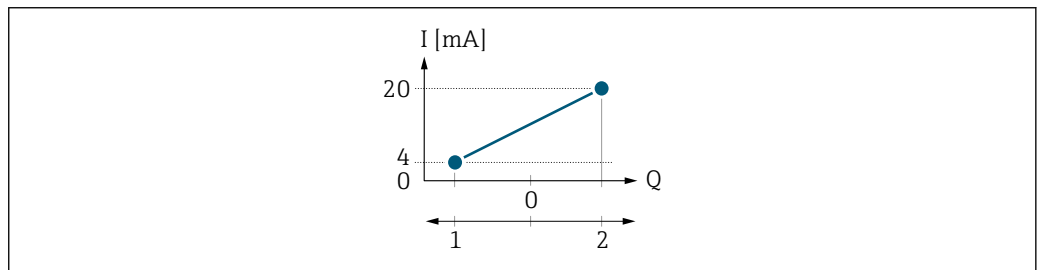
 4   *Measuring range*

I *Current*
Q *Flow*
1 *Lower range value (Start of measuring range output)*
2 *Upper range value (end of measuring range output)*

With flow a (—) outside, b (- -) inside the measuring range
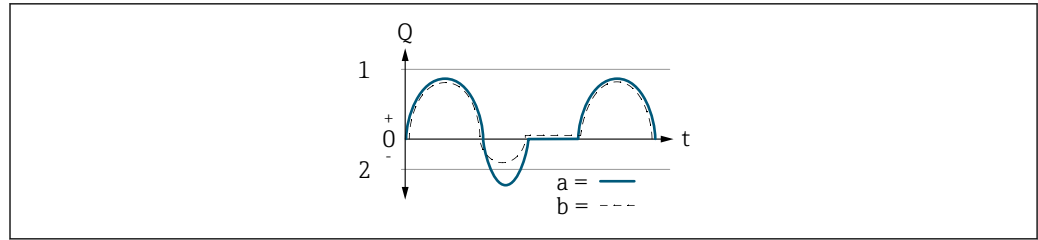
Q   Flow
t   Time
1   Lower range value (Start of measuring range output)
2   Upper range value (end of measuring range output)

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.
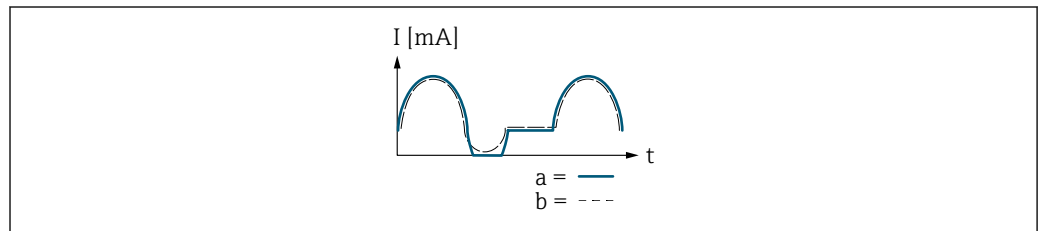
I   Current
t   Time

With **Forward/Reverse flow** option

This option cannot be selected here since the values for the **Lower range value output** parameter (→ 🖹 77) and **Upper range value output** parameter (→ 🖹 78) 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.
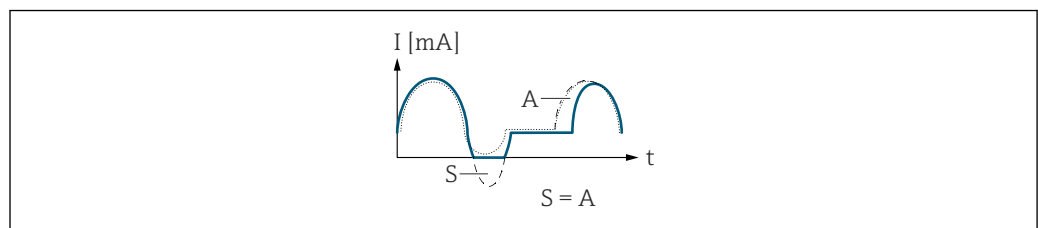
I   Current
t   Time
S   Flow components saved
A   Balancing of saved flow components

Damping current output	🔒

Navigation	🎛️🖥️ Expert → Output → Curr.output 1 to n → Damp.curr.outp
Prerequisite	A process variable is selected in the **Assign current output** parameter (→ 🖺 75) and one of the following options is selected in the **Current span** parameter (→ 🖺 75): • 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 [2]) 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 to n → Failure behav.
Prerequisite	A process variable is selected in the **Assign current output** parameter (→ 🖺 75) and one of the following options is selected in the **Current span** parameter (→ 🖺 75): • 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.

---

2)   proportional transmission behavior with first order delay

Additional information   *Description*

    ℹ 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.

    ℹ The signal on alarm level is defined via the **Current span** parameter (→ 🖺 75).

"Max." option

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

    ℹ The signal on alarm level is defined via the **Current span** parameter (→ 🖺 75).

"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.

    ℹ The measured value is defined via the **Failure current** parameter (→ 🖺 84).

Failure current   🔒

Navigation   🖩🖵 Expert → Output → Curr.output 1 to n → Fail. current

Prerequisite   The **Defined value** option is selected in the **Failure mode** parameter (→ 🖺 83).

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

Navigation   🖩🖵 Expert → Output → Curr.output 1 to n → Output curr.

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

User interface   3.59 to 22.5 mA

Measured current

Navigation   🖩🖵   Expert → Output → Curr.output 1 to n → Measur. curr.

Description   Displays the actual measured value of the output current.

User interface   0 to 30 mA

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

Navigation   🖩🖵   Expert → Output → PFS output 1 to n

▶ Pulse/frequency/switch output 1 to n	
Terminal number	→ 🖺 86
Signal mode	→ 🖺 87
Operating mode	→ 🖺 87
Assign pulse output	→ 🖺 88
Pulse scaling	→ 🖺 89
Pulse width	→ 🖺 89
Measuring mode	→ 🖺 90
Failure mode	→ 🖺 91
Pulse output	→ 🖺 91
Assign frequency output	→ 🖺 92
Minimum frequency value	→ 🖺 92
Maximum frequency value	→ 🖺 93
Measuring value at minimum frequency	→ 🖺 93
Measuring value at maximum frequency	→ 🖺 93
Measuring mode	→ 🖺 94

Damping output	→ 🗎 94	
Response time	→ 🗎 95	
Failure mode	→ 🗎 95	
Failure frequency	→ 🗎 96	
Output frequency	→ 🗎 96	
Switch output function	→ 🗎 96	
Assign diagnostic behavior	→ 🗎 97	
Assign limit	→ 🗎 98	
Switch-on value	→ 🗎 100	
Switch-off value	→ 🗎 100	
Assign flow direction check	→ 🗎 101	
Assign status	→ 🗎 101	
Switch-on delay	→ 🗎 101	
Switch-off delay	→ 🗎 102	
Failure mode	→ 🗎 102	
Switch state	→ 🗎 102	
Invert output signal	→ 🗎 103	

Terminal number

Navigation   🖲️🖳 Expert → Output → PFS output 1 to n → Terminal no.

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

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

Additional information   *"Not used" option*

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

Signal mode	🔒

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

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

Selection	• Passive • Active * • Passive NE

Factory setting	Passive

Operating mode	🔒

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

Prerequisite	If the **Pulse** option is selected, the **Load rate** option must be selected in the **Assign pulse output** parameter (→ 🗎 88).

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

Selection	• Pulse • Frequency • Switch

Factory setting	Pulse

Additional information	*"Pulse" option* Example • Flow rate approx. 100 g/s • Pulse value0.1 g • Pulse width 0.05 ms • Pulse rate 1 000 Impuls/s

---

*   Visibility depends on order options or device settings
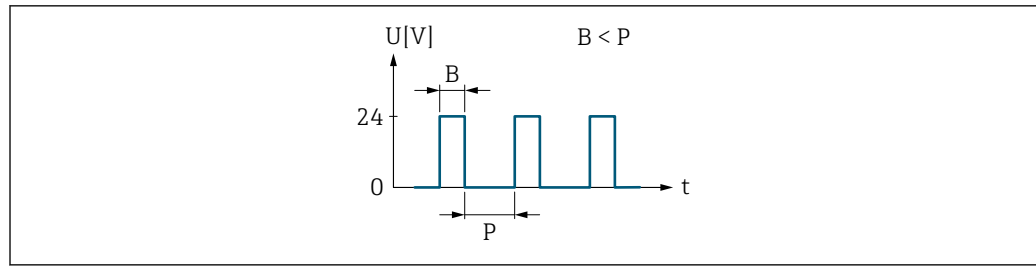
⊠ 5   Quantity-proportional pulse (pulse value) with pulse width to be configured

B   Pulse width entered
P   Pauses between the individual pulses

"Frequency" option

Example
• Flow rate approx. 100 g/s
• Max. frequency 10 kHz
• Flow rate at max. frequency 1 000 g/s
• Output frequency approx. 1 000 Hz
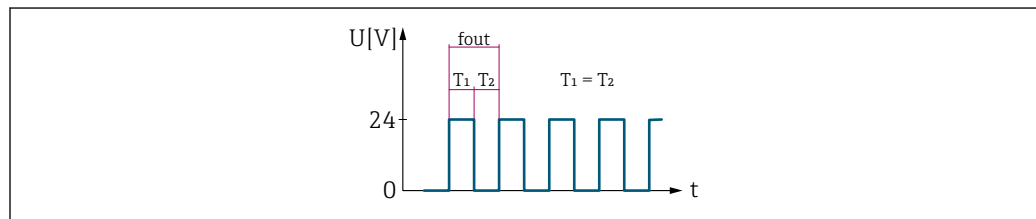
⊠ 6   Flow-proportional frequency output

Assign pulse output   🔒

Navigation   ⓘ⌨ Expert → Output → PFS output 1 to n → Assign pulse

Prerequisite   The **Load rate** option is only available if the volume flow of the medium is read in via the
                                Current input 1 to n (→ 🔲 49) or the fieldbus.

Prerequisite   The **Pulse** option is selected in **Operating mode** parameter (→ 🔲 87).

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

Selection   • Off
                                • Load rate *

Factory setting   Off

---

* Visibility depends on order options or device settings

Pulse scaling	🔒

Navigation	🔘🔲 Expert → Output → PFS output 1 to n → Pulse scaling
Prerequisite	The **Pulse** option is selected in the **Operating mode** parameter (→ 🖺 87) and a process variable is selected in the **Assign pulse output** parameter (→ 🖺 88).
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
Prerequisite	The **Pulse** option is selected in the **Operating mode** parameter (→ 🖺 87) and a process variable is selected in the **Assign pulse output** parameter (→ 🖺 88).
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.
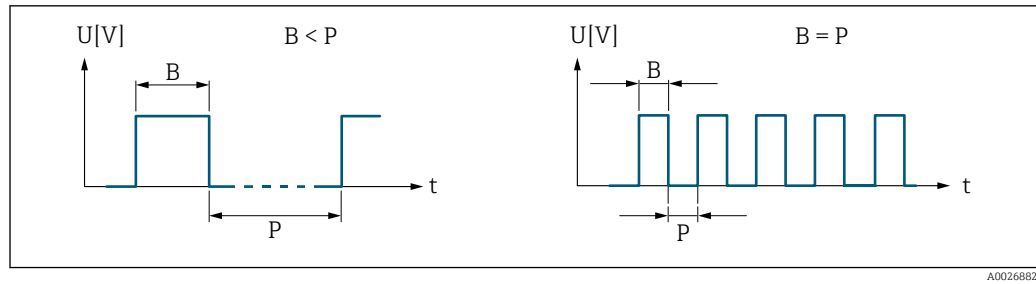
B   *Pulse width entered*
P   *Pauses between the individual pulses*

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   �e🔲   Expert → Output → PFS output 1 to n → Measuring mode

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.

ℹ️ For a detailed description of the options available, see the **Measuring mode** parameter (→ 🔖 78)

Examples

ℹ️ For a detailed description of the configuration examples, see the **Measuring mode** parameter (→ 🔖 78)

Failure mode	🔒

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

Prerequisite	The **Pulse** option is selected in the **Operating mode** parameter (→ 🖩 87) and a process variable is selected in the **Assign pulse output** parameter (→ 🖩 88).

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

Prerequisite	The **Pulse** option is selected in the **Operating mode** parameter (→ 🖩 87) 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.

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 (→ 🖹 103) 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 (→ 🖹 91)) can be configured.

Assign frequency output

Navigation	🔢🖳 Expert → Output → PFS output 1 to n → Assign freq.
Prerequisite	• The **Frequency** option is selected in **Operating mode** parameter (→ 🖹 87). • The **Load rate** option is only available if the volume flow of the medium is read in via the Current input 1 to n (→ 🖹 49) or the fieldbus.
Description	Use this function to select the process variable for the frequency output.
Selection	• Off • Total solids • Temperature • Electronics temperature • Conductivity • Corrected conductivity • Load rate *
Factory setting	Off

Minimum frequency value

Navigation	🔢🖳 Expert → Output → PFS output 1 to n → Min. freq. value
Prerequisite	The **Frequency** option is selected in the **Operating mode** parameter (→ 🖹 87) and a process variable is selected in the **Assign frequency output** parameter (→ 🖹 92).
Description	Use this function to enter the minimum frequency.
User entry	0.0 to 10000.0 Hz

---

*   Visibility depends on order options or device settings

Factory setting   0.0 Hz

Maximum frequency value	🔒

Navigation   🎛️🖥️ Expert → Output → PFS output 1 to n → Max. freq. value

Prerequisite   The **Frequency** option is selected in the **Operating mode** parameter (→ 🗎 87) and a process variable is selected in the **Assign frequency output** parameter (→ 🗎 92).

Description   Use this function to enter the end value frequency.

User entry   0.0 to 10 000.0 Hz

Factory setting   10 000.0 Hz

Measuring value at minimum frequency	🔒

Navigation   🎛️🖥️ Expert → Output → PFS output 1 to n → Val. at min.freq

Prerequisite   The **Frequency** option is selected in the **Operating mode** parameter (→ 🗎 87) and a process variable is selected in the **Assign frequency output** parameter (→ 🗎 92).

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*

    ℹ️ The entry depends on the process variable selected in the **Assign frequency output** parameter (→ 🗎 92).

Measuring value at maximum frequency	🔒

Navigation   🎛️🖥️ Expert → Output → PFS output 1 to n → Val. at max.freq

Prerequisite   The **Frequency** option is selected in the **Operating mode** parameter (→ 🗎 87) and a process variable is selected in the **Assign frequency output** parameter (→ 🗎 92).

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 (→ 🖹 92).

Measuring mode   🔒

Navigation	🖩🖥 Expert → Output → PFS output 1 to n → Measuring mode
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 (→ 🖹 78) *Examples* For a detailed description of the configuration examples, see the **Measuring mode** parameter (→ 🖹 78)

Damping output   🔒

Navigation	🖩🖥 Expert → Output → PFS output 1 to n → Damping out.
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 [3]) 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.

ℹ️ 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

Prerequisite   The **Frequency** option is selected in the **Operating mode** parameter (→ 🖺 87) and an option is selected in the **Assign frequency output** parameter (→ 🖺 92).

Description   Shows how quickly the output reaches 63% of a measured value change.

User interface   Positive floating-point number

Factory setting   0 s

Failure mode   🔒

Navigation   ▣▣ Expert → Output → PFS output 1 to n → Failure mode

Prerequisite   The **Frequency** option is selected in the **Operating mode** parameter (→ 🖺 87) and a process variable is selected in the **Assign frequency output** parameter (→ 🖺 92).

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

---

3)   proportional transmission behavior with first order delay

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 (→ 🖺 96) 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.

Prerequisite   In the **Operating mode** parameter (→ 🖺 87), the **Frequency** option is selected, in the **Assign frequency output** parameter (→ 🖺 92) a process variable is selected, and in the **Failure mode** parameter (→ 🖺 95), 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.

Prerequisite   In the **Operating mode** parameter (→ 🖺 87), 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

Prerequisite   The **Switch** option is selected in the **Operating mode** parameter (→ 🖺 87).

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	• Off The switch output is permanently switched off (open, non-conductive). • On The switch output is permanently switched on (closed, conductive). • Diagnostic behavior The switch output is switched on (closed, conductive), if there is a pending diagnostic event of the assigned behavioral category. • Limit The switch output is switched on (closed, conductive), if a limit value specified for the process variable is reached. • Flow direction check The switch output is switched on (closed, conductive), when the flow direction changes (forward or reverse flow). • Status The switch output is switched on (closed/conductive) to display the device status for the selected detection method, e.g. empty pipe detection.

Assign diagnostic behavior   🔒

Navigation	🔁🔲 Expert → Output → PFS output 1 to n → Assign diag. beh

Prerequisite	• In the **Operating mode** parameter (→ 🖹 87), the **Switch** option is selected. • In the **Switch output function** parameter (→ 🖹 96), 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

Prerequisite   • The **Switch** option is selected in **Operating mode** parameter (→ 🖺 87).
                         • The **Limit** option is selected in **Switch output function** parameter (→ 🖺 96).
                         • The **Load rate** option is only available if the volume flow of the medium is read in via the
                           Current input 1 to n (→ 🖺 49) or the fieldbus.

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

Selection   • Off
                         • Total solids
                         • Temperature
                         • Electronics temperature
                         • Conductivity
                         • Corrected conductivity
                         • Load rate *
                         • Totalizer 1 *

Factory setting   Temperature

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

---

*   Visibility depends on order options or device settings
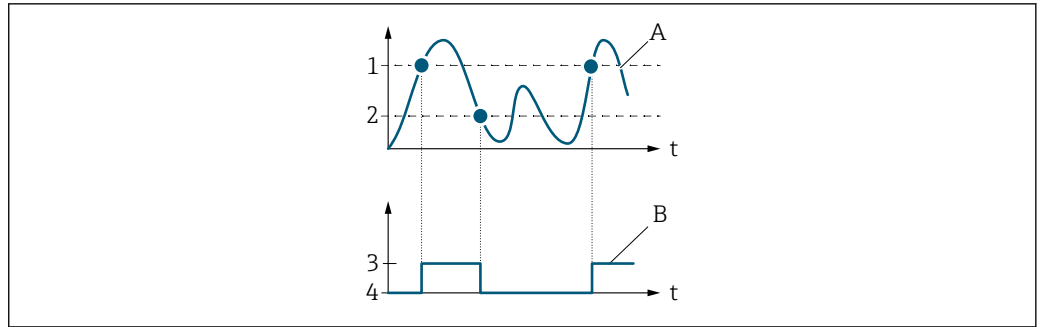
A0026891

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
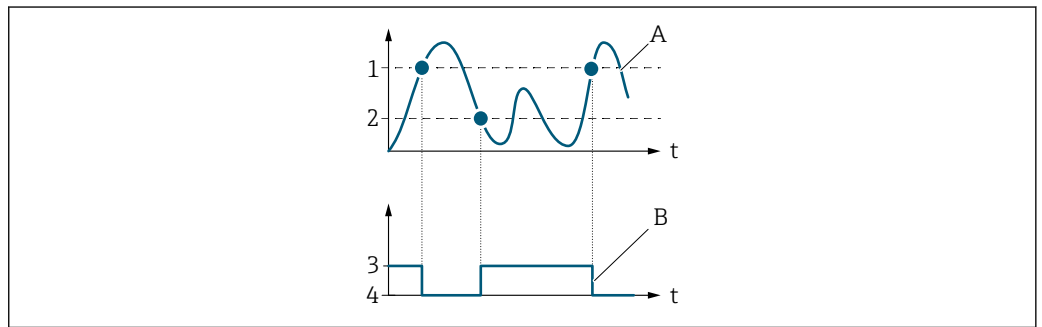
A0026892

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
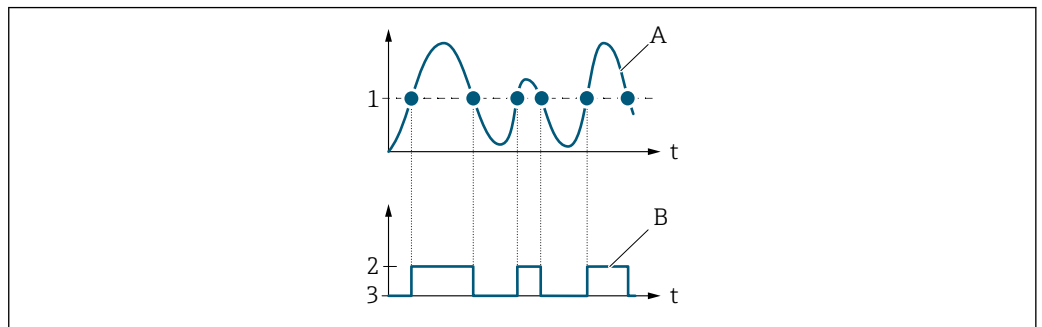
A0026893

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
Prerequisite	• The **Switch** option is selected in the **Operating mode** parameter (→ 🖺 87). • The **Limit** option is selected in the **Switch output function** parameter (→ 🖺 96).
Description	Use this function to enter the measured value for the switch-on point.
User entry	Floating point number with sign
Factory setting	0 ℃
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 (→ 🖺 98).

Switch-off value	🔒

Navigation	🔲🔳 Expert → Output → PFS output 1 to n → Switch-off value
Prerequisite	• The **Switch** option is selected in the **Operating mode** parameter (→ 🖺 87). • The **Limit** option is selected in the **Switch output function** parameter (→ 🖺 96).
Description	Use this function to enter the measured value for the switch-off point.
User entry	Floating point number with sign
Factory setting	0 ℃
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 (→ 🖺 98).

Assign flow direction check	🔒

Navigation	🔘🔲 Expert → Output → PFS output 1 to n → Assign dir.check
Prerequisite	• The **Switch** option is selected in the **Operating mode** parameter (→ 🖺 87). • The **Flow direction check** option is selected in the **Switch output function** parameter (→ 🖺 96).
Description	Use this function to select a process variable for monitoring the flow direction.
Selection	
Factory setting	Off

Assign status	🔒

Navigation	🔘🔲 Expert → Output → PFS output 1 to n → Assign status
Prerequisite	• The **Switch** option is selected in **Operating mode** parameter (→ 🖺 87). • The **Status** option is selected in **Switch output function** parameter (→ 🖺 96).
Description	Select the device function whose status you want to display.
Selection	• Off • Partially filled pipe detection
Factory setting	Partially filled pipe detection
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
Prerequisite	• The **Switch** option is selected in the **Operating mode** parameter (→ 🖺 87). • The **Limit** option is selected in the **Switch output function** parameter (→ 🖺 96).
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
Prerequisite	• The **Switch** option is selected in the **Operating mode** parameter (→ 🗎 87). • The **Limit** option is selected in the **Switch output function** parameter (→ 🗎 96).
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
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
Prerequisite	The **Switch** option is selected in the **Operating mode** parameter (→ 🗎 87).
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.

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)
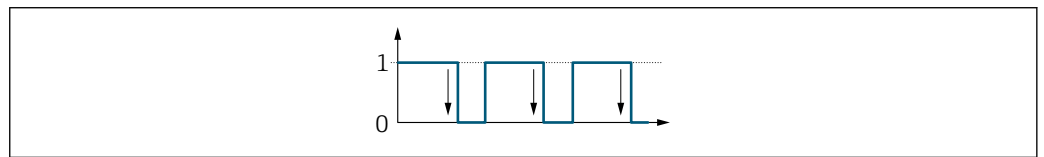
A0026693

Yes option (passive - positive)
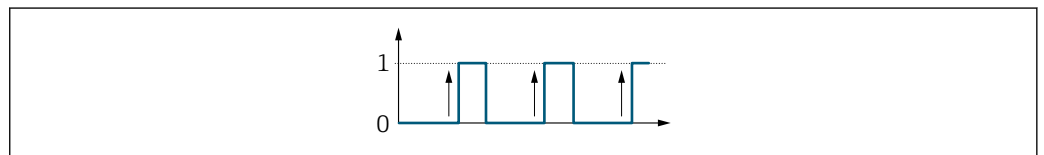
A0026692

3.5.3 "Relay output 1 to n" submenu

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

▶ Relay output 1 to n

Terminal number		→ 🔖 104
Relay output function		→ 🔖 104
Assign flow direction check		→ 🔖 105

Assign limit	→ 🖹 105
Assign diagnostic behavior	→ 🖹 106
Assign status	→ 🖹 106
Switch-off value	→ 🖹 107
Switch-off delay	→ 🖹 107
Switch-on value	→ 🖹 107
Switch-on delay	→ 🖹 108
Failure mode	→ 🖹 108
Switch state	→ 🖹 109
Powerless relay status	→ 🖹 109

Terminal number

Navigation   🎮🖳 Expert → Output → Relay output 1 to n → Terminal no.

Description   Displays the terminal numbers used by the relay output module.

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

Additional information   *"Not used" option*

                        The relay output module does not use any terminal numbers.

Relay output function   🔒

Navigation   🎮🖳 Expert → Output → Relay output 1 to n → Relay outp.func.

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

Selection   • Closed
                        • Open
                        • Diagnostic behavior
                        • Limit
                        • Flow direction check
                        • Status

Factory setting	Closed

Additional information	*Selection*

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

Assign flow direction check   🔒

Navigation	🔘🔲 Expert → Output → Relay output 1 to n → Assign dir.check

Prerequisite	The **Flow direction check** option is selected in the **Relay output function** parameter (→ 🖹 104).

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

Selection	

Factory setting	Off

Assign limit   🔒

Navigation	🔘🔲 Expert → Output → Relay output 1 to n → Assign limit

Prerequisite	• The **Limit** option is selected in **Relay output function** parameter (→ 🖹 104). • The **Load rate** option is only available if the volume flow of the medium is read in via the Current input 1 to n (→ 🖹 49) or the fieldbus.

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

Selection	• Off • Total solids • Temperature • Electronics temperature • Conductivity

> • Corrected conductivity
> • Load rate [*]
> • Totalizer 1 [*]

Factory setting   Temperature

Assign diagnostic behavior   ⌂

Navigation   ⓐⓔ Expert → Output → Relay output 1 to n → Assign diag. beh

Prerequisite   In the **Relay output function** parameter (→ 🕮 104), the **Diagnostic behavior** option is
                            selected.

Description   Use this function to select the category of the diagnostic events that are displayed for the
                            relay output.

Selection   • Alarm
                            • Alarm or warning
                            • Warning

Factory setting   Alarm

Additional information   *Description*

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

                            Selection

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

Assign status   ⌂

Navigation   ⓐⓔ Expert → Output → Relay output 1 to n → Assign status

Prerequisite   In the **Relay output function** parameter (→ 🕮 104), the **Digital Output** option is
                            selected.

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

Selection   • Off
                            • Partially filled pipe detection

Factory setting   Off

---

* Visibility depends on order options or device settings

Switch-off value   🔒

Navigation	🖥🔲 Expert → Output → Relay output 1 to n → Switch-off value
Prerequisite	The **Limit** option is selected in the **Relay output function** parameter (→ 🖺 104).
Description	Use this function to enter the measured value for the switch-off point.
User entry	Floating point number with sign
Factory setting	0 °C
Additional information	*Description*

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 is dependent on the process variable selected in the **Assign limit** parameter (→ 🖺 105).

Switch-off delay   🔒

Navigation	🖥🔲 Expert → Output → Relay output 1 to n → Switch-off delay
Prerequisite	In the **Relay output function** parameter (→ 🖺 104), the **Limit** option is selected.
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

Switch-on value   🔒

Navigation	🖥🔲 Expert → Output → Relay output 1 to n → Switch-on value
Prerequisite	The **Limit** option is selected in the **Relay output function** parameter (→ 🖺 104).
Description	Use this function to enter the measured value for the switch-on point.
User entry	Floating point number with sign
Factory setting	0 °C

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 is dependent on the process variable selected in the **Assign limit** parameter (→ 🗎 105).

Switch-on delay   🔒

Navigation   @ 🗏🖥   Expert → Output → Relay output 1 to n → Switch-on delay

Prerequisite   In the **Relay output function** parameter (→ 🗎 104), the **Limit** option is selected.

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

User entry   0.0 to 100.0 s

Factory setting   0.0 s

Failure mode   🔒

Navigation   @ 🗏🖥   Expert → Output → Relay output 1 to n → Failure mode

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

Selection   • Actual status
                        • Open
                        • Closed

Factory setting   Open

Additional information *Selection*

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

Switch state

Navigation   ⧉⧉ Expert → Output → Relay output 1 to n → Switch state

Description   Displays the current status of the relay output.

User interface   • Open
                            • Closed

Additional information   *User interface*

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

Powerless relay status   🔒

Navigation   ⧉⧉ Expert → Output → Relay output 1 to n → Powerless relay

Description   Use this function to select the quiescent state for the relay output.

Selection   • Open
                            • Closed

Factory setting   Open

Additional information   *Selection*

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

3.6 "Communication" submenu

Navigation   ⧉⧉ Expert → Communication

‣ Communication		
	‣ HART input	→ 🖹 110
	‣ HART output	→ 🖹 115
	‣ Diagnostic configuration	→ 🖹 131
	‣ Web server	→ 🖹 135

3.6.1 "HART input" submenu

Navigation   ⊞⊟ Expert → Communication → HART input

▸ HART input	
▸ Configuration	→ 🗏 110
▸ Input	→ 🗏 114

"Configuration" submenu

Navigation   ⊞⊟ Expert → Communication → HART input → Configuration

▸ Configuration	
Capture mode	→ 🗏 110
Device ID	→ 🗏 111
Device type	→ 🗏 111
Manufacturer ID	→ 🗏 112
Burst command	→ 🗏 112
Slot number	→ 🗏 113
Timeout	→ 🗏 113
Failure mode	→ 🗏 113
Failure value	→ 🗏 114

Capture mode   🔒

Navigation   ⊞⊟ Expert → Communication → HART input → Configuration → Capture mode

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

Selection   • Off
                         • Burst network
                         • Master network

Factory setting   Off

Additional information	*"Burst network" option*
	The device records data transmitted via burst in the network.
	"Master network" option
	In this case, the device must be located in a HART network in which a HART master (control) queries the measured values of the up to 64 network participants. The device reacts only to the responses of a specific device in the network. Device ID,device type, manufacturer ID and the HART commands used by the master must be defined.

Device ID   🔒

Navigation	🔘🖥 Expert → Communication → HART input → Configuration → Device ID
Prerequisite	The **Master network** option is selected in the **Capture mode** parameter (→ 🖺 110).
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	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.

Device type   🔒

Navigation	🔘🖥 Expert → Communication → HART input → Configuration → Device type
Prerequisite	In the **Capture mode** parameter (→ 🖺 110), 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

Prerequisite   The **Master network** option is selected in the **Capture mode** parameter (→ 🔖 110).

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

Prerequisite   The **Burst network** option or the **Master network** option are selected in the **Capture mode** parameter (→ 🔖 110).

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
Prerequisite	The **Burst network** option or the **Master network** option is selected in the **Capture mode** parameter (→ 🔲 110).
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)

Timeout	🔒

Navigation	🔘🔲 Expert → Communication → HART input → Configuration → Timeout
Prerequisite	The **Burst network** option or the **Master network** option is selected in the **Capture mode** parameter (→ 🔲 110).
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
Prerequisite	In the **Capture mode** parameter (→ 🔲 110), 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 (→ 🖺 114)). |

Failure value   🔒

| Navigation | 🔧🖥 Expert → Communication → HART input → Configuration → Failure value |

| Prerequisite | The following conditions are met:
• In the **Capture mode** parameter (→ 🖺 110), the **Burst network** option or **Master network** option is selected.
• In the **Failure mode** parameter (→ 🖺 113), the **Defined value** option is selected. |

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

| User entry | Signed floating-point number |

| Factory setting | 0 |

"Input" submenu

Navigation   🔧🖥   Expert → Communication → HART input → Input

▶ Input	
Value	→ 🖺 115
Status	→ 🖺 115

Value	
Navigation	⧉🖳 Expert → Communication → HART input → Input → Value
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
Description	Displays the value of the device variable recorded by the HART input in accordance with the HART specification.
User interface	• Manual/Fixed • Good • Poor accuracy • Bad

3.6.2   "HART output" submenu

Navigation   ⧉🖳 Expert → Communication → HART output

▸ HART output	
▸ Configuration	→ 🖺 115
▸ Burst configuration	→ 🖺 117
▸ Information	→ 🖺 124
▸ Output	→ 🖺 127

"Configuration" submenu

Navigation   ⧉🖳 Expert → Communication → HART output → Configuration

▸ Configuration	
HART short tag	→ 🖺 116
Device tag	→ 🖺 116

HART address	→ 🖹 116
No. of preambles	→ 🖹 117
Fieldbus writing access	→ 🖹 117

HART short tag   🔒

Navigation	🖩🖳 Expert → Communication → HART output → Configuration → HART short tag
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	TEQWAVEM

Device tag   🔒

Navigation	🖩🖳 Expert → Communication → HART output → Configuration → Device tag
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	Teqwave M

HART address   🔒

Navigation	🖩🖳 Expert → Communication → HART output → Configuration → HART address
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 (→ 🖹 75) (current output 1).

No. of preambles	🔒

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

Fieldbus writing access	🔒

Navigation	🔘🖳 Expert → Communication → HART output → Configuration → Fieldb.writ.acc.
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	→ 🗎 118
Burst command 1 to n	→ 🗎 119

Burst variable 0	→ 🗎 119
Burst variable 1	→ 🗎 120
Burst variable 2	→ 🗎 120
Burst variable 3	→ 🗎 121
Burst variable 4	→ 🗎 121
Burst variable 5	→ 🗎 121
Burst variable 6	→ 🗎 121
Burst variable 7	→ 🗎 122
Burst trigger mode	→ 🗎 122
Burst trigger level	→ 🗎 123
Min. update period	→ 🗎 123
Max. update period	→ 🗎 123

Burst mode 1 to n   🔒

Navigation   🖴🖵 Expert → Communication → HART output → Burst config. → Burst config. 1 to n
   → Burst mode 1 to n

Description   Use this function to select whether to activate the HART burst mode for burst message X.

Selection   • Off
                            • On

Factory setting   Off

Additional information *Options*

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

Burst command 1 to n	🔒

Navigation	🗔🖵 Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst command 1 to n

Description	Use this function to select the HART command that is sent to the HART master.

Selection	• Command 1 • Command 2 • Command 3 • Command 9 • Command 33 • Command 48

Factory setting	Command 2

Additional information	*Selection*

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

"Command 33" option

The HART device variables are defined via Command 107.

Commands

ℹ️ • 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 (→ 🖺 73).

Burst variable 0	🔒

Navigation	🗔🖵 Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 0

Prerequisite	The **Load rate** option is only available if the volume flow of the medium is read in via the Current input 1 to n (→ 🖺 49) or the fieldbus.

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

Selection	• Conductivity • Corrected conductivity • Temperature • Electronics temperature

- Total solids
- Load rate [*]
- Totalizer 1
- Percent of range
- Measured current
- Current input 1 [*]
- Current input 2 [*]
- Current input 3 [*]
- Primary variable (PV)
- Secondary variable (SV)
- Tertiary variable (TV)
- Quaternary variable (QV)
- HART input
- Not used

Factory setting   Total solids

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

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

Selection   See the **Burst variable 0** parameter (→ 🕮 119).

Factory setting   Not used

Burst variable 2	🔒

Navigation   🖩🗉 Expert → Communication → HART output → Burst config. → Burst config. 1 to n
                            → Burst variable 2

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

Selection   See the **Burst variable 0** parameter (→ 🕮 119).

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
Description	For HART command 9 and 33: select the HART device variable or the process variable.
Selection	See the **Burst variable 0** parameter (→ 🖺 119).
Factory setting	Not used

Burst variable 4   ⓐ

Navigation	ⓐⓔ Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 4
Description	For HART command 9: select the HART device variable or the process variable.
Selection	See the **Burst variable 0** parameter (→ 🖺 119).
Factory setting	Not used

Burst variable 5   ⓐ

Navigation	ⓐⓔ Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 5
Description	For HART command 9: select the HART device variable or the process variable.
Selection	See the **Burst variable 0** parameter (→ 🖺 119).
Factory setting	Not used

Burst variable 6   ⓐ

Navigation	ⓐⓔ Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 6
Description	For HART command 9: select the HART device variable or the process variable.
Selection	See the **Burst variable 0** parameter (→ 🖺 119).
Factory setting	Not used

Burst variable 7		🔒

Navigation	🔘🖥 Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 7
Description	For HART command 9: select the HART device variable or the process variable.
Selection	See the **Burst variable 0** parameter (→ 📖 119).
Factory setting	Not used

Burst trigger mode		🔒

Navigation	🔘🖥 Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Trigger mode
Description	Use this function to select the event that triggers burst message X.
Selection	• Continuous • Window * • Rising * • Falling * • On change
Factory setting	Continuous
Additional information	*Selection* • Continuous The message is sent continuously, at least at intervals corresponding to the time frame specified in the **Burst min period** parameter (→ 📖 123). • Window The message is sent if the specified measured value has changed by the value in the **Burst trigger level** parameter (→ 📖 123). • Rising The message is sent if the specified measured value exceeds the value in the **Burst trigger level** parameter (→ 📖 123). • Falling The message is sent if the specified measured value drops below the value in the **Burst trigger level** parameter (→ 📖 123). • 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
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 (→ 🕮 122) 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.
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.
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	→ 🗎 124
Device ID	→ 🗎 125
Device type	→ 🗎 125
Manufacturer ID	→ 🗎 125
HART revision	→ 🗎 125
HART descriptor	→ 🗎 126
HART message	→ 🗎 126
Hardware revision	→ 🗎 126
Software revision	→ 🗎 126
HART date code	→ 🗎 127

Device revision

Navigation　　　⊞⊟　Expert → Communication → HART output → Information → Device revision

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

User interface　　　2-digit hexadecimal number

Factory setting　　　1

Additional information　　　*Description*

ℹ️ 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
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*

ℹ️ 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
Description	Displays the device type used to register the measuring device with the HART Communication Foundation
User interface	Hexadecimal number
Factory setting	11B3
Additional information	*Description*

ℹ️ 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
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
Description	Use this function to display the HART protocol revision of the measuring device.

User interface	5 to 7

Factory setting	7

HART descriptor   🔒

Navigation	🔲🔲 Expert → Communication → HART output → Information → HART descriptor

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

User entry	Max. 16 characters, such as letters, numbers or special characters (e.g. @, %, /)

Factory setting	TEQWAVE M300 500

HART message   🔒

Navigation	🔲🔲 Expert → Communication → HART output → Information → HART message

Description	Use this function to enter a HART message which is sent via the HART protocol when requested by the master.

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

Factory setting	TEQWAVE M300 500

Hardware revision

Navigation	🔲🔲 Expert → Communication → HART output → Information → Hardware rev.

Description	Displays the hardware revision of the measuring device.

User interface	0 to 255

Factory setting	1

Software revision

Navigation	🔲🔲 Expert → Communication → HART output → Information → Software rev.

Description	Displays the software revision of the measuring device.

User interface	0 to 255

Factory setting   1

| HART date code | 🔒 |

Navigation   🎛🖥 Expert → Communication → HART output → Information → HART date code

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	→ 🔖 128
Primary variable (PV)	→ 🔖 128
Assign SV	→ 🔖 128
Secondary variable (SV)	→ 🔖 129
Assign TV	→ 🔖 129
Tertiary variable (TV)	→ 🔖 130
Assign QV	→ 🔖 130
Quaternary variable (QV)	→ 🔖 131

Assign PV

Navigation	🔤🔲 Expert → Communication → HART output → Output → Assign PV
Prerequisite	The **Load rate** option is only available if the volume flow of the medium is read in via the Current input 1 to n (→ 🔖 49) or the fieldbus.
Description	Use this function to select a measured variable (HART device variable) for the primary dynamic variable (PV).
Selection	• Off • Total solids • Temperature • Electronics temperature • Conductivity • Corrected conductivity • Load rate *
Factory setting	Total solids

Primary variable (PV)

Navigation	🔤🔲 Expert → Communication → HART output → Output → Primary var (PV)
Description	Displays the current measured value of the primary dynamic variable (PV).
User interface	Floating point number with sign
Additional information	*Display*

The measured value displayed depends on the process variable selected in the **Assign PV** parameter (→ 🔖 128).

Dependency

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

Assign SV

Navigation	🔤🔲 Expert → Communication → HART output → Output → Assign SV
Prerequisite	The **Load rate** option is only available if the volume flow of the medium is read in via the Current input 1 to n (→ 🔖 49) or the fieldbus.
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	• Conductivity
	• Corrected conductivity
	• Temperature
	• Electronics temperature
	• Total solids
	• Load rate *
	• Volume flow *
	• Totalizer 1 *
	• Current input 1 *
	• Current input 2 *
	• Current input 3 *
	• HART input

Factory setting	Temperature

Secondary variable (SV)

Navigation	🖩🖳 Expert → Communication → HART output → Output → Second.var(SV)
Description	Displays the current measured value of the secondary dynamic variable (SV).
User interface	Floating point number with sign
Additional information	*Display*
	The measured value displayed depends on the process variable selected in the **Assign SV** parameter (→ 🕮 128).
	Dependency
	🛈 The unit of the displayed measured value is taken from the **System units** submenu (→ 🕮 54).

Assign TV   🔒

Navigation	🖩🖳 Expert → Communication → HART output → Output → Assign TV
Prerequisite	The **Load rate** option is only available if the volume flow of the medium is read in via the Current input 1 to n (→ 🕮 49) or the fieldbus.
Description	Use this function to select a measured variable (HART device variable) for the tertiary (third) dynamic variable (TV).
Selection	• Conductivity
	• Corrected conductivity
	• Temperature
	• Electronics temperature
	• Total solids
	• Load rate *

---

* Visibility depends on order options or device settings

- Volume flow [*]
- Totalizer 1 [*]
- Current input 1 [*]
- Current input 2 [*]
- Current input 3 [*]
- HART input

Factory setting   Electronics temperature

| Tertiary variable (TV) |

Navigation   �🔲 Expert → Communication → HART output → Output → Tertiary var(TV)

Description   Displays the current measured value of the tertiary dynamic variable (TV).

User interface   Floating point number with sign

Additional information *Display*

The measured value displayed depends on the process variable selected in the **Assign TV** parameter (→ 🗎 129).

Dependency

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

| Assign QV | 🔒 |

Navigation   🔲🔲 Expert → Communication → HART output → Output → Assign QV

Prerequisite   The **Load rate** option is only available if the volume flow of the medium is read in via the Current input 1 to n (→ 🗎 49) or the fieldbus.

Description   Use this function to select a measured variable (HART device variable) for the quaternary (fourth) dynamic variable (QV).

Selection   - Conductivity
- Corrected conductivity
- Temperature
- Electronics temperature
- Total solids
- Load rate [*]
- Volume flow [*]
- Totalizer 1 [*]
- Current input 1 [*]
- Current input 2 [*]
- Current input 3 [*]
- HART input

---

* Visibility depends on order options or device settings

Factory setting	Conductivity

Quaternary variable (QV)

Navigation	🅐🅑 Expert → Communication → HART output → Output → Quaterna.var(QV)
Description	Displays the current measured value of the quaternary dynamic variable (QV).
User interface	Floating point number with sign
Additional information	*Display*

The measured value displayed depends on the process variable selected in the **Assign QV** parameter (→ 🕮 130).

Dependency

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

3.6.3   "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).
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 441	→ 🕮 132
Event category 442	→ 🕮 132

Event category 443	→ 🖹 133
Event category 444	→ 🖹 133
Event category 832	→ 🖹 134
Event category 833	→ 🖹 134
Event category 834	→ 🖹 134
Event category 835	→ 🖹 135

Event category 441 (Current output 1 to n)

Navigation   🔲   Expert → Communication → Diag. config. → Event category 441

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   ℹ️ For a detailed description of the event categories available for selection: → 🖹 131

Event category 442 (Frequency output 1 to n)

Navigation   🔲   Expert → Communication → Diag. config. → Event category 442

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: → 🖺 131

Event category 443 (Pulse output 1 to n)   🔒

Navigation	🔢 Expert → Communication → Diag. config. → Event category 443

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: → 🖺 131

Event category 444 (Current input 1 to n)   🔒

Navigation	🔢 Expert → Communication → Diag. config. → Event category 444

Prerequisite   The current input is available.

Description   Use this function to select a category for the **444 Current input 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   *Selection*

        For a detailed description of the event categories available for selection: → 🖺 131

Event category 832 (Electronics temperature too high)   🔒

Navigation	⊞◱ Expert → Communication → Diag. config. → Event category 832
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*

    ℹ️ For a detailed description of the event categories available for selection: → 🗐 131

Event category 833 (Electronics temperature too low)   🔒

Navigation	⊞◱ Expert → Communication → Diag. config. → Event category 833
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*

    ℹ️ For a detailed description of the event categories available for selection: → 🗐 131

Event category 834 (Process temperature too high)   🔒

Navigation	⊞◱ Expert → Communication → Diag. config. → Event category 834
Description	Use this option to select a category for the **834 Process temperature too high** diagnostic message.

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

Factory setting	Out of specification (S)

Additional information	*Selection* For a detailed description of the event categories available for selection: → 🖺 131

Event category 835 (Process temperature too low) 🔒

Navigation	🔘 Expert → Communication → Diag. config. → Event category 835

Description	Use this option to select a category for the **835 Process temperature too low** diagnostic message.

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

Factory setting	Out of specification (S)

Additional information	*Selection* For a detailed description of the event categories available for selection: → 🖺 131

3.6.4 "Web server" submenu

Navigation 🔘🖥 Expert → Communication → Web server

▸ Web server	
Web server language	→ 🖺 136
MAC address	→ 🖺 136
DHCP client	→ 🖺 137
IP address	→ 🖺 137
Subnet mask	→ 🖺 137

Default gateway	→ 🖺 138
Web server functionality	→ 🖺 138
Login page	→ 🖺 138

Web server language

Navigation   🖩🖳 Expert → Communication → Web server → Webserv.language

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)
                                • čeština (Czech)

Factory setting   English

MAC address

Navigation   🖩🖳 Expert → Communication → Web server → MAC Address

Description   Displays the MAC [4] 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

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4)   Media Access Control

DHCP client	🔒

Navigation	🎛️🖥️ Expert → Communication → Web server → DHCP client

Description	Use this function to activate and deactivate the DHCP client functionality.

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 (→ 🗎 138) are set automatically.

> ℹ️ • 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 (→ 🗎 137) 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 (→ 🗎 137) is inactive.

IP address	🔒

Navigation	🎛️🖥️ Expert → Communication → Web server → IP address

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

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
Description	Display or enter the Default gateway (→ 🖺 138).
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.
Description	Use this function to switch the Web server on and off.
Selection	• Off • HTML Off • On
Factory setting	On

Additional information

Description

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

Selection

Option	Description
Off	• The Web server is completely disabled. • Port 80 is locked.
HTML Off	The HTML version of the Web server is not available.
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
Description	Use this function to select the format of the login page.
Selection	• Without header • With header

Factory setting   With header

3.6.5 "WLAN settings" wizard

Navigation   ▤▣   Expert → Communication → WLAN settings

‣ WLAN settings		
WLAN		→ 🖺 140
WLAN mode		→ 🖺 140
SSID name		→ 🖺 140
Network security		→ 🖺 141
Security identification		→ 🖺 141
User name		→ 🖺 141
WLAN password		→ 🖺 142
WLAN IP address		→ 🖺 142
WLAN MAC address		→ 🖺 142
WLAN subnet mask		→ 🖺 143
WLAN MAC address		→ 🖺 142
WLAN passphrase		→ 🖺 143
WLAN MAC address		→ 🖺 142
Assign SSID name		→ 🖺 143
SSID name		→ 🖺 144
2.4 GHz WLAN channel		→ 🖺 144
Select antenna		→ 🖺 144
Connection state		→ 🖺 144
Received signal strength		→ 🖺 145

WLAN IP address	→ 🗎 142
Gateway IP address	→ 🗎 145
IP address domain name server	→ 🗎 145

WLAN 🔒

Navigation	🖩🗔 Expert → Communication → WLAN settings → WLAN
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
Description	Use this function to select the WLAN mode.
Selection	• WLAN access point • WLAN Client
Factory setting	WLAN access point

SSID name 🔒

Navigation	🖩🗔 Expert → Communication → WLAN settings → SSID name
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

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.

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

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

User entry	–

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*   Visibility depends on order options or device settings

| Factory setting | – |

| **WLAN password** | 🔒 |

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

| **WLAN IP address** | 🔒 |

Navigation	🔘🔲 Expert → Communication → WLAN settings → WLAN IP address
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

| **WLAN MAC address** | |

Navigation	🔘🔲 Expert → Communication → WLAN settings → WLAN MAC address
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

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5)   Media Access Control

WLAN subnet mask	⌧

Navigation	▣ Expert → Communication → WLAN settings → WLAN subnet mask
	▣ Expert → Communication → WLAN settings → WLAN subnet mask
	▣▣ Expert → Communication → WLAN settings → WLAN subnet mask

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 passphrase	⌧

Navigation	▣▣ Expert → Communication → WLAN settings → WLAN passphrase

Prerequisite	The **WPA2-PSK** option is selected in the **Security type** parameter (→ 🗎 141).

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

Description	Use this function to select which name is used for the SSID [6].

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.

---

6) Service Set Identifier

SSID name	🔒

Navigation	🔘🖳 Expert → Communication → WLAN settings → SSID name
Prerequisite	• The **User-defined** option is selected in the **Assign SSID name** parameter (→ 🖺 143). • The **WLAN access point** option is selected in the **WLAN mode** parameter (→ 🖺 140).
Description	Use this function to enter a user-defined SSID name.
User entry	Max. 32-digit character string comprising numbers, letters and special characters
Factory setting	

2.4 GHz WLAN channel	🔒

Navigation	🔘🖳 Expert → Communication → WLAN settings → WLAN channel
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.

Select antenna	🔒

Navigation	🔘🖳 Expert → Communication → WLAN settings → Select antenna
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

Connection state	

Navigation	🖳 Expert → Communication → WLAN settings → Connection state
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 |

| Description | Displays the signal strength received. |

User interface	• Low
	• Medium
	• High

| Factory setting | High |

Gateway IP address

| Navigation | ⓐⓔ Expert → Communication → WLAN settings → Gateway IP addr. |

| 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 |

| 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 |

3.7 "Application" submenu

Navigation   Expert → Application

```
▶ Application

            Reset all totalizers                              →  🖹 146

            ▶ Totalizer 1                                     →  🖹 146
```

Reset all totalizers

Navigation   Expert → Application → Reset all tot.

Description   Use this function to reset all totalizers to the value **0** and restart the totaling process. This deletes all the 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 the totalizer to 0 and restarts the totaling process. The previously aggregated load quantity is thus deleted.

3.7.1 "Totalizer 1 to n" submenu

Navigation   Expert → Application → Totalizer 1 to n

```
▶ Totalizer 1

            Assign process variable 1                         →  🖹 147

            Process variable unit 1                           →  🖹 147

            Totalizer 1 operation mode                        →  🖹 148

            Totalizer 1 control                               →  🖹 148
```

	Preset value 1	→ 🖺 149
	Totalizer 1 failure behavior	→ 🖺 149

Assign process variable 1   🔒

Navigation   �’🔲 Expert → Application → Totalizer 1 → AssignVariab. 1

Prerequisite   The **Load rate** option is only available if the volume flow of the medium is read in via the Current input 1 to n (→ 🖺 49) or the fieldbus.

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

Selection   • Off
                              • Load rate *

Factory setting   Off

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 (→ 🖺 147) is still displayed in the **Totalizer 1 to n** submenu. All other parameters in the submenu are hidden.

Process variable unit 1   🔒

Navigation   �’🔲 Expert → Application → Totalizer 1 → VariableUnit 1

Prerequisite   A process variable is selected in the **Assign process variable** parameter (→ 🖺 147) of the **Totalizer 1 to n** submenu.

Description   Use this function to select the process variable unit for the Totalizer 1 to n (→ 🖺 146).

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

                              or

---

* Visibility depends on order options or device settings

Other units
None *

> * Visibility depends on order options or device settings

Factory setting   Depends on country

Additional information   *Description*

ℹ The unit is selected separately for the totalizer and is independent of the option selected in the **System units** submenu (→ 🖺 54).

Options

The selection is dependent on the process variable selected in the **Assign process variable** parameter (→ 🖺 147).

Totalizer 1 operation mode   🔒

Navigation   🔘🔲 Expert → Application → Totalizer 1 → Operat. mode 1

Prerequisite   A process variable is selected in the **Assign process variable** parameter (→ 🖺 147) 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

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 control

Navigation   🔘🔲 Expert → Application → Totalizer 1 → Tot. 1 control

Prerequisite   A process variable is selected in the **Assign process variable** parameter (→ 🖺 147) of the **Totalizer 1 to n** submenu.

Description   Use this function to select the control of totalizer value 1-3.

Selection	• Totalize
	• Reset + hold
	• Preset + hold
	• Reset + totalize
	• Preset + totalize
	• Hold

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.
Hold	Totalizing is stopped.

1)   Visible depending on the order options or device settings

---

Preset value 1

Navigation   Expert → Application → Totalizer 1 → Preset value 1

Prerequisite   A process variable is selected in the **Assign process variable** parameter (→ 🖺 147) 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   0 kg

Additional information   *User entry*

🛈   The unit of the selected process variable is defined in the **Unit totalizer** parameter
     (→ 🖺 147) for the totalizer.

Totalizer 1 failure behavior   🔒

Navigation   Expert → Application → Totalizer 1 → FailureBehav. 1

Prerequisite   A process variable is selected in the **Assign process variable** parameter (→ 🖺 147) 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   Hold

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.

3.8   "Diagnostics" submenu

Navigation   Expert → Diagnostics

▸ **Diagnostics**		
	Actual diagnostics	→ 🖹 151
	Previous diagnostics	→ 🖹 152
	Operating time from restart	→ 🖹 152
	Operating time	→ 🖹 153
	▸ Diagnostic list	→ 🖹 153
	▸ Event logbook	→ 🖹 155
	▸ Device information	→ 🖹 157
	▸ Main electronic module + I/O module 1	→ 🖹 161
	▸ Sensor electronic module (ISEM)	→ 🖹 162
	▸ I/O module 2	→ 🖹 163
	▸ I/O module 3	→ 🖹 164

▶ Display module	→ 🗎 165
▶ Data logging	→ 🗎 166
▶ Min/max values	→ 🗎 174
▶ Heartbeat Technology	→ 🗎 178
▶ Simulation	→ 🗎 179

Actual diagnostics

Navigation   🖩🖳   Expert → Diagnostics → Actual diagnos.

Prerequisite   A diagnostic event has occurred.

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

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

Additional information   *Display*

ℹ️   Additional pending diagnostic messages can be viewed in the **Diagnostic list** submenu (→ 🗎 153).

ℹ️   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 electronics failure

Timestamp

Navigation   🖳   Expert → Diagnostics → Timestamp

Description   Displays the operating time when the current diagnostic message occurred.

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

Additional information   *Display*

ℹ️   The diagnostic message can be viewed via the **Actual diagnostics** parameter (→ 🗎 151).

Example

For the display format:
24d12h13m00s

Previous diagnostics

Navigation	ⓘⓖ Expert → Diagnostics → Prev.diagnostics
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*

ℹ️ 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 electronics failure

Timestamp

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

ℹ️ The diagnostic message can be viewed via the **Previous diagnostics** parameter (→ 🖺 152).

Example

For the display format:
24d12h13m00s

Operating time from restart

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

Operating time

Navigation	@⊛ Expert → Diagnostics → Operating time
Description	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)

3.8.1 "Diagnostic list" submenu

Navigation   @⊛ Expert → Diagnostics → Diagnostic list

```
▶ Diagnostic list

        Diagnostics 1                        → 🗎 153

        Diagnostics 2                        → 🗎 154

        Diagnostics 3                        → 🗎 154

        Diagnostics 4                        → 🗎 154

        Diagnostics 5                        → 🗎 155
```

Diagnostics 1

Navigation	@⊛ Expert → Diagnostics → Diagnostic list → Diagnostics 1
Description	Displays the current diagnostics message with the highest priority.
User interface	Symbol for diagnostic behavior, diagnostic code and short message.
Additional information	*Display*

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

Examples

For the display format:
- ⊗F271 Main electronics failure
- ⊗F276 I/O module failure

Diagnostics 2

Navigation	�e🔲 Expert → Diagnostics → Diagnostic list → Diagnostics 2
Description	Displays the current diagnostics message with the second-highest priority.
User interface	Symbol for diagnostic behavior, diagnostic code and short message.
Additional information	*Display*

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

Examples

For the display format:
- ⊗F271 Main electronics failure
- ⊗F276 I/O module failure

Diagnostics 3

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

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

Examples

For the display format:
- ⊗F271 Main electronics failure
- ⊗F276 I/O module failure

Diagnostics 4

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

Additional information   *Display*

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

Examples

For the display format:
- ⊗F271 Main electronics failure
- ⊗F276 I/O module failure

Diagnostics 5

Navigation   ⊞⊟ Expert → Diagnostics → Diagnostic list → Diagnostics 5

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:
- ⊗F271 Main electronics failure
- ⊗F276 I/O module failure

3.8.2   "Event logbook" submenu

Viewing event messages

Event messages are displayed in chronological order. The event history includes both
diagnostic events and information events. The symbol in front of the timestamp indicates
whether the event has started or ended.

Navigation   ⊟   Expert → Diagnostics → Event logbook

▶ Event logbook	
Filter options	→ 🖪 156

Filter options   🔒

Navigation   ⌂⊞   Expert → Diagnostics → Event logbook → Filter options

Description   Use this function to select the category whose event messages are displayed in the event
                               list of the local display.

Selection   • All
                               • Failure (F)
                               • Function check (C)
                               • Out of specification (S)
                               • Maintenance required (M)
                               • Information (I)

Factory setting   All

Additional information   *Description*

                               ℹ️ The status signals are categorized in accordance with VDI/VDE 2650 and NAMUR
                                   Recommendation NE 107:
                                   • F = Failure
                                   • C = Function Check
                                   • S = Out of Specification
                                   • M = Maintenance Required

                               "Event list" submenu

                               ℹ️ The **Event list** submenu is only displayed if operating via the local display.

                                   If operating via the FieldCare operating tool, the event list can be read out with a
                                   separate FieldCare module.

                                   If operating via the Web browser, the event messages can be found directly in the
                                   Event logbook submenu.

                               Navigation   ⊞⊟   Expert → Diagnostics → Event logbook → Event list

                               ┌───┐
                               │ ▸ Event list   │
                               │   │
                               │   Event list   → 📄 156   │
                               └───┘
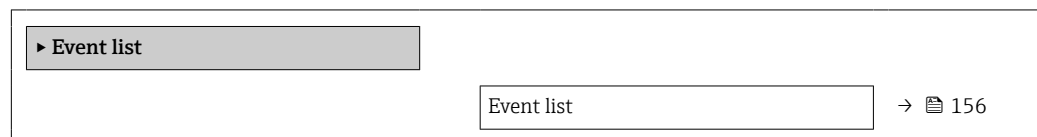
Event list

Navigation   ⌂   Expert → Diagnostics → Event logbook → Event list

Description   Displays the history of event messages of the category selected in the **Filter options**
                               parameter (→ 📄 156).

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

Additional information   *Description*

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

If the **Extended HistoROM** application package (order option) is enabled in the device, the
event list can contain up to 100 entries .

The following symbols indicate whether an event has occurred or has ended:
• ⊙: Occurrence of the event
• ⊙: End of the event

Examples

For the display format:
• I1091 Configuration modified
  ⊙ 24d12h13m00s
• ⊗F271 Main electronics failure
  ⊙ 01d04h12min30s

HistoROM

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

3.8.3   "Device information" submenu

Navigation   ▣▣   Expert → Diagnostics → Device info

▸ Device information	
Device tag	→ 🖺 158
Serial number	→ 🖺 158
Firmware version	→ 🖺 159
Device name	→ 🖺 159
Order code	→ 🖺 159
Extended order code 1	→ 🖺 159
Extended order code 2	→ 🖺 160
Extended order code 3	→ 🖺 160

Configuration counter	→ 🖹 160
ENP version	→ 🖹 160

Device tag

Navigation   🖩🖵 Expert → Diagnostics → Device info → Device tag

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

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

Factory setting   Teqwave M

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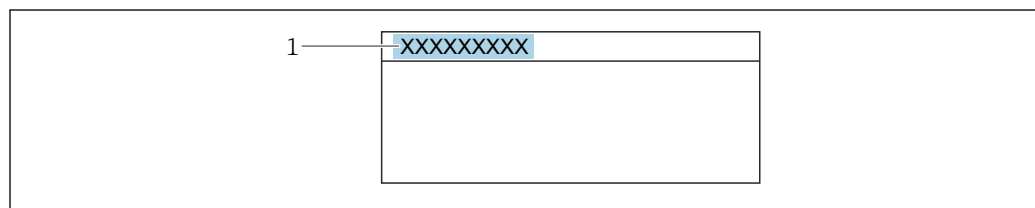
1   Position of the header text on the display

The number of characters displayed depends on the characters used.

Serial number

Navigation   🖩🖵 Expert → Diagnostics → Device info → Serial number

Description   Displays the serial number of the measuring device.

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

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

Additional information   *Description*

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

Firmware version

Navigation	ⓞⓔ Expert → Diagnostics → Device info → Firmware version
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
Description	Displays the name of the transmitter. It can also be found on the nameplate of the transmitter.
User interface	Character string comprising numbers, letters and special characters

Order code	🔒

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

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

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

Extended order code 1	🔒

Navigation	ⓞⓔ Expert → Diagnostics → Device info → Ext. order cd. 1
Description	Displays the first part of the extended order code.

On account of length restrictions, the extended order code is split into a maximum of 3 parameters.

User interface   Character string

Additional information   *Description*

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

Extended order code 2	🔒

Navigation   🔘🖥 Expert → Diagnostics → Device info → Ext. order cd. 2

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 (→ 🔖 159)

Extended order code 3	🔒

Navigation   🔘🖥 Expert → Diagnostics → Device info → Ext. order cd. 3

Description   Displays the third part of the extended order code.

User interface   Character string

Additional information   For additional information, see **Extended order code 1** parameter (→ 🔖 159)

Configuration counter

Navigation   🔘🖥 Expert → Diagnostics → Device info → Config. counter

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

User interface   0 to 65 535

ENP version

Navigation   🔘🖥 Expert → Diagnostics → Device info → ENP version

Description   Displays the version of the electronic nameplate.

User interface	Character string

Factory setting	2.02.00

Additional information   *Description*

This electronic nameplate stores a data record for device identification that includes more data than the nameplates attached to the outside of the device.

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

Navigation   ▣▢ Expert → Diagnostics → Main elec.+I/O1

```
▶ Main electronic module + I/O
  module 1
```

Firmware version	→ ▤ 161
Build no. software	→ ▤ 161
Bootloader revision	→ ▤ 162

Firmware version

Navigation	▣▢ Expert → Diagnostics → Main elec.+I/O1 → Firmware version

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

User interface	Positive integer

Build no. software

Navigation	▣▢ Expert → Diagnostics → Main elec.+I/O1 → Build no. softw.

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

User interface	Positive integer

Bootloader revision
_____

Navigation   ⌨⊞   Expert → Diagnostics → Main elec.+I/O1 → Bootloader rev.

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

User interface   Positive integer

3.8.5   "Sensor electronic module (ISEM)" submenu

Navigation   ⌨⊞   Expert → Diagnostics → Sens. electronic

► Sensor electronic module (ISEM)	
Firmware version	→ 🗎 162
Build no. software	→ 🗎 162
Bootloader revision	→ 🗎 163

Firmware version
_____

Navigation   ⌨⊞   Expert → Diagnostics → Sens. electronic → Firmware version

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.

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.

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

User interface   Positive integer

3.8.6   "I/O module 2" submenu

Navigation   ⊞⊟   Expert → Diagnostics → I/O module 2

▸ I/O module 2	
I/O module 2 terminal numbers	→ 🖺 163
Firmware version	→ 🖺 163
Build no. software	→ 🖺 164
Bootloader revision	→ 🖺 164

I/O module 2 terminal numbers

Navigation   ⊞⊟   Expert → Diagnostics → I/O module 2 → I/O 2 terminals

Description   Displays the terminal numbers used by the I/O module.

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

Firmware version

Navigation   ⊞⊟   Expert → Diagnostics → I/O module 2 → Firmware version

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

User interface   Positive integer

Build no. software

Navigation   �🖽 Expert → Diagnostics → I/O module 2 → Build no. softw.

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

User interface   Positive integer

Bootloader revision

Navigation   �🖽 Expert → Diagnostics → I/O module 2 → Bootloader rev.

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

User interface   Positive integer

3.8.7   "I/O module 3" submenu

Navigation   �🖽 Expert → Diagnostics → I/O module 3

▸ I/O module 3	
I/O module 3 terminal numbers	→ 🖺 164
Firmware version	→ 🖺 165
Build no. software	→ 🖺 165
Bootloader revision	→ 🖺 165

I/O module 3 terminal numbers

Navigation   �🖽 Expert → Diagnostics → I/O module 3 → I/O 3 terminals

Description   Displays the terminal numbers used by the I/O module.

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

Firmware version

Navigation   ⌨️🖥️ Expert → Diagnostics → I/O module 3 → Firmware version

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

User interface   Positive integer

Build no. software

Navigation   ⌨️🖥️ Expert → Diagnostics → I/O module 3 → Build no. softw.

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

User interface   Positive integer

Bootloader revision

Navigation   ⌨️🖥️ Expert → Diagnostics → I/O module 3 → Bootloader rev.

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

User interface   Positive integer

3.8.8   "Display module" submenu

Navigation   ⌨️🖥️ Expert → Diagnostics → Display module

▶ Display module	
Firmware version	→ 🖺 166
Build no. software	→ 🖺 166
Bootloader revision	→ 🖺 166

Firmware version

Navigation   ◉▣   Expert → Diagnostics → Display module → Firmware version

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.

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.

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

User interface   **Positive integer**

3.8.9   "Data logging" submenu

Navigation   ◉▣   Expert → Diagnostics → Data logging

▶ Data logging		
Assign channel 1		→ 🖹 167
Assign channel 2		→ 🖹 168
Assign channel 3		→ 🖹 168
Assign channel 4		→ 🖹 168
Logging interval		→ 🖹 169
Clear logging data		→ 🖹 169

Data logging	→ 🖺 170
Logging delay	→ 🖺 170
Data logging control	→ 🖺 170
Data logging status	→ 🖺 171
Entire logging duration	→ 🖺 171

Assign channel 1 🔒

Navigation	🗆🗆 Expert → Diagnostics → Data logging → Assign chan. 1
Prerequisite	• The **Load rate** option is only available if the volume flow of the medium is read in via the Current input 1 to n (→ 🖺 49) or the fieldbus. • The **Extended HistoROM** application package is available. 🛈 The software options currently enabled are displayed in the **Software option overview** parameter (→ 🖺 45).
Description	Use this function to assign a process variable to the data logging channel.
Selection	• Off • Total solids • Temperature • Electronics temperature • Conductivity • Corrected conductivity • Load rate * • Current output 1 * • Current output 2 * • Current output 3 * • Current output 4 *
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). 🛈 The log contents are cleared if the option selected is changed.

---

* Visibility depends on order options or device settings

Assign channel 2   🔒

Navigation	🔘🔲 Expert → Diagnostics → Data logging → Assign chan. 2
Prerequisite	• The **Load rate** option is only available if the volume flow of the medium is read in via the Current input 1 to n (→ 🖽 49) or the fieldbus. • The **Extended HistoROM** application package is available. ℹ️ The software options currently enabled are displayed in the **Software option overview** parameter (→ 🖽 45).
Description	Use this function to assign a process variable to the logging channel.
Selection	For the picklist, see **Assign channel 1** parameter (→ 🖽 167)
Factory setting	Off

Assign channel 3   🔒

Navigation	🔘🔲 Expert → Diagnostics → Data logging → Assign chan. 3
Prerequisite	• The **Load rate** option is only available if the volume flow of the medium is read in via the Current input 1 to n (→ 🖽 49) or the fieldbus. • The **Extended HistoROM** application package is available. ℹ️ The software options currently enabled are displayed in the **Software option overview** parameter (→ 🖽 45).
Description	Use this function to assign a process variable to the logging channel.
Selection	For the picklist, see **Assign channel 1** parameter (→ 🖽 167)
Factory setting	Off

Assign channel 4   🔒

Navigation	🔘🔲 Expert → Diagnostics → Data logging → Assign chan. 4
Prerequisite	• The **Load rate** option is only available if the volume flow of the medium is read in via the Current input 1 to n (→ 🖽 49) or the fieldbus. • The **Extended HistoROM** application package is available. ℹ️ The software options currently enabled are displayed in the **Software option overview** parameter (→ 🖽 45).
Description	Use this function to assign a process variable to the logging channel.
Selection	For the picklist, see **Assign channel 1** parameter (→ 🖽 167)
Factory setting	Off

Logging interval	🔒

Navigation	🖩🖵 Expert → Diagnostics → Data logging → Logging interval

Prerequisite	The **Extended HistoROM** application package is available.

ℹ️ The software options currently enabled are displayed in the **Software option overview** parameter (→ 🖺 45).

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).

ℹ️ 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 ≈15 min
• $T_{log} = 1000 \times 10$ s = 10 000 s ≈ 3 h
• $T_{log} = 1000 \times 80$ s = 80 000 s ≈ 1 d
• $T_{log} = 1000 \times 3\ 600$ s = 3 600 000 s ≈ 41 d

Clear logging data	🔒

Navigation	🖩🖵 Expert → Diagnostics → Data logging → Clear logging

Prerequisite	The **Extended HistoROM** application package is available.

ℹ️ The software options currently enabled are displayed in the **Software option overview** parameter (→ 🖺 45).

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

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

Prerequisite   In the **Data logging** parameter (→ 🗎 170), 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 (→ 🗎 170),
                            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

Prerequisite   In the **Data logging** parameter (→ 🗎 170), 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 |

| Prerequisite | In the **Data logging** parameter (→ 🖺 170), 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 |

| Prerequisite | In the **Data logging** parameter (→ 🖺 170), 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          →  🖹 172
```
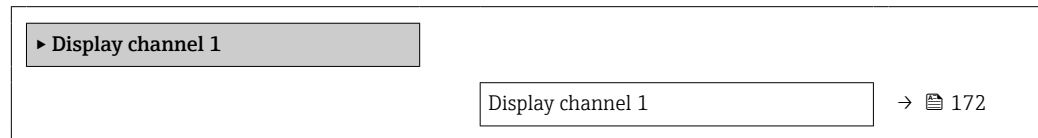
Display channel 1

Navigation	🔲 Expert → Diagnostics → Data logging → Displ.channel 1

Prerequisite	The **Extended HistoROM** application package is available.
	ℹ️ The software options currently enabled are displayed in the **Software option overview** parameter (→ 🖹 45).

Description	Displays the measured value trend for the logging channel in the form of a chart.

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

"Display channel 2" submenu

Navigation   🔲   Expert → Diagnostics → Data logging → Displ.channel 2

```
▶ Display channel 2

                                    Display channel 2          →  🖹 173
```

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 → 🖺 172

"Display channel 3" submenu

Navigation   ⊠   Expert → Diagnostics → Data logging → Displ.channel 3

▸ Display channel 3

Display channel 3	→ 🖺 173

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 → 🖺 172

"Display channel 4" submenu

Navigation   ⊠   Expert → Diagnostics → Data logging → Displ.channel 4

▸ Display channel 4

Display channel 4	→ 🖺 173

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 → 🖹 172

3.8.10   "Min/max values" submenu

Navigation   🖩🗔   Expert → Diagnostics → Min/max val.

```
‣ Min/max values
                    ‣ Electronics temperature                → 🖹 174

                    ▶ Main electronics temperature           → 🖹 175

                    ▶ Sensor electronics temperature         → 🖹 176
                      (ISEM)

                    ▶ Medium temperature                     → 🖹 176

                    ▶ Total solids                           → 🖹 177

                    ▶ Conductivity                           → 🖹 178
```

"Electronics temperature" submenu

Navigation   🖩🗔   Expert → Diagnostics → Min/max val. → Electronics temp

```
‣ Electronics temperature

                    Minimum value                            → 🖹 174

                    Maximum value                            → 🖹 175
```

Minimum value

Navigation   🖩🗔   Expert → Diagnostics → Min/max val. → Electronics temp → Minimum value

Description   Shows the lowest electronics temperature measured to date.

User interface   Positive floating-point number

Maximum value

Navigation	ⓘⓘ Expert → Diagnostics → Min/max val. → Electronics temp → Maximum value
Description	Shows the highest electronics temperature measured to date.
User interface	Positive floating-point number

"Main electronics temperature" submenu

Navigation   ⓘⓘ Expert → Diagnostics → Min/max val. → Main elect.temp.

```
▶ Main electronics temperature

        Minimum value                                              → 🖻 175

        Maximum value                                              → 🖻 175
```

Minimum value

Navigation	ⓘⓘ Expert → Diagnostics → Min/max val. → Main elect.temp. → Minimum value
Description	Shows the lowest temperature measured to date for the main electronic module.
User interface	Signed floating-point number
Additional information	*Dependency*
	ⓘ The unit is taken from the **Temperature unit** parameter (→ 🖻 56)

Maximum value

Navigation	ⓘⓘ Expert → Diagnostics → Min/max val. → Main elect.temp. → Maximum value
Description	Shows the highest temperature measured to date for the main electronic module.
User interface	Signed floating-point number
Additional information	*Dependency*
	ⓘ The unit is taken from the **Temperature unit** parameter (→ 🖻 56)

"Sensor electronics temperature (ISEM)" submenu

Navigation　　　�@🔲　Expert → Diagnostics → Min/max val. → Sensor elec.temp

▸ Sensor electronics temperature (ISEM)		
Minimum value		→ 🖺 176
Maximum value		→ 🖺 176

Minimum value

Navigation　　　�@🔲　Expert → Diagnostics → Min/max val. → Sensor elec.temp → Minimum value

Description　　　Shows the lowest temperature measured to date for the sensor electronic module.

User interface　　　Signed floating-point number

Maximum value

Navigation　　　�@🔲　Expert → Diagnostics → Min/max val. → Sensor elec.temp → Maximum value

Description　　　Shows the highest temperature measured to date for the sensor electronic module.

User interface　　　Signed floating-point number

"Medium temperature" submenu

Navigation　　　�@🔲　Expert → Diagnostics → Min/max val. → Medium temp.

▸ Medium temperature		
Minimum value		→ 🖺 177
Maximum value		→ 🖺 177

Minimum value

Navigation   ⊞⊟ Expert → Diagnostics → Min/max val. → Medium temp. → Minimum value

Description   Shows the lowest medium temperature measured to date.

User interface   Positive floating-point number

Maximum value

Navigation   ⊞⊟ Expert → Diagnostics → Min/max val. → Medium temp. → Maximum value

Description   Shows the highest medium temperature measured to date.

User interface   Positive floating-point number

"Total solids" submenu

Navigation   ⊞⊟ Expert → Diagnostics → Min/max val. → Total solids

▸ Total solids	
Maximum value	→ 🖺 177
Minimum value	→ 🖺 177
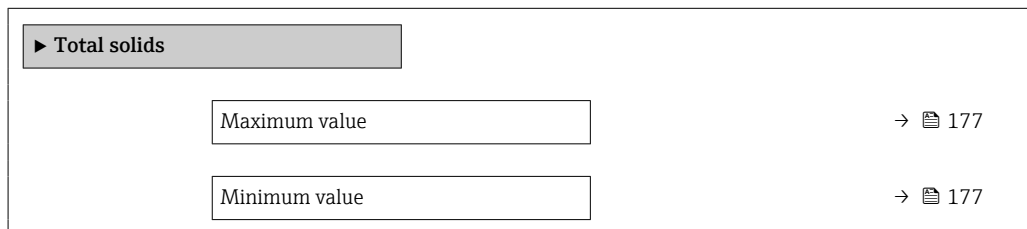
Maximum value

Navigation   ⊞⊟ Expert → Diagnostics → Min/max val. → Total solids → Maximum value

Description   Shows the highest total solids value measured to date.

User interface   Positive floating-point number

Minimum value

Navigation   ⊞⊟ Expert → Diagnostics → Min/max val. → Total solids → Minimum value

Description   Shows the lowest total solids value measured to date.

User interface   Positive floating-point number

"Conductivity" submenu

Navigation   ◉◻   Expert → Diagnostics → Min/max val. → Conductivity

▸ Conductivity		
	Maximum value	→ 🖻 178
	Minimum value	→ 🖻 178
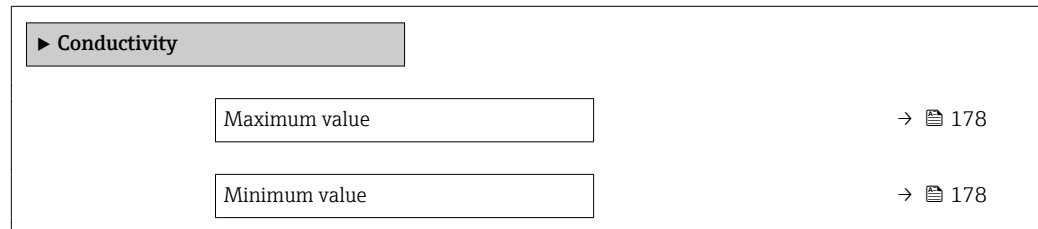
Maximum value

Navigation   ◉◻   Expert → Diagnostics → Min/max val. → Conductivity → Maximum value

Description   Shows the highest conductivity measured to date.

User interface   Positive floating-point number

Minimum value

Navigation   ◉◻   Expert → Diagnostics → Min/max val. → Conductivity → Minimum value

Description   Shows the lowest conductivity measured to date.

User interface   Positive floating-point number

3.8.11   "Heartbeat Technology" submenu

📖 For detailed information on the parameter descriptions of the **Heartbeat Verification** application package, see the Special Documentation for the device → 🖻 7

Navigation   ◉◻   Expert → Diagnostics → Heartbeat Techn.

3.8.12   "Simulation" submenu

Navigation   ⊞⊟   Expert → Diagnostics → Simulation

| Assign simulation process variable | 🔒 |

| Navigation | 🆎🖳 Expert → Diagnostics → Simulation → Assign proc.var. |

| Prerequisite | The **Load rate** option is only available if the volume flow of the medium is read in via the Current input 1 to n (→ 🖺 49) or the fieldbus. |

| Description | Select a process variable for the simulation process that is activated. |

| Selection | • Off
• Load rate *
• Total solids
• Temperature
• Electronics temperature
• Conductivity
• Corrected conductivity |

| Factory setting | Off |

| Process variable value | 🔒 |

| Navigation | 🆎🖳 Expert → Diagnostics → Simulation → Proc. var. value |

| Description | Enter the simulation value for the selected process variable. |

| User entry | Signed floating-point number |

| Factory setting | 0 |

| Current input 1 to n simulation | 🔒 |

| Navigation | 🆎🖳 Expert → Diagnostics → Simulation → Curr.inp 1 to n sim. |

| Description | Option for switching simulation of the current input on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress. |

ℹ️ The desired simulation value is defined in the **Value current input 1 to n** parameter.

| Selection | • Off
• On |

| Factory setting | Off |

---

* Visibility depends on order options or device settings

Additional information   *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 input 1 to n	🔒

Navigation   🔲📟 Expert → Diagnostics → Simulation → Value curr.inp 1 to n

Prerequisite   In the **Current input 1 to n simulation** parameter, the **On** option is selected.

Description   Use this function to enter the current value for the simulation. In this way, users can verify the correct configuration of the current input and the correct function of upstream feed-in units.

User entry   0 to 22.5 mA

Status input 1 to n simulation	🔒

Navigation   🔲📟 Expert → Diagnostics → Simulation → Status inp 1 to n sim

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*

ℹ The desired simulation value is defined in the **Input signal level** parameter
(→ 🗎 182).

Selection

• Off
Simulation for the status input is switched off. The device is in normal measuring mode or another process variable is being simulated.
• On
Simulation for the status input is active.

Input signal level 1 to n	⌂

Navigation	ⓢ⌨ Expert → Diagnostics → Simulation → Signal level 1 to n
Prerequisite	In the **Status input simulation** parameter (→ 🔲 181), the **On** option is selected.
Description	Use this function to select the signal level for the simulation of the status input. In this way, users can verify the correct configuration of the status input and the correct function of upstream feed-in units.
Selection	• High • Low

Current output 1 to n simulation	⌂

Navigation	ⓢ⌨ Expert → Diagnostics → Simulation → Curr.outp 1 to n sim.
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 defined in the **Value current output 1 to n** parameter.
	
	Selection
	• Off
	  Current simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
	• On
	  Current simulation is active.

Current output value	⌂

Navigation	ⓢ⌨ Expert → Diagnostics → Simulation → Curr.outp val.
Prerequisite	In the **Current output 1 to n simulation** parameter, the **On** option is selected.
Description	Use this function to enter a current value for the simulation. In this way, users can verify the correct adjustment of the current output and the correct function of downstream switching units.
User entry	3.59 to 22.5 mA

Additional information   *Dependency*

The input range is dependent on the option selected in the **Current span** parameter
(→ 🗎 75).

Frequency output 1 to n simulation	🔒

Navigation   🔘🖥️ Expert → Diagnostics → Simulation → Freq.outp 1 to n sim.

Prerequisite   In the **Operating mode** parameter (→ 🗎 87), the **Frequency** option is selected.

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

Selection   • Off
                        • On

Factory setting   Off

Additional information *Description*

ℹ️ The desired simulation value is defined in the **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.

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

Prerequisite | In the **Operating mode** parameter (→ 🖺 87), 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 (→ 🖺 89).
• Down-counting value
The pulses specified in the **Pulse value** parameter (→ 🖺 184) are output.

Pulse value 1 to n

Navigation	🗏🖳 Expert → Diagnostics → Simulation → Pulse value 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 65535

Switch output simulation 1 to n

Navigation	🗏🖳 Expert → Diagnostics → Simulation → Switch sim. 1 to n

Prerequisite | In the **Operating mode** parameter (→ 🖺 87), 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*

ℹ️ 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

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

Selection	• Open
	• Closed

Additional information	*Selection*

• Open
Switch simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
• Closed
Switch simulation is active.

Relay output 1 to n simulation   🔒

Navigation	🗗🖩 Expert → Diagnostics → Simulation → Relay out. 1 to n sim

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

Selection	• Off
	• On

Factory setting	Off

Additional information   *Description*

ℹ The desired simulation value is defined in the **Switch state 1 to n** parameter.

Selection

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

Switch state 1 to n   🔒

Navigation   🖩🖵 Expert → Diagnostics → Simulation → Switch state 1 to n

Prerequisite   The **On** option is selected in the **Switch output simulation 1 to n** parameter parameter.

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

Selection   • Open
• Closed

Additional information   *Selection*

• Open
Relay simulation is switched off. The device is in normal measuring mode or another
process variable is being simulated.
• Closed
Relay simulation is active.

Device alarm simulation   🔒

Navigation   🖩🖵 Expert → Diagnostics → Simulation → Dev. alarm sim.

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
Description	Use this function to select the category of the diagnostic events that are displayed for the simulation in the **Diagnostic event simulation** parameter (→ 🔲 187).
Selection	• Sensor • Electronics • Configuration • Process
Factory setting	Process

Diagnostic event simulation	🔒

Navigation	⌨🖵 Expert → Diagnostics → Simulation → Diagnostic event
Description	Use this function to select a diagnostic event for the simulation process that is activated.
Selection	• Off • Diagnostic event picklist (depends on the category selected)
Factory setting	Off
Additional information	*Description*
	For the simulation, you can choose from the diagnostic events of the category selected in the **Diagnostic event category** parameter (→ 🔲 187).

4   Country-specific factory settings

4.1   SI units

ℹ️ The country-specific factory setting in SI units is made for all countries except the USA and Canada.

4.1.1   System units

Process variable	Unit
Total solids	%TS
Density	g/l
Mass flow	kg/h
Mass	kg
Volume	l/h
Temperature	℃
Conductivity	µS/cm
Load rate	kg/h

ℹ️ For further information on system units, see: **System units** submenu (→ 📖 54)

4.1.2   Output current span

Output	Current range
Current output 1 to n	4 to 20 mA NAMUR

ℹ️ For further information on the current ranges, see: **Current range output** parameter (→ 📖 75)

4.2   US units

ℹ️ The country-specific factory setting in US units is made for the USA and Canada.

4.2.1   System units

Process variable	Unit
Total solids	%TS
Density	lb/ft³
Mass flow	lb/h
Mass	lb
Volume	l/h
Temperature	℉

Process variable	Unit
Conductivity	µS/cm
Load rate	lb/h

ℹ For further information on system units, see: **System units** submenu (→ 🗏 54)

4.2.2 Output current span

Output	Current range
Current output 1 to n	4 to 20 mA US

ℹ For further information on the current ranges, see: **Current range output** parameter (→ 🗏 75)

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