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71645371
2024-05-15

Valid as of version
01.00.zz (Device firmware)

Description of Device Parameters
Proline Prosonic Flow I 400

Ultrasonic time-of-flight flowmeter
Modbus RS485

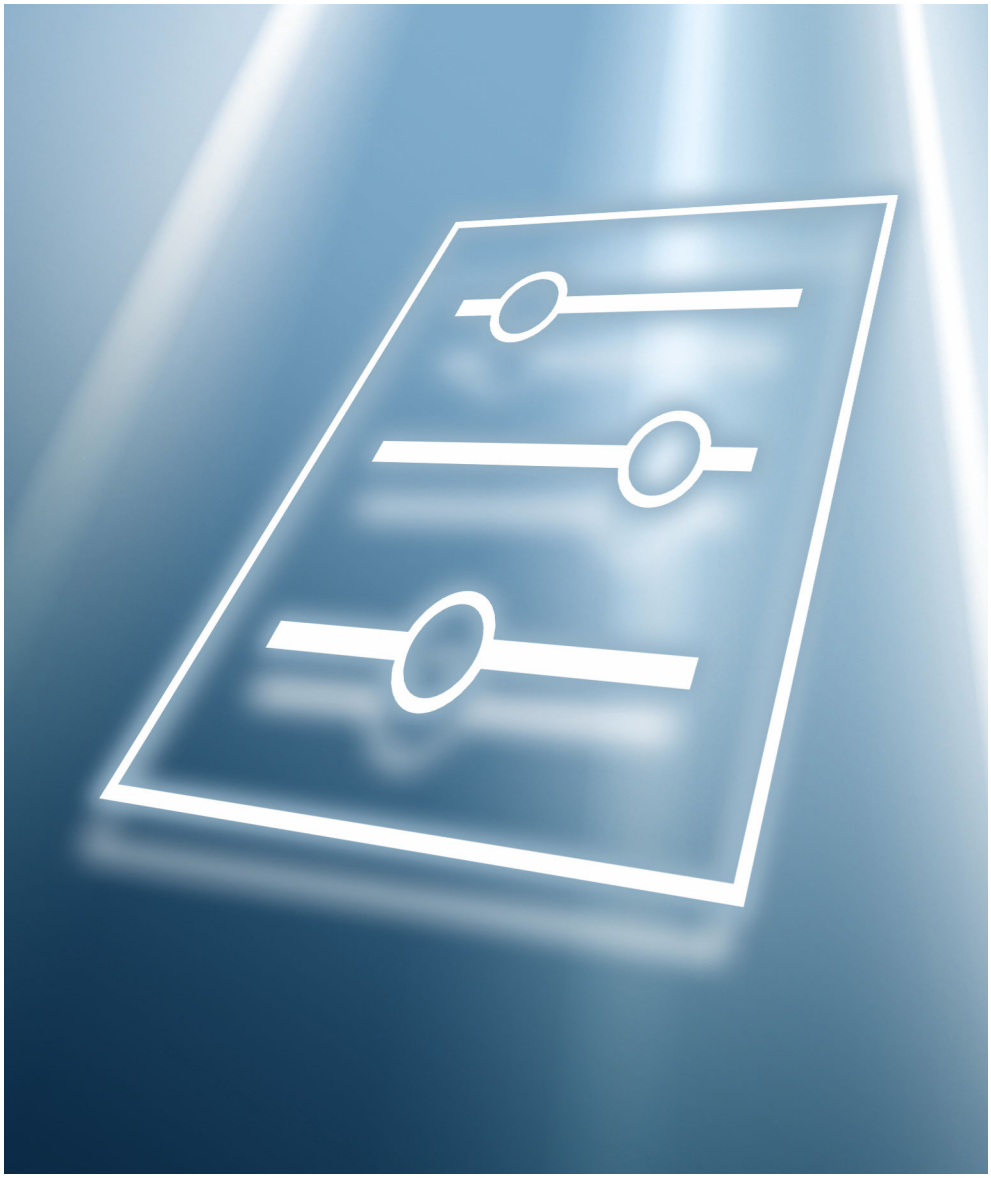

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Table of contents

1 About this document

1.1 Document function

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

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

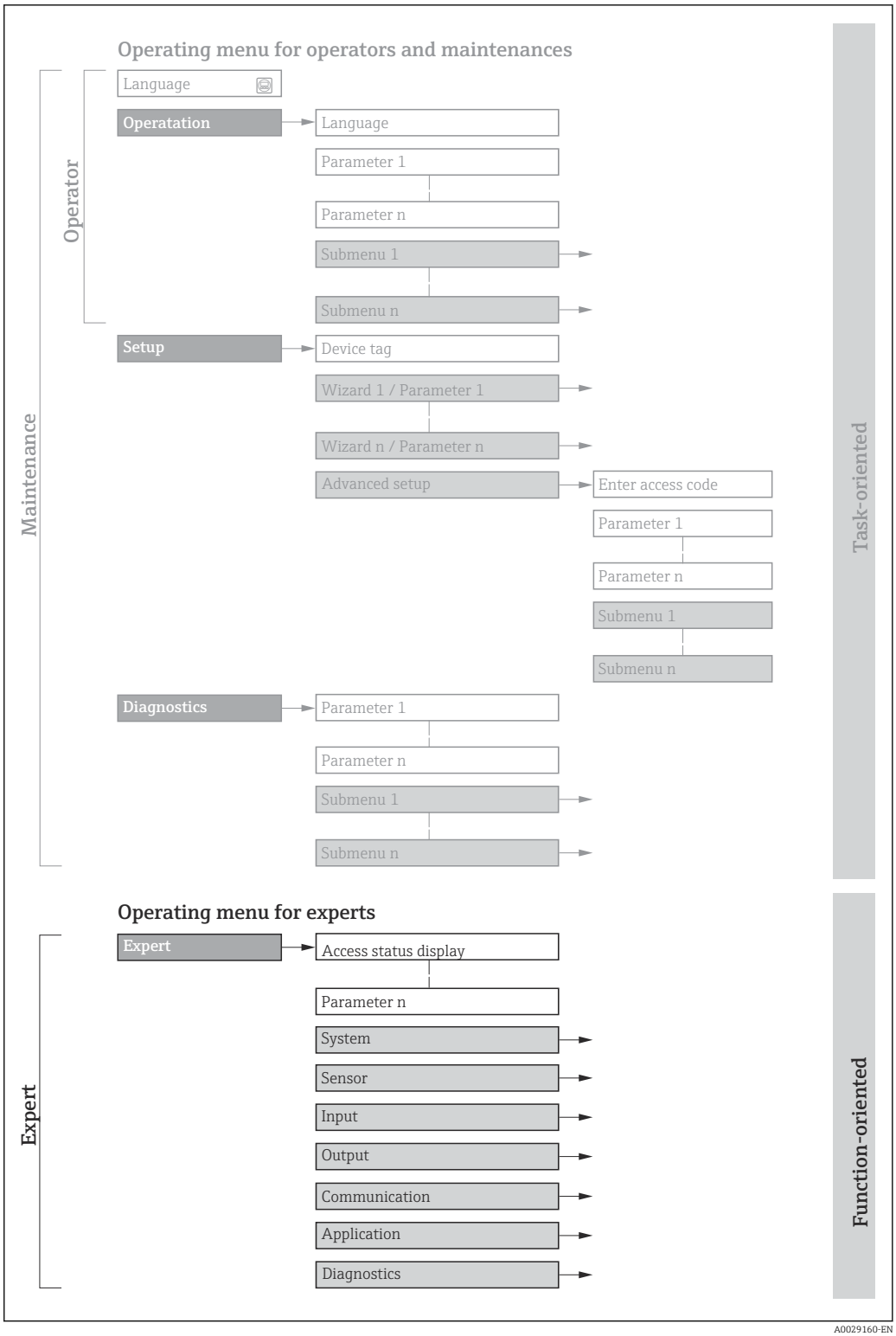
1.2 Target group

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

1.3 Using this document

1.3.1 Information on the document structure

The document lists the submenus and their parameters according to the structure from the **Expert** menu (→ 🖹 8), which is displayed when the **"Maintenance" user role** is enabled.



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

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

1.3.2 Structure of a parameter description

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

Complete parameter name	Write-protected parameter =

Navigation
Navigation path to the parameter via the local display (direct access code) or web browser
Navigation path to the parameter via the operating tool
The names of the menus, submenus and parameters are abbreviated to the form in which they appear on the display and in the operating tool.

Prerequisite
The parameter is only available under these specific conditions

Description
Description of the parameter function

Selection
List of the individual options for the parameter
- Option 1
- Option 2

User entry
Parameter entry range

Display
Display value/data of the parameter

Factory setting
Default setting ex works

Additional information
Additional explanations (e.g. in examples):
- For individual options
- For display value/data
- For the input range
- For the factory setting
- For the parameter function

1.4 Symbols used

1.4.1 Symbols for certain types of information

Symbol	Meaning
	Tip Indicates additional information.
	Reference to documentation
	Reference to page
	Reference to graphic
A0028662	Operation via local display
A0028663	Operation via operating tool
A0028665	Write-protected parameter

1.4.2 Symbols in graphics

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

1.5 Documentation

1.5.1 Standard documentation

Operating Instructions

Measuring device	Documentation code
Prosonic Flow I 400	BA02303D

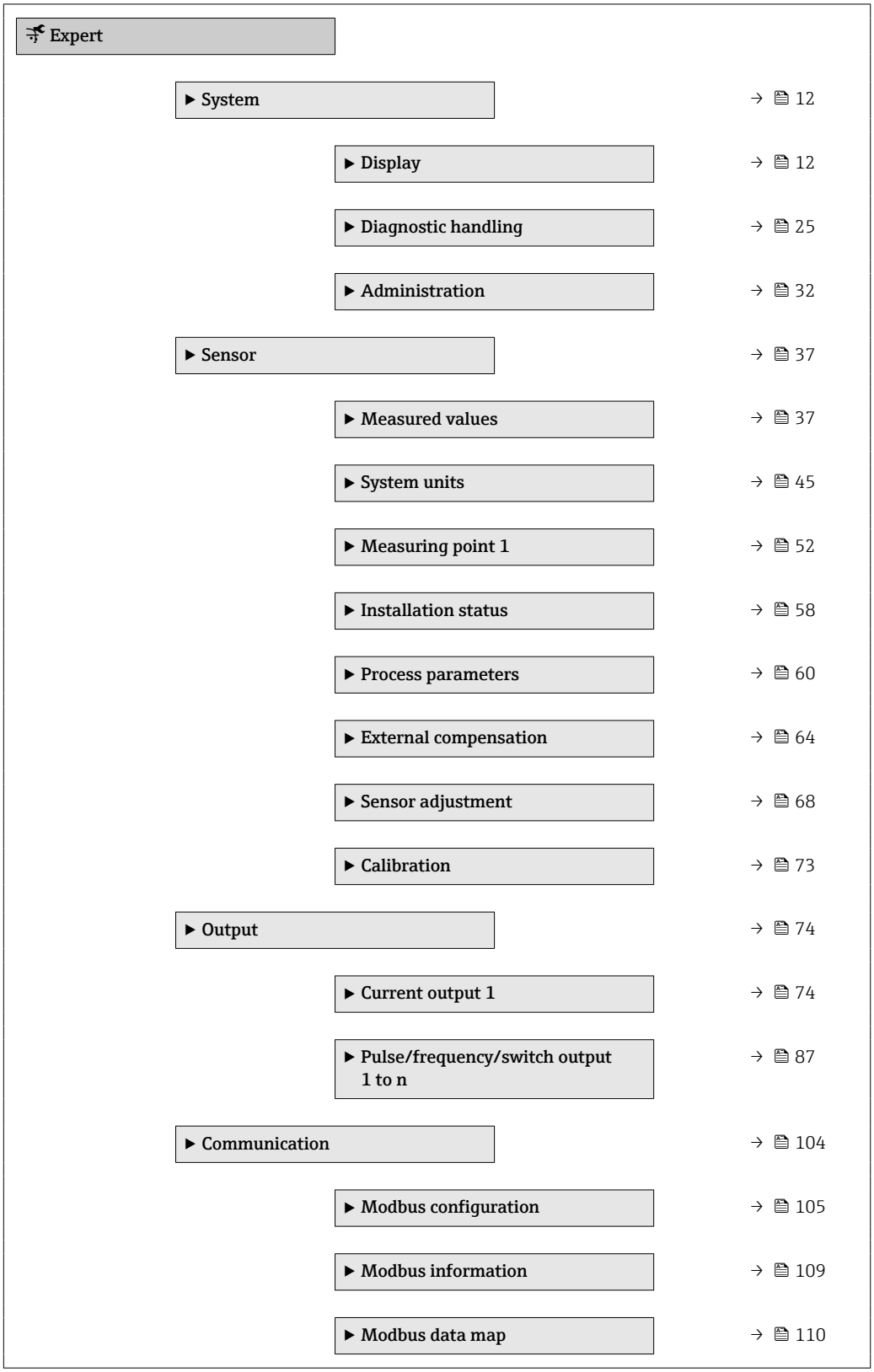
1.5.2 Supplementary device-dependent documentation

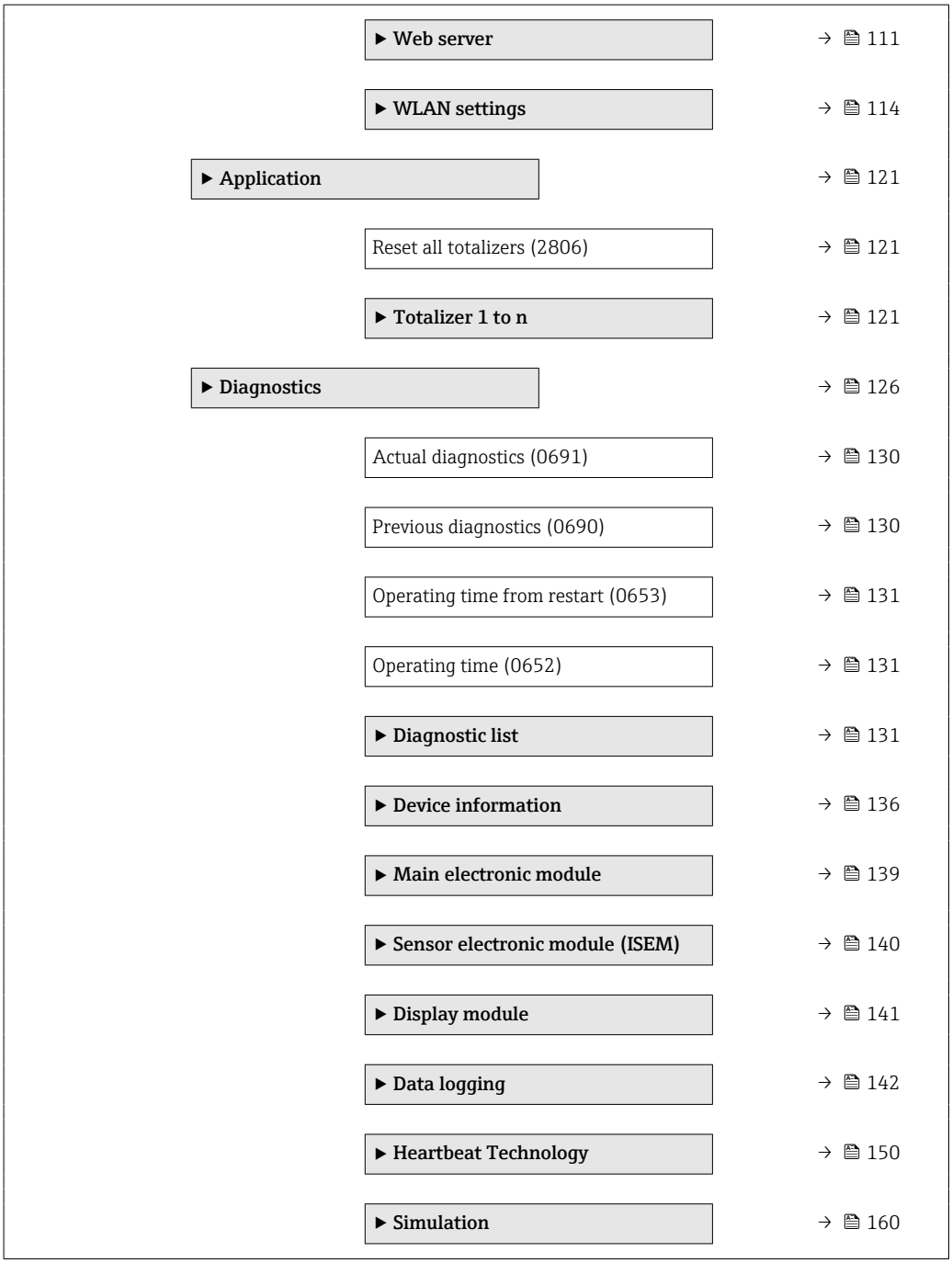
Special Documentation

Content	Documentation code
Radio approvals for WLAN interface for A309/A310 display module	SD01793D
Heartbeat Technology	SD03132D

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.




▶ Web server → 111
▶ WLAN settings → 114
▶ Application → 121
Reset all totalizers (2806) → 121
▶ Totalizer 1 to n → 121
▶ Diagnostics → 126
Actual diagnostics (0691) → 130
Previous diagnostics (0690) → 130
Operating time from restart (0653) → 131
Operating time (0652) → 131
▶ Diagnostic list → 131
▶ Device information → 136
▶ Main electronic module → 139
▶ Sensor electronic module (ISEM) → 140
▶ Display module → 141
▶ Data logging → 142
▶ Heartbeat Technology → 150
▶ Simulation → 160

3 Description of device parameters

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

Direct access

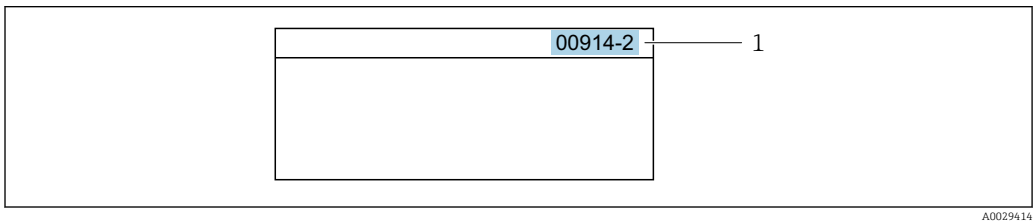
Navigation Expert → Direct access (0106)

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

User entry 0 to 65 535

Additional information *User entry*

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



1 Direct access code

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

Locking status

Navigation Expert → Locking status (0004)

Description Displays the active write protection.

User interface
- Hardware locked
- Temporarily locked

Additional information *Display*

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

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

Options

Options	Description
None	The access authorization displayed in the **Access status display** parameter (→ 24) applies . Only appears on local display.
Hardware locked (priority 1)	The DIP switch for hardware locking is activated on the main electronics module. This locks write access to the parameters (e.g. via local display or operating tool) .
Temporarily locked	Write access to the parameters is temporarily locked on account of internal processes running in the device (e.g. data upload/download, reset, etc.). Once the internal processing has been completed, the parameters can be changed once again.

User role

Navigation Expert → User role (0005)

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

User interface
- Operator
- Maintenance

Factory setting Maintenance

Additional information

Description

Access authorization can be modified via the **Enter access code** parameter (→ 12).

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

User interface

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

Enter access code

Navigation Expert → Ent. access code (0003)

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

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

3.1 "System" submenu

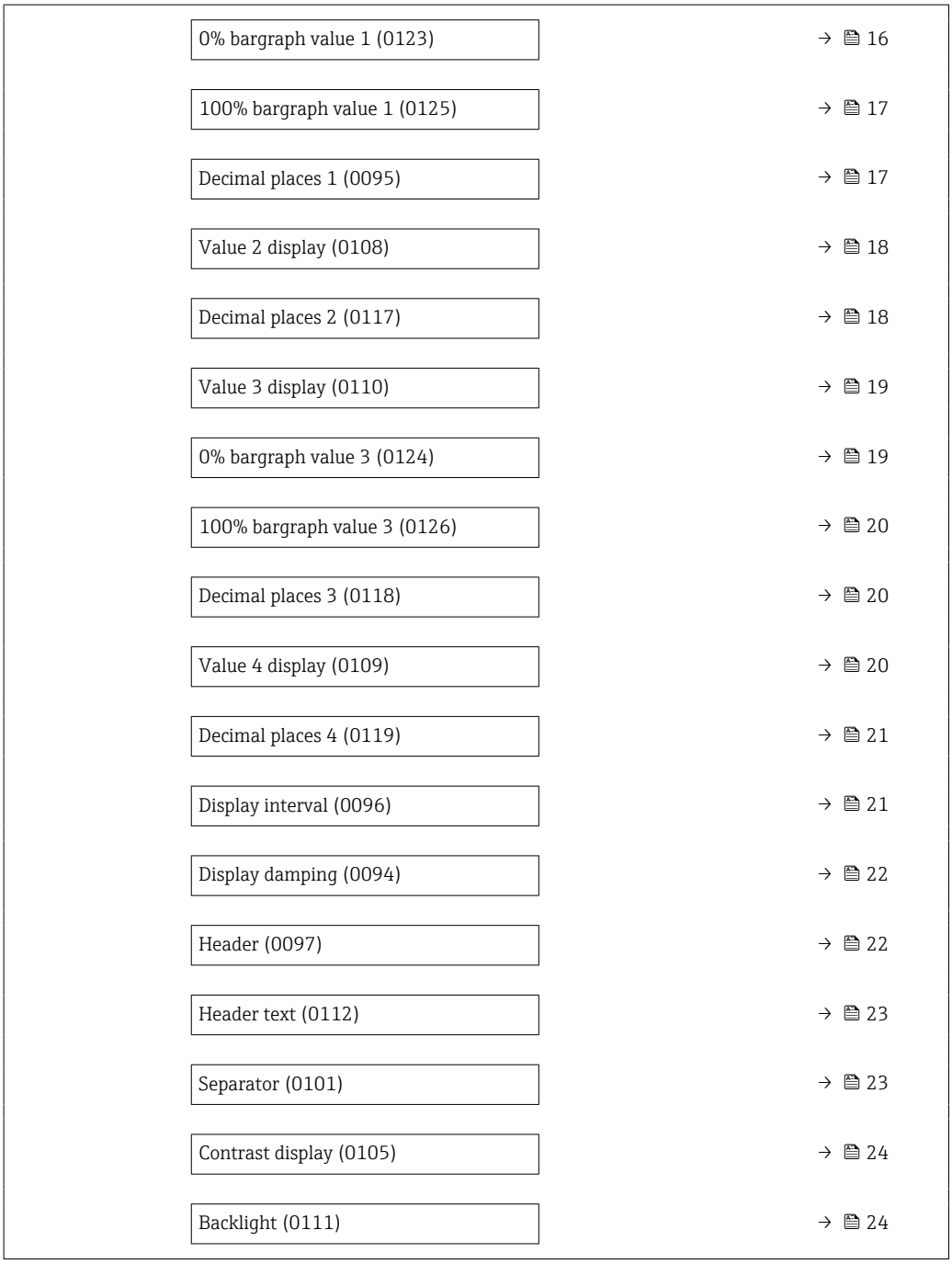
Navigation Expert → System

▶ **System**	
▶ **Display**	→ 12
▶ **Diagnostic handling**	→ 25
▶ **Administration**	→ 32

3.1.1 "Display" submenu

Navigation Expert → System → Display

▶ **Display**	
Display language (0104)	→ 13
Format display (0098)	→ 14
Value 1 display (0107)	→ 16



Display language

Navigation Expert → System → Display → Display language (0104)

Prerequisite A local display is provided.

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

Selection
- English
- Deutsch
- Français

- Español
- Italiano
- Nederlands
- Portuguesa
- Polski
- русский язык (Russian)
- Svenska
- Türkçe
- 中文 (Chinese)
- 日本語 (Japanese)
- 한국어 (Korean)
- čeština (Czech)

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

Format display

Navigation Expert → System → Display → Format display (0098)

Prerequisite A local display is provided.

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

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

Factory setting 1 value, max. size

Additional information *Description*

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

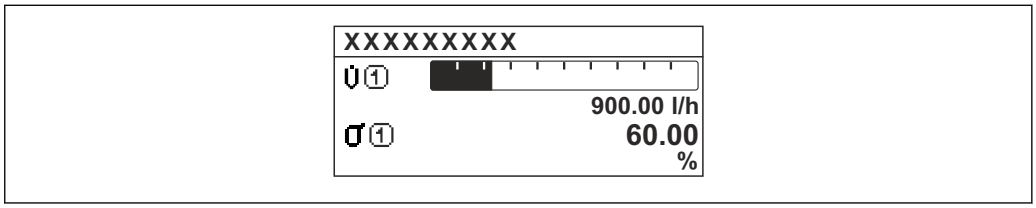
- The **Value 1 display** parameter (→ 16)...**Value 4 display** parameter (→ 20) are used to specify which measured values are shown on the local display and in what order.
- If more measured values are specified than the display mode selected permits, then the values alternate on the device display. The display time until the next change is configured using the **Display interval** parameter (→ 21).

Possible measured values shown on the local display:

"1 value, max. size" option

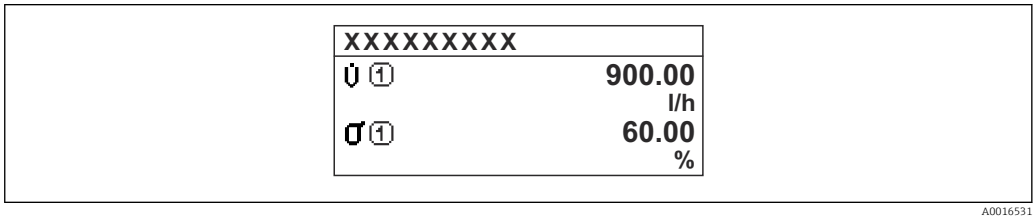
A0016529

"1 bargraph + 1 value" option



A0016530

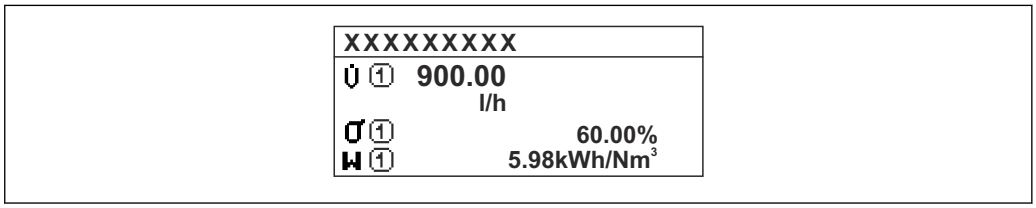
"2 values" option



A0016531

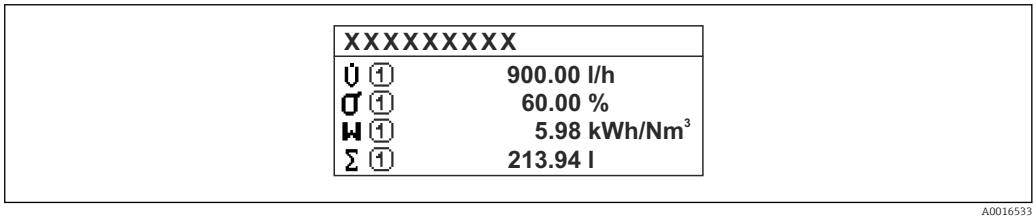
2

"1 value large + 2 values" option



A0016532

"4 values" option



A0016533

Value 1 display

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

Prerequisite A local display is provided.

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

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

Factory setting Volume flow

Additional information

Description

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

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

Dependency

The unit of the displayed measured value is taken from the **System units** submenu (→ 45).

0% bargraph value 1

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

Prerequisite A local display is provided.

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

User entry Signed floating-point number

Factory setting Country-specific

* 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 (→ 45).

100% bargraph value 1

Navigation Expert → System → Display → 100% bargraph 1 (0125)

Prerequisite A local display is provided.

Description Use this function to enter the 100% bar graph value to be shown on the display for the measured value 1.

User entry Signed floating-point number

Factory setting Depends on country and nominal diameter

Additional information

Description

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 (→ 45).

Decimal places 1

Navigation Expert → System → Display → Decimal places 1 (0095)

Prerequisite A measured value is specified in the **Value 1 display** parameter (→ 16).

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 (0108)

Prerequisite A local display is provided.

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

Selection For the picklist, see **Value 1 display** parameter (→ 16)

or

For the picklist, see **Value 1 display** parameter (→ 16)

Factory setting None

Additional information *Description*

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

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

Dependency

The unit of the displayed measured value is taken from the **System units** submenu (→ 45).

Decimal places 2

Navigation Expert → System → Display → Decimal places 2 (0117)

Prerequisite A measured value is specified in the **Value 2 display** parameter (→ 18).

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

Selection

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

Factory setting x.xx

Additional information *Description*

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

Value 3 display

Navigation Expert → System → Display → Value 3 display (0110)

Prerequisite A local display is provided.

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

Selection For the picklist, see **Value 1 display** parameter (→ 16)

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 (→ 45).

0% bargraph value 3

Navigation Expert → System → Display → 0% bargraph 3 (0124)

Prerequisite A selection was made in the **Value 3 display** parameter (→ 19).

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

User entry Signed floating-point number

Factory setting Country-specific

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 (→ 45).

100% bargraph value 3

Navigation Expert → System → Display → 100% bargraph 3 (0126)

Prerequisite A selection was made in the **Value 3 display** parameter (→ 19).

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

User entry Signed floating-point number

Factory setting 0

Additional information *Description*

The **Format display** parameter (→ 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 (→ 45).

Decimal places 3

Navigation Expert → System → Display → Decimal places 3 (0118)

Prerequisite A measured value is specified in the **Value 3 display** parameter (→ 19).

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

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

Factory setting x.xx

Additional information *Description*

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

Value 4 display

Navigation Expert → System → Display → Value 4 display (0109)

Prerequisite A local display is provided.

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

Selection For the picklist, see **Value 1 display** parameter (→ 16)

Factory setting None

Additional information *Description*

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

The **Format display** parameter (→ 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 (→ 45).

Decimal places 4

Navigation Expert → System → Display → Decimal places 4 (0119)

Prerequisite A measured value is specified in the **Value 4 display** parameter (→ 20).

Description Use this function to select the number of decimal places for measured value 4.

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

Factory setting x.xx

Additional information *Description*

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

Display interval

Navigation Expert → System → Display → Display interval (0096)

Prerequisite A local display is provided.

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

User entry 1 to 10 s

Factory setting 5 s

Additional information *Description*

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

- The **Value 1 display** parameter (→ 16)...**Value 4 display** parameter (→ 20) 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 (0094)

Prerequisite A local display is provided.

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

User entry 0.0 to 999.9 s

Factory setting 0.0 s

Additional information *User entry*

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

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

Header

Navigation Expert → System → Display → Header (0097)

Prerequisite A local display is provided.

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

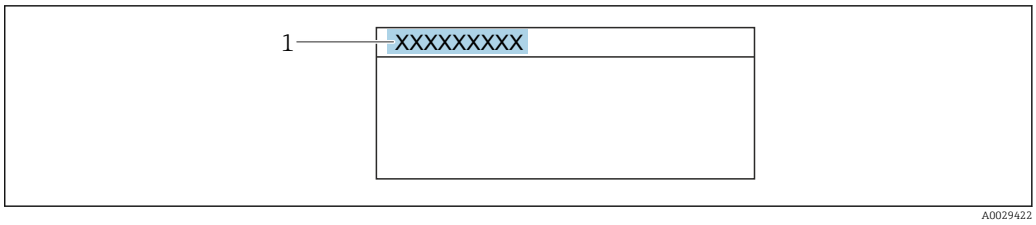
Selection
- Device tag
- Free text

Factory setting Device tag

Additional information *Description*

The header text only appears during normal operation.

1) proportional transmission behavior with first order delay



1 Position of the header text on the display

Selection

- Device tag
  Is defined in the **Device tag** parameter (→ 136).
- Free text
  Is defined in the **Header text** parameter (→ 23).

Header text

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

Prerequisite The **Free text** option is selected in the **Header** parameter (→ 22).

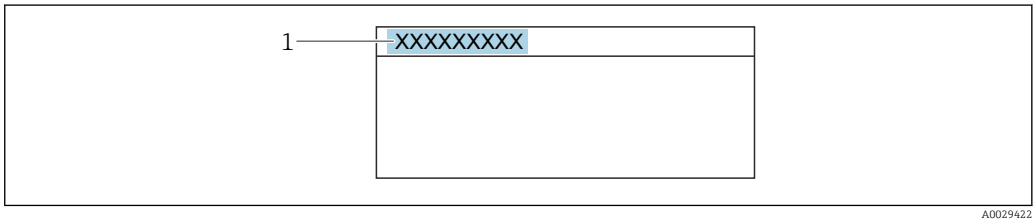
Description Use this function to enter a customer-specific text for the header of the local display.

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

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

Additional information *Description*

The header text only appears during normal operation.



1 Position of the header text on the display

User entry

The number of characters displayed depends on the characters used.

Separator

Navigation Expert → System → Display → Separator (0101)

Prerequisite A local display is provided.

Description Use this function to select the decimal separator.

Selection
- . (point)
- , (comma)

Factory setting . (point)

Contrast display

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

Prerequisite A local display is provided.

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

User entry 20 to 80 %

Factory setting 50 %

Backlight

Navigation Expert → System → Display → Backlight (0111)

Prerequisite A local display is provided.

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

Selection
- Disable
- Enable

Factory setting Enable

Access status display

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

Prerequisite A local display is provided.

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

User interface
- Operator
- Maintenance

Factory setting Operator

Additional information

Description

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

Access authorization can be modified via the **Enter access code** parameter (→ 12).

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

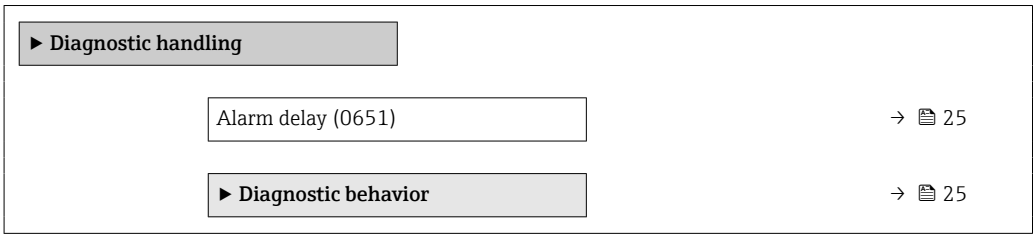
If additional write protection is active, this restricts the current access authorization even further.

User interface

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

3.1.2 "Diagnostic handling" submenu

Navigation Expert → System → Diagn. handling



Alarm delay 🔒

Navigation Expert → System → Diagn. handling → Alarm delay (0651)

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

The diagnostic message is reset without a time delay.

User entry 0 to 60 s

Factory setting 0 s

"Diagnostic behavior" submenu

Each item of diagnostic information is assigned a specific diagnostic behavior at the factory. The user can change this assignment for specific diagnostic information in the **Diagnostic behavior** submenu (→ 25).

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

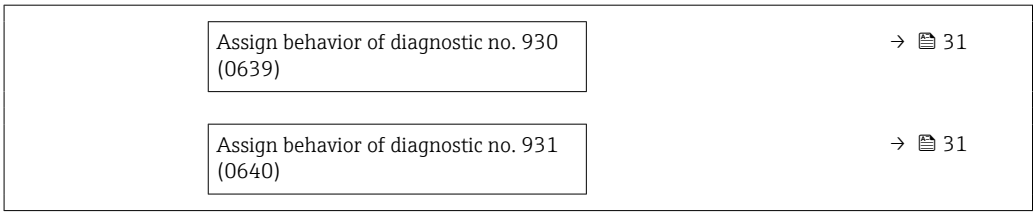
Options	Description
Alarm	The device stops measurement. The measured value output via Modbus RS485 and the totalizers assume the defined alarm condition. A diagnostic message is generated. The background lighting changes to red.
Warning	The device continues to measure. The measured value output via Modbus RS485 and the totalizers are not affected. A diagnostic message is generated.
Logbook entry only	The device continues to measure. The diagnostic message is only displayed in the **Event logbook** submenu (**Event list** submenu) and is not displayed in alternating sequence with the operational display.
Off	The diagnostic event is ignored, and no diagnostic message is generated or entered.

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

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

▶ **Diagnostic behavior**

Assign behavior of diagnostic no. 019 (0635)	→ 27
Assign behavior of diagnostic no. 160 (0776)	→ 27
Assign behavior of diagnostic no. 302 (0742)	→ 27
Assign behavior of diagnostic no. 441 (0657)	→ 28
Assign behavior of diagnostic no. 442 (0658)	→ 28
Assign behavior of diagnostic no. 443 (0659)	→ 29
Assign behavior of diagnostic no. 832 (0675)	→ 29
Assign behavior of diagnostic no. 833 (0676)	→ 29
Assign behavior of diagnostic no. 841 (0680)	→ 30
Assign behavior of diagnostic no. 842 (0638)	→ 30
Assign behavior of diagnostic no. 870 (0726)	→ 30



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

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 019 (0635)

Description Use this function to change the diagnostic behavior of the ⚠**S019 Device initialization active** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available: → 26

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

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 160 (0776)

Description Use this function to change the diagnostic behavior of the **160 Signal path switched off** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available: → 26

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

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

Description Use this function to change the diagnostic behavior of the **302 Device verification active** diagnostic message.

Selection
- Off
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available: → 26

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

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

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information *Selection*

For a detailed description of the options available: → 26

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

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

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

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available: → 26

Assign behavior of diagnostic no. 443 (Pulse output)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 443 (0659)

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

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information *Selection*

For a detailed description of the options available: → 26

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

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 832 (0675)

Description Use this function to change the diagnostic behavior of the **832 Electronics temperature too high** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available: → 26

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

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 833 (0676)

Description Use this function to change the diagnostic behavior of the **833 Electronics temperature too low** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information *Selection*

For a detailed description of the options available: → 26

Assign behavior of diagnostic no. 841

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

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available: → 26

Assign behavior of diagnostic no. 842 (Process limit)

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

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Off

Additional information For a detailed description of the options available: → 26

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

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

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Off

Additional information *Selection*

For a detailed description of the options available: → 26

Assign behavior of diagnostic no. 930 (Process fluid)

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

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Alarm

Additional information For a detailed description of the options available: → 26

Assign behavior of diagnostic no. 931 (Process fluid)

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

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Alarm

Additional information For a detailed description of the options available: → 26

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

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 953 (0636)

Description Use this function to change the diagnostic behavior of the ⚠**M953 Asymmetry noise signal too high path 1 to n** diagnostic message.

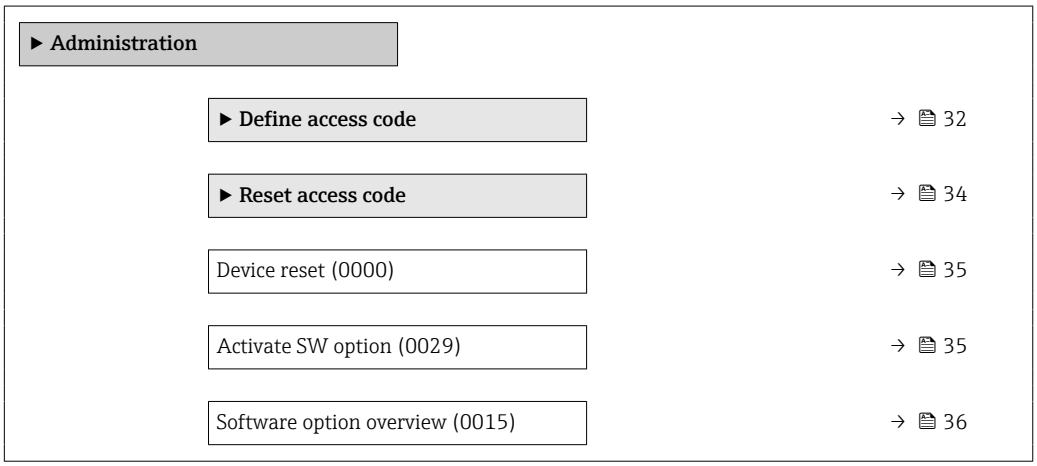
Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available: → 26

3.1.3 "Administration" submenu

Navigation Expert → System → Administration

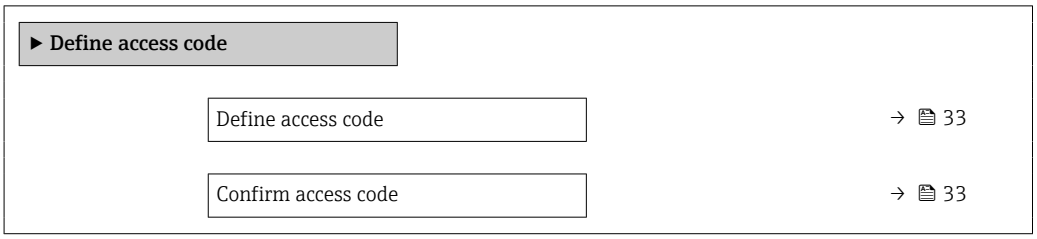


"Define access code" wizard

The **Define access code** wizard (→ 32) 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

Navigation Expert → System → Administration → Def. access code → Def. access code

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

User entry 0 to 9 999

Factory setting 0

Additional information

Description

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

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

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

Once the access code has been defined, write-protected parameters can only be modified if the access code is entered in the **Enter access code** parameter (→ 12).

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

User entry

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

Factory setting

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

Confirm access code

Navigation Expert → System → Administration → Def. access code → Confirm code

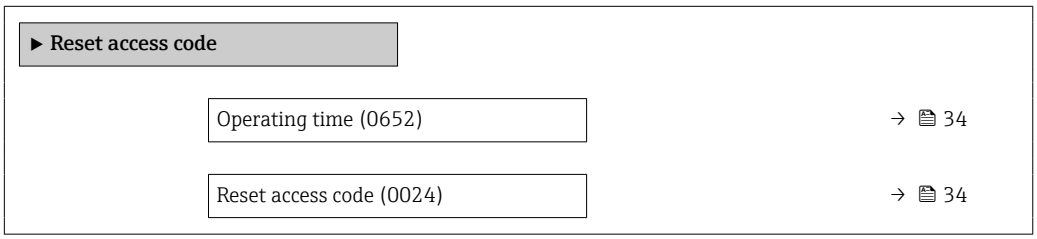
Description Enter the defined release code a second time to confirm the release code.

User entry 0 to 9 999

Factory setting 0

"Reset access code" submenu

Navigation Expert → System → Administration → Reset acc. code



Operating time

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

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

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

Additional information *Indication*

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

Reset access code

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

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

User entry Character string comprising numbers, letters and special characters

Factory setting 0x00

Additional information *Description*

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

User entry

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

Additional parameters in the "Administration" submenu

Device reset

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

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

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

Factory setting Cancel

Additional information *Selection*

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

Activate SW option

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

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

User entry Max. 10-digit string of numbers.

* Visibility depends on order options or device settings

Factory setting Depends on the software option ordered

Additional information

Description

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

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

Entering the activation code

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

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

▸ Before you enter a new activation code, make a note of the current activation code .

▸ Enter the new activation code provided by Endress+Hauser when the new software option was ordered.

▸ Once the activation code has been entered, check if the new software option is displayed in the **Software option overview** parameter (→ 36).

↳ The new software option is active if it is displayed.

↳ If the new software option is not displayed or all software options have been deleted, the code entered was either incorrect or invalid.

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

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

Example for a software option

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

The software options currently enabled are displayed in the **Software option overview** parameter (→ 36).

Web browser

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

Software option overview

Navigation Expert → System → Administration → SW option overv. (0015)

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

User interface

or

- Extended HistoROM
- 4-20mA,2x pulse/freq./switch output
- Heartbeat Verification
- Heartbeat Monitoring

Additional information

Description

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

"Extended HistoROM" option

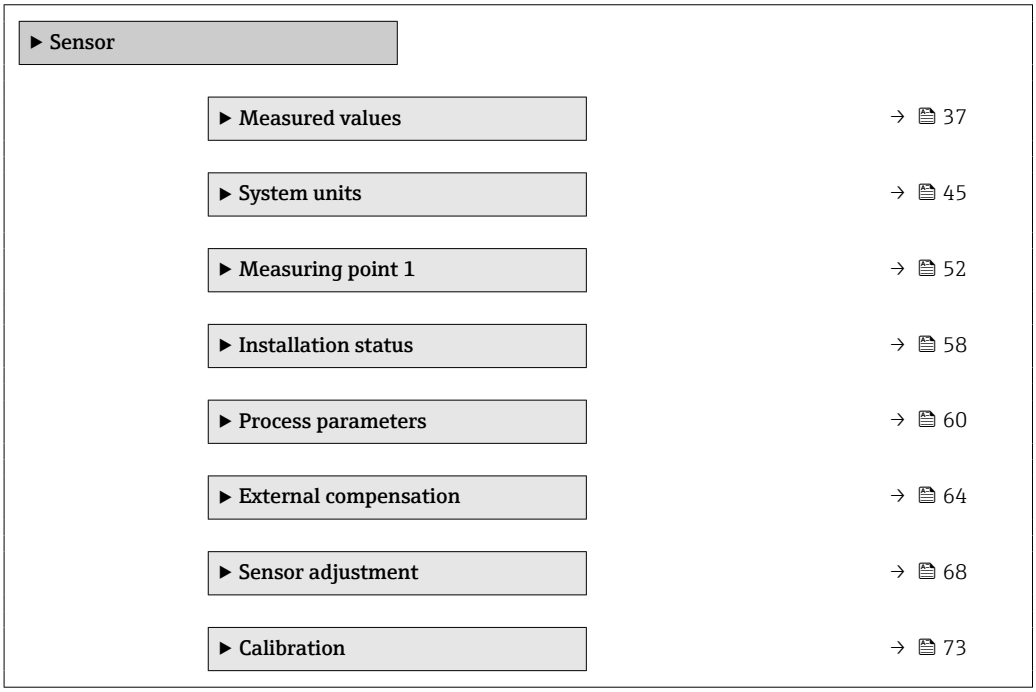
Order code for "Application package", option EA "Extended HistoROM"

"Heartbeat Verification" option and "Heartbeat Monitoring" option

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

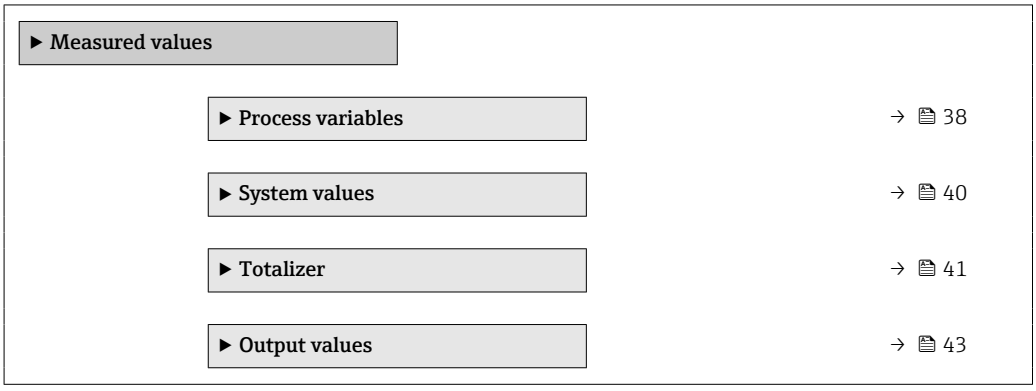
3.2 "Sensor" submenu

Navigation Expert → Sensor



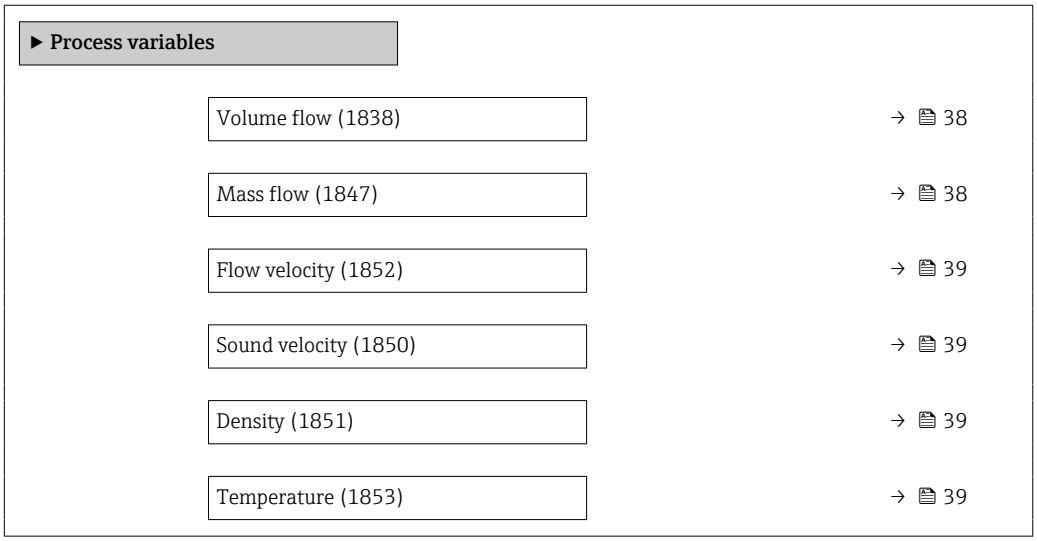
3.2.1 "Measured values" submenu

Navigation Expert → Sensor → Measured val.



"Process variables" submenu

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



Volume flow

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

Description Displays the volume flow that is currently measured.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Volume flow unit** parameter (→ 46)

Mass flow

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

Description Displays the mass flow that is currently calculated.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Mass flow unit** parameter (→ 48)

Flow velocity

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

Description Displays the average flow velocity that is currently calculated.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Velocity unit** parameter (→ 49)

Sound velocity

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

Description Displays the sound velocity that is currently measured.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Velocity unit** parameter (→ 49)

Temperature

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

Prerequisite Temperature is not entered as a fixed value.

Description Displays the medium temperature that is currently measured.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 50)

Density

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

Prerequisite A fixed density is not entered.

Description Displays the density that is currently calculated.

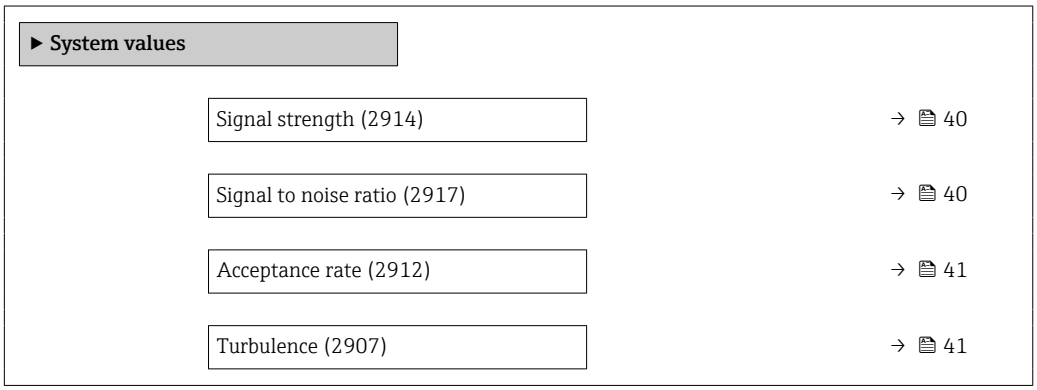
User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Density unit** parameter (→ 50)

"System values" submenu

Navigation Expert → Sensor → Measured val. → System values



Signal strength

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

Description Displays the current signal strength.

User interface Signed floating-point number

Additional information *Description*

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

Signal to noise ratio

Navigation Expert → Sensor → Measured val. → System values → SNR (2917)

Description Displays the current signal to noise ratio.

User interface Signed floating-point number

Additional information *Description*

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

Acceptance rate

Navigation Expert → Sensor → Measured val. → System values → Acceptance rate (2912)

Description Displays the ratio of the number of ultrasonic signals accepted for flow calculation and the total number of ultrasonic signals emitted.

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

User interface 0 to 100 %

Turbulence

Navigation Expert → Sensor → Measured val. → System values → Turbulence (2907)

Description Displays the current turbulence.

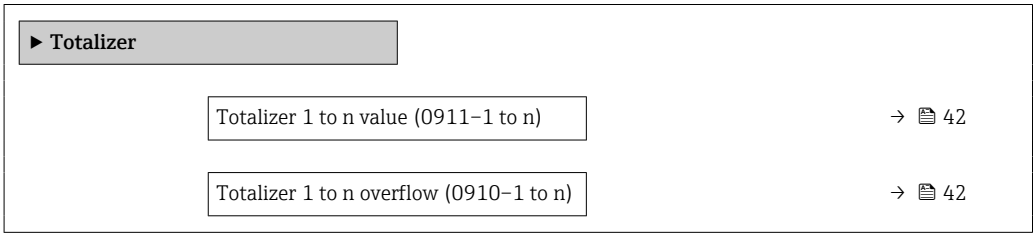
User interface Signed floating-point number

Additional information *Description*

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

"Totalizer" submenu

Navigation Expert → Sensor → Measured val. → Totalizer



Totalizer 1 to n value

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

Description Displays the current totalizer counter value.

User interface Signed floating-point number

Factory setting 0 l

Totalizer 1 to n overflow

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

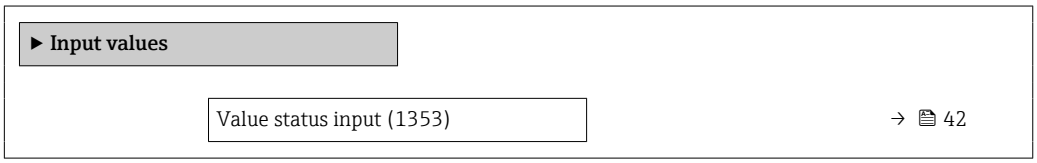
Description Displays the current totalizer overflow.

User interface −32 000.0 to 32 000.0

Factory setting 0

"Input values" submenu

Navigation Expert → Sensor → Measured val. → Input values



Value status input

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

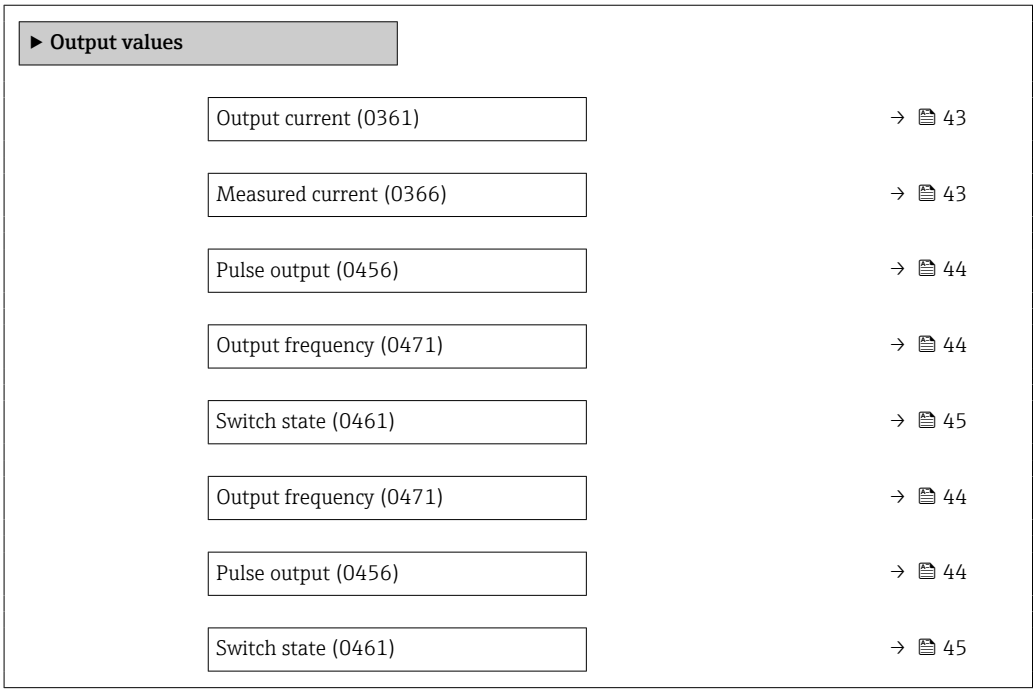
Prerequisite For the following order code:
"Output; input", option **I** "4-20mA HART, 2x pul./freq./switch output; status input"

Description Displays the current input signal level.

User interface
- High
- Low

"Output values" submenu

Navigation Expert → Sensor → Measured val. → Output values



Output current

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

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

User interface 0 to 22.5 mA

Measured current

Navigation Expert → Sensor → Measured val. → Output values → Measur. curr. (0366)

Description Displays the actual measured value of the output current.

User interface 0 to 30 mA

Pulse output 1 to n

Navigation

Expert → Sensor → Measured val. → Output values → Pulse output (0456)

Expert → Sensor → Measured val. → Output values → Pulse output (0456)

Prerequisite

The **Pulse** option is selected in the **Operating mode** parameter (→ 88) parameter.

Description

Displays the pulse frequency currently output.

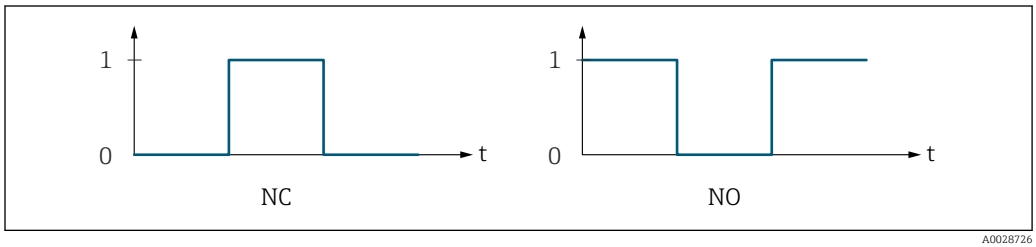
User interface

Positive floating-point number

Additional information

Description

- The pulse output is an open collector output.
- This is configured at the factory in such a way that the transistor is conductive for the duration of the pulse (NO contact) and is safety-oriented.
- The **Value per pulse** parameter (→ 90) and **Pulse width** parameter (→ 91) can be used to define the value (i.e. the measured value amount that corresponds to a pulse) and the duration of the pulse.



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

The output behavior can be reversed via the **Invert output signal** parameter (→ 104) 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 (→ 92)) can be configured.

Output frequency 1 to n

Navigation

Expert → Sensor → Measured val. → Output values → Output freq. (0471)

Expert → Sensor → Measured val. → Output values → Output freq. (0471)

Prerequisite

In the **Operating mode** parameter (→ 88), the **Frequency** option is selected.

Description

Displays the actual value of the output frequency which is currently measured.

User interface

0.0 to 12 500.0 Hz

Switch state 1 to n

Navigation Expert → Sensor → Measured val. → Output values → Switch state (0461)
Expert → Sensor → Measured val. → Output values → Switch state (0461)

Prerequisite In the **Operating mode** parameter (→ 88), the **Switch** option is selected.

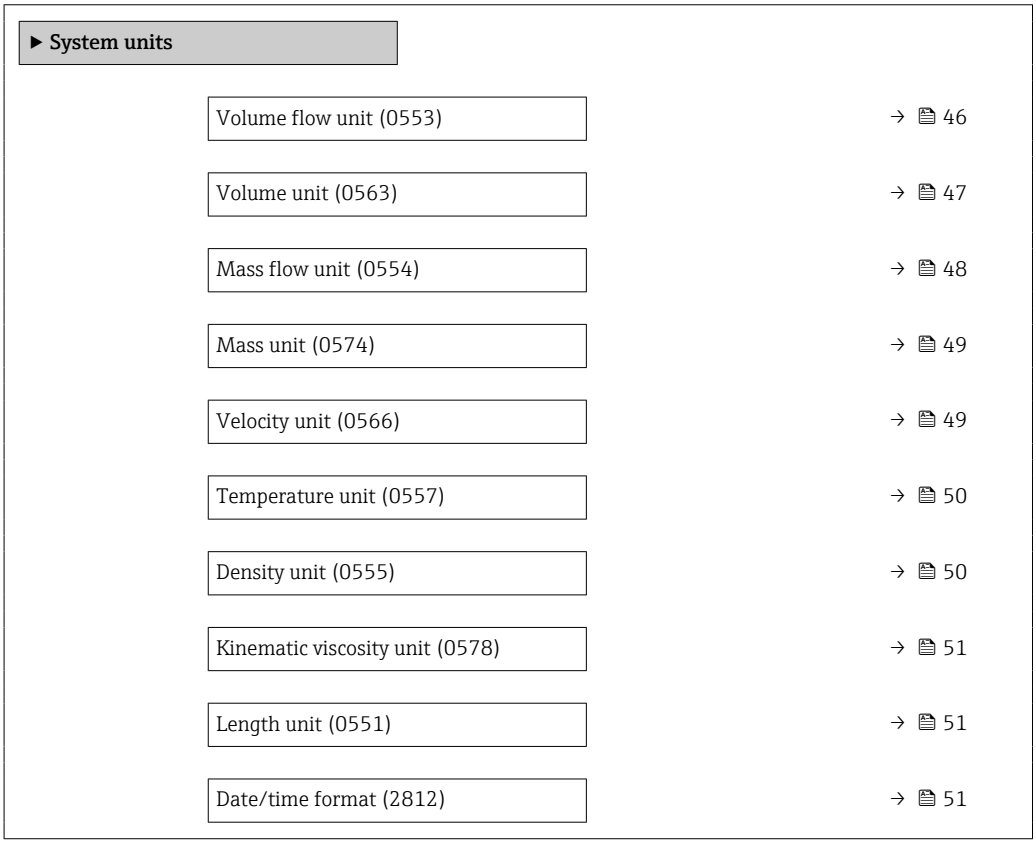
Description Displays the current switch status of the status output.

User interface
- Open
- Closed

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

3.2.2 "System units" submenu

Navigation Expert → Sensor → System units



Volume flow unit

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

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

Selection
- cm^3/s
- cm^3/min
- cm^3/h
- cm^3/d
- dm^3/s
- dm^3/min
- dm^3/h
- dm^3/d
- m^3/s
- m^3/min
- m^3/h
- m^3/d
- ml/s
- ml/min
- ml/h
- ml/d
- l/s
- l/min
- l/h
- l/d
- hl/s
- hl/min
- hl/h
- hl/d
- Ml/s
- Ml/min
- Ml/h
- Ml/d
- af/s
- af/min
- af/h
- af/d
- ft^3/s
- ft^3/min
- ft^3/h
- ft^3/d
- Mft^3/s
- Mft^3/min
- Mft^3/h
- Mft^3/d
- fl oz/s (us)
- fl oz/min (us)
- fl oz/h (us)
- fl oz/d (us)
- gal/s (us)
- gal/min (us)
- gal/h (us)
- gal/d (us)
- Mgal/s (us)
- Mgal/min (us)
- Mgal/h (us)
- Mgal/d (us)

- bbl/s (us;liq.)
- bbl/min (us;liq.)
- bbl/h (us;liq.)
- bbl/d (us;liq.)
- bbl/s (us;beer)
- bbl/min (us;beer)
- bbl/h (us;beer)
- bbl/d (us;beer)
- bbl/s (us;oil)
- bbl/min (us;oil)
- bbl/h (us;oil)
- bbl/d (us;oil)
- bbl/s (us;tank)
- bbl/min (us;tank)
- bbl/h (us;tank)
- bbl/d (us;tank)
- gal/s (imp)
- gal/min (imp)
- gal/h (imp)
- gal/d (imp)
- Mgal/s (imp)
- Mgal/min (imp)
- Mgal/h (imp)
- Mgal/d (imp)
- bbl/s (imp;beer)
- bbl/min (imp;beer)
- bbl/h (imp;beer)
- bbl/d (imp;beer)
- bbl/s (imp;oil)
- bbl/min (imp;oil)
- bbl/h (imp;oil)
- bbl/d (imp;oil)
- kgal/s (us)
- kgal/min (us)
- kgal/h (us)
- kgal/d (us)

Factory setting

Country-specific:
- m^3/h
- ft^3/min

Additional information

Result

The selected unit applies to:
Volume flow parameter (→ 38)

Selection

For an explanation of the abbreviated units: → 169

Volume unit

Navigation

Expert → Sensor → System units → Volume unit (0563)

Description

Use this function to select the unit for the volume.

Selection
- cm^3
- dm^3
- m^3
- ml
- l
- hl
- Ml
- af
- ft^3
- Mft^3
- fl oz (us)
- gal (us)
- kgal (us)
- Mgal (us)
- bbl (us;oil)
- bbl (us;liq.)
- bbl (us;beer)
- bbl (us;tank)
- gal (imp)
- Mgal (imp)
- bbl (imp;beer)
- bbl (imp;oil)

Factory setting
Country-specific:
- m^3
- ft^3

Additional information
Selection

For an explanation of the abbreviated units: → 169

Mass flow unit

Navigation
Expert → Sensor → System units → Mass flow unit (0554)

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

Selection

SI units
- g/s
- g/min
- g/h
- g/d
- kg/s
- kg/min
- kg/h
- kg/d
- t/s
- t/min
- t/h
- t/d

US units
- oz/s
- oz/min
- oz/h
- oz/d
- lb/s
- lb/min
- lb/h
- lb/d
- STon/s
- STon/min
- STon/h
- STon/d

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

Additional information

Result

The selected unit applies to:
Mass flow parameter

Selection

For an explanation of the abbreviated units: → 169

Mass unit

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

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

Selection

SI units	*US units*
▪ g	▪ oz
▪ kg	▪ lb
▪ t	▪ STon

Factory setting

Country-specific:
- kg
- lb

Additional information

Selection

For an explanation of the abbreviated units: → 169

Velocity unit

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

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

Selection

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

Factory setting

Depends on country:
- m/s
- ft/s

Additional information

Effect

The selected unit applies to:
- Flow velocity (→ 39)
- Sound velocity (→ 39)

Options

For an explanation of the abbreviated units: → 169

Temperature unit

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

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

Selection

SI units
- °C
- K

US units
- °F
- °R

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

Additional information

Result

The selected unit applies to:
- Temperature (→ 39)
- Electronic temperature
- External temperature
- Reference temperature

Selection

For an explanation of the abbreviated units: → 169

Density unit

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

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

Selection

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

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

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

Factory setting Country-specific:
- kg/dm³
- lb/ft³

Additional information

Selection

For an explanation of the abbreviated units: → 169

Kinematic viscosity unit

Navigation Expert → Sensor → System units → Kin. visc. unit (0578)

Description Use this function to select the unit for the kinematic viscosity.

Selection
SI units
- cSt
- St
- mm^2/s
- m^2/s

Factory setting
Country-specific:
- m^2/s
- cSt

Length unit

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

Description Use this function to select the unit of length of.

Selection

SI units	*US units*
▪ m	▪ ft
▪ mm	▪ in

Factory setting
Country-specific:
- mm
- in

Additional information *Selection*

For an explanation of the abbreviated units: → 169

Date/time format

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

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

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

Factory setting dd.mm.yy hh:mm

Additional information *Options*

For an explanation of the abbreviated units: → 169

3.2.3 "Measuring point " submenu

Navigation Expert → Sensor → Meas. point

▶ **Measuring point 1**	
Measuring point configuration (5675–1)	→ 53
Medium (2926–1)	→ 53
Medium temperature (3053–1)	→ 53
Sound velocity (2929–1)	→ 54
Viscosity (2932–1)	→ 54
Pipe dimensions (2943–1)	→ 54
Pipe circumference (2934–1)	→ 54
Pipe outer diameter (2910–1)	→ 55
Pipe wall thickness (2916–1)	→ 55
Liner thickness (2935–1)	→ 55
Signal filter (3011–1)	→ 56
Cable length (2939–1)	→ 56
Intermediate pipe length (2945–1)	→ 56
Result sensor type / sensor distance (3066–1)	→ 56
Result path length / arc length (3067–1)	→ 57
▶ **Mounting deviations signal path 1 to n**	→ 57

Measuring point configuration

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

Description Use this function to enter the measuring point configuration.

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

Factory setting Depending on the sensor version

Medium

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

Description Select the medium.

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

Factory setting Water

Medium temperature

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

Description Enter the medium temperature for the installation.

User entry –200 to 550 °C

Factory setting 20 °C

* Visibility depends on order options or device settings

Sound velocity

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

Prerequisite The **User-specific liquid** option is selected in **Medium** parameter (→ 53).

Description Enter the sound velocity of the medium.

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

User entry 200 to 3 000 m/s

Factory setting 1 482.4 m/s

Viscosity

Navigation Expert → Sensor → Meas. point 1 → Viscosity (2932–1)

Prerequisite The **User-specific liquid** option is selected in **Medium** parameter (→ 53).

Description Enter medium viscosity at installation temperature.

User entry 0.01 to 10 000 mm^2/s

Factory setting 1 mm^2/s

Pipe dimensions

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

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

Selection
- Diameter
- Pipe circumference

Factory setting Diameter

Pipe circumference

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

Prerequisite The **Pipe circumference** option is selected in the **Pipe dimensions** parameter (→ 54).

Description Define the pipe circumference.

User entry 30 to 62 800 mm

Factory setting 314.159 mm

Pipe outer diameter

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

Prerequisite The **Diameter** option is selected in **Pipe dimensions** parameter (→ 54).

Description Define the outer diameter of the pipe.

User entry 0 to 20 000 mm

Factory setting 100 mm

Pipe wall thickness

Navigation Expert → Sensor → Meas. point 1 → Wall thickness (2916–1)

Description Enter the pipe wall thickness.

User entry Positive floating point number

Factory setting 3 mm

Liner thickness

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

Description Define the thickness of liner.

User entry 0 to 100 mm

Factory setting 0 mm

Signal filter

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

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

Selection
- Off
- On

Factory setting On

Cable length

Navigation Expert → Sensor → Meas. point 1 → Cable length (2939–1)

Description Enter length of sensor cables.

User entry 0 to 200 000 mm

Factory setting As per order

Intermediate pipe length

Navigation Expert → Sensor → Meas. point 1 → Interm. pipe l. (2945–1)

Prerequisite The **1 measuring point - 2 signal paths** option is selected in **Measuring point configuration** parameter (→ 53).

Description Enter the length of the intermediate pipe between the two bends.

User entry Positive floating-point number

Factory setting 0 mm

Result sensor type / sensor distance

Navigation Expert → Sensor → Meas. point 1 → Sens. type/dist. (3066–1)

Description Shows the sensor type and sensor distance calculated for installation.

User interface e.g. I-100-A / 500 mm

Factory setting -

Result path length / arc length

Navigation Expert → Sensor → Meas. point 1 → Path/arc length (3067–1)

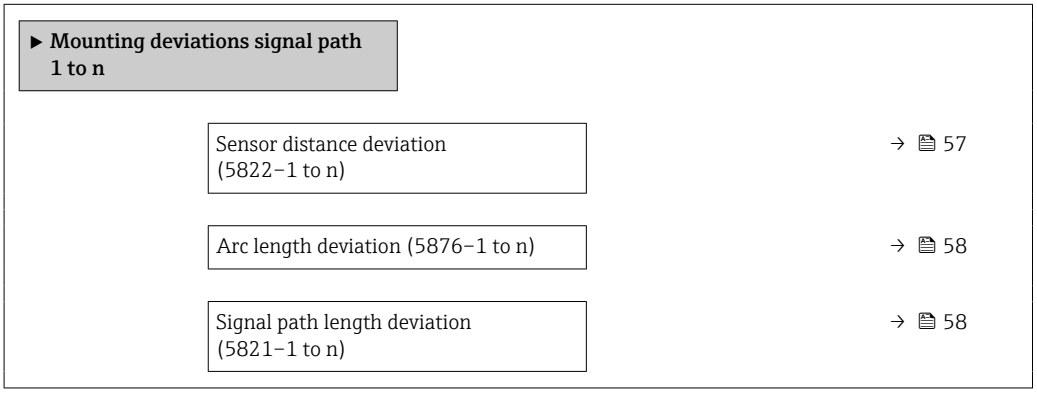
Description Shows the path length calculated and (if applicable) the calculated arc length.

User interface e.g. 1085 mm / 257.56 mm

Factory setting -

"Mounting deviations signal path 1 to n" submenu

Navigation Expert → Sensor → Meas. point 1 → Deviat. path 1 to n



Sensor distance deviation

Navigation Expert → Sensor → Meas. point 1 → Deviat. path 1 to n → Sens. dist. dev. (5822–1 to n)

Description Enter the deviation between the nominal sensor distance and the welded position.

User entry Signed floating-point number

Factory setting 0 mm

Additional information *Description*

If the welded position is greater than the nominal sensor distance, enter a positive deviation (e.g. 5 mm (0.20 in)). If the welded position is smaller than the nominal sensor distance, enter a negative deviation (e.g. −5 mm (−0.20 in)).

Arc length deviation

Navigation Expert → Sensor → Meas. point 1 → Deviat. path 1 to n → Arc length dev. (5876–1 to n)

Description Enter the radial deviation between given radial distance and the real mounting position of the sensor.

User entry Signed floating-point number

Factory setting 0 mm

Additional information *Description*

If the actual radial distance is greater than the nominal value, enter a positive deviation (e.g. 5 mm (0.20 in)). If the actual radial distance is smaller than the nominal value, enter a negative deviation (e.g. −5 mm (−0.20 in)).

Signal path length deviation

Navigation Expert → Sensor → Meas. point 1 → Deviat. path 1 to n → Path length dev. (5821–1 to n)

Description Enter the deviation between the nominal signal path length and the welded position.

User entry Signed floating-point number

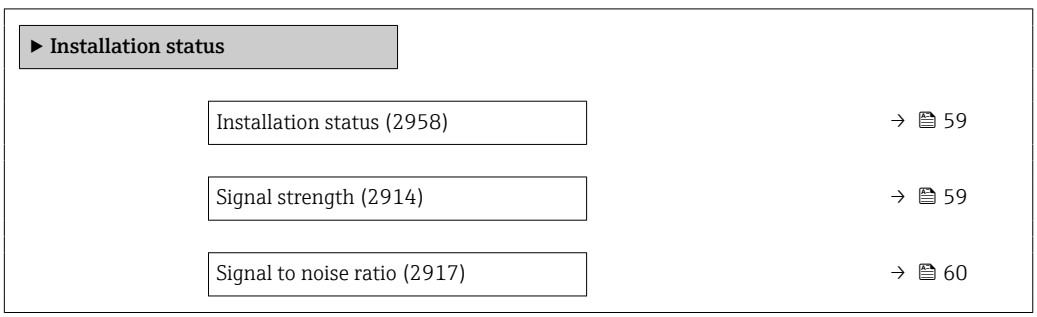
Factory setting 0 mm

Additional information *Description*

If the actual signal path length is greater than the nominal value, enter a positive deviation (e.g. 5 mm (0.20 in)). If the actual signal path length is smaller than the nominal value, enter a negative deviation (e.g. −5 mm (−0.20 in)).

3.2.4 "Installation status" submenu

Navigation Expert → Sensor → Install. status



Sound velocity (2915)	→ 60
Sound velocity deviation (2986)	→ 60

Installation status

Navigation Expert → Sensor → Install. status → Install. status (2958)

Description Displays the device status after installation according to the displayed measured values.
- **Good** option: No further optimization required
  Signal strength > 40 dB, SNR > 35, sound velocity deviation (measured to expected) < 2%
- **Acceptable** option: Measuring performance ok, optimize if possible. You should always aim for the status **Good** option.
  Signal strength > 25 dB, SNR > 35, sound velocity deviation (measured to expected) < 3%
- **Bad** option: Optimization is required. Poor and unstable measuring performance.

Check the following points to optimize the sensor installation:
- Number of traverses, change if necessary (e.g. from 2 traverses to 1 traverse)
- Sensor distance
- Alignment of sensors
- Sufficient coupling medium available (coupling pad or coupling gel)
- Check the measuring point parameters in the configuration

User interface
- Good
- Acceptable
- Bad

Factory setting Good

Signal strength

Navigation Expert → Sensor → Install. status → Signal strength (2914)

Description Displays the current signal strength.

User interface Signed floating-point number

Additional information *Description*

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

Signal to noise ratio

Navigation Expert → Sensor → Install. status → SNR (2917)

Description Displays the current signal to noise ratio.

User interface Signed floating-point number

Additional information *Description*

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

Sound velocity

Navigation Expert → Sensor → Install. status → Sound velocity (2915)

Description Displays the sound velocity that is currently measured.

The difference between the configured sound velocity and the measured sound velocity should not be > 2%.

User interface Signed floating-point number

Sound velocity deviation

Navigation Expert → Sensor → Install. status → SoundVelocDeviat (2986)

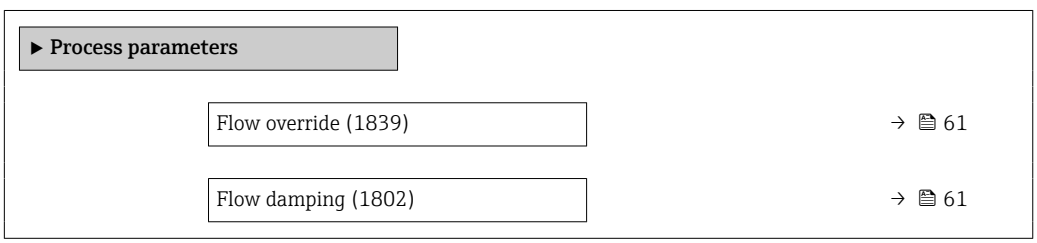
Description Shows the deviation of the installation sound velocity from the measured sound velocity.

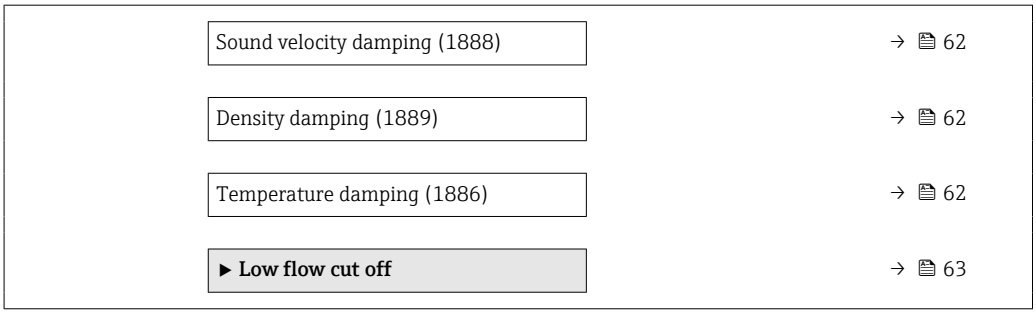
User interface Signed floating-point number

Factory setting 0 %

3.2.5 "Process parameters" submenu

Navigation Expert → Sensor → Process param.





Flow override

Navigation Expert → Sensor → Process param. → Flow override (1839)

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

Selection
- Off
- On

Factory setting Off

Additional information

Effect

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

Description

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

The **Flow override** option can also be activated in the **Status input** submenu: **Assign status input** parameter.

Flow damping

Navigation Expert → Sensor → Process param. → Flow damping (1802)

Description Use this function to enter a time constant for flow damping (PT1 element). Reduction of the variability of the flow measured value (in relation to interference). For this purpose, the depth of the flow filter is adjusted: when the filter setting increases, the reaction time of the device also increases.

User entry 0 to 999.9 s

Factory setting 1 s

Additional information

Description

The damping is performed by a PT1 element [2].

User entry

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

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

Effect

The damping affects the following variables of the device:
- Outputs → 74
- Low flow cut off → 63
- Totalizers → 121

Sound velocity damping

Navigation Expert → Sensor → Process param. → Sound vel. damp. (1888)

Description Use this function to enter the time constant for sound velocity damping. Reduction of the variability of the measured sound velocity or sound velocity measured value (in relation to interference). For this purpose, the depth of the sound velocity filter is adjusted: when the filter setting increases, the reaction time of the device also increases.

User entry 0 to 999.9 s

Factory setting 1 s

Density damping

Navigation Expert → Sensor → Process param. → Density damping (1889)

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

User entry 0 to 999.9 s

Factory setting 0 s

Temperature damping

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

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

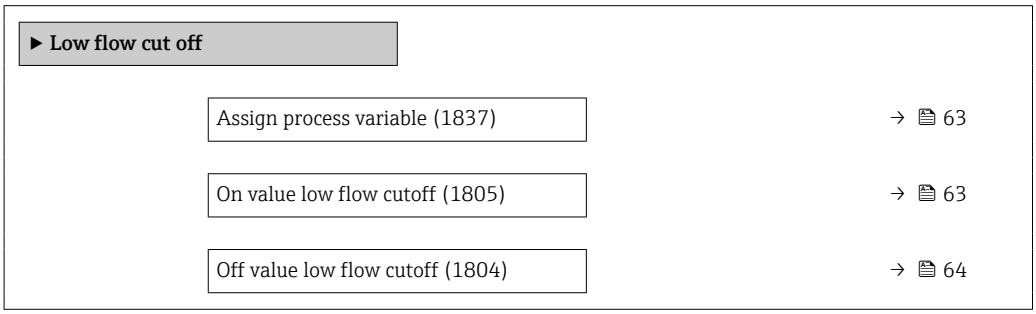
2) Proportional behavior with first-order lag

User entry 0 to 999.9 s

Factory setting 10 s

"Low flow cut off" submenu

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



Assign process variable

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

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

Selection
- Off
- Volume flow
- Mass flow
- Flow velocity

Factory setting Flow velocity

On value low flow cutoff

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

Prerequisite A process variable is selected in the **Assign process variable** parameter (→ 63).

Description Use this function to enter a switch-on value for low flow cut off. Low flow cut off is activated if the value entered is not equal to 0 → 64.

User entry Positive floating-point number

Factory setting 0.3 m/s

Additional information *Dependency*

The unit depends on the process variable selected in the **Assign process variable** parameter (→ 63).

Off value low flow cutoff

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

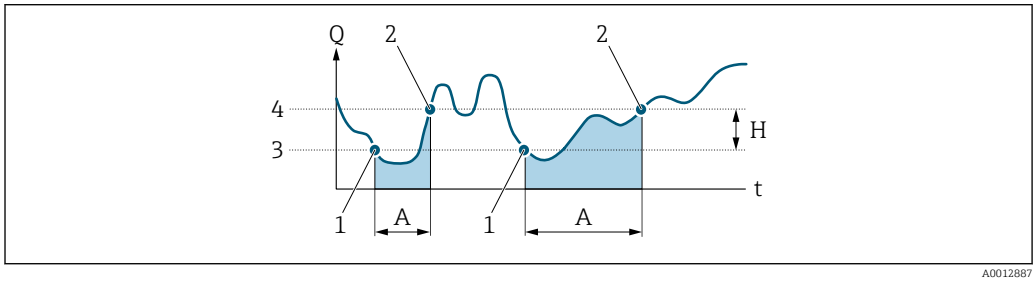
Prerequisite A process variable is selected in the **Assign process variable** parameter (→ 63).

Description Use this function to enter a switch-off value for low flow cut off. The switch-off value is entered as a positive hysteresis from the switch-on value→ 63.

User entry 0 to 100.0 %

Factory setting 50 %

Additional information *Example*



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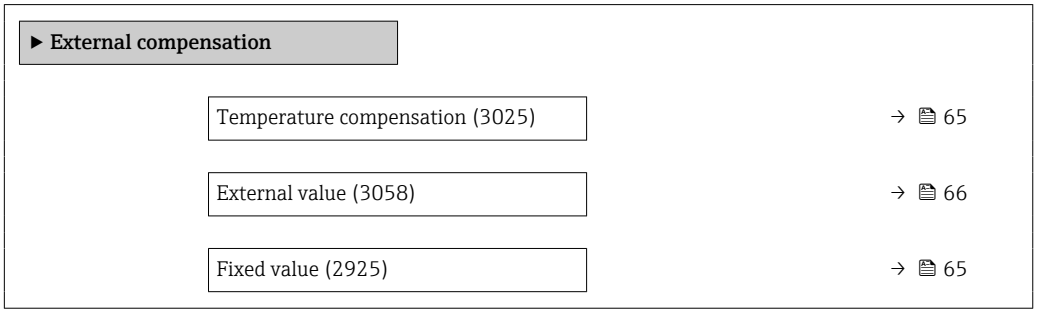
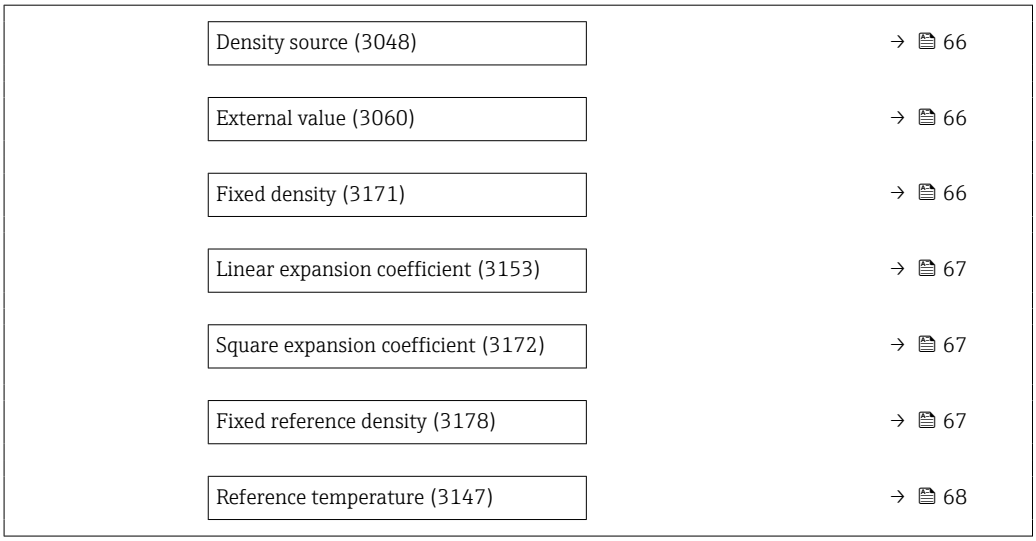
Q Flow
t Time
H Hysteresis
A Low flow cut off active
1 Low flow cut off is activated
2 Low flow cut off is deactivated
3 On value entered
4 Off value entered

3.2.6 "External compensation" submenu

Navigation Expert → Sensor → External comp.





Temperature compensation

Navigation Expert → Sensor → External comp. → Temp. compensat. (3025)

Prerequisite The **Calculated value** option is selected in the **Density source** parameter (→ 66).

Description Select temperature mode for temperature compensation.

Selection
- Fixed value
- External value

Factory setting Fixed value

Fixed value

Navigation Expert → Sensor → External comp. → Fixed value (2925)

Prerequisite The **Fixed value** option is selected in **Temperature compensation** parameter (→ 65).

Description Enter a fixed value for the process temperature.

User entry −50 to 550 °C

Factory setting 20 °C

External value

Navigation Expert → Sensor → External comp. → External value (3058)

Description Shows the process temperature read from the external device.

User entry −273.15 to 99 999 °C

Factory setting –

Density source

Navigation Expert → Sensor → External comp. → Density source (3048)

Description Select the density source for the mass calculation.

Selection
- Fixed value
- External density
- Calculated value

Factory setting Fixed value

External value

Navigation Expert → Sensor → External comp. → External value (3060)

Prerequisite The **External density** option is selected in the **Density source** parameter (→ 66).

Description Shows the density read from the external device.

User entry Positive floating-point number

Factory setting 0 kg/m³

Fixed density

Navigation Expert → Sensor → External comp. → Fixed density (3171)

Prerequisite The **Fixed density** option is selected in the **Density source** parameter (→ 66).

Description Enter fixed value for medium density.

User entry 0.01 to 15 000 kg/m³

Factory setting 1 000 kg/m³

Linear expansion coefficient

Navigation Expert → Sensor → External comp. → Linear exp coeff (3153)

Prerequisite The **Calculated value** option is selected in the **Density source** parameter (→ 66).

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

User entry $1.0 \cdot 10^{-6}$ to $2.0 \cdot 10^{-3}$

Factory setting $2.06 \cdot 10^{-4}$

Square expansion coefficient

Navigation Expert → Sensor → External comp. → Square exp coeff (3172)

Prerequisite The **Calculated value** option is selected in the **Density source** parameter (→ 66).

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

User entry $1.0 \cdot 10^{-6}$ to $2.0 \cdot 10^{-3}$

Factory setting $2.06 \cdot 10^{-4}$

Fixed reference density

Navigation Expert → Sensor → External comp. → Fix ref.density (3178)

Prerequisite The **Calculated value** option is selected in the **Density source** parameter (→ 66).

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

User entry 0.01 to 15 000 kg/m³

Factory setting 1 000 kg/m³

Additional information *Reference density calculation*

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

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- ρ: currently used density for mass flow calculation
- ρ_N: reference density
- t: currently read-in or fixed temperature according to the setting in the **Temperature compensation** parameter (→ 65)

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

Reference temperature

Navigation Expert → Sensor → External comp. → Ref. temperature (3147)

Prerequisite The **Calculated value** option is selected in the **Density source** parameter (→ 66).

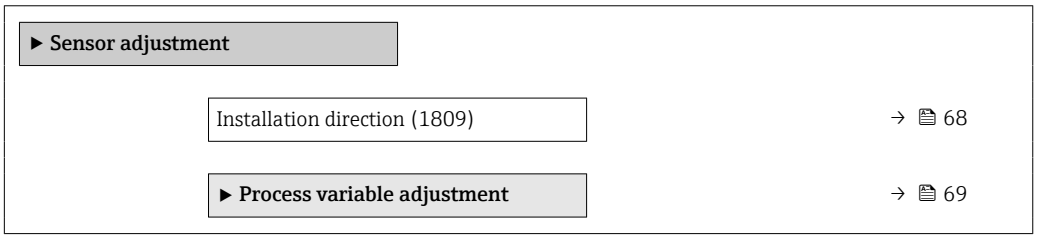
Description Enter the reference temperature at which the reference density applies.

User entry −200 to 450 °C

Factory setting 20 °C

3.2.7 "Sensor adjustment" submenu

Navigation Expert → Sensor → Sensor adjustm.



Installation direction

Navigation Expert → Sensor → Sensor adjustm. → Install. direct. (1809)

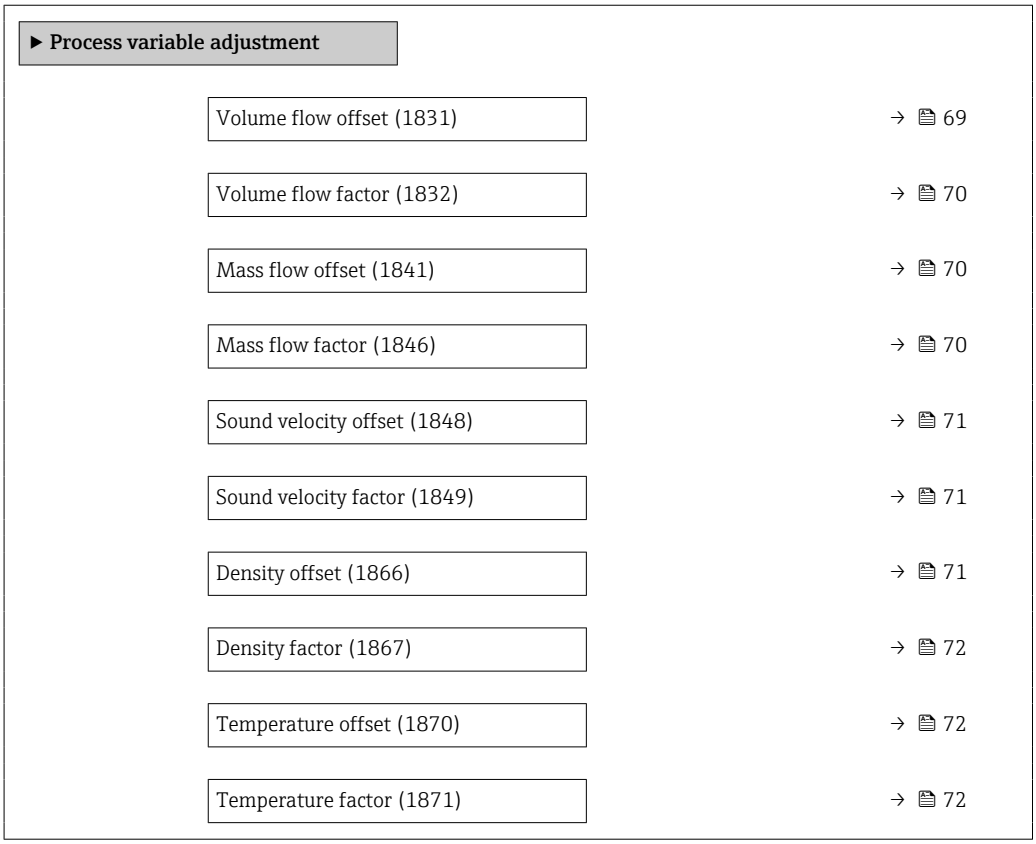
Description Use this function to change the sign of the medium flow direction.

Selection
- Forward flow
- Reverse flow

Factory setting Forward flow

"Process variable adjustment" submenu

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust



Volume flow offset

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Vol. flow offset (1831)

Description Use this function to enter the zero point shift for the volume flow trim. The volume flow unit on which the shift is based is m^3/s. The value is entered in the selected volume flow unit.

User entry Signed floating-point number

Factory setting 0 m^3/h

Additional information *Description*

Corrected value = (factor × value) + offset

Volume flow factor

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Vol. flow factor (1832)

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

User entry Positive floating-point number

Factory setting 1

Additional information *Description*

Corrected value = (factor × value) + offset

Mass flow offset

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Mass flow offset (1841)

Description Use this function to enter the zero point shift for the mass flow trim. The mass flow unit on which the shift is based is kg/h. The value is entered in the selected mass flow unit.

User entry Signed floating-point number

Factory setting 0 kg/h

Additional information *Description*

Corrected value = (factor × value) + offset

Mass flow factor

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Mass flow factor (1846)

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

User entry Positive floating-point number

Factory setting 1

Additional information *Description*

Corrected value = (factor × value) + offset

Sound velocity offset

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → S. veloc. offset (1848)

Description Use this function to enter the zero point shift for the sound velocity trim. The sound velocity unit on which the shift is based is m/s. The value is entered in the selected velocity unit.

User entry Signed floating-point number

Factory setting 0 m/s

Additional information *Description*

Corrected value = (factor × value) + offset

Sound velocity factor

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → S. veloc. factor (1849)

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

User entry Positive floating-point number

Factory setting 1

Additional information *Description*

Corrected value = (factor × value) + offset

Density offset

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Density offset (1866)

Description Use this function to enter the zero point shift for the energy flow trim. The energy flow unit on which the shift is based is 1 W.

User entry Signed floating-point number

Factory setting 0 kg/m^3

Additional information *Description*

Corrected value = (factor × value) + offset

Density factor

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Density factor (1867)

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

User entry Positive floating-point number

Factory setting 1

Additional information *Description*

Corrected value = (factor × value) + offset

Temperature offset

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Temp. offset (1870)

Prerequisite The **Calculated value** option is selected in the **Density source** parameter (→ 66) and the **External value** option is selected in the **Temperature compensation** parameter (→ 65).

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

User entry Signed floating-point number

Factory setting 0

Additional information *Description*

Corrected value = (factor × value) + offset

Temperature factor

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Temp. factor (1871)

Prerequisite The **Calculated value** option is selected in the **Density source** parameter (→ 66) and the **External value** option is selected in the **Temperature compensation** parameter (→ 65).

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

User entry Positive floating-point number

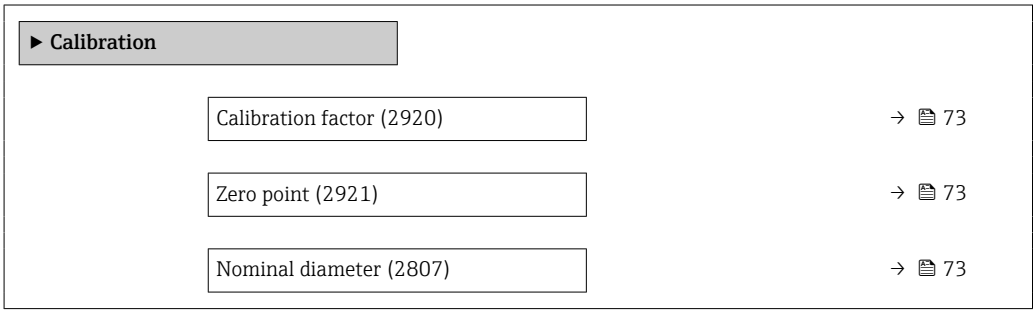
Factory setting 1

Additional information *Description*

Corrected value = (factor × value) + offset

3.2.8 "Calibration" submenu

Navigation Expert → Sensor → Calibration



Calibration factor

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

Description Displays the current calibration factor for the sensor.

User interface Signed floating-point number

Factory setting 1

Zero point

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

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

User interface Signed floating-point number

Factory setting 0

Nominal diameter

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

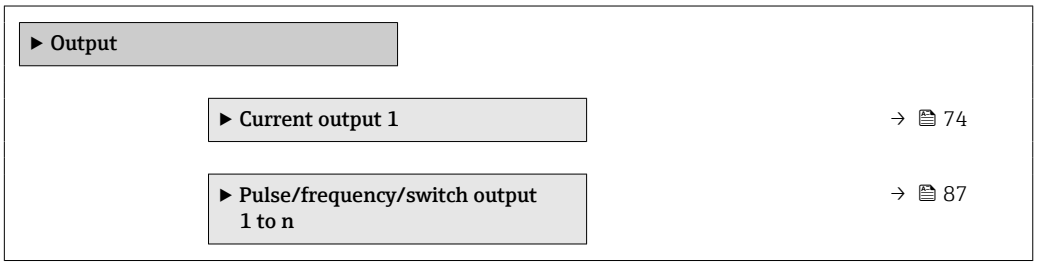
Description Displays the nominal diameter of the sensor.

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

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

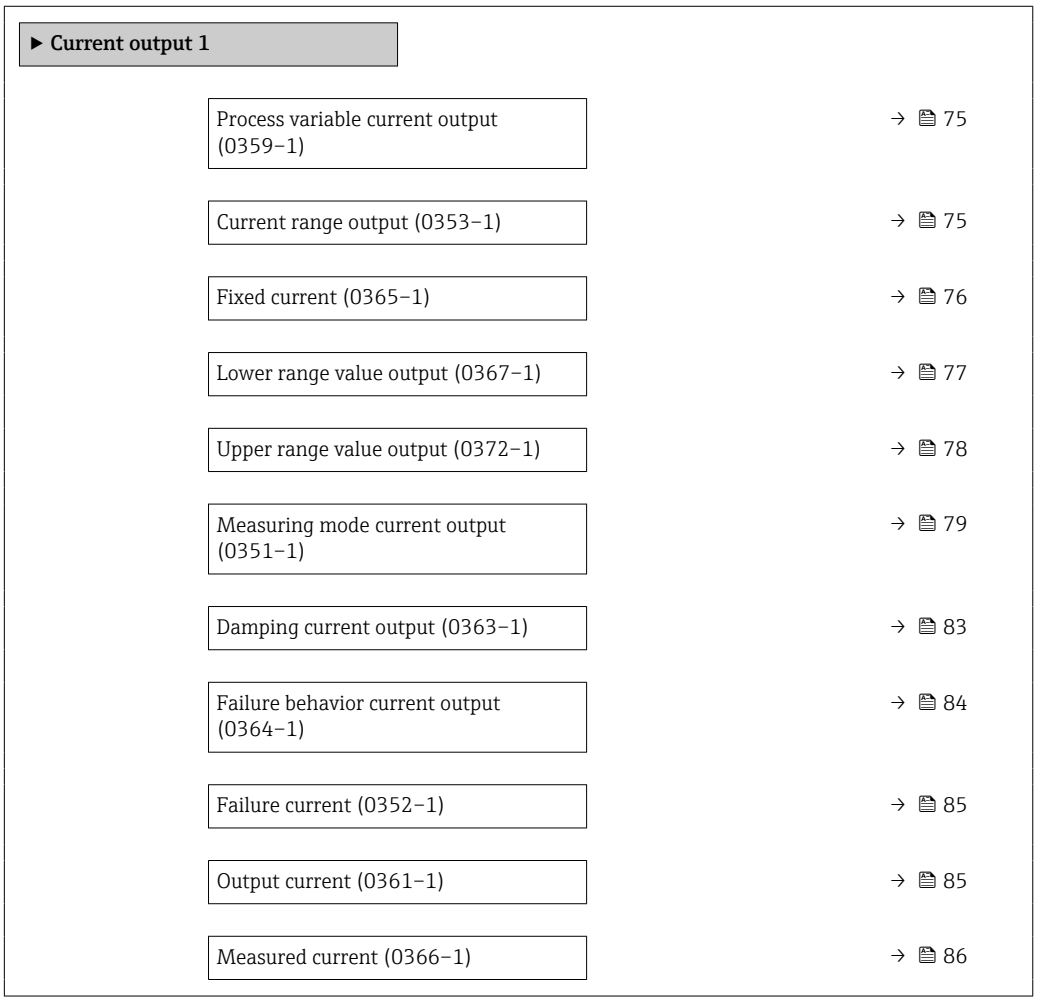
3.3 "Output" submenu

Navigation Expert → Output



3.3.1 "Current output 1" submenu

Navigation Expert → Output → Curr.output 1



Process variable current output

Navigation Expert → Output → Curr.output 1 → Proc.var. outp (0359–1)

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

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

Factory setting Volume flow

Current range output

Navigation Expert → Output → Curr.output 1 → Curr.range out (0353–1)

Description Select current range for process value output and upper/lower level for alarm signal.

Selection
- 4...20 mA NE (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)
- 4...20 mA (4...20.5 mA)
- 0...20 mA (0...20.5 mA)
- Fixed value

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

* Visibility depends on order options or device settings

Additional information

Description

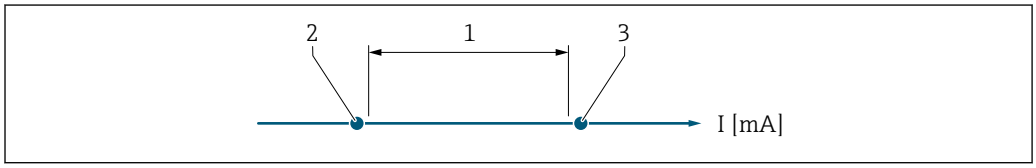
- In the event of a device alarm, the current output adopts the value specified in the **Failure mode** parameter (→ 84).
- If the measured value is outside the measuring range, the ⚠**S441 Current output 1** diagnostic message is displayed.
- The measuring range is specified via the **0/4 mA value** parameter (→ 77) and **20 mA value** parameter (→ 78).

"Fixed current" option

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

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

Fixed current

Navigation Expert → Output → Curr.output 1 → Fixed current (0365-1)

Prerequisite The **Fixed current** option is selected in the **Current span** parameter (→ 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 → Low.range outp (0367–1)

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 0/4 mA current.

User entry Signed floating-point number

Factory setting Depends on country:
- m^3/h
- ft^3/h

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 **20 mA value** parameter (→ 78).

Dependency

The unit depends on the process variable selected in the **Assign current output** parameter (→ 75).

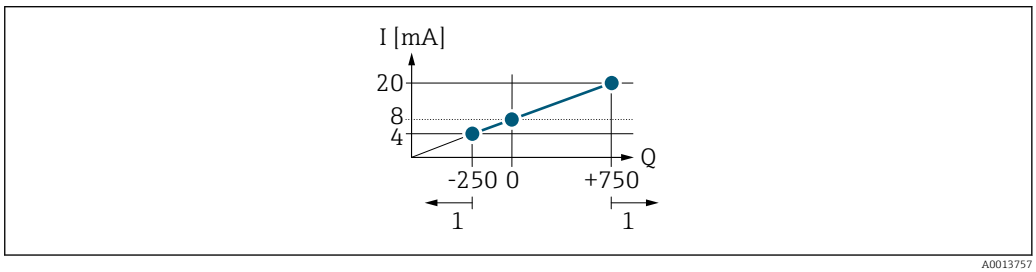
Current output behavior

The current output behaves differently depending on the settings configured in the following parameters:
- Current span (→ 75)
- Measuring mode (→ 79)
- Failure mode (→ 84)

Configuration examples

Some examples of parameter settings and their effect on the current output are given in the following section.

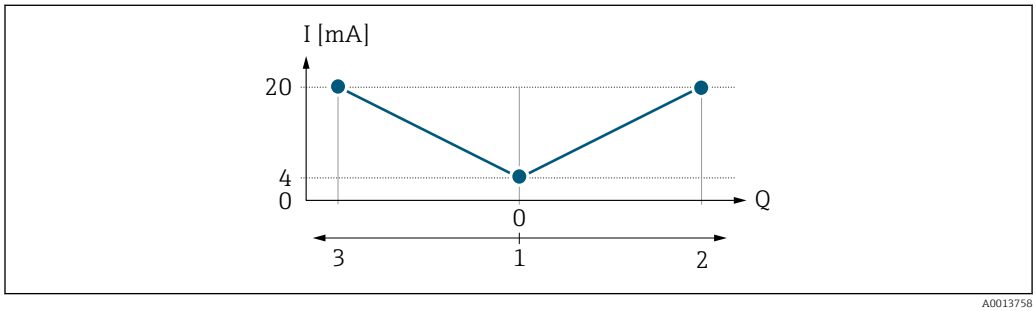
Configuration example A
Measurement mode with **Forward flow** option
- **0/4 mA value** parameter (→ 77) = not equal to zero flow (e.g. −250 m^3/h)
- **20 mA value** parameter (→ 78) = not equal to zero flow (e.g. +750 m^3/h)
- Calculated current value = 8 mA at zero flow



Q Flow
I Current
1 Measuring range is exceeded or undershot

The operational range of the measuring device is defined by the values entered for the **0/4 mA value** parameter (→ 77) and **20 mA value** parameter (→ 78). If the effective flow exceeds or falls below this operational range, the ⚠**S441 Current output 1** diagnostic message is output.

Configuration example B
Measurement mode with **Forward/Reverse flow** option



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

The current output signal is independent of the direction of flow (absolute amount of the measured variable). The values for the **0/4 mA value** parameter (→ 77) and **20 mA value** parameter (→ 78) must have the same algebraic sign. The value for the **20 mA value** parameter (→ 78) (e.g. reverse flow) corresponds to the mirrored value for the **20 mA value** parameter (→ 78) (e.g. flow).

Configuration example C
Measurement mode with **Reverse flow compensation** option
If flow is characterized by severe fluctuations (e.g. when using reciprocating pumps), flow components outside the measuring range are buffered, balanced and output after a maximum delay of 60 s → 79.

Upper range value output

Navigation Expert → Output → Curr.output 1 → Upp.range outp (0372–1)

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 20 mA current..

User entry Signed floating-point number

Factory setting Depends on country and nominal diameter

Additional information *Description*

Positive and negative values are permitted depending on the process variable assigned in the **Assign current output** parameter (→ 75). In addition, the value can be greater

than or smaller than the value assigned for the 0/4 mA current in the **0/4 mA value** parameter (→ 77).

Dependency

The unit depends on the process variable selected in the **Assign current output** parameter (→ 75).

Example

- Value assigned to 0/4 mA = −250 m^3/h
- Value assigned to 20 mA = +750 m^3/h
- Calculated current value = 8 mA (at zero flow)

If the **Forward/Reverse flow** option is selected in the **Measuring mode** parameter (→ 79), different algebraic signs cannot be entered for the values for the **0/4 mA value** parameter (→ 77) and **Upper range value output** parameter (→ 78). The ⚠**S441 Current output 1** diagnostic message is displayed.

Configuration examples

Observe the configuration examples for the **0/4 mA value** parameter (→ 77).

Measuring mode current output

Navigation Expert → Output → Curr.output 1 → Output mode (0351−1)

Prerequisite One of the following options is selected in the **Current span** parameter (→ 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.

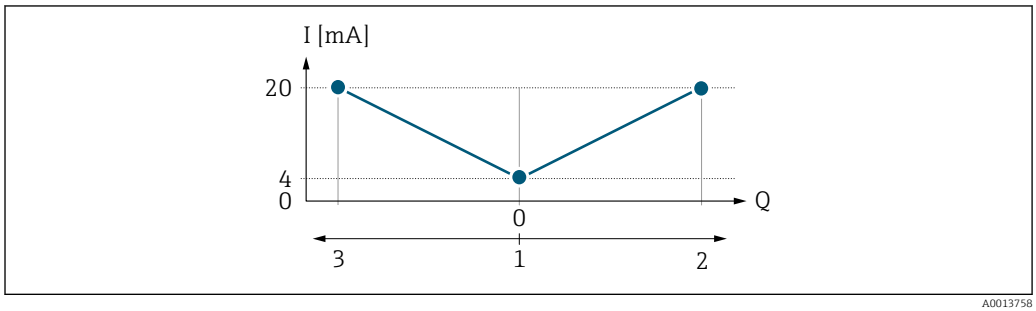
"Forward flow" option

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

* Visibility depends on order options or device settings

The flow components outside the scaled measuring range are taken into account for signal output as follows:
Both values are defined such that they are not equal to zero flow e.g.:
- 0/4 mA current value = −5 m^3/h
- 20 mA current value = 10 m^3/h

"Forward/Reverse flow" option



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

- The current output signal is independent of the direction of flow (absolute amount of the measured variable). The values for the **0/4 mA value** parameter (→ 77) and **20 mA value** parameter (→ 78) must have the same sign.
- The value for the **20 mA value** parameter (→ 78) (e.g. reverse flow) corresponds to the mirrored value for the **20 mA value** 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.

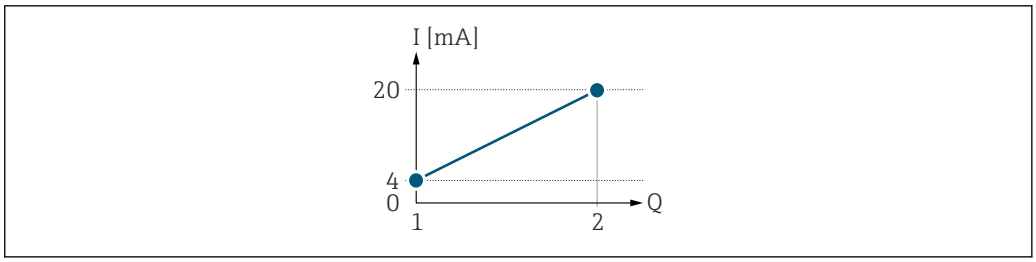
In the event of prolonged and undesired reverse flow, flow values can accumulate in the buffer memory. Due to the configuration of the current output, these values are not factored in, however, i.e. there is no compensation for the reverse flow.

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

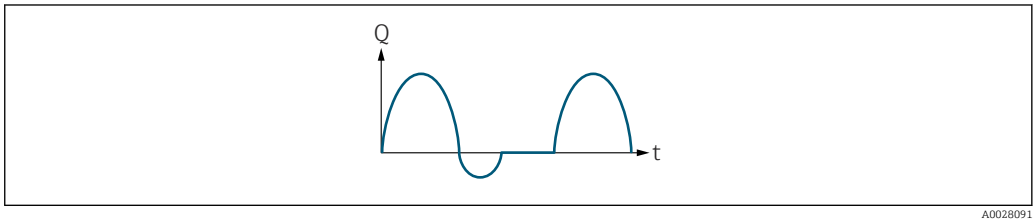
Defined measuring range: lower range value and upper range value with the **same** sign



3 *Measuring range*

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

With the following flow response:

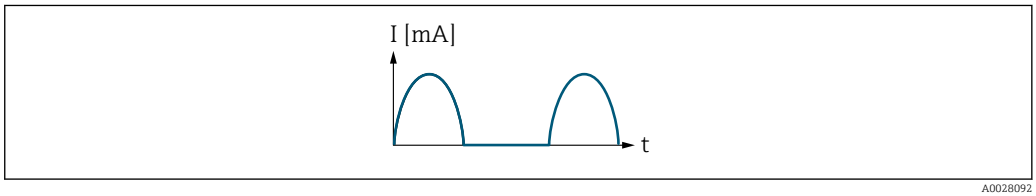


4 *Flow response*

Q Flow
t Time

With **Forward flow** option

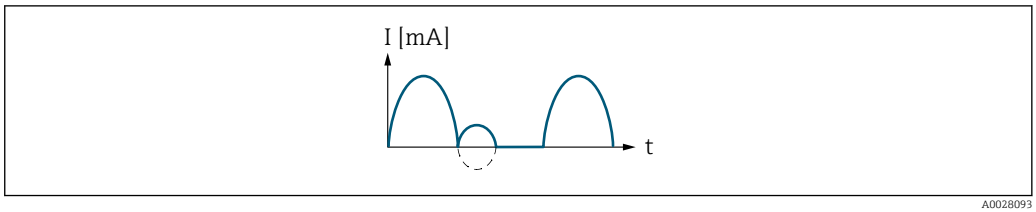
The current output signal is proportional to the process variable assigned. The flow components outside the scaled measuring range are not taken into account for signal output:.



I Current
t Time

With **Forward/Reverse flow** option

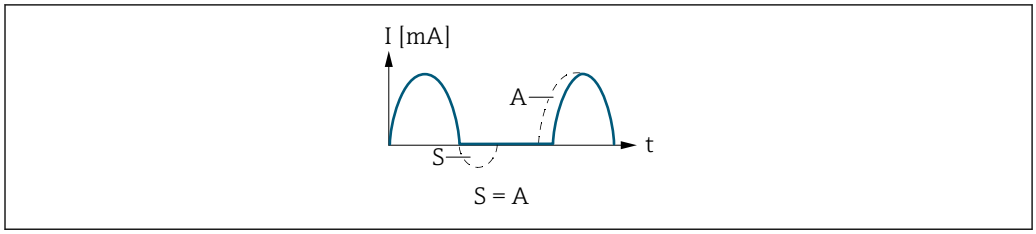
The current output signal is independent of the direction of flow.



I Current
t Time

With **Reverse flow compensation** option

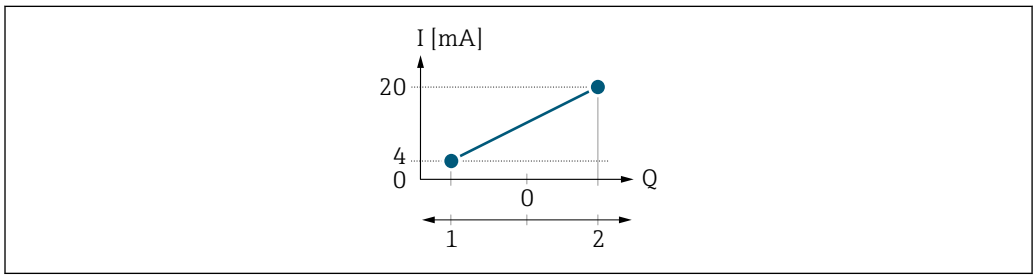
Flow components outside the measuring span are buffered, balanced and output after a maximum delay of 60 s.



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

Example 2

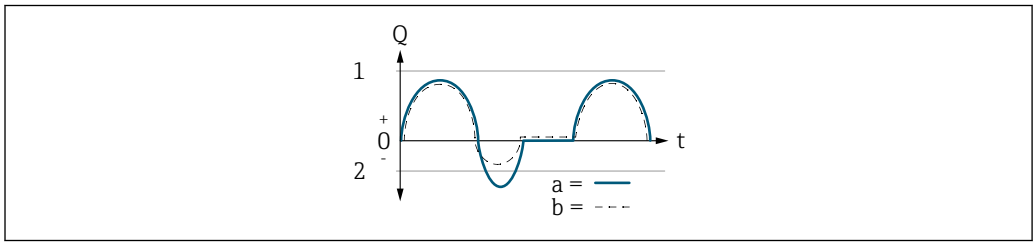
Defined measuring range: lower range value and upper range value with **different** signs



5 Measuring range

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

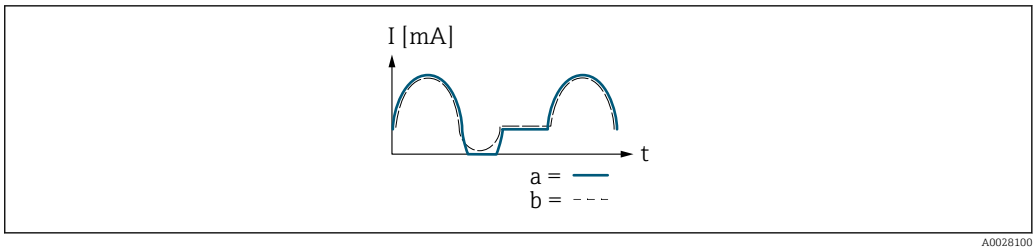
With flow a (—) outside, b (- -) inside the measuring range



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

With **Forward flow** option

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



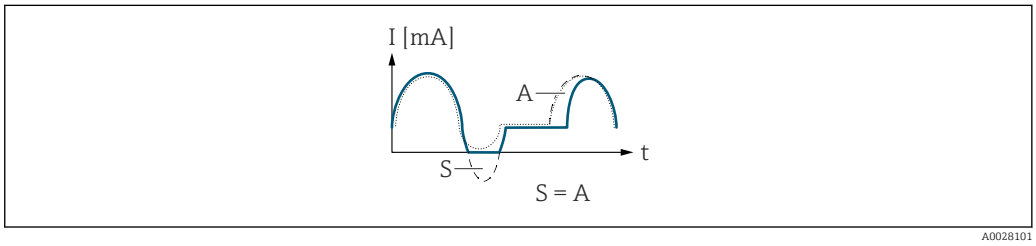
I Current
t Time

With **Forward/Reverse flow** option

This option cannot be selected here since the values for the **0/4 mA value** parameter (→ 77) and **20 mA value** 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 → Damp.curr.outp (0363–1)

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

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

Failure behavior current output

Navigation Expert → Output → Curr.output 1 → Failure behav. (0364–1)

Prerequisite A process variable is selected in the **Assign current output** parameter (→ 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.

3) proportional transmission behavior with first order delay

Additional information

Description

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

"Min." option

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

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.

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.

The measured value is defined via the **Failure current** parameter (→ 85).

Failure current

Navigation Expert → Output → Curr.output 1 → Fail. current (0352–1)

Prerequisite The **Defined value** option is selected in the **Failure mode** parameter (→ 84).

Description Use this function to enter a fixed value that the current output adopts in the event of a device alarm.

User entry 0 to 22.5 mA

Factory setting 22.5 mA

Output current 1

Navigation Expert → Output → Curr.output 1 → Output curr. 1 (0361–1)

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

User interface 0 to 22.5 mA

Measured current

Navigation Expert → Output → Curr.output 1 → Measur. curr. (0366–1)

Description Displays the actual measured value of the output current.

User interface 0 to 30 mA

Trim

Navigation Expert → Output → Curr.output 1 → Trim (0362–1)

Description Select adjustment mode for trim.

Selection
- Off
- 4 mA
- 20 mA
- Calculate
- Reset

Factory setting Off

20 mA trim value

Navigation Expert → Output → Curr.output 1 → 20 mA trim value (0356–1)

Description Enter upper measured value for trim (around 20 mA).

User entry 18 to 22 mA

Factory setting 20 mA

4 mA trim value

Navigation Expert → Output → Curr.output 1 → 4 mA trim value (0357–1)

Description Enter lower measured value for the trim (around 4 mA).

User entry 3 to 5 mA

Factory setting 4 mA

Status

Navigation Expert → Output → Curr.output 1 → Status (0360–1)

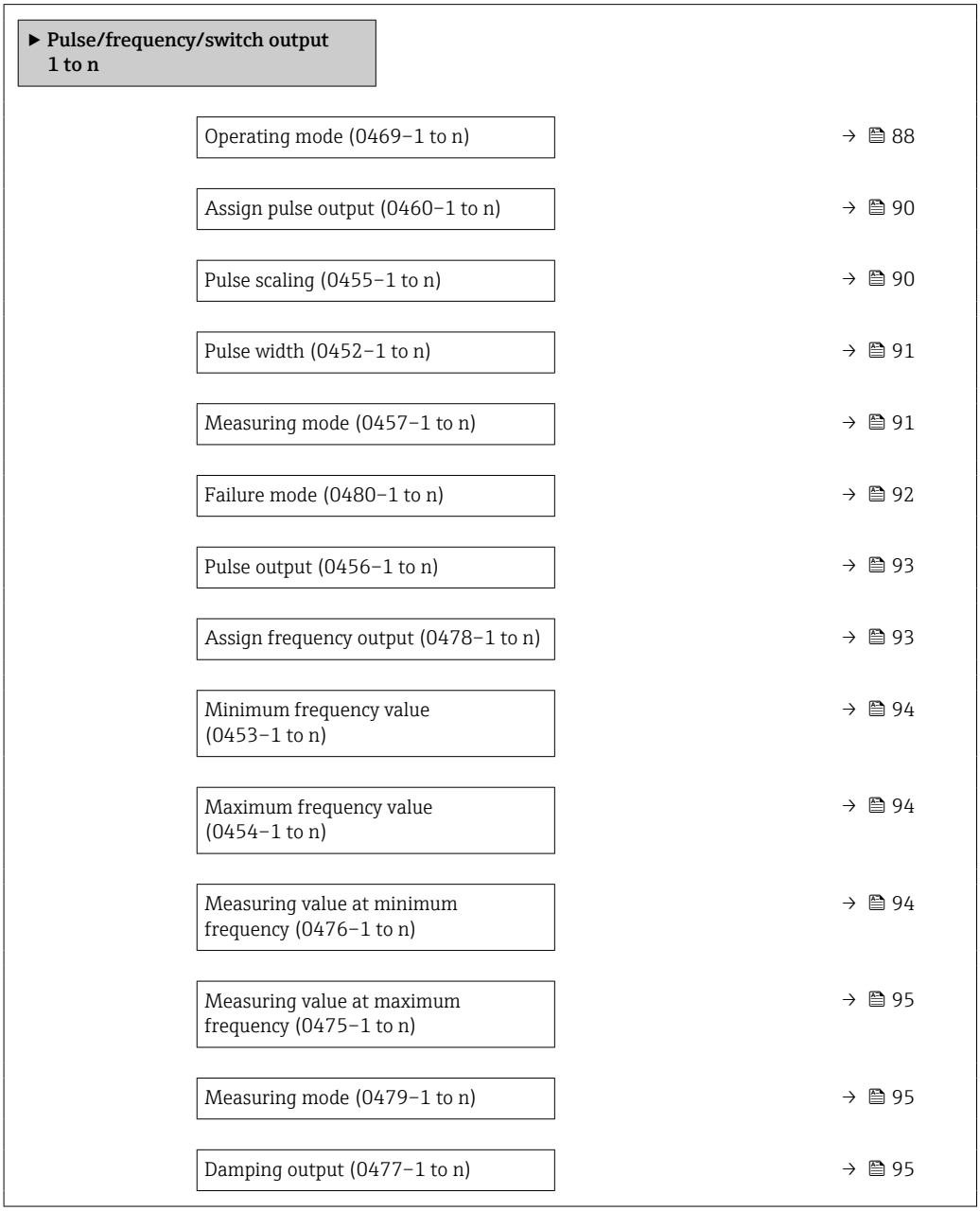
Description Shows the status of the last output current (OutValue).

User interface 0 to 255

Factory setting 0

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

Navigation Expert → Output → PFS output 1 to n



Operating mode

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

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

Selection
- Pulse *
- Frequency *
- Switch *

Factory setting Pulse

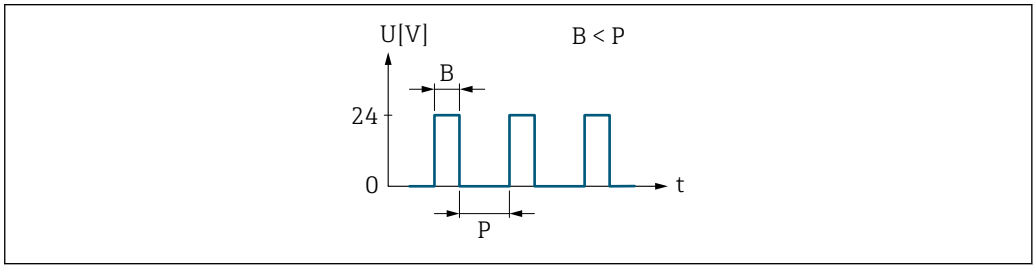
* Visibility depends on order options or device settings

Additional information

"Pulse" option

Quantity-dependent pulse with configurable pulse width
- Whenever a specific mass or volume is reached (pulse value), a pulse is output, the duration of which was set previously (pulse width).
- The pulses are never shorter than the set duration.

Example
- Flow rate approx. 100 g/s
- Pulse value0.1 g
- Pulse width 0.05 ms
- Pulse rate 1 000 Impuls/s



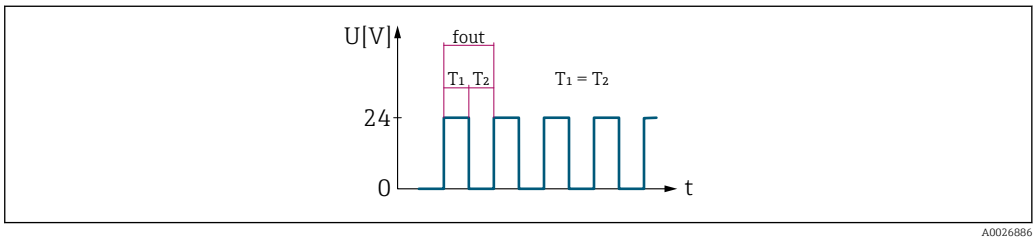
6 *Quantity-proportional pulse (pulse value) with pulse width to be configured*

B Pulse width entered
P Pauses between the individual pulses

"Frequency" option

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

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

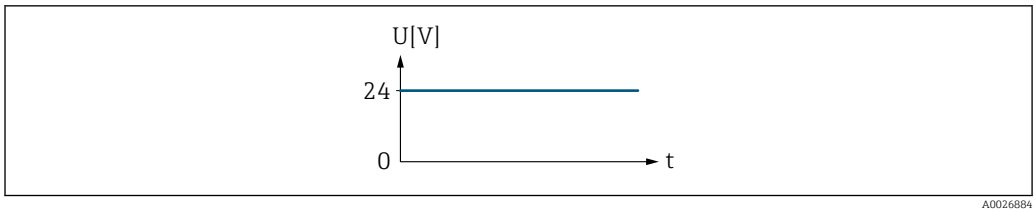


7 *Flow-proportional frequency output*

"Switch" option

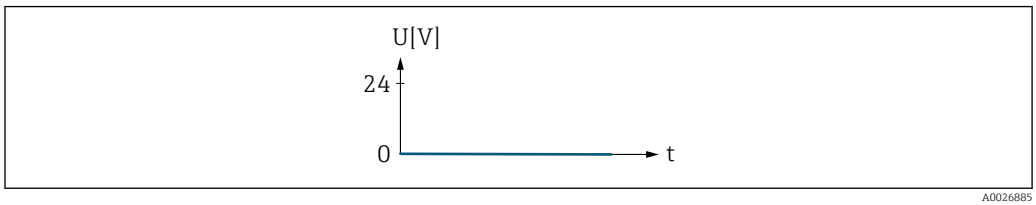
Contact for displaying a condition (e.g. alarm or warning if a limit value is reached)

Example
Alarm response without alarm



8 *No alarm, high level*

Example
Alarm response in case of alarm



9 *Alarm, low level*

Assign pulse output

Navigation Expert → Output → PFS output 1 to n → Assign pulse (0460–1 to n)

Prerequisite The **Pulse** option is selected in **Operating mode** parameter (→ 88).

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

Selection
- Off
- Volume flow
- Mass flow

Factory setting Off

Pulse scaling

Navigation Expert → Output → PFS output 1 to n → Pulse scaling (0455–1 to n)

Prerequisite The **Pulse** option is selected in the **Operating mode** parameter (→ 88) and a process variable is selected in the **Assign pulse output** parameter (→ 90).

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

User entry Positive floating point number

Factory setting Depends on country and nominal diameter

Additional information *User entry*

Weighting of the pulse output with a quantity.

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

Pulse width

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

Prerequisite The **Pulse** option is selected in the **Operating mode** parameter (→ 88) and a process variable is selected in the **Assign pulse output** parameter (→ 90).

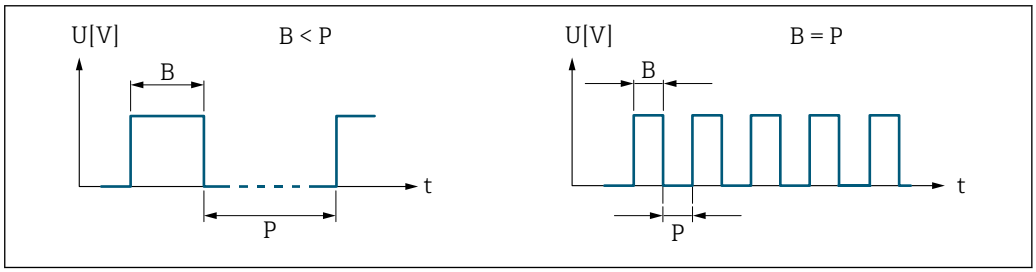
Description Use this function to enter the duration of the output pulse.

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 × pulse width).
- The interval between two pulses lasts at least as long as the set pulse width.
- The maximum flow is defined by Q_{max} = f_{max} × pulse value.
- If the flow exceeds these limit values, the measuring device displays the **443 Pulse output 1 to n** diagnostic message.



A0026882

B Pulse width entered
P Pauses between the individual pulses

Example

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

Measuring mode

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

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

Selection
- Forward flow
- Forward/Reverse flow
- Reverse flow
- Reverse flow compensation

Factory setting
Forward flow

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

Failure mode

Navigation
Expert → Output → PFS output 1 to n → Failure mode (0480–1 to n)

Prerequisite
The **Pulse** option is selected in the **Operating mode** parameter (→ 88) and a process variable is selected in the **Assign pulse output** parameter (→ 90).

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

Selection
- Actual value
- No pulses

Factory setting
No pulses

Additional information
Description

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

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

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

Pulse output

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

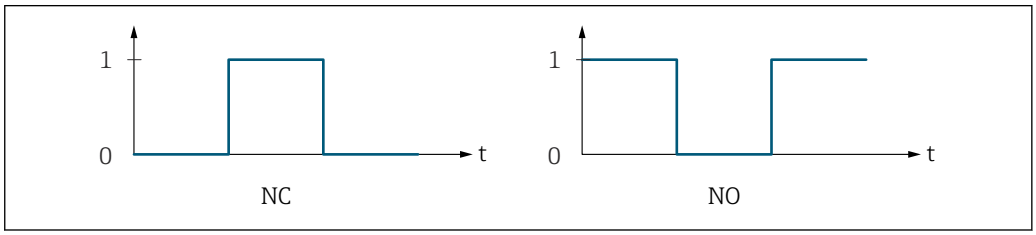
Prerequisite The **Pulse** option is selected in the **Operating mode** parameter (→ 88) parameter.

Description Displays the pulse frequency currently output.

User interface Positive floating-point number

Additional information *Description*

- The pulse output is an open collector output.
- This is configured at the factory in such a way that the transistor is conductive for the duration of the pulse (NO contact) and is safety-oriented.
- The **Value per pulse** parameter (→ 90) and **Pulse width** parameter (→ 91) can be used to define the value (i.e. the measured value amount that corresponds to a pulse) and the duration of the pulse.



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

The output behavior can be reversed via the **Invert output signal** parameter (→ 104) 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 (→ 92)) can be configured.

Assign frequency output

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

Prerequisite The **Frequency** option is selected in **Operating mode** parameter (→ 88).

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

Selection

- Off
- Volume flow
- Mass flow
- Flow velocity
- Sound velocity
- Temperature
- Density
- Electronics temperature

- Signal strength *
- Signal to noise ratio *
- Acceptance rate *
- Turbulence *

Factory setting Off

Minimum frequency value

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

Prerequisite The **Frequency** option is selected in the **Operating mode** parameter (→ 88) and a process variable is selected in the **Assign frequency output** parameter (→ 93).

Description Use this function to enter the minimum frequency.

User entry 0.0 to 10 000.0 Hz

Factory setting 0.0 Hz

Maximum frequency value

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

Prerequisite The **Frequency** option is selected in the **Operating mode** parameter (→ 88) and a process variable is selected in the **Assign frequency output** parameter (→ 93).

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 (0476–1 to n)

Prerequisite The **Frequency** option is selected in the **Operating mode** parameter (→ 88) and a process variable is selected in the **Assign frequency output** parameter (→ 93).

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

User entry Signed floating-point number

* Visibility depends on order options or device settings

Factory setting Depends on country and nominal diameter

Additional information *Dependency*

The entry depends on the process variable selected in the **Assign frequency output** parameter (→ 93).

Measuring value at maximum frequency

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

Prerequisite The **Frequency** option is selected in the **Operating mode** parameter (→ 88) and a process variable is selected in the **Assign frequency output** parameter (→ 93).

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 (→ 93).

Measuring mode

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

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

Selection
- Forward flow
- Forward/Reverse flow
- Reverse flow compensation

Factory setting Forward flow

Damping output

Navigation Expert → Output → PFS output 1 to n → Damping out. (0477–1 to n)

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

User entry 0 to 999.9 s

Factory setting 0.0 s

Additional information *User entry*

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

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

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

Response time

Navigation Expert → Output → PFS output 1 to n → Response time (0491–1 to n)

Description Displays the response time. This specifies how quickly the pulse/frequency/switch output reaches 63 % of 100 % of the measured value change when the measured value changes.

User interface Positive floating-point number

Additional information *Description*

The response time is made up of the time specified for the following dampings:
- Damping of pulse/frequency/switch output → 83
  and
- Depending on the measured variable assigned to the output.
  Flow damping

Failure mode

Navigation Expert → Output → PFS output 1 to n → Failure mode (0451–1 to n)

Prerequisite The **Frequency** option is selected in the **Operating mode** parameter (→ 88) and a process variable is selected in the **Assign frequency output** parameter (→ 93).

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

4) 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 (→ 97) replaces the current measured value, making it possible to bypass the device alarm. The actual measurement is switched off for the duration of the device alarm.
- 0 Hz
  In the event of a device alarm, the frequency output is "switched off".

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

Failure frequency

Navigation Expert → Output → PFS output 1 to n → Failure freq. (0474–1 to n)

Prerequisite In the **Operating mode** parameter (→ 88), the **Frequency** option is selected, in the **Assign frequency output** parameter (→ 93) a process variable is selected, and in the **Failure mode** parameter (→ 96), the **Defined value** option is selected.

Description Enter frequency output value in alarm condition.

User entry 0.0 to 12 500.0 Hz

Factory setting 0.0 Hz

Output frequency

Navigation Expert → Output → PFS output 1 to n → Output freq. (0471–1 to n)

Prerequisite In the **Operating mode** parameter (→ 88), the **Frequency** option is selected.

Description Displays the actual value of the output frequency which is currently measured.

User interface 0.0 to 12 500.0 Hz

Switch output function

Navigation Expert → Output → PFS output 1 to n → Switch out funct (0481–1 to n)

Prerequisite The **Switch** option is selected in the **Operating mode** parameter (→ 88).

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

Selection
- Off
- On
- Diagnostic behavior
- Limit
- Flow direction check
- Status

Factory setting Off

Additional information *Options*
- Off
  The switch output is permanently switched off (open, non-conductive).
- On
  The switch output is permanently switched on (closed, conductive).
- Diagnostic behavior
  Indicates if the diagnostic event is present or not. Is used to output diagnostic information and to react to it appropriately at the system level.
- Limit
  Indicates if a specified limit value has been reached for the process variable. Is used to output diagnostic information relating to the process and to react to it appropriately at the system level.
- Status
  Displays the device status low flow cut off is selected.

Assign diagnostic behavior

Navigation Expert → Output → PFS output 1 to n → Assign diag. beh (0482–1 to n)

Prerequisite
- In the **Operating mode** parameter (→ 88), the **Switch** option is selected.
- In the **Switch output function** parameter (→ 97), 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

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

Selection

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

Assign limit

Navigation

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

Prerequisite

- The **Switch** option is selected in **Operating mode** parameter (→ 88).
- The **Limit** option is selected in **Switch output function** parameter (→ 97).

Description

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

Selection

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

Factory setting

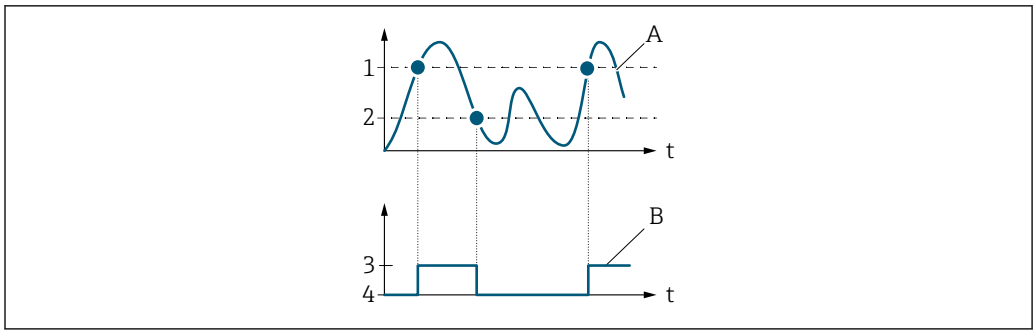
Volume flow

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

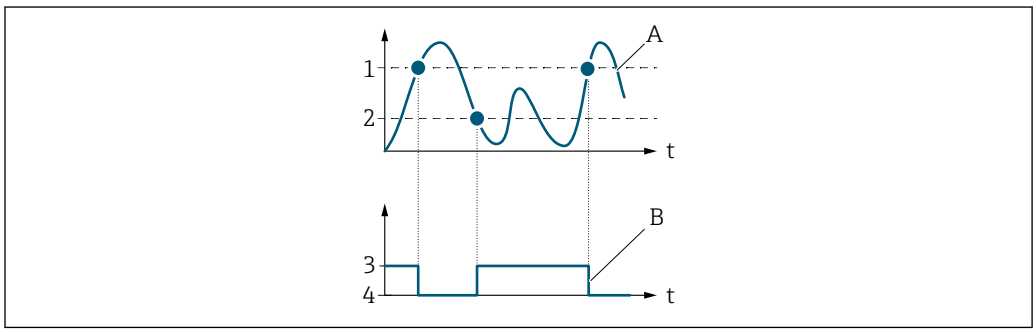
* Visibility depends on order options or device settings



A0026891

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

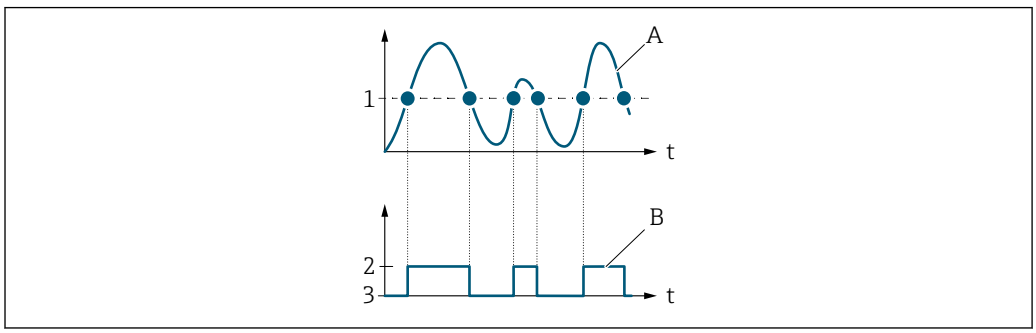
Behavior of status output when Switch-on value < Switch-off value:
- Process variable < Switch-on value: transistor is conductive
- Process variable > Switch-off value: transistor is non-conductive



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 (0466–1 to n)

Prerequisite
- The **Switch** option is selected in the **Operating mode** parameter (→ 88).
- The **Limit** option is selected in the **Switch output function** parameter (→ 97).

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

User entry Signed floating-point number

Factory setting Depends on country

Additional information

Description

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

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

Dependency

The unit depends on the process variable selected in the **Assign limit** parameter (→ 99).

Switch-off value

Navigation Expert → Output → PFS output 1 to n → Switch-off value (0464–1 to n)

Prerequisite
- The **Switch** option is selected in the **Operating mode** parameter (→ 88).
- The **Limit** option is selected in the **Switch output function** parameter (→ 97).

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

User entry Signed floating-point number

Factory setting Depends on country

Additional information

Description

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

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

Dependency

The unit depends on the process variable selected in the **Assign limit** parameter (→ 99).

Assign flow direction check

Navigation Expert → Output → PFS output 1 to n → Assign dir.check (0484–1 to n)

Prerequisite
- The **Switch** option is selected in the **Operating mode** parameter (→ 88).
- The **Flow direction check** option is selected in the **Switch output function** parameter (→ 97).

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

Selection

Factory setting Volume flow

Assign status

Navigation Expert → Output → PFS output 1 to n → Assign status (0485–1 to n)

Prerequisite
- The **Switch** option is selected in **Operating mode** parameter (→ 88).
- The **Status** option is selected in **Switch output function** parameter (→ 97).

Description Select the device function whose status you want to display.

Selection
- Off
- Low flow cut off

Factory setting Low flow cut off

Additional information *Options*

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

Switch-on delay

Navigation Expert → Output → PFS output 1 to n → Switch-on delay (0467–1 to n)

Prerequisite
- The **Switch** option is selected in the **Operating mode** parameter (→ 88).
- The **Limit** option is selected in the **Switch output function** parameter (→ 97).

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

User entry 0.0 to 100.0 s

Factory setting 0.0 s

Switch-off delay

Navigation Expert → Output → PFS output 1 to n → Switch-off delay (0465–1 to n)

Prerequisite
- The **Switch** option is selected in the **Operating mode** parameter (→ 88).
- The **Limit** option is selected in the **Switch output function** parameter (→ 97).

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

User entry 0.0 to 100.0 s

Factory setting 0.0 s

Failure mode

Navigation Expert → Output → PFS output 1 to n → Failure mode (0486–1 to n)

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

Selection
- Actual status
- Open
- Closed

Factory setting Open

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

Switch state

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

Prerequisite The **Switch** option is selected in the **Operating mode** parameter (→ 88).

Description Displays the current switch status of the status output.

User interface
- Open
- Closed

Additional information *User interface*

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

Invert output signal

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

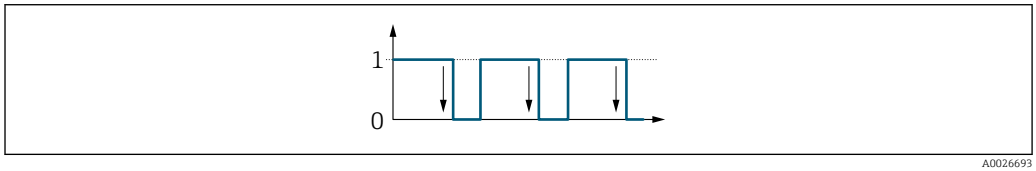
Description Use this function to select whether to invert the output signal.

Selection
- No
- Yes

Factory setting No

Additional information *Selection*

No option (passive - negative)



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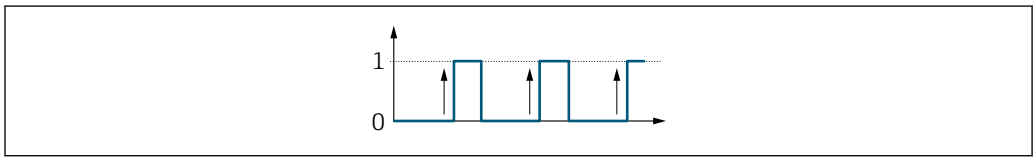
Yes option (passive - positive)



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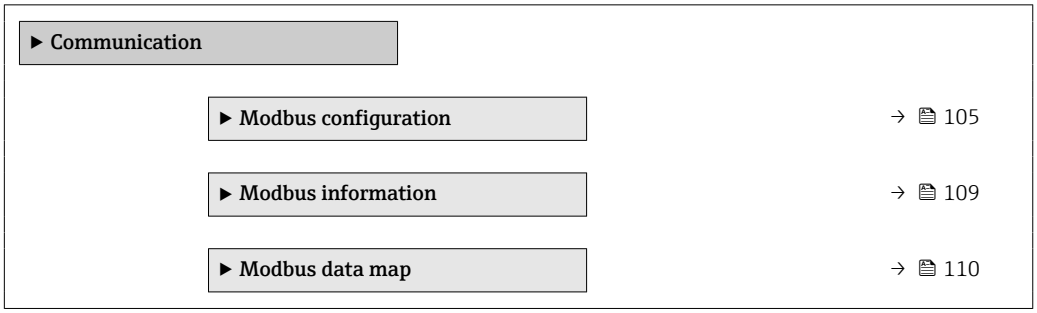
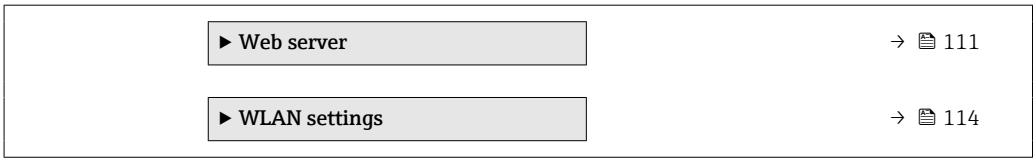
3.4 "Communication" submenu

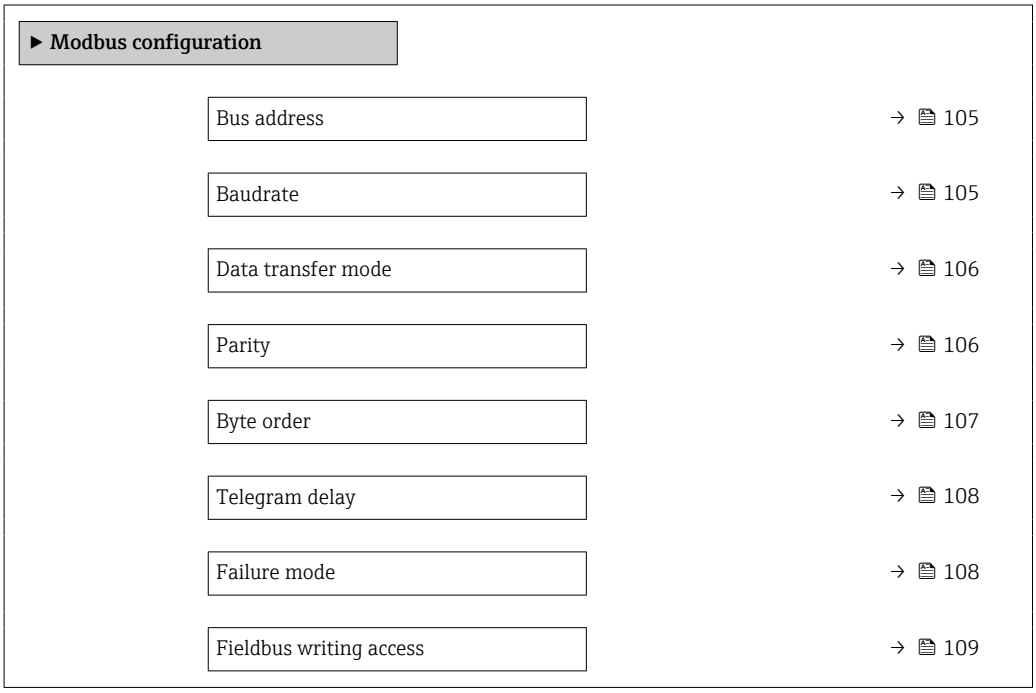
Navigation Expert → Communication





3.4.1 "Modbus configuration" submenu

Navigation Expert → Communication → Modbus config.



Bus address

Navigation Expert → Communication → Modbus config. → Bus address (7112)

Description For entering the device address.

User entry 1 to 247

Factory setting 247

Baudrate

Navigation Expert → Communication → Modbus config. → Baudrate (7111)

Description Use this function to select a transmission rate.

Selection
- 1200 BAUD
- 2400 BAUD
- 4800 BAUD
- 9600 BAUD
- 19200 BAUD
- 38400 BAUD
- 57600 BAUD
- 115200 BAUD
- 230400 BAUD

Factory setting 19200 BAUD

Data transfer mode

Navigation Expert → Communication → Modbus config. → Data trans. mode (7115)

Description Use this function to select the data transmission mode.

Selection
- ASCII
- RTU

Factory setting RTU

Additional information *Options*
- ASCII
  Transmission of data in the form of readable ASCII characters. Error protection via LRC.
- RTU
  Transmission of data in binary form. Error protection via CRC16.

Parity

Navigation Expert → Communication → Modbus config. → Parity (7122)

Description Use this function to select the parity bit.

Selection
- Odd
- Even
- None / 1 stop bit
- None / 2 stop bits

Factory setting Even

Additional information *Options*

Picklist **ASCII** option:
- 0 = **Even** option
- 1 = **Odd** option

Picklist **RTU** option:
- 0 = **Even** option
- 1 = **Odd** option
- 2 = **None / 1 stop bit** option
- 3 = **None / 2 stop bits** option

Byte order

Navigation Expert → Communication → Modbus config. → Byte order (7113)

Description Use this function to select the sequence in which the bytes are transmitted. The transmission sequence must be coordinated with the Modbus master.

Selection
- 0-1-2-3
- 3-2-1-0
- 1-0-3-2
- 2-3-0-1

Factory setting 1-0-3-2

Additional information

Description

The byte sequence is not standardized by the Modbus protocol. However, if the host system and the measuring device do not use the same byte sequence, correct data exchange is not possible.

Changing the byte sequence in the host system often requires a extensive knowledge and significant programming efforts. Endress+Hauser introduced the **Byte order** parameter (→ 107) for this reason.

This makes it possible to use the standard settings of the host system and change the byte sequence on the measuring device by trial and error. If correct data exchange cannot be achieved by changing the byte sequence, the settings for the byte sequence of the host system must be adapted accordingly.

Byte transmission sequence

Byte addressing, i.e. the transmission sequence of the bytes, is not specified in the Modbus specification. For this reason, it is important to coordinate or match the addressing method between the master and slave during commissioning. This can be configured in the measuring device using the **Byte order** parameter (→ 107).

The bytes are transmitted depending on the selection in the **Byte order** parameter (→ 107):

FLOAT				
	Sequence			
Options	1.	2.	3.	4.
1 – 0 – 3 – 2 *	Byte 1 (MMMMMMMM)	Byte 0 (MMMMMMMM)	Byte 3 (SEEEEEEE)	Byte 2 (EMMMMMMM)
0 – 1 – 2 – 3	Byte 0 (MMMMMMMM)	Byte 1 (MMMMMMMM)	Byte 2 (EMMMMMMM)	Byte 3 (SEEEEEEE)
2 – 3 – 0 – 1	Byte 2 (EMMMMMMM)	Byte 3 (SEEEEEEE)	Byte 0 (MMMMMMM)	Byte 1 (MMMMMMM)

3 – 2 – 1 – 0	Byte 3 (SEEEEEEE)	Byte 2 (EMMMMMMM)	Byte 1 (MMMMMMMM)	Byte 0 (MMMMMMMM)
* = factory setting, S = sign, E = exponent, M = mantissa				

INTEGER		
	Sequence	
Options	1.	2.
1 – **0** – 3 – 2 * 3 – 2 – **1** – **0**	Byte 1 (MSB)	Byte 0 (LSB)
0 – **1** – 2 – 3 2 – 3 – **0** – **1**	Byte 0 (LSB)	Byte 1 (MSB)
* = factory setting, MSB = most significant byte, LSB = least significant byte		

STRING Presentation taking the example of a device parameter with a data length of 18 bytes.					
	Sequence				
Options	1.	2.	...	17.	18.
1 – **0** – 3 – 2 * 3 – 2 – **1** – **0**	Byte 17 (MSB)	Byte 16	...	Byte 1	Byte 0 (LSB)
0 – **1** – 2 – 3 2 – 3 – **0** – **1**	Byte 16	Byte 17 (MSB)	...	Byte 0 (LSB)	Byte 1
* = factory setting, MSB = most significant byte, LSB = least significant byte					

Telegram delay

Navigation Expert → Communication → Modbus config. → Telegram delay (7146)

Description Use this function to enter a delay time after which the measuring device replies to the request telegram of the Modbus master. This allows communication to be adapted to slow Modbus RS485 masters.

User entry 0 to 100 ms

Factory setting 6 ms

Failure mode

Navigation Expert → Communication → Modbus config. → Failure mode (7116)

Description Use this function to select the measured value output in the event of a diagnostic message via Modbus communication.

Selection
- NaN value
- Last valid value

Factory setting NaN value

Additional information *Options*

- NaN value
  The device outputs the NaN value [5].
- Last valid value
  The device outputs the last valid measured value before the fault occurred.

This effect of this parameter depends on the option selected in the **Assign diagnostic behavior** parameter.

Fieldbus writing access

Navigation Expert → Communication → Modbus config. → Fieldb.writ.acc. (7156)

Description Use this function to restrict access to the measuring device via fieldbus (Modbus protocol).

Selection
- Read + write
- Read only

Factory setting Read + write

Additional information *Description*

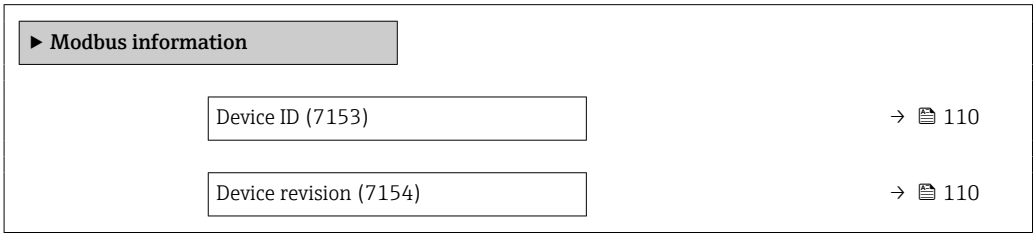
If read and/or write protection is enabled, the parameter can only be controlled and reset via local operation. Access is no longer possible via operating tools.

This does not affect cyclic measured value transmission to the higher-order system, which is always guaranteed.

Selection
- Read + write
  The parameters are read and write parameters.
- Read only
- The parameters are read only parameters.

3.4.2 "Modbus information" submenu

Navigation Expert → Communication → Modbus info



5) Not a Number

Device ID

Navigation Expert → Communication → Modbus info → Device ID (7153)

Description Displays the device ID for identifying the measuring device.

User interface 4-digit hexadecimal number

Device revision

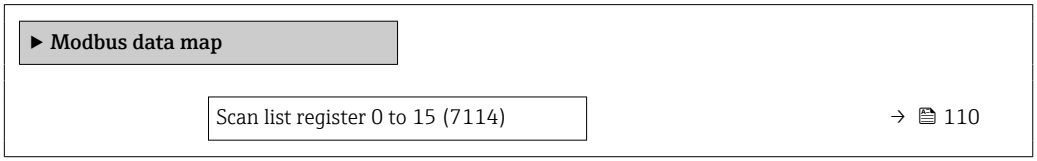
Navigation Expert → Communication → Modbus info → Device revision (7154)

Description Displays the device revision.

User interface 4-digit hexadecimal number

3.4.3 "Modbus data map" submenu

Navigation Expert → Communication → Modbus data map



Scan list register 0 to 15

Navigation Expert → Communication → Modbus data map → Scan list reg.0 to 15 (7114)

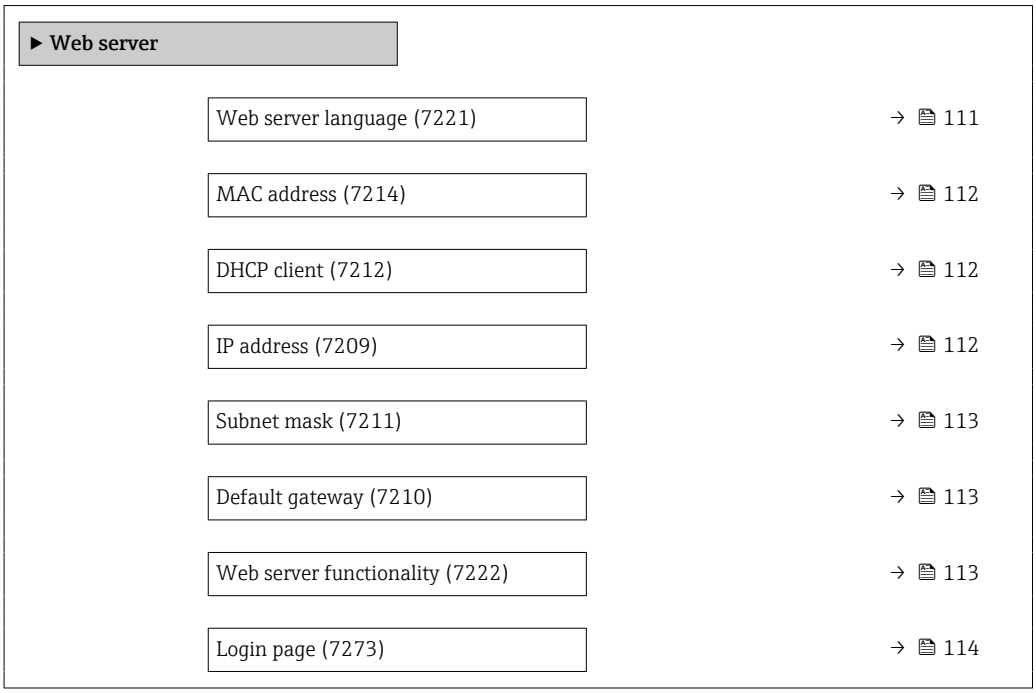
Description Use this function to enter the scan list register. By entering the register address (1-based), up to 16 device parameters can be grouped by assigning them to the scan list registers 0 to 15. The data of the device parameters assigned here are read out via the register addresses 5051 to 5081.

User entry 1 to 65 535

Factory setting 1

3.4.4 "Web server" submenu

Navigation Expert → Communication → Web server



Web server language

Navigation Expert → Communication → Web server → Webserv.language (7221)

Description Use this function to select the language configured for the Web server.

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

Factory setting English

MAC address

Navigation Expert → Communication → Web server → MAC Address (7214)

Description Displays the MAC [6] address of the measuring device.

User interface Unique 12-digit character string comprising letters and numbers

Factory setting Each measuring device is given an individual address.

Additional information *Example*

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

DHCP client

Navigation Expert → Communication → Web server → DHCP client (7212)

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

Selection
- Off
- On

Factory setting On

Additional information *Effect*

If the DHCP client functionality of the web server is selected, the IP address (→ 112), Subnet mask (→ 113) and Default gateway (→ 113) are set automatically.

- Identification is via the MAC address of the measuring device.
- The IP address (→ 112) in the **IP address** parameter (→ 112) is ignored as long as the **DHCP client** parameter (→ 112) is active. This is also the case, in particular, if the DHCP server cannot be reached. The IP address (→ 112) in the parameter of the same name is only used if the **DHCP client** parameter (→ 112) is inactive.

IP address

Navigation Expert → Communication → Web server → IP address (7209)

Description Display or enter the IP address of the Web server integrated in the measuring device.

User entry 4 octet: 0 to 255 (in the particular octet)

Factory setting 192.168.1.212

6) Media Access Control

Subnet mask

Navigation Expert → Communication → Web server → Subnet mask (7211)

Description Display or enter the subnet mask.

User entry 4 octet: 0 to 255 (in the particular octet)

Factory setting 255.255.255.0

Default gateway

Navigation Expert → Communication → Web server → Default gateway (7210)

Description Display or enter the Default gateway (→ 113).

User entry 4 octet: 0 to 255 (in the particular octet)

Factory setting 0.0.0.0

Web server functionality

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

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

Selection
- Off
- On

Factory setting On

Additional information

Description

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

Selection

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

Login page

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

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

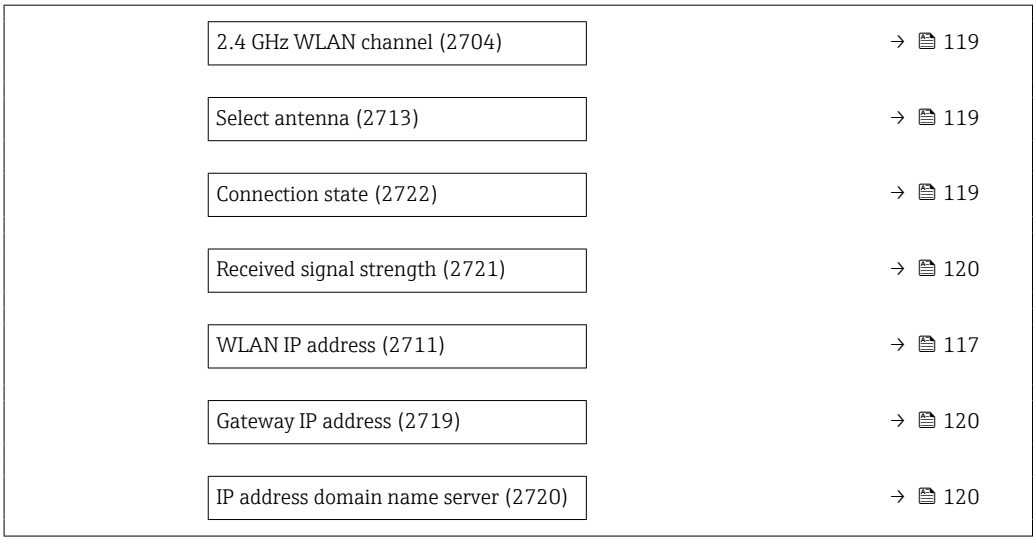
Selection
- Without header
- With header

Factory setting With header

3.4.5 "WLAN settings" wizard

Navigation Expert → Communication → WLAN settings

▶ WLAN settings	
WLAN (2702)	→ 115
WLAN mode (2717)	→ 115
SSID name (2714)	→ 115
Network security (2705)	→ 116
Security identification (2718)	→ 116
User name (2715)	→ 117
WLAN password (2716)	→ 117
WLAN IP address (2711)	→ 117
WLAN MAC address (2703)	→ 117
WLAN subnet mask (2709)	→ 118
WLAN MAC address (2703)	→ 117
WLAN passphrase (2706)	→ 118
WLAN MAC address (2703)	→ 117
Assign SSID name (2708)	→ 118
SSID name (2707)	→ 119



WLAN

Navigation Expert → Communication → WLAN settings → WLAN (2702)

Description Use this function to enable and disable the WLAN connection.

Selection
- Disable
- Enable

Factory setting Enable

WLAN mode

Navigation Expert → Communication → WLAN settings → WLAN mode (2717)

Description Use this function to select the WLAN mode.

Selection WLAN access point

Factory setting WLAN access point

SSID name

Navigation Expert → Communication → WLAN settings → SSID name (2714)

Prerequisite The client is activated.

Description Use this function to enter the user-defined SSID name (max. 32 characters) of the WLAN network.

User entry –

Factory setting –

Network security

Navigation Expert → Communication → WLAN settings → Network security (2705)

Description Use this function to select the type of security for the WLAN interface.

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

Factory setting WPA2-PSK

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

Security identification

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

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

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

* Visibility depends on order options or device settings

User name

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

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

User entry –

Factory setting –

WLAN password

Navigation Expert → Communication → WLAN settings → WLAN password (2716)

Description Use this function to enter the WLAN password for the WLAN network.

User entry –

Factory setting –

WLAN IP address

Navigation Expert → Communication → WLAN settings → WLAN IP address (2711)

Description Use this function to enter the IP address of the measuring device's WLAN connection.

User entry 4 octet: 0 to 255 (in the particular octet)

Factory setting 192.168.1.212

WLAN MAC address

Navigation Expert → Communication → WLAN settings → WLAN MAC address (2703)

Description Displays the MAC [7] 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

7) Media Access Control

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

WLAN subnet mask

Navigation Expert → Communication → WLAN settings → WLAN subnet mask (2709)

Description Use this function to enter the subnet mask.

User entry 4 octet: 0 to 255 (in the particular octet)

Factory setting 255.255.255.0

WLAN passphrase

Navigation Expert → Communication → WLAN settings → WLAN passphrase (2706)

Prerequisite The **WPA2-PSK** option is selected in the **Security type** parameter (→ 116).

Description Use this function to enter the network key.

User entry 8 to 32-digit character string comprising numbers, letters and special characters (without spaces)

Factory setting Serial number of the measuring device (e.g. L100A802000)

Assign SSID name

Navigation Expert → Communication → WLAN settings → Assign SSID name (2708)

Description Use this function to select which name is used for the SSID [8].

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.

8) Service Set Identifier

SSID name

Navigation Expert → Communication → WLAN settings → SSID name (2707)

Prerequisite
- The **User-defined** option is selected in the **Assign SSID name** parameter (→ 118).
- The **WLAN access point** option is selected in the **WLAN mode** parameter (→ 115).

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

2.4 GHz WLAN channel

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

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

User entry 1 to 11

Factory setting 6

Additional information *Description*

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

Select antenna

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

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

Selection
- External antenna
- Internal antenna

Factory setting Internal antenna

Connection state

Navigation Expert → Communication → WLAN settings → Connection state (2722)

Description The connection status is displayed.

User interface
- Connected
- Not connected

Factory setting Not connected

Received signal strength

Navigation Expert → Communication → WLAN settings → Rec.sig.strength (2721)

Description Displays the signal strength received.

User interface
- Low
- Medium
- High

Factory setting High

Gateway IP address

Navigation Expert → Communication → WLAN settings → Gateway IP addr. (2719)

Description Use this function to enter the IP address of the gateway.

User interface Character string comprising numbers, letters and special characters

Factory setting 192.168.1.212

IP address domain name server

Navigation Expert → Communication → WLAN settings → IP address DNS (2720)

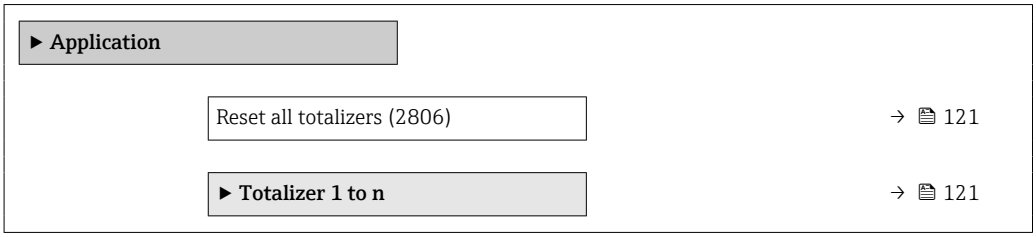
Description Use this function to enter the IP address of the domain name server.

User interface Character string comprising numbers, letters and special characters

Factory setting 192.168.1.212

3.5 "Application" submenu

Navigation Expert → Application



Reset all totalizers

Navigation Expert → Application → Reset all tot. (2806)

Description Use this function to reset all totalizers to the value **0** and restart the totaling process. This deletes all the previously aggregated flow values.

Selection
- Cancel
- Reset + totalize

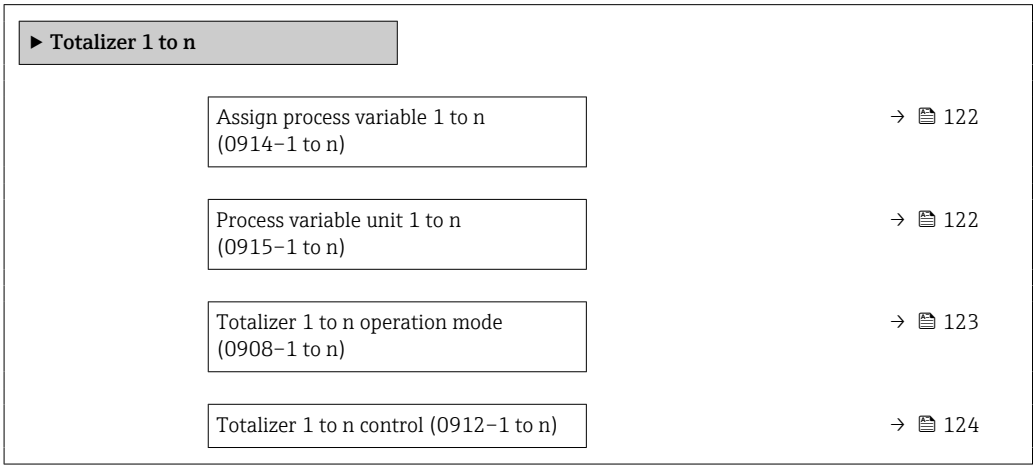
Factory setting Cancel

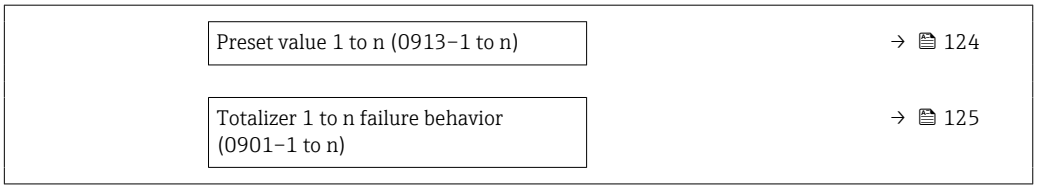
Additional information *Selection*

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

3.5.1 "Totalizer 1 to n" submenu

Navigation Expert → Application → Totalizer 1 to n





Assign process variable 1 to n

Navigation Expert → Application → Totalizer 1 to n → AssignVariab. 1 to n (0914–1 to n)

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

Selection
- Off
- Volume flow
- Mass flow

Factory setting Volume flow

Additional information

Description

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 (→ 122) is still displayed in the **Totalizer 1 to n** submenu. All other parameters in the submenu are hidden.

Process variable unit 1 to n

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

Prerequisite A process variable is selected in the **Assign process variable** parameter (→ 122) of the **Totalizer 1 to n** submenu.

Description Use this function to select the process variable unit for the Totalizer 1 to n (→ 121).

Selection
- g *
- kg *
- t *
- oz *
- lb *
- STon *
- cm³ *
- dm³ *
- m³ *
- ml *
- l *

* Visibility depends on order options or device settings

- hl *
- Ml Mega *
- af *
- ft^3 *
- Mft^3 *
- Mft^3 *
- fl oz (us) *
- gal (us) *
- kgal (us) *
- Mgal (us) *
- bbl (us;liq.) *
- bbl (us;beer) *
- bbl (us;oil) *
- bbl (us;tank) *
- gal (imp) *
- Mgal (imp) *
- bbl (imp;beer) *
- bbl (imp;oil) *
- None *

Factory setting

Depends on country:
- m^3
- ft^3

Additional information

Description

The unit is selected separately for each totalizer. It is independent of the selection made in the **System units** submenu (→ 45).

Options

The selection is dependent on the process variable selected in the **Assign process variable** parameter (→ 122).

Totalizer 1 to n operation mode

Navigation

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

Prerequisite

A process variable is selected in the **Assign process variable** parameter (→ 122) of the **Totalizer 1 to n** submenu.

Description

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

Selection

- Net
- Forward
- Reverse

Factory setting

Net flow total

* Visibility depends on order options or device settings

Additional information *Selection*

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

Totalizer 1 to n control

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

Prerequisite A process variable is selected in the **Assign process variable** parameter (→ 122) 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.

1) Visible depending on the order options or device settings

Preset value 1 to n

Navigation Expert → Application → Totalizer 1 to n → Preset value 1 to n (0913–1 to n)

Prerequisite A process variable is selected in the **Assign process variable** parameter (→ 122) of the **Totalizer 1 to n** submenu.

Description Use this function to enter a start value for the Totalizer 1 to n.

User entry Signed floating-point number

Factory setting Depends on country:
- 0 m^3
- 0 ft^3

Additional information *User entry*

The unit of the selected process variable is defined in the **Unit totalizer** parameter (→ 122) for the totalizer.

Example

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

Totalizer 1 to n failure behavior

Navigation Expert → Application → Totalizer 1 to n → FailureBehav. 1 to n (0901–1 to n)

Prerequisite A process variable is selected in the **Assign process variable** parameter (→ 122) of the **Totalizer 1 to n** submenu.

Description Use this function to select how a totalizer behaves in the event of a device alarm.

Selection
- Hold
- Continue
- Last valid value + continue

Factory setting Stop

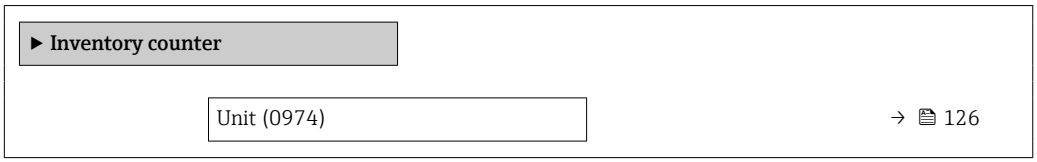
Additional information *Description*

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.

3.5.2 "Inventory counter" submenu

Navigation Expert → Application → Inventory count.



Unit

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

Description Displays the unit of the inventory counter.

User interface

SI units
- cm^3
- dm^3
- m^3
- ml
- l
- hl
- Ml Mega

US units
- ft^3
- af
- fl oz (us)
- gal (us)
- kgal (us)
- Mgal (us)
- bbl (us;oil)
- bbl (us;liq.)
- bbl (us;beer)
- bbl (us;tank)

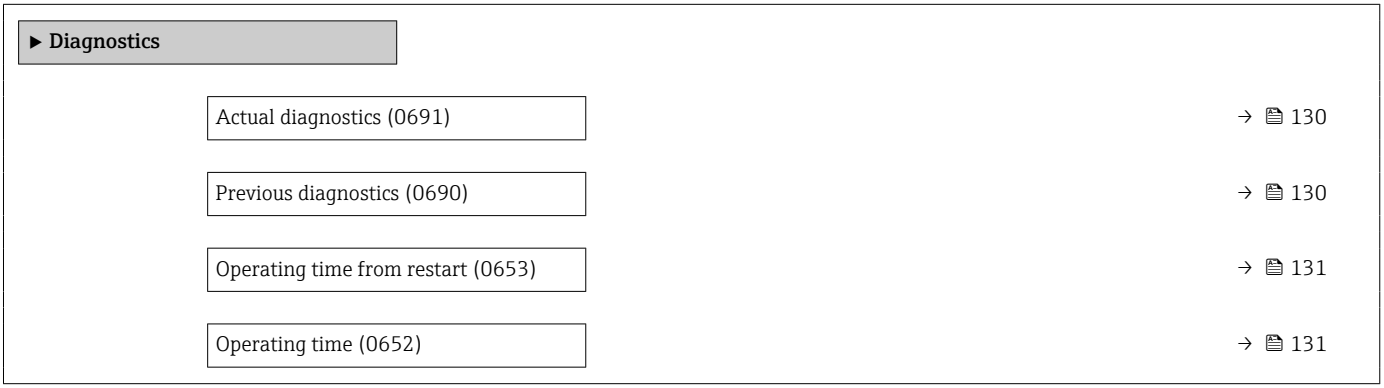
Imperial units
- gal (imp)
- Mgal (imp)
- bbl (imp;beer)
- bbl (imp;oil)

Additional information *Description*

The parameter cannot be configured or reset.

3.6 "Diagnostics" submenu

Navigation Expert → Diagnostics



Firmware version (0072) → 142

Build no. software (0079) → 142

Bootloader revision (0073) → 142

▶ **Data logging** → 142

Assign channel 1 (0851) → 143

Assign channel 2 (0852) → 144

Assign channel 3 (0853) → 144

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Logging interval (0856) → 145

Clear logging data (0855) → 145

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Logging delay (0859) → 146

Data logging control (0857) → 146

Data logging status (0858) → 147

Entire logging duration (0861) → 147

▶ **Heartbeat Technology** → 150

▶ **Heartbeat base settings** → 150

Plant operator (2754) → 150

Location (2755) → 151

▶ **Performing verification** → 151

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Month (2845) → 152

Day (2842) → 152

Hour (2843) → 153

AM/PM (2813) → 153

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Verification ID (12141) → 157

Operating time (12126) → 158

Verification result (12149) → 158

Sensor (12152) → 158

Sensor electronic module (ISEM) (12151) → 159

I/O module (12145) → 159

System status (12109) → 159

► Simulation → 160

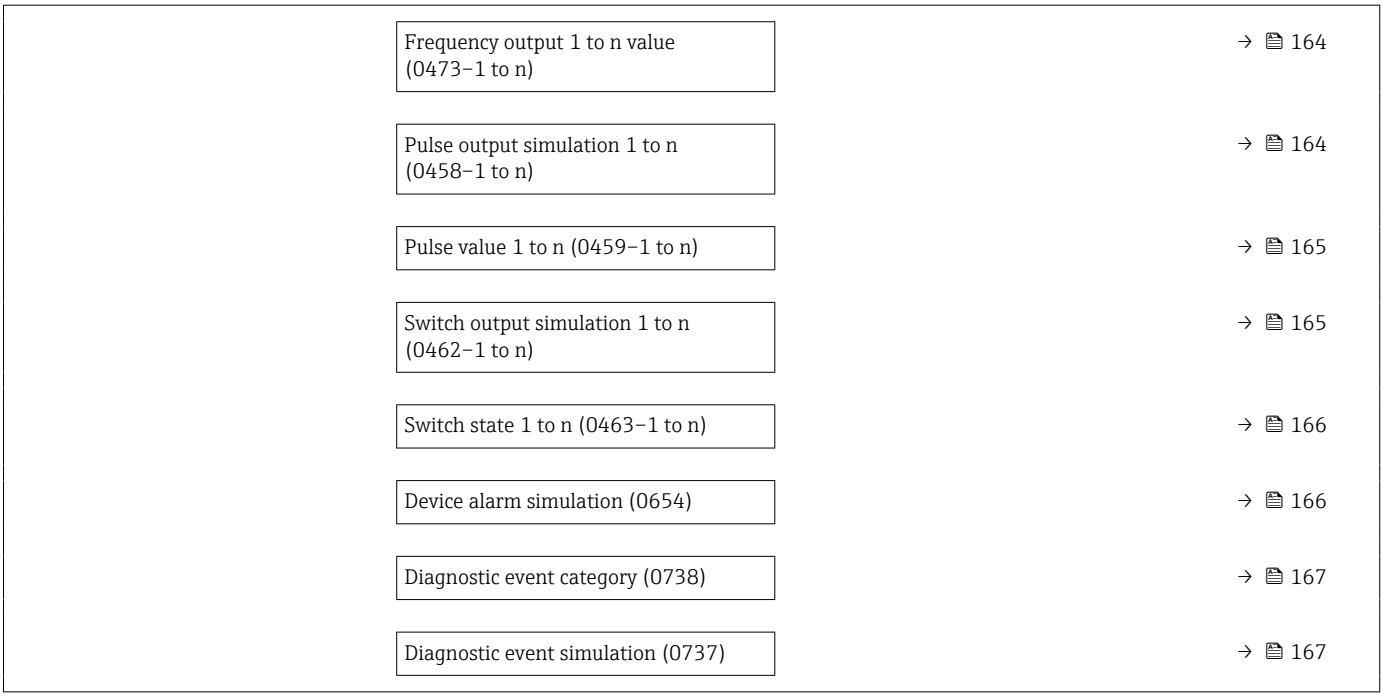
Assign simulation process variable (1810) → 161

Process variable value (1811) → 161

Current output 1 simulation (0354–1) → 162

Current output value (0355) → 163

Frequency output 1 to n simulation (0472–1 to n) → 163



Actual diagnostics

Navigation Expert → Diagnostics → Actual diagnos. (0691)

Prerequisite A diagnostic event has occurred.

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

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

Additional information

Display

Additional pending diagnostic messages can be viewed in the **Diagnostic list** submenu (→ 131).

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

Example

For the display format:
⊗F271 Main electronic failure

Previous diagnostics

Navigation Expert → Diagnostics → Prev.diagnostics (0690)

Prerequisite Two diagnostic events have already occurred.

Description Displays the diagnostic message that occurred before the current message.

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

Additional information *Display*

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

Example

For the display format:
⊗F271 Main electronic failure

Operating time from restart

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

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

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

Operating time

Navigation Expert → Diagnostics → Operating time (0652)

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

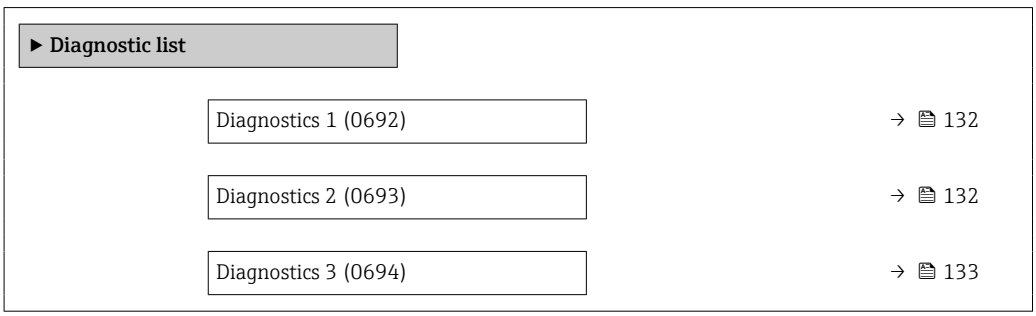
User interface Days (d), hours (h), minutes (m) and seconds (s)

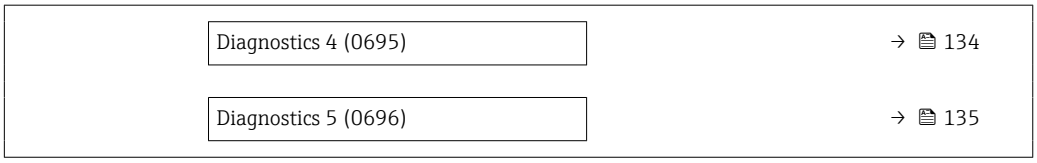
Additional information *Indication*

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

3.6.1 "Diagnostic list" submenu

Navigation Expert → Diagnostics → Diagnostic list





Diagnostics 1

Navigation Expert → Diagnostics → Diagnostic list → Diagnostics 1 (0692)

Description Displays the current diagnostics message with the highest priority.

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

Additional information *Display*

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

Examples

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

Timestamp 1

Navigation Expert → Diagnostics → Diagnostic list → Timestamp

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

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

Additional information *Display*

The diagnostic message can be viewed via the **Diagnostics 1** parameter (→ 132).

Example

For the display format:
24d12h13m00s

Diagnostics 2

Navigation Expert → Diagnostics → Diagnostic list → Diagnostics 2 (0693)

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

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

Additional information *Display*

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

Examples

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

Timestamp 2

Navigation Expert → Diagnostics → Diagnostic list → Timestamp

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

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

Additional information *Display*

The diagnostic message can be viewed via the **Diagnostics 2** parameter (→ 132).

Example

For the display format:
24d12h13m00s

Diagnostics 3

Navigation Expert → Diagnostics → Diagnostic list → Diagnostics 3 (0694)

Description Displays the current diagnostics message with the third-highest priority.

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

Additional information *Display*

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

Examples

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

Timestamp 3

Navigation Expert → Diagnostics → Diagnostic list → Timestamp

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

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

Additional information

Display

The diagnostic message can be viewed via the **Diagnostics 3** parameter (→ 133).

Example

For the display format:
24d12h13m00s

Diagnostics 4

Navigation Expert → Diagnostics → Diagnostic list → Diagnostics 4 (0695)

Description Displays the current diagnostics message with the fourth-highest priority.

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

Additional information

Display

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

Examples

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

Timestamp 4

Navigation Expert → Diagnostics → Diagnostic list → Timestamp

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

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

Additional information *Display*

The diagnostic message can be viewed via the **Diagnostics 4** parameter (→ 134).

Example

For the display format:
24d12h13m00s

Diagnostics 5

Navigation Expert → Diagnostics → Diagnostic list → Diagnostics 5 (0696)

Description Displays the current diagnostics message with the fifth-highest priority.

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

Additional information *Display*

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

Examples

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

Timestamp 5

Navigation Expert → Diagnostics → Diagnostic list → Timestamp

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

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

Additional information *Display*

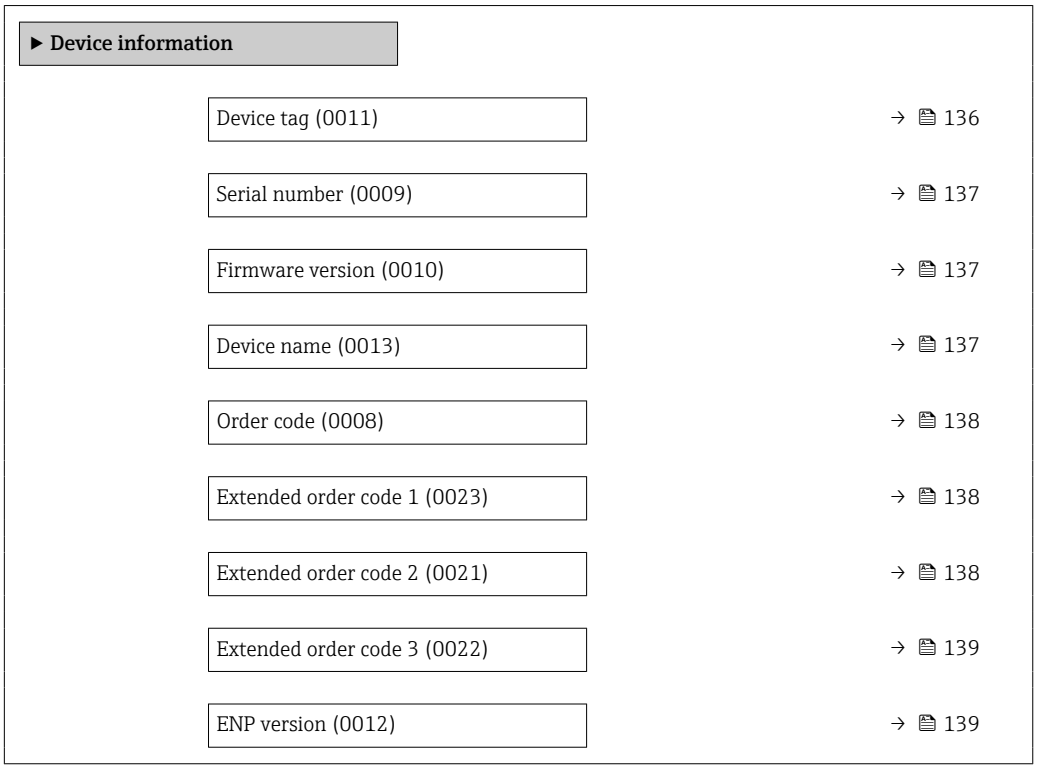
The diagnostic message can be viewed via the **Diagnostics 5** parameter (→ 135).

Example

For the display format:
24d12h13m00s

3.6.2 "Device information" submenu

Navigation Expert → Diagnostics → Device info



Device tag

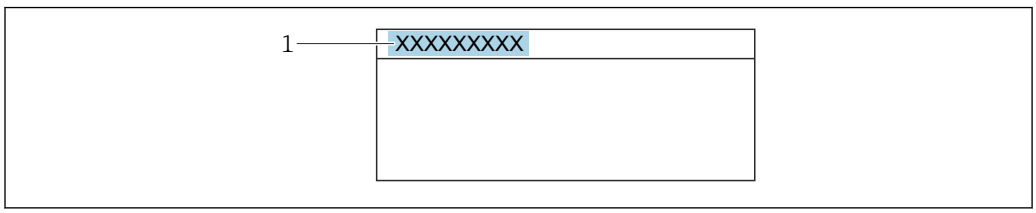
Navigation Expert → Diagnostics → Device info → Device tag (0011)

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

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

Factory setting Prosonic Flow

Additional information *User interface*



1 Position of the header text on the display

The number of characters displayed depends on the characters used.

Serial number

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

Description Displays the serial number of the measuring device.

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

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

Additional information *Description*

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

Firmware version

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

Description Displays the device firmware version installed.

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

Additional information *Display*

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

Device name

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

Description Shows the name of the transmitter.

The name can be found on the nameplate of the transmitter.

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

Factory setting Pros. Flow400 MB

Order code

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

Description Displays the device order code

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

Additional information *Description*

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

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

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

Extended order code 1

Navigation Expert → Diagnostics → Device info → Ext. order cd. 1 (0023)

Description Displays the first part of the extended order code

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

User interface Character string

Additional information *Description*

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

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

Extended order code 2

Navigation Expert → Diagnostics → Device info → Ext. order cd. 2 (0021)

Description Displays the second part of the extended order code.

User interface Character string

Additional information For additional information, see **Extended order code 1** parameter (→ 138)

Extended order code 3

Navigation Expert → Diagnostics → Device info → Ext. order cd. 3 (0022)

Description Displays the third part of the extended order code.

User interface Character string

Additional information For additional information, see **Extended order code 1** parameter (→ 138)

Configuration counter

Navigation Expert → Diagnostics → Device info → Config. counter (0233)

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

User interface 0 to 65 535

ENP version

Navigation Expert → Diagnostics → Device info → ENP version (0012)

Description Displays the version of the electronic nameplate.

User interface Character string

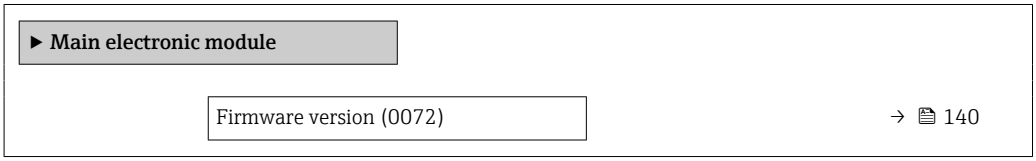
Factory setting 2.02.00

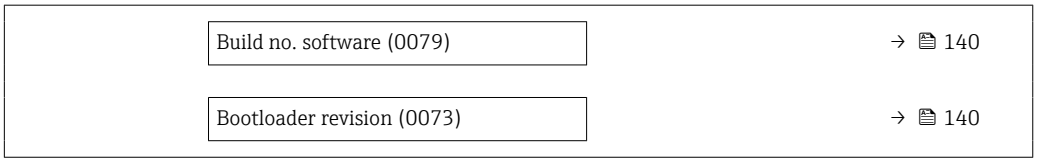
Additional information *Description*

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

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

Navigation Expert → Diagnostics → Mainboard module





Firmware version

Navigation Expert → Diagnostics → Main elec. mod. → Firmware version (0072)

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

User interface Positive integer

Build no. software

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

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

User interface Positive integer

Bootloader revision

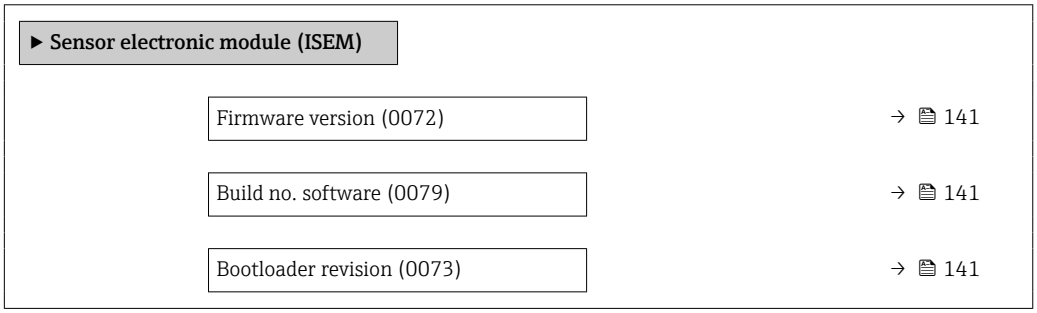
Navigation Expert → Diagnostics → Main elec. mod. → Bootloader rev. (0073)

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

User interface Positive integer

3.6.4 "Sensor electronic module (ISEM)" submenu

Navigation Expert → Diagnostics → Sens. electronic



Firmware version

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

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

User interface Positive integer

Build no. software

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

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

User interface Positive integer

Bootloader revision

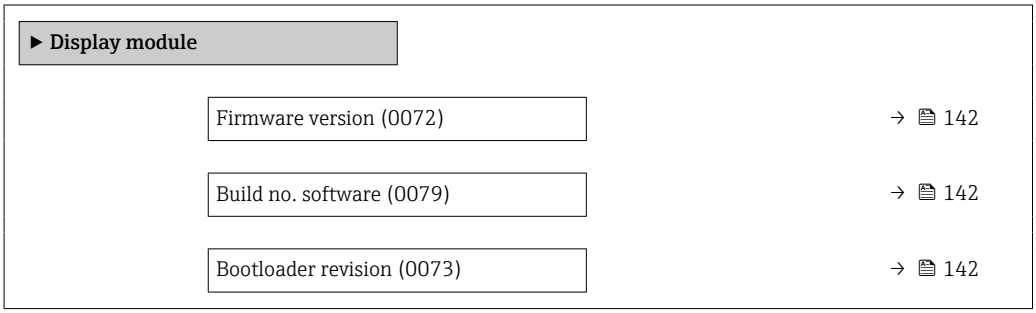
Navigation Expert → Diagnostics → Sens. electronic → Bootloader rev. (0073)

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

User interface Positive integer

3.6.5 "Display module" submenu

Navigation Expert → Diagnostics → Display module



Firmware version

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

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

User interface Positive integer

Build no. software

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

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

User interface Positive integer

Bootloader revision

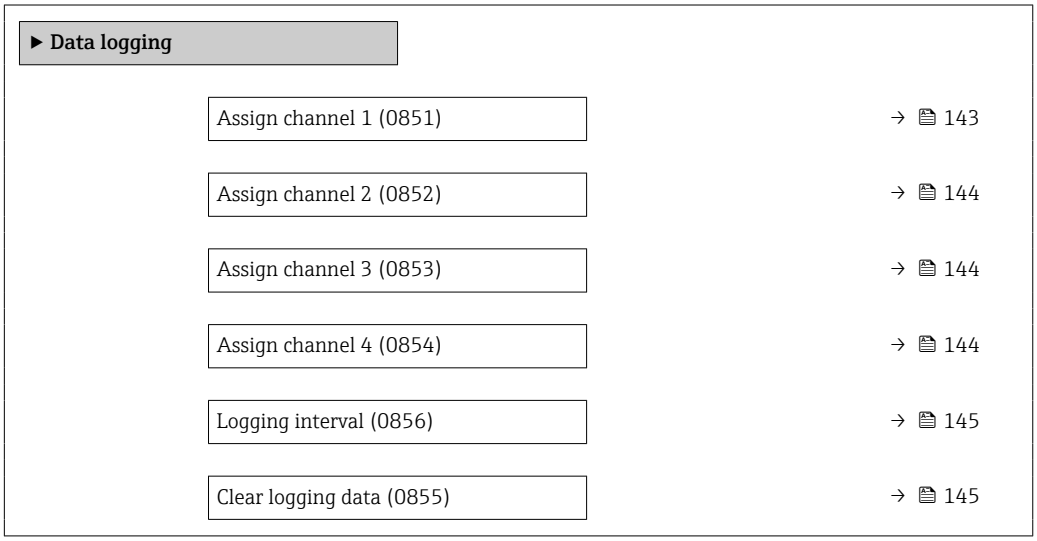
Navigation Expert → Diagnostics → Display module → Bootloader rev. (0073)

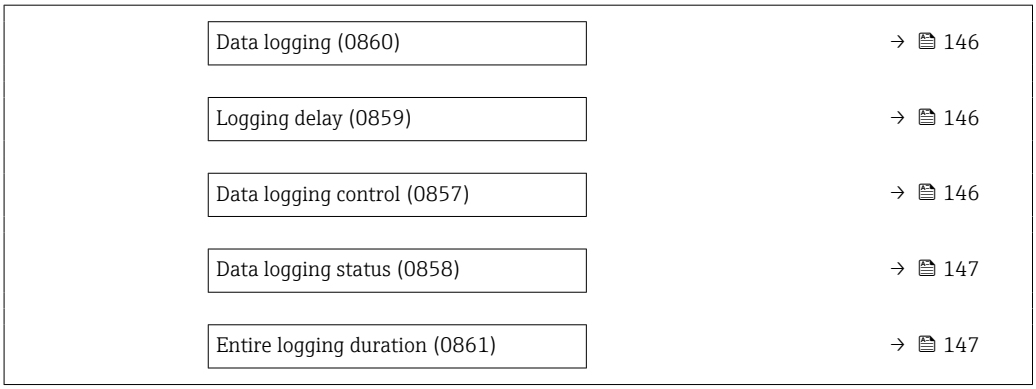
Description Use this function to display the bootloader revision of the software.

User interface Positive integer

3.6.6 "Data logging" submenu

Navigation Expert → Diagnostics → Data logging





Assign channel 1

Navigation Expert → Diagnostics → Data logging → Assign chan. 1 (0851)

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

The software options currently enabled are displayed in the **Software option overview** parameter (→ 36).

Description Use this function to assign a process variable to the data logging channel.

Selection
- Off
- Volume flow
- Mass flow
- Flow velocity
- Sound velocity
- Temperature
- Density
- Signal strength *
- Signal to noise ratio *
- Acceptance rate *
- Turbulence *
- Electronics temperature
- Current output 1

Factory setting Off

Additional information *Description*

A total of 1000 measured values can be logged. This means:
- 1000 data points if 1 logging channel is used
- 500 data points if 2 logging channels are used
- 333 data points if 3 logging channels are used
- 250 data points if 4 logging channels are used

Once the maximum number of data points is reached, the oldest data points in the data log are cyclically overwritten in such a way that the last 1000, 500, 333 or 250 measured values are always in the log (ring memory principle).

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 (0852)

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

The software options currently enabled are displayed in the **Software option overview** parameter (→ 36).

Description Use this function to assign a process variable to the logging channel.

Selection For the picklist, see **Assign channel 1** parameter (→ 143)

Factory setting Off

Assign channel 3

Navigation Expert → Diagnostics → Data logging → Assign chan. 3 (0853)

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

The software options currently enabled are displayed in the **Software option overview** parameter (→ 36).

Description Use this function to assign a process variable to the logging channel.

Selection For the picklist, see **Assign channel 1** parameter (→ 143)

Factory setting Off

Assign channel 4

Navigation Expert → Diagnostics → Data logging → Assign chan. 4 (0854)

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

The software options currently enabled are displayed in the **Software option overview** parameter (→ 36).

Description Use this function to assign a process variable to the logging channel.

Selection For the picklist, see **Assign channel 1** parameter (→ 143)

Factory setting Off

Logging interval

Navigation Expert → Diagnostics → Data logging → Logging interval (0856)

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

The software options currently enabled are displayed in the **Software option overview** parameter (→ 36).

Description Use this function to enter the logging interval T_{log} for data logging.

User entry 0.1 to 3 600.0 s

Factory setting 1.0 s

Additional information *Description*

This defines the interval between the individual data points in the data log, and thus the maximum loggable process time T_{log}:
- If 1 logging channel is used: $T_{log} = 1000 \times t_{log}$
- If 2 logging channels are used: $T_{log} = 500 \times t_{log}$
- If 3 logging channels are used: $T_{log} = 333 \times t_{log}$
- If 4 logging channels are used: $T_{log} = 250 \times t_{log}$

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

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

Example

If 1 logging channel is used:
- $T_{log} = 1000 \times 1$ s = 1 000 s ≈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 (0855)

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

The software options currently enabled are displayed in the **Software option overview** parameter (→ 36).

Description Use this function to clear the entire logging data.

Selection
- Cancel
- Clear data

Factory setting Cancel

Additional information *Selection*

- Cancel
  The data is not cleared. All the data is retained.
- Clear data
  The logging data is cleared. The logging process starts from the beginning.

Data logging

Navigation Expert → Diagnostics → Data logging → Data logging (0860)

Description Use this function to select the data logging method.

Selection
- Overwriting
- Not overwriting

Factory setting Overwriting

Additional information *Selection*

- Overwriting
  The device memory applies the FIFO principle.
- Not overwriting
  Data logging is canceled if the measured value memory is full (single shot).

Logging delay

Navigation Expert → Diagnostics → Data logging → Logging delay (0859)

Prerequisite In the **Data logging** parameter (→ 146), 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 (→ 146), the device does not save any data for the duration of the delay time entered.

Data logging control

Navigation Expert → Diagnostics → Data logging → Data log.control (0857)

Prerequisite In the **Data logging** parameter (→ 146), the **Not overwriting** option is selected.

Description Use this function to start and stop measured value logging.

Selection
- None
- Delete + start
- Stop

Factory setting None

Additional information *Selection*
- None
  Initial measured value logging status.
- Delete + start
  All the measured values recorded for all the channels are deleted and measured value logging starts again.
- Stop
  Measured value logging is stopped.

Data logging status

Navigation Expert → Diagnostics → Data logging → Data log. status (0858)

Prerequisite In the **Data logging** parameter (→ 146), the **Not overwriting** option is selected.

Description Displays the measured value logging status.

User interface
- Done
- Delay active
- Active
- Stopped

Factory setting Done

Additional information *Selection*
- Done
  Measured value logging has been performed and completed successfully.
- Delay active
  Measured value logging has been started but the logging interval has not yet elapsed.
- Active
  The logging interval has elapsed and measured value logging is active.
- Stopped
  Measured value logging is stopped.

Entire logging duration

Navigation Expert → Diagnostics → Data logging → Logging duration (0861)

Prerequisite In the **Data logging** parameter (→ 146), 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	→ 148

Display channel 1

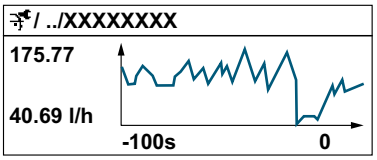
Navigation Expert → Diagnostics → Data logging → Displ.channel 1

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

The software options currently enabled are displayed in the **Software option overview** parameter (→ 36).

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

Additional information *Description*



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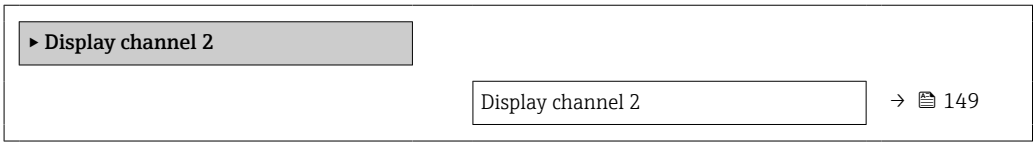
10 *Chart of a measured value trend*

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

"Display channel 2" submenu

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



Display channel 2

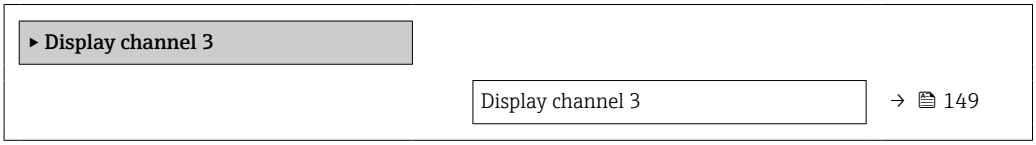
Navigation Expert → Diagnostics → Data logging → Displ.channel 2

Prerequisite A process variable is specified in the **Assign channel 2** parameter.

Description See the **Display channel 1** parameter → 148

"Display channel 3" submenu

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



Display channel 3

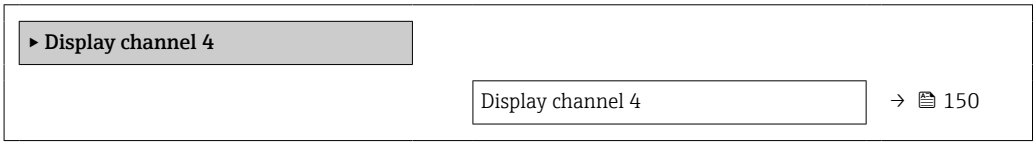
Navigation Expert → Diagnostics → Data logging → Displ.channel 3

Prerequisite A process variable is specified in the **Assign channel 3** parameter.

Description See the **Display channel 1** parameter → 148

"Display channel 4" submenu

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



Display channel 4

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

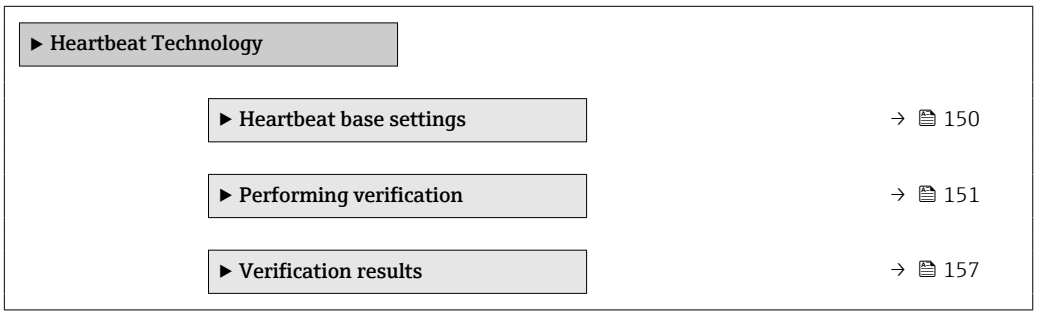
Prerequisite A process variable is specified in the **Assign channel 4** parameter.

Description See the **Display channel 1** parameter → 148

3.6.7 "Heartbeat Technology" submenu

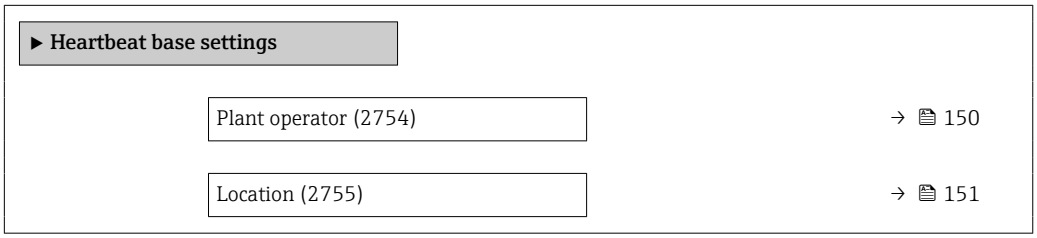
For detailed information on the parameter descriptions for the **Heartbeat Verification+Monitoring**: Special Documentation for the device → 7

Navigation Expert → Diagnostics → Heartbeat Techn.



"Heartbeat base settings" submenu

Navigation Expert → Diagnostics → Heartbeat Techn. → Base settings



Plant operator

Navigation Expert → Diagnostics → Heartbeat Techn. → Base settings → Plant operator (2754)

Description Use this function to enter the plant operator.

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

Location

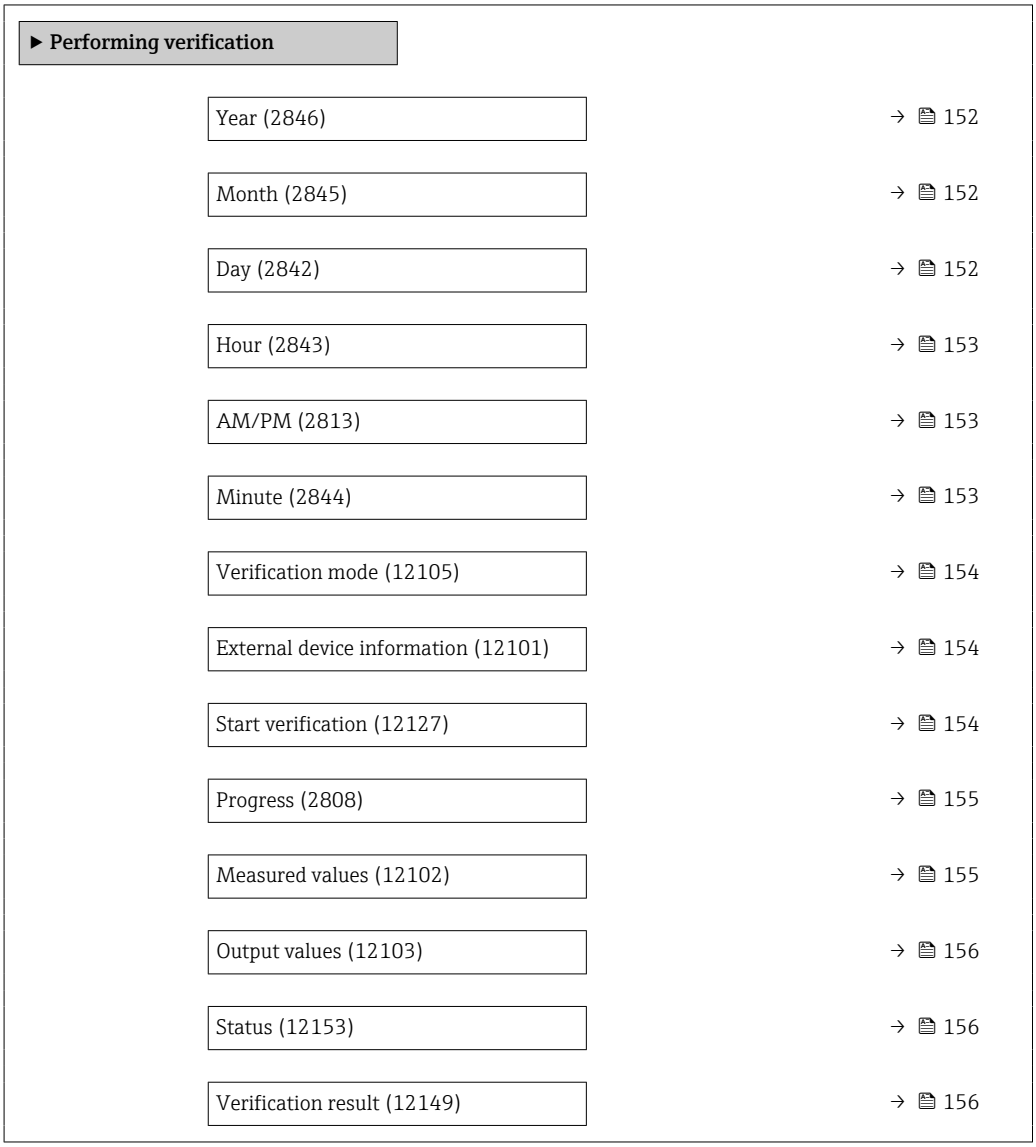
Navigation Expert → Diagnostics → Heartbeat Techn. → Base settings → Location (2755)

Description Use this function to enter the location.

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

"Performing verification" wizard

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific.



Year

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Year (2846)

Prerequisite Can be edited if Heartbeat Verification is not active.

Description Use this function to enter the year of recalibration.

User entry 9 to 99

Factory setting 21

Month

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Month (2845)

Prerequisite Can be edited if Heartbeat Verification is not active.

Description Use this function to select the month of recalibration.

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

Factory setting January

Day

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Day (2842)

Prerequisite Can be edited if Heartbeat Verification is not active.

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

User entry 1 to 31 d

Factory setting 1 d

Hour

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Hour (2843)

Prerequisite Can be edited if Heartbeat Verification is not active.

Description Use this function to enter the hour of recalibration.

User entry 0 to 23 h

Factory setting 12 h

AM/PM

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → AM/PM (2813)

Prerequisite Can be edited if Heartbeat Verification is not active.

The **dd.mm.yy hh:mm am/pm** option or the **mm/dd/yy hh:mm am/pm** option is selected in the **Date/time format** parameter (2812) (→ 51).

Description Use this function to select the time entry in the morning (**AM** option) or afternoon (**PM** option) in the case of 12-hour notation.

Selection
- AM
- PM

Factory setting AM

Minute

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Minute (2844)

Prerequisite Can be edited if Heartbeat Verification is not active.

Description Use this function to enter the minutes of recalibration.

User entry 0 to 59 min

Factory setting 0 min

Verification mode

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Verificat. mode (12105)

Prerequisite Can be edited if the verification status is not active.

Description Select verification mode.

Standard verification: Verification is performed automatically by the device and without manual checking of external measured variables.

Extended verification: Similar to internal verification but with the entry of external measured variables (see also "Measured values" parameter).

Selection
- Standard verification
- Extended verification

Factory setting Standard verification

External device information

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Ext. device info (12101)

Prerequisite With the following conditions:
- The **Extended verification** option is selected in the **Verification mode** parameter (→ 154).
- Can be edited if Heartbeat Verification is not active.

Description Record measuring equipment for extended verification.

User entry Free text entry

Factory setting –

Start verification

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Start verificat. (12127)

Description Start the verification.

To carry out a complete verification, select the selection parameters individually. Once the external measured values have been recorded, verification is started using the **Start** option.

Selection
- Cancel
- Output 1 low value *
- Output 1 high value *
- Frequency output 1 *
- Pulse output 1 *
- Frequency output 2 *
- Pulse output 2 *
- Start
- Start with testkit *

Factory setting Cancel

Progress

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Progress (2808)

Description The progress of the process is indicated.

User interface 0 to 100 %

Measured values

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Measured val. (12102)

Prerequisite One of the following options is selected in the **Start verification** parameter (→ 154):
- Output 1 low value
- Output 1 high value
- Output 2 low value
- Output 2 high value
- Frequency output 1
- Pulse output 1
- Frequency output 2
- Pulse output 2

Description Use this function to enter the measured values (actual values) for the external measured variables:.
- Current output: Output current in [mA]
- Pulse/frequency output: Output frequency in [Hz]

User entry Signed floating-point number

Factory setting 0

* Visibility depends on order options or device settings

Output values

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Output values (12103)

Description Displays the simulated output values (target values) for the external measured variables:.

Pulse/frequency output: Output frequency in [Hz].

User interface Signed floating-point number

Factory setting 0

Status

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Status (12153)

Description Displays the current status of the verification.

User interface
- Done
- Busy
- Failed
- Not done

Factory setting Done

Verification result

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Verific. result (12149)

Description Displays the overall result of the verification.

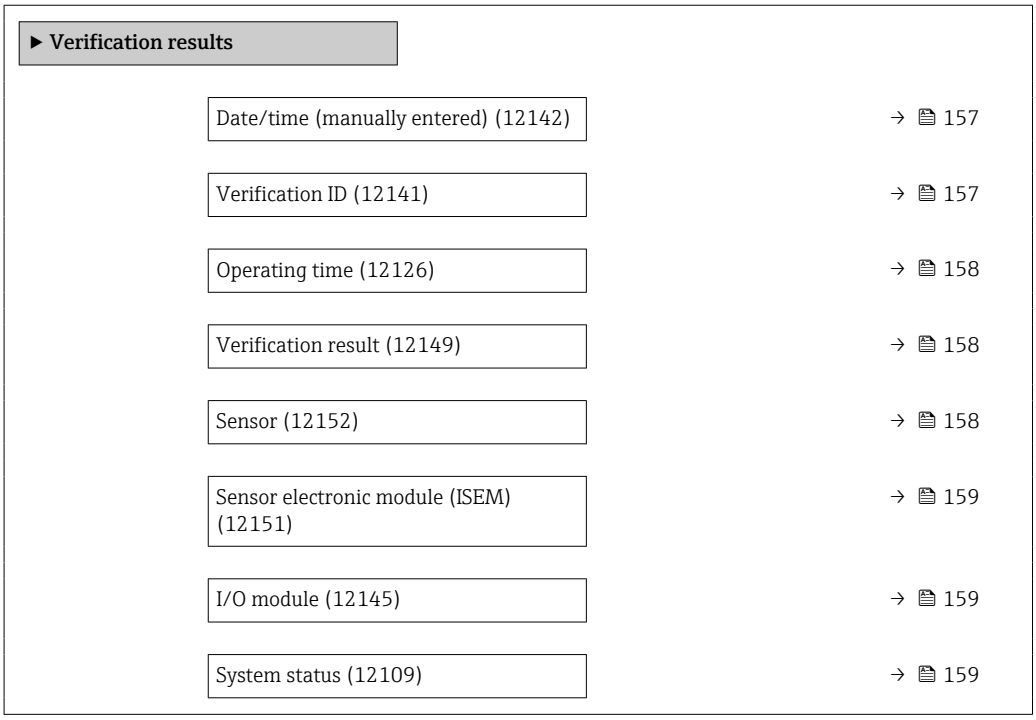
Detailed description of the classification of the results:

User interface
- Not supported
- Passed
- Not done
- Failed

Factory setting Not done

"Verification results" submenu

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results



Date/time (manually entered)

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results → Date/time (12142)

Prerequisite The verification has been performed.

Description Date and time.

User interface dd.mmmm.yyyy; hh:mm

Factory setting 1 January 2010; 12:00

Verification ID

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results → Verification ID (12141)

Prerequisite The verification has been performed.

Description Displays consecutive numbering of the verification results in the measuring device.

User interface 0 to 65 535

Factory setting 0

Operating time

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results → Operating time (12126)

Prerequisite The verification has been performed.

Description Indicates how long the device has been in operation up to the verification.

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

Factory setting –

Verification result

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results → Verific. result (12149)

Description Displays the overall result of the verification.

Detailed description of the classification of the results:

User interface
- Not supported
- Passed
- Not done
- Failed

Factory setting Not done

Sensor

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results → Sensor (12152)

Prerequisite The **Failed** option was shown in the **Overall result** parameter (→ 156).

Description Displays the result for the sensor.

Detailed description of the classification of the results:

User interface
- Not supported
- Passed
- Not done
- Failed

Factory setting Not done

Sensor electronic module (ISEM)

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results → Sens. electronic (12151)

Prerequisite In the **Overall result** parameter (→ 156), the **Failed** option was displayed.

Description Shows the overall result for the “sensor electronic module” test group.

User interface
- Not supported
- Passed
- Not done
- Failed

Factory setting Not done

I/O module

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results → I/O module (12145)

Prerequisite The **Failed** option was shown in the **Overall result** parameter (→ 156).

Description Displays the result for I/O module monitoring of the I/O module.
- For pulse output: Accuracy of pulses (for external verification only)
- For frequency output: Accuracy of frequency (for external verification only)

Heartbeat Verification does not check the digital inputs and outputs and does not issue a result for this.

Detailed description of the classification of the results:

User interface
- Not supported
- Passed
- Not done
- Failed

Factory setting Not done

System status

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results → System status (12109)

Prerequisite The **Failed** option was shown in the **Overall result** parameter (→ 156).

Description Displays the system condition. Tests the measuring device for active errors.

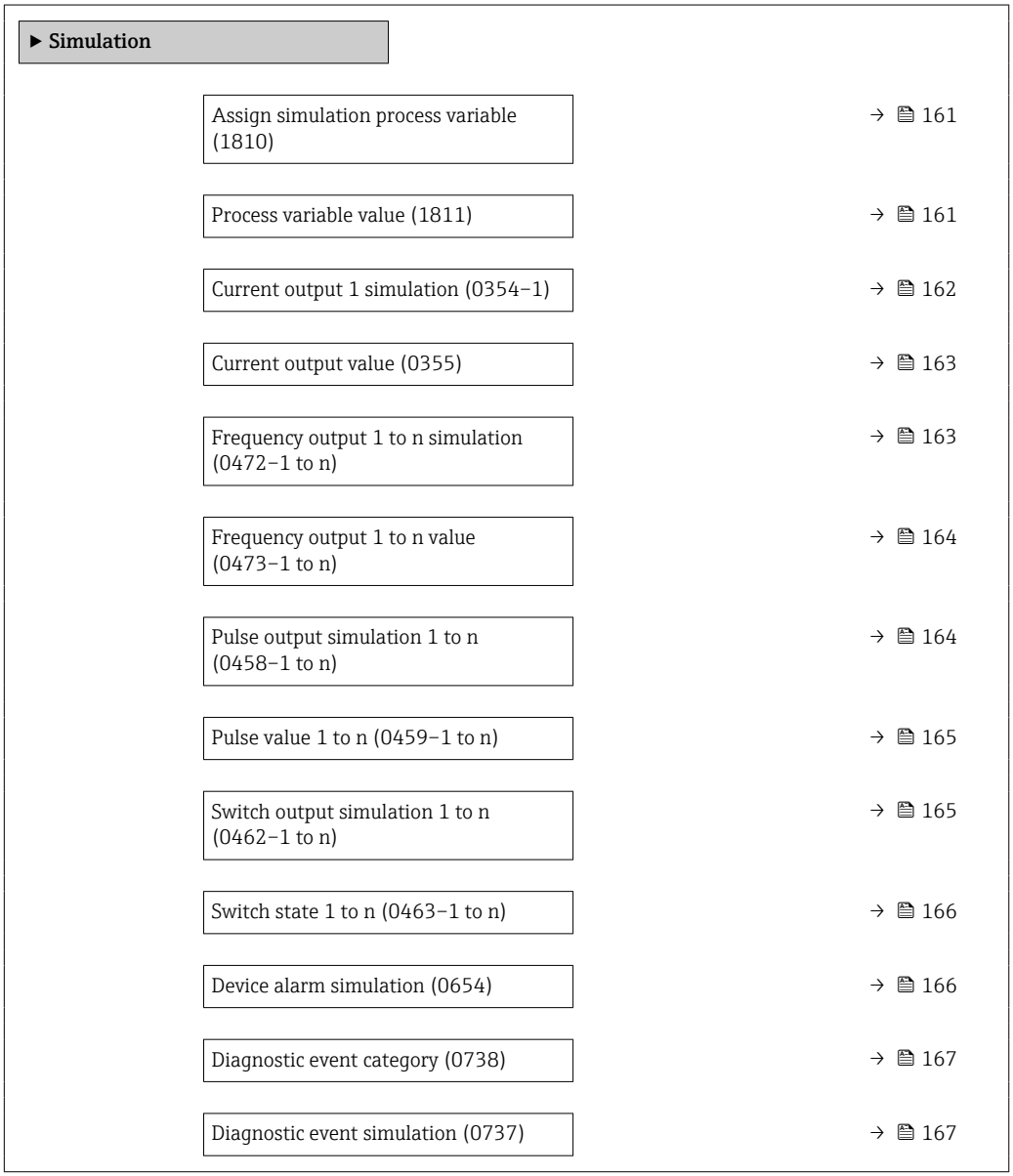
Detailed description of the classification of the results:

User interface
- Not supported
- Passed
- Not done
- Failed

Factory setting Not done

3.6.8 "Simulation" submenu

Navigation Expert → Diagnostics → Simulation



Assign simulation process variable

Navigation Expert → Diagnostics → Simulation → Assign proc.var. (1810)

Description Use this function to select a process variable for the simulation process that is activated. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

Selection
- Off
- Volume flow
- Mass flow
- Flow velocity
- Sound velocity
- Temperature
- Density

Factory setting Off

Additional information *Description*

The simulation value of the process variable selected is defined in the **Process variable value** parameter (→ 161).

Process variable value

Navigation Expert → Diagnostics → Simulation → Proc. var. value (1811)

Prerequisite A process variable is selected in the **Assign simulation process variable** parameter (→ 161).

Description Use this function to enter a simulation value for the selected process variable. Subsequent measured value processing and the signal output use this simulation value. In this way, users can verify whether the measuring device has been configured correctly.

User entry Depends on the process variable selected

Factory setting 0

Additional information *User entry*

The unit of the displayed measured value is taken from the **System units** submenu (→ 45).

Simulation status input

Navigation Expert → Diagnostics → Simulation → Sim. status inp. (1355)

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

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

Selection
- Off
- On

Factory setting Off

Additional information

Description

The desired simulation value is defined in the **Input signal level** parameter (→ 162).

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.

Value status input

Navigation Expert → Diagnostics → Simulation → Val. status inp. (1356)

Prerequisite In the **Simulation status input** parameter (→ 161), the **On** option is selected.

Description Use this function to select the signal level for the simulation of the status input. In this way, users can verify the correct configuration of the status input and the correct function of upstream feed-in units.

Selection
- High
- Low

Current output 1 simulation

Navigation Expert → Diagnostics → Simulation → Curr.outp 1 sim. (0354-1)

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

Selection
- Off
- On

Factory setting Off

Additional information *Description*

The desired simulation value is specified in the **Value current output 1** parameter (→ 163).

Selection

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

Value current output 1

Navigation

Expert → Diagnostics → Simulation → Curr.outp val. (0355)

Expert → Diagnostics → Simulation → Value curr.out 1 (0355–1)

Prerequisite In the **Current output 1 simulation** parameter, the **On** option is selected.

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

User entry 0 to 22.5 mA

Additional information *User entry*

The value must be entered with a period (.) as the separator.

Frequency output 1 to n simulation

Navigation Expert → Diagnostics → Simulation → Freq.outp 1 to n sim. (0472–1 to n)

Prerequisite In the **Operating mode** parameter (→ 88), 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

The desired simulation value is defined in the **Frequency value 1 to n** parameter.

Selection

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

Frequency output 1 to n value

Navigation Expert → Diagnostics → Simulation → Freq.outp 1 to n val. (0473–1 to n)

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

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

User entry 0.0 to 12 500.0 Hz

Pulse output simulation 1 to n

Navigation Expert → Diagnostics → Simulation → Puls.outp.sim. 1 to n (0458–1 to n)

Prerequisite In the **Operating mode** parameter (→ 88), 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 (→ 91).
- Down-counting value
  The pulses specified in the **Pulse value** parameter (→ 165) are output.

Pulse value 1 to n

Navigation Expert → Diagnostics → Simulation → Pulse value 1 to n (0459–1 to n)

Prerequisite In the **Pulse output simulation 1 to n** parameter, the **Down-counting value** option is selected.

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

User entry 0 to 65 535

Switch output simulation 1 to n

Navigation Expert → Diagnostics → Simulation → Switch sim. 1 to n (0462–1 to n)

Prerequisite In the **Operating mode** parameter (→ 88), the **Switch** option is selected.

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

Selection
- Off
- On

Factory setting Off

Additional information *Description*

The desired simulation value is defined in the **Switch state 1 to n** parameter.

Selection

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

Switch state 1 to n

Navigation Expert → Diagnostics → Simulation → Switch state 1 to n (0463–1 to n)

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

Selection
- Open
- Closed

Additional information *Selection*

- Open
  Switch simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
- Closed
  Switch simulation is active.

Device alarm simulation

Navigation Expert → Diagnostics → Simulation → Dev. alarm sim. (0654)

Description Use this function to switch the device alarm on and off.

Selection
- Off
- On

Factory setting Off

Additional information *Description*

The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

Diagnostic event category

Navigation Expert → Diagnostics → Simulation → Event category (0738)

Description Use this function to select the category of the diagnostic events that are displayed for the simulation in the **Diagnostic event simulation** parameter (→ 167).

Selection
- Sensor
- Electronics
- Configuration
- Process

Factory setting Process

Diagnostic event simulation

Navigation Expert → Diagnostics → Simulation → Diagnostic event (0737)

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

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

Factory setting Off

Additional information *Description*

For the simulation, you can choose from the diagnostic events of the category selected in the **Diagnostic event category** parameter (→ 167).

4 Country-specific factory settings

4.1 SI units

Not valid for USA and Canada.

4.1.1 System units

Mass	kg
Mass flow	kg/h
Volume	m^3
Volume flow	m^3/h
Velocity	m/s
Temperature	°C

4.1.2 Output current span

Output	Current range
Current output 1	4 to 20 mA NAMUR

4.2 US units

Only valid for USA and Canada.

4.2.1 System units

Mass	lb
Mass flow	lb/min
Volume	ft^3
Volume flow	ft^3/min
Velocity	ft/s
Temperature	°F

4.2.2 Output current span

Output	Current range
Current output 1	4 to 20 mA US

5 Explanation of abbreviated units

5.1 SI units

Process variable	Units	Explanation
Volume	cm^3, dm^3, m^3	Cubic centimeter, cubic decimeter, cubic meter
	ml, l	Milliliter, liter
Volume flow	dm^3/s, dm^3/min, dm^3/h, dm^3/d	Cubic decimeter/time unit
	m^3/s, m^3/min, m^3/h, m^3/d	Cubic meter/time unit
	l/s, l/min, l/h, l/d	Liter/time unit
Mass	g, kg, t	Gram, kilogram, metric ton
Mass flow	g/s, g/min	Gram/time unit
	kg/s, kg/min, kg/h, kg/d	Kilogram/time unit
	t/h, t/d	Metric ton/time unit
Density	kg/l	Kilogram/liter
Velocity	m/s	Meter/time unit
Kinematic viscosity	m2/s	Square meter/second
Temperature	°C , K	Celsius, Kelvin
Length	mm	Millimeters
Time	m, h, d, y	Minute, hour, day, year

5.2 US units

Process variable	Units	Explanation
Volume	ft^3	Cubic foot
Volume flow	ft^3/s, ft^3/min, ft^3/h, ft^3/d	Cubic foot/time unit
Mass	oz, lb, STon	Ounce, pound, standard ton
Mass flow	oz/s, oz/min	Ounce/time unit
	lb/s, lb/min, lb/h, lb/d	Pound/time unit
	STon/h, STon/d	Standard ton/time unit
Density	lb/ft^3	Pound/cubic foot
Velocity	ft/s	Foot/time unit
Kinematic viscosity	cSt	Centistokes
Temperature	°F, °R	Fahrenheit, Rankine
Length	in	Inch
Time	m, h, d, y	Minute, hour, day, year
	am, pm	Ante meridiem (before midday), post meridiem (after midday)

5.3 Imperial units

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

6 Modbus RS485 register information

6.1 Notes

6.1.1 Structure of the register information

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

Navigation: navigation path to the parameter					
Parameter	**Register**	**Data type**	**Access type**	**User interface/ Selection/User entry**	**→**
Name of parameter	Indicated in decimal numerical format	▪ Float length = 4 byte ▪ Integer length = 2 byte ▪ String length, depending on parameter	Possible type of access to parameter: ▪ Read access via function codes 03, 04 or 23 ▪ Write access via function codes 06, 16 or 23	**Options** List of the individual options for the parameter ▪ Option 1 ▪ Option 2 ▪ Option 3 (+) (+) = Factory setting depends on country, order options or device settings **User entry** Specific value or input range for the parameter	Page number information and cross-reference to the standard parameter description

NOTICE

If non-volatile device parameters are modified via the MODBUS RS485 function codes 06, 16 or 23, the change is saved in the EEPROM of the measuring device.

The number of writes to the EEPROM is technically restricted to a maximum of 1 million.

- ▶ Make sure to comply with this limit since, if it is exceeded, data loss and measuring device failure will result.
- ▶ Avoid constantly writing non-volatile device parameters via the MODBUS RS485.

6.1.2 Address model

The Modbus RS485 register addresses of the measuring device are implemented in accordance with the "Modbus Applications Protocol Specification V1.1".

In addition, systems are used that work with the register address model "Modicon Modbus Protocol Reference Guide (PI-MBUS-300 Rev. J)".

Depending on the function code used, a number is added at the start of the register address with this specification:

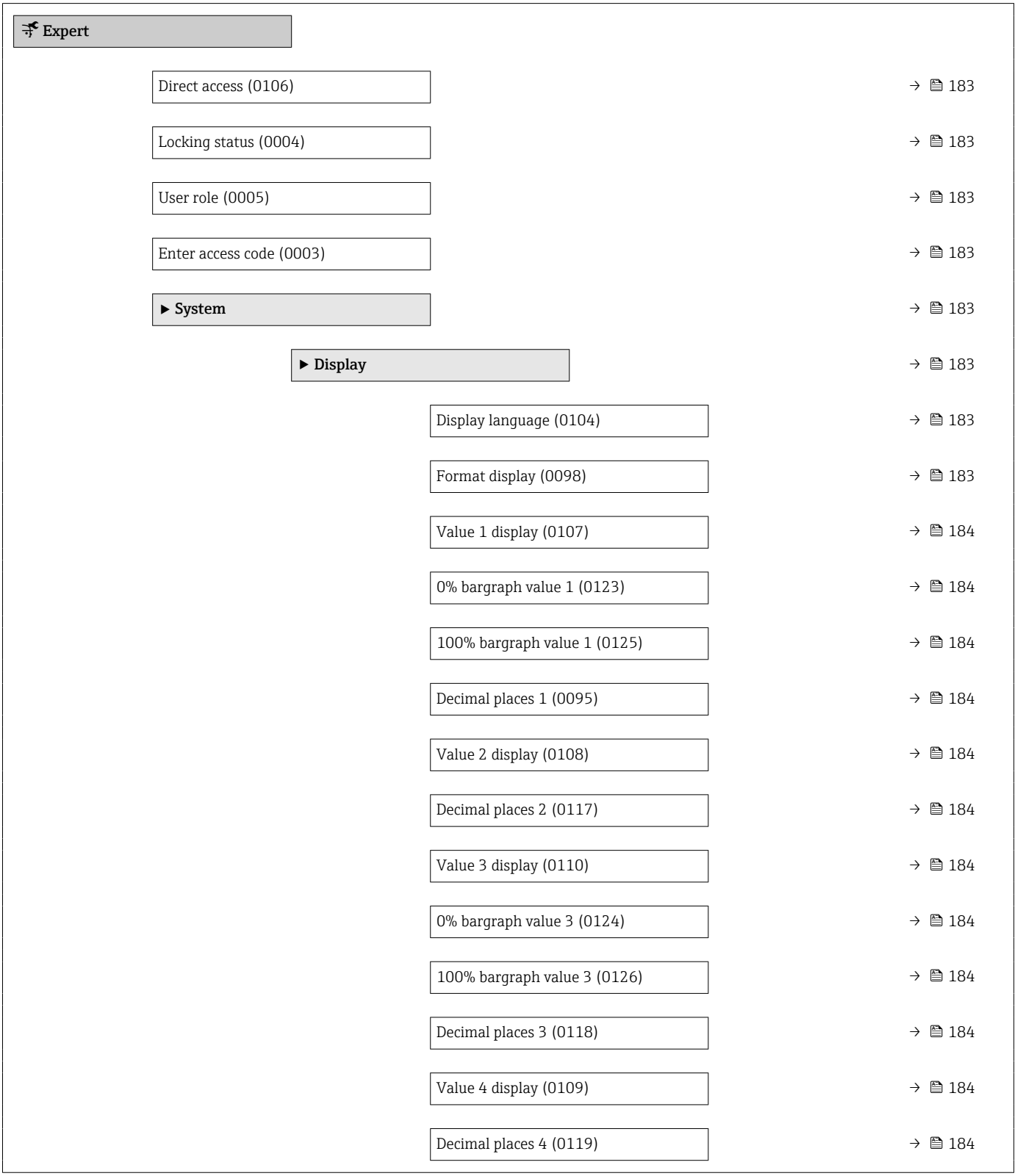
- "3" → "Read" access
- "4" → "Write" access

Function code	Access type	Register in accordance with "Modbus Applications Protocol Specification"	Register in accordance with "Modicon Modbus Protocol Reference Guide"
03 04 23	Read	XXXX Example: mass flow = 2007	3XXXX Example: mass flow = 32007
06 16 23	Write	XXXX Example: reset totalizer = 6401	4XXXX Example: reset totalizer = 46401

6.2 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.

Navigation Expert



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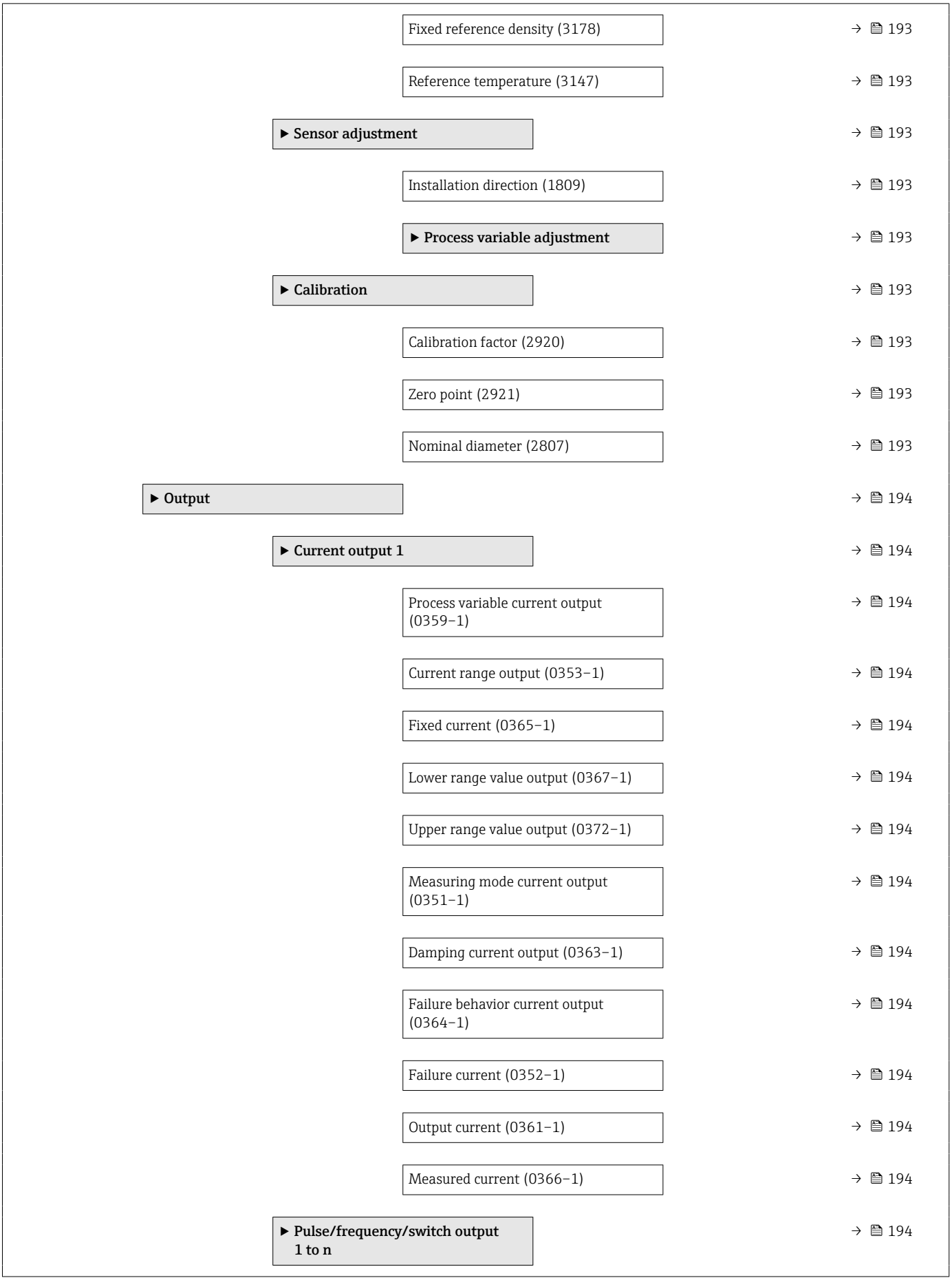
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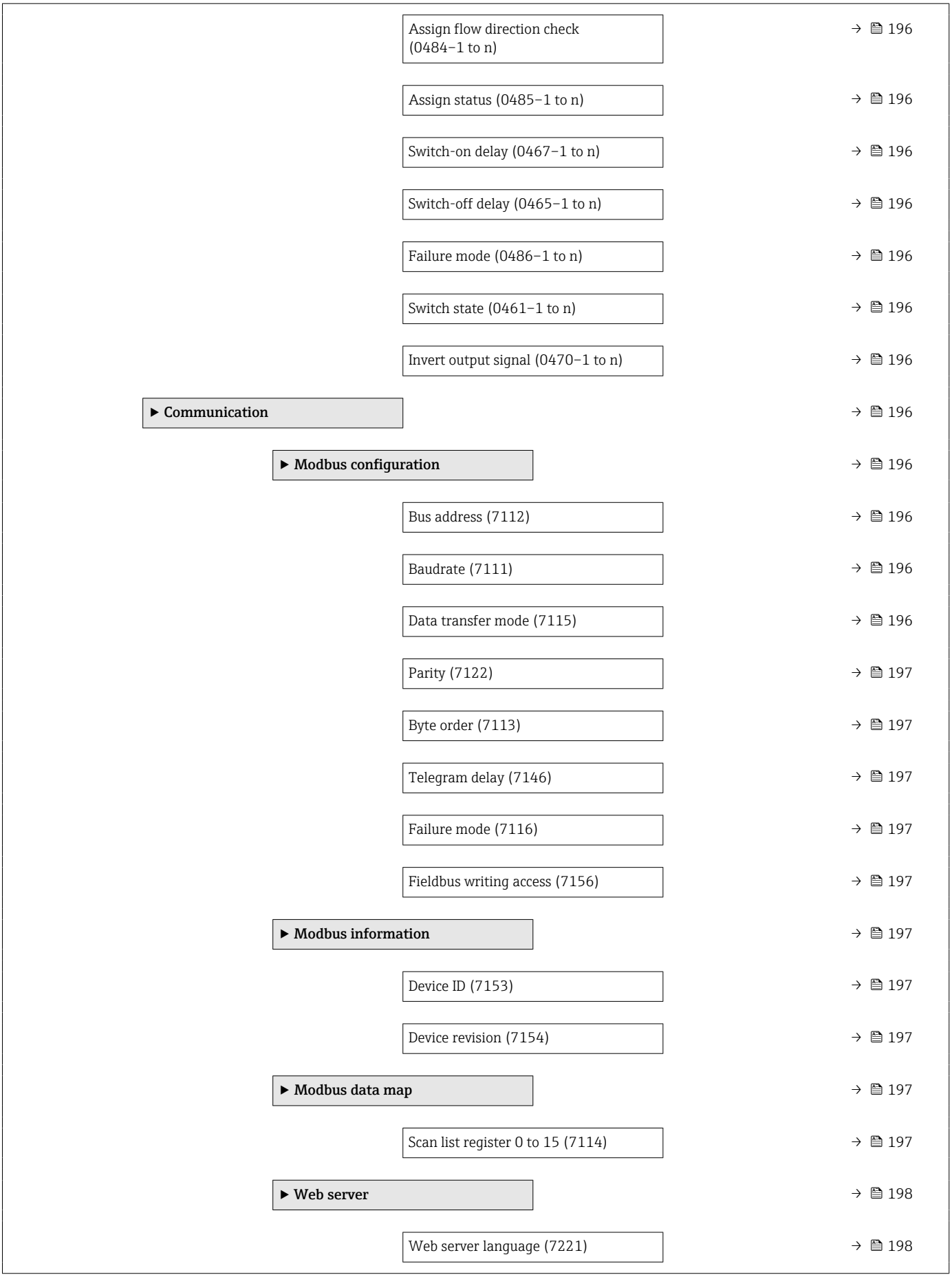
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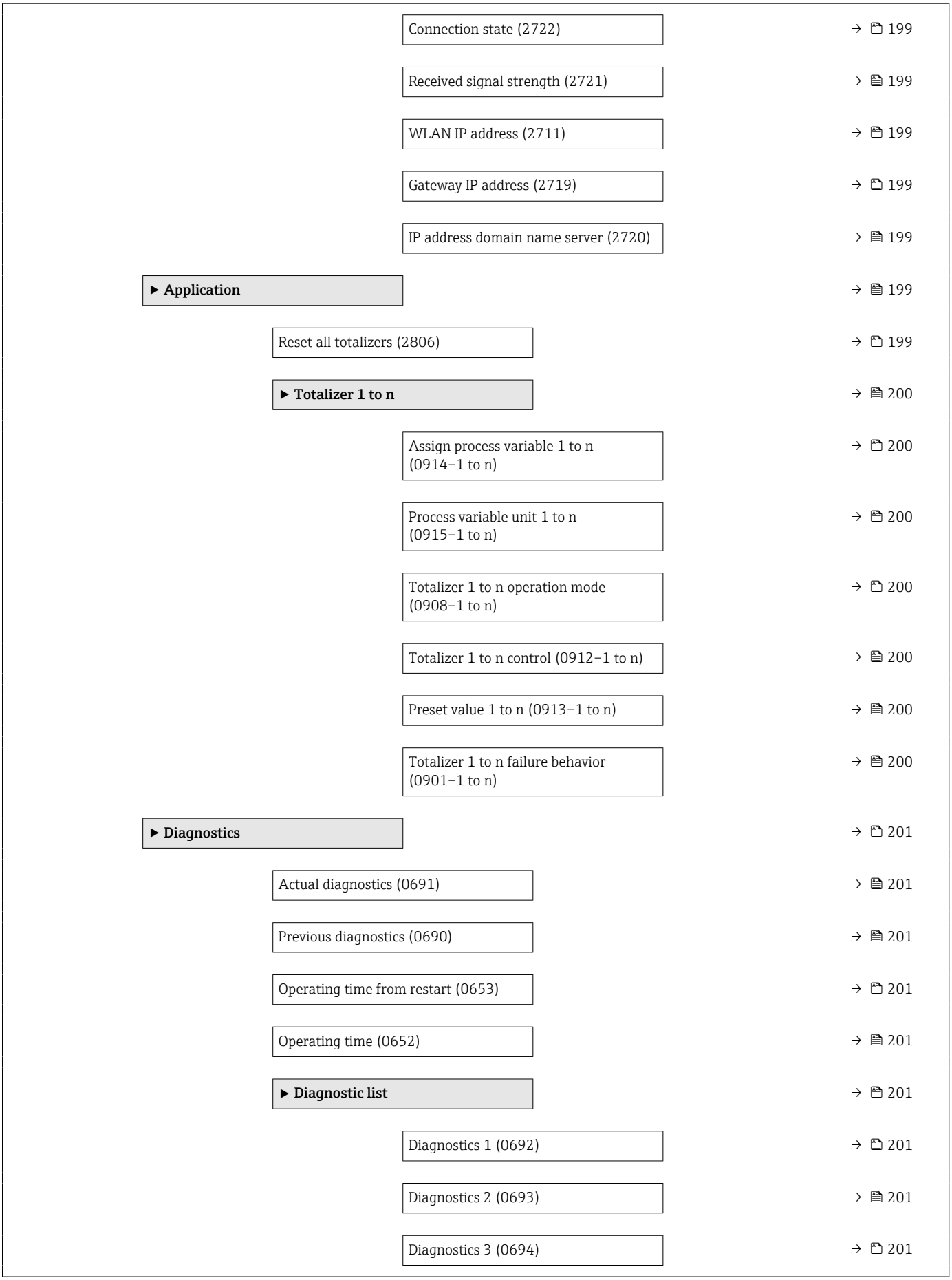
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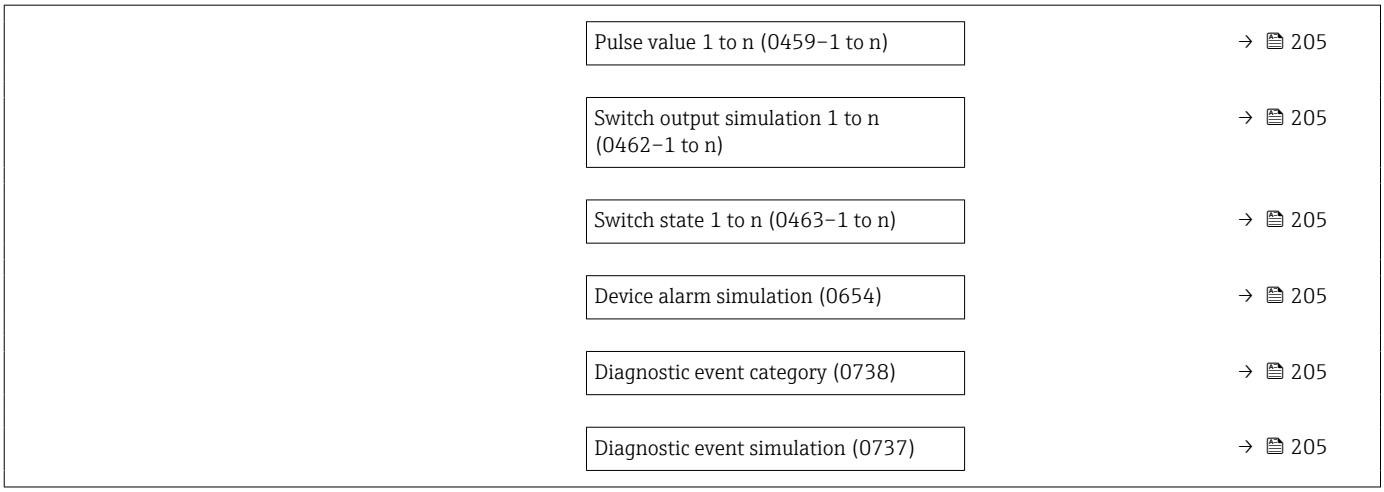

6.3 Register information

Navigation: Expert					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Direct access (0106)	3878	Integer	Read / Write	0 to 65 535	10
Locking status (0004)	4918	Integer	Read	256 = Hardware locked 512 = Temporarily locked	11
User role (0005)	2178	Integer	Read	0 = Operator **1 = Maintenance**	11
Enter access code (0003)	2177	Integer	Read / Write	Max. 16-digit character string comprising numbers, letters and special characters	12

6.3.1 "System" submenu

"Display" submenu

Navigation: Expert → System → Display					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Display language (0104)	3673	Integer	Read / Write	0 = English 1 = Deutsch 2 = Français 3 = Español 4 = Italiano 5 = Nederlands 8 = Svenska 11 = 日本語 (Japanese) 12 = Portuguesa 13 = Polski 14 = русский язык (Russian) 15 = čeština (Czech) 16 = 中文 (Chinese) 18 = Türkçe 20 = 한국어 (Korean)	13
Format display (0098)	3625	Integer	Read / Write	0 = 1 value, max. size 1 = 1 bargraph + 1 value 2 = 2 values 3 = 1 value large + 2 values 4 = 4 values	14

Navigation: Expert → System → Display					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Value 1 display (0107)	3963	Integer	Read / Write	1 = Mass flow 2 = Volume flow 3 = Flow velocity 4 = Sound velocity 5 = Totalizer 1 6 = Totalizer 2 7 = Totalizer 3 8 = Temperature 14 = Density 15 = Signal strength * 16 = Signal to noise ratio * 17 = Turbulence * 20 = Acceptance rate * 39 = Electronics temperature	16
0% bargraph value 1 (0123)	4136 to 4137	Float	Read / Write	Signed floating-point number	16
100% bargraph value 1 (0125)	4142 to 4143	Float	Read / Write	Signed floating-point number	17
Decimal places 1 (0095)	3365	Integer	Read / Write	0 = x 1 = x.x 2 = x.xx 3 = x.xxx 4 = x.xxxx	17
Value 2 display (0108)	3964	Integer	Read / Write	For the picklist, see **Value 1 display** parameter (→ 16) For the picklist, see **Value 1 display** parameter (→ 16)	18
Decimal places 2 (0117)	4049	Integer	Read / Write	0 = x 1 = x.x **2 = x.xx** 3 = x.xxx 4 = x.xxxx	18
Value 3 display (0110)	3966	Integer	Read / Write	For the picklist, see **Value 1 display** parameter (→ 16)	19
0% bargraph value 3 (0124)	4138 to 4139	Float	Read / Write	Signed floating-point number	19
100% bargraph value 3 (0126)	4140 to 4141	Float	Read / Write	Signed floating-point number	20
Decimal places 3 (0118)	4050	Integer	Read / Write	0 = x 1 = x.x **2 = x.xx** 3 = x.xxx 4 = x.xxxx	20
Value 4 display (0109)	3965	Integer	Read / Write	For the picklist, see **Value 1 display** parameter (→ 16)	20
Decimal places 4 (0119)	4051	Integer	Read / Write	0 = x 1 = x.x **2 = x.xx** 3 = x.xxx 4 = x.xxxx	21
Display interval (0096)	3604 to 3605	Float	Read / Write	1 to 10 s	21
Display damping (0094)	3554 to 3555	Float	Read / Write	0.0 to 999.9 s	22
Header (0097)	3624	Integer	Read / Write	**0 = Device tag** 1 = Free text	22
Header text (0112)	3968 to 3973	String	Read / Write	Max. 12 characters, such as letters, numbers or special characters (e.g. @, %, /)	23
Separator (0101)	3671	Integer	Read / Write	▪ . (point) ▪ , (comma)	23

Navigation: Expert → System → Display					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→
Contrast display (0105)	3674 to 3675	Float	Read / Write	20 to 80 %	24
Backlight (0111)	3967	Integer	Read / Write	0 = Disable **1 = Enable**	24

* Visibility depends on order options or device settings

"Diagnostic handling" submenu

Navigation: Expert → System → Diagnostic handling					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→
Alarm delay (0651)	6808 to 6809	Float	Read / Write	0 to 60 s	25

"Diagnostic behavior" submenu

Navigation: Expert → System → Diagnostic handling → Diagnostic behavior					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→
Assign behavior of diagnostic no. 019 (0635)	48299	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	27
Assign behavior of diagnostic no. 160 (0776)	2873	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	27
Assign behavior of diagnostic no. 302 (0742)	6484	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning**	27
Assign behavior of diagnostic no. 441 (0657)	4742	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	28
Assign behavior of diagnostic no. 442 (0658)	4919	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	28
Assign behavior of diagnostic no. 443 (0659)	5000	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	29
Assign behavior of diagnostic no. 832 (0675)	6440	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	29
Assign behavior of diagnostic no. 833 (0676)	6439	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	29
Assign behavior of diagnostic no. 841 (0680)	2434	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	30
Assign behavior of diagnostic no. 842 (0638)	9661	Integer	Read / Write	**0 = Off** 1 = Logbook entry only 2 = Warning 3 = Alarm	30

Navigation: Expert → System → Diagnostic handling → Diagnostic behavior					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Assign behavior of diagnostic no. 870 (0726)	33279	Integer	Read / Write	**0 = Off** 1 = Logbook entry only 2 = Warning 3 = Alarm	30
Assign behavior of diagnostic no. 930 (0639)	30668	Integer	Read / Write	0 = Off 1 = Logbook entry only 2 = Warning **3 = Alarm**	31
Assign behavior of diagnostic no. 931 (0640)	30930	Integer	Read / Write	0 = Off 1 = Logbook entry only 2 = Warning **3 = Alarm**	31

"Administration" submenu

Navigation: Expert → System → Administration					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Device reset (0000)	6817	Integer	Read / Write	**0 = Cancel** 1 = Restart device 2 = To delivery settings 25 = Restore S-DAT backup *	35
Activate SW option (0029)	2795	Integer	Read / Write	Max. 10-digit string of numbers.	35
Software option overview (0015)	2902	Integer	Read	1 = Extended HistoROM 8 = 4-20mA,2x pulse/freq./switch output 16384 = Heartbeat Monitoring 32768 = Heartbeat Verification	36

* Visibility depends on order options or device settings

"Define access code" wizard

"Reset access code" submenu

Navigation: Expert → System → Administration → Reset access code					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Operating time (0652)	2631	String	Read	Days (d), hours (h), minutes (m) and seconds (s)	34
Reset access code (0024)	8880 to 8895	String	Read / Write	Character string comprising numbers, letters and special characters	34

6.3.2 "Sensor" submenu

"Measured values" submenu

"Process variables" submenu

Navigation: Expert → Sensor → Measured values → Process variables					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Volume flow (1838)	2007 to 2008	Float	Read	Signed floating-point number	38
Mass flow (1847)	2009 to 2010	Float	Read	Signed floating-point number	38
Flow velocity (1852)	2015 to 2016	Float	Read	Signed floating-point number	39

Navigation: Expert → Sensor → Measured values → Process variables					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Sound velocity (1850)	2013 to 2014	Float	Read	Signed floating-point number	39
Density (1851)	2011 to 2012	Float	Read	Signed floating-point number	39
Temperature (1853)	2017 to 2018	Float	Read	Signed floating-point number	39

"System values" submenu

Navigation: Expert → Sensor → Measured values → System values					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Signal strength (2914)	4959 to 4960	Float	Read	Signed floating-point number	40
Signal to noise ratio (2917)	4983 to 4984	Float	Read	Signed floating-point number	40
Acceptance rate (2912)	4551 to 4552	Float	Read	0 to 100 %	41
Turbulence (2907)	22772 to 22773	Float	Read	Signed floating-point number	41

"Totalizer" submenu

Navigation: Expert → Sensor → Measured values → Totalizer					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Totalizer 1 to n value (0911–1 to n)	1: 2610 to 2611 2: 2810 to 2811 3: 3010 to 3011	Float	Read	Signed floating-point number	42
Totalizer 1 to n overflow (0910–1 to n)	1: 2612 to 2613 2: 2812 to 2813 3: 3012 to 3013	Float	Read	–32 000.0 to 32 000.0	42

"Output values" submenu

Navigation: Expert → Sensor → Measured values → Output values					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Output current (0361)	--	Float	Read		
Measured current (0366)	--	Float	Read		
Pulse output (0456)	--	Float	Read		
Output frequency (0471)	--	Float	Read		
Switch state (0461)	--	Integer	Read		
Output frequency (0471)	--	Float	Read		
Pulse output (0456)	--	Float	Read		
Switch state (0461)	--	Integer	Read		

"System units" submenu

Navigation: Expert → Sensor → System units					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Volume flow unit (0553)	2103	Integer	Read / Write	= = = = 0 = cm^3/s 1 = cm^3/min 2 = cm^3/h 3 = cm^3/d 4 = dm^3/s 5 = dm^3/min 6 = dm^3/h 7 = dm^3/d 8 = m^3/s 9 = m^3/min **10 = m^3/h (+)** 11 = m^3/d 12 = ml/s 13 = ml/min 14 = ml/h 15 = ml/d 16 = l/s 17 = l/min 18 = l/h 19 = l/d 20 = hl/s 21 = hl/min 22 = hl/h 23 = hl/d 24 = Ml/s 25 = Ml/min 26 = Ml/h 27 = Ml/d 32 = af/s 33 = af/min 34 = af/h 35 = af/d 36 = ft^3/s 37 = ft^3/min 38 = ft^3/h 39 = ft^3/d 40 = fl oz/s (us) 41 = fl oz/min (us) 42 = fl oz/h (us) 43 = fl oz/d (us) 44 = gal/s (us) 45 = gal/min (us) 46 = gal/h (us) 47 = gal/d (us) 48 = Mgal/s (us) 49 = Mgal/min (us) 50 = Mgal/h (us) 51 = Mgal/d (us) 52 = bbl/s (us;liq.) 53 = bbl/min (us;liq.) 54 = bbl/h (us;liq.) 55 = bbl/d (us;liq.) 56 = bbl/s (us;beer) 57 = bbl/min (us;beer) 58 = bbl/h (us;beer) 59 = bbl/d (us;beer) 60 = bbl/s (us;oil) 61 = bbl/min (us;oil) 62 = bbl/h (us;oil) 63 = bbl/d (us;oil) 64 = bbl/s (us;tank)	46

Navigation: Expert → Sensor → System units					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→
				65 = bbl/min (us;tank) 66 = bbl/h (us;tank) 67 = bbl/d (us;tank) 68 = gal/s (imp) 69 = gal/min (imp) 70 = gal/h (imp) 71 = gal/d (imp) 72 = Mgal/s (imp) 73 = Mgal/min (imp) 74 = Mgal/h (imp) 75 = Mgal/d (imp) 76 = bbl/s (imp;beer) 77 = bbl/min (imp;beer) 78 = bbl/h (imp;beer) 79 = bbl/d (imp;beer) 80 = bbl/s (imp;oil) 81 = bbl/min (imp;oil) 82 = bbl/h (imp;oil) 83 = bbl/d (imp;oil) 88 = kgal/s (us) 89 = kgal/min (us) 90 = kgal/h (us) 91 = kgal/d (us)	
Volume unit (0563)	2104	Integer	Read / Write	= = 0 = cm^3 1 = dm^3 **2 = m^3 (+)** 3 = ml 4 = l 5 = hl 8 = af 9 = ft^3 10 = fl oz (us) 11 = gal (us) 12 = Mgal (us) 13 = bbl (us;liq.) 14 = bbl (us;beer) 15 = bbl (us;oil) 16 = bbl (us;tank) 17 = gal (imp) 18 = Mgal (imp) 19 = bbl (imp;beer) 20 = bbl (imp;oil) 22 = kgal (us)	47

Navigation: Expert → Sensor → System units					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Mass flow unit (0554)	2101	Integer	Read / Write	0 = g/s 1 = g/min 2 = g/h 3 = g/d 4 = kg/s 5 = kg/min **6 = kg/h** (+) 7 = kg/d 8 = t/s 9 = t/min 10 = t/h 11 = t/d 12 = oz/s 13 = oz/min 14 = oz/h 15 = oz/d 16 = lb/s 17 = lb/min 18 = lb/h 19 = lb/d 20 = STon/s 21 = STon/min 22 = STon/h 23 = STon/d	48
Mass unit (0574)	2102	Integer	Read / Write	50 = g **51 = kg** (+) 52 = t 53 = oz 54 = lb 55 = STon	49
Velocity unit (0566)	2600	Integer	Read / Write	20 = ft/s **21 = m/s** (+)	49
Temperature unit (0557)	2109	Integer	Read / Write	**0 = °C** (+) 1 = K 2 = °F 3 = °R	50
Density unit (0555)	2107	Integer	Read / Write	0 = g/cm³ **2 = kg/dm³** (+) 3 = kg/l 4 = kg/m³ 5 = SD4°C 6 = SD15°C 7 = SD20°C 8 = SG4°C 9 = SG15°C 10 = SG20°C 11 = lb/ft³ 12 = lb/gal (us) 13 = lb/bbl (us;liq.) 14 = lb/bbl (us;beer) 15 = lb/bbl (us;oil) 16 = lb/bbl (us;tank) 17 = lb/gal (imp) 18 = lb/bbl (imp;beer) 19 = lb/bbl (imp;oil) 21 = g/m³	50
Kinematic viscosity unit (0578)	2112	Integer	Read / Write	**0 = m²/s** (+) 2 = cSt 3 = St 240 = mm²/s	51

Navigation: Expert → Sensor → System units					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→
Length unit (0551)	2087	Integer	Read / Write	44 = ft 45 = m 47 = in **49 = mm** (+)	51
Date/time format (2812)	2150	Integer	Read / Write	**0 = dd.mm.yy hh:mm** 1 = mm/dd/yy hh:mm am/pm 2 = dd.mm.yy hh:mm am/pm 3 = mm/dd/yy hh:mm	51

"Measuring point 1" submenu

Navigation: Expert → Sensor → Measuring point 1					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→
Measuring point configuration (5675–1)	4285	Integer	Read / Write	0 = 1 measuring point - signal path 1 1 = 1 measuring point - 2 signal paths * 2 = 1 measuring point - signal path 2 *	53
Medium (2926–1)	5049	Integer	Read / Write	**0 = Water** 1 = Distilled water 2 = Sea water 3 = Ammonia NH3 4 = Benzene 6 = Ethanol 7 = Glycol 9 = Milk 10 = Methanol 255 = User-specific liquid	53
Medium temperature (3053–1)	36110 to 36111	Float	Read / Write	−200 to 550 °C	53
Sound velocity (2929–1)	5171 to 5172	Float	Read / Write	200 to 3 000 m/s	54
Viscosity (2932–1)	5223 to 5224	Float	Read / Write	0.01 to 10 000 mm^2/s	54
Pipe dimensions (2943–1)	5114	Integer	Read / Write	**0 = Diameter** 1 = Pipe circumference	54
Pipe circumference (2934–1)	5334 to 5335	Float	Read / Write	30 to 62 800 mm	54
Pipe outer diameter (2910–1)	4971 to 4972	Float	Read / Write	0 to 20 000 mm	55
Pipe wall thickness (2916–1)	4975 to 4976	Float	Read / Write	Positive floating point number	55
Liner thickness (2935–1)	5338 to 5339	Float	Read / Write	0 to 100 mm	55
Signal filter (3011–1)	52344	Integer	Read / Write	0 = Off **1 = On**	56
Cable length (2939–1)	5346 to 5347	Float	Read / Write	0 to 200 000 mm	56
Intermediate pipe length (2945–1)	32808 to 32809	Float	Read / Write	Positive floating-point number	56
Result sensor type / sensor distance (3066–1)	44416 to 44428	String	Read	e.g. I-100-A / 500 mm	56
Result path length / arc length (3067–1)	44450 to 44462	String	Read	e.g. 1 085 mm / 257.56 mm	57

* Visibility depends on order options or device settings

"Mounting deviations signal path 1 to n" submenu

Navigation: Expert → Sensor → Measuring point 1 → Mounting deviations signal path 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Sensor distance deviation (5822–1 to n)	1: 5667 to 5668 2: 5669 to 5670	Float	Read / Write	Signed floating-point number	57
Arc length deviation (5876–1 to n)	1: 36007 to 36008 2: 36009 to 36010	Float	Read / Write	Signed floating-point number	58
Signal path length deviation (5821–1 to n)	1: 5663 to 5664 2: 5665 to 5666	Float	Read / Write	Signed floating-point number	58

"Installation status" submenu

Navigation: Expert → Sensor → Installation status					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Installation status (2958)	27532	Integer	Read	0 = Bad 1 = Acceptable **128 = Good**	59
Signal strength (2914)	4959 to 4960	Float	Read	Signed floating-point number	59
Signal to noise ratio (2917)	4983 to 4984	Float	Read	Signed floating-point number	60
Sound velocity (2915)	4967 to 4968	Float	Read	Signed floating-point number	60
Sound velocity deviation (2986)	46176 to 46177	Float	Read	Signed floating-point number	60

"Process parameters" submenu

Navigation: Expert → Sensor → Process parameters					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Flow override (1839)	5503	Integer	Read / Write	**0 = Off** 1 = On	61
Flow damping (1802)	5510 to 5511	Float	Read / Write	0 to 999.9 s	61
Sound velocity damping (1888)	25344 to 25345	Float	Read / Write	0 to 999.9 s	62
Density damping (1889)	25492 to 25493	Float	Read / Write	0 to 999.9 s	62
Temperature damping (1886)	2483 to 2484	Float	Read / Write	0 to 999.9 s	62

"Low flow cut off" submenu

Navigation: Expert → Sensor → Process parameters → Low flow cut off					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Assign process variable (1837)	5101	Integer	Read / Write	0 = Off 1 = Mass flow 2 = Volume flow **3 = Flow velocity**	63
On value low flow cutoff (1805)	5138 to 5139	Float	Read / Write	Positive floating-point number	63
Off value low flow cutoff (1804)	5104 to 5105	Float	Read / Write	0 to 100.0 %	64

"External compensation" submenu

Navigation: Expert → Sensor → External compensation					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→
Temperature compensation (3025)	28563	Integer	Read / Write	**1 = Fixed value** 10 = External value	65
External value (3058)	28647 to 28648	Float	Read / Write	−273.15 to 99 999 °C	66
Fixed value (2925)	4979 to 4980	Float	Read / Write	−50 to 550 °C	65
Density source (3048)	21485	Integer	Read / Write	**0 = Fixed value** 1 = External density 2 = Calculated value	66
External value (3060)	36025 to 36026	Float	Read / Write	Positive floating-point number	66
Fixed density (3171)	25234 to 25235	Float	Read / Write	0.01 to 15 000 kg/m³	66
Linear expansion coefficient (3153)	26402 to 26403	Float	Read / Write	$1.0 \cdot 10^{-6}$ to $2.0 \cdot 10^{-3}$	67
Square expansion coefficient (3172)	36021 to 36022	Float	Read / Write	$1.0 \cdot 10^{-6}$ to $2.0 \cdot 10^{-3}$	67
Fixed reference density (3178)	27177 to 27178	Float	Read / Write	0.01 to 15 000 kg/m³	67
Reference temperature (3147)	26383 to 26384	Float	Read / Write	−200 to 450 °C	68

"Sensor adjustment" submenu

Navigation: Expert → Sensor → Sensor adjustment					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→
Installation direction (1809)	5501	Integer	Read / Write	**0 = Forward flow** 1 = Reverse flow	68

"Process variable adjustment" submenu

Navigation: Expert → Sensor → Sensor adjustment → Process variable adjustment					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→
Volume flow offset (1831)	5521 to 5522	Float	Read / Write	Signed floating-point number	69
Volume flow factor (1832)	5519 to 5520	Float	Read / Write	Positive floating-point number	70
Mass flow offset (1841)	5525 to 5526	Float	Read / Write	Signed floating-point number	70
Mass flow factor (1846)	5523 to 5524	Float	Read / Write	Positive floating-point number	70
Sound velocity offset (1848)	5529 to 5530	Float	Read / Write	Signed floating-point number	71
Sound velocity factor (1849)	5527 to 5528	Float	Read / Write	Positive floating-point number	71
Density offset (1866)	2044 to 2045	Float	Read / Write	Signed floating-point number	71
Density factor (1867)	2076 to 2077	Float	Read / Write	Positive floating-point number	72
Temperature offset (1870)	5533 to 5534	Float	Read / Write	Signed floating-point number	72
Temperature factor (1871)	5531 to 5532	Float	Read / Write	Positive floating-point number	72

"Calibration" submenu

Navigation: Expert → Sensor → Calibration					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→
Calibration factor (2920)	4559 to 4560	Float	Read	Signed floating-point number	73
Zero point (2921)	4963 to 4964	Float	Read	Signed floating-point number	73
Nominal diameter (2807)	2048 to 2057	String	Read	----------	73

6.3.3 "Output" submenu

"Current output 1" submenu

Navigation: Expert → Output → Current output 1					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Process variable current output (0359–1)	5927	Integer	Read / Write	0 = Off * 1 = Mass flow **2 = Volume flow** 3 = Flow velocity 4 = Sound velocity 8 = Temperature 14 = Density 15 = Signal strength * 16 = Signal to noise ratio * 17 = Turbulence * 20 = Acceptance rate * 39 = Electronics temperature	75
Current range output (0353–1)	5923	Integer	Read / Write	0 = 4...20 mA (4...20.5 mA) 1 = 4...20 mA US (3.9...20.8 mA) 2 = 4...20 mA NE (3.8...20.5 mA) 3 = 0...20 mA (0...20.5 mA) 4 = Fixed value	75
Fixed current (0365–1)	5987 to 5988	Float	Read / Write	0 to 22.5 mA	76
Lower range value output (0367–1)	6195 to 6196	Float	Read / Write	Signed floating-point number	77
Upper range value output (0372–1)	5915 to 5916	Float	Read / Write	Signed floating-point number	78
Measuring mode current output (0351–1)	5899	Integer	Read / Write	**0 = Forward flow** 2 = Reverse flow compensation 13 = Forward/Reverse flow *	79
Damping current output (0363–1)	5903 to 5904	Float	Read / Write	0.0 to 999.9 s	83
Failure behavior current output (0364–1)	5911	Integer	Read / Write	0 = Min. **1 = Max.** 4 = Actual value 5 = Last valid value 6 = Fixed value	84
Failure current (0352–1)	5979 to 5980	Float	Read / Write	0 to 22.5 mA	85
Output current (0361–1)	5931 to 5932	Float	Read	0 to 22.5 mA	85
Measured current (0366–1)	5779 to 5780	Float	Read	0 to 30 mA	86

* Visibility depends on order options or device settings

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

Navigation: Expert → Output → Pulse/frequency/switch output 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Operating mode (0469–1 to n)	1: 4479 2: 4480	Integer	Read / Write	**0 = Pulse** * 1 = Switch * 53 = Frequency *	88
Assign pulse output (0460–1 to n)	1: 2461 2: 2462	Integer	Read / Write	**0 = Off** 1 = Mass flow 2 = Volume flow	90
Pulse scaling (0455–1 to n)	1: 3034 to 3035 2: 3036 to 3037	Float	Read / Write	Positive floating point number	90
Pulse width (0452–1 to n)	1: 2836 to 2837 2: 2838 to 2839	Float	Read / Write	0.05 to 2 000 ms	91

Navigation: Expert → Output → Pulse/frequency/switch output 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Measuring mode (0457–1 to n)	1: 2394 2: 2395	Integer	Read / Write	**0 = Forward flow** 1 = Reverse flow 2 = Reverse flow compensation 13 = Forward/Reverse flow	91
Failure mode (0480–1 to n)	1: 2948 2: 2949	Integer	Read / Write	0 = Actual value **1 = No pulses**	92
Pulse output (0456–1 to n)	1: 3082 to 3083 2: 3084 to 3085	Float	Read	Positive floating-point number	93
Assign frequency output (0478–1 to n)	1: 2614 2: 2615	Integer	Read / Write	**0 = Off** 1 = Mass flow 2 = Volume flow 3 = Flow velocity 4 = Sound velocity 8 = Temperature 14 = Density 15 = Signal strength * 16 = Signal to noise ratio * 17 = Turbulence * 20 = Acceptance rate * 39 = Electronics temperature	93
Minimum frequency value (0453–1 to n)	1: 3526 to 3527 2: 3528 to 3529	Float	Read / Write	0.0 to 10 000.0 Hz	94
Maximum frequency value (0454–1 to n)	1: 2996 to 2997 2: 2998 to 2999	Float	Read / Write	0.0 to 10 000.0 Hz	94
Measuring value at minimum frequency (0476–1 to n)	1: 5887 to 5888 2: 5889 to 5890	Float	Read / Write	Signed floating-point number	94
Measuring value at maximum frequency (0475–1 to n)	1: 3514 to 3515 2: 3516 to 3517	Float	Read / Write	Signed floating-point number	95
Measuring mode (0479–1 to n)	1: 2922 2: 2923	Integer	Read / Write	**0 = Forward flow** 2 = Reverse flow compensation 13 = Forward/Reverse flow	95
Damping output (0477–1 to n)	1: 3522 to 3523 2: 3524 to 3525	Float	Read / Write	0 to 999.9 s	95
Response time (0491–1 to n)	1: 5875 to 5876 2: 5877 to 5878	Float	Read	Positive floating-point number	96
Failure mode (0451–1 to n)	1: 2367 2: 2368	Integer	Read / Write	0 = Actual value **1 = 0 Hz** 2 = Defined value	96
Failure frequency (0474–1 to n)	1: 3510 to 3511 2: 3512 to 3513	Float	Read / Write	0.0 to 12 500.0 Hz	97
Output frequency (0471–1 to n)	1: 3462 to 3463 2: 3464 to 3465	Float	Read	0.0 to 12 500.0 Hz	97
Switch output function (0481–1 to n)	1: 3022 2: 3023	Integer	Read / Write	**0 = Off** 1 = On 2 = Diagnostic behavior 3 = Flow direction check 4 = Limit 5 = Status	97
Assign diagnostic behavior (0482–1 to n)	1: 3096 2: 3097	Integer	Read / Write	**0 = Alarm** 1 = Warning 2 = Alarm or warning	98

Navigation: Expert → Output → Pulse/frequency/switch output 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Assign limit (0483–1 to n)	1: 3184 2: 3185	Integer	Read / Write	0 = Off 1 = Mass flow **2 = Volume flow** 3 = Flow velocity 4 = Sound velocity 5 = Totalizer 1 6 = Totalizer 2 7 = Totalizer 3 8 = Temperature 14 = Density 15 = Signal strength * 16 = Signal to noise ratio * 17 = Turbulence * 20 = Acceptance rate * 39 = Electronics temperature	99
Switch-on value (0466–1 to n)	1: 3242 to 3243 2: 3244 to 3245	Float	Read / Write	Signed floating-point number	101
Switch-off value (0464–1 to n)	1: 3234 to 3235 2: 3236 to 3237	Float	Read / Write	Signed floating-point number	101
Assign flow direction check (0484–1 to n)	1: 3363 2: 3364	Integer	Read / Write		102
Assign status (0485–1 to n)	1: 3374 2: 3375	Integer	Read / Write	0 = Off **1 = Low flow cut off**	102
Switch-on delay (0467–1 to n)	1: 6247 to 6248 2: 6249 to 6250	Float	Read / Write	0.0 to 100.0 s	102
Switch-off delay (0465–1 to n)	1: 6239 to 6240 2: 6241 to 6242	Float	Read / Write	0.0 to 100.0 s	103
Failure mode (0486–1 to n)	1: 3384 2: 3385	Integer	Read / Write	0 = Actual status **1 = Open** 6 = Closed	103
Switch state (0461–1 to n)	1: 2485 2: 2486	Integer	Read	1 = Open 6 = Closed	103
Invert output signal (0470–1 to n)	1: 2583 2: 2584	Integer	Read / Write	0 = Yes **1 = No**	104

* Visibility depends on order options or device settings

6.3.4 "Communication" submenu

"Modbus configuration" submenu

Navigation: Expert → Communication → Modbus configuration					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Bus address (7112)	4910	Integer	Read / Write	1 to 247	105
Baudrate (7111)	4912	Integer	Read / Write	0 = 1200 BAUD 1 = 2400 BAUD 2 = 4800 BAUD 3 = 9600 BAUD **4 = 19200 BAUD** 5 = 38400 BAUD 6 = 57600 BAUD 7 = 115200 BAUD 8 = 230400 BAUD	105
Data transfer mode (7115)	4913	Integer	Read / Write	**0 = RTU** 1 = ASCII	106

Navigation: Expert → Communication → Modbus configuration					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→
Parity (7122)	4914	Integer	Read / Write	**0 = Even** 1 = Odd 2 = None / 2 stop bits 3 = None / 1 stop bit	106
Byte order (7113)	4915	Integer	Read / Write	0 = 0-1-2-3 1 = 3-2-1-0 2 = 2-3-0-1 **3 = 1-0-3-2**	107
Telegram delay (7146)	4916 to 4917	Float	Read / Write	0 to 100 ms	108
Failure mode (7116)	4920	Integer	Read / Write	1 = Last valid value **255 = NaN value**	108
Fieldbus writing access (7156)	6807	Integer	Read / Write	**0 = Read + write** 1 = Read only	109

"Modbus information" submenu

Navigation: Expert → Communication → Modbus information					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→
Device ID (7153)	2547	Integer	Read	4-digit hexadecimal number	110
Device revision (7154)	4481	Integer	Read	4-digit hexadecimal number	110

"Modbus data map" submenu

Navigation: Expert → Communication → Modbus data map					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→
Scan list register 0 to 15 (7114)	0: 5001 1: 5002 2: 5003 3: 5004 4: 5005 5: 5006 6: 5007 7: 5008 8: 5009 9: 5010 10: 5011 11: 5012 12: 5013 13: 5014 14: 5015 15: 5016	Integer	Read / Write	1 to 65 535	110

"Web server" submenu

Navigation: Expert → Communication → Web server					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Web server language (7221)	4219	Integer	Read / Write	**0 = English** 1 = Deutsch 2 = Français 3 = Español 4 = Italiano 5 = Nederlands 8 = Svenska 11 = 日本語 (Japanese) 12 = Portuguesa 13 = Polski 14 = русский язык (Russian) 15 = čeština (Czech) 16 = 中文 (Chinese) 18 = Türkçe 20 = 한국어 (Korean)	111
MAC address (7214)	4210 to 4218	String	Read	Unique 12-digit character string comprising letters and numbers	112
DHCP client (7212)	21781	Integer	Read / Write	0 = Off **1 = On**	112
IP address (7209)	4155 to 4162	String	Read / Write	4 octet: 0 to 255 (in the particular octet)	112
Subnet mask (7211)	4163 to 4170	String	Read / Write	4 octet: 0 to 255 (in the particular octet)	113
Default gateway (7210)	4171 to 4178	String	Read / Write	4 octet: 0 to 255 (in the particular octet)	113
Web server functionality (7222)	4220	Integer	Read / Write	0 = Off **1 = On**	113
Login page (7273)	5802	Integer	Read / Write	0 = Without header **1 = With header**	114

"WLAN settings" wizard

Navigation: Expert → Communication → WLAN settings					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
WLAN (2702)	6178	Integer	Read / Write	0 = Disable **1 = Enable**	115
WLAN mode (2717)	28777	Integer	Read / Write	**0 = WLAN access point**	115
SSID name (2714)	28940 to 28955	String	Read / Write	–	115
Network security (2705)	6206	Integer	Read / Write	0 = Unsecured **1 = WPA2-PSK** 2 = EAP-PEAP with MSCHAPv2 * 3 = EAP-TLS * 4 = EAP-PEAP MSCHAPv2 no server authentic. *	116
Security identification (2718)	28817	Integer	Read	1 = Trusted issuer certificate 2 = Device certificate 4 = Device private key	116
User name (2715)	28956 to 28971	String	Read / Write	–	117
WLAN password (2716)	28972 to 28987	String	Read / Write	–	117
WLAN IP address (2711)	8643 to 8650	String	Read / Write	4 octet: 0 to 255 (in the particular octet)	117
WLAN MAC address (2703)	8602 to 8610	String	Read	Unique 12-digit character string comprising letters and numbers	117
WLAN subnet mask (2709)	8651 to 8658	String	Read / Write	4 octet: 0 to 255 (in the particular octet)	118

Navigation: Expert → Communication → WLAN settings					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
WLAN MAC address (2703)	8602 to 8610	String	Read	Unique 12-digit character string comprising letters and numbers	117
WLAN passphrase (2706)	8611 to 8626	String	Read / Write	8 to 32-digit character string comprising numbers, letters and special characters (without spaces)	118
WLAN MAC address (2703)	8602 to 8610	String	Read	Unique 12-digit character string comprising letters and numbers	117
Assign SSID name (2708)	6218	Integer	Read / Write	0 = Device tag **1 = User-defined**	118
SSID name (2707)	8627 to 8642	String	Read / Write	Max. 32-digit character string comprising numbers, letters and special characters	119
2.4 GHz WLAN channel (2704)	6182	Integer	Read / Write	1 to 11	119
Select antenna (2713)	6102	Integer	Read / Write	0 = External antenna **1 = Internal antenna**	119
Connection state (2722)	29221	Integer	Read	**0 = Not connected** 1 = Connected	119
Received signal strength (2721)	28818	Integer	Read	0 = Low **1 = High** 2 = Medium	120
WLAN IP address (2711)	8643 to 8650	String	Read / Write	4 octet: 0 to 255 (in the particular octet)	117
Gateway IP address (2719)	29227 to 29234	String	Read	Character string comprising numbers, letters and special characters	120
IP address domain name server (2720)	29283 to 29290	String	Read	Character string comprising numbers, letters and special characters	120

* Visibility depends on order options or device settings

6.3.5 "Application" submenu

Navigation: Expert → Application					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Reset all totalizers (2806)	2609	Integer	Read / Write	**0 = Cancel** 1 = Reset + totalize	121

"Totalizer 1 to n" submenu

Navigation: Expert → Application → Totalizer 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Assign process variable 1 to n (0914–1 to n)	1: 2601 2: 2801 3: 3001	Integer	Read / Write	0 = Off 1 = Mass flow 2 = Volume flow	122
Process variable unit 1 to n (0915–1 to n)	1: 4604 2: 4605 3: 4606	Integer	Read / Write	0 = cm^3 * 1 = dm^3 * 2 = m^3 * 3 = ml * 4 = l * 5 = hl * 6 = Ml Mega * 8 = af * 9 = ft^3 * 10 = fl oz (us) * 11 = gal (us) * 12 = Mgal (us) * 13 = bbl (us;liq.) * 14 = bbl (us;beer) * 15 = bbl (us;oil) * 16 = bbl (us;tank) * 17 = gal (imp) * 18 = Mgal (imp) * 19 = bbl (imp;beer) * 20 = bbl (imp;oil) * 22 = kgal (us) * 23 = Mft^3 * 50 = g * 51 = kg * 52 = t * 53 = oz * 54 = lb * 55 = STon * 111 = Mft^3 * 251 = None *	122
Totalizer 1 to n operation mode (0908–1 to n)	1: 2605 2: 2805 3: 3005	Integer	Read / Write	0 = Net 1 = Forward 2 = Reverse	123
Totalizer 1 to n control (0912–1 to n)	1: 2608 2: 2808 3: 3008	Integer	Read / Write	**0 = Totalize** 1 = Reset + totalize 2 = Preset + hold 3 = Reset + hold 4 = Preset + totalize 5 = Hold	124
Preset value 1 to n (0913–1 to n)	1: 2590 to 2591 2: 2592 to 2593 3: 2594 to 2595	Float	Read / Write	Signed floating-point number	124
Totalizer 1 to n failure behavior (0901–1 to n)	1: 2606 2: 2806 3: 3006	Integer	Read / Write	0 = Hold 1 = Continue 2 = Last valid value + continue	125

* Visibility depends on order options or device settings

6.3.6 "Diagnostics" submenu

Navigation: Expert → Diagnostics					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Actual diagnostics (0691)	2732	Integer	Read	Symbol for diagnostic behavior, diagnostic code and short message.	130
Previous diagnostics (0690)	2734	Integer	Read	Symbol for diagnostic behavior, diagnostic code and short message.	130
Operating time from restart (0653)	2624	String	Read	Days (d), hours (h), minutes (m) and seconds (s)	131
Operating time (0652)	--	String	Read		

"Diagnostic list" submenu

Navigation: Expert → Diagnostics → Diagnostic list					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Diagnostics 1 (0692)	2736	Integer	Read	Symbol for diagnostic behavior, diagnostic code and short message.	132
Diagnostics 2 (0693)	2738	Integer	Read	Symbol for diagnostic behavior, diagnostic code and short message.	132
Diagnostics 3 (0694)	2740	Integer	Read	Symbol for diagnostic behavior, diagnostic code and short message.	133
Diagnostics 4 (0695)	2742	Integer	Read	Symbol for diagnostic behavior, diagnostic code and short message.	134
Diagnostics 5 (0696)	2744	Integer	Read	Symbol for diagnostic behavior, diagnostic code and short message.	135

"Device information" submenu

Navigation: Expert → Diagnostics → Device information					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Device tag (0011)	2026 to 2041	String	Read	Max. 32 characters, such as letters, numbers or special characters (e.g. @, %, /).	136
Serial number (0009)	7003 to 7008	String	Read	Max. 11-digit character string comprising letters and numbers.	137
Firmware version (0010)	7277 to 7280	String	Read	Character string in the format xx.yy.zz	137
Device name (0013)	7263 to 7270	String	Read	Max. 32 characters such as letters or numbers.	137
Order code (0008)	2058 to 2067	String	Read	Character string composed of letters, numbers and certain punctuation marks (e.g. /).	138
Extended order code 1 (0023)	2212 to 2221	String	Read	Character string	138
Extended order code 2 (0021)	2222 to 2231	String	Read	Character string	138
Extended order code 3 (0022)	2232 to 2241	String	Read	Character string	139
ENP version (0012)	4003 to 4010	String	Read	Character string	139

"Main electronic module" submenu

Navigation: Expert → Diagnostics → Main electronic module					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Firmware version (0072)	7039	Integer	Read	Positive integer	140
Build no. software (0079)	2326	Integer	Read	Positive integer	140
Bootloader revision (0073)	2264	Integer	Read	Positive integer	140

"Sensor electronic module (ISEM)" submenu

Navigation: Expert → Diagnostics → Sensor electronic module (ISEM)					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Firmware version (0072)	7039	Integer	Read	Positive integer	141
Build no. software (0079)	2326	Integer	Read	Positive integer	141
Bootloader revision (0073)	2264	Integer	Read	Positive integer	141

"Display module" submenu

Navigation: Expert → Diagnostics → Display module					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Firmware version (0072)	7039	Integer	Read	Positive integer	142
Build no. software (0079)	2326	Integer	Read	Positive integer	142
Bootloader revision (0073)	2264	Integer	Read	Positive integer	142

"Data logging" submenu

Navigation: Expert → Diagnostics → Data logging					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Assign channel 1 (0851)	2445	Integer	Read / Write	**0 = Off** 1 = Mass flow 2 = Volume flow 3 = Flow velocity 4 = Sound velocity 8 = Temperature 14 = Density 15 = Signal strength * 16 = Signal to noise ratio * 17 = Turbulence * 20 = Acceptance rate * 39 = Electronics temperature 121 = Current output 1	143
Assign channel 2 (0852)	2446	Integer	Read / Write	For the picklist, see **Assign channel 1** parameter (→ 143)	144
Assign channel 3 (0853)	2548	Integer	Read / Write	For the picklist, see **Assign channel 1** parameter (→ 143)	144
Assign channel 4 (0854)	4286	Integer	Read / Write	For the picklist, see **Assign channel 1** parameter (→ 143)	144
Logging interval (0856)	4288 to 4289	Float	Read / Write	0.1 to 3 600.0 s	145
Clear logging data (0855)	4287	Integer	Read / Write	**0 = Cancel** 2 = Clear data	145
Data logging (0860)	5950	Integer	Read / Write	**0 = Overwriting** 1 = Not overwriting	146

Navigation: Expert → Diagnostics → Data logging					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Logging delay (0859)	5938	Integer	Read / Write	0 to 999 h	146
Data logging control (0857)	5930	Integer	Read / Write	**0 = None** 1 = Stop 2 = Delete + start	146
Data logging status (0858)	5937	Integer	Read	**0 = Done** 1 = Stopped 2 = Active 3 = Delay active	147
Entire logging duration (0861)	2827 to 2828	Float	Read	Positive floating-point number	147

* Visibility depends on order options or device settings

"Heartbeat Technology" submenu

"Heartbeat base settings" submenu

Navigation: Expert → Diagnostics → Heartbeat Technology → Heartbeat base settings					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Plant operator (2754)	3414 to 3429	String	Read / Write	Max. 32 characters such as letters, numbers or special characters (e.g. @, %, /)	150
Location (2755)	3430 to 3445	String	Read / Write	Max. 32 characters such as letters, numbers or special characters (e.g. @, %, /)	151

"Performing verification" submenu

Navigation: Expert → Diagnostics → Heartbeat Technology → Performing verification					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Year (2846)	2495	Integer	Read / Write	9 to 99	152
Month (2845)	2494	Integer	Read / Write	**0 = January** 1 = February 2 = March 3 = April 4 = May 5 = June 6 = July 7 = August 8 = September 9 = October 10 = November 11 = December	152
Day (2842)	2493	Integer	Read / Write	1 to 31 d	152
Hour (2843)	2492	Integer	Read / Write	0 to 23 h	153
AM/PM (2813)	2496	Integer	Read / Write	**0 = AM** 1 = PM	153
Minute (2844)	2467	Integer	Read / Write	0 to 59 min	153
Verification mode (12105)	2366	Integer	Read / Write	**0 = Standard verification** 1 = Extended verification	154
External device information (12101)	20493 to 20508	String	Read / Write	Free text entry	154

Navigation: Expert → Diagnostics → Heartbeat Technology → Performing verification					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Start verification (12127)	2270	Integer	Read / Write	**0 = Cancel** 1 = Start 3 = Start with testkit * 10 = Output 1 low value * 11 = Output 1 high value * 20 = Pulse output 1 * 21 = Frequency output 1 * 22 = Pulse output 2 * 23 = Frequency output 2 *	154
Progress (2808)	6797	Integer	Read	0 to 100 %	155
Measured values (12102)	5512 to 5513	Float	Read / Write	Signed floating-point number	155
Output values (12103)	5516 to 5517	Float	Read	Signed floating-point number	156
Status (12153)	2079	Integer	Read	0 = Failed **1 = Done** 3 = Not done 8 = Busy	156
Verification result (12149)	2355	Integer	Read	0 = Failed 2 = Passed **3 = Not done** 250 = Not supported	156

* Visibility depends on order options or device settings

"Verification results" submenu

Navigation: Expert → Diagnostics → Heartbeat Technology → Verification results					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Date/time (manually entered) (12142)	2372 to 2381	String	Read	dd.mmmm.yyyy; hh:mm	157
Verification ID (12141)	2315	Integer	Read	0 to 65 535	157
Operating time (12126)	3346	String	Read	Days (d), hours (h), minutes (m), seconds (s)	158
Verification result (12149)	2355	Integer	Read	0 = Failed 2 = Passed **3 = Not done** 250 = Not supported	158
Sensor (12152)	2384	Integer	Read	0 = Failed 2 = Passed **3 = Not done** 250 = Not supported	158
Sensor electronic module (ISEM) (12151)	2385	Integer	Read	0 = Failed 2 = Passed **3 = Not done** 250 = Not supported	159
I/O module (12145)	2386	Integer	Read	0 = Failed 2 = Passed **3 = Not done** 250 = Not supported	159
System status (12109)	5790	Integer	Read	0 = Failed 2 = Passed **3 = Not done** 250 = Not supported	159

"Simulation" submenu

Navigation: Expert → Diagnostics → Simulation					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Assign simulation process variable (1810)	6813	Integer	Read / Write	**0 = Off** 1 = Mass flow 2 = Volume flow 3 = Flow velocity 4 = Sound velocity 8 = Temperature 14 = Density	161
Process variable value (1811)	6814 to 6815	Float	Read / Write	Depends on the process variable selected	161
Current output 1 simulation (0354–1)	5939	Integer	Read / Write	**0 = Off** 1 = On	162
Current output value (0355)	5995 to 5996	Float	Read / Write	0 to 22.5 mA	163
Frequency output 1 to n simulation (0472–1 to n)	1: 6203 2: 6204	Integer	Read / Write	**0 = Off** 1 = On	163
Frequency output 1 to n value (0473–1 to n)	1: 6207 to 6208 2: 6209 to 6210	Float	Read / Write	0.0 to 12 500.0 Hz	164
Pulse output simulation 1 to n (0458–1 to n)	1: 6215 2: 6216	Integer	Read / Write	**0 = Off** 1 = Down-counting value 2 = Fixed value	164
Pulse value 1 to n (0459–1 to n)	1: 6219 2: 6220	Integer	Read / Write	0 to 65 535	165
Switch output simulation 1 to n (0462–1 to n)	1: 6223 2: 6224	Integer	Read / Write	**0 = Off** 1 = On	165
Switch state 1 to n (0463–1 to n)	1: 6227 2: 6228	Integer	Read / Write	1 = Open 6 = Closed	166
Device alarm simulation (0654)	6812	Integer	Read / Write	**0 = Off** 1 = On	166
Diagnostic event category (0738)	4261	Integer	Read / Write	0 = Sensor 1 = Electronics 2 = Configuration **3 = Process**	167
Diagnostic event simulation (0737)	4259	Integer	Read / Write	▪ Off ▪ Diagnostic event picklist (depends on the category selected)	167

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