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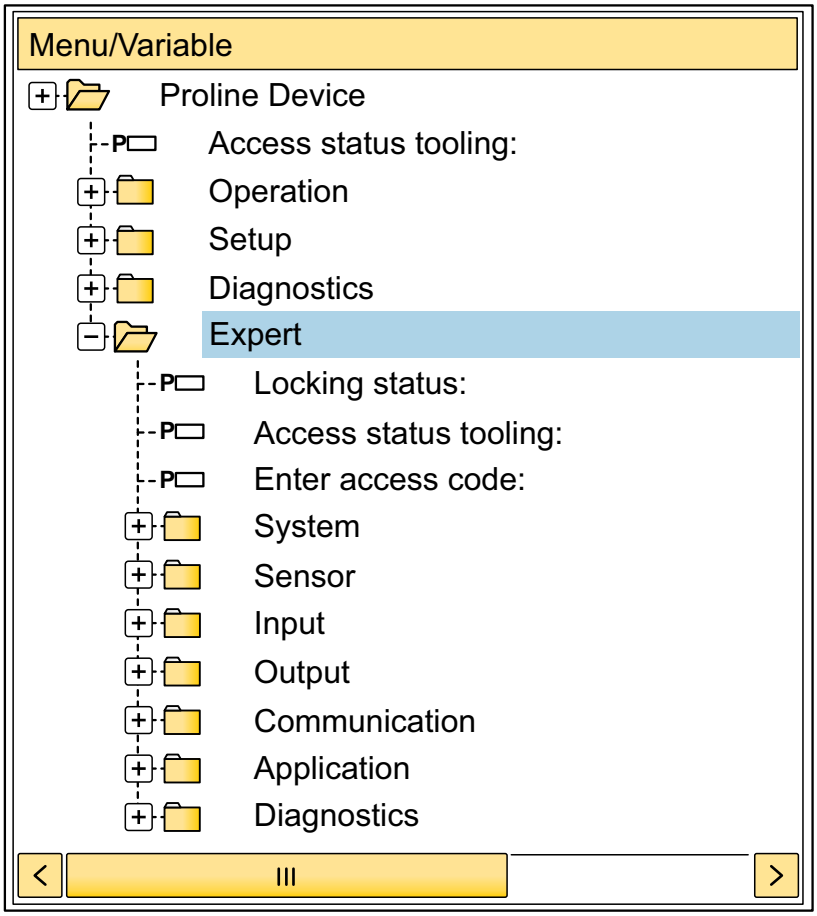
Valid as of version
01.00.zz (Device firmware)

Description of Device Parameters
Proline Promag 300

Electromagnetic flowmeter
PROFINET with Ethernet-APL

ethernet-apl™
advanced physical layer



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1 About this document

1.1 Document function

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

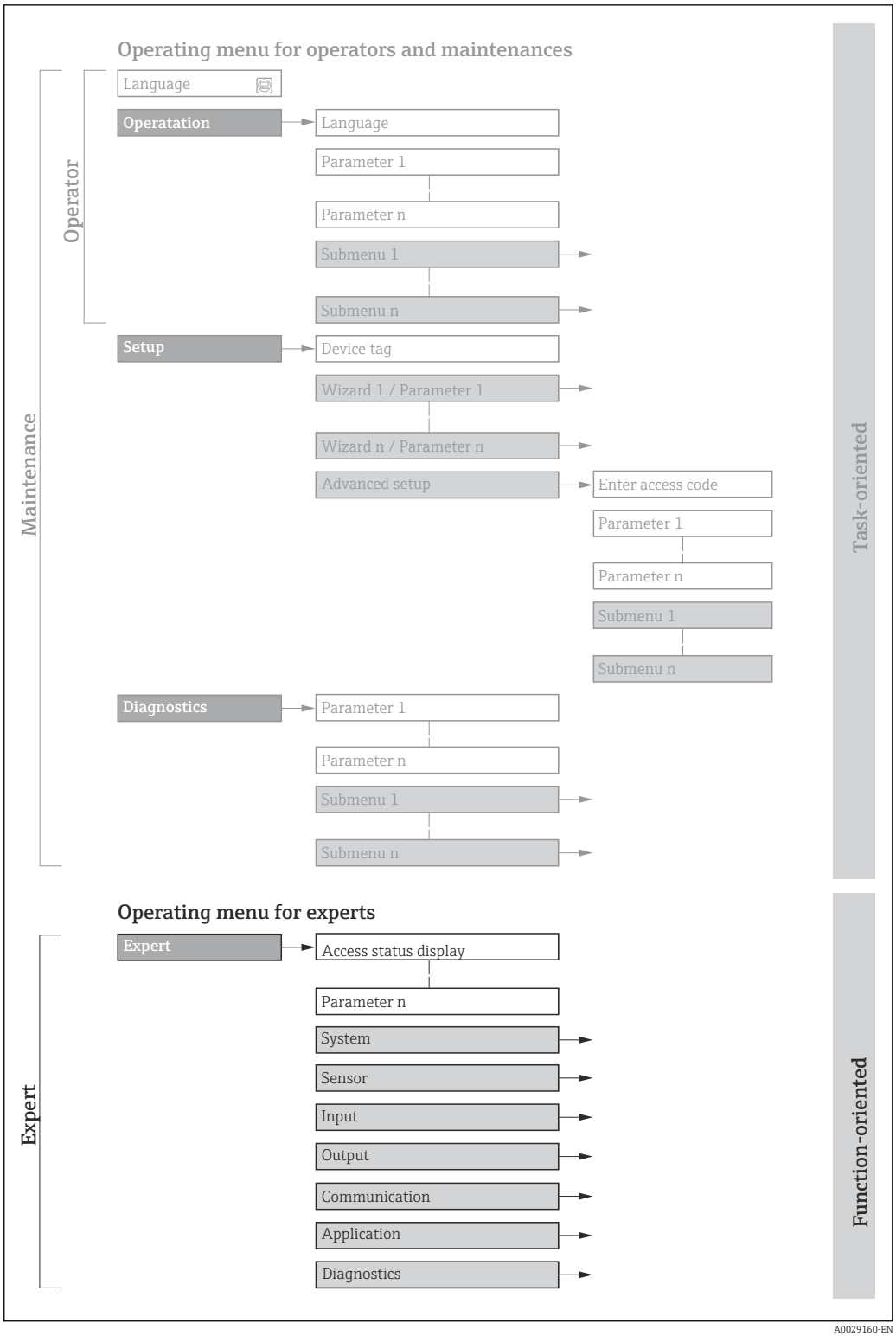
1.2 Target group

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

1.3 Using this document

1.3.1 Information on the document structure

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



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 → 7
- Operating concept of the operating menus: Operating Instructions → 7

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

User interface
Display value/data of the parameter

Factory setting
Default setting ex works

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

1.4 Symbols used

1.4.1 Symbols for certain types of information

Symbol	Meaning
	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
Promag H 300	BA02106D
Promag P 300	BA02105D
Promag W 300	BA02104D

1.5.2 Supplementary device-dependent documentation

Special Documentation

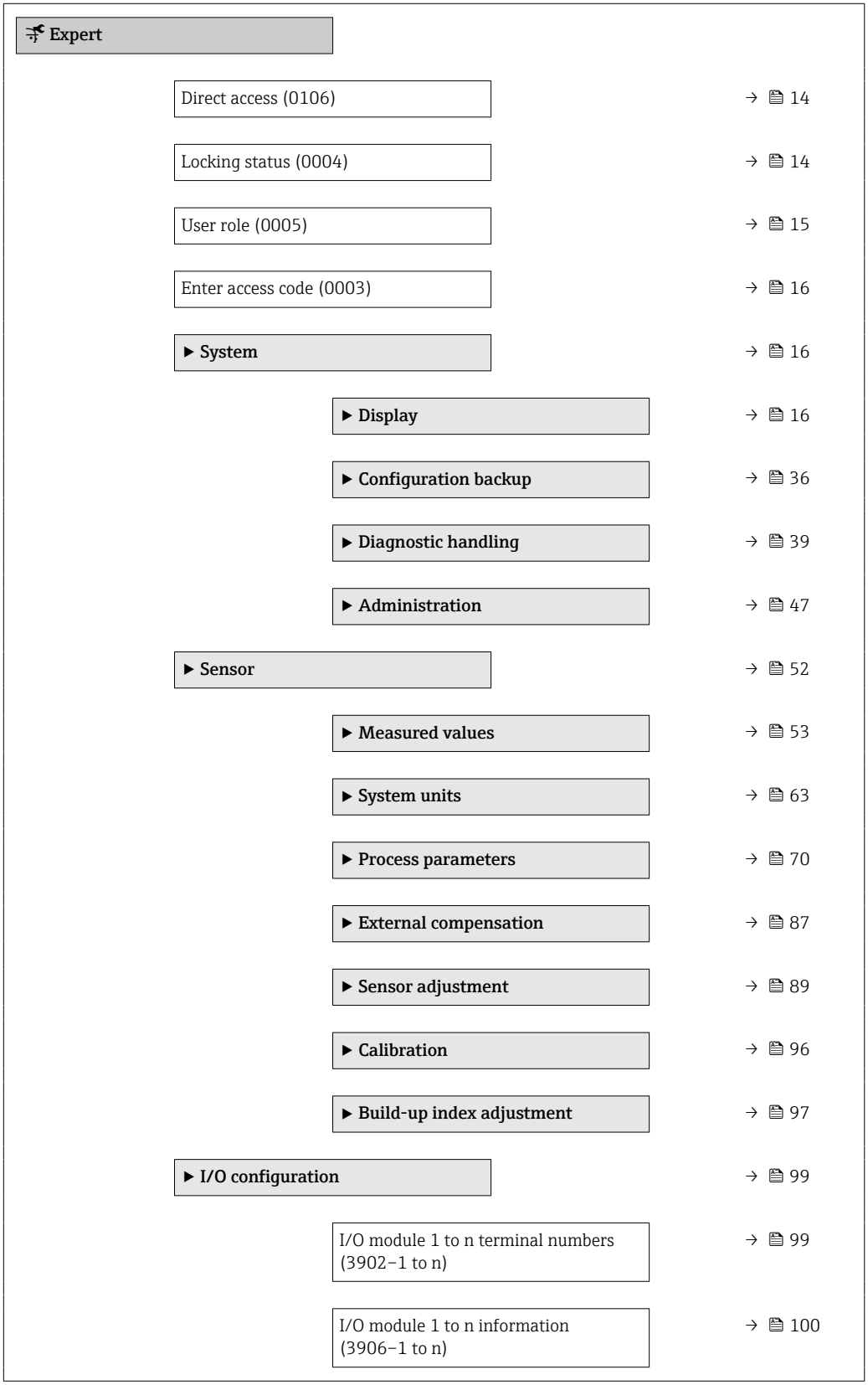
Contents	Documentation code
Information on the Pressure Equipment Directive	SD01614D
Radio approvals for WLAN interface for A309/A310 display module	SD01793D
Web server	SD02768D
Remote display and operating module DKX001	SD01763D

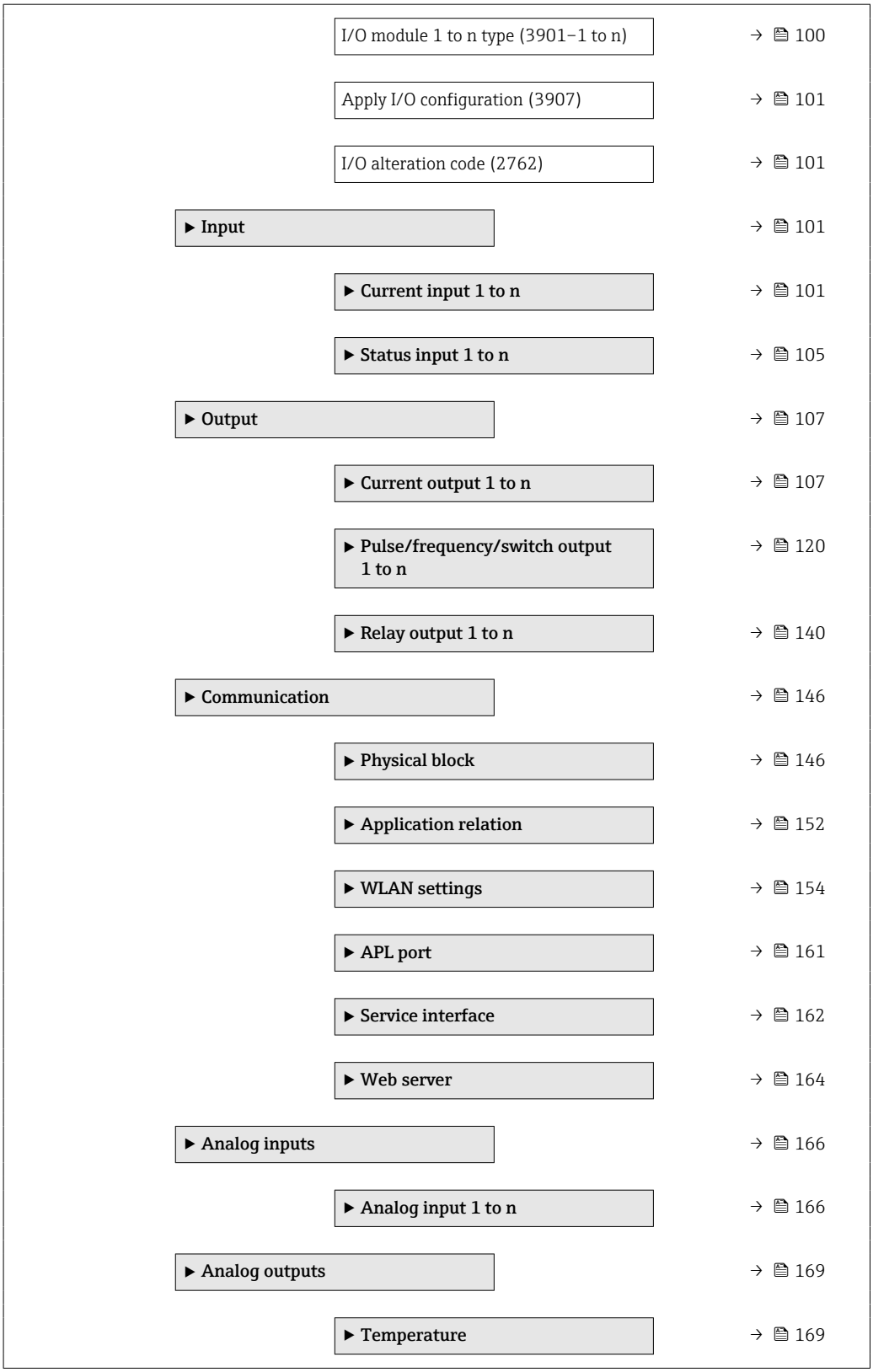
Contents	Documentation code
Heartbeat Technology	SD02729D
Web server	SD02768D

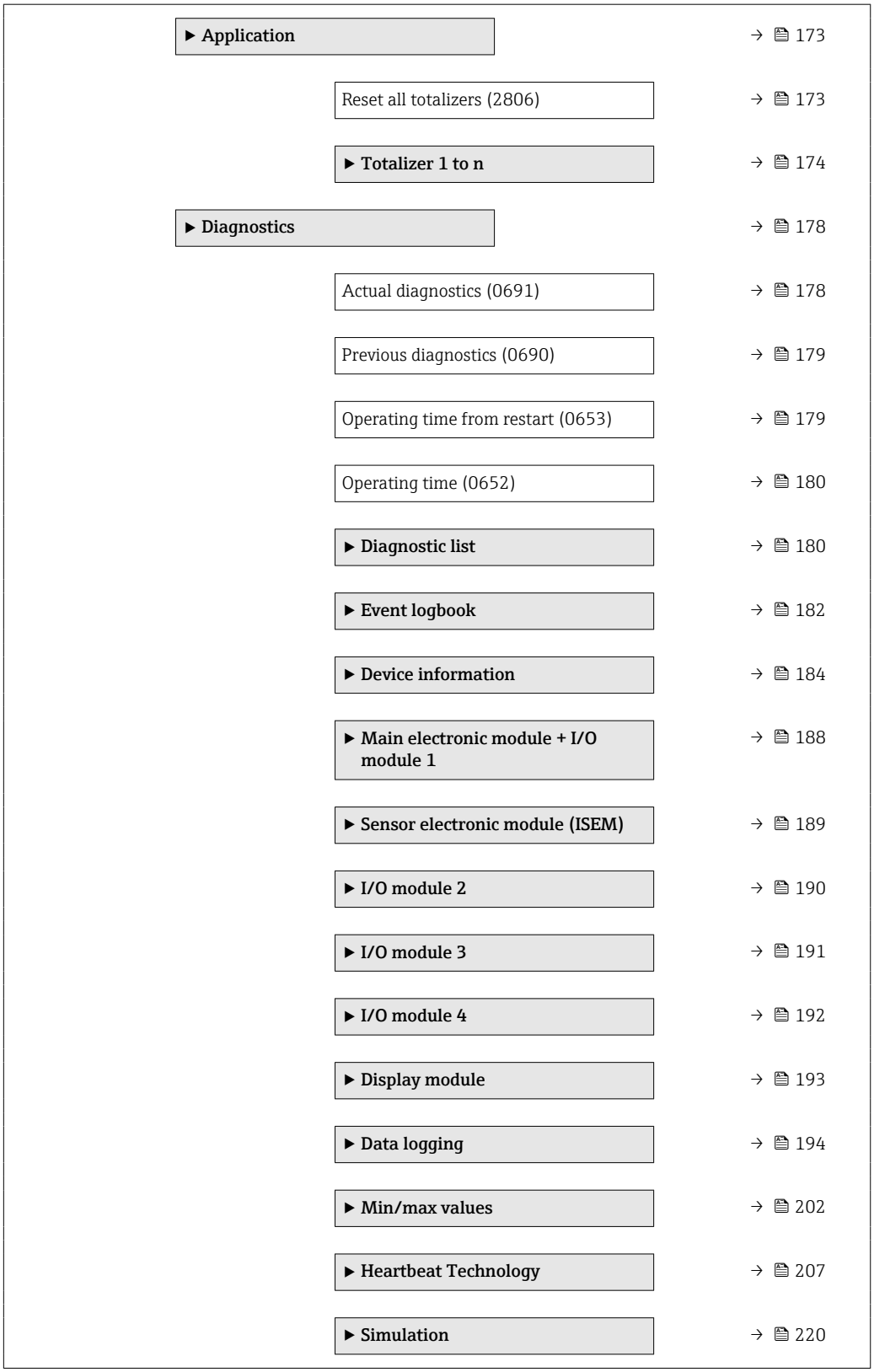
2 Overview of the Expert operating menu

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

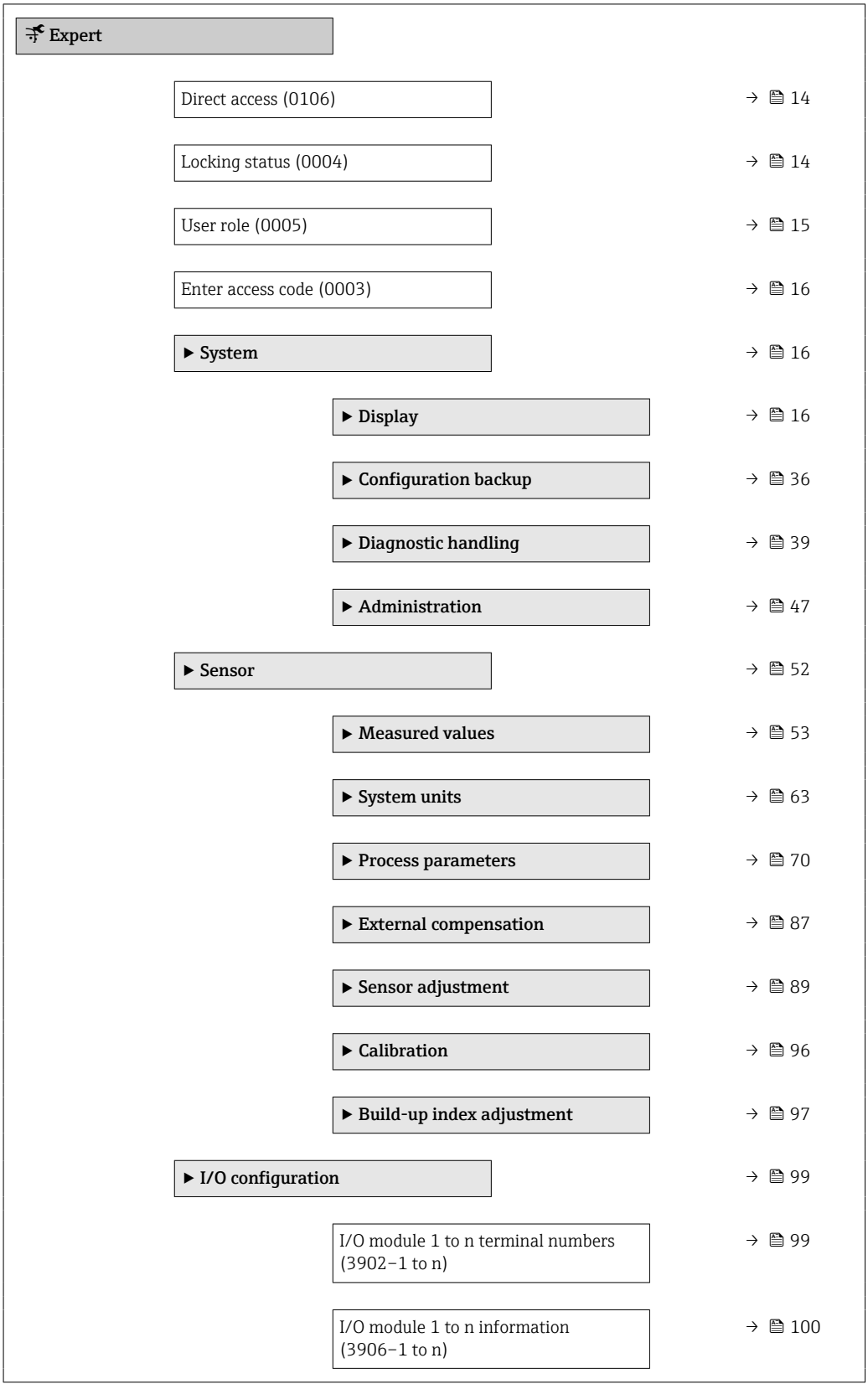


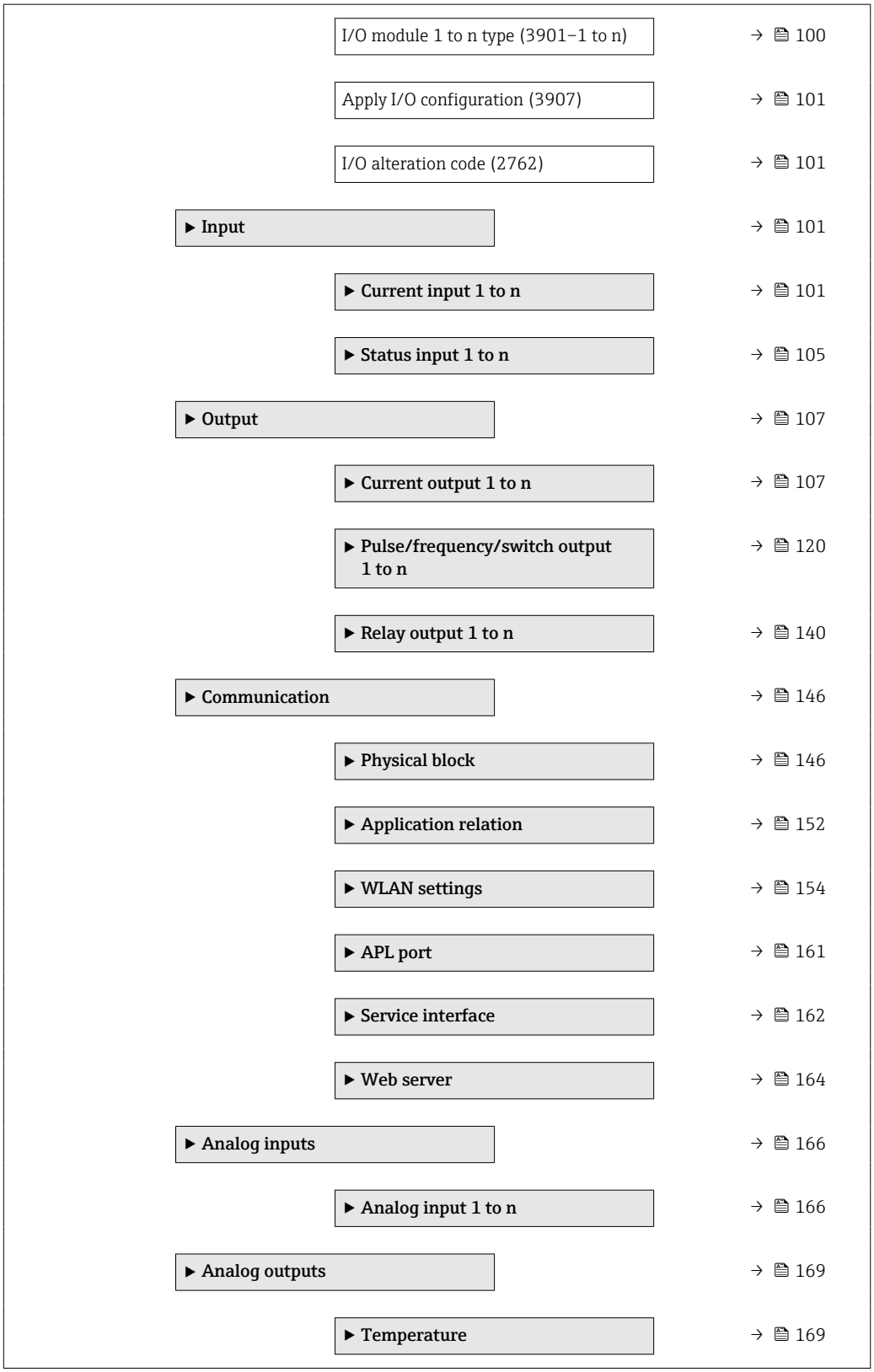

I/O module 1 to n type (3901–1 to n) → 100
Apply I/O configuration (3907) → 101
I/O alteration code (2762) → 101
▶ Input → 101
▶ Current input 1 to n → 101
▶ Status input 1 to n → 105
▶ Output → 107
▶ Current output 1 to n → 107
▶ Pulse/frequency/switch output 1 to n → 120
▶ Relay output 1 to n → 140
▶ Communication → 146
▶ Physical block → 146
▶ Application relation → 152
▶ WLAN settings → 154
▶ APL port → 161
▶ Service interface → 162
▶ Web server → 164
▶ Analog inputs → 166
▶ Analog input 1 to n → 166
▶ Analog outputs → 169
▶ Temperature → 169

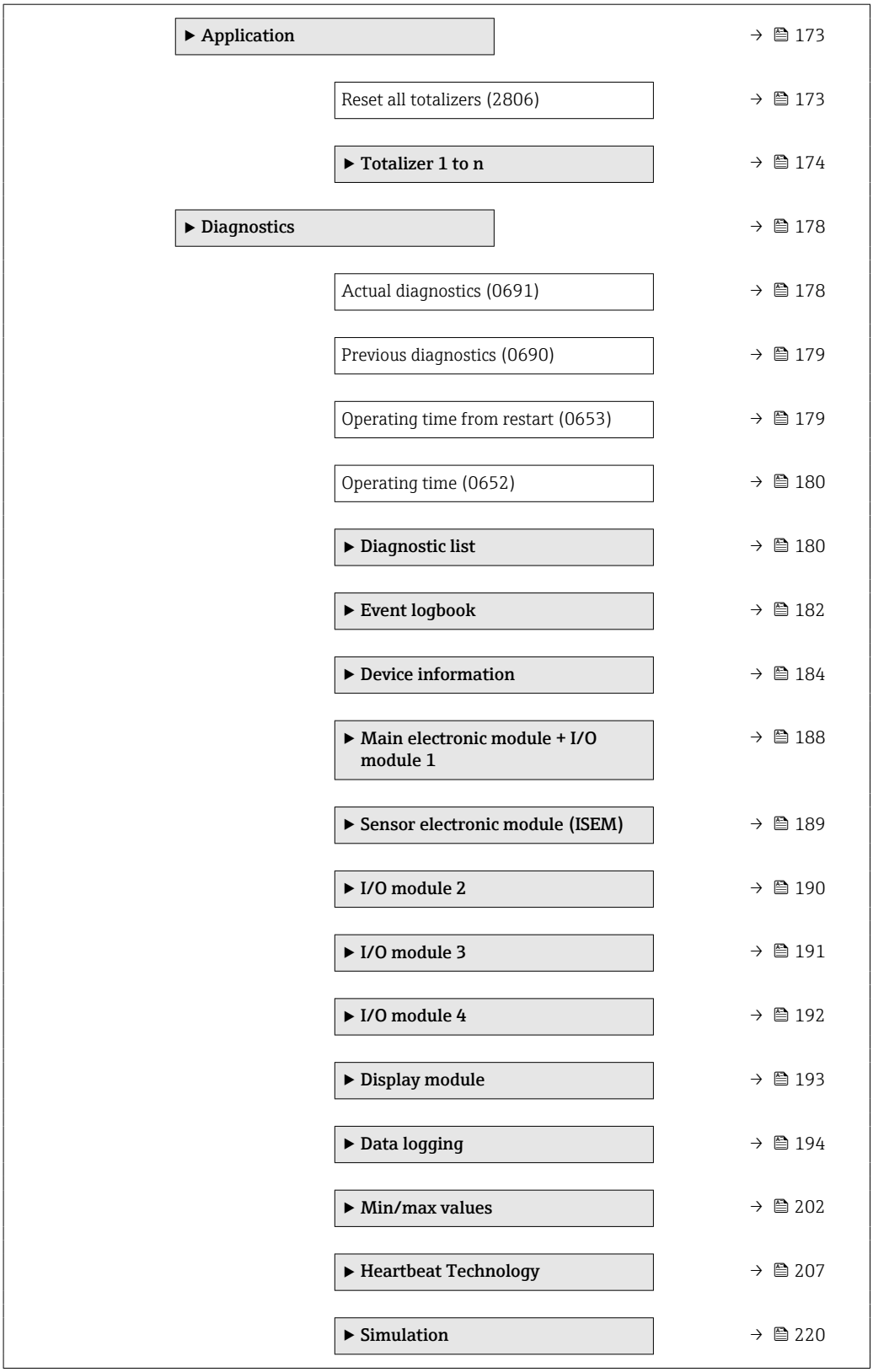

▶ Application → 173
Reset all totalizers (2806) → 173
▶ Totalizer 1 to n → 174
▶ Diagnostics → 178
Actual diagnostics (0691) → 178
Previous diagnostics (0690) → 179
Operating time from restart (0653) → 179
Operating time (0652) → 180
▶ Diagnostic list → 180
▶ Event logbook → 182
▶ Device information → 184
▶ Main electronic module + I/O module 1 → 188
▶ Sensor electronic module (ISEM) → 189
▶ I/O module 2 → 190
▶ I/O module 3 → 191
▶ I/O module 4 → 192
▶ Display module → 193
▶ Data logging → 194
▶ Min/max values → 202
▶ Heartbeat Technology → 207
▶ Simulation → 220

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.




I/O module 1 to n type (3901–1 to n) → 100
Apply I/O configuration (3907) → 101
I/O alteration code (2762) → 101
▶ Input → 101
▶ Current input 1 to n → 101
▶ Status input 1 to n → 105
▶ Output → 107
▶ Current output 1 to n → 107
▶ Pulse/frequency/switch output 1 to n → 120
▶ Relay output 1 to n → 140
▶ Communication → 146
▶ Physical block → 146
▶ Application relation → 152
▶ WLAN settings → 154
▶ APL port → 161
▶ Service interface → 162
▶ Web server → 164
▶ Analog inputs → 166
▶ Analog input 1 to n → 166
▶ Analog outputs → 169
▶ Temperature → 169


▶ Application → 173
Reset all totalizers (2806) → 173
▶ Totalizer 1 to n → 174
▶ Diagnostics → 178
Actual diagnostics (0691) → 178
Previous diagnostics (0690) → 179
Operating time from restart (0653) → 179
Operating time (0652) → 180
▶ Diagnostic list → 180
▶ Event logbook → 182
▶ Device information → 184
▶ Main electronic module + I/O module 1 → 188
▶ Sensor electronic module (ISEM) → 189
▶ I/O module 2 → 190
▶ I/O module 3 → 191
▶ I/O module 4 → 192
▶ Display module → 193
▶ Data logging → 194
▶ Min/max values → 202
▶ Heartbeat Technology → 207
▶ Simulation → 220

Direct access

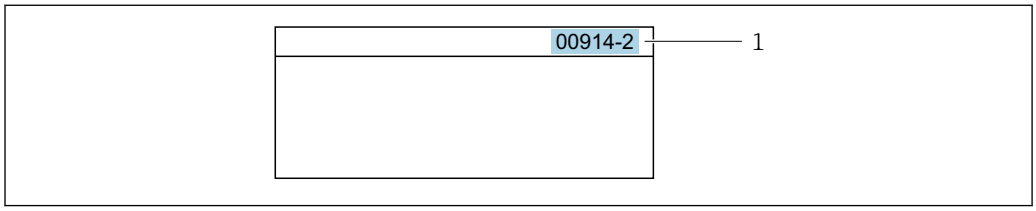
Navigation Expert → Direct access (0106)

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

User interface

If two or more types of write protection are active, the write protection with the highest priority is shown on the local display. In the operating tool all active types of write protection are 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 → 7

Selection

Options	Description
None	The access authorization displayed in the **Access status** parameter (→ 15) applies . Only appears on local display.
Hardware locked (priority 1)	The DIP switch for hardware locking is activated on the PCB board. This locks write access to the parameters (e.g. via local display or operating tool) .
Temporarily locked	Write access to the parameters is temporarily locked on account of internal processes running in the device (e.g. data upload/download, reset, etc.). Once the internal processing has been completed, the parameters can be changed once again.

User role

Navigation Expert → User role (0005)

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

User interface

- Maintenance
- Service

Factory setting Maintenance

Additional information

Description

Access authorization can be modified via the **Enter access code** parameter (→ 16).

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 → 7

Enter access code

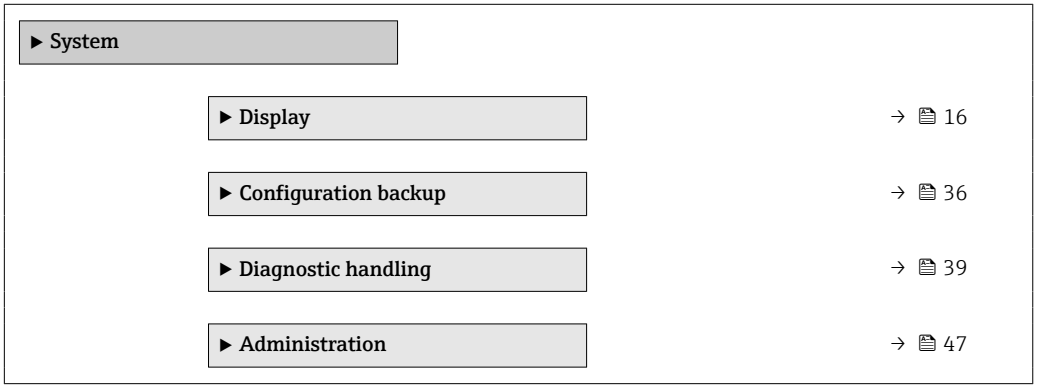
Navigation Expert → Ent. access code (0003)

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

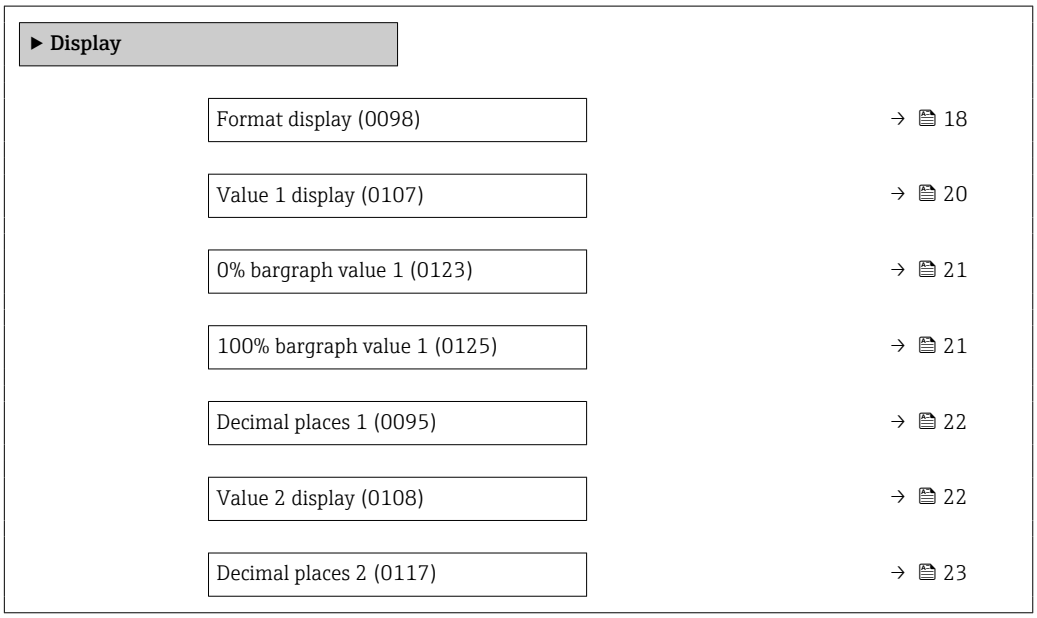
Navigation Expert → System

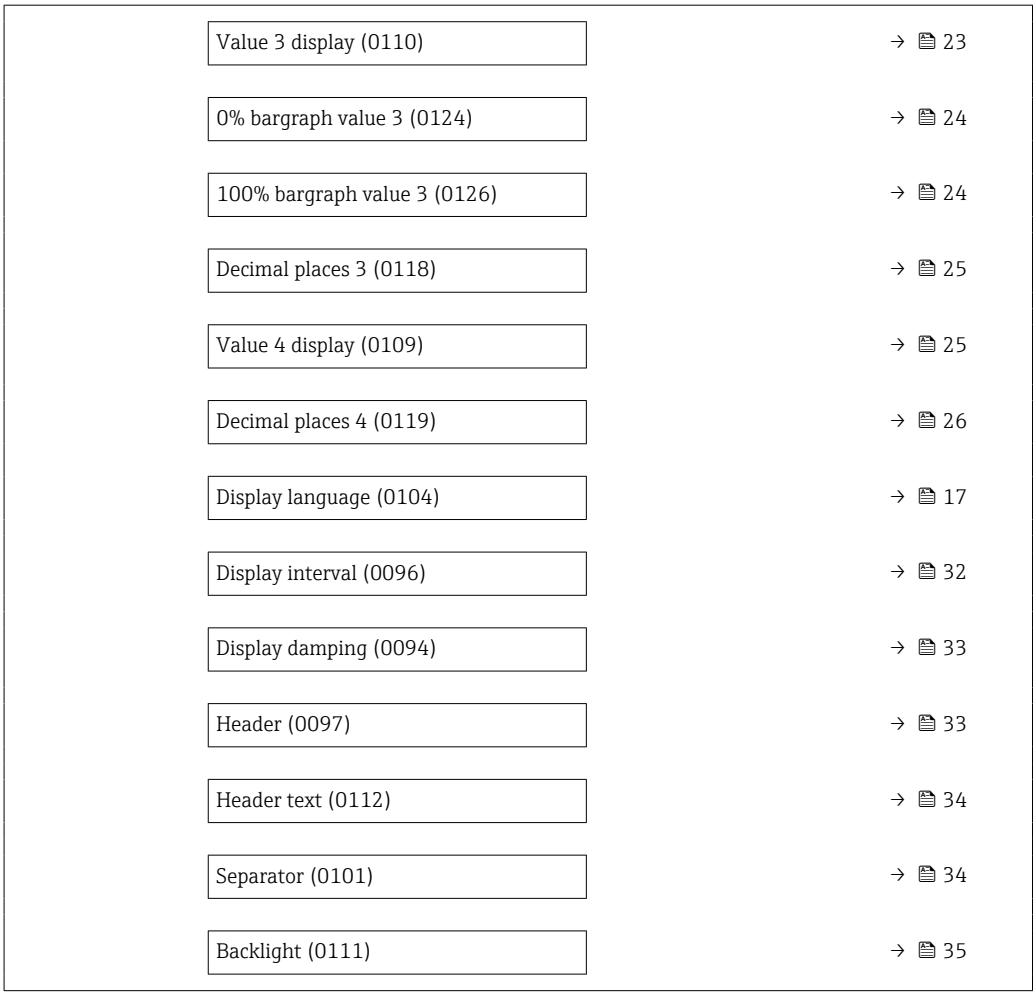


3.1.1 "Display" submenu

Navigation Setup → Advanced setup → Display

Navigation Expert → System → Display





Display language

Navigation

Expert → System → Display → Display language (0104)

Setup → Advanced setup → Display → Display language (0104)

Prerequisite

A local display is provided.

Description

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

Selection

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

- 한국어 (Korean)
- tiếng Việt (Vietnamese)
- čeština (Czech)

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

Format display

Navigation
Expert → System → Display → Format display (0098)
Setup → Advanced setup → 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

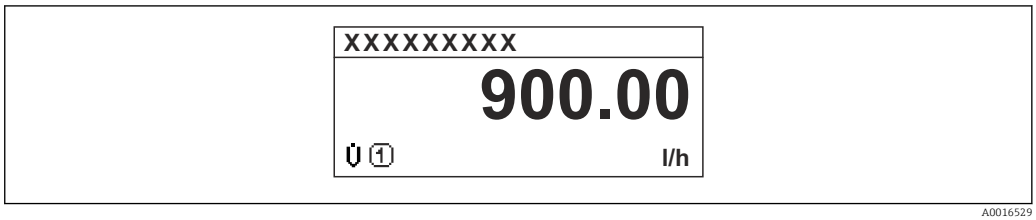
Additional information *Description*

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

- The **Value 1 display** parameter (→ 20)...**Value 8 display** parameter (→ 31) 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 (→ 32).

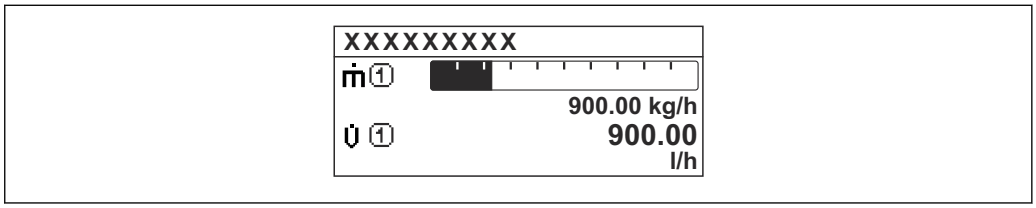
Possible measured values shown on the local display:

"1 value, max. size" option



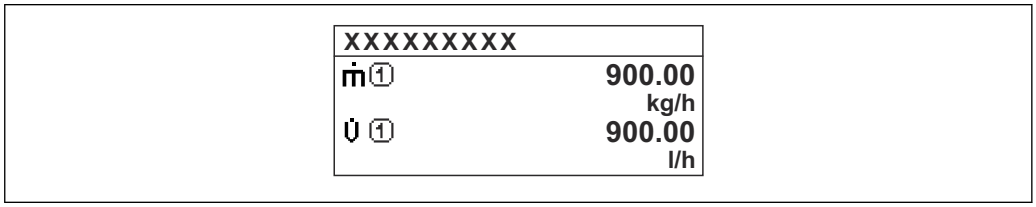
A0016529

"1 bargraph + 1 value" option



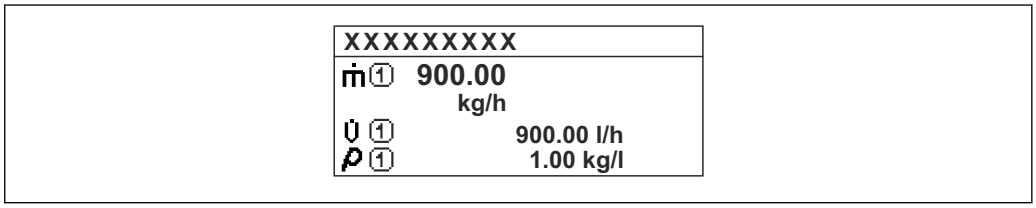
A0013098

"2 values" option



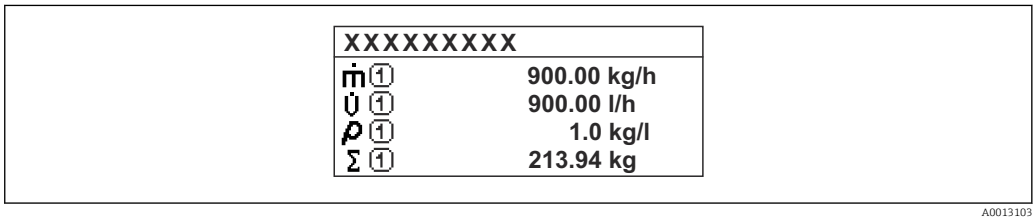
A0013100

"1 value large + 2 values" option



A0013102

"4 values" option



A0013103

Value 1 display

Navigation

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

Setup → Advanced setup → Display → Value 1 display (0107)

Prerequisite

A local display is provided.

Description

Use this function to select one of the measured values shown on the local display.

Selection

- Volume flow
- Mass flow
- Corrected volume flow
- Flow velocity
- Conductivity *
- Corrected conductivity *
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Current output 1 *
- Current output 2 *
- Current output 3 *
- Current output 4 *
- Temperature *
- Electronics temperature
- HBSI *
- Noise *
- Coil current shot time *
- Reference electrode potential against PE *
- Build-up index *
- Test point 1
- Test point 2
- Test point 3

Factory setting

Volume flow

Additional information

Description

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

The **Format display** parameter (→ 18) 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 (→ 63).

* Visibility depends on order options or device settings

0% bargraph value 1

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

Prerequisite
A local display is provided.

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

User entry
Signed floating-point number

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

Additional information
Description
The **Format display** parameter (→ 18) 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 (→ 63).

100% bargraph value 1

Navigation
Expert → System → Display → 100% bargraph 1 (0125)
Setup → Advanced setup → 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 → 229

Additional information
Description
The **Format display** parameter (→ 18) 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 (→ 63).

Decimal places 1

Navigation
Expert → System → Display → Decimal places 1 (0095)
Setup → Advanced setup → Display → Decimal places 1 (0095)

Prerequisite
A measured value is specified in the **Value 1 display** parameter (→ 20).

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)
Setup → Advanced setup → 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 the **Value 1 display** parameter (→ 20)

Factory setting
None

Additional information
Description

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

The **Format display** parameter (→ 18) 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 (→ 63).

Decimal places 2

Navigation
Expert → System → Display → Decimal places 2 (0117)
Setup → Advanced setup → Display → Decimal places 2 (0117)

Prerequisite
A measured value is specified in the **Value 2 display** parameter (→ 22).

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)
Setup → Advanced setup → 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 the **Value 1 display** parameter (→ 20)

Factory setting
None

Additional information
Description

If several measured values are displayed at once, the measured value selected here will be the third value to be displayed. The value is only displayed during normal operation.

The **Format display** parameter (→ 18) is used to specify how many measured values are displayed simultaneously and how.

Selection

The unit of the displayed measured value is taken from the **System units** submenu (→ 63).

0% bargraph value 3

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

Prerequisite
A selection was made in the **Value 3 display** parameter (→ 23).

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

User entry
Signed floating-point number

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

Additional information
Description
The **Format display** parameter (→ 18) 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 (→ 63).

100% bargraph value 3

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

Prerequisite
A selection was made in the **Value 3 display** parameter (→ 23).

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 (→ 18) 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 (→ 63).

Decimal places 3

Navigation
Expert → System → Display → Decimal places 3 (0118)
Setup → Advanced setup → Display → Decimal places 3 (0118)

Prerequisite
A measured value is specified in the **Value 3 display** parameter (→ 23).

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)
Setup → Advanced setup → 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 the **Value 1 display** parameter (→ 20)

Factory setting
None

Additional information
Description

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

The **Format display** parameter (→ 18) is used to specify how many measured values are displayed simultaneously and how.

Selection

The unit of the displayed measured value is taken from the **System units** submenu (→ 63).

Decimal places 4

Navigation
Expert → System → Display → Decimal places 4 (0119)
Setup → Advanced setup → Display → Decimal places 4 (0119)

Prerequisite
A measured value is specified in the **Value 4 display** parameter (→ 25).

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.

Value 5 display

Navigation
Expert → System → Display → Value 5 display (0145)
Setup → Advanced setup → Display → Value 5 display (0145)

Prerequisite
A local display is provided.

Description
Use this function to select one of the measured values shown on the local display.

Selection
For the picklist, see the **Value 1 display** parameter (→ 20)

Factory setting
None

Additional information
Description

If several measured values are displayed at once, the measured value selected here will be the fifth value to be displayed. The value is only displayed during normal operation.

The **Format display** parameter (→ 18) is used to specify how many measured values are displayed simultaneously and how.

Selection

The unit of the displayed measured value is taken from the **System units** submenu (→ 63).

0% bargraph value 5

Navigation
Expert → System → Display → 0% bargraph 5 (0153)
Setup → Advanced setup → Display → 0% bargraph 5 (0153)

Prerequisite
An option was selected in the **Value 5 display** parameter (→ 26).

Description
Use this function to enter the 0% bar graph value to be shown on the display for the measured value 5.

User entry
Signed floating-point number

Factory setting
Depends on country:
- 0 l/h
- 0 gal/min (us)

Additional information
Description
The **Format display** parameter (→ 18) 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 (→ 63).

100% bargraph value 5

Navigation
Expert → System → Display → 100% bargraph 5 (0155)
Setup → Advanced setup → Display → 100% bargraph 5 (0155)

Prerequisite
An option was selected in the **Value 5 display** parameter (→ 26).

Description
Use this function to enter the 100% bar graph value to be shown on the display for the measured value 5.

User entry
Signed floating-point number

Factory setting
0

Additional information
Description
The **Format display** parameter (→ 18) 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 (→ 63).

Decimal places 5

Navigation
Expert → System → Display → Decimal places 5 (0149)
Setup → Advanced setup → Display → Decimal places 5 (0149)

Prerequisite
A measured value is specified in the **Value 5 display** parameter (→ 26).

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

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

Factory setting
x.xx

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

Value 6 display

Navigation
Expert → System → Display → Value 6 display (0146)
Setup → Advanced setup → Display → Value 6 display (0146)

Prerequisite
A local display is provided.

Description
Use this function to select one of the measured values shown on the local display.

Selection
For the picklist, see the **Value 1 display** parameter (→ 20)

Factory setting
None

Additional information
Description
If several measured values are displayed at once, the measured value selected here will be the sixth value to be displayed. The value is only displayed during normal operation.
The **Format display** parameter (→ 18) is used to specify how many measured values are displayed simultaneously and how.

Selection
The unit of the displayed measured value is taken from the **System units** submenu (→ 63).

Decimal places 6

Navigation
Expert → System → Display → Decimal places 6 (0150)
Setup → Advanced setup → Display → Decimal places 6 (0150)

Prerequisite
A measured value is specified in the **Value 6 display** parameter (→ 28).

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

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

Factory setting
x.xx

Additional information
Description

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

Value 7 display

Navigation
Expert → System → Display → Value 7 display (0147)
Setup → Advanced setup → Display → Value 7 display (0147)

Prerequisite
A local display is provided.

Description
Use this function to select one of the measured values shown on the local display.

Selection
For the picklist, see the **Value 1 display** parameter (→ 20)

Factory setting
None

Additional information
Description

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

The **Format display** parameter (→ 18) is used to specify how many measured values are displayed simultaneously and how.

Selection

The unit of the displayed measured value is taken from the **System units** submenu (→ 63).

0% bargraph value 7

Navigation
Expert → System → Display → 0% bargraph 7 (0154)
Setup → Advanced setup → Display → 0% bargraph 7 (0154)

Prerequisite
An option was selected in the **Value 7 display** parameter (→ 29).

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

User entry
Signed floating-point number

Factory setting
Depends on country:
- 0 l/h
- 0 gal/min (us)

Additional information
Description
The **Format display** parameter (→ 18) 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 (→ 63).

100% bargraph value 7

Navigation
Expert → System → Display → 100% bargraph 7 (0156)
Setup → Advanced setup → Display → 100% bargraph 7 (0156)

Prerequisite
An option was selected in the **Value 7 display** parameter (→ 29).

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

User entry
Signed floating-point number

Factory setting
0

Additional information
Description
The **Format display** parameter (→ 18) 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 (→ 63).

Decimal places 7

Navigation
Expert → System → Display → Decimal places 7 (0151)
Setup → Advanced setup → Display → Decimal places 7 (0151)

Prerequisite
A measured value is specified in the **Value 7 display** parameter (→ 29).

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

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

Factory setting
x.xx

Additional information
Description

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

Value 8 display

Navigation
Expert → System → Display → Value 8 display (0148)
Setup → Advanced setup → Display → Value 8 display (0148)

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 the **Value 1 display** parameter (→ 20)

Factory setting
None

Additional information
Description

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

The **Format display** parameter (→ 18) is used to specify how many measured values are displayed simultaneously and how.

Selection

The unit of the displayed measured value is taken from the **System units** submenu (→ 63).

Decimal places 8

Navigation
Expert → System → Display → Decimal places 8 (0152)
Setup → Advanced setup → Display → Decimal places 8 (0152)

Prerequisite
A measured value is specified in the **Value 8 display** parameter (→ 31).

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

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

Factory setting
x.xx

Additional information
Description

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)
Setup → Advanced setup → 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 (→ 20)...**Value 8 display** parameter (→ 31) 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 (→ 18).

Display damping

Navigation
Expert → System → Display → Display damping (0094)
Setup → Advanced setup → 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:
- If a low time constant is entered, the display reacts particularly quickly to fluctuating measured variables.
- On the other hand, the display reacts more slowly if a high time constant is entered.

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

Header

Navigation
Expert → System → Display → Header (0097)
Setup → Advanced setup → Display → Header (0097)

Prerequisite
A local display is provided.

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

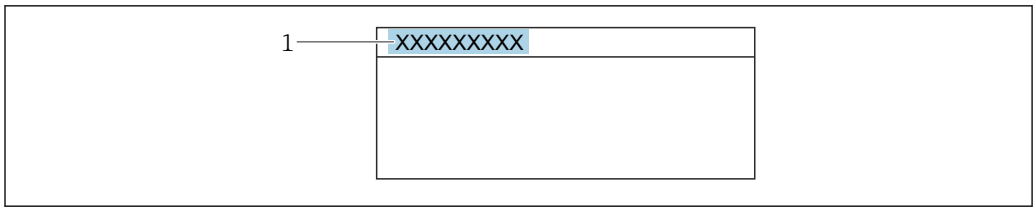
Selection
- Device tag
- Free text

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

Free text
Is defined in the **Header text** parameter (→ 34).

Header text

Navigation
Expert → System → Display → Header text (0112)
Setup → Advanced setup → Display → Header text (0112)

Prerequisite
The **Free text** option is selected in the **Header** parameter (→ 33).

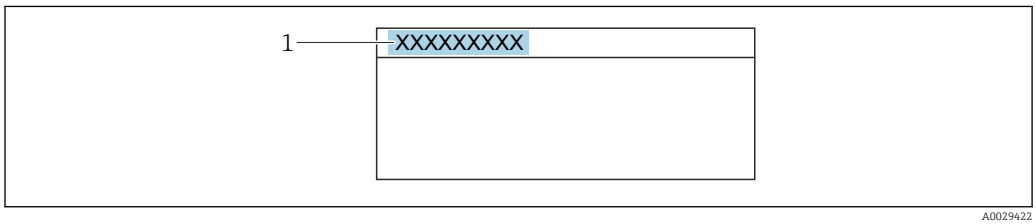
Description
Use this function to enter a customer-specific text for the header of the local display.

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)
Setup → Advanced setup → 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 Depends on the display

Backlight

Navigation
Expert → System → Display → Backlight (0111)
Setup → Advanced setup → Display → Backlight (0111)

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

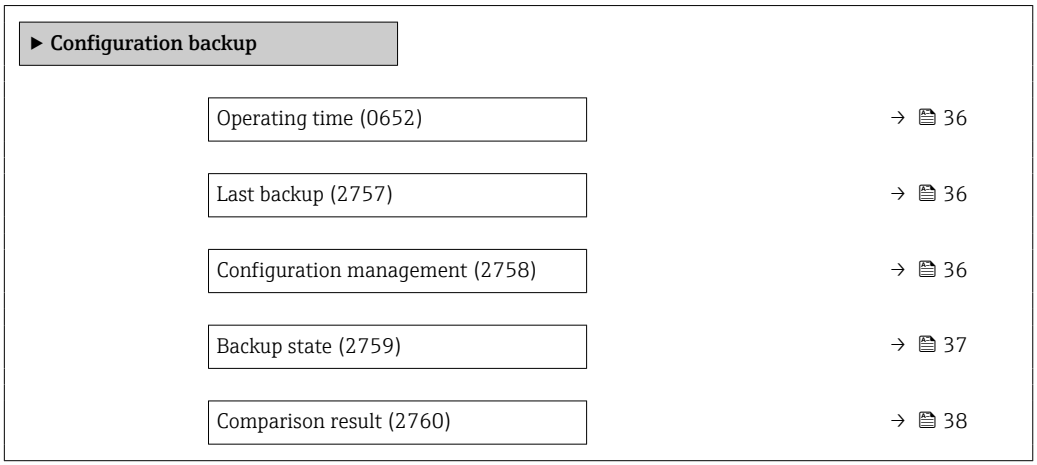
Description Use this function to switch the backlight of the local display on and off.

Selection
- Disable
- Enable

Factory setting Enable

3.1.2 "Configuration backup" submenu

Navigation Expert → System → Config. backup



Operating time

Navigation Expert → System → Config. backup → Operating time (0652)

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

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

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

Last backup

Navigation Expert → System → Config. backup → Last backup (2757)

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

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

Configuration management

Navigation Expert → System → Config. backup → Config. managem. (2758)

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

Selection

- Cancel
- Execute backup
- Restore *
- Compare *
- Clear backup data

Factory setting

Cancel

Additional information

Selection

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

HistoROM

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

Backup state

Navigation

Expert → System → Config. backup → Backup state (2759)

Description

Displays the status of the data backup process.

User interface

- None
- Backup in progress
- Restoring in progress
- Delete in progress
- Compare in progress
- Restoring failed
- Backup failed

Factory setting

None

* Visibility depends on order options or device settings

Comparison result

Navigation Expert → System → Config. backup → Compar. result (2760)

Description Displays the last result of the comparison of the data records in the device memory and in the HistoROM.

User interface
- Settings identical
- Settings not identical
- No backup available
- Backup settings corrupt
- Check not done
- Dataset incompatible

Factory setting Check not done

Additional information

Description

The comparison is started via the **Compare** option in the **Configuration management** parameter (→ 36).

Selection

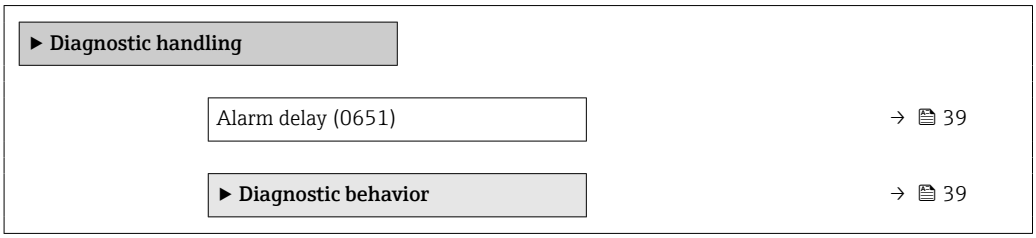
Options	Description
Settings identical	The current device configuration of the HistoROM is identical to the backup copy in the device memory. If the transmitter configuration of another device has been transmitted to the device via HistoROM in the **Configuration management** parameter, the current device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

HistoROM

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

3.1.3 "Diagnostic handling" submenu

Navigation Expert → System → Diagn. handling



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

Additional information *Effect*

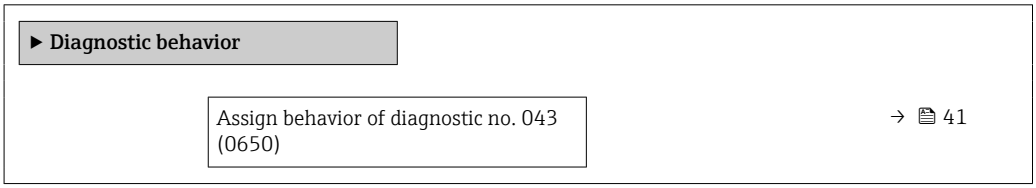
This setting affects the following diagnostic messages:
- 170 coil resistance
- 832 Electronics temperature too high
- 833 Electronics temperature too low
- 834 Process temperature too high
- 835 Process temperature too low

"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 (→ 39).

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

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



Assign behavior of diagnostic no. 143 (0646)	→ 41
Assign behavior of diagnostic no. 302 (0739)	→ 41
Assign behavior of diagnostic no. 376 (0645)	→ 42
Assign behavior of diagnostic no. 377 (0777)	→ 42
Assign behavior of diagnostic no. 441 (0657)	→ 42
Assign behavior of diagnostic no. 442 (0658)	→ 43
Assign behavior of diagnostic no. 443 (0659)	→ 43
Assign behavior of diagnostic no. 444 (0740)	→ 43
Assign behavior of diagnostic no. 531 (0741)	→ 44
Assign behavior of diagnostic no. 832 (0681)	→ 44
Assign behavior of diagnostic no. 833 (0682)	→ 45
Assign behavior of diagnostic no. 834 (0700)	→ 45
Assign behavior of diagnostic no. 835 (0702)	→ 45
Assign behavior of diagnostic no. 842 (0638)	→ 46
Assign behavior of diagnostic no. 961 (0736)	→ 46
Assign behavior of diagnostic no. 962 (0745)	→ 46
Assign behavior of diagnostic no. 937 (0743)	→ 47
Assign behavior of diagnostic no. 938 (0642)	→ 47

Assign behavior of diagnostic no. 043 (Sensor short circuit)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 043 (0650)

Description Use this function to change the diagnostic behavior of the **043 Sensor short circuit** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available:

Assign behavior of diagnostic no. 143 (HBSI limit exceeded)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 143 (0646)

Description Change behavior of diagnostic event with diagnostic number 143 'HBSI limit exceeded'.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available:

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

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 302 (0739)

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:

Assign behavior of diagnostic no. 376 (Sensor electronics (ISEM) faulty)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 376 (0645)

Description Use this function to change the diagnostic behavior of the **376 Sensor electronics (ISEM) faulty** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available:

Assign behavior of diagnostic no. 377 (Sensor electronics (ISEM) faulty)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 377 (0777)

Description Use this function to change the diagnostic behavior of the **377 Sensor electronics (ISEM) faulty** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available:

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 For a detailed description of the options available:

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:

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

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 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:

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

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 444 (0740)

Prerequisite The device has one current input.

Description Use this function to change the diagnostic behavior of the **444 Current input 1 to n** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available:

Assign behavior of diagnostic no. 531 (Empty pipe detection)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 531 (0741)

Description Use this function to change the diagnostic behavior of the **531 Empty pipe detection** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available:

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

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 832 (0681)

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 Logbook entry only

Additional information For a detailed description of the options available:

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

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 833 (0682)

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 Logbook entry only

Additional information For a detailed description of the options available:

Assign behavior of diagnostic no. 834 (Process temperature too high)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 834 (0700)

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available:

Assign behavior of diagnostic no. 835 (Process temperature too low)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 835 (0702)

Description Use this function to change the diagnostic behavior of the **835 Process temperature too low** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available:

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:

Assign behavior of diagnostic no. 961 (Electrode potential out of specification)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 961 (0736)

Description Use this function to change the diagnostic behavior of the **861 Process fluid** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Alarm

Additional information For a detailed description of the options available:

Assign behavior of diagnostic no. 962 (Pipe empty)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 962 (0745)

Description Use this function to change the diagnostic behavior of the **862 Pipe empty** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available:

Assign behavior of diagnostic no. 937 (EMC interference)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 937 (0743)

Description Use this function to change the diagnostic behavior of the **937 EMC interference** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available:

Assign behavior of diagnostic no. 938 (EMC interference)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 938 (0642)

Description Use this function to change the diagnostic behavior of the **938 EMC interference** diagnostic message.

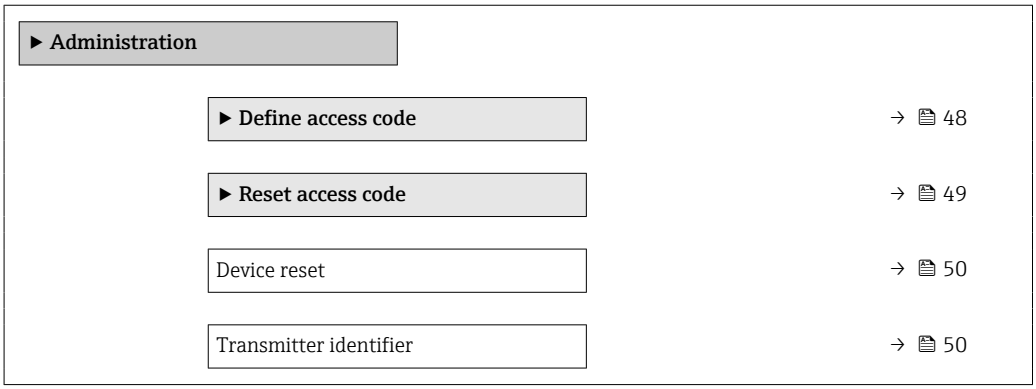
Selection
- Off
- Alarm
- Warning
- Logbook entry only

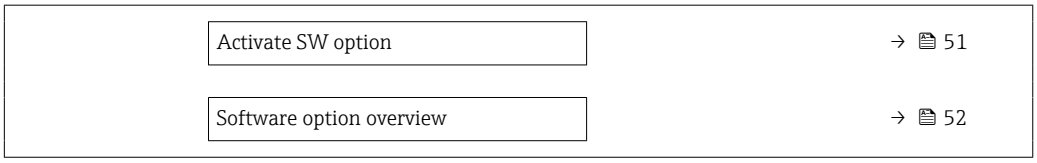
Factory setting Alarm

Additional information For a detailed description of the options available:

3.1.4 "Administration" submenu

Navigation Expert → System → Administration



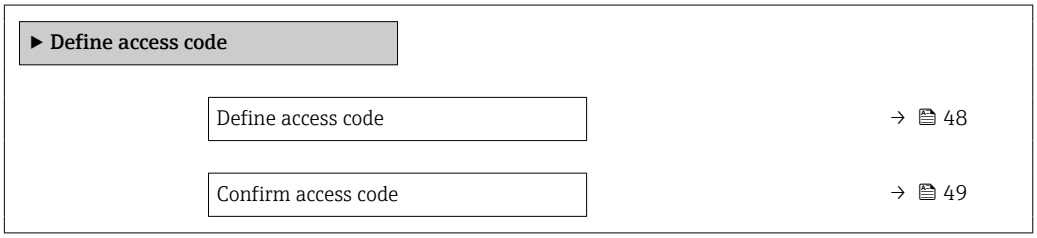


"Define access code" wizard

The **Define access code** wizard (→ 48) 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 device configuration against any inadvertent modifications via the local display, Web browser, FieldCare or DeviceCare (via CDI-RJ45 service interface).

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

Additional information

Description

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

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

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

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 (→ 16).

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

User entry

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

Factory setting

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

Confirm access code

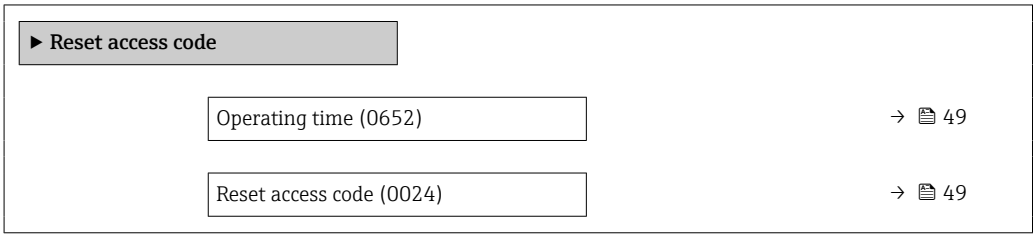
Navigation Expert → System → Administration → Def. access code → Confirm code

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

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

"Reset access code" submenu

Navigation Expert → System → Administration → Reset acc. code



Operating time

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

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

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

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

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 *Options*

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.

Transmitter identifier

Navigation Expert → System → Administration → Transm. identif. (2765)

Description Select transmitter identifier.

* Visibility depends on order options or device settings

User interface
- Unknown
- 500
- 300

Factory setting Unknown

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 consisting of numbers.

Factory setting Depends on the software option ordered

Additional information

Description

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

User entry

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

NOTE!

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

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

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

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

▸ Once the activation code has been entered, check if the new software option is displayed in the **Software option overview** parameter (→ 52).

↳ 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 (→ 52).

Web browser

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

Software option overview

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

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

User interface
- Extended HistoROM *
- Electrode cleaning circuit *
- Build-up index
- Heartbeat Monitoring *
- Heartbeat Verification *

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"

"Electrode cleaning circuit" option

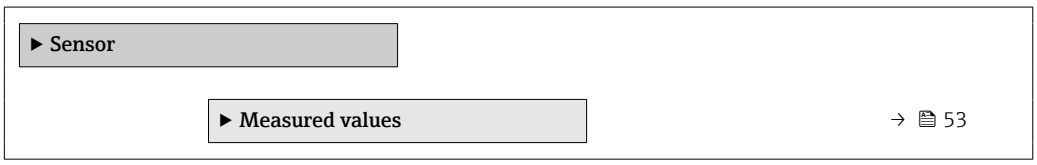
Order code for "Application package", option **EC** "ECC electrode cleaning"

"Heartbeat Verification" option and "Heartbeat Monitoring" option

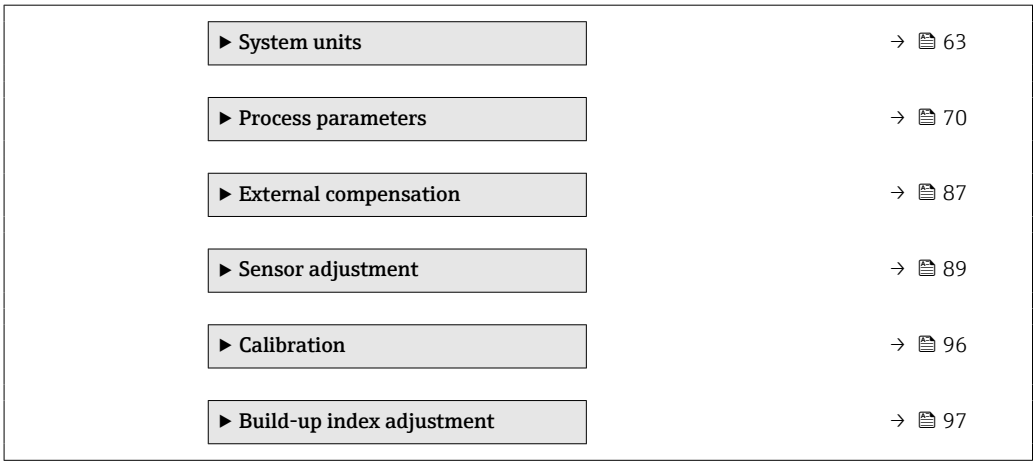
Order code for "Application package", option EB "Heartbeat Verification + Monitoring"

3.2 "Sensor" submenu

Navigation Expert → Sensor

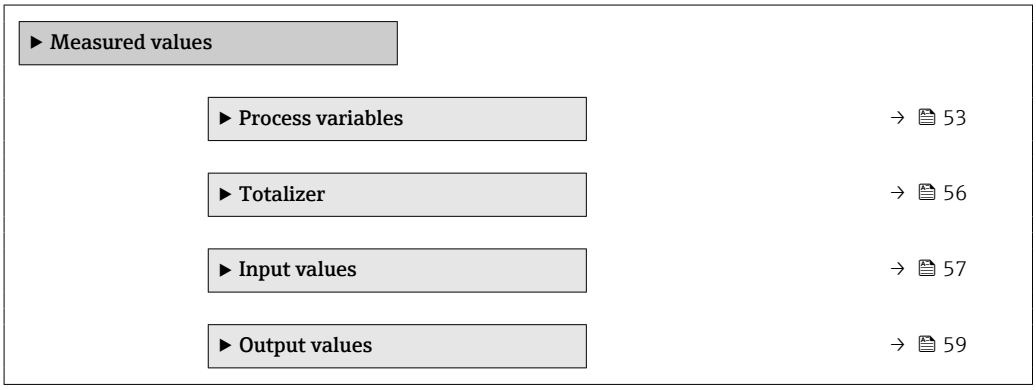


* Visibility depends on order options or device settings



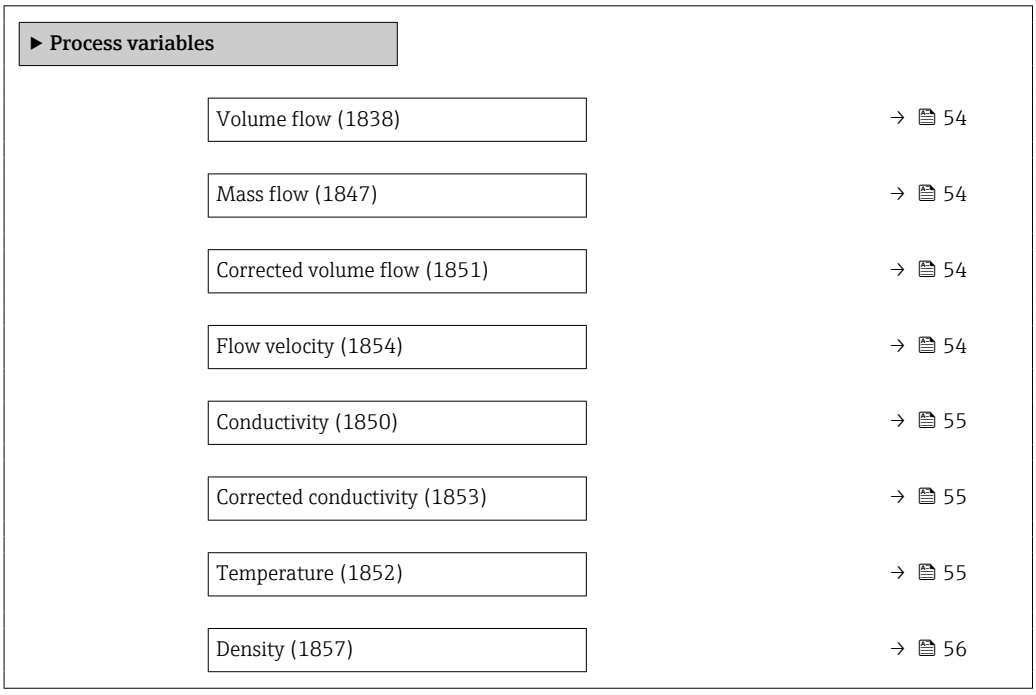
3.2.1 "Measured values" submenu

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

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 (→ 67)

Corrected volume flow

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

Description Displays the corrected volume flow that is currently measured.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Corrected volume flow unit** parameter (→ 68)

Flow velocity

Navigation Expert → Sensor → Measured val. → Process variab. → Flow velocity (1854)

Description Displays the flow velocity that is currently calculated.

User interface Signed floating-point number

Conductivity

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

Description Displays the conductivity that is currently measured.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Conductivity unit** parameter (→ 65)

Corrected conductivity

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

Prerequisite One of the following conditions is met:
- Order code for "Sensor option", option **CI** "Medium temperature measurement"
  or
- The temperature is read into the flowmeter from an external device.

Description Displays the conductivity that is currently corrected.

User interface Positive floating-point number

Additional information *Dependency*

The unit is taken from the **Conductivity unit** parameter (→ 65)

Temperature

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

Prerequisite One of the following conditions is met:
- Order code for "Sensor option", option **CI** "Medium temperature measurement"
  or
- The temperature is read into the flowmeter from an external device.

Description Displays the temperature that is currently calculated.

User interface Positive floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 66)

Density

Navigation Expert → Sensor → Measured val. → Process variab. → Density (1857)

Description Displays the current fixed density or density read in from an external device.

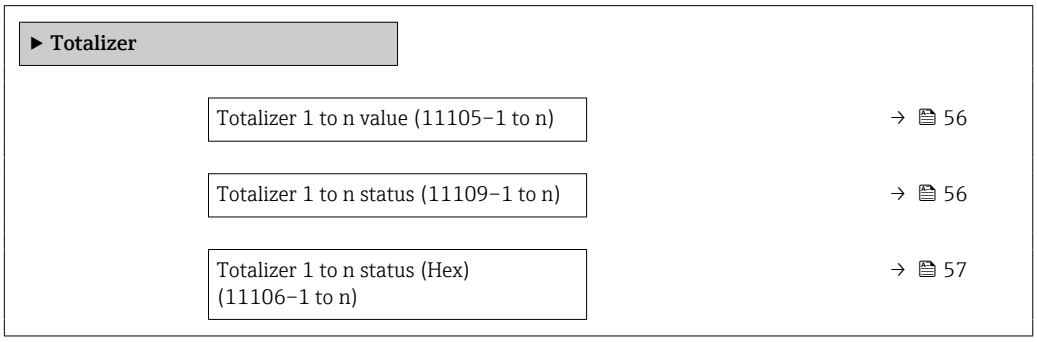
User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Density unit** parameter (→ 68)

"Totalizer" submenu

Navigation Expert → Sensor → Measured val. → Totalizer



Totalizer 1 to n value

Navigation Expert → Sensor → Measured val. → Totalizer → Tot. 1 to n value (11105–1 to n)

Description Shows the totalizer value reported to the controller for further processing.

User interface Signed floating-point number

Factory setting 0 l

Totalizer 1 to n status

Navigation Expert → Sensor → Measured val. → Totalizer → Tot. 1 to n status (11109–1 to n)

Description Shows the status of the totalizer value reported to the controller for further processing ('Good', 'Uncertain', 'Bad').

User interface
- Good
- Uncertain
- Bad

Factory setting Good

Totalizer 1 to n status (Hex)

Navigation Expert → Sensor → Measured val. → Totalizer → Status 1 to n (Hex) (11106–1 to n)

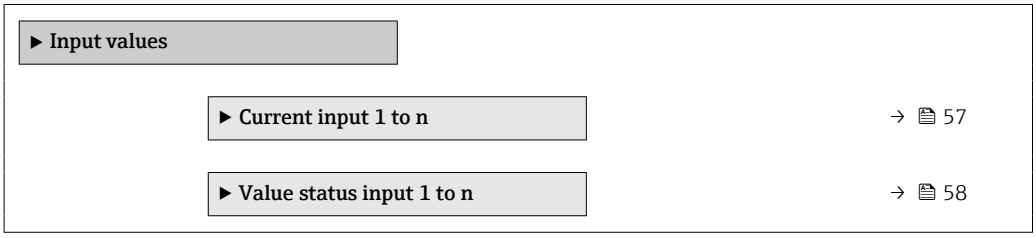
Description Shows the status of the totalizer value reported to the controller for further processing (Hex).

User interface 0 to 255

Factory setting 128

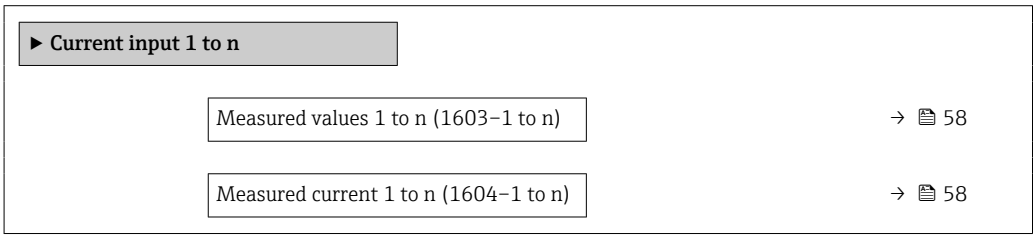
"Input values" submenu

Navigation Expert → Sensor → Measured val. → Input values



"Current input 1 to n" submenu

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



Measured values 1 to n

Navigation Expert → Sensor → Measured val. → Input values → Current input 1 to n → Measured val. 1 to n (1603–1 to n)

Description Displays the current input value.

User interface Signed floating-point number

Measured current 1 to n

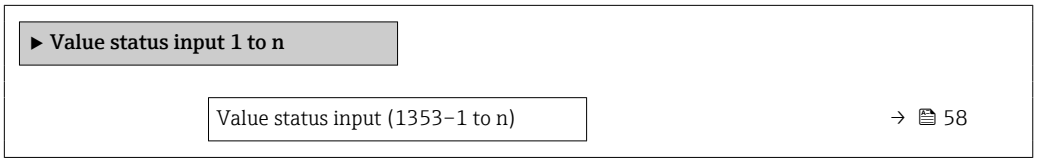
Navigation Expert → Sensor → Measured val. → Input values → Current input 1 to n → Measur. curr. 1 to n (1604–1 to n)

Description Displays the current value of the current input.

User interface 0 to 22.5 mA

"Value status input 1 to n" submenu

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



Value status input

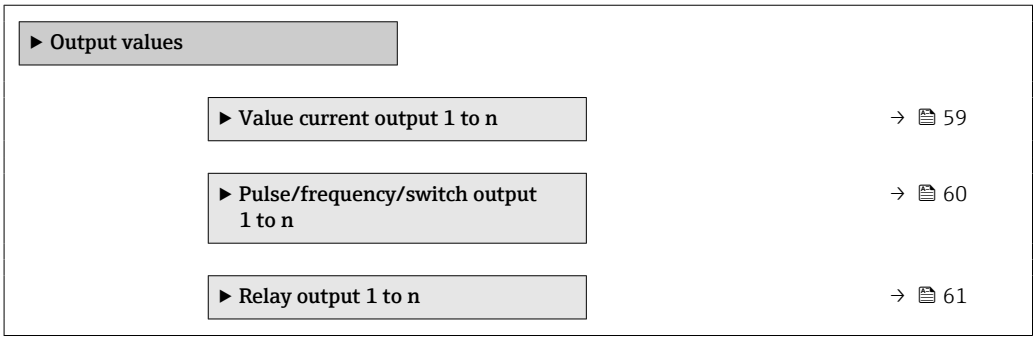
Navigation Expert → Sensor → Measured val. → Input values → Val.stat.inp. 1 to n → Val.stat.inp. (1353–1 to n)

Description Displays the current input signal level.

User interface
- High
- Low

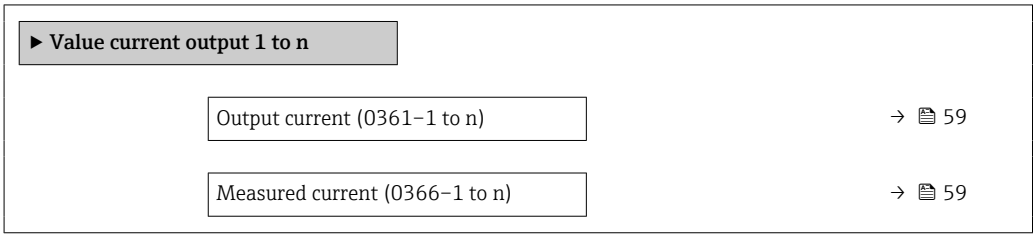
"Output values" submenu

Navigation Expert → Sensor → Measured val. → Output values



"Value current output 1 to n" submenu

Navigation Expert → Sensor → Measured val. → Output values → Val. curr.outp 1 to n



Output current

Navigation Expert → Sensor → Measured val. → Output values → Val. curr.outp 1 to n → Output curr. (0361–1 to n)

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

User interface 0 to 22.5 mA

Measured current

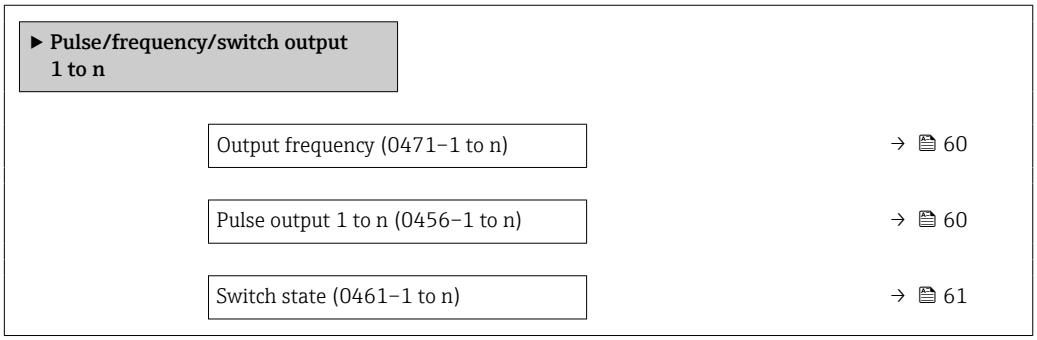
Navigation Expert → Sensor → Measured val. → Output values → Val. curr.outp 1 to n → Measur. curr. (0366–1 to n)

Description Displays the actual measured value of the output current.

User interface 0 to 30 mA

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

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



Output frequency

Navigation Expert → Sensor → Measured val. → Output values → PFS output 1 to n → Output freq. (0471–1 to n)

Prerequisite In the **Operating mode** parameter (→ 122), the **Frequency** option is selected.

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

User interface 0.0 to 12 500.0 Hz

Pulse output 1 to n

Navigation Expert → Sensor → Measured val. → Output values → PFS output 1 to n → Pulse output 1 to n (0456–1 to n)

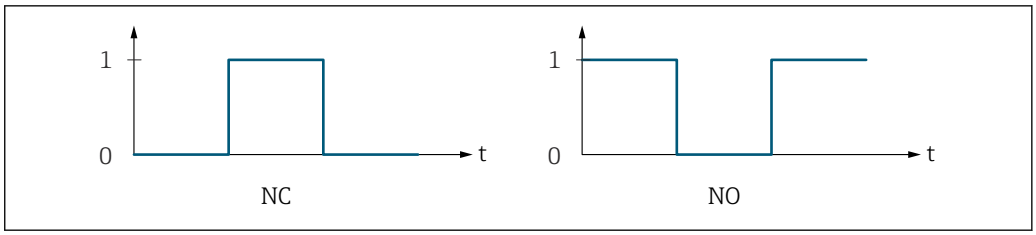
Prerequisite The **Pulse** option is selected in the **Operating mode** parameter (→ 122) parameter.

Description Displays the pulse frequency currently output.

User interface Positive floating-point number

Additional information *Description*

- The pulse output is an open collector output.
- This is configured at the factory in such a way that the transistor is conductive for the duration of the pulse (NO contact) and is safety-oriented.



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

The output behavior can be reversed via the **Invert output signal** parameter (→ 139) 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 (→ 126)) can be configured.

Switch state

Navigation Expert → Sensor → Measured val. → Output values → PFS output 1 to n → Switch state (0461–1 to n)

Prerequisite The **Switch** option is selected in the **Operating mode** parameter (→ 122).

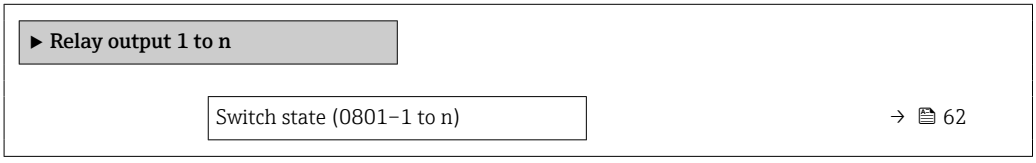
Description Displays the current switch status of the status output.

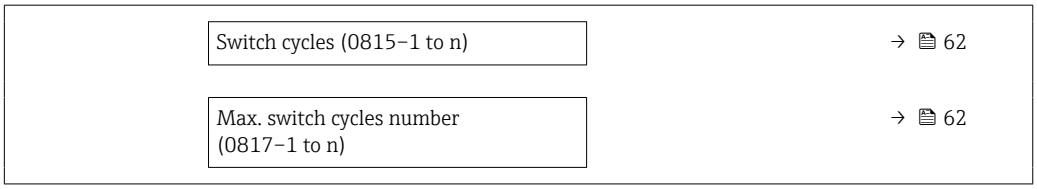
User interface
- Open
- Closed

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

"Relay output 1 to n" submenu

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





Switch state

Navigation Expert → Sensor → Measured val. → Output values → Relay output 1 to n → Switch state (0801–1 to n)

Description Displays the current status of the relay output.

User interface
- Open
- Closed

Additional information *User interface*
- Open
  The relay output is not conductive.
- Closed
  The relay output is conductive.

Switch cycles

Navigation Expert → Sensor → Measured val. → Output values → Relay output 1 to n → Switch cycles (0815–1 to n)

Description Displays all the switch cycles performed.

User interface Positive integer

Max. switch cycles number

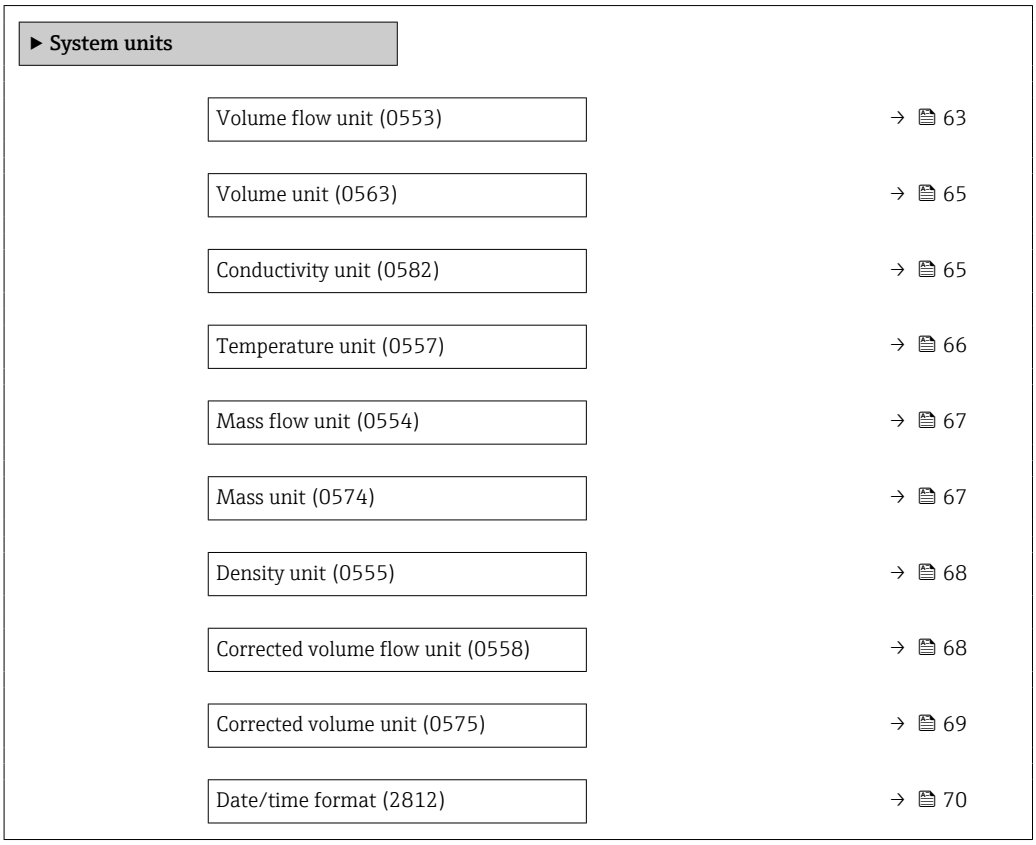
Navigation Expert → Sensor → Measured val. → Output values → Relay output 1 to n → Max. cycles no. (0817–1 to n)

Description Displays the maximum number of guaranteed switch cycles.

User interface Positive integer

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

SI units
- 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

US units
- af/s
- af/min
- af/h
- af/d
- ft^3/s
- ft^3/min
- ft^3/h
- ft^3/d
- kft^3/s
- kft^3/min
- kft^3/h
- kft^3/d
- $MMft^3/s$
- $MMft^3/min$
- $MMft^3/h$
- 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)
- kgal/s (us)
- kgal/min (us)
- kgal/h (us)
- kgal/d (us)

Imperial units
- 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)

Factory setting

Depends on country:
- l/h
- gal/min (us)

Additional information

Effect

The selected unit applies for:
Volume flow parameter (→ 54)

Selection

For an explanation of the abbreviated units: → 237

Volume unit

Navigation

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

Description

Use this function to select the unit for the volume.

Selection

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

US units
- af
- ft^3
- Mft^3
- Mft^3
- 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)

Factory setting

Country-specific:
- m^3
- gal (us)

Additional information

Selection

For an explanation of the abbreviated units: → 237

Conductivity unit

Navigation

Expert → Sensor → System units → Conductiv. unit (0582)

Prerequisite

The **On** option is selected in the **Conductivity measurement** parameter (→ 74) parameter.

Description

Use this function to select the unit for the conductivity.

Selection

SI units
- nS/cm
- µS/cm
- µS/m
- µS/mm
- mS/m
- mS/cm
- S/cm
- S/m
- kS/m
- MS/m

Factory setting

µS/cm

Additional information

Effect

The selected unit applies for:
- **Conductivity** parameter (→ 55)
- **Corrected conductivity** parameter (→ 55)

Selection

For an explanation of the abbreviated units: → 237

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

Effect

The selected unit applies for:
- **Temperature** parameter (→ 55)
- **Maximum value** parameter (→ 204)
- **Minimum value** parameter (→ 203)
- **External temperature** parameter (→ 88)
- **Maximum value** parameter (→ 207)
- **Minimum value** parameter (→ 206)

Selection

For an explanation of the abbreviated units: → 237

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

Effect

The selected unit applies for:
Mass flow parameter (→ 54)

Selection

For an explanation of the abbreviated units: → 237

Mass unit

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

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

Selection

SI units
- g
- kg
- t

US units
- oz
- lb
- STon

Factory setting

Country-specific:
- kg
- lb

Additional information

Selection

For an explanation of the abbreviated units: → 237

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
- 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/l
- lb/ft³

Additional information

Effect

The selected unit applies for:
- **External density** parameter (→ 88)
- **Fixed density** parameter (→ 87)

Selection

- SD = specific density
  The specific density is the ratio of the medium density to the water density at a water temperature of +4 °C (+39 °F), +15 °C (+59 °F), +20 °C (+68 °F).
- SG = specific gravity
  The specific gravity is the ratio of the medium density to the water density at a water temperature of +4 °C (+39 °F), +15 °C (+59 °F), +20 °C (+68 °F).

For an explanation of the abbreviated units: → 237

Corrected volume flow unit

Navigation Expert → Sensor → System units → Cor.volflow unit (0558)

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

Selection

SI units
- Nl/s
- Nl/min
- Nl/h
- Nl/d
- Nhl/s
- Nhl/min
- Nhl/h
- Nhl/d
- Nm^3/s
- Nm^3/min
- Nm^3/h
- Nm^3/d
- Sl/s
- Sl/min
- Sl/h
- Sl/d
- Sm^3/s
- Sm^3/min
- Sm^3/h
- Sm^3/d

US units
- Sft^3/s
- Sft^3/min
- Sft^3/h
- Sft^3/d
- $MSft^3/s$
- $MSft^3/min$
- $MSft^3/h$
- $MSft^3/D$
- $MMSft^3/s$
- $MMSft^3/min$
- $MMSft^3/h$
- $MMSft^3/d$
- Sgal/s (us)
- Sgal/min (us)
- Sgal/h (us)
- Sgal/d (us)
- Sbbl/s (us;liq.)
- Sbbl/min (us;liq.)
- Sbbl/h (us;liq.)
- Sbbl/d (us;liq.)
- Sbbl/s (us;oil)
- Sbbl/min (us;oil)
- Sbbl/h (us;oil)
- Sbbl/d (us;oil)

Imperial units
- Sgal/s (imp)
- Sgal/min (imp)
- Sgal/h (imp)
- Sgal/d (imp)

Factory setting

Country-specific:
- Nl/h
- Sft^3/h

Additional information

Result

The selected unit applies for:
Corrected volume flow parameter (→ 54)

Selection

For an explanation of the abbreviated units: → 237

Corrected volume unit

Navigation

Expert → Sensor → System units → Corr. vol. unit (0575)

Description

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

Selection

SI units
- Nl
- Nhl
- Nm^3
- Sl
- Sm^3

US units
- Sft^3
- $MSft^3$
- $MMSft^3$
- Sgal (us)
- Sbbl (us;liq.)
- Sbbl (us;oil)

Imperial units
Sgal (imp)

Factory setting Country-specific:
- Nm^3
- Sft^3

Additional information *Selection*

For an explanation of the abbreviated units: → 237

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

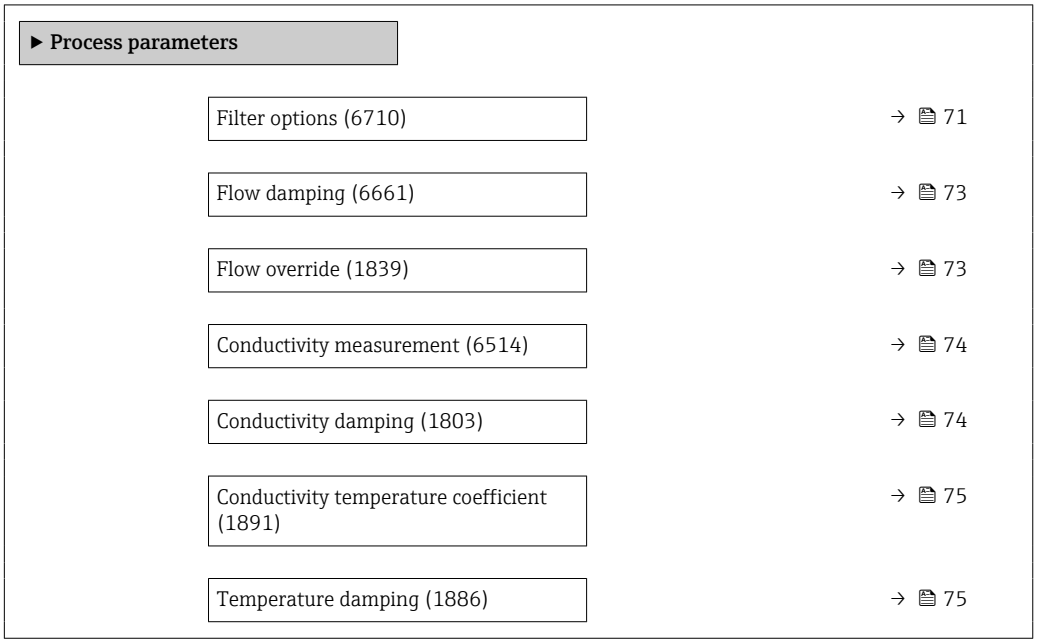
Factory setting dd.mm.yy hh:mm

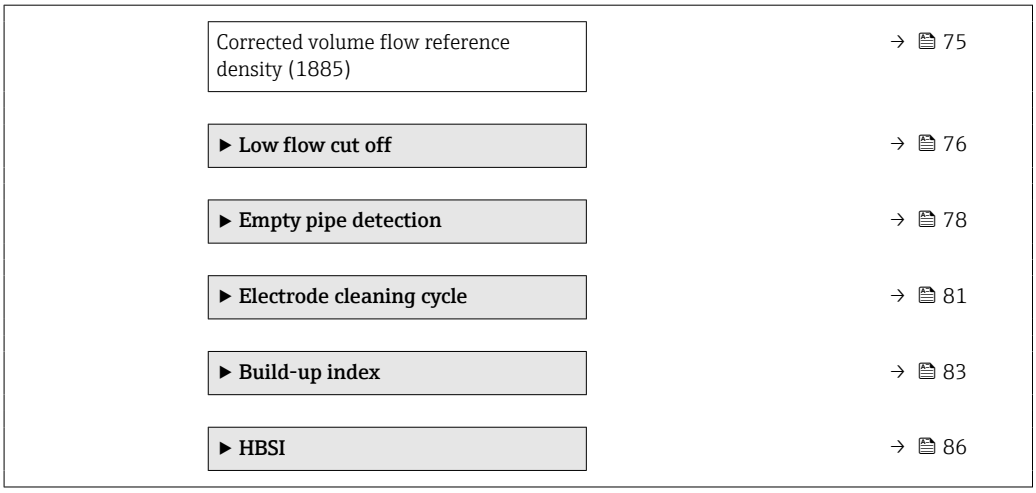
Additional information *Selection*

For an explanation of the abbreviated units: → 237

3.2.3 "Process parameters" submenu

Navigation Expert → Sensor → Process param.





Filter options

Navigation Expert → Sensor → Process param. → Filter options (6710)

Description Use this function to select a filter option.

Selection
- Adaptive
- Adaptive CIP on
- Dynamic
- Dynamic CIP on
- Binomial
- Binomial CIP on

Factory setting Binomial

Additional information *Description*

The user can choose from a range of filter combinations which can optimize the measurement result depending on the application. Each change in the filter setting affects

the output signal of the measuring device. The response time of the output signal increases as the filter depth increases.

Selection

- **Adaptive**
  - Strong flow damping with a short output signal response time.
  - Some time is needed before a stable output signal can be generated.
  - Not suitable for pulsating flow as the average flow can be different here.
- **Dynamic**
  - Average flow damping with a delayed output signal response time.
  - The average flow is displayed correctly over a measuring interval determined over a long period.
- **Binomial**
  - Weak flow damping with a short output signal response time.
  - The average flow is displayed correctly over a measuring interval determined over a long period.
- **CIP**
  - This filter makes the **Adaptive**, **Dynamic** and **Binomial** filter options additionally available.
  - If the CIP filter has detected a change in the medium (abrupt increase in the noise level, e.g. quickly changing medium conductivity values during CIP cleaning), flow damping is greatly increased and the raw value (before flow damping) is limited by the mean value (delimiter). This eliminates extremely high measured errors (up to several 100 m/s).
  - If the CIP filter is enabled, the response time of the entire measuring system increases and the output signal is delayed accordingly.

Examples

Possible applications for the filters

Application	Adaptive	Adaptive CIP	Dynamic	Dynamic CIP	Binomial	Binomial CIP
Pulsating flow (flow is negative intermittently)	−−−	−−−	++	−−	++	−−
Flow changes frequently (flow is dynamic)	−	−−	++	−	++	−
Clear signal, fast control loop (< 1 s)	−−	−−	+ [1)]		++	−
Poor signal, slow control loop (response time of a few seconds)	++	−	−−	−−−	−−−	−−−
Permanently bad signal	++	−−	−	−−−	−	−−−
Short and severe signal distortion after a while		++		++		++
Replacement of a Promag 50/53: system damping Promag 100 = 0.5 * system damping Promag 50/53					+++	+++
Replacement of a Promag 10: system damping Promag 100 = system damping Promag 10 + 2			+++			
For a stable flow signal (no other requirements)	+++					

1) Value of flow damping < 6

Flow damping

Navigation Expert → Sensor → Process param. → Flow damping (6661)

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

User entry 0 to 15

Factory setting 4

Additional information

Input range 0 to 15

- Value = 0: no damping
- Value = 1: minor damping
- Value = 15: strong damping

- The damping depends on the measuring period and the filter type selected.
- An increase or decrease in the damping depends on the application.

Effect

The damping affects the following variables of the device:
- Outputs → 107
- Low flow cut off → 76
- Totalizers

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

Description

Flow override is active
- The **453 Flow override** diagnostic message is output.
- Output values
  - Temperature: 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 (→ 105).

Conductivity measurement

Navigation Expert → Sensor → Process param. → Conduct. measur. (6514)

Prerequisite The **On** option is selected in the **Conductivity measurement** parameter (→ 74) parameter.

Description Use this function to enable and disable conductivity measurement.

Selection
- Off
- On

Factory setting Off

Additional information *Description*

For conductivity measurement to work, the medium must have a minimum conductivity of 5 µS/cm.

Conductivity damping

Navigation Expert → Sensor → Process param. → Conduct. damping (1803)

Prerequisite The **On** option is selected in the **Conductivity measurement** parameter (→ 74).

Description Use this function to enter a time constant for conductivity damping (PT1 element).

User entry 0 to 999.9 s

Factory setting 0 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).

2) Proportional behavior with first-order lag

Conductivity temperature coefficient

Navigation Expert → Sensor → Process param. → Cond. temp.coeff (1891)

Prerequisite
One of the following conditions is met:
- Order code for "Sensor option", option **CI** "Medium temperature measurement"
  or
- The temperature is read into the flowmeter from an external device.

Description Use this function to enter the temperature coefficient for the conductivity.

User entry Signed floating-point number

Factory setting 2.1 %/K

Temperature damping

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

Prerequisite
One of the following conditions is met:
- Order code for "Sensor option", option **CI** "Medium temperature measurement"
  or
- The temperature is read into the flowmeter from an external device.

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

User entry 0 to 999.9 s

Factory setting 0 s

Corrected volume flow reference density

Navigation Expert → Sensor → Process param. → CVolFlowRefDens (1885)

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

User entry Positive floating-point number

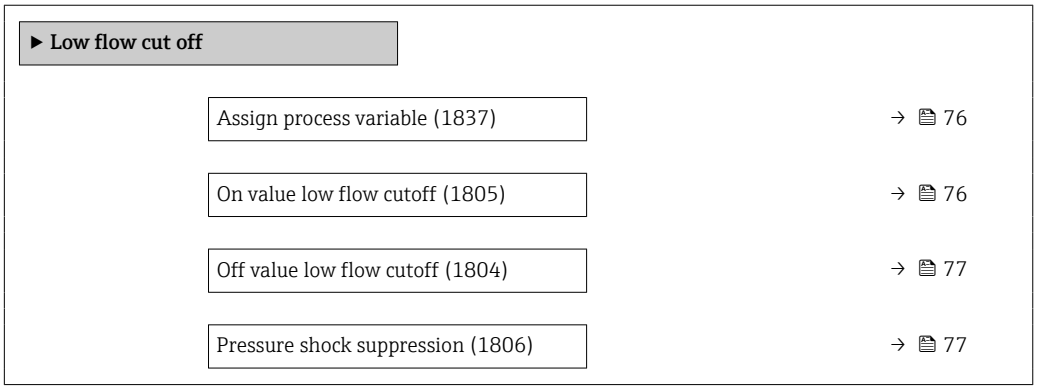
Factory setting
Country-specific:
- 1 kg/l
- 1 lb/ft³

Additional information *Dependency*

The unit is taken from the **Density unit** parameter (→ 68)

"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
- Corrected volume flow

Factory setting Volume flow

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 (→ 76).

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 → 77.

User entry Positive floating-point number

Factory setting Depends on country and nominal diameter → 231

Additional information *Dependency*

The unit depends on the process variable selected in the **Assign process variable** parameter (→ 76).

Off value low flow cutoff

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

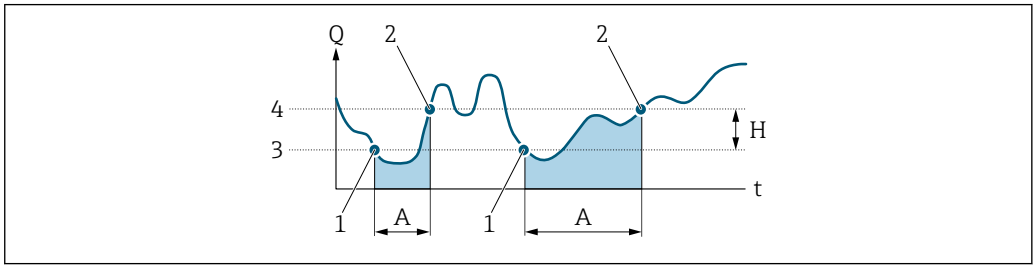
Prerequisite A process variable is selected in the **Assign process variable** parameter (→ 76).

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→ 76.

User entry 0 to 100.0 %

Factory setting 50 %

Additional information *Example*



A0012887

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

Pressure shock suppression

Navigation Expert → Sensor → Process param. → Low flow cut off → Pres. shock sup. (1806)

Prerequisite A process variable is selected in the **Assign process variable** parameter (→ 76).

Description Use this function to enter the time interval for signal suppression (= active pressure shock suppression).

User entry 0 to 100 s

Factory setting 0 s

Additional information *Description*

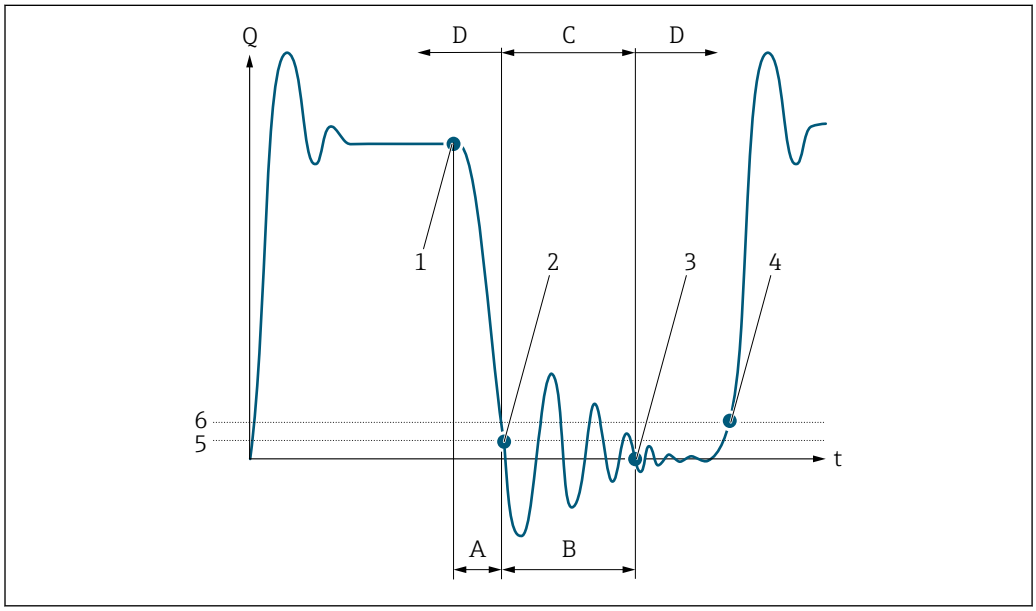
Pressure shock suppression is enabled
- Prerequisite:
  Flow rate < on-value of low flow cut off
- Output values
  - Flow displayed: 0
  - Totalizer: the totalizers are pegged at the last correct value

Pressure shock suppression is disabled

- Prerequisite: the time interval set in this function has elapsed.
- If the flow also exceeds the off value for low flow cut off, the device starts processing and displaying the current flow value again.

Example

When closing a valve, momentarily strong fluid movements may occur in the pipeline, which are registered by the measuring system. These totalized flow values lead to a false totalizer status, particularly during batching processes.

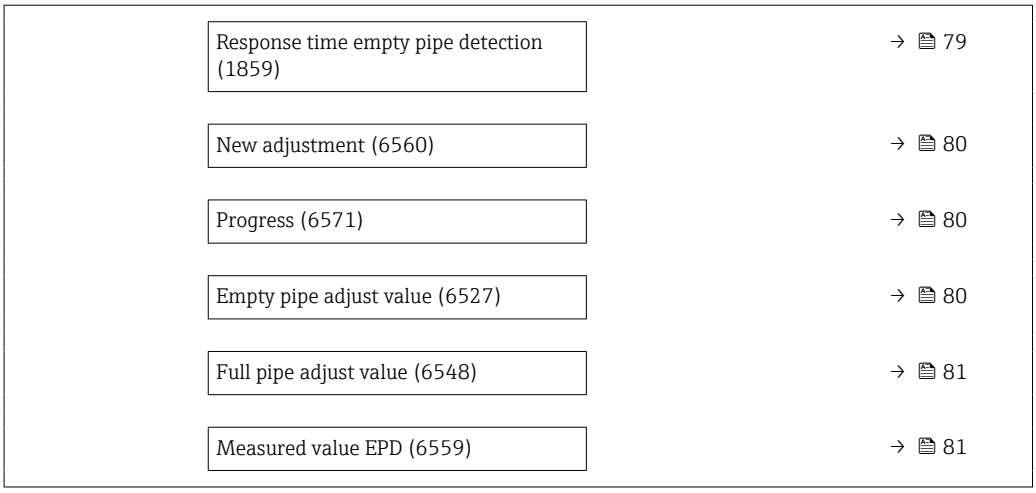


Q Flow
t Time
A After run
B Pressure shock
C Pressure shock suppression active according to the time entered
D Pressure shock suppression inactive
1 Valve closes
2 Flow falls below the on-value of the low flow cut off: pressure shock suppression is activated
3 The time entered has elapsed: pressure shock suppression is deactivated
4 The current flow value is processed and displayed again
5 On value for low flow cut off
6 Off value for low flow cut off

"Empty pipe detection" submenu

Navigation Expert → Sensor → Process param. → Empty pipe det.

▶ **Empty pipe detection**	
Empty pipe detection (1860)	→ 79
Switch point empty pipe detection (6562)	→ 79



Empty pipe detection

Navigation Expert → Sensor → Process param. → Empty pipe det. → Empty pipe det. (1860)

Description Use this function to switch empty pipe detection on and off.

Selection
- Off
- On

Factory setting Off

Switch point empty pipe detection

Navigation Expert → Sensor → Process param. → Empty pipe det. → Switch point EPD (6562)

Prerequisite The **On** option is selected in the **Empty pipe detection** parameter (→ 79).

Description Use this function to enter the percentage threshold value of the resistance in relation to the adjustment values.

User entry 0 to 100 %

Factory setting 50 %

Response time empty pipe detection

Navigation Expert → Sensor → Process param. → Empty pipe det. → Response time (1859)

Prerequisite A process variable is selected in the **Assign process variable** parameter (→ 79).

Description Use this function to enter the minimum time (hold time) the signal must be present before diagnostic message S962 "Empty pipe" is triggered in the event of a partially filled or empty measuring pipe.

User entry 0 to 100 s

Factory setting 1 s

New adjustment

Navigation Expert → Sensor → Process param. → Empty pipe det. → New adjustment (6560)

Prerequisite The **On** option is selected in the **Empty pipe detection** parameter (→ 79).

Description For selecting whether to perform an empty pipe or full pipe adjustment.

Selection
- Cancel
- Empty pipe adjust
- Full pipe adjust

Factory setting Cancel

Progress

Navigation Expert → Sensor → Process param. → Empty pipe det. → Progress (6571)

Prerequisite The **On** option is selected in the **Empty pipe detection** parameter (→ 79).

Description Use this function to view the progress.

User interface
- Ok
- Busy
- Not ok

Empty pipe adjust value

Navigation Expert → Sensor → Process param. → Empty pipe det. → Empty pipe value (6527)

Prerequisite
- In the **Empty pipe detection** parameter (→ 79), the **On** option is selected.
- Adjustment value > full pipe value.

Description Use this function to display the adjustment value when the measuring pipe is empty.

User interface Positive floating-point number

Factory setting 1 000 000 Ohm

Full pipe adjust value

Navigation Expert → Sensor → Process param. → Empty pipe det. → Full pipe value (6548)

Prerequisite
- In the **Empty pipe detection** parameter (→ 79), the **On** option is selected.
- Adjustment value < empty pipe value.

Description Use this function to display the adjustment value when the measuring pipe is full.

User interface Positive floating-point number

Factory setting 1 000 Ohm

Measured value EPD

Navigation Expert → Sensor → Process param. → Empty pipe det. → Meas. value EPD (6559)

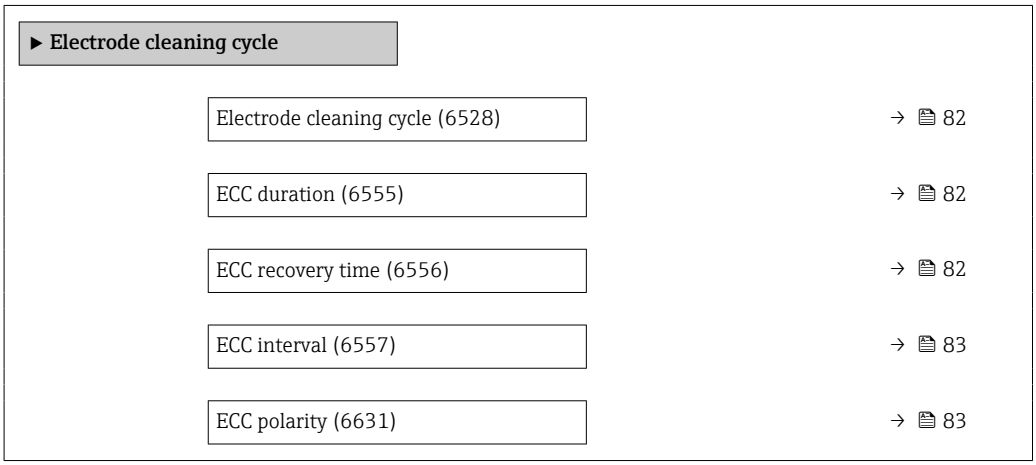
Prerequisite In the **Empty pipe detection** parameter (→ 79), the **On** option is selected.

Description Displays the current measured value.

User interface Positive floating-point number

"Electrode cleaning circuit" submenu

Navigation Expert → Sensor → Process param. → ECC



Electrode cleaning cycle

Navigation Expert → Sensor → Process param. → Elec. clean cycl → Elec. clean cycl (6528)

Prerequisite For the following order code:
"Application package", option **EC** "ECC electrode cleaning"

Description Use this function to enable and disable cyclic electrode cleaning.

Selection
- Off
- On

Factory setting On

Additional information Conductive deposits on the electrodes and on the walls of the measuring tube (e.g. magnetite) can falsify measurement values. The Electrode Cleaning Circuitry (ECC) was developed to prevent such conductive deposits developing in the vicinity of the electrodes. ECC functions as described above for all available electrode materials except tantalum. If tantalum is used as the electrode material, the ECC protects the electrode surface only against oxidation.

ECC duration

Navigation Expert → Sensor → Process param. → Elec. clean cycl → ECC duration (6555)

Prerequisite For the following order code:
"Application package", option **EC** "ECC electrode cleaning"

Description Use this function to enter the duration of electrode cleaning in seconds.

User entry 0.01 to 30 s

Factory setting 2 s

ECC recovery time

Navigation Expert → Sensor → Process param. → Elec. clean cycl → ECC recov. time (6556)

Prerequisite For the following order code:
"Application package", option **EC** "ECC electrode cleaning"

Description Use this function to enter the recovery time after electrode cleaning to prevent signal output interference. The current output values are frozen in the meanwhile.

User entry 1 to 600 s

Factory setting 60 s

ECC interval

Navigation Expert → Sensor → Process param. → Elec. clean cycl → ECC interval (6557)

Prerequisite For the following order code:
"Application package", option **EC** "ECC electrode cleaning"

Description Use this function to enter the pause duration until the next electrode cleaning.

User entry 0.5 to 168 h

Factory setting 0.5 h

ECC polarity

Navigation Expert → Sensor → Process param. → Elec. clean cycl → ECC polarity (6631)

Prerequisite For the following order code:
"Application package", option **EC** "ECC electrode cleaning"

Description Displays the polarity of the electrode cleaning circuit.

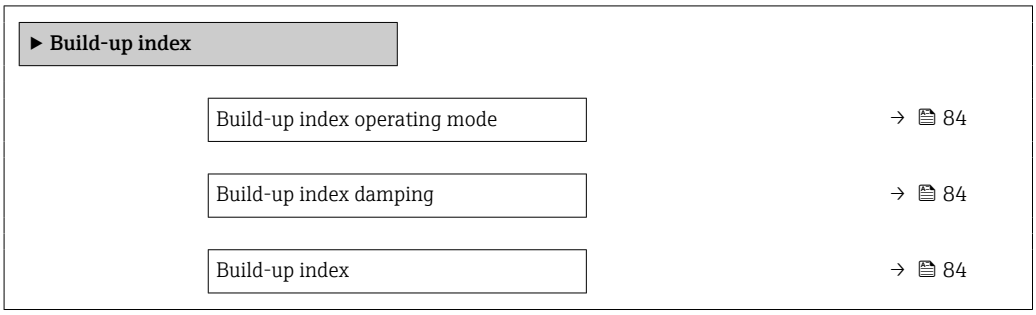
User interface
- Positive
- Negative

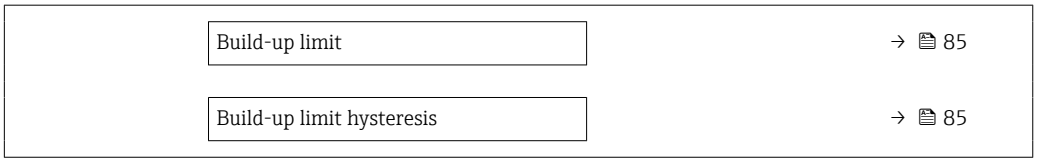
Factory setting Depends on the electrode material:
- Tantalum: **Negative** option
- Platinum, Alloy C22, stainless steel: **Positive** option

"Coating detection" submenu

Build-up detection is only available:
- In conjunction with the Promag W sensor
- In the compact device version (transmitter and sensor form a mechanical unit)
- For detailed information on build-up detection: see the Special Documentation for the **Heartbeat Verification + Monitoring** application package

Navigation Expert → Sensor → Process param. → Build-up detect.





Build-up index operating mode

Navigation Expert → Sensor → Process param. → Build-up index → BuildUpIndexMode (6734)

Description Select mode of operation for build-up index.

Selection
- Off
- Slow
- Standard
- Fast

Factory setting Off

Build-up index damping

Navigation Expert → Sensor → Process param. → Build-up index → BuildUpIndexDamp (6840)

Description Enter damping value for build-up index.

Damping value:
- 0 = minimum damping
- 15 = maximum damping

The damping value should only be increased if the measured value is unstable.

User entry 0 to 15

Factory setting 0

Build-up index

Navigation Expert → Sensor → Process param. → Build-up index → Build-up index (12111)

Description Shows current build-up index value.

User interface 0.0 to 100.0 %

Factory setting 0.0 %

Additional information The formation of build-up is output as a percentage in the Build-up index value (→ 84) parameter. The higher the percentage, the thicker the build-up.

Build-up index value (→ 🖹 84) = 0%
- No build-up present
- Measuring tube as-delivered state (initial value)
- Measuring tube was cleaned thoroughly after formation of build-up

Build-up index value (→ 🖹 84) = 100%
- Value for the maximum measurable build-up thickness
- The thickness of the build-up at 100% varies depending on the process
- A value of 100% should not be equated with a blocked measuring tube

The percentage indicated in the Build-up index value (→ 🖹 84) parameter does not provide direct information about the absolute thickness or the composition of the build-up. Therefore, to make optimum use of the build-up detection function, it is necessary to first compare the formation of build-up in the process, as known from experience, with the associated Build-up index value (→ 🖹 84). The aim is to determine the Build-up index value (→ 🖹 84) at the time the cleaning is usually performed.

On the basis of the Build-up index value (→ 🖹 84) during cleaning, it is possible to make a valid assessment of the condition inside the measuring tube and to plan the cleaning using the build-up limit and build-up detection hysteresis parameters.

In addition, conclusions about possible effects on neighboring processes can be drawn from the Build-up index value (→ 🖹 84).

Build-up limit

Navigation Expert → Sensor → Process param. → Build-up index → Build-up limit (6466)

Description Enter limit value for the build-up index.

User entry 0 to 100 %

Factory setting 50 %

Build-up limit hysteresis

Navigation Expert → Sensor → Process param. → Build-up index → BuildUpLimitHyst (6467)

Description Enter hysteresis for build-up limit value.

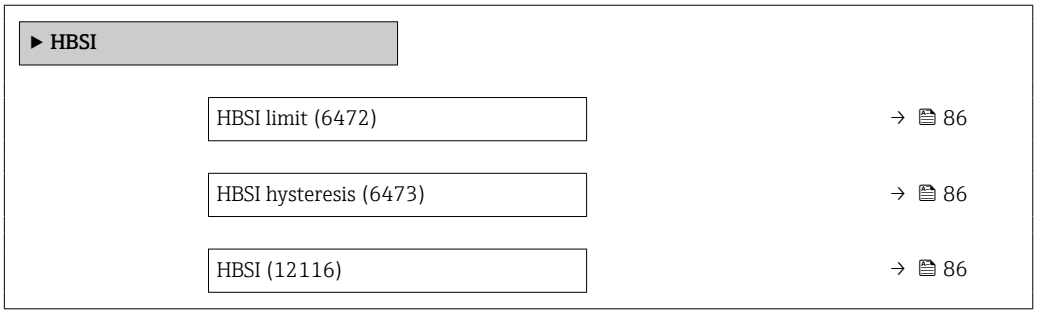
If the value for build-up detection hysteresis is higher than the Build-up limit (→ 🖹 85), the "Build-up detected" diagnostic information is not reset until the measuring tube has been cleaned and a restart has been performed.

User entry 0 to 100 %

Factory setting 20 %

"HBSI" submenu

Navigation Expert → Sensor → Process param. → HBSI



HBSI limit

Navigation Expert → Sensor → Process param. → HBSI → HBSI limit (6472)

Description Enter HBSI limit value.

User entry 0 to 100 %

Factory setting 4 %

HBSI hysteresis

Navigation Expert → Sensor → Process param. → HBSI → HBSI hysteresis (6473)

Description Enter hysteresis for HBSI limit value.

User entry 0 to 100 %

Factory setting 1 %

HBSI

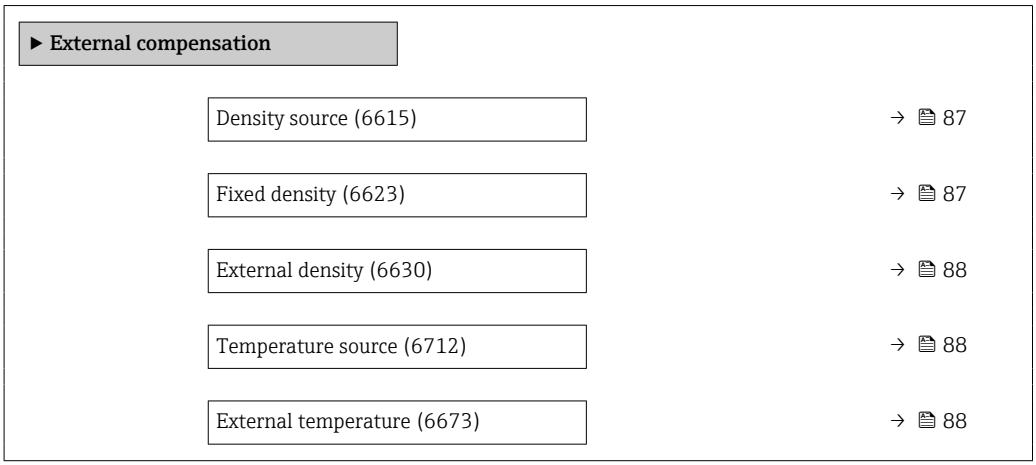
Navigation Expert → Sensor → Process param. → HBSI → HBSI (12116)

Description Displays the relative change of the entire sensor, with all its electrical, mechanical and electromechanical components incorporated in the sensor housing (including the measuring tube, electrodynamic pick-ups, excitation system, cables etc.), in % of the reference value.

User interface −100.0 to 100.0 %

3.2.4 "External compensation" submenu

Navigation Expert → Sensor → External comp.



Density source

Navigation Expert → Sensor → External comp. → Density source (6615)

Description Use this function to select the density source.

Selection
- Fixed density
- External density
- Current input 1 *
- Current input 2 *
- Current input 3 *
- Calculated value

Factory setting Fixed density

Fixed density

Navigation Expert → Sensor → External comp. → Fixed density (6623)

Prerequisite The **Fixed density** option is selected in the **Density source** parameter (→ 87).

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

User entry Positive floating-point number

Factory setting Depends on country:
- 1 000 kg/m³
- 62 lb/ft³

* Visibility depends on order options or device settings

Additional information *Dependency*

The unit is taken from the **Density unit** parameter (→ 68)

External density

Navigation Expert → Sensor → External comp. → External density (6630)

Prerequisite The **External density** option is selected in the **Density source** parameter (→ 87).

Description Shows the density read from the external device.

User entry Positive floating-point number

Factory setting 0 kg/l

Additional information *Dependency*

The unit is taken from the **Density unit** parameter (→ 68)

Temperature source

Navigation Expert → Sensor → External comp. → Temp. source (6712)

Description Use this function to select the temperature source.

Selection
- Internal temperature sensor *
- Off
- External value
- Current input 1 *
- Current input 2 *
- Current input 3 *

Factory setting Off

External temperature

Navigation Expert → Sensor → External comp. → External temp. (6673)

Prerequisite The **External value** option is selected in the **Temperature source** parameter (→ 88).

Description Shows the external process temperature read in from the external device.

User entry Floating point number with sign

* Visibility depends on order options or device settings

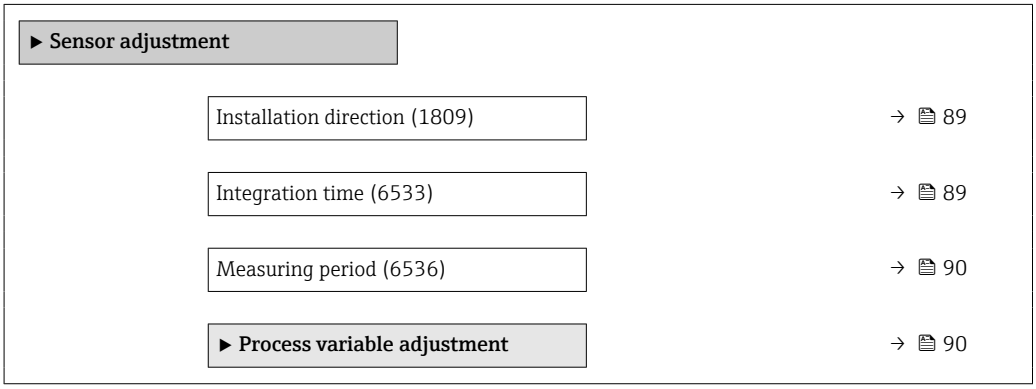
Factory setting −273.15 °C

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 66)

3.2.5 "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

Additional information *Description*

Before changing the sign: ascertain the actual direction of fluid flow with reference to the direction indicated by the arrow on the sensor nameplate.

Integration time

Navigation Expert → Sensor → Sensor adjustm. → Integration time (6533)

Description Use this function to display the duration of the integration time.

User interface 1 to 65 ms

Factory setting Depends on country and nominal diameter

Measuring period

Navigation Expert → Sensor → Sensor adjustm. → Measuring period (6536)

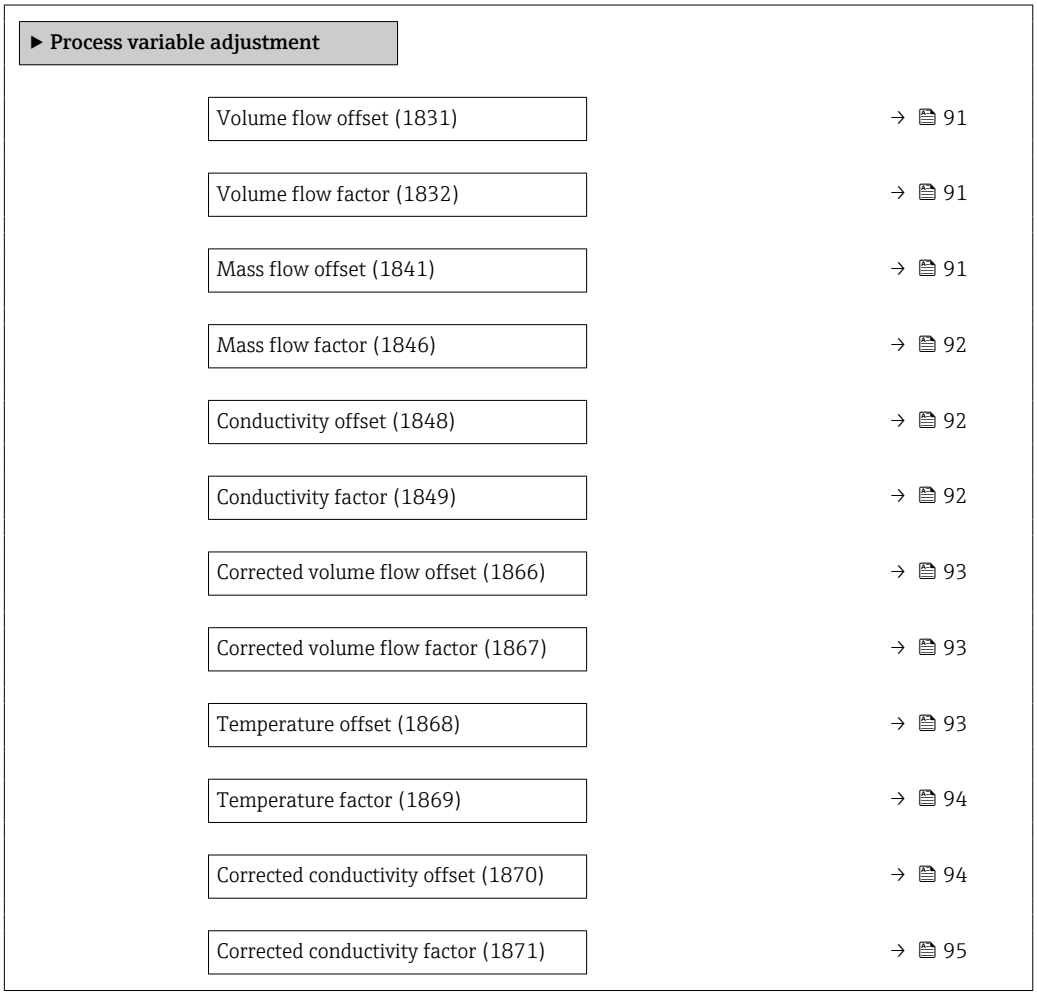
Description Use this function to display the time of a full measuring period.

User interface 0 to 1 000 ms

Factory setting Depends on country and nominal diameter

"Process variable adjustment" submenu

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust



Flow velocity offset (1879)	→ 95
Flow velocity factor (1880)	→ 95

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.

User entry Signed floating-point number

Factory setting 0 m^3/s

Additional information *Description*

Corrected value = (factor × value) + offset

Volume flow factor

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

Description Enter quantity factor for the volume flow value.

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/s.

User entry Signed floating-point number

Factory setting 0 kg/s

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

Conductivity offset

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

Prerequisite The **On** option is selected in the **Conductivity measurement** parameter (→ 74).

Description Use this function to enter the zero point shift for the conductivity trim. The conductivity unit on which the shift is based is S/m.

User entry Signed floating-point number

Factory setting 0 S/m

Additional information *Description*

Corrected value = (factor × value) + offset

Conductivity factor

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

Prerequisite The **On** option is selected in the **Conductivity measurement** parameter (→ 74).

Description Use this function to enter a quantity factor for the conductivity. This multiplication factor is applied over the conductivity range.

User entry Positive floating-point number

Factory setting 1

Additional information *Description*

Corrected value = (factor × value) + offset

Corrected volume flow offset

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

Description Use this function to enter the zero point shift for the corrected volume flow trim. The corrected volume flow unit on which the shift is based is 1 Nm^3/s.

User entry Signed floating-point number

Factory setting 0 Nm^3/s

Additional information *Description*

Corrected value = (factor × value) + offset

Corrected volume flow factor

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

Description Use this function to enter a quantity factor (without time) for the corrected volume flow. This multiplication factor is applied over the corrected volume 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 (1868)

Prerequisite One of the following conditions is met:
- Order code for "Sensor option", option **CI** "Medium temperature measurement"
  or
- The temperature is read into the flowmeter from an external device.

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

User entry Signed floating-point number

Factory setting 0 K

Additional information *Description*

Corrected value = (factor × value) + offset

Temperature factor

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Temp. factor (1869)

Prerequisite One of the following conditions is met:
- Order code for "Sensor option", option **CI** "Medium temperature measurement"
  or
- The temperature is read into the flowmeter from an external device.

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

User entry Positive floating-point number

Factory setting 1

Additional information *Description*

Corrected value = (factor × value) + offset

Corrected conductivity offset

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

Prerequisite The **On** option is selected in the **Conductivity measurement** parameter (→ 74).

Description Use this function to enter the zero point shift to trim the corrected conductivity. The conductivity unit on which the shift is based is µS/cm.

User entry Signed floating-point number

Factory setting 0 S/m

Additional information *Description*

Corrected value = (factor × value) + offset

Corrected conductivity factor

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

Prerequisite The **On** option is selected in the **Conductivity measurement** parameter (→ 74).

Description Use this function to enter a quantity factor for the corrected conductivity. In each case, this factor refers to the conductivity in µS/cm.

User entry Positive floating-point number

Factory setting 1

Additional information *Description*

Corrected value = (factor × value) + offset

Flow velocity offset

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Flow vel. offset (1879)

Description Use this function to enter the zero point shift for the flow velocity trim. The flow velocity unit on which the shift is based is m/s.

User entry Signed floating-point number

Factory setting 0 m/s

Additional information *Description*

Corrected value = (factor × value) + offset

Flow velocity factor

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Flow vel. factor (1880)

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

User entry Positive floating-point number

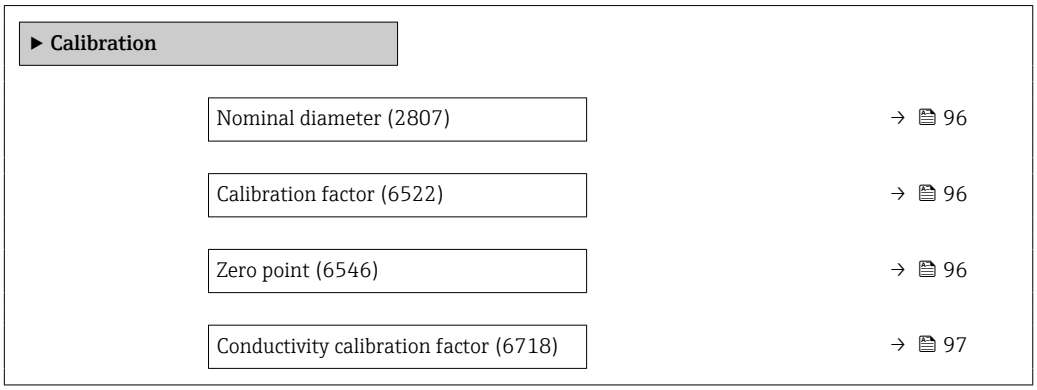
Factory setting 1

Additional information *Description*

Corrected value = (factor × value) + offset

3.2.6 "Calibration" submenu

Navigation Expert → Sensor → Calibration



Nominal diameter

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

Description Displays the nominal diameter of the sensor.

User interface DNxx / x"

Factory setting Depends on the size of the sensor

Additional information *Description*

The value is also specified on the sensor nameplate.

Calibration factor

Navigation Expert → Sensor → Calibration → Cal. factor (6522)

Description Displays the current calibration factor for the sensor.

User interface Positive floating-point number

Factory setting Depends on nominal diameter and calibration.

Zero point

Navigation Expert → Sensor → Calibration → Zero point (6546)

Description This function shows the zero point correction value for the sensor.

User interface Signed floating-point number

Factory setting Depends on nominal diameter and calibration

Conductivity calibration factor

Navigation Expert → Sensor → Calibration → Cond. cal. fact. (6718)

Prerequisite In the **Conductivity measurement** parameter (→ 74), the **On** option is selected.

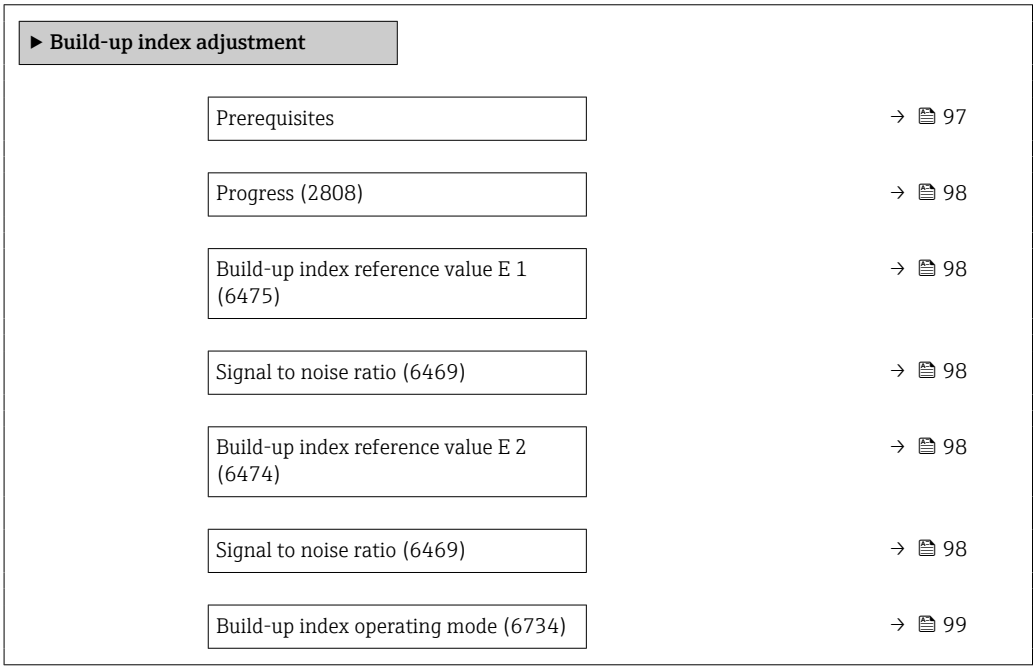
Description Displays the calibration factor for the conductivity measurement.

User interface 0.01 to 10 000

3.2.7 "Build-up index adjustment" wizard

Complete this wizard to adjust the reference values of the build-up index for each electrode (E1 and E2) and activate the build-up index for build-up measurement.

Navigation Expert → Sensor → BuildUpIndAdjust



Prerequisites

Navigation Expert → Sensor → BuildUpIndAdjust → Prerequisites

Description The following conditions must be met before performing a build-up index adjustment.

User interface
- The sensor is free of build-up
- The measuring tube is completely filled

Progress

Navigation Expert → Sensor → BuildUpIndAdjust → Progress (2808)

Description The progress of the process is indicated.

User interface 0 to 100 %

Build-up index reference value E 1

Navigation Expert → Sensor → BuildUpIndAdjust → BuildUpIndRefE 1 (6475)

Description Shows the reference value 'Build-up free sensor' measured for electrode E1.

User interface 0 to 1

Signal to noise ratio

Navigation Expert → Sensor → BuildUpIndAdjust → SNR (6469)

Description Shows the signal to noise ratio during the measurement. A value between 1.0 - 2.0 is sufficient to excellent.

User interface Signed floating-point number

Build-up index reference value E 2

Navigation Expert → Sensor → BuildUpIndAdjust → BuildUpIndRefE 2 (6474)

Description Shows the reference value 'Build-up free sensor' measured for electrode E2.

User interface 0 to 1

Build-up index operating mode

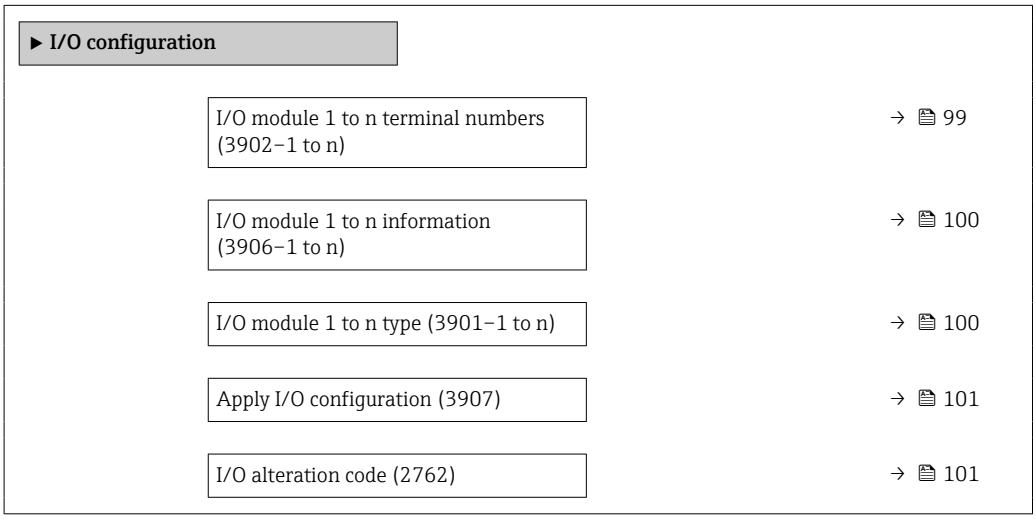
Navigation Expert → Sensor → BuildUpIndAdjust → BuildUpIndexMode (6734)

Description Select mode of operation for build-up index.

Selection
- Off
- Slow
- Standard
- Fast

3.3 "I/O configuration" submenu

Navigation Expert → I/O config.



I/O module 1 to n terminal numbers

Navigation Expert → I/O config. → I/O 1 to n terminals (3902–1 to n)

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

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

I/O module 1 to n information

Navigation Expert → I/O config. → I/O 1 to n info (3906–1 to n)

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

User interface
- Not plugged
- Invalid
- Not configurable
- Configurable
- PROFINET

Additional information

"Not plugged" option

The I/O module is not plugged in.

"Invalid" option

The I/O module is not plugged correctly.

"Not configurable" option

The I/O module is not configurable.

"Configurable" option

The I/O module is configurable.

The I/O module is configured for .

I/O module 1 to n type

Navigation Expert → I/O config. → I/O 1 to n type (3901–1 to n)

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

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

Selection
- Off
- Current output *
- Current input *
- Status input *
- Pulse/frequency/switch output *
- Double pulse output *
- Relay output *

Factory setting Off

* Visibility depends on order options or device settings

Apply I/O configuration

Navigation Expert → I/O config. → Apply I/O config (3907)

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

Selection
- No
- Yes

Factory setting No

I/O alteration code

Navigation Expert → I/O config. → I/O alterat.code (2762)

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

User entry Positive integer

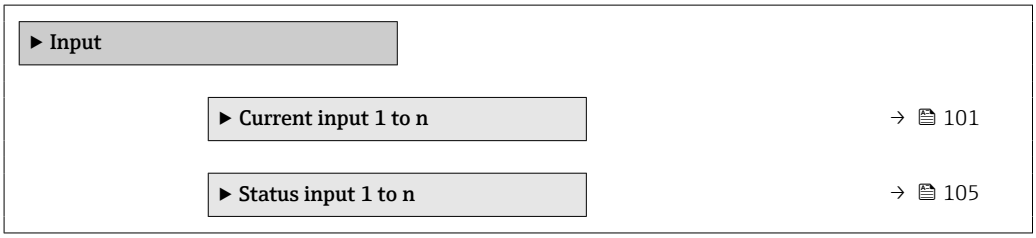
Factory setting 0

Additional information *Description*

The I/O configuration is changed in the **I/O module type** parameter (→ 100).

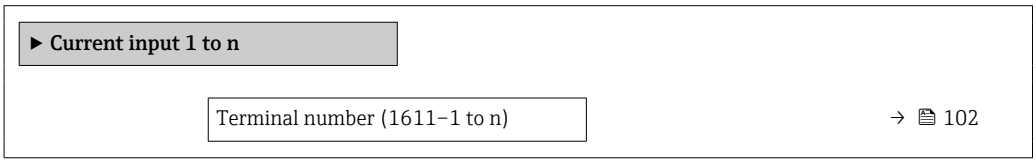
3.4 "Input" submenu

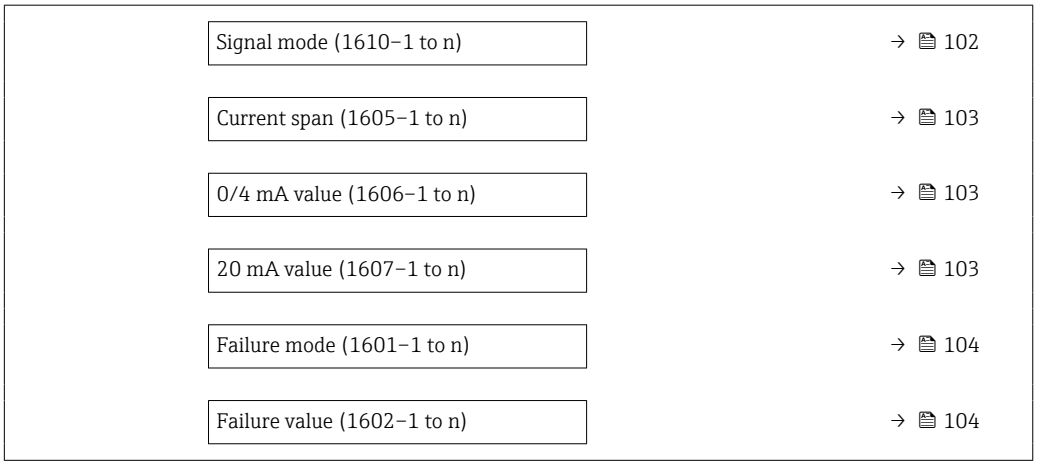
Navigation Expert → Input



3.4.1 "Current input 1 to n" submenu

Navigation Expert → Input → Current input 1 to n





Terminal number

Navigation Expert → Input → Current input 1 to n → Terminal no. (1611–1 to n)

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

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

Additional information *"Not used" option*

The current input module does not use any terminal numbers.

Signal mode

Navigation Expert → Input → Current input 1 to n → Signal mode (1610–1 to n)

Prerequisite The measuring device is **not** approved for use in the hazardous area with type of protection Ex-i.

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

Selection
- Passive
- Active *

Factory setting Active

* Visibility depends on order options or device settings

Current span

Navigation Expert → Input → Current input 1 to n → Current span (1605–1 to n)

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

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

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

Additional information *Examples*

Sample values for the current range: **Current span** parameter (→ 109)

0/4 mA value

Navigation Expert → Input → Current input 1 to n → 0/4 mA value (1606–1 to n)

Description Use this function to enter a value for the 4 mA current.

User entry Signed floating-point number

Factory setting 0

Additional information *Current input behavior*

The current input behaves differently depending on the settings configured in the following parameters:
- Current span (→ 103)
- Failure mode (→ 104)

Configuration examples

Pay attention to the configuration examples for **4 mA value** parameter (→ 110).

20 mA value

Navigation Expert → Input → Current input 1 to n → 20 mA value (1607–1 to n)

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 *Configuration examples*

Pay attention to the configuration examples for **4 mA value** parameter (→ 110).

Failure mode

Navigation Expert → Input → Current input 1 to n → Failure mode (1601–1 to n)

Description Use this function to select the input behavior when measuring a current outside the configured **Current span** parameter (→ 103).

Selection
- Alarm
- Last valid value
- Defined value

Factory setting Alarm

Additional information *Options*
- Alarm
  An error message is set.
- Last valid value
  The last valid measured value is used.
- Defined value
  A user-defined measured value is used (**Failure value** parameter (→ 104)).

Failure value

Navigation Expert → Input → Current input 1 to n → Failure value (1602–1 to n)

Prerequisite In the **Failure mode** parameter (→ 104), the **Defined value** option is selected.

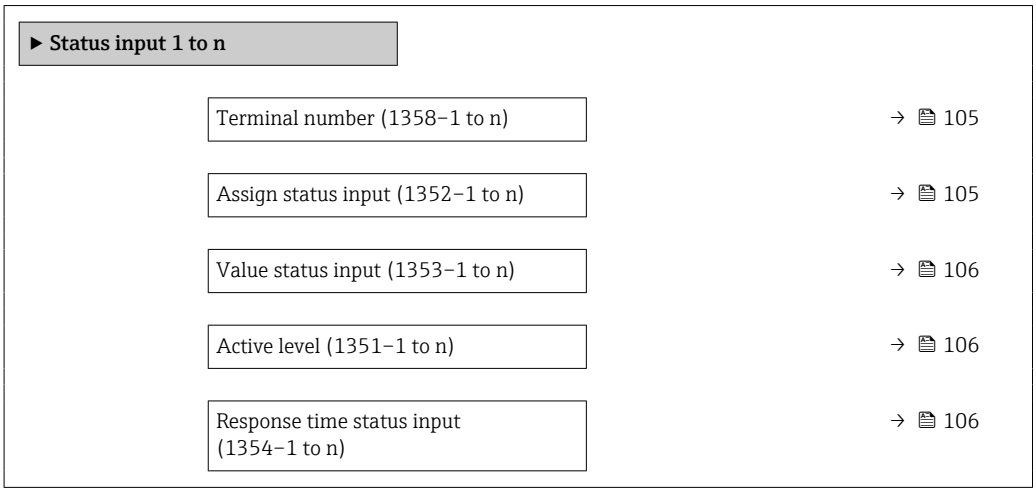
Description Use this function to enter the value that the device uses if it does not receive an input signal from the external device, or if the input signal is invalid.

User entry Signed floating-point number

Factory setting 0

3.4.2 "Status input 1 to n" submenu

Navigation Expert → Input → Status input 1 to n



Terminal number

Navigation Expert → Input → Status input 1 to n → Terminal no. (1358–1 to n)

Description Displays the terminal numbers used by the status input module.

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

Additional information *"Not used" option*

The status input module does not use any terminal numbers.

Assign status input

Navigation Expert → Input → Status input 1 to n → Assign stat.inp. (1352–1 to n)

Description Use this function to select the function for the status input.

Selection
- Off
- Reset totalizer 1
- Reset totalizer 2
- Reset totalizer 3
- Reset all totalizers
- Flow override
- Zero adjustment

Factory setting Off

Additional information *Selection*

- Off
  The status input is switched off.
- Reset totalizer 1…3
  The individual totalizers are reset.
- Reset all totalizers
  All totalizers are reset.
- Flow override
  The Flow override (→ 🖹 73) is activated.

Note on the Flow override (→ 🖹 73):
- The Flow override (→ 🖹 73) is enabled as long as the level is at the status input (continuous signal).
- All other assignments react to a change in level (pulse) at the status input.

Value status input

Navigation Expert → Input → Status input 1 to n → Val.stat.inp. (1353–1 to n)

Description Displays the current input signal level.

User interface
- High
- Low

Active level

Navigation Expert → Input → Status input 1 to n → Active level (1351–1 to n)

Description Use this function to determine the input signal level at which the assigned function is activated.

Selection
- High
- Low

Factory setting High

Response time status input

Navigation Expert → Input → Status input 1 to n → Response time (1354–1 to n)

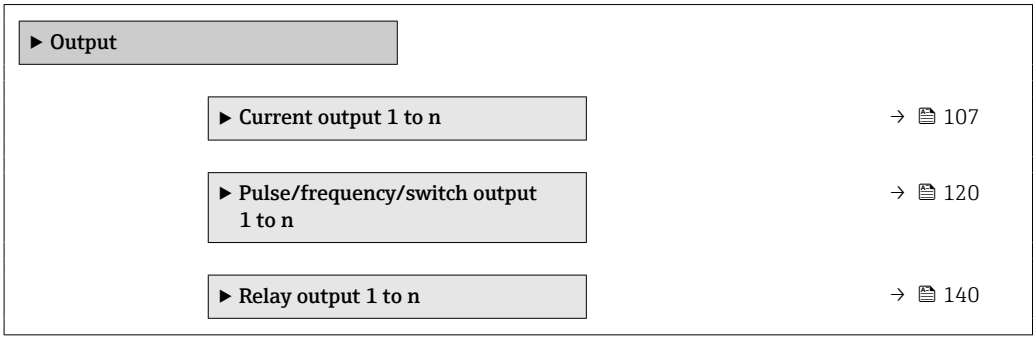
Description Use this function to enter the minimum time period for which the input signal level must be present before the selected function is activated.

User entry 5 to 200 ms

Factory setting 50 ms

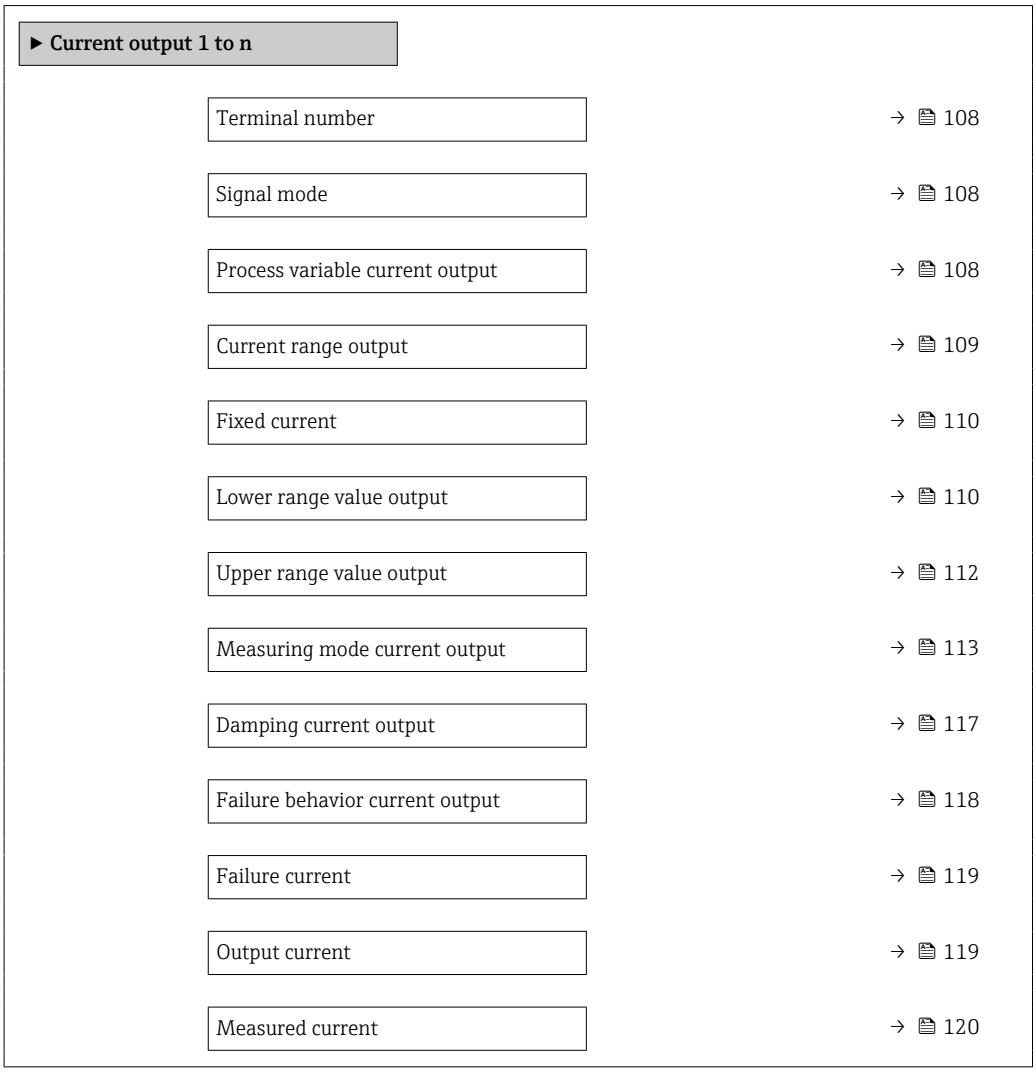
3.5 "Output" submenu

Navigation Expert → Output



3.5.1 "Current output 1 to n" submenu

Navigation Expert → Output → Curr.output 1 to n



Terminal number

Navigation Expert → Output → Curr.output 1 to n → Terminal no. (0379–1 to n)

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

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

Additional information *"Not used" option*

The current output module does not use any terminal numbers.

Signal mode

Navigation Expert → Output → Curr.output 1 to n → Signal mode (0377–1 to n)

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

Selection
- Active *
- Passive *

Factory setting Active

Process variable current output

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

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

Selection
- Off
- Volume flow
- Mass flow
- Corrected volume flow
- Flow velocity
- Conductivity
- Corrected conductivity *
- Temperature *
- Electronics temperature
- Noise *
- Coil current shot time *
- Reference electrode potential against PE *
- HBSI *
- Build-up index *

* Visibility depends on order options or device settings

- Test point 1
- Test point 2
- Test point 3

Factory setting Volume flow

Current range output

Navigation Expert → Output → Curr.output 1 to n → Curr.range out (0353-1 to n)

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)

Additional information *Description*

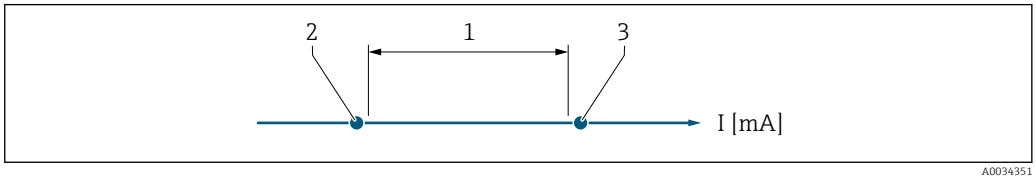
- In the event of a device alarm, the current output adopts the value specified in the **Failure mode** parameter (→ 118).
- If the measured value is outside the measuring range, the ⚠**S441 Current output 1 to n** diagnostic message is displayed.
- The measuring range is specified via the **Lower range value output** parameter (→ 110) and **Upper range value output** parameter (→ 112).

"Fixed current" option

The current value is set via the **Fixed current** parameter (→ 110).

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

Selection	1	2	3
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 to n** diagnostic message is displayed.

Fixed current

Navigation Expert → Output → Curr.output 1 to n → Fixed current (0365–1 to n)

Prerequisite The **Fixed current** option is selected in the **Current span** parameter (→ 109).

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

User entry 0 to 22.5 mA

Factory setting 22.5 mA

Lower range value output

Navigation Expert → Output → Curr.output 1 to n → Low.range outp (0367–1 to n)

Prerequisite One of the following options is selected in the **Current span** parameter (→ 109):
- 4...20 mA NE (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)
- 4...20 mA (4... 20.5 mA)
- 0...20 mA (0... 20.5 mA)

Description Use this function to enter a value for the start of measuring range.

User entry Signed floating-point number

Factory setting Depends on country:
- 0 l/h
- 0 gal/min (us)

Additional information *Description*

Positive and negative values are permitted depending on the process variable assigned in the **Assign current output** parameter (→ 108). In addition, the value can be greater

than or smaller than the value assigned for the 20 mA current in the **Upper range value output** parameter (→ 112).

Dependency

The unit depends on the process variable selected in the **Assign current output** parameter (→ 108).

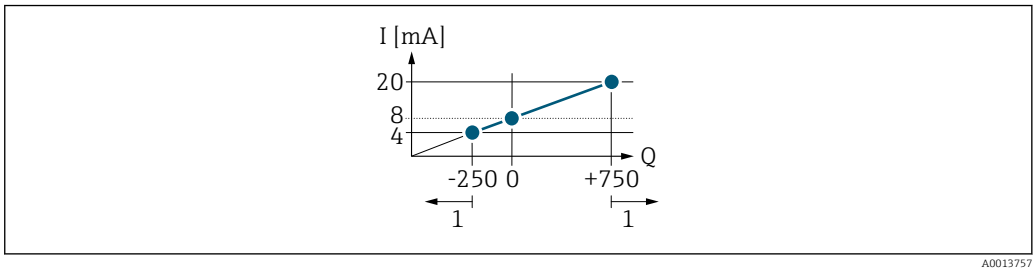
Current output behavior

The current output behaves differently depending on the settings configured in the following parameters:
- Current span (→ 109)
- Failure mode (→ 118)

Configuration examples

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

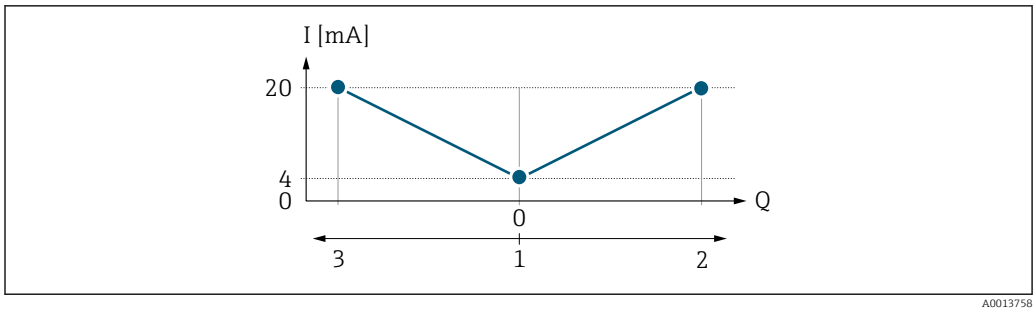
Configuration example A
Measurement mode with **Forward flow** option
- **Lower range value output** parameter (→ 110) = not equal to zero flow (e.g. −250 m^3/h)
- **Upper range value output** parameter (→ 112) = not equal to zero flow (e.g. +750 m^3/h)
- Calculated current value = 8 mA at zero flow



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 **Lower range value output** parameter (→ 110) and **Upper range value output** parameter (→ 112). If the effective flow exceeds or falls below this operational range, the ⚠**S441 Current output 1 to n** diagnostic message is output.

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



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

The current output signal is independent of the direction of flow (absolute amount of the measured variable). The values for the **Lower range value output** parameter (→ 110) and **Upper range value output** parameter (→ 112) must have the same algebraic sign. The value for the **Upper range value output** parameter (→ 112) (e.g. reverse flow) corresponds to the mirrored value for the **Upper range value output** parameter (→ 112) (e.g. forward 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 → 113.

Upper range value output

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

Prerequisite One of the following options is selected in the **Current span** parameter (→ 109):
- 4...20 mA NE (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)
- 4...20 mA (4... 20.5 mA)
- 0...20 mA (0... 20.5 mA)

Description Use this function to enter a value for the end of measuring range.

User entry Signed floating-point number

Factory setting Depends on country and nominal diameter → 229

Additional information *Description*

Positive and negative values are permitted depending on the process variable assigned in the **Assign current output** parameter (→ 108). In addition, the value can be greater

than or smaller than the value assigned for the 0/4 mA current in the **Lower range value output** parameter (→ 110).

Dependency

The unit depends on the process variable selected in the **Assign current output** parameter (→ 108).

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 (→ 113), different algebraic signs cannot be entered for the values for the **Lower range value output** parameter (→ 110) and **Upper range value output** parameter (→ 112). The ⚠**S441 Current output 1 to n** diagnostic message is displayed.

Configuration examples

Pay attention to the configuration examples for the **Lower range value output** parameter (→ 110).

Measuring mode current output

Navigation Expert → Output → Curr.output 1 to n → Meas.mode outp (0351−1 to n)

Prerequisite

One of the following options is selected in the **Assign current output** parameter (→ 108):
- Volume flow
- Mass flow
- Corrected volume flow
- Flow velocity
- Conductivity *
- Corrected conductivity *
- Temperature *
- Electronics temperature

One of the following options is selected in the **Current span** parameter (→ 109):
- 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

* Visibility depends on order options or device settings

Additional information

Description

The process variable that is assigned to the current output via the **Assign current output** parameter (→ 108) is displayed below the parameter.

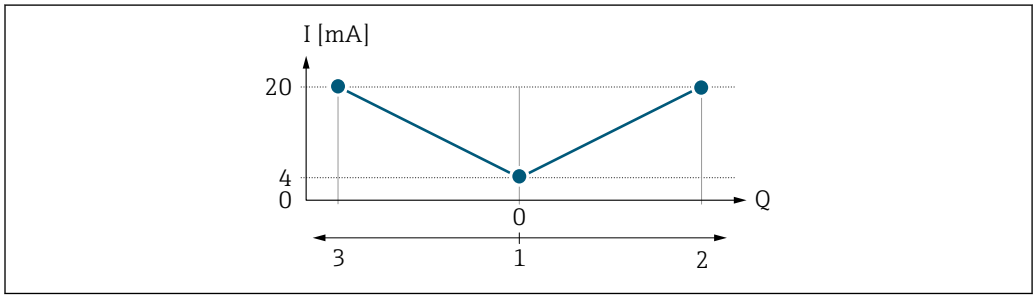
"Forward flow" option

The current output signal is proportional to the process variable assigned. The measuring range is defined by the values that are assigned to the **Lower range value output** parameter (→ 110) and the **Upper range value output** parameter (→ 112).

The flow components outside the scaled measuring range are taken into account for signal output as follows:

- Both values are defined such that they are not equal to zero flow e.g.:
  - start of measuring range = −5 m^3/h
  - end of measuring range = 10 m^3/h
- If the effective flow exceeds or falls below this measuring range, the ⚠**S441 Current output 1 to n** diagnostic message is output.

"Forward/Reverse flow" option



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

- The current output signal is independent of the direction of flow (absolute amount of the measured variable). The values for the **Lower range value output** parameter (→ 110) and **Upper range value output** parameter (→ 112) must have the same algebraic sign.
- The value for the **Upper range value output** parameter (→ 112) (e.g. reverse flow) corresponds to the mirrored value for the **Upper range value output** parameter (→ 112) (e.g. forward flow).

"Reverse flow compensation" option

The **Reverse flow compensation** option is primarily used to compensate for intermittent backflow 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.

If buffering cannot be processed within approx. 60 s, the ⚠**S441 Current output 1 to n** diagnostic message is displayed.

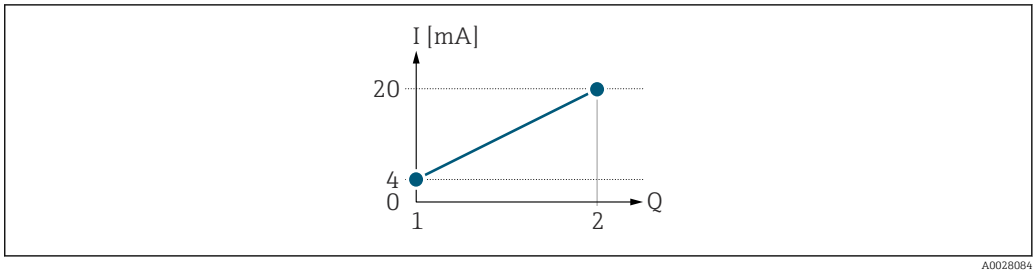
In the event of prolonged and undesired reverse flow, flow values can accumulate in the buffer memory. Due to the configuration of the current output, these values are not factored in, however, i.e. there is no compensation for the reverse flow.

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

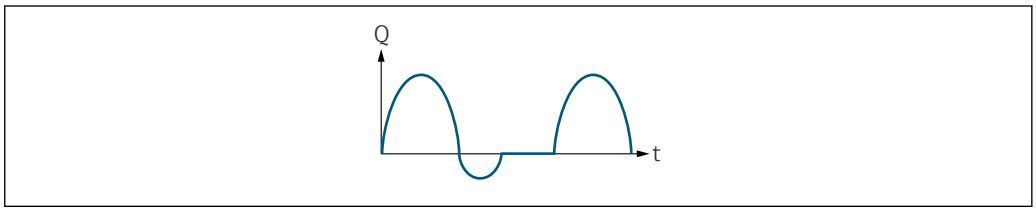
Defined measuring range: lower range value and upper range value with the **same** sign



2 *Measuring range*

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

With the following flow response:

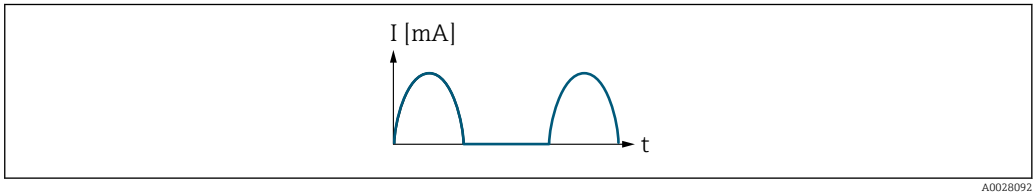


3 *Flow response*

Q *Flow*
t *Time*

With **Forward flow** option

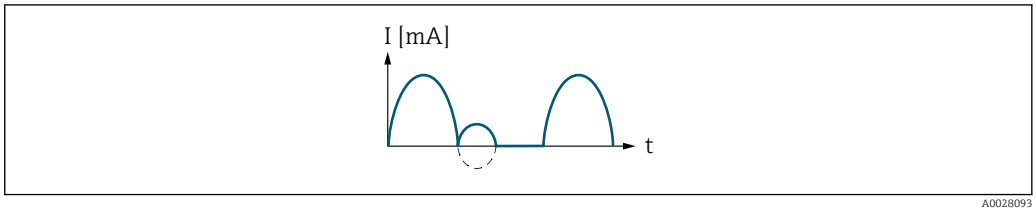
The current output signal is proportional to the process variable assigned. The flow components outside the scaled measuring range are not taken into account for signal output:.



I *Current*
t *Time*

With **Forward/Reverse flow** option

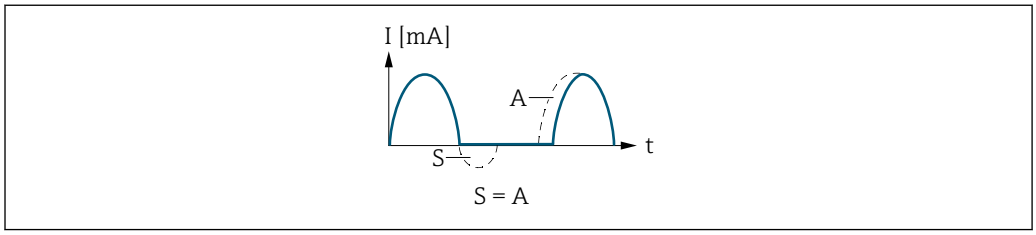
The current output signal is independent of the direction of flow.



I *Current*
t *Time*

With **Reverse flow compensation** option

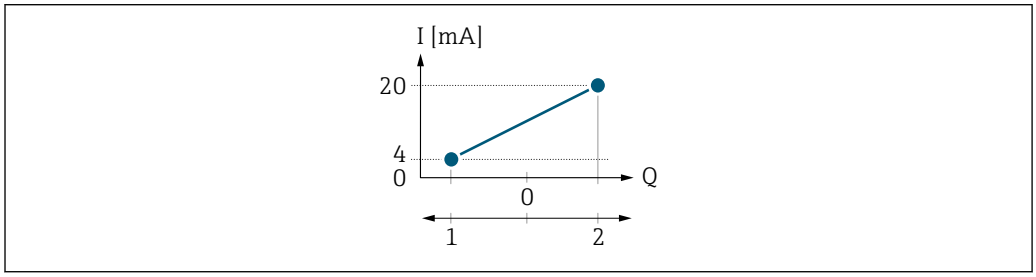
Flow components outside the measuring span are buffered, balanced and output after a maximum delay of 60 s.



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

Example 2

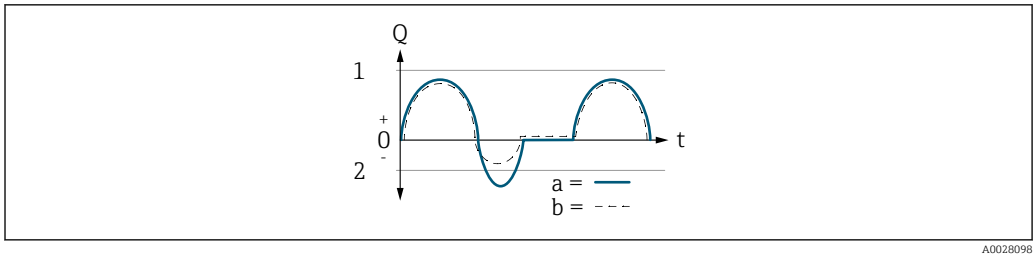
Defined measuring range: lower range value and upper range value with **different** signs



4 Measuring range

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

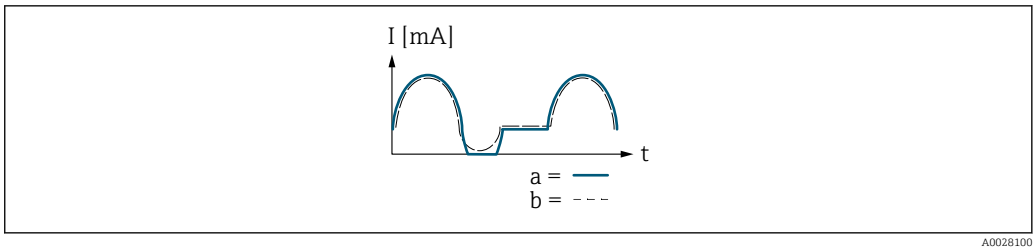
With flow a (—) outside, b (- -) inside the measuring range



Q Flow
t Time
1 Lower range value (Start of measuring range output)
2 Upper range value (end of measuring range output)

With **Forward flow** option

- a (—): The flow components outside the scaled measuring range cannot be taken into account for signal output.
  The ⚠**S441 Current output 1 to n** diagnostic message is output.
- b (- -): The current output signal is proportional to the process variable assigned.



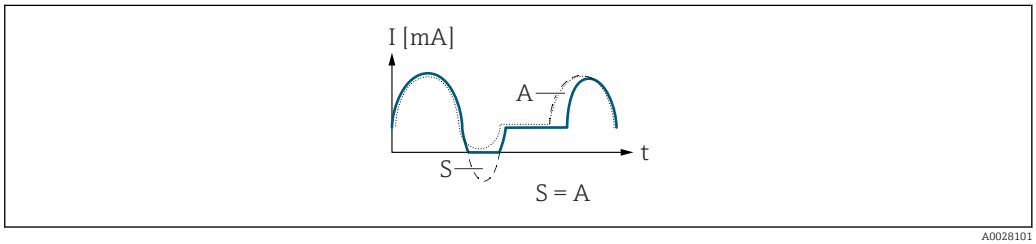
I Current
t Time

With **Forward/Reverse flow** option

This option cannot be selected here since the values for the **Lower range value output** parameter (→ 110) and **Upper range value output** parameter (→ 112) have different algebraic signs.

With **Reverse flow compensation** option

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



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

Damping current output

Navigation Expert → Output → Curr.output 1 to n → Damp.curr.outp (0363–1 to n)

Prerequisite A process variable is selected in the **Assign current output** parameter (→ 108) and one of the following options is selected in the **Current span** parameter (→ 109):
- 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 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).

Failure behavior current output

Navigation Expert → Output → Curr.output 1 to n → Fail.behav.out (0364–1 to n)

Prerequisite A process variable is selected in the **Assign current output** parameter (→ 108) and one of the following options is selected in the **Current span** parameter (→ 109):
- 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 (→ 109).

"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 (→ 109).

"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 (→ 119).

Failure current

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

Prerequisite The **Defined value** option is selected in the **Failure mode** parameter (→ 118).

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

User entry 0 to 22.5 mA

Factory setting 22.5 mA

Output current

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

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

User interface 3.59 to 22.5 mA

Measured current

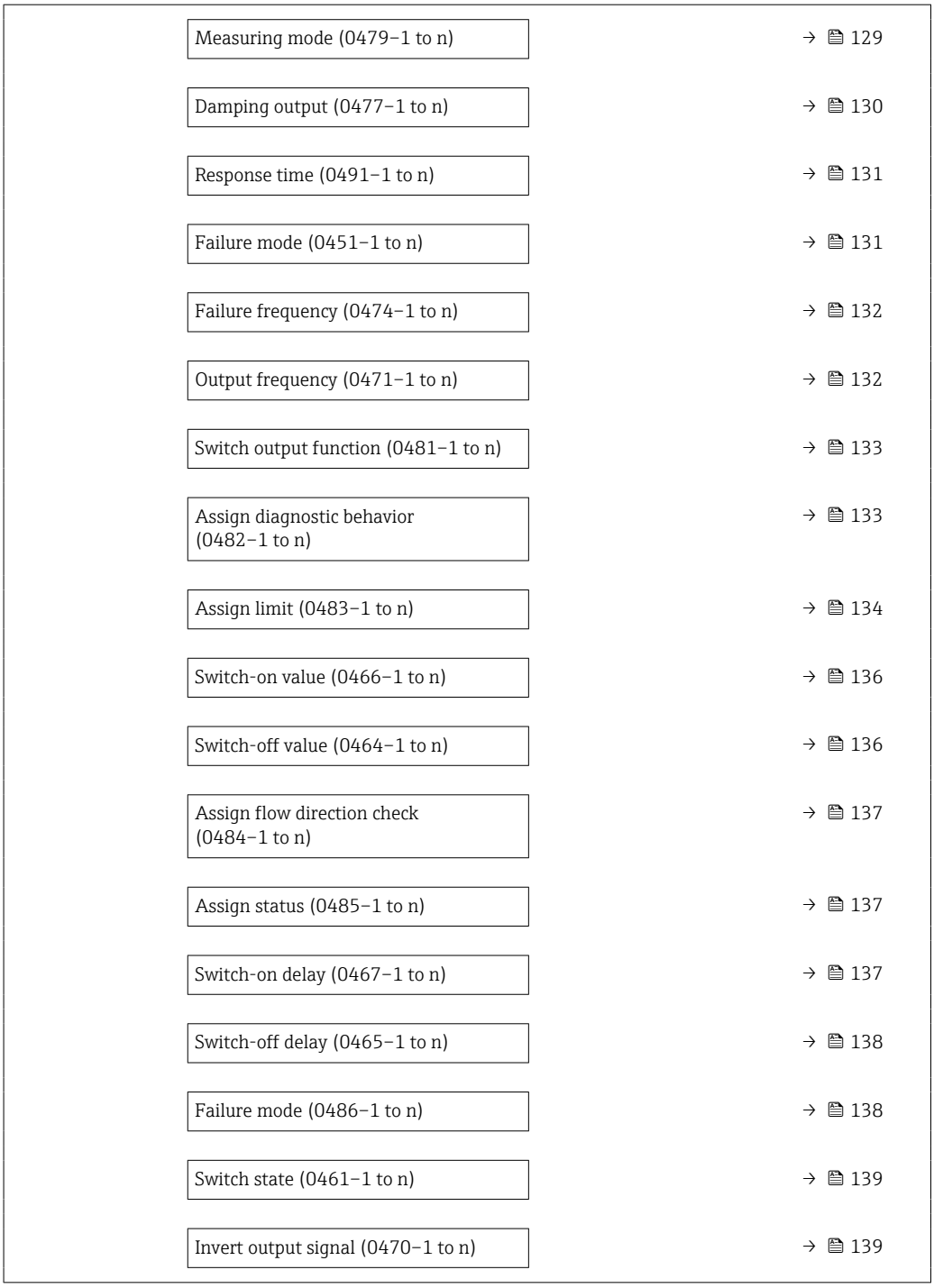
Navigation Expert → Output → Curr.output 1 to n → Measur. curr. (0366–1 to n)

Description Displays the actual measured value of the output current.

User interface 0 to 30 mA

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

Navigation Expert → Output → PFS output 1 to n



Terminal number

Navigation Expert → Output → PFS output 1 to n → Terminal no. (0492–1 to n)

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

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

Additional information *"Not used" option*

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

Signal mode

Navigation Expert → Output → PFS output 1 to n → Signal mode (0490–1 to n)

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

Selection
- Passive
- Active *
- Passive NE

Factory setting Passive

Operating mode

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

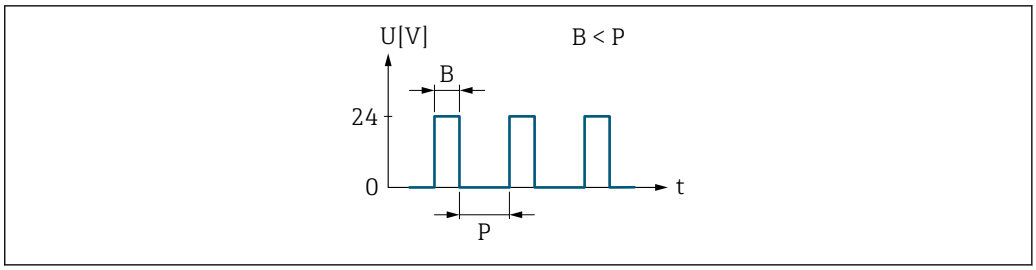
Factory setting Pulse

Additional information *"Pulse" option*

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

Example
- Flow rate approx. 100 g/s
- Pulse value 0.1 g
- Pulse width 0.05 ms
- Pulse rate 1 000 Impuls/s

* Visibility depends on order options or device settings



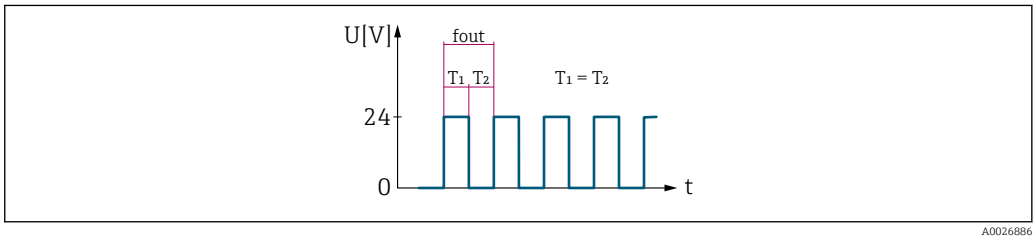
5 *Quantity-proportional pulse (pulse value) with pulse width to be configured*

B Pulse width entered
P Pauses between the individual pulses

"Frequency" option

Flow-proportional frequency output with on/off ratio of 1:1
An output frequency is output that is proportional to the value of a process variable, such as volume flow, mass flow, corrected volume flow, flow velocity, conductivity, corrected conductivity, temperature or electronics temperature.

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

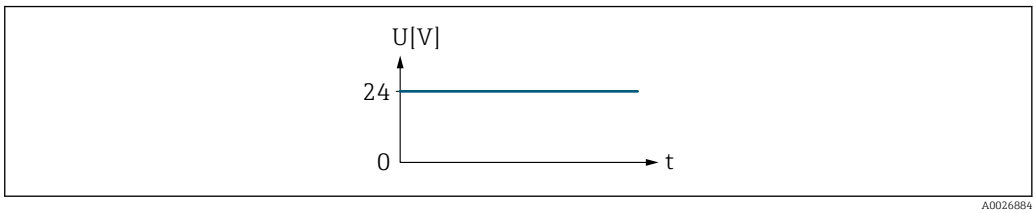


6 *Flow-proportional frequency output*

"Switch" option

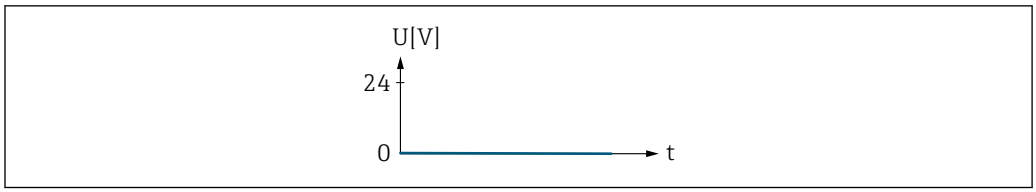
Contact for displaying a condition (e.g. alarm or warning if a limit value is reached)

Example
Alarm response without alarm



7 *No alarm, high level*

Example
Alarm response in case of alarm



8 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 the **Operating mode** parameter (→ 122).

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

Selection
- Off
- Volume flow
- Mass flow
- Corrected volume 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 (→ 122) and a process variable is selected in the **Assign pulse output** parameter (→ 124).

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→ 230

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 (→ 122) and a process variable is selected in the **Assign pulse output** parameter (→ 124).

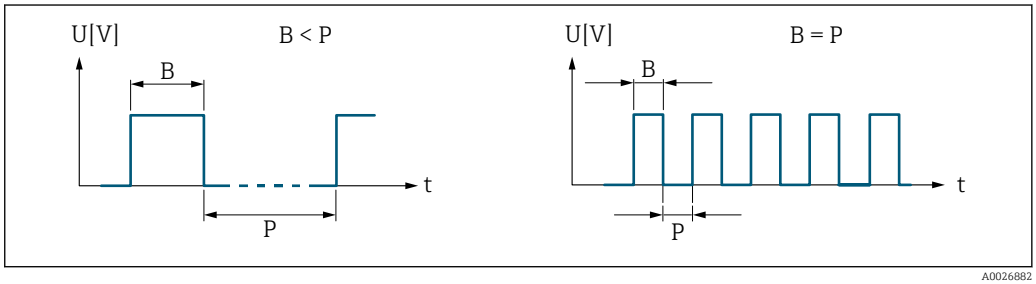
Description Use this function to enter the duration of the output pulse.

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.



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)

Prerequisite In the **Operating mode** parameter (→ 122), the **Pulse** option is selected, and one of the following options is selected in the **Assign pulse output** parameter (→ 124):
- Mass flow
- Volume flow
- Corrected volume flow

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

For a detailed description of the options available, see the **Measuring mode** parameter (→ 113)

Examples

For a detailed description of the configuration examples, see the **Measuring mode** parameter (→ 113)

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 (→ 122) and a process variable is selected in the **Assign pulse output** parameter (→ 124).

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

Selection
- Actual value
- No pulses

Factory setting
No pulses

Additional information
Description

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

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

NOTICE! A device alarm is a measuring device error that must be taken seriously. It can affect the measurement quality such that the quality can no longer be guaranteed. The

Actual value option is only recommended if it can be guaranteed that all possible alarm conditions will not affect the measurement quality.

Pulse output 1 to n

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

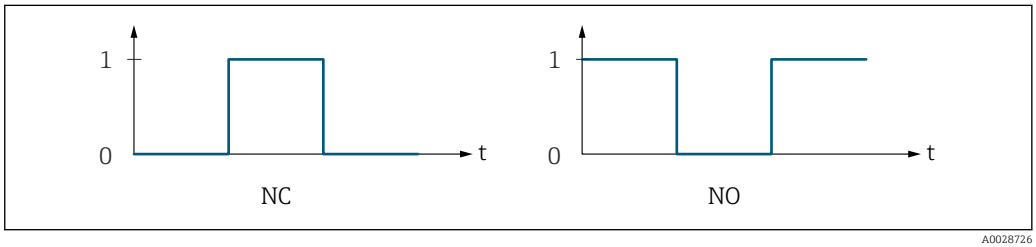
Prerequisite The **Pulse** option is selected in the **Operating mode** parameter (→ 122) parameter.

Description Displays the pulse frequency currently output.

User interface Positive floating-point number

Additional information *Description*

- The pulse output is an open collector output.
- This is configured at the factory in such a way that the transistor is conductive for the duration of the pulse (NO contact) and is safety-oriented.



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

The output behavior can be reversed via the **Invert output signal** parameter (→ 139) 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 (→ 126)) can be configured.

Assign frequency output

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

Prerequisite In the **Operating mode** parameter (→ 122), the **Frequency** option is selected.

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

Selection

- Off
- Volume flow
- Mass flow
- Corrected volume flow
- Flow velocity

- Conductivity *
- Corrected conductivity *
- Temperature *
- Electronics temperature
- Noise *
- Coil current shot time *
- Reference electrode potential against PE *
- HBSI *
- Build-up index *
- Test point 1
- Test point 2
- Test point 3

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 (→ 122) and a process variable is selected in the **Assign frequency output** parameter (→ 127).

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 (→ 122) and a process variable is selected in the **Assign frequency output** parameter (→ 127).

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

* Visibility depends on order options or device settings

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 (→ 122) and a process variable is selected in the **Assign frequency output** parameter (→ 127).

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

User entry Signed floating-point number

Factory setting Depends on country and nominal diameter

Additional information *Dependency*

The entry depends on the process variable selected in the **Assign frequency output** parameter (→ 127).

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 (→ 122) and a process variable is selected in the **Assign frequency output** parameter (→ 127).

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 (→ 127).

Measuring mode

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

Prerequisite One of the following options is selected in the **Assign current output** parameter (→ 108):
- Volume flow
- Mass flow
- Corrected volume flow
- Flow velocity

- Conductivity *
- Corrected conductivity *
- Temperature *
- Electronics temperature

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

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

Factory setting Forward flow

Additional information *Selection*

For a detailed description of the options available, see the **Measuring mode** parameter (→ 113)

Examples

For a detailed description of the configuration examples, see the **Measuring mode** parameter (→ 113)

Damping output

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

Prerequisite One of the following options is selected in the **Assign current output** parameter (→ 108):
- Volume flow
- Mass flow
- Corrected volume flow
- Flow velocity
- Conductivity *
- Corrected conductivity *
- Temperature *
- Electronics temperature

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

* Visibility depends on order options or device settings

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)

Prerequisite One of the following options is selected in the **Assign current output** parameter (→ 108):
- Volume flow
- Mass flow
- Corrected volume flow
- Flow velocity
- Conductivity *
- Corrected conductivity *
- Temperature *
- Electronics temperature

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

User interface Positive floating-point number

Additional information *Description*

The response time is made up of the time specified for the following dampings:
- Damping of pulse/frequency/switch output → 117
  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 (→ 122) and a process variable is selected in the **Assign frequency output** parameter (→ 127).

4) proportional transmission behavior with first order delay
* Visibility depends on order options or device settings

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

Selection
- Actual value
- Defined value
- 0 Hz

Factory setting 0 Hz

Additional information *Selection*

- Actual value
  In the event of a device alarm, the frequency output continues on the basis of the current flow measurement. The device alarm is ignored.
- Defined value
  In the event of a device alarm, the frequency output continues on the basis of a predefined value. The Failure frequency (→ 132) replaces the current measured value, making it possible to bypass the device alarm. The actual measurement is switched off for the duration of the device alarm.
- 0 Hz
  In the event of a device alarm, the frequency output is "switched off".

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

Failure frequency

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

Prerequisite In the **Operating mode** parameter (→ 122), the **Frequency** option is selected, in the **Assign frequency output** parameter (→ 127) a process variable is selected, and in the **Failure mode** parameter (→ 131), the **Defined value** option is selected.

Description Use this function to enter the value for the frequency output in the event of a device alarm in order to bypass the alarm.

User entry 0.0 to 12 500.0 Hz

Factory setting 0.0 Hz

Output frequency

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

Prerequisite In the **Operating mode** parameter (→ 122), 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 (→ 122).

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 *Selection*
- Off
  The switch output is permanently switched off (open, non-conductive).
- On
  The switch output is permanently switched on (closed, conductive).
- Diagnostic behavior
  Indicates if the diagnostic event is present or not. Is used to output diagnostic information and to react to it appropriately at the system level.
- Limit
  Indicates if a specified limit value has been reached for the process variable. Is used to output diagnostic information relating to the process and to react to it appropriately at the system level.
- Flow direction check
  Indicates the flow direction (forward or reverse flow).
- Status
  Displays the device status depending on whether empty pipe detection or 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 (→ 122), the **Switch** option is selected.
- In the **Switch output function** parameter (→ 133), 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

- In the **Operating mode** parameter (→ 122), the **Switch** option is selected.
- In the **Switch output function** parameter (→ 133), the **Limit** option is selected.

Description

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

Selection

- Off
- Volume flow
- Mass flow
- Corrected volume flow
- Flow velocity
- Conductivity *
- Corrected conductivity *
- Temperature *
- Electronics temperature
- Totalizer 1
- Totalizer 2
- Totalizer 3

Factory setting

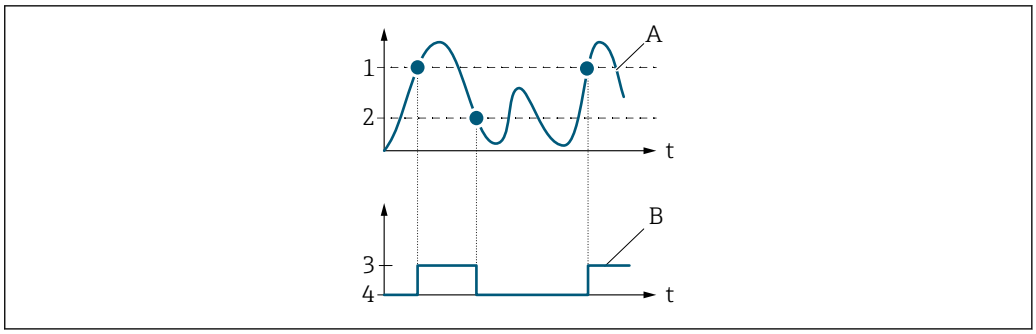
Volume flow

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



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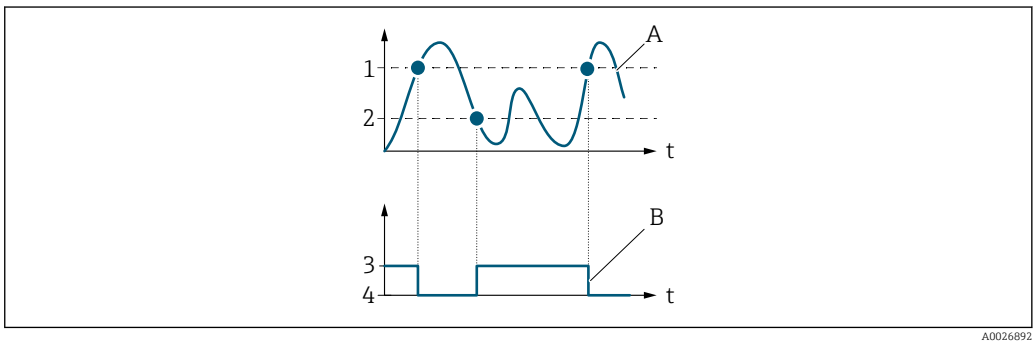
1 Switch-on value
2 Switch-off value
3 Conductive
4 Non-conductive
A Process variable
B Status output

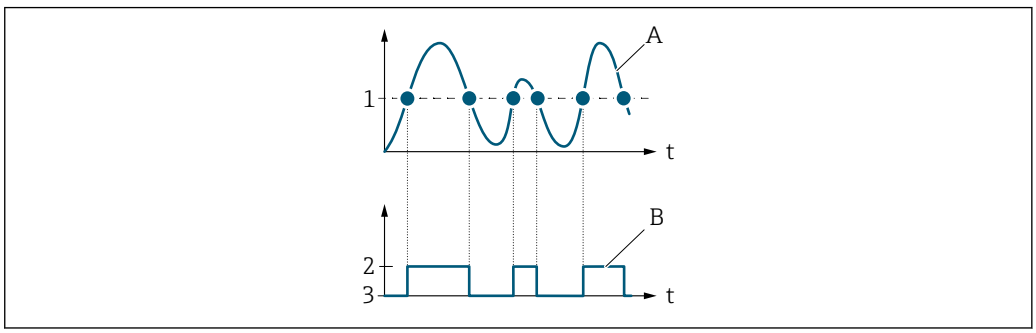
Behavior of status output when Switch-on value < Switch-off value:
- Process variable < Switch-on value: transistor is conductive
- Process variable > Switch-off value: transistor is non-conductive



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 (→ 122).
- The **Limit** option is selected in the **Switch output function** parameter (→ 133).

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

User entry Signed floating-point number

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

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 (→ 134).

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 (→ 122).
- The **Limit** option is selected in the **Switch output function** parameter (→ 133).

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

User entry Signed floating-point number

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

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 (→ 134).

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 (→ 122).
- The **Flow direction check** option is selected in the **Switch output function** parameter (→ 133).

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

Selection
- Off
- Volume flow
- Mass flow
- Corrected volume flow

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 the **Operating mode** parameter (→ 122).
- The **Status** option is selected in the **Switch output function** parameter (→ 133).

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

Selection
- Empty pipe detection
- Low flow cut off
- Binary output *
- Binary output *
- Binary output *
- Build-up index *
- HBSI limit exceeded *

Factory setting Empty pipe detection

Additional information *Selection*

If empty pipe detection or low flow cut off are active, the output is conductive. Otherwise, the switch 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 (→ 122).
- The **Limit** option is selected in the **Switch output function** parameter (→ 133).

* Visibility depends on order options or device settings

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 (→ 122).
- The **Limit** option is selected in the **Switch output function** parameter (→ 133).

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 (→ 122).

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)

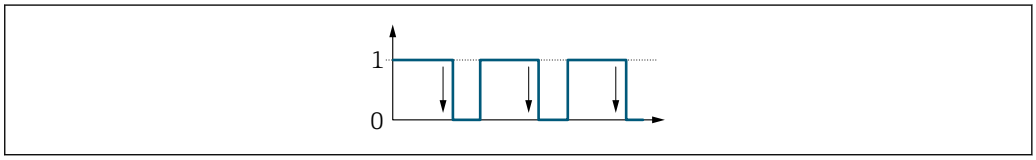
Description Use this function to select whether to invert the output signal.

Selection
- No
- Yes

Factory setting No

Additional information *Selection*

No option (passive - negative)



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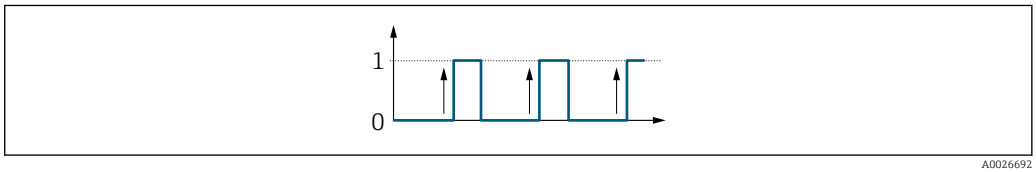
Yes option (passive - positive)



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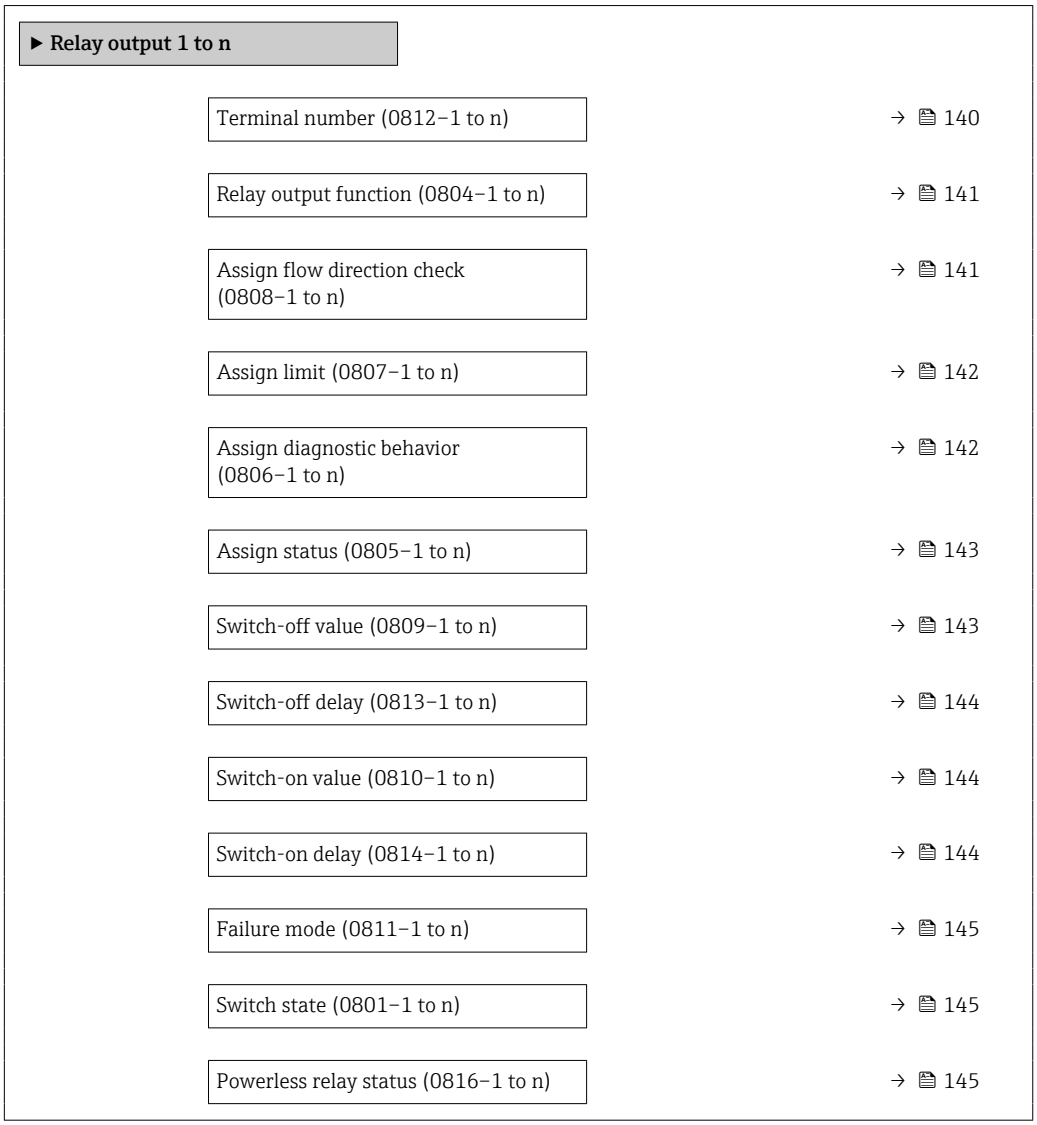
3.5.3 "Relay output 1 to n" submenu

Navigation Expert → Output → Relay output 1 to n



Terminal number

Navigation Expert → Output → Relay output 1 to n → Terminal no. (0812–1 to n)

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

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

Additional information *"Not used" option*

The relay output module does not use any terminal numbers.

Relay output function

Navigation Expert → Output → Relay output 1 to n → Relay outp.func. (0804–1 to n)

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

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

Factory setting Closed

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

Assign flow direction check

Navigation Expert → Output → Relay output 1 to n → Assign dir.check (0808–1 to n)

Prerequisite The **Flow direction check** option is selected in the **Relay output function** parameter (→ 141).

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

Selection
- Off
- Volume flow
- Mass flow
- Corrected volume flow

Factory setting Volume flow

Assign limit

Navigation Expert → Output → Relay output 1 to n → Assign limit (0807–1 to n)

Prerequisite The **Limit** option is selected in the **Relay output function** parameter (→ 141).

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

Selection
- Off
- Volume flow
- Mass flow
- Corrected volume flow
- Flow velocity
- Conductivity *
- Corrected conductivity *
- Temperature *
- Electronics temperature
- Totalizer 1
- Totalizer 2
- Totalizer 3

Factory setting Volume flow

Assign diagnostic behavior

Navigation Expert → Output → Relay output 1 to n → Assign diag. beh (0806–1 to n)

Prerequisite In the **Relay output function** parameter (→ 141), the **Diagnostic behavior** option is selected.

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

Selection
- Alarm
- Alarm or warning
- Warning

Factory setting Alarm

Additional information

Description

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

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

* Visibility depends on order options or device settings

Assign status

Navigation Expert → Output → Relay output 1 to n → Assign status (0805–1 to n)

Prerequisite In the **Relay output function** parameter (→ 141), the **Digital Output** option is selected.

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

Selection
- Empty pipe detection
- Low flow cut off
- Binary output *
- Binary output *
- Binary output *
- HBSI limit exceeded *

Factory setting Empty pipe detection

Switch-off value

Navigation Expert → Output → Relay output 1 to n → Switch-off value (0809–1 to n)

Prerequisite In the **Relay output function** parameter (→ 141), the **Limit** option is selected.

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

User entry Signed floating-point number

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

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 is dependent on the process variable selected in the **Assign limit** parameter (→ 142).

* Visibility depends on order options or device settings

Switch-off delay

Navigation Expert → Output → Relay output 1 to n → Switch-off delay (0813–1 to n)

Prerequisite In the **Relay output function** parameter (→ 141), the **Limit** option is selected.

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

User entry 0.0 to 100.0 s

Factory setting 0.0 s

Switch-on value

Navigation Expert → Output → Relay output 1 to n → Switch-on value (0810–1 to n)

Prerequisite The **Limit** option is selected in the **Relay output function** parameter (→ 141).

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

User entry Signed floating-point number

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

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 is dependent on the process variable selected in the **Assign limit** parameter (→ 142).

Switch-on delay

Navigation Expert → Output → Relay output 1 to n → Switch-on delay (0814–1 to n)

Prerequisite In the **Relay output function** parameter (→ 141), the **Limit** option is selected.

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

User entry 0.0 to 100.0 s

Factory setting 0.0 s

Failure mode

Navigation Expert → Output → Relay output 1 to n → Failure mode (0811–1 to n)

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

Selection
- Actual status
- Open
- Closed

Factory setting Open

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

Switch state

Navigation Expert → Output → Relay output 1 to n → Switch state (0801–1 to n)

Description Displays the current status of the relay output.

User interface
- Open
- Closed

Additional information *User interface*
- Open
  The relay output is not conductive.
- Closed
  The relay output is conductive.

Powerless relay status

Navigation Expert → Output → Relay output 1 to n → Powerless relay (0816–1 to n)

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

Selection
- Open
- Closed

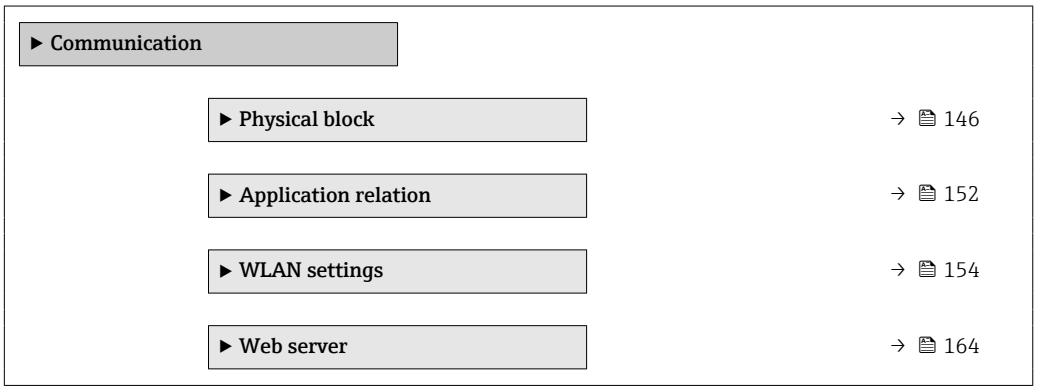
Factory setting Open

Additional information *Selection*

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

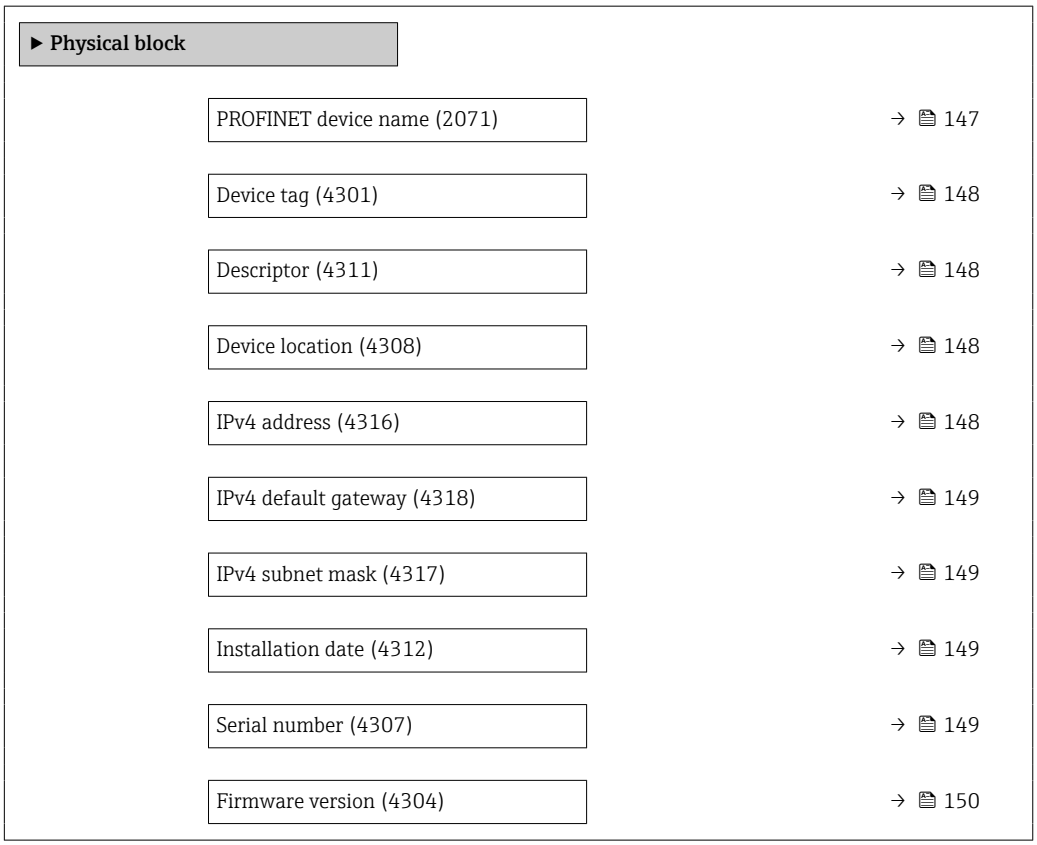
3.6 "Communication" submenu

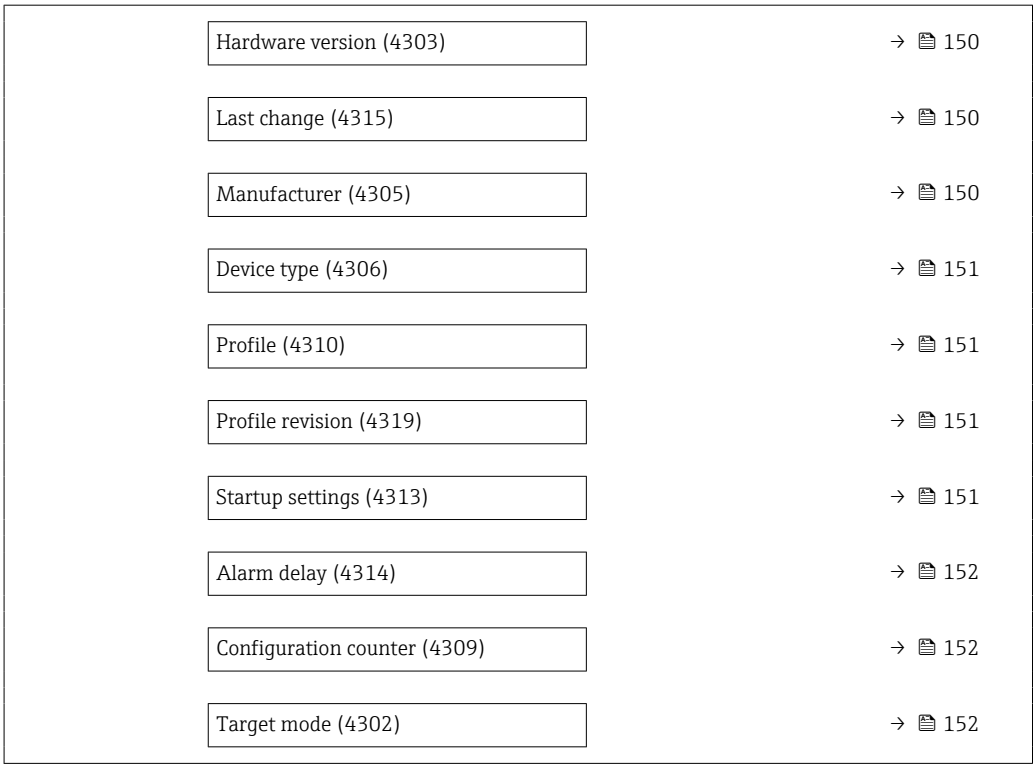
Navigation Expert → Communication



3.6.1 "Physical block" submenu

Navigation Expert → Communication → Physical block





PROFINET device name

Navigation Expert → Communication → Physical block → PROFINET DevName (2071)

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

User entry Max. 240 characters such as lower-case letters or numbers

Factory setting eh-promag300-xxxxx

Additional information

Description

The device tag corresponds to the device name ("Name Of Station" of PROFINET specification). The device name can be adjusted via DIP switch or the automation system.

Factory setting

Structure of the device tag:
eh-promag300-xxxxx
- eh: Endress+Hauser
- promag: Instrument family
- 300: Transmitter
- xxxxx: Serial number of the device

Device tag

Navigation Expert → Communication → Physical block → Device tag (4301)

Description Enter a name for the measuring point to identify the measuring device in the plant.

User entry Character string comprising numbers, letters and special characters (32)

Factory setting

Descriptor

Navigation Expert → Communication → Physical block → Descriptor (4311)

Description Enter a description for the measuring point.

User entry Character string comprising numbers, letters and special characters (54)

Factory setting

Device location

Navigation Expert → Communication → Physical block → Device location (4308)

Description Enter the location of the measuring point.

User entry Character string comprising numbers, letters and special characters (22)

Factory setting

IPv4 address

Navigation Expert → Communication → Physical block → IPv4 address (4316)

Description Shows the APL port IP address of the measuring device.

User interface Character string comprising numbers, letters and special characters

Factory setting 000.000.000.000

IPv4 default gateway

Navigation Expert → Communication → Physical block → IPv4 gateway (4318)

Description Shows the IP address of the default gateway for the APL port of the measuring device.

User interface Character string comprising numbers, letters and special characters

Factory setting 000.000.000.000

IPv4 subnet mask

Navigation Expert → Communication → Physical block → IPv4 subnet mask (4317)

Description Shows the subnet mask for the APL port of the measuring device.

User interface Character string comprising numbers, letters and special characters

Factory setting 000.000.000.000

Installation date

Navigation Expert → Communication → Physical block → InstallationDate (4312)

Description Enter date, e. g. date when the device was installed or commissioned.

User entry Character string comprising numbers, letters and special characters (16)

Factory setting

Serial number

Navigation Expert → Communication → Physical block → Serial number (4307)

Description Shows the serial number of the measuring device.

User interface Character string comprising numbers, letters and special characters

Factory setting

Firmware version

Navigation Expert → Communication → Physical block → Firmware version (4304)

Description Shows the device firmware version installed.

User interface Character string comprising numbers, letters and special characters

Factory setting 00.00.00

Hardware version

Navigation Expert → Communication → Physical block → Hardware version (4303)

Description Shows the hardware version of the measuring device.

User interface Character string comprising numbers, letters and special characters

Factory setting 00.00.00

Last change

Navigation Expert → Communication → Physical block → Last change (4315)

Description Enter the date when static parameters (e.g. configuration parameters) were last changed.

User entry Character string comprising numbers, letters and special characters (16)

Factory setting

Manufacturer

Navigation Expert → Communication → Physical block → Manufacturer (4305)

Description Shows the manufacturer of the measuring device.

User interface 0 to 65 535

Factory setting 17

Device type

Navigation Expert → Communication → Physical block → Device type (4306)

Description Shows the device type assigned by the manufacturer to the measuring device.

User interface Character string comprising numbers, letters and special characters

Factory setting Promag 300 500

Profile

Navigation Expert → Communication → Physical block → Profile (4310)

Description Shows the profile ID of the PA profile.

User interface 0 to 65 535

Factory setting 38 656

Profile revision

Navigation Expert → Communication → Physical block → Profile revision (4319)

User interface 0 to 65 535

Factory setting 1 026

Startup settings

Navigation Expert → Communication → Physical block → Startup settings (4313)

Description Indicates which configuration settings (factory settings unless otherwise specified by the controller) are applied on startup.

Selection
- None applied
- Only units applied
- All applied

Factory setting None applied

Alarm delay

Navigation Expert → Communication → Physical block → Alarm delay (4314)

Description Enter a delay to suppress momentarily pending diagnostic messages.

User entry 0 to 60

Factory setting 0

Configuration counter

Navigation Expert → Communication → Physical block → Config. counter (4309)

Description Shows the number of changes made to static parameters (e.g. configuration parameters).

User interface 0 to 65 535

Factory setting 0

Target mode

Navigation Expert → Communication → Physical block → Target mode (4302)

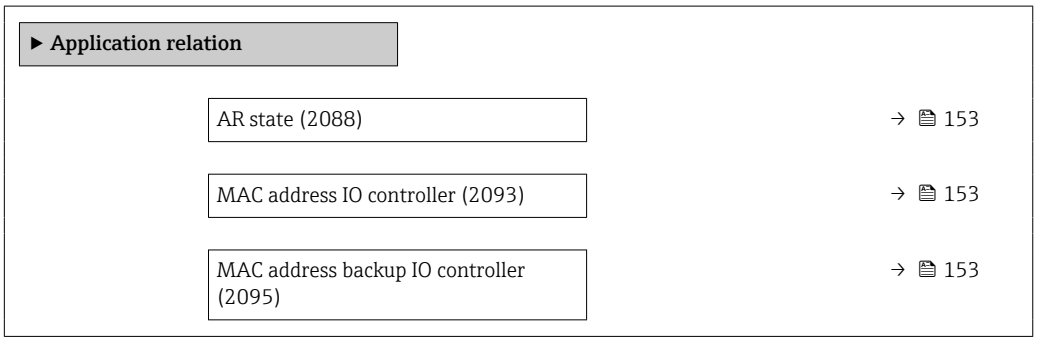
Description Select the target mode. The selected mode applies toall output function blocks.

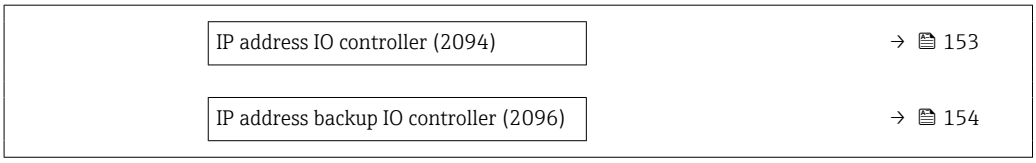
Selection
- Automatic
- Out of service

Factory setting Automatic

3.6.2 "Application relation" submenu

Navigation Expert → Communication → Applicat. relat.





AR state

Navigation Expert → Communication → Applicat. relat. → AR state (2088)

Description Displays whether an active AR (Application Relation) connection has been established.

User interface
- Active
- Not active
- Redundancy 1AR active
- Redundancy 2AR active

Factory setting Not active

MAC address IO controller

Navigation Expert → Communication → Applicat. relat. → MAC IO contr. (2093)

Description Shows the MAC address of the only or of the primary IO controller.

User interface Character string comprising numbers, letters and special characters

Factory setting 0x00

MAC address backup IO controller

Navigation Expert → Communication → Applicat. relat. → MAC backup IO c. (2095)

Description Shows the MAC adress of the backup IO controller.

User interface Character string comprising numbers, letters and special characters

Factory setting 0x00

IP address IO controller

Navigation Expert → Communication → Applicat. relat. → IP IO controller (2094)

Description Shows the IP address of the only or of the primary IO controller.

User interface Character string comprising numbers, letters and special characters

Factory setting 0x00

IP address backup IO controller

Navigation Expert → Communication → Applicat. relat. → IP backup IO c. (2096)

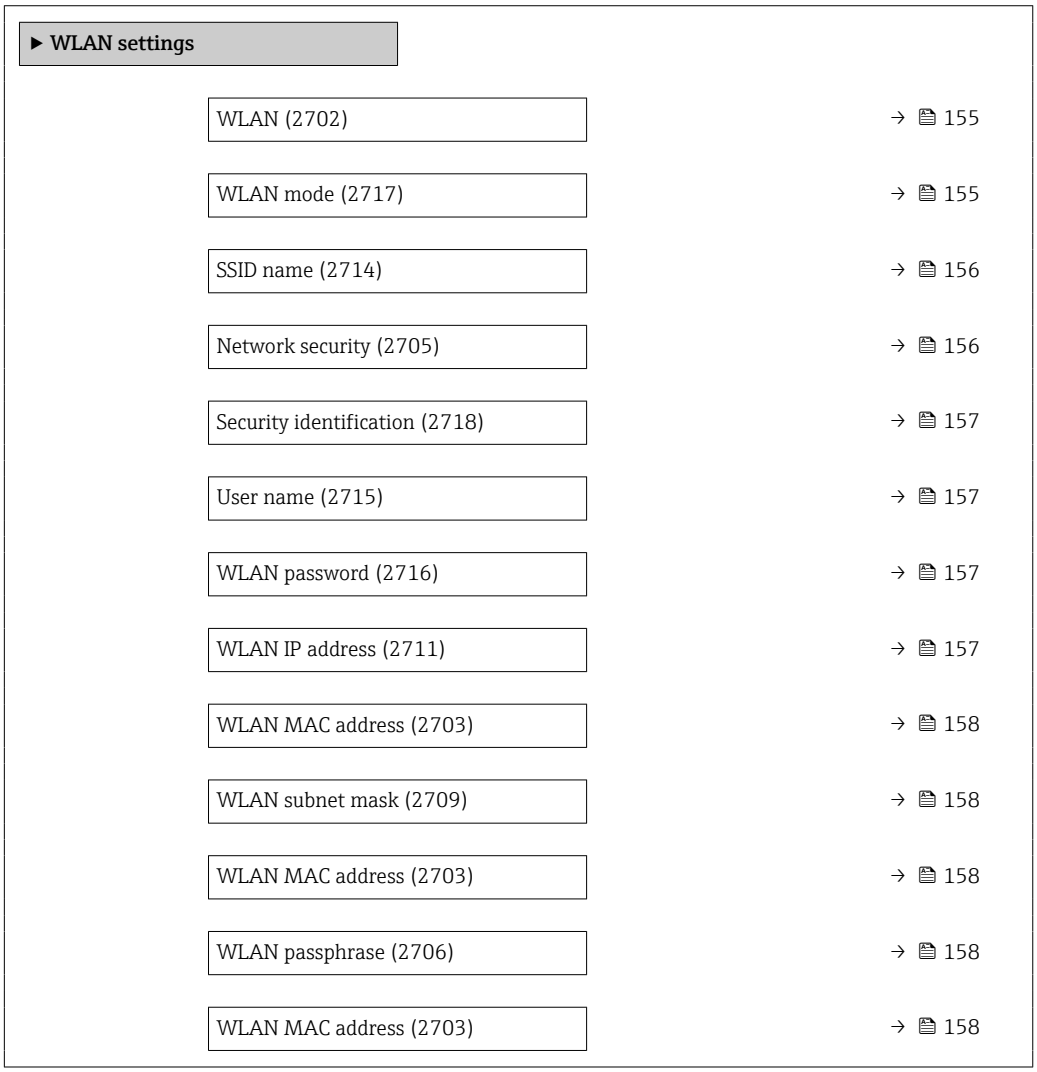
Description Shows the IP adress of the backup IO controller.

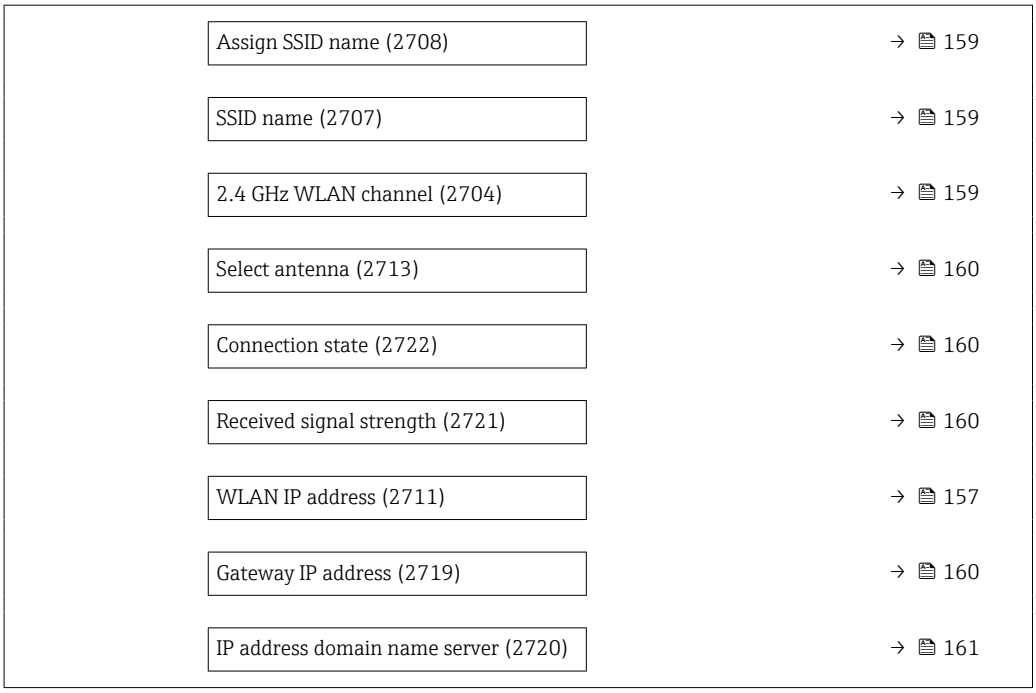
User interface Character string comprising numbers, letters and special characters

Factory setting 0x00

3.6.3 "WLAN settings" wizard

Navigation Expert → Communication → WLAN settings





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
- WLAN Client

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.

* Visibility depends on order options or device settings

Security identification

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

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

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

User name

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

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

User entry –

Factory setting –

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 [5] address of the measuring device.

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

Factory setting Each measuring device is given an individual address.

Additional information *Example*
For the display format
00:07:05:10:01:5F

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 (→ 156).

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)

5) Media Access Control

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 [6].

Selection
- Device tag
- User-defined

Factory setting User-defined

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

SSID name

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

Prerequisite
- The **User-defined** option is selected in the **Assign SSID name** parameter (→ 159).
- The **WLAN access point** option is selected in the **WLAN mode** parameter (→ 155).

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_Promag_300_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.

6) Service Set Identifier

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)

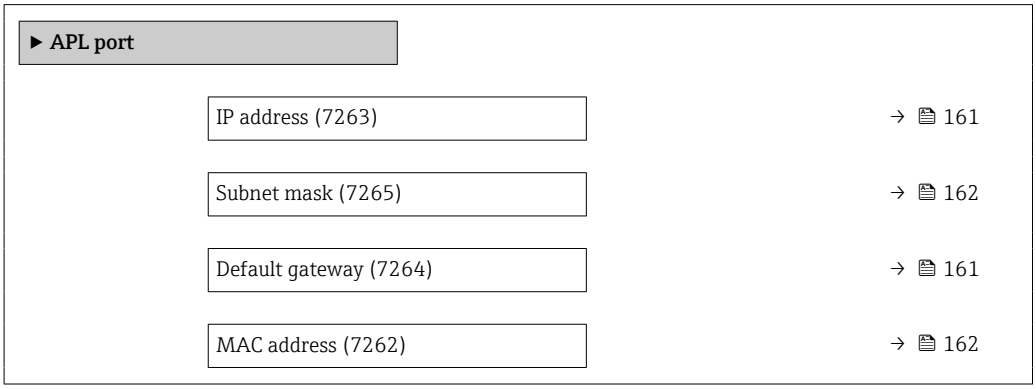
Description Use this function to enter the IP address of the domain name server.

User interface Character string comprising numbers, letters and special characters

Factory setting 192.168.1.212

3.6.4 "APL port" submenu

Navigation Setup → Communication → APL port



IP address

Navigation Setup → Communication → APL port → IP address (7263)

Description Enter the IP address of the measuring device.

User entry Character string comprising numbers, letters and special characters (15)

Factory setting 0.0.0.0

Default gateway

Navigation Setup → Communication → APL port → Default gateway (7264)

Description Enter IP address for the default gateway of the measuring device.

User entry Character string comprising numbers, letters and special characters (15)

Factory setting 0.0.0.0

Subnet mask

Navigation Setup → Communication → APL port → Subnet mask (7265)

Description Enter subnet mask of the measuring device.

User entry Character string comprising numbers, letters and special characters (15)

Factory setting 255.255.255.0

MAC address

Navigation Setup → Communication → APL port → MAC Address (7262)

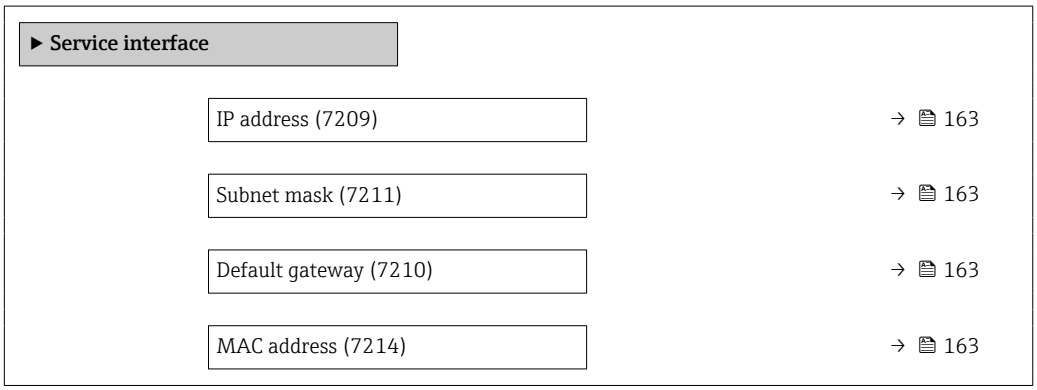
Description Shows the MAC address of the measuring device.

User interface Character string comprising numbers, letters and special characters

Factory setting

3.6.5 "Service interface" submenu

Navigation Setup → Communication → ServiceInterface



IP address

Navigation Setup → Communication → ServiceInterface → IP address (7209)

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

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

Factory setting 192.168.1.212

Subnet mask

Navigation Setup → Communication → ServiceInterface → 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 Setup → Communication → ServiceInterface → Default gateway (7210)

Description Display or enter the Default gateway (→ 163).

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

Factory setting 0.0.0.0

MAC address

Navigation Setup → Communication → ServiceInterface → MAC Address (7214)

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.

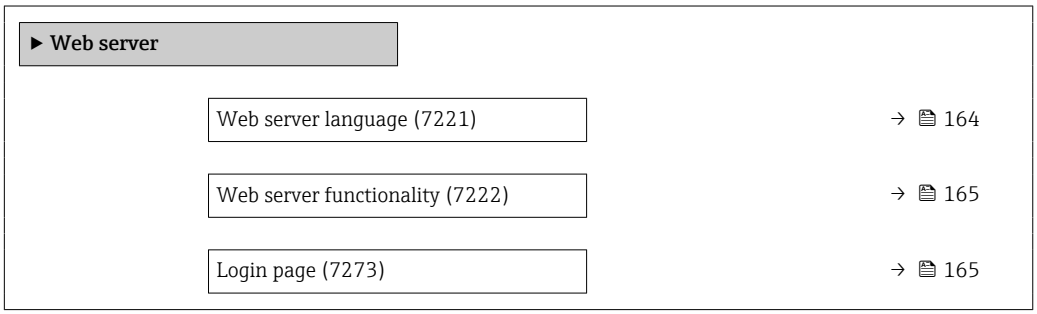
7) Media Access Control

Additional information *Example*

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

3.6.6 "Web server" submenu

Navigation Expert → Communication → Web server



Web server language

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

Description Set web server language.

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

Factory setting English

* Visibility depends on order options or device settings

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
- HTML Off
- On

Factory setting On

Additional information *Description*

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

Selection

Option	Description
Off	▪ The Web server is completely disabled. ▪ Port 80 is locked.
HTML Off	The HTML version of the Web server is not available.
On	▪ The complete Web server functionality is available. ▪ JavaScript is used. ▪ The password is transferred in an encrypted state. ▪ Any change to the password is also transferred in an encrypted state.

Login page

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

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

Selection
- Without header
- With header

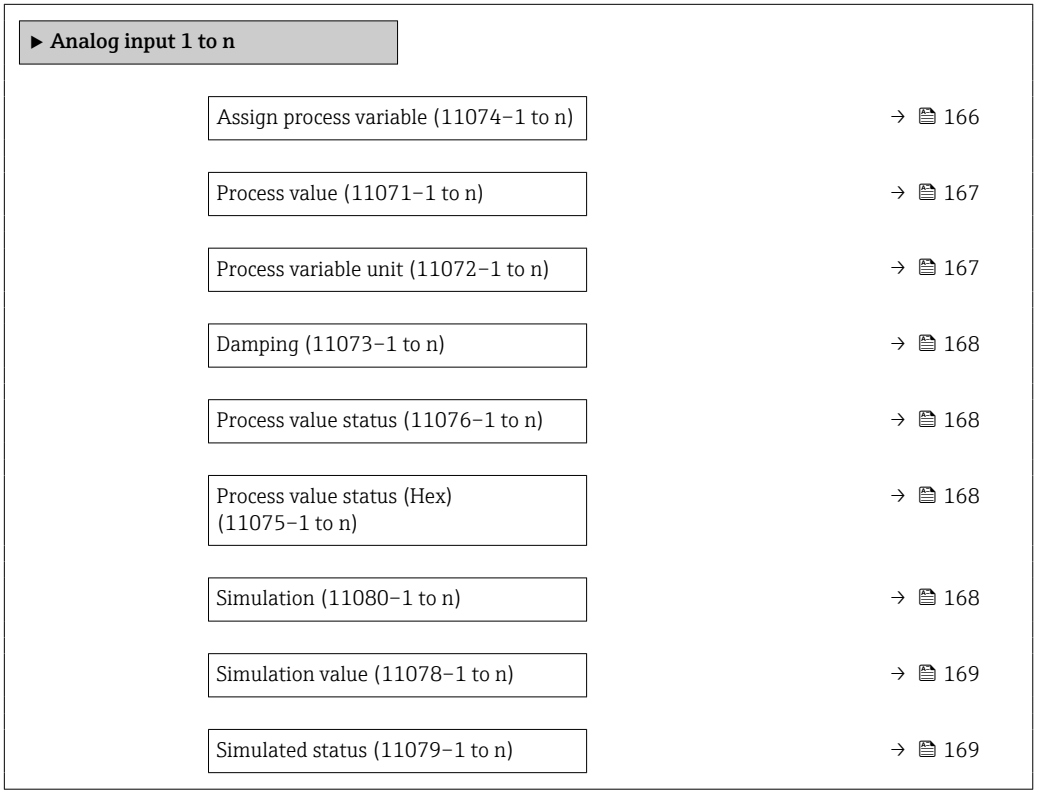
Factory setting With header

3.7 "Analog inputs" submenu

Navigation Expert → Analog inputs

3.7.1 "Analog inputs" submenu

Navigation Expert → Analog inputs → Volume flow



Assign process variable

Navigation
Expert → Analog inputs → Analog input 1 to n → Assign variable (11074–1 to n)
Expert → Analog inputs → Volume flow → Assign variable (11074)

Description
Select a process variable.

User interface
- Mass flow
- Volume flow
- Temperature
- Electronics temperature
- Noise *
- Coil current shot time *
- Reference electrode potential against PE *
- HBSI *

* Visibility depends on order options or device settings

- Build-up index **
- Current input 1
- Current input 2
- Current input 3
- Flow velocity
- Conductivity *
- Corrected conductivity *
- Corrected volume flow

Factory setting Volume flow

Process value

Navigation
- Expert → Analog inputs → Analog input 1 to n → Process value (11071–1 to n)
- Expert → Analog inputs → Volume flow → Process value (11071)

Description Shows the process value reported to the controller for further processing.

User interface Signed floating-point number

Factory setting 0 l/h

Process variable unit

Navigation
- Expert → Analog inputs → Analog input 1 to n → ProcVariableUnit (11072–1 to n)
- Expert → Analog inputs → Volume flow → ProcVariableUnit (11072)

Description Shows the unit of the process variable.

User interface 0 to 65 535

Factory setting 1 997

** The build-up index is only available in conjunction with Heartbeat Technology. If Heartbeat Technology was ordered together with the measuring device, the option will already be enabled, and no further action is required. If Heartbeat Technology was ordered at a later date, you must first activate the option under 'Activate SW option' by entering the activation key you received. To purchase Heartbeat Technology, contact your local sales and service center. In addition to Heartbeat Technology, conductivity measurement must be enabled on the device. To do this, go to the 'Conductivity measurement' parameter on the 'Process parameters' menu and select the 'On' option.

* Visibility depends on order options or device settings

Damping

Navigation
- Expert → Analog inputs → Analog input 1 to n → Damping (11073–1 to n)
- Expert → Analog inputs → Volume flow → Damping (11073)

Description
Enter time constant for input damping (PT1 element). Damping reduces the effect of fluctuations in the measured value on the output signal.

User entry
Positive floating-point number

Factory setting
1.0 s

Process value status

Navigation
- Expert → Analog inputs → Analog input 1 to n → Proc.ValueStatus (11076–1 to n)
- Expert → Analog inputs → Volume flow → Proc.ValueStatus (11076)

Description
Shows the status of the process value reported to the controller for further processing ('Good', 'Uncertain', 'Bad').

User interface
- Good
- Uncertain
- Bad

Factory setting
Good

Process value status (Hex)

Navigation
- Expert → Analog inputs → Volume flow → ProcValStatusHex (11075)
- Expert → Analog inputs → Analog input 1 to n → ProcValStatusHex (11075–1 to n)

Description
Shows the status of the process value reported to the controller for further processing (Hex).

User interface
0 to 255

Factory setting
128

Simulation

Navigation
- Expert → Analog inputs → Analog input 1 to n → Simulation (11080–1 to n)
- Expert → Analog inputs → Volume flow → Simulation (11080)

Description
Switch simulation of the analog input on or off (Off = 0, On <> 0).

User entry 0 to 255

Factory setting 0

Simulation value

Navigation Expert → Analog inputs → Volume flow → Simulation value (11078)
Expert → Analog inputs → Analog input 1 to n → Simulation value (11078–1 to n)

Description Enter the simulation value for the selected process variable.

User entry Signed floating-point number

Factory setting 0 l/h

Simulated status

Navigation Expert → Analog inputs → Volume flow → Simulated status (11079)
Expert → Analog inputs → Analog input 1 to n → Simulated status (11079–1 to n)

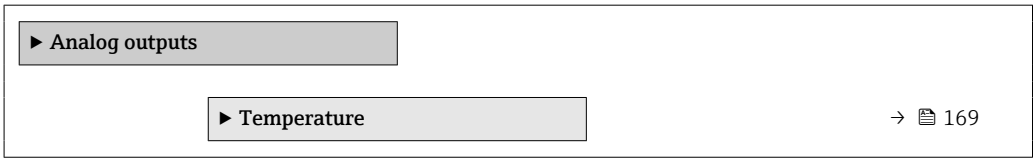
Description Specify the status of the simulated process value (Hex).

User entry 0 to 255

Factory setting 60

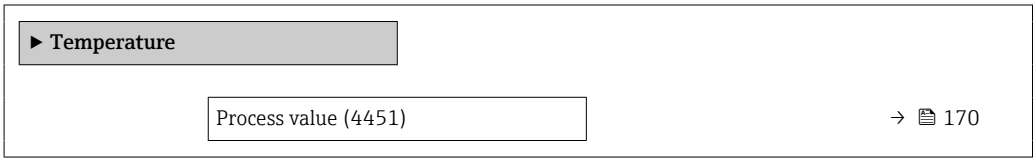
3.8 "Analog outputs" submenu

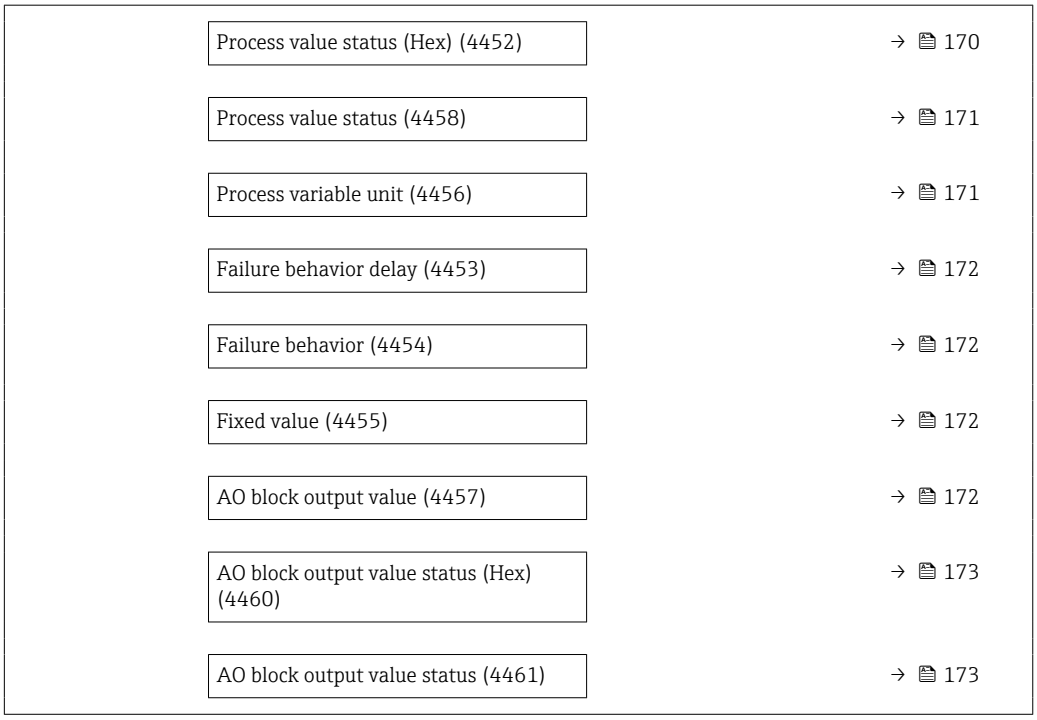
Navigation Expert → Analog outputs



3.8.1 "Temperature" submenu

Navigation Expert → Analog outputs → Temperature





Process value

Navigation Expert → Analog outputs → Temperature → Process value (4451)

Description Shows the process value reported by the controller for further processing.

User entry Signed floating-point number

Factory setting 0 °C

Process value status (Hex)

Navigation Expert → Analog outputs → Temperature → ProcValStatusHex (4452)

Description Shows the status of the process value reported by the controller (Hex).

User entry 0 to 255

Factory setting 128

Process value status

Navigation Expert → Analog outputs → Temperature → Proc.ValueStatus (4458)

Description Shows the status of the process value reported by the controller ('Good', 'Uncertain', 'Bad').

User interface
- Good
- Uncertain
- Bad

Factory setting Good

Process variable unit

Navigation Expert → Analog outputs → Temperature → ProcVariableUnit (4456)

Description Shows the unit of the process variable.

Selection

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

US units
- SG60°F *
- 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) *

Other units
- °API *

* Visibility depends on order options or device settings

or

SI units
- °C *
- K *

US units
- °F *
- °R *

* Visibility depends on order options or device settings

Factory setting °C

Failure behavior delay

Navigation Expert → Analog outputs → Temperature → FailBehavDelay (4453)

Description Enter a delay until in the event of a failure (value with status 'Bad') the failure behavior specified applies.

User entry Positive floating-point number

Factory setting 0 s

Failure behavior

Navigation Expert → Analog outputs → Temperature → Failure behavior (4454)

Description Select failure behavior in the event of a failure (value with status 'Bad').

Selection
- Fixed value
- Last valid value
- Actual value

Factory setting Actual value

Fixed value

Navigation Expert → Analog outputs → Temperature → Fixed value (4455)

Description Enter value to report in the event of a failure (value with status 'Bad').

User entry Signed floating-point number

Factory setting 0 °C

AO block output value

Navigation Expert → Analog outputs → Temperature → AOBlockOutValue (4457)

Description Shows the external process value reported to the measuring device for further processing.

User entry Signed floating-point number

Factory setting 0 °C

AO block output value status (Hex)

Navigation Expert → Analog outputs → Temperature → OutValStatusHex (4460)

Description Shows the status of the external process value reported to the measuring device for further processing (Hex).

User entry 0 to 255

Factory setting 128

AO block output value status

Navigation Expert → Analog outputs → Temperature → OutValueStatus (4461)

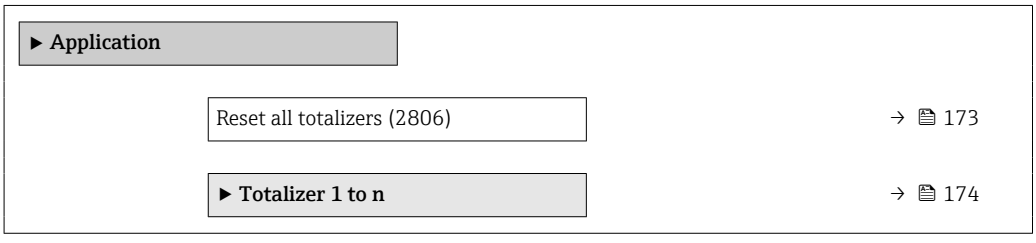
Description Shows the status of the external process value reported to the measuring device for further processing ('Good', 'Uncertain', 'Bad').

User interface
- Good
- Uncertain
- Bad

Factory setting Good

3.9 "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 flow values previously totalized.

Selection
- Cancel
- Reset + totalize

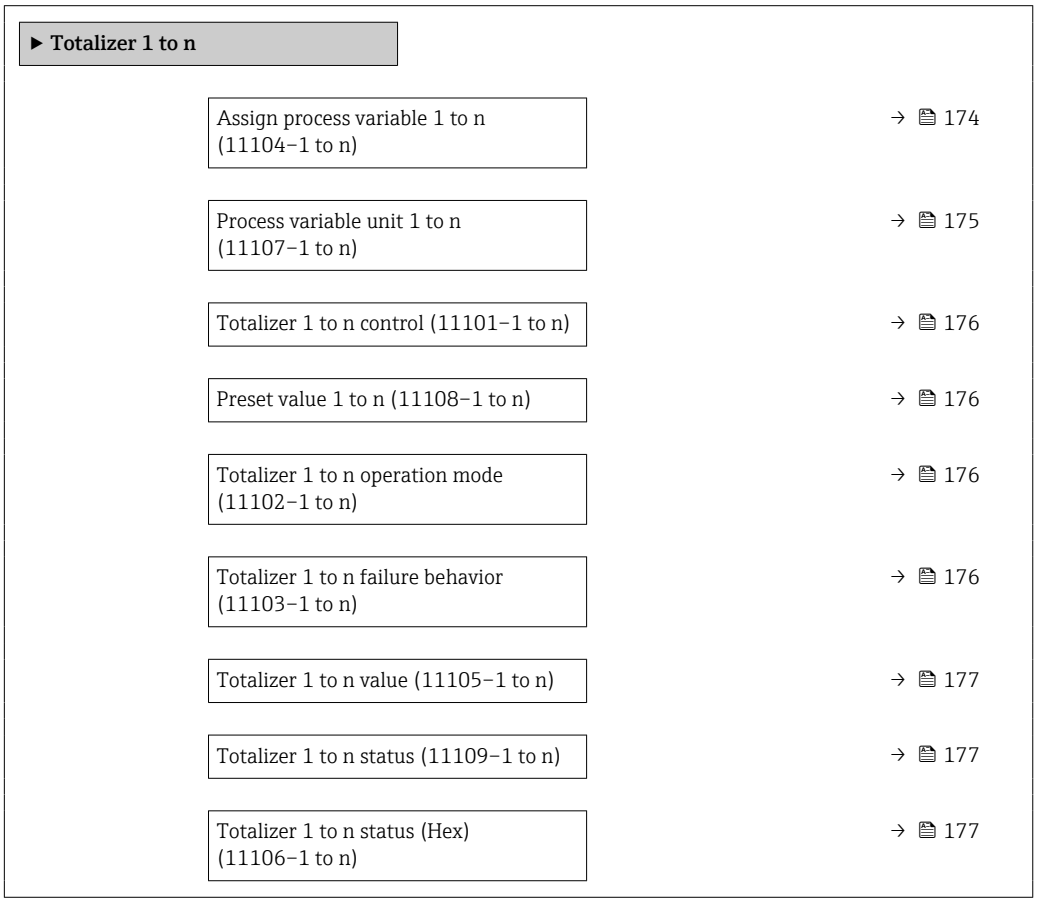
Factory setting Cancel

Additional information *Selection*

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

3.9.1 "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 (11104–1 to n)

Description Select process variable for totalizer.

Selection
- Volume flow
- Mass flow
- Corrected volume flow

Factory setting Volume flow

Process variable unit 1 to n

Navigation Expert → Application → Totalizer 1 to n → VariableUnit 1 to n (11107–1 to n)

Description Select the unit for the process variable of the totalizer.

Selection

SI units
- g *
- kg *
- t *

US units
- oz *
- lb *
- STon *

* Visibility depends on order options or device settings

or

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

US units
- 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) *

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

* Visibility depends on order options or device settings

or

SI units
- Nl *
- Nhl *
- Nm^3 *
- Sl *
- Sm^3 *

US units
- Sft^3 *
- $MSft^3$ *
- $MMSft^3$ *
- Sgal (us) *
- Sbbl (us;liq.) *
- Sbbl (us;oil) *

Imperial units
Sgal (imp) *

* Visibility depends on order options or device settings

Factory setting l

Totalizer 1 to n control

Navigation Expert → Application → Totalizer 1 to n → Tot. 1 to n control (11101–1 to n)

Description Operate the totalizer.

Selection
- Reset + hold
- Preset + hold
- Hold
- Totalize

Factory setting Totalize

Preset value 1 to n

Navigation Expert → Application → Totalizer 1 to n → Preset value 1 to n (11108–1 to n)

Description Specify start value for totalizer.

User entry Signed floating-point number

Factory setting 0 l

Totalizer 1 to n operation mode

Navigation Expert → Application → Totalizer 1 to n → Operat. mode 1 to n (11102–1 to n)

Description Select totalizer operation mode, e.g. only totalize forward flow or only totalize reverse flow.

Selection
- Net
- Forward
- Reverse

Factory setting Forward

Totalizer 1 to n failure behavior

Navigation Expert → Application → Totalizer 1 to n → FailureBehav. 1 to n (11103–1 to n)

Description Select totalizer behavior in the event of a device alarm.

Selection
- Hold
- Continue
- Last valid value + continue

Factory setting Continue

Totalizer 1 to n value

Navigation Expert → Application → Totalizer 1 to n → Tot. 1 to n value (11105–1 to n)

Description Shows the totalizer value reported to the controller for further processing.

User interface Signed floating-point number

Factory setting 0 l

Totalizer 1 to n status

Navigation Expert → Application → Totalizer 1 to n → Tot. 1 to n status (11109–1 to n)

Description Shows the status of the totalizer value reported to the controller for further processing ('Good', 'Uncertain', 'Bad').

User interface
- Good
- Uncertain
- Bad

Factory setting Good

Totalizer 1 to n status (Hex)

Navigation Expert → Application → Totalizer 1 to n → Status 1 to n (Hex) (11106–1 to n)

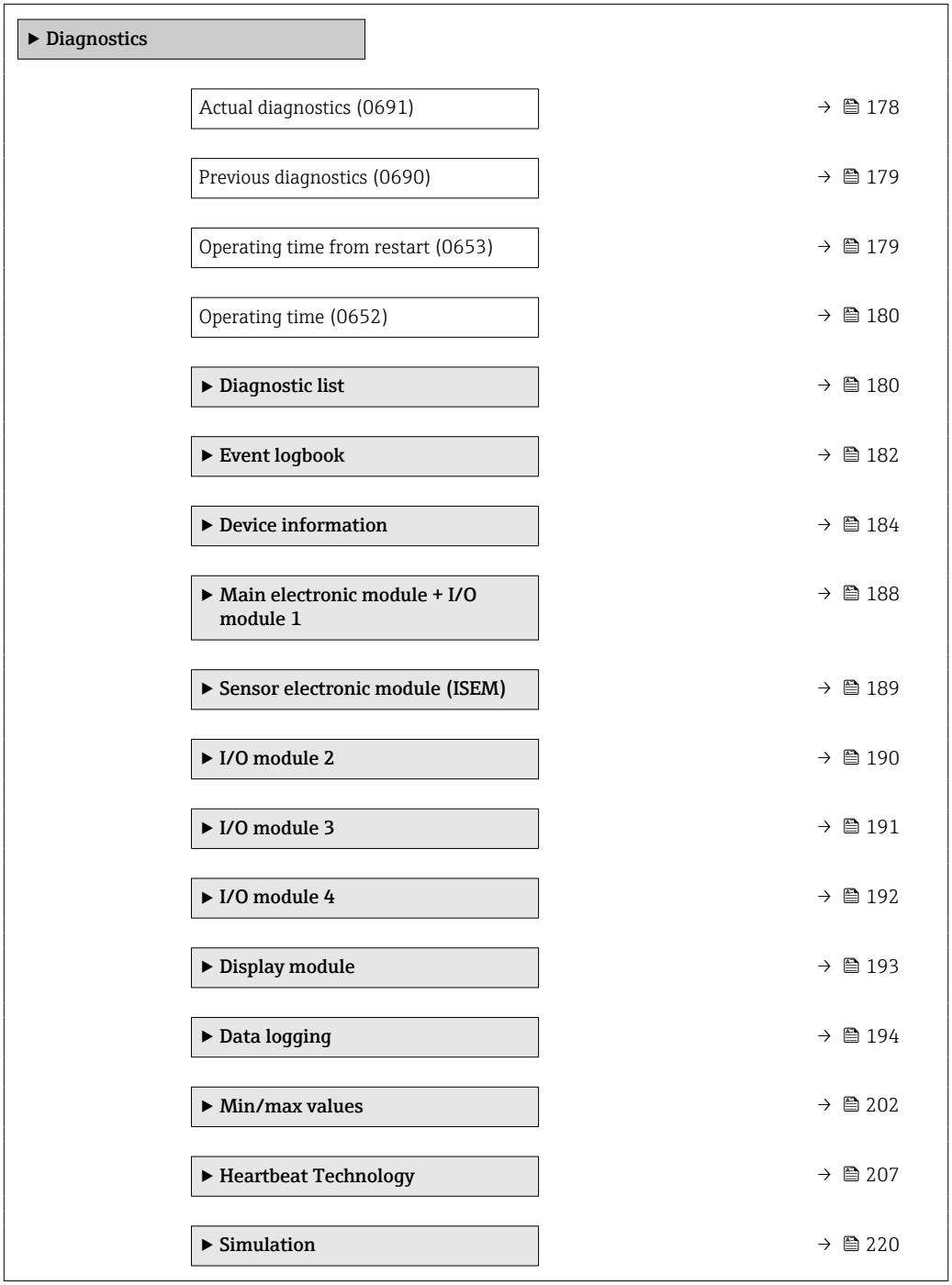
Description Shows the status of the totalizer value reported to the controller for further processing (Hex).

User interface 0 to 255

Factory setting 128

3.10 "Diagnostics" submenu

Navigation Expert → Diagnostics



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 (→ 180).

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

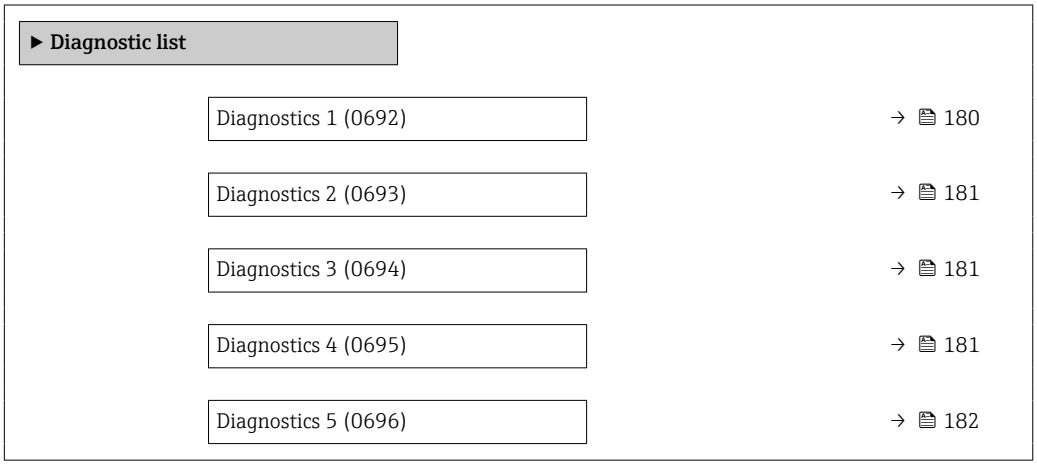
User interface Days (d), hours (h), minutes (m) and seconds (s)

Additional information *User interface*

The maximum number of days is 9999, which is equivalent to 27 years.

3.10.1 "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:
- ⊗F271 Main electronic failure
- ⊗F276 I/O module failure

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

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

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

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

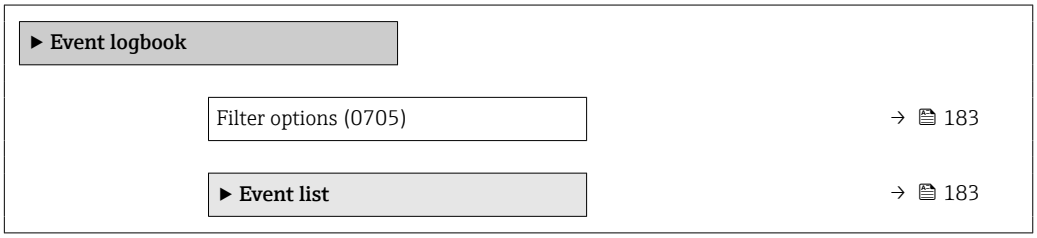
For the display format:
- ⊗F271 Main electronic failure
- ⊗F276 I/O module failure

3.10.2 "Event logbook" submenu

Viewing event messages

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

Navigation Expert → Diagnostics → Event logbook



Filter options

Navigation Expert → Diagnostics → Event logbook → Filter options (0705)

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

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

Factory setting All

Additional information *Description*

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

"Event list" submenu

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

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

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

Navigation Expert → Diagnostics → Event logbook → Event list

Event list

Navigation Expert → Diagnostics → Event logbook → Event list

Description Displays the history of event messages of the category selected in the **Filter options** parameter (→ 183).

User interface

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

Additional information

Description

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

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

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

Examples

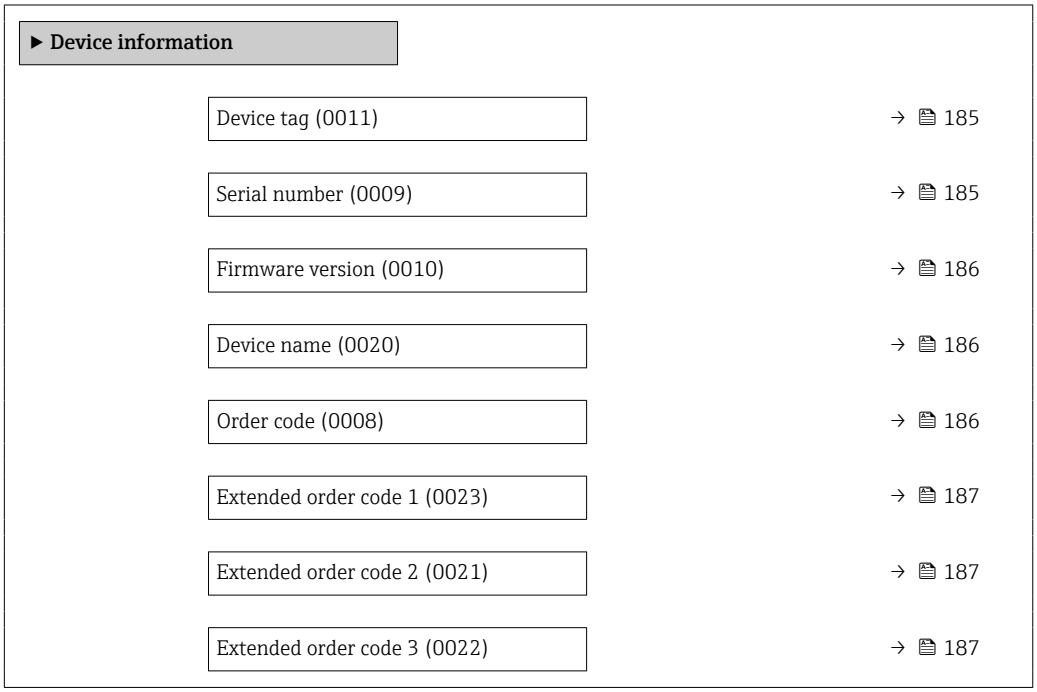
For the display format:
- I1091 Configuration modified
  ⊕ 24d12h13m00s
- ⊗F271 Main electronic failure
  ⊕ 01d04h12min30s

HistoROM

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

3.10.3 "Device information" submenu

Navigation Expert → Diagnostics → Device info



Configuration counter (2751)	→ 187
ENP version (0012)	→ 188

Device tag

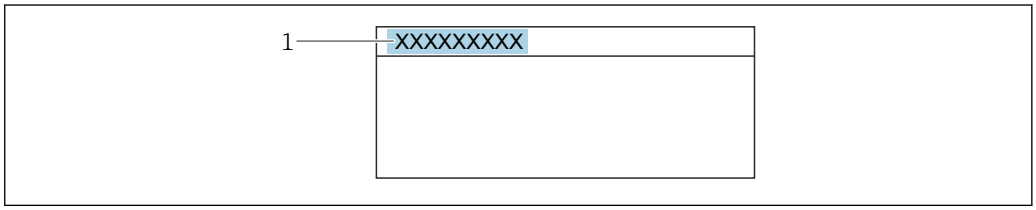
Navigation Expert → Diagnostics → Device info → Device tag (0011)

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 Character string comprising numbers, letters and special characters

Factory setting Promag

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 (0020)

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

User interface Promag 300/500

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 (→ 187)

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 (→ 187)

Configuration counter

Navigation Expert → Diagnostics → Device info → Config. counter (2751)

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

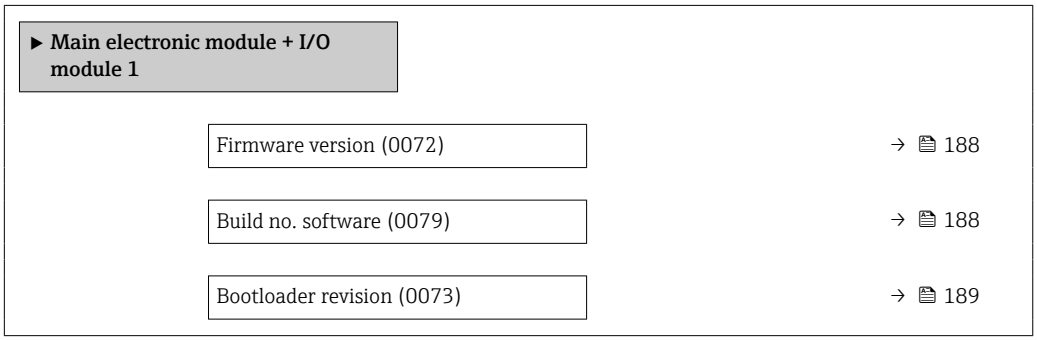
Factory setting 2.02.00

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.

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

Navigation Expert → Diagnostics 1 → Main elec.+I/O1



Firmware version

Navigation Expert → Diagnostics → Main elec.+I/O1 → 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.+I/O1 → Build no. softw. (0079)

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

User interface Positive integer

Bootloader revision

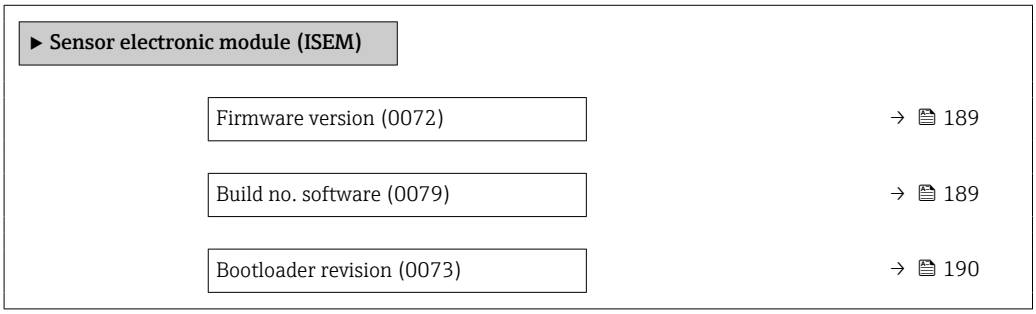
Navigation Expert → Diagnostics → Main elec.+I/O1 → Bootloader rev. (0073)

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

User interface Positive integer

3.10.5 "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

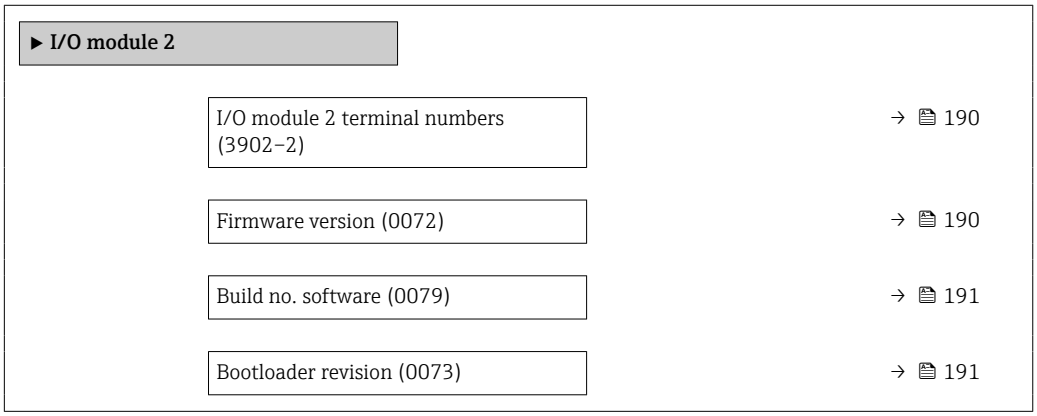
Navigation Expert → Diagnostics → Sens. electronic → Bootloader rev. (0073)

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

User interface Positive integer

3.10.6 "I/O module 2" submenu

Navigation Expert → Diagnostics → I/O module 2



I/O module 2 terminal numbers

Navigation Expert → Diagnostics → I/O module 2 → I/O 2 terminals (3902–2)

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

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

Firmware version

Navigation Expert → Diagnostics → I/O module 2 → Firmware version (0072)

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

User interface Positive integer

Build no. software

Navigation Expert → Diagnostics → I/O module 2 → Build no. softw. (0079)

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

User interface Positive integer

Bootloader revision

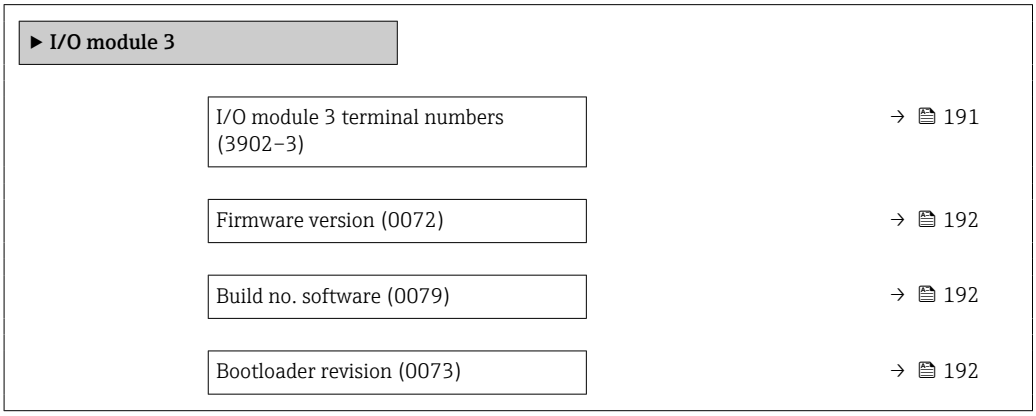
Navigation Expert → Diagnostics → I/O module 2 → Bootloader rev. (0073)

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

User interface Positive integer

3.10.7 "I/O module 3" submenu

Navigation Expert → Diagnostics → I/O module 3



I/O module 3 terminal numbers

Navigation Expert → Diagnostics → I/O module 3 → I/O 3 terminals (3902–3)

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

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

Firmware version

Navigation Expert → Diagnostics → I/O module 3 → Firmware version (0072)

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

User interface Positive integer

Build no. software

Navigation Expert → Diagnostics → I/O module 3 → Build no. softw. (0079)

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

User interface Positive integer

Bootloader revision

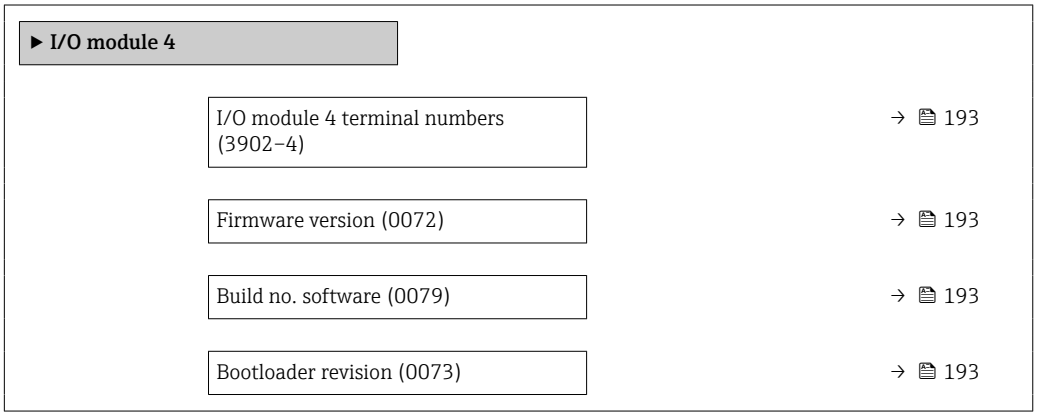
Navigation Expert → Diagnostics → I/O module 3 → Bootloader rev. (0073)

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

User interface Positive integer

3.10.8 "I/O module 4" submenu

Navigation Expert → Diagnostics → I/O module 4



I/O module 4 terminal numbers

Navigation Expert → Diagnostics → I/O module 4 → I/O 4 terminals (3902–4)

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

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

Firmware version

Navigation Expert → Diagnostics → I/O module 4 → 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 → I/O module 4 → 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 → I/O module 4 → Bootloader rev. (0073)

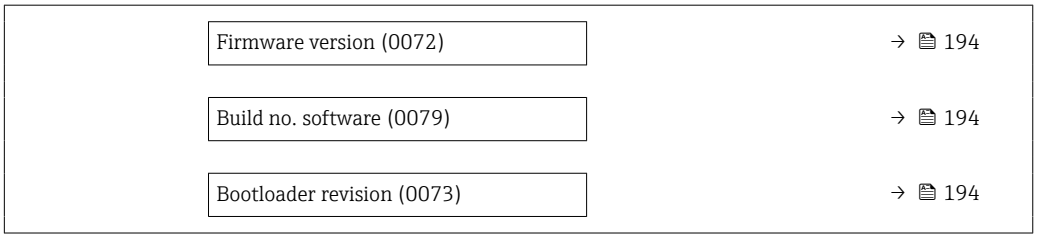
Description Use this function to display the bootloader revision of the software.

User interface Positive integer

3.10.9 "Display module" submenu

Navigation Expert → Diagnostics → Display module

▶ **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

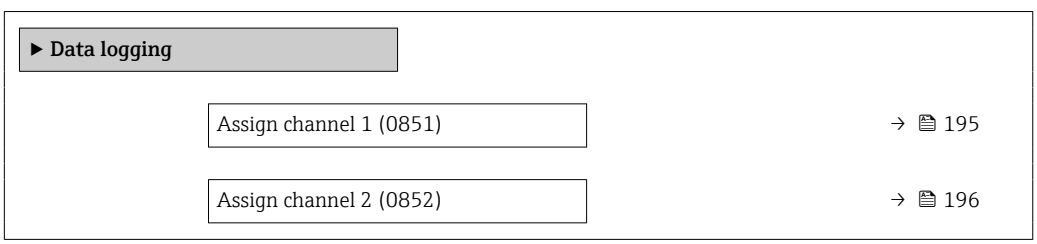
Navigation Expert → Diagnostics → Display module → Bootloader rev. (0073)

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

User interface Positive integer

3.10.10 "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 (→ 52).

Description Use this function to select a process variable for the data logging channel.

Selection
- Off
- Volume flow
- Mass flow
- Corrected volume flow
- Flow velocity
- Conductivity *
- Corrected conductivity *
- Temperature *
- Electronics temperature
- Current output 1 *

* Visibility depends on order options or device settings

- Current output 2 *
- Current output 3 *
- Current output 4 *
- Noise *
- Coil current shot time *
- Reference electrode potential against PE *
- HBSI *
- Build-up index *
- Test point 1
- Test point 2
- Test point 3

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.

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 (→ 52).

Description Use this function to select a process variable for the data logging channel.

Selection For the picklist, see the **Assign channel 1** parameter (→ 195)

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 (→ 52).

* Visibility depends on order options or device settings

Description Use this function to select a process variable for the data logging channel.

Selection For the picklist, see the **Assign channel 1** parameter (→ 195)

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 (→ 52).

Description Use this function to select a process variable for the data logging channel.

Selection For the picklist, see the **Assign channel 1** parameter (→ 195)

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 (→ 52).

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 × 1 s = 1 000 s ≈15 min
- T_{log} = 1000 × 10 s = 10 000 s ≈ 3 h
- T_{log} = 1000 × 80 s = 80 000 s ≈ 1 d
- T_{log} = 1000 × 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 (→ 52).

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 (→ 198), 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 (→ 199), 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 (→ 198), 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 (→ 198), 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 (→ 198), the **Not overwriting** option is selected.

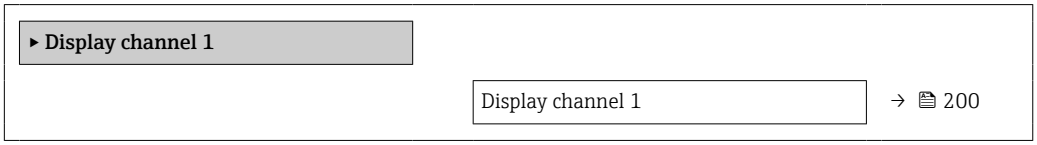
Description Displays the total logging duration.

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

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

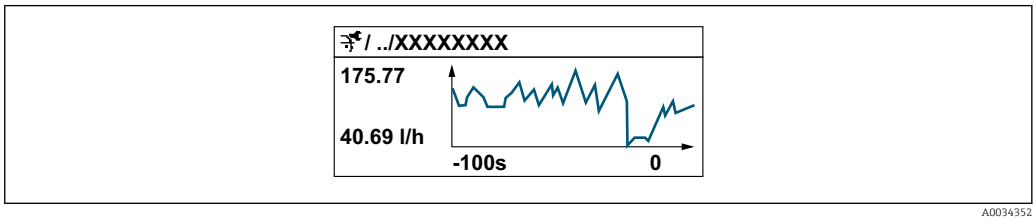
Prerequisite The **Extended HistoROM** application package is available.

The software options currently enabled are displayed in the **Software option overview** parameter (→ 52).

One of the following options is selected in the **Assign channel 1** parameter (→ 195):
- Conductivity *
- Corrected conductivity *
- Temperature *

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

Additional information *Description*

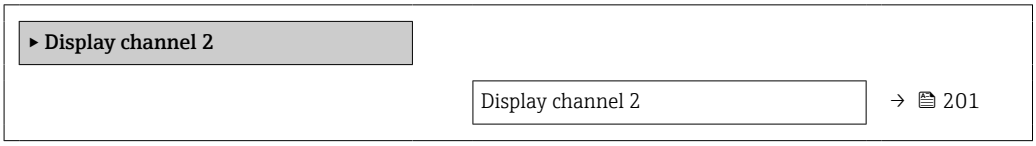


9 *Chart of a measured value trend*

- 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

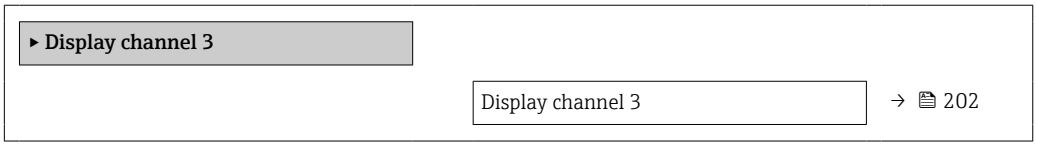
Prerequisite A process variable is specified in the **Assign channel 2** parameter.

Description See the **Display channel 1** parameter → 200

* Visibility depends on order options or device settings

"Display channel 3" submenu

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



Display channel 3

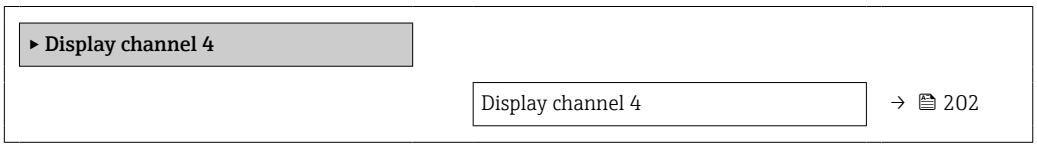
Navigation Expert → Diagnostics → Data logging → Displ.channel 3

Prerequisite A process variable is specified in the **Assign channel 3** parameter.

Description See the **Display channel 1** parameter → 200

"Display channel 4" submenu

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



Display channel 4

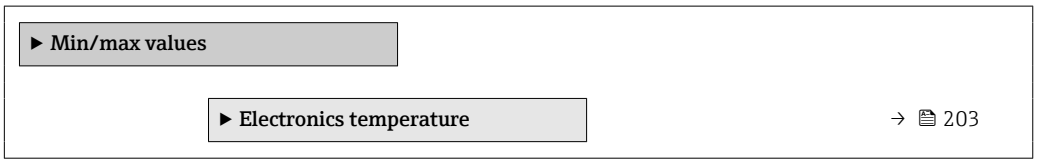
Navigation Expert → Diagnostics → Data logging → Displ.channel 4

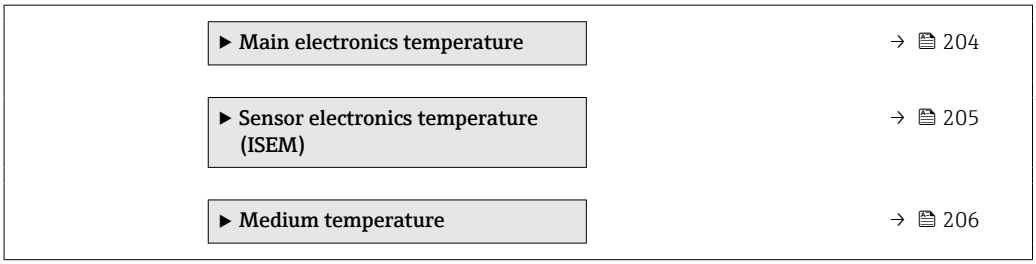
Prerequisite A process variable is specified in the **Assign channel 4** parameter.

Description See the **Display channel 1** parameter → 200

3.10.11 "Min/max values" submenu

Navigation Expert → Diagnostics → Min/max val.





Reset min/max values

Navigation Expert → Diagnostics → Min/max val. → Reset min/max (6541)

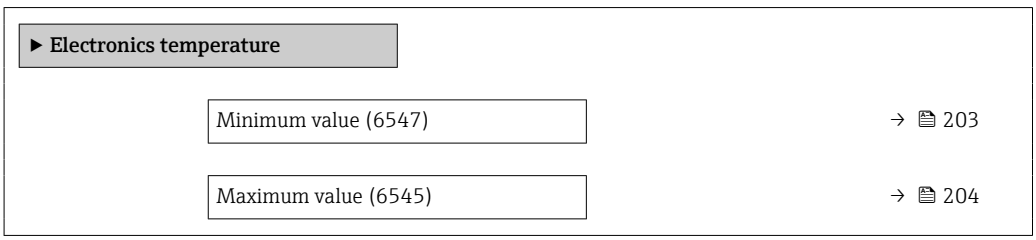
Description Use this function to select measured variables whose minimum, maximum and average measured values are to be reset.

Selection
- Cancel
- Terminal voltage
- IO module temperature

Factory setting Cancel

"Main electronics temperature" submenu

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



Minimum value

Navigation Expert → Diagnostics → Min/max val. → Electronics temp → Minimum value (6547)

Description Displays the lowest previously measured temperature value of the main electronics module.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 66)

Maximum value

Navigation Expert → Diagnostics → Min/max val. → Electronics temp → Maximum value (6545)

Description Displays the highest previously measured temperature value of the main electronics module.

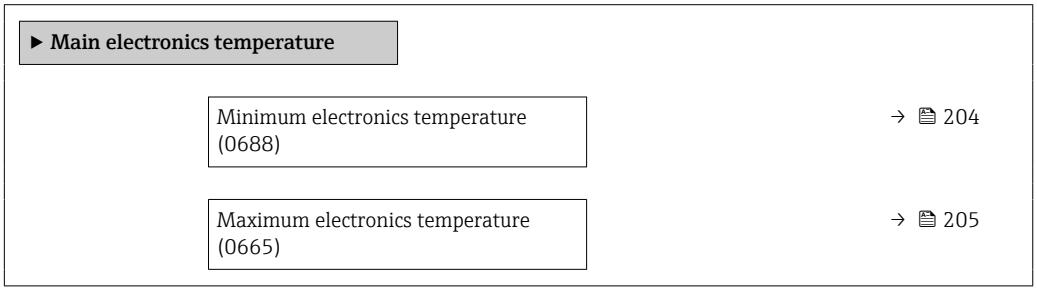
User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 66)

"Main electronics temperature" submenu

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



Minimum electronics temperature

Navigation Expert → Diagnostics → Min/max val. → Main elect.temp. → Min.electr.temp. (0688)

Description Shows the lowest previously measured temperature for the main electronic module in the transmitter.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 66)

Maximum electronics temperature

Navigation Expert → Diagnostics → Min/max val. → Main elect.temp. → Max.electr.temp. (0665)

Description Shows the highest previously measured temperature for the main electronic module in the transmitter.

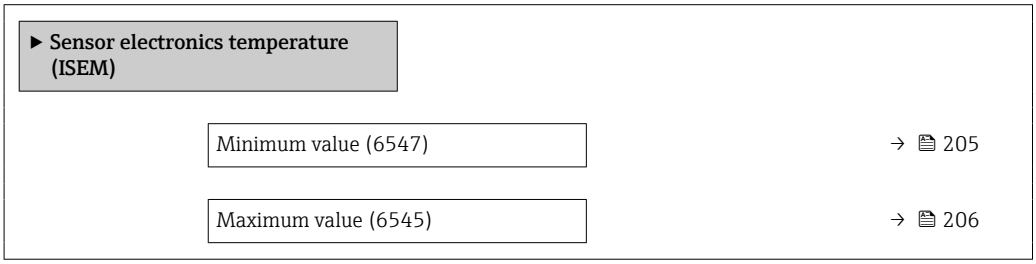
User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 66)

"Sensor electronics temperature (ISEM)" submenu

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



Minimum value

Navigation Expert → Diagnostics → Min/max val. → Sensor elec.temp → Minimum value (6547)

Description Displays the lowest previously measured temperature value of the main electronics module.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 66)

Maximum value

Navigation Expert → Diagnostics → Min/max val. → Sensor elec.temp → Maximum value (6545)

Description Displays the highest previously measured temperature value of the main electronics module.

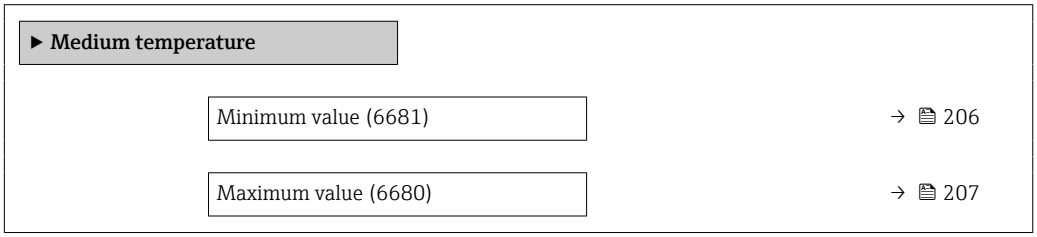
User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 66)

"Temperature" submenu

Navigation Expert → Diagnostics → Min/max val. → Temperature



Minimum value

Navigation Expert → Diagnostics → Min/max val. → Medium temp. → Minimum value (6681)

Prerequisite One of the following conditions is met:
- Order code for "Sensor option", option **CI** "Medium temperature measurement"
  or
- The temperature is read into the flowmeter from an external device.

Description Displays the lowest previously measured medium temperature value.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 66)

Maximum value

Navigation Expert → Diagnostics → Min/max val. → Medium temp. → Maximum value (6680)

Prerequisite One of the following conditions is met:
- Order code for "Sensor option", option **CI** "Medium temperature measurement"
  or
- The temperature is read into the flowmeter from an external device.

Description Displays the highest previously measured medium temperature value.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 66)

3.10.12 "Heartbeat Technology" submenu

For detailed information on the parameter descriptions for the **Heartbeat Verification+Monitoring**: Special Documentation for the device → 7

Navigation Expert → Diagnostics → Heartbeat Techn.

▶ Heartbeat Technology	
▶ Heartbeat base settings	→ 207
▶ Performing verification	→ 208
▶ Verification results	→ 214
▶ Monitoring results	→ 218

"Heartbeat base settings" submenu

Navigation Expert → Diagnostics → Heartbeat Techn. → Base settings

▶ Heartbeat base settings	
Plant operator (2754)	→ 208
Location (2755)	→ 208
Partially filled pipe (6465)	→ 208

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. @, %, /)

Partially filled pipe

Navigation Expert → Diagnostics → Heartbeat Techn. → Base settings → Part.filled pipe (6465)

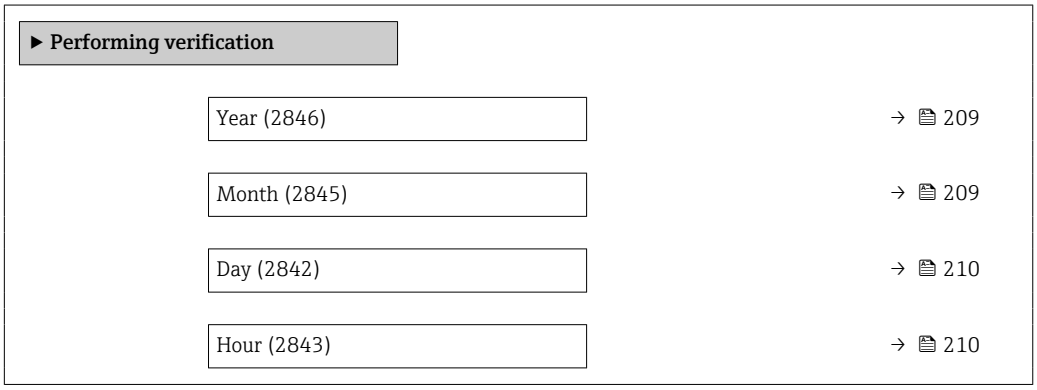
Description Indicate, if the measuring tube is partially filled during the verification process in order to avoid evaluating the EPD electrode cable.

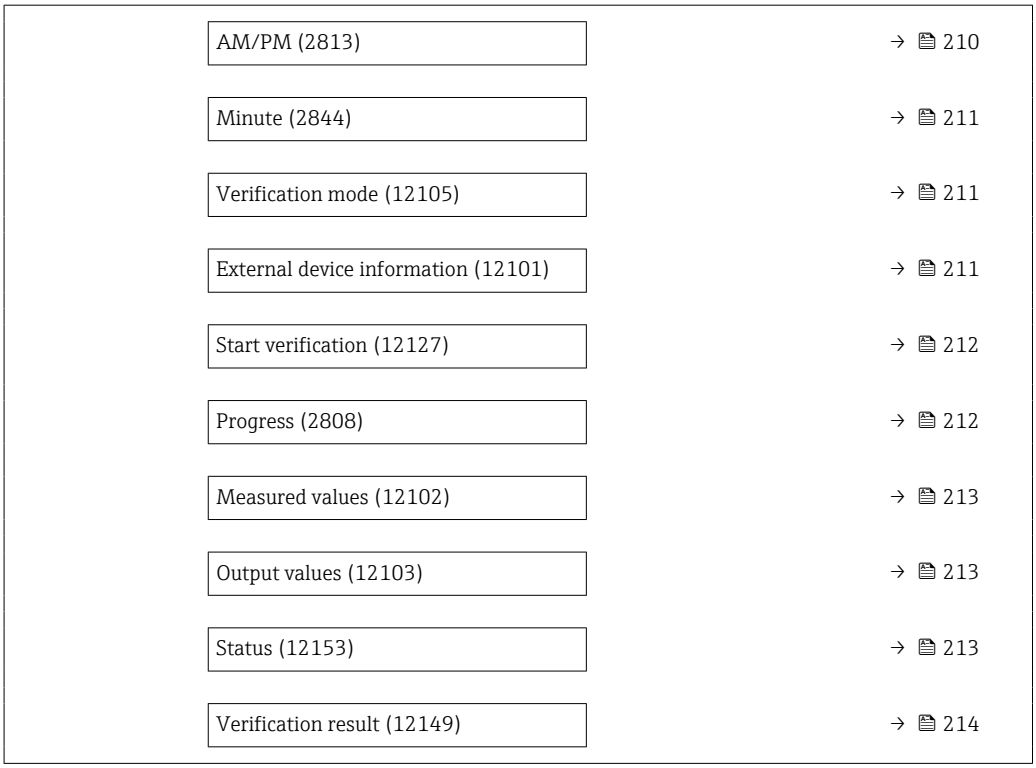
Selection
- No
- Yes

Factory setting No

"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 10

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) (→ 70).

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 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 (→ 211).
- Can be edited if the verification status 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 *
- Output 2 low value *
- Output 2 high value *
- Output 3 low value *
- Output 3 high value *
- Frequency output 1 *
- Pulse output 1 *
- Frequency output 2 *
- Pulse output 2 *
- Double pulse output *
- Start

Factory setting Cancel

Progress

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Progress (2808)

Description The progress of the process is indicated.

User interface 0 to 100 %

* Visibility depends on order options or device settings

Measured values

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Measured val. (12102)

Prerequisite One of the following options is selected in the **Start verification** parameter (→ 212):
- Output 1 low value
- Output 1 high value
- Output 2 low value
- Output 2 high value
- Frequency output 1
- Pulse output 1

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]
- Double pulse output: Output frequency in [Hz]

User entry Signed floating-point number

Factory setting 0

Output values

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Output values (12103)

Description Displays the simulated output values (target values) for the external measured variables:.

- Current output: Output current in [mA].
- Pulse/frequency output: Output frequency in [Hz].

User interface Signed floating-point number

Factory setting -

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

Verification result

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Verific. result (12149)

Description Displays the overall result of the verification.

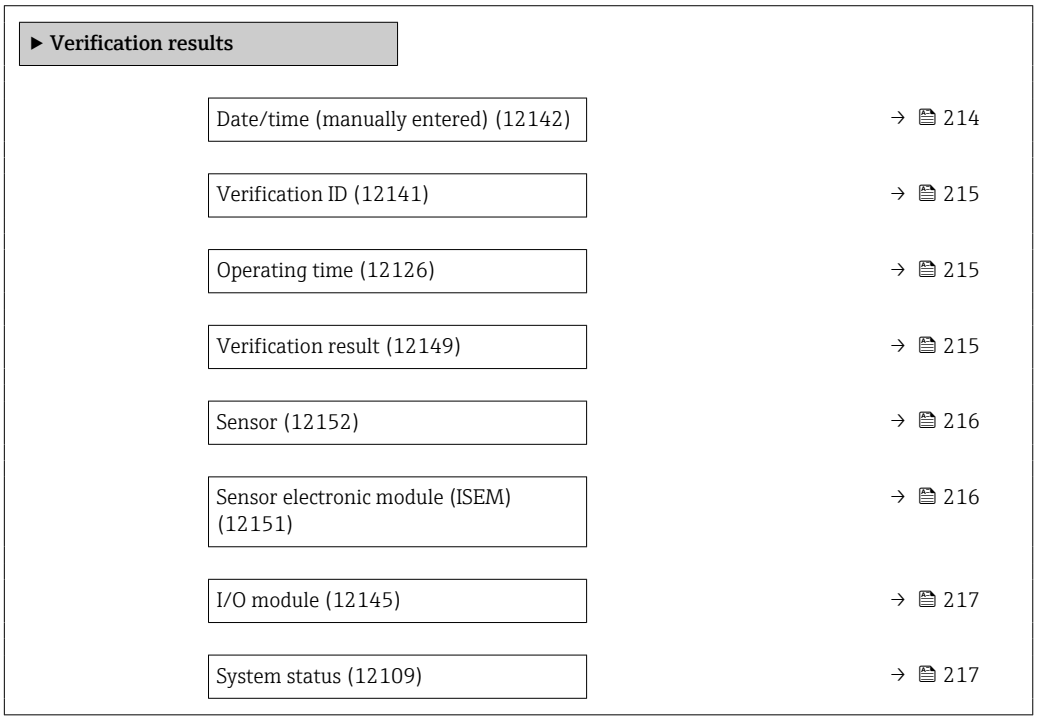
Detailed description of results classification:

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 results classification:

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 is shown in the **Overall result** parameter (→ 214).

Description Displays the result for the sensor.

Detailed description of results classification:

User interface
- Not supported
- Passed
- Not done
- Failed

Factory setting Not done

HBSI

Navigation Expert → Diagnostics → Heartbeat → Verific. results → HBSI (12167)

Prerequisite In the **Overall result** parameter (→ 214), the **Failed** option was displayed.

Description Displays the relative change in the sensor with all the sensor components.

Detailed description of results classification:

User interface
- Failed
- Passed
- Not done

Factory setting Not done

Sensor electronic module (ISEM)

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results → Sens. electronic (12151)

Prerequisite The **Failed** option is shown in the **Overall result** parameter (→ 214).

Description Displays the result for the sensor electronics module (ISEM).

Detailed description of results classification:

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 is shown in the **Overall result** parameter (→ 214).

Description Displays the result for I/O module monitoring of the I/O module.

- For current output: Accuracy of the current
- For pulse output: Accuracy of the pulses
- For frequency output: Accuracy of the frequency
- Current input: Accuracy of the current
- Double pulse output: Accuracy of the pulses
- Relay output: Number of switching cycles

Heartbeat Verification does not check the digital inputs and outputs and does not output any result for them.

Detailed description of results classification:

User interface

- Not supported
- Passed
- Not done
- Not plugged
- Failed

Factory setting Not done

System status

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results → System status (12109)

Prerequisite The **Failed** option is shown in the **Overall result** parameter (→ 214).

Description Displays the system condition. Tests the measuring device for active errors.

Detailed description of results classification:

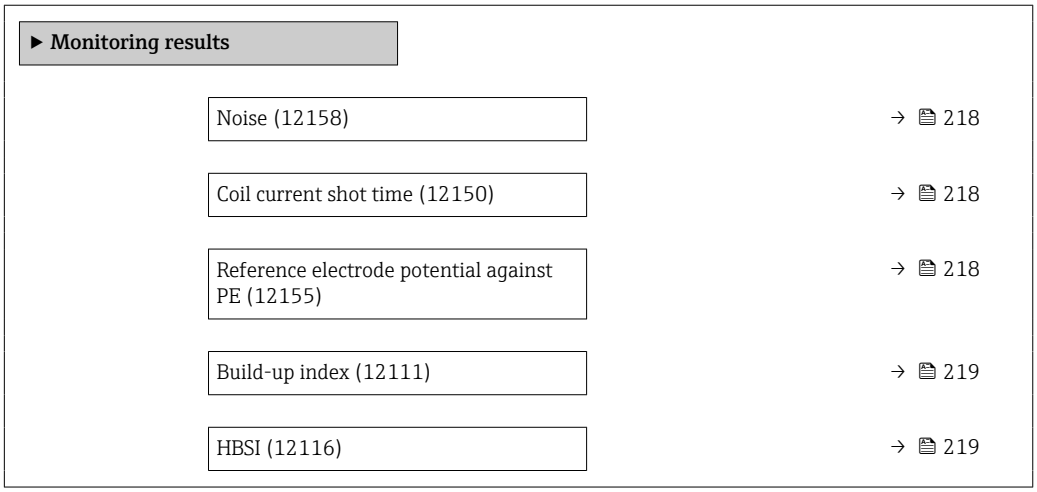
User interface

- Not supported
- Passed
- Not done
- Failed

Factory setting Not done

"Monitoring results" submenu

Navigation Expert → Diagnostics → Heartbeat Techn. → Monitor. results



Noise

Navigation Expert → Diagnostics → Heartbeat Techn. → Monitor. results → Noise (12158)

Description Indicates the degree to which the differential signal from both measuring electrodes is dispersed.

User interface 0 to 3.0 · 10^{+38} µV

Coil current shot time

Navigation Expert → Diagnostics → Heartbeat Techn. → Monitor. results → CoilCurrShotTime (12150)

Description Indicates the rise time of the coil current for the buildup of the magnetic field.

User interface 2 to 500 ms

Reference electrode potential against PE

Navigation Expert → Diagnostics → Heartbeat Techn. → Monitor. results → RefElectrPotPE (12155)

Description Displays the voltage of the reference electrode in relation to the potential of the measuring tube.

User interface −30 to +30 V

Build-up index

Navigation Expert → Diagnostics → Heartbeat Techn. → Monitor. results → Build-up index (12111)

Description Shows current build-up index value.

User interface 0.0 to 100.0 %

Factory setting 0.0 %

Additional information The formation of build-up is output as a percentage in the Build-up index value (→ 84) parameter. The higher the percentage, the thicker the build-up.

Build-up index value (→ 84) = 0%
- No build-up present
- Measuring tube as-delivered state (initial value)
- Measuring tube was cleaned thoroughly after formation of build-up

Build-up index value (→ 84) = 100%
- Value for the maximum measurable build-up thickness
- The thickness of the build-up at 100% varies depending on the process
- A value of 100% should not be equated with a blocked measuring tube

The percentage indicated in the Build-up index value (→ 84) parameter does not provide direct information about the absolute thickness or the composition of the build-up. Therefore, to make optimum use of the build-up detection function, it is necessary to first compare the formation of build-up in the process, as known from experience, with the associated Build-up index value (→ 84). The aim is to determine the Build-up index value (→ 84) at the time the cleaning is usually performed.

On the basis of the Build-up index value (→ 84) during cleaning, it is possible to make a valid assessment of the condition inside the measuring tube and to plan the cleaning using the build-up limit and build-up detection hysteresis parameters.

In addition, conclusions about possible effects on neighboring processes can be drawn from the Build-up index value (→ 84).

HBSI

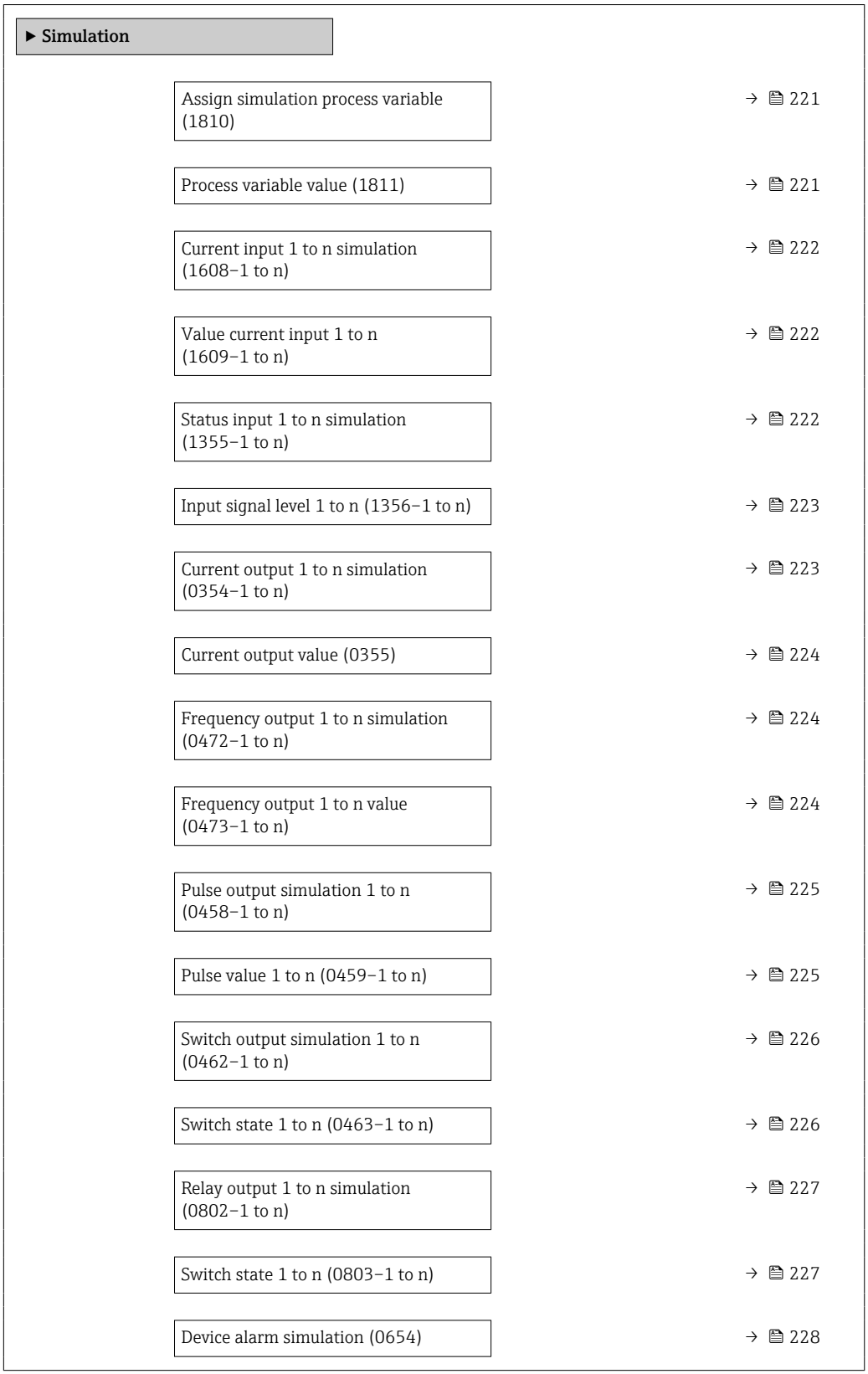
Navigation Expert → Diagnostics → Heartbeat Techn. → Monitor. results → HBSI (12116)

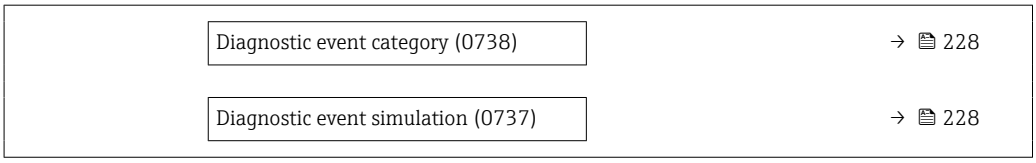
Description Displays the relative change of the entire sensor, with all its electrical, mechanical and electromechanical components incorporated in the sensor housing (including the measuring tube, electrodynamic pick-ups, excitation system, cables etc.), in % of the reference value.

User interface −100.0 to 100.0 %

3.10.13 "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
- Corrected volume flow
- Flow velocity
- Conductivity *
- Corrected conductivity *
- Temperature *

Factory setting Off

Additional information *Description*

The simulation value of the process variable selected is defined in the **Process variable value** parameter (→ 221).

Process variable value

Navigation Expert → Diagnostics → Simulation → Proc. var. value (1811)

Prerequisite A process variable is selected in the **Assign simulation process variable** parameter (→ 221).

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 (→ 63).

* Visibility depends on order options or device settings

Current input 1 to n simulation

Navigation Expert → Diagnostics → Simulation → Curr.inp 1 to n sim. (1608–1 to n)

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

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

Selection
- Off
- On

Factory setting Off

Additional information *Selection*
- Off
  Current simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
- On
  Current simulation is active.

Value current input 1 to n

Navigation Expert → Diagnostics → Simulation → Value curr.inp 1 to n (1609–1 to n)

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

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

User entry 0 to 22.5 mA

Status input 1 to n simulation

Navigation Expert → Diagnostics → Simulation → Status inp 1 to n sim (1355–1 to n)

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 (→ 223).

Selection

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

Input signal level 1 to n

Navigation Expert → Diagnostics → Simulation → Signal level 1 to n (1356–1 to n)

Prerequisite In the **Status input simulation** parameter (→ 222), the **On** option is selected.

Description Use this function to select the signal level for the simulation of the status input. In this way, users can verify the correct configuration of the status input and the correct function of upstream feed-in units.

Selection

- High
- Low

Current output 1 to n simulation

Navigation Expert → Diagnostics → Simulation → Curr.outp 1 to n sim. (0354–1 to n)

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 defined in the **Value current output 1 to n** parameter.

Selection

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

Current output value

Navigation
Expert → Diagnostics → Simulation → Curr.outp val. (0355)
Expert → Diagnostics → Simulation → Value curr.out 1 to n (0355–1 to n)

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

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

User entry
3.59 to 22.5 mA

Additional information
Dependency

The input range is dependent on the option selected in the **Current span** parameter (→ 109).

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 (→ 122), 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 (→ 122), 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 (→ 125).
- Down-counting value
  The pulses specified in the **Pulse value** parameter (→ 225) 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 (→ 122), 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.

Relay output 1 to n simulation

Navigation Expert → Diagnostics → Simulation → Relay out. 1 to n sim (0802–1 to n)

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

Selection
- Off
- On

Factory setting Off

Additional information *Description*

The desired simulation value is defined in the **Switch state 1 to n** parameter.

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

Switch state 1 to n

Navigation Expert → Diagnostics → Simulation → Switch state 1 to n (0803–1 to n)

Prerequisite The **On** option is selected in the **Switch output simulation 1 to n** parameter parameter.

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

Selection
- Open
- Closed

Additional information *Selection*
- Open
  Relay simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
- Closed
  Relay simulation is active.

Device alarm simulation

Navigation Expert → Diagnostics → Simulation → Dev. alarm sim. (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 (→ 228).

Selection
- Sensor
- Electronics
- Configuration
- Process

Factory setting Process

Diagnostic event simulation

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

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

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

Factory setting Off

Additional information *Description*

For the simulation, you can choose from the diagnostic events of the category selected in the **Diagnostic event category** parameter (→ 228).

4 Country-specific factory settings

4.1 SI units

Not valid for USA and Canada.

4.1.1 System units

Process variable	Unit
Volume flow	l/h
Volume	m^3
Conductivity	µS/cm
Temperature	°C
Mass flow	kg/h
Mass	kg
Density	kg/l
Corrected volume flow	Nl/h
Corrected volume	Nm^3

4.1.2 Full scale values

The factory settings applie to the following parameters:
- 20 mA value (full scale value of the current output)
- 100% bar graph value 1

Nominal diameter [mm]	(v ~ 2.5 m/s) [dm^3/min]
2	0.5
4	2
8	8
15	25
25	75
32	125
40	200
50	300
65	500
80	750
100	1200
125	1850

Nominal diameter [mm]	(v ~ 2.5 m/s) [m^3/h]
150	150
200	300
250	500
300	750

Nominal diameter [mm]	(v ~ 2.5 m/s) [m³/h]
350	1 000
400	1 200
450	1 500
500	2 000
600	2 500
700	3 500
750	4 000
800	4 500
900	6 000
1 000	7 000
1 200	10 000
1 400	14 000
1 600	18 000
1 800	23 000
2 000	28 500
2 200	34 000
2 400	40 000
2600	48 000
2800	55 500
3000	63 500

4.1.3 Output current span

Output	Current range
Current output 1…n	4 to 20 mA NAMUR

4.1.4 Pulse value

Nominal diameter [mm]	(~ 2 pulse/s at v ~ 2.5 m/s) [dm³]
2	0.005
4	0.025
8	0.1
15	0.2
25	0.5
32	1
40	1.5
50	2.5
65	5
80	5
100	10
125	15

Nominal diameter [mm]	(~ 2 pulse/s at v ~ 2.5 m/s) [m³]
150	0.03
200	0.05
250	0.05
300	0.1
350	0.1
400	0.15
450	0.25
500	0.25
600	0.3
700	0.5
750	0.5
800	0.75
900	0.75
1000	1
1200	1.5
1400	2
1600	2.5
1800	3
2000	3.5
2200	4.5
2400	5.5
2600	7
2800	8
3000	9

4.1.5 Switch-on point low flow cut off

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

Nominal diameter [mm]	(v ~ 0.04 m/s) [dm³/min]
2	0.01
4	0.05
8	0.1
15	0.5
25	1
32	2
40	3
50	5
65	8
80	12
100	20
125	30

Nominal diameter [mm]	(v ~ 0.04 m/s) [m³/h]
150	2.5
200	5
250	7.5
300	10
350	15
400	20
450	25
500	30
600	40
700	50
750	60
800	75
900	100
1 000	125
1 200	150
1 400	225
1 600	300
1 800	350
2 000	450
2 200	540
2 400	650
2600	775
2800	875
3000	1025

4.2 US units

Only valid for USA and Canada.

4.2.1 System units

Process variable	Unit
Volume flow	gal/min (us)
Volume	gal (us)
Temperature	°F
Mass flow	lb/min
Mass	lb
Density	lb/ft³
Corrected volume flow	Sft³/h
Corrected volume	Sft³

4.2.2 Full scale values

The factory settings applie to the following parameters:
- 20 mA value (full scale value of the current output)
- 100% bar graph value 1

Nominal diameter [in]	(v ~ 2.5 m/s) [gal/min]
1/12	0.1
1/8	0.5
3/8	2
½	6
1	18
1½	50
2	75
3	200
4	300
5	450
6	600
8	1200
10	1500
12	2400
14	3600
15	4800
16	4800
18	6000
20	7500
24	10500
28	13500
30	16500
32	19500
36	24000
40	30000
42	33000
48	42000

Nominal diameter [in]	(v ~ 2.5 m/s) [Mgal/d]
54	75
60	95
66	120
72	140
78	175
84	190
90	220
96	265

Nominal diameter [in]	(v ~ 2.5 m/s) [Mgal/d]
102	300
108	340
114	375
120	415

4.2.3 Output current span

Output	Current range
Current output 1…n	4 to 20 mA US

4.2.4 Pulse value

Nominal diameter [in]	(~ 2 pulse/s at v ~ 2.5 m/s) [gal]
$^{1}/_{12}$	0.001
$^{1}/_{8}$	0.005
$^{3}/_{8}$	0.02
½	0.1
1	0.2
1½	0.5
2	0.5
3	2
4	2
5	5
6	5
8	10
10	15
12	25
14	30
15	50
16	50
18	50
20	75
24	100
28	125
30	150
32	200
36	225
40	250
42	250
48	400

Nominal diameter [in]	(~ 2 pulse/s at v ~ 2.5 m/s) [Mgal]
54	0.0005
60	0.0005
66	0.0008
72	0.0008
78	0.001
84	0.0011
90	0.0013
96	0.0015
102	0.0017
108	0.0020
114	0.0022
120	0.0024

4.2.5 Switch-on point low flow cut off

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

Nominal diameter [in]	(v ~ 0.04 m/s) [gal/min]
1/12	0.002
1/8	0.008
3/8	0.025
½	0.15
1	0.25
1½	0.75
2	1.25
3	2.5
4	4
5	7
6	12
8	15
10	30
12	45
14	60
15	60
16	60
18	90
20	120
24	180
28	210
30	270
32	300
36	360

Nominal diameter [in]	(v ~ 0.04 m/s) [gal/min]
40	480
42	600
48	600

Nominal diameter [in]	(v ~ 0.04 m/s) [Mgal/d]
54	1.3
60	1.3
66	2.2
72	2.6
78	3.0
84	3.2
90	3.6
96	4.0
102	5.0
108	5.0
114	6.0
120	7.0

5 Explanation of abbreviated units

5.1 SI units

Process variable	Units	Explanation
Density	g/cm³, g/m³	Gram/volume unit
	kg/dm³, kg/l, kg/m³	Kilogram/volume unit
	SD4°C, SD15°C, SD20°C	Specific density: The specific density is the ratio of the density of the fluid to the density of water at a water temperature of 4 °C (39 °F), 15 °C (59 °F), 20 °C (68 °F).
	SG4°C, SG15°C, SG20°C	Specific gravity: The specific gravity is the ratio of the density of the fluid to the density of water at a water temperature of 4 °C (39 °F), 15 °C (59 °F), 20 °C (68 °F).
Conductivity	µS/mm	Microsiemens/length unit
	nS/cm, µS/cm, mS/cm, S/cm	Nano-, Micro- , Milli- , Siemens/length unit
	µS/m, mS/m, S/m, kS/m, MS/m	Micro- , Milli- , Siemens, Kilo-, Megasiemens/length unit
Mass	g, kg, t	Gram, kilogram, metric ton
Mass flow	g/s, g/min, g/h, g/d	Gram/time unit
	kg/s, kg/min, kg/h, kg/d	Kilogram/time unit
	t/s, t/min, t/h, t/d	Metric ton/time unit
Temperature	°C , K	Celsius, Kelvin
Volume	cm³, dm³, m³	Cubic centimeter, cubic decimeter, cubic meter
	ml, l, hl, Ml Mega	Milliliter, liter, hectoliter, megaliter
Time	s, m, h, d, y	Second, minute, hour, day, year

5.2 US units

Process variable	Units	Explanation
Density	lb/ft³, lb/gal (us)	Pound/cubic foot, pound/gallon
	lb/bbl (us;liq.), lb/bbl (us;beer), lb/bbl (us;oil), lb/bbl (us;tank)	Pound/volume unit
Mass	oz, lb, STon	Ounce, pound, standard ton
Mass flow	oz/s, oz/min, oz/h, oz/d	Ounce/time unit
	lb/s, lb/min, lb/h, lb/d	Pound/time unit
	STon/s, STon/min, STon/h, STon/d	Standard ton/time unit
Corrected volume	Sft³, Sgal (us), Sbbl (us;liq.)	Standard cubic foot, standard gallon, standard barrel
Corrected volume flow	Sft³/s, Sft³/min, Sft³/h, Sft³/d	Standard cubic foot/time unit
	Sgal/s (us), Sgal/min (us), Sgal/h (us), Sgal/d (us)	Standard gallon/time unit
	Sbbl/s (us;liq.), Sbbl/min (us;liq.), Sbbl/h (us;liq.), Sbbl/d (us;liq.)	Barrel/time unit (normal liquids)
Temperature	°F, °R	Fahrenheit, Rankine
Volume	af	Acre foot
	ft³	Cubic foot

Process variable	Units	Explanation
	fl oz (us), gal (us), kgal (us), Mgal (us)	Fluid ounce, gallon, kilogallon, million gallon
	bbl (us;liq.), bbl (us;beer), bbl (us;oil), bbl (us;tank)	Barrel (normal liquids), barrel (beer), barrel (petrochemicals), barrel (filling tanks)
Volume flow	af/s, af/min, af/h, af/d	Acre foot/time unit
	ft^3/s, ft^3/min, ft^3/h, ft^3/d	Cubic foot/time unit
	fl oz/s (us), fl oz/min (us), fl oz/h (us), fl oz/d (us)	Fluid ounce/time unit
	gal/s (us), gal/min (us), gal/h (us), gal/d (us)	Gallon/time unit
	kgal/s (us), kgal/min (us), kgal/h (us), kgal/d (us)	Kilogallon/time unit
	Mgal/s (us), Mgal/min (us), Mgal/h (us), Mgal/d (us)	Million gallon/time unit
	bbl/s (us;liq.), bbl/min (us;liq.), bbl/h (us;liq.), bbl/d (us;liq.)	Barrel/time unit (normal liquids) Normal liquids: 31.5 gal/bbl
	bbl/s (us;beer), bbl/min (us;beer), bbl/h (us;beer), bbl/d (us;beer)	Barrel /time unit (beer) Beer: 31.0 gal/bbl
	bbl/s (us;oil), bbl/min (us;oil), bbl/h (us;oil), bbl/d (us;oil)	Barrel/time unit (petrochemicals) Petrochemicals: 42.0 gal/bbl
	bbl/s (us;tank), bbl/min (us;tank), bbl/h (us;tank), bbl/d (us;tank)	Barrel/time unit (filling tank) Filling tanks: 55.0 gal/bbl
Time	s, m, h, d, y	Second, minute, hour, day, year
	am, pm	Ante meridiem (before midday), post meridiem (after midday)

5.3 Imperial units

Process variable	Units	Explanation
Density	lb/gal (imp), lb/bbl (imp;beer), lb/bbl (imp;oil)	Pound/volume unit
Corrected volume	Sgal (imp)	Standard gallon
Corrected volume flow	Sgal/s (imp), Sgal/min (imp), Sgal/h (imp), Sgal/d (imp)	Standard gallon/time unit
Volume	gal (imp), Mgal (imp)	Gallon, mega gallon
	bbl (imp;beer), bbl (imp;oil)	Barrel (beer), barrel (petrochemicals)
Volume flow	gal/s (imp), gal/min (imp), gal/h (imp), gal/d (imp)	Gallon/time unit
	Mgal/s (imp), Mgal/min (imp), Mgal/h (imp), Mgal/d (imp)	Mega gallon/time unit
	bbl/s (imp;beer), bbl/min (imp;beer), bbl/h (imp;beer), bbl/d (imp;beer)	Barrel /time unit (beer) Beer: 36.0 gal/bbl
	bbl/s (imp;oil), bbl/min (imp;oil), bbl/h (imp;oil), bbl/d (imp;oil)	Barrel/time unit (petrochemicals) Petrochemicals: 34.97 gal/bbl
Time	s, m, h, d, y	Second, minute, hour, day, year
	am, pm	Ante meridiem (before midday), post meridiem (after midday)

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