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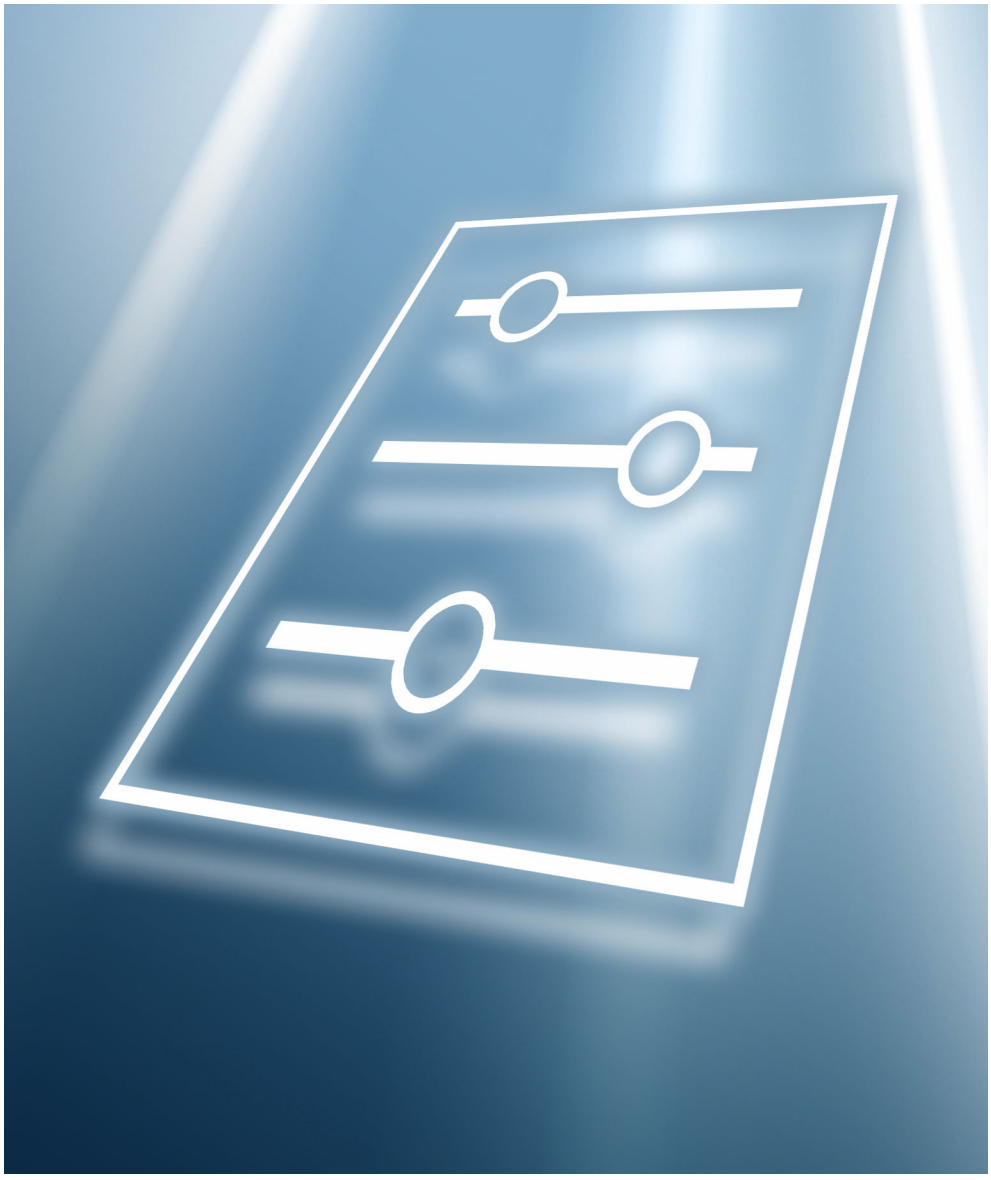
01.06.zz (Device firmware)

Description of Device Parameters
Proline Promag 300

Electromagnetic flowmeter
Modbus RS485



Endress+Hauser
People for Process Automation

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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.

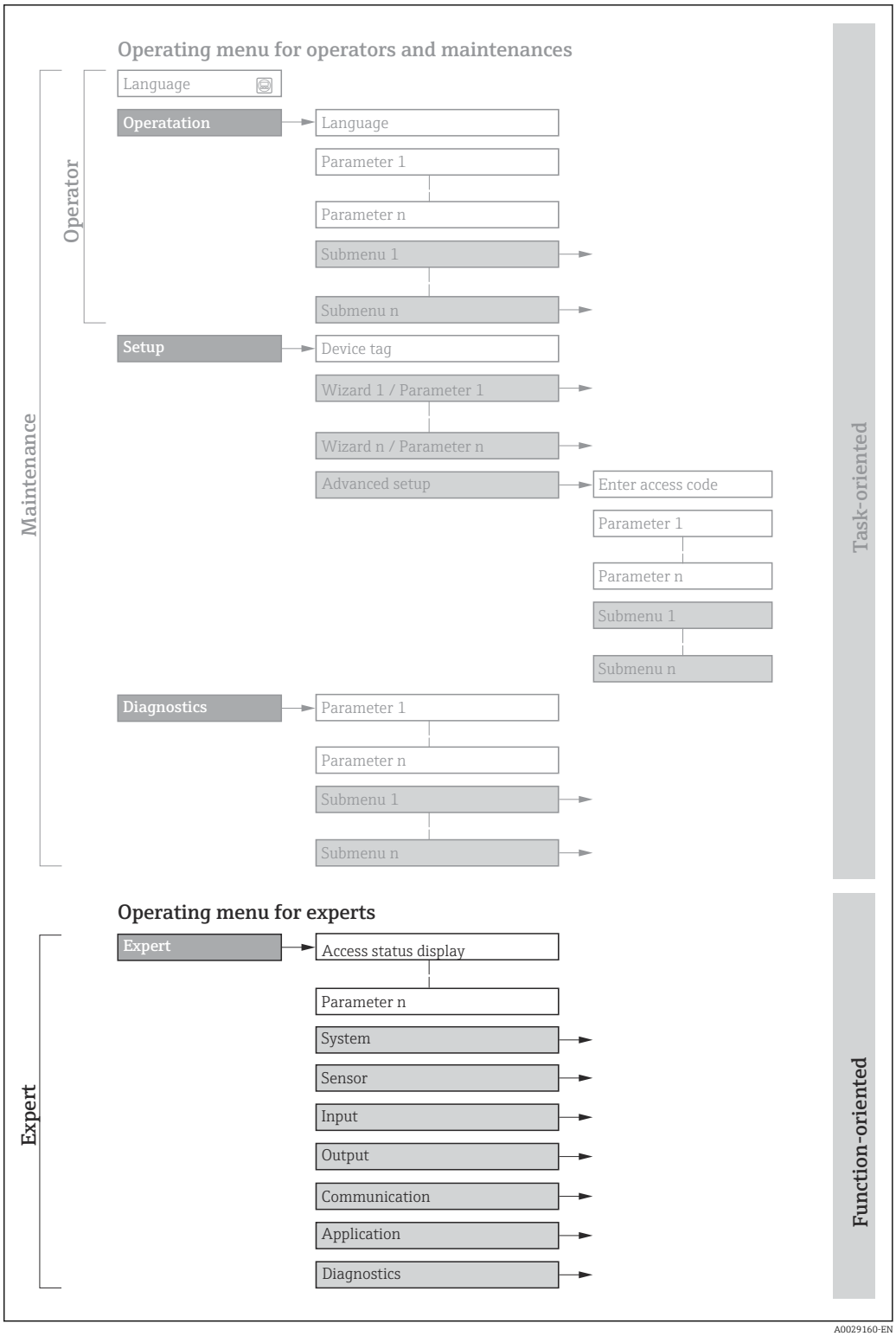
1.2 Target group

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	BA01394D
Promag P 300	BA01395D
Promag W 300	BA01939D

1.5.2 Supplementary device-dependent documentation

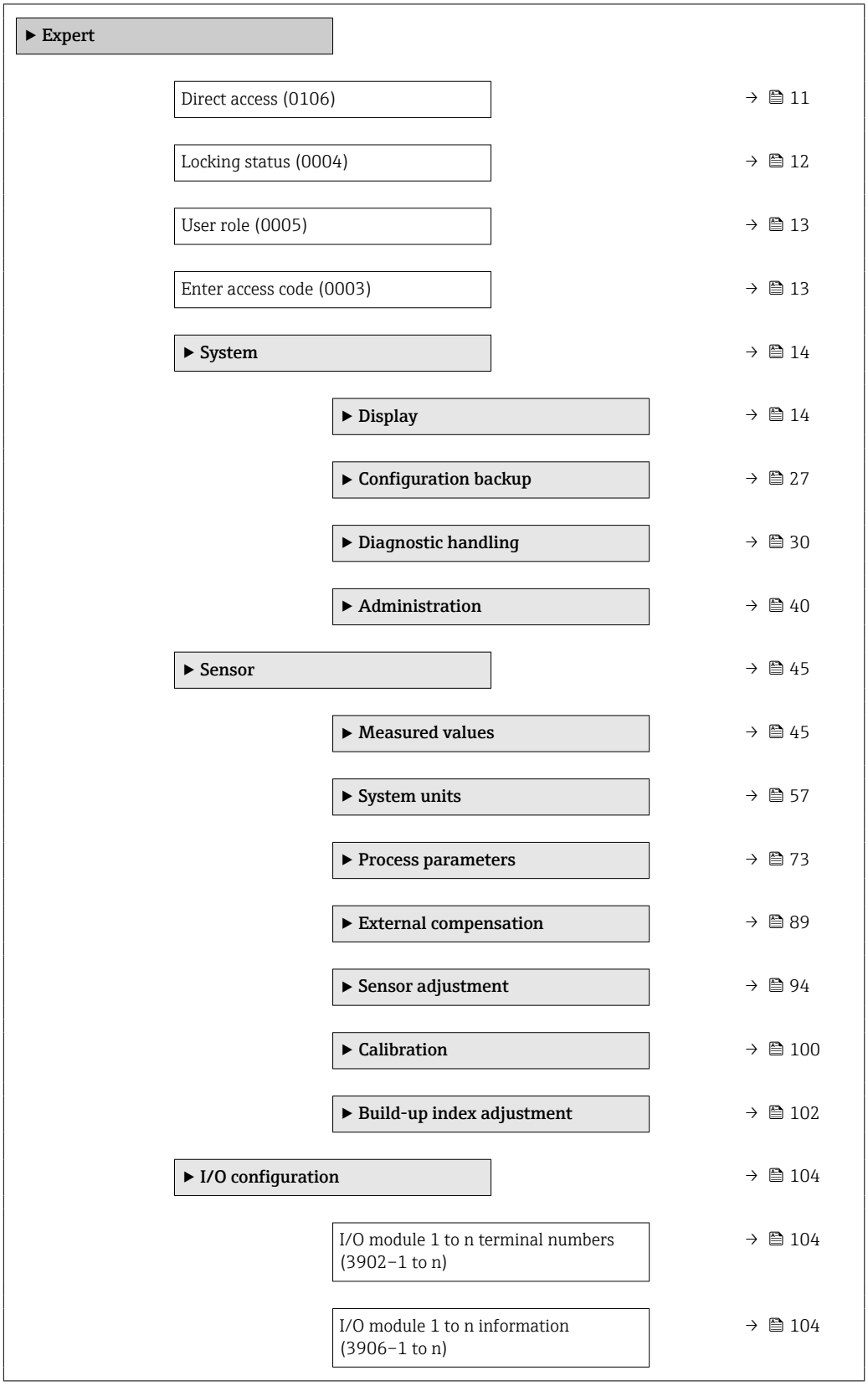
Special Documentation

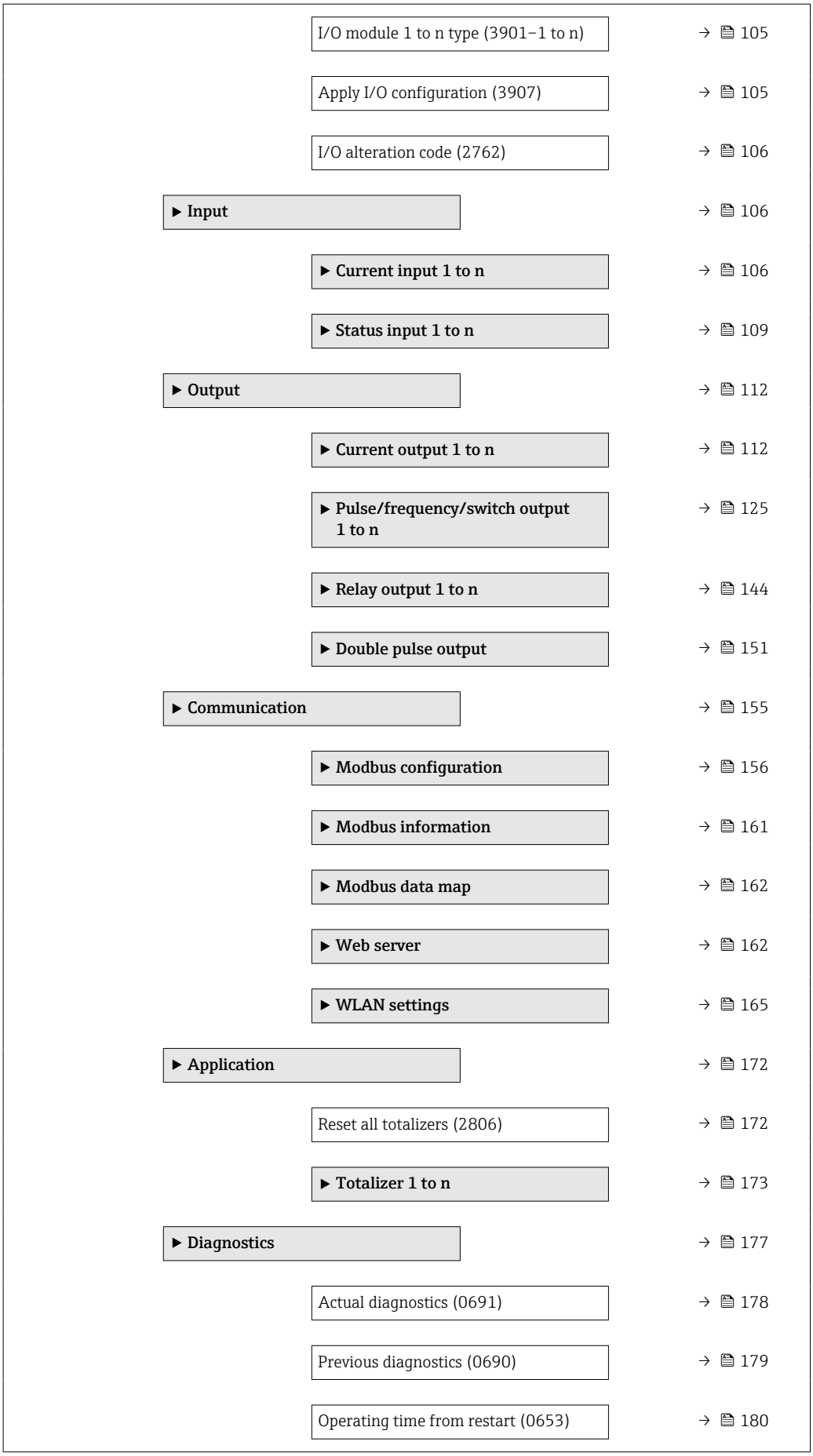
Contents	Documentation code
Information on the Pressure Equipment Directive	SD01614D
Radio approvals for WLAN interface for A309/A310 display module	SD01793D
Web server	SD01659D
Remote display and operating module DKX001	SD01763D

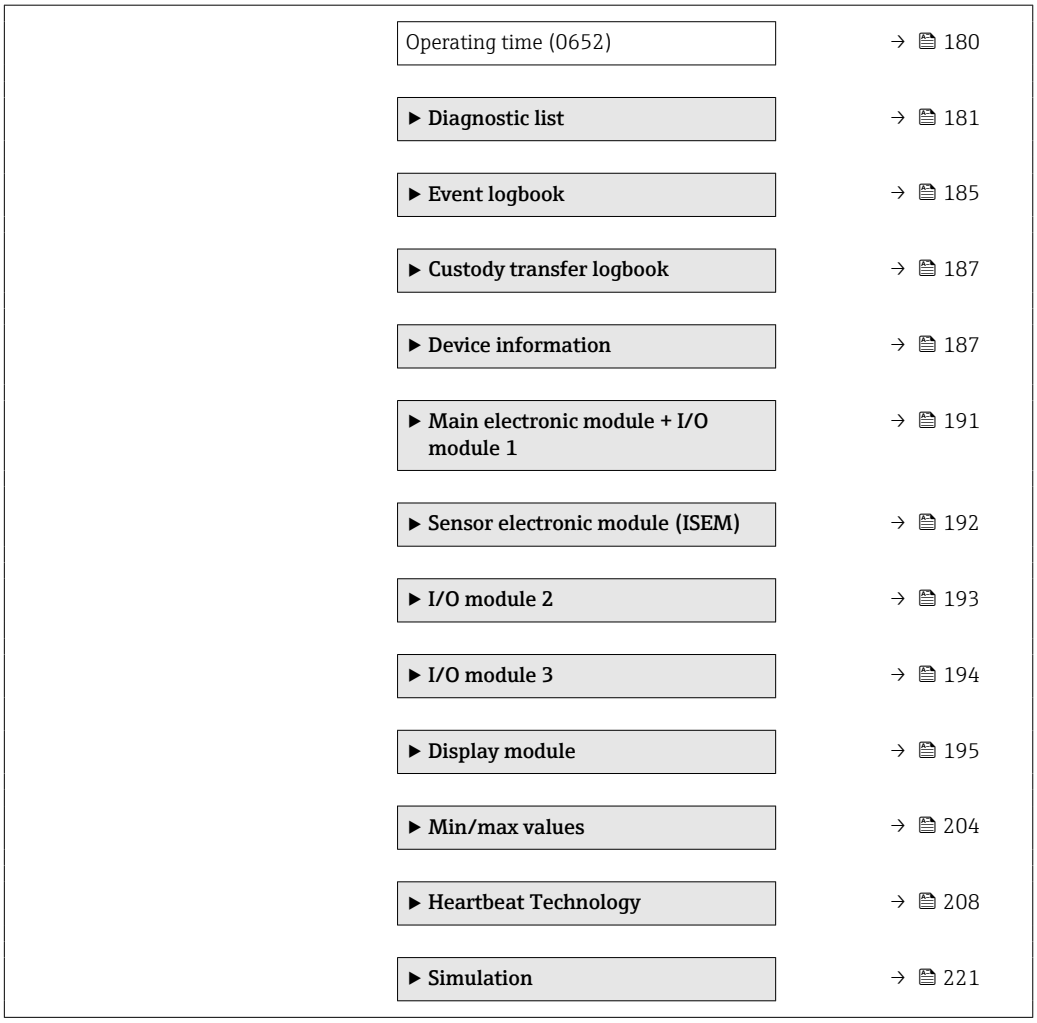
Contents	Documentation code
Heartbeat Technology	SD01743D
Web server	SD01655D

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.




I/O module 1 to n type (3901–1 to n) → 105
Apply I/O configuration (3907) → 105
I/O alteration code (2762) → 106
▶ Input → 106
▶ Current input 1 to n → 106
▶ Status input 1 to n → 109
▶ Output → 112
▶ Current output 1 to n → 112
▶ Pulse/frequency/switch output 1 to n → 125
▶ Relay output 1 to n → 144
▶ Double pulse output → 151
▶ Communication → 155
▶ Modbus configuration → 156
▶ Modbus information → 161
▶ Modbus data map → 162
▶ Web server → 162
▶ WLAN settings → 165
▶ Application → 172
Reset all totalizers (2806) → 172
▶ Totalizer 1 to n → 173
▶ Diagnostics → 177
Actual diagnostics (0691) → 178
Previous diagnostics (0690) → 179
Operating time from restart (0653) → 180


Operating time (0652)
→ 180
▶ Diagnostic list
→ 181
▶ Event logbook
→ 185
▶ Custody transfer logbook
→ 187
▶ Device information
→ 187
▶ Main electronic module + I/O module 1
→ 191
▶ Sensor electronic module (ISEM)
→ 192
▶ I/O module 2
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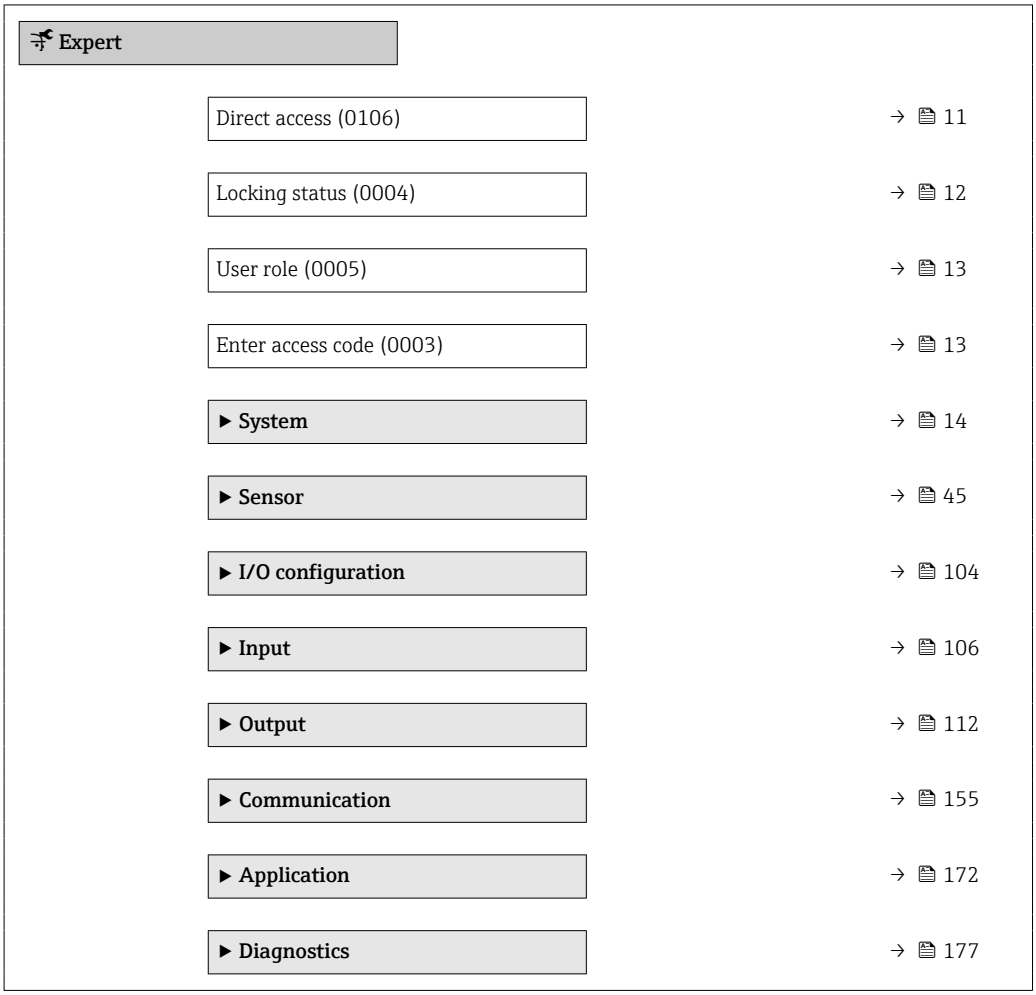
▶ Display module
→ 195
▶ Min/max values
→ 204
▶ Heartbeat Technology
→ 208
▶ Simulation
→ 221

3 Description of device parameters

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



Direct access

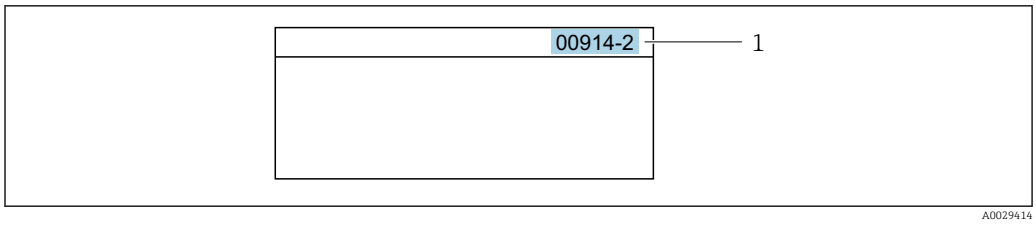
Navigation Expert → Direct access (0106)

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

User entry 0 to 65 535

Additional information *User entry*

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



1 Direct access code

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

Locking status

Navigation Expert → Locking status (0004)

Description Displays the active write protection.

User interface
- Hardware locked
- CT active - defined parameters
- CT active - all parameters
- 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 (→ 13) 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) .
CT active - all parameters (priority 2)	Only available for Promag H. The DIP switch for custody transfer mode is activated on the PCB board. Locks the parameters that are relevant for custody transfer and also parameters that are predefined by Endress+Hauser and are not relevant for custody transfer (e.g. on local display or operating tool). For detailed information on custody transfer mode, see the Special Documentation for the device → 7

Options	Description
CT active - defined parameters (priority 3)	Only available for Promag H. The DIP switch for the custody transfer mode is activated on the PCB board. Only locks the parameters that are relevant for custody transfer (e.g. on the local display or operating tool). For detailed information on custody transfer mode, see the Special Documentation for the device → 7
Temporarily locked (priority 4)	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 (→ 13).

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

User interface

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

Enter access code

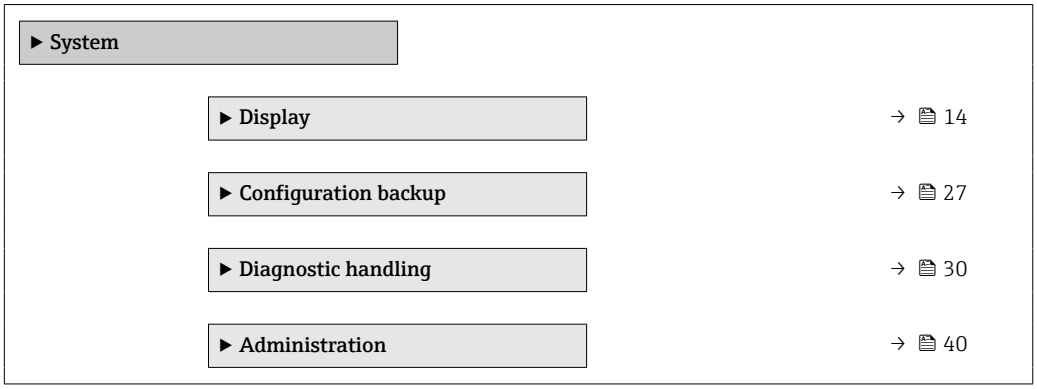
Navigation Expert → Ent. access code (0003)

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

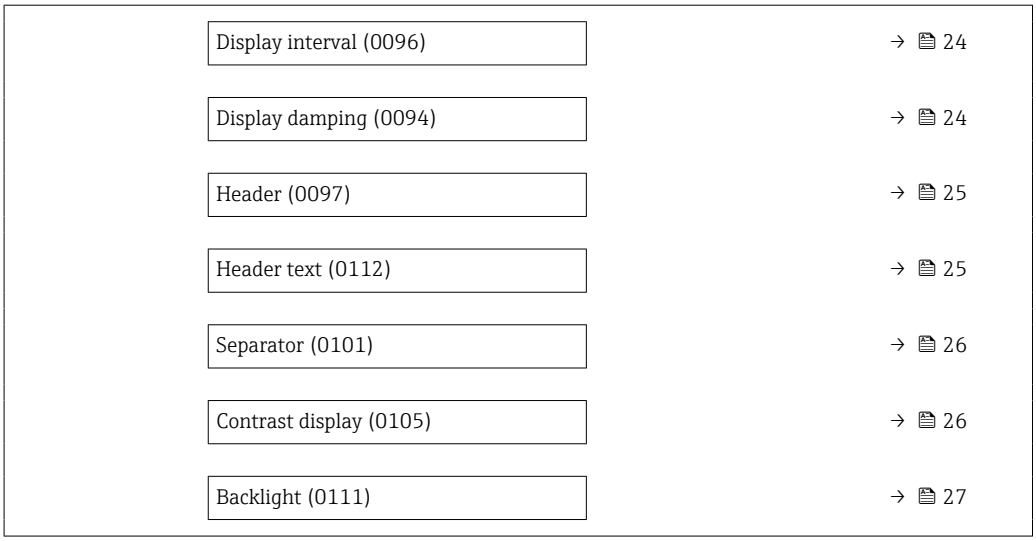
3.1 "System" submenu

Navigation Expert → System



3.1.1 "Display" submenu

Navigation Expert → System → Display



Display language

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

Prerequisite A local display is provided.

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

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

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

Format display

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

Prerequisite A local display is provided.

Description

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

Selection

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

Factory setting

1 value, max. size

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 (→ 18)...**Value 8 display** parameter 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 (→ 24).

Custody transfer mode

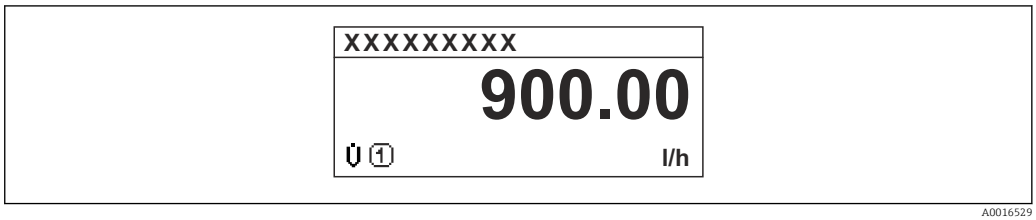
Only available for Promag H.

- Once the measuring device has been enabled for custody transfer mode, depending on the custody transfer approval selected the display can switch between showing the relevant information and the custody transfer counter.
- In addition, a padlock symbol appears in the header of the display (🔒).

For detailed information on custody transfer mode, see the Special Documentation for the device → 7

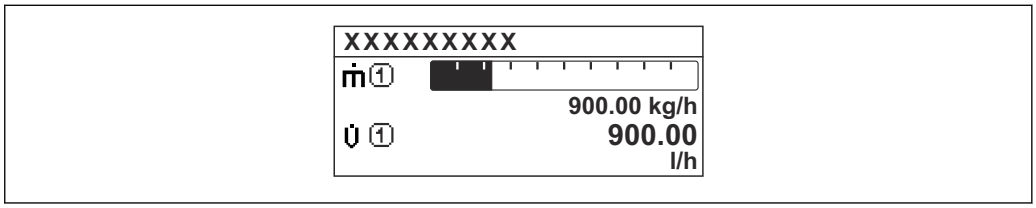
Possible measured values shown on the local display:

"1 value, max. size" option



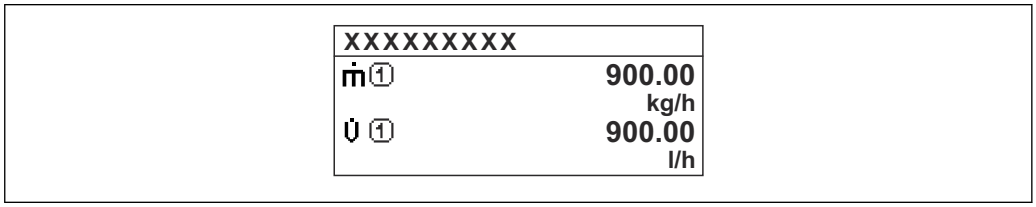
A0016529

"1 bargraph + 1 value" option



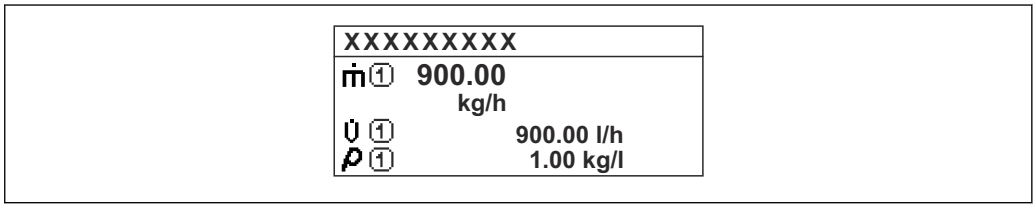
A0013098

"2 values" option



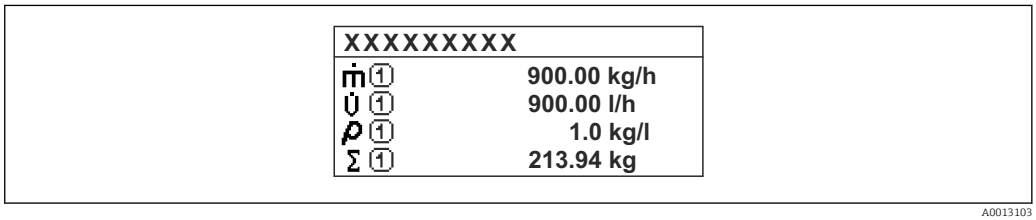
A0013100

"1 value large + 2 values" option



A0013102

"4 values" option



A0013103

Value 1 display

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

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 (→ 15) is used to specify how many measured values are displayed simultaneously and how.

Custody transfer mode

Only available for Promag H.

Once the measuring device has been enabled for custody transfer mode, depending on the custody transfer approval selected the display can switch to show the relevant information.

For detailed information on custody transfer mode, see the Special Documentation for the device → 7

Dependency

The unit of the displayed measured value is taken from the **System units** submenu (→ 57).

* Visibility depends on order options or device settings

0% bargraph value 1

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

Prerequisite A local display is provided.

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

User entry Signed floating-point number

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

Additional information

Description

The **Format display** parameter (→ 15) 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 (→ 57).

100% bargraph value 1

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

Prerequisite A local display is provided.

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

User entry Signed floating-point number

Factory setting Depends on country and nominal diameter → 233

Additional information

Description

The **Format display** parameter (→ 15) 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 (→ 57).

Decimal places 1

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

Prerequisite A measured value is specified in the **Value 1 display** parameter (→ 18).

Description Use this function to select the number of decimal places for measured value 1.

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

Factory setting x.xx

Additional information *Description*

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

Value 2 display

Navigation Expert → System → Display → Value 2 display (0108)

Prerequisite A local display is provided.

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

Selection For the picklist, see the **Value 1 display** parameter (→ 18)

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 (→ 15) is used to specify how many measured values are displayed simultaneously and how.

Dependency

The unit of the displayed measured value is taken from the **System units** submenu (→ 57).

Decimal places 2

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

Prerequisite A measured value is specified in the **Value 2 display** parameter (→ 20).

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

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

Factory setting x.xx

Additional information *Description*

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

Value 3 display

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

Prerequisite A local display is provided.

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

Selection For the picklist, see the **Value 1 display** parameter (→ 18)

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 (→ 15) 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 (→ 57).

0% bargraph value 3

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

Prerequisite A selection was made in the **Value 3 display** parameter (→ 21).

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

User entry Signed floating-point number

Factory setting

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

Additional information

Description

The **Format display** parameter (→ 15) 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 (→ 57).

100% bargraph value 3

Navigation

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

Prerequisite

A selection was made in the **Value 3 display** parameter (→ 21).

Description

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

User entry

Signed floating-point number

Factory setting

0

Additional information

Description

The **Format display** parameter (→ 15) 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 (→ 57).

Decimal places 3

Navigation

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

Prerequisite

A measured value is specified in the **Value 3 display** parameter (→ 21).

Description

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

Selection

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

Factory setting

x.xx

Additional information *Description*

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

Value 4 display

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

Prerequisite A local display is provided.

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

Selection For the picklist, see the **Value 1 display** parameter (→ 18)

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 (→ 15) 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 (→ 57).

Custody transfer mode

Only available for Promag H.

Once the measuring device has been enabled for custody transfer mode, depending on the custody transfer approval selected the display can switch to showing the custody transfer counter.

For detailed information on custody transfer mode, see the Special Documentation for the device → 7

Decimal places 4

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

Prerequisite A measured value is specified in the **Value 4 display** parameter (→ 23).

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

Selection

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

Factory setting x.xx

Additional information *Description*

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

Display interval

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

Prerequisite A local display is provided.

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

User entry 1 to 10 s

Factory setting 5 s

Additional information *Description*

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

- The **Value 1 display** parameter (→ 18)...**Value 8 display** parameter are used to specify which measured values are shown on the local display.
- The display format for the measured values displayed is defined in the **Format display** parameter (→ 15).

Custody transfer mode

Only available for Promag H.

Once the measuring device has been enabled for custody transfer mode, depending on the custody transfer approval selected the display can switch between showing the relevant information and the custody transfer counter.

For detailed information on custody transfer mode, see the Special Documentation for the device → 7

Display damping

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

Prerequisite A local display is provided.

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

User entry 0.0 to 999.9 s

Factory setting 0.0 s

Additional information *User entry*

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

Prerequisite A local display is provided.

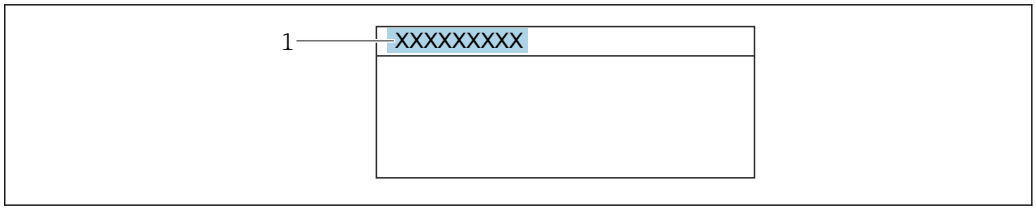
Description Use this function to select the contents of the header of the local display.

Selection
- Device tag
- Free text

Factory setting Device tag

Additional information *Description*

The header text only appears during normal operation.



1 Position of the header text on the display

Selection
- Device tag
  Is defined in the **Device tag** parameter (→ 188).
- Free text
  Is defined in the **Header text** parameter (→ 25).

Header text

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

Prerequisite The **Free text** option is selected in the **Header** parameter (→ 25).

1) proportional transmission behavior with first order delay

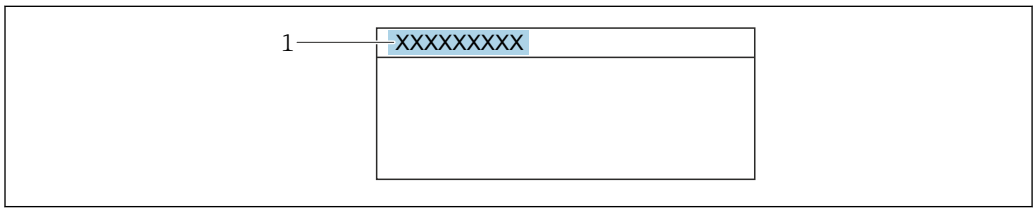
Description Use this function to enter a customer-specific text for the header of the local display.

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

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

Additional information *Description*

The header text only appears during normal operation.



1 Position of the header text on the display

User entry

The number of characters displayed depends on the characters used.

Separator

Navigation Expert → System → Display → Separator (0101)

Prerequisite A local display is provided.

Description Use this function to select the decimal separator.

Selection
- . (point)
- , (comma)

Factory setting . (point)

Contrast display

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

Prerequisite A local display is provided.

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

User entry 20 to 80 %

Factory setting Depends on the display

Backlight

Navigation Expert → System → 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"

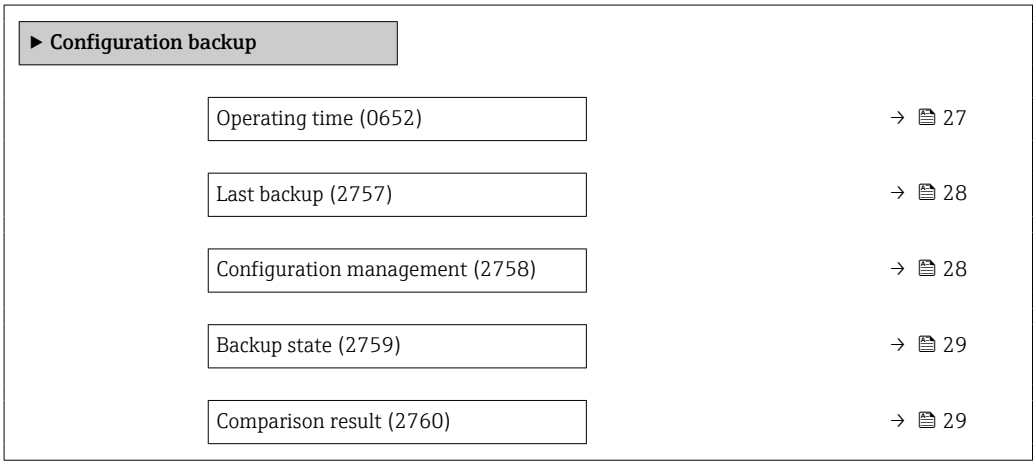
Description Use this function to switch the backlight of the local display on and off.

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.

* Visibility depends on order options or device settings

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

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 (→ 28).

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.

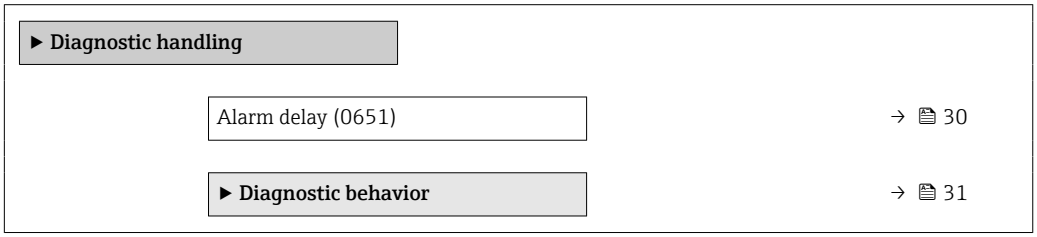
Options	Description
Check not done	The device configuration of the HistoROM has not yet been compared to the backup copy in the device memory.
Dataset incompatible	The backup copy in the device memory is not compatible with the device.

HistoROM

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

3.1.3 "Diagnostic handling" submenu

Navigation Expert → System → Diagn. handling



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
- 962 empty pipe

"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 (→ 31).

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

Options	Description
Alarm	The device stops measurement. The measured value output via Modbus RS485 and the totalizers assume the defined alarm condition. A diagnostic message is generated. The background lighting changes to red.
Warning	The device continues to measure. The measured value output via Modbus RS485 and the totalizers are not affected. A diagnostic message is generated.
Logbook entry only	The device continues to measure. The diagnostic message is displayed only in the **Event logbook** submenu (→ 185) (**Event list** submenu (→ 186)) and is not displayed in alternation with the operational display.
Off	The diagnostic event is ignored, and no diagnostic message is generated or entered.

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

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

► **Diagnostic behavior**

Assign behavior of diagnostic no. 043 (0650)	→ 32
Assign behavior of diagnostic no. 143 (0635)	→ 33
Assign behavior of diagnostic no. 302 (0739)	→ 33
Assign behavior of diagnostic no. 376 (0645)	→ 33
Assign behavior of diagnostic no. 377 (0777)	→ 34
Assign behavior of diagnostic no. 441 (0657)	→ 34
Assign behavior of diagnostic no. 442 (0658)	→ 34
Assign behavior of diagnostic no. 443 (0659)	→ 35
Assign behavior of diagnostic no. 444 (0740)	→ 35

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: → 31

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

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 143 (0635)

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: → 31

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: → 31

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: → 31

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: → 31

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: → 31

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: → 31

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: → 31

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: → 31

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: → 31

Assign behavior of diagnostic no. 543 (Double pulse output)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 543 (0643)

Description Use this function to change the diagnostic behavior of the **543 Double pulse output** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available: → 31

Assign behavior of diagnostic no. 599 (Custody transfer logbook full)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 599 (0644)

Description Use this function to select the diagnostic behavior of the ⚠**S599 Custody transfer logbook full** diagnostic message

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

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: → 31

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: → 31

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: → 31

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: → 31

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: → 31

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: → 31

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: → 31

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: → 31

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.

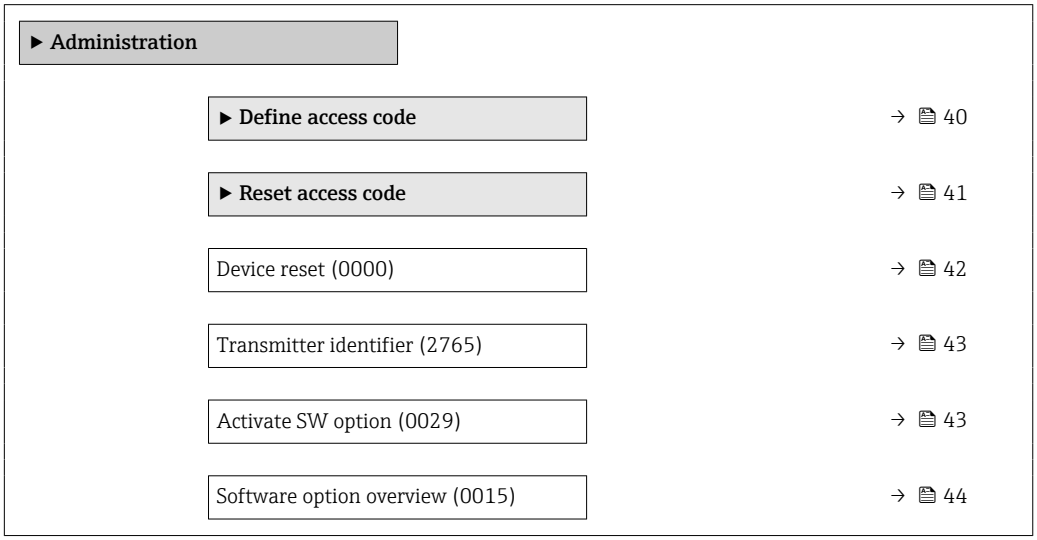
Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available: → 31

3.1.4 "Administration" submenu

Navigation Expert → System → Administration

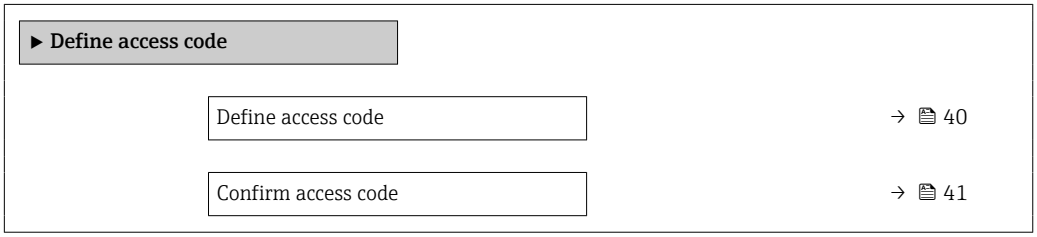


"Define access code" wizard

The **Define access code** wizard (→ 40) 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 (→ 13).

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

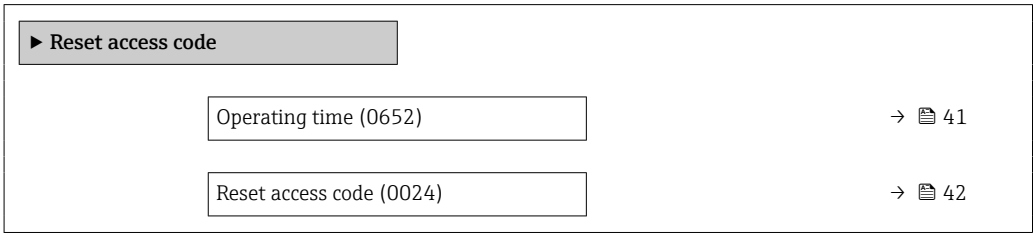
Navigation Expert → System → Administration → Def. access code → Confirm code

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

* Visibility depends on order options or device settings

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

Transmitter identifier

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

Description Select transmitter identifier.

User interface
- Unknown
- 500
- 300

Factory setting 300

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 (→ 44).

↳ 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 (→ 44).

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 *
- Custody transfer
- Build-up index
- Heartbeat Monitoring *
- Heartbeat Verification *

* Visibility depends on order options or device settings

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"

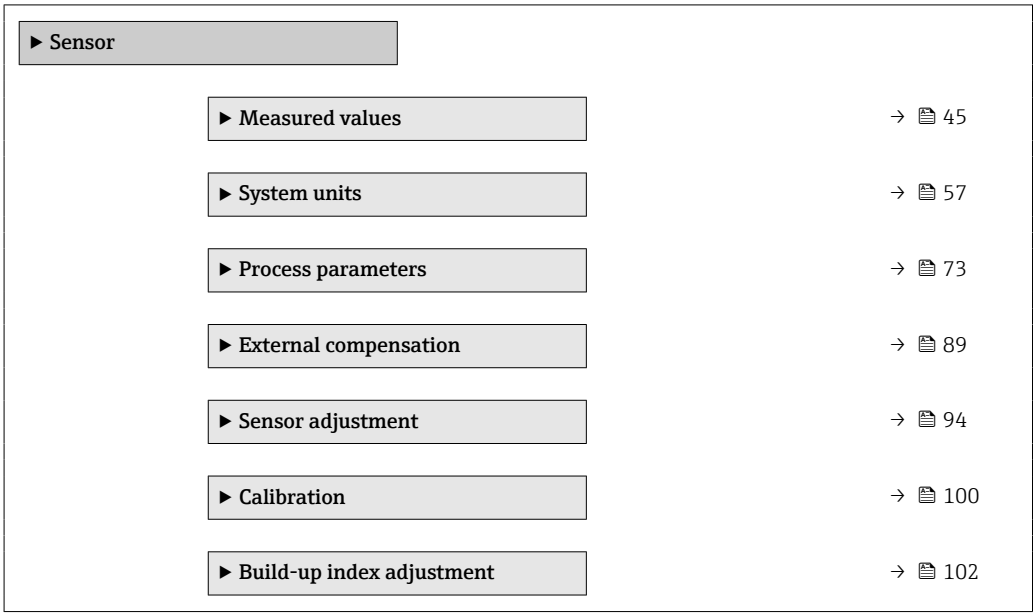
"Custody transfer" option

The measuring device has an approval for custody transfer measurement.

Detailed information on the national and international approvals for custody transfer that are currently available can be supplied by your Endress+Hauser sales organization.

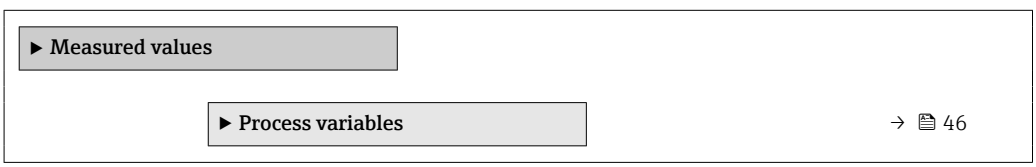
3.2 "Sensor" submenu

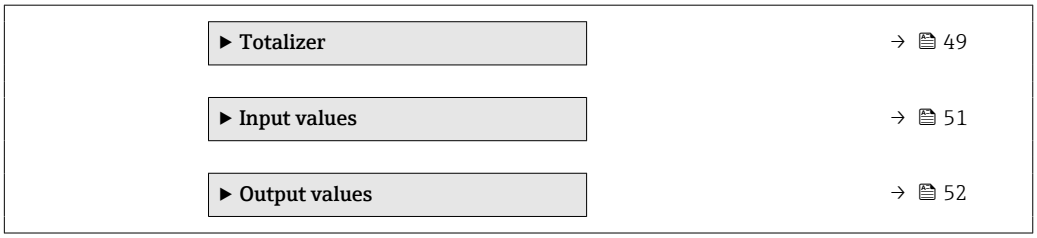
Navigation Expert → Sensor



3.2.1 "Measured values" submenu

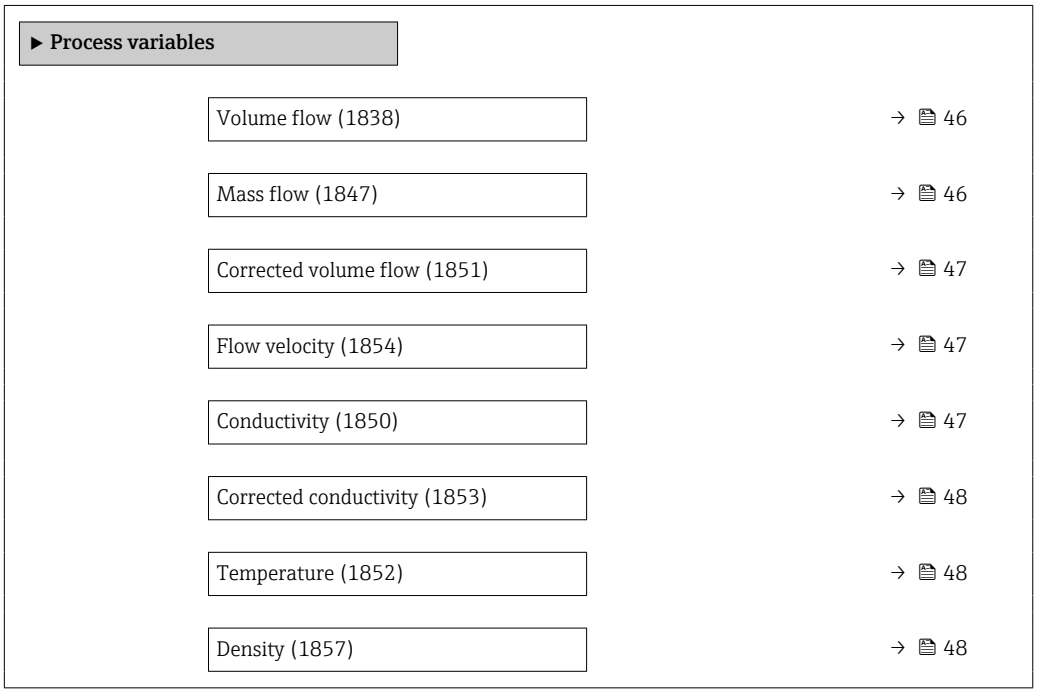
Navigation Expert → Sensor → Measured val.





"Process variables" submenu

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



Volume flow

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

Description Displays the volume flow that is currently measured.

User interface Signed floating-point number

Additional information

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 (→ 61)

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 (→ 63)

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 (→ 59)

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 (→ 59)

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 (→ 60)

Density

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

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

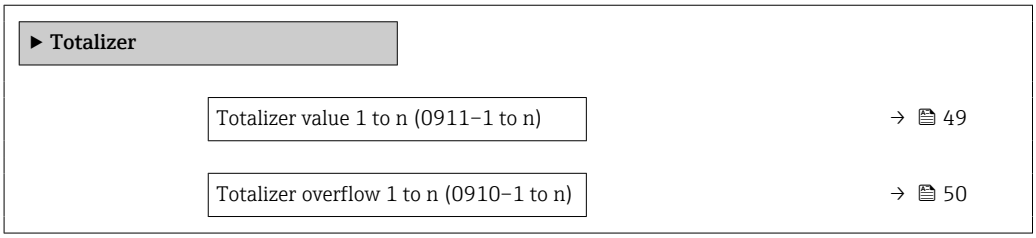
User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Density unit** parameter (→ 62)

"Totalizer" submenu

Navigation Expert → Sensor → Measured val. → Totalizer



Totalizer value 1 to n

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

Prerequisite A process variable is selected in the **Assign process variable** parameter (→ 173) of the **Totalizer 1 to n** submenu.

Description Displays the current totalizer counter reading.

User interface Signed floating-point number

Additional information

Description

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

In the event of an error, the totalizer adopts the mode defined in the **Failure mode** parameter (→ 177).

User interface

The value of the process variable totalized since measuring began can be positive or negative. This depends on the settings in the **Totalizer operation mode** parameter (→ 175).

The unit of the selected process variable is specified for the totalizer in the **Unit totalizer** parameter (→ 174).

Example

Calculation of the current totalizer reading when the value exceeds the 7-digit display range of the operating tool:
- Value in the **Totalizer value 1** parameter: 1 968 457 m^3
- Value in the **Totalizer overflow 1** parameter: $1 \cdot 10^7$ (1 overflow) = 10 000 000 m^3
- Current totalizer reading: 11 968 457 m^3

Totalizer overflow 1 to n

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

Prerequisite A process variable is selected in the **Assign process variable** parameter (→ 173) of the **Totalizer 1 to n** submenu.

Description Displays the current totalizer overflow.

User interface Integer with sign

Additional information

Description

If the current totalizer reading exceeds 7 digits, which is the maximum value range that can be displayed by the operating tool, the value above this range is output as an overflow. The current totalizer value is therefore the sum of the overflow value and the totalizer value from the **Totalizer value 1 to n** parameter.

User interface

The unit of the selected process variable is specified for the totalizer in the **Unit totalizer** parameter (→ 174).

Example

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

Totalizer 1 to n value

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

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

User interface Signed floating-point number

Factory setting 0 m^3

Totalizer 1 to n status

Navigation Expert → Sensor → Measured val. → Totalizer → Tot. 1 to n status

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)

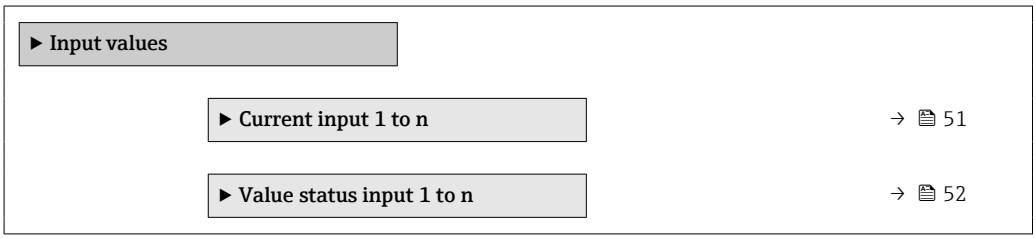
Description Shows the status of the totalizer value reported to the controller for further processing (Hex).

User interface 0 to 255

Factory setting 128

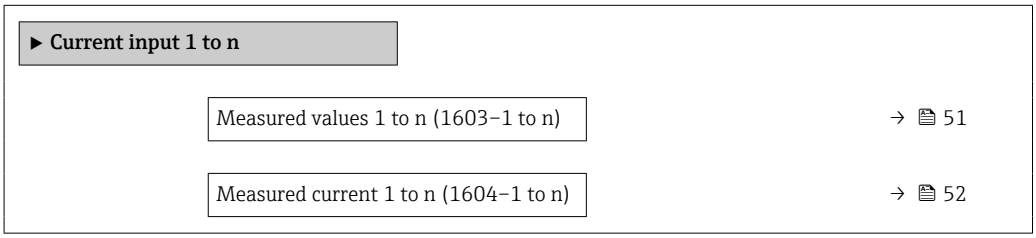
"Input values" submenu

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

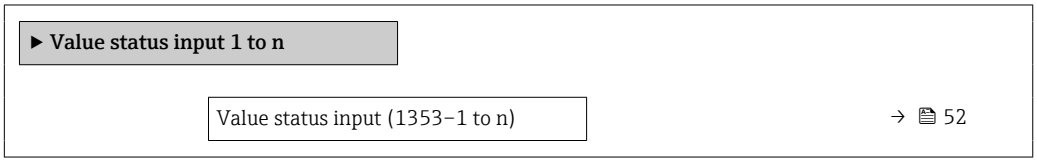
Navigation Expert → Sensor → Measured val. → Input values → Current input 1 to n → Measur. curr. 1 to n (1604–1 to n)

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

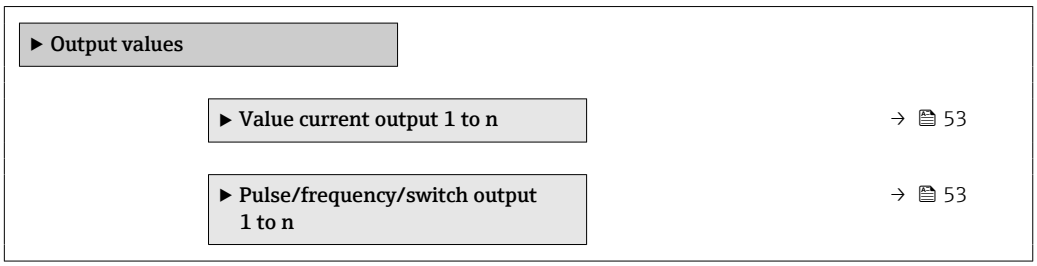
Navigation Expert → Sensor → Measured val. → Input values → Val.stat.inp. 1 to n → Val.stat.inp. (1353–1 to n)

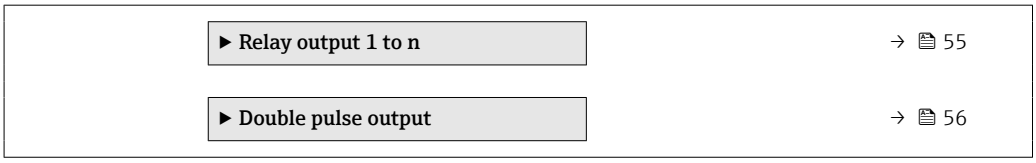
Description Displays the current input signal level.

User interface
- High
- Low

"Output values" submenu

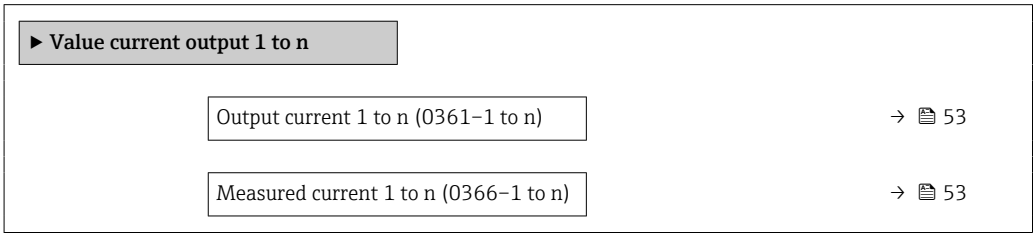
Navigation Expert → Sensor → Measured val. → Output values





"Value current output 1 to n" submenu

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



Output current 1 to n

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

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

User interface 0 to 22.5 mA

Measured current 1 to n

Navigation Expert → Sensor → Measured val. → Output values → Val. curr.outp 1 to n → Measur. curr. 1 to n (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 1 to n (0471–1 to n)	→ 54
Pulse output 1 to n (0456–1 to n)	→ 54
Switch state 1 to n (0461–1 to n)	→ 55

Output frequency 1 to n

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

Prerequisite In the **Operating mode** parameter (→ 127), 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)

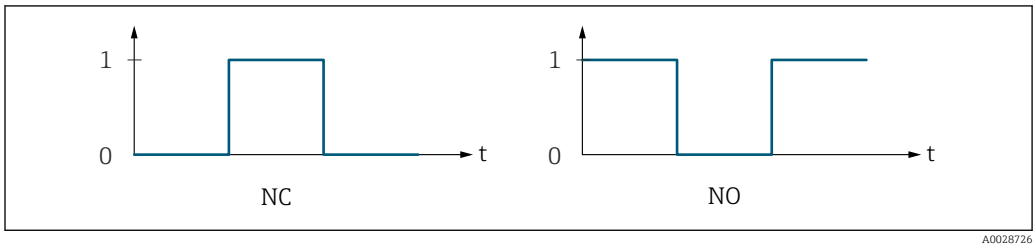
Prerequisite The **Pulse** option is selected in the **Operating mode** parameter (→ 127) parameter.

Description Displays the pulse frequency currently output.

User interface Positive floating-point number

Additional information *Description*

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



A0028726

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

The output behavior can be reversed via the **Invert output signal** parameter (→ 144) 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 (→ 131)) can be configured.

Switch state 1 to n

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

Prerequisite The **Switch** option is selected in the **Operating mode** parameter (→ 127).

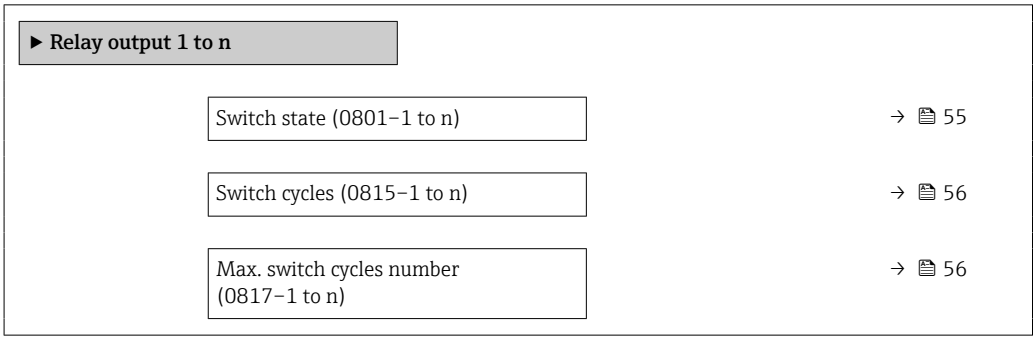
Description Displays the current switch status of the status output.

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

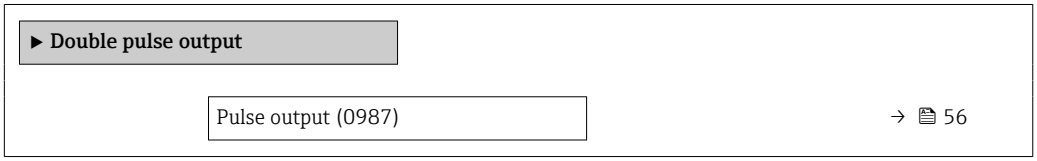
Navigation Expert → Sensor → Measured val. → Output values → Relay output 1 to n → Max. cycles no. (0817–1 to n)

Description Displays the maximum number of guaranteed switch cycles.

User interface Positive integer

"Double pulse output" submenu

Navigation Expert → Sensor → Measured val. → Output values → Double pulse out



Pulse output

Navigation Expert → Sensor → Measured val. → Output values → Double pulse out → Pulse output (0987)

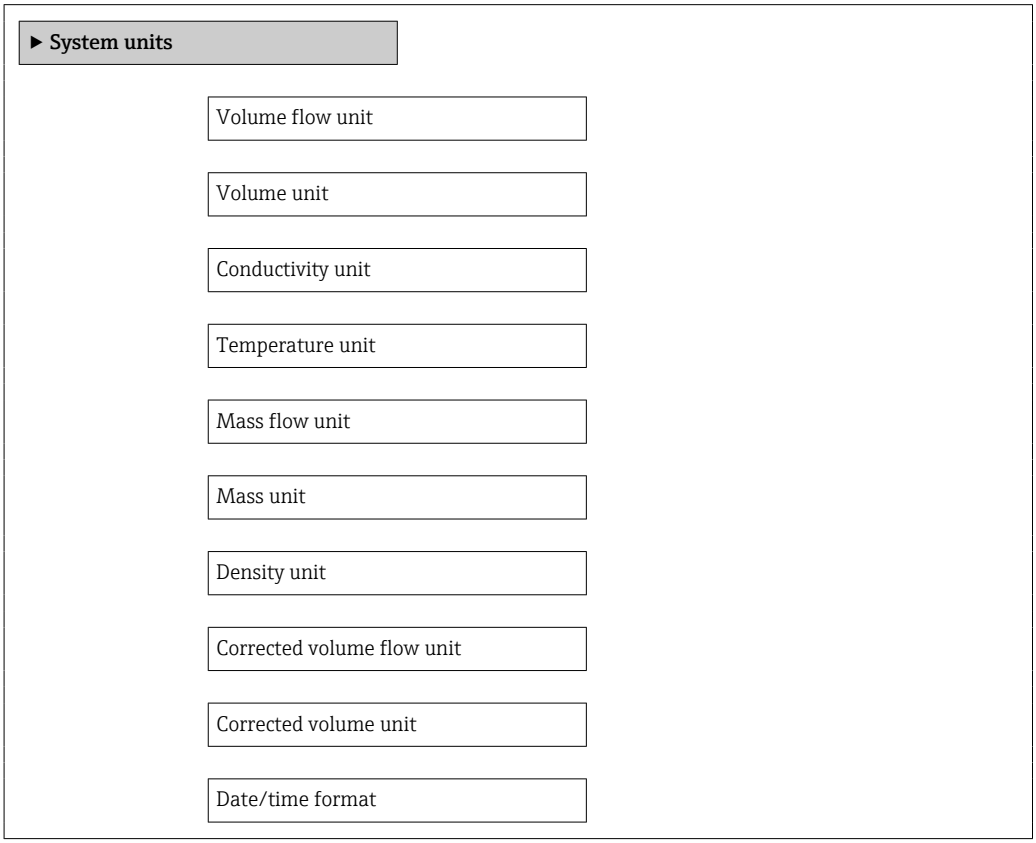
Description Displays the pulse frequency of the double pulse output which is currently output.

User interface Positive floating-point number

Additional information For a detailed description and example: **Pulse output** parameter (→ 54)

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 (→ 46)

Selection

For an explanation of the abbreviated units: → 241

Customer-specific units

The unit for the customer-specific volume is specified in the **User volume text** parameter (→ 65).

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: → 241

Customer-specific units

The unit for the customer-specific volume is specified in the **User volume text** parameter (→ 65).

Conductivity unit

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

Prerequisite The **On** option is selected in the **Conductivity measurement** parameter (→ 76) 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 (→ 47)
- **Corrected conductivity** parameter (→ 48)

Selection

For an explanation of the abbreviated units: → 241

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 (→ 48)
- **Maximum value** parameter (→ 206)
- **Minimum value** parameter (→ 205)
- **External temperature** parameter (→ 93)
- **Maximum value** parameter
- **Minimum value** parameter

Selection

For an explanation of the abbreviated units: → 241

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 (→ 46)

Selection

For an explanation of the abbreviated units: → 241

Customer-specific units

The unit for the customer-specific mass is specified in the **User mass text** parameter (→ 67).

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: → 241

Customer-specific units

The unit for the customer-specific mass is specified in the **User mass text** parameter (→ 67).

Density unit

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

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

Selection

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

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

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

Factory setting

Country-specific:
- kg/l
- lb/ft³

Additional information

Effect

The selected unit applies for:
- **External density** parameter (→ 90)
- **Fixed density** parameter (→ 89)

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: → 241

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 (→ 47)

Selection

For an explanation of the abbreviated units: → 241

Customer-specific units

The unit for the customer-specific corrected volume is defined in the **User corrected volume text** parameter (→ 68).

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: → 241

Customer-specific units

The unit for the customer-specific corrected volume is defined in the **User corrected volume text** parameter (→ 68).

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

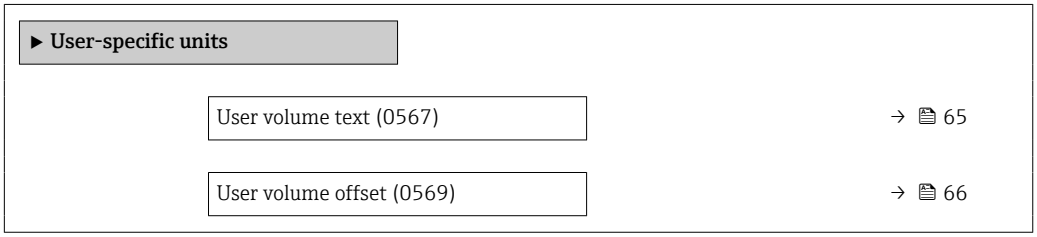
Additional information

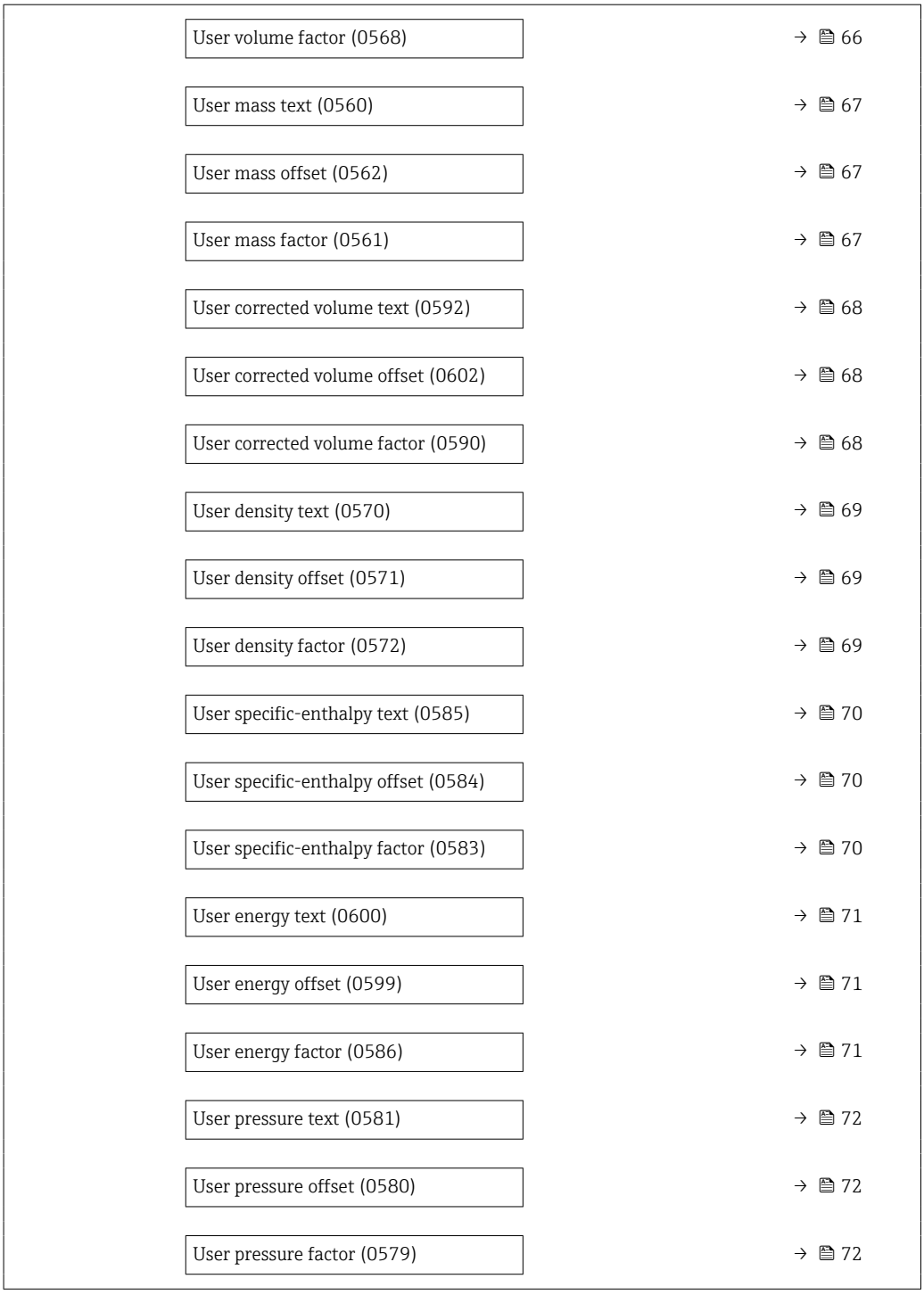
Selection

For an explanation of the abbreviated units: → 241

"User-specific units" submenu

Navigation Expert → Sensor → System units → User-spec. units





User volume text

Navigation Expert → Sensor → System units → User-spec. units → Volume text (0567)

Description Use this function to enter a text for the user-specific unit of volume and volume flow. The corresponding time units (s, min, h, d) for volume flow are generated automatically.

User entry Max. 10 characters such as letters, numbers or special characters (@, %, /)

Factory setting User vol.

Additional information *Result*

The defined unit is shown as an option in the choose list of the following parameters:
- **Volume flow unit** parameter (→ 57)
- **Volume unit** parameter (→ 59)

Example

If the text GLAS is entered, the choose list of the **Volume flow unit** parameter (→ 57) shows the following options:
- GLAS/s
- GLAS/min
- GLAS/h
- GLAS/d

User volume offset

Navigation Expert → Sensor → System units → User-spec. units → Volume offset (0569)

Description Use this function to enter the offset for adapting the user-specific volume unit and volume flow unit (without time).

User entry Signed floating-point number

Factory setting 0

Additional information *Description*

Value in user-specific unit = (factor × value in base unit) + offset

User volume factor

Navigation Expert → Sensor → System units → User-spec. units → Volume factor (0568)

Description Use this function to enter a quantity factor (without time) for the user-specific volume and volume flow unit.

User entry Signed floating-point number

Factory setting 1.0

User mass text

Navigation Expert → Sensor → System units → User-spec. units → Mass text (0560)

Description Use this function to enter a text for the user-specific unit of mass and mass flow. The corresponding time units (s, min, h, d) for mass flow are generated automatically.

User entry Max. 10 characters such as letters, numbers or special characters (@, %, /)

Factory setting User mass

Additional information *Result*

The defined unit is shown as an option in the choose list of the following parameters:
- **Mass flow unit** parameter (→ 61)
- **Mass unit** parameter (→ 61)

Example

If the text GLAS is entered, the following options are displayed in the picklist for the **Mass flow unit** parameter (→ 61):
- GLAS/s
- GLAS/min
- GLAS/h
- GLAS/d

User mass offset

Navigation Expert → Sensor → System units → User-spec. units → Mass offset (0562)

Description Use this function to enter the offset for adapting the user-specific mass unit and mass flow unit (without time).

User entry Signed floating-point number

Factory setting 0

Additional information *Description*

Value in user-specific unit = (factor × value in basic unit) + offset

User mass factor

Navigation Expert → Sensor → System units → User-spec. units → Mass factor (0561)

Description Use this function to enter a quantity factor (without time) for the user-specific mass and mass flow unit.

User entry Signed floating-point number

Factory setting 1.0

User corrected volume text

Navigation Expert → Sensor → System units → User-spec. units → Corr. vol. text (0592)

Description Use this function to enter a text for the user-specific unit of the corrected volume and corrected volume flow. The corresponding time units (s, min, h, d) for mass flow are generated automatically.

User entry Max. 10 characters such as letters, numbers or special characters (@, %, /)

Factory setting UserCrVol.

Additional information *Result*

The defined unit is shown as an option in the choose list of the following parameters:
- **Corrected volume flow unit** parameter (→ 63)
- **Corrected volume unit** parameter (→ 63)

Example

If the text GLAS is entered, the choose list of the **Corrected volume flow unit** parameter (→ 63) shows the following options:
- GLAS/s
- GLAS/min
- GLAS/h
- GLAS/d

User corrected volume offset

Navigation Expert → Sensor → System units → User-spec. units → Corr vol. offset (0602)

Description Use this function to enter the offset for adapting the user-specific corrected volume unit and corrected volume flow unit (without time).

Value in user-specific unit = (factor × value in base unit) + offset

User entry Signed floating-point number

Factory setting 0

User corrected volume factor

Navigation Expert → Sensor → System units → User-spec. units → Cor.vol. factor (0590)

Description Use this function to enter a quantity factor (without time) for the user-specific corrected volume unit and corrected volume flow unit.

User entry Signed floating-point number

Factory setting 1.0

User density text

Navigation Expert → Sensor → System units → User-spec. units → Density text (0570)

Description Use this function to enter a text or the user-specific unit of density.

User entry Max. 10 characters such as letters, numbers or special characters (@, %, /)

Factory setting User dens.

Additional information *Result*

The defined unit is shown as an option in the choose list of the **Density unit** parameter (→ 62).

Example

Enter text “CE_L” for centners per liter

User density offset

Navigation Expert → Sensor → System units → User-spec. units → Density offset (0571)

Description Use this function to enter the zero point shift for the user-specific density unit.

Value in user-specific unit = (factor × value in basic unit) + offset

User entry Signed floating-point number

Factory setting 0

User density factor

Navigation Expert → Sensor → System units → User-spec. units → Density factor (0572)

Description Use this function to enter a quantity factor for the user-specific density unit.

User entry Signed floating-point number

Factory setting 1.0

User specific-enthalpy text

Navigation Expert → Sensor → System units → User-spec. units → Spec. enth. text (0585)

User entry Max. 10 characters such as letters, numbers or special characters (@, %, /)

Factory setting User enth.

Additional information *Result*

Example

If the text CAL is entered, the choose list of the **Calorific value unit** parameter shows the following options:
- CAL/Nm3
- CAL/m3
- CAL/ft3
- CAL/Sft3

User specific-enthalpy offset

Navigation Expert → Sensor → System units → User-spec. units → Spec. enth. off. (0584)

Description Use this function to enter the offset for adapting the user-specific calorific value unit (without volume).

User entry Signed floating-point number

Factory setting 0

User specific-enthalpy factor

Navigation Expert → Sensor → System units → User-spec. units → Spec. enth. fac. (0583)

Description Use this function to enter a quantity factor (without volume) for the user-specific calorific value unit.

User entry Signed floating-point number

Factory setting 1.0

Additional information *Example*

1 W × min = 60 J → 0.166 W × min = 1 J → user entry: 0.0166

User energy text

Navigation Expert → Sensor → System units → User-spec. units → Energy text (0600)

Description Use this function to enter a text for the user-specific energy unit.

User entry Max. 10 characters such as letters, numbers or special characters (@, %, /)

Factory setting User en.

Additional information *Result*

The defined unit is shown as an option in the choose list of the following parameters:
- **Energy unit** parameter
- **Energy flow unit** parameter

Example

If the text W is entered, the choose list of the **Energy flow unit** parameter shows the following options:
- W/s
- W/min
- W/h
- W/d

User energy offset

Navigation Expert → Sensor → System units → User-spec. units → Energy offset (0599)

Description Use this function to enter the offset for adapting the user-specific energy unit (without time).

User entry Signed floating-point number

Factory setting 0

User energy factor

Navigation Expert → Sensor → System units → User-spec. units → Energy factor (0586)

Description Use this function to enter a quantity factor for the user-specific energy unit.

User entry Signed floating-point number

Factory setting 1.0

User pressure text

Navigation Expert → Sensor → System units → User-spec. units → Pressure text (0581)

Description Use this function to enter a text for the user-specific pressure unit.

User entry Max. 10 characters such as letters, numbers or special characters (@, %, /)

Factory setting User pres.

Additional information *Result*

The defined unit is shown as an option in the choose list of the **Pressure unit** parameter.

User pressure offset

Navigation Expert → Sensor → System units → User-spec. units → Pressure offset (0580)

Description Use this function to enter the offset for adapting the user-specific pressure unit.

User entry Signed floating-point number

Factory setting 0

User pressure factor

Navigation Expert → Sensor → System units → User-spec. units → Pressure factor (0579)

Description Use this function to enter a quantity factor for the user-specific pressure unit.

User entry Signed floating-point number

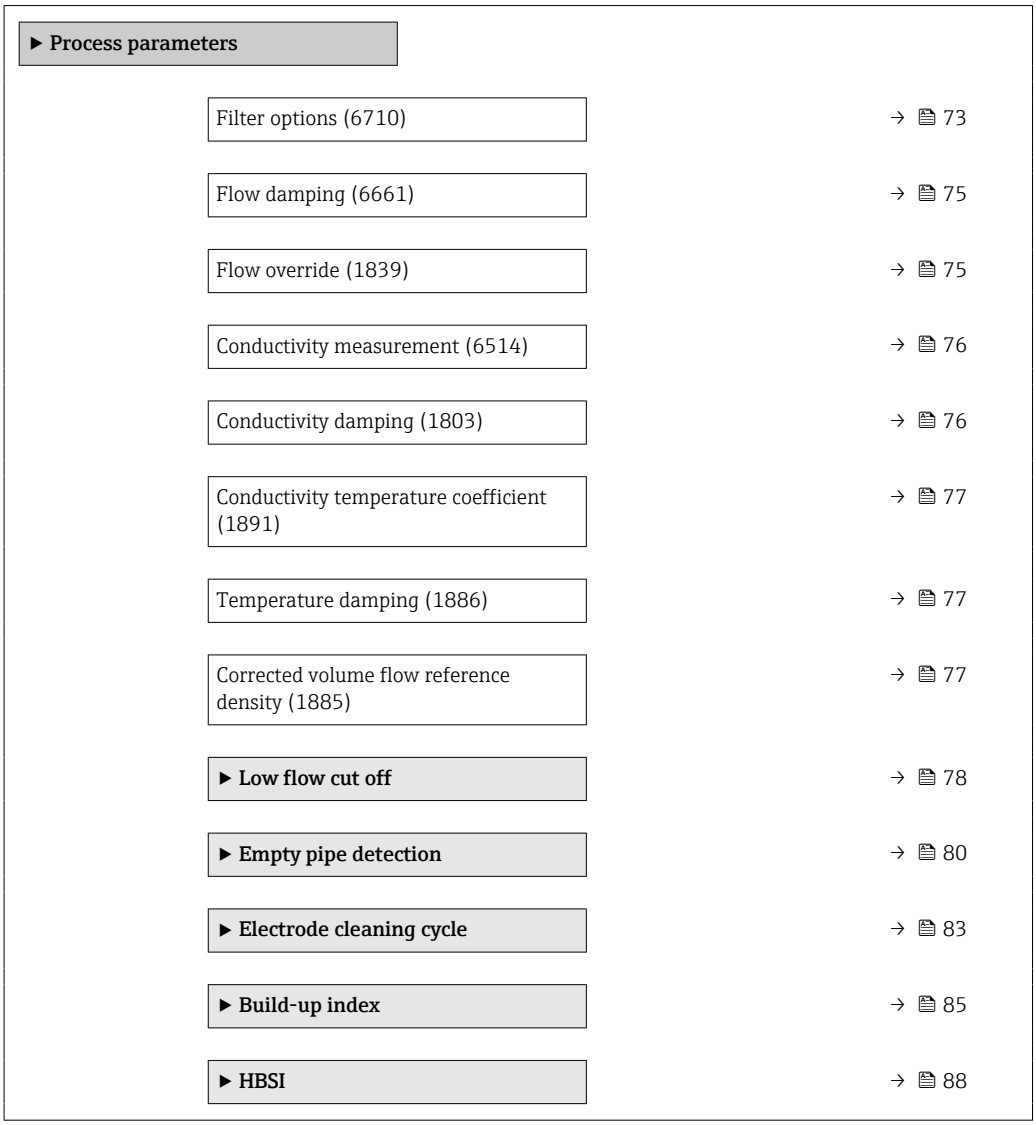
Factory setting 1.0

Additional information *Example*

1 Dyn/cm² = 0.1 Pa → 10 Dyn/cm² = 1 Pa → user entry: 10

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 → 112
- Low flow cut off → 78
- Totalizers → 173

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 (→ 110).

Conductivity measurement

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

Prerequisite The **On** option is selected in the **Conductivity measurement** parameter (→ 76) 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 (→ 76).

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

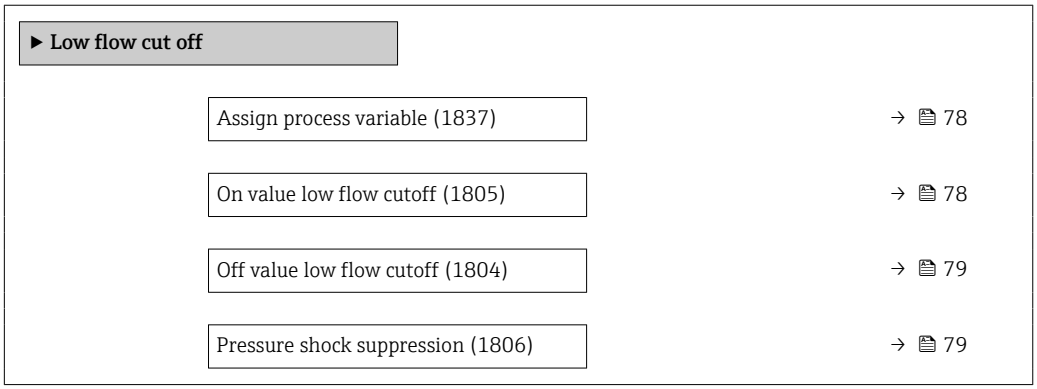
Factory setting
Country-specific:
- 1 kg/l
- 1 lb/ft³

Additional information *Dependency*

The unit is taken from the **Density unit** parameter (→ 62)

"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 (→ 78).

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 → 79.

User entry Positive floating-point number

Factory setting Depends on country and nominal diameter → 235

Additional information *Dependency*

The unit depends on the process variable selected in the **Assign process variable** parameter (→ 78).

Off value low flow cutoff

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

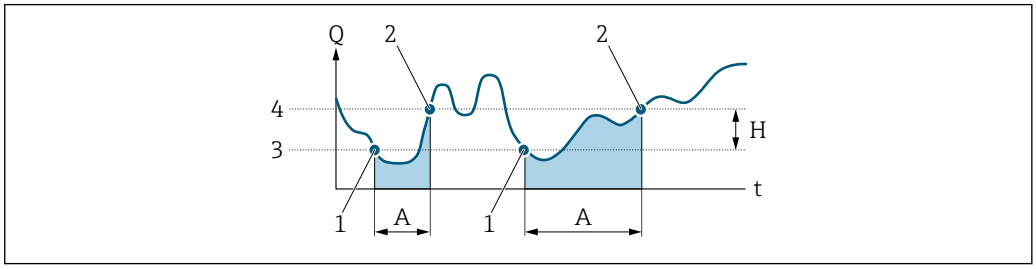
Prerequisite A process variable is selected in the **Assign process variable** parameter (→ 78).

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→ 78.

User entry 0 to 100.0 %

Factory setting 50 %

Additional information *Example*



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

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 (→ 78).

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*

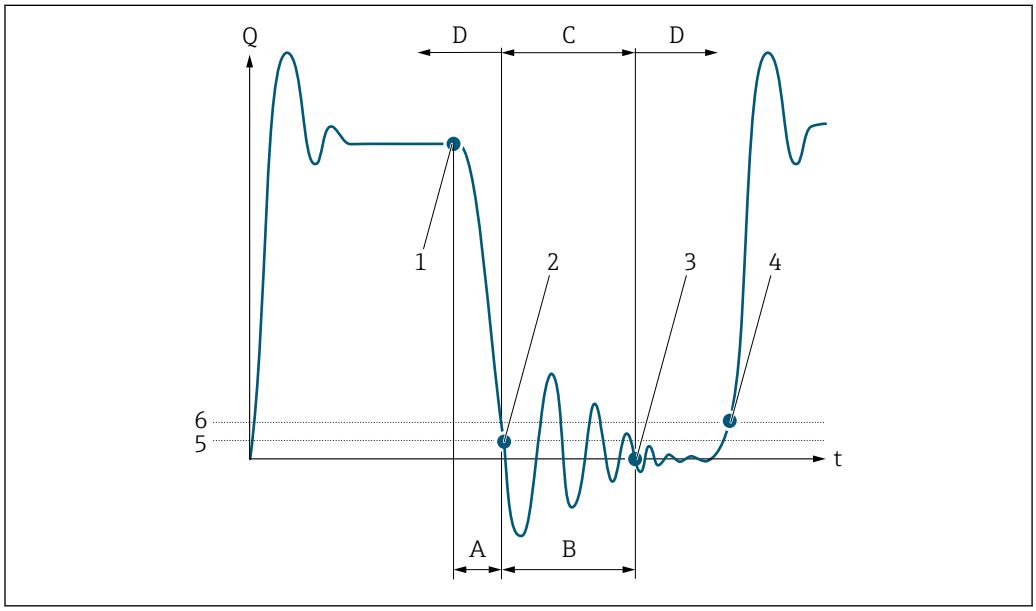
Pressure shock suppression is enabled
- Prerequisite:
  Flow rate < on-value of low flow cut off
- Output values
  - Flow displayed: 0
  - Totalizer: the totalizers are pegged at the last correct value

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.

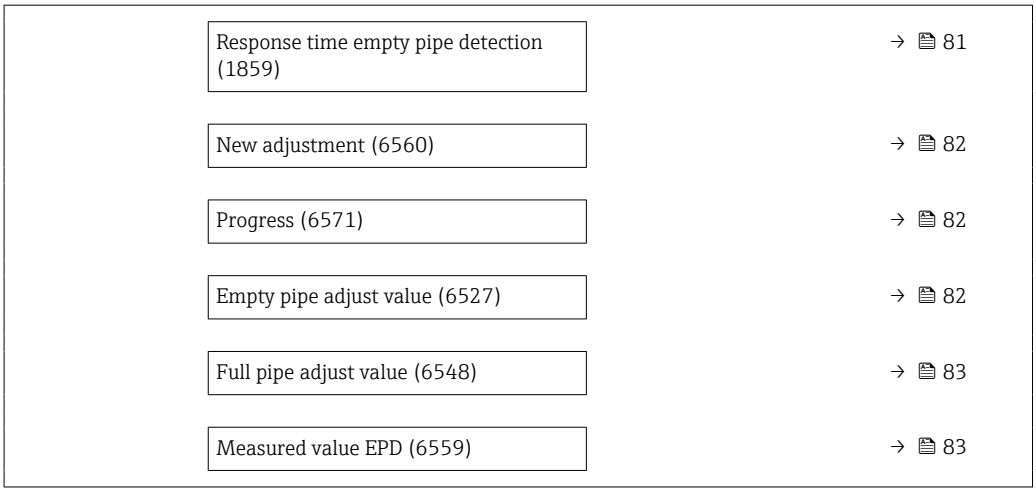


Q Flow
t Time
A After run
B Pressure shock
C Pressure shock suppression active according to the time entered
D Pressure shock suppression inactive
1 Valve closes
2 Flow falls below the on-value of the low flow cut off: pressure shock suppression is activated
3 The time entered has elapsed: pressure shock 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)	→ 81
Switch point empty pipe detection (6562)	→ 81



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 (→ 81).

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 (→ 81).

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 (→ 81).

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 (→ 81).

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 (→ 81), 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 (→ 81), 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 (→ 81), 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**		
	Electrode cleaning cycle (6528)	→ 84
	ECC duration (6555)	→ 84
	ECC recovery time (6556)	→ 84
	ECC interval (6557)	→ 85
	ECC polarity (6631)	→ 85

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.

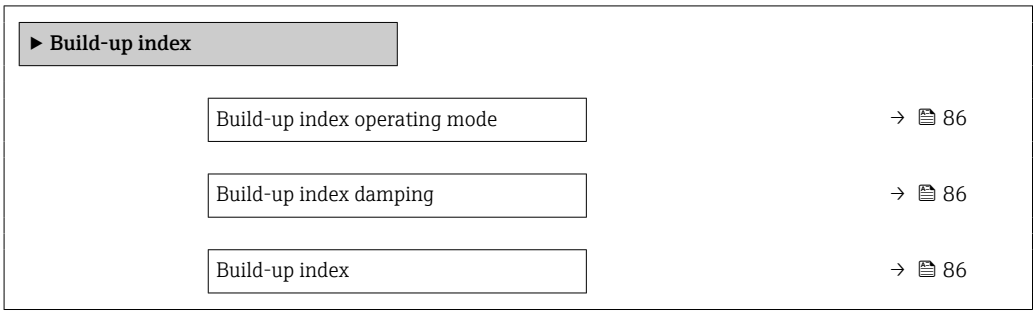
User interface
- Positive
- Negative

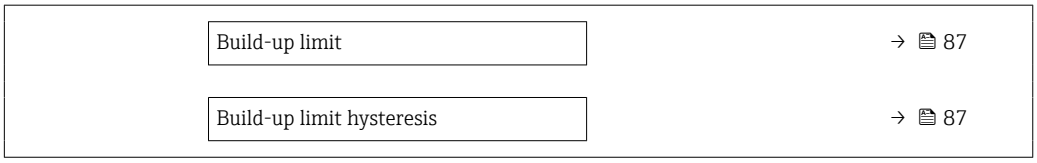
Factory setting Depends on the electrode material:
- Tantalum: **Negative** option
- Platinum, Alloy C22, stainless steel: **Positive** option

"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 (→ 86) parameter. The higher the percentage, the thicker the build-up.

Build-up index value (→ 86) = 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 (→ 86) = 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 (→ 86) 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 (→ 86). The aim is to determine the Build-up index value (→ 86) at the time the cleaning is usually performed.

On the basis of the Build-up index value (→ 86) 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 (→ 86).

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.

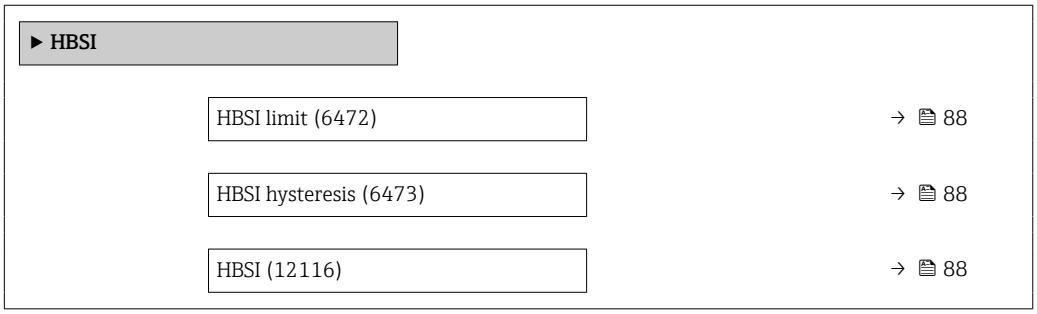
If the value for build-up detection hysteresis is higher than the Build-up limit (→ 87), the "Build-up detected" diagnostic information is not reset until the measuring tube has been cleaned and a restart has been performed.

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

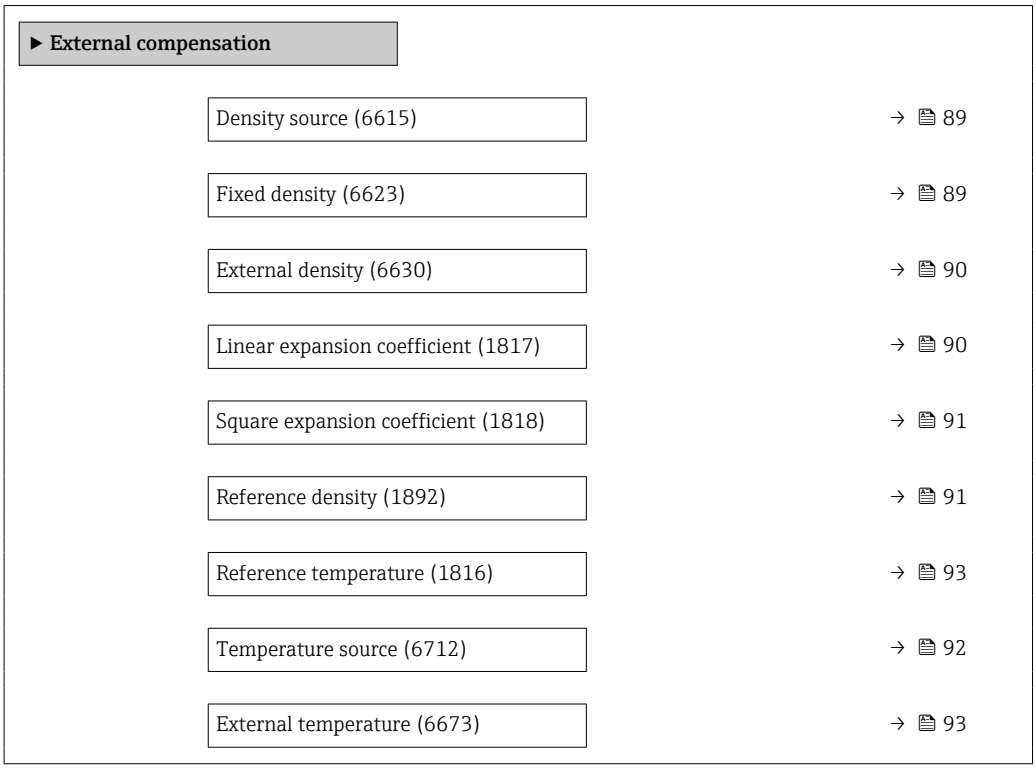
Navigation Expert → Sensor → Process param. → HBSI → HBSI (12116)

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
- Current input 1 *
- Current input 2 *
- Current input 3 *
- External density
- 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 (→ 89).

* Visibility depends on order options or device settings

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

Additional information *Dependency*

The unit is taken from the **Density unit** parameter (→ 62)

External density

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

Prerequisite The **External density** option is selected in the **Density source** parameter (→ 89).

Description Use this function to enter the density read in 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 (→ 62)

Linear expansion coefficient

Navigation Expert → Sensor → External comp. → Linear exp coeff (1817)

Prerequisite The **Calculated value** option is selected in the **Density source** parameter (→ 89) parameter.

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

User interface Signed floating-point number

Factory setting $-2.0295 \cdot 10^{-04}$ 1/K

Square expansion coefficient

Navigation Expert → Sensor → External comp. → Square exp coeff (1818)

Prerequisite The **Calculated value** option is selected in the **Density source** parameter (→ 89) parameter.

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

User interface Signed floating-point number

Factory setting $-3.8436 \cdot 10^{-06}$ 1/K²

Reference density

Navigation Expert → Sensor → External comp. → Ref. density (1892)

Prerequisite The **Calculated value** option is selected in the **Density source** parameter (→ 89) parameter.

Description Displays the reference density.

User interface Positive floating-point number

Additional information *Description*

The reference density is required for density calculation.

Deviation of the process temperature from the reference temperature:

$\Delta T = T - T_{ref}$

ΔT: *Deviation*

T: *Process temperature*

T_{ref}: *Reference temperature (→ 93)*

Temperature-compensated density:

$\rho_{comp} = \rho_{ref}(1 + \alpha\Delta T + \beta\Delta T^{2})$

ρ_{comp}: *Calculated density*

ρ_{ref}: *Reference density*

ΔT: *Deviation of the process temperature from the reference temperature*

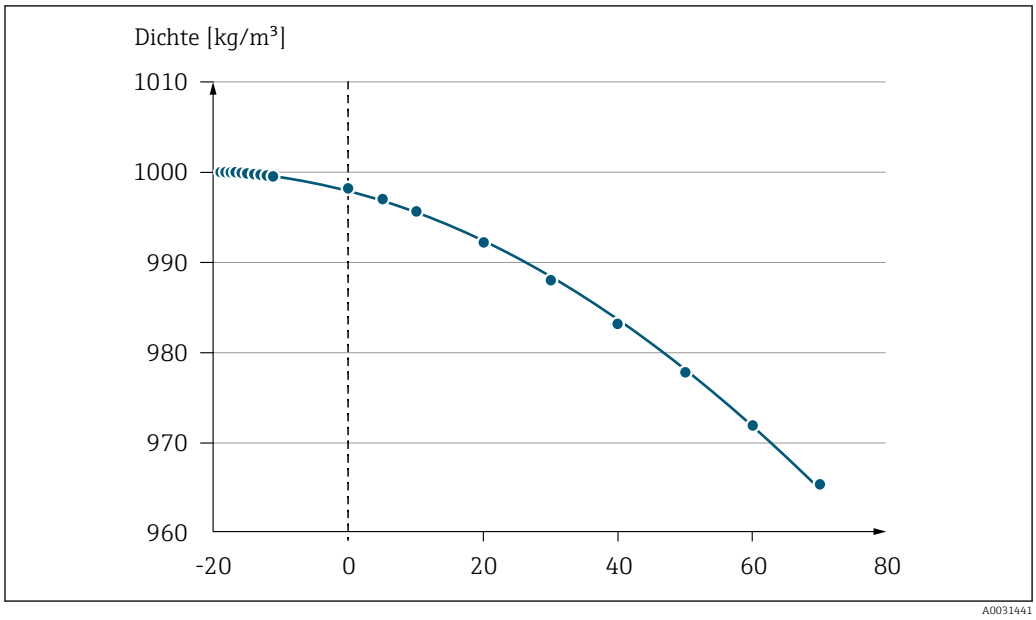
α: *Linear expansion coefficient (→ 90)*

β: *Square expansion coefficient (→ 91)*

Example for water (factory setting)

For a reference temperature of T_{ref} = 20 °C

A quadratic fit of a number of density values results in the following coefficients:
- $\alpha = -2.0295 \cdot 10^{-4}$ 1/K
- $\beta = -3.8436 \cdot 10^{-6}$ 1/K^2
- $\rho_{ref} = 997.82$ kg/m^3



2 *Quadratic fit*

Dependency

The unit is taken from the **Density unit** parameter (→ 62)

Temperature source

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

Description Use this function to select the temperature source.

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

Factory setting Off

* Visibility depends on order options or device settings

External temperature

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

Prerequisite The **External value** option is selected in the **Temperature source** parameter (→ 92).

Description Use this function to enter the temperature read in from the external device.

User entry Floating point number with sign

Factory setting −273.15 °C

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 60)

Reference temperature

Navigation Expert → Sensor → External comp. → Ref. temperature (1816)

Prerequisite The **Fixed density** option or **External density** option are selected in the **Density source** parameter (→ 89).

Description Use this function to enter a reference temperature for calculating the reference density.

User interface −273.15 to 99 999 °C

Factory setting Country-specific:
- +20 °C
- +68 °F

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 60)

Reference density calculation

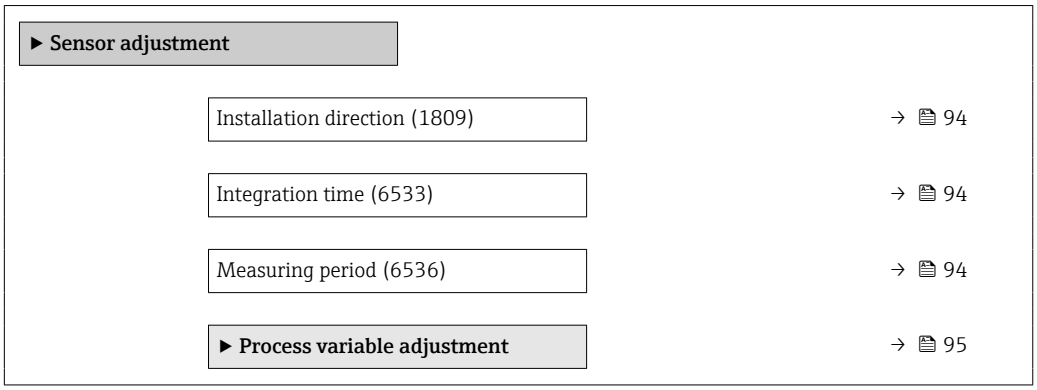
$$\rho_n = \rho \cdot (1 + \alpha \cdot \Delta t + \beta \cdot \Delta t^2)$$

A0023403

- ρ_N: reference density
- ρ: fluid density currently measured
- t: fluid temperature currently measured
- t_N: reference temperature at which the reference density is calculated (e.g. 20 °C)
- Δt: t - t_N
- α: linear expansion coefficient of the fluid, unit = [1/K]; K = Kelvin
- β: square expansion coefficient of the fluid, unit = [1/K²]

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)

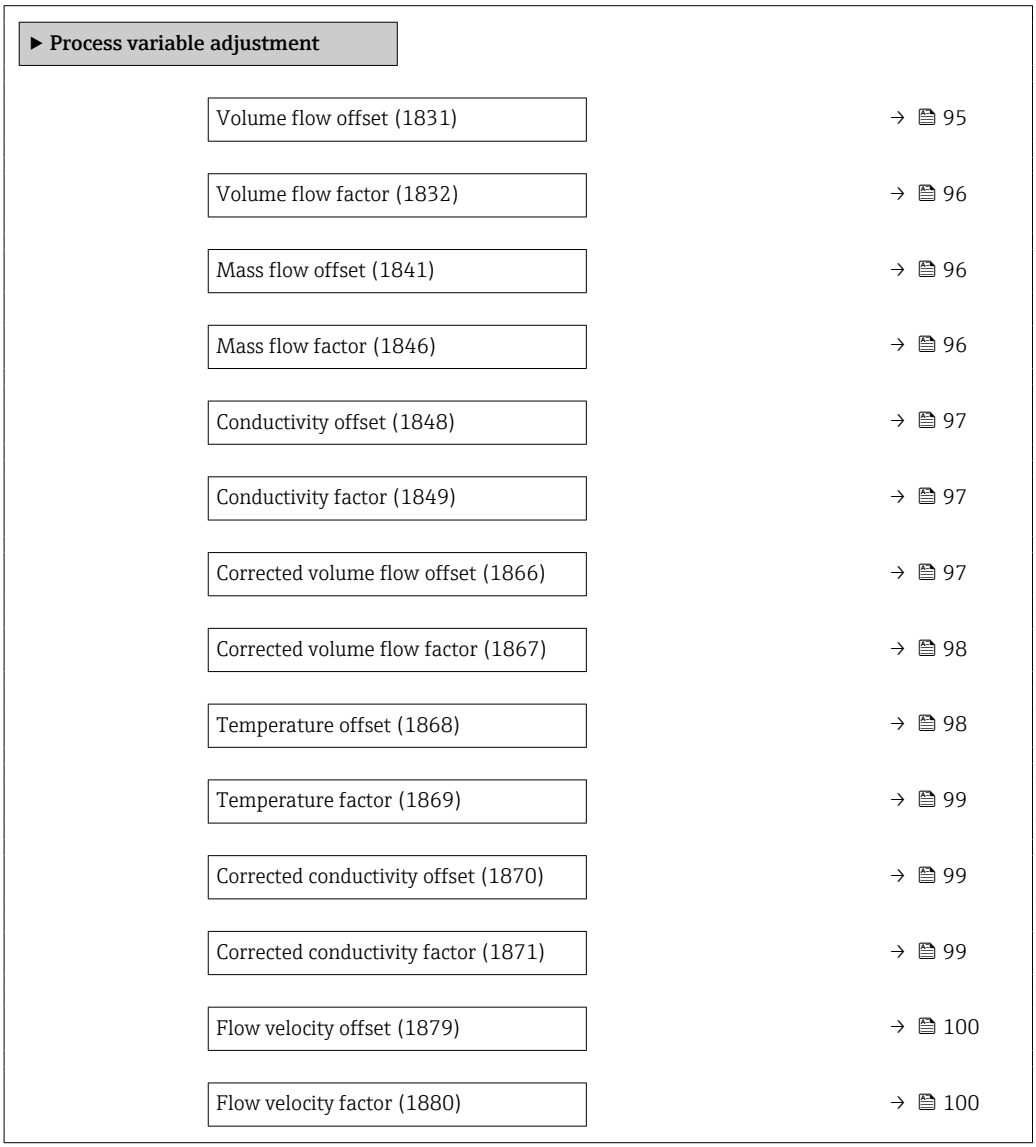
Description Use this function to display the time of a full measuring period.

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



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 (→ 76).

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 (→ 76).

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 (→ 76).

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 (→ 76).

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

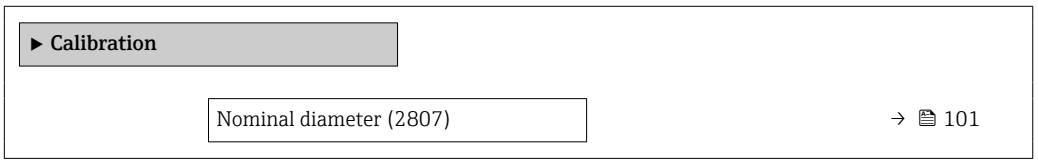
Factory setting 1

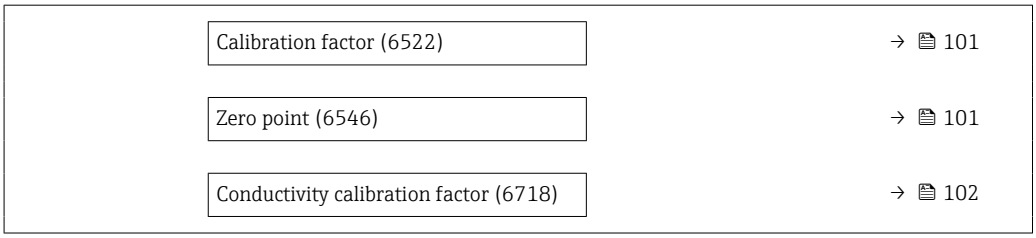
Additional information *Description*

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 (→ 76), 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

▶ **Build-up index adjustment**	
Prerequisites	→ 102
Progress (2808)	→ 103
Build-up index reference value E 1 (6475)	→ 103
Signal to noise ratio (6469)	→ 103
Build-up index reference value E 2 (6474)	→ 103
Signal to noise ratio (6469)	→ 103
Build-up index operating mode (6734)	→ 103

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)

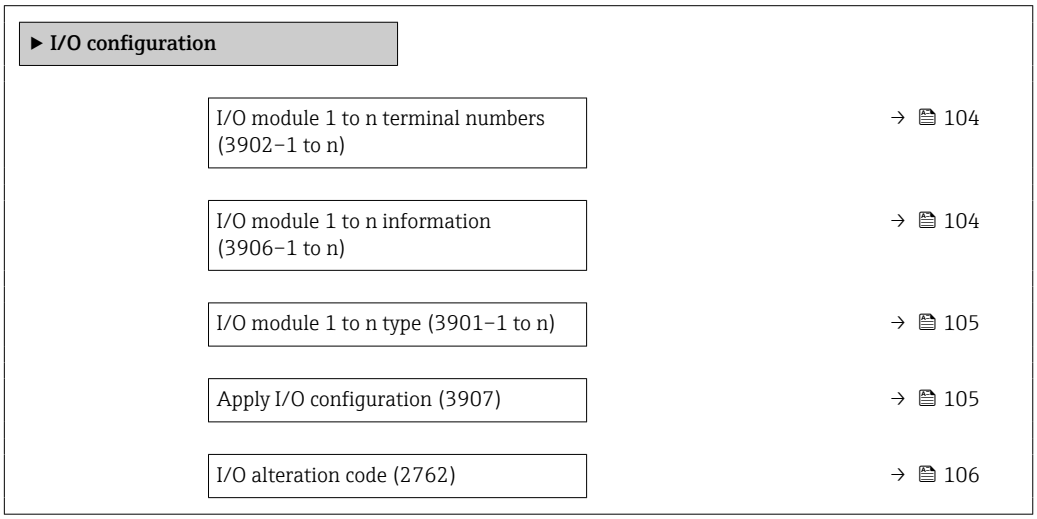
Description Select mode of operation for build-up index.

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
- MODBUS

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.

"MODBUS" option

The I/O module is configured for Modbus.

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"
- "Output; input 3", option **D** "Configurable I/O initial setting off"

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

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

Factory setting Off

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.

* Visibility depends on order options or device settings

Selection
- No
- Yes

Factory setting No

I/O alteration code

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

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

User entry Positive integer

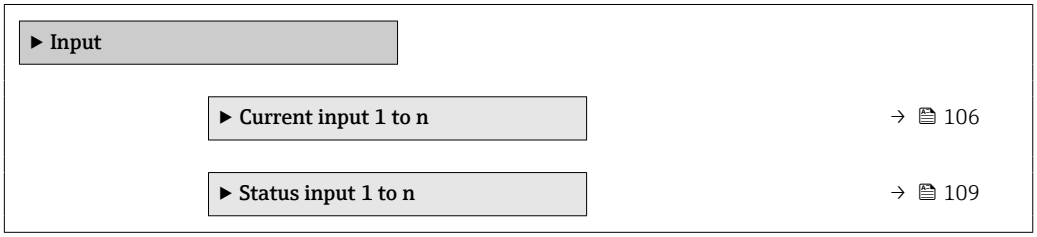
Factory setting 0

Additional information *Description*

The I/O configuration is changed in the **I/O module type** parameter (→ 105).

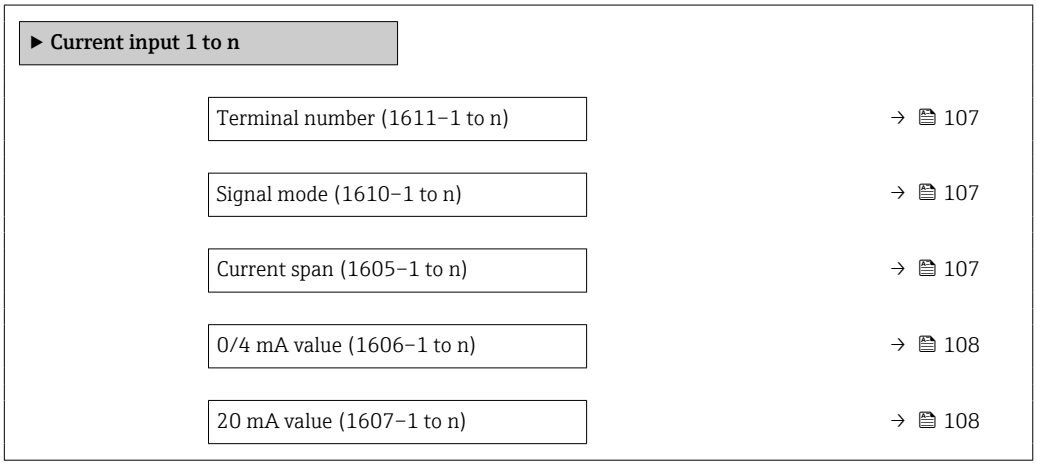
3.4 "Input" submenu

Navigation Expert → Input



3.4.1 "Current input 1 to n" submenu

Navigation Expert → Input → Current input 1 to n



Failure mode (1601–1 to n)	→ 109
Failure value (1602–1 to n)	→ 109

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

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)

* Visibility depends on order options or device settings

Factory setting

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

Additional information

Examples

Sample values for the current range: **Current span** parameter (→ 114)

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 (→ 107)
- Failure mode (→ 109)

Configuration examples

Pay attention to the configuration examples for **4 mA value** parameter (→ 115).

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 (→ 115).

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 (→ 107).

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 (→ 109)).

Failure value

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

Prerequisite In the **Failure mode** parameter (→ 109), the **Defined value** option is selected.

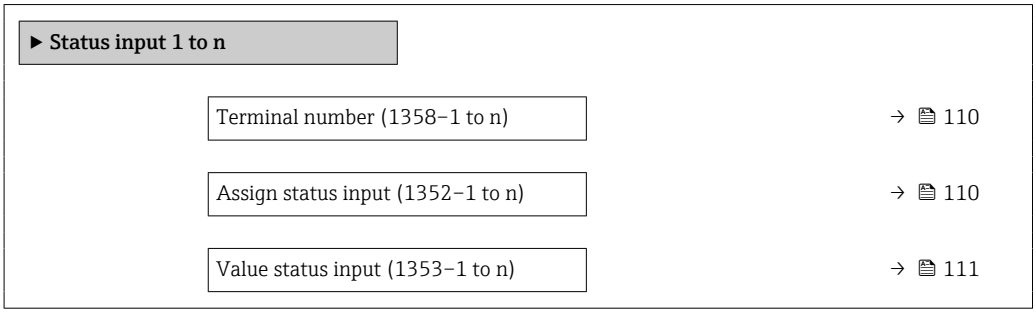
Description Use this function to enter the value that the device uses if it does not receive an input signal from the external device, or if the input signal is invalid.

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



Active level (1351–1 to n)	→ 111
Response time status input (1354–1 to n)	→ 111

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

Factory setting Off

Additional information *Custody transfer mode*

Only available for Promag H.

NOTE!

Before enabling the measuring device for custody transfer mode, make sure that the **Off** option is selected in the Assign status input.

For detailed information on custody transfer mode, see the Special Documentation for the device → 7

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 (→ 🖹 75) is activated.

Note on the Flow override (→ 🖹 75):
- The Flow override (→ 🖹 75) 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

▶ **Output**	
▶ **Current output 1 to n**	→ 112
▶ **Pulse/frequency/switch output 1 to n**	→ 125
▶ **Relay output 1 to n**	→ 144
▶ **Double pulse output**	→ 151

3.5.1 "Current output 1 to n" submenu

Navigation Expert → Output → Curr.output 1 to n

▶ **Current output 1 to n**	
Terminal number	→ 113
Signal mode	→ 113
Process variable current output	→ 113
Current range output	→ 114
Fixed current	→ 115
Lower range value output	→ 115
Upper range value output	→ 117
Measuring mode current output	→ 118
Damping current output	→ 122
Failure behavior current output	→ 123
Failure current	→ 124
Output current 1 to n	→ 124
Measured current 1 to n	→ 125

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

* Visibility depends on order options or device settings

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

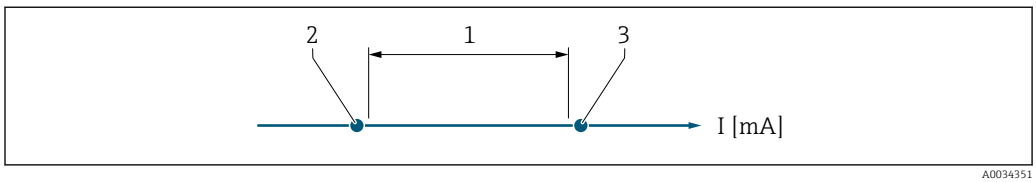
- In the event of a device alarm, the current output adopts the value specified in the **Failure mode** parameter (→ 123).
- If the measured value is outside the measuring range, the ⚠**S441 Current output 1 to n** diagnostic message is displayed.
- The measuring range is specified via the **Lower range value output** parameter (→ 115) and **Upper range value output** parameter (→ 117).

"Fixed current" option

The current value is set via the **Fixed current** parameter (→ 115).

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 (→ 114).

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 (→ 114):
- 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 (→ 113). 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 (→ 117).

Dependency

The unit depends on the process variable selected in the **Assign current output** parameter (→ 113).

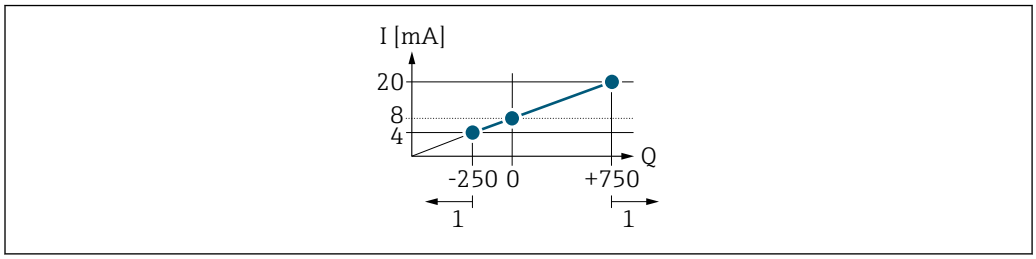
Current output behavior

The current output behaves differently depending on the settings configured in the following parameters:
- Current span (→ 114)
- Failure mode (→ 123)

Configuration examples

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

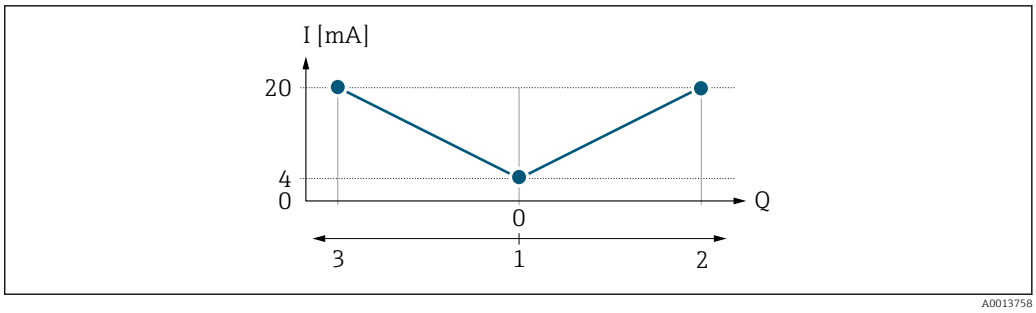
Configuration example A
Measurement mode with **Forward flow** option
- **Lower range value output** parameter (→ 115) = not equal to zero flow (e.g. −250 m^3/h)
- **Upper range value output** parameter (→ 117) = not equal to zero flow (e.g. +750 m^3/h)
- Calculated current value = 8 mA at zero flow



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 (→ 115) and **Upper range value output** parameter (→ 117). 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 (→ 115) and **Upper range value output** parameter (→ 117) must have the same algebraic sign. The value for the **Upper range value output** parameter (→ 117) (e.g. reverse flow) corresponds to the mirrored value for the **Upper range value output** parameter (→ 117) (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 → 118.

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 (→ 114):
- 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 → 233

Additional information *Description*

Positive and negative values are permitted depending on the process variable assigned in the **Assign current output** parameter (→ 113). 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 (→ 115).

Dependency

The unit depends on the process variable selected in the **Assign current output** parameter (→ 113).

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 (→ 118), different algebraic signs cannot be entered for the values for the **Lower range value output** parameter (→ 115) and **Upper range value output** parameter (→ 117). 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 (→ 115).

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 (→ 113):
- 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 (→ 114):
- 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 (→ 113) is displayed below the parameter.

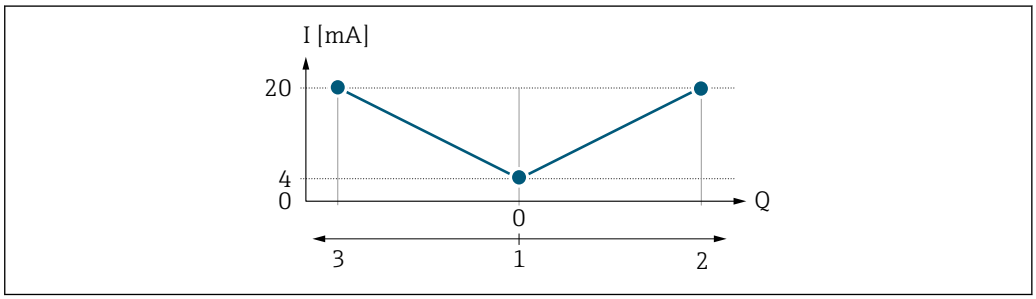
"Forward flow" option

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 (→ 115) and the **Upper range value output** parameter (→ 117).

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 (→ 115) and **Upper range value output** parameter (→ 117) must have the same algebraic sign.
- The value for the **Upper range value output** parameter (→ 117) (e.g. reverse flow) corresponds to the mirrored value for the **Upper range value output** parameter (→ 117) (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.

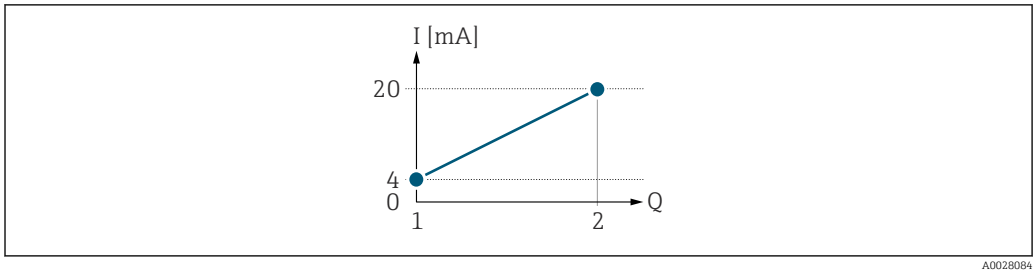
In the event of prolonged and undesired reverse flow, flow values can accumulate in the buffer memory. Due to the configuration of the current output, these values are not factored in, however, i.e. there is no compensation for the reverse flow.

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

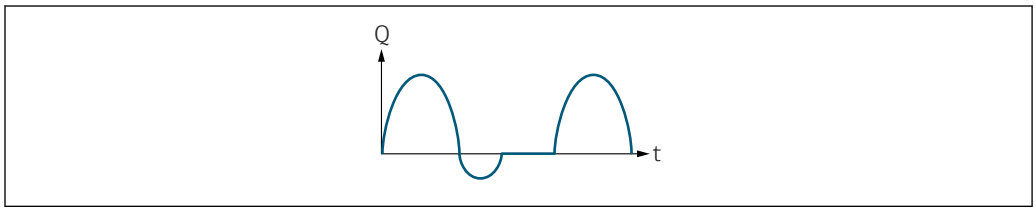
Defined measuring range: lower range value and upper range value with the **same** sign



3 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:

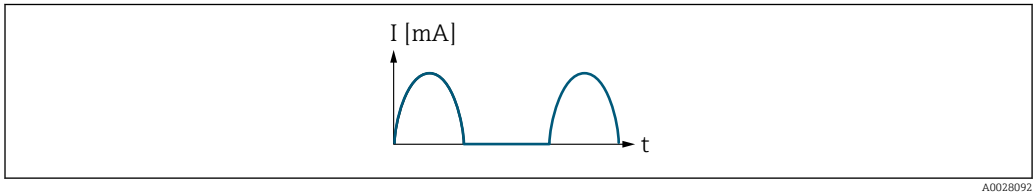


4 Flow response

Q Flow
t Time

With **Forward flow** option

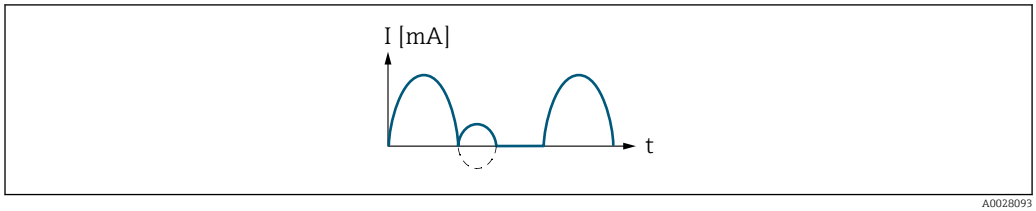
The current output signal is proportional to the process variable assigned. The flow components outside the scaled measuring range are not taken into account for signal output:.



I Current
t Time

With **Forward/Reverse flow** option

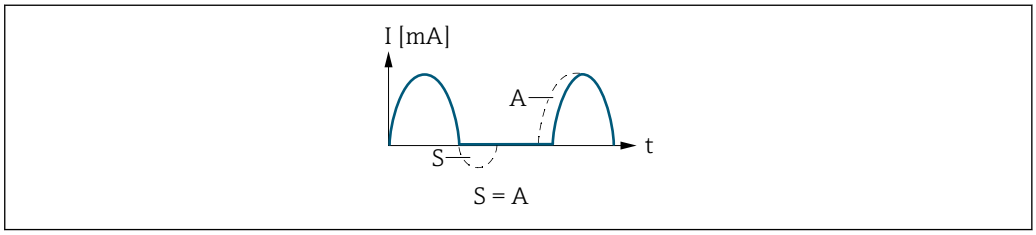
The current output signal is independent of the direction of flow.



I Current
t Time

With **Reverse flow compensation** option

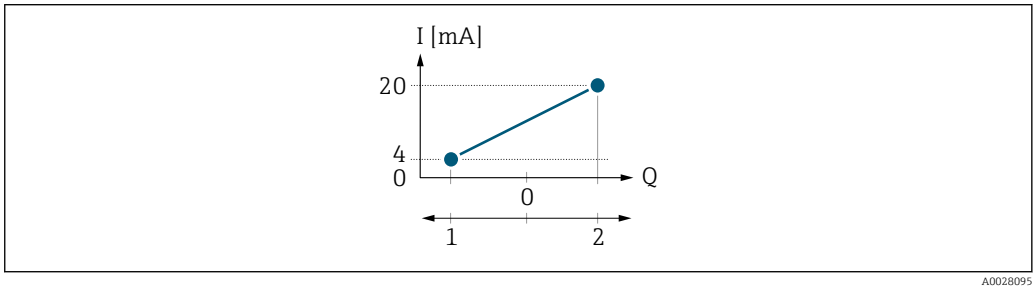
Flow components outside the measuring span are buffered, balanced and output after a maximum delay of 60 s.



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

Example 2

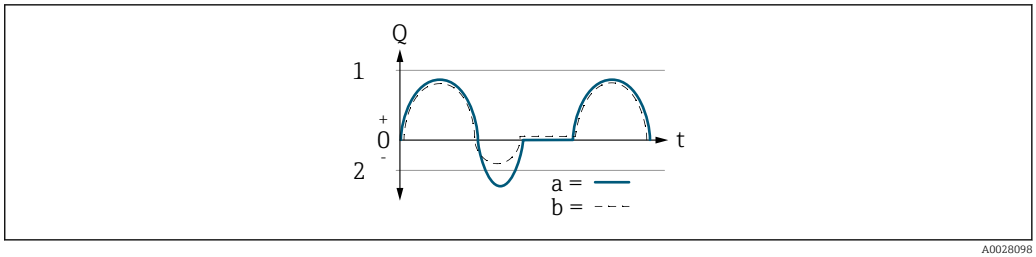
Defined measuring range: lower range value and upper range value with **different** signs



5 *Measuring range*

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

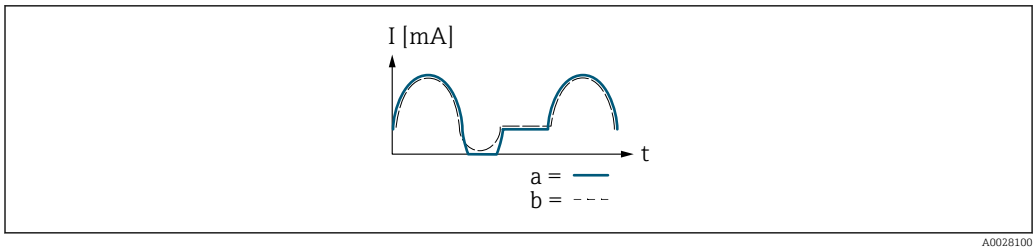
With flow a (—) outside, b (- -) inside the measuring range



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.



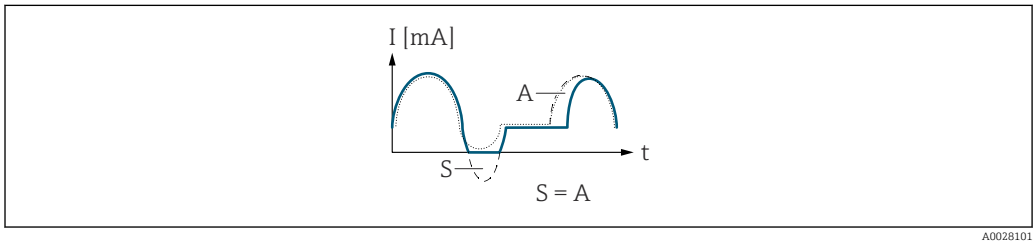
I Current
t Time

With **Forward/Reverse flow** option

This option cannot be selected here since the values for the **Lower range value output** parameter (→ 115) and **Upper range value output** parameter (→ 117) 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 (→ 113) and one of the following options is selected in the **Current span** parameter (→ 114):
- 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 (→ 113) and one of the following options is selected in the **Current span** parameter (→ 114):
- 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 (→ 114).

"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 (→ 114).

"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 (→ 124).

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 (→ 123).

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

User entry 0 to 22.5 mA

Factory setting 22.5 mA

Output current 1 to n

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

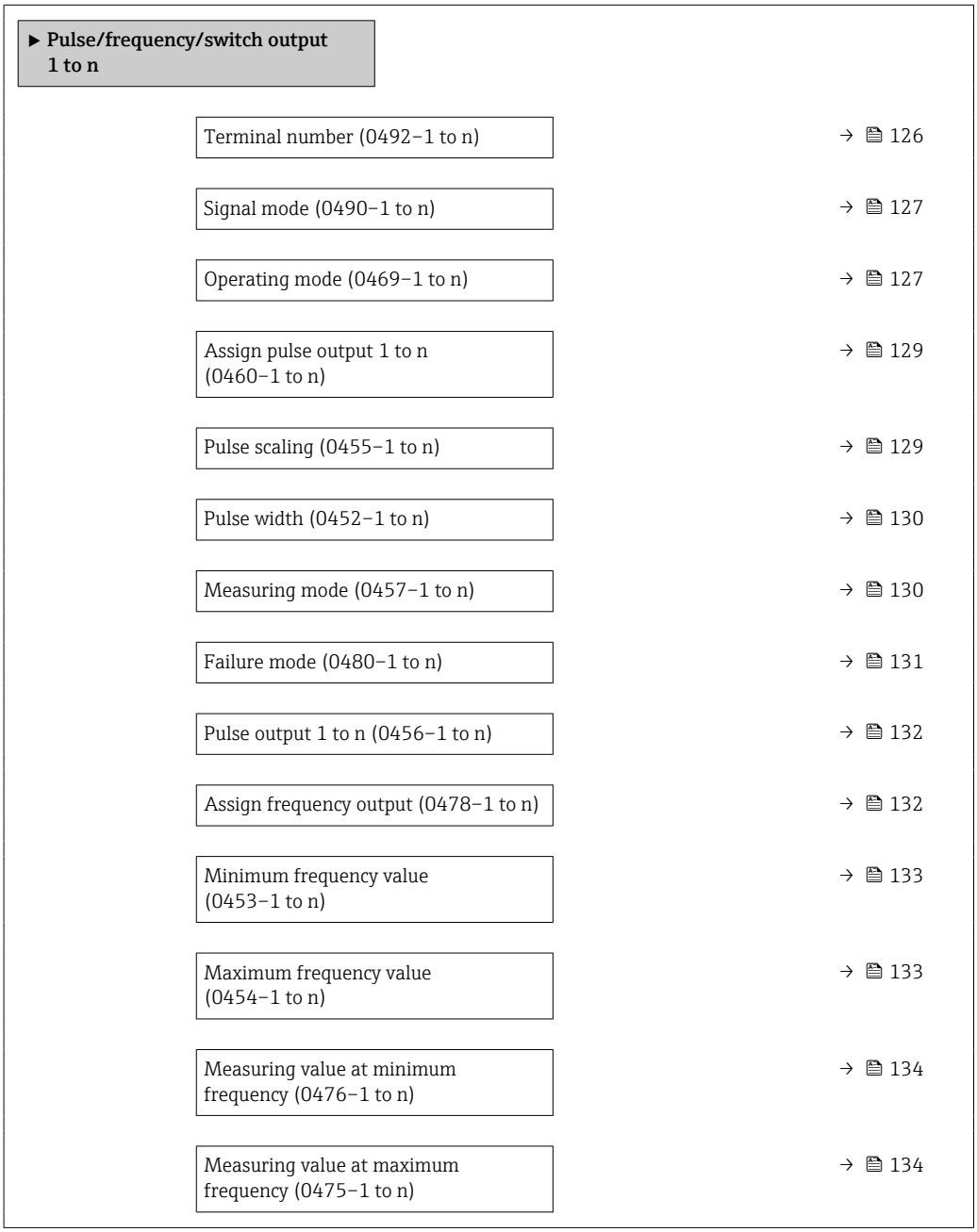
Navigation Expert → Output → Curr.output 1 to n → Measur. curr. 1 to n (0366–1 to n)

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

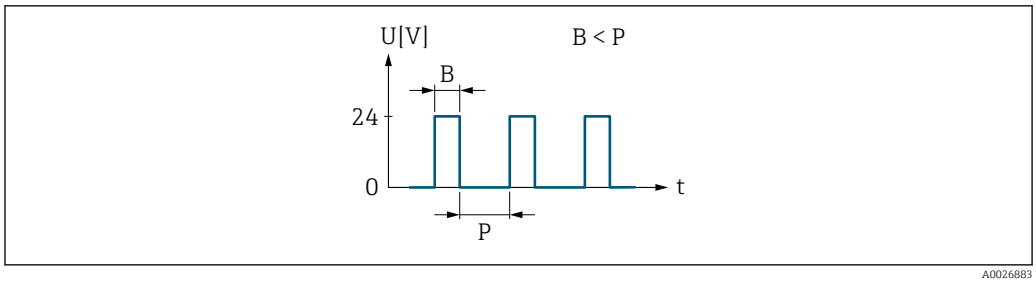
Factory setting Pulse

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



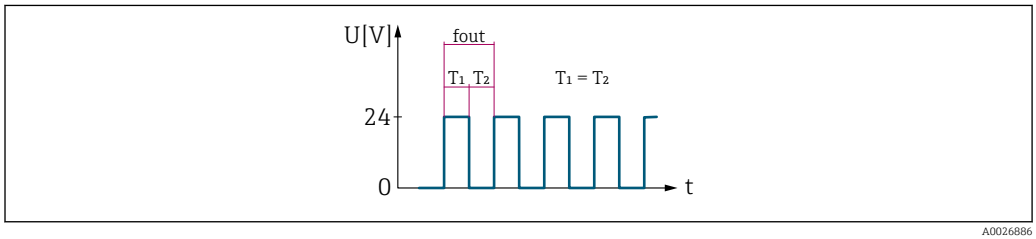
6 Quantity-proportional pulse (pulse value) with pulse width to be configured

B Pulse width entered
P Pauses between the individual pulses

"Frequency" option

Flow-proportional frequency output with 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

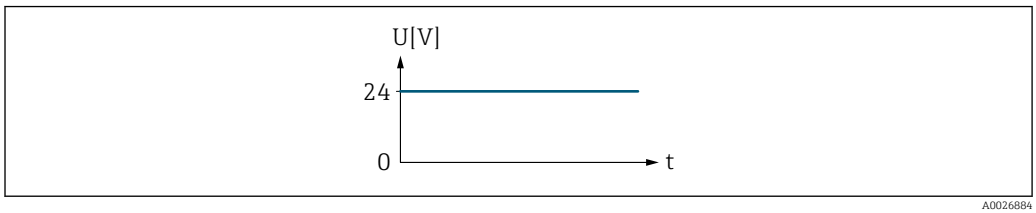


7 Flow-proportional frequency output

"Switch" option

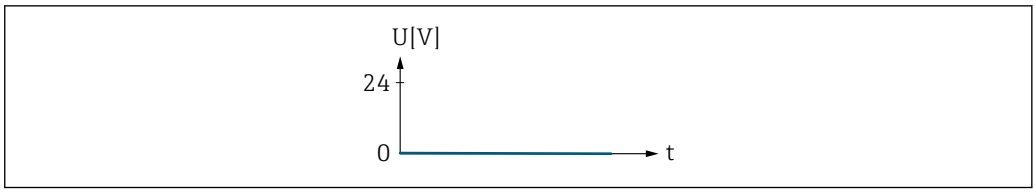
Contact for displaying a condition (e.g. alarm or warning if a limit value is reached)

Example
Alarm response without alarm



8 No alarm, high level

Example
Alarm response in case of alarm



9 *Alarm, low level*

Assign pulse output 1 to n

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

Prerequisite The **Pulse** option is selected in the **Operating mode** parameter (→ 127).

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 (→ 127) and a process variable is selected in the **Assign pulse output** parameter (→ 129).

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→ 234

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 (→ 127) and a process variable is selected in the **Assign pulse output** parameter (→ 129).

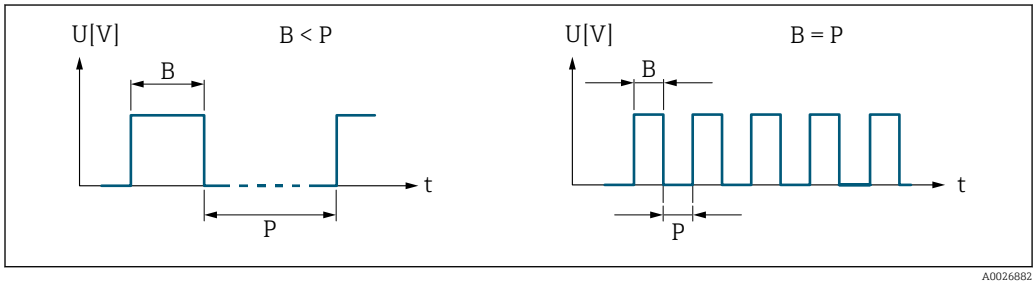
Description Use this function to enter the duration of the output pulse.

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 (→ 127), the **Pulse** option is selected, and one of the following options is selected in the **Assign pulse output** parameter (→ 129):
- 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 (→ 118)

Examples

For a detailed description of the configuration examples, see the **Measuring mode** parameter (→ 118)

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 (→ 127) and a process variable is selected in the **Assign pulse output** parameter (→ 129).

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)

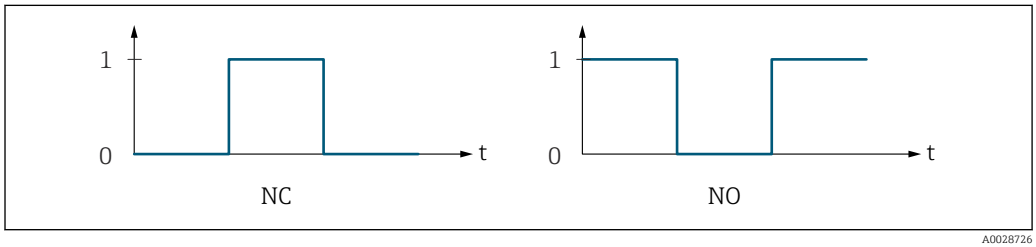
Prerequisite The **Pulse** option is selected in the **Operating mode** parameter (→ 127) parameter.

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 (→ 144) 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 (→ 131)) 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 (→ 127), 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 (→ 127) and a process variable is selected in the **Assign frequency output** parameter (→ 132).

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 (→ 127) and a process variable is selected in the **Assign frequency output** parameter (→ 132).

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 (→ 127) and a process variable is selected in the **Assign frequency output** parameter (→ 132).

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 (→ 132).

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 (→ 127) and a process variable is selected in the **Assign frequency output** parameter (→ 132).

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 (→ 132).

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 (→ 113):
- 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 (→ 118)

Examples

For a detailed description of the configuration examples, see the **Measuring mode** parameter (→ 118)

Damping output 1 to n

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

Prerequisite One of the following options is selected in the **Assign current output** parameter (→ 113):
- 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 (→ 113):
- 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 → 122
  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 (→ 127) and a process variable is selected in the **Assign frequency output** parameter (→ 132).

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 (→ 137) 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 (→ 127), the **Frequency** option is selected, in the **Assign frequency output** parameter (→ 132) a process variable is selected, and in the **Failure mode** parameter (→ 136), 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 1 to n

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

Prerequisite In the **Operating mode** parameter (→ 127), 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 (→ 127).

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 (→ 127), the **Switch** option is selected.
- In the **Switch output function** parameter (→ 138), 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 (→ 127), the **Switch** option is selected.
- In the **Switch output function** parameter (→ 138), the **Limit** option is selected.

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

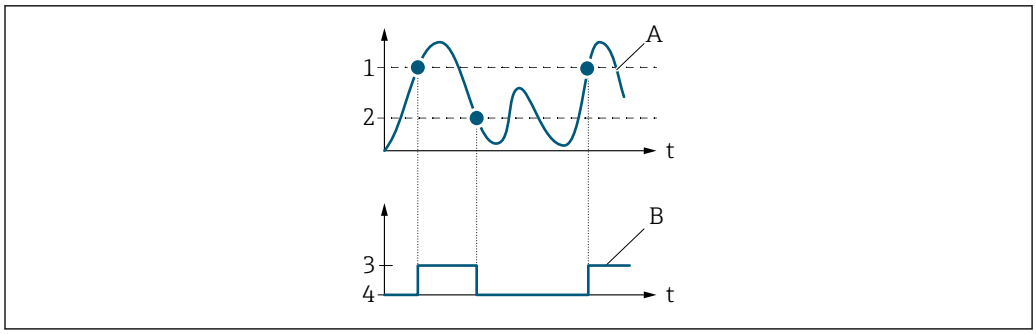
Selection
- Off
- Volume flow
- Mass flow
- Corrected volume flow
- Flow velocity
- Conductivity *
- Corrected conductivity *
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Temperature *
- Electronics temperature

Factory setting Volume flow

Additional information *Description*

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

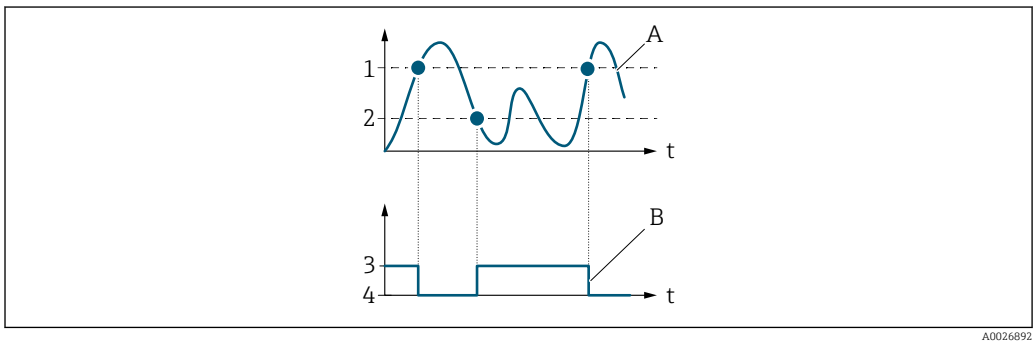
* Visibility depends on order options or device settings



A0026891

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

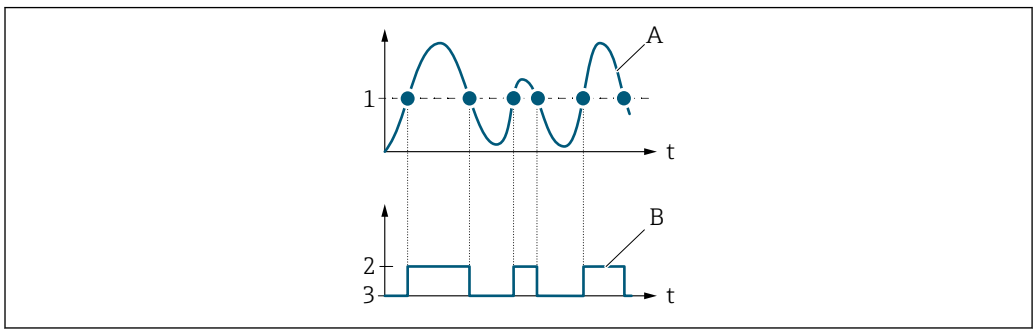
Behavior of status output when Switch-on value < Switch-off value:
- Process variable < Switch-on value: transistor is conductive
- Process variable > Switch-off value: transistor is non-conductive



A0026892

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

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



A0026893

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

Switch-on value

Navigation Expert → Output → PFS output 1 to n → Switch-on value (0466–1 to n)

Prerequisite
- The **Switch** option is selected in the **Operating mode** parameter (→ 127).
- The **Limit** option is selected in the **Switch output function** parameter (→ 138).

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 (→ 139).

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 (→ 127).
- The **Limit** option is selected in the **Switch output function** parameter (→ 138).

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 (→ 139).

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 (→ 127).
- The **Flow direction check** option is selected in the **Switch output function** parameter (→ 138).

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 (→ 127).
- The **Status** option is selected in the **Switch output function** parameter (→ 138).

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

Selection
- Empty pipe detection
- Low flow cut off
- 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 (→ 127).
- The **Limit** option is selected in the **Switch output function** parameter (→ 138).

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

* Visibility depends on order options or device settings

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 (→ 127).
- The **Limit** option is selected in the **Switch output function** parameter (→ 138).

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 1 to n

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

Prerequisite The **Switch** option is selected in the **Operating mode** parameter (→ 127).

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)

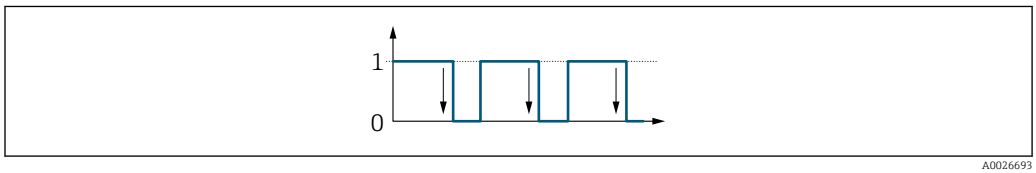
Description Use this function to select whether to invert the output signal.

Selection
- No
- Yes

Factory setting No

Additional information *Selection*

No option (passive - negative)



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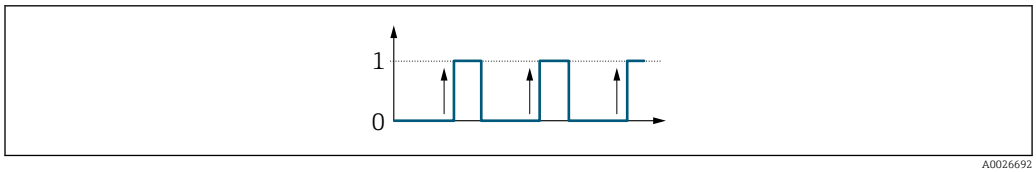
Yes option (passive - positive)



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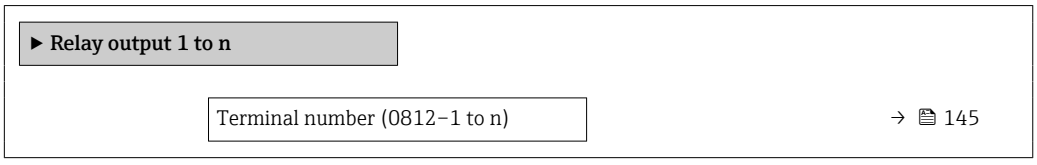
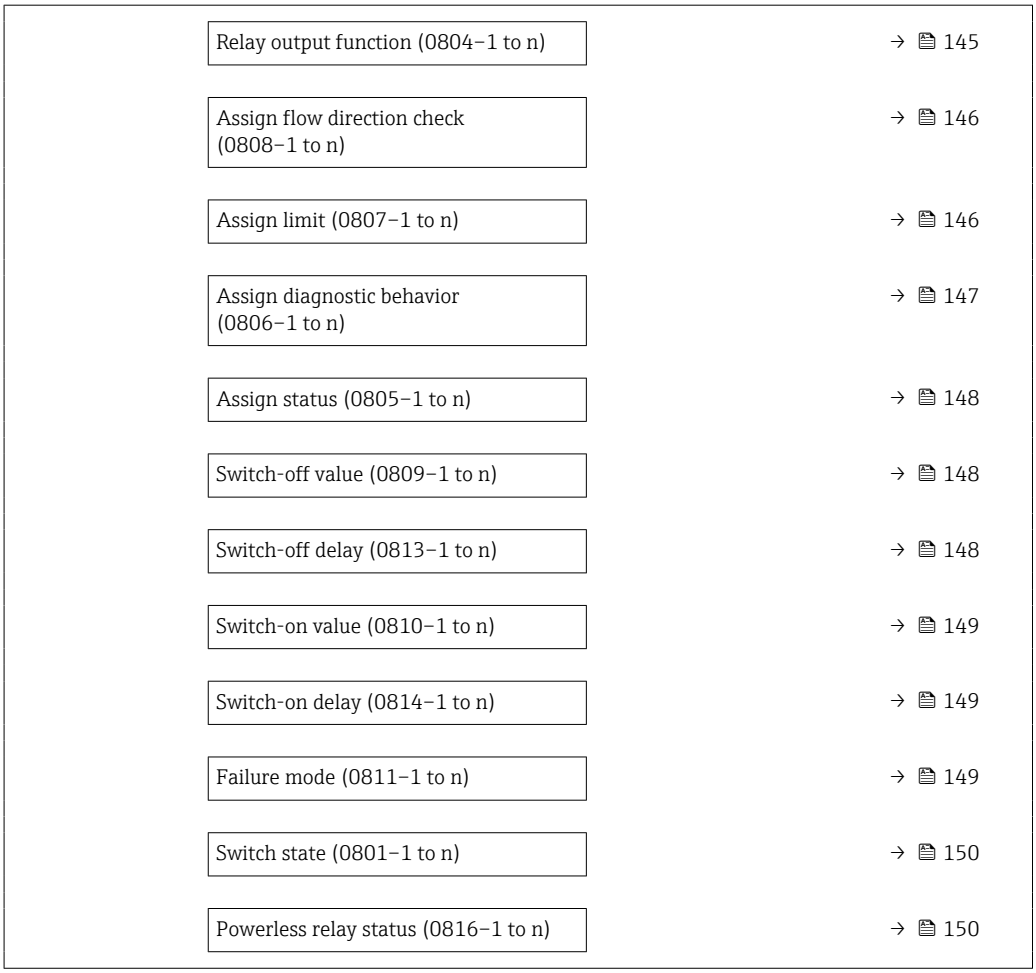
3.5.3 "Relay output 1 to n" submenu

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
- Digital Output

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 (→ 145).

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 (→ 145).

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 *
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Temperature *
- Electronics temperature

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 (→ 145), 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 (→ 145), the **Digital Output** option is selected.

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

Selection
- Partially filled pipe detection
- Low flow cut off
- HBSI limit exceeded *

Factory setting Partially filled 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 (→ 145), 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 (→ 146).

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 (→ 145), the **Limit** option is selected.

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

* Visibility depends on order options or device settings

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 (→ 145).

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 (→ 146).

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 (→ 145), 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.

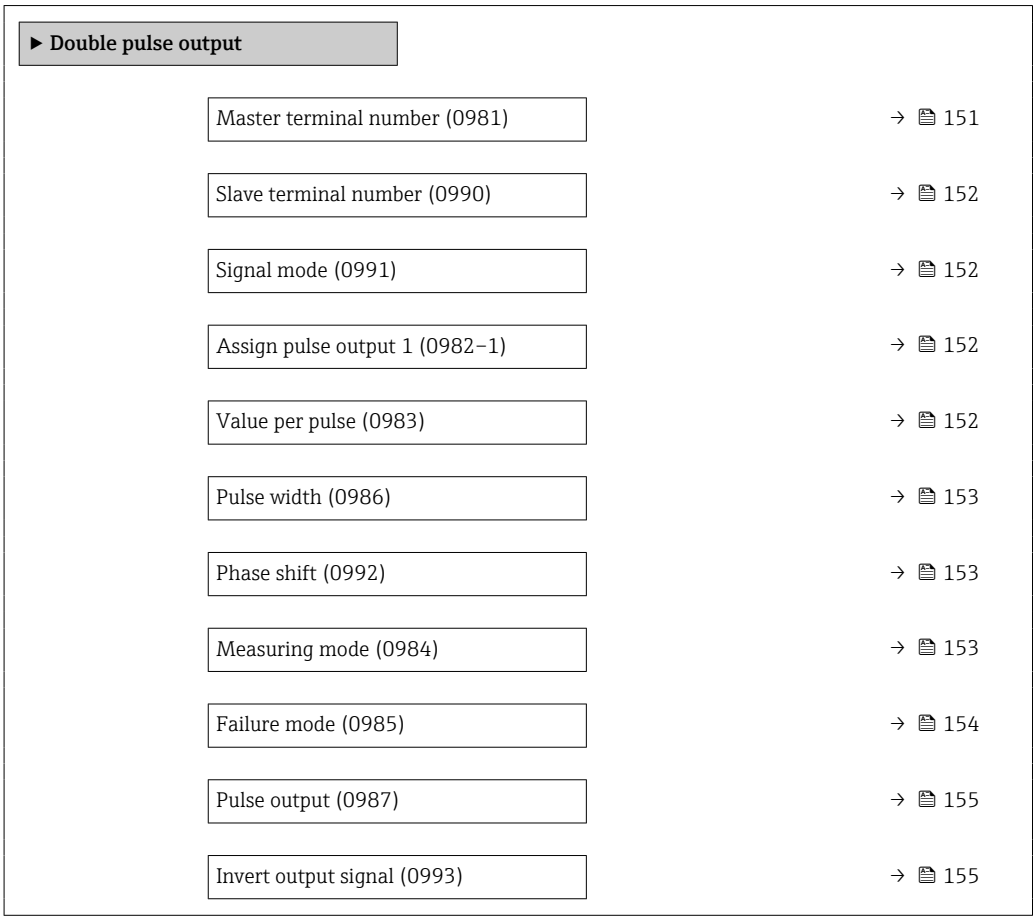
Selection
- Open
- Closed

Factory setting
Open

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

3.5.4 "Double pulse output" submenu

Navigation Expert → Output → Double pulse out



Master terminal number

Navigation Expert → Output → Double pulse out → Master term. no. (0981)

Description Displays the master terminal number for the double pulse output.

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

Additional information *"Not used" option*

The double pulse output does not use any terminal numbers.

Slave terminal number

Navigation Expert → Output → Double pulse out → Slave term. no. (0990)

Description Displays the slave terminal number for the double pulse output.

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

Additional information *"Not used" option*

The double pulse output does not use any terminal numbers.

Signal mode

Navigation Expert → Output → Double pulse out → Signal mode (0991)

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

Selection
- Passive
- Active *
- Passive NE

Factory setting Passive

Assign pulse output 1

Navigation Expert → Output → Double pulse out → Assign pulse 1 (0982–1)

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

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

Factory setting Off

Value per pulse

Navigation Expert → Output → Double pulse out → Value per pulse (0983)

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

* Visibility depends on order options or device settings

User entry Signed floating-point number

Factory setting Depends on country and nominal diameter → 234

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 → Double pulse out → Pulse width (0986)

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

User entry 0.5 to 2 000 ms

Factory setting 0.5 ms

Additional information For a detailed description and example: **Pulse width** parameter (→ 130)

Phase shift

Navigation Expert → Output → Double pulse out → Phase shift (0992)

Description Use this function to select the degree of phase shift.

Selection
- 90°
- 180°

Factory setting 90°

Additional information *Selection*

- 90°
  Phase shift by a quarter period.
- 180°
  Phase shift by a half period, which is equivalent to a phase reversal.

Measuring mode

Navigation Expert → Output → Double pulse out → Measuring mode (0984)

Description Use this function to select the measuring mode for the double 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 span 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 (→ 118)

Examples

For a detailed description of the configuration examples, see the **Measuring mode** parameter (→ 118)

Failure mode

Navigation
Expert → Output → Double pulse out → Failure mode (0985)

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

Selection
- Actual value
- No pulses

Factory setting
No pulses

Additional information
Description

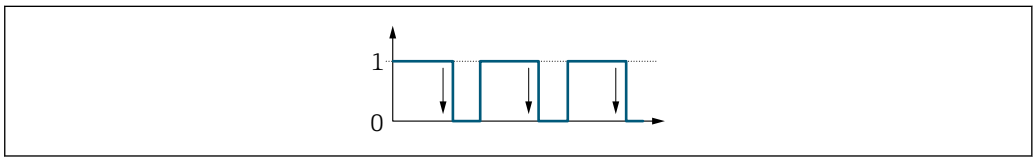
The dictates of safety render it advisable to ensure that the double pulse output shows a predefined behavior in the event of a device alarm.

Selection
- Actual value
  In the event of a device alarm, the double pulse output continues on the basis of the current flow measurement. The fault is ignored.
- No pulses
  In the case of the double pulse output, if a device alarm occurs one pulse output is stopped and the other pulse output runs at the maximum pulse frequency.

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	
Navigation	Expert → Output → Double pulse out → Pulse output (0987)
Description	Displays the pulse frequency of the double pulse output which is currently output.
User interface	Positive floating-point number
Additional information	For a detailed description and example: **Pulse output** parameter (→ 54)

Invert output signal	
Navigation	Expert → Output → Double pulse out → Invert outp.sig. (0993)
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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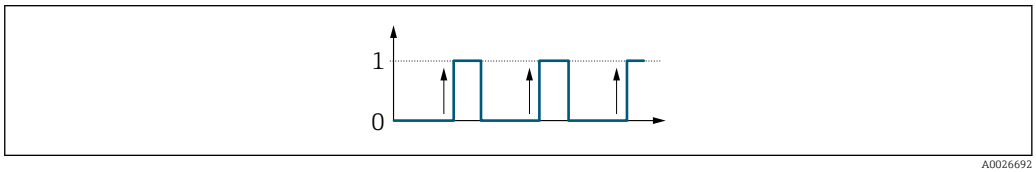
Yes option (passive - positive)



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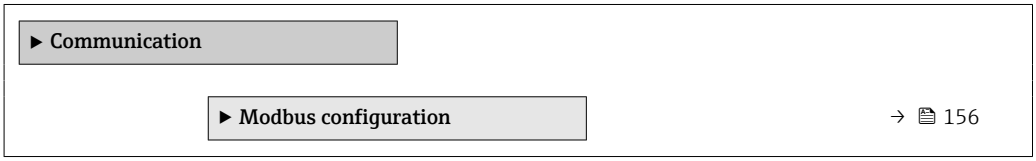
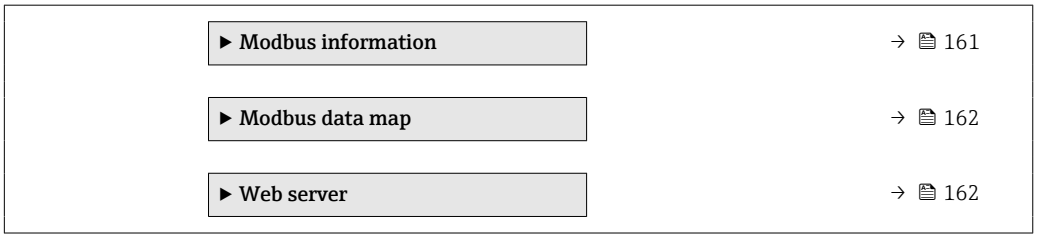
3.6 "Communication" submenu

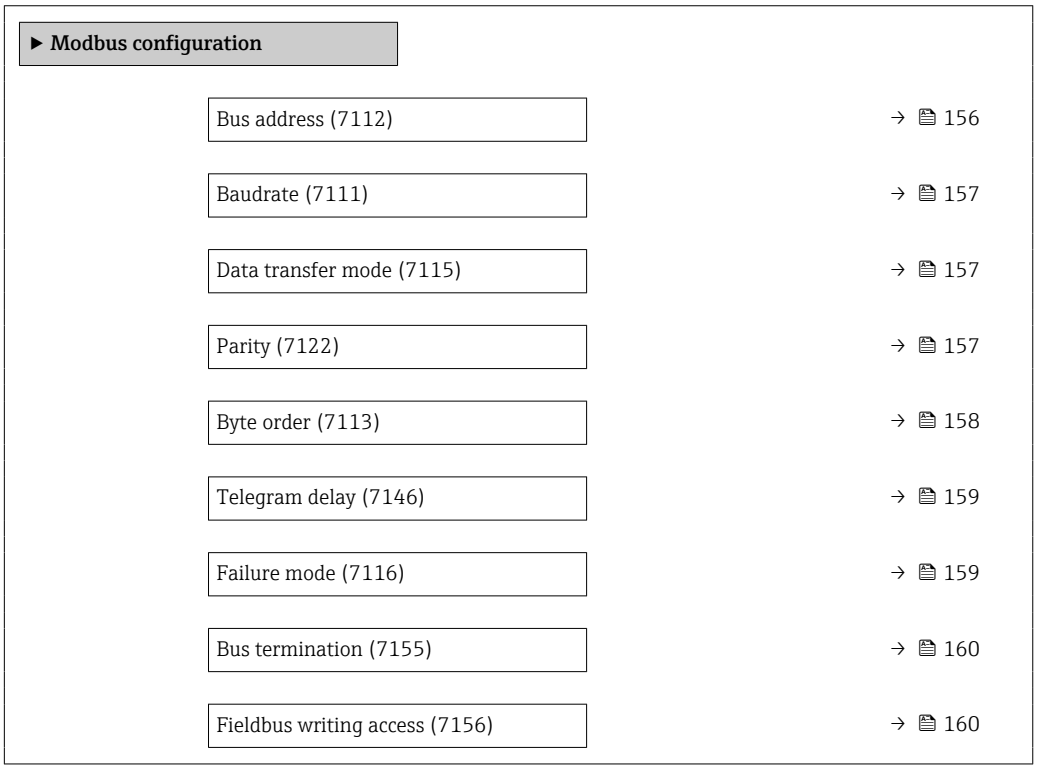
Navigation Expert → Communication





3.6.1 "Modbus configuration" submenu

Navigation Expert → Communication → Modbus config.



Bus address

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

Description For entering the device address.

User entry 1 to 247

Factory setting 247

Baudrate

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

Description Use this function to select a transmission rate.

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

Factory setting 19200 BAUD

Data transfer mode

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

Description Use this function to select the data transmission mode.

Selection
- ASCII
- RTU

Factory setting RTU

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

Parity

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

Description Use this function to select the parity bit.

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

Factory setting Even

Additional information *Options*

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

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

Byte order

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

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

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

Factory setting 1-0-3-2

Additional information *Description*

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

Changing the byte sequence in the host system often requires a extensive knowledge and significant programming efforts. Endress+Hauser introduced the **Byte order** parameter (→ 158) for this reason.

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

Byte transmission sequence

Byte addressing, i.e. the transmission sequence of the bytes, is not specified in the Modbus specification. For this reason, it is important to coordinate or match the addressing method between the master and slave during commissioning. This can be configured in the measuring device using the **Byte order** parameter (→ 158).

The bytes are transmitted depending on the selection in the **Byte order** parameter (→ 158):

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

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

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

STRING
Presentation taking the example of a device parameter with a data length of 18 bytes.

	Sequence				
Options	1.	2.	...	17.	18.
1 – **0** – 3 – 2 * 3 – 2 – **1** – **0**	Byte 17 (MSB)	Byte 16	...	Byte 1	Byte 0 (LSB)
0 – **1** – 2 – 3 2 – 3 – **0** – **1**	Byte 16	Byte 17 (MSB)	...	Byte 0 (LSB)	Byte 1
* = factory setting, MSB = most significant byte, LSB = least significant byte					

Telegram delay

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

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

User entry 0 to 100 ms

Factory setting 6 ms

Failure mode

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

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

Selection
- NaN value
- Last valid value

Factory setting NaN value

Additional information *Options*

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

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

Bus termination

Navigation Expert → Communication → Modbus config. → Bus termination (7155)

Description Displays whether the terminating resistor is enabled or disabled.

User interface

- Off
- On

Factory setting Off

Additional information *Selection*

- Off
  The terminating resistor is disabled.
- On
  The terminating resistor is enabled.

For detailed information about enabling the terminating resistor, see the Operating Instructions for the device, "Enabling the terminating resistor" section

Fieldbus writing access

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

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

Selection

- Read + write
- Read only

Factory setting Read + write

5) Not a Number

Additional information

Description

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

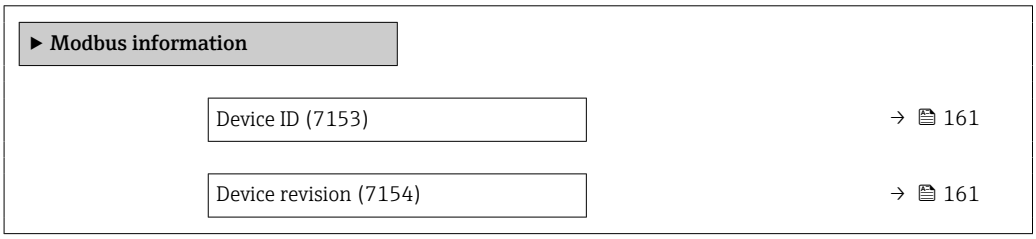
This does not affect cyclic measured value transmission to the higher-order system, which is always guaranteed.

Selection

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

3.6.2 "Modbus information" submenu

Navigation Expert → Communication → Modbus info



Device ID

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

Description Displays the device ID for identifying the measuring device.

User interface 4-digit hexadecimal number

Device revision

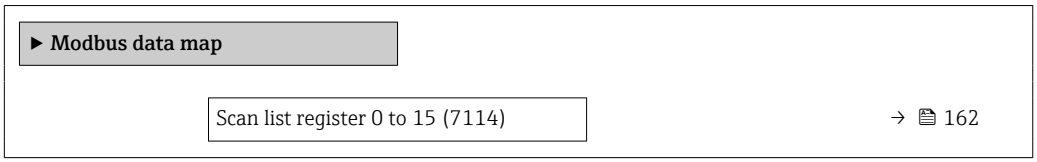
Navigation Expert → Communication → Modbus info → Device revision (7154)

Description Displays the device revision.

User interface 4-digit hexadecimal number

3.6.3 "Modbus data map" submenu

Navigation Expert → Communication → Modbus data map



Scan list register 0 to 15

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

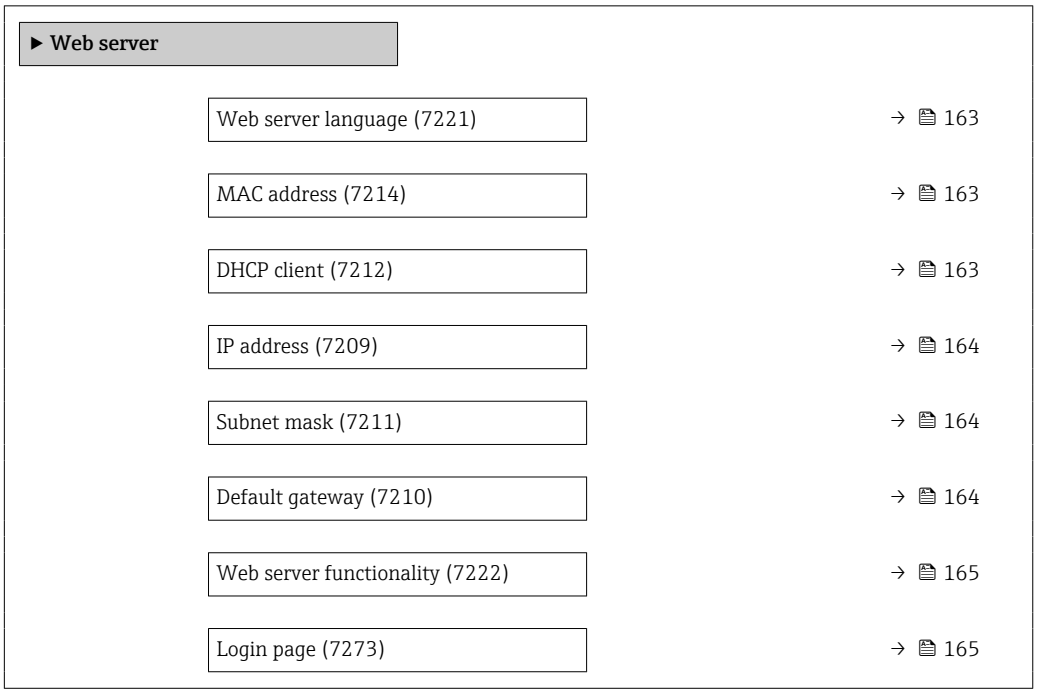
Description Use this function to enter the scan list register. By entering the register address (1-based), up to 16 device parameters can be grouped by assigning them to the scan list registers 0 to 15. The data of the device parameters assigned here are read out via the register addresses 5051 to 5081.

User entry 1 to 65 535

Factory setting 1

3.6.4 "Web server" submenu

Navigation Expert → Communication → Web server



Web server language

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

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

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

Factory setting English

MAC address

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

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

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

Factory setting Each measuring device is given an individual address.

Additional information *Example*

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

DHCP client

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

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

6) Media Access Control

Selection
- Off
- On

Factory setting On

Additional information *Effect*

If the DHCP client functionality of the web server is selected, the IP address (→ 164), Subnet mask (→ 164) and Default gateway (→ 164) are set automatically.

- Identification is via the MAC address of the measuring device.
- The IP address (→ 164) in the **IP address** parameter (→ 164) is ignored as long as the **DHCP client** parameter (→ 163) is active. This is also the case, in particular, if the DHCP server cannot be reached. The IP address (→ 164) in the parameter of the same name is only used if the **DHCP client** parameter (→ 163) is inactive.

IP address

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

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

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

Factory setting 192.168.1.212

Subnet mask

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

Description Display or enter the subnet mask.

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

Factory setting 255.255.255.0

Default gateway

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

Description Display or enter the Default gateway (→ 164).

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

Factory setting 0.0.0.0

Web server functionality

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

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

Selection
- Off
- 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)

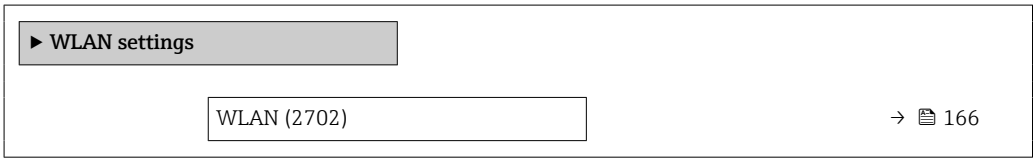
Description Use this function to select the format of the login page.

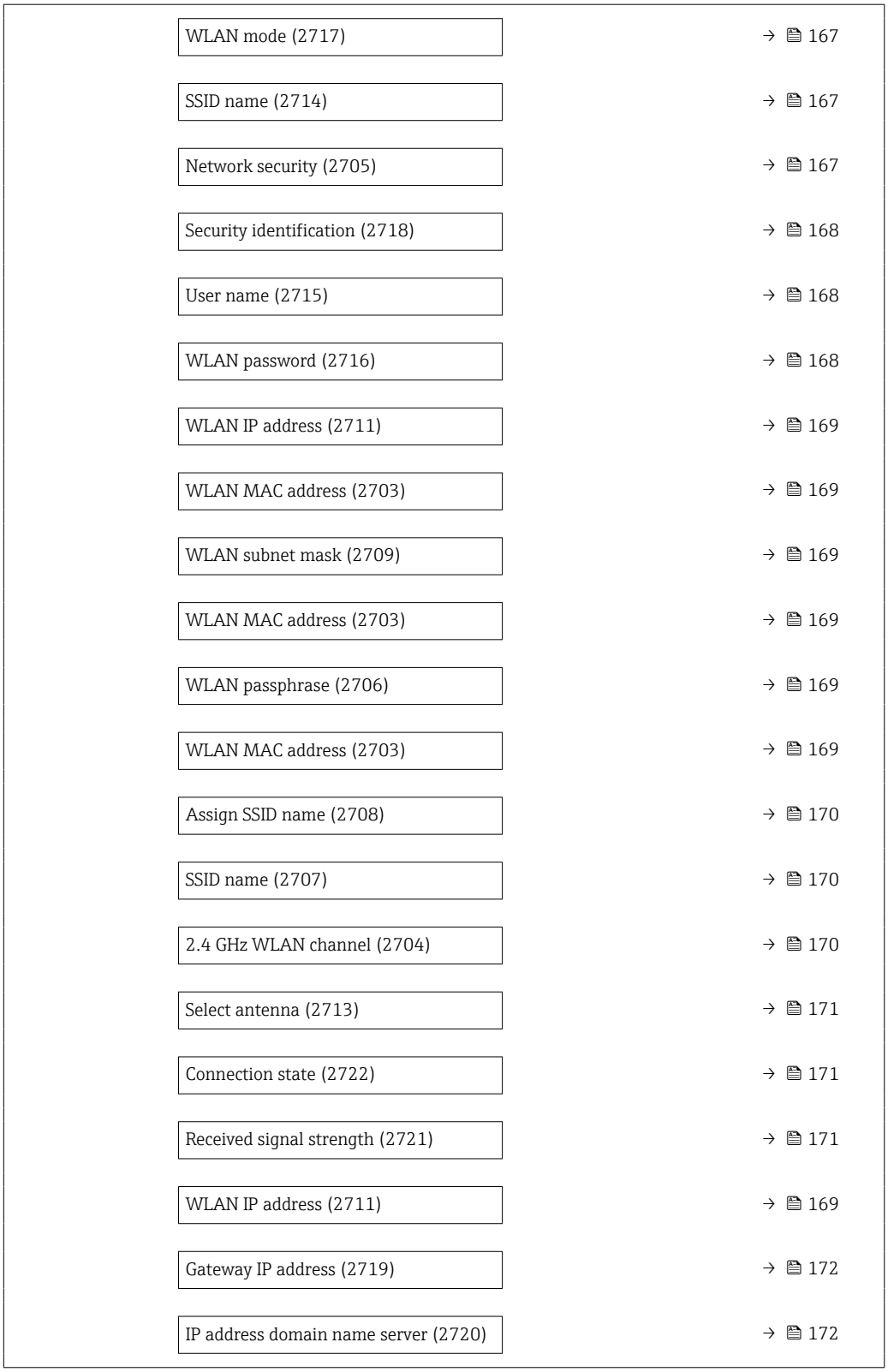
Selection
- Without header
- With header

Factory setting With header

3.6.5 "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

* Visibility depends on order options or device settings

Additional information *Selection*

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

Security identification

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

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

User interface

- Trusted issuer certificate
- Device certificate
- Device private key

User name

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

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

User entry –

Factory setting –

WLAN password

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

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

User entry –

Factory setting –

WLAN IP address

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

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

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

Factory setting 192.168.1.212

WLAN MAC address

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

Description Displays the MAC [7] address of the measuring device.

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

Factory setting Each measuring device is given an individual address.

Additional information *Example*
For the display format
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 (→ 167).

Description Use this function to enter the network key.

7) Media Access Control

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

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

Assign SSID name

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

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

Selection
- Device tag
- User-defined

Factory setting User-defined

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

SSID name

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

Prerequisite
- The **User-defined** option is selected in the **Assign SSID name** parameter (→ 170).
- The **WLAN access point** option is selected in the **WLAN mode** parameter (→ 167).

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

8) Service Set Identifier

Factory setting 6

Additional information *Description*

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

Select antenna

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

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

Selection
- External antenna
- Internal antenna

Factory setting Internal antenna

Connection state

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

Description The connection status is displayed.

User interface
- Connected
- Not connected

Factory setting Not connected

Received signal strength

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

Description Displays the signal strength received.

User interface
- Low
- Medium
- High

Factory setting High

Gateway IP address

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

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

User interface Character string comprising numbers, letters and special characters

Factory setting 192.168.1.212

IP address domain name server

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

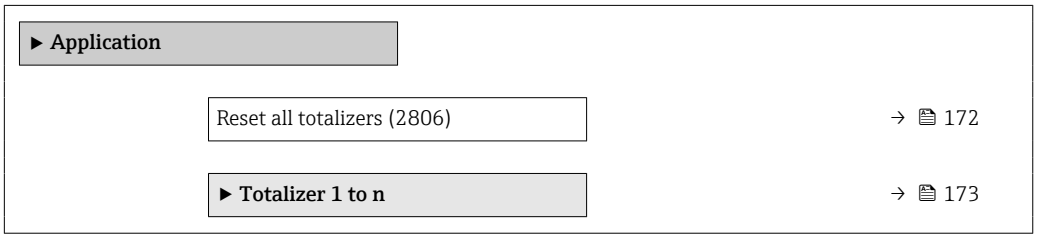
Description Use this function to enter the IP address of the domain name server.

User interface Character string comprising numbers, letters and special characters

Factory setting 192.168.1.212

3.7 "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

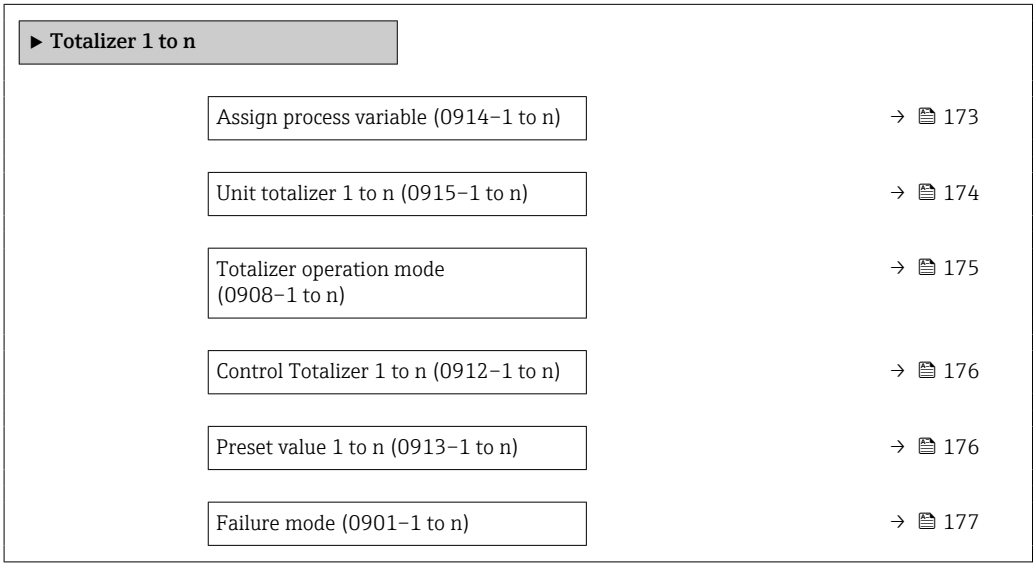
Factory setting Cancel

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.

3.7.1 "Totalizer 1 to n" submenu

Navigation Expert → Application → Totalizer 1 to n



Assign process variable

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

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

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

Factory setting Volume flow

Additional information

Description

If the option selected is changed, the device resets the totalizer to 0.

Selection

If the **Off** option is selected, only the **Assign process variable** parameter (→ 173) is still displayed in the **Totalizer 1 to n** submenu. All other parameters in the submenu are hidden.

Unit totalizer 1 to n

Navigation

Expert → Application → Totalizer 1 to n → Unit totalizer 1 to n (0915–1 to n)

Prerequisite

A process variable is selected in the **Assign process variable** parameter (→ 173) of the **Totalizer 1 to n** submenu.

Description

Use this function to select the process variable unit for the Totalizer 1 to n (→ 173).

Selection

SI units
- g *
- kg *
- t *

US units
- oz *
- lb *
- STon *

* Visibility depends on order options or device settings

or

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

US units
- af *
- ft³ *
- Mft³ *
- Mft³ *
- fl oz (us) *
- gal (us) *
- kgal (us) *
- Mgal (us) *
- bbl (us;liq.) *
- bbl (us;beer) *
- bbl (us;oil) *
- bbl (us;tank) *

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 *
- Nm³ *
- Sl *
- Sm³ *

US units
- Sft³ *
- MSft³ *
- MMSft³ *
- Sgal (us) *
- Sbbl (us;liq.) *
- Sbbl (us;oil) *

Imperial units
Sgal (imp) *

* Visibility depends on order options or device settings

or

Other units
None *

* Visibility depends on order options or device settings

Factory setting

Depends on country:
- l
- gal (us)

Additional information

Description

The unit is selected separately for each totalizer. It is independent of the selection made in the **System units** submenu (→ 57).

Selection

The selection is dependent on the process variable selected in the **Assign process variable** parameter (→ 173).

Totalizer operation mode

Navigation

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

Prerequisite

A process variable is selected in the **Assign process variable** parameter (→ 173) of the **Totalizer 1 to n** submenu.

Description

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

Selection
- Net
- Forward
- Reverse

Factory setting

Net

Additional information

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

Control Totalizer 1 to n

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

Prerequisite A process variable is selected in the **Assign process variable** parameter (→ 173) of the **Totalizer 1 to n** submenu.

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

Selection
- Totalize
- Reset + hold *
- Preset + hold *
- Reset + totalize
- Preset + totalize *
- Hold *

Factory setting Totalize

Additional information *Selection*

Options	Description
Totalize	The totalizer is started or continues running.
Reset + hold	The totaling process is stopped and the totalizer is reset to 0.
Preset + hold 1)	The totaling process is stopped and the totalizer is set to its defined start value from the **Preset value** parameter.
Reset + totalize	The totalizer is reset to 0 and the totaling process is restarted.
Preset + totalize 1)	The totalizer is set to the defined start value in the **Preset value** parameter and the totaling process is restarted.
Hold	Totalizing is stopped.

1) Visible depending on the order options or device settings

Preset value 1 to n

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

Prerequisite A process variable is selected in the **Assign process variable** parameter (→ 173) of the **Totalizer 1 to n** submenu.

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

User entry Signed floating-point number

Factory setting 0 l

* Visibility depends on order options or device settings

Additional information *User entry*

The unit of the selected process variable is specified for the totalizer in the **Unit totalizer** parameter (→ 174).

Example

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

Failure mode

Navigation Expert → Application → Totalizer 1 to n → Failure mode (0901–1 to n)

Prerequisite A process variable is selected in the **Assign process variable** parameter (→ 173) of the **Totalizer 1 to n** submenu.

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

Selection
- Hold
- Continue
- Last valid value + continue

Factory setting Hold

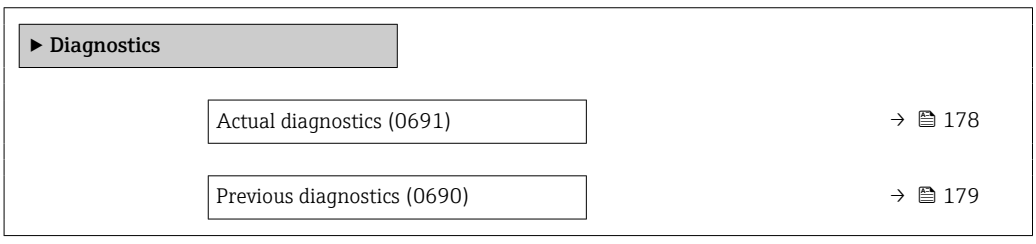
Additional information *Description*

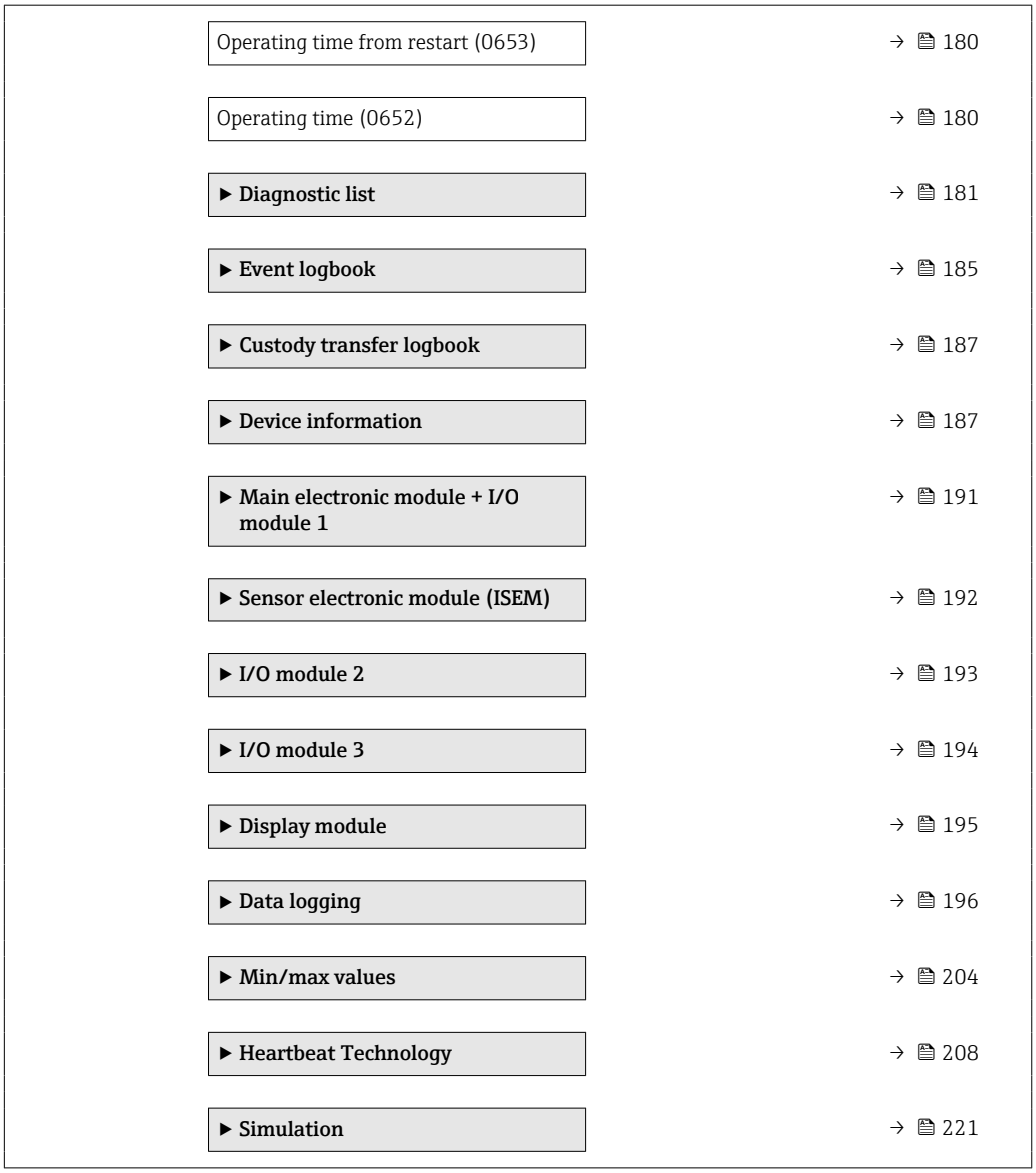
This setting does not affect the failsafe mode of other totalizers and the outputs. This is specified in separate parameters.

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

3.8 "Diagnostics" submenu

Navigation Expert → Diagnostics





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 (→ 181).

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 electronics failure

Timestamp

Navigation Expert → Diagnostics → Timestamp

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

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

Additional information *Display*

The diagnostic message can be viewed via the **Actual diagnostics** parameter (→ 178).

Example

For the display format:
24d12h13m00s

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 electronics failure

Timestamp

Navigation Expert → Diagnostics → Timestamp

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

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

Additional information *Display*

The diagnostic message can be viewed via the **Previous diagnostics** parameter (→ 179).

Example

For the display format:
24d12h13m00s

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.

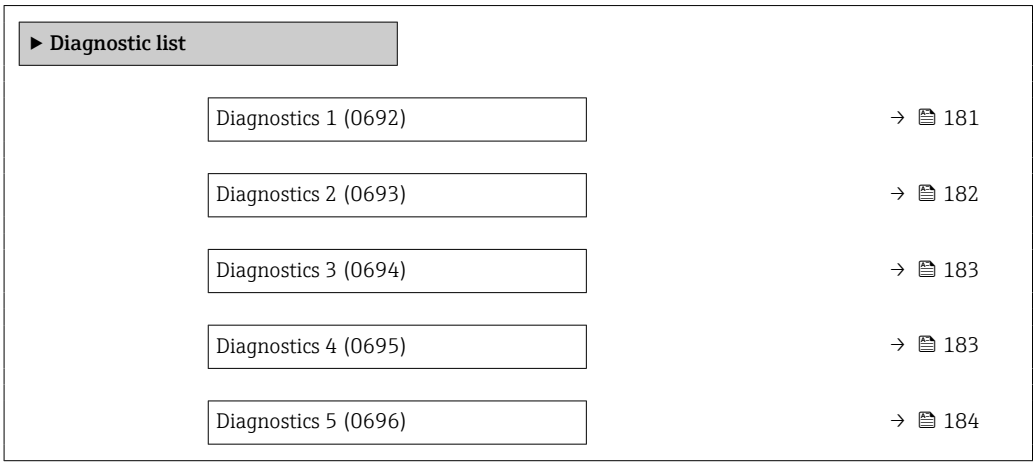
User interface Days (d), hours (h), minutes (m) and seconds (s)

Additional information *User interface*

The maximum number of days is 9999, which is equivalent to 27 years.

3.8.1 "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 electronics failure
- ⊗F276 I/O module failure

Timestamp 1

Navigation Expert → Diagnostics → Diagnostic list → Timestamp

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

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

Additional information *Display*

The diagnostic message can be viewed via the **Diagnostics 1** parameter (→ 181).

Example

For the display format:
24d12h13m00s

Diagnostics 2

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

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

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

Additional information *Display*

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

Examples

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

Timestamp 2

Navigation Expert → Diagnostics → Diagnostic list → Timestamp

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

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

Additional information *Display*

The diagnostic message can be viewed via the **Diagnostics 2** parameter (→ 182).

Example

For the display format:
24d12h13m00s

Diagnostics 3

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

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

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

Additional information

Display

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

Examples

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

Timestamp 3

Navigation Expert → Diagnostics → Diagnostic list → Timestamp

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

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

Additional information

Display

The diagnostic message can be viewed via the **Diagnostics 3** parameter (→ 183).

Example

For the display format:
24d12h13m00s

Diagnostics 4

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

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

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

Additional information *Display*

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

Examples

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

Timestamp 4

Navigation Expert → Diagnostics → Diagnostic list → Timestamp

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

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

Additional information *Display*

The diagnostic message can be viewed via the **Diagnostics 4** parameter (→ 183).

Example

For the display format:
24d12h13m00s

Diagnostics 5

Navigation Expert → Diagnostics → Diagnostic list → Diagnostics 5 (0696)

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

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

Additional information *Display*

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

Examples

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

Timestamp 5

Navigation Expert → Diagnostics → Diagnostic list → Timestamp

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

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

Additional information *Display*

The diagnostic message can be viewed via the **Diagnostics 5** parameter (→ 184).

Example

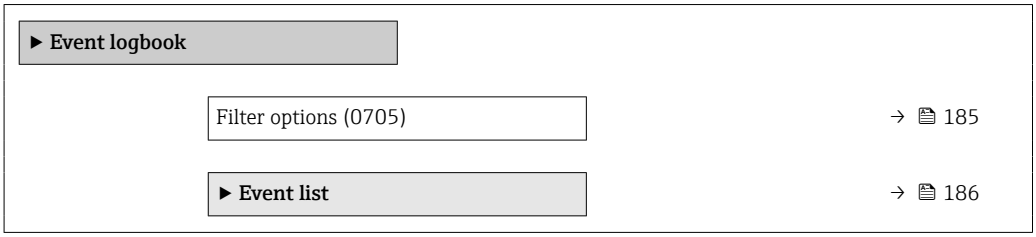
For the display format:
24d12h13m00s

3.8.2 "Event logbook" submenu

Viewing event messages

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

Navigation Expert → Diagnostics → Event logbook



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 (→ 185).

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

Additional information *Description*

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

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

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

Examples

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

HistoROM

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

3.8.3 "Custody transfer logbook" submenu

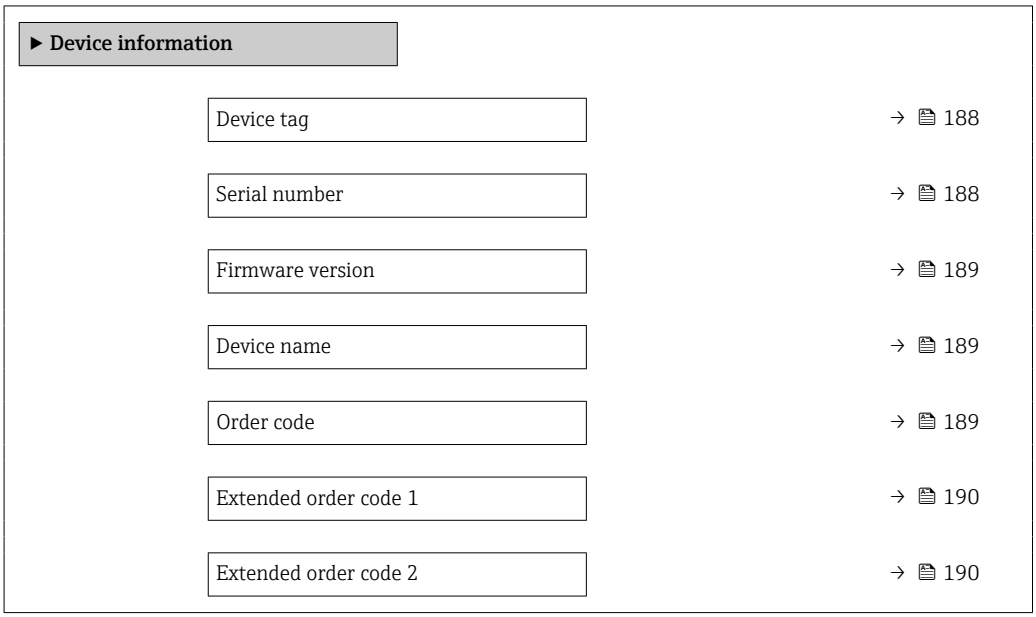
Only available for Promag H.

For detailed information on the parameter descriptions for custody transfer measurement, see the Special Documentation for the device → 7

Navigation Expert → Diagnostics → Cust.transf.log.

3.8.4 "Device information" submenu

Navigation Expert → Diagnostics → Device info



Extended order code 3	→ 190
ENP version	→ 190

Device tag

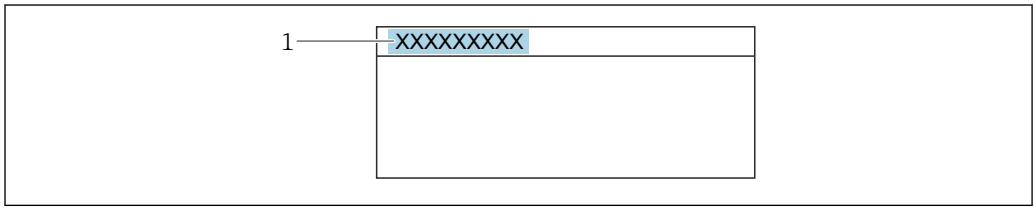
Navigation Expert → Diagnostics → Device info → Device tag (0011)

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

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

Factory setting 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 (→ 190)

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 (→ 190)

ENP version

Navigation Expert → Diagnostics → Device info → ENP version (0012)

Description Displays the version of the electronic nameplate.

User interface Character string

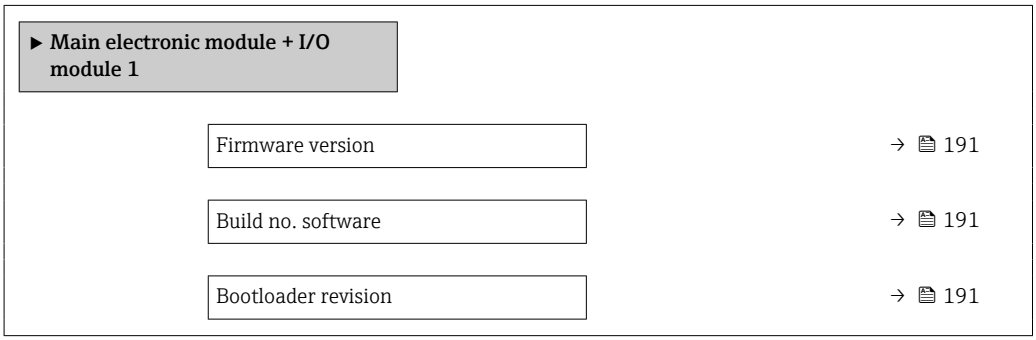
Factory setting 2.02.00

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.

3.8.5 "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

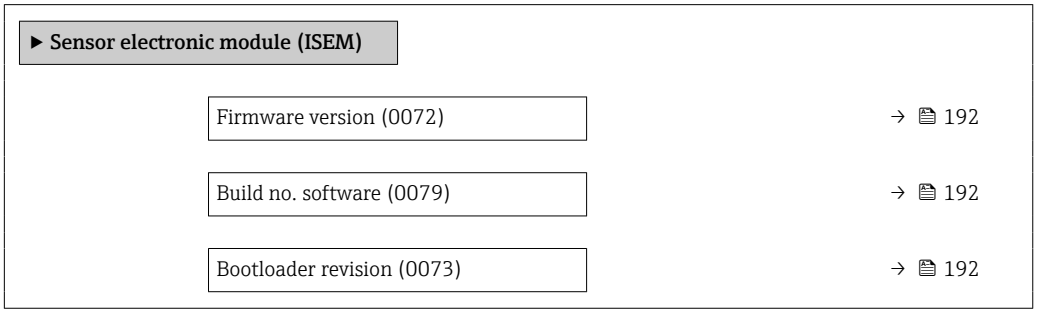
Navigation Expert → Diagnostics → Main elec.+I/O1 → Bootloader rev. (0073)

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

User interface Positive integer

3.8.6 "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

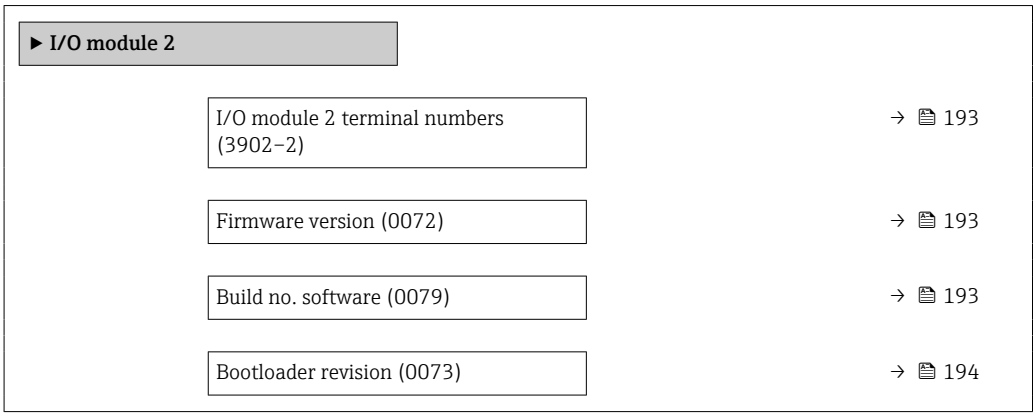
Navigation Expert → Diagnostics → Sens. electronic → Bootloader rev. (0073)

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

User interface Positive integer

3.8.7 "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

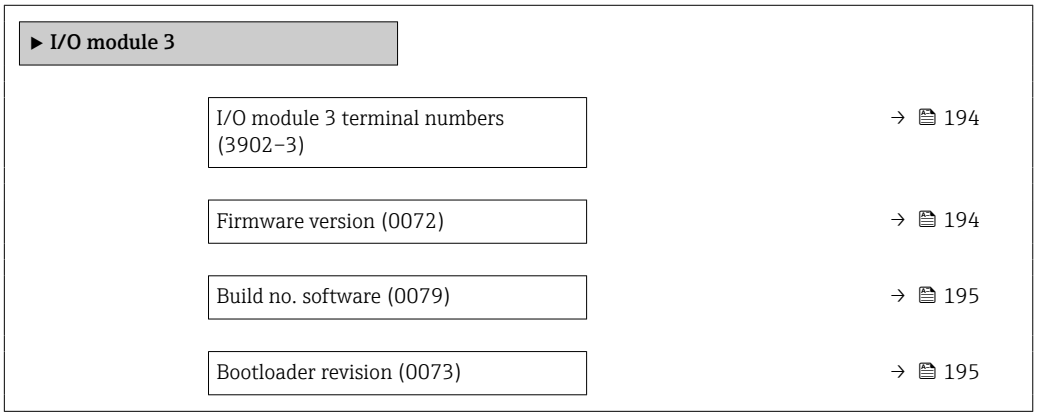
Navigation Expert → Diagnostics → I/O module 2 → Bootloader rev. (0073)

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

User interface Positive integer

3.8.8 "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

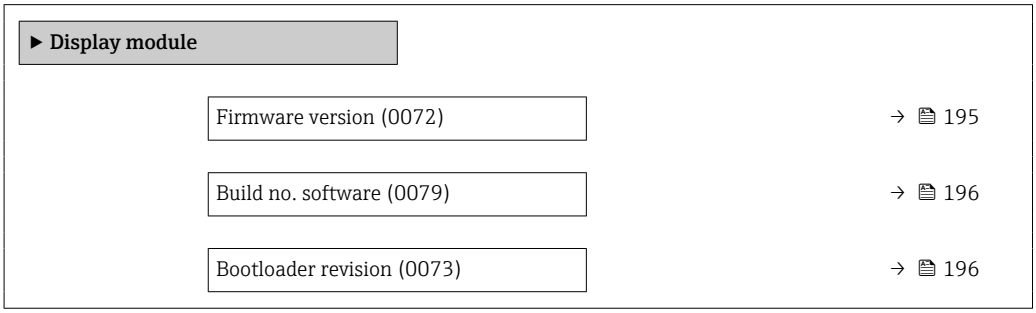
Navigation Expert → Diagnostics → I/O module 3 → Bootloader rev. (0073)

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

User interface Positive integer

3.8.9 "Display module" submenu

Navigation Expert → Diagnostics → Display module



Firmware version

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

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

User interface Positive integer

Build no. software

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

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

User interface Positive integer

Bootloader revision

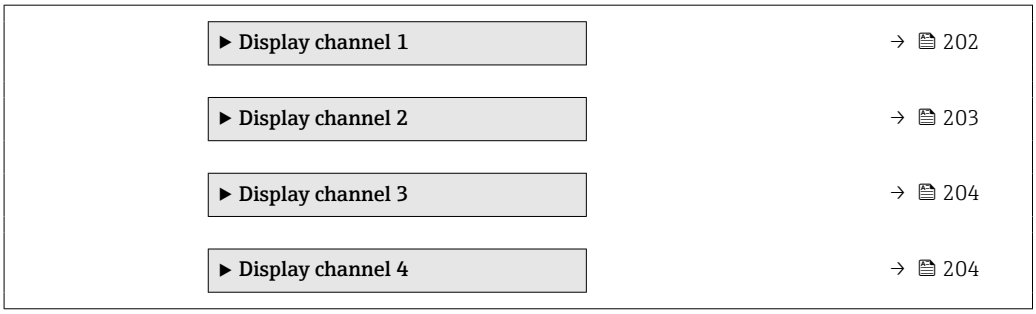
Navigation Expert → Diagnostics → Display module → Bootloader rev. (0073)

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

User interface Positive integer

3.8.10 "Data logging" submenu

Navigation Expert → Diagnostics → Data logging



Assign channel 1

Navigation

Diagnostics → Data logging → Assign chan. 1 (0851)

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 (→ 44).

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 *
- 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

* Visibility depends on order options or device settings

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
Diagnostics → Data logging → Assign chan. 2 (0852)
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 (→ 44).

Description
Use this function to select a process variable for the data logging channel.

Selection
For the picklist, see the **Assign channel 1** parameter (→ 197)

Factory setting
Off

Assign channel 3

Navigation
Diagnostics → Data logging → Assign chan. 3 (0853)
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 (→ 44).

Description
Use this function to select a process variable for the data logging channel.

Selection
For the picklist, see the **Assign channel 1** parameter (→ 197)

Factory setting
Off

Assign channel 4

Navigation

Diagnostics → Data logging → Assign chan. 4 (0854)

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 (→ 44).

Description

Use this function to select a process variable for the data logging channel.

Selection

For the picklist, see the **Assign channel 1** parameter (→ 197)

Factory setting

Off

Logging interval

Navigation

Diagnostics → Data logging → Logging interval (0856)

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 (→ 44).

Description

Use this function to enter the logging interval T_{log} for data logging.

User entry

0.1 to 3 600.0 s

Factory setting

1.0 s

Additional information

Description

This defines the interval between the individual data points in the data log, and thus the maximum loggable process time T_{log}:

- If 1 logging channel is used: $T_{log} = 1000 \times t_{log}$
- If 2 logging channels are used: $T_{log} = 500 \times t_{log}$
- If 3 logging channels are used: $T_{log} = 333 \times t_{log}$
- If 4 logging channels are used: $T_{log} = 250 \times t_{log}$

Once this time elapses, the oldest data points in the data log are cyclically overwritten such that a time of T_{log} always remains in the memory (ring memory principle).

The log contents are cleared if the length of the logging interval is changed.

Example

If 1 logging channel is used:

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

Clear logging data

Navigation
Diagnostics → Data logging → Clear logging (0855)
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 (→ 44).

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
Diagnostics → Data logging → Data logging (0860)
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
Diagnostics → Data logging → Logging delay (0859)
Expert → Diagnostics → Data logging → Logging delay (0859)

Prerequisite
In the **Data logging** parameter (→ 200), 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 (→ 201), the device does not save any data for the duration of the delay time entered.

Data logging control

Navigation
Diagnostics → Data logging → Data log.control (0857)
Expert → Diagnostics → Data logging → Data log.control (0857)

Prerequisite In the **Data logging** parameter (→ 200), 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
Diagnostics → Data logging → Data log. status (0858)
Expert → Diagnostics → Data logging → Data log. status (0858)

Prerequisite In the **Data logging** parameter (→ 200), 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 Diagnostics → Data logging → Logging duration (0861)
Expert → Diagnostics → Data logging → Logging duration (0861)

Prerequisite In the **Data logging** parameter (→ 200), the **Not overwriting** option is selected.

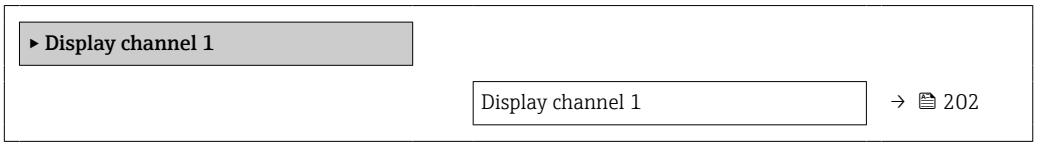
Description Displays the total logging duration.

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 (→ 44).

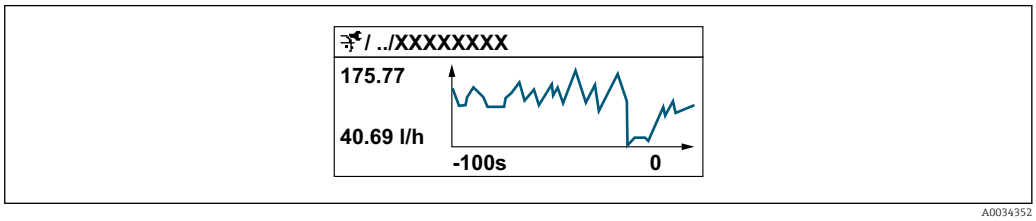
One of the following options is selected in the **Assign channel 1** parameter (→ 197):
- Conductivity *
- Corrected conductivity *
- Temperature *

Description

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

Additional information

Description

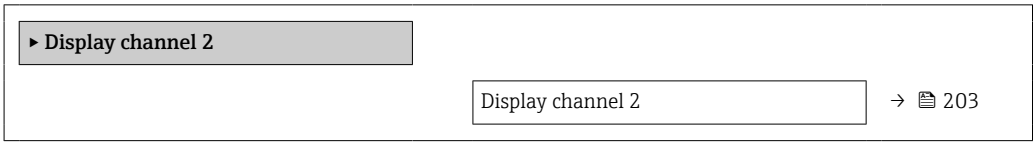


10 *Chart of a measured value trend*

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

"Display channel 2" submenu

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



Display channel 2

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

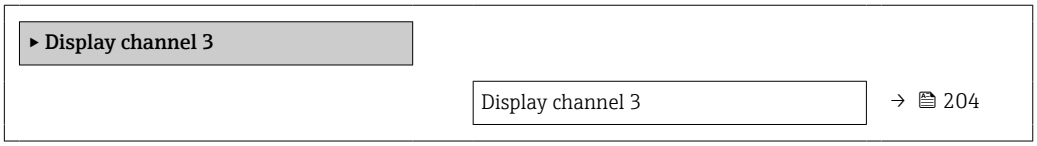
Prerequisite A process variable is specified in the **Assign channel 2** parameter.

Description See the **Display channel 1** parameter → 202

* Visibility depends on order options or device settings

"Display channel 3" submenu

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



Display channel 3

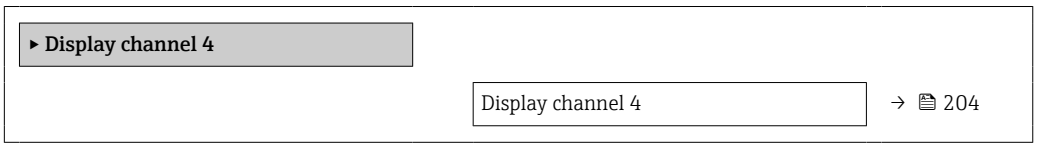
Navigation Expert → Diagnostics → Data logging → Displ.channel 3

Prerequisite A process variable is specified in the **Assign channel 3** parameter.

Description See the **Display channel 1** parameter → 202

"Display channel 4" submenu

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



Display channel 4

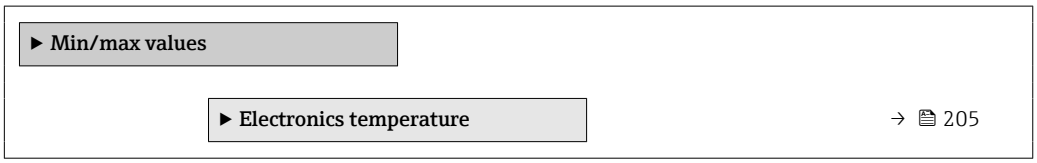
Navigation Expert → Diagnostics → Data logging → Displ.channel 4

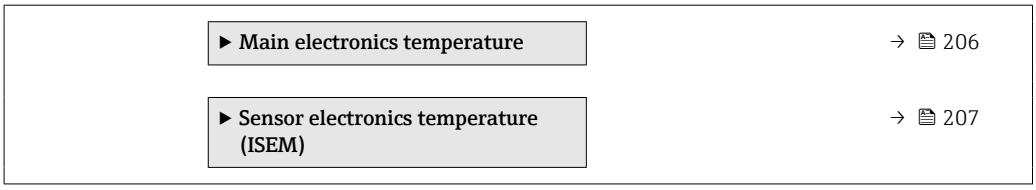
Prerequisite A process variable is specified in the **Assign channel 4** parameter.

Description See the **Display channel 1** parameter → 202

3.8.11 "Min/max values" submenu

Navigation Expert → Diagnostics → Min/max val.





Reset min/max values

Navigation Expert → Diagnostics → Min/max val. → Reset min/max (6541)

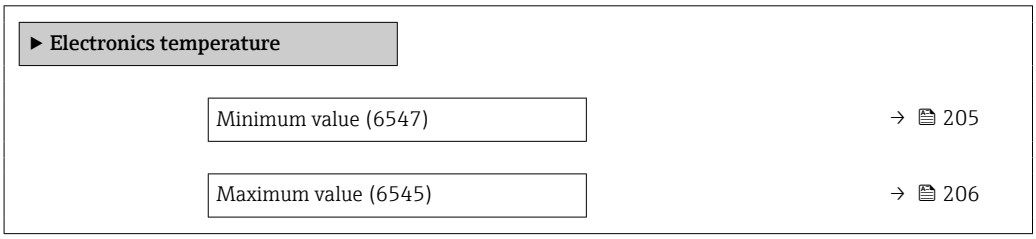
Description Use this function to select measured variables whose minimum, maximum and average measured values are to be reset.

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 (→ 60)

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.

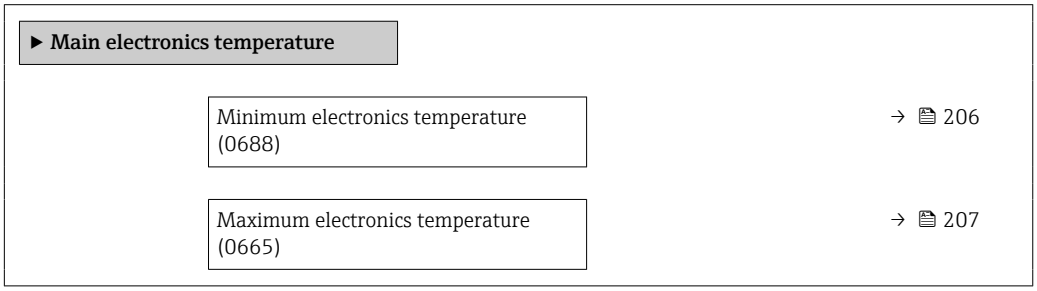
User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 60)

"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 (→ 60)

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.

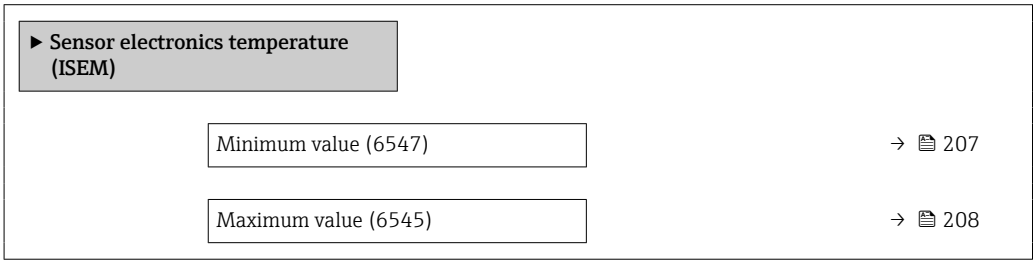
User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 60)

"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 (→ 60)

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

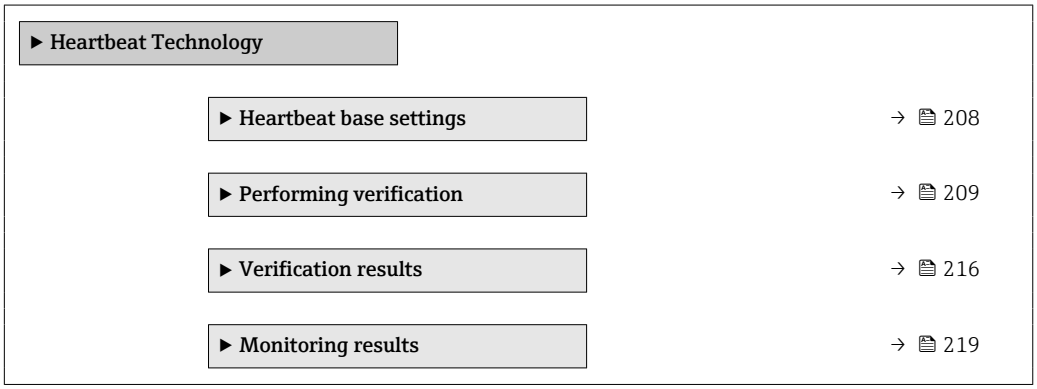
Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 60)

3.8.12 "Heartbeat Technology" submenu

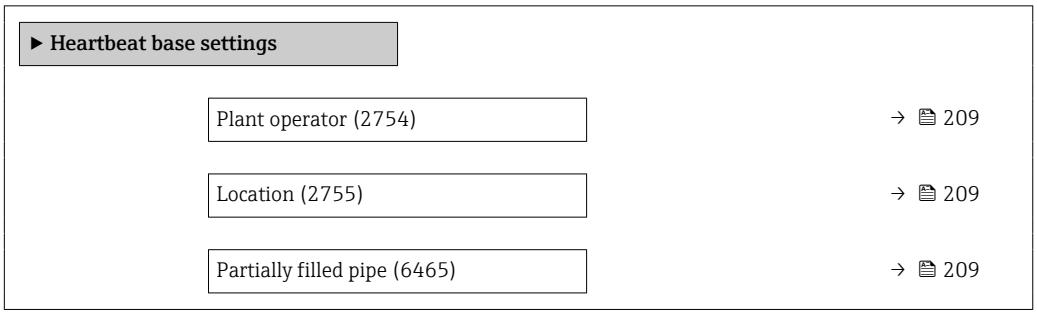
For detailed information on the parameter descriptions for the **Heartbeat Verification+Monitoring**: Special Documentation for the device → 7

Navigation Expert → Diagnostics → Heartbeat Techn.



"Heartbeat base settings" submenu

Navigation Expert → Diagnostics → Heartbeat Techn. → Base settings



Plant operator

Navigation Expert → Diagnostics → Heartbeat Techn. → Base settings → Plant operator (2754)

Description Use this function to enter the plant operator.

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

Location

Navigation Expert → Diagnostics → Heartbeat Techn. → Base settings → Location (2755)

Description Use this function to enter the location.

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

Partially filled pipe

Navigation Expert → Diagnostics → Heartbeat Techn. → Base settings → Part.filled pipe (6465)

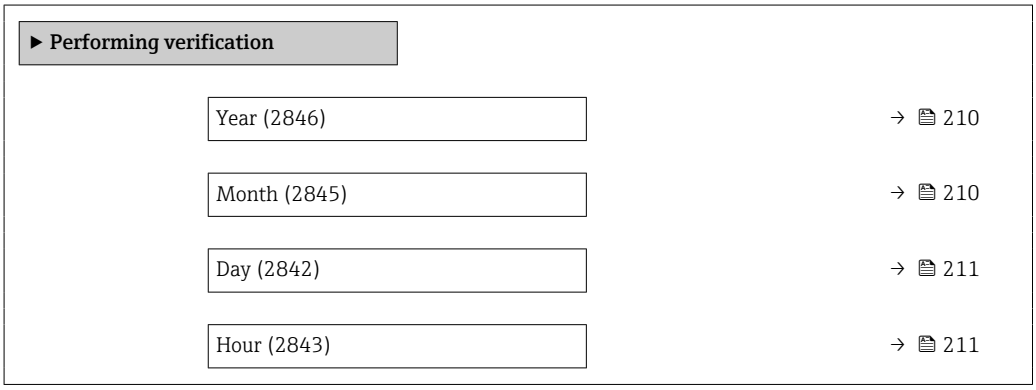
Description Indicate, if the measuring tube is partially filled during the verification process in order to avoid evaluating the EPD electrode cable.

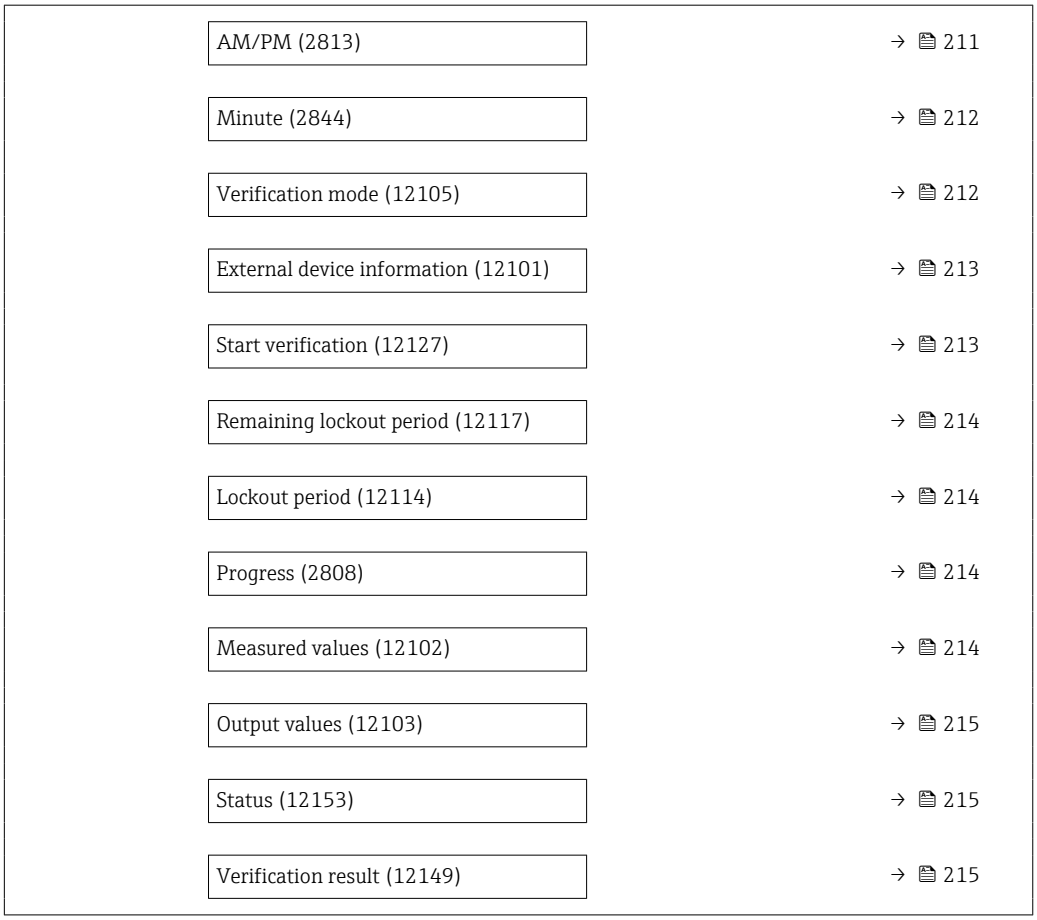
Selection
- No
- Yes

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) (→ 64).

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 (→ 212).
- 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

* Visibility depends on order options or device settings

Remaining lockout period

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → RemainLockoutPer (12117)

Description Shows the remaining number of hours until the lockout period has elapsed.

User interface 0 to 99 h

Factory setting 0 h

Lockout period

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Lockout period (12114)

Description Enter the lockout period in hours. When the device is in custody transfer mode, it is not possible to perform a verification during this time.

User entry 0 to 99 h

Factory setting 48 h

Progress

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Progress (2808)

Description The progress of the process is indicated.

User interface 0 to 100 %

Measured values

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Measured val. (12102)

Prerequisite One of the following options is selected in the **Start verification** parameter (→ 213):
- 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

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.

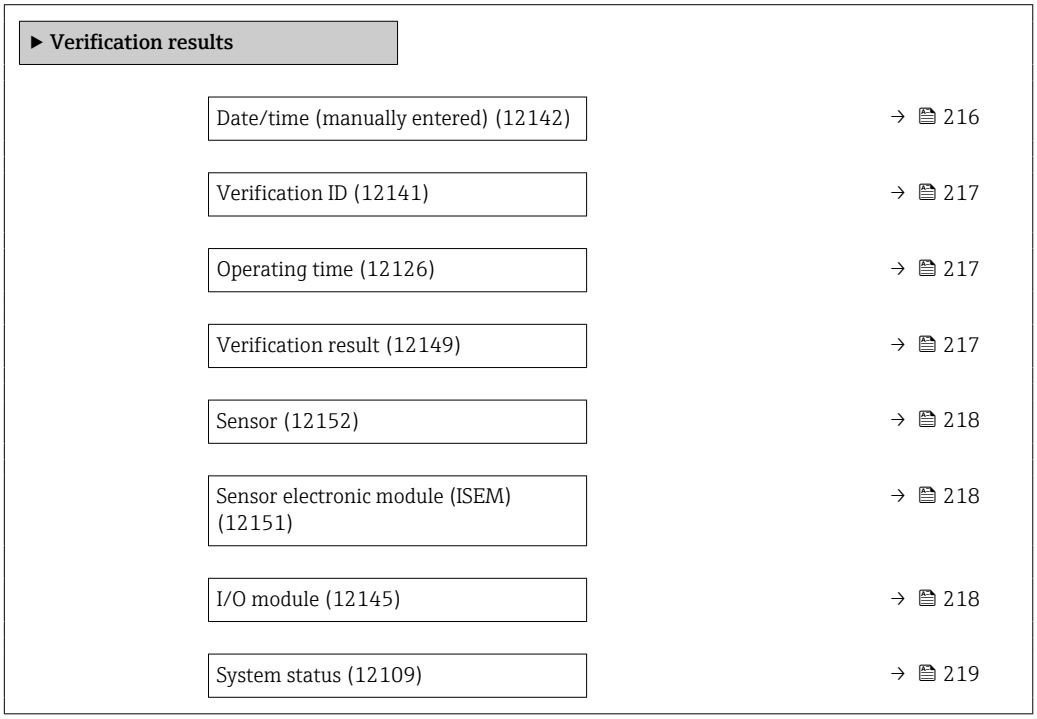
Detailed description of results classification:

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 result is shown in the **Overall result** parameter (→ 215).

Description Displays the result for the sensor.

Detailed description of results classification:

User interface
- Not supported
- Passed
- Not done
- Failed

Factory setting Not done

Sensor electronic module (ISEM)

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results → Sens. electronic (12151)

Prerequisite The **Failed** option result is shown in the **Overall result** parameter (→ 215).

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 In the **Overall result** parameter (→ 215), the **Failed** option was displayed.

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 result is shown in the **Overall result** parameter (→ 215).

Description

Displays the system condition. Tests the measuring device for active errors.

Detailed description of results classification:

User interface

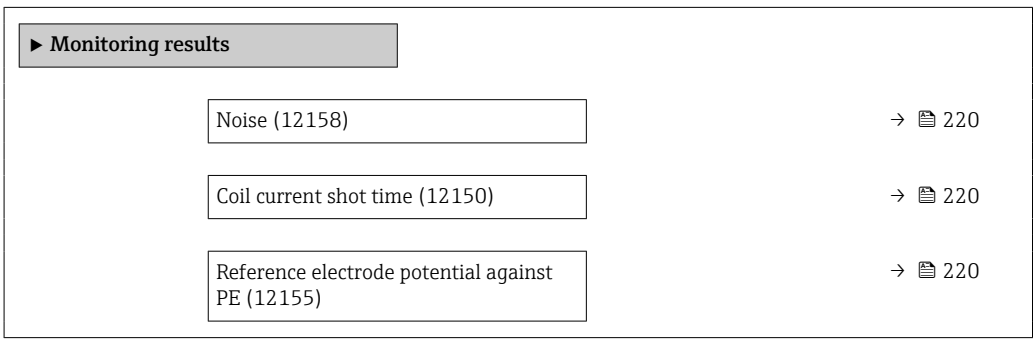
- Not supported
- Passed
- Not done
- Failed

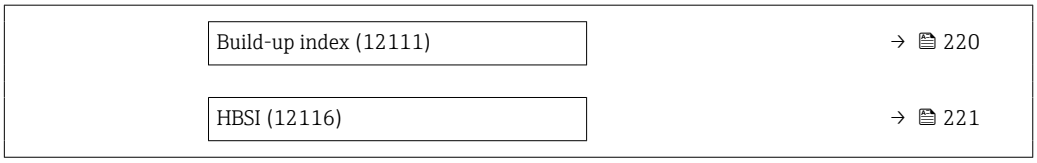
Factory setting

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 → Ref Electr. Pot. (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 (→ 86) parameter. The higher the percentage, the thicker the build-up.

Build-up index value (→ 86) = 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 (→ 86) = 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 (→ 86) 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 (→ 86). The aim is to determine the Build-up index value (→ 86) at the time the cleaning is usually performed.

On the basis of the Build-up index value (→ 86) 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 (→ 86).

HBSI

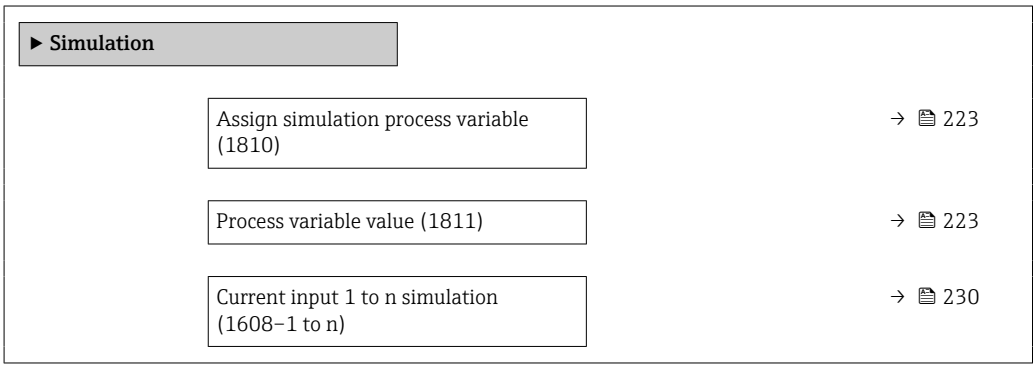
Navigation Expert → Diagnostics → Heartbeat Techn. → Monitor. results → HBSI (12116)

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 %

3.8.13 "Simulation" submenu

Navigation Expert → Diagnostics → Simulation



Value current input 1 to n (1609–1 to n)	→ 231
Status input simulation 1 to n (1355–1 to n)	→ 231
Input signal level 1 to n (1356–1 to n)	→ 232
Current output 1 to n simulation (0354–1 to n)	→ 224
Current output value (0355)	→ 224
Frequency output 1 to n simulation (0472–1 to n)	→ 224
Frequency output 1 to n value (0473–1 to n)	→ 225
Pulse output simulation 1 to n (0458–1 to n)	→ 225
Pulse value 1 to n (0459–1 to n)	→ 226
Switch output simulation 1 to n (0462–1 to n)	→ 226
Switch state 1 to n (0463–1 to n)	→ 227
Relay output 1 to n simulation (0802–1 to n)	→ 227
Switch state 1 to n (0803–1 to n)	→ 228
Pulse output simulation (0988)	→ 228
Pulse value (0989)	→ 229
Device alarm simulation (0654)	→ 229
Diagnostic event category (0738)	→ 230
Diagnostic event simulation (0737)	→ 230

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 (→ 223).

Process variable value

Navigation Expert → Diagnostics → Simulation → Proc. var. value (1811)

Prerequisite A process variable is selected in the **Assign simulation process variable** parameter (→ 223).

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 (→ 57).

* Visibility depends on order options or device settings

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 (→ 114).

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 (→ 127), 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 (→ 127), 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 (→ 130).
- Down-counting value
  The pulses specified in the **Pulse value** parameter (→ 226) 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 (→ 127), 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.

Pulse output simulation

Navigation Expert → Diagnostics → Simulation → Puls.outp.sim. (0988)

Description Use this function to switch simulation of the double 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** parameter (→ 229).

Selection

- Off
  Simulation of the double pulse output 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 (→ 153).
- Down-counting value
  The pulses specified in the **Pulse value** parameter (→ 229) are output.

Pulse value

Navigation Expert → Diagnostics → Simulation → Pulse value (0989)

Prerequisite In the **Pulse output simulation** parameter (→ 228), the **Down-counting value** option is selected.

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

User entry 0 to 65 535

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 (→ 230).

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 (→ 230).

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 simulation 1 to n

Navigation Expert → Diagnostics → Simulation → Status inp.sim 1 to n (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 (→ 232).

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 (→ 231), 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

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	1000
400	1200
450	1500
500	2000
600	2500
700	3500
750	4000
800	4500
900	6000
1000	7000
1200	10000
1400	14000
1600	18000
1800	23000
2000	28500
2200	34000
2400	40000
2600	48000
2800	55500
3000	63500

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	1 025

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)

6 Modbus RS485 register information

6.1 Notes

6.1.1 Structure of the register information

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

Navigation: navigation path to the parameter					
Parameter	**Register**	**Data type**	**Access type**	**User interface/ Selection/User entry**	**→**
Name of parameter	Indicated in decimal numerical format	▪ Float length = 4 byte ▪ Integer length = 2 byte ▪ String length, depending on parameter	Possible type of access to parameter: ▪ Read access via function codes 03, 04 or 23 ▪ Write access via function codes 06, 16 or 23	**Options** List of the individual options for the parameter ▪ Option 1 ▪ Option 2 ▪ Option 3 (+) (+) = Factory setting depends on country, order options or device settings **User entry** Specific value or input range for the parameter	Page number information and cross-reference to the standard parameter description

NOTICE

If non-volatile device parameters are modified via the MODBUS RS485 function codes 06, 16 or 23, the change is saved in the EEPROM of the measuring device.

The number of writes to the EEPROM is technically restricted to a maximum of 1 million.

- ▶ Make sure to comply with this limit since, if it is exceeded, data loss and measuring device failure will result.
- ▶ Avoid constantly writing non-volatile device parameters via the MODBUS RS485.

6.1.2 Address model

The Modbus RS485 register addresses of the measuring device are implemented in accordance with the "Modbus Applications Protocol Specification V1.1".

In addition, systems are used that work with the register address model "Modicon Modbus Protocol Reference Guide (PI-MBUS-300 Rev. J)".

Depending on the function code used, a number is added at the start of the register address with this specification:

- "3" → "Read" access
- "4" → "Write" access

Function code	Access type	Register in accordance with "Modbus Applications Protocol Specification"	Register in accordance with "Modicon Modbus Protocol Reference Guide"
03 04 23	Read	XXXX Example: mass flow = 2007	3XXXX Example: mass flow = 32007
06 16 23	Write	XXXX Example: reset totalizer = 6401	4XXXX Example: reset totalizer = 46401

6.2 Overview of the Expert operating menu

The following table provides an overview of the menu structure of the expert operating menu and its parameters. The page reference indicates where the associated description of the submenu or parameter can be found.

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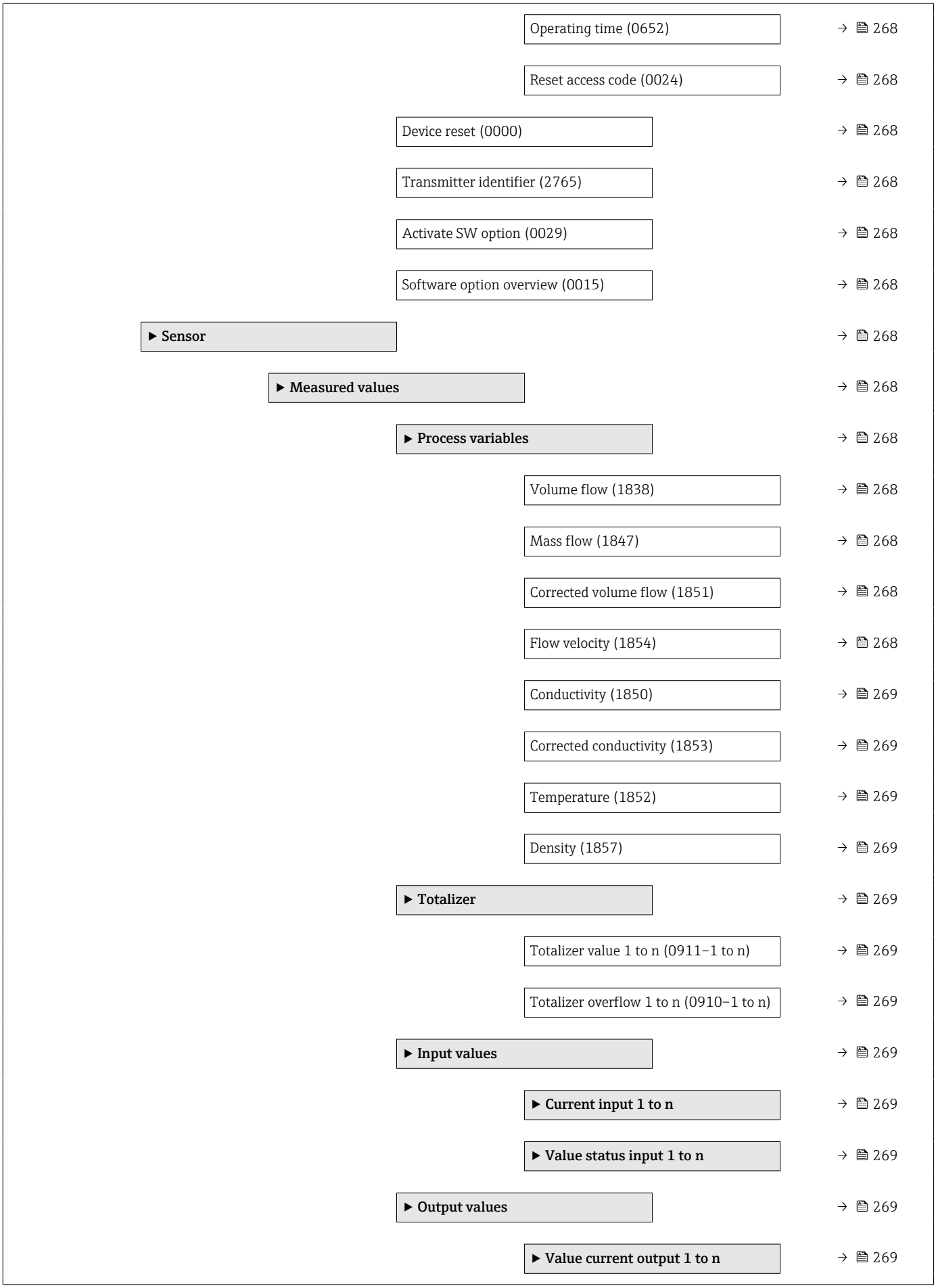
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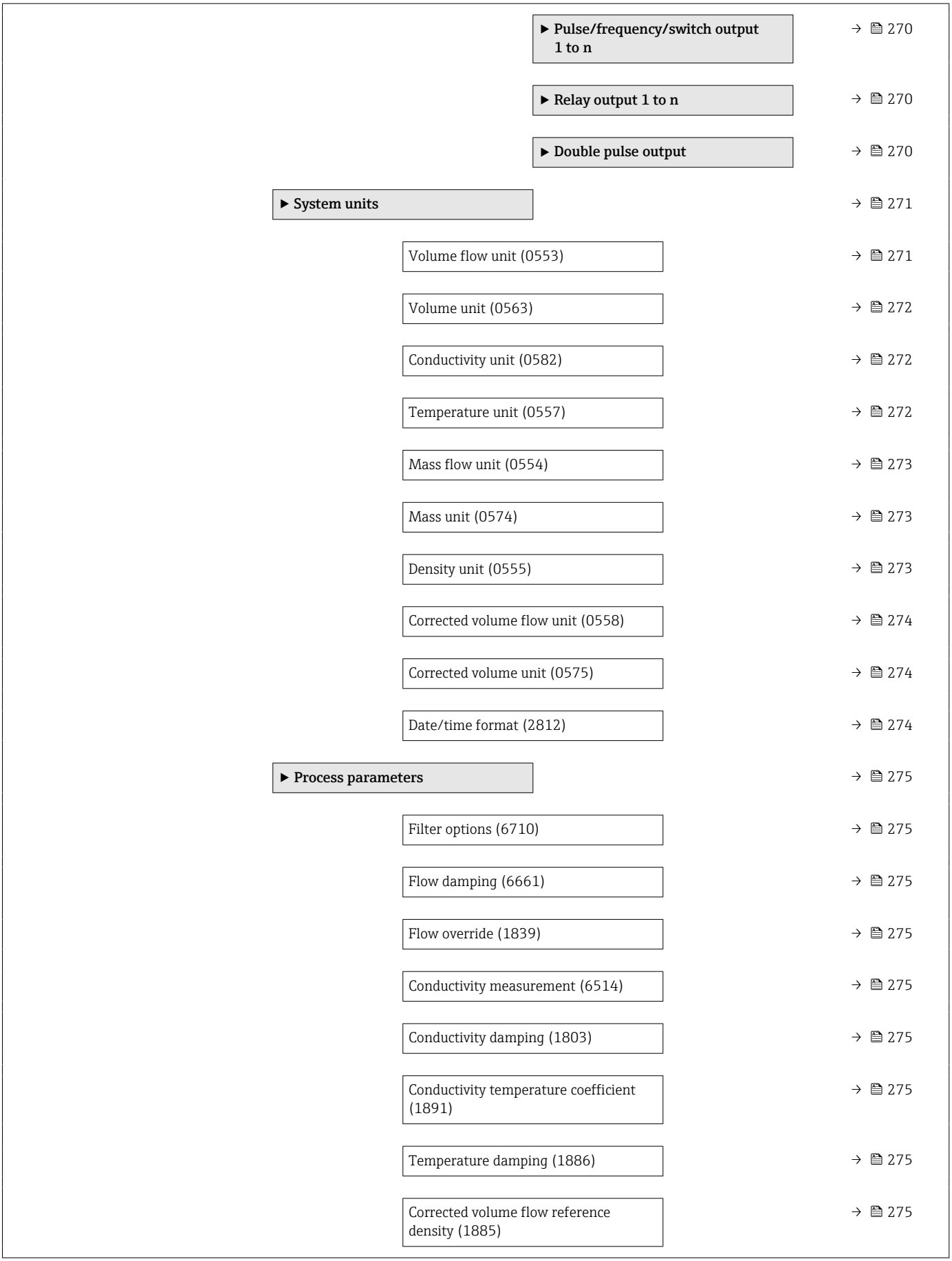
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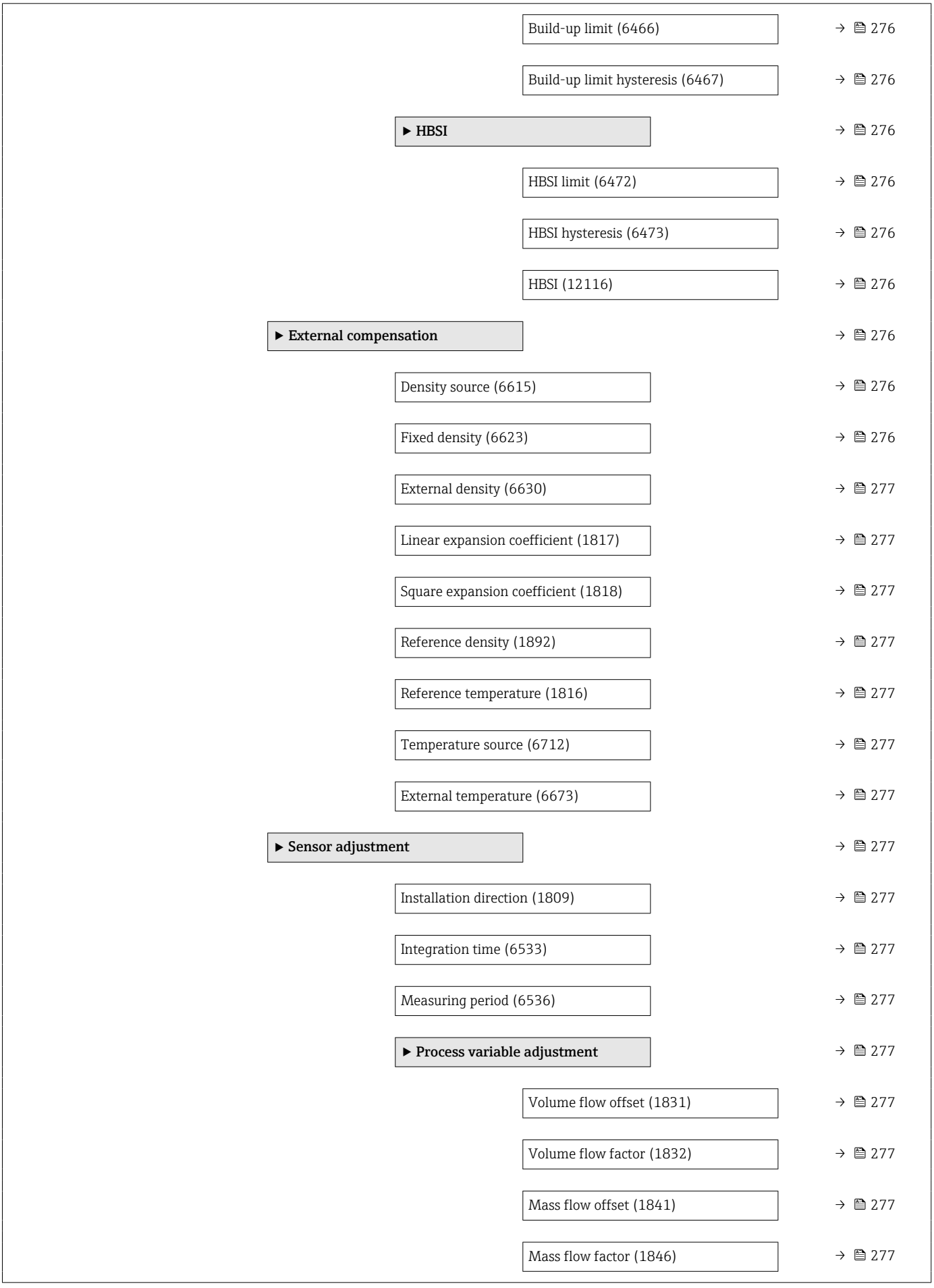
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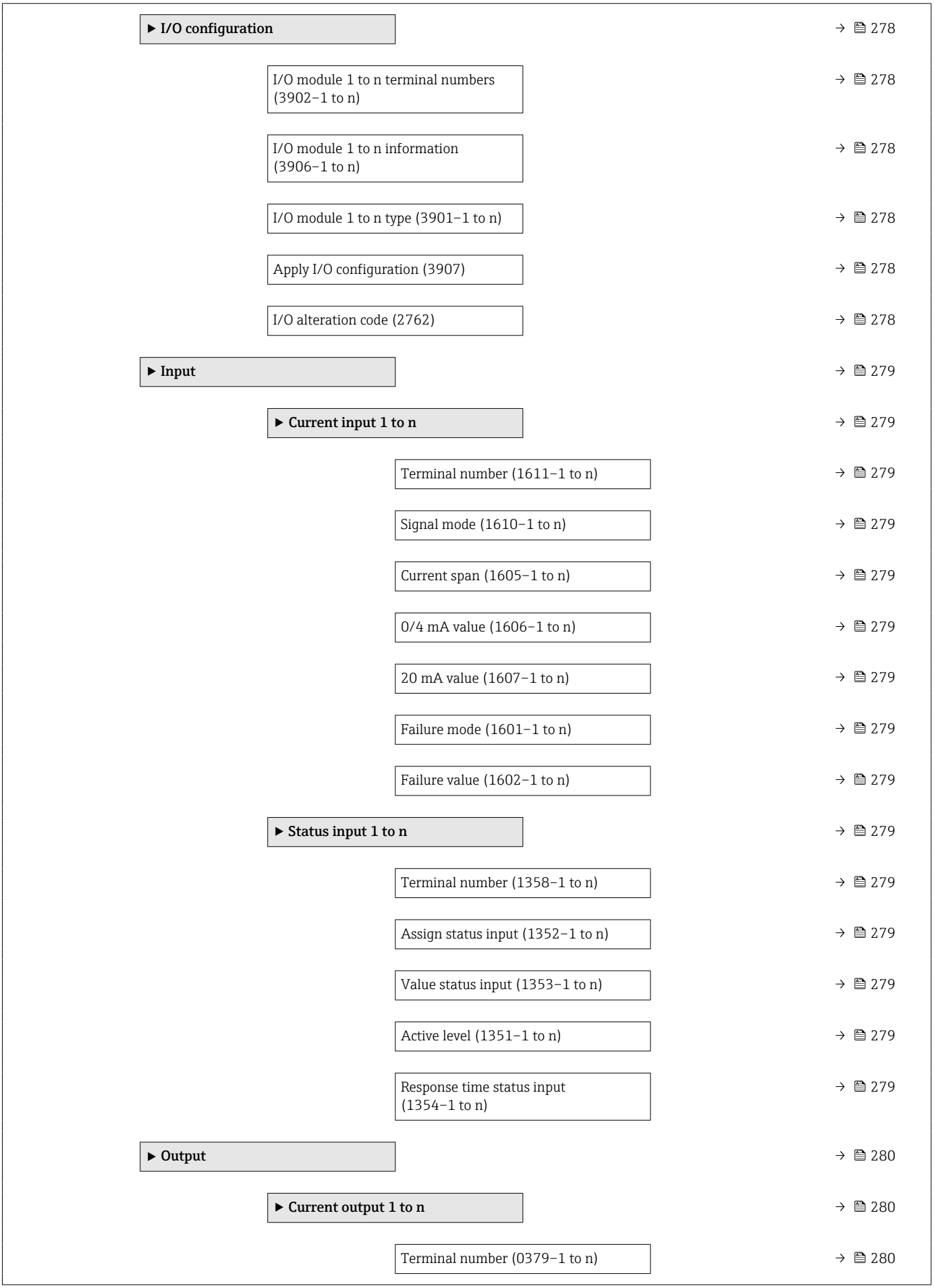
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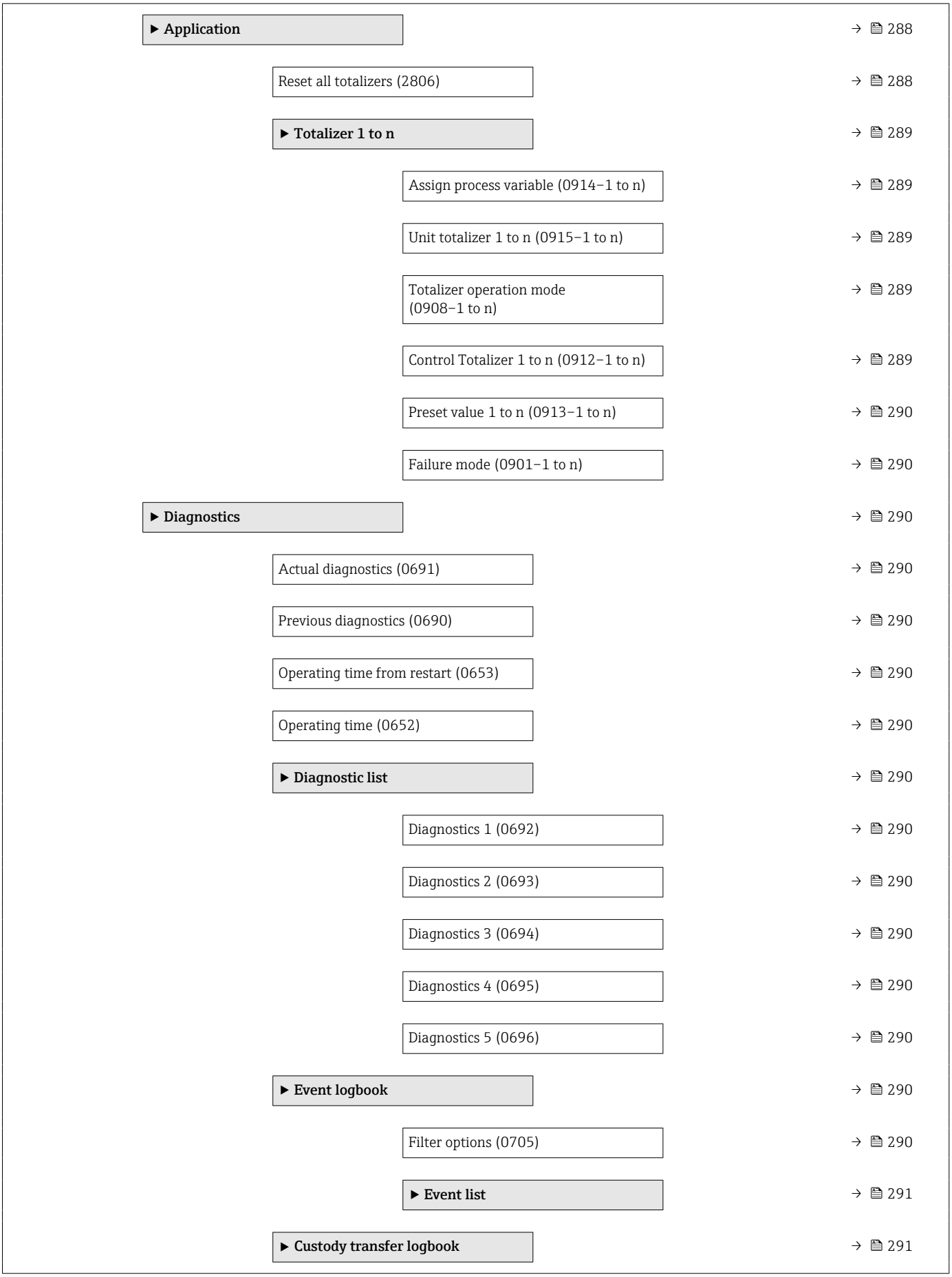
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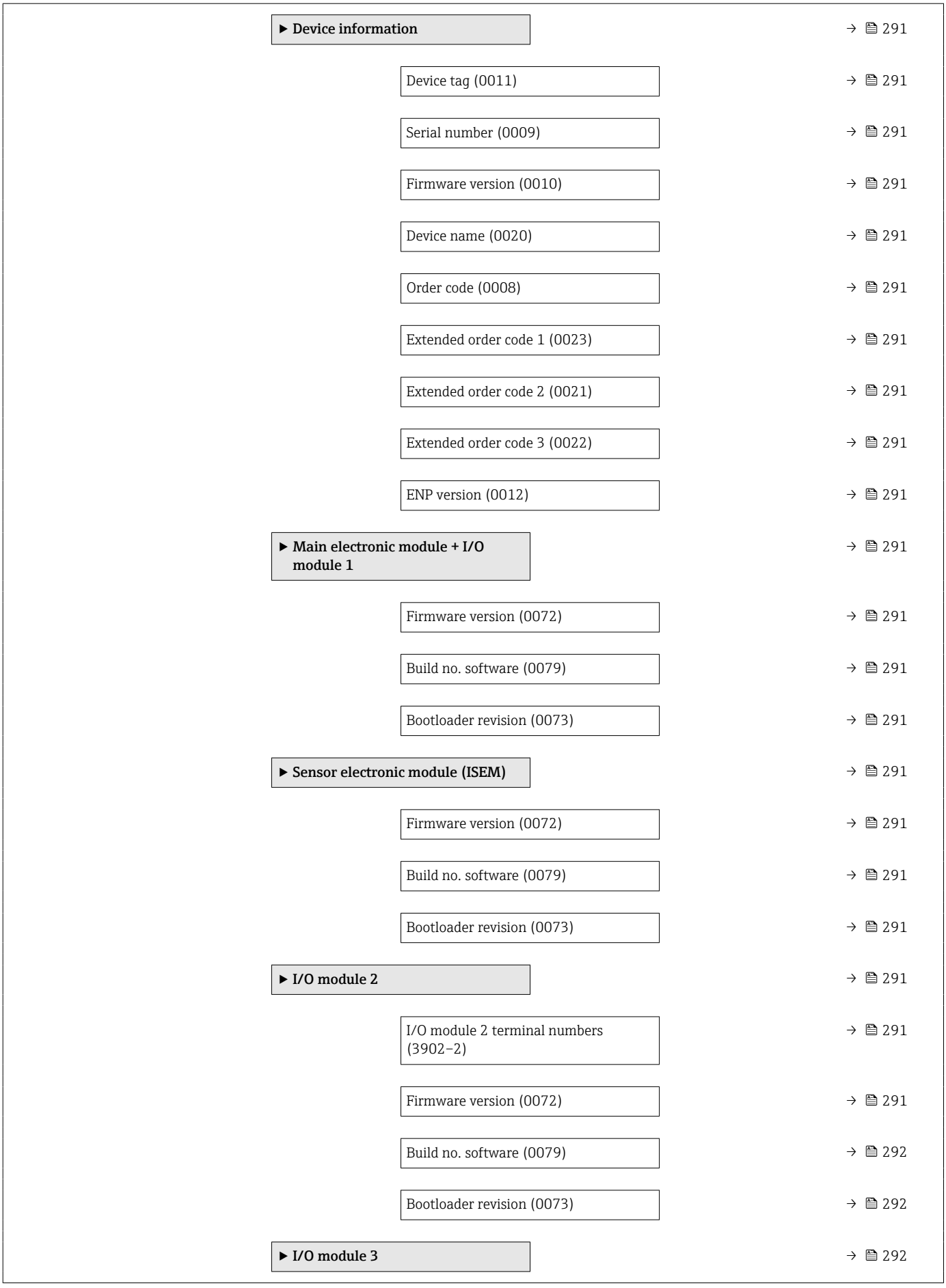
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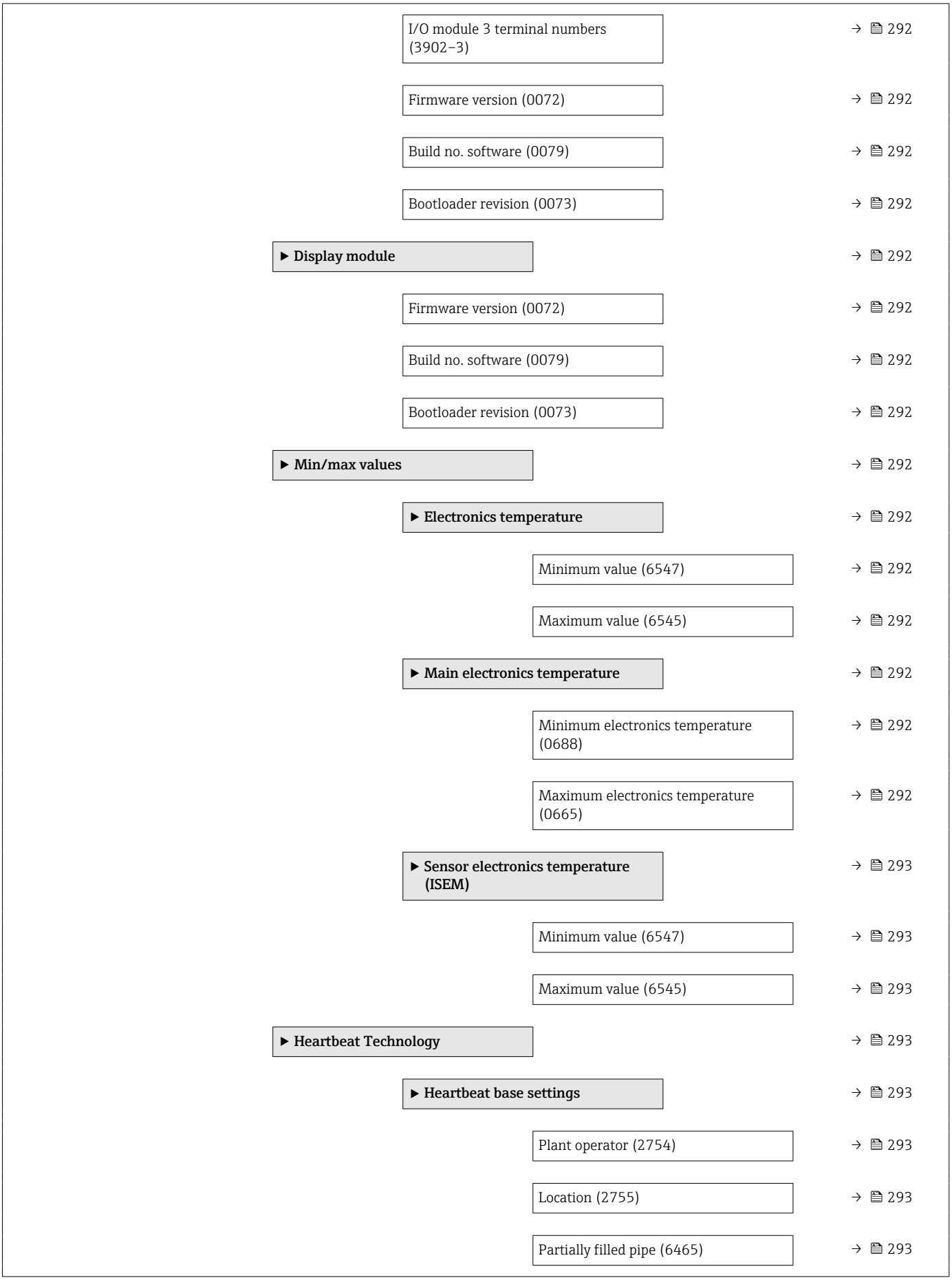
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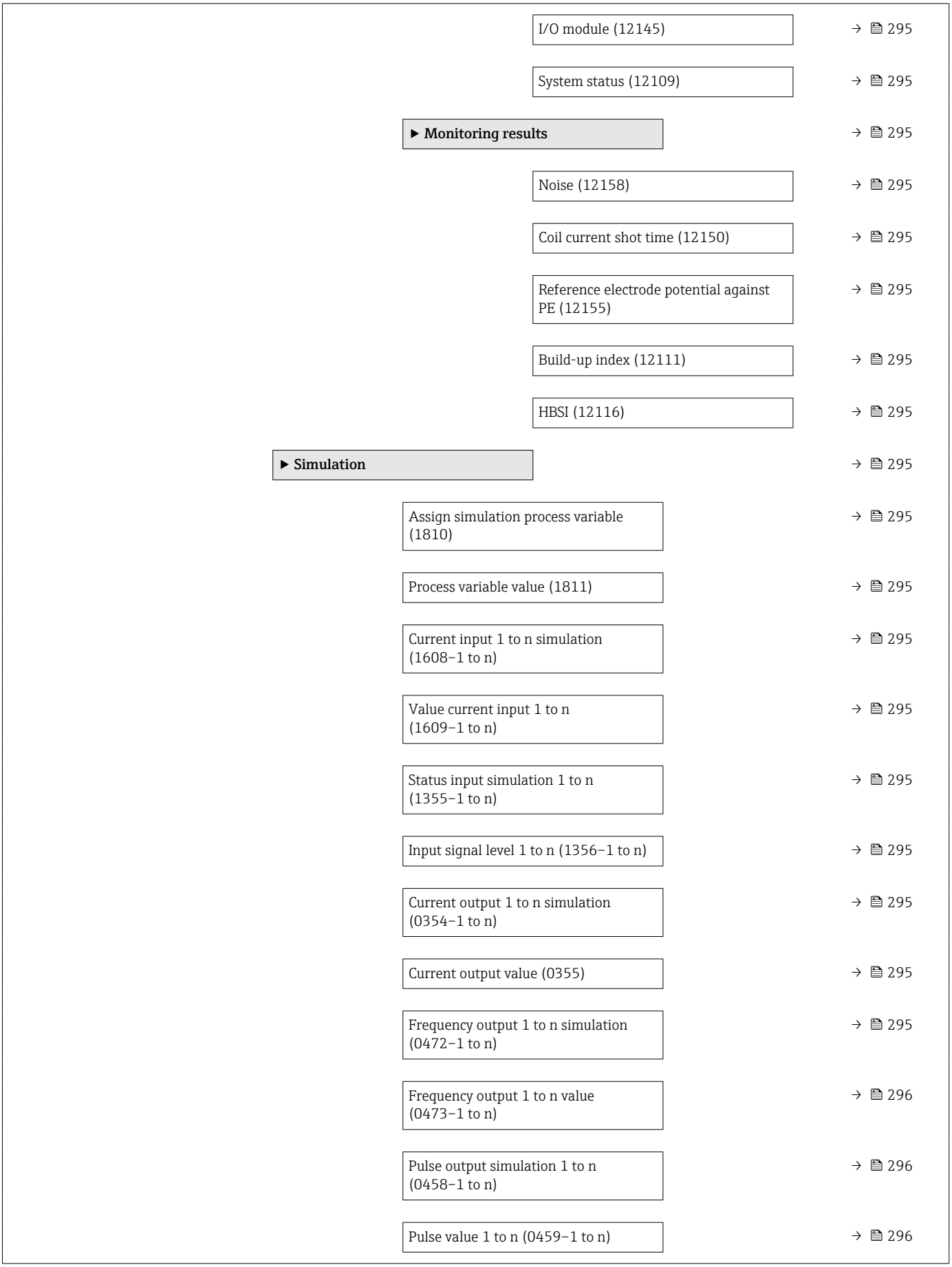
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6.3 Register information

Navigation: Expert					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Direct access (0106)	3878	Integer	Read / Write	0 to 65 535	11
Locking status (0004)	4918	Integer	Read	256 = Hardware locked 512 = Temporarily locked 2048 = CT active - defined parameters 32768 = CT active - all parameters	12
User role (0005)	2178	Integer	Read	**1 = Maintenance** 2 = Service	13
Enter access code (0003)	2177	Integer	Read / Write	Max. 16-digit character string comprising numbers, letters and special characters	13

6.3.1 "System" submenu

"Display" submenu

Navigation: Expert → System → Display					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Display language (0104)	3673	Integer	Read / Write	0 = English 1 = Deutsch 2 = Français 3 = Español 4 = Italiano 5 = Nederlands 8 = Svenska 11 = 日本語 (Japanese) 12 = Portuguesa 13 = Polski 14 = русский язык (Russian) 15 = čeština (Czech) 16 = 中文 (Chinese) 18 = Türkçe 19 = tiếng Việt (Vietnamese) 20 = 한국어 (Korean)	15
Format display (0098)	3625	Integer	Read / Write	**0 = 1 value, max. size** 1 = 1 bargraph + 1 value 2 = 2 values 3 = 1 value large + 2 values 4 = 4 values	15
Value 1 display (0107)	3963	Integer	Read / Write	**1 = Volume flow** 2 = Mass flow 3 = Corrected volume flow 3 = Conductivity * 4 = Corrected conductivity * 5 = Temperature * 16 = Totalizer 1 17 = Totalizer 2 18 = Totalizer 3 19 = Build-up index * 37 = Flow velocity 39 = Electronics temperature 40 = Noise * 41 = Coil current shot time * 42 = Reference electrode potential against PE * 43 = HBSI * 51 = Test point 1 52 = Test point 2 53 = Test point 3 121 = Current output 1 * 122 = Current output 2 * 123 = Current output 3 * 124 = Current output 4 *	18
0% bargraph value 1 (0123)	4136 to 4137	Float	Read / Write	Signed floating-point number	19
100% bargraph value 1 (0125)	4142 to 4143	Float	Read / Write	Signed floating-point number	19
Decimal places 1 (0095)	3365	Integer	Read / Write	0 = x 1 = x.x **2 = x.xx** 3 = x.xxx 4 = x.xxxx	20
Value 2 display (0108)	3964	Integer	Read / Write	For the picklist, see the **Value 1 display** parameter (→ 18)	20

Navigation: Expert → System → Display					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Decimal places 2 (0117)	4049	Integer	Read / Write	0 = x 1 = x.x **2 = x.xx** 3 = x.xxx 4 = x.xxxx	20
Value 3 display (0110)	3966	Integer	Read / Write	For the picklist, see the **Value 1 display** parameter (→ 18)	21
0% bargraph value 3 (0124)	4138 to 4139	Float	Read / Write	Signed floating-point number	21
100% bargraph value 3 (0126)	4140 to 4141	Float	Read / Write	Signed floating-point number	22
Decimal places 3 (0118)	4050	Integer	Read / Write	0 = x 1 = x.x **2 = x.xx** 3 = x.xxx 4 = x.xxxx	22
Value 4 display (0109)	3965	Integer	Read / Write	For the picklist, see the **Value 1 display** parameter (→ 18)	23
Decimal places 4 (0119)	4051	Integer	Read / Write	0 = x 1 = x.x **2 = x.xx** 3 = x.xxx 4 = x.xxxx	23
Display interval (0096)	3604 to 3605	Float	Read / Write	1 to 10 s	24
Display damping (0094)	3554 to 3555	Float	Read / Write	0.0 to 999.9 s	24
Header (0097)	3624	Integer	Read / Write	**0 = Device tag** 1 = Free text	25
Header text (0112)	3968 to 3973	String	Read / Write	Max. 12 characters, such as letters, numbers or special characters (e.g. @, %, /)	25
Separator (0101)	3671	Integer	Read / Write	▪ . (point) ▪ , (comma)	26
Contrast display (0105)	3674 to 3675	Float	Read / Write	20 to 80 %	26
Backlight (0111)	3967	Integer	Read / Write	0 = Disable **1 = Enable**	27

* Visibility depends on order options or device settings

"Configuration backup" submenu

Navigation: Expert → System → Configuration backup					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Operating time (0652)	2631	String	Read	Days (d), hours (h), minutes (m) and seconds (s)	27
Last backup (2757)	6430	String	Read	Days (d), hours (h), minutes (m) and seconds (s)	28
Configuration management (2758)	5500	Integer	Read / Write	**0 = Cancel** 1 = Execute backup 2 = Restore * 4 = Clear backup data 5 = Compare *	28

Navigation: Expert → System → Configuration backup					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Backup state (2759)	5502	Integer	Read	1 = Backup in progress 2 = Restoring in progress 4 = Delete in progress 5 = Compare in progress 6 = Restoring failed 7 = Backup failed **251 = None**	29
Comparison result (2760)	5514	Integer	Read	0 = Settings identical 1 = Settings not identical 2 = No backup available **3 = Check not done** 4 = Backup settings corrupt 5 = Dataset incompatible	29

* Visibility depends on order options or device settings

"Diagnostic handling" submenu

Navigation: Expert → System → Diagnostic handling					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Alarm delay (0651)	6808 to 6809	Float	Read / Write	0 to 60 s	30

"Diagnostic behavior" submenu

Navigation: Expert → System → Diagnostic handling → Diagnostic behavior					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Assign behavior of diagnostic no. 043 (0650)	9666	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	32
Assign behavior of diagnostic no. 143 (0635)	48298	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	33
Assign behavior of diagnostic no. 302 (0739)	2312	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning**	33
Assign behavior of diagnostic no. 376 (0645)	6442	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	33
Assign behavior of diagnostic no. 377 (0777)	5183	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	34
Assign behavior of diagnostic no. 441 (0657)	4742	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	34
Assign behavior of diagnostic no. 442 (0658)	4919	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	34

Navigation: Expert → System → Diagnostic handling → Diagnostic behavior					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→
Assign behavior of diagnostic no. 443 (0659)	5000	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	35
Assign behavior of diagnostic no. 444 (0740)	5120	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	35
Assign behavior of diagnostic no. 531 (0741)	2397	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	35
Assign behavior of diagnostic no. 543 (0643)	2362	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	36
Assign behavior of diagnostic no. 599 (0644)	4730	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	36
Assign behavior of diagnostic no. 832 (0681)	2759	Integer	Read / Write	0 = Off **1 = Logbook entry only** 2 = Warning 3 = Alarm	36
Assign behavior of diagnostic no. 833 (0682)	2762	Integer	Read / Write	0 = Off **1 = Logbook entry only** 2 = Warning 3 = Alarm	37
Assign behavior of diagnostic no. 834 (0700)	2761	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	37
Assign behavior of diagnostic no. 835 (0702)	2760	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	38
Assign behavior of diagnostic no. 842 (0638)	9661	Integer	Read / Write	**0 = Off** 1 = Logbook entry only 2 = Warning 3 = Alarm	38
Assign behavior of diagnostic no. 961 (0736)	28459	Integer	Read / Write	0 = Off 1 = Logbook entry only 2 = Warning **3 = Alarm**	39
Assign behavior of diagnostic no. 962 (0745)	2097	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	39
Assign behavior of diagnostic no. 937 (0743)	2396	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	38
Assign behavior of diagnostic no. 938 (0642)	5837	Integer	Read / Write	0 = Off 1 = Logbook entry only 2 = Warning **3 = Alarm**	39

"Administration" submenu

Navigation: Expert → System → Administration					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Device reset (0000)	6817	Integer	Read / Write	**0 = Cancel** 1 = Restart device 2 = To delivery settings 25 = Restore S-DAT backup *	42
Transmitter identifier (2765)	4510	Integer	Read	0 = Unknown 1 = 300 2 = 500	43
Activate SW option (0029)	2795	Integer	Read / Write	Max. 10-digit string consisting of numbers.	43
Software option overview (0015)	2902	Integer	Read	1 = Extended HistoROM * 32 = Electrode cleaning circuit * 128 = Custody transfer 512 = Build-up index 16384 = Heartbeat Monitoring * 32768 = Heartbeat Verification *	44

* Visibility depends on order options or device settings

"Define access code" wizard

Navigation: Expert → System → Administration → Define access code					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Define access code	8677 to 8684	String	Read / Write	Max. 16-digit character string comprising numbers, letters and special characters	40
Confirm access code	8685 to 8692	String	Read / Write	Max. 16-digit character string comprising numbers, letters and special characters	41

"Reset access code" submenu

Navigation: Expert → System → Administration → Reset access code					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Operating time (0652)	2631	String	Read	Days (d), hours (h), minutes (m) and seconds (s)	41
Reset access code (0024)	8880 to 8895	String	Read / Write	Character string comprising numbers, letters and special characters	42

6.3.2 "Sensor" submenu

"Measured values" submenu

"Process variables" submenu

Navigation: Expert → Sensor → Measured values → Process variables					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Volume flow (1838)	3874 to 3875	Float	Read	Signed floating-point number	46
Mass flow (1847)	3876 to 3877	Float	Read	Signed floating-point number	46
Corrected volume flow (1851)	2011 to 2012	Float	Read	Signed floating-point number	47
Flow velocity (1854)	2019 to 2020	Float	Read	Signed floating-point number	47

Navigation: Expert → Sensor → Measured values → Process variables					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Conductivity (1850)	2013 to 2014	Float	Read	Signed floating-point number	47
Corrected conductivity (1853)	3977 to 3978	Float	Read	Positive floating-point number	48
Temperature (1852)	2015 to 2016	Float	Read	Positive floating-point number	48
Density (1857)	2083 to 2084	Float	Read	Signed floating-point number	48

"Totalizer" submenu

Navigation: Expert → Sensor → Measured values → Totalizer					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Totalizer value 1 to n (0911–1 to n)	1: 2610 to 2611 2: 2810 to 2811 3: 3010 to 3011	Float	Read	Signed floating-point number	49
Totalizer overflow 1 to n (0910–1 to n)	1: 2612 to 2613 2: 2812 to 2813 3: 3012 to 3013	Float	Read	Integer with sign	50

"Input values" submenu

"Current input 1 to n" submenu

Navigation: Expert → Sensor → Measured values → Input values → Current input 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Measured values 1 to n (1603–1 to n)	1: 6151 to 6152 2: 6153 to 6154 3: 6155 to 6156	Float	Read	Signed floating-point number	51
Measured current 1 to n (1604–1 to n)	1: 6131 to 6132 2: 6133 to 6134 3: 6135 to 6136	Float	Read	0 to 22.5 mA	52

"Value status input 1 to n" submenu

Navigation: Expert → Sensor → Measured values → Input values → Value status input 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Value status input (1353–1 to n)	1: 2746 2: 4699 3: 4700	Integer	Read	9 = Low 10 = High	52

"Output values" submenu

"Value current output 1 to n" submenu

Navigation: Expert → Sensor → Measured values → Output values → Value current output 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Output current 1 to n (0361–1 to n)	1: 5931 to 5932 2: 5933 to 5934 3: 5935 to 5936	Float	Read	0 to 22.5 mA	53
Measured current 1 to n (0366–1 to n)	1: 5779 to 5780 2: 5781 to 5782 3: 5783 to 5784	Float	Read	0 to 30 mA	53

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

Navigation: Expert → Sensor → Measured values → Output values → Pulse/frequency/switch output 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Output frequency 1 to n (0471–1 to n)	1: 3462 to 3463 2: 3464 to 3465 3: 9910 to 9911	Float	Read	0.0 to 12 500.0 Hz	54
Pulse output 1 to n (0456–1 to n)	1: 3082 to 3083 2: 3084 to 3085 3: 4718 to 4719	Float	Read	Positive floating-point number	54
Switch state 1 to n (0461–1 to n)	1: 2485 2: 2486 3: 9917	Integer	Read	1 = Open 6 = Closed	55

"Relay output 1 to n" submenu

Navigation: Expert → Sensor → Measured values → Output values → Relay output 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Switch state (0801–1 to n)	1: 3518 2: 3519 3: 9875	Integer	Read	1 = Open 6 = Closed	55
Switch cycles (0815–1 to n)	1: 7625 2: 7627 3: 7629	Integer	Read	Positive integer	56
Max. switch cycles number (0817–1 to n)	1: 21919 2: 21921 3: 21923	Integer	Read	Positive integer	56

"Double pulse output" submenu

Navigation: Expert → Sensor → Measured values → Output values → Double pulse output					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Pulse output (0987)	7041 to 7042	Float	Read	Positive floating-point number	56

"System units" submenu

Navigation: Expert → Sensor → System units					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Volume flow unit (0553)	2103	Integer	Read / Write	0 = cm^3/s 1 = cm^3/min 2 = cm^3/h 3 = cm^3/d 4 = dm^3/s 5 = dm^3/min 6 = dm^3/h 7 = dm^3/d 8 = m^3/s 9 = m^3/min 10 = m^3/h 11 = m^3/d 12 = ml/s 13 = ml/min 14 = ml/h 15 = ml/d 16 = l/s 17 = l/min **18 = l/h** (+) 19 = l/d 20 = hl/s 21 = hl/min 22 = hl/h 23 = hl/d 24 = Ml/s 25 = Ml/min 26 = Ml/h 27 = Ml/d 32 = af/s 33 = af/min 34 = af/h 35 = af/d 36 = ft^3/s 37 = ft^3/min 38 = ft^3/h 39 = ft^3/d 40 = fl oz/s (us) 41 = fl oz/min (us) 42 = fl oz/h (us) 43 = fl oz/d (us) 44 = gal/s (us) 45 = gal/min (us) 46 = gal/h (us) 47 = gal/d (us) 48 = Mgal/s (us) 49 = Mgal/min (us) 50 = Mgal/h (us) 51 = Mgal/d (us) 52 = bbl/s (us;liq.) 53 = bbl/min (us;liq.) 54 = bbl/h (us;liq.) 55 = bbl/d (us;liq.) 56 = bbl/s (us;beer) 57 = bbl/min (us;beer) 58 = bbl/h (us;beer) 59 = bbl/d (us;beer) 60 = bbl/s (us;oil) 61 = bbl/min (us;oil) 62 = bbl/h (us;oil) 63 = bbl/d (us;oil) 64 = bbl/s (us;tank) 65 = bbl/min (us;tank) 66 = bbl/h (us;tank) 67 = bbl/d (us;tank) 68 = gal/s (imp)	57

Navigation: Expert → Sensor → System units					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
				69 = gal/min (imp) 70 = gal/h (imp) 71 = gal/d (imp) 72 = Mgal/s (imp) 73 = Mgal/min (imp) 74 = Mgal/h (imp) 75 = Mgal/d (imp) 76 = bbl/s (imp;beer) 77 = bbl/min (imp;beer) 78 = bbl/h (imp;beer) 79 = bbl/d (imp;beer) 80 = bbl/s (imp;oil) 81 = bbl/min (imp;oil) 82 = bbl/h (imp;oil) 83 = bbl/d (imp;oil) 88 = kgal/s (us) 89 = kgal/min (us) 90 = kgal/h (us) 91 = kgal/d (us) 92 = MMft³/s 93 = MMft³/min 94 = MMft³/h 96 = Mft³/d 97 = kft³/s 98 = kft³/min 99 = kft³/h 100 = kft³/d	
Volume unit (0563)	2104	Integer	Read / Write	0 = cm³ 1 = dm³ **2 = m³ (+)** 3 = ml 4 = l 5 = hl 6 = Ml Mega 8 = af 9 = ft³ 10 = fl oz (us) 11 = gal (us) 12 = Mgal (us) 13 = bbl (us;liq.) 14 = bbl (us;beer) 15 = bbl (us;oil) 16 = bbl (us;tank) 17 = gal (imp) 18 = Mgal (imp) 19 = bbl (imp;beer) 20 = bbl (imp;oil) 22 = kgal (us) 23 = Mft³ 111 = Mft³	59
Conductivity unit (0582)	2121	Integer	Read / Write	1 = MS/m 2 = kS/m 3 = S/m 4 = S/cm 5 = mS/m 6 = mS/cm 7 = µS/m **8 = µS/cm** 9 = µS/mm 10 = nS/cm	59
Temperature unit (0557)	2109	Integer	Read / Write	**0 = °C (+)** 1 = K 2 = °F 3 = °R	60

Navigation: Expert → Sensor → System units					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→
Mass flow unit (0554)	2101	Integer	Read / Write	0 = g/s 1 = g/min 2 = g/h 3 = g/d 4 = kg/s 5 = kg/min **6 = kg/h** (+) 7 = kg/d 8 = t/s 9 = t/min 10 = t/h 11 = t/d 12 = oz/s 13 = oz/min 14 = oz/h 15 = oz/d 16 = lb/s 17 = lb/min 18 = lb/h 19 = lb/d 20 = STon/s 21 = STon/min 22 = STon/h 23 = STon/d	61
Mass unit (0574)	2102	Integer	Read / Write	50 = g **51 = kg** (+) 52 = t 53 = oz 54 = lb 55 = STon	61
Density unit (0555)	2107	Integer	Read / Write	0 = g/cm³ 2 = kg/dm³ **3 = kg/l** (+) 4 = kg/m³ 5 = SD4°C 6 = SD15°C 7 = SD20°C 8 = SG4°C 9 = SG15°C 10 = SG20°C 11 = lb/ft³ 12 = lb/gal (us) 13 = lb/bbl (us;liq.) 14 = lb/bbl (us;beer) 15 = lb/bbl (us;oil) 16 = lb/bbl (us;tank) 17 = lb/gal (imp) 18 = lb/bbl (imp;beer) 19 = lb/bbl (imp;oil) 21 = g/m³	62

Navigation: Expert → Sensor → System units					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Corrected volume flow unit (0558)	2105	Integer	Read / Write	0 = Nl/s 1 = Nl/min **2 = Nl/h (+)** 3 = Nl/d 4 = Nm^3/s 5 = Nm^3/min 6 = Nm^3/h 7 = Nm^3/d 8 = Sm^3/s 9 = Sm^3/min 10 = Sm^3/h 11 = Sm^3/d 12 = Sft^3/s 13 = Sft^3/min 14 = Sft^3/h 15 = Sft^3/d 16 = Sgal/s (us) 17 = Sgal/min (us) 18 = Sgal/h (us) 19 = Sgal/d (us) 20 = Sbbl/s (us;liq.) 21 = Sbbl/min (us;liq.) 22 = Sbbl/h (us;liq.) 23 = Sbbl/d (us;liq.) 24 = Sgal/s (imp) 25 = Sgal/min (imp) 26 = Sgal/h (imp) 27 = Sgal/d (imp) 28 = $MSft^3/s$ 29 = $MSft^3/min$ 30 = $MSft^3/h$ 31 = $MSft^3/d$ 32 = Sbbl/s (us;oil) 33 = Sbbl/min (us;oil) 34 = Sbbl/h (us;oil) 35 = Sbbl/d (us;oil) 36 = Nhl/s 37 = Nhl/min 38 = Nhl/h 39 = Nhl/d 40 = Sl/s 41 = Sl/min 42 = Sl/h 43 = Sl/d 44 = $MSft^3/s$ 45 = $MSft^3/min$ 46 = $MSft^3/h$ 47 = $MSft^3/D$	63
Corrected volume unit (0575)	2106	Integer	Read / Write	100 = Nl **101 = Nm^3 (+)** 102 = Sm^3 103 = Sft^3 104 = Sl 105 = Sgal (us) 106 = Sbbl (us;liq.) 107 = Sgal (imp) 108 = Sbbl (us;oil) 109 = $MSft^3$ 110 = Nhl 112 = $MSft^3$	63
Date/time format (2812)	2150	Integer	Read / Write	**0 = dd.mm.yy hh:mm** 1 = mm/dd/yy hh:mm am/pm 2 = dd.mm.yy hh:mm am/pm 3 = mm/dd/yy hh:mm	64

"Process parameters" submenu

Navigation: Expert → Sensor → Process parameters					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Filter options (6710)	2273	Integer	Read / Write	1 = Adaptive 2 = Adaptive CIP on 3 = Dynamic 4 = Dynamic CIP on **5 = Binomial** 6 = Binomial CIP on	73
Flow damping (6661)	2274	Integer	Read / Write	0 to 15	75
Flow override (1839)	5503	Integer	Read / Write	**0 = Off** 1 = On	75
Conductivity measurement (6514)	2268	Integer	Read / Write	**0 = Off** 1 = On	76
Conductivity damping (1803)	5508 to 5509	Float	Read / Write	0 to 999.9 s	76
Conductivity temperature coefficient (1891)	2886 to 2887	Float	Read / Write	Signed floating-point number	77
Temperature damping (1886)	2483 to 2484	Float	Read / Write	0 to 999.9 s	77
Corrected volume flow reference density (1885)	2536 to 2537	Float	Read / Write	Positive floating-point number	77

"Low flow cut off" submenu

Navigation: Expert → Sensor → Process parameters → Low flow cut off					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Assign process variable (1837)	5101	Integer	Read / Write	0 = Off **1 = Volume flow** 2 = Mass flow 3 = Corrected volume flow	78
On value low flow cutoff (1805)	5138 to 5139	Float	Read / Write	Positive floating-point number	78
Off value low flow cutoff (1804)	5104 to 5105	Float	Read / Write	0 to 100.0 %	79
Pressure shock suppression (1806)	5140 to 5141	Float	Read / Write	0 to 100 s	79

"Empty pipe detection" submenu

Navigation: Expert → Sensor → Process parameters → Empty pipe detection					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Empty pipe detection (1860)	5106	Integer	Read / Write	**0 = Off** 1 = On	81
Switch point empty pipe detection (6562)	2890 to 2891	Float	Read / Write	0 to 100 %	81
Response time empty pipe detection (1859)	5108 to 5109	Float	Read / Write	0 to 100 s	81
New adjustment (6560)	2335	Integer	Read / Write	**0 = Cancel** 1 = Empty pipe adjust 2 = Full pipe adjust	82
Progress (6571)	2336	Integer	Read	0 = Not ok 6 = Ok 8 = Busy	82
Empty pipe adjust value (6527)	2181 to 2182	Float	Read	Positive floating-point number	82

Navigation: Expert → Sensor → Process parameters → Empty pipe detection					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Full pipe adjust value (6548)	2832 to 2833	Float	Read	Positive floating-point number	83
Measured value EPD (6559)	2298 to 2299	Float	Read	Positive floating-point number	83

"Electrode cleaning cycle" submenu

Navigation: Expert → Sensor → Process parameters → Electrode cleaning cycle					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Electrode cleaning cycle (6528)	2280	Integer	Read / Write	0 = Off **1 = On**	84
ECC duration (6555)	2330 to 2331	Float	Read / Write	0.01 to 30 s	84
ECC recovery time (6556)	2332 to 2333	Float	Read / Write	1 to 600 s	84
ECC interval (6557)	2328 to 2329	Float	Read / Write	0.5 to 168 h	85
ECC polarity (6631)	2334	Integer	Read	0 = Positive 1 = Negative	85

"Build-up index" submenu

Navigation: Expert → Sensor → Process parameters → Build-up index					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Build-up index operating mode (6734)	21842	Integer	Read / Write	**0 = Off** 5 = Slow 6 = Standard 7 = Fast	86
Build-up index damping (6840)	32609	Integer	Read / Write	0 to 15	86
Build-up index (12111)	32597 to 32598	Float	Read	0.0 to 100.0 %	86
Build-up limit (6466)	27335 to 27336	Float	Read / Write	0 to 100 %	87
Build-up limit hysteresis (6467)	27337 to 27338	Float	Read / Write	0 to 100 %	87

"HBSI" submenu

Navigation: Expert → Sensor → Process parameters → HBSI					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
HBSI limit (6472)	48259 to 48260	Float	Read / Write	0 to 100 %	88
HBSI hysteresis (6473)	48261 to 48262	Float	Read / Write	0 to 100 %	88
HBSI (12116)	48268 to 48269	Float	Read	−100.0 to 100.0 %	88

"External compensation" submenu

Navigation: Expert → Sensor → External compensation					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Density source (6615)	2497	Integer	Read / Write	**0 = Fixed density** 1 = External density 2 = Calculated value 11 = Current input 1 * 12 = Current input 2 * 13 = Current input 3 *	89
Fixed density (6623)	2830 to 2831	Float	Read / Write	Positive floating-point number	89

Navigation: Expert → Sensor → External compensation					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→
External density (6630)	2117 to 2118	Float	Read / Write	Positive floating-point number	90
Linear expansion coefficient (1817)	5132 to 5133	Float	Read	Signed floating-point number	90
Square expansion coefficient (1818)	5134 to 5135	Float	Read	Signed floating-point number	91
Reference density (1892)	6637 to 6638	Float	Read	Positive floating-point number	91
Reference temperature (1816)	5136 to 5137	Float	Read	−273.15 to 99 999 °C	93
Temperature source (6712)	2114	Integer	Read / Write	0 = Internal temperature sensor * 1 = External value **2 = Off** 11 = Current input 1 * 12 = Current input 2 * 13 = Current input 3 *	92
External temperature (6673)	2125 to 2126	Float	Read / Write	Floating point number with sign	93

* Visibility depends on order options or device settings

"Sensor adjustment" submenu

Navigation: Expert → Sensor → Sensor adjustment					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→
Installation direction (1809)	5501	Integer	Read / Write	**0 = Forward flow** 1 = Reverse flow	94
Integration time (6533)	2260 to 2261	Float	Read	1 to 65 ms	94
Measuring period (6536)	2852 to 2853	Float	Read	0 to 1 000 ms	94

"Process variable adjustment" submenu

Navigation: Expert → Sensor → Sensor adjustment → Process variable adjustment					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→
Volume flow offset (1831)	5521 to 5522	Float	Read / Write	Signed floating-point number	95
Volume flow factor (1832)	5519 to 5520	Float	Read / Write	Positive floating-point number	96
Mass flow offset (1841)	5525 to 5526	Float	Read / Write	Signed floating-point number	96
Mass flow factor (1846)	5523 to 5524	Float	Read / Write	Positive floating-point number	96
Conductivity offset (1848)	5529 to 5530	Float	Read / Write	Signed floating-point number	97
Conductivity factor (1849)	5527 to 5528	Float	Read / Write	Positive floating-point number	97
Corrected volume flow offset (1866)	2044 to 2045	Float	Read / Write	Signed floating-point number	97
Corrected volume flow factor (1867)	2076 to 2077	Float	Read / Write	Positive floating-point number	98
Temperature offset (1868)	2046 to 2047	Float	Read / Write	Signed floating-point number	98
Temperature factor (1869)	2042 to 2043	Float	Read / Write	Positive floating-point number	99
Corrected conductivity offset (1870)	5533 to 5534	Float	Read / Write	Signed floating-point number	99
Corrected conductivity factor (1871)	5531 to 5532	Float	Read / Write	Positive floating-point number	99
Flow velocity offset (1879)	21556 to 21557	Float	Read / Write	Signed floating-point number	100
Flow velocity factor (1880)	21554 to 21555	Float	Read / Write	Positive floating-point number	100

"Calibration" submenu

Navigation: Expert → Sensor → Calibration					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Nominal diameter (2807)	2048 to 2057	String	Read	DNxx / x"	101
Calibration factor (6522)	2313 to 2314	Float	Read	Positive floating-point number	101
Zero point (6546)	2870 to 2871	Float	Read	Signed floating-point number	101
Conductivity calibration factor (6718)	19806 to 19807	Float	Read	0.01 to 10 000	102

"Build-up index adjustment" wizard

Navigation: Expert → Sensor → Build-up index adjustment					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Prerequisites	26227	Integer	Read	1 = The sensor is free of build-up 2 = The measuring tube is completely filled	102
Progress (2808)	6797	Integer	Read	0 to 100 %	103
Build-up index reference value E 1 (6475)	48265 to 48266	Float	Read	0 to 1	103
Signal to noise ratio (6469)	48253 to 48254	Float	Read	Signed floating-point number	103
Build-up index reference value E 2 (6474)	48263 to 48264	Float	Read	0 to 1	103
Signal to noise ratio (6469)	48253 to 48254	Float	Read	Signed floating-point number	103
Build-up index operating mode (6734)	21842	Integer	Read / Write	0 = Off 5 = Slow 6 = Standard 7 = Fast	103

6.3.3 "I/O configuration" submenu

Navigation: Expert → I/O configuration					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
I/O module 1 to n terminal numbers (3902–1 to n)	1: 6541 2: 6542 3: 6543 4: 6544	Integer	Read	0 = Not used 1 = 26-27 (I/O 1) 2 = 24-25 (I/O 2) 3 = 22-23 (I/O 3)	104
I/O module 1 to n information (3906–1 to n)	1: 8659 2: 8660 3: 8661 4: 8662	Integer	Read	1 = MODBUS 2 = Configurable 3 = Not configurable 254 = Not plugged 255 = Invalid	104
I/O module 1 to n type (3901–1 to n)	1: 6417 2: 6418 3: 6419 4: 6420	Integer	Read / Write	**0 = Off** 1 = Current output * 2 = Current input * 3 = Pulse/frequency/switch output * 4 = Double pulse output * 5 = Status input * 6 = Relay output *	105
Apply I/O configuration (3907)	8665	Integer	Read / Write	0 = Yes **1 = No**	105
I/O alteration code (2762)	6427	Integer	Read / Write	Positive integer	106

* Visibility depends on order options or device settings

6.3.4 "Input" submenu

"Current input 1 to n" submenu

Navigation: Expert → Input → Current input 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Terminal number (1611–1 to n)	1: 6548 2: 6549 3: 6550	Integer	Read	0 = Not used 2 = 24-25 (I/O 2) 3 = 22-23 (I/O 3)	107
Signal mode (1610–1 to n)	1: 6424 2: 6425 3: 6426	Integer	Read / Write	0 = Passive 2 = Active *	107
Current span (1605–1 to n)	1: 6147 2: 6148 3: 6149	Integer	Read / Write	0 = 4...20 mA (4... 20.5 mA) 1 = 4...20 mA US (3.9...20.8 mA) **2 = 4...20 mA NE (3.8...20.5 mA)** (+) 3 = 0...20 mA (0... 20.5 mA)	107
0/4 mA value (1606–1 to n)	1: 6111 to 6112 2: 6113 to 6114 3: 6115 to 6116	Float	Read / Write	Signed floating-point number	108
20 mA value (1607–1 to n)	1: 6119 to 6120 2: 6121 to 6122 3: 6123 to 6124	Float	Read / Write	Signed floating-point number	108
Failure mode (1601–1 to n)	1: 6159 2: 6160 3: 6161	Integer	Read / Write	1 = Last valid value **2 = Alarm** 6 = Defined value	109
Failure value (1602–1 to n)	1: 6163 to 6164 2: 6165 to 6166 3: 6167 to 6168	Float	Read / Write	Signed floating-point number	109

* Visibility depends on order options or device settings

"Status input 1 to n" submenu

Navigation: Expert → Input → Status input 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Terminal number (1358–1 to n)	1: 6554 2: 6555 3: 6556	Integer	Read	0 = Not used 2 = 24-25 (I/O 2) 3 = 22-23 (I/O 3)	110
Assign status input (1352–1 to n)	1: 2506 2: 4687 3: 4688	Integer	Read / Write	**0 = Off** 1 = Flow override 2 = Reset all totalizers 3 = Reset totalizer 1 4 = Reset totalizer 2 5 = Reset totalizer 3	110
Value status input (1353–1 to n)	1: 2746 2: 4699 3: 4700	Integer	Read	9 = Low 10 = High	111
Active level (1351–1 to n)	1: 2530 2: 4690 3: 4691	Integer	Read / Write	9 = Low **10 = High**	111
Response time status input (1354–1 to n)	1: 3404 to 3405 2: 5753 to 5754 3: 5755 to 5756	Float	Read / Write	5 to 200 ms	111

6.3.5 "Output" submenu

"Current output 1 to n" submenu

Navigation: Expert → Output → Current output 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Terminal number (0379–1 to n)	1: 6545 2: 6546 3: 6547	Integer	Read	0 = Not used 2 = 24-25 (I/O 2) 3 = 22-23 (I/O 3)	113
Signal mode (0377–1 to n)	1: 6421 2: 6422 3: 6423	Integer	Read / Write	0 = Passive * 2 = Active *	113
Process variable current output (0359–1 to n)	1: 5927 2: 5928 3: 5929	Integer	Read / Write	0 = Off **1 = Volume flow** 2 = Mass flow 3 = Corrected volume flow 4 = Conductivity 7 = Temperature * 9 = Corrected conductivity * 19 = Build-up index * 37 = Flow velocity 39 = Electronics temperature 40 = Noise * 41 = Coil current shot time * 42 = Reference electrode potential against PE * 43 = HBSI * 51 = Test point 1 52 = Test point 2 53 = Test point 3	113
Current range output (0353–1 to n)	1: 5923 2: 5924 3: 5925	Integer	Read / Write	0 = 4...20 mA (4... 20.5 mA) 1 = 4...20 mA US (3.9...20.8 mA) 2 = 4...20 mA NE (3.8...20.5 mA) 3 = 0...20 mA (0... 20.5 mA) 4 = Fixed value	114
Fixed current (0365–1 to n)	1: 5987 to 5988 2: 5989 to 5990 3: 5991 to 5992	Float	Read / Write	0 to 22.5 mA	115
Lower range value output (0367–1 to n)	1: 6195 to 6196 2: 6197 to 6198 3: 6199 to 6200	Float	Read / Write	Signed floating-point number	115
Upper range value output (0372–1 to n)	1: 5915 to 5916 2: 5917 to 5918 3: 5919 to 5920	Float	Read / Write	Signed floating-point number	117
Measuring mode current output (0351–1 to n)	1: 5899 2: 5900 3: 5901	Integer	Read / Write	**0 = Forward flow** 2 = Reverse flow compensation 13 = Forward/Reverse flow *	118
Damping current output (0363–1 to n)	1: 5903 to 5904 2: 5905 to 5906 3: 5907 to 5908	Float	Read / Write	0.0 to 999.9 s	122
Failure behavior current output (0364–1 to n)	1: 5911 2: 5912 3: 5913	Integer	Read / Write	0 = Min. **1 = Max.** 4 = Actual value 5 = Last valid value 6 = Fixed value	123
Failure current (0352–1 to n)	1: 5979 to 5980 2: 5981 to 5982 3: 5983 to 5984	Float	Read / Write	0 to 22.5 mA	124

Navigation: Expert → Output → Current output 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Output current 1 to n (0361–1 to n)	1: 5931 to 5932 2: 5933 to 5934 3: 5935 to 5936	Float	Read	3.59 to 22.5 mA	124
Measured current 1 to n (0366–1 to n)	1: 5779 to 5780 2: 5781 to 5782 3: 5783 to 5784	Float	Read	0 to 30 mA	125

* Visibility depends on order options or device settings

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

Navigation: Expert → Output → Pulse/frequency/switch output 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Terminal number (0492–1 to n)	1: 6551 2: 6552 3: 6553	Integer	Read	0 = Not used 2 = 24-25 (I/O 2) 3 = 22-23 (I/O 3)	126
Signal mode (0490–1 to n)	1: 6235 2: 6236 3: 6237	Integer	Read / Write	**0 = Passive** 2 = Active * 3 = Passive NE	127
Operating mode (0469–1 to n)	1: 4479 2: 4480 3: 9907	Integer	Read / Write	**0 = Pulse** 1 = Switch 53 = Frequency	127
Assign pulse output 1 to n (0460–1 to n)	1: 2461 2: 2462 3: 4685	Integer	Read / Write	**0 = Off** 1 = Volume flow 2 = Mass flow 3 = Corrected volume flow	129
Pulse scaling (0455–1 to n)	1: 3034 to 3035 2: 3036 to 3037 3: 4714 to 4715	Float	Read / Write	Positive floating point number	129
Pulse width (0452–1 to n)	1: 2836 to 2837 2: 2838 to 2839 3: 4702 to 4703	Float	Read / Write	0.05 to 2 000 ms	130
Measuring mode (0457–1 to n)	1: 2394 2: 2395 3: 4683	Integer	Read / Write	**0 = Forward flow** 1 = Reverse flow 2 = Reverse flow compensation 13 = Forward/Reverse flow	130
Failure mode (0480–1 to n)	1: 2948 2: 2949 3: 4708	Integer	Read / Write	0 = Actual value **1 = No pulses**	131
Pulse output 1 to n (0456–1 to n)	1: 3082 to 3083 2: 3084 to 3085 3: 4718 to 4719	Float	Read	Positive floating-point number	132

Navigation: Expert → Output → Pulse/frequency/switch output 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Assign frequency output (0478–1 to n)	1: 2614 2: 2615 3: 9915	Integer	Read / Write	**0 = Off** 1 = Volume flow 2 = Mass flow 3 = Corrected volume flow 4 = Conductivity * 7 = Temperature * 9 = Corrected conductivity * 19 = Build-up index * 37 = Flow velocity 39 = Electronics temperature 40 = Noise * 41 = Coil current shot time * 42 = Reference electrode potential against PE * 43 = HBSI * 51 = Test point 1 52 = Test point 2 53 = Test point 3	132
Minimum frequency value (0453–1 to n)	1: 3526 to 3527 2: 3528 to 3529 3: 5767 to 5768	Float	Read / Write	0.0 to 10 000.0 Hz	133
Maximum frequency value (0454–1 to n)	1: 2996 to 2997 2: 2998 to 2999 3: 4710 to 4711	Float	Read / Write	0.0 to 10 000.0 Hz	133
Measuring value at minimum frequency (0476–1 to n)	1: 5887 to 5888 2: 5889 to 5890 3: 5891 to 5892	Float	Read / Write	Signed floating-point number	134
Measuring value at maximum frequency (0475–1 to n)	1: 3514 to 3515 2: 3516 to 3517 3: 5759 to 5760	Float	Read / Write	Signed floating-point number	134
Measuring mode (0479–1 to n)	1: 2922 2: 2923 3: 4706	Integer	Read / Write	**0 = Forward flow** 2 = Reverse flow compensation 13 = Forward/Reverse flow	134
Damping output 1 to n (0477–1 to n)	1: 3522 to 3523 2: 3524 to 3525 3: 5763 to 5764	Float	Read / Write	0 to 999.9 s	135
Response time (0491–1 to n)	1: 5875 to 5876 2: 5877 to 5878 3: 5879 to 5880	Float	Read	Positive floating-point number	136
Failure mode (0451–1 to n)	1: 2367 2: 2368 3: 4681	Integer	Read / Write	0 = Actual value **1 = 0 Hz** 2 = Defined value	136
Failure frequency (0474–1 to n)	1: 3510 to 3511 2: 3512 to 3513 3: 9908 to 9909	Float	Read / Write	0.0 to 12 500.0 Hz	137
Output frequency 1 to n (0471–1 to n)	1: 3462 to 3463 2: 3464 to 3465 3: 9910 to 9911	Float	Read	0.0 to 12 500.0 Hz	137
Switch output function (0481–1 to n)	1: 3022 2: 3023 3: 9914	Integer	Read / Write	**0 = Off** 1 = On 2 = Diagnostic behavior 3 = Flow direction check 4 = Limit 5 = Status	138
Assign diagnostic behavior (0482–1 to n)	1: 3096 2: 3097 3: 9913	Integer	Read / Write	**0 = Alarm** 1 = Warning 2 = Alarm or warning	138

Navigation: Expert → Output → Pulse/frequency/switch output 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Assign limit (0483–1 to n)	1: 3184 2: 3185 3: 4722	Integer	Read / Write	0 = Off **1 = Volume flow** 2 = Mass flow 3 = Corrected volume flow 4 = Conductivity * 7 = Temperature * 9 = Corrected conductivity * 16 = Totalizer 1 17 = Totalizer 2 18 = Totalizer 3 37 = Flow velocity 39 = Electronics temperature	139
Switch-on value (0466–1 to n)	1: 3242 to 3243 2: 3244 to 3245 3: 4728 to 4729	Float	Read / Write	Signed floating-point number	141
Switch-off value (0464–1 to n)	1: 3234 to 3235 2: 3236 to 3237 3: 4724 to 4725	Float	Read / Write	Signed floating-point number	141
Assign flow direction check (0484–1 to n)	1: 3363 2: 3364 3: 4732	Integer	Read / Write	0 = Off **1 = Volume flow** 2 = Mass flow 3 = Corrected volume flow	142
Assign status (0485–1 to n)	1: 3374 2: 3375 3: 4734	Integer	Read / Write	0 = Low flow cut off **1 = Empty pipe detection** 2 = Build-up index * 3 = HBSI limit exceeded *	142
Switch-on delay (0467–1 to n)	1: 6247 to 6248 2: 6249 to 6250 3: 6251 to 6252	Float	Read / Write	0.0 to 100.0 s	142
Switch-off delay (0465–1 to n)	1: 6239 to 6240 2: 6241 to 6242 3: 6243 to 6244	Float	Read / Write	0.0 to 100.0 s	143
Failure mode (0486–1 to n)	1: 3384 2: 3385 3: 9912	Integer	Read / Write	0 = Actual status **1 = Open** 6 = Closed	143
Switch state 1 to n (0461–1 to n)	1: 2485 2: 2486 3: 9917	Integer	Read	1 = Open 6 = Closed	143
Invert output signal (0470–1 to n)	1: 2583 2: 2584 3: 9916	Integer	Read / Write	0 = Yes **1 = No**	144

* Visibility depends on order options or device settings

"Relay output 1 to n" submenu

Navigation: Expert → Output → Relay output 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Terminal number (0812–1 to n)	1: 8278 2: 8279 3: 8280	Integer	Read	0 = Not used 2 = 24-25 (I/O 2) 3 = 22-23 (I/O 3)	145
Relay output function (0804–1 to n)	1: 2488 2: 2489 3: 9876	Integer	Read / Write	1 = Open 2 = Diagnostic behavior 3 = Flow direction check 4 = Limit 5 = Digital Output **6 = Closed**	145

Navigation: Expert → Output → Relay output 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Assign flow direction check (0808–1 to n)	1: 8251 2: 8252 3: 8253	Integer	Read / Write	0 = Off **1 = Volume flow** 2 = Mass flow 3 = Corrected volume flow	146
Assign limit (0807–1 to n)	1: 8248 2: 8249 3: 8250	Integer	Read / Write	0 = Off **1 = Volume flow** 2 = Mass flow 3 = Corrected volume flow 4 = Conductivity * 7 = Temperature * 9 = Corrected conductivity * 16 = Totalizer 1 17 = Totalizer 2 18 = Totalizer 3 37 = Flow velocity 39 = Electronics temperature	146
Assign diagnostic behavior (0806–1 to n)	1: 8245 2: 8246 3: 8247	Integer	Read / Write	**0 = Alarm** 1 = Warning 2 = Alarm or warning	147
Assign status (0805–1 to n)	1: 8272 2: 8273 3: 8274	Integer	Read / Write	0 = Low flow cut off **1 = Partially filled pipe detection** 3 = HBSI limit exceeded *	148
Switch-off value (0809–1 to n)	1: 8260 to 8261 2: 8262 to 8263 3: 8264 to 8265	Float	Read / Write	Signed floating-point number	148
Switch-off delay (0813–1 to n)	1: 8254 to 8255 2: 8256 to 8257 3: 8258 to 8259	Float	Read / Write	0.0 to 100.0 s	148
Switch-on value (0810–1 to n)	1: 8233 to 8234 2: 8235 to 8236 3: 8237 to 8238	Float	Read / Write	Signed floating-point number	149
Switch-on delay (0814–1 to n)	1: 8266 to 8267 2: 8268 to 8269 3: 8270 to 8271	Float	Read / Write	0.0 to 100.0 s	149
Failure mode (0811–1 to n)	1: 8242 2: 8243 3: 8244	Integer	Read / Write	0 = Actual status **1 = Open** 6 = Closed	149
Switch state (0801–1 to n)	1: 3518 2: 3519 3: 9875	Integer	Read	1 = Open 6 = Closed	150
Powerless relay status (0816–1 to n)	1: 7009 2: 7010 3: 7011	Integer	Read / Write	**1 = Open** 6 = Closed	150

* Visibility depends on order options or device settings

"Double pulse output" submenu

Navigation: Expert → Output → Double pulse output					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Master terminal number (0981)	5838	Integer	Read	0 = Not used 2 = 24-25 (I/O 2) 3 = 22-23 (I/O 3)	151
Slave terminal number (0990)	5845	Integer	Read	0 = Not used 2 = 24-25 (I/O 2) 3 = 22-23 (I/O 3)	152

Navigation: Expert → Output → Double pulse output					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→
Signal mode (0991)	5949	Integer	Read / Write	**0 = Passive** 2 = Active * 3 = Passive NE	152
Assign pulse output 1 (0982–1)	5993	Integer	Read / Write	**0 = Off** 1 = Volume flow 2 = Mass flow 3 = Corrected volume flow	152
Value per pulse (0983)	7495 to 7496	Float	Read / Write	Signed floating-point number	152
Pulse width (0986)	6998 to 6999	Float	Read / Write	0.5 to 2 000 ms	153
Phase shift (0992)	6089	Integer	Read / Write	**0 = 90°** 1 = 180°	153
Measuring mode (0984)	6001	Integer	Read / Write	**0 = Forward flow** 1 = Reverse flow 2 = Reverse flow compensation 13 = Forward/Reverse flow	153
Failure mode (0985)	6009	Integer	Read / Write	0 = Actual value **1 = No pulses**	154
Pulse output (0987)	7041 to 7042	Float	Read	Positive floating-point number	155
Invert output signal (0993)	6101	Integer	Read / Write	0 = Yes **1 = No**	155

* Visibility depends on order options or device settings

6.3.6 "Communication" submenu

"Modbus configuration" submenu

Navigation: Expert → Communication → Modbus configuration					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→
Bus address (7112)	4910	Integer	Read / Write	1 to 247	156
Baudrate (7111)	4912	Integer	Read / Write	0 = 1200 BAUD 1 = 2400 BAUD 2 = 4800 BAUD 3 = 9600 BAUD **4 = 19200 BAUD** 5 = 38400 BAUD 6 = 57600 BAUD 7 = 115200 BAUD	157
Data transfer mode (7115)	4913	Integer	Read / Write	**0 = RTU** 1 = ASCII	157
Parity (7122)	4914	Integer	Read / Write	**0 = Even** 1 = Odd 2 = None / 2 stop bits 3 = None / 1 stop bit	157
Byte order (7113)	4915	Integer	Read / Write	0 = 0-1-2-3 1 = 3-2-1-0 2 = 2-3-0-1 **3 = 1-0-3-2**	158
Telegram delay (7146)	4916 to 4917	Float	Read / Write	0 to 100 ms	159
Failure mode (7116)	4920	Integer	Read / Write	1 = Last valid value **255 = NaN value**	159

Navigation: Expert → Communication → Modbus configuration					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→
Bus termination (7155)	5774	Integer	Read	**0 = Off** 1 = On	160
Fieldbus writing access (7156)	6807	Integer	Read / Write	**0 = Read + write** 1 = Read only	160

"Modbus information" submenu

Navigation: Expert → Communication → Modbus information					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→
Device ID (7153)	2547	Integer	Read	4-digit hexadecimal number	161
Device revision (7154)	4481	Integer	Read	4-digit hexadecimal number	161

"Modbus data map" submenu

Navigation: Expert → Communication → Modbus data map					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→
Scan list register 0 to 15 (7114)	0: 5001 1: 5002 2: 5003 3: 5004 4: 5005 5: 5006 6: 5007 7: 5008 8: 5009 9: 5010 10: 5011 11: 5012 12: 5013 13: 5014 14: 5015 15: 5016	Integer	Read / Write	1 to 65 535	162

"Web server" submenu

Navigation: Expert → Communication → Web server					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→
Web server language (7221)	4219	Integer	Read / Write	**0 = English** 1 = Deutsch 2 = Français 3 = Español 4 = Italiano 5 = Nederlands 8 = Svenska 11 = 日本語 (Japanese) 12 = Portuguesa 13 = Polski 14 = русский язык (Russian) 15 = čeština (Czech) 16 = 中文 (Chinese) 18 = Türkçe 19 = tiếng Việt (Vietnamese) 20 = 한국어 (Korean)	163
MAC address (7214)	4210 to 4218	String	Read	Unique 12-digit character string comprising letters and numbers	163

Navigation: Expert → Communication → Web server					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→
DHCP client (7212)	21781	Integer	Read / Write	0 = Off **1 = On**	163
IP address (7209)	4155 to 4162	String	Read / Write	4 octet: 0 to 255 (in the particular octet)	164
Subnet mask (7211)	4163 to 4170	String	Read / Write	4 octet: 0 to 255 (in the particular octet)	164
Default gateway (7210)	4171 to 4178	String	Read / Write	4 octet: 0 to 255 (in the particular octet)	164
Web server functionality (7222)	4220	Integer	Read / Write	0 = Off **1 = On** 2 = HTML Off	165
Login page (7273)	5802	Integer	Read / Write	0 = Without header **1 = With header**	165

"WLAN settings" wizard

Navigation: Expert → Communication → WLAN settings					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→
WLAN (2702)	6178	Integer	Read / Write	0 = Disable **1 = Enable**	166
WLAN mode (2717)	28777	Integer	Read / Write	**0 = WLAN access point** 1 = WLAN Client	167
SSID name (2714)	28940 to 28955	String	Read / Write	–	167
Network security (2705)	6206	Integer	Read / Write	0 = Unsecured **1 = WPA2-PSK** 2 = EAP-PEAP with MSCHAPv2 * 3 = EAP-TLS * 4 = EAP-PEAP MSCHAPv2 no server authentic. *	167
Security identification (2718)	28817	Integer	Read	1 = Trusted issuer certificate 2 = Device certificate 4 = Device private key	168
User name (2715)	28956 to 28971	String	Read / Write	–	168
WLAN password (2716)	28972 to 28987	String	Read / Write	–	168
WLAN IP address (2711)	8643 to 8650	String	Read / Write	4 octet: 0 to 255 (in the particular octet)	169
WLAN MAC address (2703)	8602 to 8610	String	Read	Unique 12-digit character string comprising letters and numbers	169
WLAN subnet mask (2709)	8651 to 8658	String	Read / Write	4 octet: 0 to 255 (in the particular octet)	169
WLAN MAC address (2703)	8602 to 8610	String	Read	Unique 12-digit character string comprising letters and numbers	169
WLAN passphrase (2706)	8611 to 8626	String	Read / Write	8 to 32-digit character string comprising numbers, letters and special characters (without spaces)	169
WLAN MAC address (2703)	8602 to 8610	String	Read	Unique 12-digit character string comprising letters and numbers	169
Assign SSID name (2708)	6218	Integer	Read / Write	0 = Device tag **1 = User-defined**	170
SSID name (2707)	8627 to 8642	String	Read / Write	Max. 32-digit character string comprising numbers, letters and special characters	170
2.4 GHz WLAN channel (2704)	6182	Integer	Read / Write	1 to 11	170
Select antenna (2713)	6102	Integer	Read / Write	0 = External antenna **1 = Internal antenna**	171

Navigation: Expert → Communication → WLAN settings					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→ 🖹
Connection state (2722)	29221	Integer	Read	**0 = Not connected** 1 = Connected	171
Received signal strength (2721)	28818	Integer	Read	2 = Medium 9 = Low **10 = High**	171
WLAN IP address (2711)	8643 to 8650	String	Read / Write	4 octet: 0 to 255 (in the particular octet)	169
Gateway IP address (2719)	29227 to 29234	String	Read	Character string comprising numbers, letters and special characters	172
IP address domain name server (2720)	29283 to 29290	String	Read	Character string comprising numbers, letters and special characters	172

* Visibility depends on order options or device settings

6.3.7 "Application" submenu

Navigation: Expert → Application					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→ 🖹
Reset all totalizers (2806)	2609	Integer	Read / Write	**0 = Cancel** 1 = Reset + totalize	172

"Totalizer 1 to n" submenu

Navigation: Expert → Application → Totalizer 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Assign process variable (0914–1 to n)	1: 2601 2: 2801 3: 3001	Integer	Read / Write	0 = Off **1 = Volume flow** 2 = Mass flow 3 = Corrected volume flow	173
Unit totalizer 1 to n (0915–1 to n)	1: 4604 2: 4605 3: 4606	Integer	Read / Write	0 = cm^3 * 1 = dm^3 * 2 = m^3 * 3 = ml * 4 = l * 5 = hl * 6 = Ml Mega * 8 = af * 9 = ft^3 * 10 = fl oz (us) * 11 = gal (us) * 12 = Mgal (us) * 13 = bbl (us;liq.) * 14 = bbl (us;beer) * 15 = bbl (us;oil) * 16 = bbl (us;tank) * 17 = gal (imp) * 18 = Mgal (imp) * 19 = bbl (imp;beer) * 20 = bbl (imp;oil) * 22 = kgal (us) * 23 = Mft^3 * 50 = g * 51 = kg * 52 = t * 53 = oz * 54 = lb * 55 = STon * 100 = Nl * 101 = Nm^3 * 102 = Sm^3 * 103 = Sft^3 * 104 = Sl * 105 = Sgal (us) * 106 = Sbbl (us;liq.) * 107 = Sgal (imp) * 108 = Sbbl (us;oil) * 109 = $MMSft^3$ * 110 = Nhl * 111 = Mft^3 * 112 = $MSft^3$ * 251 = None *	174
Totalizer operation mode (0908–1 to n)	1: 2605 2: 2805 3: 3005	Integer	Read / Write	**0 = Net** 1 = Forward 2 = Reverse	175
Control Totalizer 1 to n (0912–1 to n)	1: 2608 2: 2808 3: 3008	Integer	Read / Write	**0 = Totalize** 1 = Reset + totalize 2 = Preset + hold * 3 = Reset + hold * 4 = Preset + totalize * 5 = Hold *	176

Navigation: Expert → Application → Totalizer 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Preset value 1 to n (0913–1 to n)	1: 2590 to 2591 2: 2592 to 2593 3: 2594 to 2595	Float	Read / Write	Signed floating-point number	176
Failure mode (0901–1 to n)	1: 2606 2: 2806 3: 3006	Integer	Read / Write	**0 = Hold** 1 = Continue 2 = Last valid value + continue	177

* Visibility depends on order options or device settings

6.3.8 "Diagnostics" submenu

Navigation: Expert → Diagnostics					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Actual diagnostics (0691)	2732	Integer	Read	Symbol for diagnostic behavior, diagnostic code and short message.	178
Previous diagnostics (0690)	2734	Integer	Read	Symbol for diagnostic behavior, diagnostic code and short message.	179
Operating time from restart (0653)	2624	String	Read	Days (d), hours (h), minutes (m) and seconds (s)	180
Operating time (0652)	--	String	Read		

"Diagnostic list" submenu

Navigation: Expert → Diagnostics → Diagnostic list					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Diagnostics 1 (0692)	2736	Integer	Read	Symbol for diagnostic behavior, diagnostic code and short message.	181
Diagnostics 2 (0693)	2738	Integer	Read	Symbol for diagnostic behavior, diagnostic code and short message.	182
Diagnostics 3 (0694)	2740	Integer	Read	Symbol for diagnostic behavior, diagnostic code and short message.	183
Diagnostics 4 (0695)	2742	Integer	Read	Symbol for diagnostic behavior, diagnostic code and short message.	183
Diagnostics 5 (0696)	2744	Integer	Read	Symbol for diagnostic behavior, diagnostic code and short message.	184

"Event logbook" submenu

Navigation: Expert → Diagnostics → Event logbook					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Filter options (0705)	4596	Integer	Read / Write	0 = Failure (F) 4 = Maintenance required (M) 8 = Function check (C) 12 = Out of specification (S) 16 = Information (I) **255 = All**	185

"Event list" submenu

"Custody transfer logbook" submenu

"Device information" submenu

Navigation: Expert → Diagnostics → Device information					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Device tag (0011)	2026 to 2041	String	Read	Max. 32 characters, such as letters, numbers or special characters (e.g. @, %, /).	188
Serial number (0009)	7003 to 7008	String	Read	Max. 11-digit character string comprising letters and numbers.	188
Firmware version (0010)	7277 to 7280	String	Read	Character string in the format xx.yy.zz	189
Device name (0020)	7238 to 7245	String	Read	Promag 300/500	189
Order code (0008)	2058 to 2067	String	Read	Character string composed of letters, numbers and certain punctuation marks (e.g. /).	189
Extended order code 1 (0023)	2212 to 2221	String	Read	Character string	190
Extended order code 2 (0021)	2222 to 2231	String	Read	Character string	190
Extended order code 3 (0022)	2232 to 2241	String	Read	Character string	190
ENP version (0012)	4003 to 4010	String	Read	Character string	190

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

Navigation: Expert → Diagnostics → Main electronic module + I/O module 1					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Firmware version (0072)	7039	Integer	Read	Positive integer	191
Build no. software (0079)	2326	Integer	Read	Positive integer	191
Bootloader revision (0073)	2264	Integer	Read	Positive integer	191

"Sensor electronic module (ISEM)" submenu

Navigation: Expert → Diagnostics → Sensor electronic module (ISEM)					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Firmware version (0072)	7039	Integer	Read	Positive integer	192
Build no. software (0079)	2326	Integer	Read	Positive integer	192
Bootloader revision (0073)	2264	Integer	Read	Positive integer	192

"I/O module 2" submenu

Navigation: Expert → Diagnostics → I/O module 2					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
I/O module 2 terminal numbers (3902–2)	6542	Integer	Read	0 = Not used 1 = 26-27 (I/O 1) 2 = 24-25 (I/O 2) 3 = 22-23 (I/O 3)	193
Firmware version (0072)	7039	Integer	Read	Positive integer	193

Navigation: Expert → Diagnostics → I/O module 2					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Build no. software (0079)	2326	Integer	Read	Positive integer	193
Bootloader revision (0073)	2264	Integer	Read	Positive integer	194

"I/O module 3" submenu

Navigation: Expert → Diagnostics → I/O module 3					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
I/O module 3 terminal numbers (3902–3)	6543	Integer	Read	0 = Not used 1 = 26-27 (I/O 1) 2 = 24-25 (I/O 2) 3 = 22-23 (I/O 3)	194
Firmware version (0072)	7039	Integer	Read	Positive integer	194
Build no. software (0079)	2326	Integer	Read	Positive integer	195
Bootloader revision (0073)	2264	Integer	Read	Positive integer	195

"Display module" submenu

Navigation: Expert → Diagnostics → Display module					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Firmware version (0072)	7039	Integer	Read	Positive integer	195
Build no. software (0079)	2326	Integer	Read	Positive integer	196
Bootloader revision (0073)	2264	Integer	Read	Positive integer	196

"Min/max values" submenu

"Electronics temperature" submenu

Navigation: Expert → Diagnostics → Min/max values → Electronics temperature					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Minimum value (6547)	2292 to 2293	Float	Read	Signed floating-point number	205
Maximum value (6545)	2294 to 2295	Float	Read	Signed floating-point number	206

"Main electronics temperature" submenu

Navigation: Expert → Diagnostics → Min/max values → Main electronics temperature					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Minimum electronics temperature (0688)	4651 to 4652	Float	Read	Signed floating-point number	206
Maximum electronics temperature (0665)	4649 to 4650	Float	Read	Signed floating-point number	207

"Sensor electronics temperature (ISEM)" submenu

Navigation: Expert → Diagnostics → Min/max values → Sensor electronics temperature (ISEM)					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Minimum value (6547)	2292 to 2293	Float	Read	Signed floating-point number	207
Maximum value (6545)	2294 to 2295	Float	Read	Signed floating-point number	208

"Heartbeat Technology" submenu

"Heartbeat base settings" submenu

Navigation: Expert → Diagnostics → Heartbeat Technology → Heartbeat base settings					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Plant operator (2754)	3414 to 3429	String	Read / Write	Max. 32 characters such as letters, numbers or special characters (e.g. @, %, /)	209
Location (2755)	3430 to 3445	String	Read / Write	Max. 32 characters such as letters, numbers or special characters (e.g. @, %, /)	209
Partially filled pipe (6465)	37517	Integer	Read / Write	0 = Yes **1 = No**	209

"Performing verification" submenu

Navigation: Expert → Diagnostics → Heartbeat Technology → Performing verification					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Year (2846)	2495	Integer	Read / Write	9 to 99	210
Month (2845)	2494	Integer	Read / Write	**0 = January** 1 = February 2 = March 3 = April 4 = May 5 = June 6 = July 7 = August 8 = September 9 = October 10 = November 11 = December	210
Day (2842)	2493	Integer	Read / Write	1 to 31 d	211
Hour (2843)	2492	Integer	Read / Write	0 to 23 h	211
AM/PM (2813)	2496	Integer	Read / Write	**0 = AM** 1 = PM	211
Minute (2844)	2467	Integer	Read / Write	0 to 59 min	212
Verification mode (12105)	2366	Integer	Read / Write	**0 = Standard verification** 1 = Extended verification	212
External device information (12101)	20493 to 20508	String	Read / Write	Free text entry	213

Navigation: Expert → Diagnostics → Heartbeat Technology → Performing verification					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Start verification (12127)	2270	Integer	Read / Write	**0 = Cancel** 1 = Start 10 = Output 1 low value * 11 = Output 1 high value * 12 = Output 2 low value * 13 = Output 2 high value * 14 = Output 3 low value * 15 = Output 3 high value * 20 = Pulse output 1 * 21 = Frequency output 1 * 22 = Pulse output 2 * 23 = Frequency output 2 * 24 = Double pulse output *	213
Remaining lockout period (12117)	25118 to 25119	Float	Read	0 to 99 h	214
Lockout period (12114)	25116 to 25117	Float	Read / Write	0 to 99 h	214
Progress (2808)	6797	Integer	Read	0 to 100 %	214
Measured values (12102)	5512 to 5513	Float	Read / Write	Signed floating-point number	214
Output values (12103)	5516 to 5517	Float	Read	Signed floating-point number	215
Status (12153)	2079	Integer	Read	0 = Failed 1 = Done 3 = Not done 8 = Busy	215
Verification result (12149)	2355	Integer	Read	0 = Failed 2 = Passed 3 = Not done 250 = Not supported	215

* Visibility depends on order options or device settings

"Verification results" submenu

Navigation: Expert → Diagnostics → Heartbeat Technology → Verification results					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Date/time (manually entered) (12142)	2372 to 2381	String	Read	dd.mmmm.yyyy; hh:mm	216
Verification ID (12141)	2315	Integer	Read	0 to 65 535	217
Operating time (12126)	3346	String	Read	Days (d), hours (h), minutes (m), seconds (s)	217
Verification result (12149)	2355	Integer	Read	0 = Failed 2 = Passed 3 = Not done 250 = Not supported	217
Sensor (12152)	2384	Integer	Read	0 = Failed 2 = Passed **3 = Not done** 250 = Not supported	218
Sensor electronic module (ISEM) (12151)	2385	Integer	Read	0 = Failed 2 = Passed **3 = Not done** 250 = Not supported	218

Navigation: Expert → Diagnostics → Heartbeat Technology → Verification results					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
I/O module (12145)	2386	Integer	Read	0 = Failed 2 = Passed **3 = Not done** 250 = Not supported 254 = Not plugged	218
System status (12109)	5790	Integer	Read	0 = Failed 2 = Passed **3 = Not done** 250 = Not supported	219

"Monitoring results" submenu

Navigation: Expert → Diagnostics → Heartbeat Technology → Monitoring results					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Noise (12158)	2463 to 2464	Float	Read	0 to 3.0 · 10^{+38} µV	220
Coil current shot time (12150)	2465 to 2466	Float	Read	2 to 500 ms	220
Reference electrode potential against PE (12155)	3990 to 3991	Float	Read	−30 to +30 V	220
Build-up index (12111)	32597 to 32598	Float	Read	0.0 to 100.0 %	220
HBSI (12116)	48268 to 48269	Float	Read	−100.0 to 100.0 %	221

"Simulation" submenu

Navigation: Expert → Diagnostics → Simulation					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Assign simulation process variable (1810)	6813	Integer	Read / Write	**0 = Off** 1 = Volume flow 2 = Mass flow 3 = Corrected volume flow 3 = Conductivity * 4 = Corrected conductivity * 5 = Temperature * 37 = Flow velocity	223
Process variable value (1811)	6814 to 6815	Float	Read / Write	Depends on the process variable selected	223
Current input 1 to n simulation (1608–1 to n)	1: 6127 2: 6128 3: 6129	Integer	Read / Write	**0 = Off** 1 = On	230
Value current input 1 to n (1609–1 to n)	1: 6139 to 6140 2: 6141 to 6142 3: 6143 to 6144	Float	Read / Write	0 to 22.5 mA	231
Status input simulation 1 to n (1355–1 to n)	1: 2620 2: 4693 3: 4694	Integer	Read / Write	**0 = Off** 1 = On	231
Input signal level 1 to n (1356–1 to n)	1: 2638 2: 4696 3: 4697	Integer	Read / Write	9 = Low 10 = High	232
Current output 1 to n simulation (0354–1 to n)	1: 5939 2: 5940 3: 5941	Integer	Read / Write	**0 = Off** 1 = On	224
Current output value (0355)	5995 to 5996	Float	Read / Write	3.59 to 22.5 mA	224
Frequency output 1 to n simulation (0472–1 to n)	1: 6203 2: 6204 3: 6205	Integer	Read / Write	**0 = Off** 1 = On	224

Navigation: Expert → Diagnostics → Simulation					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Frequency output 1 to n value (0473–1 to n)	1: 6207 to 6208 2: 6209 to 6210 3: 6211 to 6212	Float	Read / Write	0.0 to 12 500.0 Hz	225
Pulse output simulation 1 to n (0458–1 to n)	1: 6215 2: 6216 3: 6217	Integer	Read / Write	**0 = Off** 1 = Down-counting value 2 = Fixed value	225
Pulse value 1 to n (0459–1 to n)	1: 6219 2: 6220 3: 6221	Integer	Read / Write	0 to 65 535	226
Switch output simulation 1 to n (0462–1 to n)	1: 6223 2: 6224 3: 6225	Integer	Read / Write	**0 = Off** 1 = On	226
Switch state 1 to n (0463–1 to n)	1: 6227 2: 6228 3: 6229	Integer	Read / Write	1 = Open 6 = Closed	227
Relay output 1 to n simulation (0802–1 to n)	1: 7523 2: 7524 3: 7525	Integer	Read / Write	**0 = Off** 1 = On	227
Switch state 1 to n (0803–1 to n)	1: 8239 2: 8240 3: 8241	Integer	Read / Write	1 = Open 6 = Closed	228
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Diagnostic event category (0738)	4261	Integer	Read / Write	0 = Sensor 1 = Electronics 2 = Configuration **3 = Process**	230
Diagnostic event simulation (0737)	4259	Integer	Read / Write	▪ Off ▪ Diagnostic event picklist (depends on the category selected)	230

* Visibility depends on order options or device settings

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