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71633435
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Valid as of version
01.02.zz (Device firmware)

Description of Device Parameters
Proline Prosonic Flow P 500

Ultrasonic time-of-flight flowmeter
Modbus RS485

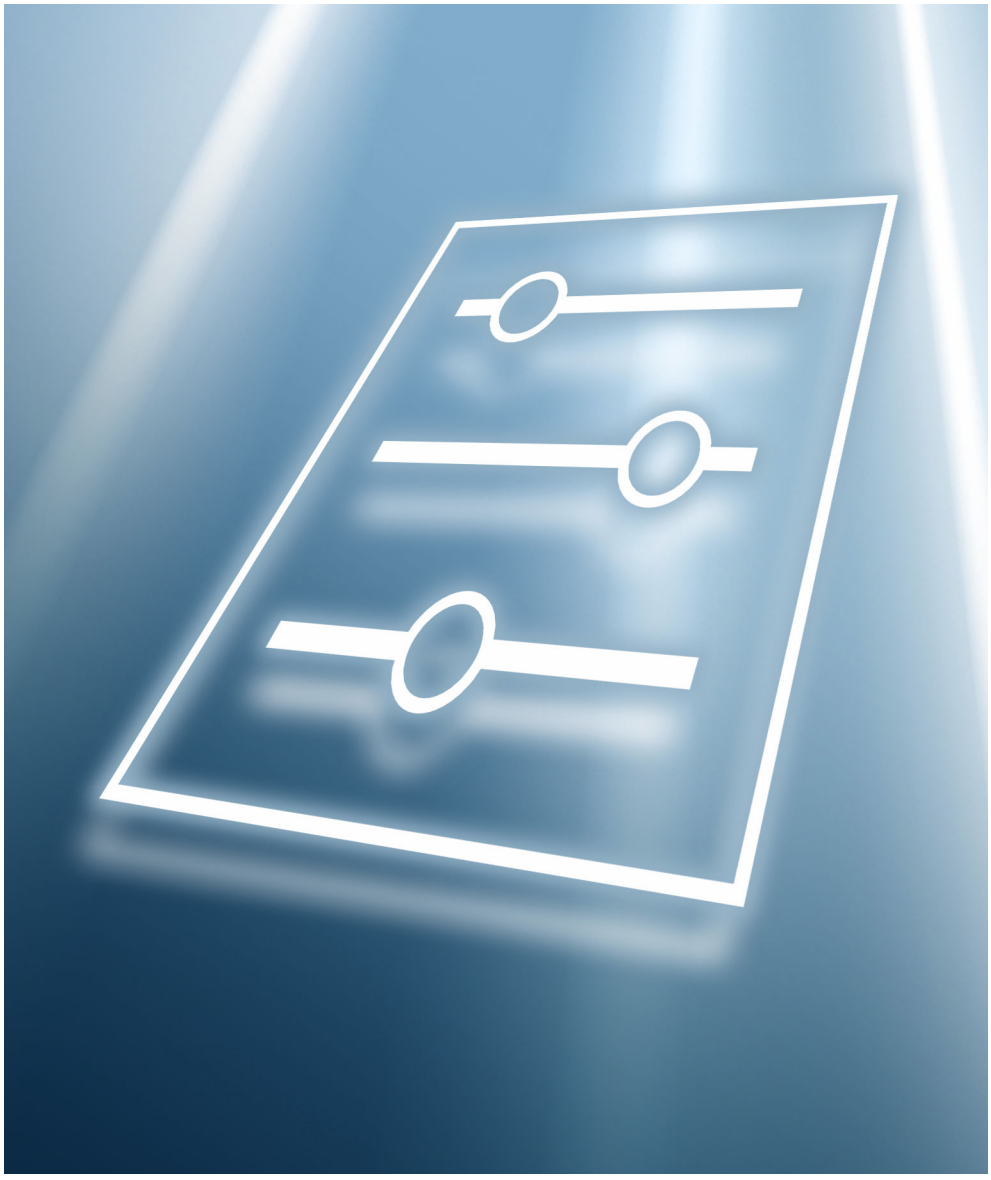

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Table of contents

1 About this document

1.1 Document function

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

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

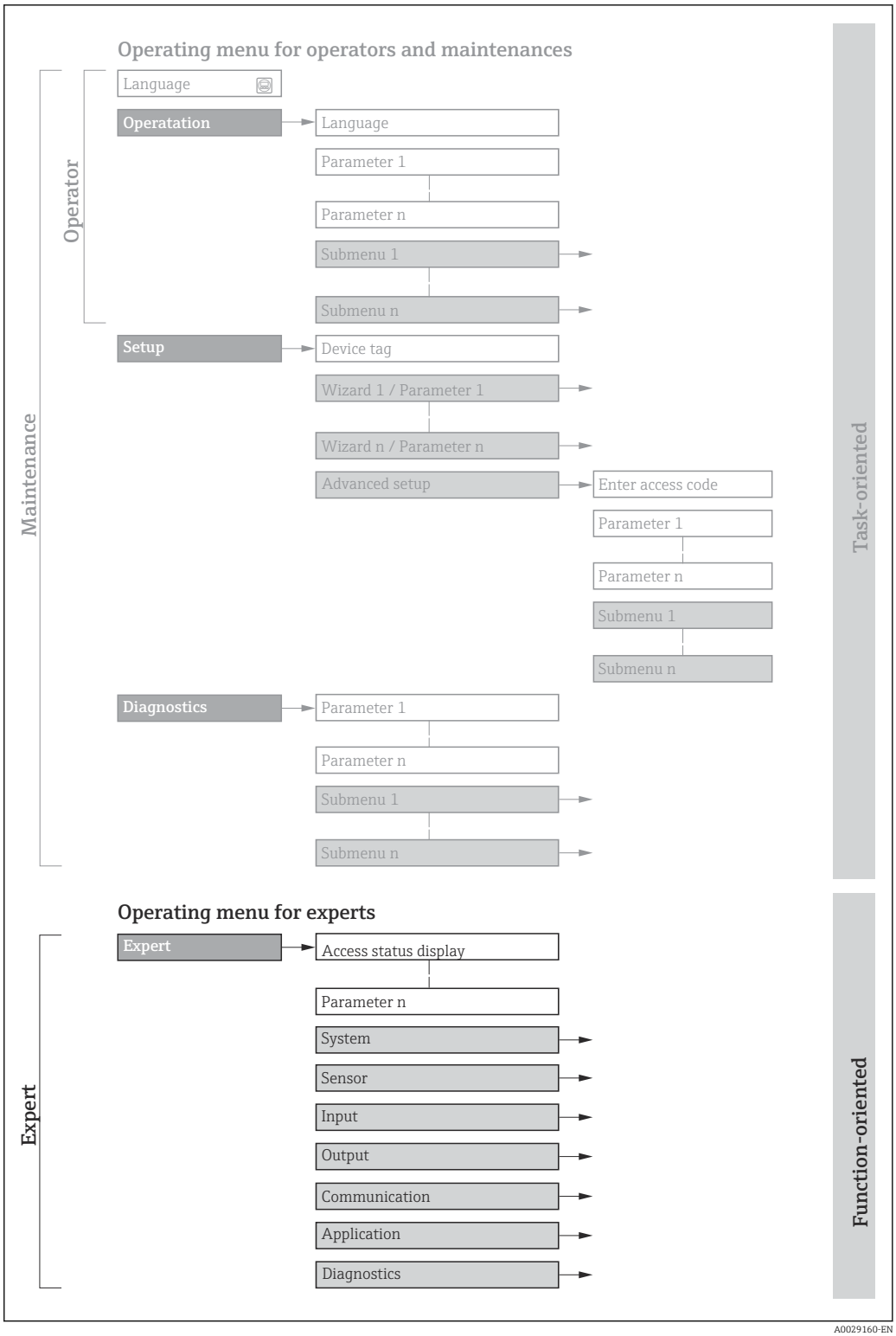
1.2 Target group

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

1.3 Using this document

1.3.1 Information on the document structure

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



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

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

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

User entry
Parameter entry range

Display
Display value/data of the parameter

Factory setting
Default setting ex works

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

1.4 Symbols used

1.4.1 Symbols for certain types of information

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

1.4.2 Symbols in graphics

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

1.5 Documentation

1.5.1 Standard documentation

Operating Instructions

Measuring device	Documentation code
Prosonic Flow P 500	BA02026D

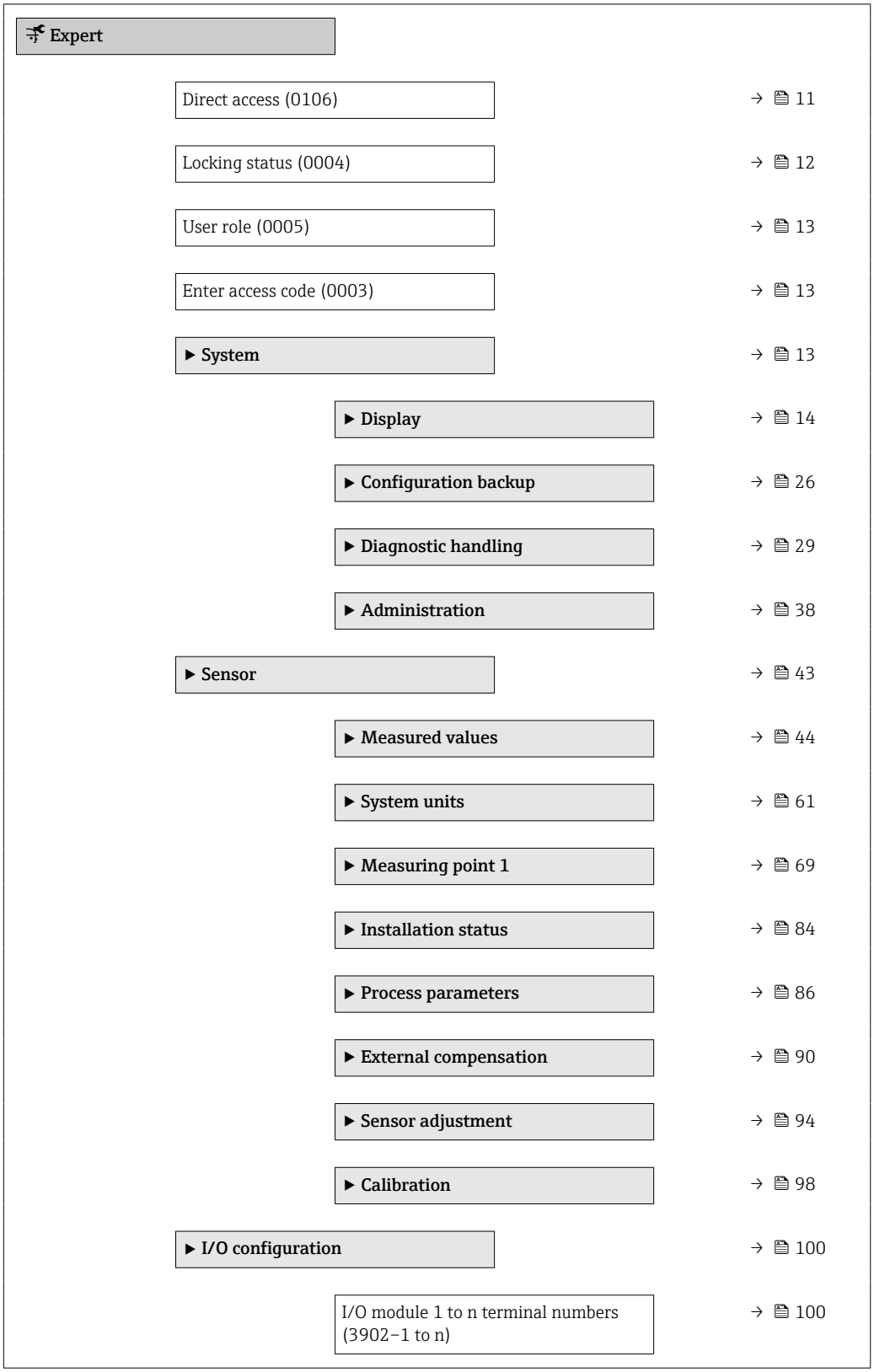
1.5.2 Supplementary device-dependent documentation

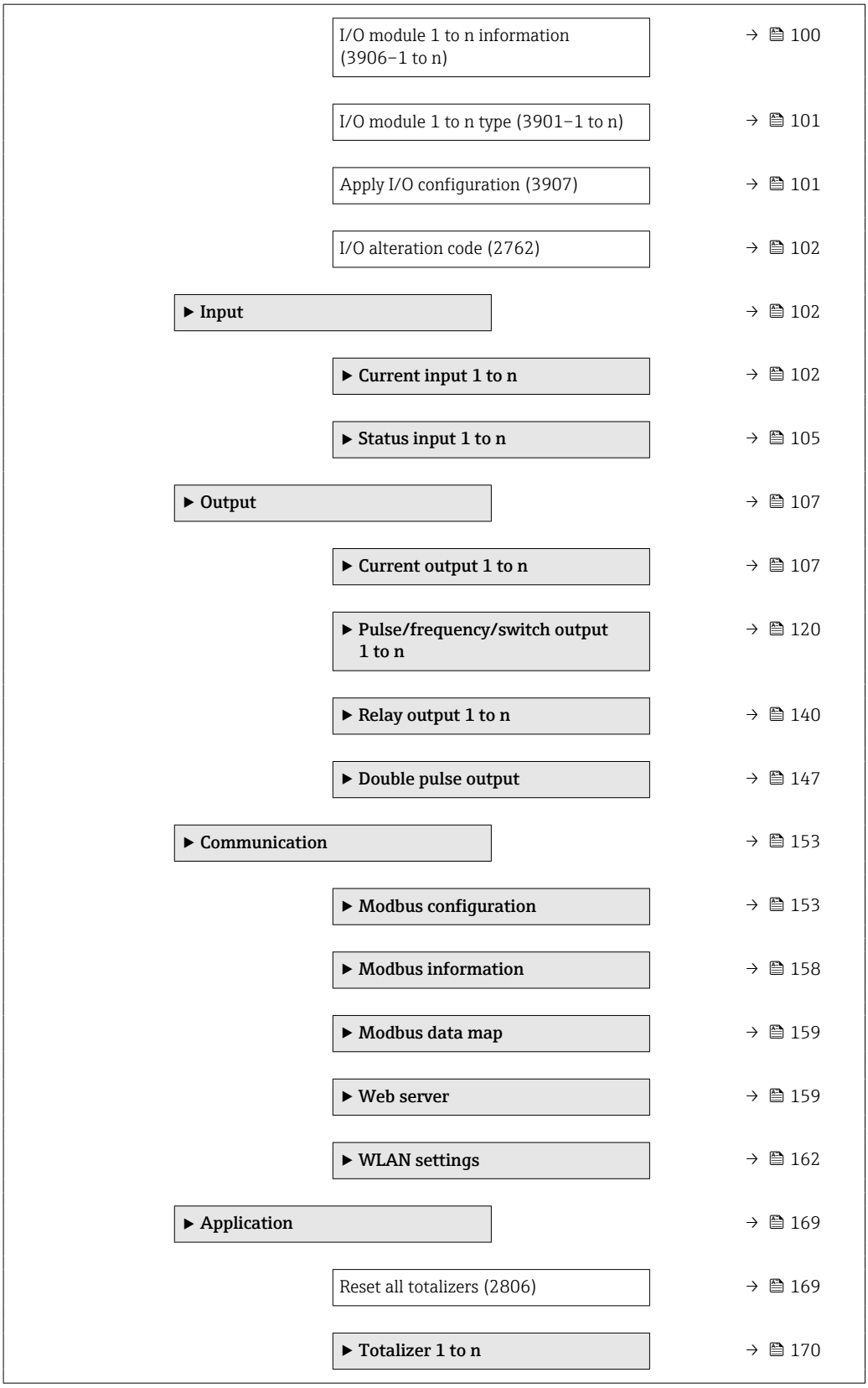
Special Documentation

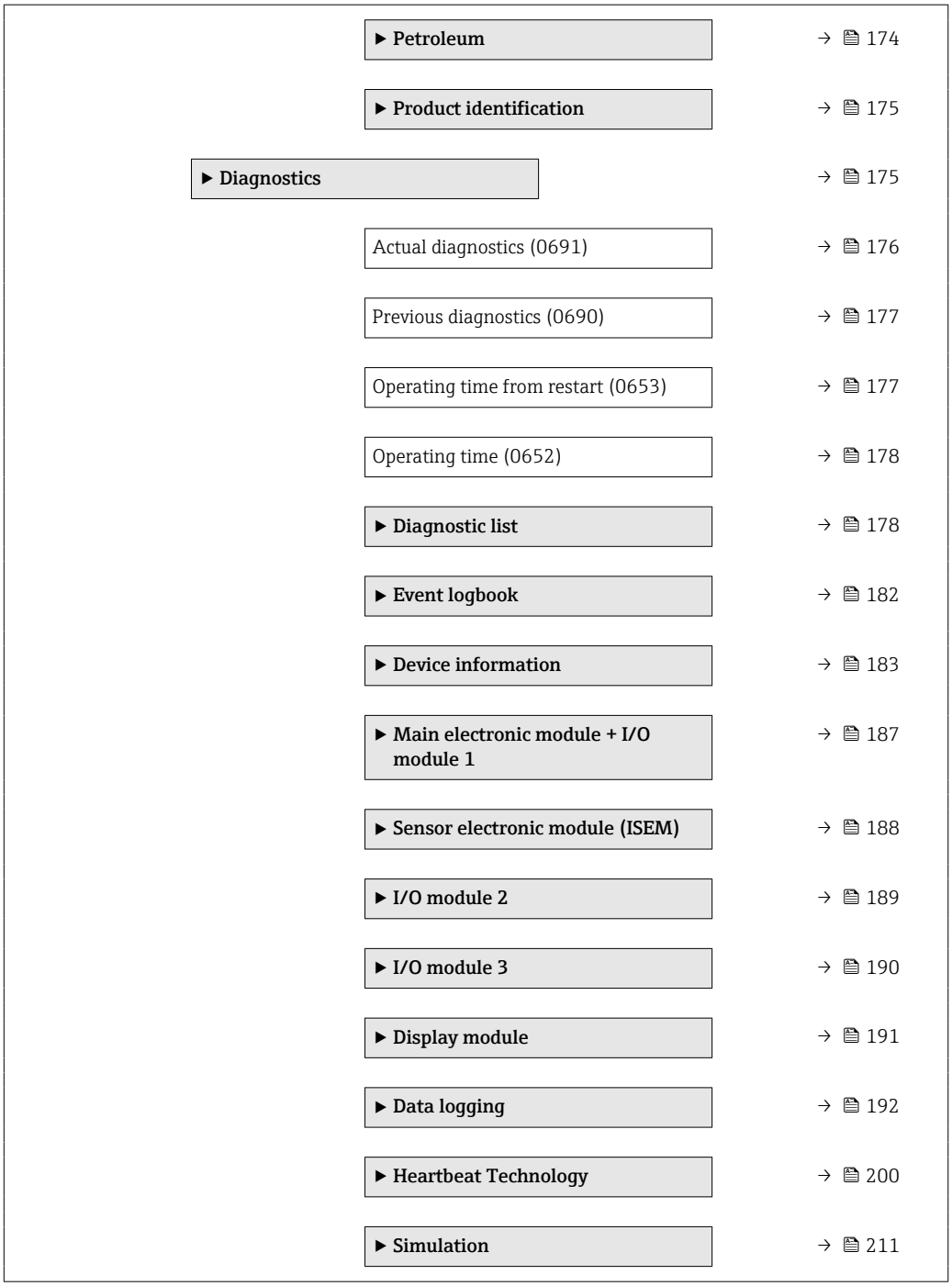
Contents	Documentation code
Radio approvals for WLAN interface for A309/A310 display module	SD01793D
FlowDC	SD02674D
Heartbeat Technology	SD02594D
High-temperature sensors	SD03088D
Petroleum & product identification	SD03108D
Web server	SD02604D

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.

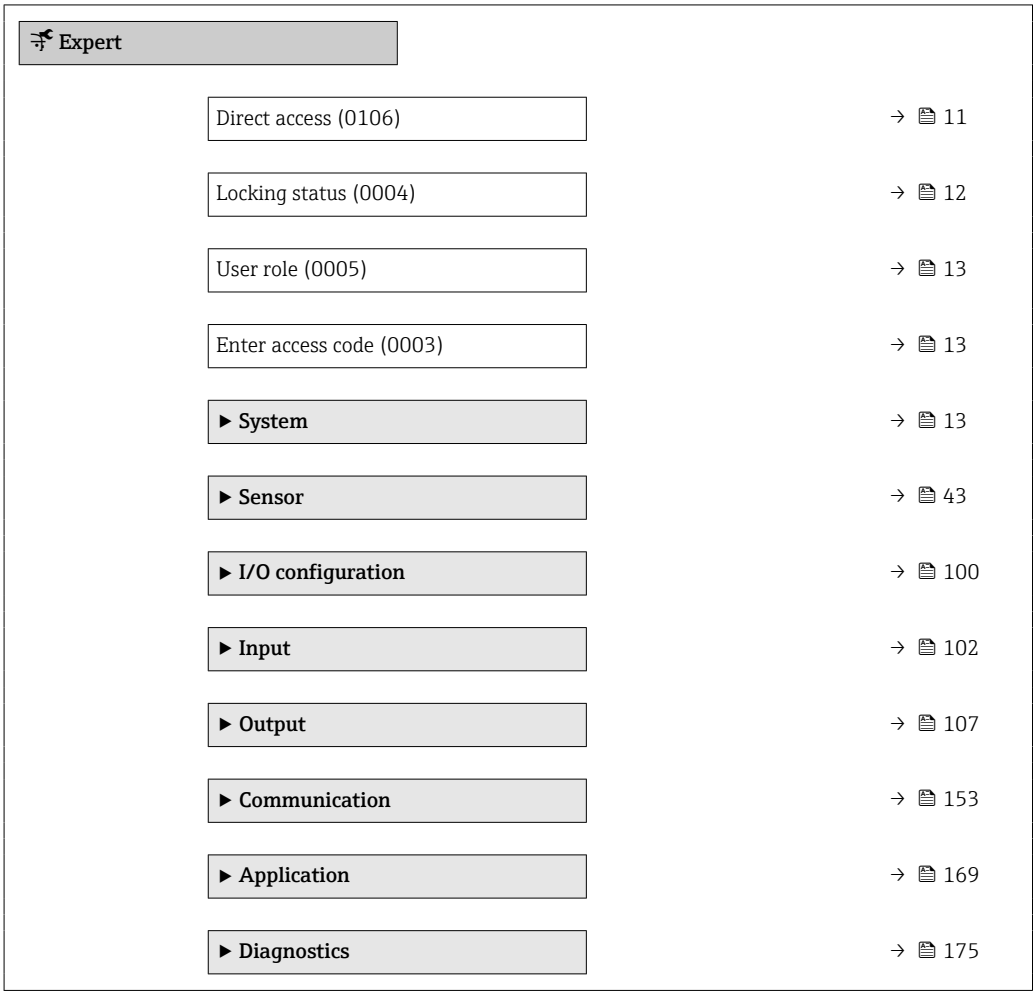



I/O module 1 to n information (3906–1 to n)
→ 100
I/O module 1 to n type (3901–1 to n)
→ 101
Apply I/O configuration (3907)
→ 101
I/O alteration code (2762)
→ 102
▶ Input
→ 102
▶ Current input 1 to n
→ 102
▶ Status input 1 to n
→ 105
▶ Output
→ 107
▶ Current output 1 to n
→ 107
▶ Pulse/frequency/switch output 1 to n
→ 120
▶ Relay output 1 to n
→ 140
▶ Double pulse output
→ 147
▶ Communication
→ 153
▶ Modbus configuration
→ 153
▶ Modbus information
→ 158
▶ Modbus data map
→ 159
▶ Web server
→ 159
▶ WLAN settings
→ 162
▶ Application
→ 169
Reset all totalizers (2806)
→ 169
▶ Totalizer 1 to n
→ 170


▶ Petroleum → 174
▶ Product identification → 175
▶ Diagnostics → 175
Actual diagnostics (0691) → 176
Previous diagnostics (0690) → 177
Operating time from restart (0653) → 177
Operating time (0652) → 178
▶ Diagnostic list → 178
▶ Event logbook → 182
▶ Device information → 183
▶ Main electronic module + I/O module 1 → 187
▶ Sensor electronic module (ISEM) → 188
▶ I/O module 2 → 189
▶ I/O module 3 → 190
▶ Display module → 191
▶ Data logging → 192
▶ Heartbeat Technology → 200
▶ Simulation → 211

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

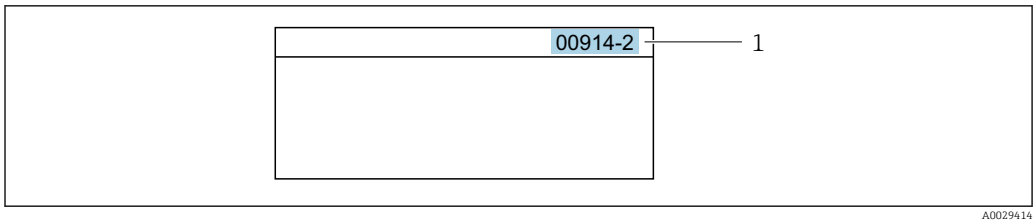
Navigation Expert → Direct access (0106)

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 (0914)
- If a different channel is opened: Enter the direct access code with the corresponding channel number.
  Example: Enter **00914-2** → **Assign process variable** parameter (0914)

Locking status

Navigation Expert → Locking status (0004)

Description Displays the active write protection.

User interface
- Hardware locked
- Temporarily locked

Additional information

Display

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

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

Options

Options	Description
None	The access authorization displayed in the **Access status** parameter (0005) (→ 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) .
Temporarily locked	Write access to the parameters is temporarily locked on account of internal processes running in the device (e.g. data upload/download, reset, etc.). Once the internal processing has been completed, the parameters can be changed once again.

User role

Navigation Expert → User role (0005)

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

User interface
- Maintenance
- Service

Factory setting Maintenance

Additional information *Description*

Access authorization can be modified via the **Enter access code** parameter (0003) (→ 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

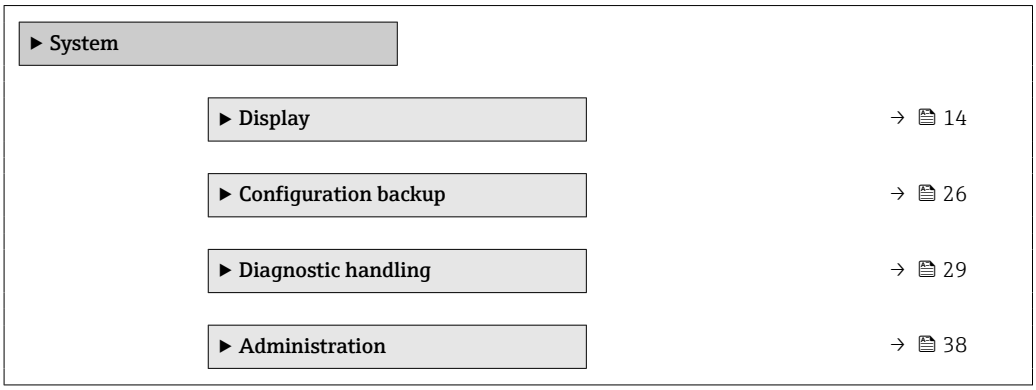
Navigation Expert → Ent. access code (0003)

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

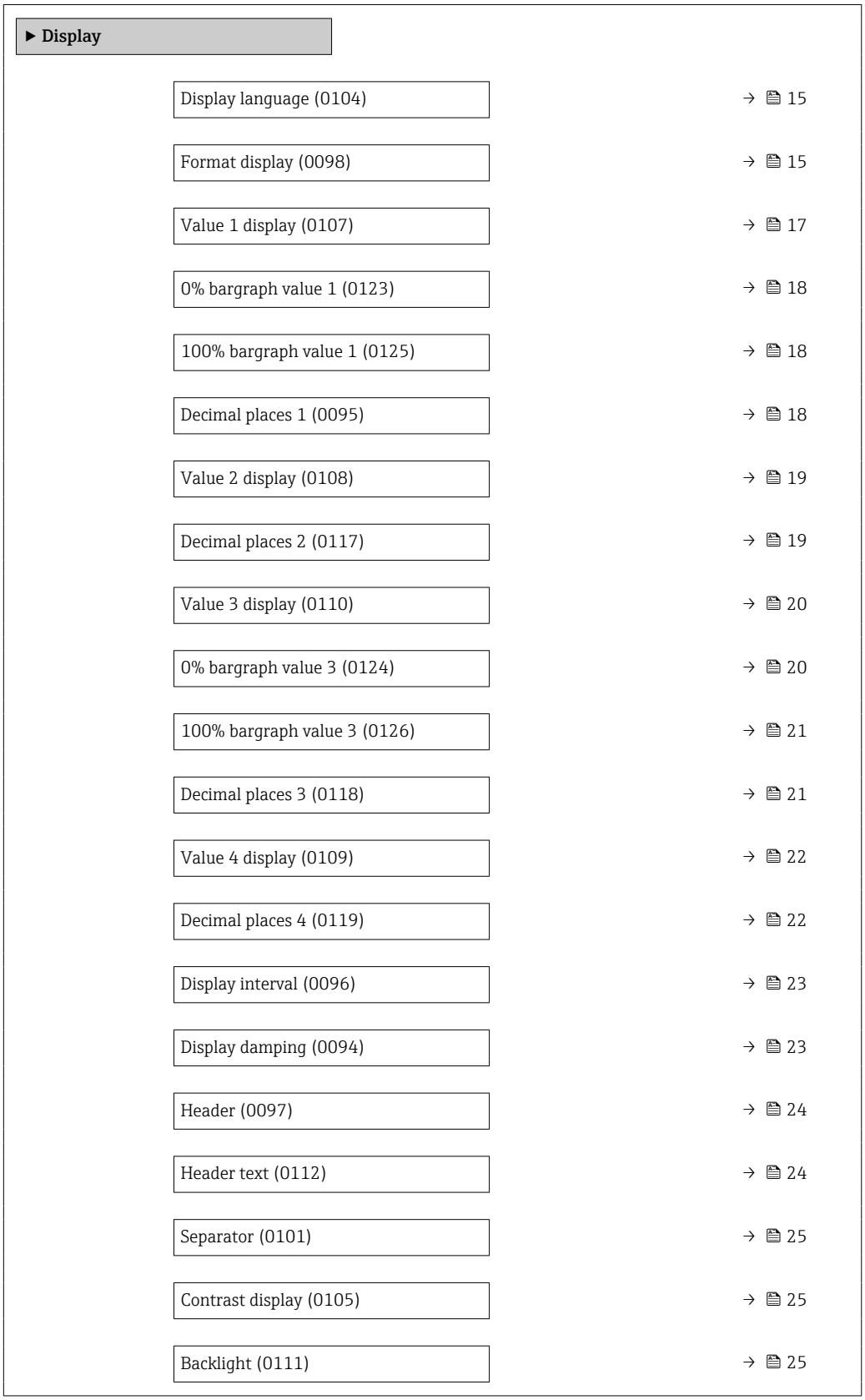
3.1 "System" submenu

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

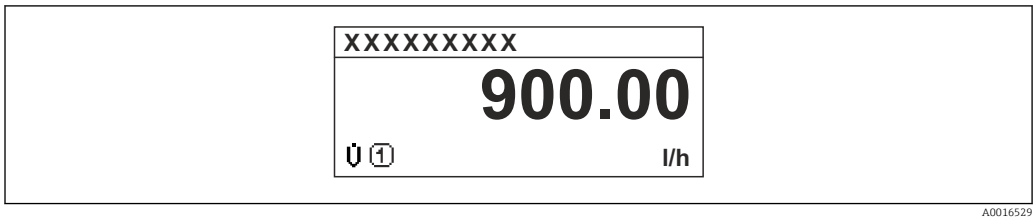
Additional information *Description*

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 (0107) (→ 17)...**Value 8 display** parameter (0148) 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 (0096) (→ 23).

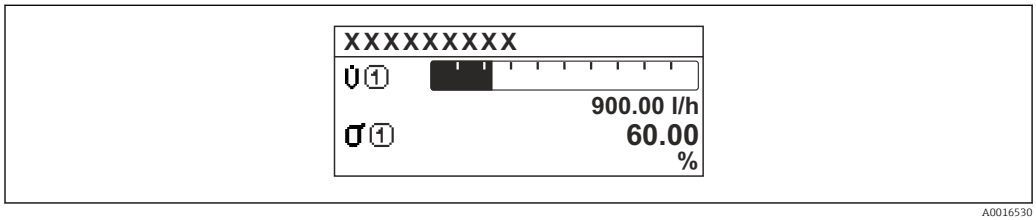
Possible measured values shown on the local display:

"1 value, max. size" option



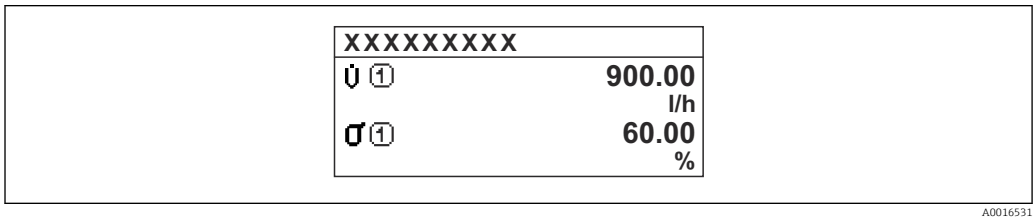
A0016529

"1 bargraph + 1 value" option



A0016530

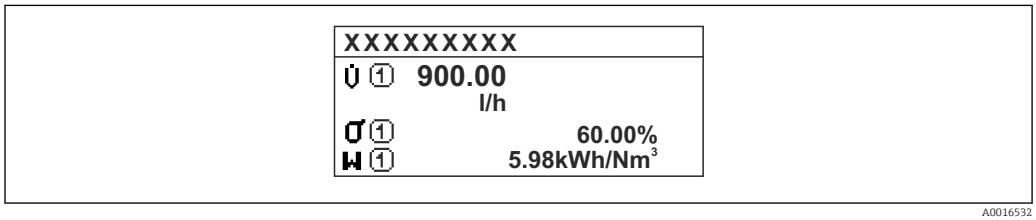
"2 values" option



A0016531

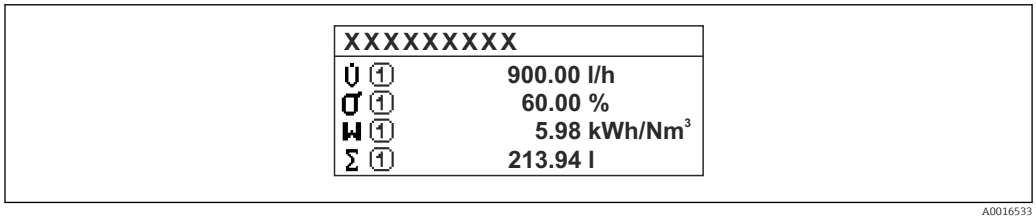
2

"1 value large + 2 values" option



A0016532

"4 values" option



A0016533

Value 1 display

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

Prerequisite A local display is provided.

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

Selection
- Mass flow
- Flow velocity
- Sound velocity
- Volume flow
- Density *
- Reference density *
- S&W volume flow *
- GSV flow *
- NSV flow *
- API gravity *
- API slope *
- Signal strength *
- Signal to noise ratio *
- Acceptance rate *
- Turbulence *
- Electronics temperature
- Temperature *
- Pressure *
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Current output 1
- Current output 2 *
- Current output 3 *
- Profile factor *
- Cross flow factor *

Factory setting Volume flow

Additional information

Description

If there are several measured values one below the other, this appears in the first position. The value is only displayed during normal operation.

The **Format display** parameter (0098) (→ 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 (→ 61).

* 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

Additional information *Description*

The **Format display** parameter (0098) (→ 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 (→ 61).

100% bargraph value 1

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

Prerequisite A local display is provided.

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

User entry Signed floating-point number

Factory setting Depends on country and nominal diameter

Additional information *Description*

The **Format display** parameter (0098) (→ 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 (→ 61).

Decimal places 1

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

Prerequisite A measured value is specified in the **Value 1 display** parameter (0107) (→ 17).

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

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

Factory setting x.xx

Additional information *Description*

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

Value 2 display

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

Prerequisite A local display is provided.

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

Selection For the picklist, see **Value 1 display** parameter (0107) (→ 17)

Factory setting None

Additional information *Description*

If there are several measured values one below the other, this appears in the second position. The value is only displayed during normal operation.

The **Format display** parameter (0098) (→ 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 (→ 61).

Decimal places 2

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

Prerequisite A measured value is specified in the **Value 2 display** parameter (0108) (→ 19).

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

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

Factory setting x.xx

Additional information *Description*

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

Value 3 display

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

Prerequisite A local display is provided.

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

Selection For the picklist, see **Value 1 display** parameter (0107) (→ 17)

Factory setting None

Additional information *Description*

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

The **Format display** parameter (0098) (→ 15) is used to specify how many measured values are displayed simultaneously and how.

Options

The unit of the displayed measured value is taken from the **System units** submenu (→ 61).

0% bargraph value 3

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

Prerequisite A selection was made in the **Value 3 display** parameter (0110) (→ 20).

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

User entry Signed floating-point number

Factory setting Country-specific

Additional information

Description

The **Format display** parameter (0098) (→ 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 (→ 61).

100% bargraph value 3

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

Prerequisite A selection was made in the **Value 3 display** parameter (0110) (→ 20).

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

User entry Signed floating-point number

Factory setting 0

Additional information

Description

The **Format display** parameter (0098) (→ 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 (→ 61).

Decimal places 3

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

Prerequisite A measured value is specified in the **Value 3 display** parameter (0110) (→ 20).

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

Selection

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

Factory setting x.xx

Additional information

Description

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

Value 4 display

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

Prerequisite A local display is provided.

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

Selection For the picklist, see **Value 1 display** parameter (0107) (→ 17)

Factory setting None

Additional information

Description

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

The **Format display** parameter (0098) (→ 15) is used to specify how many measured values are displayed simultaneously and how.

Options

The unit of the displayed measured value is taken from the **System units** submenu (→ 61).

Decimal places 4

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

Prerequisite A measured value is specified in the **Value 4 display** parameter (0109) (→ 22).

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

Selection

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

Factory setting x.xx

Additional information

Description

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

Display interval

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

Prerequisite A local display is provided.

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

User entry 1 to 10 s

Factory setting 5 s

Additional information *Description*

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

- The **Value 1 display** parameter (0107) (→ 17)...**Value 8 display** parameter (0148) 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 (0098) (→ 15).

Display damping

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

Prerequisite A local display is provided.

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

User entry 0.0 to 999.9 s

Factory setting 0.0 s

Additional information *User entry*

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

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

1) proportional transmission behavior with first order delay

Header

Navigation Expert → System → Display → Header (0097)

Prerequisite A local display is provided.

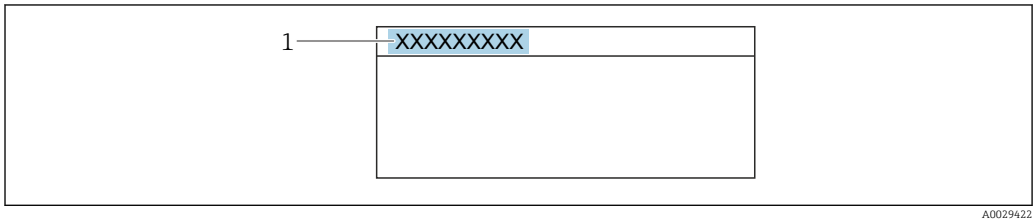
Description Use this function to select the contents of the header of the local display.

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 (0011) (→ 184).
- Free text
  Is defined in the **Header text** parameter (0112) (→ 24).

Header text

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

Prerequisite The **Free text** option is selected in the **Header** parameter (0097) (→ 24).

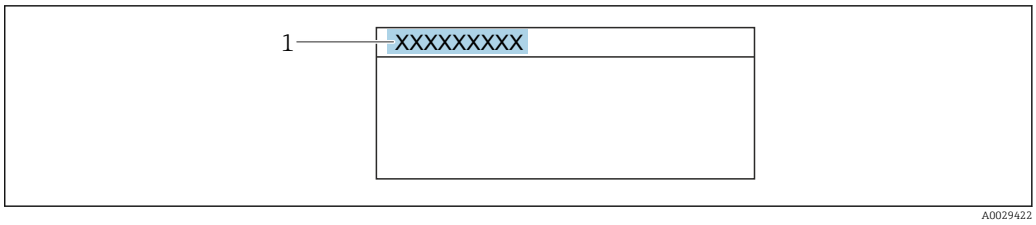
Description Use this function to enter a customer-specific text for the header of the local display.

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

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

Additional information *Description*

The header text only appears during normal operation.



1 Position of the header text on the display

User entry

The number of characters displayed depends on the characters used.

Separator

Navigation Expert → System → Display → Separator (0101)

Prerequisite A local display is provided.

Description Use this function to select the decimal separator.

Selection
- . (point)
- , (comma)

Factory setting . (point)

Contrast display

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

Prerequisite A local display is provided.

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

User entry 20 to 80 %

Factory setting 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"

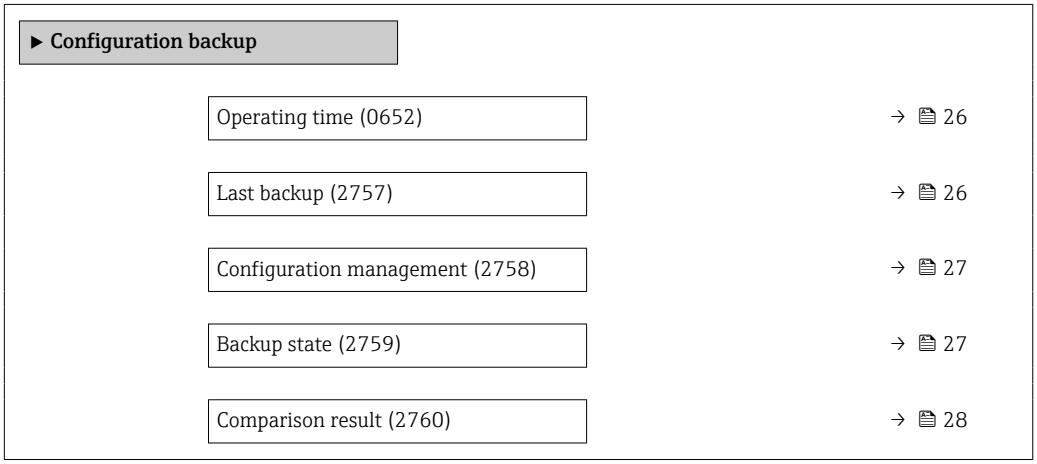
Description Use this function to switch the backlight of the local display on and off.

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

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

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

Last backup

Navigation Expert → System → Config. backup → Last backup (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 (0103).
Clear backup data	The backup copy of the device configuration is deleted from the memory of the device. The following message appears on local display: Deleting file

HistoROM

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

Backup state

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

Description Displays the status of the data backup process.

User interface
- None
- Backup in progress
- Restoring in progress
- Delete in progress

* Visibility depends on order options or device settings

- 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 (2758) (→ 27).

Options

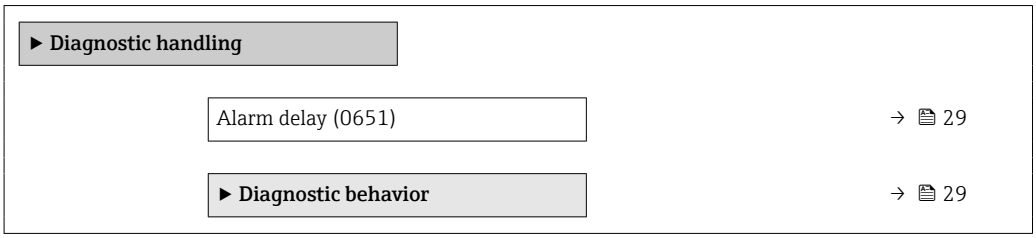
Options	Description
Settings identical	The current device configuration of the HistoROM is not identical to the backup copy in the device memory. If the transformer configuration of another device has been transmitted to the device via HistoROM in **Configuration management** parameter (0100), the current device configuration of the HistoROM is only partially identical to the backup copy in the device memory: The settings for the transmitter are not identical.
Settings not identical	The current device configuration of the HistoROM is not identical to the backup copy in the device memory.
No backup available	There is no backup copy of the device configuration of the HistoROM in the device memory.
Backup settings corrupt	The current device configuration of the HistoROM is corrupt or not compatible with the backup copy in the device memory.
Check not done	The device configuration of the HistoROM has not yet been compared to the backup copy in the device memory.
Dataset incompatible	The backup copy in the device memory is not compatible with the device.

HistoROM

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

3.1.3 "Diagnostic handling" submenu

Navigation Expert → System → Diagn. handling



Alarm delay

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

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

The diagnostic message is reset without a time delay.

User entry 0 to 60 s

Factory setting 0 s

Additional information *Effect*

This setting affects the following diagnostic messages:
- 832 Electronics temperature too high
- 833 Electronics temperature too low
- ⚠S841 Flow velocity too high
- ⚠S870 Measuring inaccuracy increased

"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 (→ 29).

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.

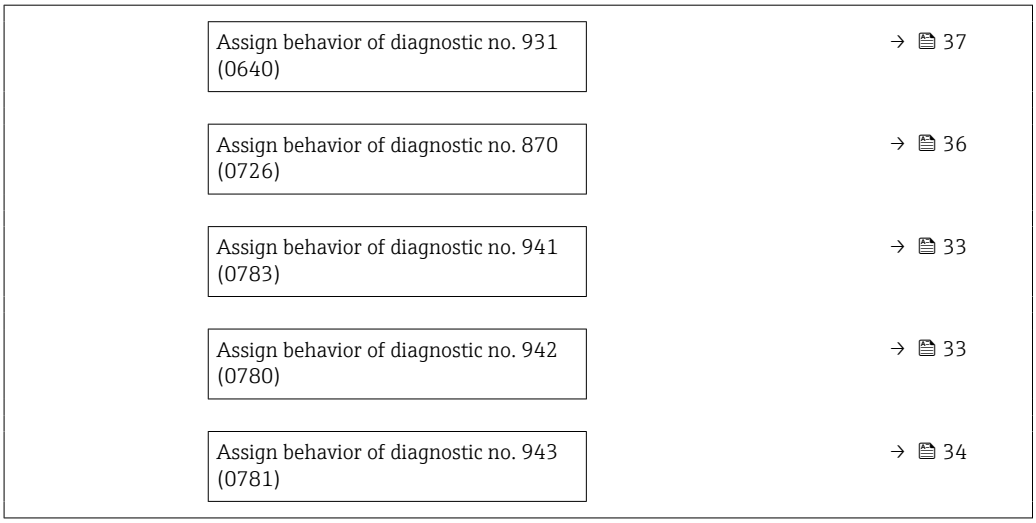
Options	Description
Logbook entry only	The device continues to measure. The diagnostic message is only displayed in the **Event logbook** submenu (→ 182) (**Event list** submenu) and is not displayed in alternating sequence with the operational display.
Off	The diagnostic event is ignored, and no diagnostic message is generated or entered.

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

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

▶ **Diagnostic behavior**

Assign behavior of diagnostic no. 019 (0635)	→ 31
Assign behavior of diagnostic no. 160 (0776)	→ 31
Assign behavior of diagnostic no. 302 (0742)	→ 32
Assign behavior of diagnostic no. 441 (0657)	→ 32
Assign behavior of diagnostic no. 442 (0658)	→ 32
Assign behavior of diagnostic no. 443 (0659)	→ 33
Assign behavior of diagnostic no. 444 (0740)	→ 34
Assign behavior of diagnostic no. 543 (0643)	→ 34
Assign behavior of diagnostic no. 832 (0675)	→ 35
Assign behavior of diagnostic no. 833 (0676)	→ 35
Assign behavior of diagnostic no. 841 (0680)	→ 36
Assign behavior of diagnostic no. 842 (0638)	→ 36
Assign behavior of diagnostic no. 930 (0639)	→ 37



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

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

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available: → 29

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

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

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available: → 29

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

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

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

Selection
- Off
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available: → 29

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

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

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information *Selection*

For a detailed description of the options available: → 29

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: → 29

Assign behavior of diagnostic no. 443 (Pulse output)

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

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

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information *Selection*

For a detailed description of the options available: → 29

Assign behavior of diagnostic no. 941

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 941 (0783)

Description Change behavior of diagnostic event with diagnostic number 941 "API/ASTM temperature out of specificat.".

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Assign behavior of diagnostic no. 942

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 942 (0780)

Description Change behavior of diagnostic event with diagnostic number 942 "API/ASTM density out of specification".

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Assign behavior of diagnostic no. 943

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 943 (0781)

Description Change behavior of diagnostic event with diagnostic number 943 "API pressure out of specification".

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

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: → 29

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: → 29

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

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

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available: → 29

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

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

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information *Selection*

For a detailed description of the options available: → 29

Assign behavior of diagnostic no. 841

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

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available: → 29

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: → 29

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

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

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Off

Additional information *Selection*

For a detailed description of the options available: → 29

Assign behavior of diagnostic no. 930 (Process fluid)

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

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Alarm

Additional information For a detailed description of the options available: → 29

Assign behavior of diagnostic no. 931 (Process fluid)

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

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Alarm

Additional information For a detailed description of the options available: → 29

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

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

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

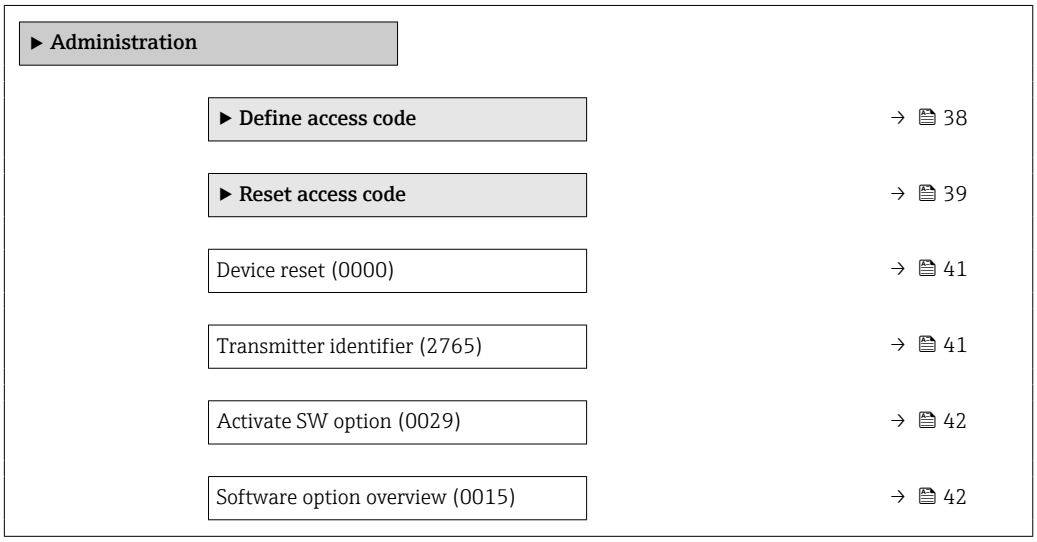
Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available: → 29

3.1.4 "Administration" submenu

Navigation Expert → System → Administration

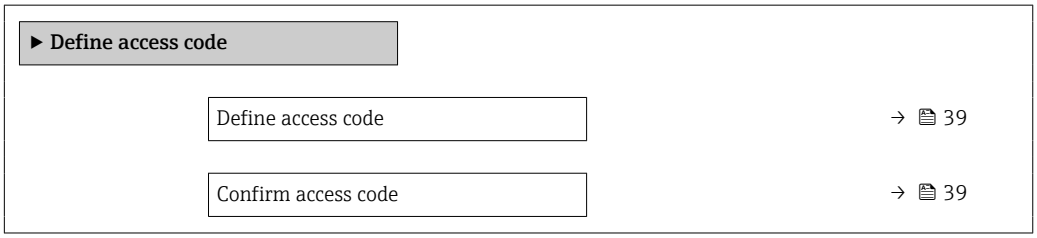


"Define access code" wizard

The **Define access code** wizard (→ 38) is only available when operating via the local display or Web browser.

If operating via the operating tool, the **Define access code** parameter (0093) 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 (0003) (→ 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

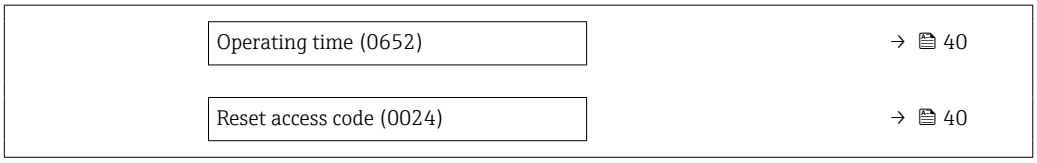
Description Enter the defined release code a second time to confirm the release code.

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

"Reset access code" submenu

Navigation Expert → System → Administration → Reset acc. code

▶ Reset access code



Operating time

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

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

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

Additional information *Indication*

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

Reset access code

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

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

User entry Character string comprising numbers, letters and special characters

Factory setting 0x00

Additional information *Description*

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

User entry

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

Additional parameters in the "Administration" submenu

Device reset

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

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

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

Factory setting Cancel

Additional information *Selection*

Options	Description
Cancel	No action is executed and the user exits the parameter.
To delivery settings	Every parameter for which a customer-specific default setting was ordered is reset to the customer-specific value. All other parameters are reset to the factory setting.
Restart device	The restart resets every parameter with data stored in volatile memory (RAM) to the factory setting (e.g. measured value data). The device configuration remains unchanged.
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 500

* Visibility depends on order options or device settings

Activate SW option

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

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

User entry Max. 10-digit string of numbers.

Factory setting Depends on the software option ordered

Additional information

Description

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

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

Entering the activation code

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

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

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

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

▸ Once the activation code has been entered, check if the new software option is displayed in the **Software option overview** parameter (0015) (→ 42).

↳ 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 (0015) (→ 42).

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
- Flow disturbance compensation *
- Heartbeat Monitoring
- Heartbeat Verification
- Petroleum *
- Product identification *

Additional information

Description

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

"Extended HistoROM" option

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

"Heartbeat Verification" option and "Heartbeat Monitoring" option

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

"Petroleum" option

Order code for "Application package", option EJ "Petroleum"

or

Order code for "Application package", option EQ "Petroleum & Product identification"

"Product identification" option

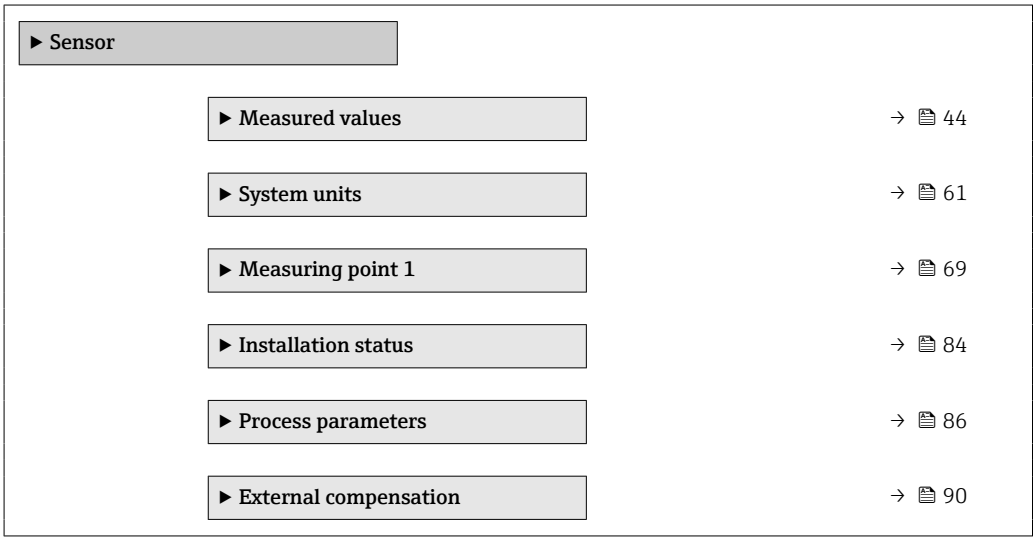
Order code for "Application package", option EQ "Petroleum & Product identification"

"Flow disturbance compensation" option

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

3.2 "Sensor" submenu

Navigation Expert → Sensor



* Visibility depends on order options or device settings

▶ **Sensor adjustment**	→ 94
▶ **Calibration**	→ 98

3.2.1 "Measured values" submenu

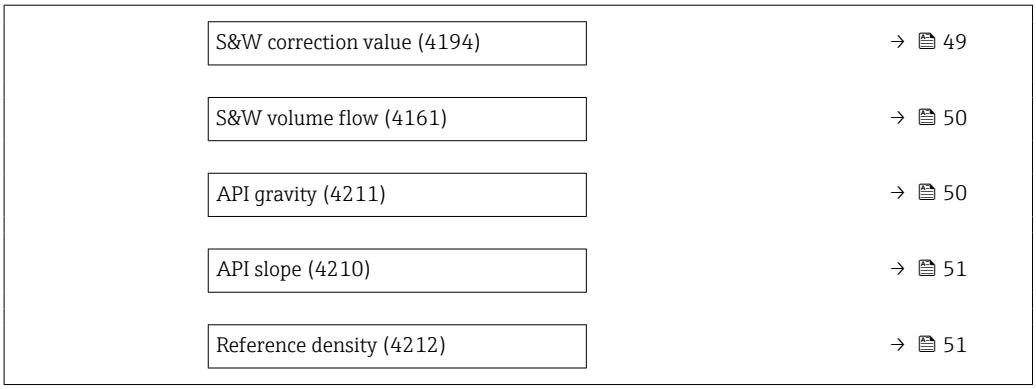
Navigation Expert → Sensor → Measured val.

▶ **Measured values**	
▶ **Process variables**	→ 44
▶ **System values**	→ 51
▶ **Totalizer**	→ 53
▶ **Input values**	→ 55
▶ **Output values**	→ 57

"Process variables" submenu

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

▶ **Process variables**	
Volume flow (1838)	→ 45
Mass flow (1847)	→ 45
Flow velocity (1852)	→ 45
Sound velocity (1850)	→ 46
Pressure (1872)	→ 46
Energy flow (1851)	→ 46
CPL (4192)	→ 47
CTL (4191)	→ 47
CTPL (4193)	→ 48
GSV flow (4157)	→ 48
NSV flow (4159)	→ 49



Volume flow

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

Description Displays the volume flow that is currently measured.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Volume flow unit** parameter (0553) (→ 62)

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 (0554) (→ 65)

Flow velocity

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

Description Displays the average flow velocity that is currently calculated.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Velocity unit** parameter (0566) (→ 66)

Sound velocity

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

Description Displays the sound velocity that is currently measured.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Velocity unit** parameter (0566) (→ 66)

Pressure

Navigation Expert → Sensor → Measured val. → Process variab. → Pressure (1872)

Prerequisite For the following order code:
- "Application package", option **EJ** "Petroleum"
- The **API referenced correction** option is selected in the **Petroleum mode** parameter (4187).

The software options currently enabled are displayed in the **Software option overview** parameter (0015) (→ 42).

Description Shows depending on the setting the external, entered or measured pressure value.

User interface Signed floating-point number

Additional information *Dependency*

Energy flow

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

Description Shows the energy flow currently calculated.

User interface Signed floating-point number

Additional information

CPL

Navigation Expert → Sensor → Measured val. → Process variab. → CPL (4192)

Prerequisite

For the following order code:
- "Application package", option EJ "Petroleum"
- "Application package", option EQ "Petroleum & Product identification"
- The **API referenced correction** option is selected in **Petroleum mode** parameter (4187).

The software options currently enabled are displayed in the **Software option overview** parameter (0015) (→ 42).

Description Displays the calibration factor which represents the effect of pressure on the fluid. This is used to convert the measured volume flow and the measured density to values at reference pressure.

User interface Positive floating-point number

Factory setting –

CTL

Navigation Expert → Sensor → Measured val. → Process variab. → CTL (4191)

Prerequisite

For the following order code:
- "Application package", option EJ "Petroleum"
- "Application package", option EQ "Petroleum & Product identification"
- The **API referenced correction** option is selected in **Petroleum mode** parameter (4187).

The software options currently enabled are displayed in the **Software option overview** parameter (0015) (→ 42).

Description Displays the calibration factor which represents the effect of temperature on the fluid. This is used to convert the measured volume flow and the measured density to values at reference temperature.

User interface Positive floating-point number

Factory setting –

CTPL

Navigation Expert → Sensor → Measured val. → Process variab. → CTPL (4193)

Prerequisite

For the following order code:
- "Application package", option EJ "Petroleum"
- "Application package", option EQ "Petroleum & Product identification"
- The **API referenced correction** option is selected in **Petroleum mode** parameter (4187).

The software options currently enabled are displayed in the **Software option overview** parameter (0015) (→ 42).

Description

Displays the combined calibration factor which represents the effect of temperature and pressure on the fluid This is used to convert the measured volume flow and the measured density to values at reference temperature and reference pressure.

User interface

Positive floating-point number

Factory setting

–

GSV flow

Navigation Expert → Sensor → Measured val. → Process variab. → GSV flow (4157)

Prerequisite

For the following order code:
- "Application package", option EJ "Petroleum"
- "Application package", option EQ "Petroleum & Product identification"
- The **API referenced correction** option is selected in **Petroleum mode** parameter (4187).

The software options currently enabled are displayed in the **Software option overview** parameter (0015) (→ 42).

Description

Displays the measured total volume flow, corrected to the reference temperature and the reference pressure.

Dependency

The unit is taken from: **Corrected volume flow unit** parameter (0558)

User interface

Signed floating-point number

Factory setting

–

Additional information

The unit is taken from the **Corrected volume flow unit** parameter (0558)

NSV flow

Navigation Expert → Sensor → Measured val. → Process variab. → NSV flow (4159)

Prerequisite

For the following order code:
- "Application package", option EJ "Petroleum"
- "Application package", option EQ "Petroleum & Product identification"
- The **API referenced correction** option is selected in **Petroleum mode** parameter (4187).

The software options currently enabled are displayed in the **Software option overview** parameter (0015) (→ 42).

Description

Displays the net volume flow which is calculated from the measured total volume flow minus the value for sediment & water and minus the shrinkage.

Dependency

The unit is taken from: **Corrected volume flow unit** parameter (0558)

User interface Signed floating-point number

Factory setting –

Additional information The unit is taken from the **Corrected volume flow unit** parameter (0558)

S&W correction value

Navigation Expert → Sensor → Measured val. → Process variab. → S&W correction (4194)

Prerequisite

For the following order code:
- "Application package", option EJ "Petroleum"
- "Application package", option EQ "Petroleum & Product identification"
- The **External value** option or **Current input 1...n** option is selected in the **S&W input mode** parameter (4189).

The software options currently enabled are displayed in the **Software option overview** parameter (0015) (→ 42).

Description Shows the correction value for sediment and water.

User interface Positive floating-point number

Factory setting –

S&W volume flow

Navigation Expert → Sensor → Measured val. → Process variab. → S&W volume flow (4161)

Prerequisite

For the following order code:
- "Application package", option EJ "Petroleum"
- "Application package", option EQ "Petroleum & Product identification"
- The **API referenced correction** option is selected in **Petroleum mode** parameter (4187).

The software options currently enabled are displayed in the **Software option overview** parameter (0015) (→ 42).

Description

Displays the S&W volume flow which is calculated from the measured total volume flow minus the net volume flow.

Dependency

The unit is taken from: **Volume flow unit** parameter (0553) (→ 62)

User interface Signed floating-point number

Factory setting –

Additional information The unit is taken from the **Volume flow unit** parameter (0553) (→ 62)

API gravity

Navigation Expert → Sensor → Measured val. → Process variab. → API gravity (4211)

Prerequisite

For the following order code:
- "Application package", option EJ "Petroleum"
- "Application package", option EQ "Petroleum & Product identification"
- The **API referenced correction** option is selected in **Petroleum mode** parameter (4187).

The software options currently enabled are displayed in the **Software option overview** parameter (0015) (→ 42).

Description

Displays the reference density in API degrees (specified depending on the option, or read in by an external device).

User interface 0.0 to 100.0 °API

Factory setting –

API slope

Navigation Expert → Sensor → Measured val. → Process variab. → API slope (4210)

Prerequisite

For the following order code:
- "Application package", option EJ "Petroleum"
- "Application package", option EQ "Petroleum & Product identification"
- The **API referenced correction** option is selected in **Petroleum mode** parameter (4187).

The software options currently enabled are displayed in the **Software option overview** parameter (0015) (→ 42).

Description Shows the API slope (change of API over time). Can be used e.g. to detect different products.

User interface −10 to 100 °API/s

Factory setting –

Reference density

Navigation Expert → Sensor → Measured val. → Process variab. → Ref.density (4212)

Prerequisite

For the following order code:
- "Application package", option EJ "Petroleum"
- "Application package", option EQ "Petroleum & Product identification"
- The **API referenced correction** option is selected in **Petroleum mode** parameter (4187).

The software options currently enabled are displayed in the **Software option overview** parameter (0015) (→ 42).

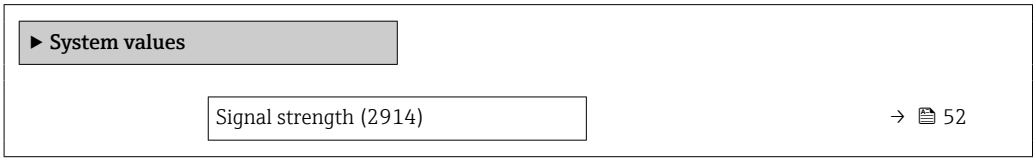
Description Shows the reference density at the API reference conditions specified for temperature and pressure.

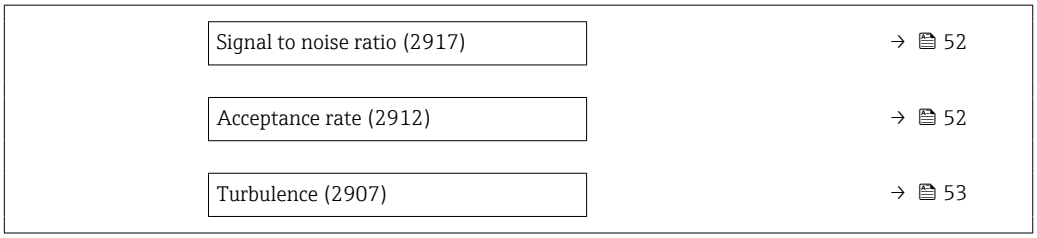
User interface 0 to 30 kg/Nm³

Factory setting –

"System values" submenu

Navigation Expert → Sensor → Measured val. → System values





Signal strength

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

Description Displays the current signal strength.

User interface Signed floating-point number

Additional information *Description*

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

Signal to noise ratio

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

Description Displays the current signal to noise ratio.

User interface Signed floating-point number

Additional information *Description*

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

Acceptance rate

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

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

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

User interface 0 to 100 %

Turbulence

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

Description Displays the current turbulence.

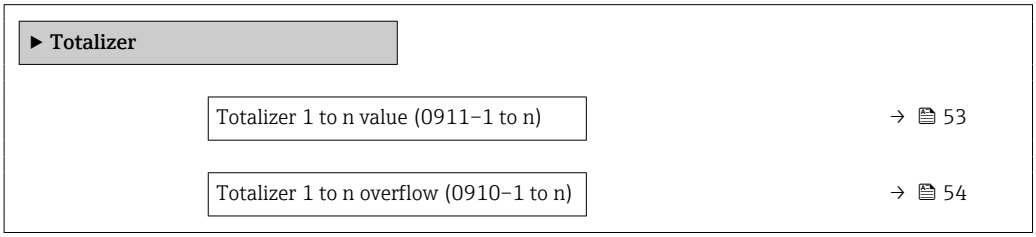
User interface Signed floating-point number

Additional information *Description*

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

"Totalizer" submenu

Navigation Expert → Sensor → Measured val. → Totalizer



Totalizer 1 to n value

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

Prerequisite One of the following options is selected in the **Assign process variable** parameter (0914) (→ 170) of the **Totalizer 1 to n** submenu:
- Volume flow
- Mass flow

Description Displays the current totalizer reading.

User interface Signed floating-point number

Additional information

Description

As it is only possible to display a maximum of 7 digits in the operating tool, the current counter value is the sum of the totalizer value and the overflow value from the **Totalizer overflow 1 to n** parameter (0910–1 to n) if the display range is exceeded.

In the event of an error, the totalizer adopts the mode defined in the **Failure mode** parameter (0901) (→ 174).

Display

The value of the process variable aggregated since measuring began can be positive or negative. This depends on the settings in the **Totalizer operation mode** parameter (0908) (→ 172).

The unit of the selected process variable is defined in the **Unit totalizer** parameter (0915) (→ 171) for the totalizer.

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 (0911): 1 968 457 m^3
- Value in the **Totalizer overflow 1** parameter (0910): $1 \cdot 10^7$ (1 overflow) = 10 000 000 m^3
- Current totalizer value: 11 968 457 m^3

Totalizer 1 to n overflow

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

Prerequisite One of the following options is selected in the **Assign process variable** parameter (0914) (→ 170) of the **Totalizer 1 to n** submenu:
- Volume flow
- Mass flow

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 (0911–1 to n).

Display

The unit of the selected process variable is defined in the **Unit totalizer** parameter (0915) (→ 171) for the totalizer.

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 (0911): 1 968 457 m^3
- Value in the **Totalizer overflow 1** parameter (0910): $2 \cdot 10^7$ (2 overflows) = 20 000 000 [m^3]
- Current totalizer value: 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)

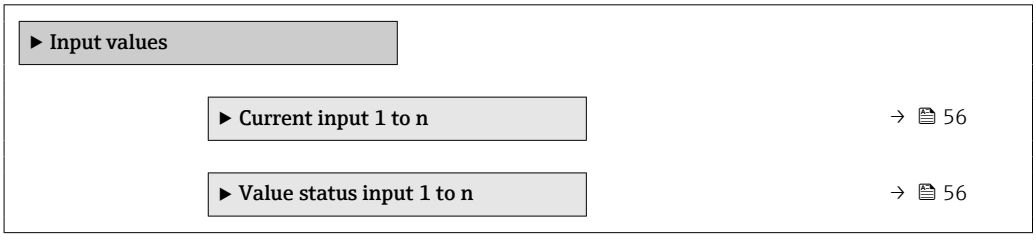
Description Shows the status of the totalizer value reported to the controller for further processing (Hex).

User interface 0 to 255

Factory setting 128

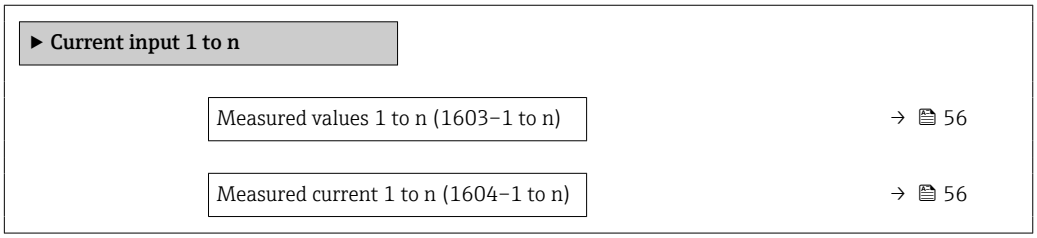
"Input values" submenu

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

Additional information *Dependency*

The unit is taken from the **Pressure unit** parameter (0564)

Measured current 1 to n

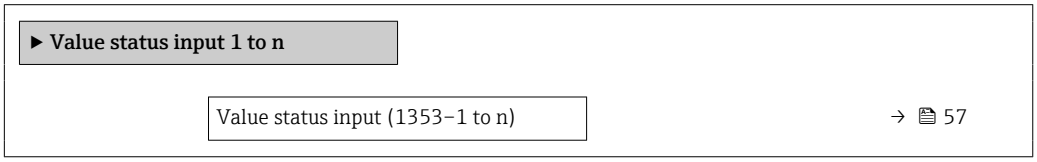
Navigation Expert → Sensor → Measured val. → Input values → Current input 1 to n → Measur. curr. 1 to n (1604–1 to n)

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

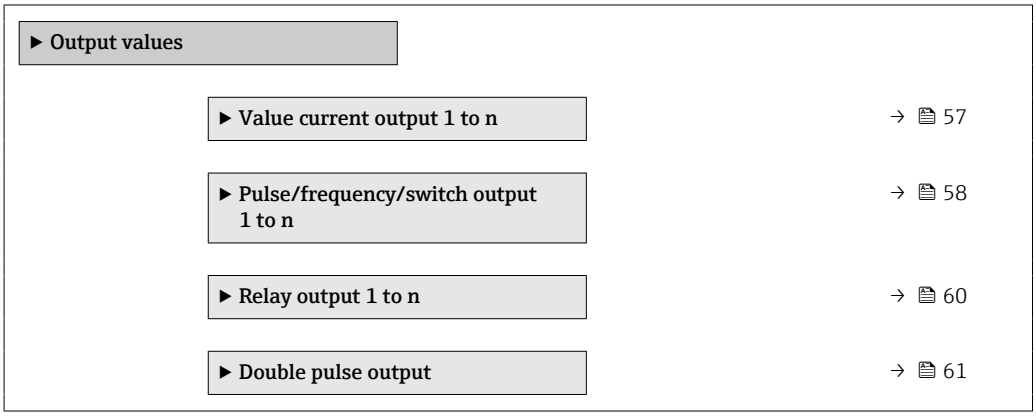
Navigation Expert → Sensor → Measured val. → Input values → Val.stat.inp. 1 to n → Val.stat.inp. (1353–1 to n)

Description Displays the current input signal level.

User interface
- High
- Low

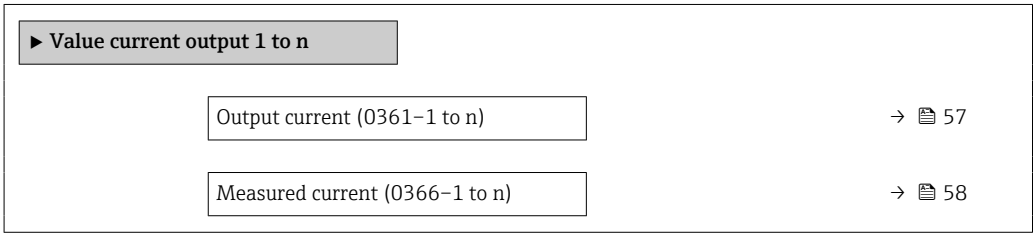
"Output values" submenu

Navigation Expert → Sensor → Measured val. → Output values



"Value current output 1 to n" submenu

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



Output current

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

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

User interface 0 to 22.5 mA

Measured current

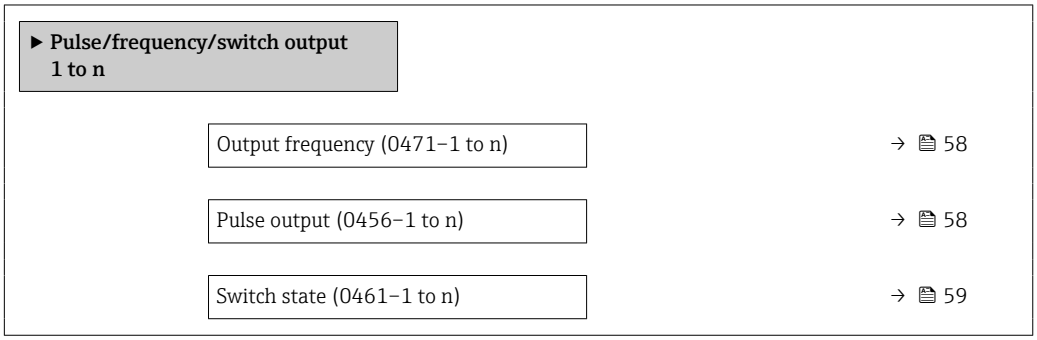
Navigation Expert → Sensor → Measured val. → Output values → Current output 1 to n → Measur. curr. (0366–1 to n)

Description Displays the actual measured value of the output current.

User interface 0 to 30 mA

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

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



Output frequency

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

Prerequisite In the **Operating mode** parameter (0469) (→ 122), the **Frequency** option is selected.

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

User interface 0.0 to 12 500.0 Hz

Pulse output

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

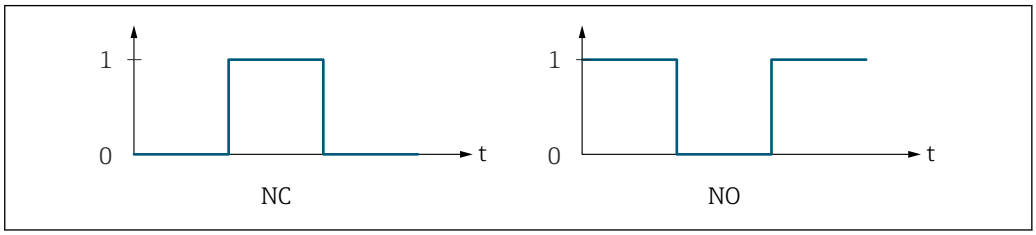
Prerequisite The **Pulse** option is selected in the **Operating mode** parameter (0469) (→ 122) parameter.

Description Displays the pulse frequency currently output.

User interface Positive floating-point number

Additional information *Description*

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



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

The output behavior can be reversed via the **Invert output signal** parameter (0470) (→ 🖹 140) 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 (0480) (→ 🖹 126)) can be configured.

Switch state

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

Prerequisite The **Switch** option is selected in the **Operating mode** parameter (0469) (→ 🖹 122).

Description Displays the current switch status of the status output.

User interface

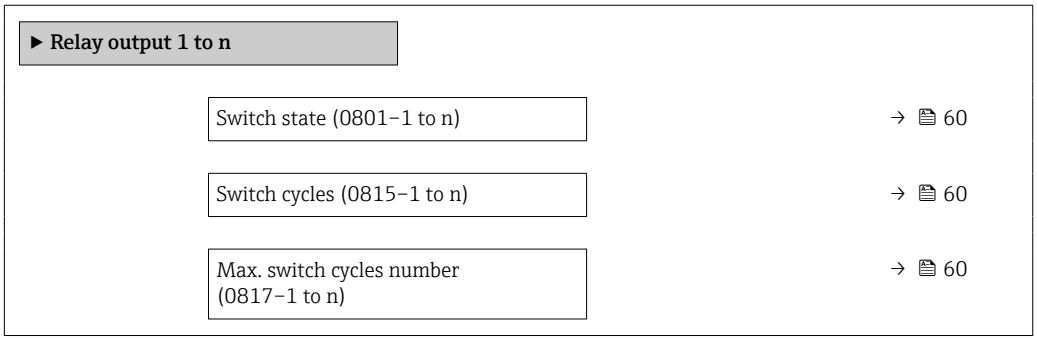
- Open
- Closed

Additional information *User interface*

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

"Relay output 1 to n" submenu

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



Switch state

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

Description Displays the current status of the relay output.

User interface
- Open
- Closed

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

Switch cycles

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

Description Displays all the switch cycles performed.

User interface Positive integer

Max. switch cycles number

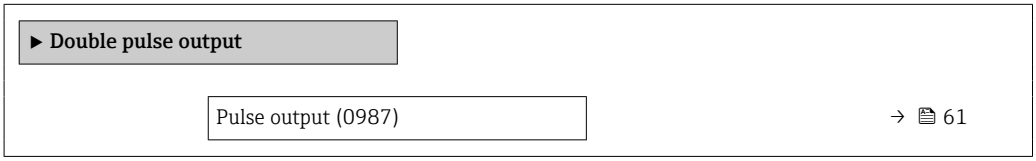
Navigation Expert → Sensor → Measured val. → Output values → Relay output 1 to n → Max. cycles no. (0817–1 to n)

Description Displays the maximum number of guaranteed switch cycles.

User interface Positive integer

"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)

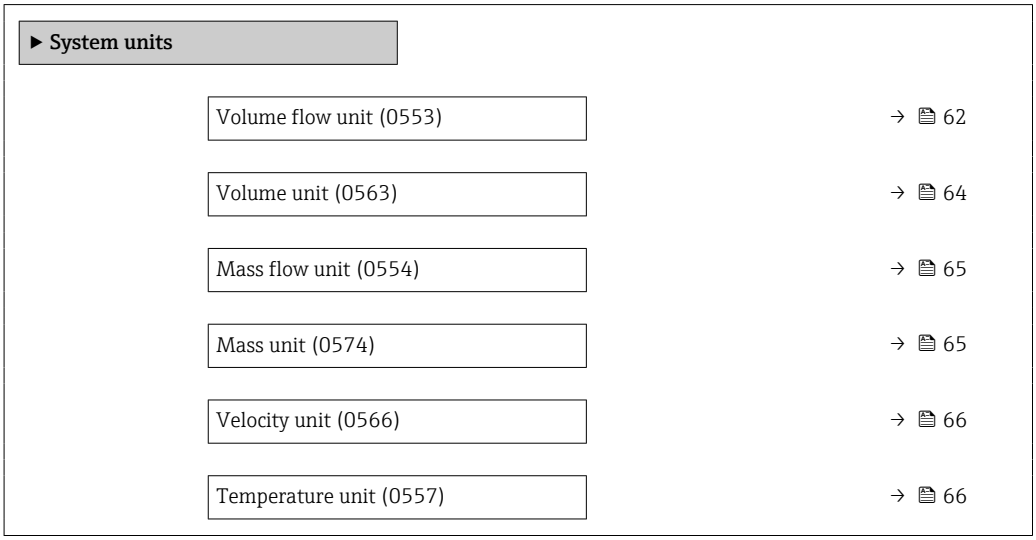
Description Displays the pulse frequency of the double pulse output which is currently output.

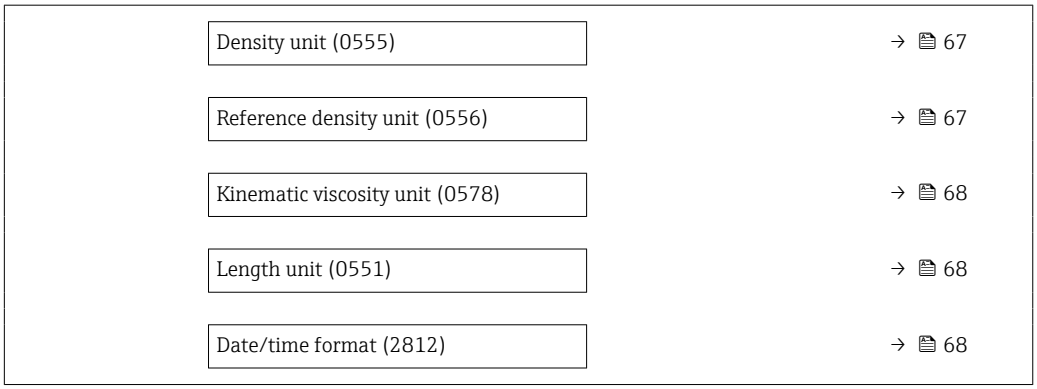
User interface Positive floating-point number

Additional information For a detailed description and example: **Pulse output** parameter (0456–1 to n) (→ 58)

3.2.2 "System units" submenu

Navigation Expert → Sensor → System units





Volume flow unit

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

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

Selection
- cm^3/s
- cm^3/min
- cm^3/h
- cm^3/d
- dm^3/s
- dm^3/min
- dm^3/h
- dm^3/d
- m^3/s
- m^3/min
- m^3/h
- m^3/d
- ml/s
- ml/min
- ml/h
- ml/d
- l/s
- l/min
- l/h
- l/d
- hl/s
- hl/min
- hl/h
- hl/d
- Ml/s
- Ml/min
- Ml/h
- Ml/d
- af/s
- af/min
- af/h
- af/d
- ft^3/s
- ft^3/min
- ft^3/h
- ft^3/d

- Mft^3/s
- Mft^3/min
- Mft^3/h
- Mft^3/d
- $MMft^3/s$
- $MMft^3/min$
- $MMft^3/h$
- fl oz/s (us)
- fl oz/min (us)
- fl oz/h (us)
- fl oz/d (us)
- gal/s (us)
- gal/min (us)
- gal/h (us)
- gal/d (us)
- Mgal/s (us)
- Mgal/min (us)
- Mgal/h (us)
- Mgal/d (us)
- bbl/s (us;liq.)
- bbl/min (us;liq.)
- bbl/h (us;liq.)
- bbl/d (us;liq.)
- bbl/s (us;beer)
- bbl/min (us;beer)
- bbl/h (us;beer)
- bbl/d (us;beer)
- bbl/s (us;oil)
- bbl/min (us;oil)
- bbl/h (us;oil)
- bbl/d (us;oil)
- bbl/s (us;tank)
- bbl/min (us;tank)
- bbl/h (us;tank)
- bbl/d (us;tank)
- gal/s (imp)
- gal/min (imp)
- gal/h (imp)
- gal/d (imp)
- Mgal/s (imp)
- Mgal/min (imp)
- Mgal/h (imp)
- Mgal/d (imp)
- bbl/s (imp;beer)
- bbl/min (imp;beer)
- bbl/h (imp;beer)
- bbl/d (imp;beer)
- bbl/s (imp;oil)
- bbl/min (imp;oil)
- bbl/h (imp;oil)
- bbl/d (imp;oil)
- kgal/s (us)
- kgal/min (us)
- kgal/h (us)
- kgal/d (us)

Factory setting

Depends on country:
- m^3/h
- ft^3/min

Additional information

Effect

The selected unit applies to:
Volume flow parameter (1838) (→ 45)

Options

For an explanation of the abbreviated units: → 223

Customer-specific units

The unit for the customer-specific volume is specified in the **User volume text** parameter (0567).

Volume unit

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

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

Selection

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

Factory setting

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

Additional information

Options

For an explanation of the abbreviated units: → 223

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 Depends on country:
- kg/h
- lb/min

Additional information

Result

The selected unit applies to:
Mass flow parameter (1872) (→ 46)

Selection

For an explanation of the abbreviated units: → 223

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: → 223

Velocity unit

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

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

Selection

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

Factory setting Country-specific:
- m/s
- ft/s

Additional information

Effect

The selected unit applies for:
- Flow velocity (1852) (→ 45)
- Sound velocity (1850) (→ 46)

Selection

For an explanation of the abbreviated units: → 223

Temperature unit

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

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

Selection

SI units	*US units*
▪ °C	▪ °F
▪ K	▪ °R

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

Additional information

Effect

The selected unit applies for:
- Temperature (1853)
- Electronic temperature (6053)
- External temperature (6080)
- Reference temperature (1816)

Selection

For an explanation of the abbreviated units: → 223

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
- SG60°F
- lb/ft³
- lb/gal (us)
- lb/bbl (us;liq.)
- lb/bbl (us;beer)
- lb/bbl (us;oil)
- lb/bbl (us;tank)

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

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

Additional information *Selection*

For an explanation of the abbreviated units: → 223

Reference density unit

Navigation Expert → Sensor → System units → Ref. dens. unit (0556)

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

Selection

SI units
- kg/Nm³
- kg/Nl
- g/Scm³
- kg/Sm³
- RD15°C
- RD20°C

US units
- lb/Sft³
- RD60°F

Factory setting kg/Nm³

Additional information *Result*

The selected unit applies for:
- **External reference density** parameter (6198)
- **Fixed reference density** parameter (1814)
- **Reference density** parameter (1852) (→ 45)

Selection

For an explanation of the abbreviated units: → 223

Kinematic viscosity unit

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

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

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

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

Length unit

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

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

Selection

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

Factory setting
Country-specific:
- mm
- in

Additional information *Selection*

For an explanation of the abbreviated units: → 223

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

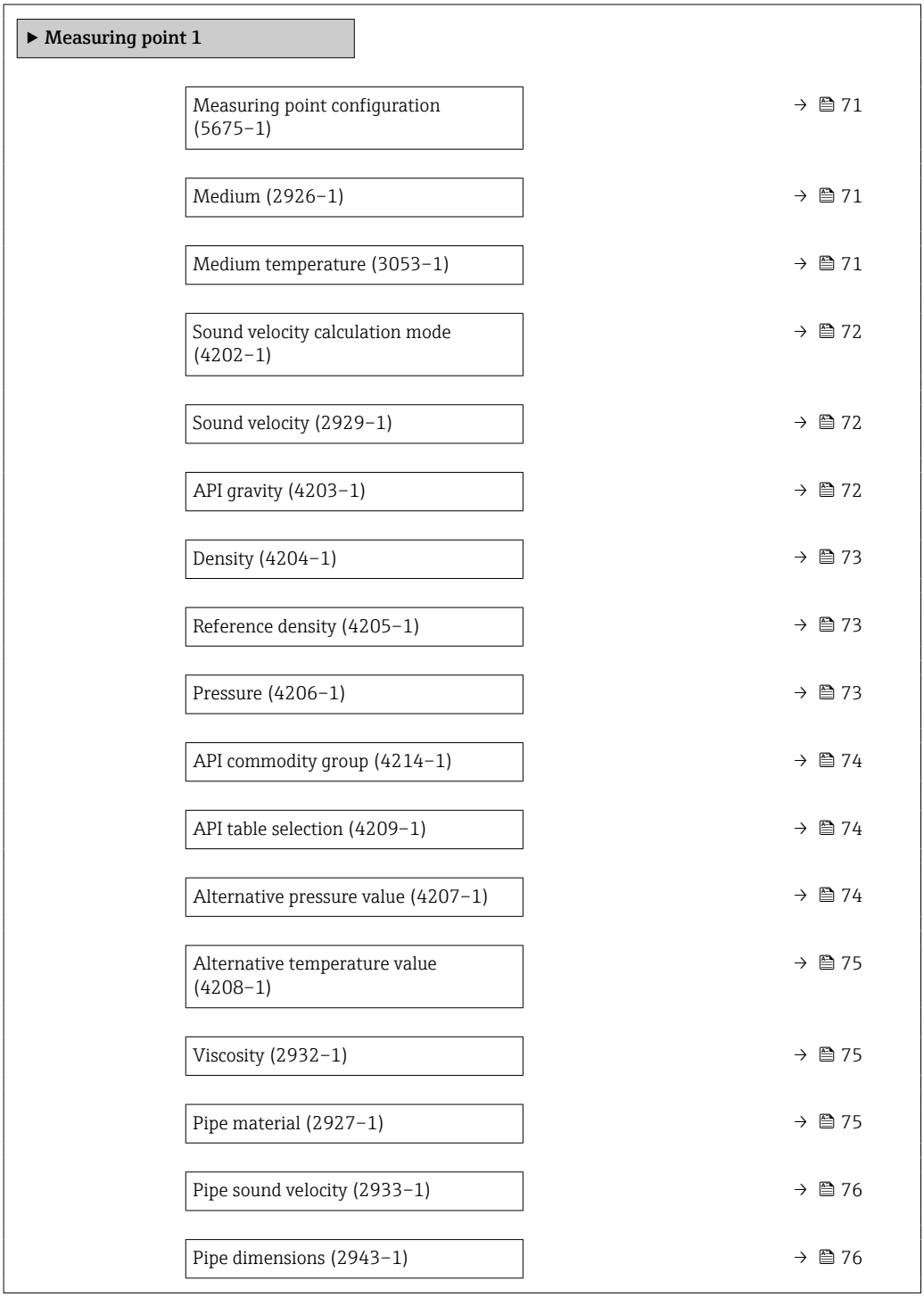
Factory setting dd.mm.yy hh:mm

Additional information *Selection*

For an explanation of the abbreviated units: → 223

3.2.3 "Measuring point " submenu

Navigation Expert → Sensor → Meas. point



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Result sensor type / sensor distance (3066–1)	→ 82
Result path length / arc length (3067–1)	→ 83
▶ **Mounting deviations signal path 1 to n**	→ 83

Measuring point configuration

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

Description Use this function to enter the measuring point configuration.

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

Factory setting Depending on the sensor version

Medium

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

Description Select the medium.

Selection
- Water
- Sea water
- Distilled water
- Ammonia NH3
- Benzene
- Ethanol
- Glycol
- Kerosene
- Milk
- Methanol
- User-specific liquid
- Air *
- Liquid hydrocarbons *

Factory setting Water

Medium temperature

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

Description Enter the medium temperature for the installation.

User entry –200 to 550 °C

Factory setting 20 °C

* Visibility depends on order options or device settings

Sound velocity calculation mode

Navigation Expert → Sensor → Meas. point 1 → SoundVelocCalc. (4202–1)

Prerequisite The **Liquid hydrocarbons** option is selected in **Medium** parameter (2926) (→ 71).

Description Select the process variable to use to calculate the sound velocity at installation.

Selection
- Fixed value
- API gravity
- Density
- Reference density

Factory setting API gravity

Sound velocity

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

Prerequisite The **User-specific liquid** option is selected in **Medium** parameter (2926) (→ 71).

Description Enter the sound velocity of the medium.

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

User entry 200 to 3 000 m/s

Factory setting 1 482.4 m/s

API gravity

Navigation Expert → Sensor → Meas. point 1 → API gravity (4203–1)

Prerequisite The **Liquid hydrocarbons** option is selected in the **Medium** parameter (2926) (→ 71) and the **API gravity** option is selected in the **Sound velocity calculation mode** parameter (4202) (→ 72).

Description Enter the medium's API gravity for the installation.

User entry 0.0 to 100.0 °API

Factory setting 10.0 °API

Density

Navigation Expert → Sensor → Meas. point 1 → Density (4204–1)

Prerequisite The **Liquid hydrocarbons** option is selected in the **Medium** parameter (2926) (→ 71) and the **Density** option is selected in the **Sound velocity calculation mode** parameter (4202) (→ 72).

Description Enter the medium's density for the installation.

User entry Signed floating-point number

Factory setting 1 000 kg/m³

Reference density

Navigation Expert → Sensor → Meas. point 1 → Ref.density (4205–1)

Prerequisite The **Liquid hydrocarbons** option is selected in the **Medium** parameter (2926) (→ 71) and the **Reference density** option is selected in the **Sound velocity calculation mode** parameter (4202) (→ 72).

Description Enter the medium's reference density for the installation.

User entry Signed floating-point number

Factory setting 1 000 kg/m³

Pressure

Navigation Expert → Sensor → Meas. point 1 → Pressure (4206–1)

Prerequisite The **Liquid hydrocarbons** option is selected in the **Medium** parameter (2926) (→ 71) and the **API gravity** option, **Density** option or **Reference density** option is selected in the **Sound velocity calculation mode** parameter (4202) (→ 72).

Description Enter the process pressure for the installation.

User entry 0.8 to 110 bar

Factory setting 1.01325 bar

API commodity group

Navigation Expert → Sensor → Meas. point 1 → API comm. group (4214–1)

Prerequisite The **Liquid hydrocarbons** option is selected in the **Medium** parameter (2926) (→ 71) and the **API gravity** option or **Density** option or **Reference density** option is selected in the **Sound velocity calculation mode** parameter (4202) (→ 72).

Description Select the medium's API commodity group.

Selection
- A - crude oil
- B - refined products
- D - lubricating oils

Factory setting A - crude oil

API table selection

Navigation Expert → Sensor → Meas. point 1 → API tab. select. (4209–1)

Prerequisite The **Liquid hydrocarbons** option is selected in the **Medium** parameter (2926) (→ 71) and the **API gravity** option, **Density** option or **Reference density** option is selected in the **Sound velocity calculation mode** parameter (4202) (→ 72).

Description Select the API reference conditions (temperature and pressure) that apply for the reference density specified.

Selection
- API table 5/6
- API table 23/24
- API table 53/54
- API table 59/60
- Other

Factory setting API table 23/24

Alternative pressure value

Navigation Expert → Sensor → Meas. point 1 → Alternat. press. (4207–1)

Description Enter an alternative user-defined reference value for the pressure.

User entry 0.8 to 110 bar

Factory setting 1.01325 bar

Alternative temperature value

Navigation Expert → Sensor → Meas. point 1 → Alternativ.temp. (4208–1)

Description Enter an alternative user-defined reference value for the temperature.

User entry −10 to 110 °C

Factory setting 29.5 °C

Viscosity

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

Prerequisite The **User-specific liquid** option is selected in **Medium** parameter (2926) (→ 71).

Description Enter medium viscosity at installation temperature.

User entry 0.01 to 10 000 mm^2/s

Factory setting 1 mm^2/s

Pipe material

Navigation Expert → Sensor → Meas. point 1 → Pipe material (2927–1)

Description Select pipe material.

Selection
- Carbon steel
- Ductile cast iron
- Stainless steel
- 1.4301 (UNS S30400)
- 1.4401 (UNS S31600)
- 1.4550 (UNS S34700)
- Hastelloy C
- PVC
- PE
- LDPE
- HDPE
- GRP
- PVDF
- PA
- PP
- PTFE
- Pyrex glass
- Asbestos cement
- Copper
- Unknown pipe material

Factory setting Stainless steel

Pipe sound velocity

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

Prerequisite The **Unknown pipe material** option is selected in the **Pipe material** parameter (2927) (→ 75).

Description Enter sound velocity of pipe material.

User entry 800.0 to 3 800.0 m/s

Factory setting 3 120.0 m/s

Pipe dimensions

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

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

Selection
- Diameter
- Pipe circumference

Factory setting Diameter

Pipe circumference

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

Prerequisite The **Pipe circumference** option is selected in the **Pipe dimensions** parameter (2943) (→ 76).

Description Define the pipe circumference.

User entry 30 to 62 800 mm

Factory setting 314.159 mm

Pipe outer diameter

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

Prerequisite The **Diameter** option is selected in **Pipe dimensions** parameter (2943) (→ 76).

Description Define the outer diameter of the pipe.

User entry 0 to 20 000 mm

Factory setting 100 mm

Pipe wall thickness

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

Description Enter the pipe wall thickness.

User entry Positive floating point number

Factory setting 3 mm

Liner material

Navigation Expert → Sensor → Meas. point 1 → Liner material (2928–1)

Description Select liner material.

Selection
- None
- Cement
- Rubber
- Epoxy resin
- Unknown liner material

Factory setting None

Liner sound velocity

Navigation Expert → Sensor → Meas. point 1 → Liner sound vel. (2936–1)

Prerequisite The **Unknown liner material** option is selected in the **Liner material** parameter (2928) (→ 77).

Description Define the sound velocity of liner material.

User entry 800.0 to 3 800.0 m/s

Factory setting 2 400.0 m/s

Liner thickness

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

Description Define the thickness of liner.

User entry 0 to 100 mm

Factory setting 0 mm

Sensor type

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

Description Select sensor type.

Selection
- C-030-A
- C-050-A
- C-100-A
- C-100-B
- C-100-C
- C-200-A
- C-200-B
- C-200-C
- C-500-A
- CH-050-A *
- CH-100-A *

Factory setting As per order

Signal filter

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

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

Selection
- Off
- On

* Visibility depends on order options or device settings

Factory setting On

Sensor coupling

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

Prerequisite The following option is selected in **Sensor type** parameter (2924) (→ 78):
- C-030-A
- C-050-A
- C-100-A
- C-100-B
- C-100-C
- C-200-A
- C-200-B
- C-200-C
- C-500-A

Description Select coupling medium.

Selection
- Coupling pad
- Coupling paste

Factory setting Coupling pad

Mounting type

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

Description
- **(1) direct** option: sensor arrangement with 1 traverse
- **(2) V-mounting** option: sensor arrangement with 2 traverses
- **(3) Z-Mounting** option: sensor arrangement with 3 traverses
- **(4) W-mounting** option: sensor arrangement with 4 traverses

Selection
- (1) direct
- (2) V-mounting
- (3) Z-Mounting
- (4) W-mounting
- Automatic

Factory setting Automatic

Cable length

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

Description Enter length of sensor cables.

User entry 0 to 200 000 mm

Factory setting As per order

FlowDC inlet configuration

Navigation Expert → Sensor → Meas. point 1 → FlowDC inl. conf (3049–1)

Prerequisite The **1 measuring point - 2 signal paths** option is selected in the **Measuring point configuration** parameter (5675) (→ 71).

Description Select FlowDC inlet configuration.

Selection
- Off
- Single elbow
- Double elbow
- Double elbow 3D
- 45° bend
- 2 x 45° bend
- Concentric diameter change
- Reduction
- Other *

Factory setting Off

Intermediate pipe length

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

Prerequisite The **1 measuring point - 2 signal paths** option is selected in **Measuring point configuration** parameter (5675) (→ 71).

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

User entry Positive floating-point number

Factory setting 0 mm

* Visibility depends on order options or device settings

Inlet diameter

Navigation Expert → Sensor → Meas. point 1 → Inlet diameter (3054–1)

Prerequisite
- The **1 measuring point - 2 signal paths** option is selected in the **Measuring point configuration** parameter (5675) (→ 71).
- The **Concentric diameter change** option is selected in the **Inlet configuration** parameter (→ 80).

Description Enter the outer diameter of the pipe before the cross-section change. For convenience, the same measuring pipe wall thickness as for the clamp-on system is applied.

User entry 1 to 10 000 mm

Factory setting 88.9 mm

Transition length

Navigation Expert → Sensor → Meas. point 1 → Transit. length (3065–1)

Prerequisite
- In the **Measuring point configuration** parameter (5675) (→ 71), the **1 measuring point - 2 signal paths** option is selected.
- In the **Inlet configuration** parameter (→ 80), the **Concentric diameter change** option is selected.

Description Enter the length of the concentric change in diameter .

User entry 0 to 20 000 mm

Factory setting 0 mm

Inlet run

Navigation Expert → Sensor → Meas. point 1 → Inlet run (3050–1)

Prerequisite The **1 measuring point - 2 signal paths** option is selected in **Measuring point configuration** parameter (5675) (→ 71).

Description Enter length of the available straight inlet run.

User entry 0 to 300 000 mm

Factory setting 0 mm

Relative sensor position

Navigation Expert → Sensor → Meas. point 1 → Rel. sensor pos. (2985–1)

Prerequisite The **1 measuring point - 2 signal paths** option is selected in the **Measuring point configuration** parameter (5675) (→ 71) and the **Off** option is not selected in **FlowDC inlet configuration** parameter (3049) (→ 80).

Description Shows the correct position for the sensor.

User interface
- 90°
- 180°

Result sensor type / mounting type

Navigation Expert → Sensor → Meas. point 1 → Sensor/mounting (2946–1)

Description Shows the selected sensor type and (if applicable automatically) selected mounting type.

User interface e.g. **C-100-A** option / **(2) V-mounting** option

Result sensor distance / measuring aid

Navigation Expert → Sensor → Meas. point 1 → Dist./meas. aid (2947–1)

Description Shows the calculated sensor distance and vernier or wire length (if applicable) required for installation.

User interface e.g. 201.3 mm / B 21

Result sensor type / sensor distance

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

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

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

Factory setting -

Result path length / arc length

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

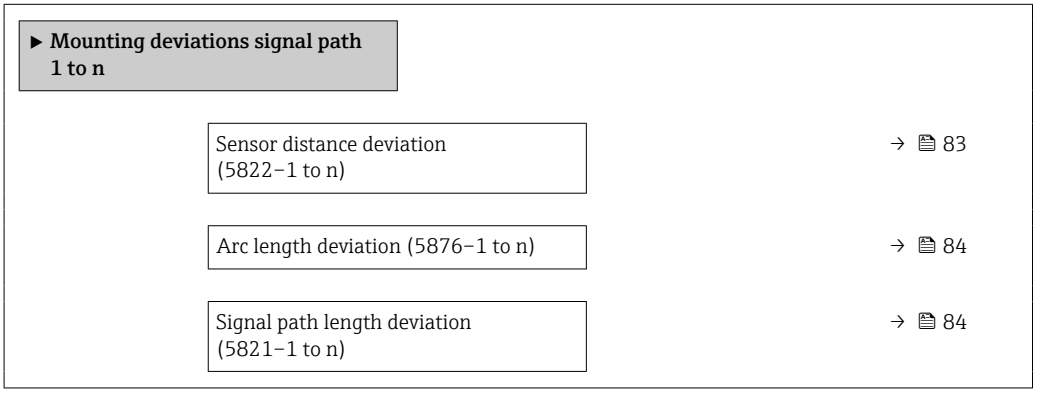
Description Shows the path length calculated and (if applicable) the calculated arc length.

User interface e.g. 1085 mm / 257.56 mm

Factory setting -

"Mounting deviations signal path 1 to n" submenu

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



Sensor distance deviation

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

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

User entry Signed floating-point number

Factory setting 0 mm

Additional information *Description*

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

Arc length deviation

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

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

User entry Signed floating-point number

Factory setting 0 mm

Additional information *Description*

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

Signal path length deviation

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

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

User entry Signed floating-point number

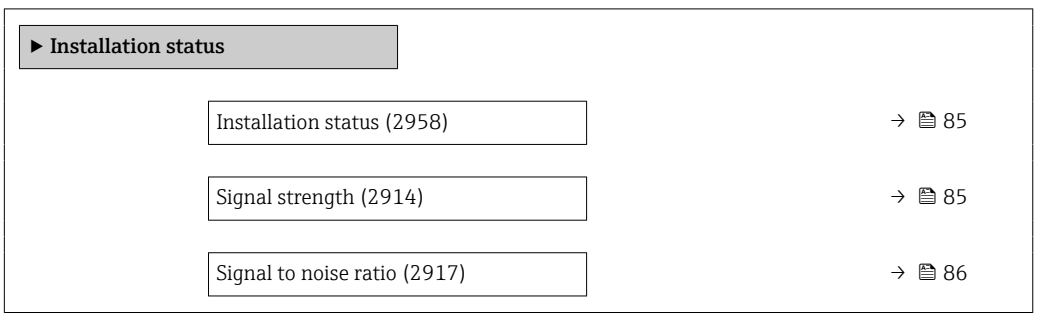
Factory setting 0 mm

Additional information *Description*

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

3.2.4 "Installation status" submenu

Navigation Expert → Sensor → Install. status



Sound velocity (2915)	→ 86
Sound velocity deviation (2986)	→ 86

Installation status

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

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

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

User interface
- Good
- Acceptable
- Bad

Factory setting Good

Signal strength

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

Description Displays the current signal strength.

User interface Signed floating-point number

Additional information *Description*

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

Signal to noise ratio

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

Description Displays the current signal to noise ratio.

User interface Signed floating-point number

Additional information *Description*

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

Sound velocity

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

Description Displays the sound velocity that is currently measured.

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

User interface Signed floating-point number

Sound velocity deviation

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

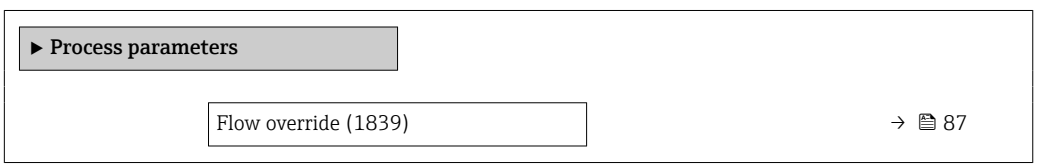
Description Shows the deviation of the installation sound velocity from the measured sound velocity.

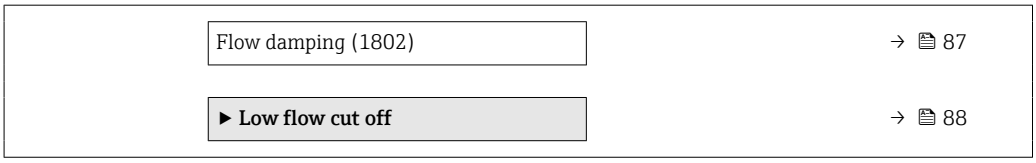
User interface Signed floating-point number

Factory setting 0 %

3.2.5 "Process parameters" submenu

Navigation Expert → Sensor → Process param.





Flow override

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

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

Selection
- Off
- On

Factory setting Off

Additional information *Description*

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

The **Flow override** option can also be activated in the **Status input** submenu: **Assign status input** parameter (1352) (→ 106).

Flow damping

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

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

User entry 0 to 999.9 s

Factory setting 1 s

Additional information

Description

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

User entry

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

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

Effect

The damping affects the following variables of the device:
- Outputs → 107
- Low flow cut off → 88
- Totalizers → 170

"Low flow cut off" submenu

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

▶ Low flow cut off	
Assign process variable (1837)	→ 88
On value low flow cutoff (1805)	→ 89
Off value low flow cutoff (1804)	→ 89

Assign process variable

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

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

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

Factory setting Flow velocity

2) Proportional behavior with first-order lag

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 (→ 88).

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 → 89.

User entry Positive floating-point number

Factory setting Depends on country and nominal diameter

Additional information *Dependency*

The unit depends on the process variable selected in the **Assign process variable** parameter (→ 88).

Off value low flow cutoff

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

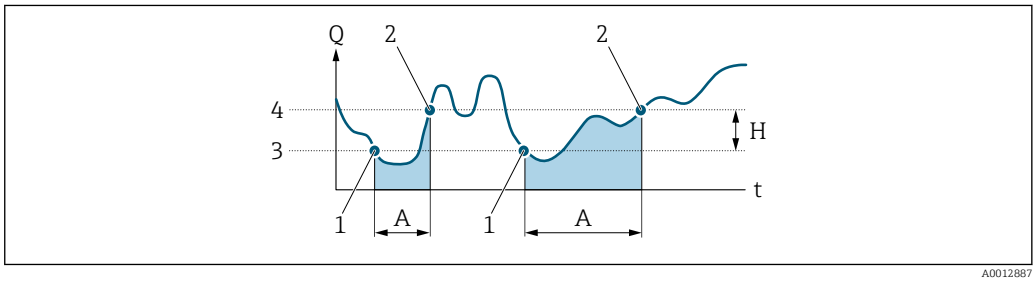
Prerequisite A process variable is selected in the **Assign process variable** parameter (→ 88).

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→ 89.

User entry 0 to 100.0 %

Factory setting 50 %

Additional information *Example*



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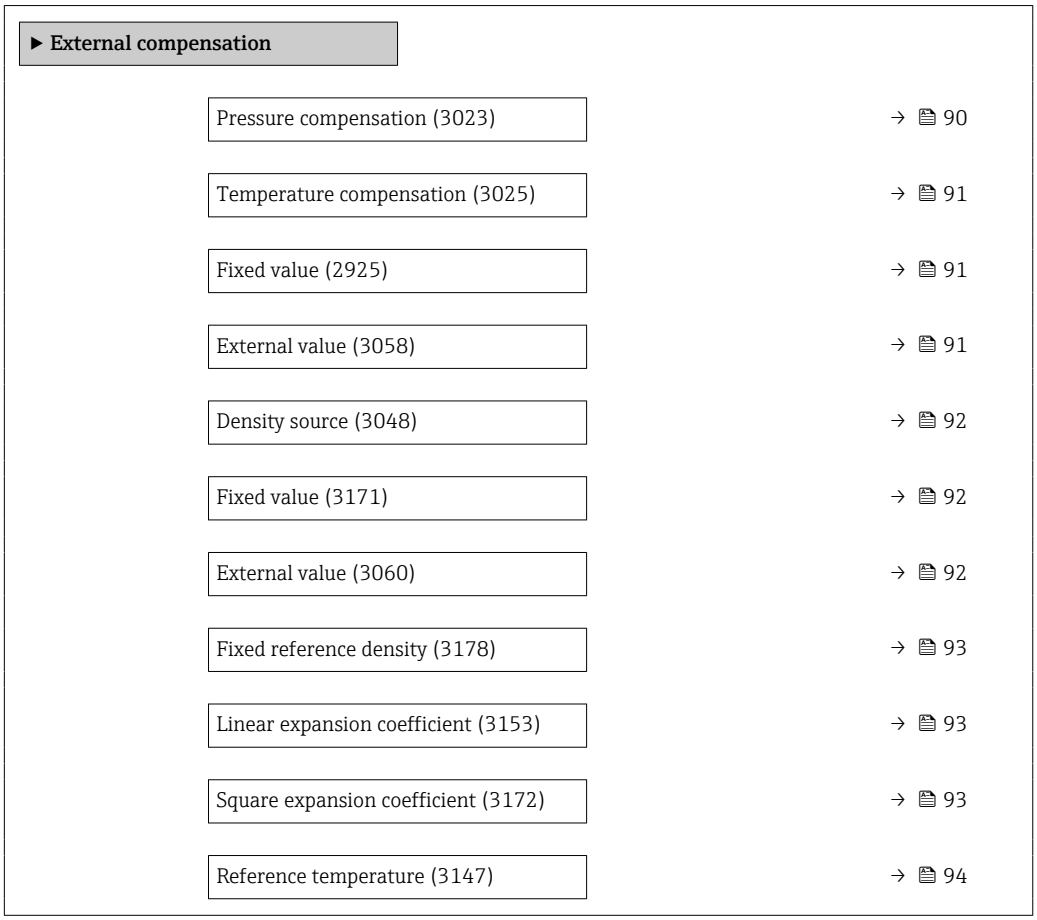
Q Flow
t Time
H Hysteresis
A Low flow cut off active
1 Low flow cut off is activated
2 Low flow cut off is deactivated
3 On value entered
4 Off value entered

3.2.6 "External compensation" submenu

Navigation Expert → Sensor → External comp.



Pressure compensation

Navigation Expert → Sensor → External comp. → Pressure compen. (3023)

Prerequisite The **Off** option is not selected in **Petroleum mode** parameter (4187).

Description Select pressure compensation type.

Selection
- Fixed value
- External value *
- Current input 1 *
- Current input 2 *

Factory setting Fixed value

* Visibility depends on order options or device settings

Temperature compensation

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

Prerequisite The **Calculated value** option is selected in the **Density source** parameter (3048) (→ 92).

Description Select temperature mode for temperature compensation.

Selection
- Fixed value
- External value *
- Current input 1 *
- Current input 2 *

Factory setting Fixed value

Fixed value

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

Prerequisite The **Fixed value** option is selected in **Temperature compensation** parameter (3025) (→ 91).

Description Enter a fixed value for the process temperature.

User entry −50 to 550 °C

Factory setting 20 °C

External value

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

Prerequisite The **External value** option or the **Current input 1...n** option is selected in the **Temperature compensation** parameter (3025) (→ 91).

Description Shows the process temperature read from the external device.

User entry −273.15 to 99 999 °C

Factory setting –

* Visibility depends on order options or device settings

Density source

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

Description Select the source of the density.

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

Factory setting Fixed value

External value

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

Prerequisite The **External value** option or the **Current input 1...n** option is selected in the **Density source** parameter (3048) (→ 92).

Description Shows the density read from the external device.

User entry Positive floating-point number

Factory setting 0 kg/m³

Fixed value

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

Prerequisite The **Fixed value** parameter (3171) (→ 92) is selected in the **Density source** parameter (3048) (→ 92).

Description Enter fixed value for medium density.

User entry 0.01 to 15 000 kg/m³

Factory setting 1 000 kg/m³

* Visibility depends on order options or device settings

Linear expansion coefficient

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

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

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

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

Square expansion coefficient

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

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

User entry $1.0 \cdot 10^{-8}$ to $2.0 \cdot 10^{-3}$

Factory setting $3.8436 \cdot 10^{-6}$

Fixed reference density

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

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

User entry 0.01 to 15 000 kg/m³

Factory setting 1 000 kg/m³

Additional information *Reference density calculation*

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

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- ρ: currently used density for mass flow calculation
- ρ_N: reference density
- t: currently read-in or fixed temperature according to the setting in the **Temperature compensation** parameter (3025) (→ 91)
- t_N: reference temperature at which the reference density applies (e.g. 20 °C)
- Δt: $t - t_N$
- α: linear expansion coefficient of the medium, unit = [1/K]; K = Kelvin
- β: square expansion coefficient of the medium, unit = [1/K²]

Reference temperature

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

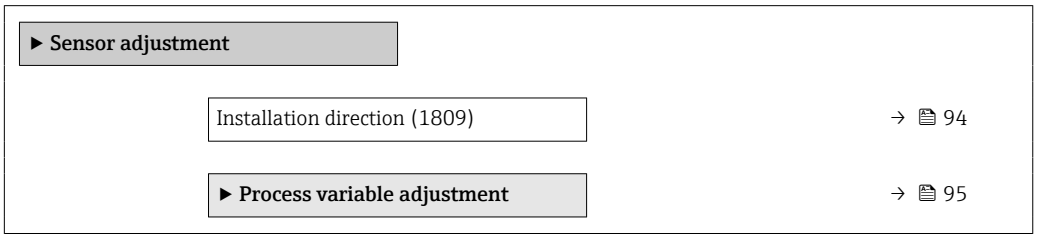
Description Use this function to enter the reference temperature for which the Fixed reference density (3178) (→ 93) applies.

User entry −200 to 450 °C

Factory setting 0 °C

3.2.7 "Sensor adjustment" submenu

Navigation Expert → Sensor → Sensor adjustm.



Installation direction

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

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

Selection
- Forward flow
- Reverse flow

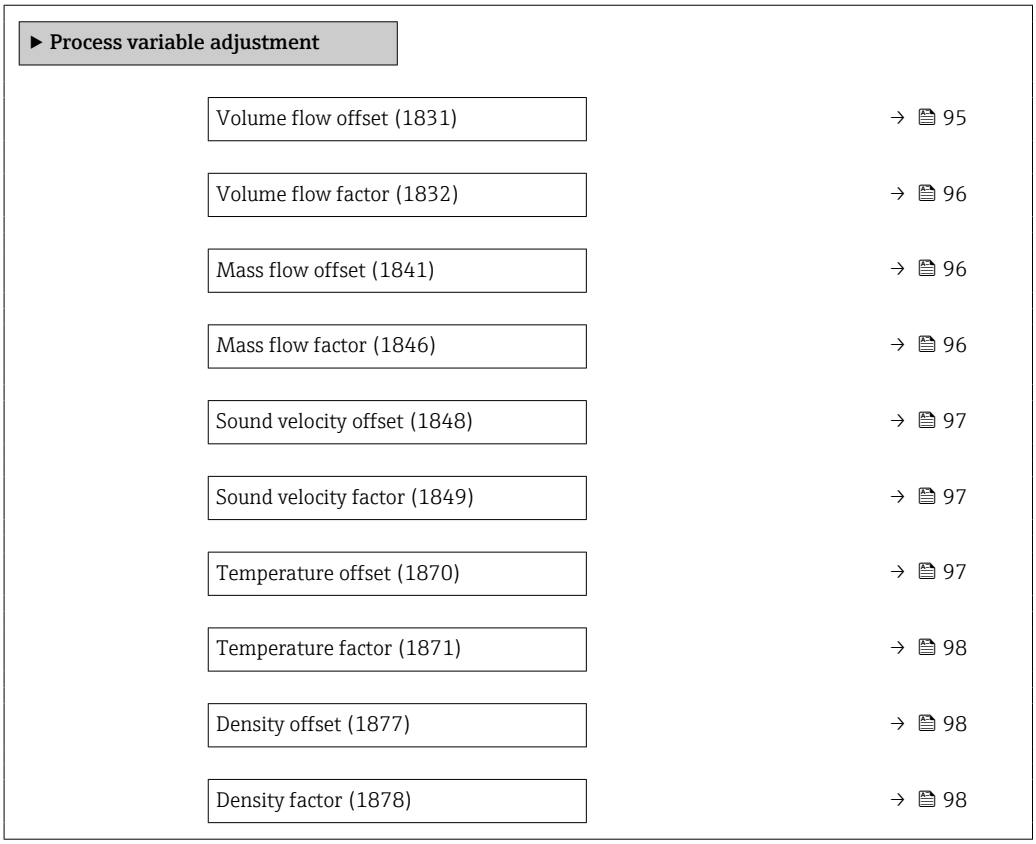
Factory setting Forward flow

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.

"Process variable adjustment" submenu

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust



Volume flow offset

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

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

User entry Signed floating-point number

Factory setting 0 m^3/h

Additional information *Description*

Corrected value = (factor × value) + offset

Volume flow factor

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

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

User entry Positive floating-point number

Factory setting 1

Additional information *Description*

Corrected value = (factor × value) + offset

Mass flow offset

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

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

User entry Signed floating-point number

Factory setting 0 kg/h

Additional information *Description*

Corrected value = (factor × value) + offset

Mass flow factor

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

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

User entry Positive floating-point number

Factory setting 1

Additional information *Description*

Corrected value = (factor × value) + offset

Sound velocity offset

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

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

User entry Signed floating-point number

Factory setting 0 m/s

Additional information *Description*

Corrected value = (factor × value) + offset

Sound velocity factor

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

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

User entry Positive floating-point number

Factory setting 1

Additional information *Description*

Corrected value = (factor × value) + offset

Temperature offset

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

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

User entry Signed floating-point number

Factory setting 0 K

Additional information *Description*

Corrected value = (factor × value) + offset

Temperature factor

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

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

User entry Positive floating-point number

Factory setting 1

Additional information *Description*

Corrected value = (factor × value) + offset

Density offset

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Density offset (1877)

Description Use this function to enter the zero point shift for the density trim. The value is entered in the selected density unit.

User entry Signed floating-point number

Factory setting 0 kg/m³

Density factor

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Density factor (1878)

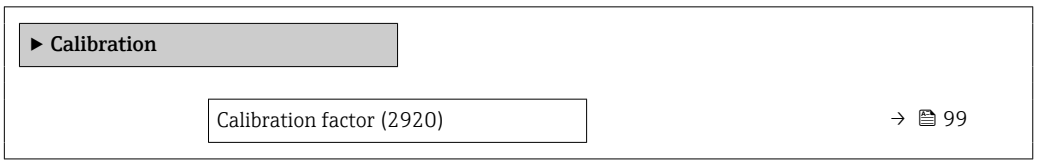
Description Use this function to enter a quantity factor for the density.

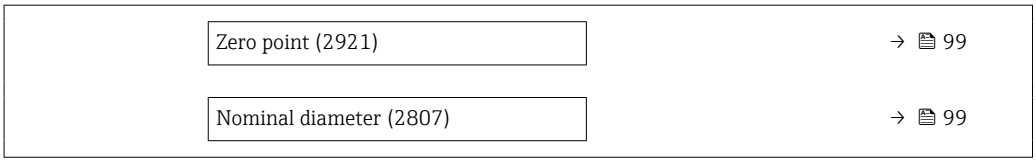
User entry Positive floating-point number

Factory setting 1

3.2.8 "Calibration" submenu

Navigation Expert → Sensor → Calibration





Calibration factor

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

Description Displays the current calibration factor for the sensor.

User interface Signed floating-point number

Factory setting 1

Zero point

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

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

User interface Signed floating-point number

Factory setting 0

Nominal diameter

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

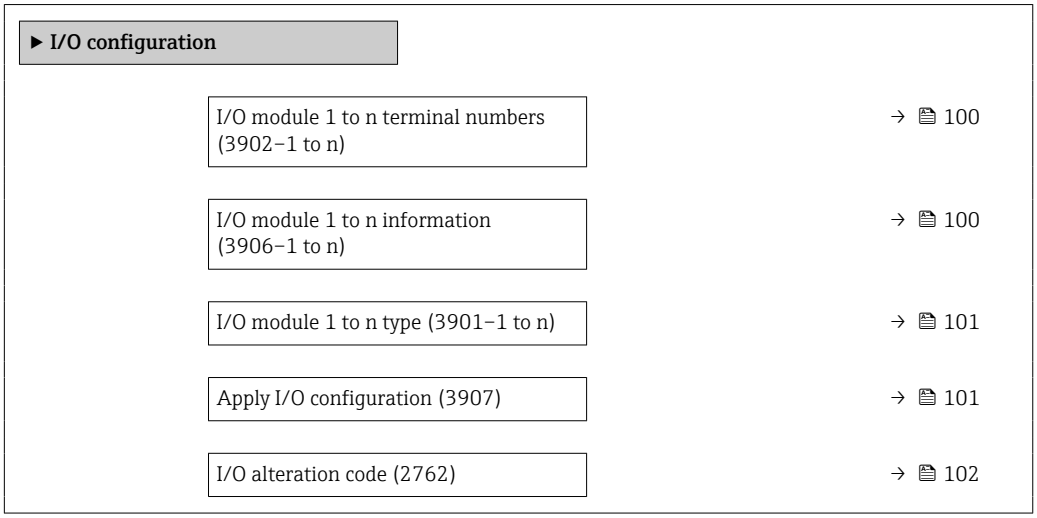
Description Displays the nominal diameter of the sensor.

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

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

3.3 "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"
- "Output; input 4", 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.

Selection

- No
- Yes

Factory setting

No

* Visibility depends on order options or device settings

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

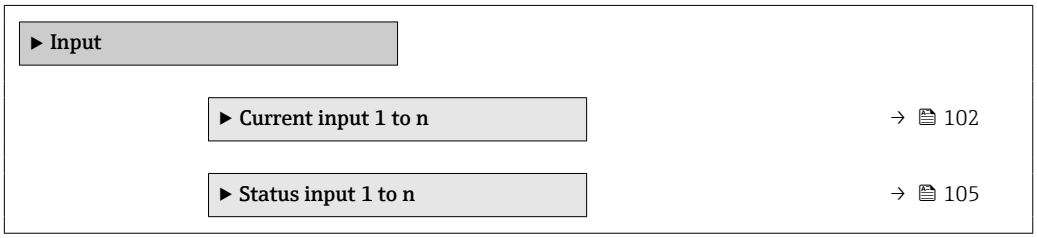
Factory setting 0

Additional information *Description*

The I/O configuration is changed in the **I/O module type** parameter (3901–1 to n) (→ 101).

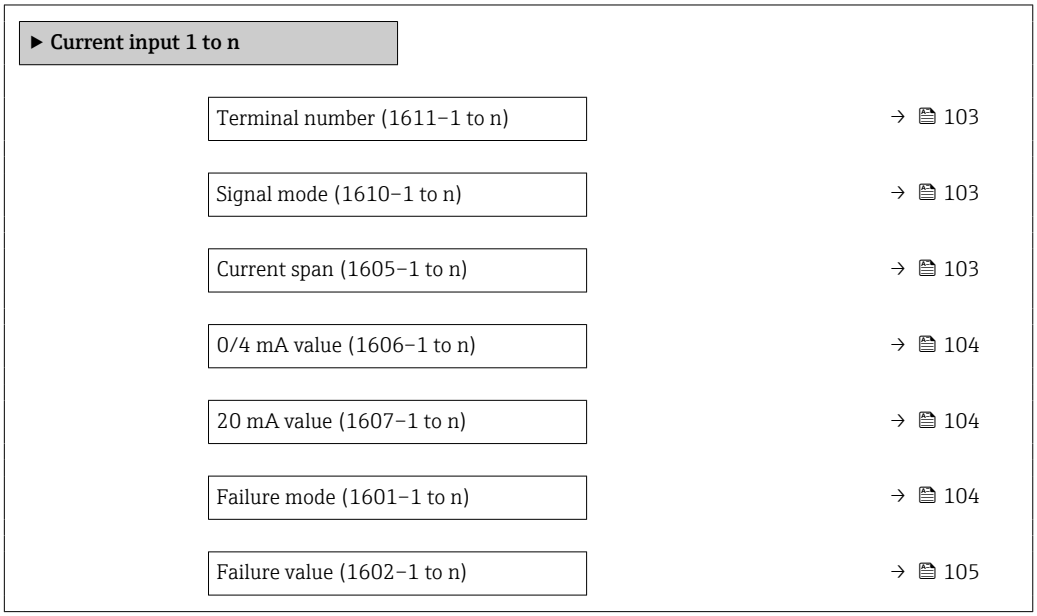
3.4 "Input" submenu

Navigation Expert → Input



3.4.1 "Current input 1 to n" submenu

Navigation Expert → Input → Current input 1 to n



Terminal number

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

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

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

Additional information *"Not used" option*

The current input module does not use any terminal numbers.

Signal mode

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

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

Selection
- Passive
- Active *

Factory setting Passive

Current span

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

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

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

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

Additional information *Examples*

Sample values for the current range: **Current span** parameter (0353) (→ 109)

* Visibility depends on order options or device settings

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 (1605) (→ 103)
- Failure mode (1601) (→ 104)

Configuration examples

Pay attention to the configuration examples for **4 mA value** parameter (0367) (→ 111).

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 (0367) (→ 111).

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 (1605) (→ 103).

Selection
- Alarm
- Last valid value
- Defined value

Factory setting Alarm

Additional information *Options*

- Alarm
  An error message is set.
- Last valid value
  The last valid measured value is used.
- Defined value
  A user-defined measured value is used (**Failure value** parameter (1602) (→ 🖹 105)).

Failure value

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

Prerequisite In the **Failure mode** parameter (1601) (→ 🖹 104), the **Defined value** option is selected.

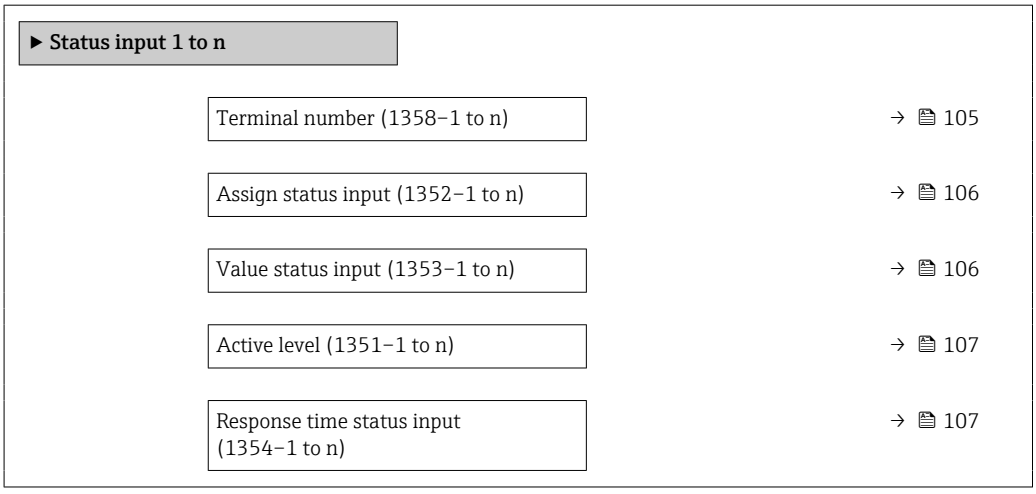
Description Use this function to enter the value that the device uses if it does not receive an input signal from the external device, or if the input signal is invalid.

User entry Signed floating-point number

Factory setting 0

3.4.2 "Status input 1 to n" submenu

Navigation Expert → Input → Status input 1 to n



Terminal number

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

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

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

Additional information *"Not used" option*

The status input module does not use any terminal numbers.

Assign status input

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

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

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

Factory setting Off

Additional information *Options*
- Off
  The status input is switched off.
- Reset totalizer 1…3
  The individual totalizers are reset.
- Reset all totalizers
  All totalizers are reset.
- Flow override
  The Flow override (→ 87) is activated.

Note on the Flow override (→ 87):
- The Flow override (→ 87) is enabled as long as the level is at the status input (continuous signal).
- All other assignments react to a change in level (pulse) at the status input.

Value status input

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

Description Displays the current input signal level.

User interface
- High
- Low

Active level

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

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

Selection
- High
- Low

Factory setting High

Response time status input

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

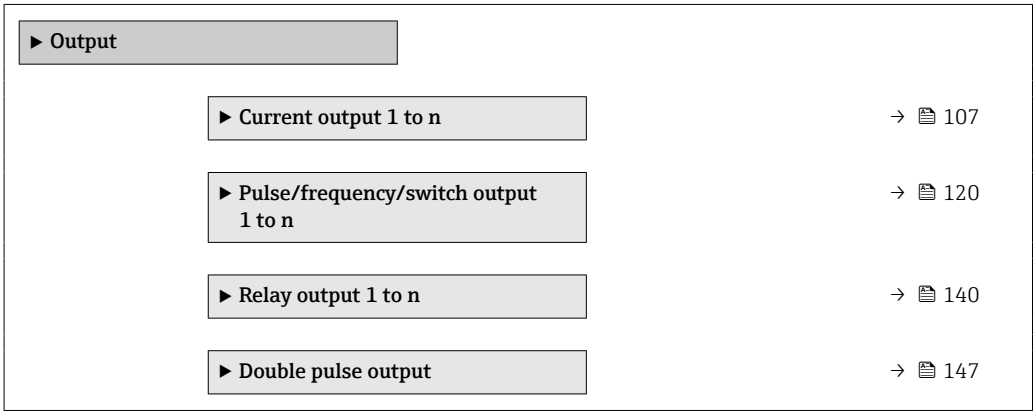
Description Use this function to enter the minimum time period for which the input signal level must be present before the selected function is activated.

User entry 5 to 200 ms

Factory setting 50 ms

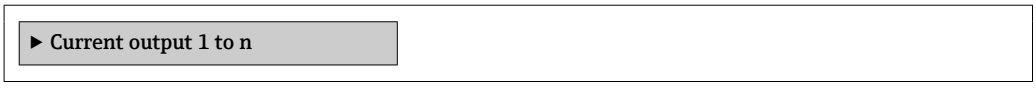
3.5 "Output" submenu

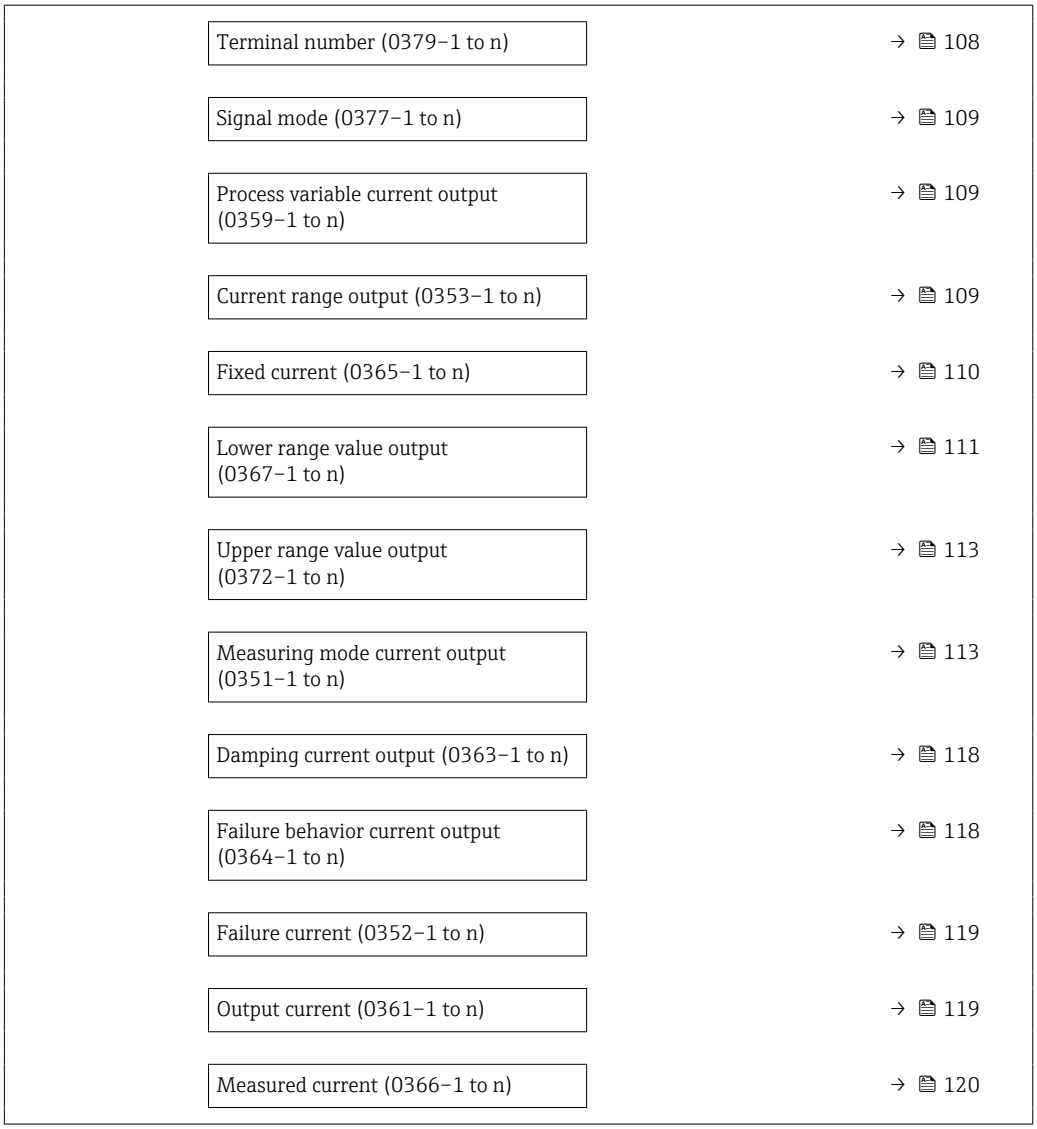
Navigation Expert → Output



3.5.1 "Current output 1 to n" submenu

Navigation Expert → Output → Curr.output 1 to n





Terminal number

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

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

User interface
- Not used
- 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
- Flow velocity
- Sound velocity
- Temperature *
- Pressure *
- Density *
- Reference density *
- S&W volume flow *
- GSV flow *
- NSV flow *
- API gravity *
- API slope *
- Signal strength *
- Signal to noise ratio *
- Acceptance rate *
- Turbulence *
- Electronics temperature
- Profile factor *
- Cross flow factor *

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.

* Visibility depends on order options or device settings

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

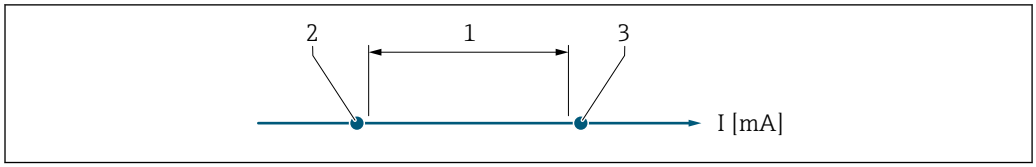
- In the event of a device alarm, the current output adopts the value specified in the **Failure mode** parameter (0364) (→ 118).
- If the measured value is outside the measuring range, the ⚠**S441 Current output 1 to n** diagnostic message is displayed.
- The measuring range is specified via the **Lower range value output** parameter (0367) (→ 111) and **Upper range value output** parameter (0372) (→ 113).

"Fixed current" option

The current value is set via the **Fixed current** parameter (0365) (→ 110).

Example

Shows the relationship between the current range for the output of the process value and the two signal on alarm levels:



1 *Current range for process value*
2 *Lower level for signal on alarm*
3 *Upper level for signal on alarm*

Selection

Selection	1	2	3
4...20 mA NE (3.8...20.5 mA)	3.8 to 20.5 mA	< 3.6 mA	> 21.95 mA
4...20 mA US (3.9...20.8 mA)	3.9 to 20.8 mA US	< 3.6 mA	> 21.95 mA
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 (0353) (→ 109).

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

User entry 0 to 22.5 mA

Factory setting 22.5 mA

Lower range value output

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

Prerequisite In **Current span** parameter (0353) (→ 109), one of the following options is selected:
- 4...20 mA NE (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)
- 4...20 mA (4...20.5 mA)
- 0...20 mA (0...20.5 mA)

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

User entry Signed floating-point number

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

Additional information

Description

Positive and negative values are permitted depending on the process variable assigned in the **Assign current output** parameter (0359) (→ 109). 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 (0372) (→ 113).

Dependency

The unit depends on the process variable selected in the **Assign current output** parameter (0359) (→ 109).

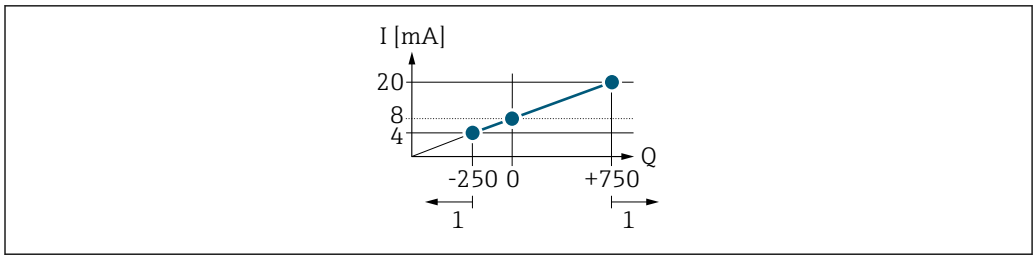
Current output behavior

The current output behaves differently depending on the settings configured in the following parameters:
- Current span (0353) (→ 109)
- Failure mode (0364) (→ 118)

Configuration examples

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

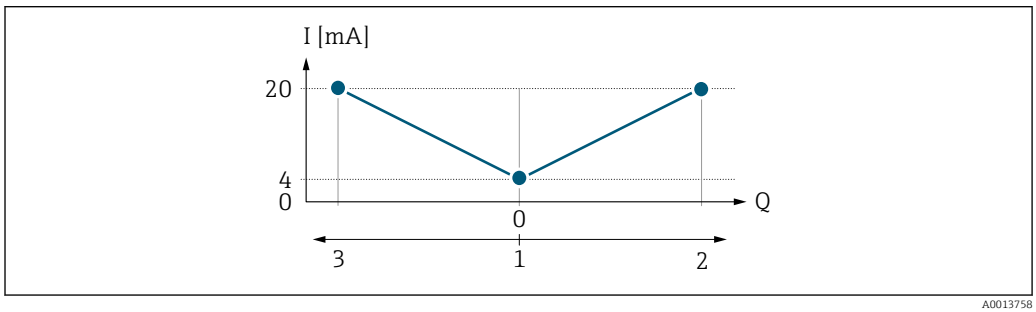
Configuration example A
Measurement mode with **Forward flow** option
- **Lower range value output** parameter (0367) (→ 111) = not equal to zero flow (e.g. −250 m^3/h)
- **Upper range value output** parameter (0372) (→ 113) = not equal to zero flow (e.g. +750 m^3/h)
- Calculated current value = 8 mA 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 (0367) (→ 🖹 111) and **Upper range value output** parameter (0372) (→ 🖹 113). 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 **0/4 mA value** parameter (0367) (→ 🖹 111) and **20 mA value** parameter (0372) (→ 🖹 113) must have the same algebraic sign. The value for the **20 mA value** parameter (0372) (→ 🖹 113) (e.g. reverse flow) corresponds to the mirrored value for the **20 mA value** parameter (0372) (→ 🖹 113) (e.g. flow).

Configuration example C
Measurement mode with **Reverse flow compensation** option
If flow is characterized by severe fluctuations (e.g. when using reciprocating pumps), flow components outside the measuring range are buffered, balanced and output after a maximum delay of 60 s → 🖹 113.

Upper range value output

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

Prerequisite In **Current span** parameter (0353) (→ 109), one of the following options is selected:
- 4...20 mA NE (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)
- 4...20 mA (4...20.5 mA)
- 0...20 mA (0...20.5 mA)

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

User entry Signed floating-point number

Factory setting Depends on country and nominal diameter

Additional information

Description

Positive and negative values are permitted depending on the process variable assigned in the **Assign current output** parameter (0359) (→ 109). 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 (0367) (→ 111).

Dependency

The unit depends on the process variable selected in the **Assign current output** parameter (0359) (→ 109).

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 (0351) (→ 113), different algebraic signs cannot be entered for the values for the **Lower range value output** parameter (0367) (→ 111) and **Upper range value output** parameter (0372) (→ 113). 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 (0367) (→ 111).

Measuring mode current output

Navigation Expert → Output → Curr.output 1 to n → Output mode (0351–1 to n)

Prerequisite One of the following options is selected in the **Assign current output** parameter (0359) (→ 109):
- Volume flow
- Mass flow
- Flow velocity
- Sound velocity

- Temperature *
- Pressure *
- Density *
- Signal strength *
- Signal to noise ratio *
- Acceptance rate *
- Turbulence *
- Electronics temperature

One of the following options is selected in the **Current span** parameter (0353) (→ 109):
- 4...20 mA NE (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)
- 4...20 mA (4...20.5 mA)
- 0...20 mA (0...20.5 mA)

Description

Use this function to select the measuring mode for the current output.

Selection

- Forward flow
- Forward/Reverse flow *
- Reverse flow compensation

Factory setting

Forward flow

Additional information

Description

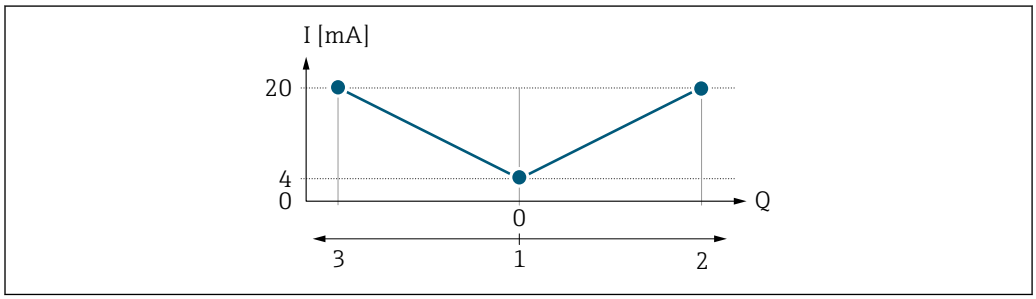
The process variable that is assigned to the current output via the **Assign current output** parameter (0359) (→ 109) is displayed below the parameter.

"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 (0367) (→ 111) and the **Upper range value output** parameter (0372) (→ 113).

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

"Forward/Reverse flow" option



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

* Visibility depends on order options or device settings

- 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 (0367) (→ 111) and **Upper range value output** parameter (0372) (→ 113) must have the same sign.
- The value for the **Upper range value output** parameter (0372) (→ 113) (e.g. reverse flow) corresponds to the mirrored value for the **Upper range value output** parameter (0372) (→ 113) (e.g. forward flow).

"Reverse flow compensation" option

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

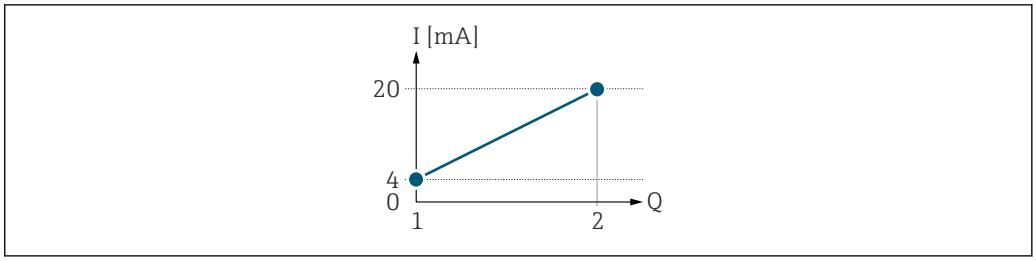
In the event of prolonged and undesired reverse flow, flow values can accumulate in the buffer memory. Due to the configuration of the current output, these values are not factored in, however, i.e. there is no compensation for the reverse flow.

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

Examples of how the current output behaves

Example 1

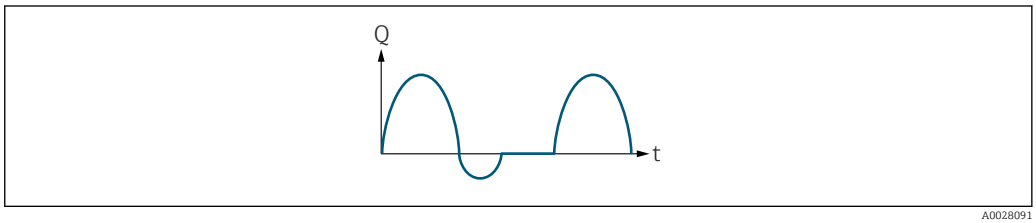
Defined measuring range: lower range value and upper range value with the **same** sign



3 *Measuring range*

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

With the following flow response:

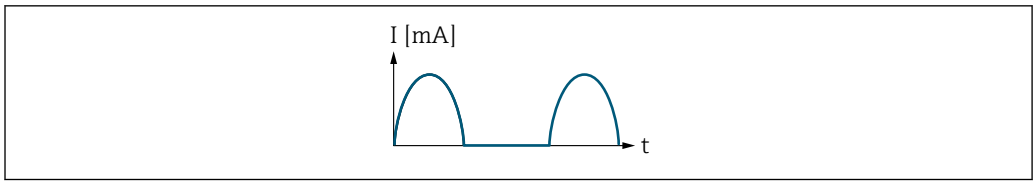


4 *Flow response*

Q *Flow*
t *Time*

With **Forward flow** option

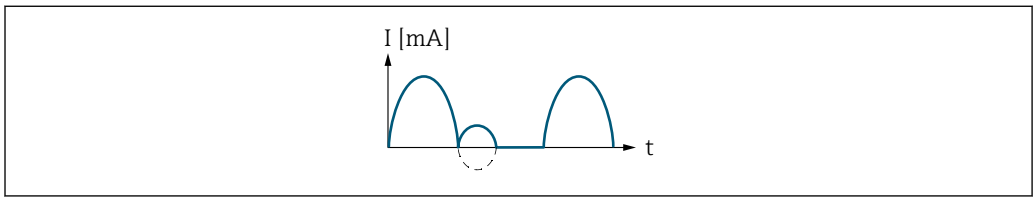
The current output signal is proportional to the process variable assigned. The flow components outside the scaled measuring range are not taken into account for signal output:.



I *Current*
t *Time*

With **Forward/Reverse flow** option

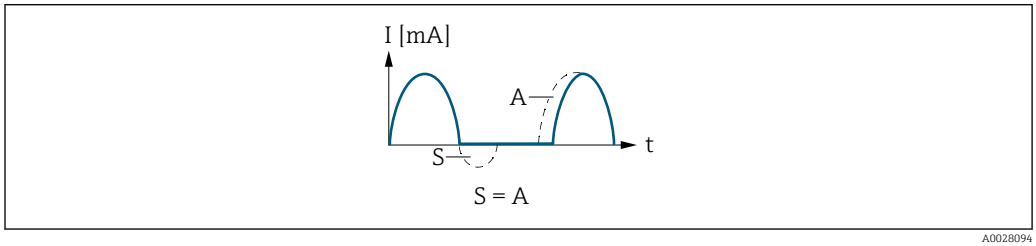
The current output signal is independent of the direction of flow.



I *Current*
t *Time*

With **Reverse flow compensation** option

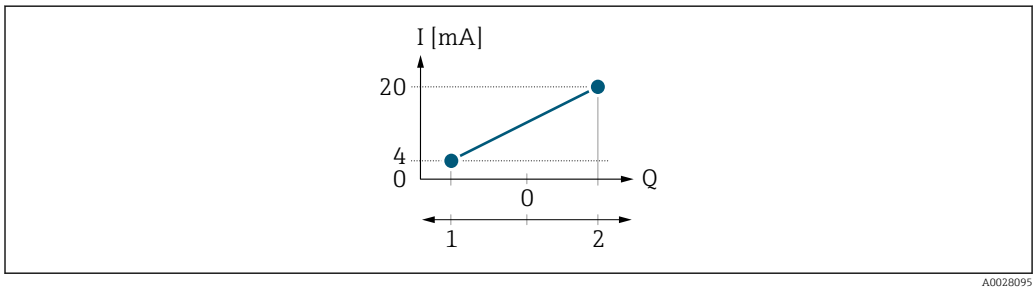
Flow components outside the measuring span are buffered, balanced and output after a maximum delay of 60 s.



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

Example 2

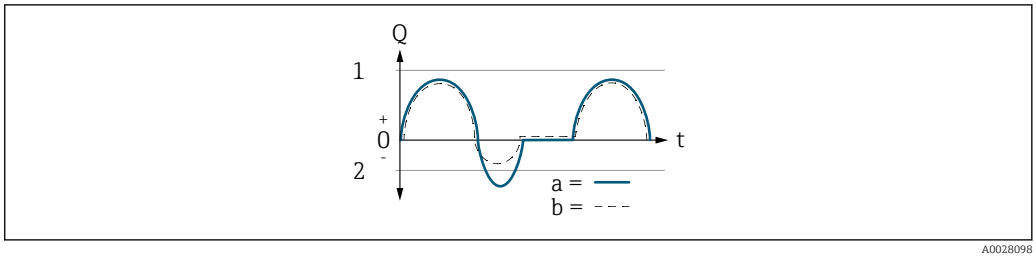
Defined measuring range: lower range value and upper range value with **different** signs



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)*

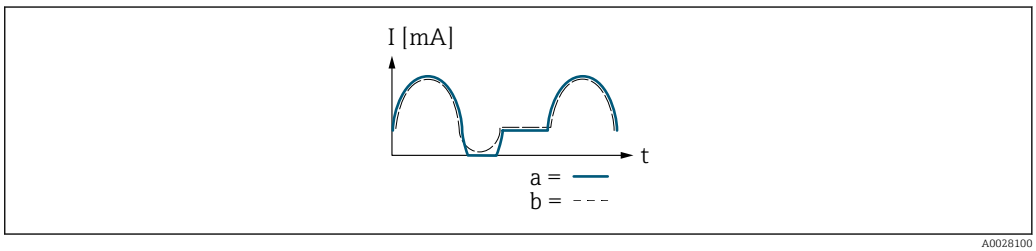
With flow a (—) outside, b (- -) inside the measuring range



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.



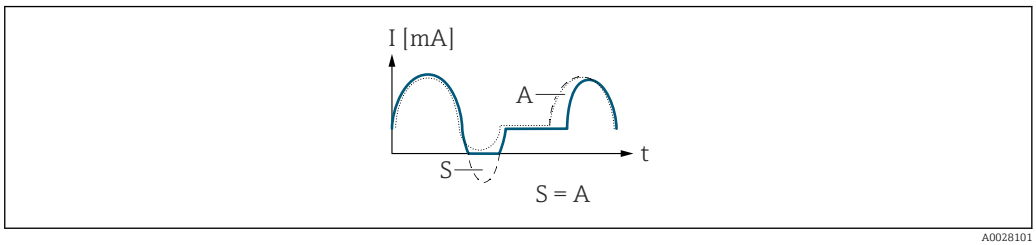
I Current
t Time

With **Forward/Reverse flow** option

This option cannot be selected here since the values for the **Lower range value output** parameter (0367) (→ 🖹 111) and **Upper range value output** parameter (0372) (→ 🖹 113) have different signs.

With **Reverse flow compensation** option

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



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

Damping current output

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

Prerequisite A process variable is selected in the **Assign current output** parameter (0359) (→ 109) and one of the following options is selected in the **Current span** parameter (0353) (→ 109):
- 4...20 mA NE (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)
- 4...20 mA (4...20.5 mA)
- 0...20 mA (0...20.5 mA)

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

User entry 0.0 to 999.9 s

Factory setting 1.0 s

Additional information *User entry*

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

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

Failure behavior current output

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

Prerequisite A process variable is selected in the **Assign current output** parameter (0359) (→ 109) and one of the following options is selected in the **Current span** parameter (0353) (→ 109):
- 4...20 mA NE (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)
- 4...20 mA (4...20.5 mA)
- 0...20 mA (0...20.5 mA)

Description Use this function to select the value of the current output in the event of a device alarm.

Selection
- Min.
- Max.
- Last valid value
- Actual value
- Fixed value

Factory setting Max.

3) proportional transmission behavior with first order delay

Additional information

Description

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

"Min." option

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

The signal on alarm level is defined via the **Current span** parameter (0353) (→ 109).

"Max." option

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

The signal on alarm level is defined via the **Current span** parameter (0353) (→ 109).

"Last valid value" option

The current output adopts the last measured value that was valid before the device alarm occurred.

"Actual value" option

The current output adopts the measured value on the basis of the current flow measurement; the device alarm is ignored.

"Defined value" option

The current output adopts a defined measured value.

The measured value is defined via the **Failure current** parameter (0352) (→ 119).

Failure current

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

Prerequisite The **Defined value** option is selected in the **Failure mode** parameter (0364) (→ 118).

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

User entry 0 to 22.5 mA

Factory setting 22.5 mA

Output current

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

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

User interface 3.59 to 22.5 mA

Measured current

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

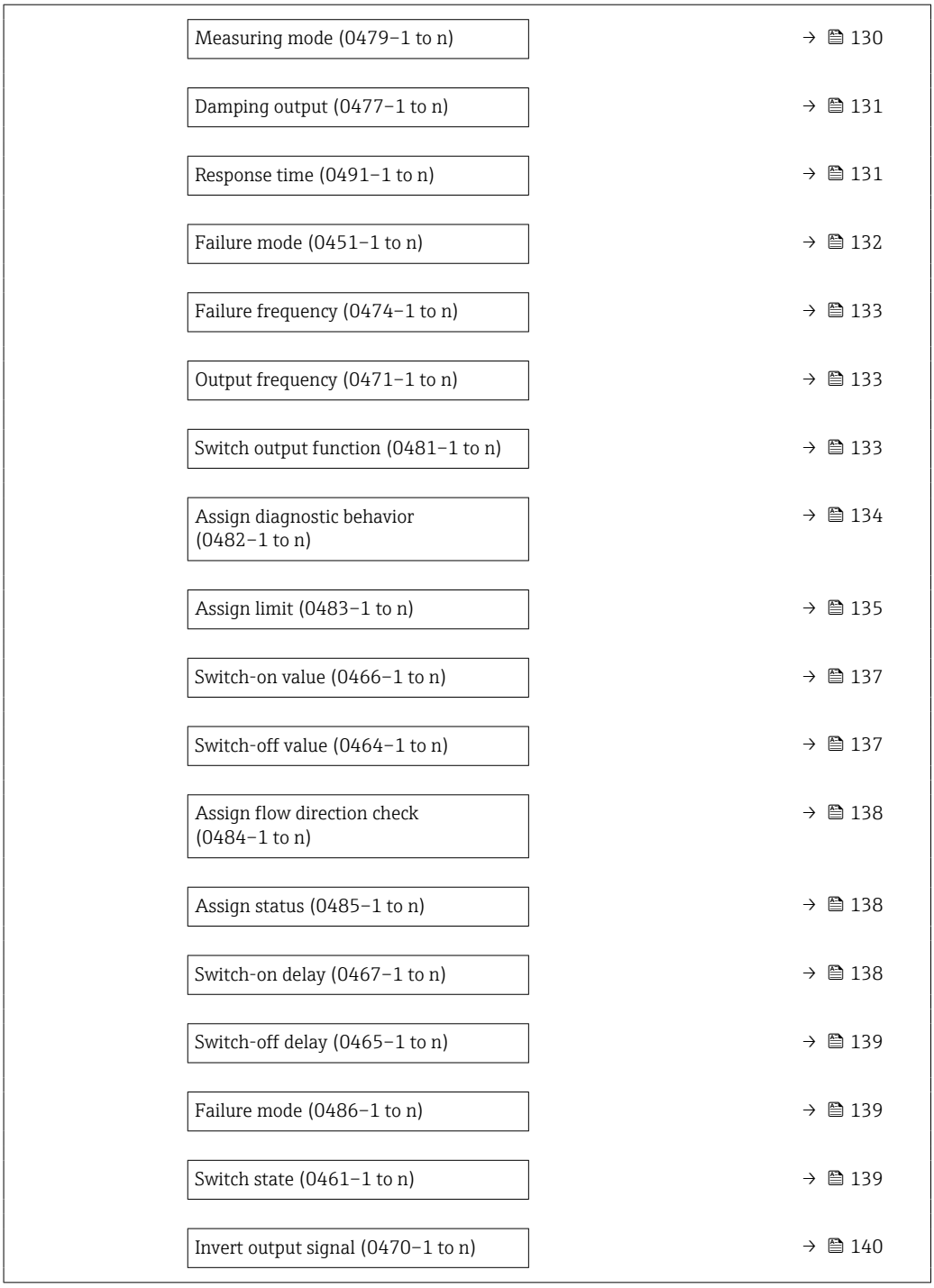
Description Displays the actual measured value of the output current.

User interface 0 to 30 mA

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

Navigation Expert → Output → PFS output 1 to n

▶ **Pulse/frequency/switch output 1 to n**	
Terminal number (0492–1 to n)	→ 121
Signal mode (0490–1 to n)	→ 122
Operating mode (0469–1 to n)	→ 122
Assign pulse output (0460–1 to n)	→ 124
Pulse scaling (0455–1 to n)	→ 124
Pulse width (0452–1 to n)	→ 125
Measuring mode (0457–1 to n)	→ 126
Failure mode (0480–1 to n)	→ 126
Pulse output (0456–1 to n)	→ 127
Assign frequency output (0478–1 to n)	→ 128
Minimum frequency value (0453–1 to n)	→ 128
Maximum frequency value (0454–1 to n)	→ 129
Measuring value at minimum frequency (0476–1 to n)	→ 129
Measuring value at maximum frequency (0475–1 to n)	→ 129



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

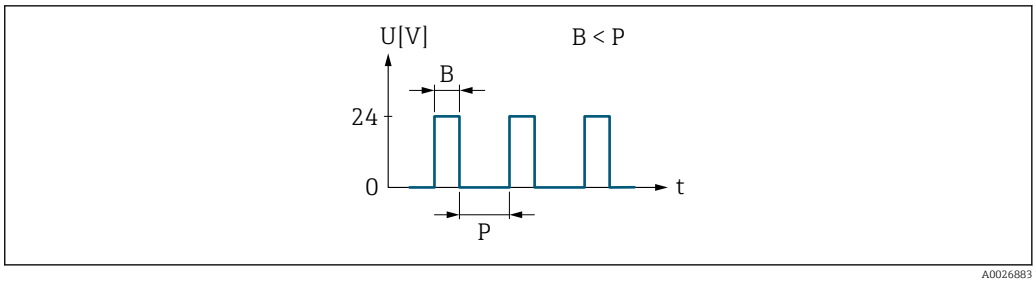
Factory setting Pulse

Additional information *"Pulse" option*

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

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

* Visibility depends on order options or device settings



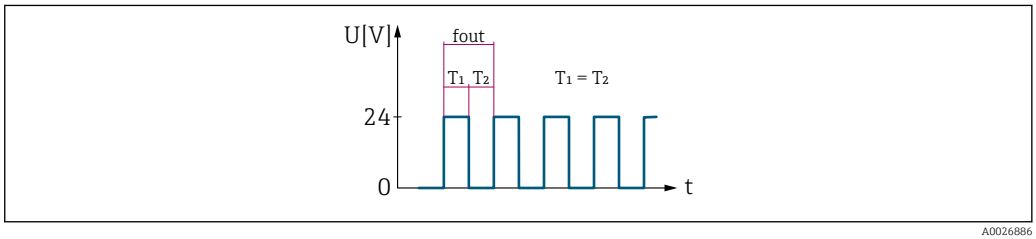
6 *Quantity-proportional pulse (pulse value) with pulse width to be configured*

B Pulse width entered
P Pauses between the individual pulses

"Frequency" option

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

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

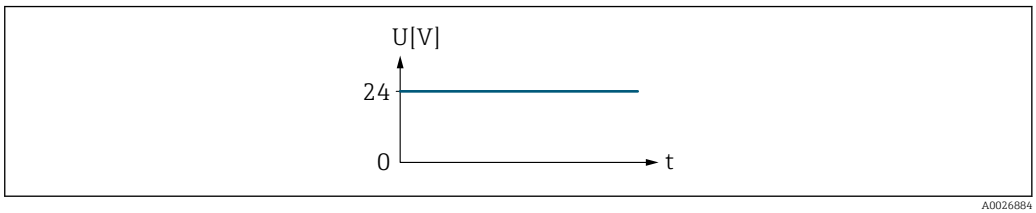


7 *Flow-proportional frequency output*

"Switch" option

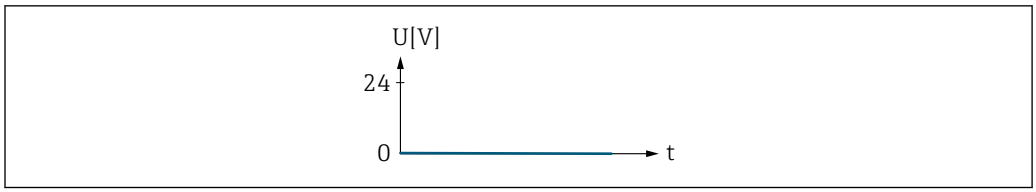
Contact for displaying a condition (e.g. alarm or warning if a limit value is reached)

Example
Alarm response without alarm



8 *No alarm, high level*

Example
Alarm response in case of alarm



9 *Alarm, low level*

Assign pulse output

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

Prerequisite The **Pulse** option is selected in **Operating mode** parameter (0469) (→ 122).

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

Selection
- Off
- Volume flow
- Mass flow
- GSV flow *
- NSV flow *
- S&W volume flow *
- Product 1 volume flow *
- Product 2 volume flow *
- Product 3 volume flow *
- Product 4 volume flow *
- Product 5 volume flow *
- Product 1 mass flow *
- Product 2 mass flow *
- Product 3 mass flow *
- Product 4 mass flow *
- Product 5 mass flow *
- Product 1 NSV flow *
- Product 2 NSV flow *
- Product 3 NSV flow *
- Product 4 NSV flow *
- Product 5 NSV 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 (0469) (→ 122) and a process variable is selected in the **Assign pulse output** parameter (0460) (→ 124).

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 Positive floating point number

Factory setting Depends on country and nominal diameter

Additional information *User entry*

Weighting of the pulse output with a quantity.

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

Pulse width

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

Prerequisite The **Pulse** option is selected in the **Operating mode** parameter (0469) (→ 122) and a process variable is selected in the **Assign pulse output** parameter (0460) (→ 124).

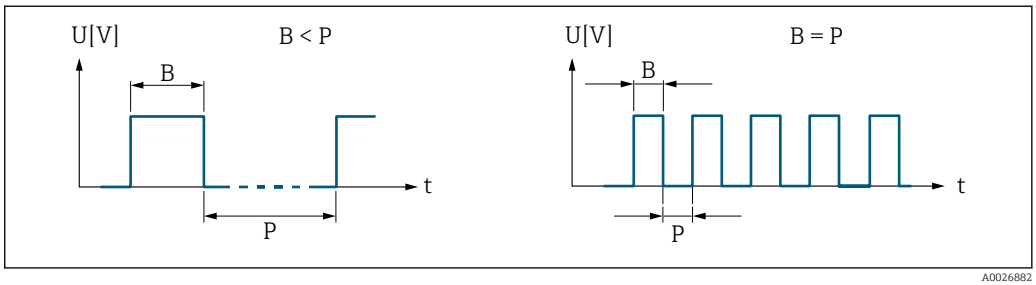
Description Use this function to enter the duration of the output pulse.

User entry 0.05 to 2 000 ms

Factory setting 100 ms

Additional information *Description*

- Define how long a pulse is (duration).
- The maximum pulse rate is defined by f_{max} = 1 / (2 × pulse width).
- The interval between two pulses lasts at least as long as the set pulse width.
- The maximum flow is defined by Q_{max} = f_{max} × pulse value.
- If the flow exceeds these limit values, the measuring device displays the **443 Pulse output 1 to n** diagnostic message.



B Pulse width entered
P Pauses between the individual pulses

Example

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

Measuring mode

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

Prerequisite *The "Pulse" option is selected in the "Operating mode" parameter (0469) and one of the following options is selected in the "Assign pulse output" parameter (0460):*

- Volume flow
- Mass 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 *Options*

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

For a detailed description of the options available, see the **Measuring mode** parameter (0351) (→ 113)

Examples

For a detailed description of the configuration examples, see the **Measuring mode** parameter (0351) (→ 113)

Failure mode

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

Prerequisite The **Pulse** option is selected in the **Operating mode** parameter (0469) (→ 122) and a process variable is selected in the **Assign pulse output** parameter (0460) (→ 124).

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

Selection

- Actual value
- No pulses

Factory setting No pulses

Additional information

Description

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

Options

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

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

Pulse output

Navigation

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

Prerequisite

The **Pulse** option is selected in the **Operating mode** parameter (0469) (→ 122) parameter.

Description

Displays the pulse frequency currently output.

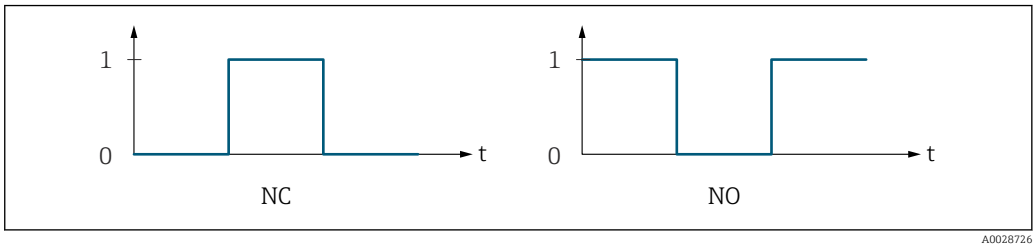
User interface

Positive floating-point number

Additional information

Description

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



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

The output behavior can be reversed via the **Invert output signal** parameter (0470) (→ 140) 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 (0480) (→ 126)) can be configured.

Assign frequency output

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

Prerequisite The **Frequency** option is selected in **Operating mode** parameter (0469) (→ 122).

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

Selection
- Off
- Volume flow
- Mass flow
- Flow velocity
- Sound velocity
- Temperature *
- Pressure *
- Density *
- Reference density *
- S&W volume flow *
- GSV flow *
- NSV flow *
- API gravity *
- API slope *
- Signal strength *
- Signal to noise ratio *
- Acceptance rate *
- Turbulence *
- Electronics temperature
- Profile factor *
- Cross flow factor *

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 (0469) (→ 122) and a process variable is selected in the **Assign frequency output** parameter (0478) (→ 128).

Description Use this function to enter the minimum frequency.

User entry 0.0 to 10 000.0 Hz

Factory setting 0.0 Hz

* Visibility depends on order options or device settings

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 (0469) (→ 122) and a process variable is selected in the **Assign frequency output** parameter (0478) (→ 128).

Description Use this function to enter the end value frequency.

User entry 0.0 to 10 000.0 Hz

Factory setting 10 000.0 Hz

Measuring value at minimum frequency

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

Prerequisite The **Frequency** option is selected in the **Operating mode** parameter (0469) (→ 122) and a process variable is selected in the **Assign frequency output** parameter (0478) (→ 128).

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 (0478) (→ 128).

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 (0469) (→ 122) and a process variable is selected in the **Assign frequency output** parameter (0478) (→ 128).

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 (0478) (→ 128).

Measuring mode

Navigation

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

Prerequisite

The **Frequency** option is selected in the **Operating mode** parameter (0469) (→ 122) and one of the following options is selected in the **Assign frequency output** parameter (0478) (→ 128):
- Off
- Volume flow
- Mass flow
- Flow velocity
- Sound velocity
- Temperature *
- Pressure *
- Density *
- Signal strength *
- Signal to noise ratio *
- Acceptance rate *
- Turbulence *
- 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

Options

For a detailed description of the options available, see the **Measuring mode** parameter (0351) (→ 113)

Examples

For a detailed description of the configuration examples, see the **Measuring mode** parameter (0351) (→ 113)

* Visibility depends on order options or device settings

Damping output

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

Prerequisite *The "Frequency" option is selected in the "Operating mode" parameter (0469) and one of the following options is selected in the "Assign frequency output" parameter (0478):*

- Volume flow
- Mass flow
- Flow velocity
- Sound velocity
- Temperature *
- Pressure *
- Density *
- Signal strength *
- Signal to noise ratio *
- Acceptance rate *
- Turbulence *
- 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

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 *The "Frequency" option is selected in the "Operating mode" parameter (0469) and one of the following options is selected in the "Assign frequency output" parameter (0478):*

- Volume flow
- Mass flow
- Flow velocity
- Sound velocity
- Temperature *

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

- Pressure *
- Density *
- Signal strength *
- Signal to noise ratio *
- Acceptance rate *
- Turbulence *
- Electronics temperature

Description

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

User interface

Positive floating-point number

Additional information

Description

The response time is made up of the time specified for the following dampings:
- Damping of pulse/frequency/switch output → 118
  and
- Depending on the measured variable assigned to the output.
  - Flow damping
    or
  - Temperature 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 (0469) (→ 122) and a process variable is selected in the **Assign frequency output** parameter (0478) (→ 128).

Description

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

Selection

- Actual value
- Defined value
- 0 Hz

Factory setting

0 Hz

Additional information

Options

- Actual value
  In the event of a device alarm, the frequency output continues on the basis of the current flow measurement. The device alarm is ignored.
- Defined value
  In the event of a device alarm, the frequency output continues on the basis of a predefined value. The Failure frequency (0474) (→ 133) 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".

* Visibility depends on order options or device settings

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

Failure frequency

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

Prerequisite In the **Operating mode** parameter (0469) (→ 122), the **Frequency** option is selected, in the **Assign frequency output** parameter (0478) (→ 128) a process variable is selected, and in the **Failure mode** parameter (0451) (→ 132), the **Defined value** option is selected.

Description Enter frequency output value in alarm condition.

User entry 0.0 to 12 500.0 Hz

Factory setting 0.0 Hz

Output frequency

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

Prerequisite In the **Operating mode** parameter (0469) (→ 122), the **Frequency** option is selected.

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

User interface 0.0 to 12 500.0 Hz

Switch output function

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

Prerequisite The **Switch** option is selected in the **Operating mode** parameter (0469) (→ 122).

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

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

Factory setting Off

Additional information *Options*

- Off
  The switch output is permanently switched off (open, non-conductive).
- On
  The switch output is permanently switched on (closed, conductive).
- Diagnostic behavior
  Indicates if the diagnostic event is present or not. Is used to output diagnostic information and to react to it appropriately at the system level.
- Limit
  Indicates if a specified limit value has been reached for the process variable. Is used to output diagnostic information relating to the process and to react to it appropriately at the system level.
- Status
  Displays the device status 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 (0469) (→ 122), the **Switch** option is selected.
- In the **Switch output function** parameter (0481) (→ 133), the **Diagnostic behavior** option is selected.

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

Selection
- Alarm
- Alarm or warning
- Warning

Factory setting Alarm

Additional information *Description*

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

Selection

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

Assign limit

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

Prerequisite
- The **Switch** option is selected in the **Operating mode** parameter (0469) (→ 122).
- The **Limit** option is selected in the **Switch output function** parameter (0481) (→ 133).

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

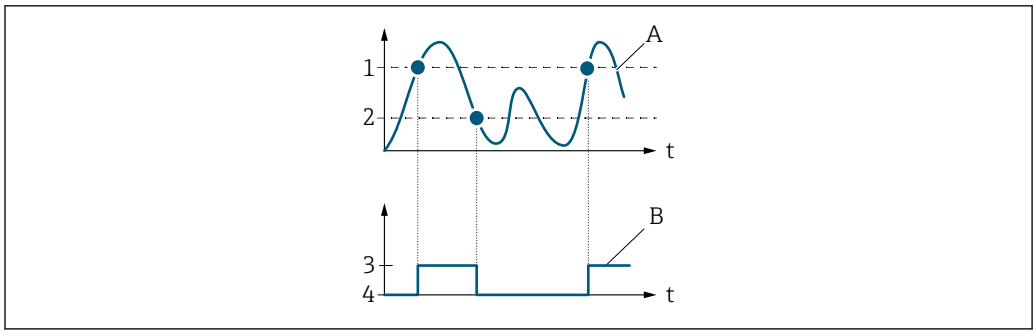
Selection
- Off
- Volume flow
- Mass flow
- Flow velocity
- Sound velocity
- Temperature *
- Pressure *
- Density *
- Reference density *
- S&W volume flow *
- GSV flow *
- NSV flow *
- API gravity *
- API slope *
- Signal strength *
- Signal to noise ratio *
- Acceptance rate *
- Turbulence *
- Electronics temperature
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Profile factor *
- Cross flow factor *

Factory setting Volume flow

Additional information *Description*

Behavior of status output when Switch-on value (0466) > Switch-off value (0464):
- Process variable > Switch-on value (0466): transistor is conductive
- Process variable < Switch-off value (0464): transistor is non-conductive

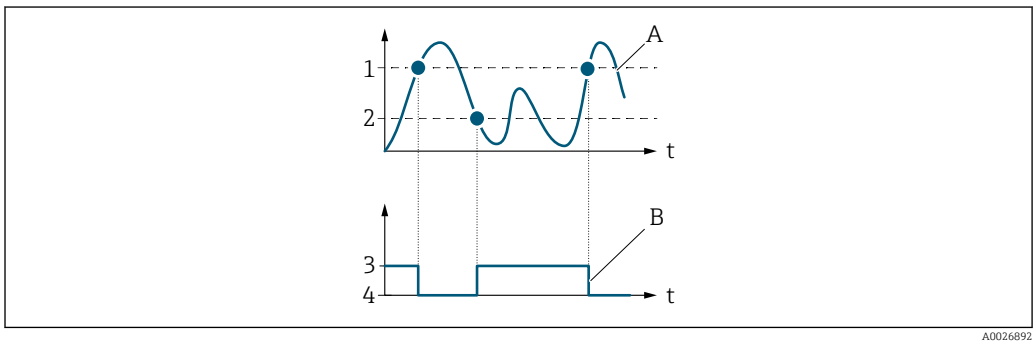
* Visibility depends on order options or device settings



A0026891

1 Switch-on value (0466)
2 Switch-off value (0464)
3 Conductive
4 Non-conductive
A Process variable
B Status output

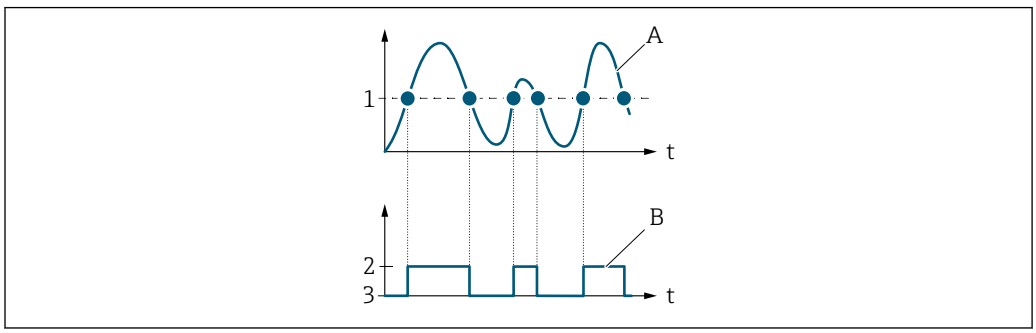
Behavior of status output when Switch-on value (0466) < Switch-off value (0464):
- Process variable < Switch-on value (0466): transistor is conductive
- Process variable > Switch-off value (0464): transistor is non-conductive



A0026892

1 Switch-off value (0464)
2 Switch-on value (0466)
3 Conductive
4 Non-conductive
A Process variable
B Status output

Behavior of status output when Switch-on value (0466) = Switch-off value (0464):
- Process variable > Switch-on value (0466): transistor is conductive
- Process variable < Switch-off value (0464): transistor is non-conductive



A0026893

1 Switch-on value (0466) = Switch-off value (0464)
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 (0469) (→ 122).
- The **Limit** option is selected in the **Switch output function** parameter (0481) (→ 133).

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

User entry Signed floating-point number

Factory setting Depends on country

Additional information

Description

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

When using a hysteresis: Switch-on value (0466) > Switch-off value (0464).

Dependency

The unit depends on the process variable selected in the **Assign limit** parameter (0483) (→ 135).

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 (0469) (→ 122).
- The **Limit** option is selected in the **Switch output function** parameter (0481) (→ 133).

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

User entry Signed floating-point number

Factory setting Depends on country

Additional information

Description

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

When using a hysteresis: Switch-on value (0466) > Switch-off value (0464).

Dependency

The unit depends on the process variable selected in the **Assign limit** parameter (0483) (→ 135).

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 (0469) (→ 122).
- The **Flow direction check** option is selected in the **Switch output function** parameter (0481) (→ 133).

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

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

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 (0469) (→ 122).
- The **Status** option is selected in the **Switch output function** parameter (0481) (→ 133).

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

Selection
- Off
- Low flow cut off
- Product identification *

Factory setting Low flow cut off

Additional information *Options*

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 (0469) (→ 122).
- The **Limit** option is selected in the **Switch output function** parameter (0481) (→ 133).

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 (0469) (→ 122).
- The **Limit** option is selected in the **Switch output function** parameter (0481) (→ 133).

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

User entry 0.0 to 100.0 s

Factory setting 0.0 s

Failure mode

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

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

Selection
- Actual status
- Open
- Closed

Factory setting Open

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

Switch state

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

Prerequisite The **Switch** option is selected in the **Operating mode** parameter (0469) (→ 122).

Description Displays the current switch status of the status output.

User interface
- Open
- Closed

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

Invert output signal

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

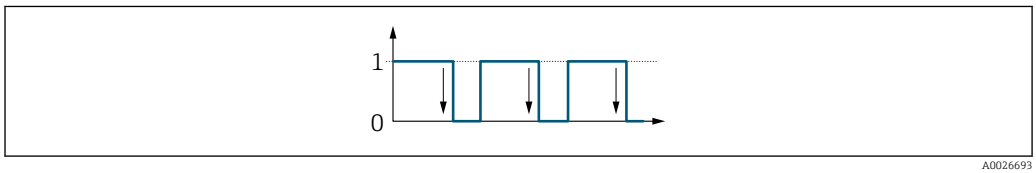
Description Use this function to select whether to invert the output signal.

Selection
- No
- Yes

Factory setting No

Additional information *Selection*

No option (passive - negative)



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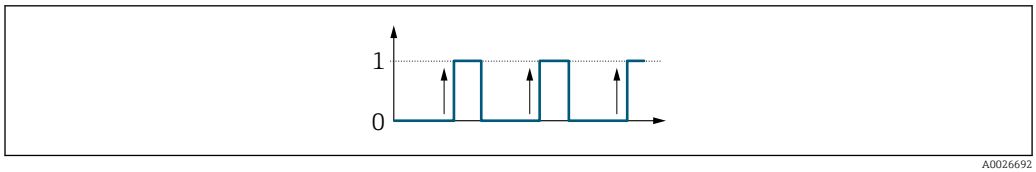
Yes option (passive - positive)



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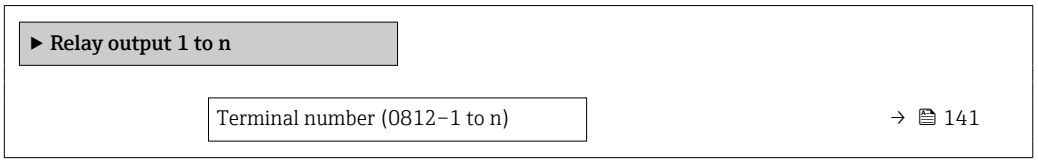
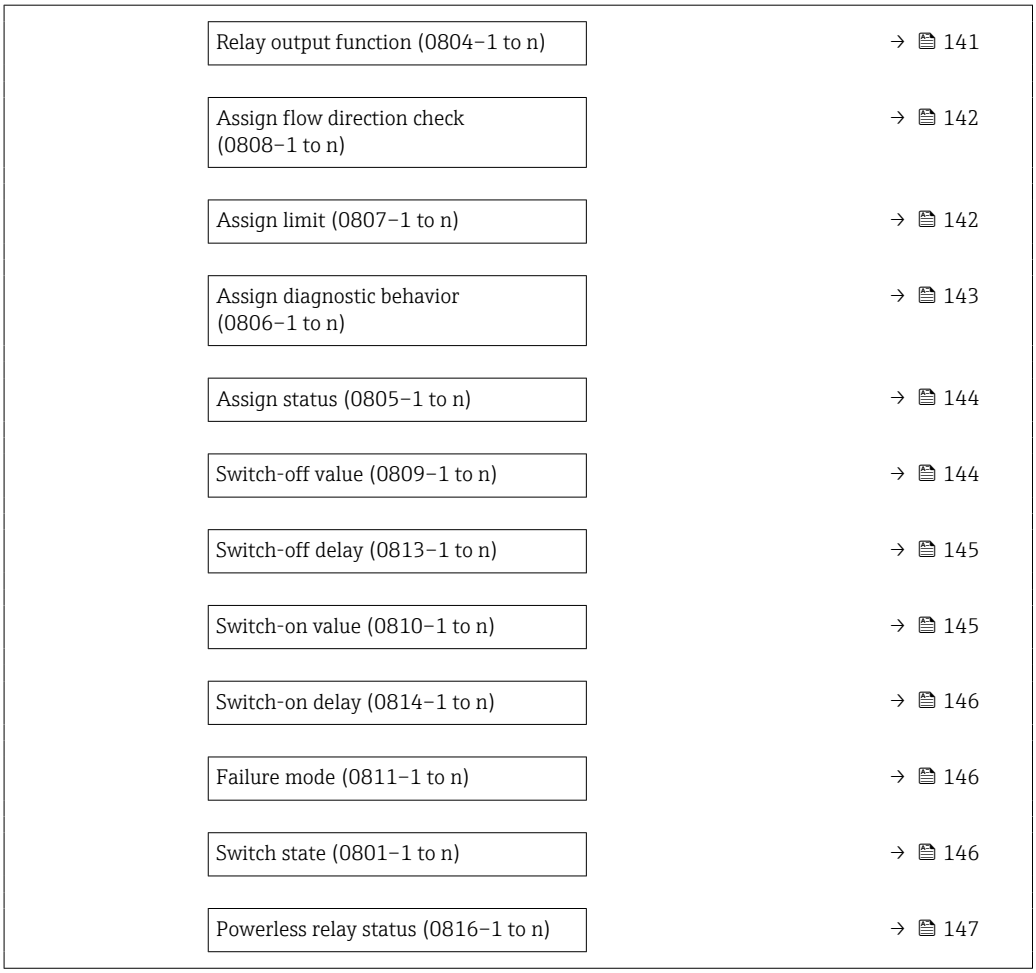
3.5.3 "Relay output 1 to n" submenu

Navigation Expert → Output → Relay output 1 to n





Terminal number

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

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

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

Additional information *"Not used" option*

The relay output module does not use any terminal numbers.

Relay output function

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

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

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

Factory setting Closed

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

Assign flow direction check

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

Prerequisite The **Flow direction check** option is selected in the **Relay output function** parameter (0804) (→ 141).

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

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

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 (0804) (→ 141).

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

Selection
- Off
- Volume flow
- Mass flow
- Flow velocity
- Sound velocity
- Temperature *
- Pressure *
- Density *
- Reference density *
- S&W volume flow *
- GSV flow *
- NSV flow *
- API gravity *
- API slope *
- Signal strength *
- Signal to noise ratio *
- Acceptance rate *
- Turbulence *
- Electronics temperature
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Profile factor *
- Cross flow factor *

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 (0804) (→ 141), the **Diagnostic behavior** option is selected.

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

Selection
- Alarm
- Alarm or warning
- Warning

Factory setting Alarm

* Visibility depends on order options or device settings

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.

Assign status

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

Prerequisite In the **Relay output function** parameter (0804) (→ 141), the **Digital Output** option is selected.

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

Selection
- Off
- Low flow cut off
- Product identification *

Factory setting Off

Switch-off value

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

Prerequisite The **Limit** option is selected in the **Relay output function** parameter (0804) (→ 141).

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

User entry Signed floating-point number

Factory setting 0 m^3/h

* Visibility depends on order options or device settings

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 (0466) > Switch-off value (0464).

Dependency

The unit is dependent on the process variable selected in the **Assign limit** parameter (0807) (→ 142).

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 (0804) (→ 141), the **Limit** option is selected.

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

User entry 0.0 to 100.0 s

Factory setting 0.0 s

Switch-on value

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

Prerequisite The **Limit** option is selected in the **Relay output function** parameter (0804) (→ 141).

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

User entry Signed floating-point number

Factory setting 0 m^3/h

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 (0466) > Switch-off value (0464).

Dependency

The unit is dependent on the process variable selected in the **Assign limit** parameter (0807) (→ 142).

Switch-on delay

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

Prerequisite In the **Relay output function** parameter (0804) (→ 141), the **Limit** option is selected.

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

User entry 0.0 to 100.0 s

Factory setting 0.0 s

Failure mode

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

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

Selection
- Actual status
- Open
- Closed

Factory setting Open

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

Switch state

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

Description Displays the current status of the relay output.

User interface
- Open
- Closed

Additional information *User interface*

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

Powerless relay status

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

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

Selection

- Open
- Closed

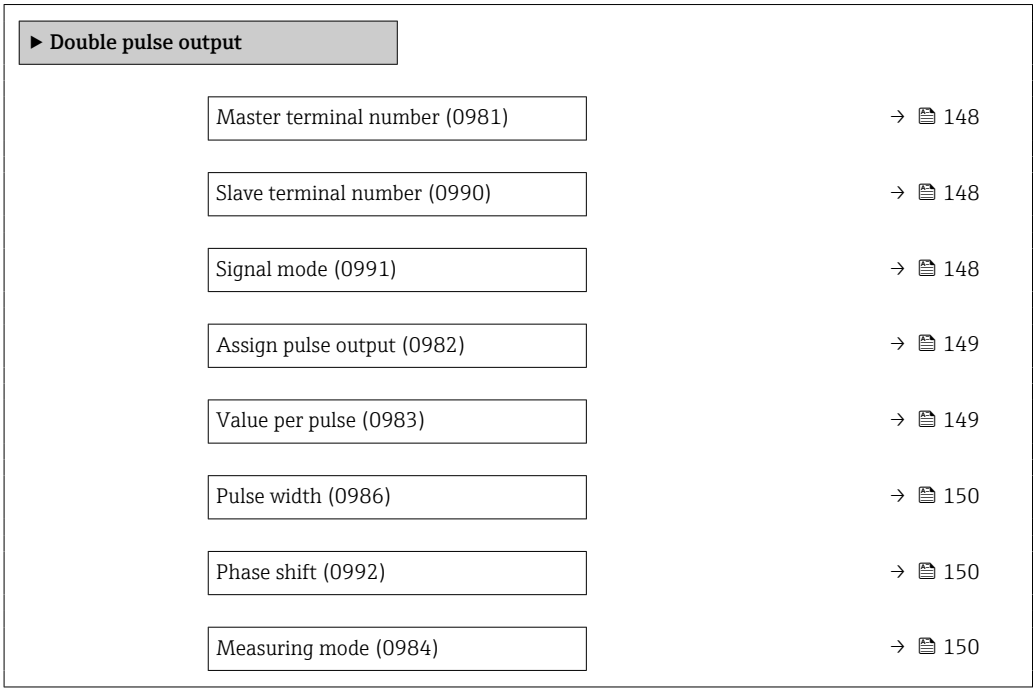
Factory setting Open

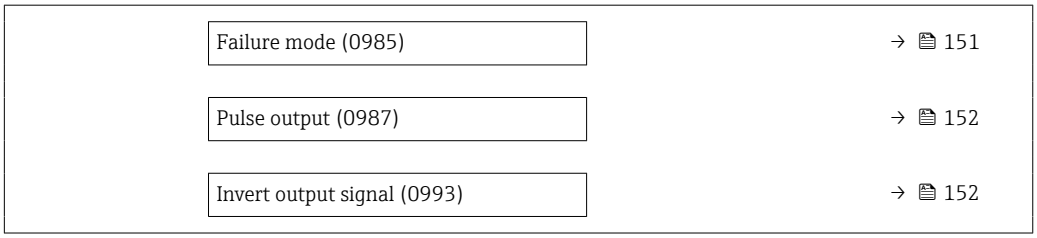
Additional information *Selection*

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

3.5.4 "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

* Visibility depends on order options or device settings

Factory setting Passive

Assign pulse output

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

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

Selection
- Off
- Volume flow
- Mass flow
- GSV flow *
- NSV flow *
- S&W volume flow *
- Product 1 volume flow *
- Product 2 volume flow *
- Product 3 volume flow *
- Product 4 volume flow *
- Product 5 volume flow *
- Product 1 mass flow *
- Product 2 mass flow *
- Product 3 mass flow *
- Product 4 mass flow *
- Product 5 mass flow *
- Product 1 NSV flow *
- Product 2 NSV flow *
- Product 3 NSV flow *
- Product 4 NSV flow *
- Product 5 NSV 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.

User entry Signed floating-point number

Factory setting Depends on country and nominal diameter

Additional information *User entry*

Weighting of the pulse output with a quantity.

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

* Visibility depends on order options or device settings

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 (0452) (→ 125)

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 (0351) (→ 113)

Examples

For a detailed description of the configuration examples, see the **Measuring mode** parameter (0351) (→ 113)

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.

Options

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

Pulse output

Navigation Expert → Output → 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 (0456–1 to n) (→ 58)

Invert output signal

Navigation Expert → Output → Double pulse out → Invert outp.sig. (0993)

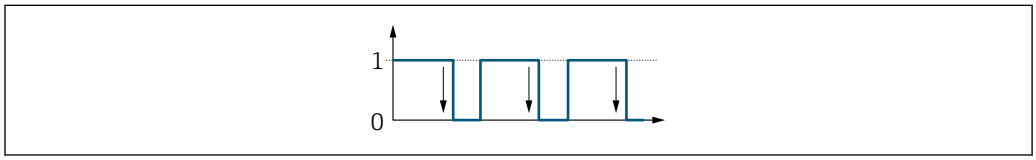
Description Use this function to select whether to invert the output signal.

Selection
- No
- Yes

Factory setting No

Additional information *Selection*

No option (passive - negative)



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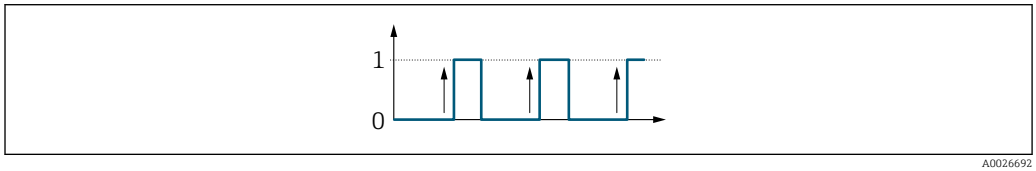
Yes option (passive - positive)



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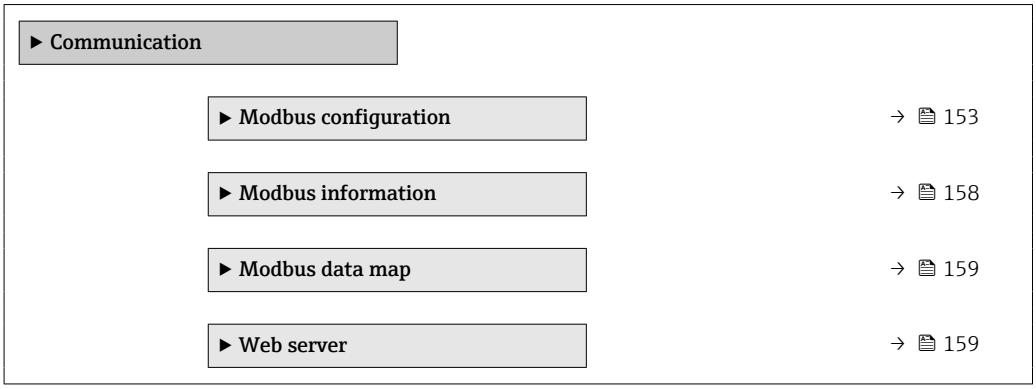
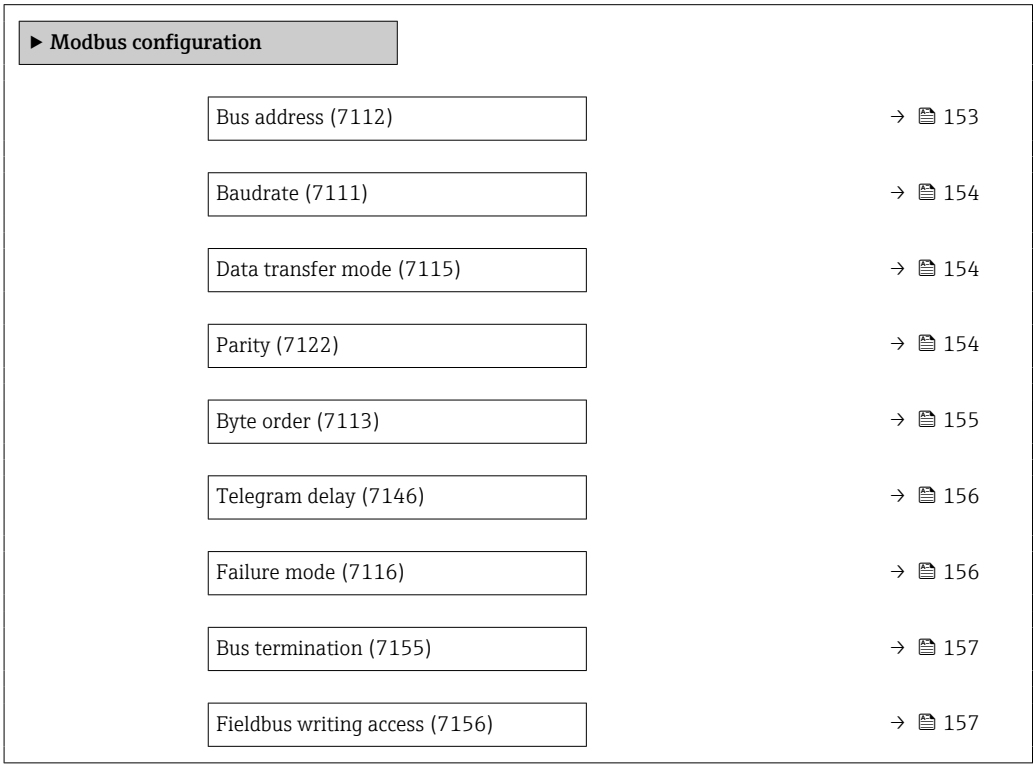
3.6 "Communication" submenu

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
- 230400 BAUD

Factory setting 19200 BAUD

Data transfer mode

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

Description Use this function to select the data transmission mode.

Selection
- ASCII
- RTU

Factory setting RTU

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

Parity

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

Description Use this function to select the parity bit.

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

Factory setting Even

Additional information *Options*

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

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

Byte order

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

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

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

Factory setting 1-0-3-2

Additional information *Description*

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

Changing the byte sequence in the host system often requires a extensive knowledge and significant programming efforts. Endress+Hauser introduced the **Byte order** parameter (7113) (→ 155) 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 (7113) (→ 155).

The bytes are transmitted depending on the selection in the **Byte order** parameter (7113) (→ 155):

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 (7117).

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.

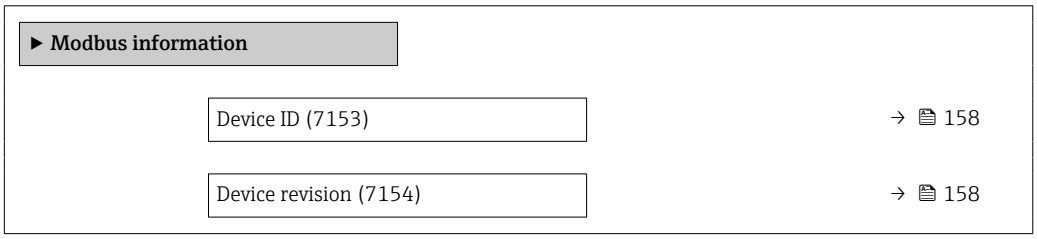
This does not affect cyclic measured value transmission to the higher-order system, which is always guaranteed.

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

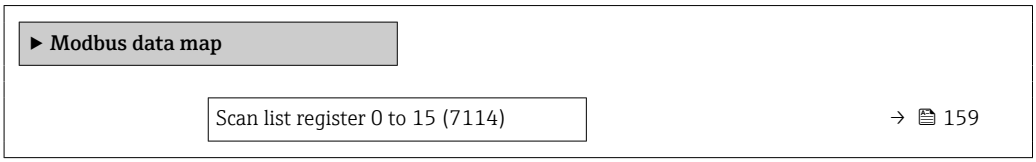
Navigation Expert → Communication → Modbus info → Device revision (7154)

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)

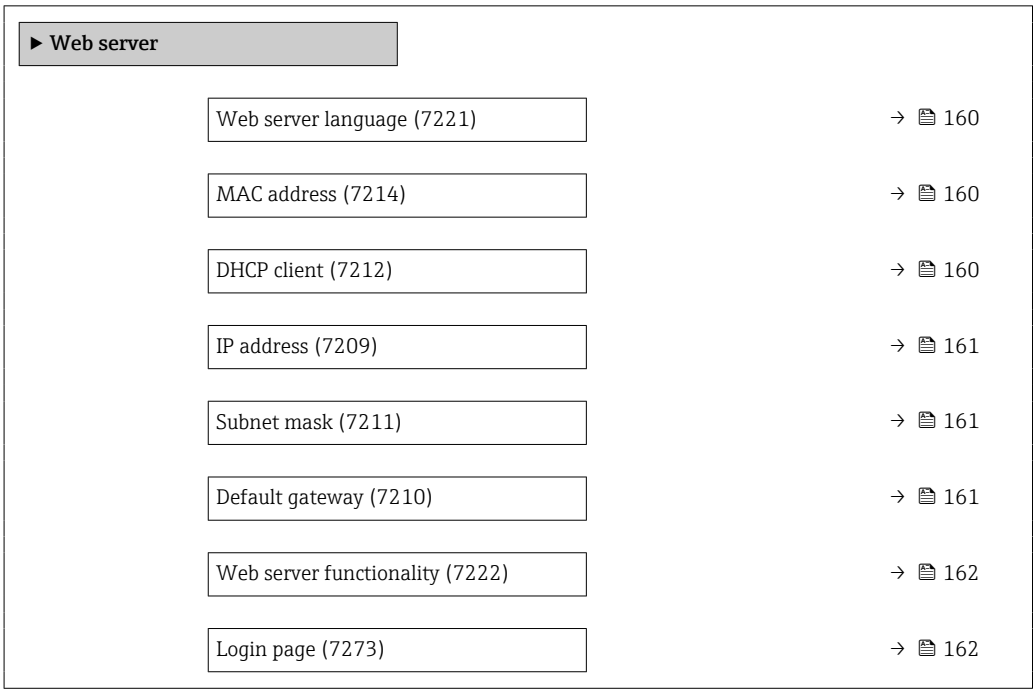
Description Use this function to enter the scan list register. By entering the register address (1-based), up to 16 device parameters can be grouped by assigning them to the scan list registers 0 to 15. The data of the device parameters assigned here are read out via the register addresses 5051 to 5081.

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 (7209) (→ 161), Subnet mask (7211) (→ 161) and Default gateway (7210) (→ 161) are set automatically.

- Identification is via the MAC address of the measuring device.
- The IP address (7209) (→ 161) in the **IP address** parameter (7209) (→ 161) is ignored as long as the **DHCP client** parameter (7212) (→ 160) is active. This is also the case, in particular, if the DHCP server cannot be reached. The IP address (7209) (→ 161) in the parameter of the same name is only used if the **DHCP client** parameter (7212) (→ 160) is inactive.

IP address

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

Description
Display or enter the IP address (7209) 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 (7210) (→ 161).

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 (7222) 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.
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)

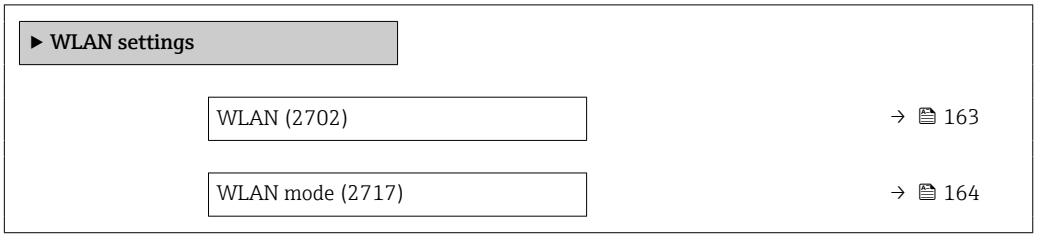
Description Use this function to select the format of the login page.

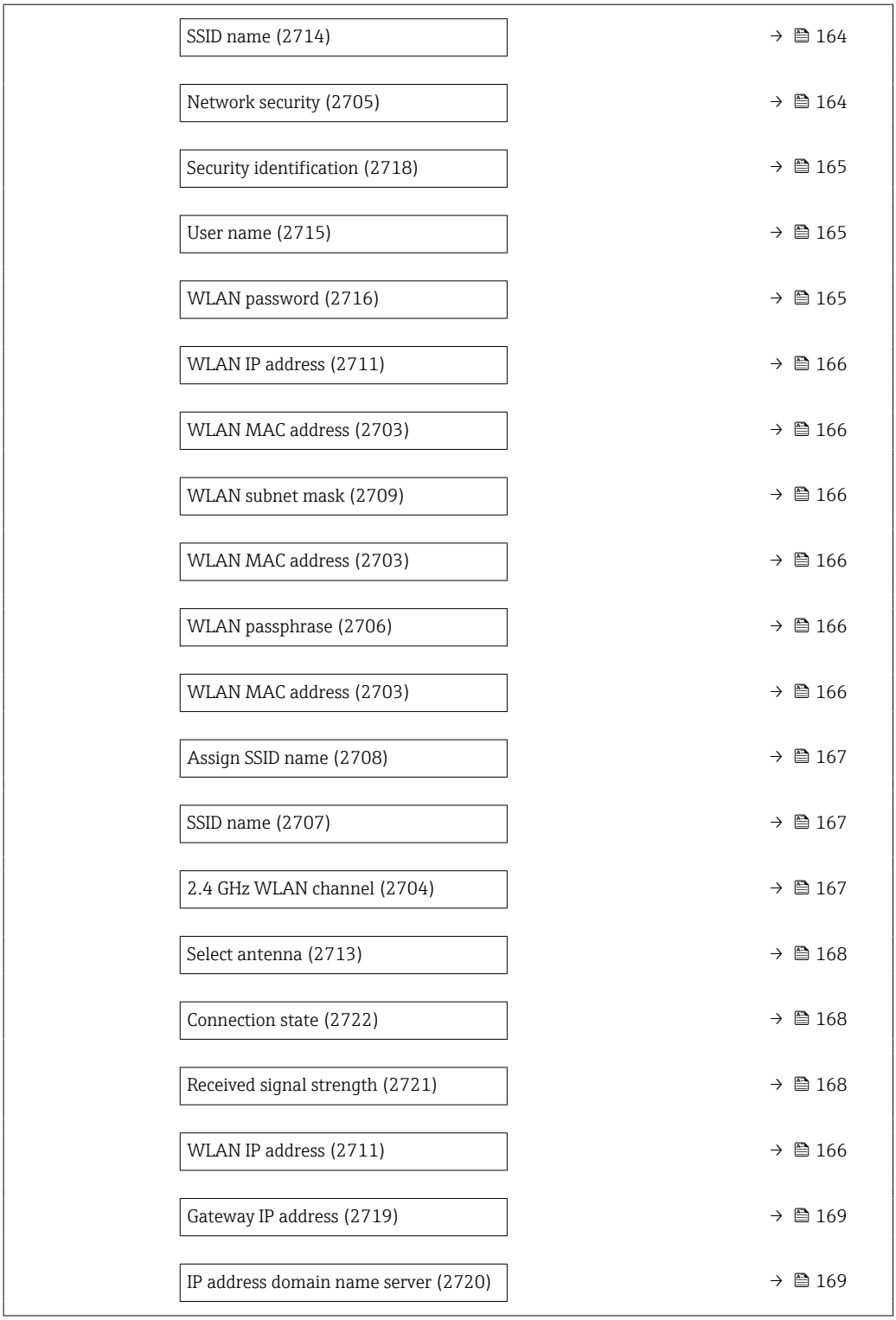
Selection
- Without header
- With header

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)
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 (2705) (→ 164).

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 (2708) (→ 167).
- The **WLAN access point** option is selected in the **WLAN mode** parameter (2717) (→ 164).

Description Use this function to enter a user-defined SSID name.

User entry Max. 32-digit character string comprising numbers, letters and special characters

Factory setting EH_device designation_last 7 digits of the serial number (e.g. EH_Prosonic_Flow_500_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 (2704).

8) Service Set Identifier

User entry 1 to 11

Factory setting 6

Additional information *Description*

- It is only necessary to enter a 2.4 GHz WLAN channel (2704) 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)

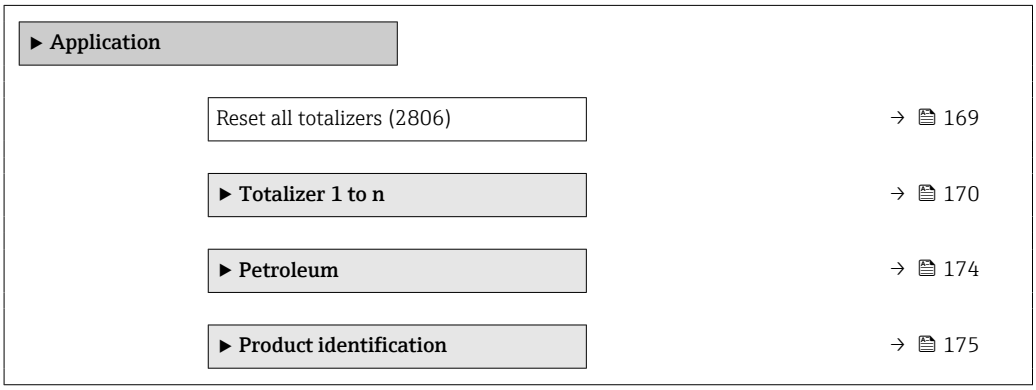
Description Use this function to enter the IP address of the domain name server.

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 previously aggregated flow values.

Selection
- Cancel
- Reset + totalize

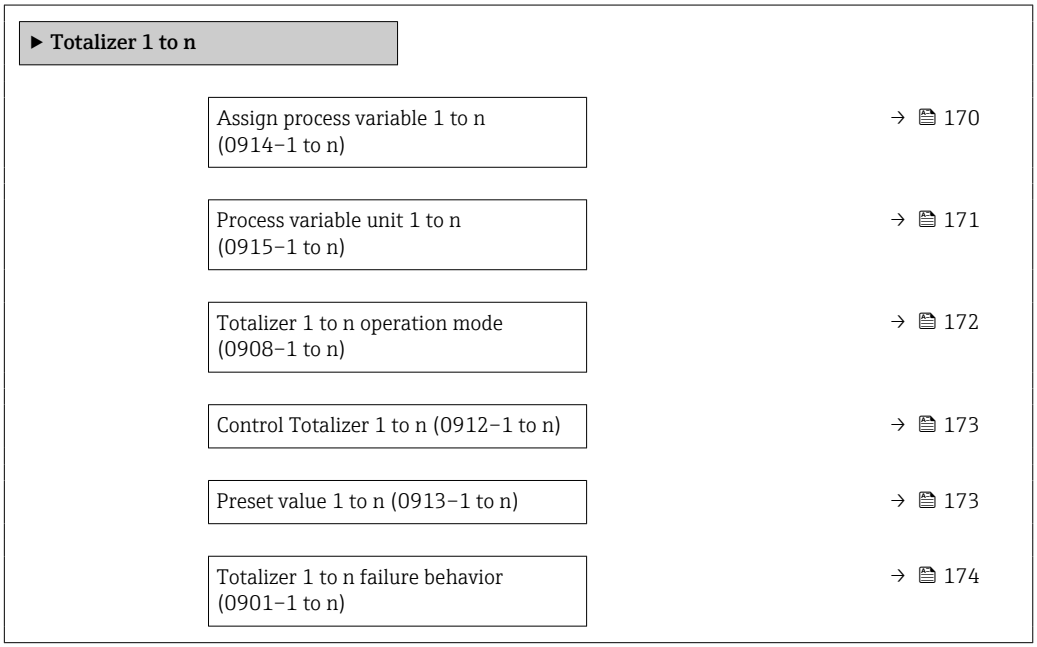
Factory setting Cancel

Additional information *Selection*

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

3.7.1 "Totalizer 1 to n" submenu

Navigation Expert → Application → Totalizer 1 to n



Assign process variable 1 to n

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

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

Selection
- Off
- Volume flow
- Mass flow
- S&W volume flow *

* Visibility depends on order options or device settings

- GSV flow *
- NSV flow *
- Product 1 volume flow *
- Product 2 volume flow *
- Product 3 volume flow *
- Product 4 volume flow *
- Product 5 volume flow *
- Product 1 mass flow *
- Product 2 mass flow *
- Product 3 mass flow *
- Product 4 mass flow *
- Product 5 mass flow *
- Product 1 NSV flow *
- Product 2 NSV flow *
- Product 3 NSV flow *
- Product 4 NSV flow *
- Product 5 NSV flow *

Factory setting Volume flow

Additional information *Description*

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

Options

If the **Off** option is selected, only the **Assign process variable** parameter (0914) (→ 170) is still displayed in the **Totalizer 1 to n** submenu. All other parameters in the submenu are hidden.

Process variable unit 1 to n

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

Prerequisite A process variable is selected in the **Assign process variable** parameter (0914) (→ 170) of the **Totalizer 1 to n** submenu.

Description Use this function to select the process variable unit for the Totalizer 1 to n (→ 170).

Selection

- g *
- kg *
- t *
- oz *
- lb *
- STon *
- cm³ *
- dm³ *
- m³ *
- ml *
- l *
- hl *
- Ml Mega *
- af *

* Visibility depends on order options or device settings

- ft^3 *
- Mft^3 *
- Mft^3 *
- fl oz (us) *
- gal (us) *
- kgal (us) *
- Mgal (us) *
- bbl (us;liq.) *
- bbl (us;beer) *
- bbl (us;oil) *
- bbl (us;tank) *
- gal (imp) *
- Mgal (imp) *
- bbl (imp;beer) *
- bbl (imp;oil) *
- $MSft^3$ *
- None *

Factory setting

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

Additional information

Description

The unit is selected separately for each totalizer. It is independent of the selection made in the **System units** submenu (→ 61).

Options

The selection is dependent on the process variable selected in the **Assign process variable** parameter (0914) (→ 170).

Totalizer 1 to n operation mode

Navigation

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

Prerequisite

A process variable is selected in the **Assign process variable** parameter (0914) (→ 170) of the **Totalizer 1 to n** submenu.

Description

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

Selection

- Net
- Forward
- Reverse

Factory setting

Net flow total

* Visibility depends on order options or device settings

Additional information *Selection*

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

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 (0914) (→ 170) 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 (0914) (→ 170) of the **Totalizer 1 to n** submenu.

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

User entry Signed floating-point number

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

Additional information *User entry*

The unit of the selected process variable is defined in the **Unit totalizer** parameter (0915) (→ 171) for the totalizer.

Example

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

Totalizer 1 to n failure behavior

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

Prerequisite A process variable is selected in the **Assign process variable** parameter (0914) (→ 170) of the **Totalizer 1 to n** submenu.

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

Selection
- Hold
- Continue
- Last valid value + continue

Factory setting Stop

Additional information *Description*

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

Selection

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

3.7.2 "Petroleum" submenu

For detailed information on the parameter descriptions for the **Petroleum** application package,refer to the Special Documentation for the device

Navigation Expert → Application → Petroleum

▶ Petroleum

3.7.3 "Product identification" submenu

For detailed information on the parameter descriptions for the **Petroleum** application package,refer to the Special Documentation for the device

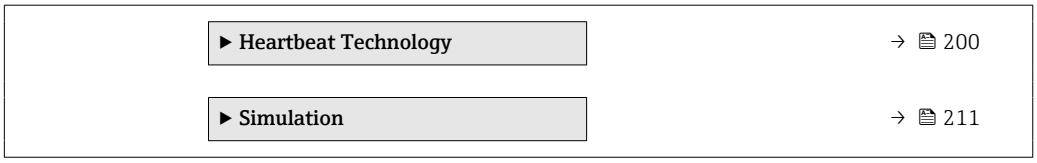
Navigation Expert → Application → Product identif.

▶ Product identification

3.8 "Diagnostics" submenu

Navigation Expert → Diagnostics

▶ Diagnostics		
	Actual diagnostics (0691)	→ 176
	Previous diagnostics (0690)	→ 177
	Operating time from restart (0653)	→ 177
	Operating time (0652)	→ 178
	▶ Diagnostic list	→ 178
	▶ Event logbook	→ 182
	▶ Device information	→ 183
	▶ Main electronic module + I/O module 1	→ 187
	▶ Sensor electronic module (ISEM)	→ 188
	▶ I/O module 2	→ 189
	▶ I/O module 3	→ 190
	▶ Display module	→ 191
	▶ Data logging	→ 192



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 (→ 178).

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

Example

For the display format:
⊗F271 Main electronic failure

Timestamp

Navigation Expert → Diagnostics → Timestamp (0667)

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 (0691) (→ 176).

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 electronic failure

Timestamp

Navigation Expert → Diagnostics → Timestamp (0672)

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 (0690) (→ 177).

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

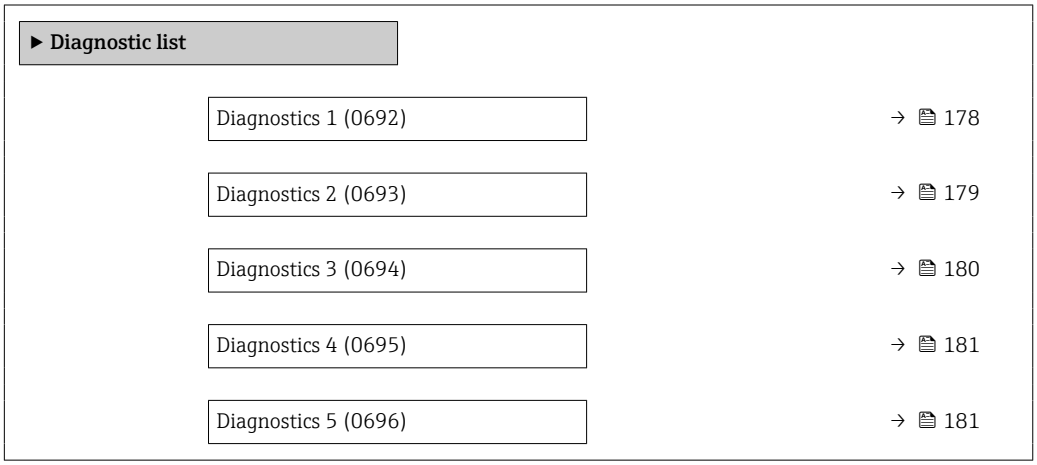
User interface Days (d), hours (h), minutes (m) and seconds (s)

Additional information *Indication*

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

3.8.1 "Diagnostic list" submenu

Navigation Expert → Diagnostics → Diagnostic list



Diagnostics 1

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

Description Displays the current diagnostics message with the highest priority.

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

Additional information *Display*

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

Examples

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

Timestamp 1

Navigation Expert → Diagnostics → Diagnostic list → Timestamp (0683)

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 (0692) (→ 178).

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 electronic failure
- ⊗F276 I/O module failure

Timestamp 2

Navigation Expert → Diagnostics → Diagnostic list → Timestamp (0684)

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 (0693) (→ 179).

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 electronic failure
- ⊗F276 I/O module failure

Timestamp 3

Navigation Expert → Diagnostics → Diagnostic list → Timestamp (0685)

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 (0694) (→ 180).

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 electronic failure
- ⊗F276 I/O module failure

Timestamp 4

Navigation Expert → Diagnostics → Diagnostic list → Timestamp (0686)

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 (0695) (→ 181).

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 electronic failure
- ⊗F276 I/O module failure

Timestamp 5

Navigation Expert → Diagnostics → Diagnostic list → Timestamp (0687)

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 (0696) (→ 181).

Example

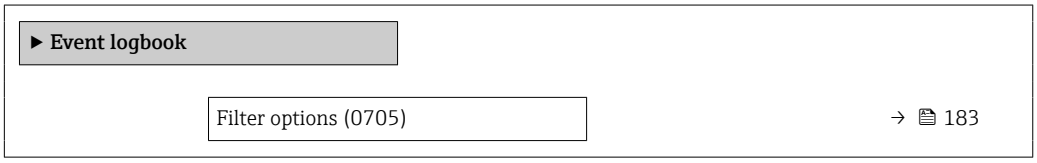
For the display format:
24d12h13m00s

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)

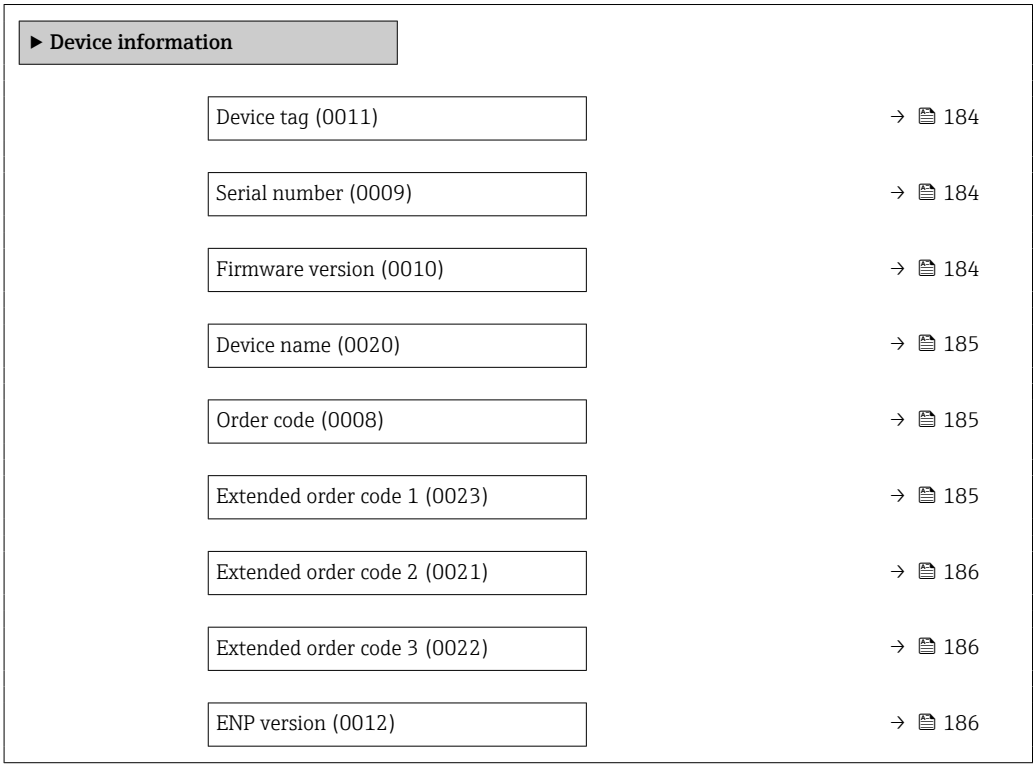
Factory setting All

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

3.8.3 "Device information" submenu

Navigation Expert → Diagnostics → Device info



Device tag

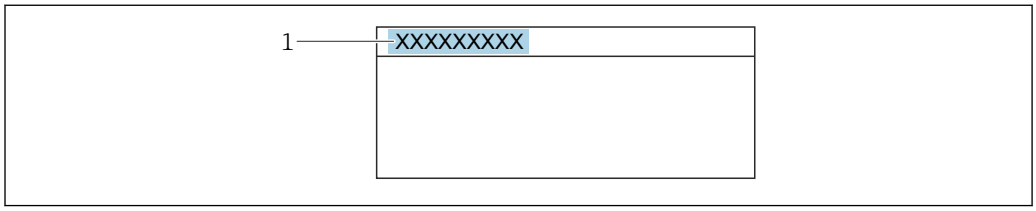
Navigation Expert → Diagnostics → Device info → Device tag (0011)

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

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

Factory setting Prosonic Flow

Additional information *User interface*



1 Position of the header text on the display

The number of characters displayed depends on the characters used.

Serial number

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

Description Displays the serial number of the measuring device.

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

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

Additional information *Description*

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

Firmware version

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

Description Displays the device firmware version installed.

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

Additional information *Display*

The Firmware version (0010) 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 Prosonic Flow 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 (0023) (→ 185)

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 (0023) (→ 185)

ENP version

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

Description Displays the version of the electronic nameplate.

User interface Character string

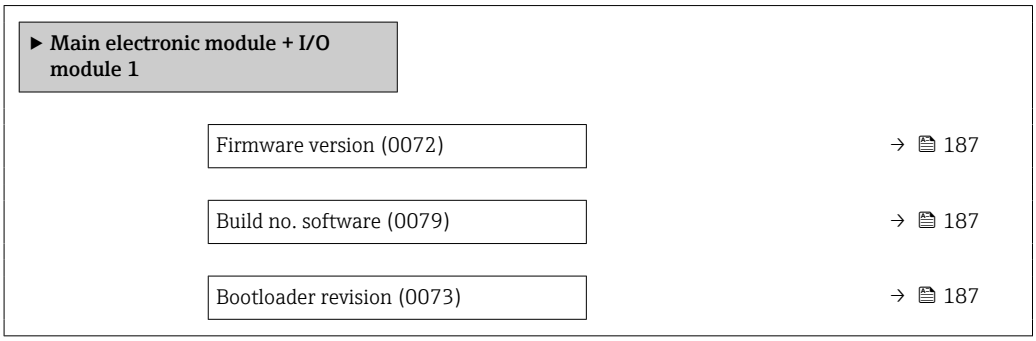
Factory setting 2.02.00

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.

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

Navigation Expert → Diagnostics 1 → Main elec.+I/O1



Firmware version

Navigation Expert → Diagnostics → Main elec.+I/O1 → Firmware version (0072)

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

User interface Positive integer

Build no. software

Navigation Expert → Diagnostics → Main elec.+I/O1 → Build no. softw. (0079)

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

User interface Positive integer

Bootloader revision

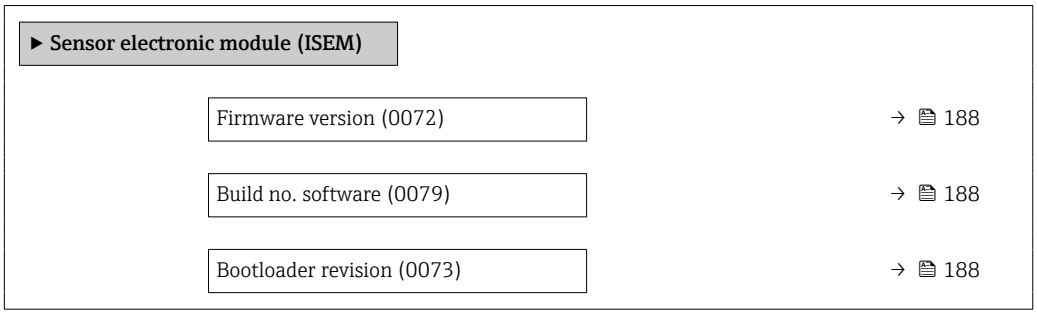
Navigation Expert → Diagnostics → Main elec.+I/O1 → Bootloader rev. (0073)

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

User interface Positive integer

3.8.5 "Sensor electronic module (ISEM)" submenu

Navigation Expert → Diagnostics → Sens. electronic



Firmware version

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

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

User interface Positive integer

Build no. software

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

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

User interface Positive integer

Bootloader revision

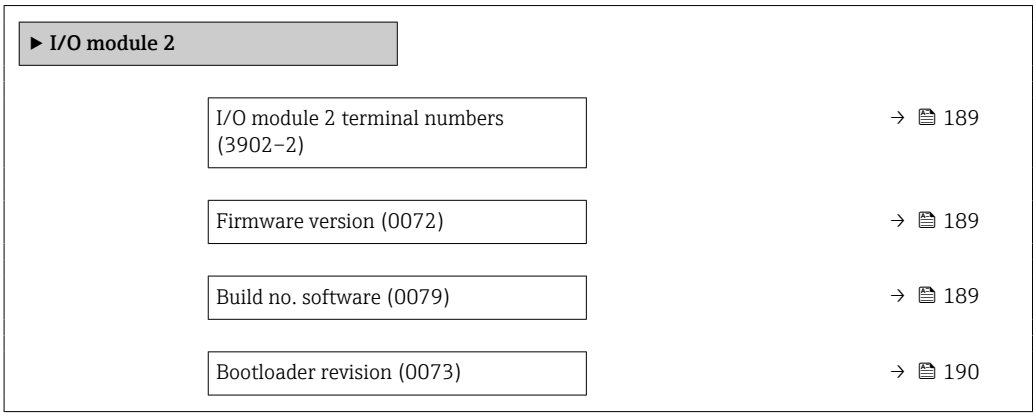
Navigation Expert → Diagnostics → Sens. electronic → Bootloader rev. (0073)

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

User interface Positive integer

3.8.6 "I/O module 2" submenu

Navigation Expert → Diagnostics → I/O module 2



I/O module 2 terminal numbers

Navigation Expert → Diagnostics → I/O module 2 → I/O 2 terminals (3902–2)

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

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

Firmware version

Navigation Expert → Diagnostics → I/O module 2 → Firmware version (0072)

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

User interface Positive integer

Build no. software

Navigation Expert → Diagnostics → I/O module 2 → Build no. softw. (0079)

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

User interface Positive integer

Bootloader revision

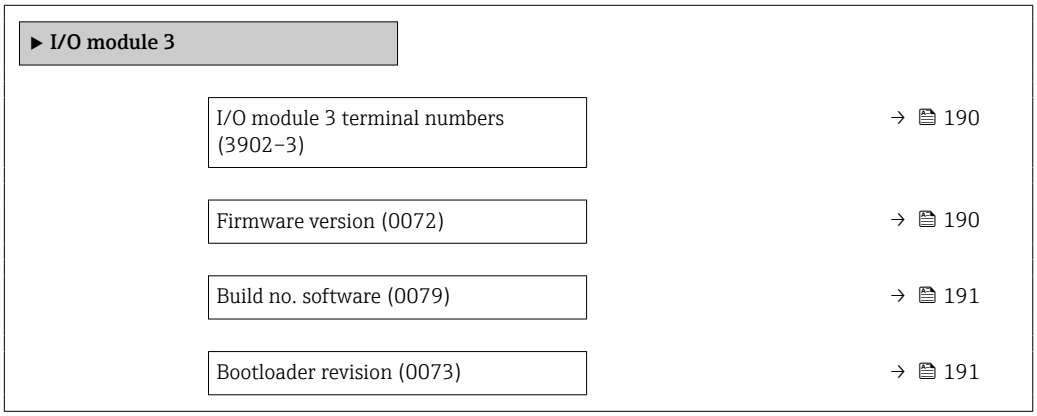
Navigation Expert → Diagnostics → I/O module 2 → Bootloader rev. (0073)

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

User interface Positive integer

3.8.7 "I/O module 3" submenu

Navigation Expert → Diagnostics → I/O module 3



I/O module 3 terminal numbers

Navigation Expert → Diagnostics → I/O module 3 → I/O 3 terminals (3902–3)

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

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

Firmware version

Navigation Expert → Diagnostics → I/O module 3 → Firmware version (0072)

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

User interface Positive integer

Build no. software

Navigation Expert → Diagnostics → I/O module 3 → Build no. softw. (0079)

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

User interface Positive integer

Bootloader revision

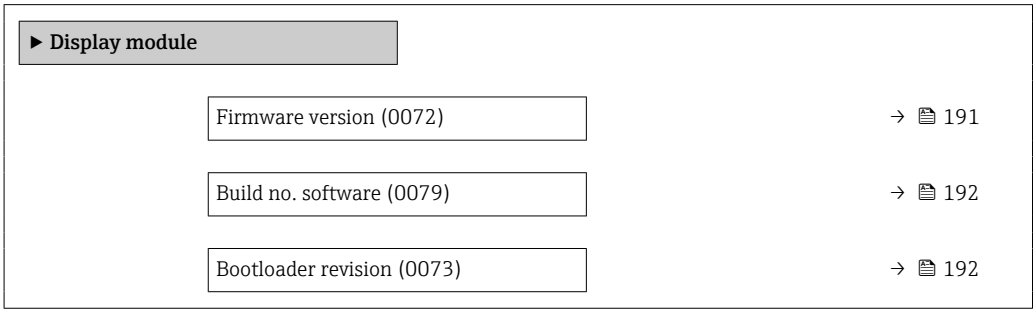
Navigation Expert → Diagnostics → I/O module 3 → Bootloader rev. (0073)

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

User interface Positive integer

3.8.8 "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

3.8.9 "Data logging" submenu

Navigation Expert → Diagnostics → Data logging

Assign channel 1

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

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

The software options currently enabled are displayed in the **Software option overview** parameter (0015) (→ 42).

Description Use this function to assign a process variable to the logging channel.

Selection
- Off
- Volume flow
- Mass flow
- Flow velocity
- Sound velocity
- Temperature *
- Pressure *
- Density *
- Current output 2 *
- Current output 3 *
- Reference density *
- S&W volume flow *
- GSV flow *
- NSV flow *
- API gravity *
- API slope *
- Signal strength *
- Signal to noise ratio *
- Acceptance rate *
- Turbulence *
- Electronics temperature
- Current output 1
- Profile factor *
- Cross flow factor *

Factory setting Off

Additional information *Description*

A total of 1000 measured values can be logged. This means:
- 1000 data points if 1 logging channel is used
- 500 data points if 2 logging channels are used
- 333 data points if 3 logging channels are used
- 250 data points if 4 logging channels are used

Once the maximum number of data points is reached, the oldest data points in the data log are cyclically overwritten in such a way that the last 1000, 500, 333 or 250 measured values are always in the log (ring memory principle).

The log contents are cleared if the option selected is changed.

* Visibility depends on order options or device settings

Assign channel 2

Navigation Expert → Diagnostics → Data logging → Assign chan. 2 (0852)

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

The software options currently enabled are displayed in the **Software option overview** parameter (0015) (→ 42).

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

Selection For the picklist, see **Assign channel 1** parameter (0851) (→ 193)

Factory setting Off

Assign channel 3

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

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

The software options currently enabled are displayed in the **Software option overview** parameter (0015) (→ 42).

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

Selection For the picklist, see **Assign channel 1** parameter (0851) (→ 193)

Factory setting Off

Assign channel 4

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

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

The software options currently enabled are displayed in the **Software option overview** parameter (0015) (→ 42).

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

Selection For the picklist, see **Assign channel 1** parameter (0851) (→ 193)

Factory setting Off

Logging interval

Navigation Expert → Diagnostics → Data logging → Logging interval (0856)

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

The software options currently enabled are displayed in the **Software option overview** parameter (0015) (→ 42).

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

User entry 0.1 to 3 600.0 s

Factory setting 1.0 s

Additional information *Description*

This defines the interval between the individual data points in the data log, and thus the maximum loggable process time T_{log}:
- If 1 logging channel is used: $T_{log} = 1000 \times t_{log}$
- If 2 logging channels are used: $T_{log} = 500 \times t_{log}$
- If 3 logging channels are used: $T_{log} = 333 \times t_{log}$
- If 4 logging channels are used: $T_{log} = 250 \times t_{log}$

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

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

Example

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

Clear logging data

Navigation Expert → Diagnostics → Data logging → Clear logging (0855)

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

The software options currently enabled are displayed in the **Software option overview** parameter (0015) (→ 42).

Description Use this function to clear the entire logging data.

Selection
- Cancel
- Clear data

Factory setting Cancel

Additional information *Selection*

- Cancel
  The data is not cleared. All the data is retained.
- Clear data
  The logging data is cleared. The logging process starts from the beginning.

Data logging

Navigation Expert → Diagnostics → Data logging → Data logging (0860)

Description Use this function to select the data logging method.

Selection
- Overwriting
- Not overwriting

Factory setting Overwriting

Additional information *Selection*

- Overwriting
  The device memory applies the FIFO principle.
- Not overwriting
  Data logging is canceled if the measured value memory is full (single shot).

Logging delay

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

Prerequisite In the **Data logging** parameter (0860) (→ 196), 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 (0857) (→ 196), the device does not save any data for the duration of the delay time entered.

Data logging control

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

Prerequisite In the **Data logging** parameter (0860) (→ 196), the **Not overwriting** option is selected.

Description Use this function to start and stop measured value logging.

Selection
- None
- Delete + start
- Stop

Factory setting None

Additional information *Selection*
- None
  Initial measured value logging status.
- Delete + start
  All the measured values recorded for all the channels are deleted and measured value logging starts again.
- Stop
  Measured value logging is stopped.

Data logging status

Navigation Expert → Diagnostics → Data logging → Data log. status (0858)

Prerequisite In the **Data logging** parameter (0860) (→ 196), the **Not overwriting** option is selected.

Description Displays the measured value logging status.

User interface
- Done
- Delay active
- Active
- Stopped

Factory setting Done

Additional information *Selection*
- Done
  Measured value logging has been performed and completed successfully.
- Delay active
  Measured value logging has been started but the logging interval has not yet elapsed.
- Active
  The logging interval has elapsed and measured value logging is active.
- Stopped
  Measured value logging is stopped.

Entire logging duration

Navigation Expert → Diagnostics → Data logging → Logging duration (0861)

Prerequisite In the **Data logging** parameter (0860) (→ 196), the **Not overwriting** option is selected.

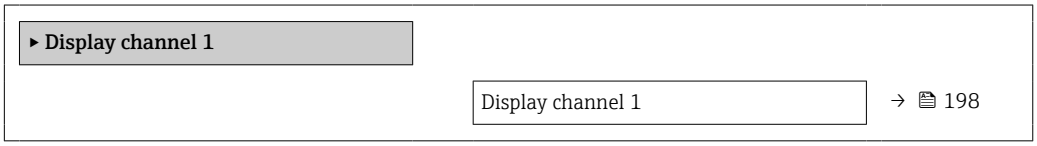
Description Displays the total logging duration.

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.

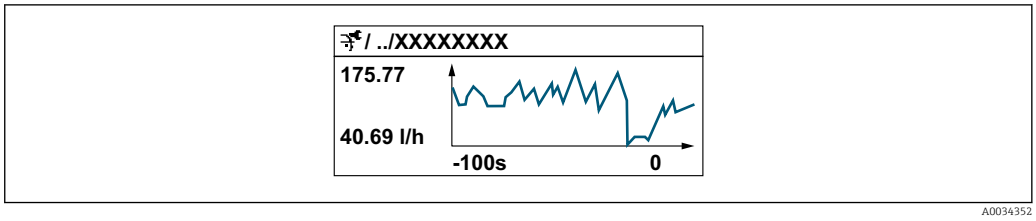
The software options currently enabled are displayed in the **Software option overview** parameter (0015) (→ 42).

One of the following options is selected in the **Assign channel 1** parameter (0851) (→ 193):
- Off
- Volume flow
- Mass flow
- Flow velocity
- Sound velocity
- Temperature *
- Pressure *
- Density *
- Current output 2 *
- Current output 3 *
- Signal strength *
- Signal to noise ratio *
- Acceptance rate *
- Turbulence *
- Electronics temperature
- Current output 1

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

* Visibility depends on order options or device settings

Additional information *Description*

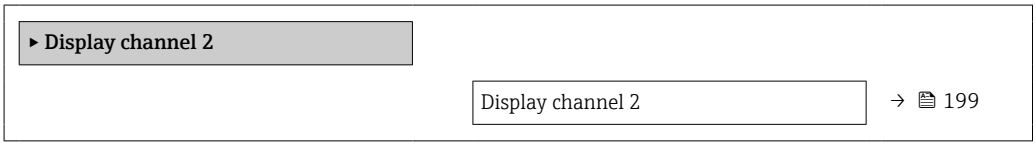


10 Chart of a measured value trend

- 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 (0851).

Description See the **Display channel 1** parameter → 198

"Display channel 3" submenu

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

Display channel 3

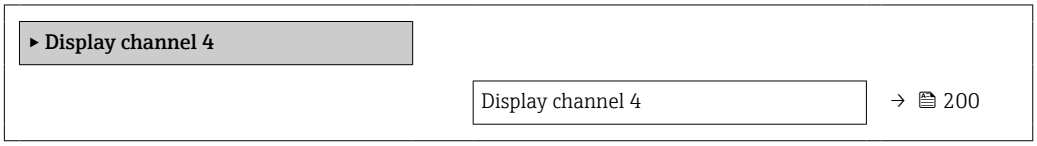
Navigation Expert → Diagnostics → Data logging → Displ.channel 3

Prerequisite A process variable is specified in the **Assign channel 3** parameter (0851).

Description See the **Display channel 1** parameter → 198

"Display channel 4" submenu

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



Display channel 4

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

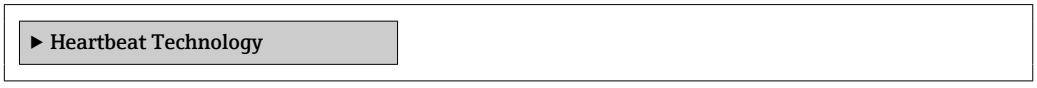
Prerequisite A process variable is specified in the **Assign channel 4** parameter (0851).

Description See the **Display channel 1** parameter → 198

3.8.10 "Heartbeat Technology" submenu

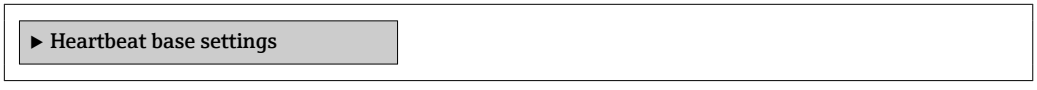
For detailed information on the parameter descriptions for the **Heartbeat Verification+Monitoring**: Special Documentation for the device → 7

Navigation Expert → Diagnostics → Heartbeat Techn.



"Heartbeat base settings" submenu

Navigation Expert → Diagnostics → Heartbeat Techn. → Base settings



Plant operator (2754)	→ 201
Location (2755)	→ 201

Plant operator

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

Description Use this function to enter the plant operator.

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

Location

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

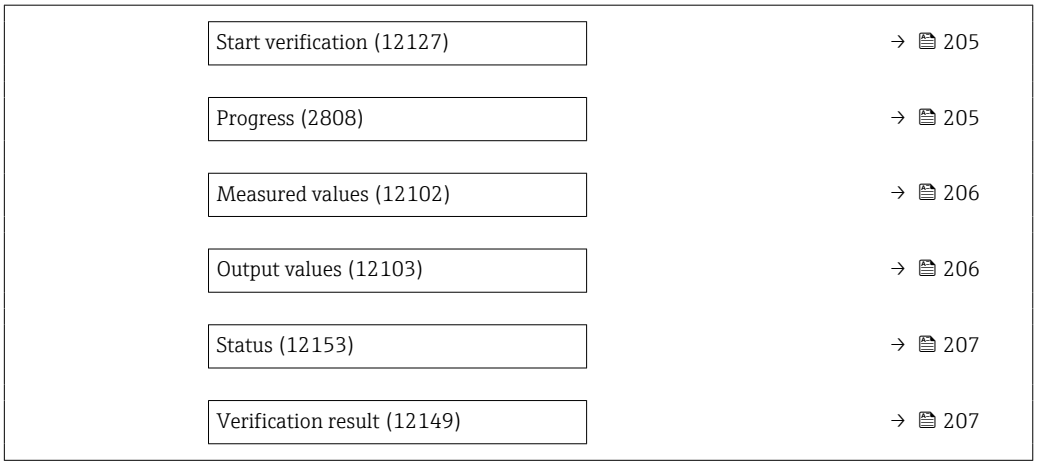
Description Use this function to enter the location.

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

"Performing verification" wizard

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific.

▶ **Performing verification**	
Year (2846)	→ 202
Month (2845)	→ 202
Day (2842)	→ 203
Hour (2843)	→ 203
AM/PM (2813)	→ 203
Minute (2844)	→ 204
Verification mode (12105)	→ 204
External device information (12101)	→ 204



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) (→ 68).

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 (12105) (→ 204).
- Can be edited if Heartbeat Verification is not active.

Description Record measuring equipment for extended verification.

User entry Free text entry

Factory setting –

Start verification

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Start verificat. (12127)

Prerequisite If using a test kit:
It is necessary to first remove the sensors from the measuring point and mount them on the test kits.

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 *
- Output 4 low value *
- Output 4 high value *
- Frequency output 1 *
- Pulse output 1 *
- Frequency output 2 *
- Pulse output 2 *
- Frequency output 3 *
- Double pulse output *
- Start
- Start with testkit *

Factory setting Cancel

Progress

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

Description The progress of the process is indicated.

User interface 0 to 100 %

* Visibility depends on order options or device settings

Measured values

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

Prerequisite One of the following options is selected in the **Start verification** parameter (12127) (→ 205):
- Output 1 low value
- Output 1 high value
- Output 2 low value
- Output 2 high value
- Output 3 low value
- Output 3 high value
- Output 4 low value
- Output 4 high value
- Frequency output 1
- Pulse output 1
- Frequency output 2
- Pulse output 2
- Frequency output 3
- 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

Factory setting Not done

Verification result

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Verific. result (12149)

Description Displays the overall result of the verification.

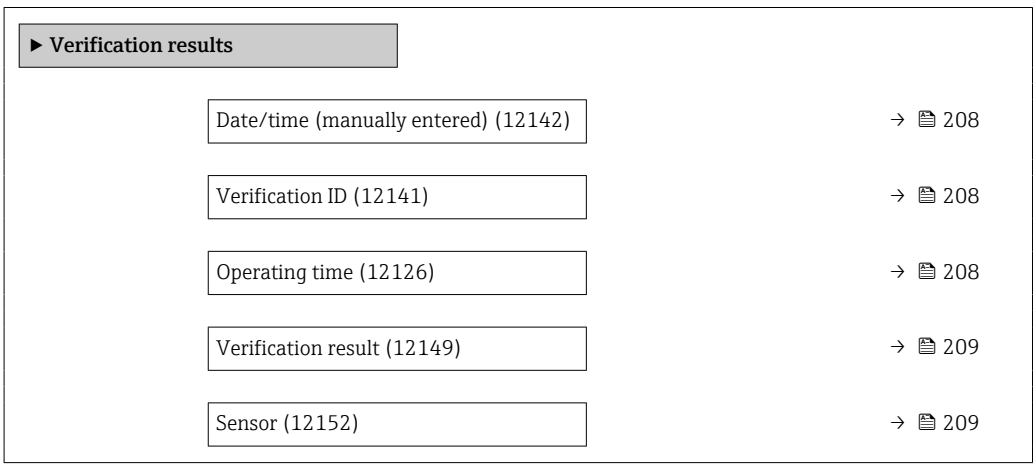
Detailed description of results classification:

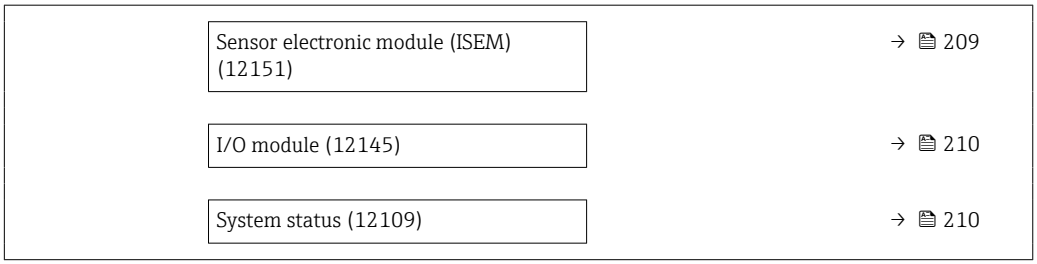
User interface
- Not supported
- Passed
- Not done
- Failed

Factory setting Not done

"Verification results" submenu

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results





Date/time (manually entered)

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results → Date/time (12142)

Prerequisite The verification has been performed.

Description Date and time.

User interface dd.mmmm.yyyy; hh:mm

Factory setting 1 January 2010; 12:00

Verification ID

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results → Verification ID (12141)

Prerequisite The verification has been performed.

Description Displays consecutive numbering of the verification results in the measuring device.

User interface 0 to 65 535

Factory setting 0

Operating time

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results → Operating time (12126)

Prerequisite The verification has been performed.

Description Indicates how long the device has been in operation up to the verification.

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

Factory setting –

Verification result

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results → Verific. result (12149)

Description Displays the overall result of the verification.

Detailed description of results classification:

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

Factory setting Not done

Sensor

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results → Sensor (12152)

Prerequisite The **Failed** option is shown in the **Overall result** parameter (12149) (→ 207).

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 is shown in the **Overall result** parameter (12149) (→ 207).

Description Displays the result for the sensor electronics module (ISEM).

Detailed description of results classification:

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

Factory setting Not done

I/O module

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results → I/O module (12145)

Prerequisite The **Failed** option is shown in the **Overall result** parameter (12149) (→ 207).

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 pulses
- For frequency output: Accuracy of 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 issue a result for this.

Detailed description of results classification:

User interface

- Not supported
- Passed
- Not done
- Not plugged
- Failed

Factory setting Not done

System status

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results → System status (12109)

Prerequisite The **Failed** option is shown in the **Overall result** parameter (12149) (→ 207).

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

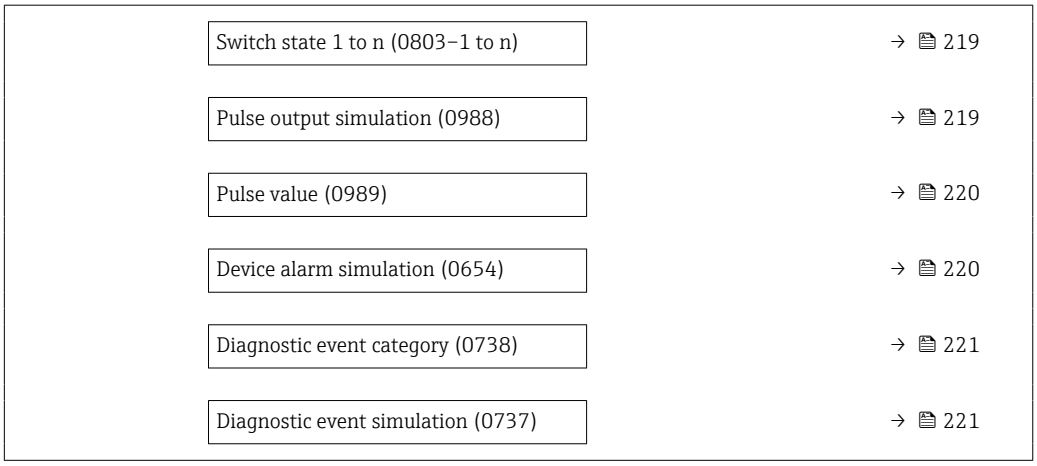
► **Monitoring results**

3.8.11 "Simulation" submenu

Navigation Expert → Diagnostics → Simulation

► **Simulation**

Assign simulation process variable (1810)	→ 212
Process variable value (1811)	→ 213
Current input 1 to n simulation (1608–1 to n)	→ 213
Value current input 1 to n (1609–1 to n)	→ 213
Status input 1 to n simulation (1355–1 to n)	→ 214
Input signal level 1 to n (1356–1 to n)	→ 214
Current output 1 to n simulation (0354–1 to n)	→ 215
Current output value (0355)	→ 215
Frequency output 1 to n simulation (0472–1 to n)	→ 215
Frequency output 1 to n value (0473–1 to n)	→ 216
Pulse output simulation 1 to n (0458–1 to n)	→ 216
Pulse value 1 to n (0459–1 to n)	→ 217
Switch output simulation 1 to n (0462–1 to n)	→ 217
Switch state 1 to n (0463–1 to n)	→ 218
Relay output 1 to n simulation (0802–1 to n)	→ 218



Assign simulation process variable

Navigation Expert → Diagnostics → Simulation → Assign proc.var. (1810)

Description Use this function to select a process variable for the simulation process that is activated. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

Selection
- Off
- Volume flow
- Mass flow
- Flow velocity
- Sound velocity
- Temperature *
- Pressure *
- Density *
- Reference density *
- S&W volume flow *
- GSV flow *
- NSV flow *
- API gravity *
- API slope *

Factory setting Off

Additional information *Description*

The simulation value of the process variable selected is defined in the **Process variable value** parameter (1811) (→ 213).

* Visibility depends on order options or device settings

Process variable value

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

Prerequisite A process variable is selected in the **Assign simulation process variable** parameter (1810) (→ 212).

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 (→ 61).

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 (1609–1 to n).

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 (1608–1 to n), the **On** option is selected.

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

User entry 0 to 22.5 mA

Status input 1 to n simulation

Navigation Expert → Diagnostics → Simulation → Status inp 1 to n sim (1355–1 to n)

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

Selection
- Off
- On

Factory setting Off

Additional information

Description

The desired simulation value is defined in the **Input signal level** parameter (1356) (→ 214).

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 (1355) (→ 214), the **On** option is selected.

Description Use this function to select the signal level for the simulation of the status input. In this way, users can verify the correct configuration of the status input and the correct function of upstream feed-in units.

Selection
- High
- Low

Current output 1 to n simulation

Navigation Expert → Diagnostics → Simulation → Curr.outp 1 to n sim. (0354–1 to n)

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

Selection
- Off
- On

Factory setting Off

Additional information

Description

The desired simulation value is defined in the **Value current output 1 to n** parameter (0355–1 to n).

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)

Prerequisite In the **Current output 1 to n simulation** parameter (0354–1 to n), 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 (0353) (→ 109).

Frequency output 1 to n simulation

Navigation Expert → Diagnostics → Simulation → Freq.outp 1 to n sim. (0472–1 to n)

Prerequisite In the **Operating mode** parameter (0469) (→ 122), the **Frequency** option is selected.

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

Selection
- Off
- On

Factory setting Off

Additional information

Description

The desired simulation value is defined in the **Frequency value 1 to n** parameter (0473–1 to n).

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 (0472–1 to n), 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 (0469) (→ 122), the **Pulse** option is selected.

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

Selection
- Off
- Fixed value
- Down-counting value

Factory setting Off

Additional information

Description

The desired simulation value is defined in the **Pulse value 1 to n** parameter (0459–1 to n).

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 (0452) (→ 125).
- Down-counting value
  The pulses specified in the **Pulse value** parameter (0459) (→ 217) 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 (0458–1 to n), 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 (0469) (→ 122), the **Switch** option is selected.

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

Selection

- Off
- On

Factory setting Off

Additional information

Description

The desired simulation value is defined in the **Switch state 1 to n** parameter (0463–1 to n).

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 (0803–1 to n).

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 (0802–1 to n) 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 (0989) (→ 220).

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 (0986) (→ 150).
- Down-counting value
  The pulses specified in the **Pulse value** parameter (0989) (→ 220) are output.

Pulse value

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

Prerequisite In the **Pulse output simulation** parameter (0988) (→ 219), 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 (0737) (→ 221).

Selection
- Sensor
- Electronics
- Configuration
- Process

Factory setting Process

Diagnostic event simulation

Navigation Expert → Diagnostics → Simulation → Diagnostic event (0737)

Description Use this function to select a diagnostic event for the simulation process that is activated.

Selection
- Off
- Diagnostic event picklist (depends on the category selected)

Factory setting Off

Additional information *Description*

For the simulation, you can choose from the diagnostic events of the category selected in the **Diagnostic event category** parameter (0738) (→ 221).

4 Country-specific factory settings

4.1 SI units

Not valid for USA and Canada.

4.1.1 System units

Mass	kg
Mass flow	kg/h
Volume	m^3
Volume flow	m^3/h
Density	kg/dm^3
Velocity	m/s
Kinematic viscosity	m2/s
Temperature	°C
Length	mm

4.1.2 Output current span

Output	Current range
Current output 1...n	4 to 20 mA NAMUR

4.2 US units

Only valid for USA and Canada.

4.2.1 System units

Mass	lb
Mass flow	lb/min
Volume	ft^3
Volume flow	ft^3/min
Density	lb/ft^3
Velocity	ft/s
Kinematic viscosity	cSt
Temperature	°F
Length	in

4.2.2 Output current span

Output	Current range
Current output 1...n	4 to 20 mA US

5 Explanation of abbreviated units

5.1 SI units

Process variable	Units	Explanation
Volume	cm^3, dm^3, m^3	Cubic centimeter, cubic decimeter, cubic meter
	ml, l	Milliliter, liter
Volume flow	dm^3/s, dm^3/min, dm^3/h, dm^3/d	Cubic decimeter/time unit
	m^3/s, m^3/min, m^3/h, m^3/d	Cubic meter/time unit
	l/s, l/min, l/h, l/d	Liter/time unit
Mass	g, kg, t	Gram, kilogram, metric ton
Mass flow	g/s, g/min	Gram/time unit
	kg/s, kg/min, kg/h, kg/d	Kilogram/time unit
	t/h, t/d	Metric ton/time unit
Density	kg/l	Kilogram/liter
Velocity	m/s	Meter/time unit
Kinematic viscosity	m2/s	Square meter/second
Temperature	°C , K	Celsius, Kelvin
Length	mm	Millimeters
Time	m, h, d, y	Minute, hour, day, year

5.2 US units

Process variable	Units	Explanation
Volume	ft^3	Cubic foot
Volume flow	ft^3/s, ft^3/min, ft^3/h, ft^3/d	Cubic foot/time unit
Mass	oz, lb, STon	Ounce, pound, standard ton
Mass flow	oz/s, oz/min	Ounce/time unit
	lb/s, lb/min, lb/h, lb/d	Pound/time unit
	STon/h, STon/d	Standard ton/time unit
Density	lb/ft^3	Pound/cubic foot
Velocity	ft/s	Foot/time unit
Kinematic viscosity	cSt	Centistokes
Temperature	°F, °R	Fahrenheit, Rankine
Length	in	Inch
Time	m, h, d, y	Minute, hour, day, year
	am, pm	Ante meridiem (before midday), post meridiem (after midday)

5.3 Imperial units

Process variable	Units	Explanation
Volume	bbl (imp;beer)	Barrel (beer)
Volume flow	bbl/s (imp;beer), bbl/min (imp;beer), bbl/h (imp;beer), bbl/d (imp;beer)	Barrel /time unit (beer) Beer: 36.0 gal/bbl
Time	m, h, d, y	Minute, hour, day, year
	am, pm	Ante meridiem (before midday), post meridiem (after midday)

6 Modbus RS485 register information

6.1 Notes

6.1.1 Structure of the register information

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

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

NOTICE

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

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

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

6.1.2 Address model

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

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

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

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

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

6.2 Overview of the Expert operating menu

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

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- Header text (0112) → 243
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- ▶ **Administration** → 245
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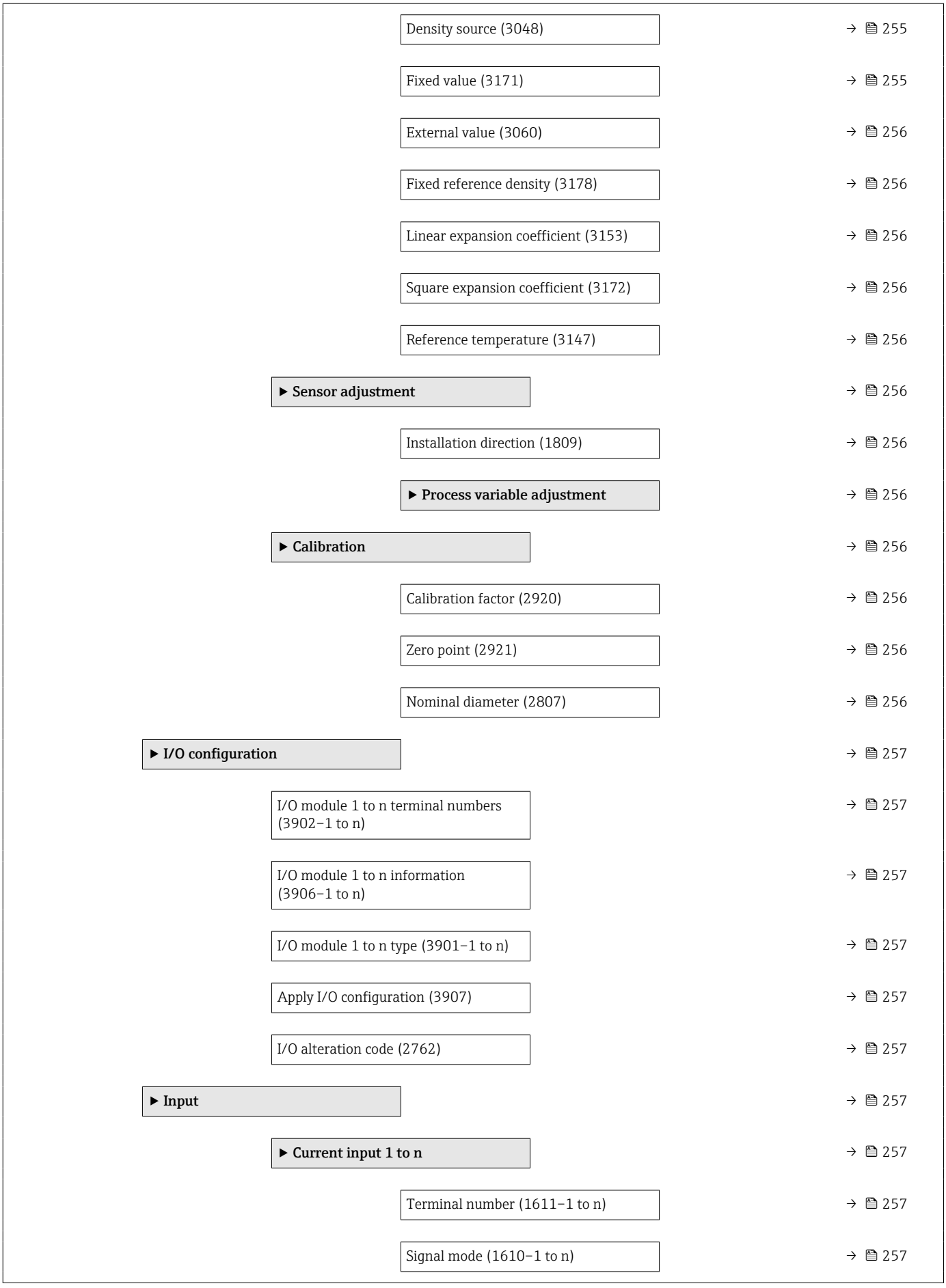
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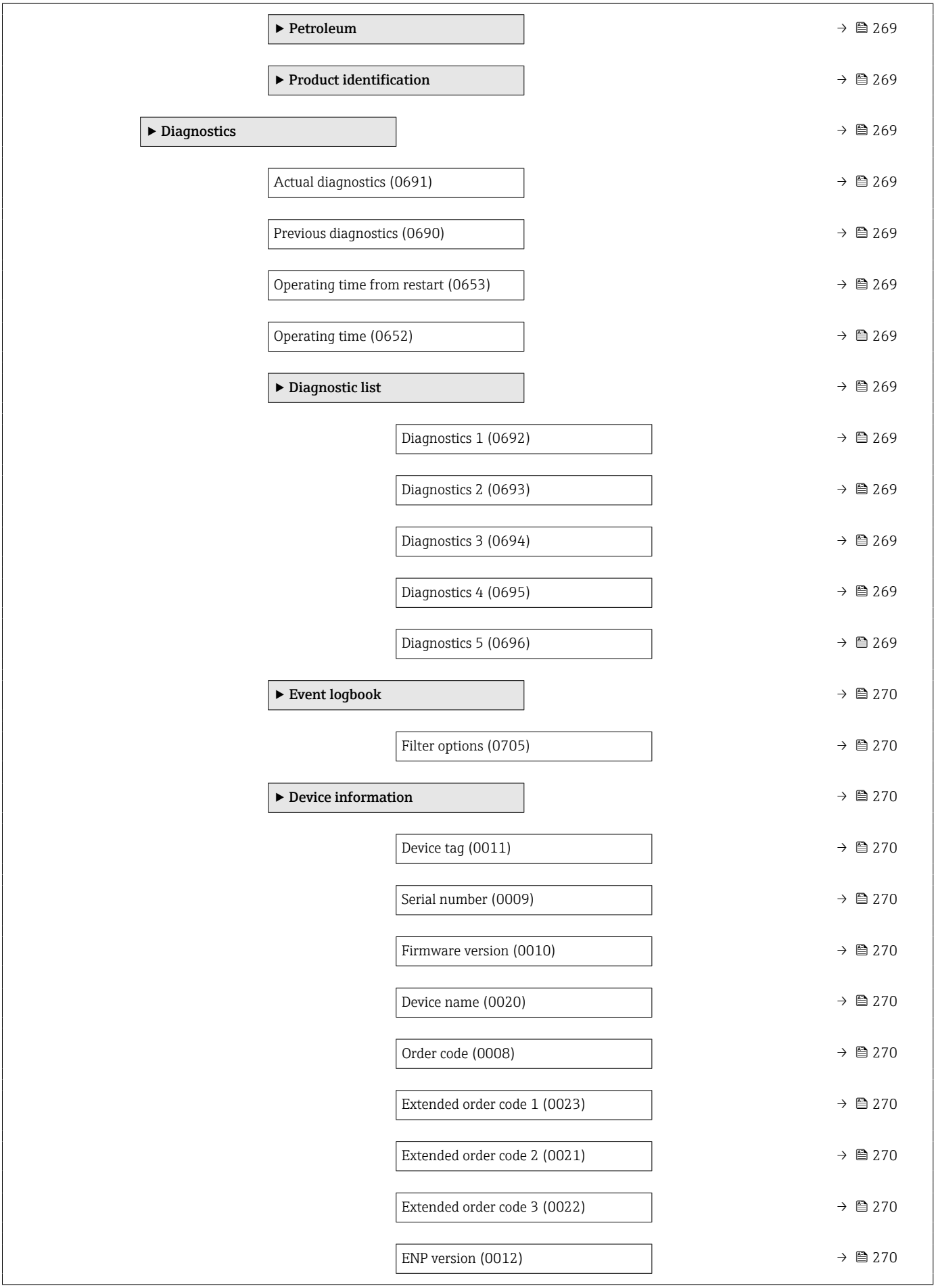
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- Build no. software (0079) → 270
- Bootloader revision (0073) → 270

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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	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	0 = Volume flow 0 = Current output 3 * 1 = Mass flow 3 = Flow velocity 4 = Sound velocity 5 = Temperature * 6 = Pressure * 9 = Density * 14 = Signal strength * 15 = Signal to noise ratio * 16 = Turbulence * 18 = Profile factor * 19 = Current output 1 19 = Cross flow factor * 20 = Acceptance rate * 21 = Electronics temperature 21 = Current output 2 * 22 = Totalizer 1 23 = Totalizer 2 24 = Totalizer 3 86 = GSV flow * 90 = NSV flow * 92 = S&W volume flow * 97 = Reference density * 98 = API slope * 99 = API gravity *	17
0% bargraph value 1 (0123)	4136 to 4137	Float	Read / Write	Signed floating-point number	18
100% bargraph value 1 (0125)	4142 to 4143	Float	Read / Write	Signed floating-point number	18
Decimal places 1 (0095)	3365	Integer	Read / Write	0 = x 1 = x.x 2 = x.xx 3 = x.xxx 4 = x.xxxx	18
Value 2 display (0108)	3964	Integer	Read / Write	For the picklist, see **Value 1 display** parameter (0107) (→ 17)	19

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	19
Value 3 display (0110)	3966	Integer	Read / Write	For the picklist, see **Value 1 display** parameter (0107) (→ 17)	20
0% bargraph value 3 (0124)	4138 to 4139	Float	Read / Write	Signed floating-point number	20
100% bargraph value 3 (0126)	4140 to 4141	Float	Read / Write	Signed floating-point number	21
Decimal places 3 (0118)	4050	Integer	Read / Write	0 = x 1 = x.x **2 = x.xx** 3 = x.xxx 4 = x.xxxx	21
Value 4 display (0109)	3965	Integer	Read / Write	For the picklist, see **Value 1 display** parameter (0107) (→ 17)	22
Decimal places 4 (0119)	4051	Integer	Read / Write	0 = x 1 = x.x **2 = x.xx** 3 = x.xxx 4 = x.xxxx	22
Display interval (0096)	3604 to 3605	Float	Read / Write	1 to 10 s	23
Display damping (0094)	3554 to 3555	Float	Read / Write	0.0 to 999.9 s	23
Header (0097)	3624	Integer	Read / Write	**0 = Device tag** 1 = Free text	24
Header text (0112)	3968 to 3973	String	Read / Write	Max. 12 characters, such as letters, numbers or special characters (e.g. @, %, /)	24
Separator (0101)	3671	Integer	Read / Write	▪ . (point) ▪ , (comma)	25
Contrast display (0105)	3674 to 3675	Float	Read / Write	20 to 80 %	25
Backlight (0111)	3967	Integer	Read / Write	0 = Disable **1 = Enable**	25

* 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)	26
Last backup (2757)	6430	String	Read	Days (d), hours (h), minutes (m) and seconds (s)	26
Configuration management (2758)	5500	Integer	Read / Write	**0 = Cancel** 1 = Execute backup 2 = Restore * 4 = Clear backup data 5 = Compare *	27

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**	27
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	28

* 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	29

"Diagnostic behavior" submenu

Navigation: Expert → System → Diagnostic handling → Diagnostic behavior					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Assign behavior of diagnostic no. 019 (0635)	48299	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	31
Assign behavior of diagnostic no. 160 (0776)	2873	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	31
Assign behavior of diagnostic no. 302 (0742)	6484	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning**	32
Assign behavior of diagnostic no. 441 (0657)	4742	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	32
Assign behavior of diagnostic no. 442 (0658)	4919	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	32
Assign behavior of diagnostic no. 443 (0659)	5000	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	33
Assign behavior of diagnostic no. 444 (0740)	5120	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. 543 (0643)	2362	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	34
Assign behavior of diagnostic no. 832 (0675)	6440	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	35
Assign behavior of diagnostic no. 833 (0676)	6439	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	35
Assign behavior of diagnostic no. 841 (0680)	2434	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	36
Assign behavior of diagnostic no. 842 (0638)	9661	Integer	Read / Write	**0 = Off** 1 = Logbook entry only 2 = Warning 3 = Alarm	36
Assign behavior of diagnostic no. 930 (0639)	30668	Integer	Read / Write	0 = Off 1 = Logbook entry only 2 = Warning **3 = Alarm**	37
Assign behavior of diagnostic no. 931 (0640)	30930	Integer	Read / Write	0 = Off 1 = Logbook entry only 2 = Warning **3 = Alarm**	37
Assign behavior of diagnostic no. 870 (0726)	33279	Integer	Read / Write	**0 = Off** 1 = Logbook entry only 2 = Warning 3 = Alarm	36
Assign behavior of diagnostic no. 941 (0783)	29985	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	33
Assign behavior of diagnostic no. 942 (0780)	25099	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	33
Assign behavior of diagnostic no. 943 (0781)	29098	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	34

"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 *	41
Transmitter identifier (2765)	4510	Integer	Read	0 = Unknown 1 = 300 2 = 500	41

Navigation: Expert → System → Administration					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Activate SW option (0029)	2795	Integer	Read / Write	Max. 10-digit string of numbers.	42
Software option overview (0015)	2902	Integer	Read	1 = Extended HistoROM 32 = Product identification * 256 = Petroleum * 512 = Flow disturbance compensation * 16384 = Heartbeat Monitoring 32768 = Heartbeat Verification	42

* 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	39
Confirm access code	8685 to 8692	String	Read / Write	Max. 16-digit character string comprising numbers, letters and special characters	39

"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)	40
Reset access code (0024)	8880 to 8895	String	Read / Write	Character string comprising numbers, letters and special characters	40

6.3.2 "Sensor" submenu

"Measured values" submenu

"Process variables" submenu

Navigation: Expert → Sensor → Measured values → Process variables					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Volume flow (1838)	2007 to 2008	Float	Read	Signed floating-point number	45
Mass flow (1847)	2009 to 2010	Float	Read	Signed floating-point number	45
Flow velocity (1852)	2015 to 2016	Float	Read	Signed floating-point number	45
Sound velocity (1850)	2013 to 2014	Float	Read	Signed floating-point number	46
Pressure (1872)	2093 to 2094	Float	Read	Signed floating-point number	46
Energy flow (1851)	2011 to 2012	Float	Read	Signed floating-point number	46
CPL (4192)	26571 to 26572	Float	Read	Positive floating-point number	47
CTL (4191)	26569 to 26570	Float	Read	Positive floating-point number	47
CTPL (4193)	26869 to 26870	Float	Read	Positive floating-point number	48
GSV flow (4157)	26311 to 26312	Float	Read	Signed floating-point number	48
NSV flow (4159)	26483 to 26484	Float	Read	Signed floating-point number	49

Navigation: Expert → Sensor → Measured values → Process variables					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
S&W correction value (4194)	26939 to 26940	Float	Read	Positive floating-point number	49
S&W volume flow (4161)	26495 to 26496	Float	Read	Signed floating-point number	50
API gravity (4211)	29983 to 29984	Float	Read	0.0 to 100.0 °API	50
API slope (4210)	25097 to 25098	Float	Read	−10 to 100 °API/s	51
Reference density (4212)	29993 to 29994	Float	Read	0 to 30 kg/Nm³	51

"System values" submenu

Navigation: Expert → Sensor → Measured values → System values					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Signal strength (2914)	4959 to 4960	Float	Read	Signed floating-point number	52
Signal to noise ratio (2917)	4983 to 4984	Float	Read	Signed floating-point number	52
Acceptance rate (2912)	4551 to 4552	Float	Read	0 to 100 %	52
Turbulence (2907)	22772 to 22773	Float	Read	Signed floating-point number	53

"Totalizer" submenu

Navigation: Expert → Sensor → Measured values → Totalizer					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Totalizer 1 to n value (0911–1 to n)	1: 2610 to 2611 2: 2810 to 2811 3: 3010 to 3011	Float	Read	Signed floating-point number	53
Totalizer 1 to n overflow (0910–1 to n)	1: 2612 to 2613 2: 2812 to 2813 3: 3012 to 3013	Float	Read	Integer with sign	54

"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	56
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	56

"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	0 = Low 1 = High	57

"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 (0361–1 to n)	1: 5931 to 5932 2: 5933 to 5934 3: 5935 to 5936	Float	Read	0 to 22.5 mA	57
Measured current (0366–1 to n)	1: 5779 to 5780 2: 5781 to 5782 3: 5783 to 5784	Float	Read	0 to 30 mA	58

"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 (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	58
Pulse output (0456–1 to n)	1: 3082 to 3083 2: 3084 to 3085 3: 4718 to 4719	Float	Read	Positive floating-point number	58
Switch state (0461–1 to n)	1: 2485 2: 2486 3: 9917	Integer	Read	1 = Open 6 = Closed	59

"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	60
Switch cycles (0815–1 to n)	1: 7625 2: 7627 3: 7629	Integer	Read	Positive integer	60
Max. switch cycles number (0817–1 to n)	1: 21919 2: 21921 3: 21923	Integer	Read	Positive integer	60

"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	61

"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)	62

Navigation: Expert → Sensor → System units					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→
				65 = bbl/min (us;tank) 66 = bbl/h (us;tank) 67 = bbl/d (us;tank) 68 = gal/s (imp) 69 = gal/min (imp) 70 = gal/h (imp) 71 = gal/d (imp) 72 = Mgal/s (imp) 73 = Mgal/min (imp) 74 = Mgal/h (imp) 75 = Mgal/d (imp) 76 = bbl/s (imp;beer) 77 = bbl/min (imp;beer) 78 = bbl/h (imp;beer) 79 = bbl/d (imp;beer) 80 = bbl/s (imp;oil) 81 = bbl/min (imp;oil) 82 = bbl/h (imp;oil) 83 = bbl/d (imp;oil) 88 = kgal/s (us) 89 = kgal/min (us) 90 = kgal/h (us) 91 = kgal/d (us) 92 = MMft³/s 93 = MMft³/min 94 = MMft³/h	
Volume unit (0563)	2104	Integer	Read / Write	= = = 0 = cm³ 1 = dm³ **2 = m³ (+)** 3 = ml 4 = l 5 = hl 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)	64

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	65
Mass unit (0574)	2102	Integer	Read / Write	50 = g **51 = kg** (+) 52 = t 53 = oz 54 = lb 55 = STon	65
Velocity unit (0566)	2600	Integer	Read / Write	20 = ft/s **21 = m/s** (+)	66
Temperature unit (0557)	2109	Integer	Read / Write	**0 = °C** (+) 1 = K 2 = °F 3 = °R	66
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 24 = SG60°F	67

Navigation: Expert → Sensor → System units					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Reference density unit (0556)	2108	Integer	Read / Write	0 = g/Scm³ 1 = kg/Nl **2 = kg/Nm³** 3 = kg/Sm³ 4 = lb/Sft³ 6 = RD15°C 7 = RD20°C 8 = RD60°F	67
Kinematic viscosity unit (0578)	2112	Integer	Read / Write	**0 = m²/s** (+) 2 = cSt 3 = St 240 = mm²/s	68
Length unit (0551)	2087	Integer	Read / Write	44 = ft 45 = m 47 = in **49 = mm** (+)	68
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	68

"Measuring point 1" submenu

Navigation: Expert → Sensor → Measuring point 1					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Measuring point configuration (5675–1)	4285	Integer	Read / Write	0 = 1 measuring point - signal path 1 1 = 1 measuring point - 2 signal paths * 2 = 1 measuring point - signal path 2 *	71
Medium (2926–1)	5049	Integer	Read / Write	**0 = Water** 1 = Distilled water 2 = Sea water 4 = Benzene 6 = Ethanol 7 = Ammonia NH3 8 = Kerosene 9 = Milk 10 = Methanol 17 = Air * 18 = Glycol 19 = Liquid hydrocarbons * 255 = User-specific liquid	71
Medium temperature (3053–1)	36110 to 36111	Float	Read / Write	–200 to 550 °C	71
Sound velocity calculation mode (4202–1)	36927	Integer	Read / Write	1 = Fixed value **2 = API gravity** 3 = Density 4 = Reference density	72
Sound velocity (2929–1)	5171 to 5172	Float	Read / Write	200 to 3 000 m/s	72
API gravity (4203–1)	36928 to 36929	Float	Read / Write	0.0 to 100.0 °API	72
Density (4204–1)	36949 to 36950	Float	Read / Write	Signed floating-point number	73
Reference density (4205–1)	36951 to 36952	Float	Read / Write	Signed floating-point number	73
Pressure (4206–1)	36953 to 36954	Float	Read / Write	0.8 to 110 bar	73
API commodity group (4214–1)	24922	Integer	Read / Write	**0 = A - crude oil** 1 = B - refined products 3 = D - lubricating oils	74

Navigation: Expert → Sensor → Measuring point 1					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
API table selection (4209–1)	36930	Integer	Read / Write	**0 = API table 23/24** 1 = API table 59/60 2 = API table 5/6 3 = API table 53/54 4 = Other	74
Alternative pressure value (4207–1)	36955 to 36956	Float	Read / Write	0.8 to 110 bar	74
Alternative temperature value (4208–1)	36957 to 36958	Float	Read / Write	−10 to 110 °C	75
Viscosity (2932–1)	5223 to 5224	Float	Read / Write	0.01 to 10 000 mm²/s	75
Pipe material (2927–1)	5102	Integer	Read / Write	**0 = Stainless steel** 1 = Carbon steel 2 = Ductile cast iron 3 = Hastelloy C 6 = Copper 10 = PA 11 = PE 12 = PTFE 13 = PVC 14 = PVDF 15 = LDPE 16 = HDPE 17 = GRP 18 = PP 20 = Pyrex glass 22 = Asbestos cement 104 = 1.4301 (UNS S30400) 116 = 1.4401 (UNS S31600) 147 = 1.4550 (UNS S34700) 255 = Unknown pipe material	75
Pipe sound velocity (2933–1)	5326 to 5327	Float	Read / Write	800.0 to 3 800.0 m/s	76
Pipe dimensions (2943–1)	5114	Integer	Read / Write	**0 = Diameter** 1 = Pipe circumference	76
Pipe circumference (2934–1)	5334 to 5335	Float	Read / Write	30 to 62 800 mm	76
Pipe outer diameter (2910–1)	4971 to 4972	Float	Read / Write	0 to 20 000 mm	77
Pipe wall thickness (2916–1)	4975 to 4976	Float	Read / Write	Positive floating point number	77
Liner material (2928–1)	5118	Integer	Read / Write	1 = Cement 2 = Rubber 3 = Epoxy resin **251 = None** 255 = Unknown liner material	77
Liner sound velocity (2936–1)	5342 to 5343	Float	Read / Write	800.0 to 3 800.0 m/s	77
Liner thickness (2935–1)	5338 to 5339	Float	Read / Write	0 to 100 mm	78
Sensor type (2924–1)	4928	Integer	Read / Write	0 = C-030-A 0 = C-050-A 0 = C-100-A 0 = C-100-B 0 = C-100-C 0 = C-200-A 0 = C-200-B 0 = C-200-C 0 = C-500-A 21 = CH-050-A * 22 = CH-100-A *	78
Signal filter (3011–1)	52344	Integer	Read / Write	0 = Off **1 = On**	78
Sensor coupling (2957–1)	27037	Integer	Read / Write	**0 = Coupling pad** 1 = Coupling paste	79

Navigation: Expert → Sensor → Measuring point 1					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Mounting type (2938–1)	4998	Integer	Read / Write	1 = (1) direct 2 = (2) V-mounting 3 = (3) Z-Mounting 4 = (4) W-mounting 6 = Automatic	79
Cable length (2939–1)	5346 to 5347	Float	Read / Write	0 to 200 000 mm	79
FlowDC inlet configuration (3049–1)	21570	Integer	Read / Write	**0 = Off** 1 = Single elbow 2 = Double elbow 3 = Double elbow 3D 4 = Concentric diameter change 5 = Reduction 6 = 45° bend 7 = 2 x 45° bend 22 = Other *	80
Intermediate pipe length (2945–1)	32808 to 32809	Float	Read / Write	Positive floating-point number	80
Inlet diameter (3054–1)	36730 to 36731	Float	Read / Write	1 to 10 000 mm	81
Transition length (3065–1)	27608 to 27609	Float	Read / Write	0 to 20 000 mm	81
Inlet run (3050–1)	36023 to 36024	Float	Read / Write	0 to 300 000 mm	81
Relative sensor position (2985–1)	5122	Integer	Read	90 = 90° 180 = 180°	82
Result sensor type / mounting type (2946–1)	5187 to 5199	String	Read	e.g. **C-100-A** option / **(2) V-mounting** option	82
Result sensor distance / measuring aid (2947–1)	5203 to 5215	String	Read	e.g. 201.3 mm / B 21	82
Result sensor type / sensor distance (3066–1)	44416 to 44428	String	Read	e.g. I-100-A / 500 mm	82
Result path length / arc length (3067–1)	44450 to 44462	String	Read	e.g. 1 085 mm / 257.56 mm	83

* Visibility depends on order options or device settings

"Mounting deviations signal path 1 to n" submenu

Navigation: Expert → Sensor → Measuring point 1 → Mounting deviations signal path 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Sensor distance deviation (5822–1 to n)	1: 5667 to 5668 2: 5669 to 5670	Float	Read / Write	Signed floating-point number	83
Arc length deviation (5876–1 to n)	1: 36007 to 36008 2: 36009 to 36010	Float	Read / Write	Signed floating-point number	84
Signal path length deviation (5821–1 to n)	1: 5663 to 5664 2: 5665 to 5666	Float	Read / Write	Signed floating-point number	84

"Installation status" submenu

Navigation: Expert → Sensor → Installation status					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→
Installation status (2958)	27532	Integer	Read	0 = Bad 1 = Acceptable **128 = Good**	85
Signal strength (2914)	4959 to 4960	Float	Read	Signed floating-point number	85
Signal to noise ratio (2917)	4983 to 4984	Float	Read	Signed floating-point number	86
Sound velocity (2915)	4967 to 4968	Float	Read	Signed floating-point number	86
Sound velocity deviation (2986)	46176 to 46177	Float	Read	Signed floating-point number	86

"Process parameters" submenu

Navigation: Expert → Sensor → Process parameters					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→
Flow override (1839)	5503	Integer	Read / Write	**0 = Off** 1 = On	87
Flow damping (1802)	5510 to 5511	Float	Read / Write	0 to 999.9 s	87

"Low flow cut off" submenu

Navigation: Expert → Sensor → Process parameters → Low flow cut off					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→
Assign process variable (1837)	5101	Integer	Read / Write	0 = Off 1 = Mass flow 2 = Volume flow **3 = Flow velocity**	88
On value low flow cutoff (1805)	5138 to 5139	Float	Read / Write	Positive floating-point number	89
Off value low flow cutoff (1804)	5104 to 5105	Float	Read / Write	0 to 100.0 %	89

"External compensation" submenu

Navigation: Expert → Sensor → External compensation					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→
Pressure compensation (3023)	28560	Integer	Read / Write	**1 = Fixed value** 10 = External value * 11 = Current input 1 * 12 = Current input 2 *	90
Temperature compensation (3025)	28563	Integer	Read / Write	**1 = Fixed value** 10 = External value * 11 = Current input 1 * 12 = Current input 2 *	91
Fixed value (2925)	4979 to 4980	Float	Read / Write	−50 to 550 °C	91
External value (3058)	28647 to 28648	Float	Read / Write	−273.15 to 99 999 °C	91
Density source (3048)	21485	Integer	Read / Write	**0 = Fixed value** 1 = External value * 2 = Calculated value * 11 = Current input 1 * 12 = Current input 2 *	92
Fixed value (3171)	25234 to 25235	Float	Read / Write	0.01 to 15 000 kg/m³	92

Navigation: Expert → Sensor → External compensation					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
External value (3060)	36025 to 36026	Float	Read / Write	Positive floating-point number	92
Fixed reference density (3178)	27177 to 27178	Float	Read / Write	0.01 to 15 000 kg/m³	93
Linear expansion coefficient (3153)	26402 to 26403	Float	Read / Write	$1.0 \cdot 10^{-6}$ to $2.0 \cdot 10^{-3}$	93
Square expansion coefficient (3172)	36021 to 36022	Float	Read / Write	$1.0 \cdot 10^{-8}$ to $2.0 \cdot 10^{-3}$	93
Reference temperature (3147)	26383 to 26384	Float	Read / Write	−200 to 450 °C	94

* 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

"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
Sound velocity offset (1848)	5529 to 5530	Float	Read / Write	Signed floating-point number	97
Sound velocity factor (1849)	5527 to 5528	Float	Read / Write	Positive floating-point number	97
Temperature offset (1870)	5533 to 5534	Float	Read / Write	Signed floating-point number	97
Temperature factor (1871)	5531 to 5532	Float	Read / Write	Positive floating-point number	98
Density offset (1877)	25324 to 25325	Float	Read / Write	Signed floating-point number	98
Density factor (1878)	25336 to 25337	Float	Read / Write	Positive floating-point number	98

"Calibration" submenu

Navigation: Expert → Sensor → Calibration					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Calibration factor (2920)	4559 to 4560	Float	Read	Signed floating-point number	99
Zero point (2921)	4963 to 4964	Float	Read	Signed floating-point number	99
Nominal diameter (2807)	2048 to 2057	String	Read	----------	99

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)	100
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	100
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 *	101
Apply I/O configuration (3907)	8665	Integer	Read / Write	0 = Yes **1 = No**	101
I/O alteration code (2762)	6427	Integer	Read / Write	Positive integer	102

* 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)	103
Signal mode (1610–1 to n)	1: 6424 2: 6425 3: 6426	Integer	Read / Write	**0 = Passive** 2 = Active *	103
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)	103
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	104
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	104
Failure mode (1601–1 to n)	1: 6159 2: 6160 3: 6161	Integer	Read / Write	1 = Last valid value **2 = Alarm** 6 = Defined value	104
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	105

* 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)	105
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	106
Value status input (1353–1 to n)	1: 2746 2: 4699 3: 4700	Integer	Read	0 = Low 1 = High	106
Active level (1351–1 to n)	1: 2530 2: 4690 3: 4691	Integer	Read / Write	0 = Low **1 = High**	107
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	107

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)	108
Signal mode (0377–1 to n)	1: 6421 2: 6422 3: 6423	Integer	Read / Write	0 = Passive * 2 = Active *	109
Process variable current output (0359–1 to n)	1: 5927 2: 5928 3: 5929	Integer	Read / Write	0 = Off * **0 = Volume flow** 1 = Mass flow 3 = Flow velocity 4 = Sound velocity 5 = Temperature * 6 = Pressure * 9 = Density * 14 = Signal strength * 15 = Signal to noise ratio * 16 = Turbulence * 18 = Profile factor * 19 = Cross flow factor * 20 = Acceptance rate * 21 = Electronics temperature 86 = GSV flow * 90 = NSV flow * 92 = S&W volume flow * 97 = Reference density * 98 = API slope * 99 = API gravity *	109

Navigation: Expert → Output → Current output 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
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	109
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	110
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	111
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	113
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 *	113
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	118
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	118
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	119
Output current (0361–1 to n)	1: 5931 to 5932 2: 5933 to 5934 3: 5935 to 5936	Float	Read	3.59 to 22.5 mA	119
Measured current (0366–1 to n)	1: 5779 to 5780 2: 5781 to 5782 3: 5783 to 5784	Float	Read	0 to 30 mA	120

* 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)	121
Signal mode (0490–1 to n)	1: 6235 2: 6236 3: 6237	Integer	Read / Write	**0 = Passive** 2 = Active * 3 = Passive NE	122
Operating mode (0469–1 to n)	1: 4479 2: 4480 3: 9907	Integer	Read / Write	**0 = Pulse** 1 = Switch 53 = Frequency	122

Navigation: Expert → Output → Pulse/frequency/switch output 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Assign pulse output (0460–1 to n)	1: 2461 2: 2462 3: 4685	Integer	Read / Write	**0 = Off** 0 = Volume flow 1 = Mass flow 86 = GSV flow * 90 = NSV flow * 92 = S&W volume flow * 101 = Product 1 volume flow * 102 = Product 2 volume flow * 103 = Product 3 volume flow * 104 = Product 4 volume flow * 105 = Product 5 volume flow * 106 = Product 1 mass flow * 107 = Product 2 mass flow * 108 = Product 3 mass flow * 109 = Product 4 mass flow * 110 = Product 5 mass flow * 111 = Product 1 NSV flow * 112 = Product 2 NSV flow * 113 = Product 3 NSV flow * 114 = Product 4 NSV flow * 115 = Product 5 NSV flow *	124
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	124
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	125
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	126
Failure mode (0480–1 to n)	1: 2948 2: 2949 3: 4708	Integer	Read / Write	0 = Actual value **1 = No pulses**	126
Pulse output (0456–1 to n)	1: 3082 to 3083 2: 3084 to 3085 3: 4718 to 4719	Float	Read	Positive floating-point number	127
Assign frequency output (0478–1 to n)	1: 2614 2: 2615 3: 9915	Integer	Read / Write	**0 = Off** 0 = Volume flow 1 = Mass flow 3 = Flow velocity 4 = Sound velocity 5 = Temperature * 6 = Pressure * 9 = Density * 14 = Signal strength * 15 = Signal to noise ratio * 16 = Turbulence * 18 = Profile factor * 19 = Cross flow factor * 20 = Acceptance rate * 21 = Electronics temperature 86 = GSV flow * 90 = NSV flow * 92 = S&W volume flow * 97 = Reference density * 98 = API slope * 99 = API gravity *	128
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	128

Navigation: Expert → Output → Pulse/frequency/switch output 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
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	129
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	129
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	129
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	130
Damping output (0477–1 to n)	1: 3522 to 3523 2: 3524 to 3525 3: 5763 to 5764	Float	Read / Write	0 to 999.9 s	131
Response time (0491–1 to n)	1: 5875 to 5876 2: 5877 to 5878 3: 5879 to 5880	Float	Read	Positive floating-point number	131
Failure mode (0451–1 to n)	1: 2367 2: 2368 3: 4681	Integer	Read / Write	0 = Actual value **1 = 0 Hz** 2 = Defined value	132
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	133
Output frequency (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	133
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	133
Assign diagnostic behavior (0482–1 to n)	1: 3096 2: 3097 3: 9913	Integer	Read / Write	**0 = Alarm** 1 = Warning 2 = Alarm or warning	134
Assign limit (0483–1 to n)	1: 3184 2: 3185 3: 4722	Integer	Read / Write	0 = Off **0 = Volume flow** 1 = Mass flow 3 = Flow velocity 4 = Sound velocity 5 = Temperature * 6 = Pressure * 9 = Density * 14 = Signal strength * 15 = Signal to noise ratio * 16 = Turbulence * 18 = Profile factor * 19 = Cross flow factor * 20 = Acceptance rate * 21 = Electronics temperature 22 = Totalizer 1 23 = Totalizer 2 24 = Totalizer 3 86 = GSV flow * 90 = NSV flow * 92 = S&W volume flow * 97 = Reference density * 98 = API slope * 99 = API gravity *	135

Navigation: Expert → Output → Pulse/frequency/switch output 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
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	137
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	137
Assign flow direction check (0484–1 to n)	1: 3363 2: 3364 3: 4732	Integer	Read / Write	0 = Off **0 = Volume flow** 1 = Mass flow 3 = Flow velocity	138
Assign status (0485–1 to n)	1: 3374 2: 3375 3: 4734	Integer	Read / Write	0 = Off **1 = Low flow cut off** 2 = Product identification *	138
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	138
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	139
Failure mode (0486–1 to n)	1: 3384 2: 3385 3: 9912	Integer	Read / Write	0 = Actual status **1 = Open** 6 = Closed	139
Switch state (0461–1 to n)	1: 2485 2: 2486 3: 9917	Integer	Read	1 = Open 6 = Closed	139
Invert output signal (0470–1 to n)	1: 2583 2: 2584 3: 9916	Integer	Read / Write	0 = Yes **1 = No**	140

* 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)	141
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 = Status **6 = Closed**	141
Assign flow direction check (0808–1 to n)	1: 8251 2: 8252 3: 8253	Integer	Read / Write	0 = Off **0 = Volume flow** 1 = Mass flow 3 = Flow velocity	142

Navigation: Expert → Output → Relay output 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Assign limit (0807–1 to n)	1: 8248 2: 8249 3: 8250	Integer	Read / Write	0 = Off **0 = Volume flow** 1 = Mass flow 3 = Flow velocity 4 = Sound velocity 5 = Temperature * 6 = Pressure * 9 = Density * 14 = Signal strength * 15 = Signal to noise ratio * 16 = Turbulence * 18 = Profile factor * 19 = Cross flow factor * 20 = Acceptance rate * 21 = Electronics temperature 22 = Totalizer 1 23 = Totalizer 2 24 = Totalizer 3 86 = GSV flow * 90 = NSV flow * 92 = S&W volume flow * 97 = Reference density * 98 = API slope * 99 = API gravity *	142
Assign diagnostic behavior (0806–1 to n)	1: 8245 2: 8246 3: 8247	Integer	Read / Write	**0 = Alarm** 1 = Warning 2 = Alarm or warning	143
Assign status (0805–1 to n)	1: 8272 2: 8273 3: 8274	Integer	Read / Write	**0 = Off** 1 = Low flow cut off 2 = Product identification *	144
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	144
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	145
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	145
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	146
Failure mode (0811–1 to n)	1: 8242 2: 8243 3: 8244	Integer	Read / Write	0 = Actual status **1 = Open** 6 = Closed	146
Switch state (0801–1 to n)	1: 3518 2: 3519 3: 9875	Integer	Read	1 = Open 6 = Closed	146
Powerless relay status (0816–1 to n)	1: 7009 2: 7010 3: 7011	Integer	Read / Write	**1 = Open** 6 = Closed	147

* 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)	148
Slave terminal number (0990)	5845	Integer	Read	0 = Not used 2 = 24-25 (I/O 2) 3 = 22-23 (I/O 3)	148
Signal mode (0991)	5949	Integer	Read / Write	**0 = Passive** 2 = Active * 3 = Passive NE	148
Assign pulse output (0982)	5993	Integer	Read / Write	**0 = Off** 0 = Volume flow 1 = Mass flow 86 = GSV flow * 90 = NSV flow * 92 = S&W volume flow * 101 = Product 1 volume flow * 102 = Product 2 volume flow * 103 = Product 3 volume flow * 104 = Product 4 volume flow * 105 = Product 5 volume flow * 106 = Product 1 mass flow * 107 = Product 2 mass flow * 108 = Product 3 mass flow * 109 = Product 4 mass flow * 110 = Product 5 mass flow * 111 = Product 1 NSV flow * 112 = Product 2 NSV flow * 113 = Product 3 NSV flow * 114 = Product 4 NSV flow * 115 = Product 5 NSV flow *	149
Value per pulse (0983)	7495 to 7496	Float	Read / Write	Signed floating-point number	149
Pulse width (0986)	6998 to 6999	Float	Read / Write	0.5 to 2 000 ms	150
Phase shift (0992)	6089	Integer	Read / Write	**0 = 90°** 1 = 180°	150
Measuring mode (0984)	6001	Integer	Read / Write	**0 = Forward flow** 1 = Reverse flow 2 = Reverse flow compensation 13 = Forward/Reverse flow	150
Failure mode (0985)	6009	Integer	Read / Write	0 = Actual value **1 = No pulses**	151
Pulse output (0987)	7041 to 7042	Float	Read	Positive floating-point number	152
Invert output signal (0993)	6101	Integer	Read / Write	0 = Yes **1 = No**	152

* 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	153
Baudrate (7111)	4912	Integer	Read / Write	0 = 1200 BAUD 1 = 2400 BAUD 2 = 4800 BAUD 3 = 9600 BAUD **4 = 19200 BAUD** 5 = 38400 BAUD 6 = 57600 BAUD 7 = 115200 BAUD 8 = 230400 BAUD	154
Data transfer mode (7115)	4913	Integer	Read / Write	**0 = RTU** 1 = ASCII	154
Parity (7122)	4914	Integer	Read / Write	**0 = Even** 1 = Odd 2 = None / 2 stop bits 3 = None / 1 stop bit	154
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**	155
Telegram delay (7146)	4916 to 4917	Float	Read / Write	0 to 100 ms	156
Failure mode (7116)	4920	Integer	Read / Write	1 = Last valid value **255 = NaN value**	156
Bus termination (7155)	5774	Integer	Read	**0 = Off** 1 = On	157
Fieldbus writing access (7156)	6807	Integer	Read / Write	**0 = Read + write** 1 = Read only	157

"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	158
Device revision (7154)	4481	Integer	Read	4-digit hexadecimal number	158

"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	159

"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)	160
MAC address (7214)	4210 to 4218	String	Read	Unique 12-digit character string comprising letters and numbers	160
DHCP client (7212)	21781	Integer	Read / Write	0 = Off **1 = On**	160
IP address (7209)	4155 to 4162	String	Read / Write	4 octet: 0 to 255 (in the particular octet)	161
Subnet mask (7211)	4163 to 4170	String	Read / Write	4 octet: 0 to 255 (in the particular octet)	161
Default gateway (7210)	4171 to 4178	String	Read / Write	4 octet: 0 to 255 (in the particular octet)	161
Web server functionality (7222)	4220	Integer	Read / Write	0 = Off **1 = On** 2 = HTML Off	162
Login page (7273)	5802	Integer	Read / Write	0 = Without header **1 = With header**	162

"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**	163
WLAN mode (2717)	28777	Integer	Read / Write	**0 = WLAN access point** 1 = WLAN Client	164
SSID name (2714)	28940 to 28955	String	Read / Write	–	164
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. *	164
Security identification (2718)	28817	Integer	Read	1 = Trusted issuer certificate 2 = Device certificate 4 = Device private key	165
User name (2715)	28956 to 28971	String	Read / Write	–	165
WLAN password (2716)	28972 to 28987	String	Read / Write	–	165
WLAN IP address (2711)	8643 to 8650	String	Read / Write	4 octet: 0 to 255 (in the particular octet)	166
WLAN MAC address (2703)	8602 to 8610	String	Read	Unique 12-digit character string comprising letters and numbers	166
WLAN subnet mask (2709)	8651 to 8658	String	Read / Write	4 octet: 0 to 255 (in the particular octet)	166
WLAN MAC address (2703)	8602 to 8610	String	Read	Unique 12-digit character string comprising letters and numbers	166
WLAN passphrase (2706)	8611 to 8626	String	Read / Write	8 to 32-digit character string comprising numbers, letters and special characters (without spaces)	166
WLAN MAC address (2703)	8602 to 8610	String	Read	Unique 12-digit character string comprising letters and numbers	166
Assign SSID name (2708)	6218	Integer	Read / Write	0 = Device tag **1 = User-defined**	167
SSID name (2707)	8627 to 8642	String	Read / Write	Max. 32-digit character string comprising numbers, letters and special characters	167
2.4 GHz WLAN channel (2704)	6182	Integer	Read / Write	1 to 11	167
Select antenna (2713)	6102	Integer	Read / Write	0 = External antenna **1 = Internal antenna**	168
Connection state (2722)	29221	Integer	Read	**0 = Not connected** 1 = Connected	168
Received signal strength (2721)	28818	Integer	Read	0 = Low **1 = High** 2 = Medium	168
WLAN IP address (2711)	8643 to 8650	String	Read / Write	4 octet: 0 to 255 (in the particular octet)	166
Gateway IP address (2719)	29227 to 29234	String	Read	Character string comprising numbers, letters and special characters	169
IP address domain name server (2720)	29283 to 29290	String	Read	Character string comprising numbers, letters and special characters	169

* 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	169

"Totalizer 1 to n" submenu

Navigation: Expert → Application → Totalizer 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Assign process variable 1 to n (0914–1 to n)	1: 2601 2: 2801 3: 3001	Integer	Read / Write	0 = Off 0 = Volume flow 1 = Mass flow 86 = GSV flow * 90 = NSV flow * 92 = S&W volume flow * 101 = Product 1 volume flow * 102 = Product 2 volume flow * 103 = Product 3 volume flow * 104 = Product 4 volume flow * 105 = Product 5 volume flow * 106 = Product 1 mass flow * 107 = Product 2 mass flow * 108 = Product 3 mass flow * 109 = Product 4 mass flow * 110 = Product 5 mass flow * 111 = Product 1 NSV flow * 112 = Product 2 NSV flow * 113 = Product 3 NSV flow * 114 = Product 4 NSV flow * 115 = Product 5 NSV flow *	170
Process variable unit 1 to n (0915–1 to n)	1: 4604 2: 4605 3: 4606	Integer	Read / Write	0 = cm^3 * 1 = dm^3 * 2 = m^3 * 3 = ml * 4 = l * 5 = hl * 6 = Ml Mega * 8 = af * 9 = ft^3 * 10 = fl oz (us) * 11 = gal (us) * 12 = Mgal (us) * 13 = bbl (us;liq.) * 14 = bbl (us;beer) * 15 = bbl (us;oil) * 16 = bbl (us;tank) * 17 = gal (imp) * 18 = Mgal (imp) * 19 = bbl (imp;beer) * 20 = bbl (imp;oil) * 22 = kgal (us) * 23 = Mft^3 * 50 = g * 51 = kg * 52 = t * 53 = oz * 54 = lb * 55 = STon * 111 = Mft^3 * 112 = $MSft^3$ * 251 = None *	171

Navigation: Expert → Application → Totalizer 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Totalizer 1 to n operation mode (0908–1 to n)	1: 2605 2: 2805 3: 3005	Integer	Read / Write	0 = Net 1 = Forward 2 = Reverse	172
Control Totalizer 1 to n (0912–1 to n)	1: 2608 2: 2808 3: 3008	Integer	Read / Write	**0 = Totalize** 1 = Reset + hold 2 = Preset + hold 3 = Reset + totalize 3 = Hold 4 = Preset + totalize	173
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	173
Totalizer 1 to n failure behavior (0901–1 to n)	1: 2606 2: 2806 3: 3006	Integer	Read / Write	0 = Hold 1 = Continue 2 = Last valid value + continue	174

* Visibility depends on order options or device settings

"Petroleum" submenu

"Product identification" submenu

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.	176
Previous diagnostics (0690)	2734	Integer	Read	Symbol for diagnostic behavior, diagnostic code and short message.	177
Operating time from restart (0653)	2624	String	Read	Days (d), hours (h), minutes (m) and seconds (s)	177
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.	178
Diagnostics 2 (0693)	2738	Integer	Read	Symbol for diagnostic behavior, diagnostic code and short message.	179
Diagnostics 3 (0694)	2740	Integer	Read	Symbol for diagnostic behavior, diagnostic code and short message.	180
Diagnostics 4 (0695)	2742	Integer	Read	Symbol for diagnostic behavior, diagnostic code and short message.	181
Diagnostics 5 (0696)	2744	Integer	Read	Symbol for diagnostic behavior, diagnostic code and short message.	181

"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**	183

"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. @, %, /).	184
Serial number (0009)	7003 to 7008	String	Read	Max. 11-digit character string comprising letters and numbers.	184
Firmware version (0010)	7277 to 7280	String	Read	Character string in the format xx.yy.zz	184
Device name (0020)	7238 to 7245	String	Read	Prosonic Flow 500	185
Order code (0008)	2058 to 2067	String	Read	Character string composed of letters, numbers and certain punctuation marks (e.g. /).	185
Extended order code 1 (0023)	2212 to 2221	String	Read	Character string	185
Extended order code 2 (0021)	2222 to 2231	String	Read	Character string	186
Extended order code 3 (0022)	2232 to 2241	String	Read	Character string	186
ENP version (0012)	4003 to 4010	String	Read	Character string	186

"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	187
Build no. software (0079)	2326	Integer	Read	Positive integer	187
Bootloader revision (0073)	2264	Integer	Read	Positive integer	187

"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	188
Build no. software (0079)	2326	Integer	Read	Positive integer	188
Bootloader revision (0073)	2264	Integer	Read	Positive integer	188

"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)	189
Firmware version (0072)	7039	Integer	Read	Positive integer	189
Build no. software (0079)	2326	Integer	Read	Positive integer	189
Bootloader revision (0073)	2264	Integer	Read	Positive integer	190

"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)	190
Firmware version (0072)	7039	Integer	Read	Positive integer	190
Build no. software (0079)	2326	Integer	Read	Positive integer	191
Bootloader revision (0073)	2264	Integer	Read	Positive integer	191

"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	191
Build no. software (0079)	2326	Integer	Read	Positive integer	192
Bootloader revision (0073)	2264	Integer	Read	Positive integer	192

"Data logging" submenu

Navigation: Expert → Diagnostics → Data logging					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Assign channel 1 (0851)	2445	Integer	Read / Write	**0 = Off** 0 = Volume flow 0 = Current output 3 * 1 = Mass flow 3 = Flow velocity 4 = Sound velocity 5 = Temperature * 6 = Pressure * 9 = Density * 14 = Signal strength * 15 = Signal to noise ratio * 16 = Turbulence * 18 = Profile factor * 19 = Current output 1 19 = Cross flow factor * 20 = Acceptance rate * 21 = Current output 2 * 21 = Electronics temperature 86 = GSV flow * 90 = NSV flow * 92 = S&W volume flow * 97 = Reference density * 98 = API slope * 99 = API gravity *	193
Assign channel 2 (0852)	2446	Integer	Read / Write	For the picklist, see **Assign channel 1** parameter (0851) (→ 193)	194
Assign channel 3 (0853)	2548	Integer	Read / Write	For the picklist, see **Assign channel 1** parameter (0851) (→ 193)	194
Assign channel 4 (0854)	4286	Integer	Read / Write	For the picklist, see **Assign channel 1** parameter (0851) (→ 193)	194
Logging interval (0856)	4288 to 4289	Float	Read / Write	0.1 to 3 600.0 s	195
Clear logging data (0855)	4287	Integer	Read / Write	**0 = Cancel** 2 = Clear data	195
Data logging (0860)	5950	Integer	Read / Write	**0 = Overwriting** 1 = Not overwriting	196
Logging delay (0859)	5938	Integer	Read / Write	0 to 999 h	196
Data logging control (0857)	5930	Integer	Read / Write	**0 = None** 1 = Stop 2 = Delete + start	196
Data logging status (0858)	5937	Integer	Read	**0 = Done** 1 = Stopped 2 = Active 3 = Delay active	197
Entire logging duration (0861)	2827 to 2828	Float	Read	Positive floating-point number	197

* Visibility depends on order options or device settings

"Heartbeat Technology" submenu

"Heartbeat base settings" submenu

Navigation: Expert → Diagnostics → Heartbeat Technology → Heartbeat base settings					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Plant operator (2754)	3414 to 3429	String	Read / Write	Max. 32 characters such as letters, numbers or special characters (e.g. @, %, /)	201
Location (2755)	3430 to 3445	String	Read / Write	Max. 32 characters such as letters, numbers or special characters (e.g. @, %, /)	201

"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	202
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	202
Day (2842)	2493	Integer	Read / Write	1 to 31 d	203
Hour (2843)	2492	Integer	Read / Write	0 to 23 h	203
AM/PM (2813)	2496	Integer	Read / Write	0 = AM 1 = PM	203
Minute (2844)	2467	Integer	Read / Write	0 to 59 min	204
Verification mode (12105)	2366	Integer	Read / Write	**0 = Standard verification** 1 = Extended verification	204
External device information (12101)	20493 to 20508	String	Read / Write	Free text entry	204
Start verification (12127)	2270	Integer	Read / Write	0 = Cancel 1 = Start 3 = Start with testkit * 10 = Output 1 low value * 11 = Output 1 high value * 12 = Output 2 low value * 13 = Output 2 high value * 14 = Output 3 low value * 15 = Output 3 high value * 16 = Output 4 low value * 17 = Output 4 high value * 20 = Pulse output 1 * 21 = Frequency output 1 * 22 = Pulse output 2 * 23 = Frequency output 2 * 24 = Double pulse output * 25 = Frequency output 3 *	205
Progress (2808)	6797	Integer	Read	0 to 100 %	205
Measured values (12102)	5512 to 5513	Float	Read / Write	Signed floating-point number	206

Navigation: Expert → Diagnostics → Heartbeat Technology → Performing verification					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Output values (12103)	5516 to 5517	Float	Read	Signed floating-point number	206
Status (12153)	2079	Integer	Read	0 = Failed 1 = Done 3 = Not done 8 = Busy	207
Verification result (12149)	2355	Integer	Read	0 = Failed 2 = Passed 3 = Not done 250 = Not supported	207

* 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	208
Verification ID (12141)	2315	Integer	Read	0 to 65 535	208
Operating time (12126)	3346	String	Read	Days (d), hours (h), minutes (m), seconds (s)	208
Verification result (12149)	2355	Integer	Read	0 = Failed 2 = Passed 3 = Not done 250 = Not supported	209
Sensor (12152)	2384	Integer	Read	0 = Failed 2 = Passed **3 = Not done** 250 = Not supported	209
Sensor electronic module (ISEM) (12151)	2385	Integer	Read	0 = Failed 2 = Passed **3 = Not done** 250 = Not supported	209
I/O module (12145)	2386	Integer	Read	0 = Failed 2 = Passed **3 = Not done** 250 = Not supported 254 = Not plugged	210
System status (12109)	5790	Integer	Read	0 = Failed 2 = Passed **3 = Not done** 250 = Not supported	210

"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** 0 = Volume flow 1 = Mass flow 3 = Flow velocity 4 = Sound velocity 5 = Temperature * 6 = Pressure * 9 = Density * 86 = GSV flow * 90 = NSV flow * 92 = S&W volume flow * 97 = Reference density * 98 = API slope * 99 = API gravity *	212
Process variable value (1811)	6814 to 6815	Float	Read / Write	Depends on the process variable selected	213
Current input 1 to n simulation (1608–1 to n)	1: 6127 2: 6128 3: 6129	Integer	Read / Write	**0 = Off** 1 = On	213
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	213
Status input 1 to n simulation (1355–1 to n)	1: 2620 2: 4693 3: 4694	Integer	Read / Write	**0 = Off** 1 = On	214
Input signal level 1 to n (1356–1 to n)	1: 2638 2: 4696 3: 4697	Integer	Read / Write	0 = Low 1 = High	214
Current output 1 to n simulation (0354–1 to n)	1: 5939 2: 5940 3: 5941	Integer	Read / Write	**0 = Off** 1 = On	215
Current output value (0355)	5995 to 5996	Float	Read / Write	3.59 to 22.5 mA	215
Frequency output 1 to n simulation (0472–1 to n)	1: 6203 2: 6204 3: 6205	Integer	Read / Write	**0 = Off** 1 = On	215
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	216
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	216
Pulse value 1 to n (0459–1 to n)	1: 6219 2: 6220 3: 6221	Integer	Read / Write	0 to 65 535	217
Switch output simulation 1 to n (0462–1 to n)	1: 6223 2: 6224 3: 6225	Integer	Read / Write	**0 = Off** 1 = On	217
Switch state 1 to n (0463–1 to n)	1: 6227 2: 6228 3: 6229	Integer	Read / Write	1 = Open 6 = Closed	218
Relay output 1 to n simulation (0802–1 to n)	1: 7523 2: 7524 3: 7525	Integer	Read / Write	**0 = Off** 1 = On	218
Switch state 1 to n (0803–1 to n)	1: 8239 2: 8240 3: 8241	Integer	Read / Write	1 = Open 6 = Closed	219

Navigation: Expert → Diagnostics → Simulation					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→ 🖹
Pulse output simulation (0988)	5957	Integer	Read / Write	**0 = Off** 1 = Down-counting value 2 = Fixed value	219
Pulse value (0989)	5973	Integer	Read / Write	0 to 65 535	220
Device alarm simulation (0654)	6812	Integer	Read / Write	**0 = Off** 1 = On	220
Diagnostic event category (0738)	4261	Integer	Read / Write	0 = Sensor 1 = Electronics 2 = Configuration **3 = Process**	221
Diagnostic event simulation (0737)	4259	Integer	Read / Write	▪ Off ▪ Diagnostic event picklist (depends on the category selected)	221

* Visibility depends on order options or device settings

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