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71633425
2024-01-31

Valid as of version
01.02.zz (Device firmware)

Description of Device Parameters
Proline Prosonic Flow P 500

Ultrasonic time-of-flight flowmeter
HART

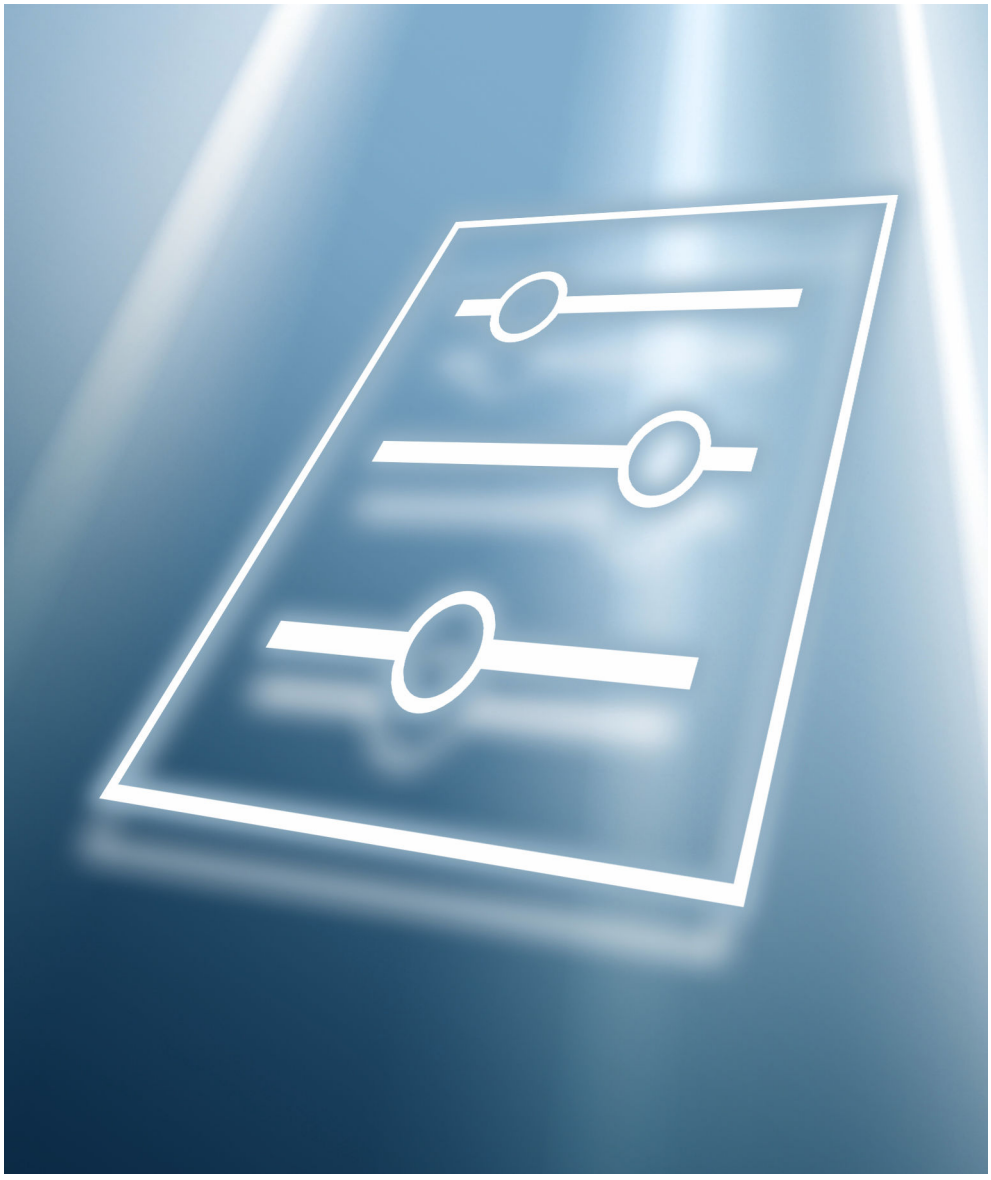

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Table of contents

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

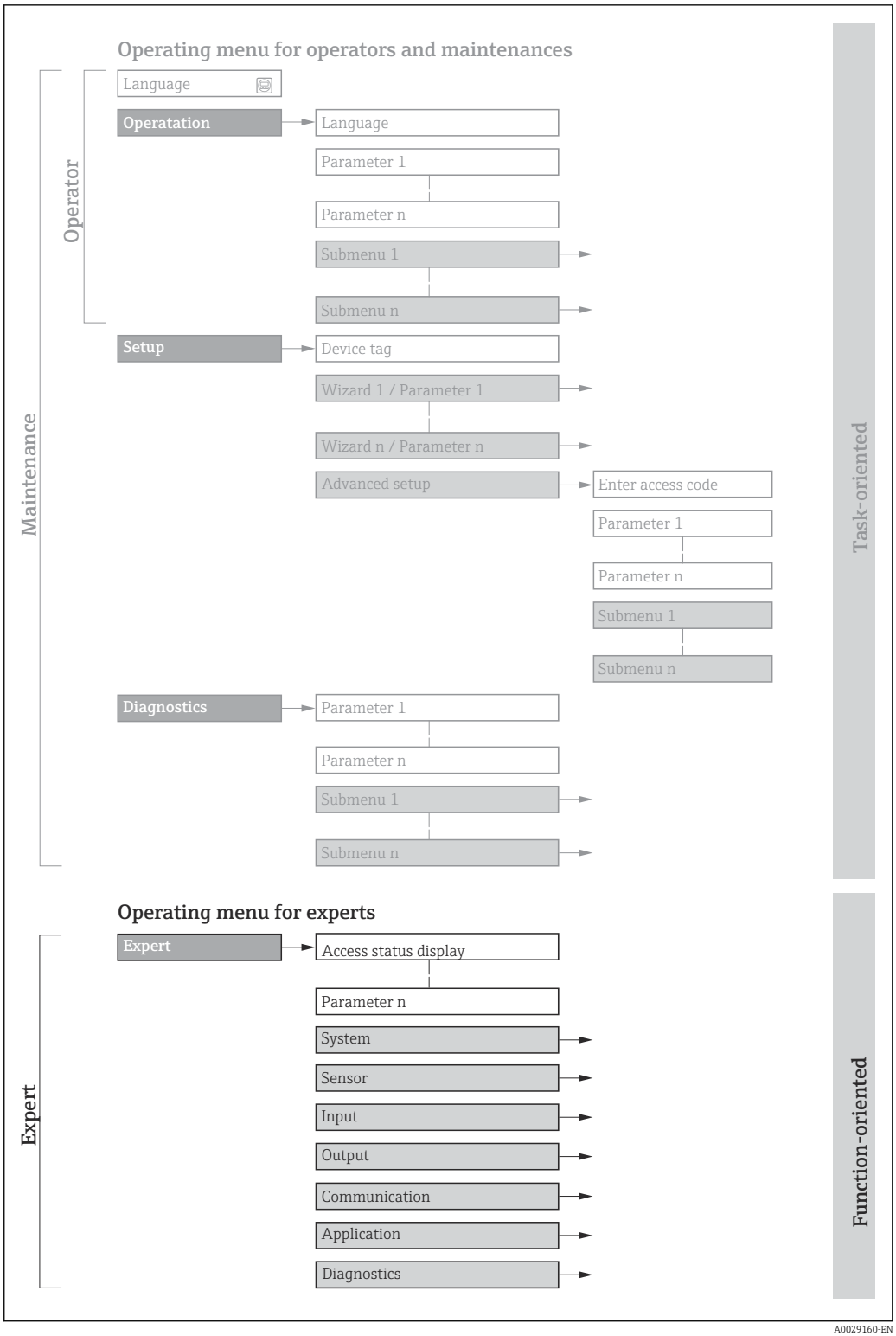
1.2 Target group

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	BA02025D

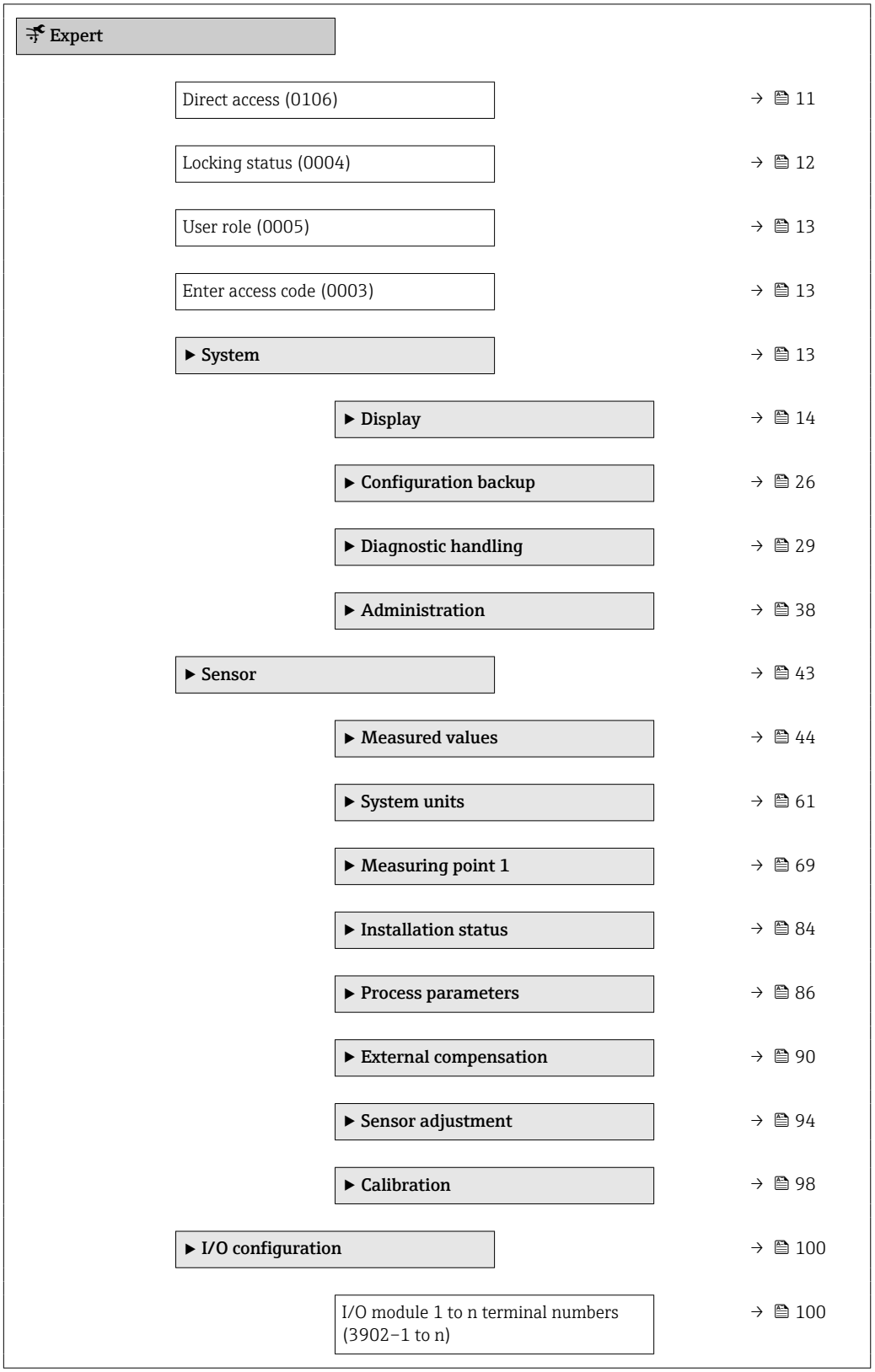
1.5.2 Supplementary device-dependent documentation

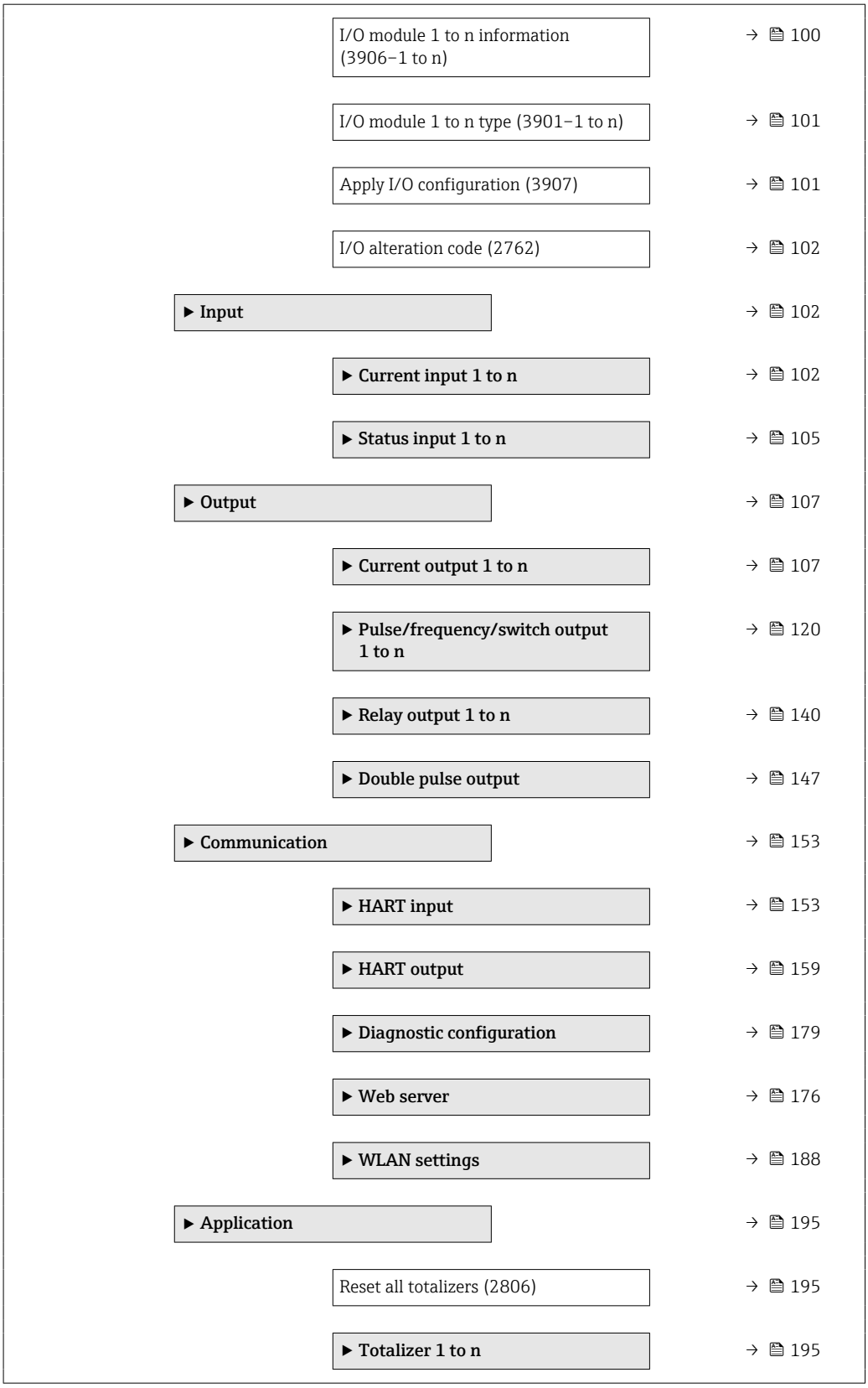
Special Documentation

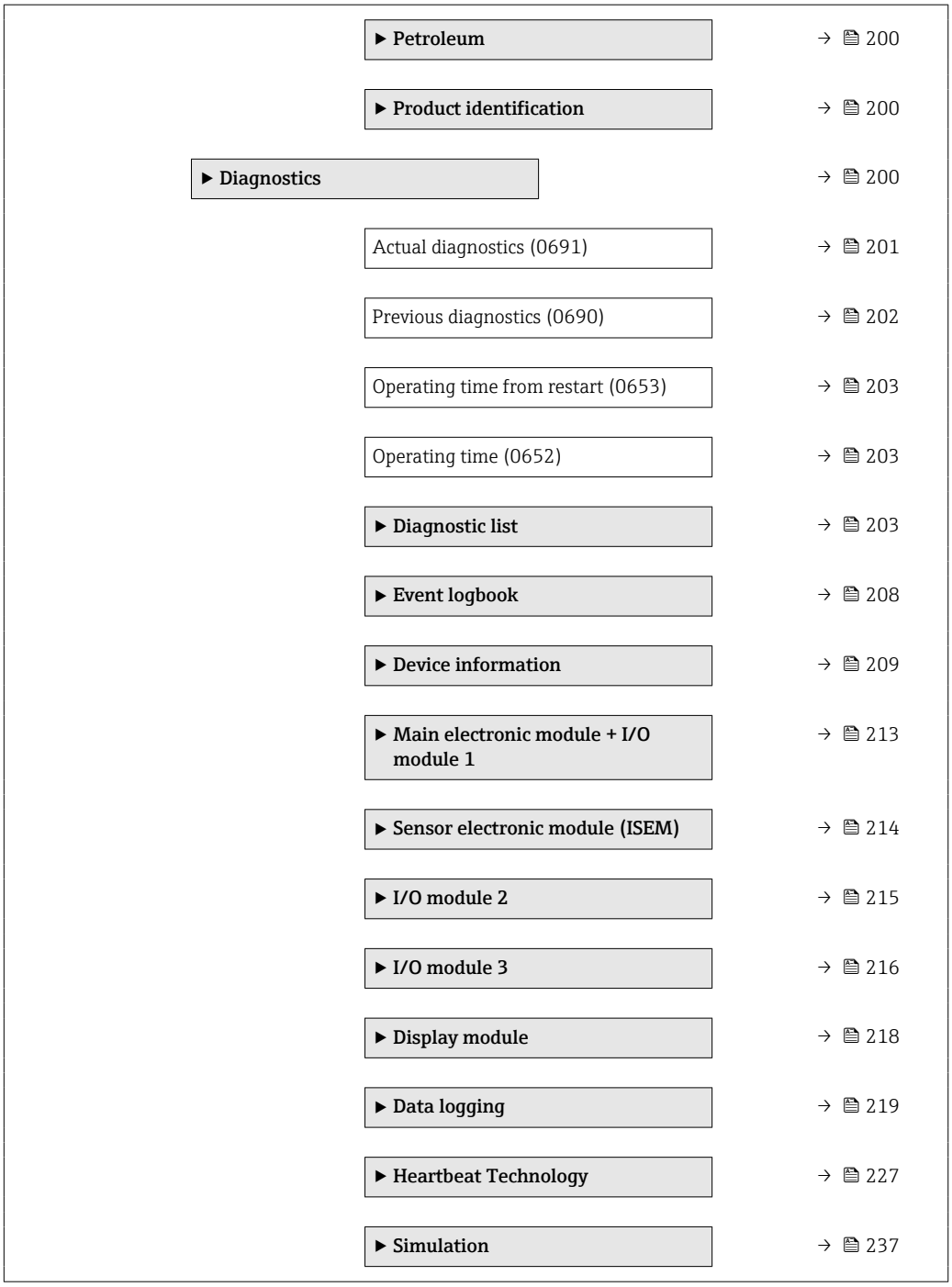
Contents	Documentation code
Radio approvals for WLAN interface for A309/A310 display module	SD01793D
FlowDC	SD02660D
Heartbeat Technology	SD02593D
High-temperature sensors	SD03088D
Petroleum & product identification	SD03081D
Web server	SD02603D

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.

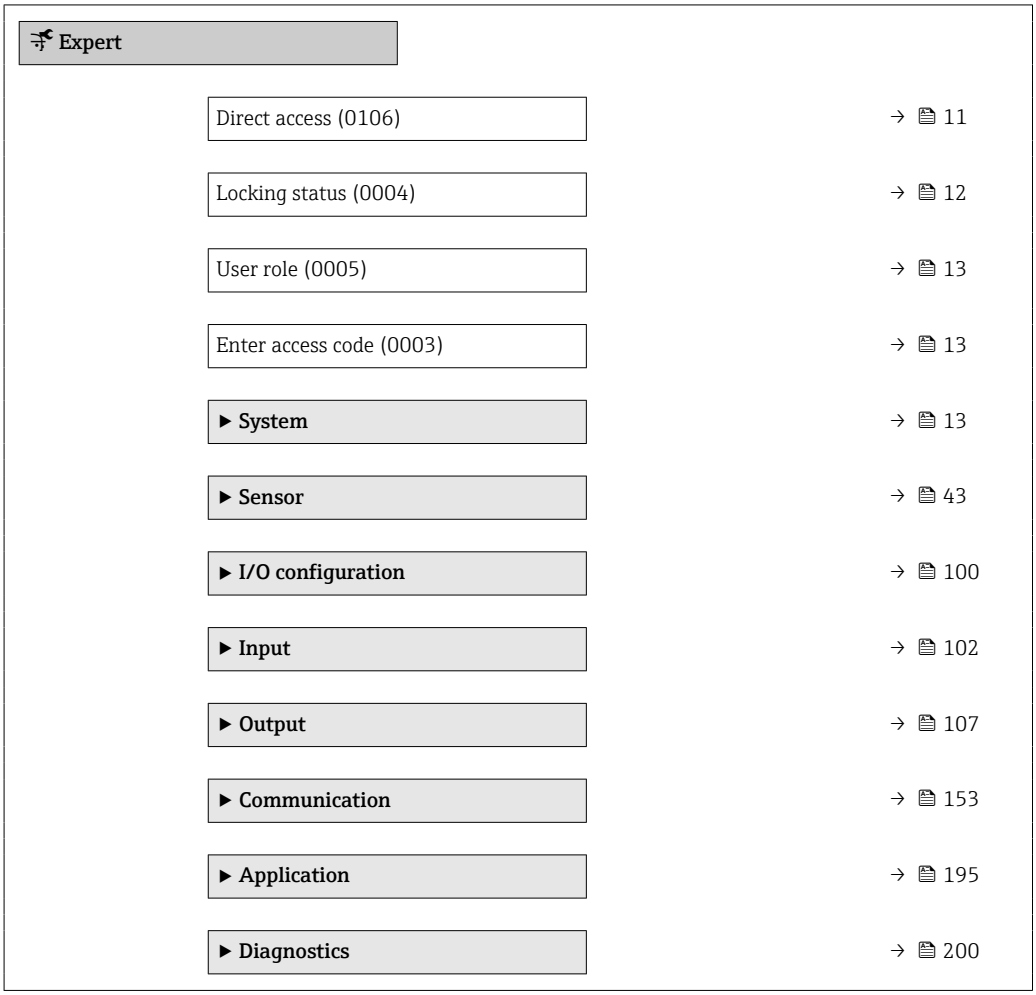



I/O module 1 to n information (3906–1 to n)
→ 100
I/O module 1 to n type (3901–1 to n)
→ 101
Apply I/O configuration (3907)
→ 101
I/O alteration code (2762)
→ 102
▶ Input
→ 102
▶ Current input 1 to n
→ 102
▶ Status input 1 to n
→ 105
▶ Output
→ 107
▶ Current output 1 to n
→ 107
▶ Pulse/frequency/switch output 1 to n
→ 120
▶ Relay output 1 to n
→ 140
▶ Double pulse output
→ 147
▶ Communication
→ 153
▶ HART input
→ 153
▶ HART output
→ 159
▶ Diagnostic configuration
→ 179
▶ Web server
→ 176
▶ WLAN settings
→ 188
▶ Application
→ 195
Reset all totalizers (2806)
→ 195
▶ Totalizer 1 to n
→ 195


▶ Petroleum → 200
▶ Product identification → 200
▶ Diagnostics → 200
Actual diagnostics (0691) → 201
Previous diagnostics (0690) → 202
Operating time from restart (0653) → 203
Operating time (0652) → 203
▶ Diagnostic list → 203
▶ Event logbook → 208
▶ Device information → 209
▶ Main electronic module + I/O module 1 → 213
▶ Sensor electronic module (ISEM) → 214
▶ I/O module 2 → 215
▶ I/O module 3 → 216
▶ Display module → 218
▶ Data logging → 219
▶ Heartbeat Technology → 227
▶ Simulation → 237

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

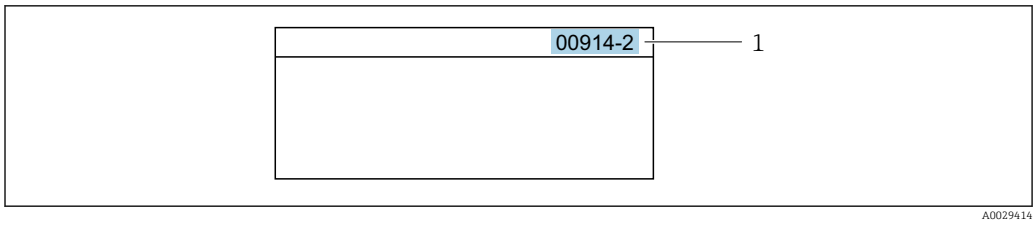
Navigation Expert → Direct access (0106)

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
- SIL 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) .
SIL locked (priority 2)	The SIL mode is enabled. 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

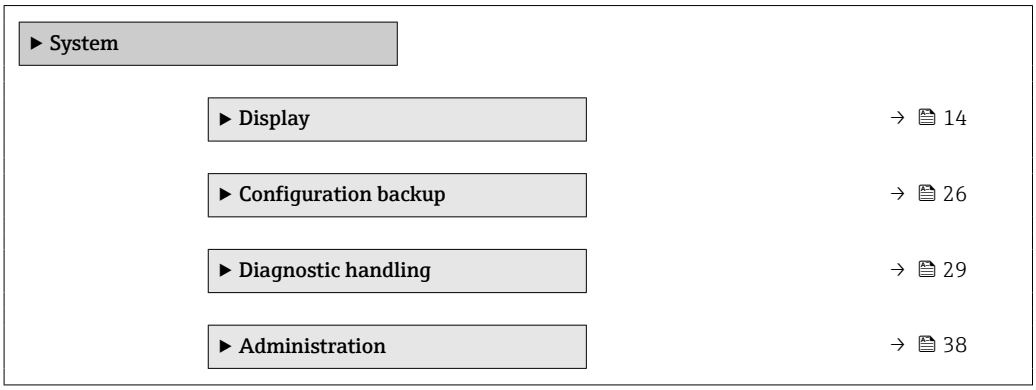
Navigation Expert → Ent. access code (0003)

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

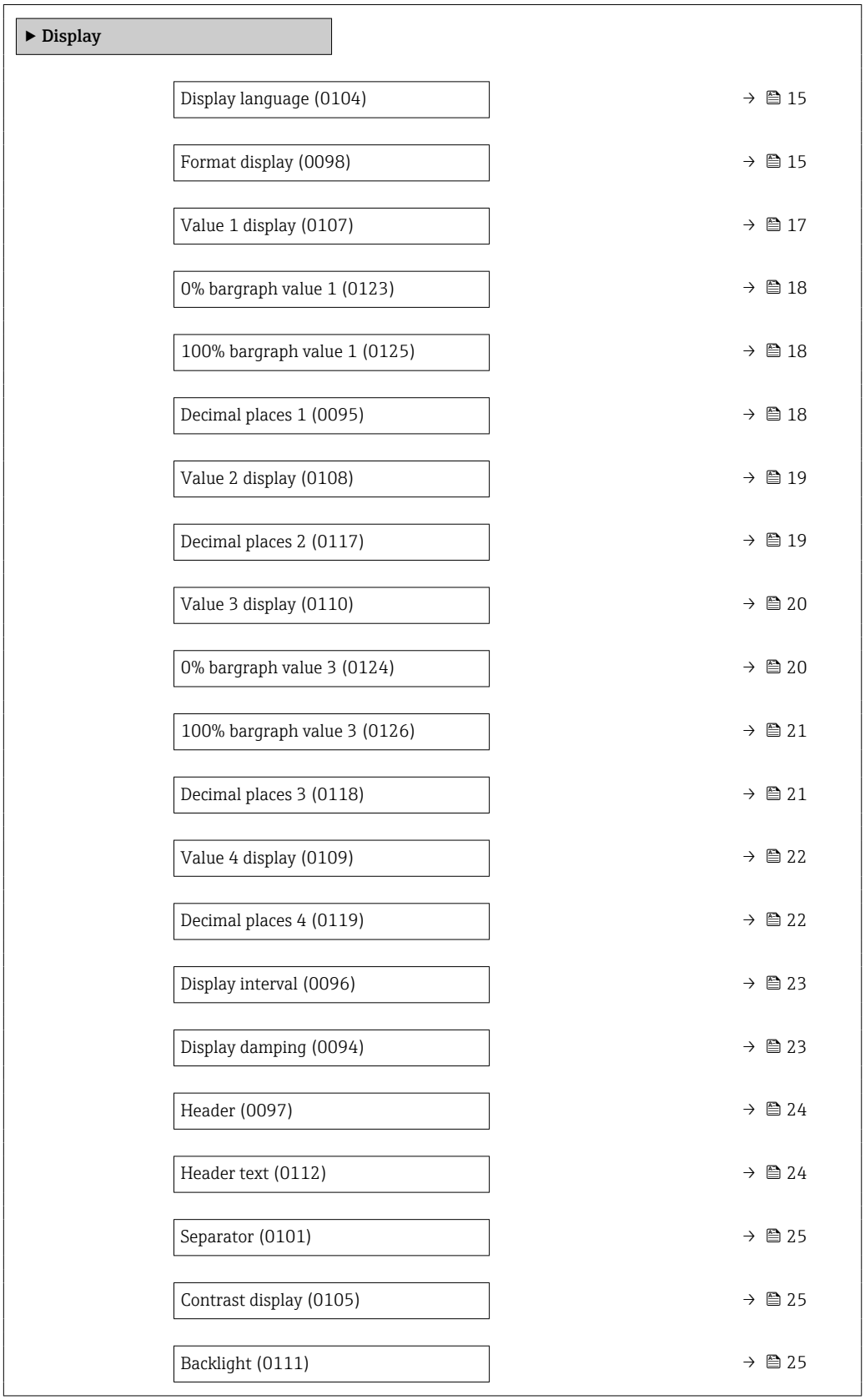
3.1 "System" submenu

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.

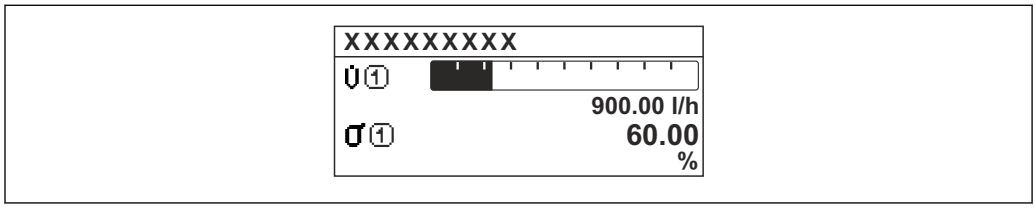
- The **Value 1 display** parameter (0107) (→ 17)...**Value 8 display** parameter (0148) are used to specify which measured values are shown on the local display and in what order.
- If more measured values are specified than the display mode selected permits, then the values alternate on the device 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

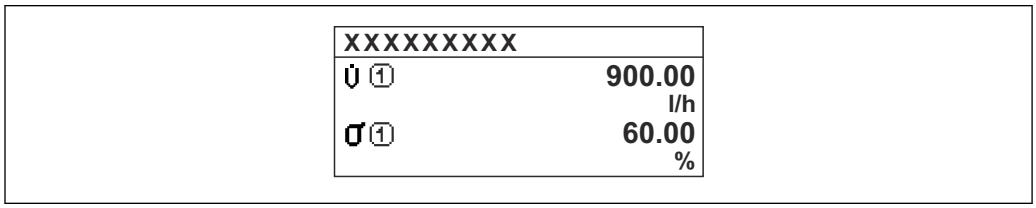
A0016529

"1 bargraph + 1 value" option



A0016530

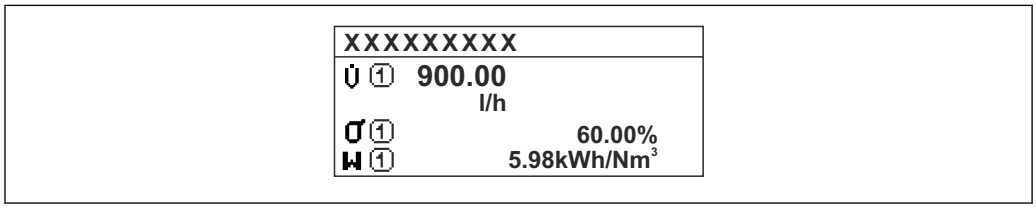
"2 values" option



A0016531

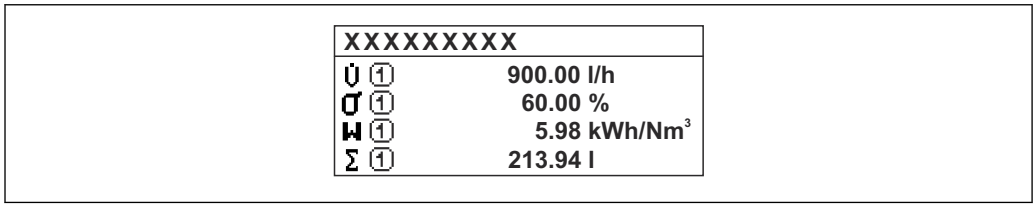
2

"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.

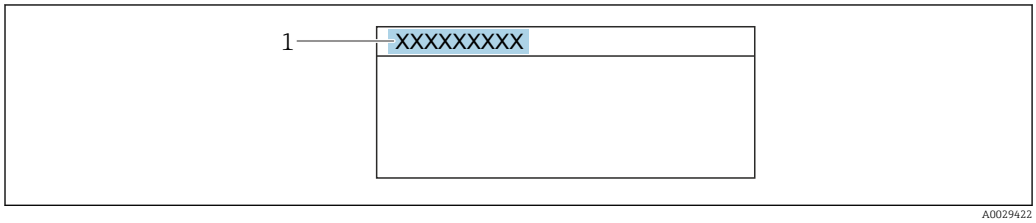
Description Use this function to select the contents of the header of the local display.

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) (→ 210).
- 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).

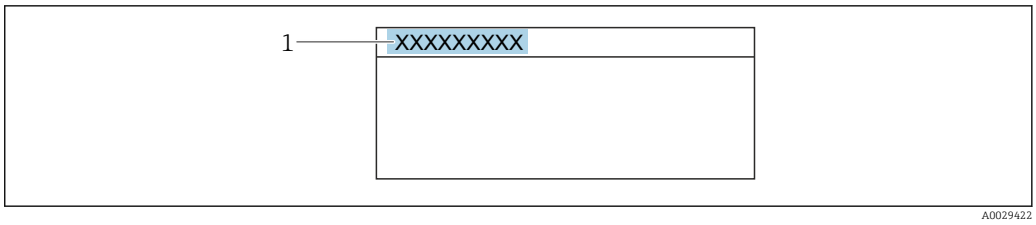
Description Use this function to enter a customer-specific text for the header of the local display.

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"

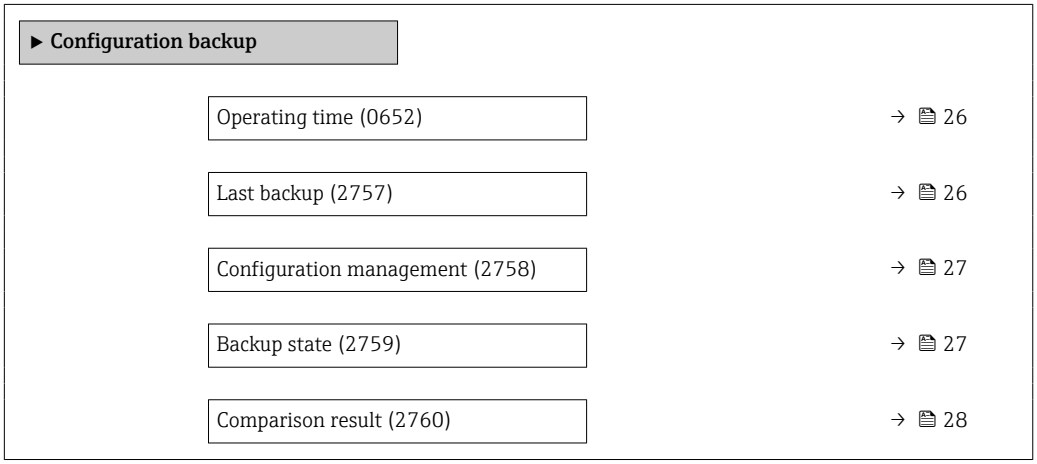
Description Use this function to switch the backlight of the local display on and off.

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

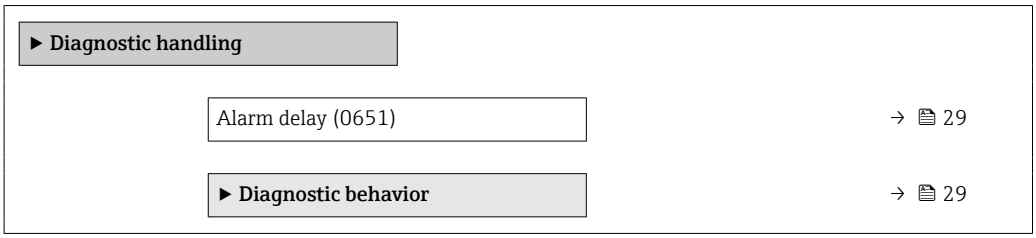
Options	Description
Settings identical	The current device configuration of the HistoROM is not identical to the backup copy in the device memory. If the transformer configuration of another device has been transmitted to the device via HistoROM in **Configuration management** parameter (0100), the current 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 signal outputs and totalizers assume the defined alarm condition. A diagnostic message is generated. The background lighting changes to red.
Warning	The device continues to measure. The signal outputs and totalizers are not affected. A diagnostic message is generated.

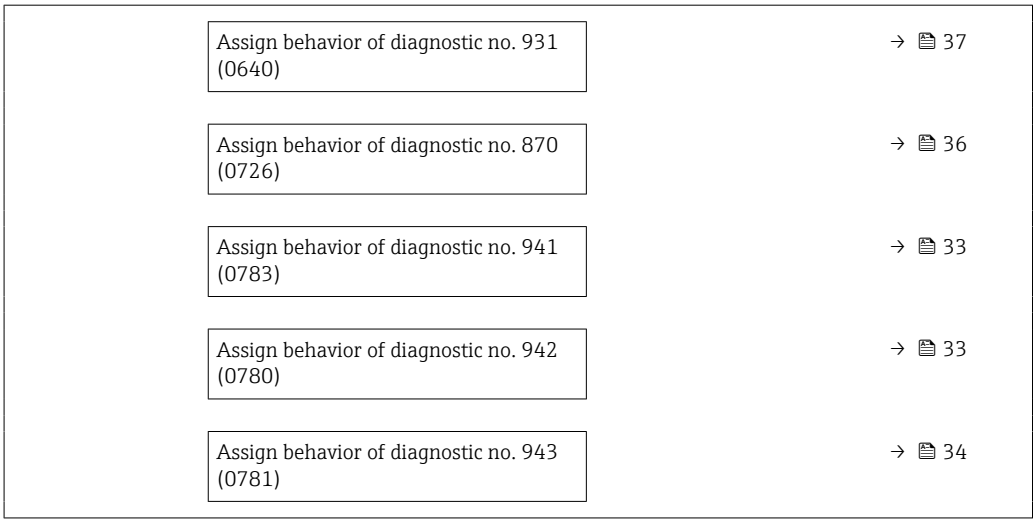
Options	Description
Logbook entry only	The device continues to measure. The diagnostic message is only displayed in the **Event logbook** submenu (→ 208) (**Event list** submenu (→ 208)) and is not displayed in alternating sequence with the operational display.
Off	The diagnostic event is ignored, and 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

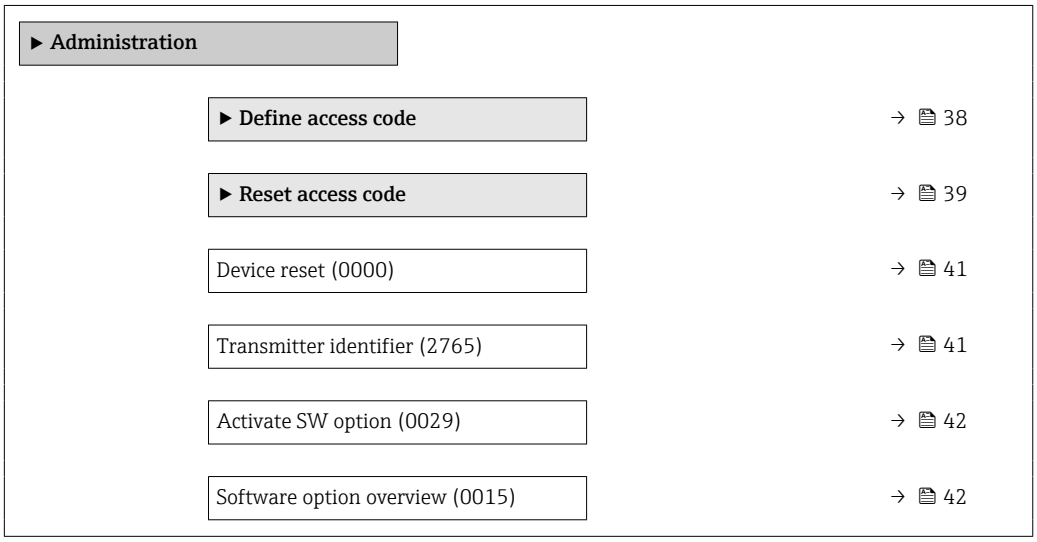
Alarm

Additional information

For a detailed description of the options available: → 29

3.1.4 "Administration" submenu

Navigation Expert → System → Administration

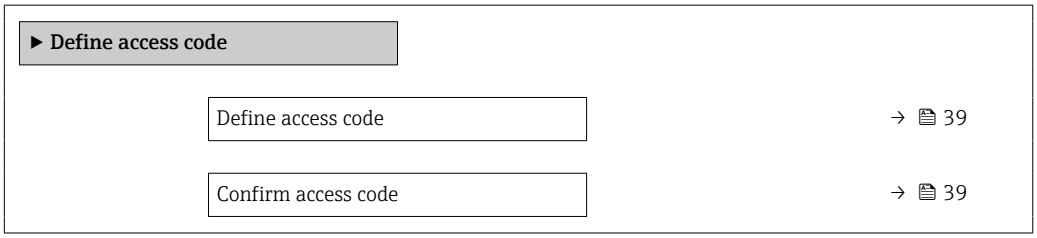


"Define access code" wizard

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

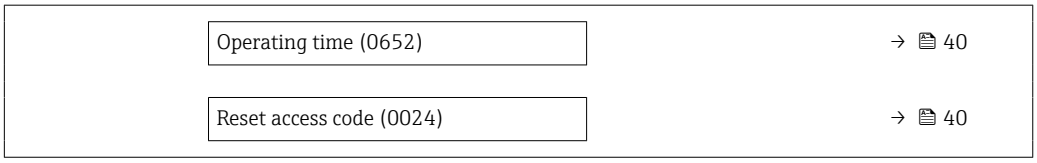
Description Enter the defined release code a second time to confirm the release code.

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
- SIL
- 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"

"SIL" option

Order code for "Additional approval", option LA "SIL"

"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

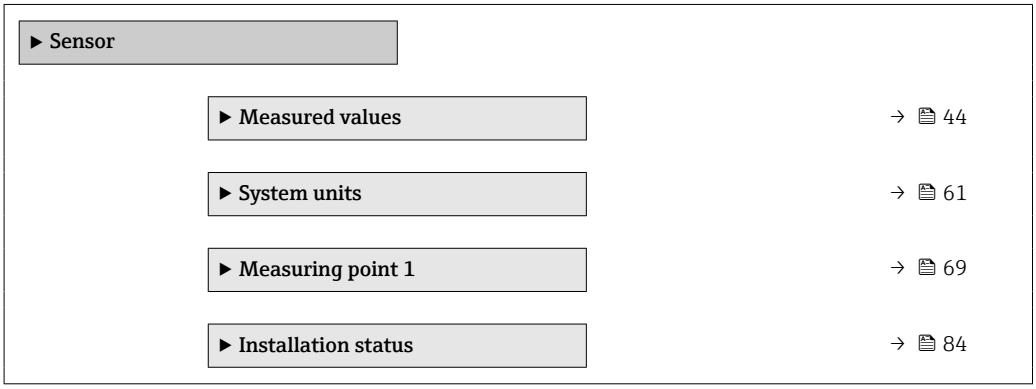
Order code for "Application package", option EQ "Petroleum & Product identification"

"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

▶ **Process parameters**	→ 86
▶ **External compensation**	→ 90
▶ **Sensor adjustment**	→ 94
▶ **Calibration**	→ 98

3.2.1 "Measured values" submenu

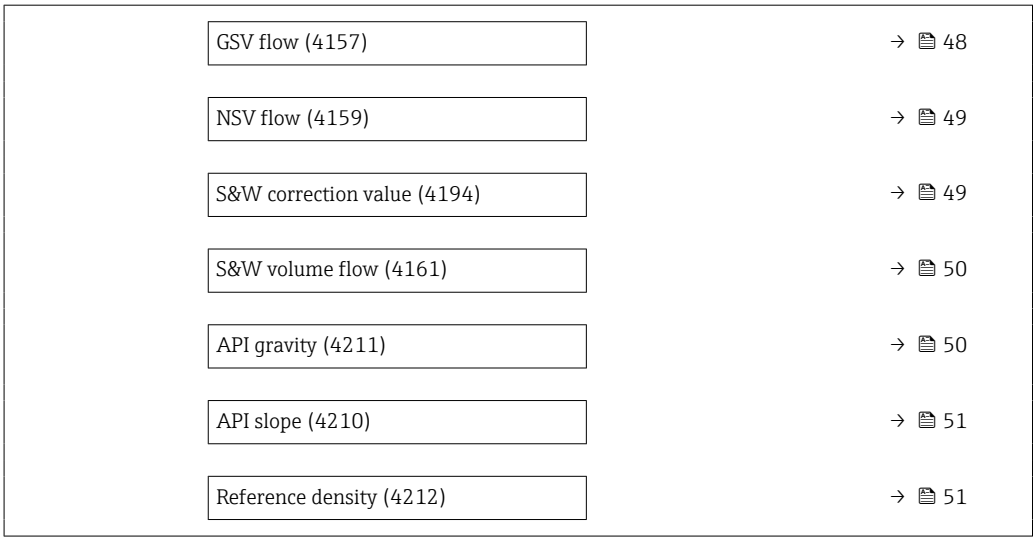
Navigation Expert → Sensor → Measured val.

▶ **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



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).

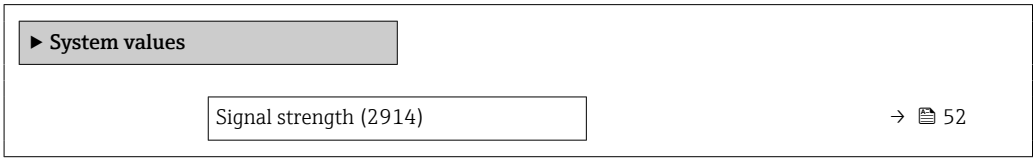
Description Shows the reference density at the API reference conditions specified for temperature and pressure.

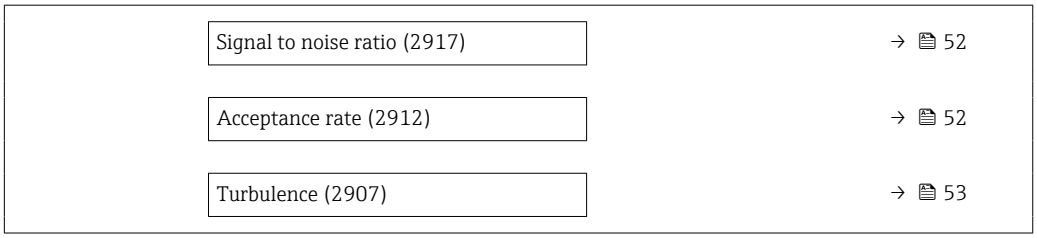
User interface 0 to 30 kg/Nm³

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)

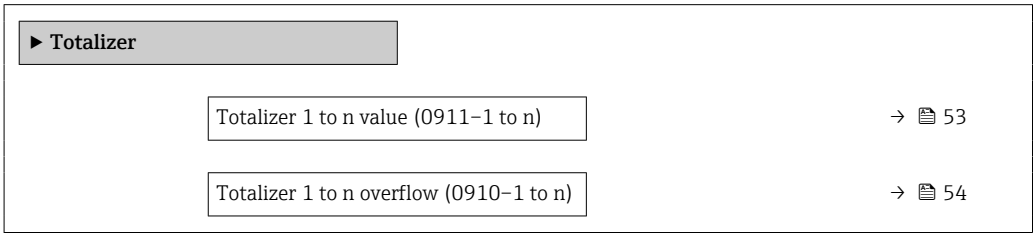
Description Displays the current turbulence.

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) (→ 196) 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) (→ 199).

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) (→ 198).

The unit of the selected process variable is defined in the **Unit totalizer** parameter (0915) (→ 197) 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) (→ 196) 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) (→ 197) 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)

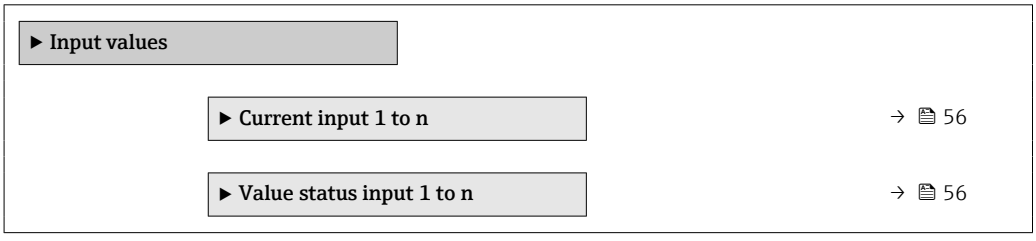
Description Shows the status of the totalizer value reported to the controller for further processing (Hex).

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

▶ **Current input 1 to n**	
Measured values 1 to n (1603–1 to n)	→ 56
Measured current 1 to n (1604–1 to n)	→ 56

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 1 to n**	
Value status input (1353–1 to n)	→ 57

Value status input

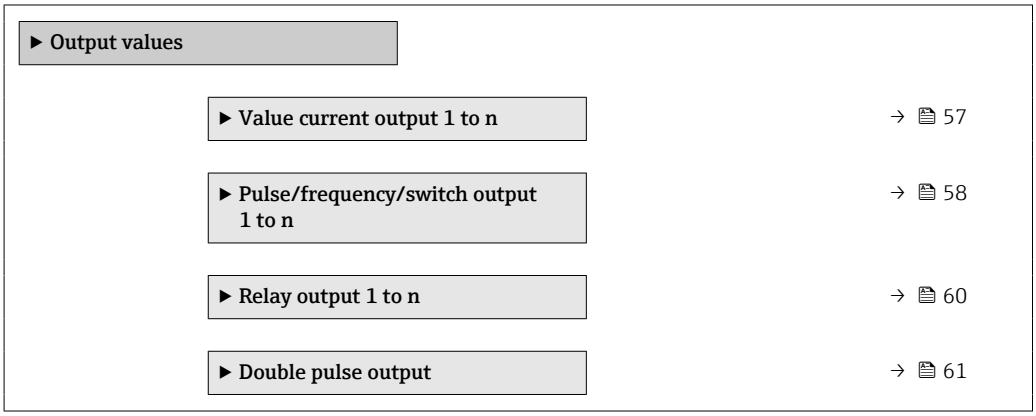
Navigation Expert → Sensor → Measured val. → Input values → Val.stat.inp. 1 to n → Val.stat.inp. (1353–1 to n)

Description Displays the current input signal level.

User interface
- High
- Low

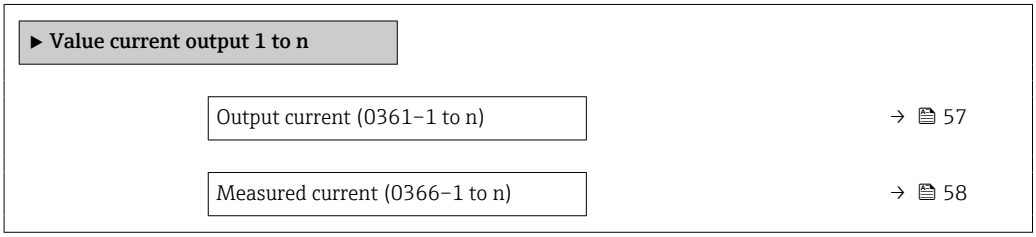
"Output values" submenu

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

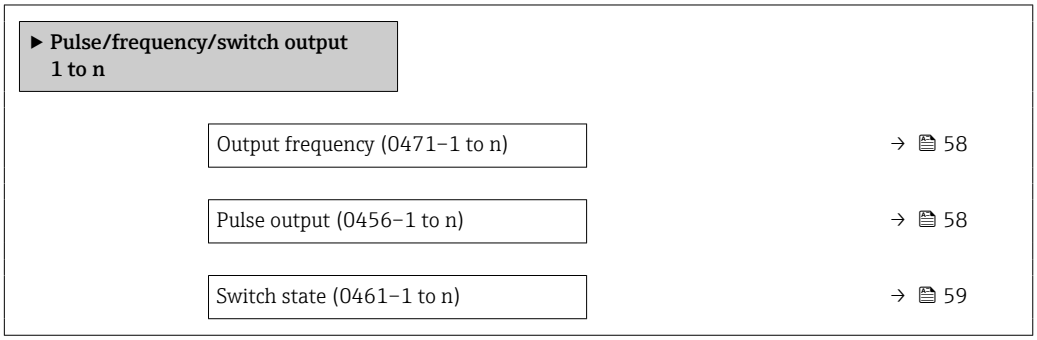
Navigation Expert → Sensor → Measured val. → Output values → Current output 1 to n → Measur. curr. (0366–1 to n)

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)

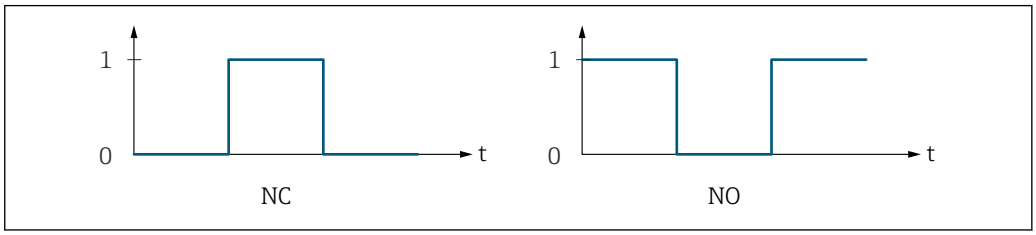
Prerequisite The **Pulse** option is selected in the **Operating mode** parameter (0469) (→ 122) parameter.

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

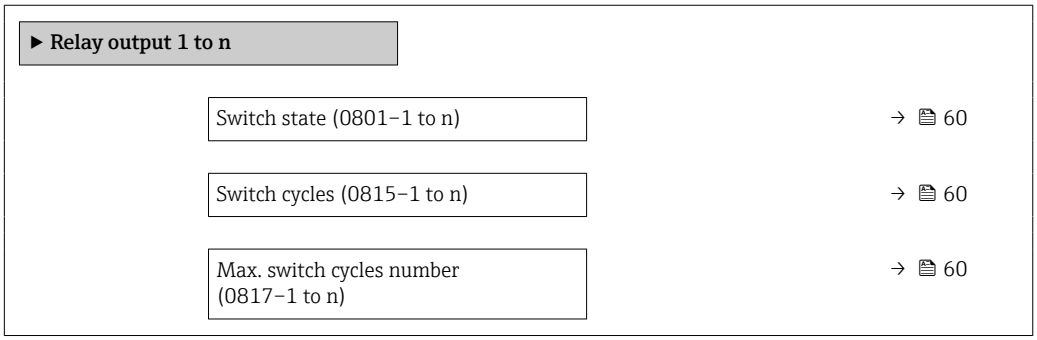
- Open
- Closed

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

▶ Double pulse output	
Pulse output (0987)	→ 61

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.

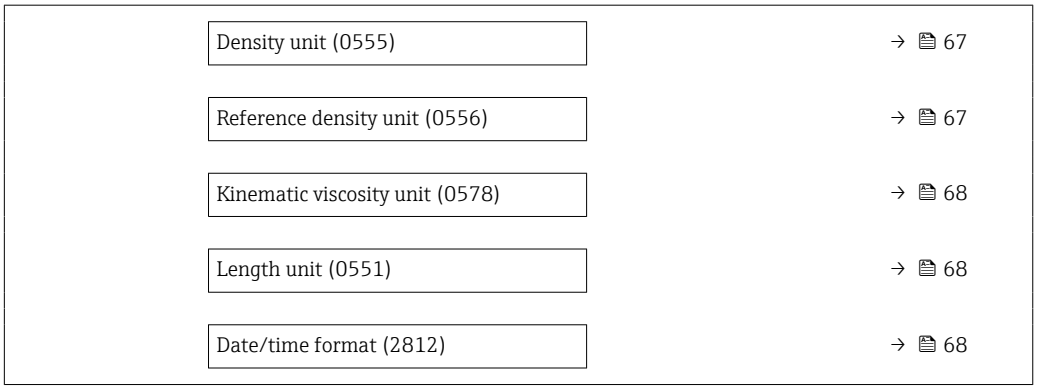
User interface Positive floating-point number

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

▶ System units	
Volume flow unit (0553)	→ 62
Volume unit (0563)	→ 64
Mass flow unit (0554)	→ 65
Mass unit (0574)	→ 65
Velocity unit (0566)	→ 66
Temperature unit (0557)	→ 66



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: → 249

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
- $MMft^3$
- fl oz (us)
- gal (us)
- kgal (us)
- Mgal (us)
- bbl (us;oil)
- bbl (us;liq.)
- bbl (us;beer)
- bbl (us;tank)
- gal (imp)
- Mgal (imp)
- bbl (imp;beer)
- bbl (imp;oil)

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

Additional information

Options

For an explanation of the abbreviated units: → 249

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: → 249

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: → 249

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: → 249

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: → 249

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: → 249

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: → 249

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: → 249

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: → 249

3.2.3 "Measuring point " submenu

Navigation Expert → Sensor → Meas. point

▶ Measuring point 1	
Measuring point configuration (5675–1)	→ 71
Medium (2926–1)	→ 71
Medium temperature (3053–1)	→ 71
Sound velocity calculation mode (4202–1)	→ 72
Sound velocity (2929–1)	→ 72
API gravity (4203–1)	→ 72
Density (4204–1)	→ 73
Reference density (4205–1)	→ 73
Pressure (4206–1)	→ 73
API commodity group (4214–1)	→ 74
API table selection (4209–1)	→ 74
Alternative pressure value (4207–1)	→ 74
Alternative temperature value (4208–1)	→ 75
Viscosity (2932–1)	→ 75
Pipe material (2927–1)	→ 75
Pipe sound velocity (2933–1)	→ 76
Pipe dimensions (2943–1)	→ 76

Pipe circumference (2934–1)	→ 76
Pipe outer diameter (2910–1)	→ 77
Pipe wall thickness (2916–1)	→ 77
Liner material (2928–1)	→ 77
Liner sound velocity (2936–1)	→ 77
Liner thickness (2935–1)	→ 78
Sensor type (2924–1)	→ 78
Signal filter (3011–1)	→ 78
Sensor coupling (2957–1)	→ 79
Mounting type (2938–1)	→ 79
Cable length (2939–1)	→ 79
FlowDC inlet configuration (3049–1)	→ 80
Intermediate pipe length (2945–1)	→ 80
Inlet diameter (3054–1)	→ 81
Transition length (3065–1)	→ 81
Inlet run (3050–1)	→ 81
Relative sensor position (2985–1)	→ 82
Result sensor type / mounting type (2946–1)	→ 82
Result sensor distance / measuring aid (2947–1)	→ 82
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
- 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)

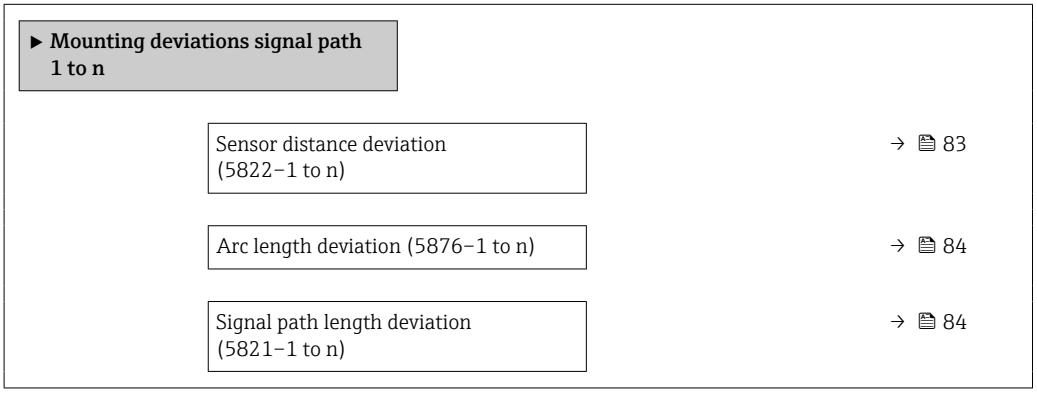
Description Shows the path length calculated and (if applicable) the calculated arc length.

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

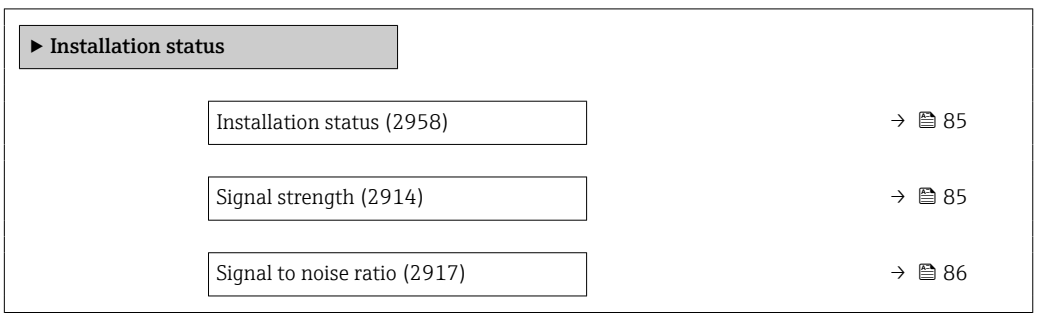
Factory setting 0 mm

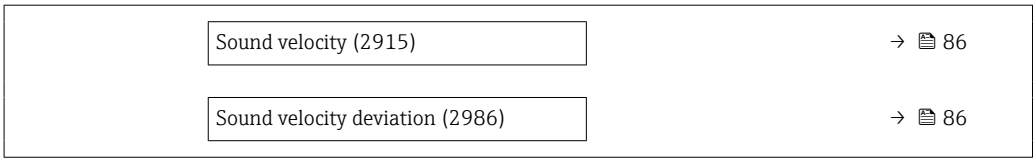
Additional information *Description*

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





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)

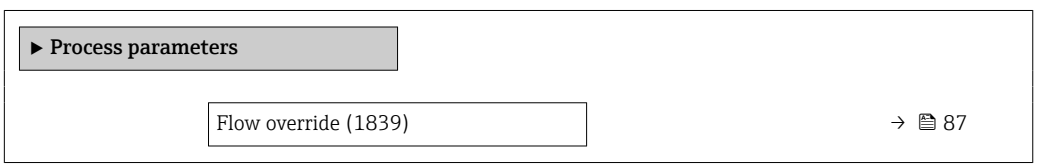
Description Shows the deviation of the installation sound velocity from the measured sound velocity.

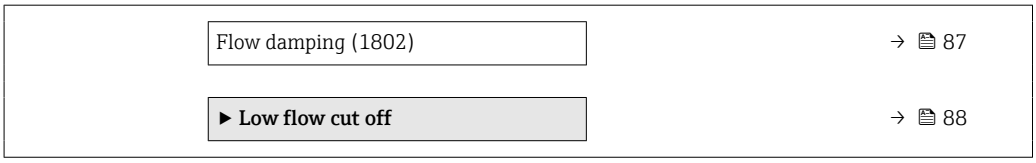
User interface Signed floating-point number

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

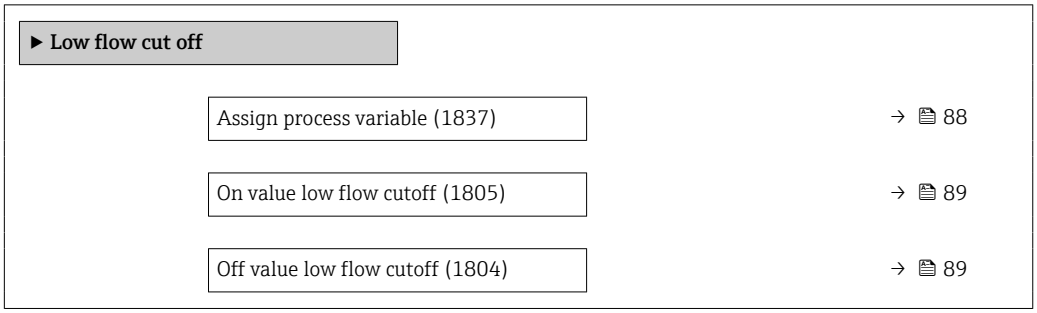
Damping is switched off if **0** is entered (factory setting).

Effect

The damping affects the following variables of the device:
- Outputs → 107
- Low flow cut off → 88
- Totalizers → 195

"Low flow cut off" submenu

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



Assign process variable

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

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

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

Factory setting Flow velocity

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)

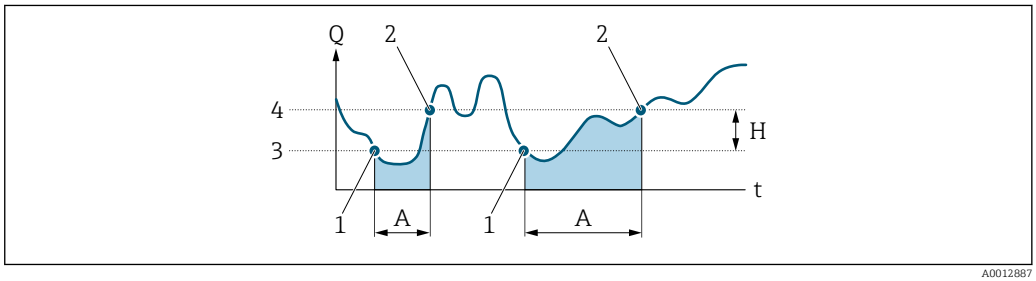
Prerequisite A process variable is selected in the **Assign process variable** parameter (→ 88).

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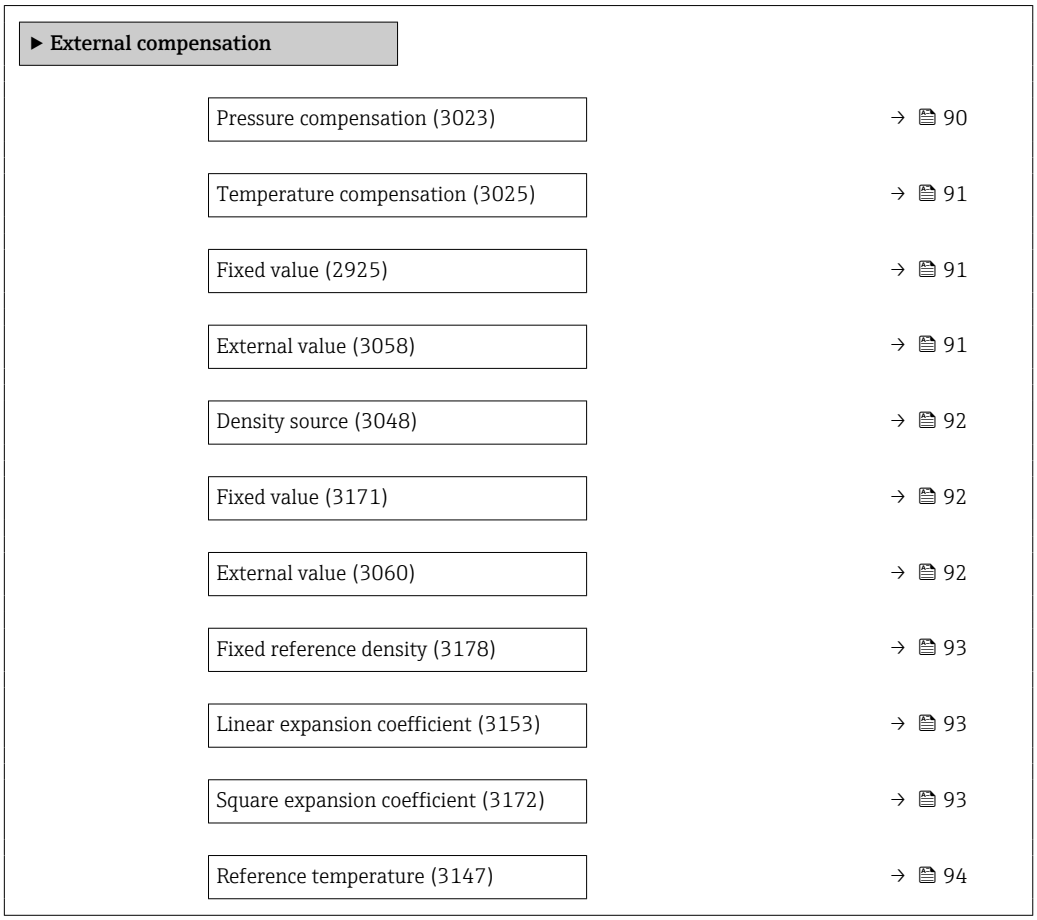
Q Flow
t Time
H Hysteresis
A Low flow cut off active
1 Low flow cut off is activated
2 Low flow cut off is deactivated
3 On value entered
4 Off value entered

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 interface −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 interface 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)

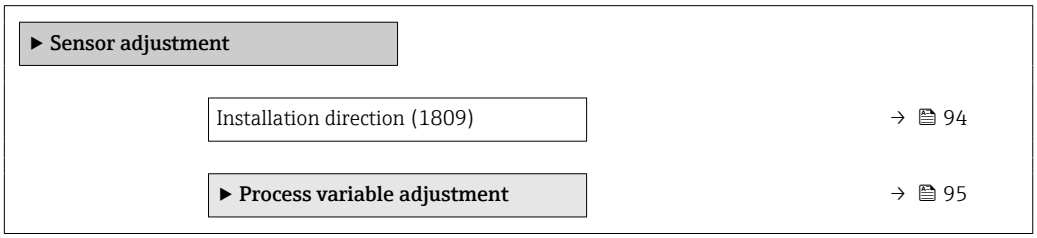
Description Use this function to enter the reference temperature for which the Fixed reference density (3178) (→ 93) applies.

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

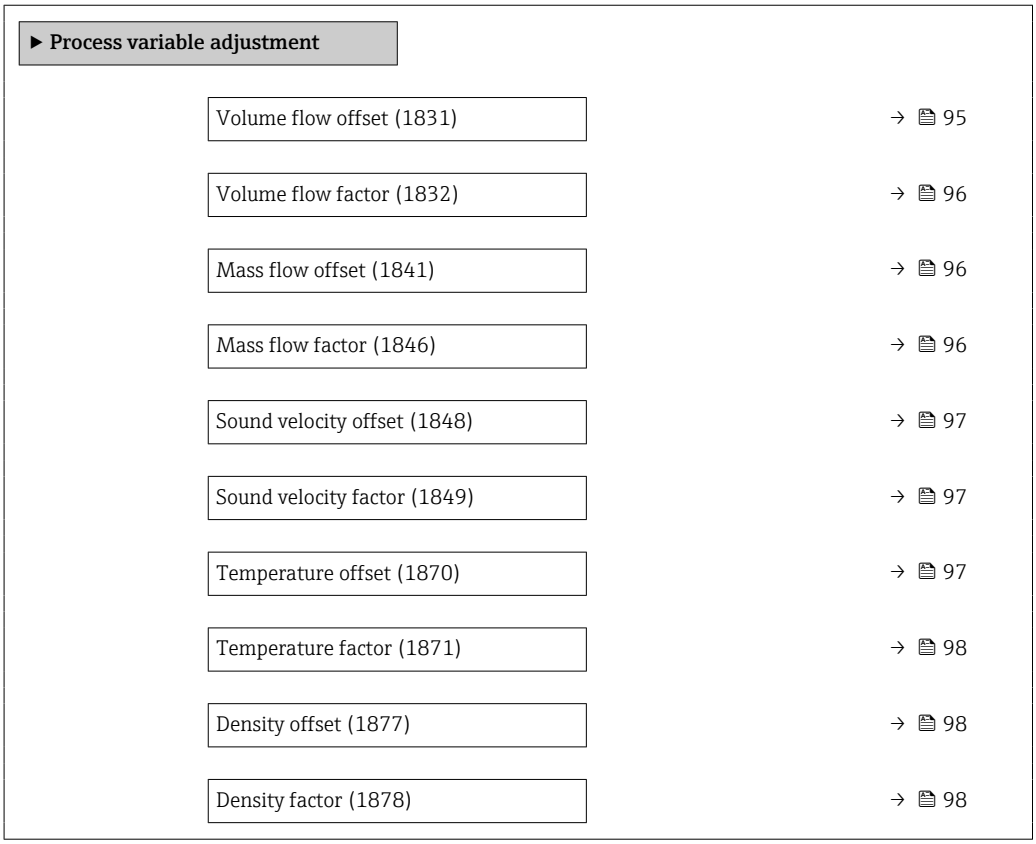
Factory setting Forward flow

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)

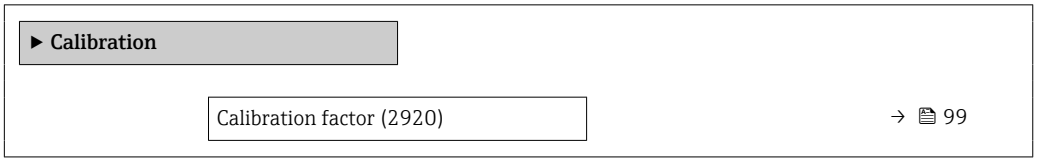
Description Use this function to enter a quantity factor for the density.

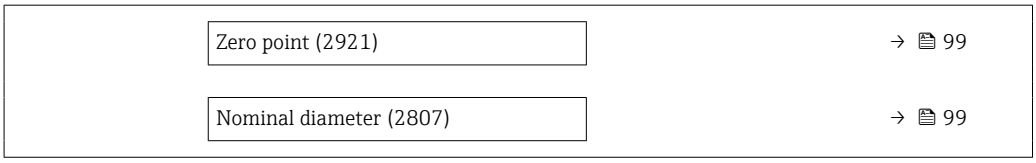
User entry Positive floating-point number

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)

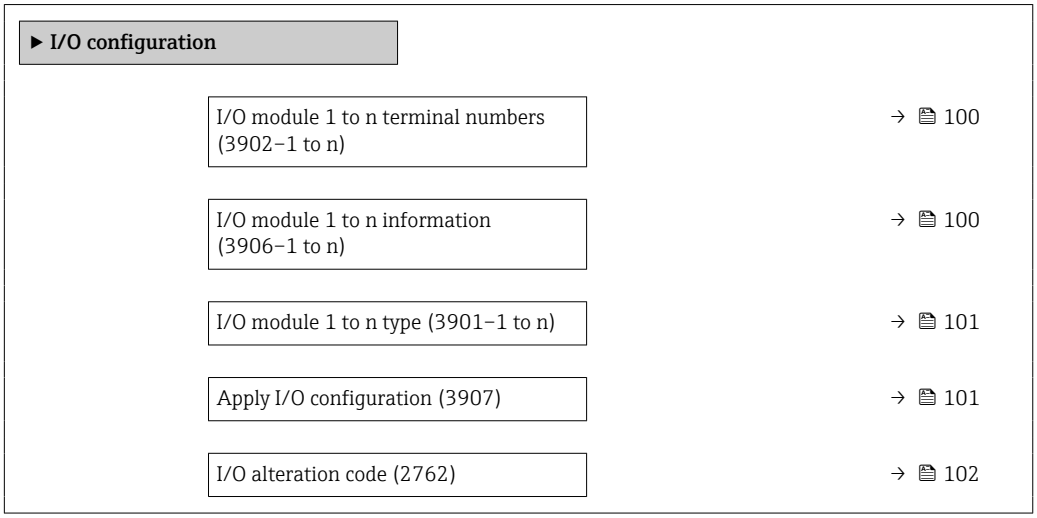
Description Displays the nominal diameter of the sensor.

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
- HART

Additional information

"Not plugged" option

The I/O module is not plugged in.

"Invalid" option

The I/O module is not plugged correctly.

"Not configurable" option

The I/O module is not configurable.

"Configurable" option

The I/O module is configurable.

"Fieldbus" option

The I/O module is configured for HART.

I/O module 1 to n type

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

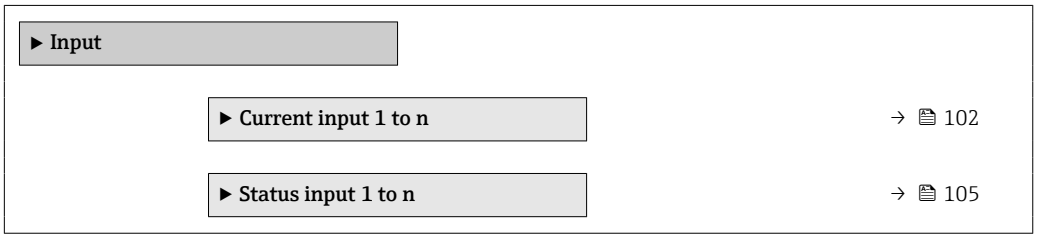
Factory setting 0

Additional information *Description*

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

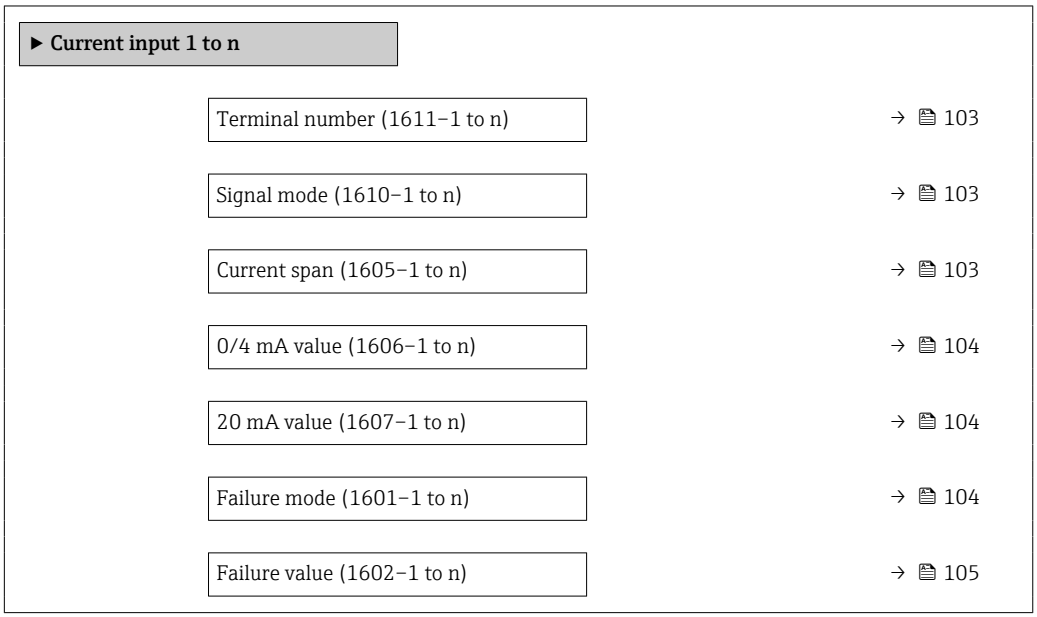
3.4 "Input" submenu

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.

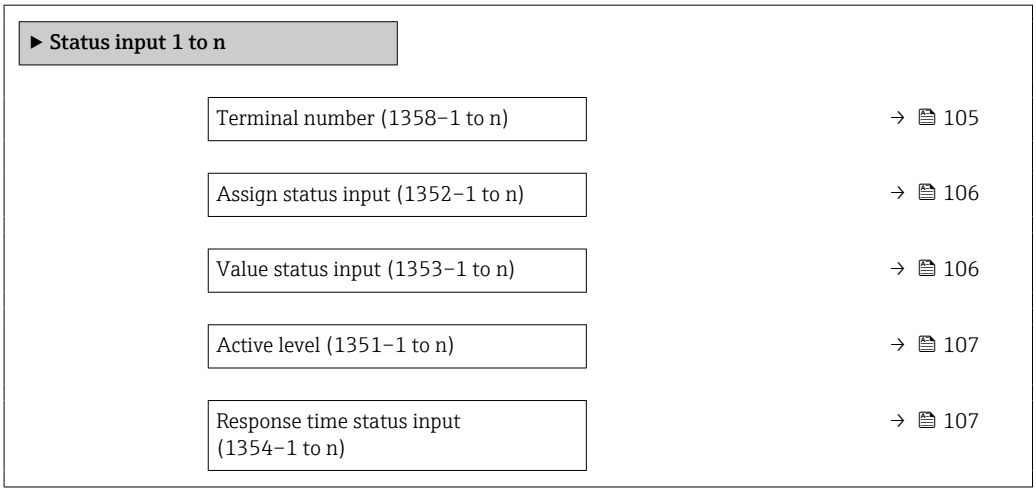
Description Use this function to enter the value that the device uses if it does not receive an input signal from the external device, or if the input signal is invalid.

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)

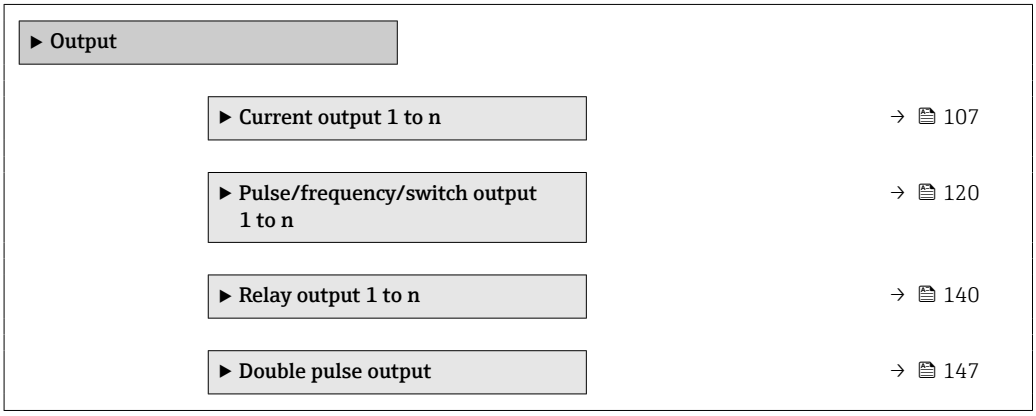
Description Use this function to enter the minimum time period for which the input signal level must be present before the selected function is activated.

User entry 5 to 200 ms

Factory setting 50 ms

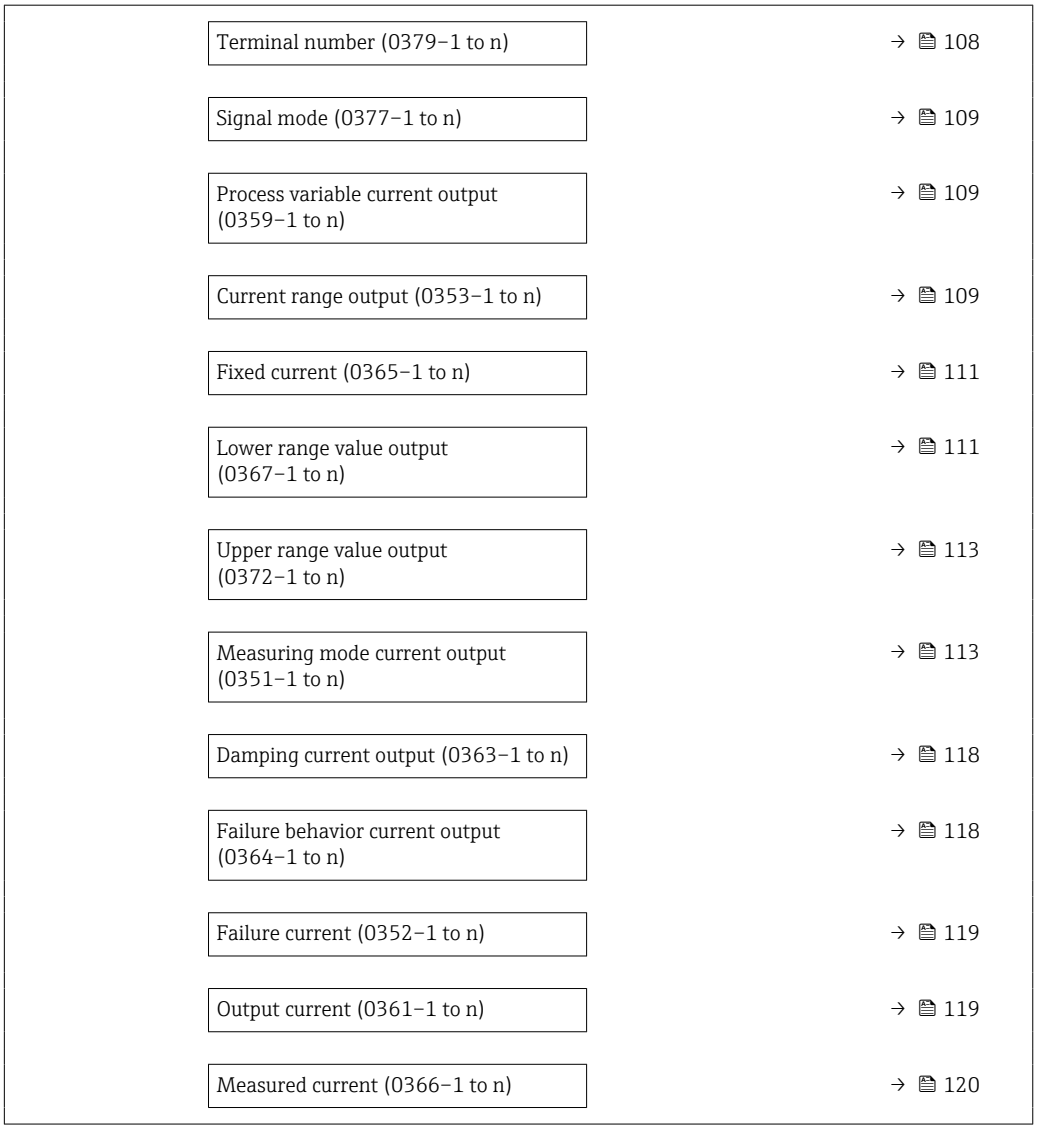
3.5 "Output" submenu

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
- 26-27 (I/O 1)
- 24-25 (I/O 2)
- 22-23 (I/O 3)

Additional information *"Not used" option*

The current output module does not use any terminal numbers.

Signal mode

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

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

Selection
- Active *
- Passive *

Factory setting Active

Process variable current output

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

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

Selection
- Off *
- Volume flow
- Mass flow
- 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

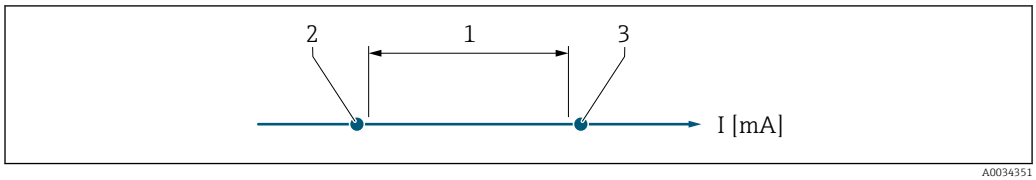
- In the event of a device alarm, the current output adopts the value specified in the **Failure mode** parameter (0364) (→ 118).
- If the measured value is outside the measuring range, the ⚠**S441 Current output 1 to n** diagnostic message is displayed.
- The measuring range is specified via the **Lower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

"Fixed current" option

- This option is used for a HART Multidrop network.
- It can only be used for the 4...20 mA HART current output (current output 1).
- The current value is set via the **Fixed current** parameter (0365) (→ 111).

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).

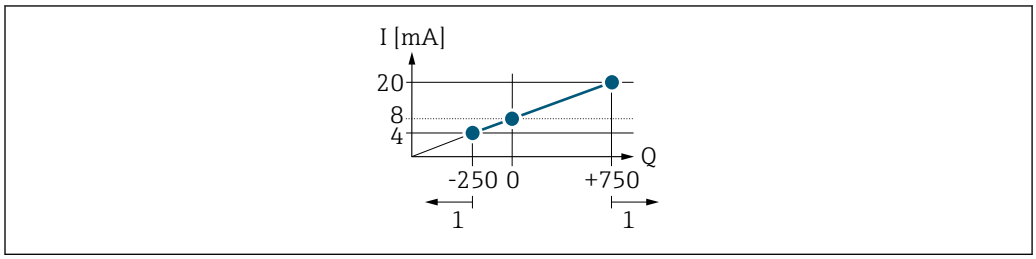
Current output behavior

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.

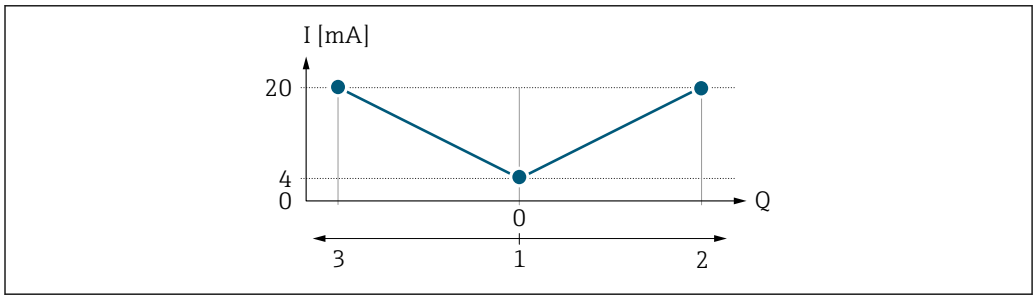
Configuration example A
Measurement mode with **Forward flow** option
- **Lower range value output** parameter (0367) (→ 111) = not equal to zero flow (e.g. −250 m^3/h)
- **Upper range value output** parameter (0372) (→ 113) = not equal to zero flow (e.g. +750 m^3/h)
- Calculated current value = 8 mA 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

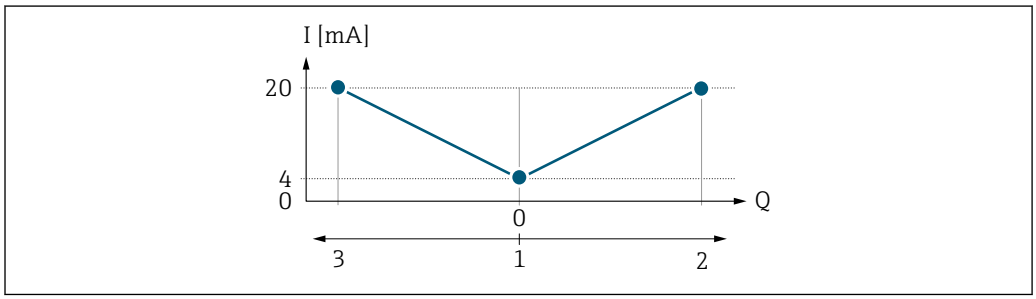
The process variable that is assigned to the current output via the **Assign current output** parameter (0359) (→ 109) is displayed below the parameter.

"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



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.

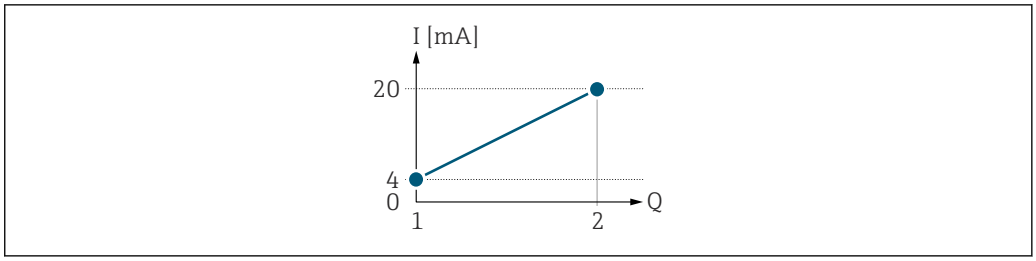
In the event of prolonged and undesired reverse flow, flow values can accumulate in the buffer memory. Due to the configuration of the current output, these values are not factored in, however, i.e. there is no compensation for the reverse flow.

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

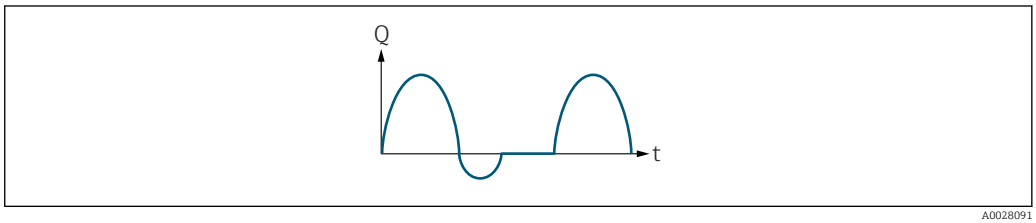
Defined measuring range: lower range value and upper range value with the **same** sign



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:

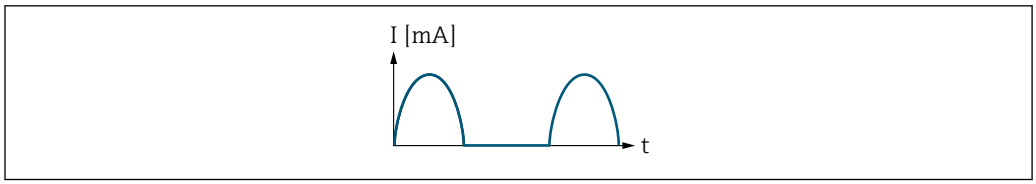


4 *Flow response*

Q *Flow*
t *Time*

With **Forward flow** option

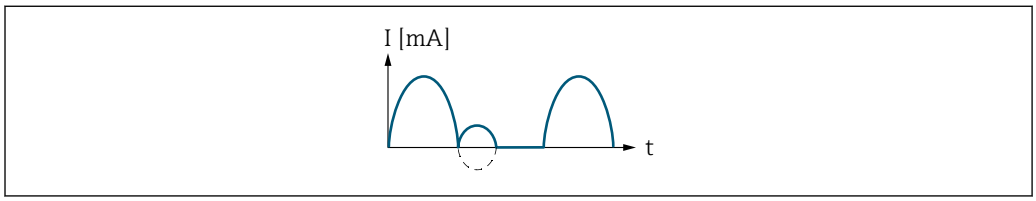
The current output signal is proportional to the process variable assigned. The flow components outside the scaled measuring range are not taken into account for signal output:.



I *Current*
t *Time*

With **Forward/Reverse flow** option

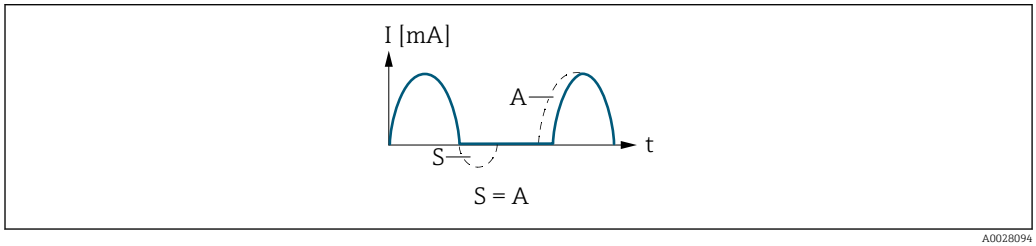
The current output signal is independent of the direction of flow.



I *Current*
t *Time*

With **Reverse flow compensation** option

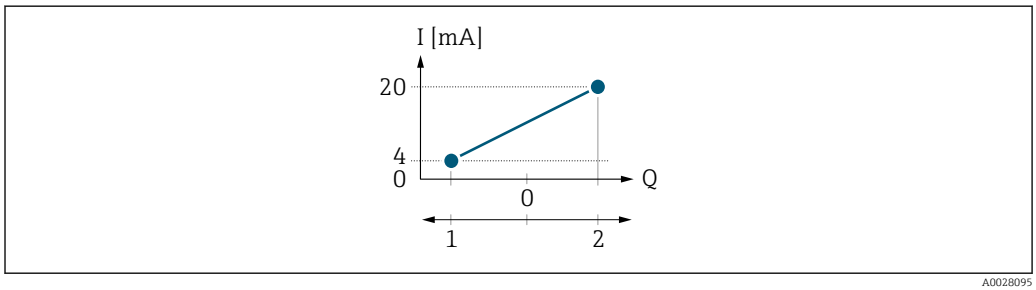
Flow components outside the measuring span are buffered, balanced and output after a maximum delay of 60 s.



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

Example 2

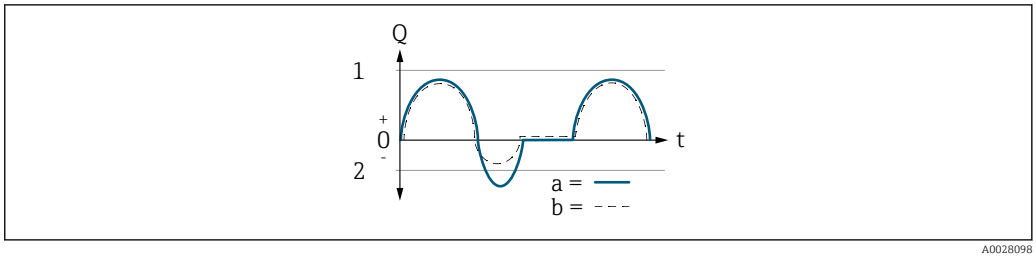
Defined measuring range: lower range value and upper range value with **different** signs



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)*

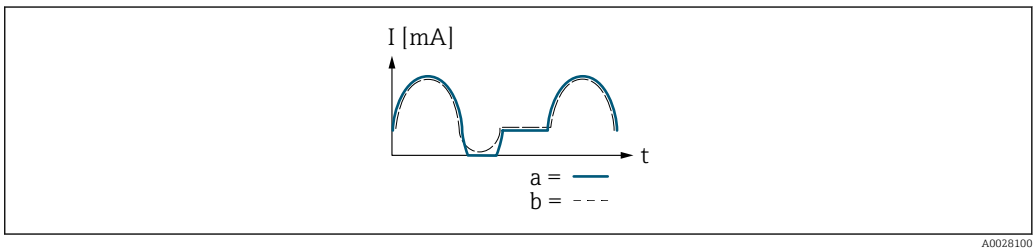
With flow a (—) outside, b (- -) inside the measuring range



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.



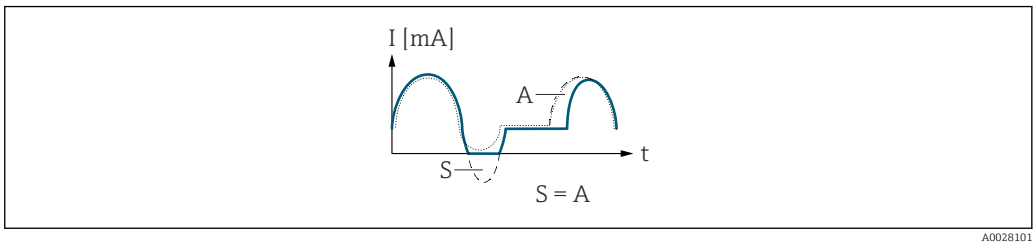
I Current
t Time

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)

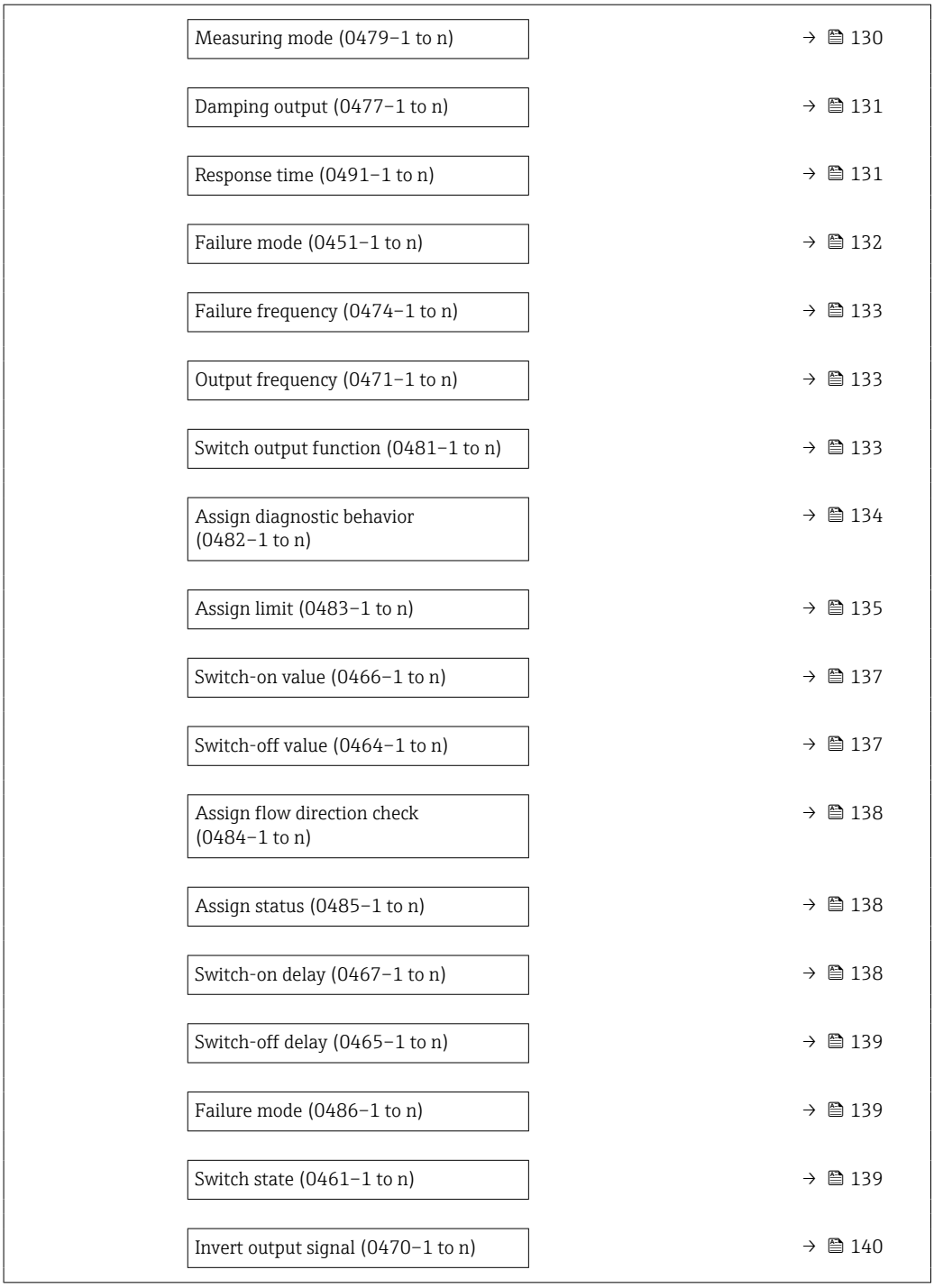
Description Displays the actual measured value of the output current.

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

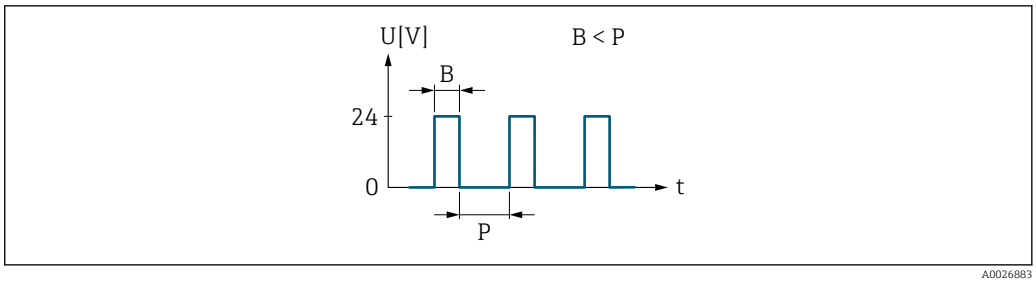
Factory setting Pulse

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



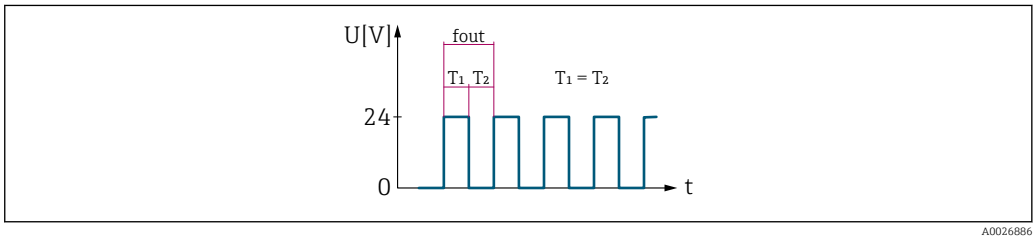
6 *Quantity-proportional pulse (pulse value) with pulse width to be configured*

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

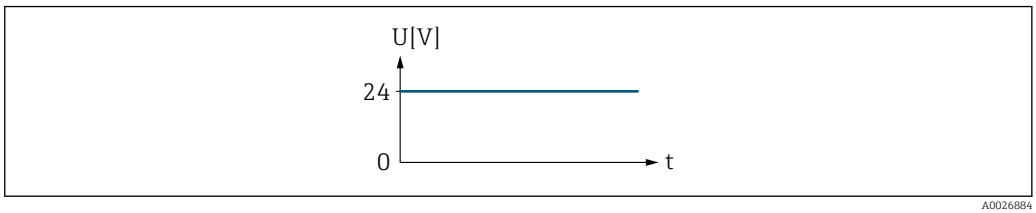


7 *Flow-proportional frequency output*

"Switch" option

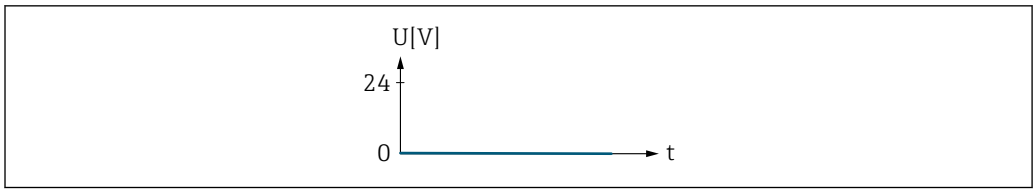
Contact for displaying a condition (e.g. alarm or warning if a limit value is reached)

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).

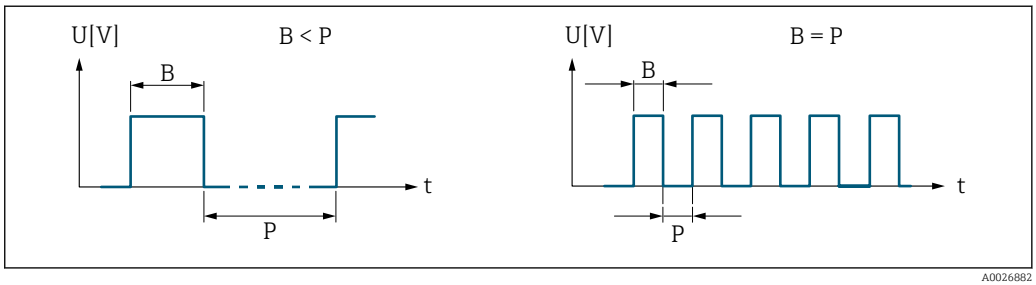
Description Use this function to enter the duration of the output pulse.

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.

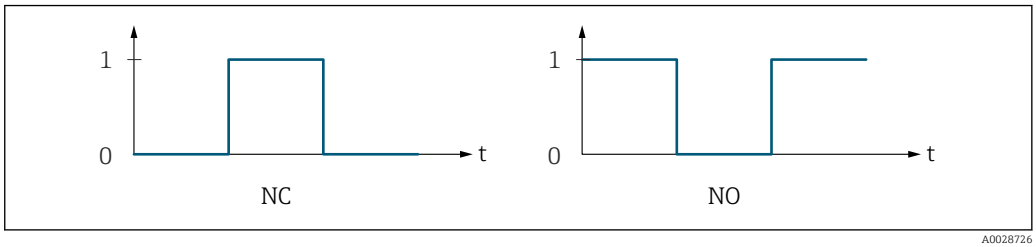
Description Displays the pulse frequency currently output.

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.

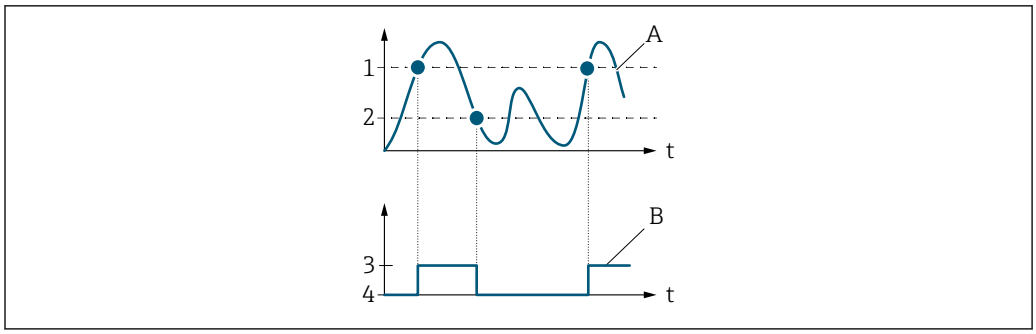
Selection
- Off
- Volume flow
- Mass flow
- Flow velocity
- Sound velocity
- Temperature *
- Pressure *
- Density *
- Reference density *
- S&W volume flow *
- GSV flow *
- NSV flow *
- API gravity *
- API slope *
- Signal strength *
- Signal to noise ratio *
- Acceptance rate *
- Turbulence *
- Electronics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

Factory setting Volume flow

Additional information *Description*

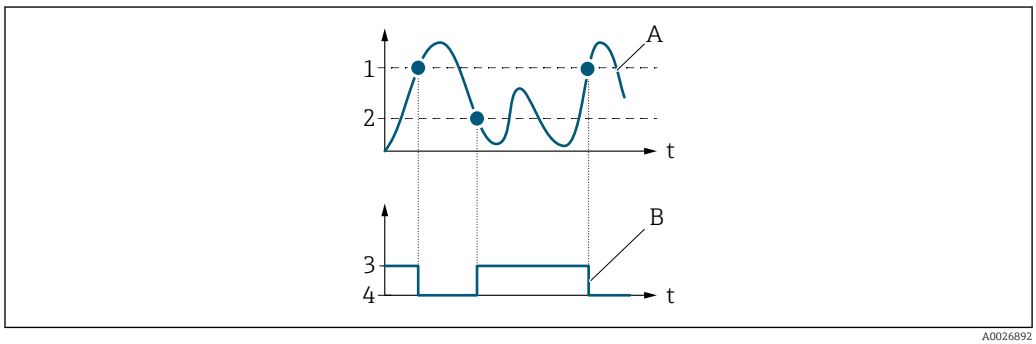
Behavior of status output when Switch-on value (0466) > Switch-off value (0464):
- Process variable > Switch-on value (0466): transistor is conductive
- Process variable < Switch-off value (0464): transistor is non-conductive

* Visibility depends on order options or device settings



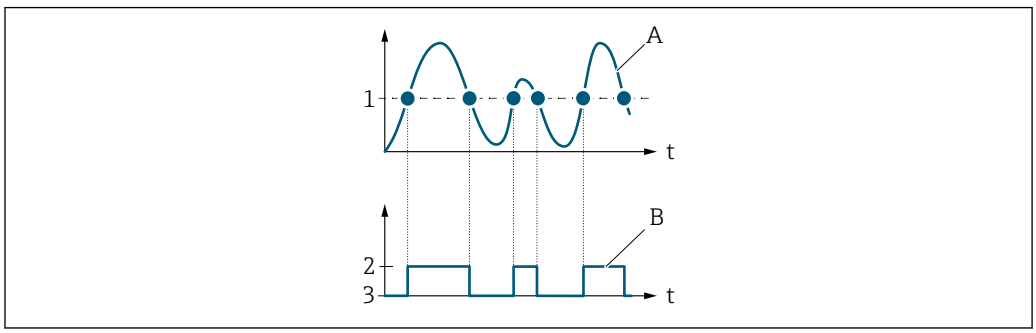
1 Switch-on value (0466)
2 Switch-off value (0464)
3 Conductive
4 Non-conductive
A Process variable
B Status output

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



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



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)

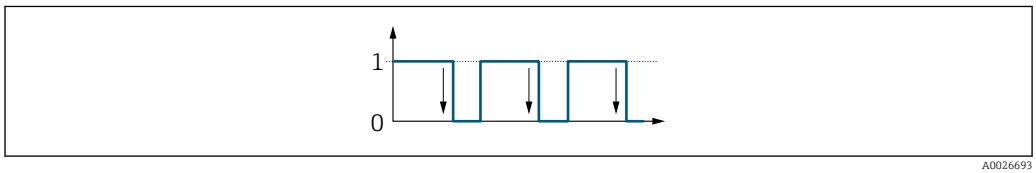
Description Use this function to select whether to invert the output signal.

Selection
- No
- Yes

Factory setting No

Additional information *Selection*

No option (passive - negative)



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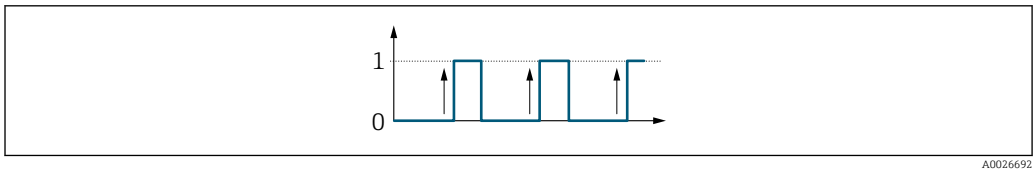
Yes option (passive - positive)



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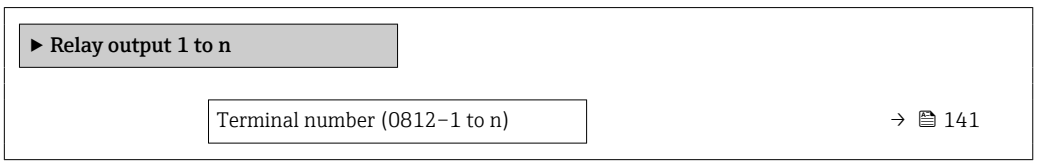
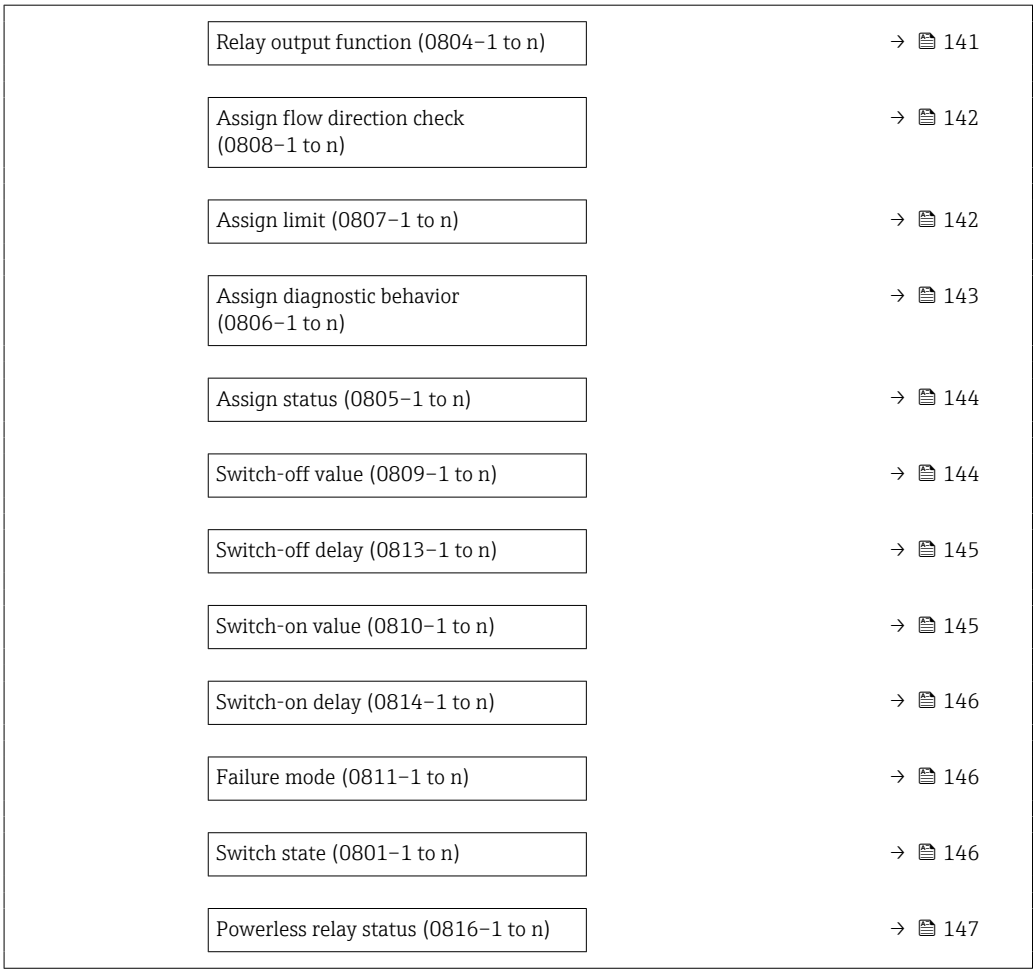
3.5.3 "Relay output 1 to n" submenu

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

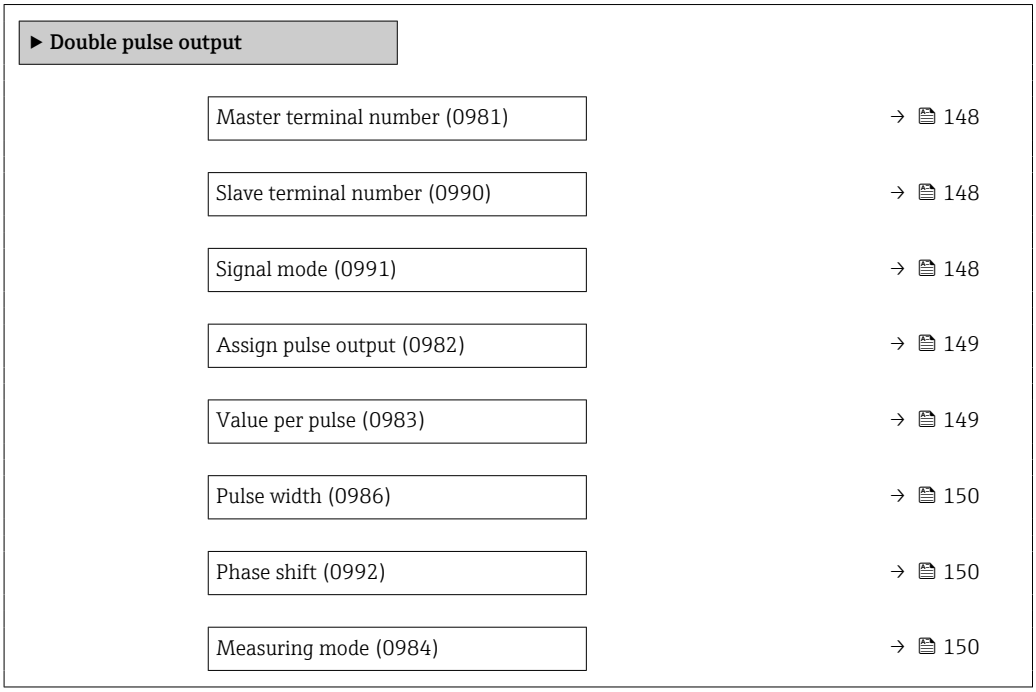
Factory setting Open

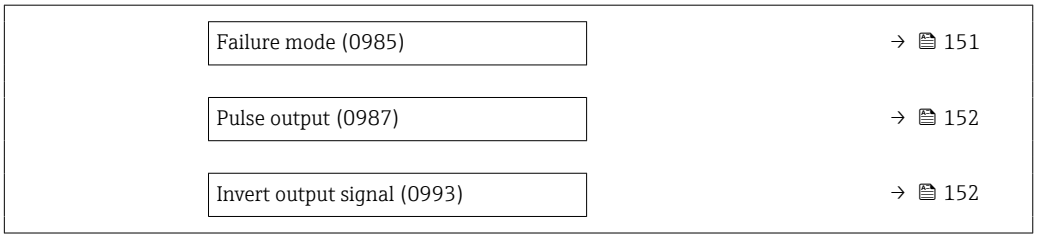
Additional information *Selection*

- 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)

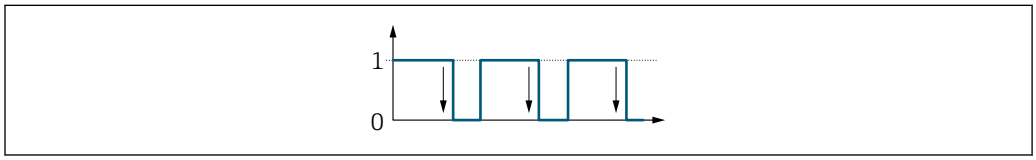
Description Use this function to select whether to invert the output signal.

Selection
- No
- Yes

Factory setting No

Additional information *Selection*

No option (passive - negative)



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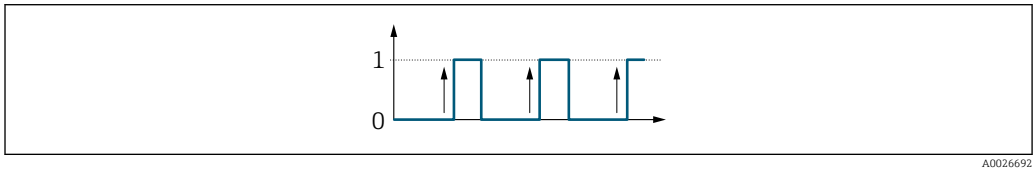
Yes option (passive - positive)



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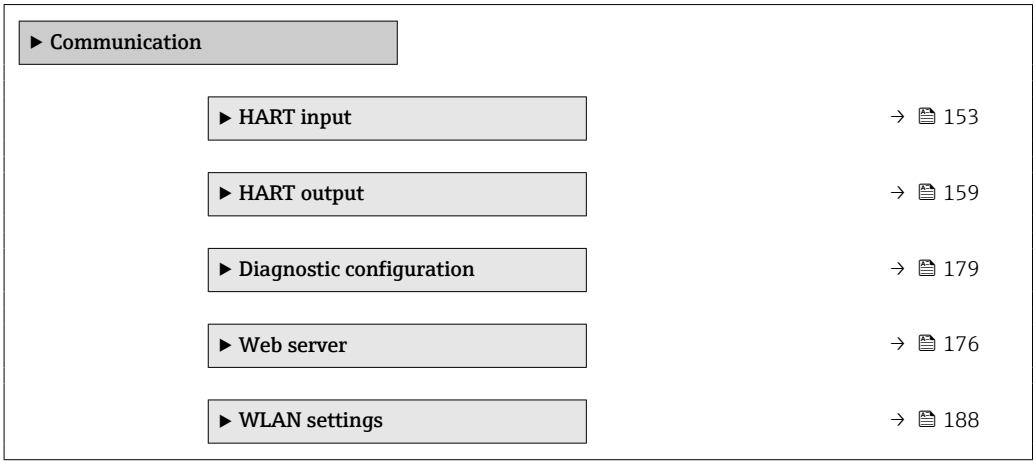
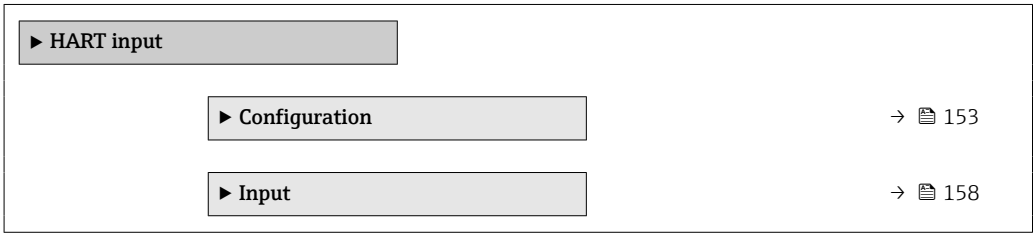
3.6 "Communication" submenu

Navigation Expert → Communication



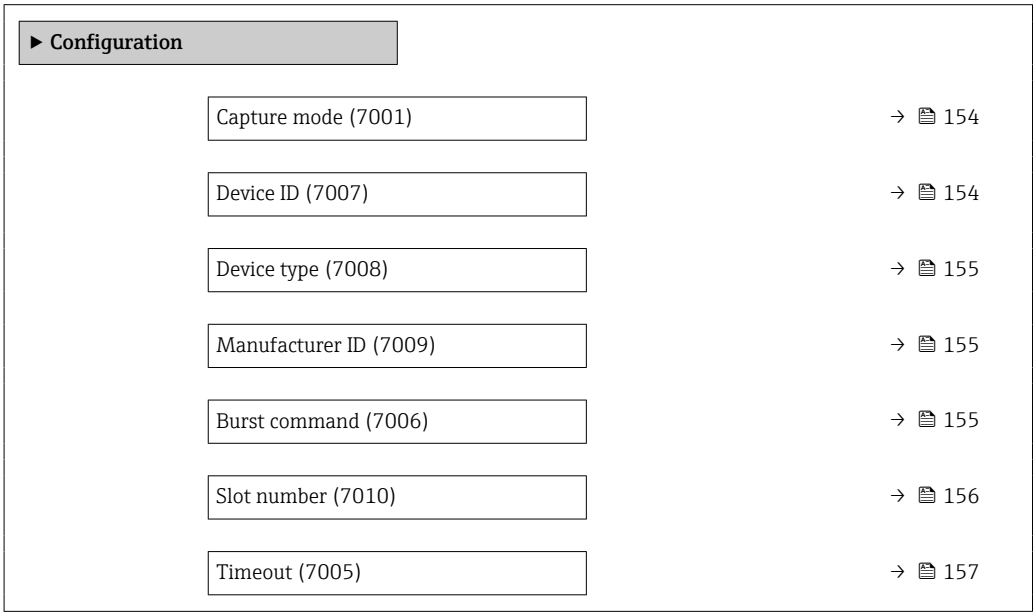
3.6.1 "HART input" submenu

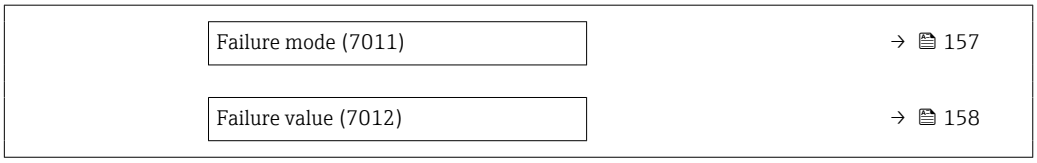
Navigation Expert → Communication → HART input



"Configuration" submenu

Navigation Expert → Communication → HART input → Configuration





Capture mode

Navigation Expert → Communication → HART input → Configuration → Capture mode (7001)

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

Selection
- Off
- Burst network
- Master network

Factory setting Off

Additional information

"Burst network" option

The device records data transmitted via burst in the network.

An external pressure sensor must be in the burst mode.

"Master network" option

In this case, the device must be located in a HART network in which a HART master (control) queries the measured values of the up to 64 network participants. The device reacts only to the responses of a specific device in the network. Device ID,device type, manufacturer ID and the HART commands used by the master must be defined.

Device ID

Navigation Expert → Communication → HART input → Configuration → Device ID (7007)

Prerequisite The **Master network** option is selected in the **Capture mode** parameter (7001) (→ 154).

Description Use this function to enter the device ID of the HART slave device whose data are to be recorded.

User entry 6-digit value:
- Via local operation: enter as hexadecimal or decimal number
- Via operating tool: enter as decimal number

Factory setting 0

Additional information In addition to the device ID and manufacturer ID, the device type is part of the unique ID. Each HART device is uniquely identified by the unique device ID.

Device type

Navigation Expert → Communication → HART input → Configuration → Device type (7008)

Prerequisite In the **Capture mode** parameter (7001) (→ 154), the **Master network** option is selected.

Description Use this function to enter the device type of the HART slave device whose data are to be recorded.

User entry 2-digit hexadecimal number

Factory setting 0x00

Additional information In addition to the device ID and manufacturer ID, the device type is part of the unique ID. Each HART device is uniquely identified by the unique device ID.

Manufacturer ID

Navigation Expert → Communication → HART input → Configuration → Manufacturer ID (7009)

Prerequisite The **Master network** option is selected in the **Capture mode** parameter (7001) (→ 154).

Description Use this function to enter the manufacturer ID of the HART slave device whose data are to be recorded.

User entry 2-digit value:
- Via local operation: enter as hexadecimal or decimal number
- Via operating tool: enter as decimal number

Factory setting 0

Additional information In addition to the device ID and manufacturer ID, the device type is part of the unique ID. Each HART device is uniquely identified by the unique device ID.

Burst command

Navigation Expert → Communication → HART input → Configuration → Burst command (7006)

Prerequisite The **Burst network** option or the **Master network** option are selected in the **Capture mode** parameter (7001) (→ 154).

Description Use this function to select the burst command to be recorded.

Selection
- Command 1
- Command 3
- Command 9
- Command 33

Factory setting
Command 1

Additional information
Selection
- Command 1
  Use this function to capture the primary variable.
- Command 3
  Use this function to capture the dynamic HART variables and the current.
- Command 9
  Use this function to capture the dynamic HART variables including the associated status.
- Command 33
  Use this function to capture the dynamic HART variables including the associated unit.

Slot number

Navigation
Expert → Communication → HART input → Configuration → Slot number (7010)

Prerequisite
The **Burst network** option or the **Master network** option is selected in the **Capture mode** parameter (7001) (→ 154).

Description
Use this function to enter the position of the process variable to be recorded in the burst command.

User entry
1 to 8

Factory setting
1

Additional information
User entry

Slot	Command			
	1	3	9	33
1	PV	PV	HART variable (slot 1)	HART variable (slot 1)
2	–	SV	HART variable (slot 2)	HART variable (slot 2)
3	–	TV	HART variable (slot 3)	HART variable (slot 3)
4	–	QV	HART variable (slot 4)	HART variable (slot 4)
5	–	–	HART variable (slot 5)	–
6	–	–	HART variable (slot 6)	–
7	–	–	HART variable (slot 7)	–
8	–	–	HART variable (slot 8)	–

Timeout

Navigation Expert → Communication → HART input → Configuration → Timeout (7005)

Prerequisite The **Burst network** option or the **Master network** option is selected in the **Capture mode** parameter (7001) (→ 154).

Description Use this function to enter the maximum permitted interval between two HART frames.

User entry 1 to 120 s

Factory setting 5 s

Additional information *Description*

If the interval is exceeded, the measuring device displays the **F882 Input signal** diagnostic message.

Failure mode

Navigation Expert → Communication → HART input → Configuration → Failure mode (7011)

Prerequisite In the **Capture mode** parameter (7001) (→ 154), the **Burst network** option or **Master network** option is selected.

Description Use this function to select the device behavior if no data are recorded within the maximum permitted interval.

Selection
- Alarm
- Last valid value
- Defined value

Factory setting Alarm

Additional information *Options*
- Alarm
  An error message is set.
- Last valid value
  The last valid measured value is used.
- Defined value
  A user-defined measured value is used: (**Failure value** parameter (7012) (→ 158)).

Failure value

Navigation Expert → Communication → HART input → Configuration → Failure value (7012)

Prerequisite
The following conditions are met:
- In the **Capture mode** parameter (7001) (→ 154), the **Burst network** option or **Master network** option is selected.
- In the **Failure mode** parameter (7011) (→ 157), the **Defined value** option is selected.

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

User entry Signed floating-point number

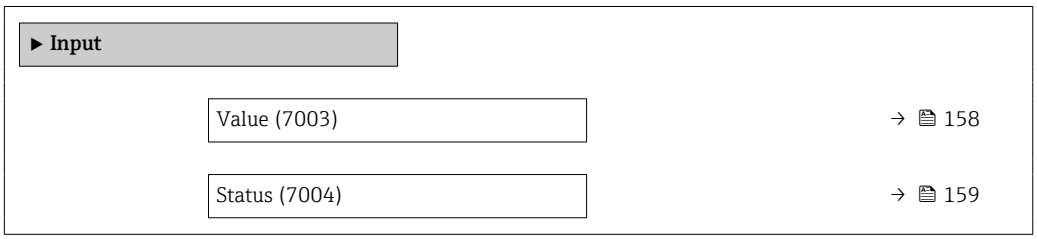
Factory setting 0

Additional information *Dependency*

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

"Input" submenu

Navigation Expert → Communication → HART input → Input



Value

Navigation Expert → Communication → HART input → Input → Value (7003)

Description Displays the value of the device variable recorded by the HART input.

User interface Signed floating-point number

Status

Navigation Expert → Communication → HART input → Input → Status (7004)

Description Displays the value of the device variable recorded by the HART input in accordance with the HART specification.

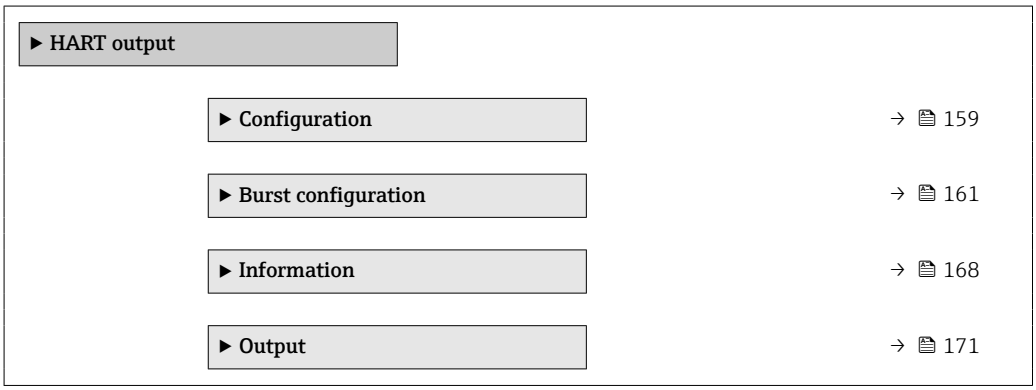
User interface
- Manual/Fixed
- Good
- Poor accuracy
- Bad

Additional information *Description*

If the measuring device reads in an invalid pressure measured value, the **⊗F882 Input signal** diagnostic message is output

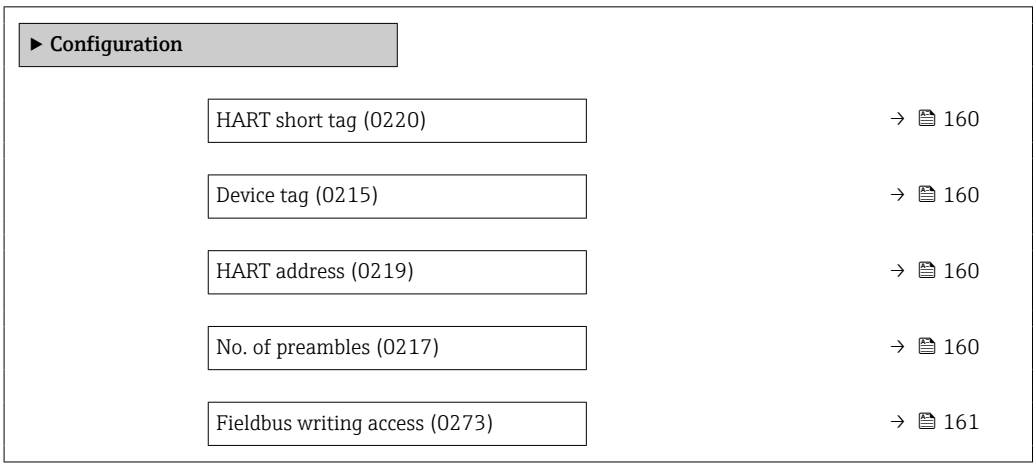
3.6.2 "HART output" submenu

Navigation Expert → Communication → HART output



"Configuration" submenu

Navigation Expert → Communication → HART output → Configuration



HART short tag

Navigation Expert → Communication → HART output → Configuration → HART short tag (0220)

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

User entry Max. 8 characters: A to Z, 0 to 9 and certain special characters (e.g. punctuation marks, @, %).

Factory setting PROSONIC

Device tag

Navigation Expert → Communication → HART output → Configuration → Device tag (0215)

Description Use this function to enter the name for the measuring point.

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

Factory setting Prosonic Flow

HART address

Navigation Expert → Communication → HART output → Configuration → HART address (0219)

Description Use this function to enter the address via which the data exchange takes place via HART protocol.

User entry 0 to 63

Factory setting 0

Additional information *Description*

For addressing in a HART Multidrop network, the **Fixed current** option must be set in the **Current span** parameter (0353) (→ 109) (current output 1).

No. of preambles

Navigation Expert → Communication → HART output → Configuration → No. of preambles (0217)

Description Use this function to enter the number of preambles in the HART protocol.

User entry 2 to 20

Factory setting 5

Additional information *User entry*

As every modem component can "swallow" a byte, 2-byte preambles at least must be defined.

Fieldbus writing access

Navigation Expert → Communication → HART output → Configuration → Fieldb.writ.acc. (0273)

Description Use this function to restrict access to the measuring device via fieldbus (HART interface).

Selection
- Read + write
- Read only

Factory setting Read + write

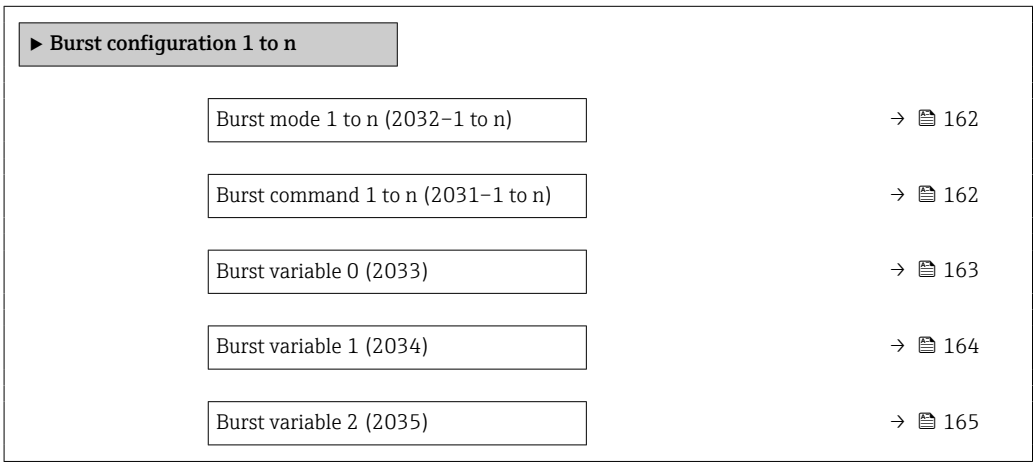
Additional information *Description*

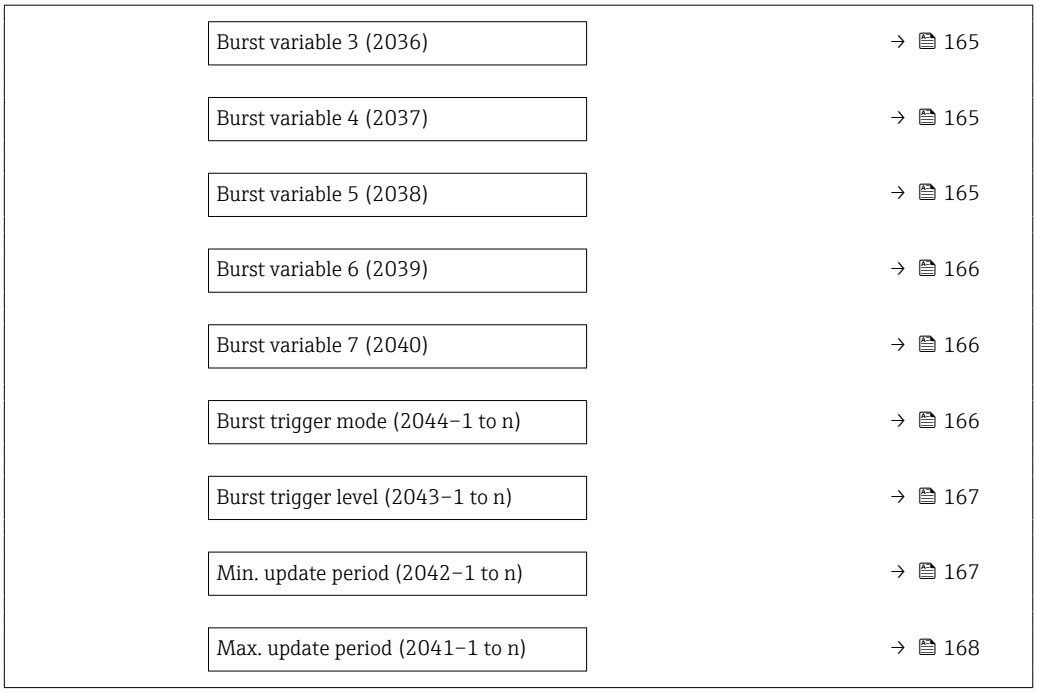
If read and/or write protection is enabled, the parameter can only be controlled and reset via local operation. Access is no longer possible via operating tools.

Selection
- Read + write
  The parameters are readable and writable.
- Read only
  The parameters are only readable.

"Burst configuration 1 to n" submenu

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





Burst mode 1 to n

Navigation Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst mode 1 to n (2032–1 to n)

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

Selection
- Off
- On

Factory setting Off

Additional information *Options*
- Off
  The measuring device transmits data only when requested by the HART master.
- On
  The measuring device transmits data regularly without being requested.

Burst command 1 to n

Navigation Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst command 1 to n (2031–1 to n)

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

Selection
- Command 1
- Command 2
- Command 3

- Command 9
- Command 33
- Command 48

Factory setting Command 2

Additional information *Selection*

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

"Command 33" option

The HART device variables are defined via Command 107.

The following measured variables (HART device variables) can be read out:
- Volume flow
- Mass flow
- Temperature *
- Totalizer 1...3
- Sound velocity
- Flow velocity
- Acceptance rate *
- Turbulence *
- Signal strength *
- Signal to noise ratio *
- Percent of range
- Measured current
- Primary variable (PV)
- Secondary variable (SV)
- Tertiary variable (TV)
- Quaternary variable (QV)

Commands

- Information about the defined details of the command: HART specifications
- The measured variables (HART device variables) are assigned to the dynamic variables in the **Output** submenu (→ 107).

Burst variable 0

Navigation Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 0 (2033)

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

* Visibility depends on order options or device settings

Selection

- Not used
- 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 *
- Electronics temperature
- Signal strength *
- Signal to noise ratio *
- Acceptance rate *
- Turbulence *
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Cross flow factor *
- Profile factor *
- Primary variable (PV)
- Secondary variable (SV)
- Tertiary variable (TV)
- Quaternary variable (QV)
- HART input
- Percent of range
- Measured current
- Current input 1 *
- Current input 2 *
- Current input 3 *

Factory setting Volume flow

Additional information *Options*

If a burst message is not configured, the **Not used** option is set.

Burst variable 1

Navigation Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 1 (2034)

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

Selection See the **Burst variable 0** parameter (2033) (→ 163).

Factory setting Not used

* Visibility depends on order options or device settings

Burst variable 2

Navigation Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 2 (2035)

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

Selection See the **Burst variable 0** parameter (2033) (→ 163).

Factory setting Not used

Burst variable 3

Navigation Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 3 (2036)

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

Selection See the **Burst variable 0** parameter (2033) (→ 163).

Factory setting Not used

Burst variable 4

Navigation Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 4 (2037)

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

Selection See the **Burst variable 0** parameter (2033) (→ 163).

Factory setting Not used

Burst variable 5

Navigation Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 5 (2038)

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

Selection See the **Burst variable 0** parameter (2033) (→ 163).

Factory setting Not used

Burst variable 6

Navigation Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 6 (2039)

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

Selection See the **Burst variable 0** parameter (2033) (→ 163).

Factory setting Not used

Burst variable 7

Navigation Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 7 (2040)

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

Selection See the **Burst variable 0** parameter (2033) (→ 163).

Factory setting Not used

Burst trigger mode

Navigation Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Trigger mode (2044–1 to n)

Description Use this function to select the event that triggers burst message X.

Selection
- Continuous
- Window
- Rising
- Falling
- On change

Factory setting Continuous

Additional information *Selection*

- Continuous
  The message is sent continuously, at least at intervals corresponding to the time frame specified in the **Burst min period** parameter (2042) (→ 🖹 167).
- Window
  The message is sent if the specified measured value has changed by the value in the **Burst trigger level** parameter (2043) (→ 🖹 167).
- Rising
  The message is sent if the specified measured value exceeds the value in the **Burst trigger level** parameter (2043) (→ 🖹 167).
- Falling
  The message is sent if the specified measured value drops below the value in the **Burst trigger level** parameter (2043) (→ 🖹 167).
- On change
  The message is sent if a measured value changes in the burst message.

Burst trigger level

Navigation Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Trigger level (2043–1 to n)

Description For entering the burst trigger value.

User entry Signed floating-point number

Additional information *Description*

Together with the option selected in the **Burst trigger mode** parameter (2044) (→ 🖹 166) the burst trigger value determines the time of burst message X.

Min. update period

Navigation Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Min. upd. per. (2042–1 to n)

Description Use this function to enter the minimum time span between two burst commands of burst message X.

User entry Positive integer

Factory setting 1000 ms

Max. update period

Navigation Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Max. upd. per. (2041–1 to n)

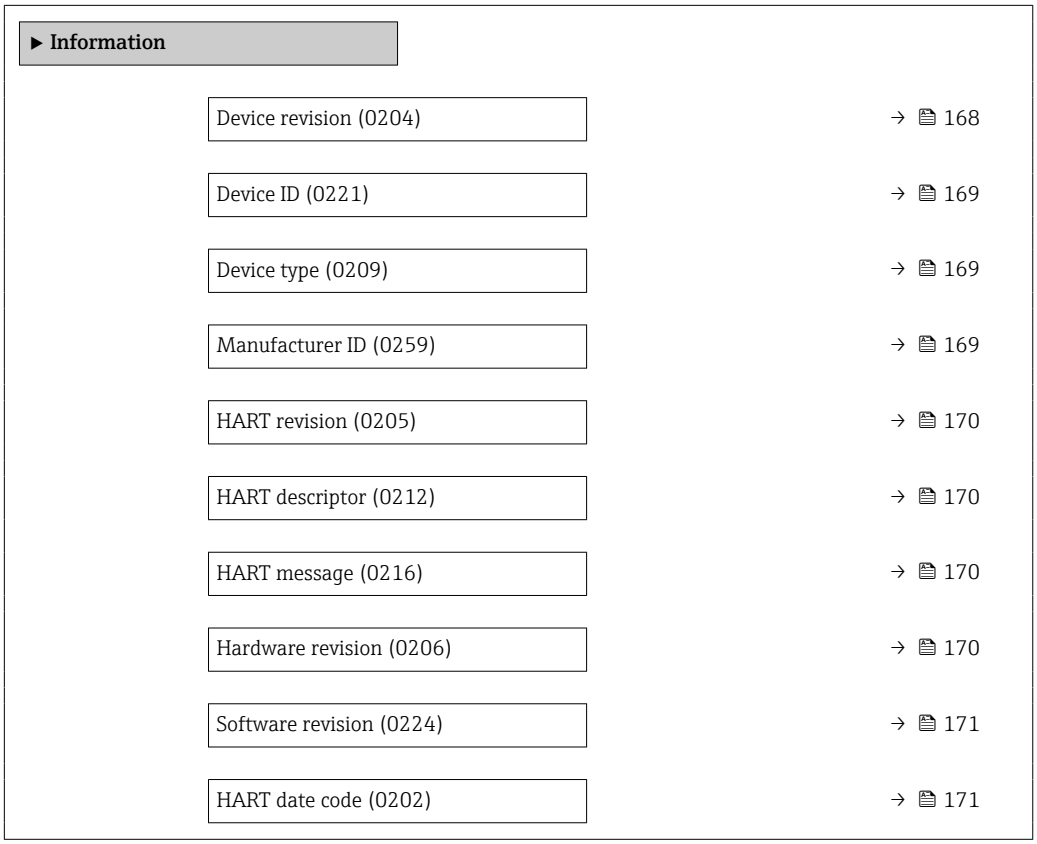
Description Use this function to enter the maximum time span between two burst commands of burst message X.

User entry Positive integer

Factory setting 2 000 ms

"Information" submenu

Navigation Expert → Communication → HART output → Information



Device revision

Navigation Expert → Communication → HART output → Information → Device revision (0204)

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

User interface 2-digit hexadecimal number

Factory setting 0x5D

Additional information *Description*

The device revision is needed to assign the appropriate device description file (DD) to the device.

Device ID

Navigation Expert → Communication → HART output → Information → Device ID (0221)

Description Use this function to view the device ID for identifying the measuring device in a HART network.

User interface 6-digit hexadecimal number

Additional information *Description*

In addition to the device type and manufacturer ID, the device ID is part of the unique ID. Each HART device is uniquely identified by the unique device ID.

Device type

Navigation Expert → Communication → HART output → Information → Device type (0209)

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

User interface 2-digit hexadecimal number

Factory setting 0x5D (for Prosonic Flow P 500)

Additional information *Description*

The device type is specified by the manufacturer. It is needed to assign the appropriate device description file (DD) to the device.

Manufacturer ID

Navigation Expert → Communication → HART output → Information → Manufacturer ID (0259)

Description Use this function to view the manufacturer ID with which the measuring device is registered with the HART Communication Foundation.

User interface 2-digit hexadecimal number

Factory setting 0x11 (for Endress+Hauser)

HART revision

Navigation Expert → Communication → HART output → Information → HART revision (0205)

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

User interface 5 to 7

Factory setting 7

HART descriptor

Navigation Expert → Communication → HART output → Information → HART descriptor (0212)

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

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

Factory setting Pros.Flow300/500

HART message

Navigation Expert → Communication → HART output → Information → HART message (0216)

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

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

Factory setting Pros.Flow300/500

Hardware revision

Navigation Expert → Communication → HART output → Information → Hardware rev. (0206)

Description Displays the hardware revision of the measuring device.

User interface 0 to 255

Factory setting 1

Software revision

Navigation Expert → Communication → HART output → Information → Software rev. (0224)

Description Displays the software revision of the measuring device.

User interface 0 to 255

Factory setting 3

HART date code

Navigation Expert → Communication → HART output → Information → HART date code (0202)

Description Use this function to enter the date information for individual use.

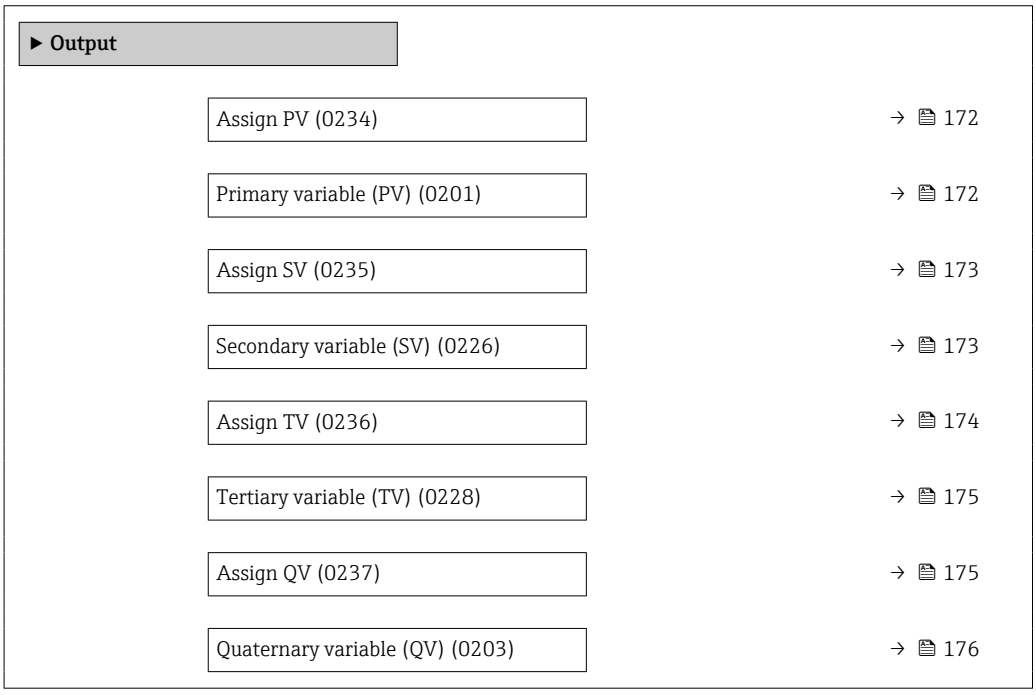
User entry Date entry format: yyyy-mm-dd

Factory setting 2009-07-20

Additional information *Example*
Device installation date

"Output" submenu

Navigation Expert → Communication → HART output → Output



Assign PV

Navigation Expert → Communication → HART output → Output → Assign PV (0234)

Description Use this function to select a measured variable (HART device variable) for the primary dynamic variable (PV).

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

Primary variable (PV)

Navigation Expert → Communication → HART output → Output → Primary var (PV) (0201)

Description Displays the current measured value of the primary dynamic variable (PV).

User interface Signed floating-point number

Additional information

Display

The measured value displayed depends on the process variable selected in the **Assign PV** parameter (0234) (→ 172).

Dependency

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

* Visibility depends on order options or device settings

Assign SV

Navigation Expert → Communication → HART output → Output → Assign SV (0235)

Description Use this function to select a measured variable (HART device variable) for the secondary dynamic variable (SV).

Selection
- 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
- Current input 1 *
- Current input 2 *
- Current input 3 *
- Profile factor *
- Cross flow factor *
- HART input

Factory setting Totalizer 1

Secondary variable (SV)

Navigation Expert → Communication → HART output → Output → Second.var(SV) (0226)

Description Displays the current measured value of the secondary dynamic variable (SV).

User interface Signed floating-point number

* Visibility depends on order options or device settings

Additional information

Display

The measured value displayed depends on the process variable selected in the **Assign SV** parameter (0235) (→ 173).

Dependency

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

Assign TV

Navigation Expert → Communication → HART output → Output → Assign TV (0236)

Description Use this function to select a measured variable (HART device variable) for the tertiary (third) dynamic variable (TV).

Selection

- 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
- Current input 1 *
- Current input 2 *
- Current input 3 *
- Profile factor *
- Cross flow factor *
- HART input

Factory setting Totalizer 2

* Visibility depends on order options or device settings

Tertiary variable (TV)

Navigation Expert → Communication → HART output → Output → Tertiary var(TV) (0228)

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

User interface Signed floating-point number

Additional information

Display

The measured value displayed depends on the process variable selected in the **Assign TV** parameter (0236) (→ 174).

Dependency

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

Assign QV

Navigation Expert → Communication → HART output → Output → Assign QV (0237)

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

Selection

- 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
- Current input 1 *
- Current input 2 *
- Current input 3 *
- Profile factor *
- Cross flow factor *
- HART input

* Visibility depends on order options or device settings

Factory setting Totalizer 3

Quaternary variable (QV)

Navigation Expert → Communication → HART output → Output → Quaterna.var(QV) (0203)

Description Displays the current measured value of the quaternary dynamic variable (QV).

User interface Signed floating-point number

Additional information *Display*

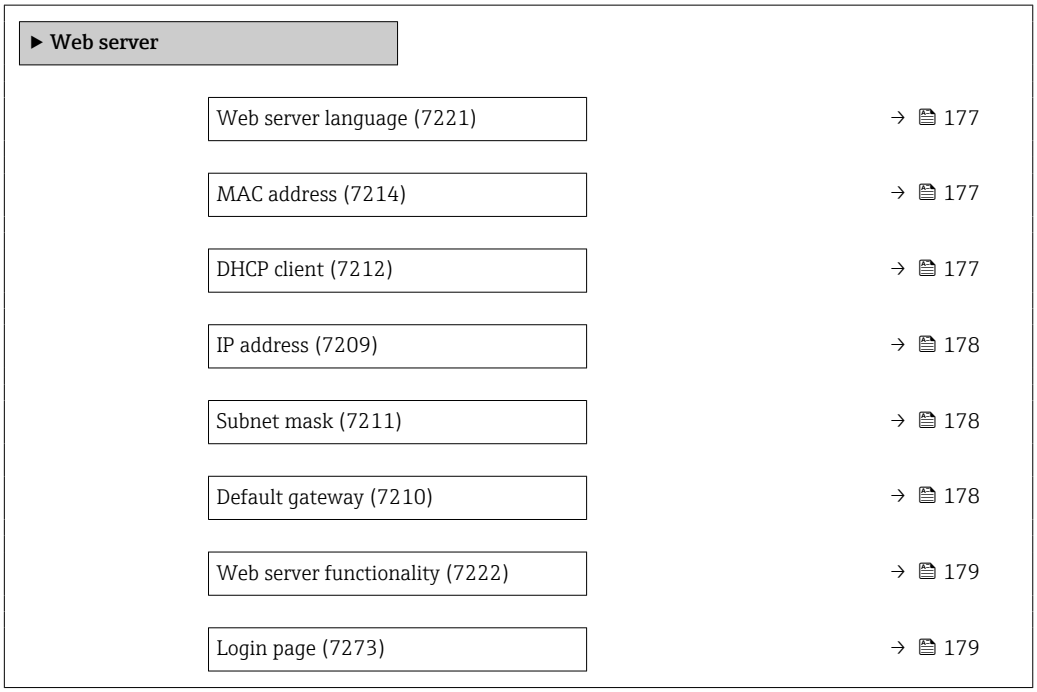
The measured value displayed depends on the process variable selected in the **Assign QV** parameter (0237) (→ 175).

Dependency

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

3.6.3 "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 [5] address of the measuring device.

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

Factory setting Each measuring device is given an individual address.

Additional information *Example*

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

DHCP client

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

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

5) 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) (→ 178), Subnet mask (7211) (→ 178) and Default gateway (7210) (→ 178) are set automatically.

- Identification is via the MAC address of the measuring device.
- The IP address (7209) (→ 178) in the **IP address** parameter (7209) (→ 178) is ignored as long as the **DHCP client** parameter (7212) (→ 177) is active. This is also the case, in particular, if the DHCP server cannot be reached. The IP address (7209) (→ 178) in the parameter of the same name is only used if the **DHCP client** parameter (7212) (→ 177) 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) (→ 178).

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

Login page

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

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

Selection
- Without header
- With header

Factory setting With header

3.6.4 "Diagnostic configuration" submenu

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

Assign a category to the particular diagnostic event:

Category	Meaning
Failure (F)	A device error has occurred. The measured value is no longer valid.
Function check (C)	The device is in the service mode (e.g. during a simulation).

Category	Meaning
Out of specification (S)	The device is being operated: ▪ Outside its technical specification limits (e.g. outside the process temperature range) ▪ Outside of the configuration carried out by the user (e.g. maximum flow in parameter 20 mA value)
Maintenance required (M)	Maintenance is required. The measured value remains valid.
No effect (N)	Has no effect on the condensed status [1].

1) Condensed status according to NAMUR recommendation NE 107

Navigation Expert → Communication → Diag. config.

▶ **Diagnostic configuration**

Event category 160 (0272)	→ 181
Event category 441 (0210)	→ 181
Event category 444 (0211)	→ 182
Event category 442 (0230)	→ 181
Event category 443 (0231)	→ 182
Event category 543 (0276)	→ 183
Event category 832 (0218)	→ 183
Event category 833 (0225)	→ 183
Event category 841 (0267)	→ 184
Event category 842 (0295)	→ 184
Event category 870 (0250)	→ 185
Event category 930 (0296)	→ 185
Event category 931 (0297)	→ 186
Event category 941 (0294)	→ 187
Event category 942 (0302)	→ 187
Event category 943 (0301)	→ 187

Event category 160 (Signal path switched off)

Navigation Expert → Communication → Diag. config. → Event category 160 (0272)

Description Use this function to select a category for the **160 Signal path switched off** diagnostic message.

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

Factory setting Maintenance required (M)

Additional information For a detailed description of the event categories available for selection: → 179

Event category 441 (Current output 1 to n)

Navigation Expert → Communication → Diag. config. → Event category 441 (0210)

Description Use this function to select a category for the **441 Current output 1 to n** diagnostic message.

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

Factory setting Out of specification (S)

Additional information For a detailed description of the event categories available for selection: → 179

Event category 442 (Frequency output 1 to n)

Navigation Expert → Communication → Diag. config. → Event category 442 (0230)

Prerequisite The pulse/frequency/switch output is available.

Description Use this function to select a category for the **442 Frequency output 1 to n** diagnostic message.

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

Factory setting Out of specification (S)

Additional information For a detailed description of the event categories available for selection: → 179

Event category 443 (Pulse output 1 to n)

Navigation Expert → Communication → Diag. config. → Event category 443 (0231)

Prerequisite The pulse/frequency/switch output is available.

Description Use this function to select a category for the **443 Pulse output 1 to n** diagnostic message.

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

Factory setting Out of specification (S)

Additional information For a detailed description of the event categories available for selection: → 179

Event category 444 (Current input 1 to n)

Navigation Expert → Communication → Diag. config. → Event category 444 (0211)

Prerequisite The current input is available.

Description Use this function to select a category for the **444 Current input 1 to n** diagnostic message.

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

Factory setting Out of specification (S)

Additional information *Selection*

For a detailed description of the event categories available for selection: → 179

Event category 543 (Double pulse output)

Navigation Expert → Communication → Diag. config. → Event category 543 (0276)

Description Use this option to select a category for the **543 Double pulse output** diagnostic message.

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

Factory setting Out of specification (S)

Additional information For a detailed description of the event categories available for selection: → 179

Event category 832 (Electronics temperature too high)

Navigation Expert → Communication → Diag. config. → Event category 832 (0218)

Description Use this function to select a category for the **832 Electronics temperature too high** diagnostic message.

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

Factory setting Out of specification (S)

Additional information *Selection*

For a detailed description of the event categories available for selection: → 179

Event category 833 (Electronics temperature too low)

Navigation Expert → Communication → Diag. config. → Event category 833 (0225)

Description Use this option to select a category for the **833 Electronics temperature too low** diagnostic message.

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

Factory setting Out of specification (S)

Additional information *Selection*

For a detailed description of the event categories available for selection: → 179

Event category 841 (Flow velocity too high)

Navigation Expert → Communication → Diag. config. → Event category 841 (0267)

Description Use this function to assign a category to the ⚠**S841 Flow velocity too high** diagnostic message.

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

Factory setting Out of specification (S)

Additional information For a detailed description of the event categories available for selection: → 179

Event category 842 (Process limit)

Navigation Expert → Communication → Diag. config. → Event category 842 (0295)

Description Use this function to assign a category to the **842 Process limit** diagnostic message.

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

Factory setting Out of specification (S)

Additional information *Selection*

For a detailed description of the event categories available for selection: → 179

Event category 870 (Measuring inaccuracy increased)

Navigation Expert → Communication → Diag. config. → Event category 870 (0250)

Description Use this function to select a category for the **870 Measuring inaccuracy increased** diagnostic message.

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

Factory setting No effect (N)

Additional information *Selection*

For a detailed description of the event categories available for selection: → 179

Event category 881 (Sensor signal path 1 to n)

Navigation Expert → Communication → Diag. config. → Event category 881 (0268)

Description Use this function to select a category for the **881 Sensor signal path 1 to n** diagnostic message.

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

Factory setting Failure (F)

Additional information For a detailed description of the event categories available for selection: → 179

Event category 930 (Process fluid)

Navigation Expert → Communication → Diag. config. → Event category 930 (0296)

Description Use this function to select a category for the ⚠**S930 Process fluid** diagnostic message.

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

Factory setting Out of specification (S)

Additional information *Selection*

For a detailed description of the event categories available for selection: → 179

Event category 931 (Process fluid)

Navigation Expert → Communication → Diag. config. → Event category 931 (0297)

Description Use this function to select a category for the ⚠**S931 Process fluid** diagnostic message.

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

Factory setting Out of specification (S)

Additional information *Selection*

For a detailed description of the event categories available for selection: → 179

Event category 953 (Asymmetry noise signal too high path 1 to n)

Navigation Expert → Communication → Diag. config. → Event category 953 (0292)

Description Use this function to select a category for the ⚠**M953 Asymmetry noise signal too high path 1 to n** diagnostic message.

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

Factory setting Failure (F)

Additional information *Selection*

For a detailed description of the event categories available for selection: → 179

Event category 941 (API/ASTM temperature out of specificat.)

Navigation Expert → Communication → Diag. config. → Event category 941 (0294)

Description Select category for diagnostic message.

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

Factory setting Out of specification (S)

Additional information For a detailed description of the event categories available for selection: → 179

Event category 942 (API/ASTM density out of specification)

Navigation Expert → Communication → Diag. config. → Event category 942 (0302)

Description Select category for diagnostic message.

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

Factory setting Out of specification (S)

Additional information For a detailed description of the event categories available for selection: → 179

Event category 943 (API pressure out of specification)

Navigation Expert → Communication → Diag. config. → Event category 943 (0301)

Description Select category for diagnostic message.

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

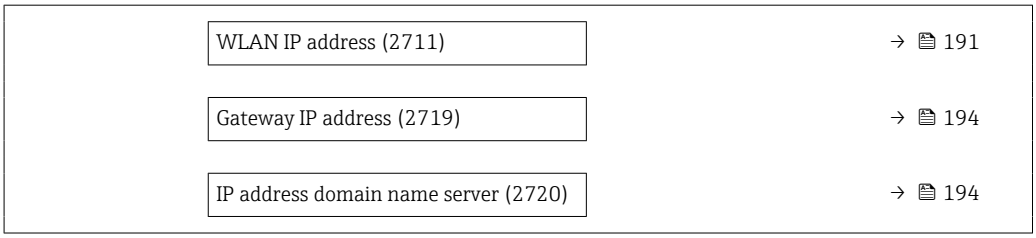
Factory setting Out of specification (S)

Additional information For a detailed description of the event categories available for selection: → 179

3.6.5 "WLAN settings" wizard

Navigation Expert → Communication → WLAN settings

▶ WLAN settings	
WLAN (2702)	→ 189
WLAN mode (2717)	→ 189
SSID name (2714)	→ 189
Network security (2705)	→ 190
Security identification (2718)	→ 190
User name (2715)	→ 190
WLAN password (2716)	→ 191
WLAN IP address (2711)	→ 191
WLAN MAC address (2703)	→ 191
WLAN subnet mask (2709)	→ 192
WLAN MAC address (2703)	→ 191
WLAN passphrase (2706)	→ 192
WLAN MAC address (2703)	→ 191
Assign SSID name (2708)	→ 192
SSID name (2707)	→ 193
2.4 GHz WLAN channel (2704)	→ 193
Select antenna (2713)	→ 193
Connection state (2722)	→ 194
Received signal strength (2721)	→ 194



WLAN

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

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

Selection
- Disable
- Enable

Factory setting Enable

WLAN mode

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

Description Use this function to select the WLAN mode.

Selection
- WLAN access point
- WLAN Client

Factory setting WLAN access point

SSID name

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

Prerequisite The client is activated.

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

User entry –

Factory setting –

Network security

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

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

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

Factory setting WPA2-PSK

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

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 –

* Visibility depends on order options or device settings

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 [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

6) Media Access Control

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) (→ 190).

Description
Use this function to enter the network key.

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

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

Assign SSID name

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

Description
Use this function to select which name is used for the SSID [7].

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.

7) Service Set Identifier

SSID name

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

Prerequisite
- The **User-defined** option is selected in the **Assign SSID name** parameter (2708) (→ 192).
- The **WLAN access point** option is selected in the **WLAN mode** parameter (2717) (→ 189).

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).

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)

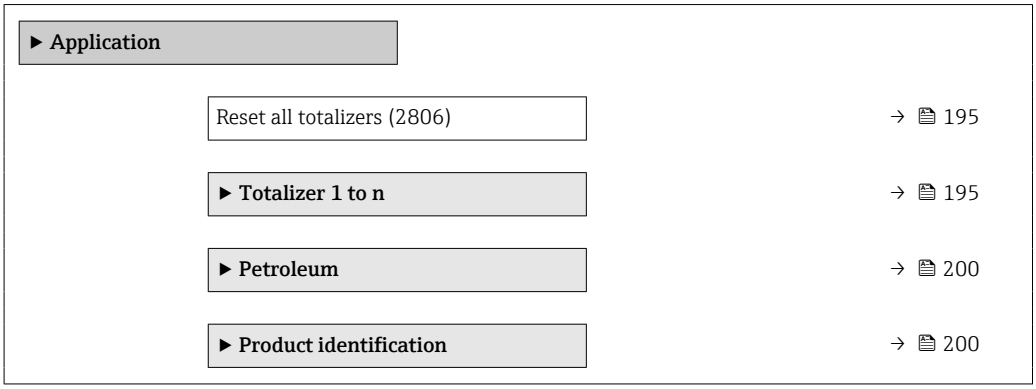
Description Use this function to enter the IP address of the domain name server.

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

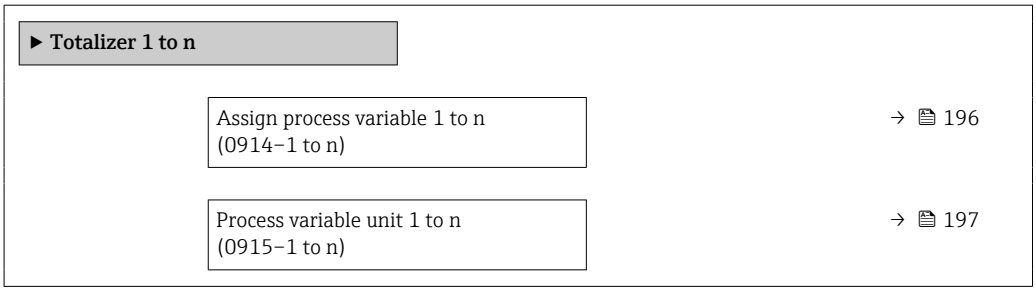
Factory setting Cancel

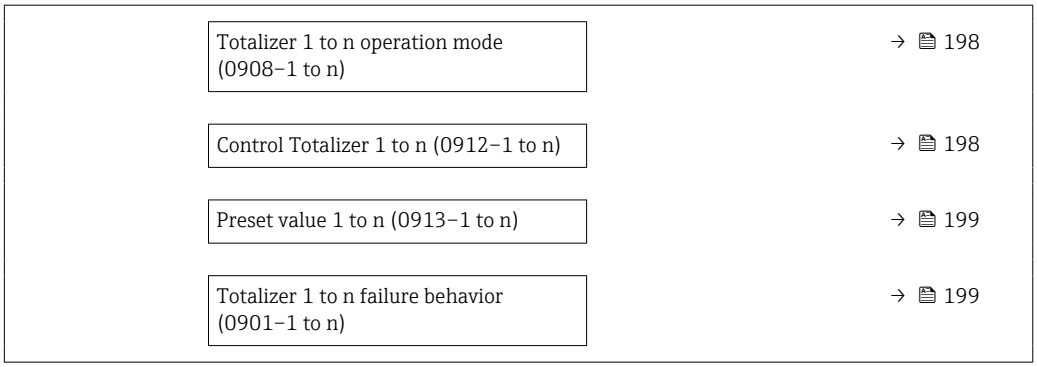
Additional information *Selection*

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 *
- 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) (→ 196) is still displayed in the **Totalizer 1 to n** submenu. All other parameters in the submenu are hidden.

* Visibility depends on order options or device settings

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) (→ 196) of the **Totalizer 1 to n** submenu.

Description Use this function to select the process variable unit for the Totalizer 1 to n (→ 195).

Selection
- g *
- kg *
- t *
- oz *
- lb *
- STon *
- cm³ *
- dm³ *
- m³ *
- ml *
- l *
- hl *
- Ml Mega *
- af *
- ft³ *
- Mft³ *
- Mft³ *
- fl oz (us) *
- gal (us) *
- kgal (us) *
- Mgal (us) *
- bbl (us;liq.) *
- bbl (us;beer) *
- bbl (us;oil) *
- bbl (us;tank) *
- gal (imp) *
- Mgal (imp) *
- bbl (imp;beer) *
- bbl (imp;oil) *
- MSft³ *
- None *

Factory setting Depends on country:
- m³
- ft³

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) (→ 196).

* Visibility depends on order options or device settings

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) (→ 196) 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

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) (→ 196) 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.

Options	Description
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) (→ 196) 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) (→ 197) 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) (→ 196) 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

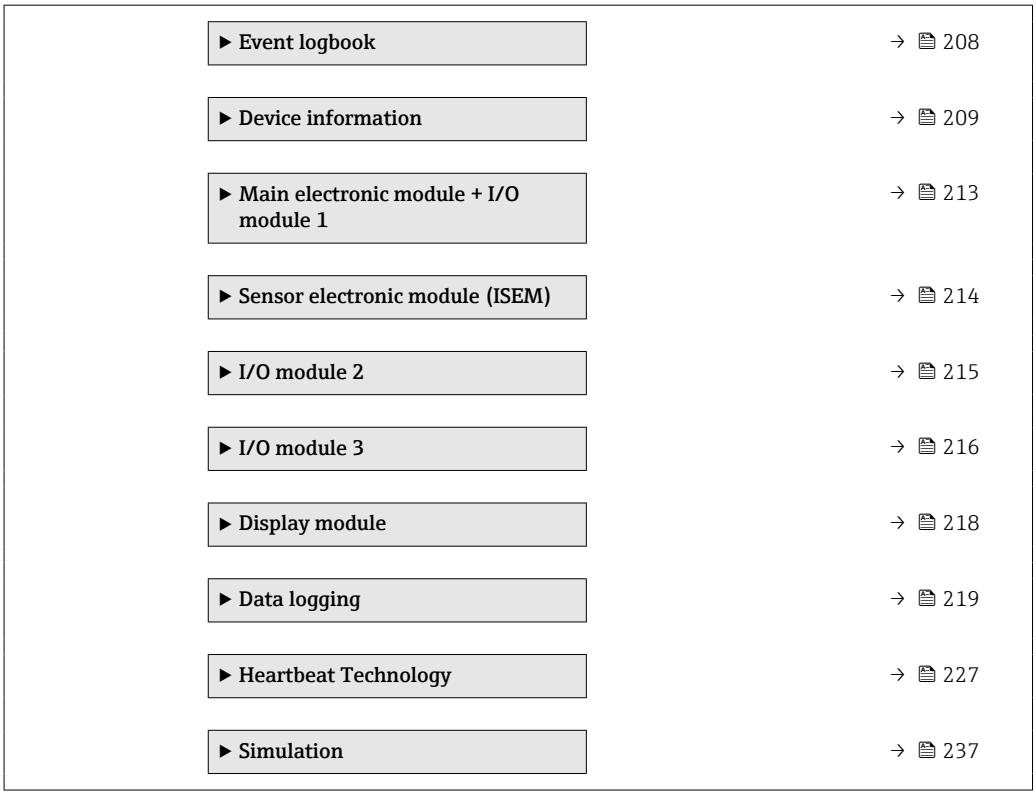
Navigation Expert → Application → Product identif.

▶ **Product identification**

3.8 "Diagnostics" submenu

Navigation Expert → Diagnostics

▶ **Diagnostics**	
Actual diagnostics (0691)	→ 201
Previous diagnostics (0690)	→ 202
Operating time from restart (0653)	→ 203
Operating time (0652)	→ 203
▶ **Diagnostic list**	→ 203



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 (→ 203).

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) (→ 201).

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) (→ 202).

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.

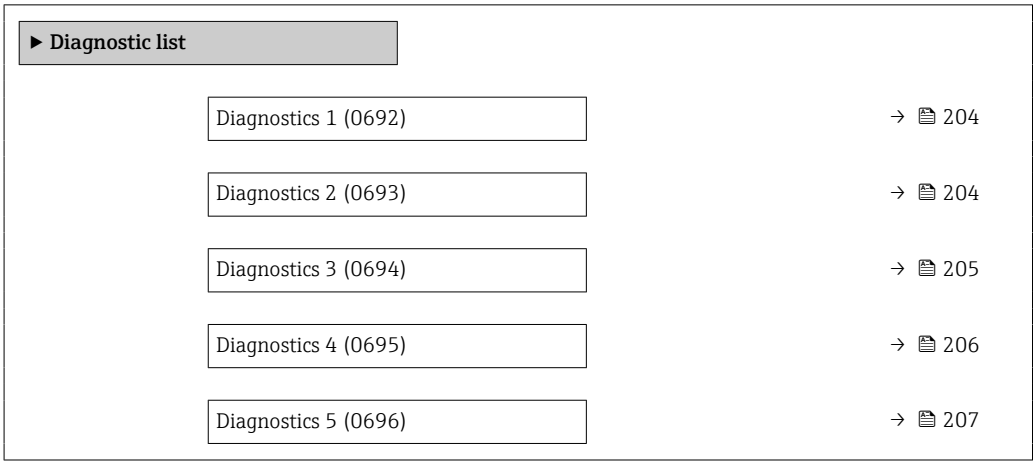
User interface Days (d), hours (h), minutes (m) and seconds (s)

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) (→ 204).

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) (→ 204).

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) (→ 205).

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) (→ 206).

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) (→ 207).

Example

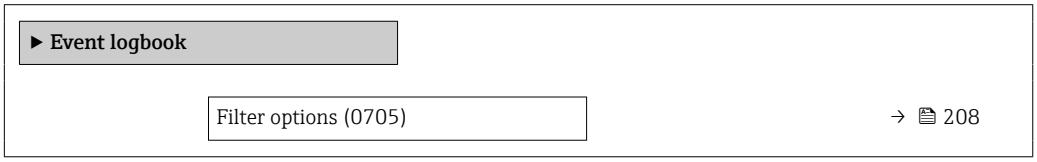
For the display format:
24d12h13m00s

3.8.2 "Event logbook" submenu

Viewing event messages

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

Navigation Expert → Diagnostics → Event logbook



Filter options

Navigation Expert → Diagnostics → Event logbook → Filter options (0705)

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

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

Factory setting All

Additional information *Description*

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

"Event list" submenu

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

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

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

Navigation Expert → Diagnostics → Event logbook → Event list

Event list

Navigation Expert → Diagnostics → Event logbook → Event list

Description Displays the history of event messages of the category selected in the **Filter options** parameter (0705) (→ 208).

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

Additional information

Description

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

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

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

Examples

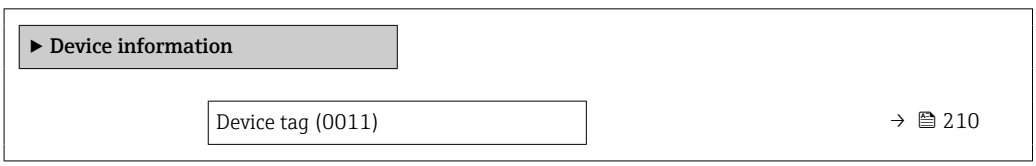
For the display format:
- I1091 Configuration modified
  24d12h13m00s
- F271 Main electronic failure
  01d04h12min30s

HistoROM

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

3.8.3 "Device information" submenu

Navigation Expert → Diagnostics → Device info



Serial number (0009)	→ 211
Firmware version (0010)	→ 211
Device name (0020)	→ 211
Order code (0008)	→ 211
Extended order code 1 (0023)	→ 212
Extended order code 2 (0021)	→ 212
Extended order code 3 (0022)	→ 212
Configuration counter (0233)	→ 213
ENP version (0012)	→ 213

Device tag

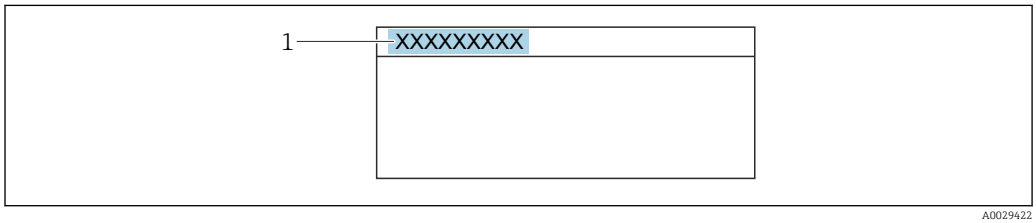
Navigation Expert → Diagnostics → Device info → Device tag (0011)

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) (→ 212)

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) (→ 🖹 212)

Configuration counter

Navigation Expert → Diagnostics → Device info → Config. counter (0233)

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

User interface 0 to 65 535

ENP version

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

Description Displays the version of the electronic nameplate.

User interface Character string

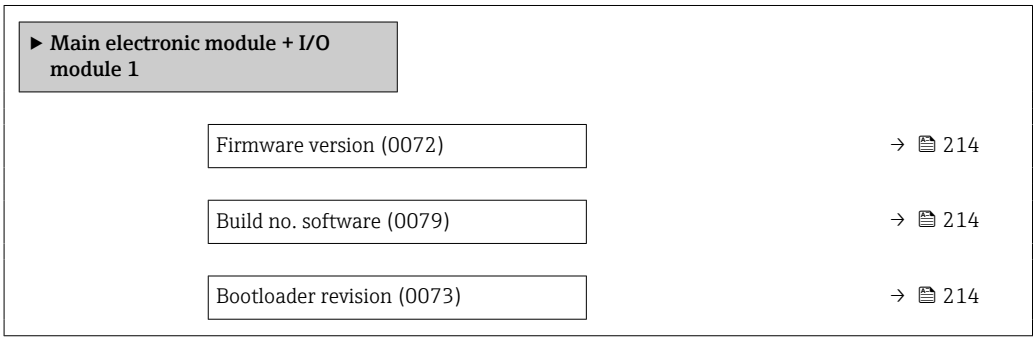
Factory setting 2.02.00

Additional information *Description*

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

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

Navigation Expert → Diagnostics → 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

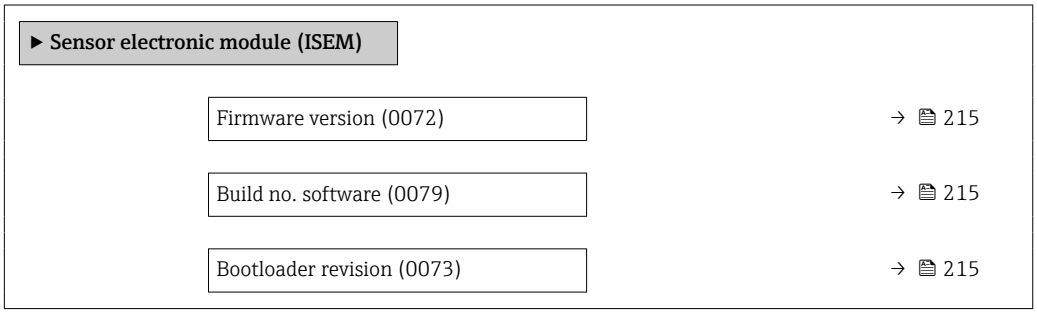
Navigation Expert → Diagnostics → Main elec.+I/O1 → Bootloader rev. (0073)

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

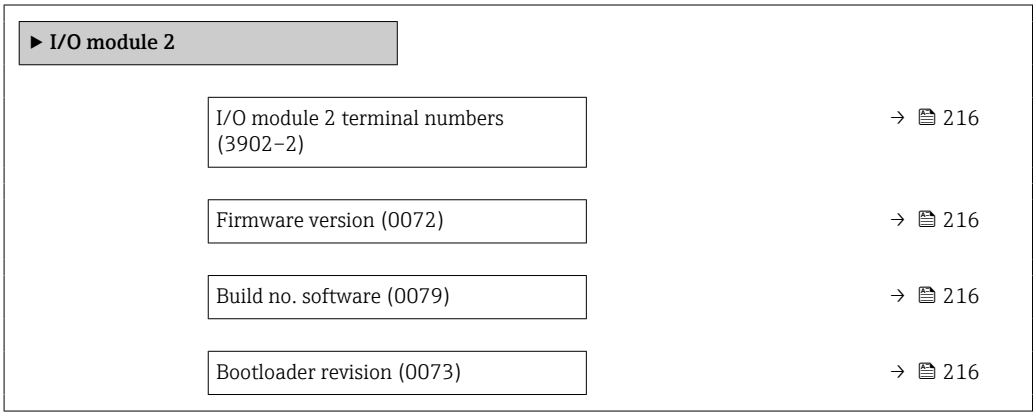
Navigation Expert → Diagnostics → Sens. electronic → Bootloader rev. (0073)

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)

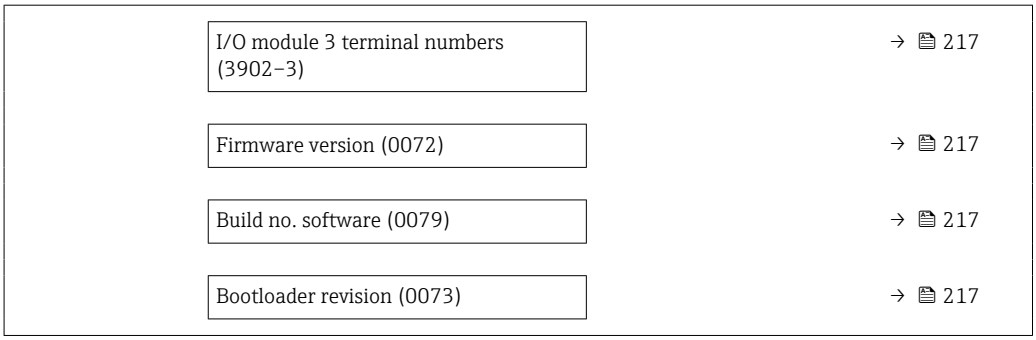
Description Use this function to display the bootloader revision of the software.

User interface Positive integer

3.8.7 "I/O module 3" submenu

Navigation Expert → Diagnostics → I/O module 3

▶ I/O module 3



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

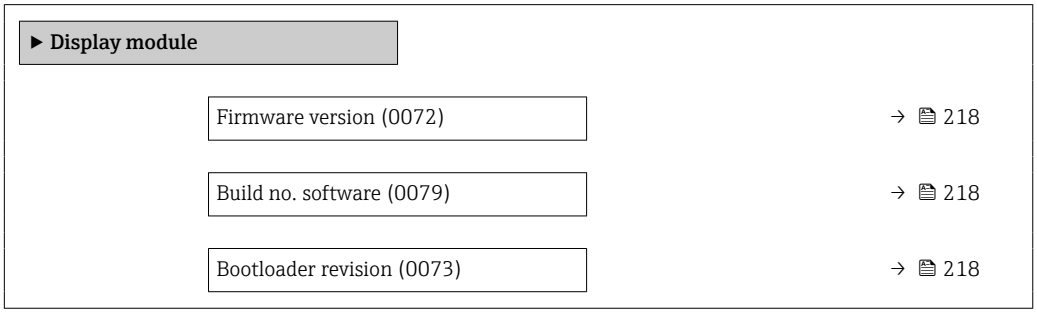
Navigation Expert → Diagnostics → I/O module 3 → Bootloader rev. (0073)

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 *

* Visibility depends on order options or device settings

- 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.

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) (→ 219)

Factory setting Off

* Visibility depends on order options or device settings

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) (→ 219)

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) (→ 219)

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) (→ 222), 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) (→ 223), 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) (→ 222), 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) (→ 222), 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) (→ 222), the **Not overwriting** option is selected.

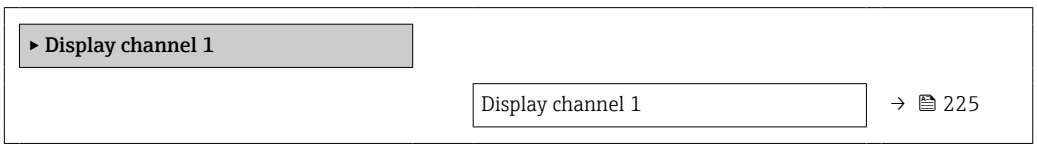
Description Displays the total logging duration.

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

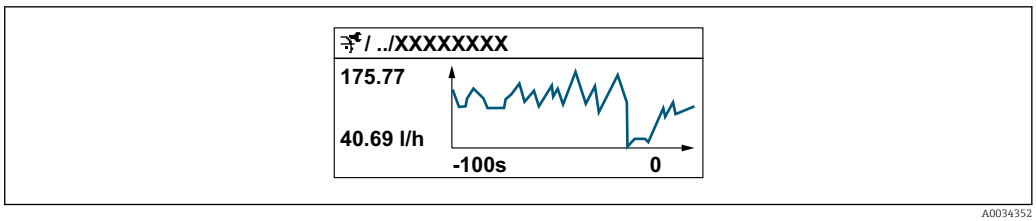
Prerequisite The **Extended HistoROM** application package is available.

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) (→ 219):
- 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.

Additional information *Description*



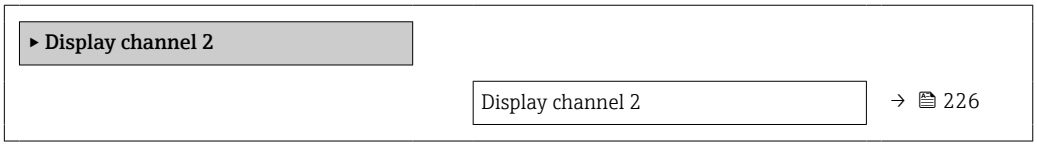
10 *Chart of a measured value trend*

- 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.

* Visibility depends on order options or device settings

"Display channel 2" submenu

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



Display channel 2

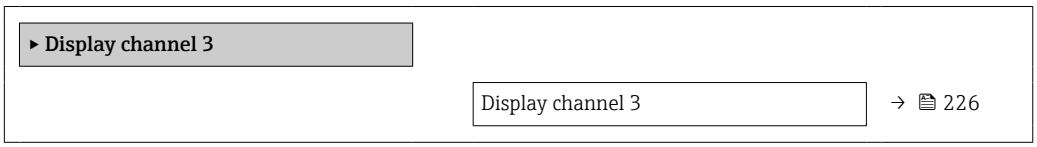
Navigation Expert → Diagnostics → Data logging → Displ.channel 2

Prerequisite A process variable is specified in the **Assign channel 2** parameter (0851).

Description See the **Display channel 1** parameter → 225

"Display channel 3" submenu

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



Display channel 3

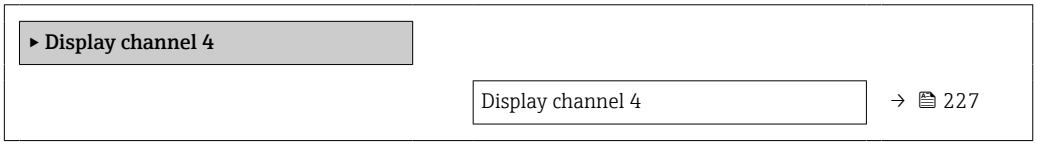
Navigation Expert → Diagnostics → Data logging → Displ.channel 3

Prerequisite A process variable is specified in the **Assign channel 3** parameter (0851).

Description See the **Display channel 1** parameter → 225

"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 → 225

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 Technology**

"Heartbeat base settings" submenu

Navigation Expert → Diagnostics → Heartbeat Techn. → Base settings

▶ **Heartbeat base settings**

Plant operator (2754) → 227

Location (2755) → 227

Plant operator

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

Description Use this function to enter the plant operator.

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

Location

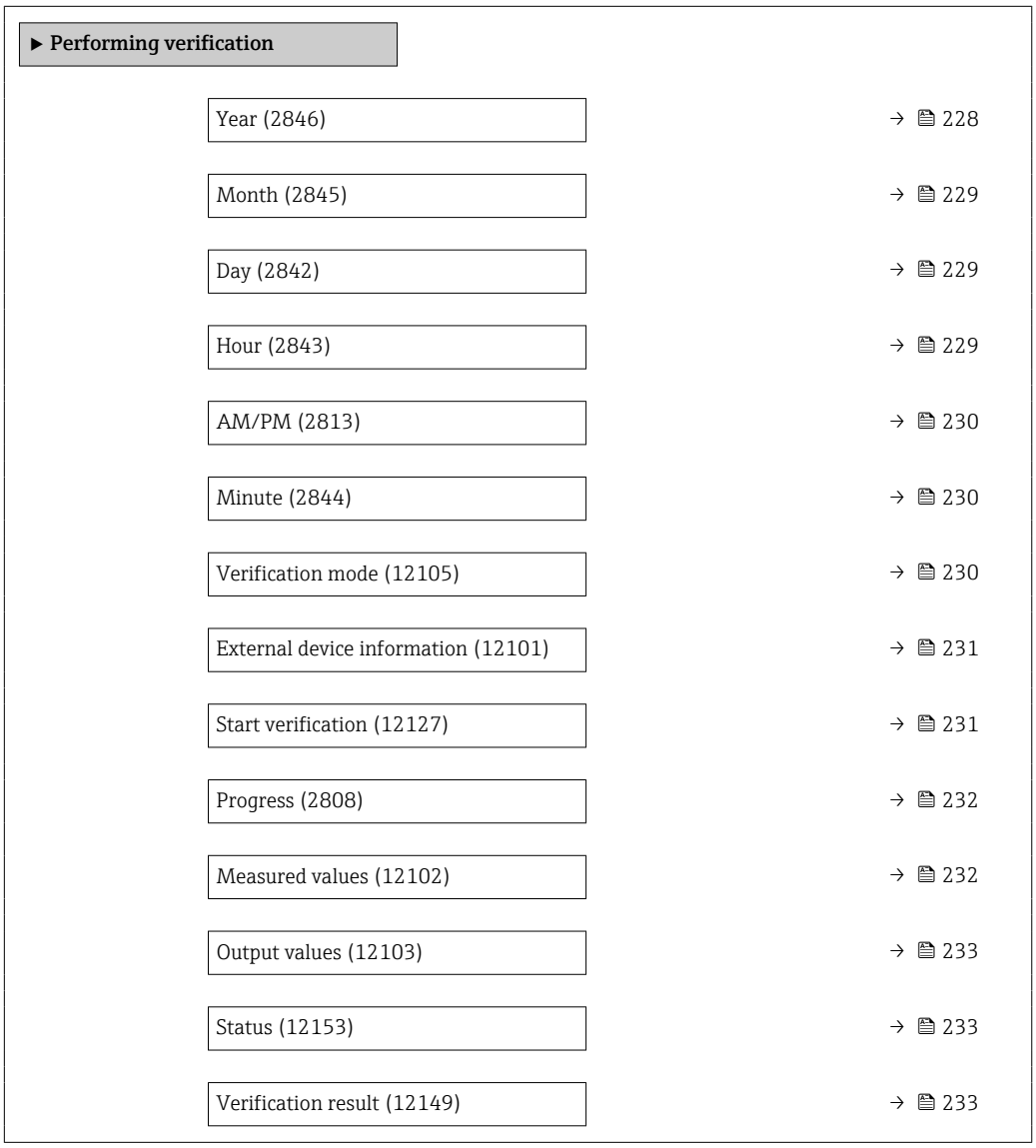
Navigation Expert → Diagnostics → Heartbeat Techn. → Base settings → Location (2755)

Description Use this function to enter the location.

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

"Performing verification" wizard

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific.



Year

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Year (2846)

Prerequisite Can be edited if Heartbeat Verification is not active.

Description Use this function to enter the year of recalibration.

User entry 9 to 99

Factory setting 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) (→ 230).
- 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 *

* Visibility depends on order options or device settings

- 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 %

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) (→ 231):
- 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

* Visibility depends on order options or device settings

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:

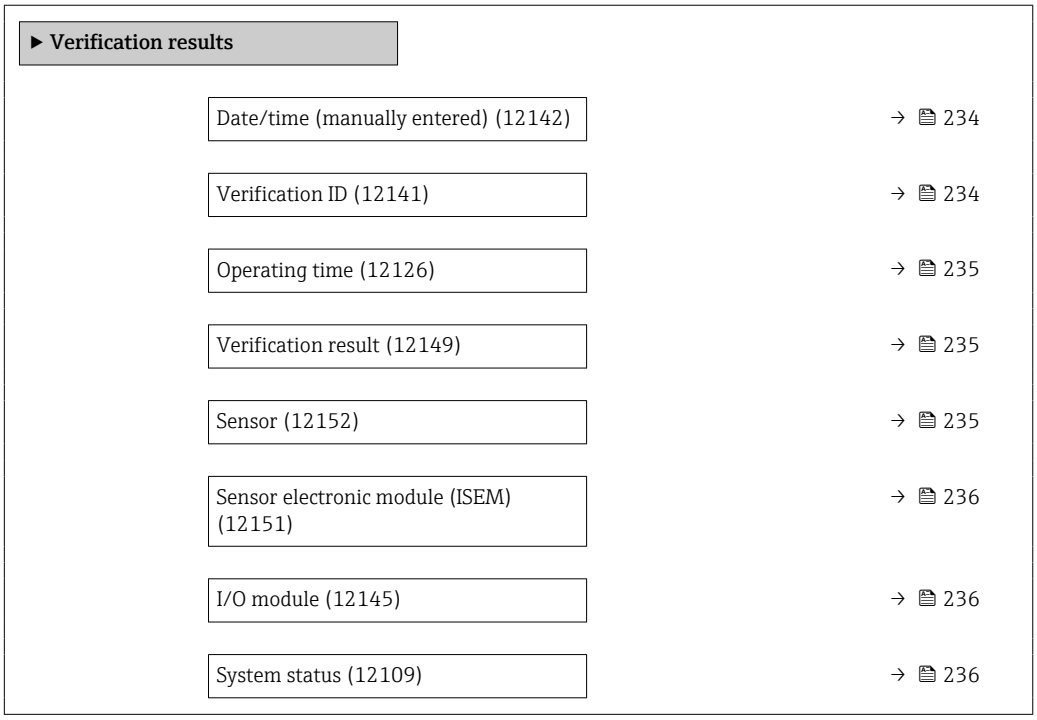
User interface

- 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) (→ 233).

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) (→ 233).

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) (→ 233).

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

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) (→ 233).

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

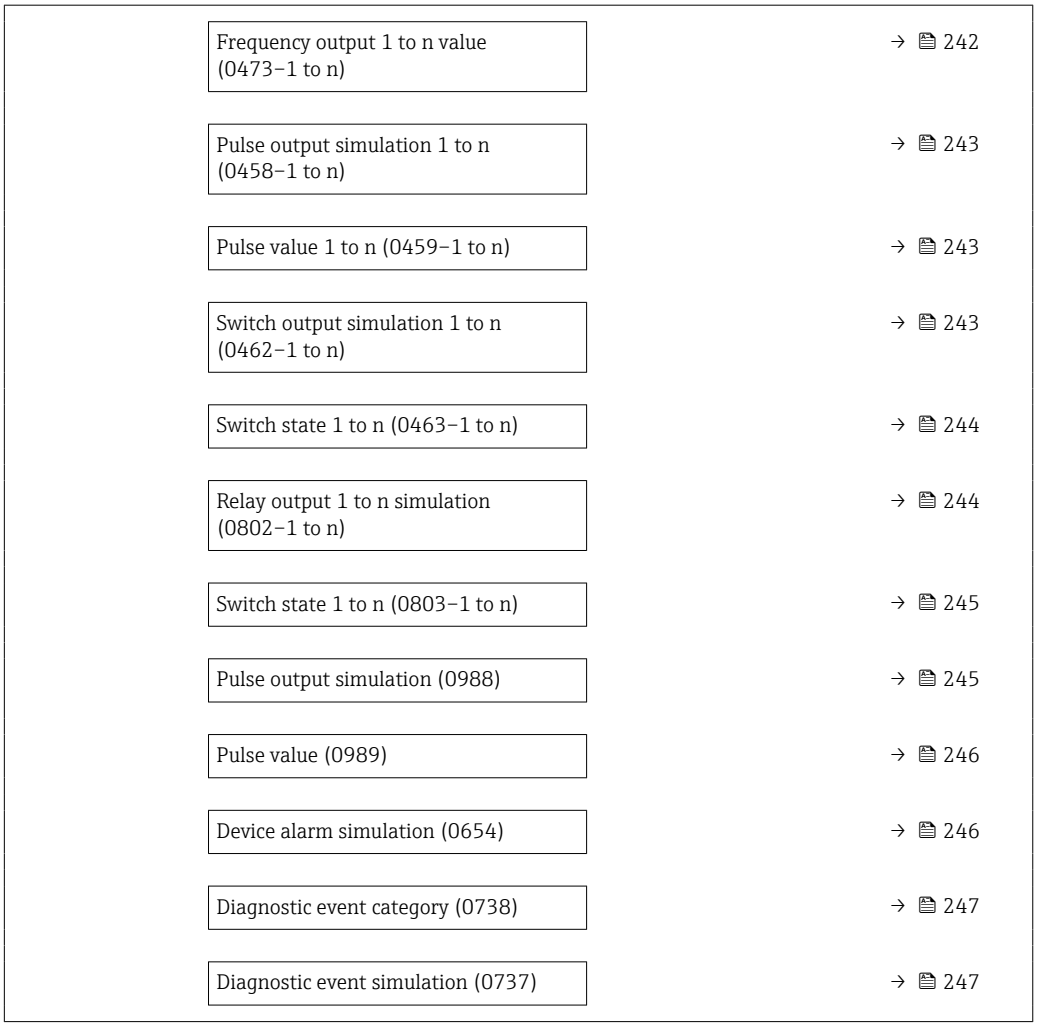
Navigation Expert → Diagnostics → Heartbeat Techn. → Monitor. results

▶ Monitoring results

3.8.11 "Simulation" submenu

Navigation Expert → Diagnostics → Simulation

▶ Simulation	
Assign simulation process variable (1810)	→ 238
Process variable value (1811)	→ 239
Current input 1 to n simulation (1608–1 to n)	→ 239
Value current input 1 to n (1609–1 to n)	→ 240
Status input 1 to n simulation (1355–1 to n)	→ 240
Input signal level 1 to n (1356–1 to n)	→ 241
Current output 1 to n simulation (0354–1 to n)	→ 241
Current output value (0355)	→ 241
Frequency output 1 to n simulation (0472–1 to n)	→ 242



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 *

* Visibility depends on order options or device settings

- 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) (→ 239).

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) (→ 238).

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

* Visibility depends on order options or device settings

Additional information *Selection*

- Off
  Current simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
- On
  Current simulation is active.

Value current input 1 to n

Navigation Expert → Diagnostics → Simulation → Value curr.inp 1 to n (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) (→ 241).

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) (→ 240), 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) (→ 243) 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) (→ 246).

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) (→ 246) are output.

Pulse value

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

Prerequisite In the **Pulse output simulation** parameter (0988) (→ 245), 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) (→ 247).

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) (→ 247).

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)

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