GP01144D/06/EN/03.24-00
71652847
2024-03-15

Valid as of version
01.00.zz (Device firmware)

Description of Device Parameters
Proline t-mass 300
Modbus RS485

Thermal mass flowmeter

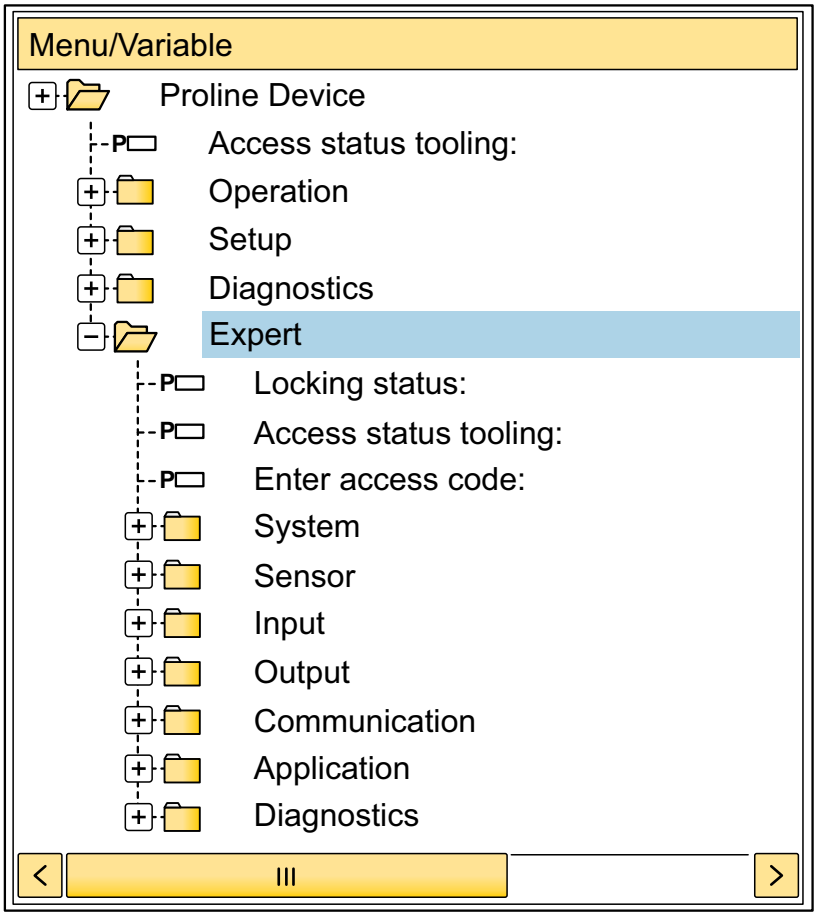

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Table of contents

1 About this document

1.1 Document function

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

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

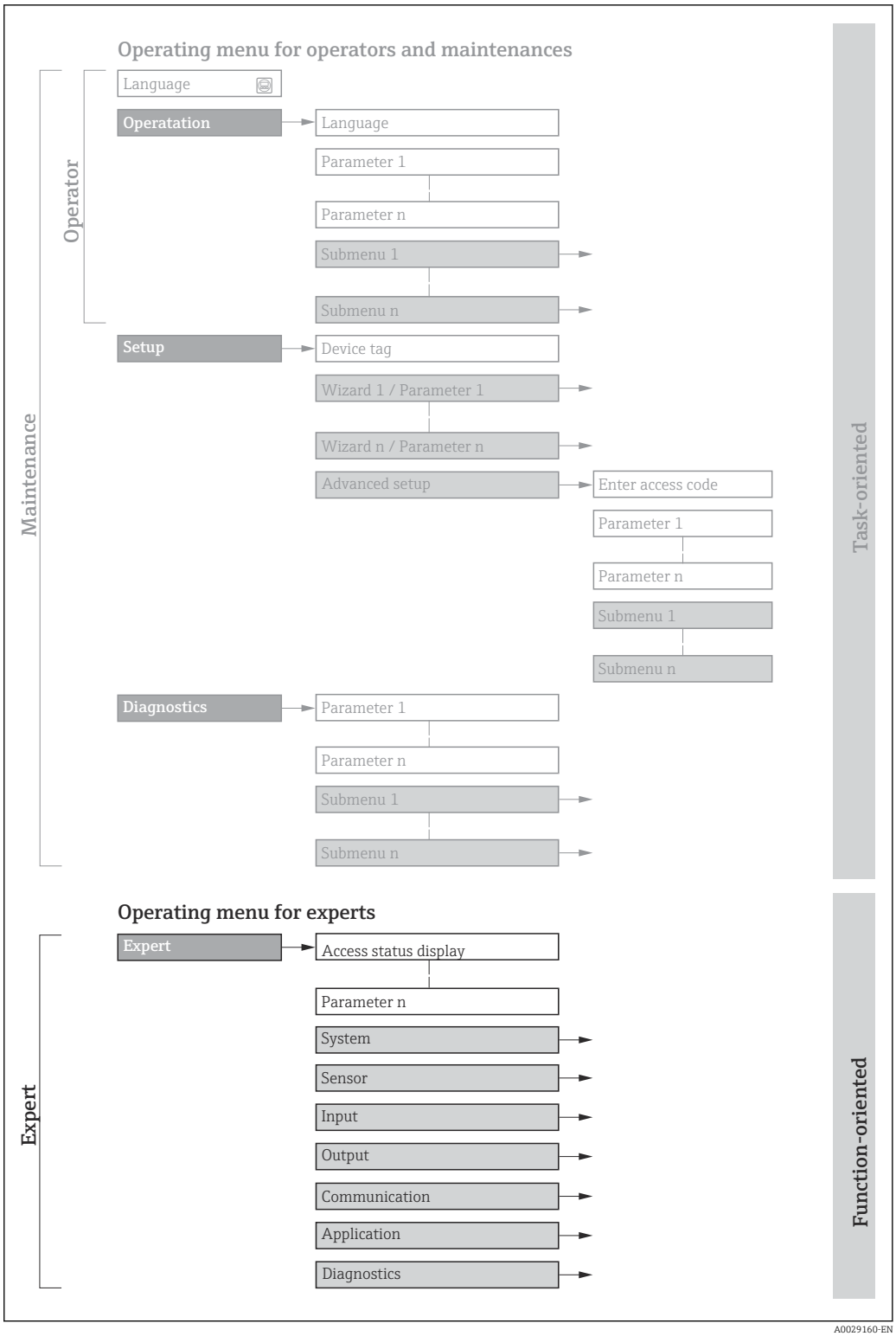
1.2 Target group

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

1.3 Using this document

1.3.1 Information on the document structure

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



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

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

1.3.2 Structure of a parameter description

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

Complete parameter name	Write-protected parameter =

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

Prerequisite
The parameter is only available under these specific conditions

Description
Description of the parameter function

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

User entry
Parameter entry range

Display
Display value/data of the parameter

Factory setting
Default setting ex works

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

1.4 Symbols used

1.4.1 Symbols for certain types of information

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

1.4.2 Symbols in graphics

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

1.5 Documentation

1.5.1 Standard documentation

Operating Instructions

Measuring device	Documentation code
t-mass F 300	BA01994D
t-mass I 300	BA01995D

1.5.2 Supplementary device-dependent documentation

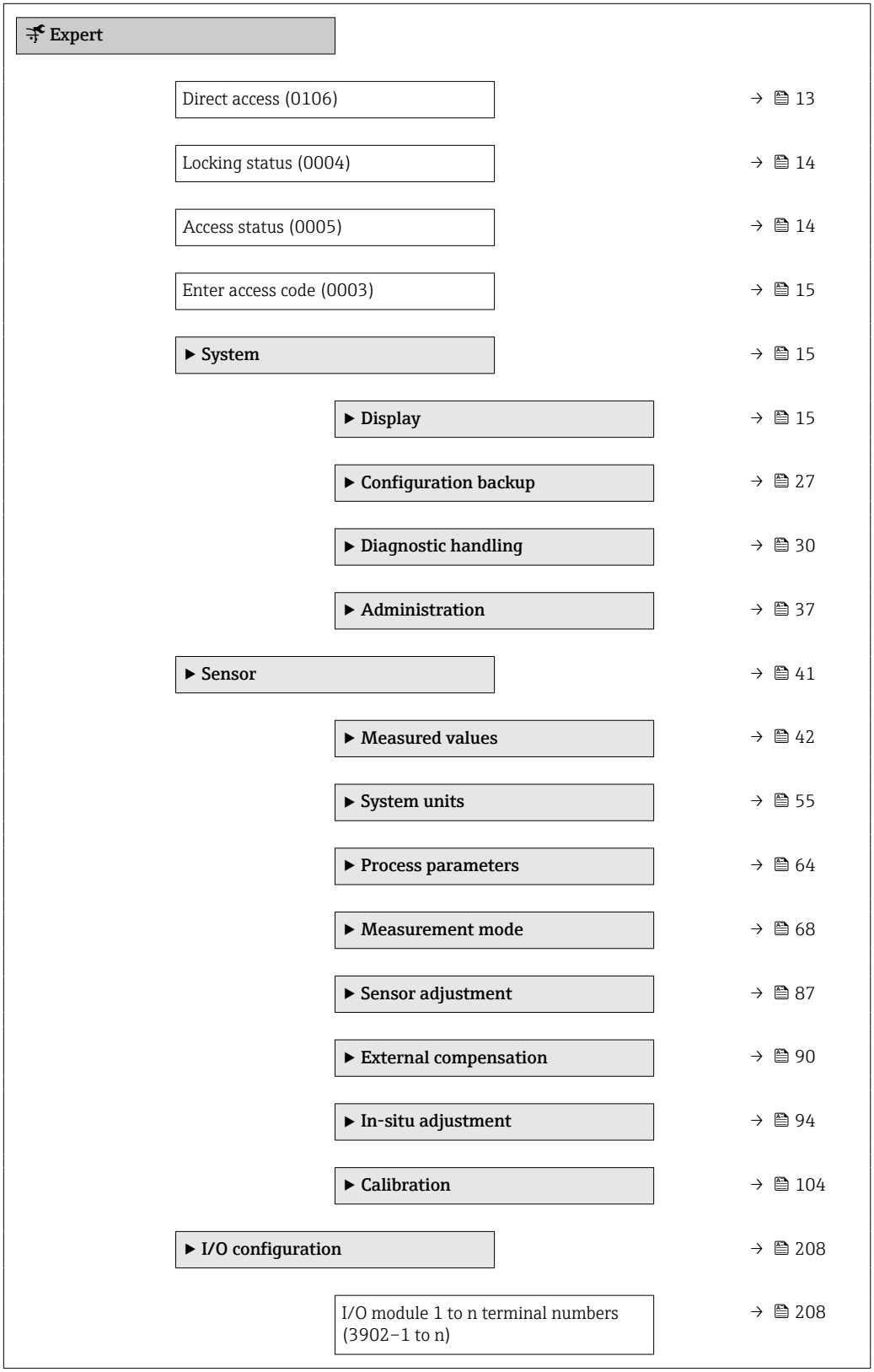
Special Documentation

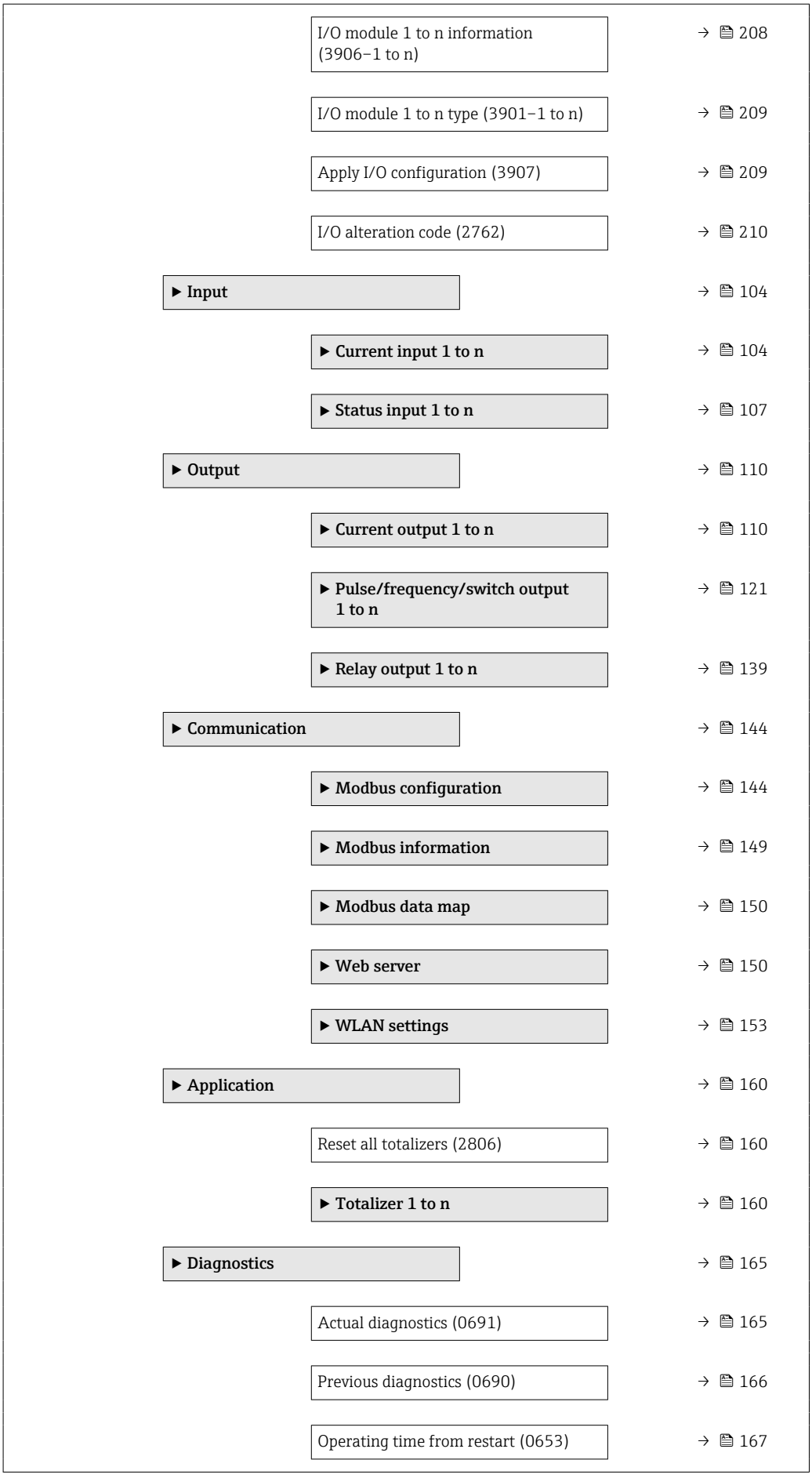
Contents	Documentation code
Information on the Pressure Equipment Directive	SD01614D
Remote display and operating module DKX001	SD01763D
Radio approvals for WLAN interface for A309/A310 display module	SD01793D
Web server	SD02486D
Heartbeat Technology	SD02478D

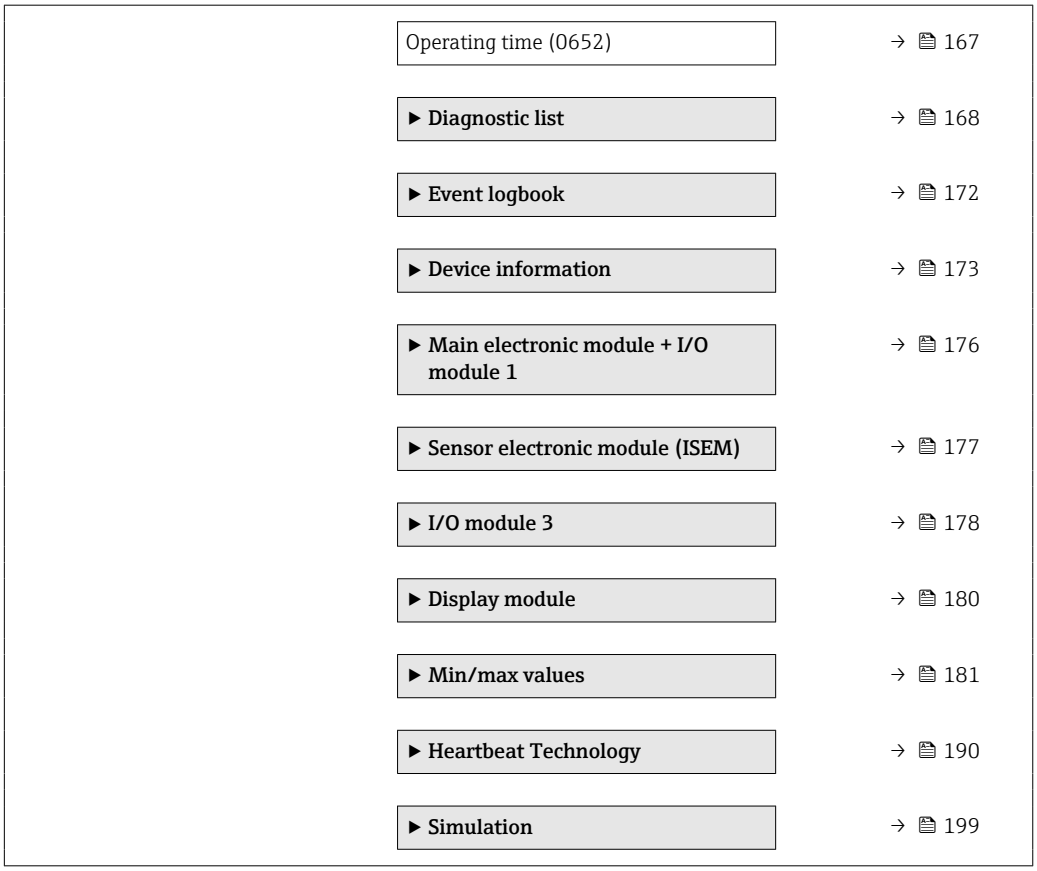
2 Overview of the Expert operating menu

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

Navigation Expert

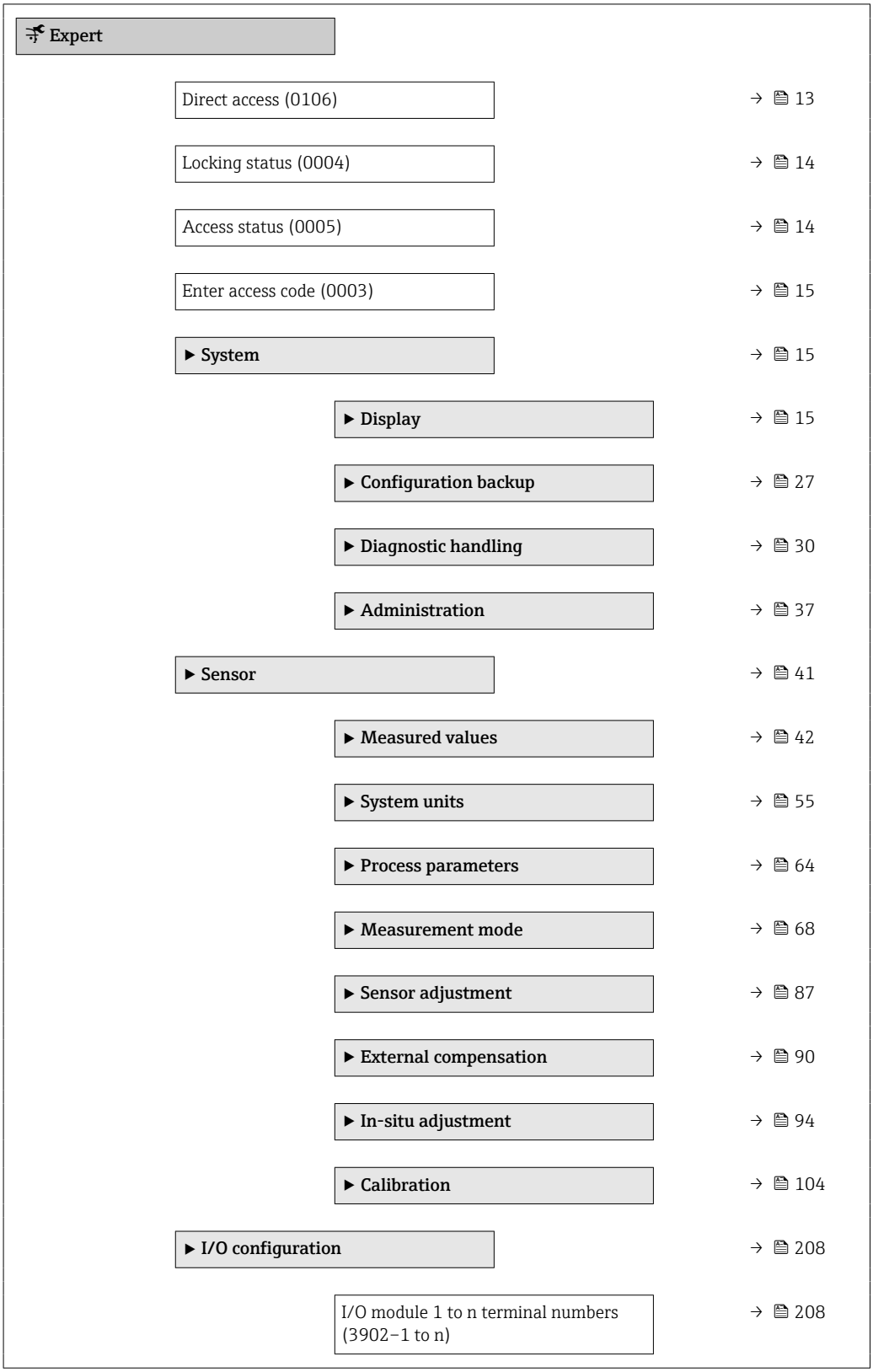


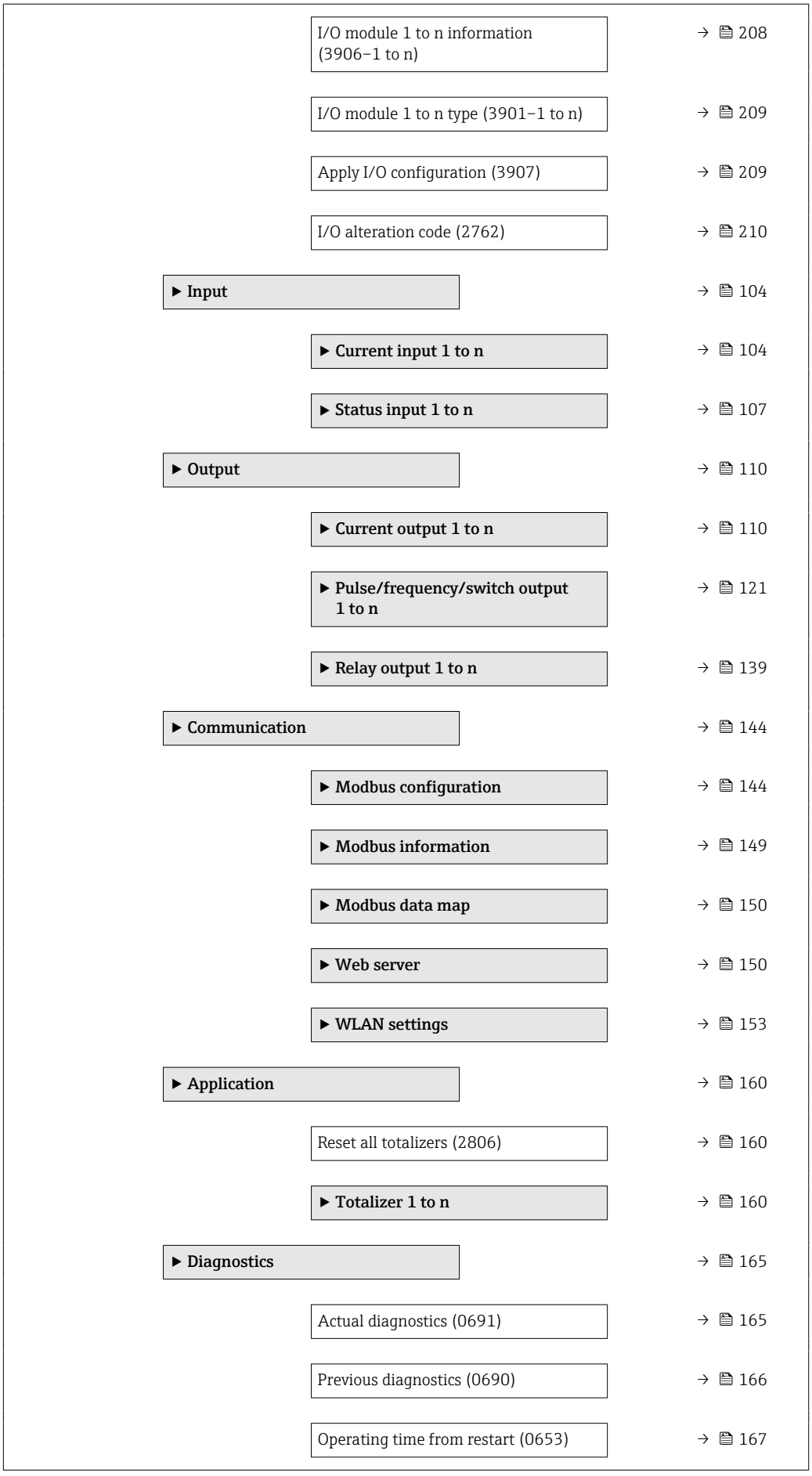

I/O module 1 to n information (3906–1 to n) → 208
I/O module 1 to n type (3901–1 to n) → 209
Apply I/O configuration (3907) → 209
I/O alteration code (2762) → 210
▶ Input → 104
▶ Current input 1 to n → 104
▶ Status input 1 to n → 107
▶ Output → 110
▶ Current output 1 to n → 110
▶ Pulse/frequency/switch output 1 to n → 121
▶ Relay output 1 to n → 139
▶ Communication → 144
▶ Modbus configuration → 144
▶ Modbus information → 149
▶ Modbus data map → 150
▶ Web server → 150
▶ WLAN settings → 153
▶ Application → 160
Reset all totalizers (2806) → 160
▶ Totalizer 1 to n → 160
▶ Diagnostics → 165
Actual diagnostics (0691) → 165
Previous diagnostics (0690) → 166
Operating time from restart (0653) → 167


Operating time (0652)
→ 167
▶ Diagnostic list
→ 168
▶ Event logbook
→ 172
▶ Device information
→ 173
▶ Main electronic module + I/O module 1
→ 176
▶ Sensor electronic module (ISEM)
→ 177
▶ I/O module 3
→ 178
▶ Display module
→ 180
▶ Min/max values
→ 181
▶ Heartbeat Technology
→ 190
▶ Simulation
→ 199

3 Description of Device Parameters

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




I/O module 1 to n information (3906–1 to n)
→ 208
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Reset all totalizers (2806)
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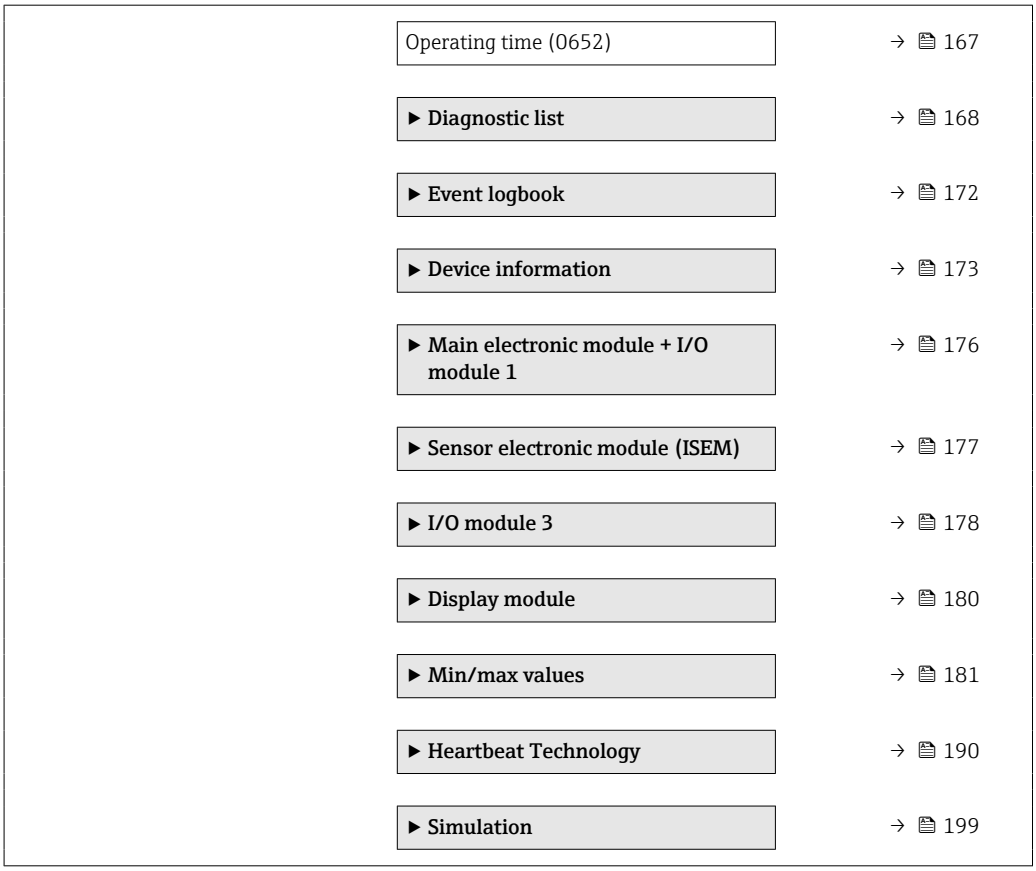
▶ Totalizer 1 to n
→ 160
▶ Diagnostics
→ 165
Actual diagnostics (0691)
→ 165
Previous diagnostics (0690)
→ 166
Operating time from restart (0653)
→ 167



Direct access

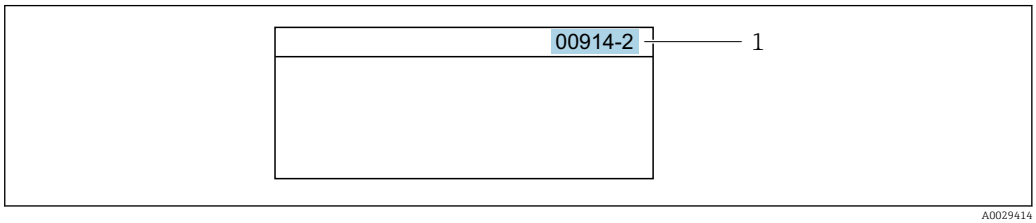
Navigation Expert → Direct access (0106)

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

User entry 0 to 65 535

Additional information *User entry*

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



1 Direct access code

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

Locking status

Navigation Expert → Locking status (0004)

Description Displays the active write protection.

User interface
- Hardware locked
- Temporarily locked

Additional information *Display*

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

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

Options

Options	Description
None	The access authorization displayed in the **Access status** parameter (→ 14) applies . Only appears on local display.
Hardware locked (priority 1)	The DIP switch for hardware locking is activated on the PCB board. This locks write access to the parameters (e.g. via local display or operating tool) .
Temporarily locked	Write access to the parameters is temporarily locked on account of internal processes running in the device (e.g. data upload/download, reset, etc.). Once the internal processing has been completed, the parameters can be changed once again.

Access status

Navigation Expert → Access status (0005)

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

User interface
- Maintenance
- Service

Additional information

Description

Access authorization can be modified via the **Enter access code** parameter (→ 15).

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

User interface

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

Enter access code

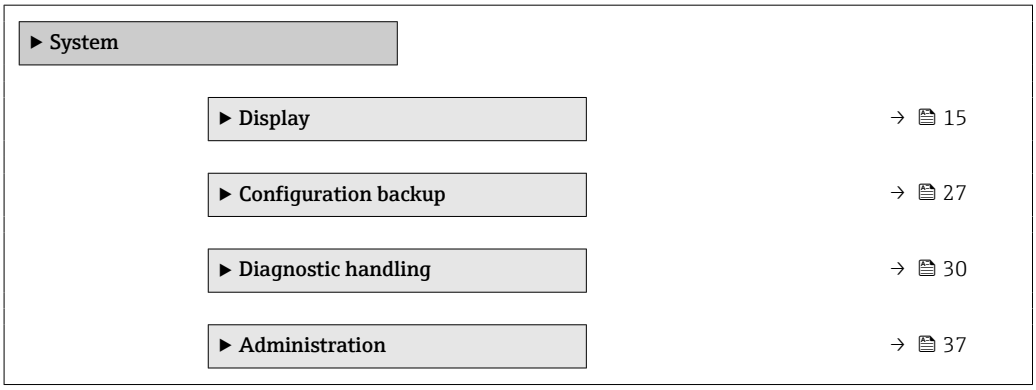
Navigation Expert → Ent. access code (0003)

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

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

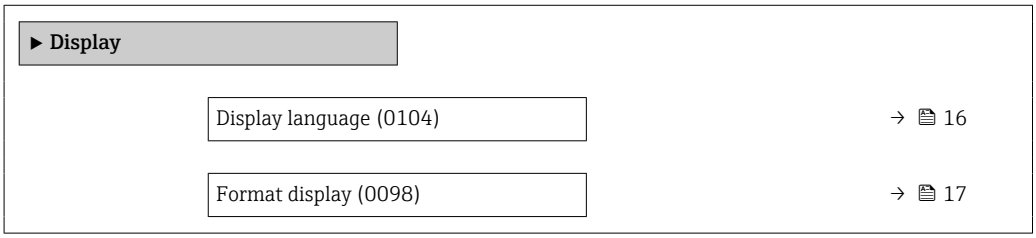
3.1 "System" submenu

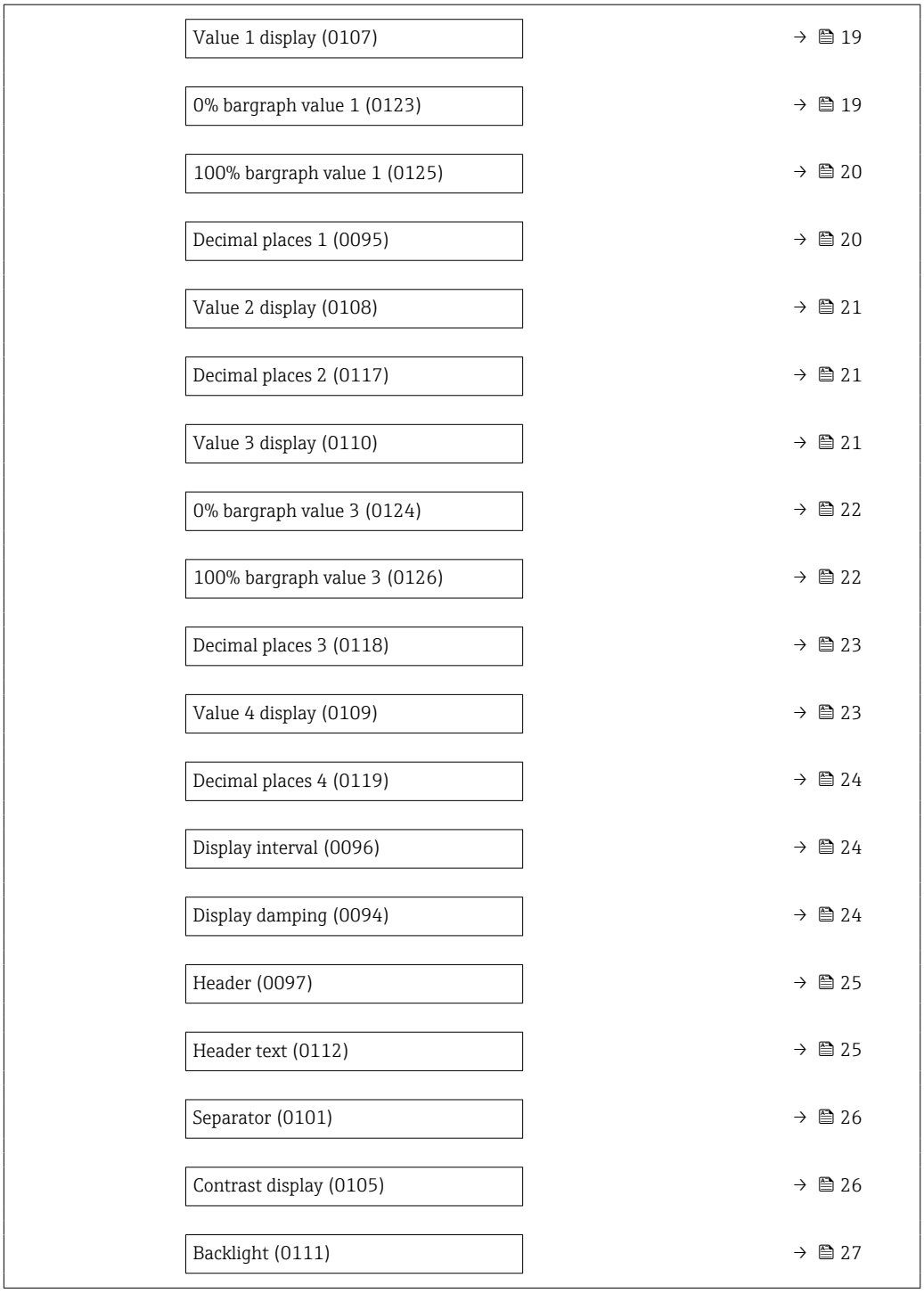
Navigation Expert → System



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

Additional information *Description*

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

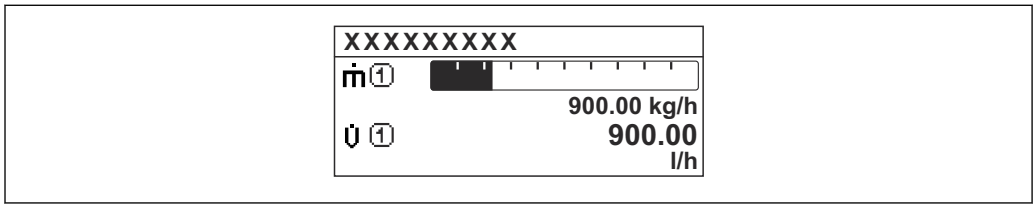
- The **Value 1 display** parameter (→ 19)...**Value 8 display** parameter are used to specify which measured values are shown on the local display and in what order.
- If more measured values are specified than the display mode selected permits, then the values alternate on the device display. The display time until the next change is configured using the **Display interval** parameter (→ 24).

Possible measured values shown on the local display:

"1 value, max. size" option

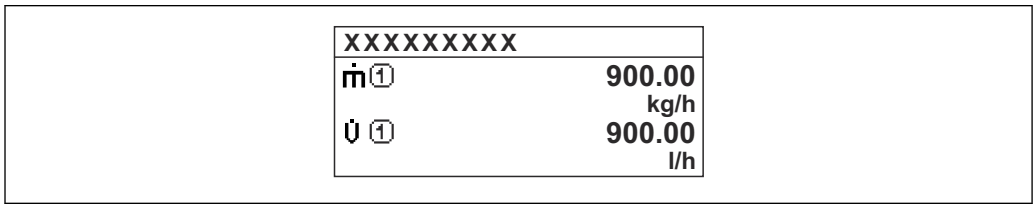
A0016529

"1 bargraph + 1 value" option



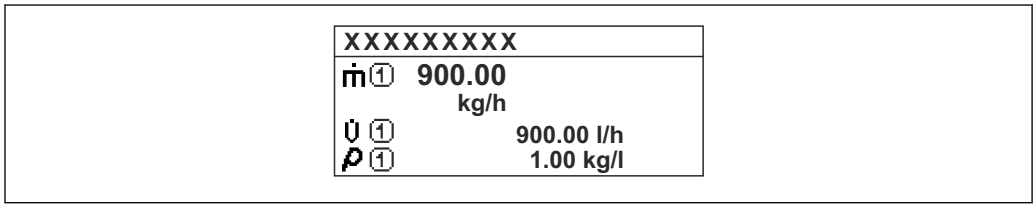
A0013098

"2 values" option



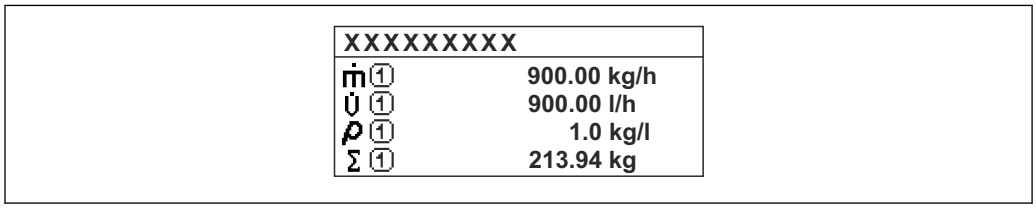
A0013100

"1 value large + 2 values" option



A0013102

"4 values" option



A0013103

Value 1 display

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

Prerequisite A local display is provided.

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

Selection
- Temperature
- Mass flow
- Corrected volume flow
- FAD volume flow *
- Volume flow
- Energy flow *
- Heat flow *
- Density
- Flow velocity
- Pressure
- 2nd temperature delta heat *
- Electronic temperature
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Current output 1 *
- Current output 2 *
- Current output 3 *

Additional information

Description

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

The **Format display** parameter (→ 17) 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 (→ 55).

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

* Visibility depends on order options or device settings

Additional information

Description

The **Format display** parameter (→ 17) 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 (→ 55).

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 → 211

Additional information

Description

The **Format display** parameter (→ 17) 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 (→ 55).

Decimal places 1

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

Prerequisite A measured value is specified in the **Value 1 display** parameter (→ 19).

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

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 (→ 19)

Additional information

Description

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

The **Format display** parameter (→ 17) 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 (→ 55).

Decimal places 2

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

Prerequisite A measured value is specified in the **Value 2 display** parameter (→ 21).

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

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 (→ 19)

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 (→ 17) 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 (→ 55).

0% bargraph value 3

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

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

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

User entry Signed floating-point number

Additional information *Description*

The **Format display** parameter (→ 17) 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 (→ 55).

100% bargraph value 3

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

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

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

User entry Signed floating-point number

Additional information

Description

The **Format display** parameter (→ 17) 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 (→ 55).

Decimal places 3

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

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

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

Selection

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

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 (→ 19)

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 (→ 17) 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 (→ 55).

Decimal places 4

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

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

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

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

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

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 (→ 19)...**Value 8 display** parameter are used to specify which measured values are shown on the local display.
- The display format for the measured values displayed is defined in the **Format display** parameter (→ 17).

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

Additional information *User entry*

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

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

Header

Navigation Expert → System → Display → Header (0097)

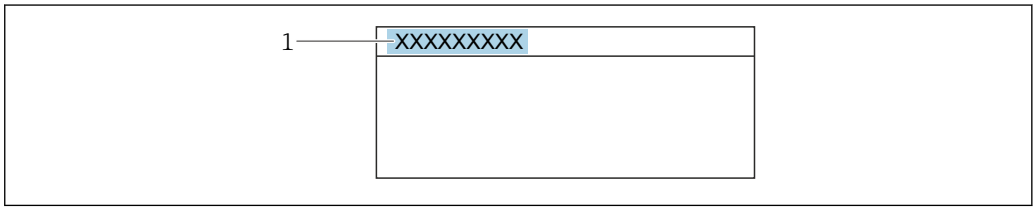
Prerequisite A local display is provided.

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

Selection
- Device tag
- Free text

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 (→ 173).
- Free text
  Is defined in the **Header text** parameter (→ 25).

Header text

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

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

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

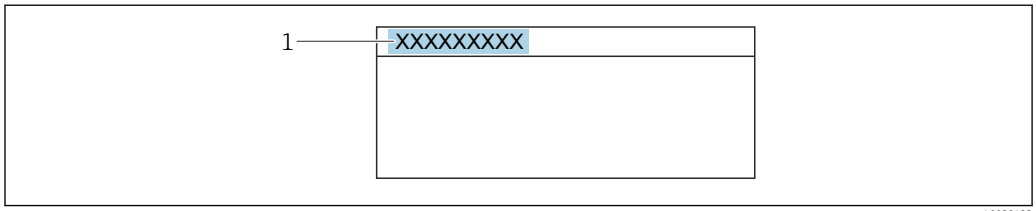
User entry Max. 12 characters, such as letters, numbers or special characters (e.g. @, %, /)

1) proportional transmission behavior with first order delay

Additional information

Description

The header text only appears during normal operation.



1 Position of the header text on the display

User entry

The number of characters displayed depends on the characters used.

Separator

Navigation Expert → System → Display → Separator (0101)

Prerequisite A local display is provided.

Description Use this function to select the decimal separator.

Selection
- . (point)
- , (comma)

Factory setting . (point)

Contrast display

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

Prerequisite A local display is provided.

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

User entry 20 to 80 %

Factory setting Depends on the display

Backlight

Navigation Expert → System → Display → Backlight (0111)

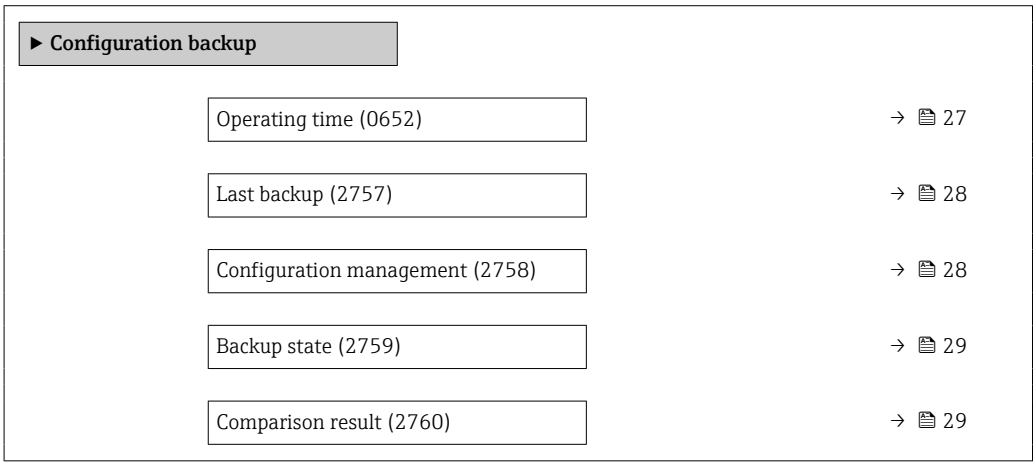
Prerequisite One of the following conditions is met:
- Order code for "Display; operation", option **F** "4-line, illum.; touch control"
- Order code for "Display; operation", option **G** "4-line, illum.; touch control +WLAN"
- Order code for "Display; operation", option **O** "Remote display 4-line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

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

Selection
- Disable
- Enable

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

Additional information *Selection*

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

HistoROM

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

* Visibility depends on order options or device settings

Backup state

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

Description Displays the status of the data backup process.

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

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

Additional information *Description*

The comparison is started via the **Compare** option in the **Configuration management** parameter (→ 28).

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, the current device configuration of the HistoROM is only partially identical to the backup copy in the device memory: The settings for the transmitter are not identical.
Settings not identical	The current device configuration of the HistoROM is not identical to the backup copy in the device memory.
No backup available	There is no backup copy of the device configuration of the HistoROM in the device memory.
Backup settings corrupt	The current device configuration of the HistoROM is corrupt or not compatible with the backup copy in the device memory.

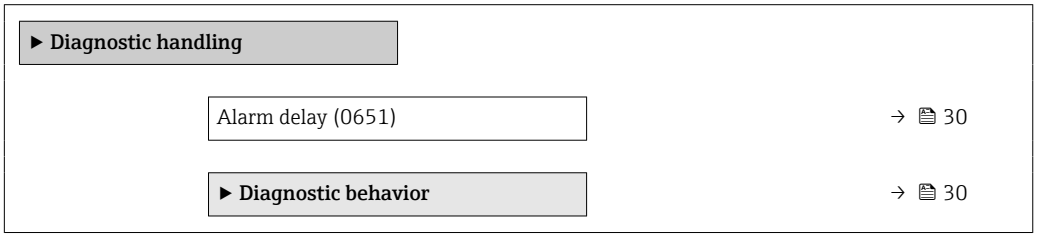
Options	Description
Check not done	The device configuration of the HistoROM has not yet been compared to the backup copy in the device memory.
Dataset incompatible	The backup copy in the device memory is not compatible with the device.

HistoROM

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

3.1.3 "Diagnostic handling" submenu

Navigation Expert → System → Diagn. handling



Alarm delay

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

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

The diagnostic message is reset without a time delay.

User entry 0 to 60 s

Additional information *Effect*

This setting affects the following diagnostic messages:
- 832 Electronic temperature too high
- 833 Electronic temperature too low
- 834 Process temperature too high
- 835 Process temperature too low

"Diagnostic behavior" submenu

Each item of diagnostic information is assigned a specific diagnostic behavior at the factory. The user can change this assignment for specific diagnostic information in the **Diagnostic behavior** submenu (→ 30).

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

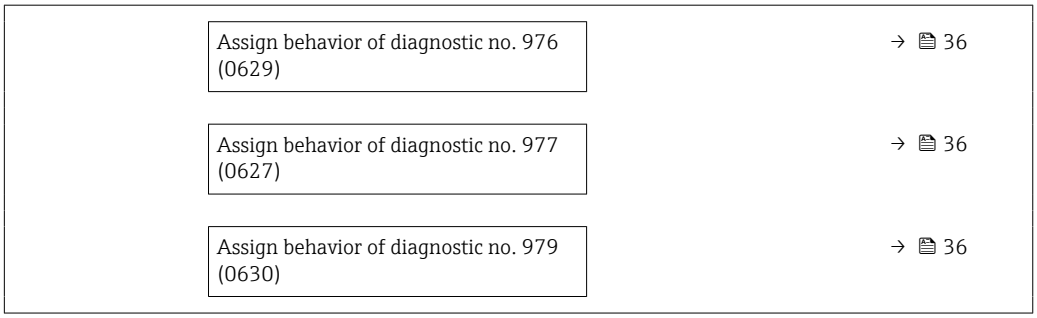
Options	Description
Alarm	The device stops measurement. The measured value output via Modbus RS485 and the totalizers assume the defined alarm condition. A diagnostic message is generated. The background lighting changes to red.
Warning	The device continues to measure. The measured value output via Modbus RS485 and the totalizers are not affected. A diagnostic message is generated.
Logbook entry only	The device continues to measure. The diagnostic message is only displayed in the **Event logbook** submenu (→ 172) (**Event list** submenu) and is not displayed in alternating sequence with the operational display.
Off	The diagnostic event is ignored, and no diagnostic message is generated or entered.

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

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

▶ **Diagnostic behavior**

Assign behavior of diagnostic no. 144 (0631)	→ 32
Assign behavior of diagnostic no. 302 (0742)	→ 32
Assign behavior of diagnostic no. 441 (0657)	→ 32
Assign behavior of diagnostic no. 442 (0658)	→ 33
Assign behavior of diagnostic no. 443 (0659)	→ 33
Assign behavior of diagnostic no. 444 (0740)	→ 34
Assign behavior of diagnostic no. 832 (0675)	→ 34
Assign behavior of diagnostic no. 833 (0676)	→ 34
Assign behavior of diagnostic no. 834 (0677)	→ 35
Assign behavior of diagnostic no. 835 (0678)	→ 35
Assign behavior of diagnostic no. 842 (0638)	→ 35



Assign behavior of diagnostic no. 144 (Sensor drift)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 144 (0631)

Description Use this function to change the diagnostic behavior of the **144 Sensor drift** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

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

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

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

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

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

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

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

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Additional information *Selection*

For a detailed description of the options available: → 31

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

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

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

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Additional information

For a detailed description of the options available: → 31

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

Additional information *Selection*

For a detailed description of the options available: → 31

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

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

Prerequisite The device has one current input.

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

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

Assign behavior of diagnostic no. 832 (Electronic 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 Electronic temperature too high** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

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

Assign behavior of diagnostic no. 833 (Electronic 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 Electronic temperature too low** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Additional information *Selection*

For a detailed description of the options available: → 31

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

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 834 (0677)

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Additional information *Selection*

For a detailed description of the options available: → 31

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

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 835 (0678)

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Additional information *Selection*

For a detailed description of the options available: → 31

Assign behavior of diagnostic no. 842 (Process limit)

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

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

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

Assign behavior of diagnostic no. 976 (Mass flow out of calibrated range)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 976 (0629)

Description Use this function to change the diagnostic behavior of the **976 Mass flow out of calibrated range** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

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

Assign behavior of diagnostic no. 977 (Reverse flow detected)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 977 (0627)

Description Use this function to change the diagnostic behavior of the **977 Reverse flow detected** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

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

Assign behavior of diagnostic no. 979 (Unstable process conditions)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 979 (0630)

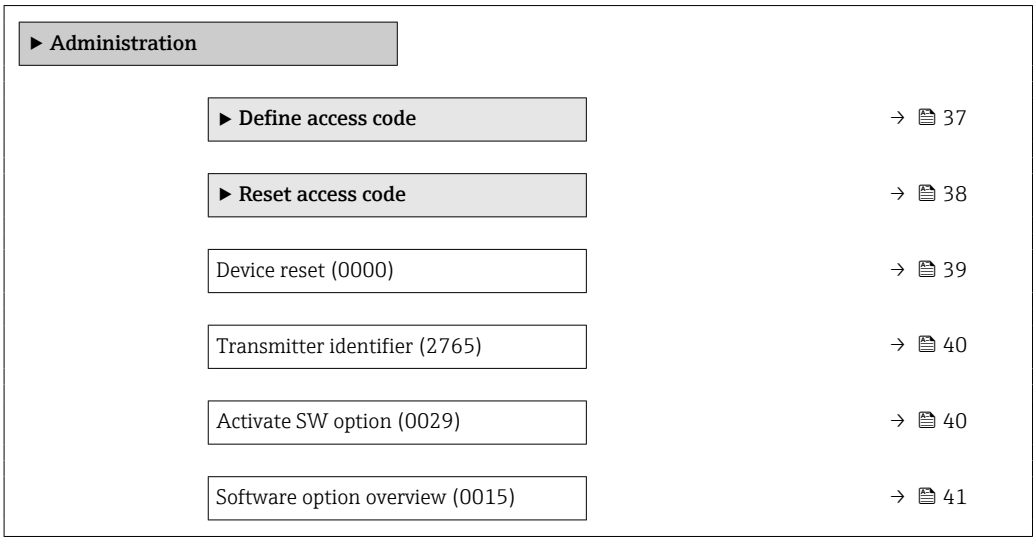
Description Use this function to change the diagnostic behavior of the **979 Unstable process conditions** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

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

3.1.4 "Administration" submenu

Navigation Expert → System → Administration

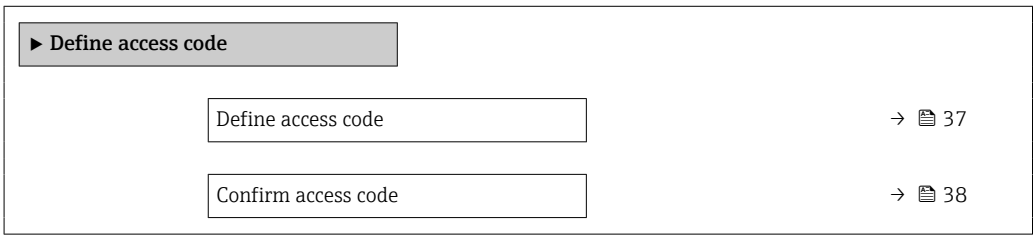


"Define access code" wizard

The **Define access code** wizard (→ 37) is only available when operating via the local display or Web browser.

If operating via the operating tool, the **Define access code** parameter can be found directly in the **Administration** submenu. There is no **Confirm access code** parameter if the device is operated via the operating tool.

Navigation Expert → System → Administration → Def. access code



Define access code

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

Description Use this function to enter a user-specific release code to restrict write-access to the parameters. This protects the device configuration against any inadvertent modifications via the local display, Web browser, FieldCare or DeviceCare (via CDI-RJ45 service interface).

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

Additional information *Description*

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

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

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

Once the access code has been defined, write-protected parameters can only be modified if the access code is entered in the **Enter access code** parameter (→ 🖹 15).

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

User entry

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

Factory setting

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

Confirm access code 🔒

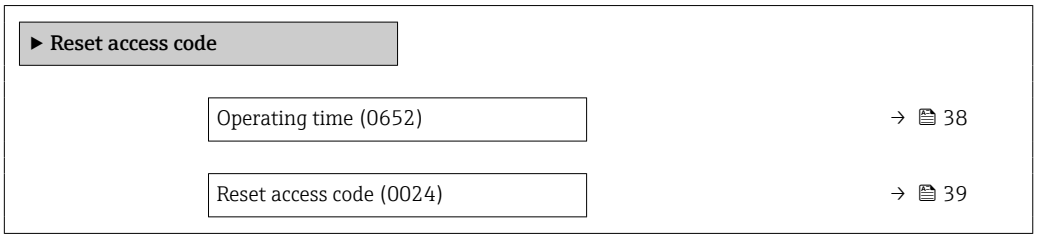
Navigation Expert → System → Administration → Def. access code → Confirm code

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

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

"Reset access code" submenu

Navigation Expert → System → Administration → Reset acc. code



Operating time

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

Description 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

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 *

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.

* Visibility depends on order options or device settings

Options	Description
Restart device	The restart resets every parameter with data stored in volatile memory (RAM) to the factory setting (e.g. measured value data). The device configuration remains unchanged.
Restore S-DAT backup	Restores the data that is saved on the S-DAT. Additional information: This function can be used to resolve the memory issue "083 Memory content inconsistent" or to restore the S-DAT data when a new S-DAT has been installed. This option is displayed only in an alarm condition.

Transmitter identifier

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

Description Select transmitter identifier.

User interface
- Unknown
- 500
- 300

Factory setting 300

Activate SW option

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

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

User entry Max. 10-digit string 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.

▸ 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"

Web browser

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

Software option overview

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

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

User interface

or

- Extended HistoROM *
- Second gas
- Heartbeat Monitoring *
- Heartbeat Verification *

Additional information *Description*

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

"Extended HistoROM" option

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

"Heartbeat Verification" option and "Heartbeat Monitoring" option

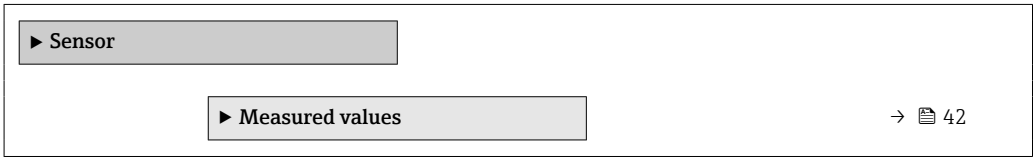
Order code for "Application package", option EB "Heartbeat Verification + Monitoring"

"Second gas" option

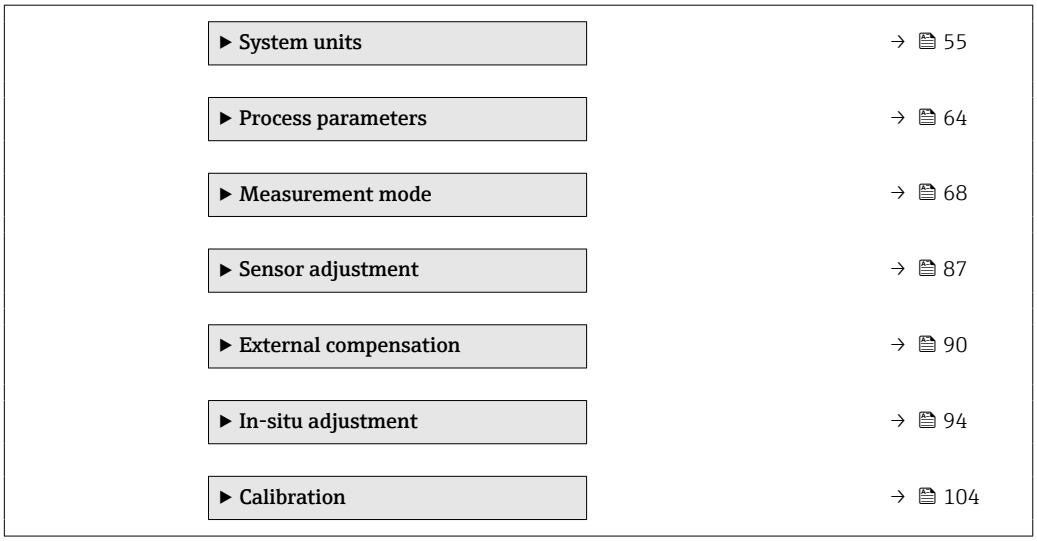
Order code for "Application package", option EV "Second gas group"

3.2 "Sensor" submenu

Navigation Expert → Sensor

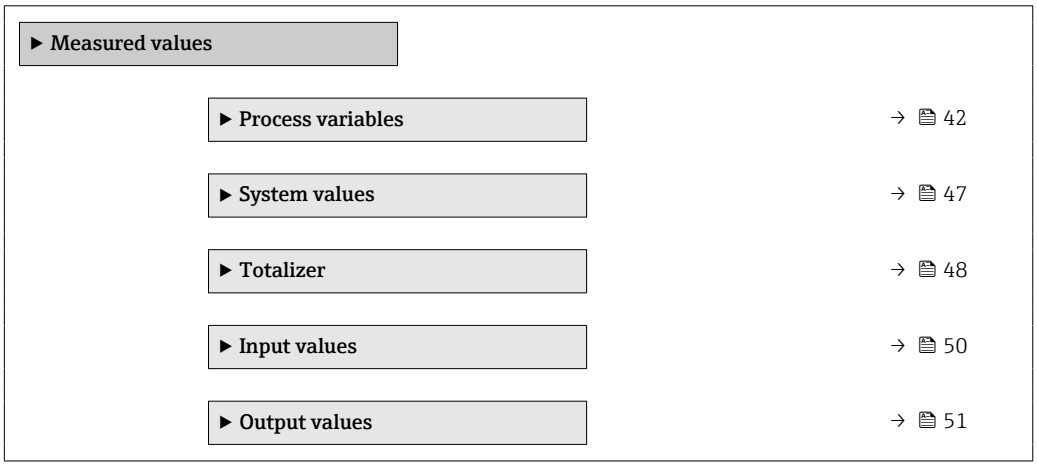


* Visibility depends on order options or device settings



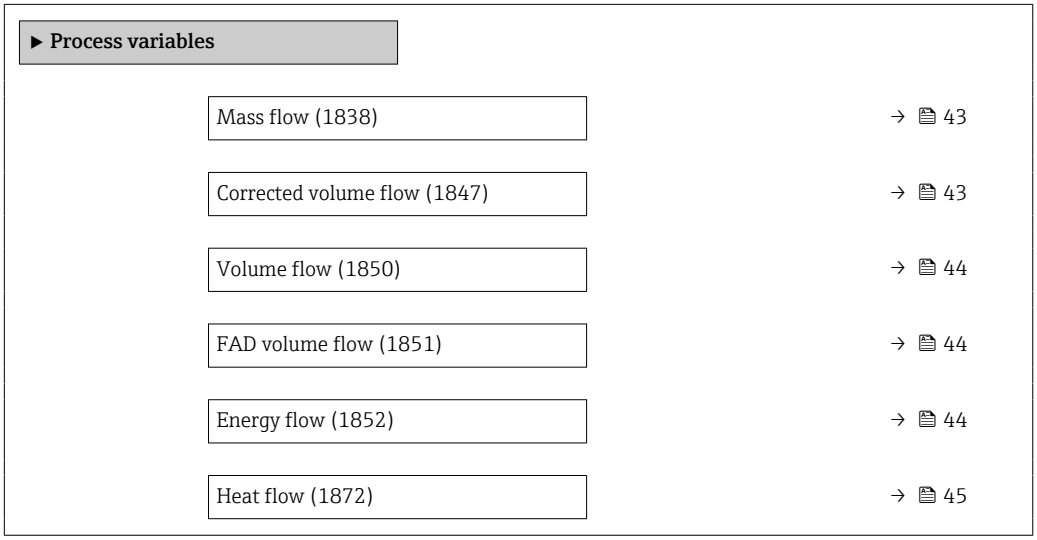
3.2.1 "Measured values" submenu

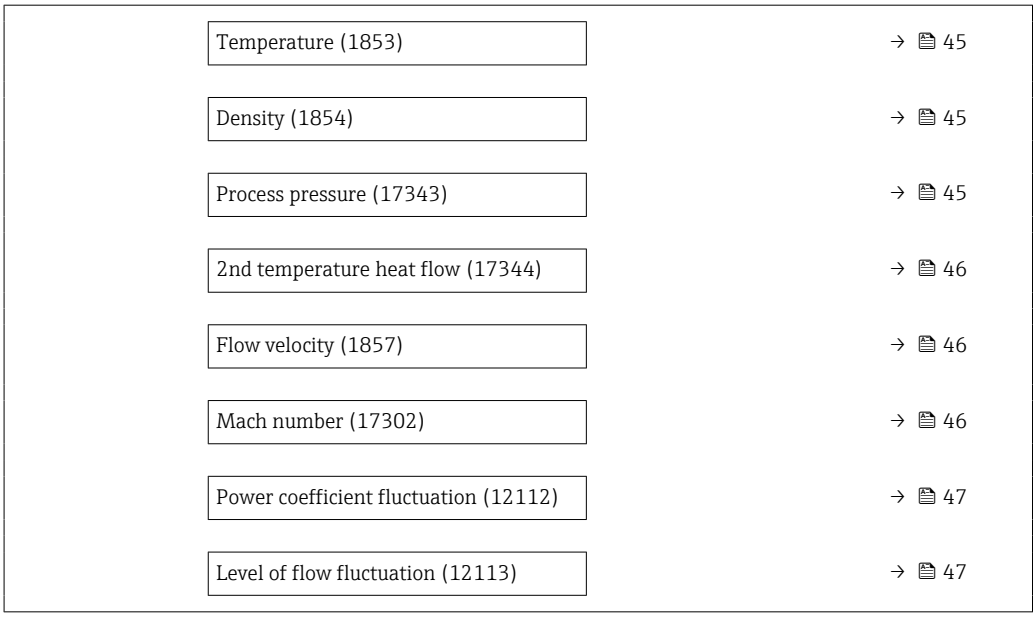
Navigation Expert → Sensor → Measured val.



"Process variables" submenu

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





Mass flow

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

Description Displays the mass flow that is currently measured.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Mass flow unit** parameter (→ 56)

Corrected volume flow

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

Description Displays the corrected volume flow that is currently calculated.

User interface Signed floating-point number

Additional information *Description*

The corrected volume flow is derived from the measured volume flow corrected to the selected reference conditions.

Dependency

The unit is taken from the **Corrected volume flow unit** parameter (→ 57)

Volume flow

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

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 (→ 58)

FAD volume flow

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

Prerequisite The **Air or compressed air** option is selected in the **Measurement application** parameter (→ 68).

Description Displays the FAD [2)] volume flow that is currently measured.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **FAD volume flow unit** parameter (→ 59).

Energy flow

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

Prerequisite The **Energy** option is selected in the **Measurement application** parameter (→ 68).

Description Shows the energy flow currently calculated.

User interface Signed floating-point number

Additional information *Dependency*

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

2) Free Air Delivery

Heat flow

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

Prerequisite The **Energy** option is selected in the **Measurement application** parameter (→ 68).

Description Shows the heat flow currently calculated.

User interface Signed floating-point number

Additional information *Dependency*

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

Temperature

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

Description Displays the temperature that is currently measured.

User interface Signed floating-point number

Additional information *Dependency*

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

Density

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

Description Shows the density currently calculated.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Density unit** parameter (→ 61)

Process pressure

Navigation Expert → Sensor → Measured val. → Process variab. → Process pressure (17343)

Description Shows depending on the setting the entered or external process pressure.

User interface Signed floating-point number

Additional information *Dependency*

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

2nd temperature heat flow

Navigation Expert → Sensor → Measured val. → Process variab. → 2nd temp.heat fl (17344)

Prerequisite The **Energy** option is selected in the **Measurement application** parameter (→ 68) parameter.

Description Displays the 2nd temperature for heat flow calculation. The temperature can be an external value or a fixed, entered value.

User interface Signed floating-point number

Additional information *Dependency*

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

Flow velocity

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

Description Shows the flow velocity currently calculated.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Velocity unit** parameter (→ 63)

Mach number

Navigation Expert → Sensor → Measured val. → Process variab. → Mach number (17302)

Description Shows the Mach number currently calculated. For the calculation the density and the pressure are required.

User interface Signed floating-point number

Power coefficient fluctuation

Navigation Expert → Sensor → Measured val. → Process variab. → Powercoeff.fluct (12112)

Description Indicates the standard deviation of the unprocessed sensor signal.

User interface Signed floating-point number

Factory setting 0 to 1

Additional information Unit: normalized value.

Level of flow fluctuation

Navigation Expert → Sensor → Measured val. → Process variab. → Fluctuat. level (12113)

Description Indicates the process stability via peak value determination.

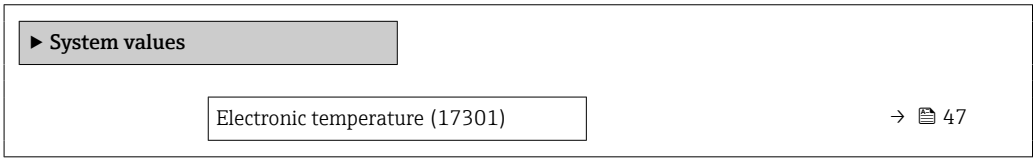
User interface Signed floating-point number

Factory setting 0 to 1

Additional information U: normalized value.

"System values" submenu

Navigation Expert → Sensor → Measured val. → System values



Electronic temperature

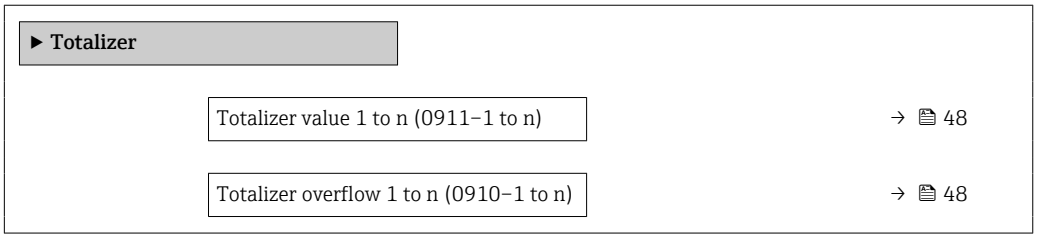
Navigation Expert → Sensor → Measured val. → System values → Electronic temp. (17301)

Description Indication of the current temperature of the electronics.

User interface Signed floating-point number

"Totalizer" submenu

Navigation Expert → Sensor → Measured val. → Totalizer



Totalizer value 1 to n

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

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 if the display range is exceeded.

In the event of an error, the totalizer adopts the mode defined in the **Failure mode** parameter (→ 164).

Display

The unit of the selected process variable is defined in the **Unit totalizer** parameter (→ 161) 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: 1 968 457 kg
- Value in the **Totalizer overflow 1** parameter: $1 \cdot 10^7$ (1 overflow) = 10 000 000 [kg]
- Current totalizer value: 11 968 457 kg

Totalizer overflow 1 to n

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

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.

Display

The unit of the selected process variable is defined in the **Unit totalizer** parameter (→ 161) 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: 1 968 457 kg
- Value in the **Totalizer overflow 1** parameter: $2 \cdot 10^7$ (2 overflows) = 20 000 000 [kg]
- Current totalizer value: 21 968 457 kg

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

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

Totalizer 1 to n status (Hex)

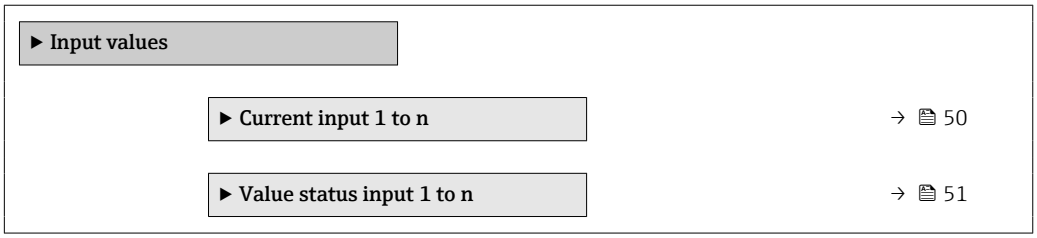
Navigation Expert → Sensor → Measured val. → Totalizer → Status 1 to n (Hex)

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

User interface 0 to 255

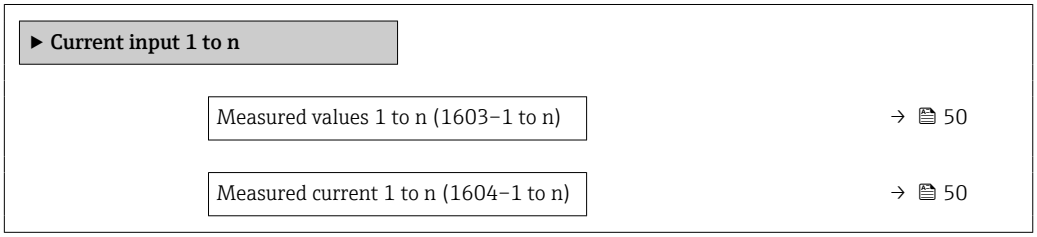
"Input values" submenu

Navigation Expert → Sensor → Measured val. → Input values



"Current input 1 to n" submenu

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



Measured values 1 to n

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

Description Displays the current input value.

User interface Signed floating-point number

Measured current 1 to n

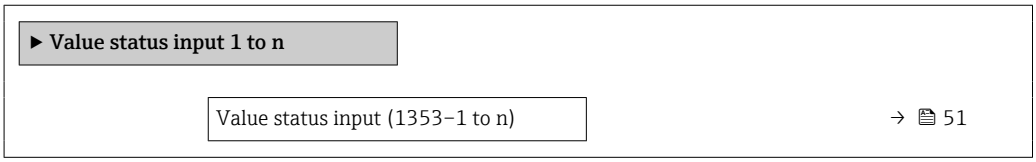
Navigation Expert → Sensor → Measured val. → Input values → Current input 1 to n → Measur. curr. 1 to n (1604–1 to n)

Description Displays the current value of the current input.

User interface 0 to 22.5 mA

"Value status input 1 to n" submenu

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



Value status input

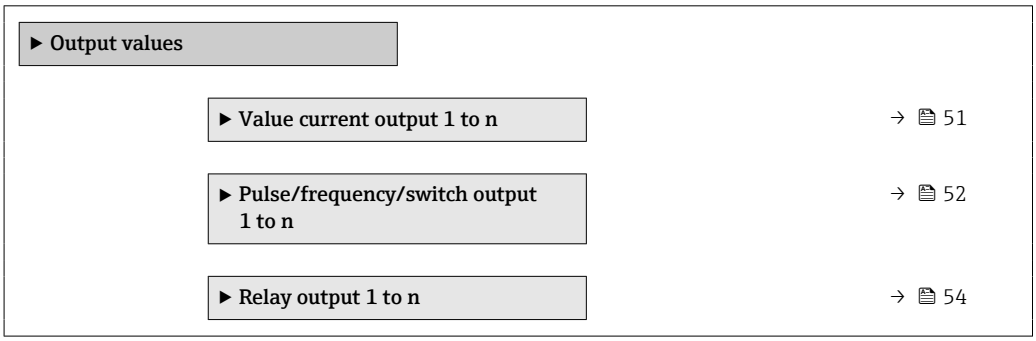
Navigation Expert → Sensor → Measured val. → Input values → Val.stat.inp. 1 to n → Val.stat.inp. (1353–1 to n)

Description Displays the current input signal level.

User interface
- High
- Low

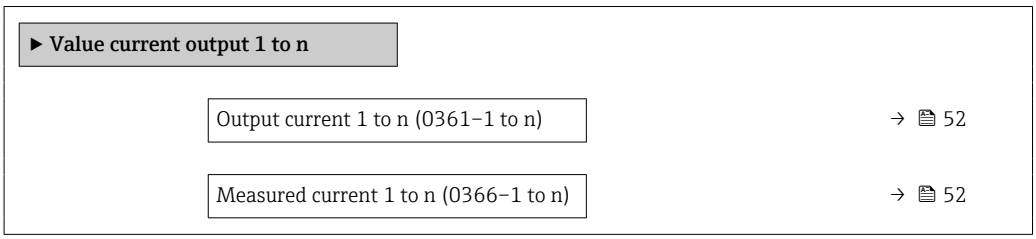
"Output values" submenu

Navigation Expert → Sensor → Measured val. → Output values



"Value current output 1 to n" submenu

Navigation Expert → Sensor → Measured val. → Output values → Value curr.out 1 to n



Output current 1 to n

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

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

User interface 0 to 22.5 mA

Measured current 1 to n

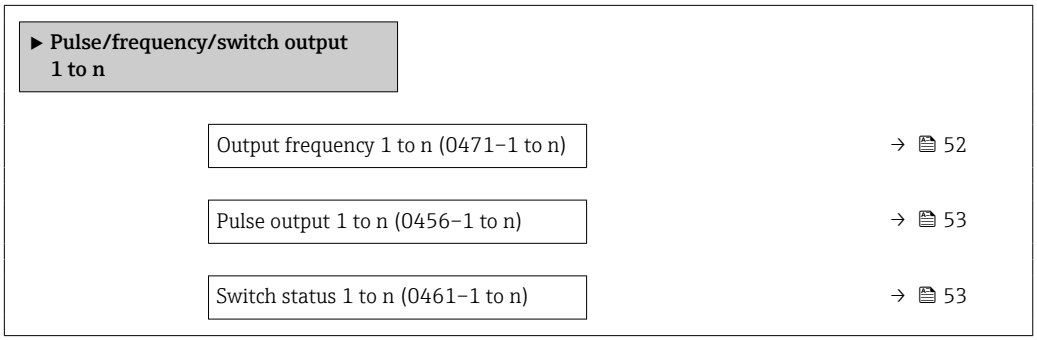
Navigation Expert → Sensor → Measured val. → Output values → Value curr.out 1 to n → Measur. curr. 1 to n (0366–1 to n)

Description Displays the actual measured value of the output current.

User interface 0 to 30 mA

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

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



Output frequency 1 to n

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

Prerequisite In the **Operating mode** parameter (→ 123), the **Frequency** option is selected.

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

User interface 0.0 to 12 500.0 Hz

Pulse output 1 to n

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

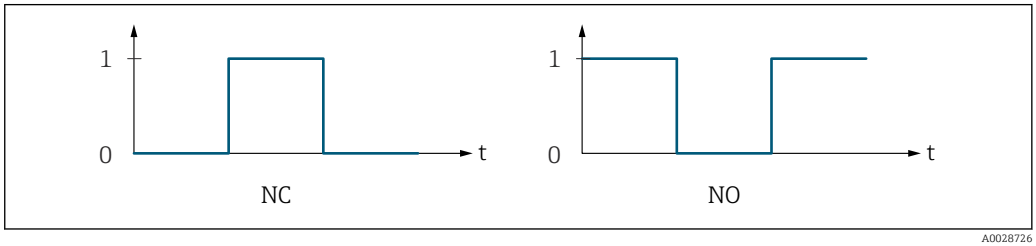
Prerequisite The **Pulse** option is selected in the **Operating mode** parameter (→ 123) parameter.

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 (→ 138) 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 (→ 127)) can be configured.

Switch status 1 to n

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

Prerequisite The **Switch** option is selected in the **Operating mode** parameter (→ 123).

Description Displays the current switch status of the status output.

User interface

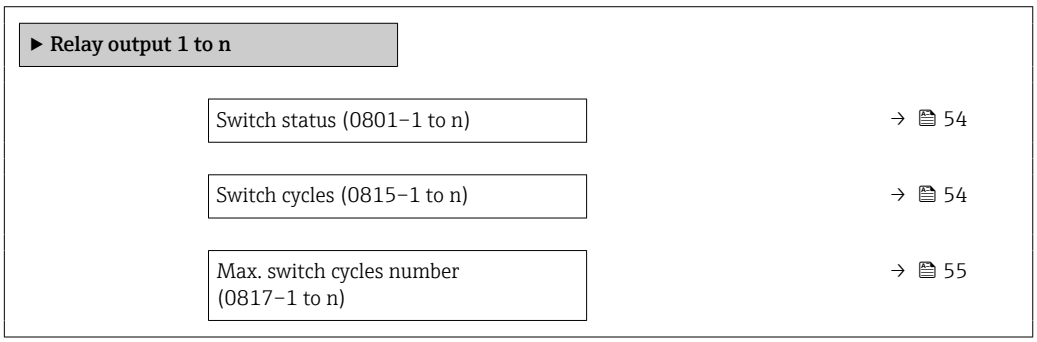
- Open
- Closed

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 status

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

Description Displays the current status of the relay output.

User interface

- Open
- Closed

Additional information *User interface*

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

Switch cycles

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

Description Displays all the switch cycles performed.

User interface Positive integer

Max. switch cycles number

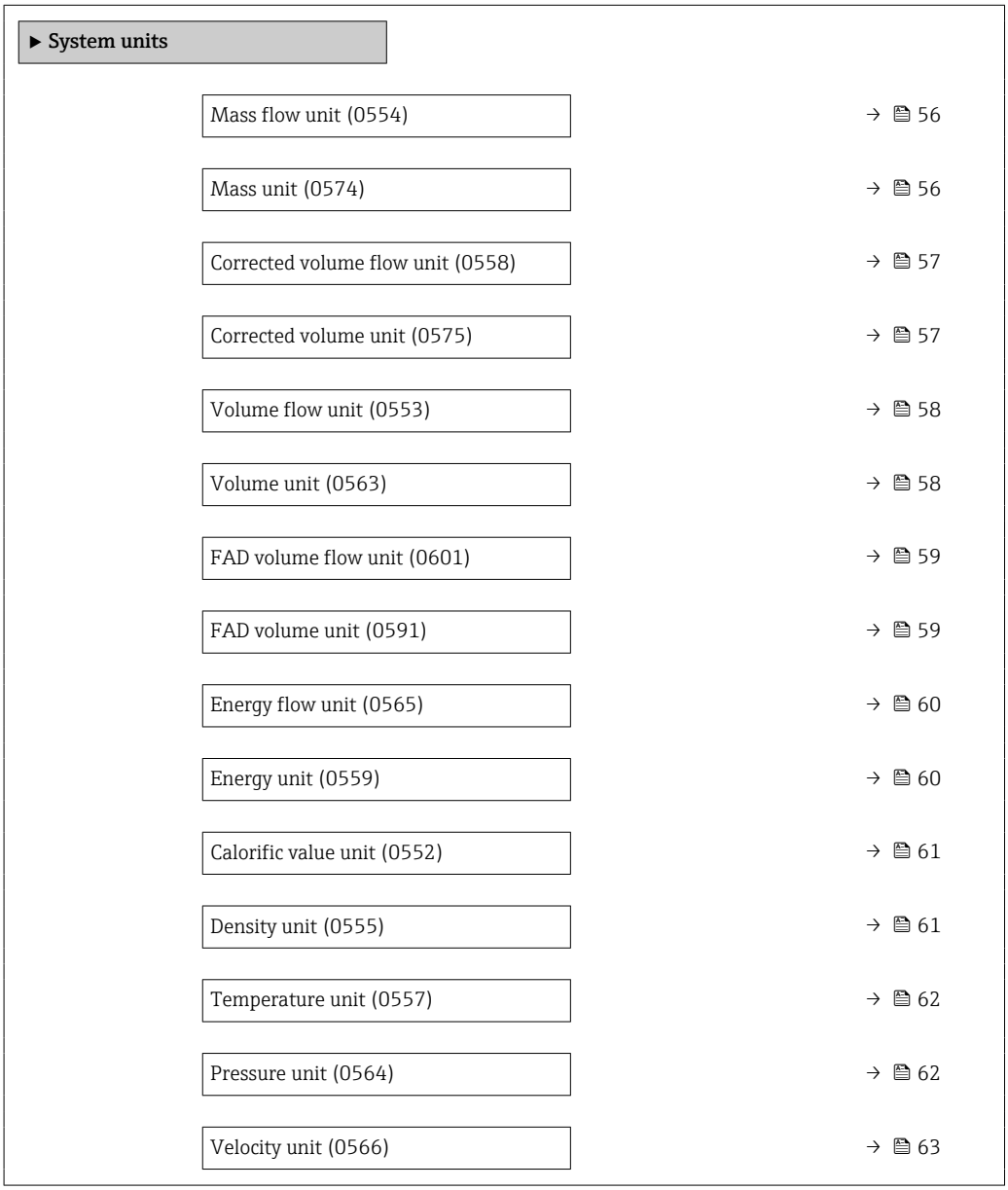
Navigation Expert → Sensor → Measured val. → Output values → Relay output 1 to n → Max. cycles no. (0817–1 to n)

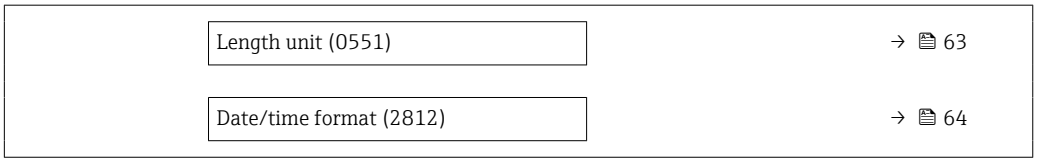
Description Displays the maximum number of guaranteed switch cycles.

User interface Positive integer

3.2.2 "System units" submenu

Navigation Expert → Sensor → System units





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
- lb/s
- lb/min
- lb/h
- lb/d
- STon/s
- STon/min
- STon/h
- STon/d

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

Additional information

Result

The selected unit applies to:
Mass flow parameter (→ 43)

Selection

For an explanation of the abbreviated units: → 213

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
- lb
- STon

Factory setting

Country-specific:
- kg
- lb

Additional information

Selection

For an explanation of the abbreviated units: → 213

Corrected volume flow unit

Navigation

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

Description

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

Selection

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

US units
- Sft^3/s
- Sft^3/min
- Sft^3/h
- Sft^3/d

Factory setting

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

Additional information

Selection

For an explanation of the abbreviated units: → 213

Corrected volume unit

Navigation

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

Description

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

Selection

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

US units
Sft^3

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

Additional information
Selection

For an explanation of the abbreviated units: → 213

Volume flow unit

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

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

Selection

SI units
- m^3/s
- m^3/min
- m^3/h
- m^3/d
- l/s
- l/min
- l/h
- l/d

US units
- ft^3/s
- ft^3/min
- ft^3/h
- ft^3/d

Factory setting
Country-specific:
- l/h
- ft^3/h

Volume unit

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

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

Selection

SI units
- m^3
- l

US units
- ft^3

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

Additional information
Selection

For an explanation of the abbreviated units: → 213

FAD volume flow unit

Navigation Expert → Sensor → System units → FAD vol.fl. unit (0601)

Description Use this function to select the unit for the FAD [3] volume flow.

Selection

SI units
- l FAD/s
- l FAD/min
- l FAD/h
- l FAD/d
- m³ FAD/s
- m³ FAD/min
- m³ FAD/h
- m³ FAD/d

US units
- cf FAD/s
- cf FAD/min
- cf FAD/h
- cf FAD/d

Factory setting Country-specific:
- m³ FAD/h
- cf FAD/min

Additional information

Result

The selected unit applies for:
FAD volume flow parameter (→ 44)

Selection

For an explanation of the abbreviated units: → 213

FAD volume unit

Navigation Expert → Sensor → System units → FAD volume unit (0591)

Description Use this function to select the unit for the FAD [4] volume.

Selection

SI units
- l FAD
- m³ FAD

US units
cf FAD

Factory setting Country-specific:
- m³ FAD
- cf FAD

Additional information

Selection

For an explanation of the abbreviated units: → 213

3) Free air delivery
4) Free air delivery

Energy flow unit

Navigation Expert → Sensor → System units → Energy flow unit (0565)

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

Selection

SI units
- kW
- MW
- GW
- kJ/s
- kJ/min
- kJ/h
- kJ/d
- MJ/s
- MJ/min
- MJ/h
- MJ/d
- GJ/s
- GJ/min
- GJ/h
- GJ/d
- kcal/s
- kcal/min
- kcal/h
- kcal/d
- Mcal/s
- Mcal/min
- Mcal/h
- Mcal/d
- Gcal/s
- Gcal/min
- Gcal/h
- Gcal/d

Imperial units
- Btu/s
- Btu/min
- Btu/h
- Btu/day
- MBtu/s
- MBtu/min
- MBtu/h
- MBtu/d
- MMBtu/s
- MMBtu/min
- MMBtu/h
- MMBtu/d

Factory setting Depends on country:
- kW
- Btu/h

Additional information *Options*

For an explanation of the abbreviated units: → 213

Energy unit

Navigation Expert → Sensor → System units → Energy unit (0559)

Description Use this function to select the unit for energy.

Selection

SI units
- kWh
- MWh
- GWh
- kJ
- MJ
- GJ
- kcal
- Mcal
- Gcal

Imperial units
- Btu
- MBtu
- MMBtu

Factory setting

Depends on country:
- kWh
- Btu

Additional information

Options

For an explanation of the abbreviated units: → 213

Calorific value unit

Navigation

Expert → Sensor → System units → Cal. value unit (0552)

Description

Use this function to select the unit for the calorific value.

Selection

SI units
- kJ/Nm³
- kWh/Nm³
- kWh/Sm³
- kJ/Sm³

Imperial units
- Btu/Sm³
- MBtu/Sm³
- Btu/Sft³
- MBtu/Sft³

Factory setting

Depends on country:
- kWh/Nm³
- Btu/Sft³

Additional information

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
- kg/dm³
- kg/l
- kg/m³

US units
lb/ft³

Factory setting

Country-specific:
- kg/m³
- lb/ft³

Additional information

Selection

For an explanation of the abbreviated units: → 213

Temperature unit

Navigation

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

Description

Use this function to select the unit for the temperature.

Selection

SI units
- °C
- K

US units
- °F
- °R

Factory setting

Country-specific:
- °C
- °F

Additional information

Result

The selected unit applies to:
- **Temperature** parameter (→ 45)
- **FAD temperature** parameter
- **Reference combustion temperature** parameter
- **Reference temperature** parameter
- **Maximum value** parameter
- **Minimum value** parameter
- **Maximum value** parameter
- **Minimum value** parameter

Selection

For an explanation of the abbreviated units: → 213

Pressure unit

Navigation

Expert → Sensor → System units → Pressure unit (0564)

Description

Use this function to select the unit for the pipe pressure.

Selection

SI units
- MPa a
- kPa a
- bar a
- mbar a

US units
- psi a

Factory setting

Country-specific:
- bar a
- psi a

Additional information

Result

The unit is taken from:
- **FAD pressure** parameter
- **Reference pressure** parameter

Selection

For an explanation of the abbreviated units: → 213

Velocity unit

Navigation

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

Description

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

Selection

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

Factory setting

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

Length unit

Navigation

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

Description

Use this function to select the unit of length.

Selection

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

Factory setting

Country-specific:
- mm
- in

Additional information

Result

The selected unit applies to:
- **Duct internal height** parameter
- **Insertion depth** parameter
- **Pipe inner diameter** parameter

- **Mounting set height** parameter
- **Pipe wall thickness** parameter
- **Duct internal width** parameter

Selection

For an explanation of the abbreviated units: → 213

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.

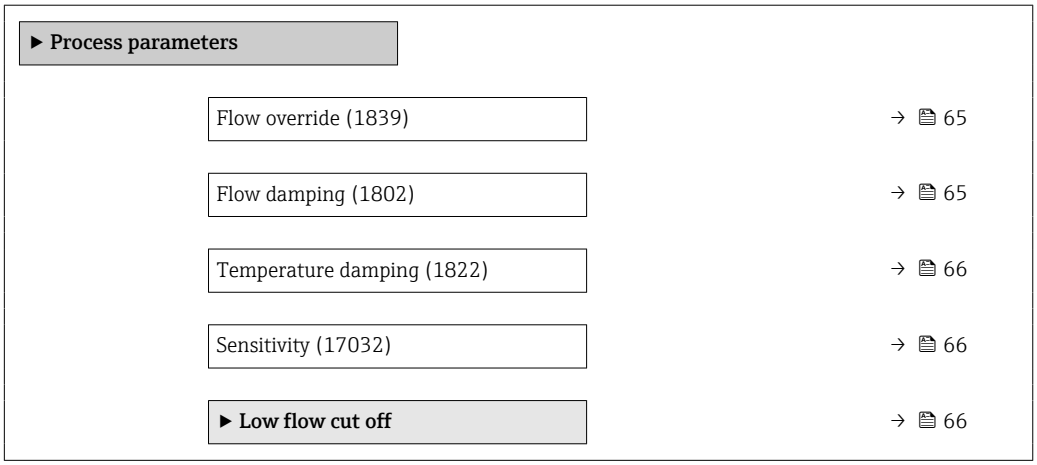
Selection
- dd.mm.yy hh:mm
- dd.mm.yy hh:mm am/pm
- mm/dd/yy hh:mm
- mm/dd/yy hh:mm am/pm

Additional information *Options*

For an explanation of the abbreviated units: → 213

3.2.3 "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

Additional information

Description

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

The **Flow override** option can also be activated in the **Status input** submenu: **Assign status input** parameter (→ 108).

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

Additional information

Description

The damping is performed by a PT1 element [5].

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 → 110
- Low flow cut off → 66
- Totalizers → 160

5) Proportional behavior with first-order lag

Temperature damping

Navigation Expert → Sensor → Process param. → Temp. damping (1822)

Description Use this function to enter a time constant for the damping (PT1 element) of the temperature measured value.

User entry 0 to 999.9 s

Additional information

Description

The damping is performed by a PT1 element [6].

User entry

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

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

Sensitivity

Navigation Expert → Sensor → Process param. → Sensitivity (17032)

Description Enter the threshold value for process stability. The higher the value, the better disturbances are detected.

User entry 1 to 9

"Low flow cut off" submenu

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

▶ Low flow cut off		
	Assign process variable (1837)	→ 67
	On value low flow cutoff (1805)	→ 67
	Off value low flow cutoff (1804)	→ 67

6) Proportional behavior with first-order lag

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
- Mass flow
- Volume flow
- Corrected volume flow
- FAD volume flow *

On value low flow cutoff

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

Prerequisite A process variable is selected in the **Assign process variable** parameter (→ 67).

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 → 67.

User entry Positive floating-point number

Factory setting Depends on country and nominal diameter → 211

Additional information *Dependency*

The unit depends on the process variable selected in the **Assign process variable** parameter (→ 67).

Off value low flow cutoff

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

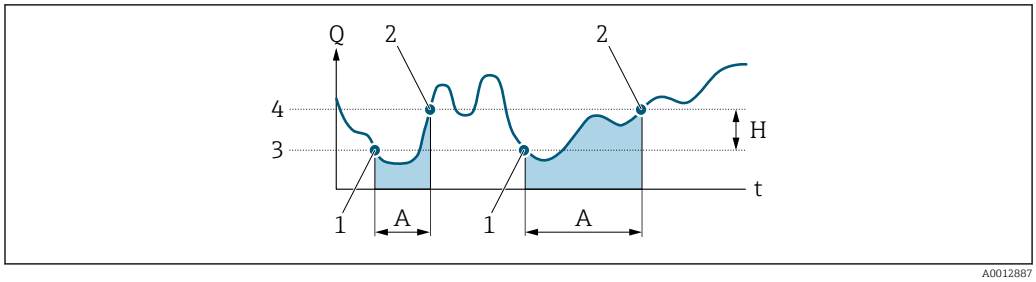
Prerequisite A process variable is selected in the **Assign process variable** parameter (→ 67).

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→ 67.

User entry 0 to 100.0 %

* Visibility depends on order options or device settings

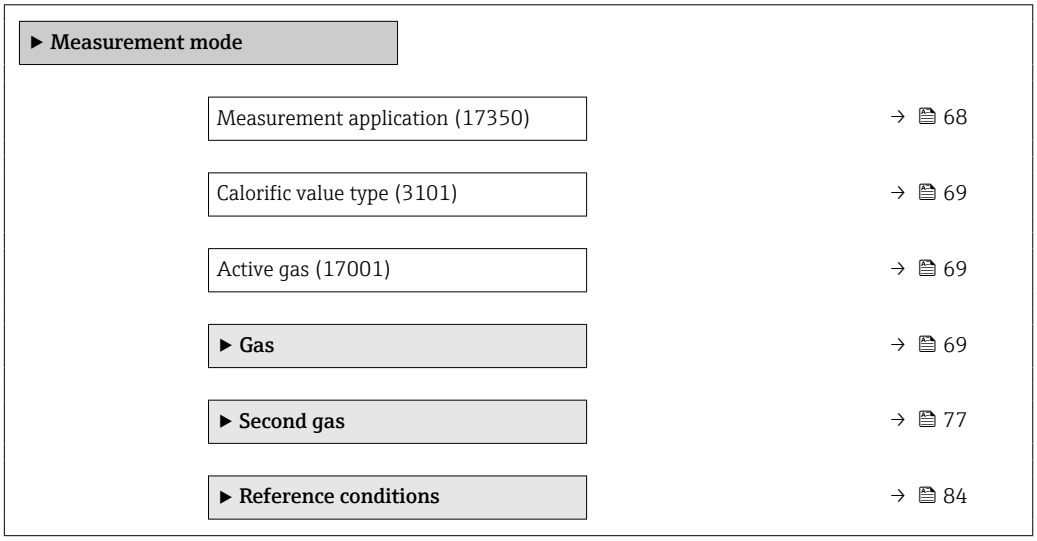
Additional information *Example*



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

3.2.4 "Measurement mode" submenu

Navigation Expert → Sensor → Measurement mode



Measurement application

Navigation Expert → Sensor → Measurement mode → Measurem. appl. (17350)

Description Select measurement application.

Selection
- Air or compressed air
- Gas or gas mixture
- Energy

Calorific value type

Navigation Expert → Sensor → Measurement mode → Calorif.val.type (3101)

Prerequisite The **Energy** option is selected in the **Measurement application** parameter (→ 68) parameter.

Description Select calculation based on gross calorific value or net calorific value.

Selection
- Gross calorific value mass
- Net calorific value mass

Active gas

Navigation Expert → Sensor → Measurement mode → Active gas (17001)

Prerequisite **Second gas** option application package is available.

Description Select the gas that the device is currently using for the measurement.

Selection
- Gas
- Second gas

"Gas" submenu

Navigation Expert → Sensor → Measurement mode → Gas

▶ **Gas**	
Select gas type	→ 70
Gas	→ 71
Special gas name	→ 71
Gas composition	→ 71
Mol% Air	→ 72
Mol% Ar	→ 72
Mol% C2H4	→ 72
Mol% C2H6	→ 73

Mol% C3H8	→ 73
Mol% CH4	→ 73
Mol% Cl2	→ 73
Mol% CO	→ 73
Mol% CO2	→ 74
Mol% H2	→ 74
Mol% H2O	→ 74
Mol% H2S	→ 74
Mol% HCl	→ 74
Mol% He	→ 75
Mol% i-C4H10	→ 75
Mol% Kr	→ 75
Mol% N2	→ 75
Mol% Ne	→ 75
Mol% NH3	→ 76
Mol% O2	→ 76
Mol% O3	→ 76
Mol% Xe	→ 76

Select gas type

Navigation Expert → Sensor → Measurement mode → Gas → Select gas type (3109)

Description Select measured gas type.

Selection
- Single gas
- Gas mixture
- Special gas *

* Visibility depends on order options or device settings

Gas

Navigation Expert → Sensor → Measurement mode → Gas → Gas (3151)

Prerequisite The **Single gas** option is selected in the **Select gas type** parameter parameter.

Description Select measured gas.

Selection
- Air
- Ammonia NH3
- Argon Ar
- Butane C4H10
- Carbon dioxide CO2
- Carbon monoxide CO
- Chlorine Cl2
- Ethane C2H6
- Ethylene C2H4
- Helium He
- Hydrogen H2
- Hydrogen chloride HCl
- Hydrogen sulfide H2S
- Krypton Kr
- Methane CH4
- Neon Ne
- Nitrogen N2
- Oxygen O2
- Ozone O3
- Propane C3H8
- Xenon Xe

Special gas name

Navigation Expert → Sensor → Measurement mode → Gas → Special gas name (3177)

Prerequisite **Special gas** option application package is available.

Description Shows the description of the gas ordered by the customer, e.g. gas name or gas composition.

User interface -

Factory setting -

Gas composition

Navigation Expert → Sensor → Measurement mode → Gas → Gas composition (3110)

Prerequisite The **Gas mixture** option is selected in the **Select gas type** parameter parameter.

Description Select measured gas mixture.

Selection
- Air
- Hydrogen H2
- Helium He
- Neon Ne
- Argon Ar
- Krypton Kr
- Xenon Xe
- Nitrogen N2
- Oxygen O2
- Chlorine Cl2
- Ammonia NH3
- Carbon monoxide CO
- Carbon dioxide CO2
- Hydrogen sulfide H2S
- Hydrogen chloride HCl
- Methane CH4
- Propane C3H8
- Ethane C2H6
- Butane C4H10
- Ethylene C2H4
- Water
- Ozone O3

Mol% Air

Navigation Expert → Sensor → Measurement mode → Gas → Mol% Air (3170)

Description Air

User entry 0 to 100 %

Mol% Ar

Navigation Expert → Sensor → Measurement mode → Gas → Mol% Ar (3112)

Description Ar = Argon

User entry 0 to 100 %

Mol% C2H4

Navigation Expert → Sensor → Measurement mode → Gas → Mol% C2H4 (3114)

Description C_2H_4 = ethylene

User entry 0 to 100 %

Mol% C2H6

Navigation Expert → Sensor → Measurement mode → Gas → Mol% C2H6 (3115)

Description C_2H_6 = ethane

User entry 0 to 100 %

Mol% C3H8

Navigation Expert → Sensor → Measurement mode → Gas → Mol% C3H8 (3116)

Description C_3H_8 = propane

User entry 0 to 100 %

Mol% CH4

Navigation Expert → Sensor → Measurement mode → Gas → Mol% CH4 (3117)

Description CH_4 = methane

User entry 0 to 100 %

Mol% Cl2

Navigation Expert → Sensor → Measurement mode → Gas → Mol% Cl2 (3118)

Description Cl_2 = chlorine

User entry 0 to 100 %

Mol% CO

Navigation Expert → Sensor → Measurement mode → Gas → Mol% CO (3119)

Description CO = carbon monoxide

User entry 0 to 100 %

Mol% CO2

Navigation Expert → Sensor → Measurement mode → Gas → Mol% CO2 (3120)

Description CO_2 = carbon dioxide

User entry 0 to 100 %

Mol% H2

Navigation Expert → Sensor → Measurement mode → Gas → Mol% H2 (3121)

Description H_2 = hydrogen

User entry 0 to 100 %

Mol% H2O

Navigation Expert → Sensor → Measurement mode → Gas → Mol% H2O (3122)

Description H_2O = water

User entry 0 to 20 %

Mol% H2S

Navigation Expert → Sensor → Measurement mode → Gas → Mol% H2S (3123)

Description H_2S = hydrogen sulfide

User entry 0 to 100 %

Mol% HCl

Navigation Expert → Sensor → Measurement mode → Gas → Mol% HCl (3124)

Description HCl = hydrogen chloride

User entry 0 to 100 %

Mol% He

Navigation Expert → Sensor → Measurement mode → Gas → Mol% He (3125)

Description He = helium

User entry 0 to 100 %

Mol% i-C4H10

Navigation Expert → Sensor → Measurement mode → Gas → Mol% i-C4H10 (3126)

Description i-C_4H_{10} = isobutane

User entry 0 to 100 %

Mol% Kr

Navigation Expert → Sensor → Measurement mode → Gas → Mol% Kr (3128)

Description Kr = krypton

User entry 0 to 100 %

Mol% N2

Navigation Expert → Sensor → Measurement mode → Gas → Mol% N2 (3129)

Description N_2 = nitrogen

User entry 0 to 100 %

Mol% Ne

Navigation Expert → Sensor → Measurement mode → Gas → Mol% Ne (3137)

Description Ne = neon

User entry 0 to 100 %

Mol% NH3

Navigation Expert → Sensor → Measurement mode → Gas → Mol% NH3 (3138)

Description NH_3 = ammonia

User entry 0 to 100 %

Mol% O2

Navigation Expert → Sensor → Measurement mode → Gas → Mol% O2 (3139)

Description O_2 = oxygen

User entry 0 to 100 %

Mol% O3

Navigation Expert → Sensor → Measurement mode → Gas → Mol% O3 (3174)

Prerequisite As a mixture, only possible with O2:
- O3: 0 to 35 %
- O2: 65 to 100 %

O3 as single gas:
100 %

Description Enter amount of substance for the gas mixture.

User entry 0 to 100 %

Mol% Xe

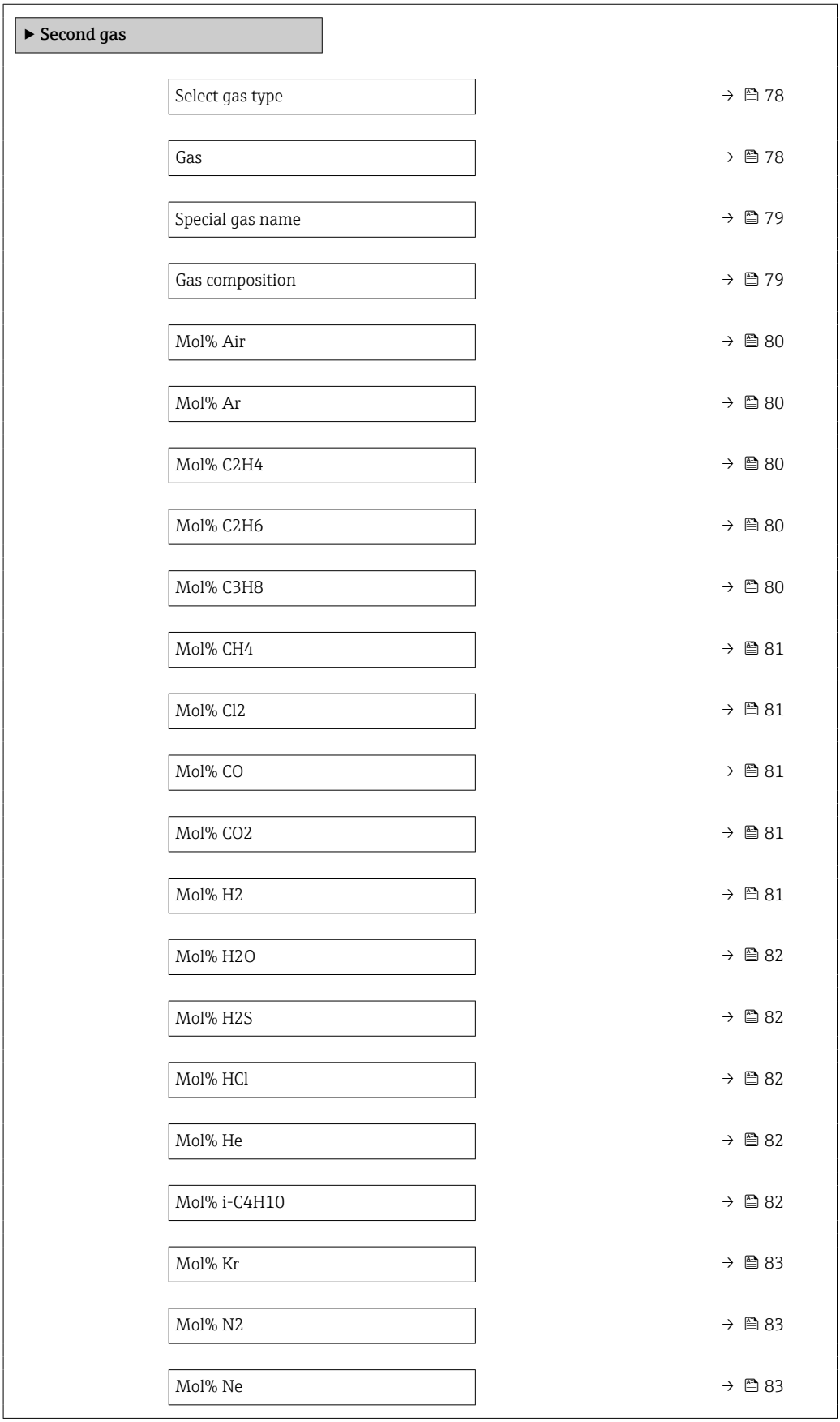
Navigation Expert → Sensor → Measurement mode → Gas → Mol% Xe (3142)

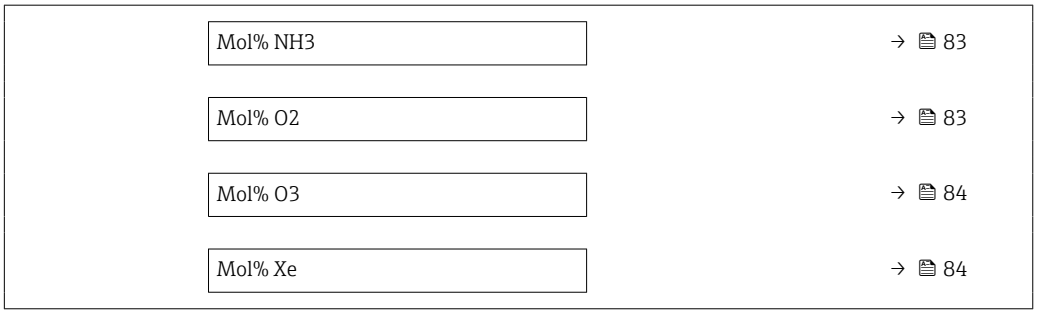
Description Xe = xenon

User entry 0 to 100 %

"Second gas" submenu

Navigation Expert → Sensor → Measurement mode → Second gas → Special gas name (3177)





Select gas type

Navigation Expert → Sensor → Measurement mode → Second gas → Select gas type (3109)

Description Select measured gas type.

Selection
- Single gas
- Gas mixture
- Special gas *

Gas

Navigation Expert → Sensor → Measurement mode → Second gas → Gas (3151)

Prerequisite The **Single gas** option is selected in the **Select gas type** parameter parameter.

Description Select measured gas.

Selection
- Air
- Ammonia NH3
- Argon Ar
- Butane C4H10
- Carbon dioxide CO2
- Carbon monoxide CO
- Chlorine Cl2
- Ethane C2H6
- Ethylene C2H4
- Helium He
- Hydrogen H2
- Hydrogen chloride HCl
- Hydrogen sulfide H2S
- Krypton Kr
- Methane CH4
- Neon Ne
- Nitrogen N2
- Oxygen O2

* Visibility depends on order options or device settings

- Ozone O3
- Propane C3H8
- Xenon Xe

Special gas name

Navigation Expert → Sensor → Measurement mode → Second gas → Special gas name (3177)

Prerequisite **Special gas** option application package is available.

Description Shows the description of the gas ordered by the customer, e.g. gas name or gas composition.

User interface -

Factory setting -

Gas composition

Navigation Expert → Sensor → Measurement mode → Second gas → Gas composition (3110)

Prerequisite The **Gas mixture** option is selected in the **Select gas type** parameter parameter.

Description Select measured gas mixture.

Selection
- Air
- Hydrogen H2
- Helium He
- Neon Ne
- Argon Ar
- Krypton Kr
- Xenon Xe
- Nitrogen N2
- Oxygen O2
- Chlorine Cl2
- Ammonia NH3
- Carbon monoxide CO
- Carbon dioxide CO2
- Hydrogen sulfide H2S
- Hydrogen chloride HCl
- Methane CH4
- Propane C3H8
- Ethane C2H6
- Butane C4H10
- Ethylene C2H4
- Water
- Ozone O3

Mol% Air

Navigation Expert → Sensor → Measurement mode → Second gas → Mol% Air (3170)

Description Air

User entry 0 to 100 %

Mol% Ar

Navigation Expert → Sensor → Measurement mode → Second gas → Mol% Ar (3112)

Description Ar = Argon

User entry 0 to 100 %

Mol% C2H4

Navigation Expert → Sensor → Measurement mode → Second gas → Mol% C2H4 (3114)

Description C_2H_4 = ethylene

User entry 0 to 100 %

Mol% C2H6

Navigation Expert → Sensor → Measurement mode → Second gas → Mol% C2H6 (3115)

Description C_2H_6 = ethane

User entry 0 to 100 %

Mol% C3H8

Navigation Expert → Sensor → Measurement mode → Second gas → Mol% C3H8 (3116)

Description C_3H_8 = propane

User entry 0 to 100 %

Mol% CH4

Navigation Expert → Sensor → Measurement mode → Second gas → Mol% CH4 (3117)

Description CH_4 = methane

User entry 0 to 100 %

Mol% Cl2

Navigation Expert → Sensor → Measurement mode → Second gas → Mol% Cl2 (3118)

Description Cl_2 = chlorine

User entry 0 to 100 %

Mol% CO

Navigation Expert → Sensor → Measurement mode → Second gas → Mol% CO (3119)

Description CO = carbon monoxide

User entry 0 to 100 %

Mol% CO2

Navigation Expert → Sensor → Measurement mode → Second gas → Mol% CO2 (3120)

Description CO_2 = carbon dioxide

User entry 0 to 100 %

Mol% H2

Navigation Expert → Sensor → Measurement mode → Second gas → Mol% H2 (3121)

Description H_2 = hydrogen

User entry 0 to 100 %

Mol% H2O

Navigation Expert → Sensor → Measurement mode → Second gas → Mol% H2O (3122)

Description H_2O = water

User entry 0 to 20 %

Mol% H2S

Navigation Expert → Sensor → Measurement mode → Second gas → Mol% H2S (3123)

Description H_2S = hydrogen sulfide

User entry 0 to 100 %

Mol% HCl

Navigation Expert → Sensor → Measurement mode → Second gas → Mol% HCl (3124)

Description HCl = hydrogen chloride

User entry 0 to 100 %

Mol% He

Navigation Expert → Sensor → Measurement mode → Second gas → Mol% He (3125)

Description He = helium

User entry 0 to 100 %

Mol% i-C4H10

Navigation Expert → Sensor → Measurement mode → Second gas → Mol% i-C4H10 (3126)

Description i-C_4H_{10} = isobutane

User entry 0 to 100 %

Mol% Kr

Navigation Expert → Sensor → Measurement mode → Second gas → Mol% Kr (3128)

Description Kr = krypton

User entry 0 to 100 %

Mol% N2

Navigation Expert → Sensor → Measurement mode → Second gas → Mol% N2 (3129)

Description N_2 = nitrogen

User entry 0 to 100 %

Mol% Ne

Navigation Expert → Sensor → Measurement mode → Second gas → Mol% Ne (3137)

Description Ne = neon

User entry 0 to 100 %

Mol% NH3

Navigation Expert → Sensor → Measurement mode → Second gas → Mol% NH3 (3138)

Description NH_3 = ammonia

User entry 0 to 100 %

Mol% O2

Navigation Expert → Sensor → Measurement mode → Second gas → Mol% O2 (3139)

Description O_2 = oxygen

User entry 0 to 100 %

Mol% O3

Navigation Expert → Sensor → Measurement mode → Second gas → Mol% O3 (3174)

Prerequisite
As a mixture, only possible with O2:
- O3: 0 to 35 %
- O2: 65 to 100 %

O3 as single gas:
100 %

Description Enter amount of substance for the gas mixture.

User entry 0 to 100 %

Mol% Xe

Navigation Expert → Sensor → Measurement mode → Second gas → Mol% Xe (3142)

Description Xe = xenon

User entry 0 to 100 %

"Reference conditions" submenu

Navigation Expert → Sensor → Measurement mode → Ref. conditions

▶ **Reference conditions**

Reference conditions (3155)	→ 85
Reference pressure (3146)	→ 85
Reference temperature (3147)	→ 85
FAD conditions (3173)	→ 85
FAD pressure (3175)	→ 86
FAD temperature (3176)	→ 86
Reference combustion temperature (3143)	→ 86

Reference conditions

Navigation Expert → Sensor → Measurement mode → Ref. conditions → Ref. conditions (3155)

Description Select reference conditions for calculation of the corrected volume flow.

Selection
- 1013.25 mbara, 0 °C
- 1013.25 mbara, 15 °C
- 1013.25 mbara, 20 °C
- 1013.25 mbara, 25 °C
- 1000 mbara, 0 °C
- 1000 mbara, 15 °C
- 1000 mbara, 20 °C
- 1000 mbara, 25 °C
- 14.696 psia, 59 °F
- 14.696 psia, 60 °F
- User-defined

Reference pressure

Navigation Expert → Sensor → Measurement mode → Ref. conditions → Ref. pressure (3146)

Prerequisite The **Others** option is selected in the **Reference conditions** parameter (→ 85).

Description Select reference conditions for the corrected volume flow.

User entry 0 to 250 bar a

Reference temperature

Navigation Expert → Sensor → Measurement mode → Ref. conditions → Ref. temperature (3147)

Description Enter reference temperature for calculating the reference density.

User entry −200 to 450 °C

FAD conditions

Navigation Expert → Sensor → Measurement mode → Ref. conditions → FAD conditions (3173)

Prerequisite The **Air or compressed air** option is selected in the **Measurement application** parameter (→ 68) parameter.

Description Select reference conditions for the calculation of the FAD density (FAD = free air delivery).

Selection
- 1000 mbara, 20 °C
- 14.504 psia, 68 °F
- User-defined

FAD pressure

Navigation Expert → Sensor → Measurement mode → Ref. conditions → FAD pressure (3175)

Prerequisite
- The **Air or compressed air** option is selected in the **Measurement application** parameter (→ 68) parameter.
- The **User-defined** option is selected in the **FAD conditions** parameter parameter.

Description Enter reference pressure for the calulation of the FAD density (FAD = free air delivery).

User entry 0 to 250 bar a

FAD temperature

Navigation Expert → Sensor → Measurement mode → Ref. conditions → FAD temperature (3176)

Prerequisite
- The **Air or compressed air** option is selected in the **Measurement application** parameter (→ 68) parameter.
- The **User-defined** option is selected in the **FAD conditions** parameter parameter.

Description Enter reference temperature for the calulation of the FAD density (FAD = free air delivery).

User entry −200 to 450 °C

Reference combustion temperature

Navigation Expert → Sensor → Measurement mode → Ref. conditions → Ref. comb. temp. (3143)

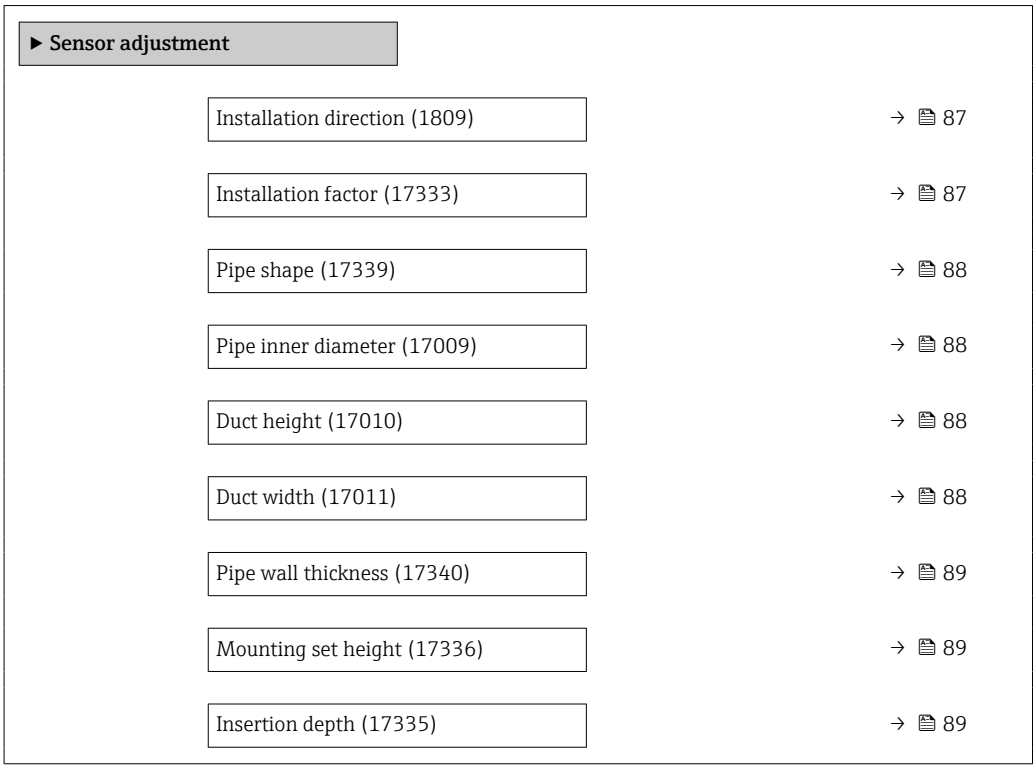
Prerequisite The **Energy** option is selected in the **Measurement application** parameter (→ 68) parameter.

Description Enter reference combustion temperature to calculate the natural gas energy value.

User entry −200 to 450 °C

3.2.5 "Sensor adjustment" submenu

Navigation Expert → Sensor → Sensor adjustm.



Installation direction

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

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

Selection
- Forward flow
- Reverse flow

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 device.

Installation factor

Navigation Expert → Sensor → Sensor adjustm. → Install. factor (17333)

Description Enter factor to compensate the mounting-related measurement error.

User entry 0.01 to 100.0

Pipe shape

Navigation Expert → Sensor → Sensor adjustm. → Pipe shape (17339)

Prerequisite Only available with t-mass I.

Description Select the shape of the pipe.

Selection
- Circular
- Rectangular

Pipe inner diameter

Navigation Expert → Sensor → Sensor adjustm. → Pipe inner diam. (17009)

Prerequisite Only available with t-mass I.

Description Enter the internal diameter of a circular pipe.

User entry 0.050 to 5 m

Duct height

Navigation Expert → Sensor → Sensor adjustm. → Duct height (17010)

Prerequisite Only available with t-mass I.

Description Enter inner duct height. Duct height and sensor shaft are parallel.

User entry 0.050 to 5 m

Duct width

Navigation Expert → Sensor → Sensor adjustm. → Duct width (17011)

Prerequisite Only available with t-mass I.

Description Enter inner duct width. The duct width is vertical to the sensor shaft.

User entry 0.050 to 5 m

Pipe wall thickness

Navigation Expert → Sensor → Sensor adjustm. → Wall thickness (17340)

Description Enter the pipe wall thickness.

User entry 0 to 1 m

Mounting set height

Navigation Expert → Sensor → Sensor adjustm. → Mounting set ht. (17336)

Description Enter mounting set height.

User entry 0 to 1 m

Insertion depth

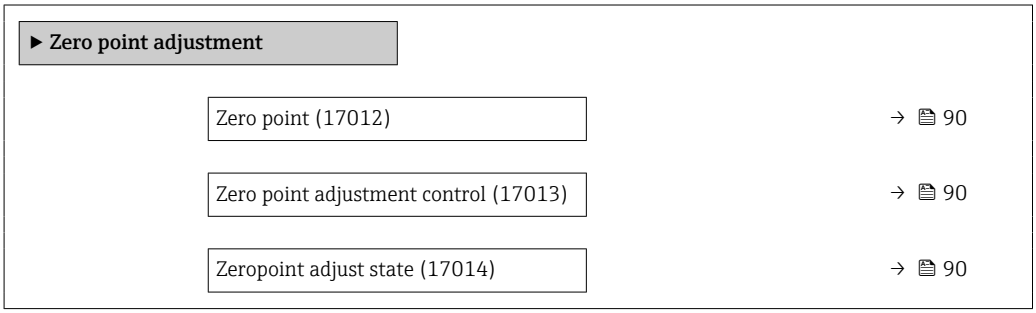
Navigation Expert → Sensor → Sensor adjustm. → Insertion depth (17335)

Description Shows calculated insertion depth of the sensor.

User interface Positive floating-point number

3.2.6 "Zero point adjustment" submenu

Navigation Expert → Sensor → Zero point adj.



Zero point adjustment control

Navigation Expert → Sensor → Zero point adj. → Zero point adj. (17013)

Description Start zero point adjustment.

Selection
- Cancel
- Start

Zero point

Navigation Expert → Sensor → Zero point adj. → Zero point (17012)

User entry −10.0 to 10.0

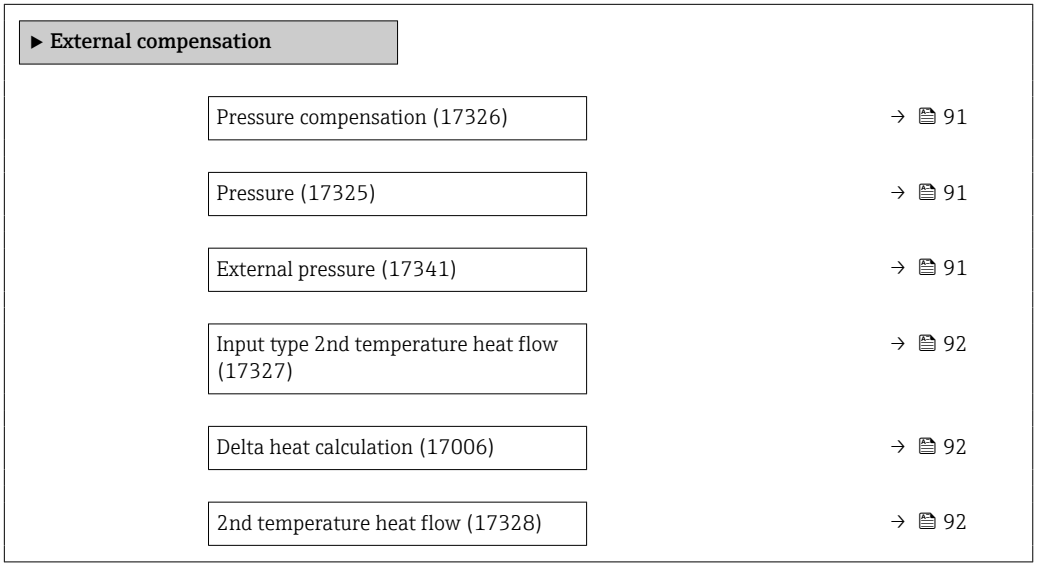
Zeropoint adjust state

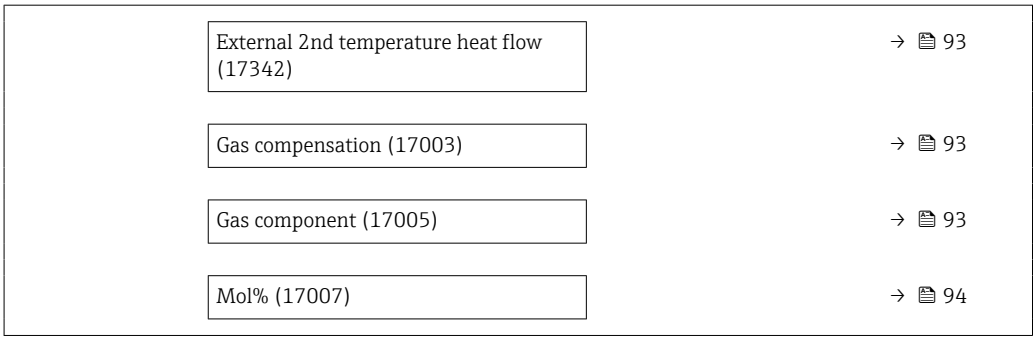
Navigation Expert → Sensor → Zero point adj. → Zero adj. state (17014)

User interface
- Busy
- Zero point adjust failure
- Ok

3.2.7 "External compensation" submenu

Navigation Expert → Sensor → External comp.





Pressure compensation

Navigation Expert → Sensor → External comp. → Pressure compen. (17326)

Description Select pressure compensation type.

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

Pressure

Navigation Expert → Sensor → External comp. → Pressure (17325)

Description Enter fixed value for the process pressure.

User entry 0.1 to 40 bar a

External pressure

Navigation Expert → Sensor → External comp. → External press. (17341)

Description Shows the external process pressure value.

User entry 0.1 to 40 bar a

* Visibility depends on order options or device settings

Input type 2nd temperature heat flow

Navigation Expert → Sensor → External comp. → Input 2nd temp. (17327)

Prerequisite The **Energy** option is selected in the **Measurement application** parameter (→ 68) parameter.

Description Select input type for the 2nd temperature for the heat flow calculation.

Selection
- Off
- Fixed value
- External value *
- Current input 1 *
- Current input 2 *
- Current input 3 *

Delta heat calculation

Navigation Expert → Sensor → External comp. → Delta heat calc. (17006)

Prerequisite The **Energy** option is selected in the **Measurement application** parameter (→ 68) parameter.

Description Select the position of the measuring device in relation to the external temperature sensor.

Selection
- Off
- Upstream
- Downstream

2nd temperature heat flow

Navigation Expert → Sensor → External comp. → 2nd temp.heat fl (17328)

Prerequisite The **Energy** option is selected in the **Measurement application** parameter (→ 68) parameter.

Description Enter fixed value for the 2nd temperature for the heat flow calculation.

User entry 233.15 to 453.15 °C

Factory setting 293.15 °C

* Visibility depends on order options or device settings

External 2nd temperature heat flow

Navigation Expert → Sensor → External comp. → Ext. 2nd temp. (17342)

Prerequisite The **Energy** option is selected in the **Measurement application** parameter (→ 68) parameter.

Description Shows the value for the external 2nd temperature for heat flow calculation.

User entry Signed floating-point number

Gas compensation

Navigation Expert → Sensor → External comp. → Gas compensation (17003)

Description Select the input type for gas compensation. The selected gas component is measured by an external gas analyzer.

Selection
- Off
- External value *
- Current input 1 *
- Current input 2 *
- Current input 3 *

Gas component

Navigation Expert → Sensor → External comp. → Gas component (17005)

Description Select the gas component that is measured by an external gas analyzer.

Selection
- Air
- Oxygen O2
- Ozone O3
- Nitrogen N2
- Methane CH4
- Hydrogen H2
- Helium He
- Hydrogen chloride HCl
- Hydrogen sulfide H2S
- Ethylene C2H4
- Carbon dioxide CO2
- Carbon monoxide CO
- Chlorine Cl2
- Butane C4H10
- Propane C3H8
- Ethane C2H6

* Visibility depends on order options or device settings

- Argon Ar
- Ammonia NH3
- Water

Mol%

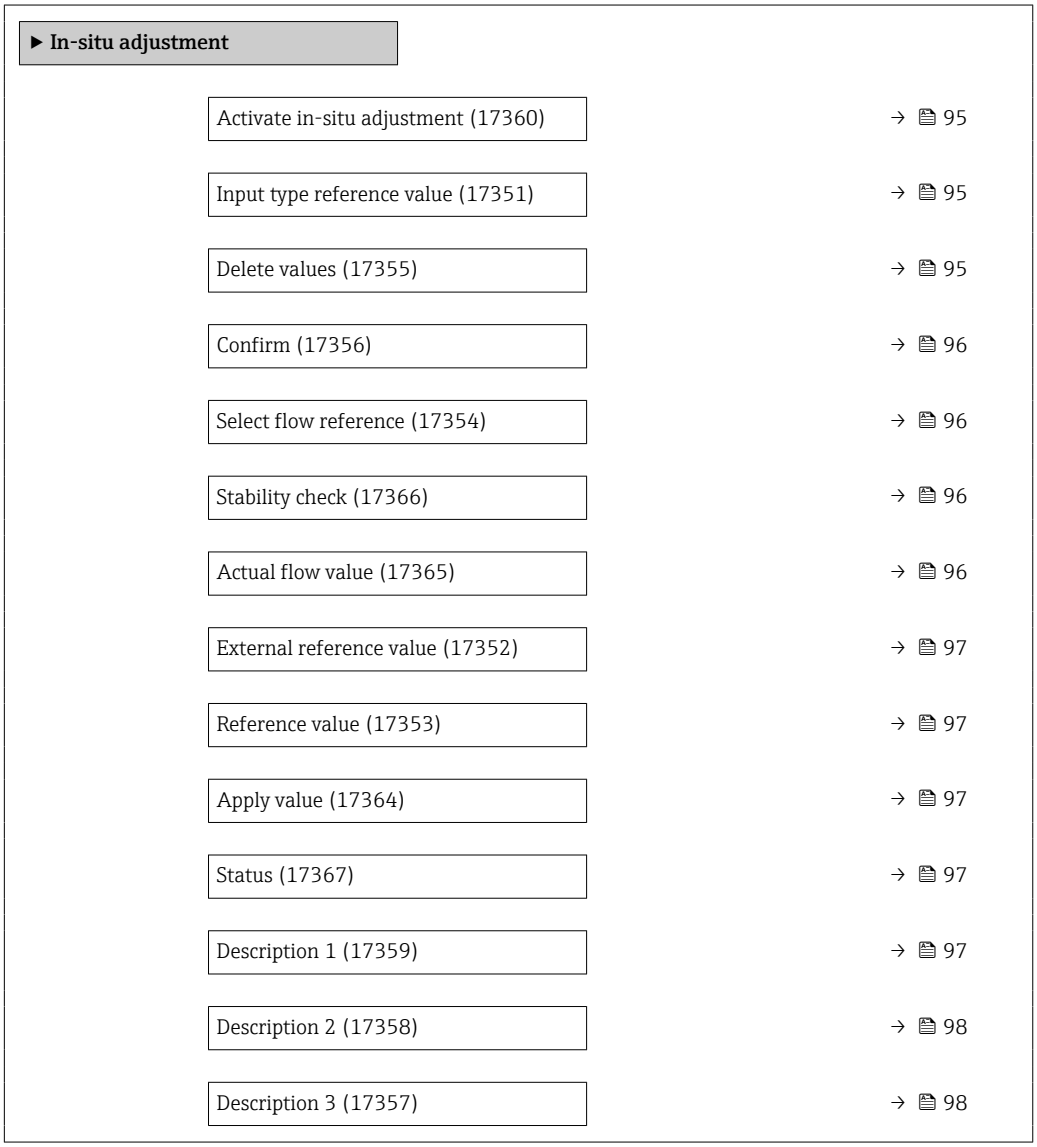
Navigation Expert → Sensor → External comp. → Mol% (17007)

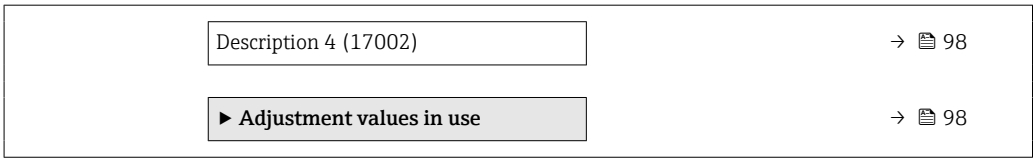
Description Enter amount of substance for the gas mixture.

User entry 0 to 100 %

3.2.8 "In-situ adjustment" submenu

Navigation Expert → Sensor → In-situ adjust.





Activate in-situ adjustment

Navigation Expert → Sensor → In-situ adjust. → In-situ adjustm. (17360)

Description Activate the in-situ adjustment. The points stored by the user are used for the in-situ adjustment.

Selection
- No
- Yes

Input type reference value

Navigation Expert → Sensor → In-situ adjust. → Input ref. value (17351)

Description Select input type for the reference value.

Selection
- Off
- Manual
- Current input 1 *
- Current input 2 *
- Current input 3 *
- External value *

Delete values

Navigation Expert → Sensor → In-situ adjust. → Delete values (17355)

Description Delete previous adjustment values and descriptions.

Selection
- No
- Yes

* Visibility depends on order options or device settings

Confirm

Navigation Expert → Sensor → In-situ adjust. → Confirm (17356)

Description Confirm deletion.

Selection
- No
- Yes

Select flow reference

Navigation Expert → Sensor → In-situ adjust. → Select flow ref. (17354)

Description Select process variable. This process variable is used as reference value for the in situ adjustment.

Selection
- Mass flow
- Corrected volume flow
- FAD volume flow *
- Volume flow

Stability check

Navigation Expert → Sensor → In-situ adjust. → Stability check (17366)

Description Activate stability check. New adjustment value is only accepted when the measurement is stable.

Selection
- No
- Yes

Actual flow value

Navigation Expert → Sensor → In-situ adjust. → Act. flow value (17365)

Description Shows the actual flow in relation to the maximum, factory-measured value that is adapted to the actual process conditions.

User interface −2 000 to 2 000 %

* Visibility depends on order options or device settings

External reference value

Navigation Expert → Sensor → In-situ adjust. → Ext. ref. value (17352)

Description Shows the external reference value for the in situ adjustment.

User entry Signed floating-point number

Reference value

Navigation Expert → Sensor → In-situ adjust. → Reference value (17353)

Description Enter fixed value as reference value used for the in situ adjustment.

User entry Signed floating-point number

Apply value

Navigation Expert → Sensor → In-situ adjust. → Apply value (17364)

Description Apply the actual value.

Selection
- No
- Yes

Status

Navigation Expert → Sensor → In-situ adjust. → Status (17367)

Description Shows the validity of the actual reference value.

User interface
- Passed
- Replaced
- Unstable
- Invalid

Description 1

Navigation Expert → Sensor → In-situ adjust. → Description 1 (17359)

Description Description for in-situ adjustment: e.g. facility, operator, date.

User entry -

Factory setting -

Description 2

Navigation Expert → Sensor → In-situ adjust. → Description 2 (17358)

Description Description for in-situ adjustment: e.g. facility, operator, date.

User entry -

Factory setting -

Description 3

Navigation Expert → Sensor → In-situ adjust. → Description 3 (17357)

Description Description for in-situ adjustment: e.g. facility, operator, date.

User entry -

Factory setting -

Description 4

Navigation Expert → Sensor → In-situ adjust. → Description 4 (17002)

Description Description for in-situ adjustment: e.g. facility, operator, date.

User entry -

Factory setting -

"Adjustment values in use" submenu

Navigation Expert → Sensor → In-situ adjust. → Values in use

▶ Adjustment values in use		
	Gas description 1/2 (17361)	→ 99

Gas description 2/2 (17362)	→ 100
Flow value 1 (17368)	→ 100
Flow value 2 (17369)	→ 100
Flow value 3 (17370)	→ 100
Flow value 4 (17371)	→ 101
Flow value 5 (17372)	→ 101
Flow value 6 (17373)	→ 101
Flow value 7 (17374)	→ 101
Flow value 8 (17375)	→ 101
Flow value 9 (17376)	→ 102
Flow value 10 (17377)	→ 102
Flow value 11 (17378)	→ 102
Flow value 12 (17379)	→ 102
Flow value 13 (17380)	→ 103
Flow value 14 (17381)	→ 103
Flow value 15 (17382)	→ 103
Flow value 16 (17383)	→ 103

Gas description 1/2

Navigation Expert → Sensor → In-situ adjust. → Values in use → Gas descrip. 1/2 (17361)

Description Shows the 1st part of the description of the set gas used in the in-situ adjustment.

User interface -

Factory setting -

Gas description 2/2

Navigation Expert → Sensor → In-situ adjust. → Values in use → Gas descrip. 2/2 (17362)

Description Shows the 2nd part of the description of the set gas used in the in-situ adjustment.

User interface -

Factory setting -

Flow value 1

Navigation Expert → Sensor → In-situ adjust. → Values in use → Flow value 1 (17368)

Description Shows the stored flow value in relation to the maximum, factory-measured value that is adapted to the actual process conditions.

User interface −2 000 to 2 000 %

Flow value 2

Navigation Expert → Sensor → In-situ adjust. → Values in use → Flow value 2 (17369)

Description Shows the stored flow value in relation to the maximum, factory-measured value that is adapted to the actual process conditions.

User interface −2 000 to 2 000 %

Flow value 3

Navigation Expert → Sensor → In-situ adjust. → Values in use → Flow value 3 (17370)

Description Shows the stored flow value in relation to the maximum, factory-measured value that is adapted to the actual process conditions.

User interface −2 000 to 2 000 %

Flow value 4

Navigation Expert → Sensor → In-situ adjust. → Values in use → Flow value 4 (17371)

Description Shows the stored flow value in relation to the maximum, factory-measured value that is adapted to the actual process conditions.

User interface −2 000 to 2 000 %

Flow value 5

Navigation Expert → Sensor → In-situ adjust. → Values in use → Flow value 5 (17372)

Description Shows the stored flow value in relation to the maximum, factory-measured value that is adapted to the actual process conditions.

User interface −2 000 to 2 000 %

Flow value 6

Navigation Expert → Sensor → In-situ adjust. → Values in use → Flow value 6 (17373)

Description Shows the stored flow value in relation to the maximum, factory-measured value that is adapted to the actual process conditions.

User interface −2 000 to 2 000 %

Flow value 7

Navigation Expert → Sensor → In-situ adjust. → Values in use → Flow value 7 (17374)

Description Shows the stored flow value in relation to the maximum, factory-measured value that is adapted to the actual process conditions.

User interface −2 000 to 2 000 %

Flow value 8

Navigation Expert → Sensor → In-situ adjust. → Values in use → Flow value 8 (17375)

Description Shows the stored flow value in relation to the maximum, factory-measured value that is adapted to the actual process conditions.

User interface −2 000 to 2 000 %

Flow value 9

Navigation Expert → Sensor → In-situ adjust. → Values in use → Flow value 9 (17376)

Description Shows the stored flow value in relation to the maximum, factory-measured value that is adapted to the actual process conditions.

User interface −2 000 to 2 000 %

Flow value 10

Navigation Expert → Sensor → In-situ adjust. → Values in use → Flow value 10 (17377)

Description Shows the stored flow value in relation to the maximum, factory-measured value that is adapted to the actual process conditions.

User interface −2 000 to 2 000 %

Flow value 11

Navigation Expert → Sensor → In-situ adjust. → Values in use → Flow value 11 (17378)

Description Shows the stored flow value in relation to the maximum, factory-measured value that is adapted to the actual process conditions.

User interface −2 000 to 2 000 %

Flow value 12

Navigation Expert → Sensor → In-situ adjust. → Values in use → Flow value 12 (17379)

Description Shows the stored flow value in relation to the maximum, factory-measured value that is adapted to the actual process conditions.

User interface −2 000 to 2 000 %

Flow value 13

Navigation Expert → Sensor → In-situ adjust. → Values in use → Flow value 13 (17380)

Description Shows the stored flow value in relation to the maximum, factory-measured value that is adapted to the actual process conditions.

User interface −2 000 to 2 000 %

Flow value 14

Navigation Expert → Sensor → In-situ adjust. → Values in use → Flow value 14 (17381)

Description Shows the stored flow value in relation to the maximum, factory-measured value that is adapted to the actual process conditions.

User interface −2 000 to 2 000 %

Flow value 15

Navigation Expert → Sensor → In-situ adjust. → Values in use → Flow value 15 (17382)

Description Shows the stored flow value in relation to the maximum, factory-measured value that is adapted to the actual process conditions.

User interface −2 000 to 2 000 %

Flow value 16

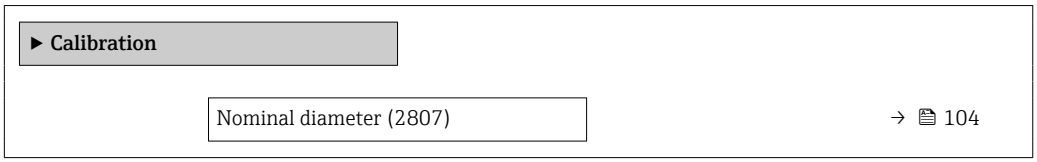
Navigation Expert → Sensor → In-situ adjust. → Values in use → Flow value 16 (17383)

Description Shows the stored flow value in relation to the maximum, factory-measured value that is adapted to the actual process conditions.

User interface −2 000 to 2 000 %

3.2.9 "Calibration" submenu

Navigation Expert → Sensor → Calibration



Nominal diameter

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

Prerequisite Only available with t-mass F.

Description Displays the nominal diameter of the sensor.

User interface DNxx / x"

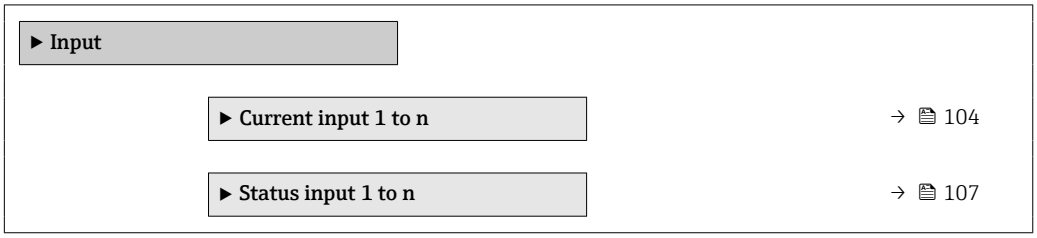
Factory setting Depends on the size of the sensor

Additional information *Description*

The value is also specified on the sensor nameplate.

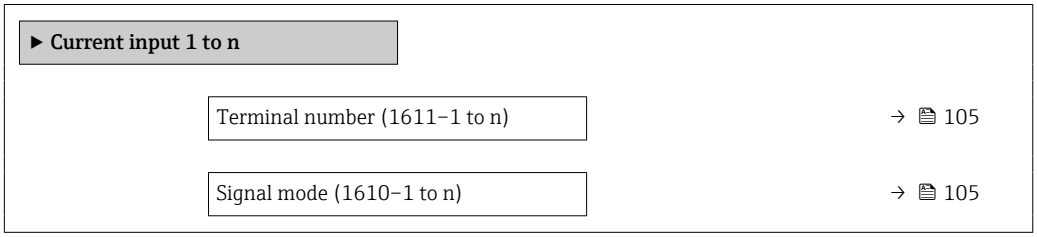
3.3 "Input" submenu

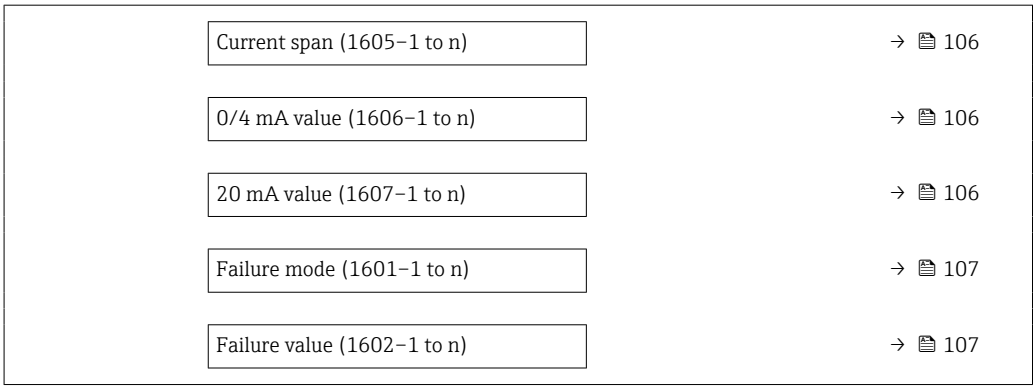
Navigation Expert → Input



3.3.1 "Current input 1 to n" submenu

Navigation Expert → Input → Current input 1 to n





Terminal number

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

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

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

Additional information *"Not used" option*

The current input module does not use any terminal numbers.

Signal mode

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

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

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

Selection
- Passive
- Active *

Factory setting Active

* Visibility depends on order options or device settings

Current span

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

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

Selection
- 4...20 mA (4... 20.5 mA)
- 4...20 mA NAMUR (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 NAMUR (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 (→ 112)

0/4 mA value

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

Description Enter 4 mA value.

User entry Signed floating-point number

Additional information *Current input behavior*

The current input behaves differently depending on the settings configured in the following parameters:
- Current span (→ 106)
- Failure mode (→ 107)

Configuration examples

Pay attention to the configuration examples for **4 mA value** parameter (→ 113).

20 mA value

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

Description Enter 20 mA value.

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 (→ 113).

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 (→ 106).

Selection
- Alarm
- Last valid value
- Defined value

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 (→ 107)).

Failure value

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

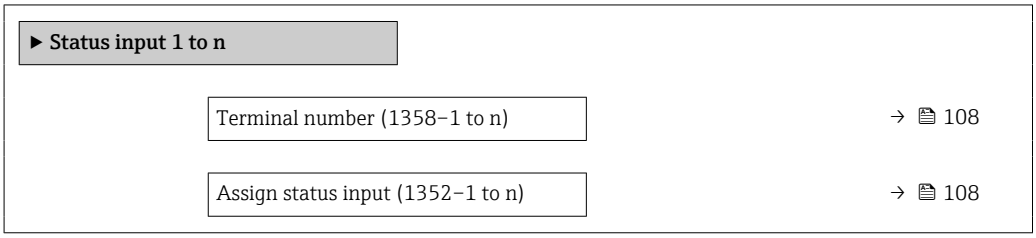
Prerequisite In the **Failure mode** parameter (→ 107), the **Defined value** option is selected.

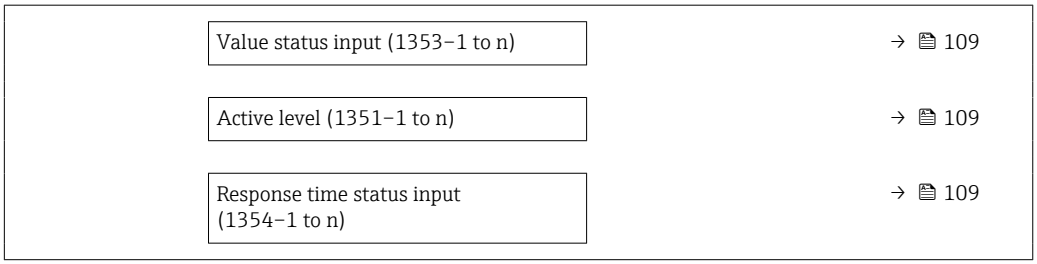
Description Use this function to enter the value that the device uses if it does not receive an input signal from the external device, or if the input signal is invalid.

User entry Signed floating-point number

3.3.2 "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
- Gas group *
- Zero point adjustment

* Visibility depends on order options or device settings

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 (→ 🖹 65) is activated.

Note on the Flow override (→ 🖹 65):
- The Flow override (→ 🖹 65) 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

Response time status input

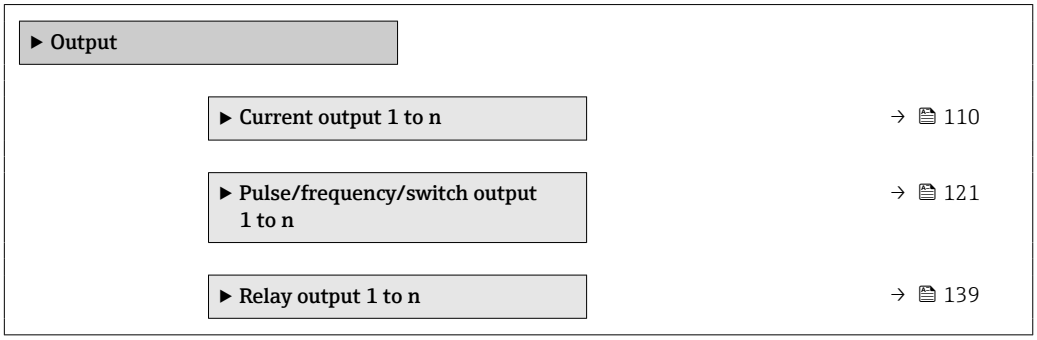
Navigation Expert → Input → Status input 1 to n → Response time (1354–1 to n)

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

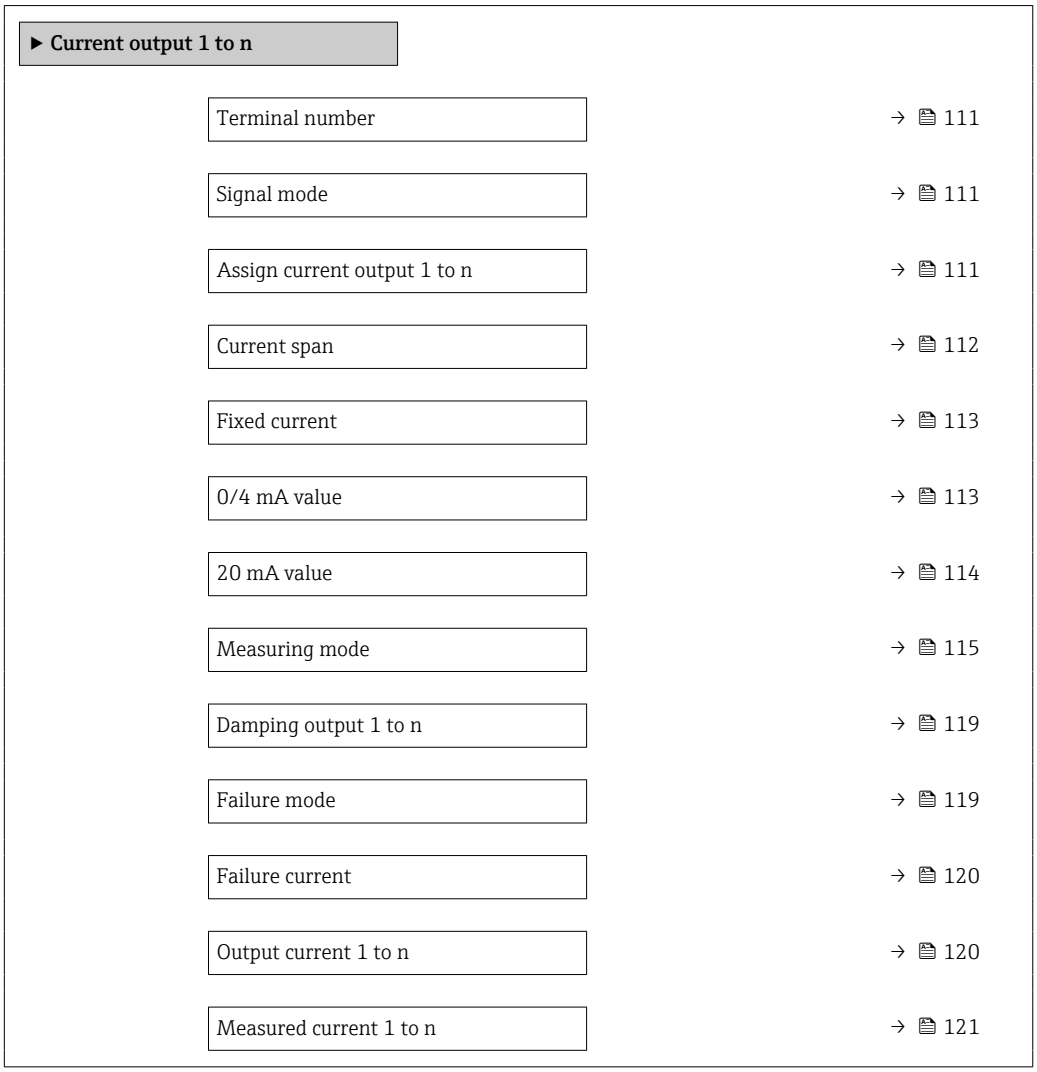
3.4 "Output" submenu

Navigation Expert → Output



3.4.1 "Current output 1 to n" submenu

Navigation Expert → Output → Curr.output 1 to n



Terminal number

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

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

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

Additional information *"Not used" option*

The current output module does not use any terminal numbers.

Signal mode

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

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

Selection
- Active *
- Passive *

Factory setting Active

Assign current output 1 to n

Navigation Expert → Output → Curr.output 1 to n → Assign curr. 1 to n (0359–1 to n)

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

Selection
- Off *
- Temperature
- Mass flow
- Corrected volume flow
- FAD volume flow *
- Volume flow
- Energy flow *
- Heat flow *
- Density
- Flow velocity
- Pressure
- 2nd temperature delta heat *
- Electronic temperature

* Visibility depends on order options or device settings

Current span

Navigation Expert → Output → Curr.output 1 to n → Current span (0353–1 to n)

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

Selection
- 4...20 mA NAMUR (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 current

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

Additional information

Description

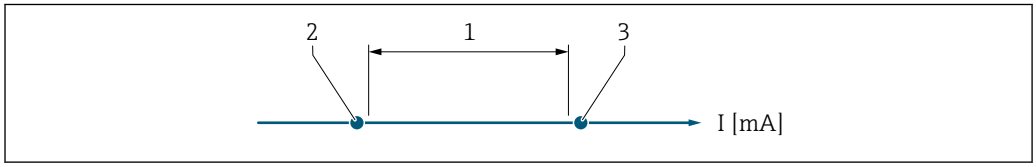
- In the event of a device alarm, the current output adopts the value specified in the **Failure mode** parameter (→ 119).
- The measuring range is specified via the **Lower range value output** parameter (→ 113) and **Upper range value output** parameter (→ 114).

"Fixed current" option

The current value is set via the **Fixed current** parameter (→ 113).

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 NAMUR (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

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 (→ 112).

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

0/4 mA value

Navigation Expert → Output → Curr.output 1 to n → 0/4 mA value (0367–1 to n)

Prerequisite In **Current span** parameter (→ 112), one of the following options is selected:
- 4...20 mA NAMUR (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

Additional information

Description

Positive and negative values are permitted depending on the process variable assigned in the **Assign current output** parameter (→ 111). 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 (→ 114).

Dependency

The unit depends on the process variable selected in the **Assign current output** parameter (→ 111).

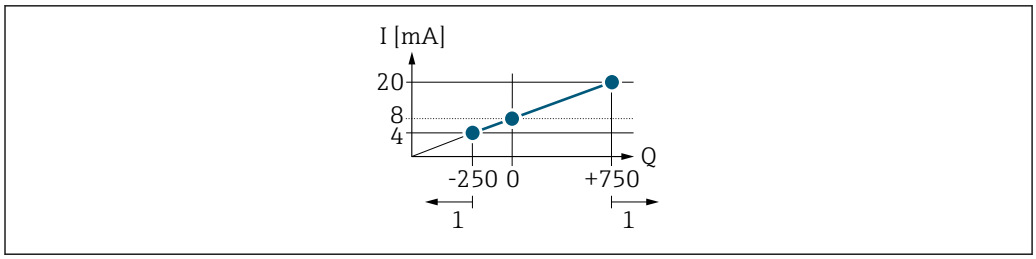
Current output behavior

The current output behaves differently depending on the settings configured in the following parameters:
- Current span (→ 112)
- Failure mode (→ 119)

Configuration examples

A configuration example and its effect on the current output is explained in the following section.

Configuration example
In Forward flow
- **0/4 mA value** parameter (→ 113) = not equal to zero flow (e.g. −250 kg/h)
- **20 mA value** parameter (→ 114) = not equal to zero flow (e.g. +750 kg/h)
- Calculated current value = 8 mA at zero flow



Q Flow
I Current
1 Measuring range is exceeded or undershot

20 mA value

Navigation Expert → Output → Curr.output 1 to n → 20 mA value (0372–1 to n)

Prerequisite In **Current span** parameter (→ 112), one of the following options is selected:
- 4...20 mA NAMUR (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 → 211

Additional information

Description

Positive and negative values are permitted depending on the process variable assigned in the **Assign current output** parameter (→ 111). 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 (→ 113).

Dependency

The unit depends on the process variable selected in the **Assign current output** parameter (→ 111).

Example

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

Configuration examples

Pay attention to the configuration examples for the **Lower range value output** parameter (→ 113).

Measuring mode

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

Prerequisite One of the following options is selected in the **Current span** parameter (→ 112):
- 4...20 mA NAMUR (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

Additional information

Description

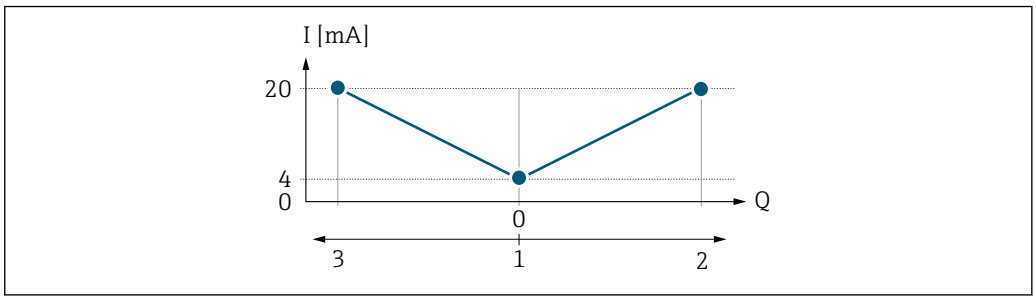
The process variable that is assigned to the current output via the **Assign current output** parameter (→ 111) is displayed below the parameter.

"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 (→ 113) and the **Upper range value output** parameter (→ 114).

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

"Forward/Reverse flow" option



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

* Visibility depends on order options or device settings

- The current output signal is independent of the direction of flow (absolute amount of the measured variable). The values for the **Lower range value output** parameter (→ 113) and **Upper range value output** parameter (→ 114) must have the same sign.
- The value for the **Upper range value output** parameter (→ 114) (e.g. reverse flow) corresponds to the mirrored value for the **Upper range value output** parameter (→ 114) (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.

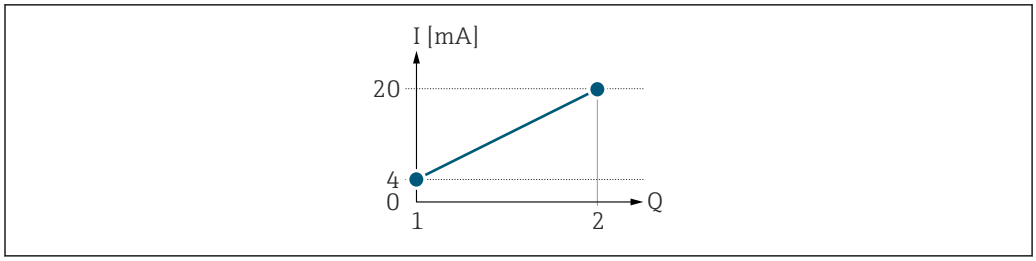
In the event of prolonged and undesired reverse flow, flow values can accumulate in the buffer memory. Due to the configuration of the current output, these values are not factored in, however, i.e. there is no compensation for the reverse flow.

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

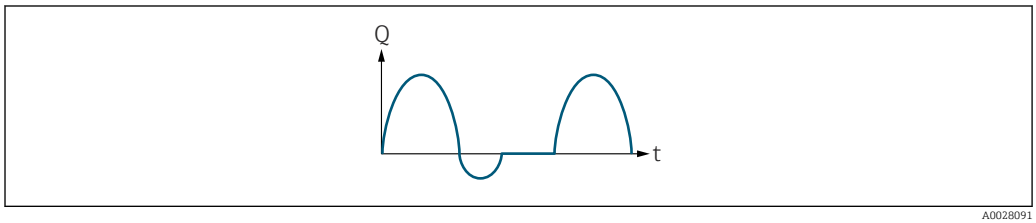
Defined measuring range: lower range value and upper range value with the **same** sign



2 *Measuring range*

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

With the following flow response:

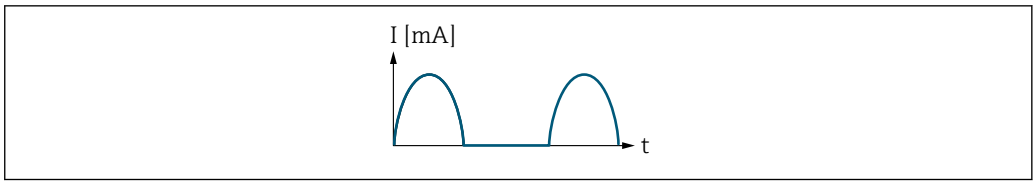


3 *Flow response*

Q Flow
t Time

With **Forward flow** option

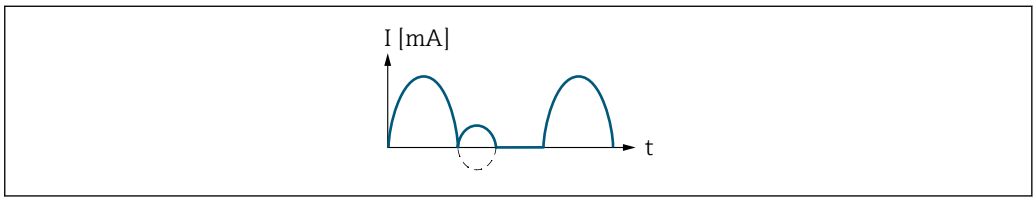
The current output signal is proportional to the process variable assigned. The flow components outside the scaled measuring range are not taken into account for signal output:.



I *Current*
t *Time*

With **Forward/Reverse flow** option

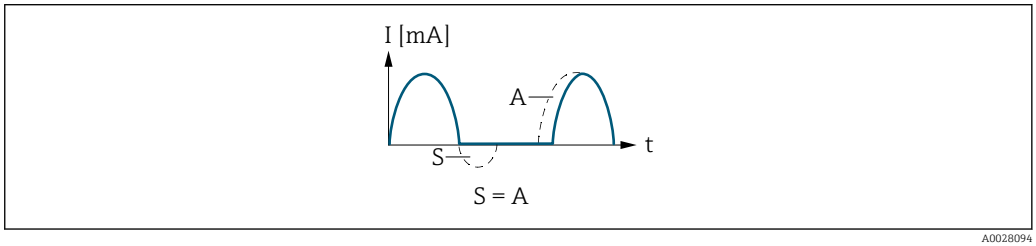
The current output signal is independent of the direction of flow.



I *Current*
t *Time*

With **Reverse flow compensation** option

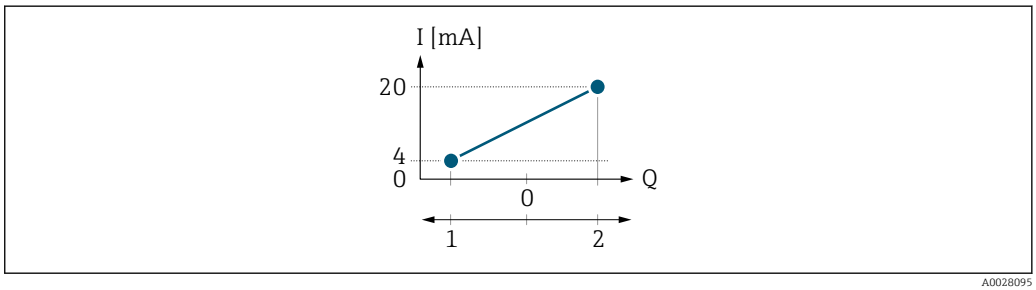
Flow components outside the measuring span are buffered, balanced and output after a maximum delay of 60 s.



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

Example 2

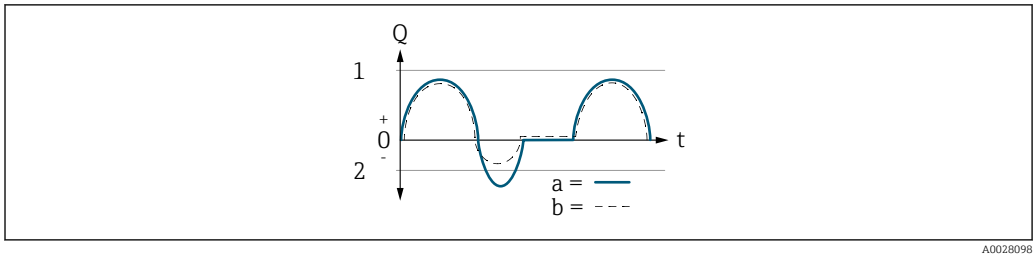
Defined measuring range: lower range value and upper range value with **different** signs



4 *Measuring range*

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

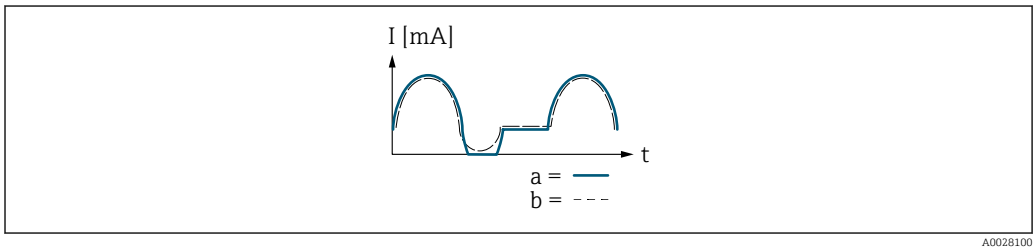
With flow a (—) outside, b (- -) inside the measuring range



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

With **Forward flow** option

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



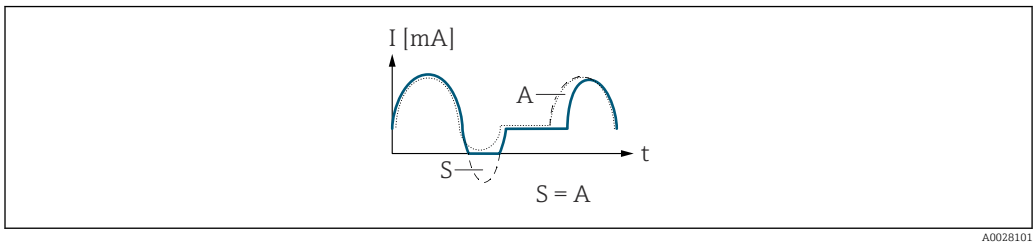
I Current
t Time

With **Forward/Reverse flow** option

This option cannot be selected here since the values for the **Lower range value output** parameter (→ 113) and **Upper range value output** parameter (→ 114) 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 output 1 to n

Navigation Expert → Output → Curr.output 1 to n → Damping out. 1 to n (0363–1 to n)

Prerequisite A process variable is selected in the **Assign current output** parameter (→ 111) and one of the following options is selected in the **Current span** parameter (→ 112):
- 4...20 mA NAMUR (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

Additional information *User entry*

Use this function to enter a time constant (PT1 element [7]) 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 mode

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

Prerequisite A process variable is selected in the **Assign current output** parameter (→ 111) and one of the following options is selected in the **Current span** parameter (→ 112):
- 4...20 mA NAMUR (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
- Defined value

7) 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 (→ 112).

"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 (→ 112).

"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 (→ 120).

Failure current

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

Prerequisite The **Defined value** option is selected in the **Failure mode** parameter (→ 119).

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

User entry 0 to 22.5 mA

Factory setting 22.5 mA

Output current 1 to n

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

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

User interface 3.59 to 22.5 mA

Measured current 1 to n

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

Description Displays the actual measured value of the output current.

User interface 0 to 30 mA

3.4.2 "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)	→ 122
Signal mode (0490–1 to n)	→ 123
Operating mode (0469–1 to n)	→ 123
Assign pulse output 1 to n (0460–1 to n)	→ 124
Pulse scaling (0455–1 to n)	→ 125
Pulse width (0452–1 to n)	→ 125
Measuring mode (0457–1 to n)	→ 126
Failure mode (0480–1 to n)	→ 127
Pulse output 1 to n (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 NAMUR

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.

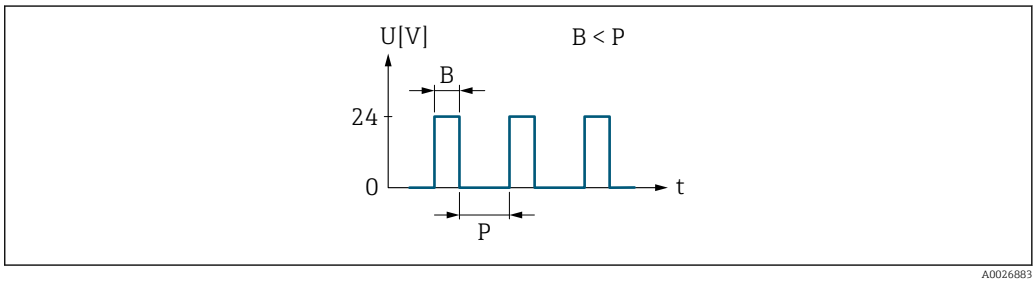
Selection
- Pulse
- Frequency
- Switch

Additional information

"Pulse" option

Quantity-dependent pulse with configurable pulse width
The pulses are never shorter than the set duration.

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



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

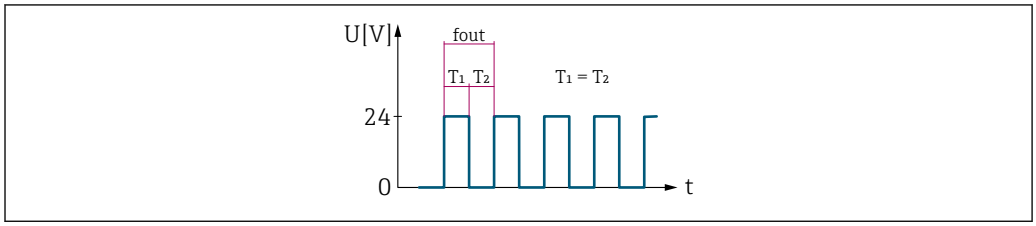
B Pulse width entered
P Pauses between the individual pulses

"Frequency" option

Flow-proportional frequency output with 1:1 on/off ratio

* Visibility depends on order options or device settings

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

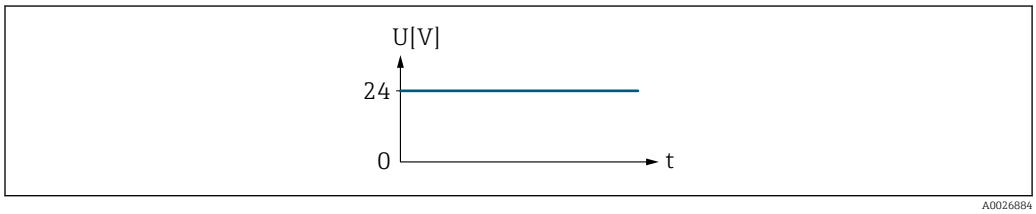


6 *Flow-proportional frequency output*

"Switch" option

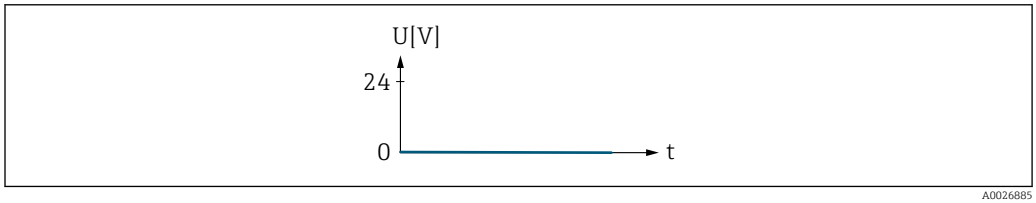
Contact for displaying a condition (e.g. alarm or warning if a limit value is reached)

Example
Alarm response without alarm



7 *No alarm, high level*

Example
Alarm response in case of alarm



8 *Alarm, low level*

Assign pulse output 1 to n

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

Prerequisite The **Pulse** option is selected in **Operating mode** parameter (→ 123).

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

Selection
- Off
- Mass flow
- Corrected volume flow

- FAD volume flow *
- Volume flow
- Energy flow *
- Heat flow *

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 (→ 123) and a process variable is selected in the **Assign pulse output** parameter (→ 124).

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

User entry Positive floating point number

Factory setting Depends on country and nominal diameter

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 (→ 123) and a process variable is selected in the **Assign pulse output** parameter (→ 124).

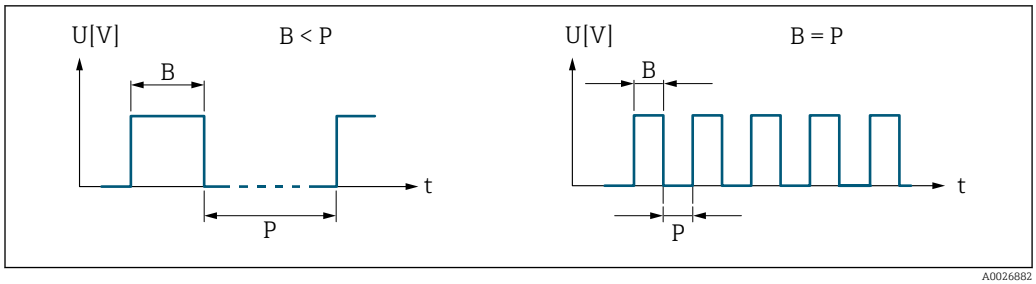
Description Use this function to enter the duration of the output pulse.

User entry 0.05 to 2 000 ms

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 $Q_{max} = f_{max} \times$ pulse value.
- If the flow exceeds these limit values, the measuring device displays the **443 Pulse output 1 to n** diagnostic message.

* Visibility depends on order options or device settings



B Pulse width entered
P Pauses between the individual pulses

Example

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

Measuring mode

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

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

Selection

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

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 (→ 115)

Examples

For a detailed description of the configuration examples, see the **Measuring mode** parameter (→ 115)

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 (→ 123) and a process variable is selected in the **Assign pulse output** parameter (→ 124).

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

Selection
- Actual value
- No pulses

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 1 to n

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

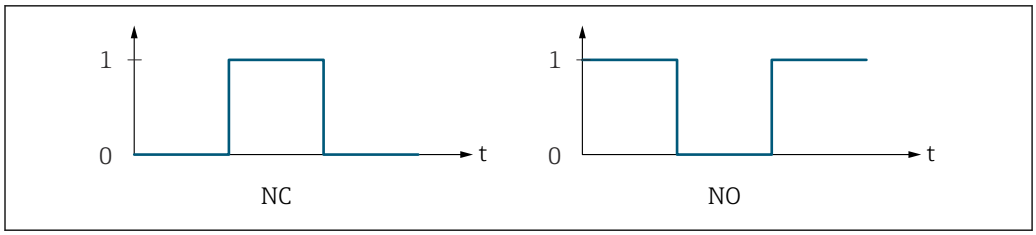
Prerequisite The **Pulse** option is selected in the **Operating mode** parameter (→ 123) parameter.

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 (→ 138) 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 (→ 127)) 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 (→ 123).

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

Selection
- Off
- Temperature
- Mass flow
- Corrected volume flow
- FAD volume flow *
- Volume flow
- Energy flow *
- Heat flow *
- Density
- Flow velocity
- Pressure
- 2nd temperature delta heat *
- Electronic temperature

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 (→ 123) and a process variable is selected in the **Assign frequency output** parameter (→ 128).

Description Use this function to enter the minimum frequency.

* Visibility depends on order options or device settings

User entry 0.0 to 10 000.0 Hz

Maximum frequency value

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

Prerequisite The **Frequency** option is selected in the **Operating mode** parameter (→ 123) and a process variable is selected in the **Assign frequency output** parameter (→ 128).

Description Use this function to enter the end value frequency.

User entry 0.0 to 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 (→ 123) and a process variable is selected in the **Assign frequency output** parameter (→ 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 (→ 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 (→ 123) and a process variable is selected in the **Assign frequency output** parameter (→ 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 (→ 128).

Measuring mode

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

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

Selection

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

Additional information

Options

For a detailed description of the options available, see the **Measuring mode** parameter (→ 115)

Examples

For a detailed description of the configuration examples, see the **Measuring mode** parameter (→ 115)

Damping output 1 to n

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

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

User entry 0 to 999.9 s

Additional information

User entry

Use this function to enter a time constant (PT1 element [8]) 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.

8) proportional transmission behavior with first order delay

Response time

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

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

User interface Positive floating-point number

Additional information *Description*

The response time is made up of the time specified for the following dampings:
- Damping of pulse/frequency/switch output → 119
  and
- Depending on the measured variable assigned to the output.
  Flow damping

Failure mode

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

Prerequisite The **Frequency** option is selected in the **Operating mode** parameter (→ 123) and a process variable is selected in the **Assign frequency output** parameter (→ 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

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

NOTICE! A device alarm 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 (→ 123), the **Frequency** option is selected, in the **Assign frequency output** parameter (→ 128) a process variable is selected, and in the **Failure mode** parameter (→ 131), the **Defined value** option is selected.

Description Enter frequency output value in alarm condition.

User entry 0.0 to 12 500.0 Hz

Output frequency 1 to n

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

Prerequisite In the **Operating mode** parameter (→ 123), 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 (→ 123).

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

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

* Visibility depends on order options or device settings

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 (→ 123), the **Switch** option is selected.
- In the **Switch output function** parameter (→ 132), 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

Additional information *Description*

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

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

Assign limit

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

Prerequisite
- The **Switch** option is selected in **Operating mode** parameter (→ 123).
- The **Limit** option is selected in **Switch output function** parameter (→ 132).

Description

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

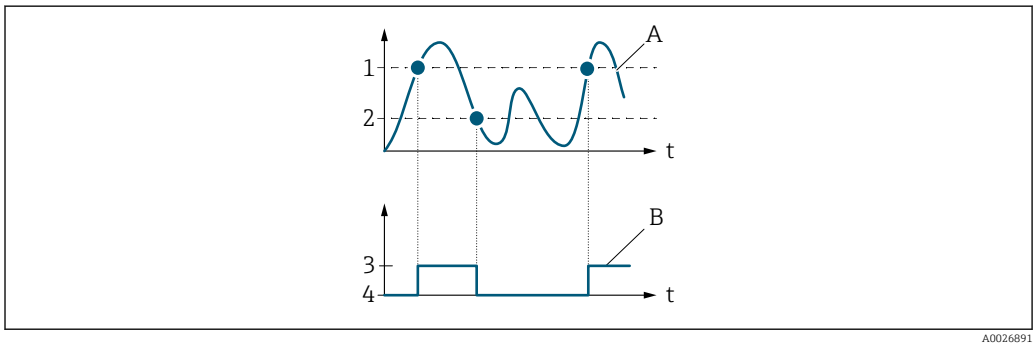
Selection

- Temperature
- Mass flow
- Corrected volume flow
- FAD volume flow *
- Volume flow
- Energy flow *
- Heat flow *
- Density
- Flow velocity
- 2nd temperature delta heat *
- Electronic temperature
- Totalizer 1
- Totalizer 2
- Totalizer 3

Additional information

Description

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



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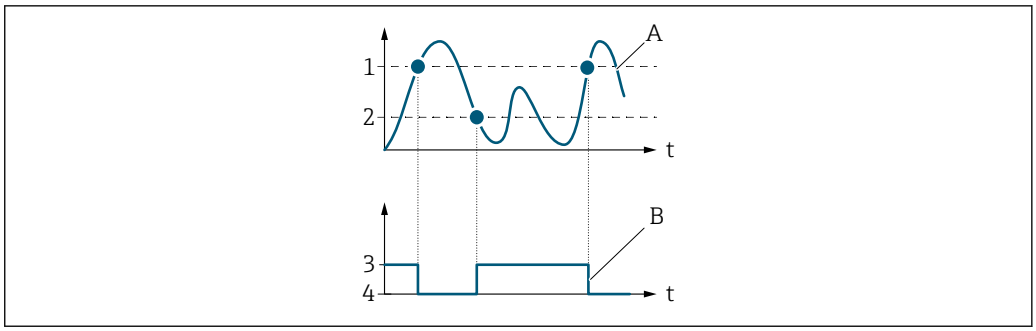
1 Switch-on value
2 Switch-off value
3 Conductive
4 Non-conductive
A Process variable
B Status output

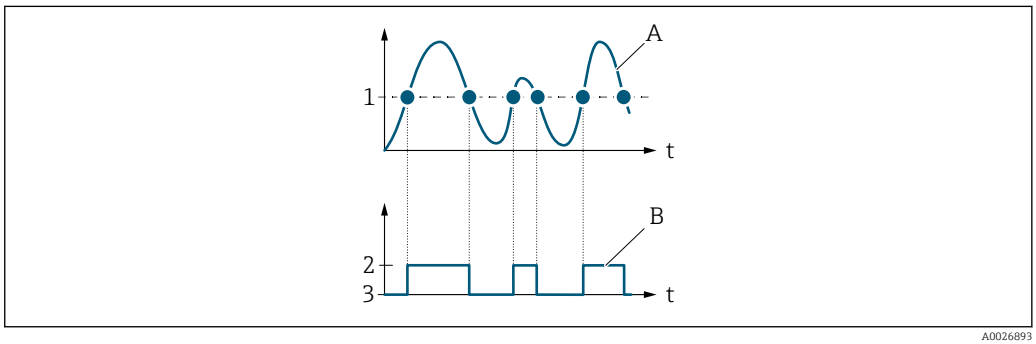
Behavior of status output when Switch-on value < Switch-off value:
- Process variable < Switch-on value: transistor is conductive
- Process variable > Switch-off value: transistor is non-conductive

* Visibility depends on order options or device settings



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

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



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

Switch-on value

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

Prerequisite
- The **Switch** option is selected in the **Operating mode** parameter (→ 123).
- The **Limit** option is selected in the **Switch output function** parameter (→ 132).

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 and nominal diameter

Additional information

Description

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

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

Dependency

The unit depends on the process variable selected in the **Assign limit** parameter (→ 133).

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 (→ 123).
- The **Limit** option is selected in the **Switch output function** parameter (→ 132).

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

User entry Signed floating-point number

Additional information

Description

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

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

Dependency

The unit depends on the process variable selected in the **Assign limit** parameter (→ 133).

Assign status

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

Prerequisite

- The **Switch** option is selected in **Operating mode** parameter (→ 123).
- The **Status** option is selected in **Switch output function** parameter (→ 132).

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

Selection

- Off
- Low flow cut off

Additional information

Options

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

Switch-on delay

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

Prerequisite
- The **Switch** option is selected in the **Operating mode** parameter (→ 123).
- The **Limit** option is selected in the **Switch output function** parameter (→ 132).

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

User entry 0.0 to 100.0 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 (→ 123).
- The **Limit** option is selected in the **Switch output function** parameter (→ 132).

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

User entry 0.0 to 100.0 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

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 status 1 to n

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

Prerequisite The **Switch** option is selected in the **Operating mode** parameter (→ 123).

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

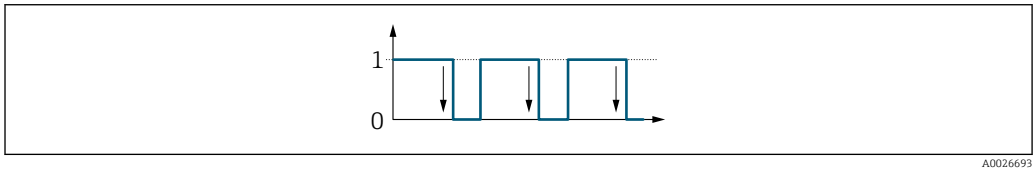
Navigation Expert → Output → PFS output 1 to n → Invert outp.sig. (0470–1 to n)

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

Selection
- No
- Yes

Additional information *Selection*

No option (passive - negative)



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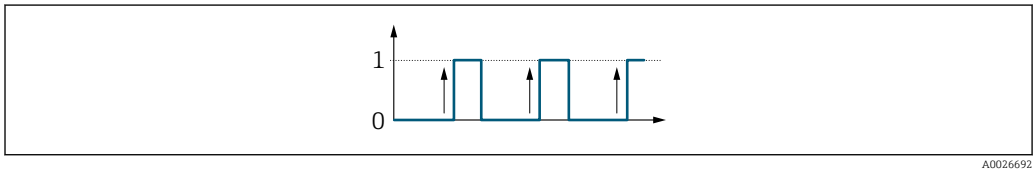
Yes option (passive - positive)



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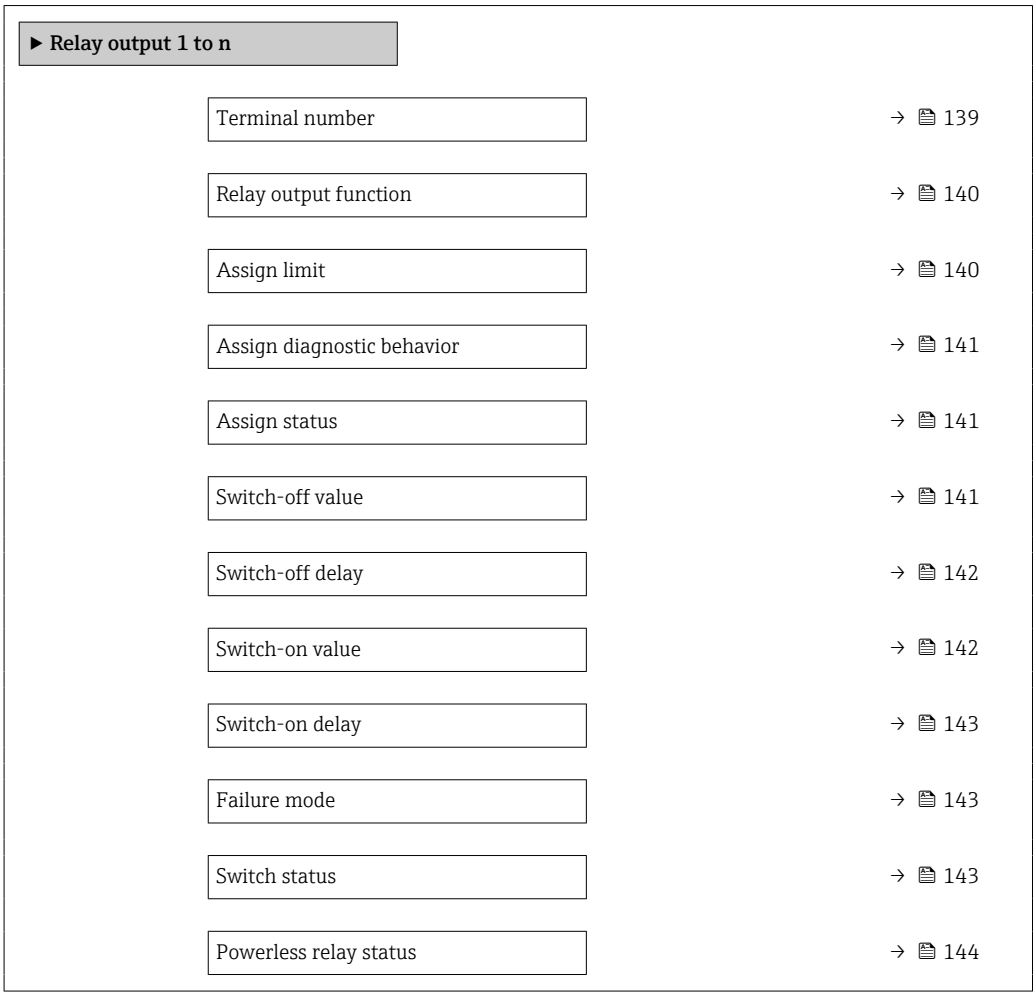
3.4.3 "Relay output 1 to n" submenu

Navigation Expert → Output → Relay output 1 to n



Terminal number

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

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

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

Additional information *"Not used" option*

The relay output module does not use any terminal numbers.

Relay output function

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

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

Selection
- Closed
- Open
- Diagnostic behavior
- Limit
- Flow direction check
- Digital Output

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 limit

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

Prerequisite The **Limit** option is selected in **Relay output function** parameter (→ 140).

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

Selection
- Temperature
- Mass flow
- Corrected volume flow
- FAD volume flow *
- Volume flow
- Energy flow *
- Heat flow *
- Density
- Flow velocity
- 2nd temperature delta heat *
- Electronic temperature

* Visibility depends on order options or device settings

- Totalizer 1
- Totalizer 2
- Totalizer 3

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 (→ 140), 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

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 (→ 140), 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

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 (→ 140).

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

User entry Signed floating-point number

Additional information

Description

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

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

Dependency

The unit is dependent on the process variable selected in the **Assign limit** parameter (→ 140).

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 (→ 140), 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

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 (→ 140).

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 and nominal diameter

Additional information

Description

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

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

Dependency

The unit is dependent on the process variable selected in the **Assign limit** parameter (→ 140).

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 (→ 140), 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

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

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 status

Navigation Expert → Output → Relay output 1 to n → Switch status (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)

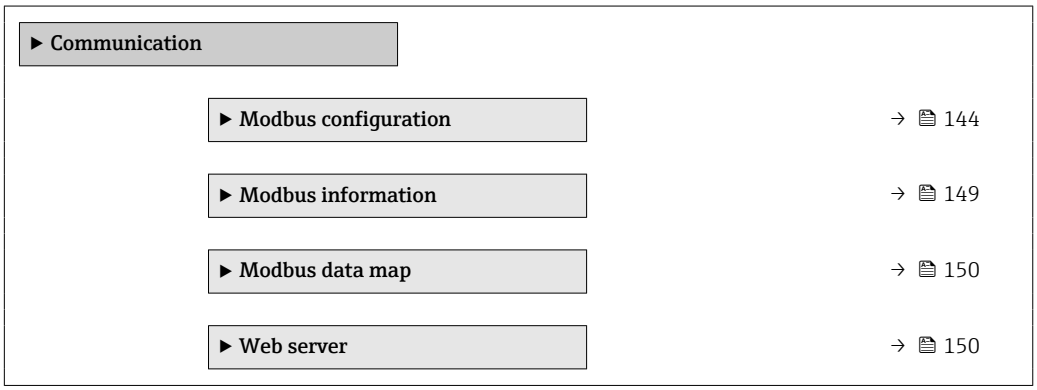
Description Use this function to select the quiescent state for the relay output.

Selection
- Open
- Closed

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

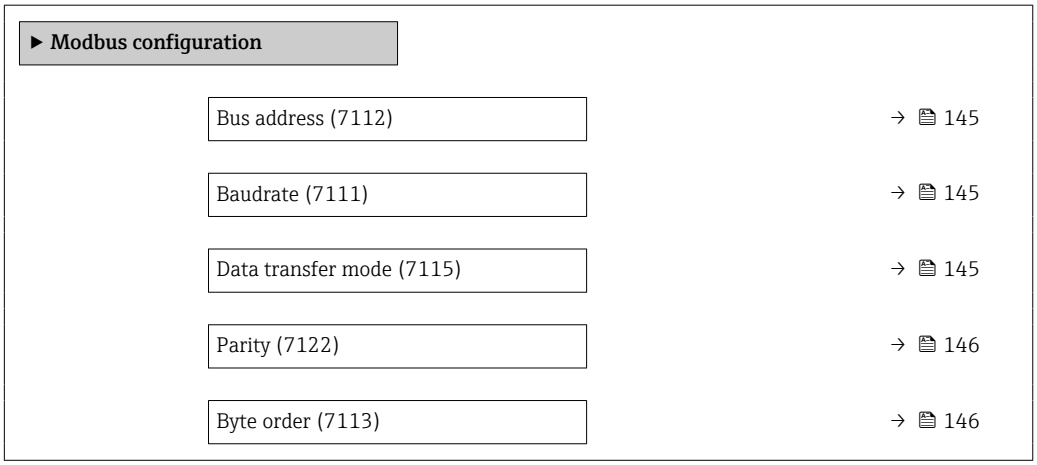
3.5 "Communication" submenu

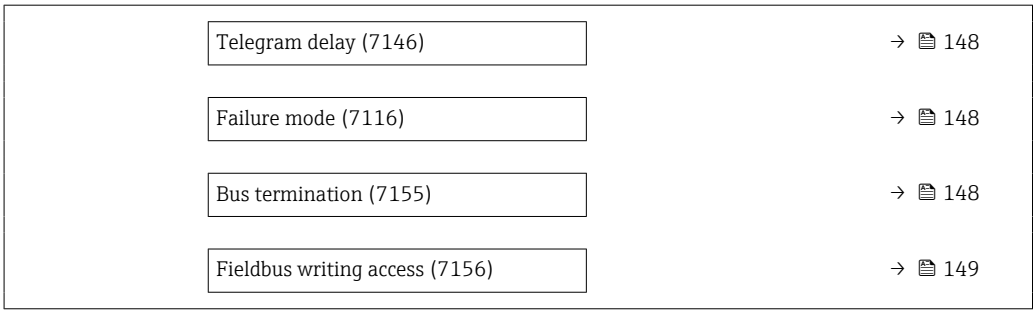
Navigation Expert → Communication



3.5.1 "Modbus configuration" submenu

Navigation Expert → Communication → Modbus config.





Bus address

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

Description For entering the device address.

User entry 1 to 247

Baudrate

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

Description Use this function to select a transmission rate.

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

Data transfer mode

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

Description Use this function to select the data transmission mode.

Selection
- ASCII
- RTU

Additional information *Options*

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

Parity

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

Description Use this function to select the parity bit.

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

Additional information *Options*

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

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

Byte order

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

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

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

Additional information *Description*

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

Changing the byte sequence in the host system often requires a extensive knowledge and significant programming efforts. Endress+Hauser introduced the **Byte order** parameter (→ 146) for this reason.

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

achieved by changing the byte sequence, the settings for the byte sequence of the host system must be adapted accordingly.

Byte transmission sequence

Byte addressing, i.e. the transmission sequence of the bytes, is not specified in the Modbus specification. For this reason, it is important to coordinate or match the addressing method between the master and slave during commissioning. This can be configured in the measuring device using the **Byte order** parameter (→ 146).

The bytes are transmitted depending on the selection in the **Byte order** parameter (→ 146):

FLOAT				
	Sequence			
Options	1.	2.	3.	4.
1 – 0 – 3 – 2 *	Byte 1 (MMMMMMMM)	Byte 0 (MMMMMMMM)	Byte 3 (SEEEEEEE)	Byte 2 (EMMMMMMM)
0 – 1 – 2 – 3	Byte 0 (MMMMMMMM)	Byte 1 (MMMMMMMM)	Byte 2 (EMMMMMMM)	Byte 3 (SEEEEEEE)
2 – 3 – 0 – 1	Byte 2 (EMMMMMMM)	Byte 3 (SEEEEEEE)	Byte 0 (MMMMMMM)	Byte 1 (MMMMMMM)
3 – 2 – 1 – 0	Byte 3 (SEEEEEEE)	Byte 2 (EMMMMMMM)	Byte 1 (MMMMMMMM)	Byte 0 (MMMMMMMM)
* = factory setting, S = sign, E = exponent, M = mantissa				

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

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

Telegram delay

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

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

User entry 0 to 100 ms

Failure mode

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

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

Selection
- NaN value
- Last valid value

Additional information *Options*
- NaN value
  The device outputs the NaN value [9].
- Last valid value
  The device outputs the last valid measured value before the fault occurred.

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

Bus termination

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

Description Displays whether the terminating resistor is enabled or disabled.

User interface
- Off
- On

Additional information *Selection*
- Off
  The terminating resistor is disabled.
- On
  The terminating resistor is enabled.

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

9) Not a Number

Fieldbus writing access

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

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

Selection
- Read + write
- Read only

Additional information

Description

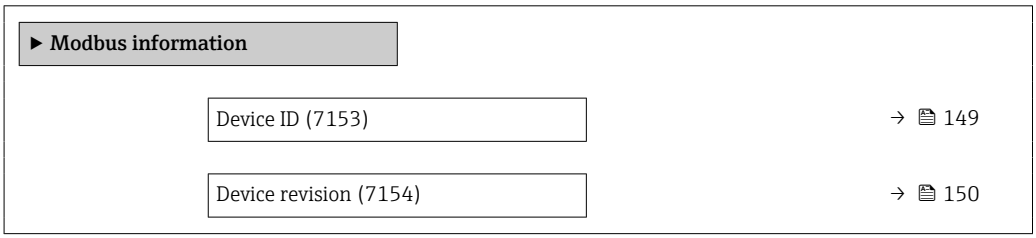
If read and/or write protection is enabled, the parameter can only be controlled and reset via local operation. Access is no longer possible via operating tools.

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

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

3.5.2 "Modbus information" submenu

Navigation Expert → Communication → Modbus info



Device ID

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

Description Displays the device ID for identifying the measuring device.

User interface 4-digit hexadecimal number

Device revision

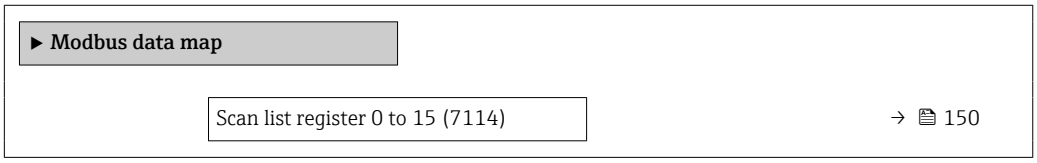
Navigation Expert → Communication → Modbus info → Device revision (7154)

Description Displays the device revision.

User interface 4-digit hexadecimal number

3.5.3 "Modbus data map" submenu

Navigation Expert → Communication → Modbus data map



Scan list register 0 to 15

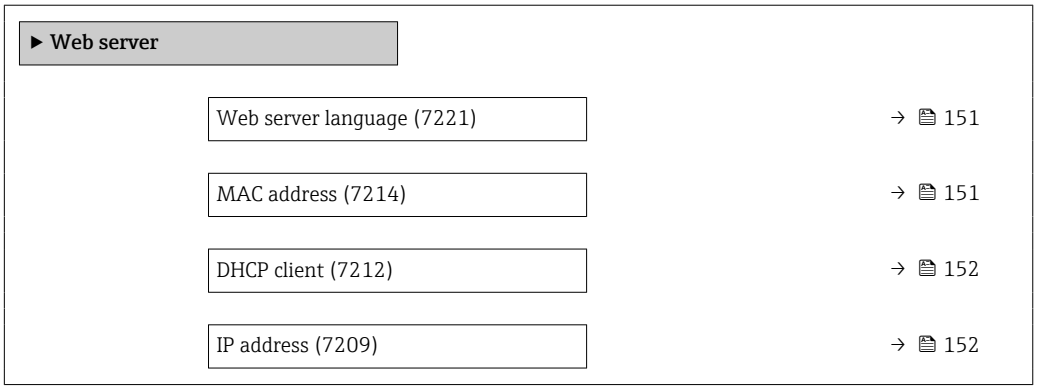
Navigation Expert → Communication → Modbus data map → Scan list reg.0 to 15 (7114)

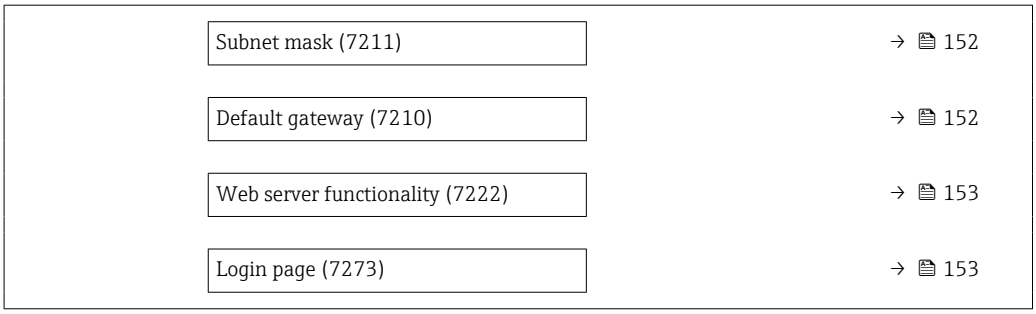
Description Use this function to enter the scan list register. By entering the register address (1-based), up to 16 device parameters can be grouped by assigning them to the scan list registers 0 to 15. The data of the device parameters assigned here are read out via the register addresses 5051 to 5081.

User entry 1 to 65 535

3.5.4 "Web server" submenu

Navigation Expert → Communication → Web server





Web server language

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

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

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

MAC address

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

Description Displays the MAC [10] 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

10) Media Access Control

DHCP client

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

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

Selection
- Off
- On

Factory setting On

Additional information *Effect*

If the DHCP client functionality of the web server is selected, the IP address (→ 152), Subnet mask (→ 152) and Default gateway (→ 152) are set automatically.

- Identification is via the MAC address of the measuring device.
- The IP address (→ 152) in the **IP address** parameter (→ 152) is ignored as long as the **DHCP client** parameter (→ 152) is active. This is also the case, in particular, if the DHCP server cannot be reached. The IP address (→ 152) in the parameter of the same name is only used if the **DHCP client** parameter (→ 152) is inactive.

IP address

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

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

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

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)

Default gateway

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

Description Display or enter the Default gateway (→ 152).

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

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

Additional information *Description*

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

Selection

Option	Description
Off	▪ The Web server is completely disabled. ▪ Port 80 is locked.
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

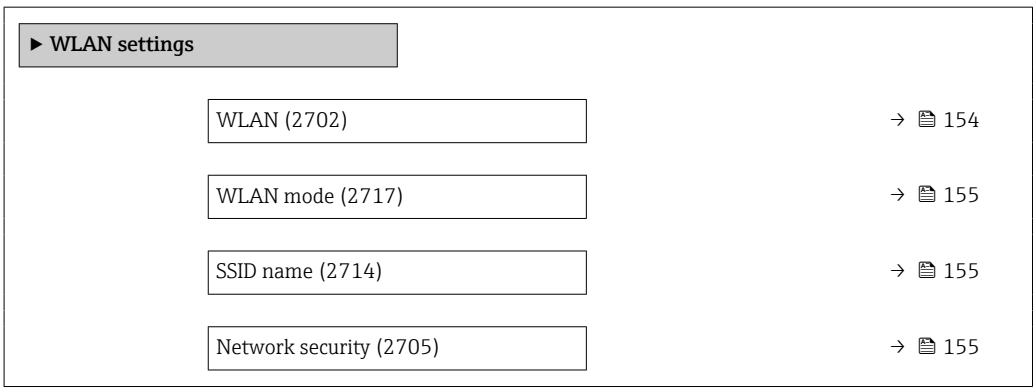
Navigation Expert → Communication → Web server → Login page (7273)

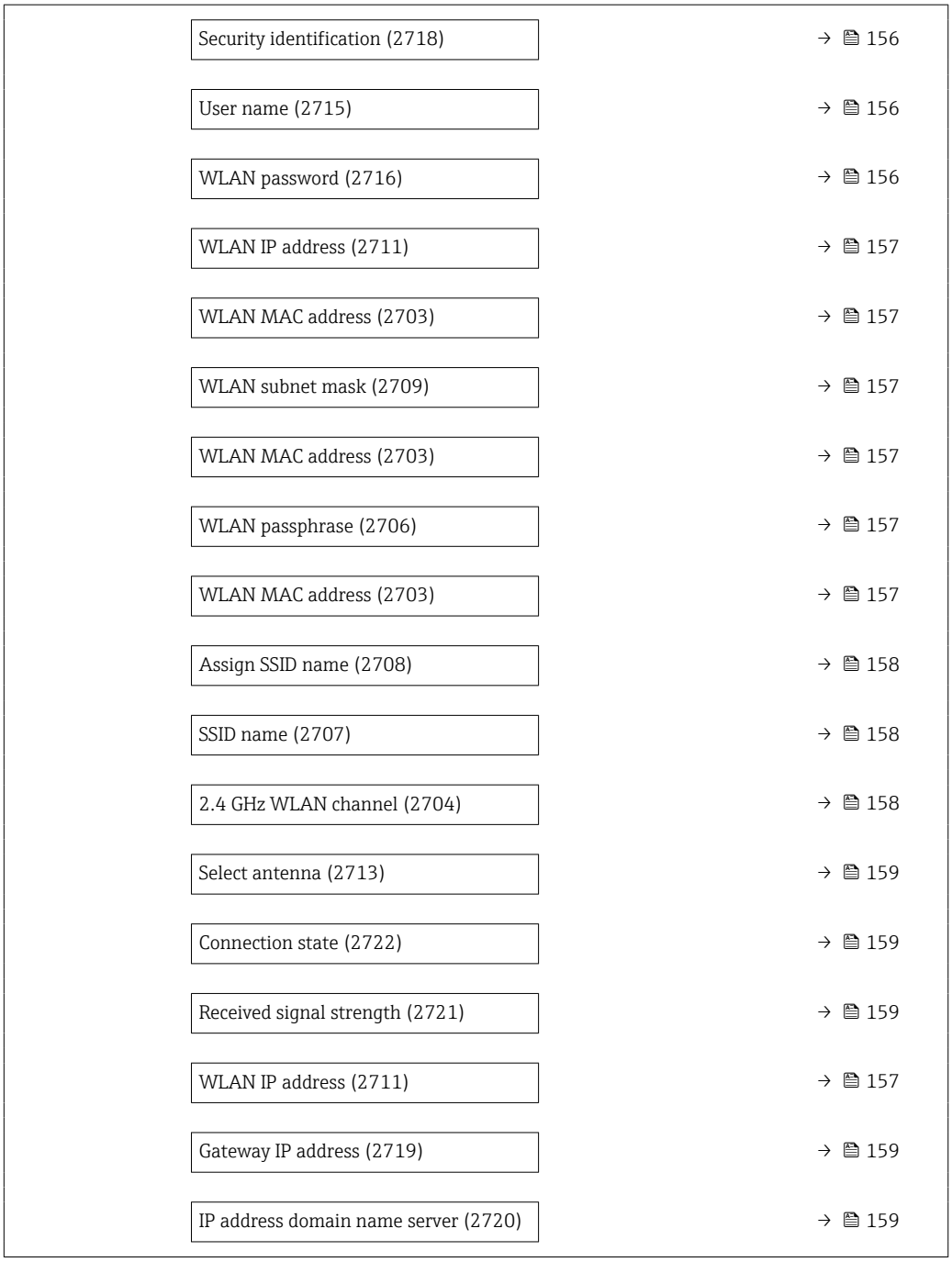
Description Use this function to select the format of the login page.

Selection
- Without header
- With header

3.5.5 "WLAN settings" wizard

Navigation Expert → Communication → WLAN settings





WLAN

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

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

Selection
- Disable
- Enable

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

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 *

* Visibility depends on order options or device settings

Additional information *Selection*

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

Security identification

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

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

User interface

- Trusted issuer certificate
- Device certificate
- Device private key

User name

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

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

User entry –

Factory setting –

WLAN password

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

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

User entry –

Factory setting –

WLAN IP address

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

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

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

WLAN MAC address

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

Description Displays the MAC [11] address of the measuring device.

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

Factory setting Each measuring device is given an individual address.

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

WLAN subnet mask

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

Description Use this function to enter the subnet mask.

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

WLAN passphrase

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

Prerequisite The **WPA2-PSK** option is selected in the **Security type** parameter (→ 155).

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)

11) Media Access Control

Assign SSID name

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

Description Use this function to select which name is used for the SSID [12].

Selection
- Device tag
- User-defined

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

SSID name

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

Prerequisite
- The **User-defined** option is selected in the **Assign SSID name** parameter (→ 158).
- The **WLAN access point** option is selected in the **WLAN mode** parameter (→ 155).

Description Use this function to enter a user-defined SSID name.

User entry Max. 32-digit character string comprising numbers, letters and special characters

2.4 GHz WLAN channel

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

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

User entry 1 to 11

Additional information *Description*

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

12) Service Set Identifier

Select antenna

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

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

Selection
- External antenna
- Internal antenna

Connection state

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

Description The connection status is displayed.

User interface
- Connected
- 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

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

IP address domain name server

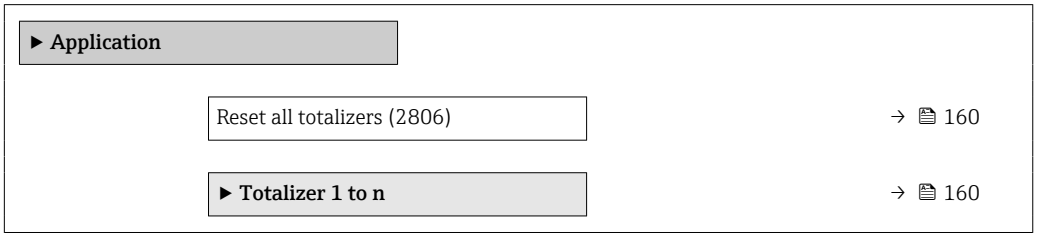
Navigation Expert → Communication → WLAN settings → IP address DNS (2720)

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

User interface Character string comprising numbers, letters and special characters

3.6 "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.

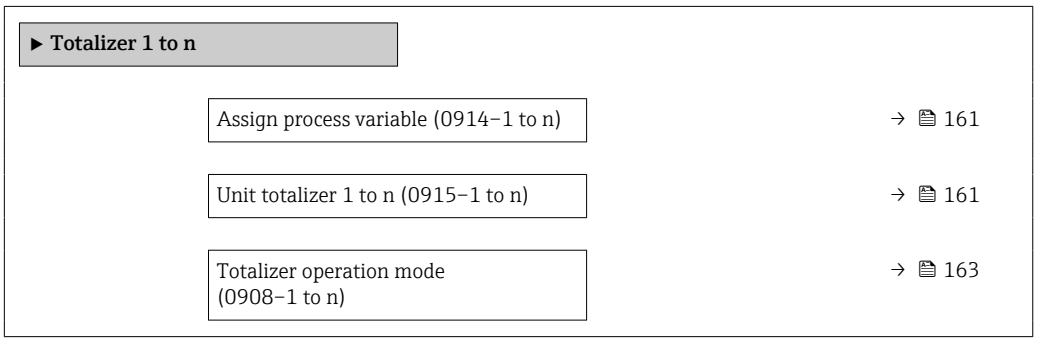
Selection
- Cancel
- Reset + totalize

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.

3.6.1 "Totalizer 1 to n" submenu

Navigation Expert → Application → Totalizer 1 to n



Control Totalizer 1 to n (0912–1 to n)	→ 163
Preset value 1 to n (0913–1 to n)	→ 164
Failure mode (0901–1 to n)	→ 164

Assign process variable

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

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

Selection
- Off
- Mass flow
- Corrected volume flow
- FAD volume flow *
- Volume flow
- Energy flow *
- Heat 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 (→ 161) is still displayed in the **Totalizer 1 to n** submenu. All other parameters in the submenu are hidden.

Unit totalizer 1 to n

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

Prerequisite A process variable is selected in the **Assign process variable** parameter (→ 161) of the **Totalizer 1 to n** submenu.

Description Use this function to select the process variable unit for the Totalizer 1 to n (→ 160).

Selection

SI units
- g *
- kg *
- t *

US units
- oz *
- lb *
- STon *

* Visibility depends on order options or device settings

* Visibility depends on order options or device settings

or

SI units
- m^3 *
- l *

US units
- ft^3 *
- Mft^3 *

* Visibility depends on order options or device settings

or

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

US units
Sft^3 *

* Visibility depends on order options or device settings

or

SI units
- m^3 FAD *
- l FAD *

US units
cf FAD *

* Visibility depends on order options or device settings

or

SI units
- kWh *
- MWh *
- GWh *
- kJ *
- MJ *
- GJ *
- kcal *
- Mcal *
- Gcal *

Imperial units
- Btu *
- MBtu *
- MMBtu *

* Visibility depends on order options or device settings

or

Other units
None *

* Visibility depends on order options or device settings

Additional information

Description

The unit is selected separately for each totalizer. It is independent of the selection made in the **System units** submenu (→ 55).

Options

The selection is dependent on the process variable selected in the **Assign process variable** parameter (→ 161).

Totalizer operation mode

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

Prerequisite A process variable is selected in the **Assign process variable** parameter (→ 161) of the **Totalizer 1 to n** submenu.

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

Selection
- Net flow total
- Forward flow total
- Reverse 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 (→ 161) 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

Additional information *Selection*

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

1) Visible depending on the order options or device settings

Preset value 1 to n

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

Prerequisite A process variable is selected in the **Assign process variable** parameter (→ 161) 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

Additional information

User entry

The unit of the selected process variable is defined in the **Unit totalizer** parameter (→ 161) for the totalizer.

Example

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

Failure mode

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

Prerequisite A process variable is selected in the **Assign process variable** parameter (→ 161) 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

- Stop
- Actual value
- Last valid value

Additional information

Description

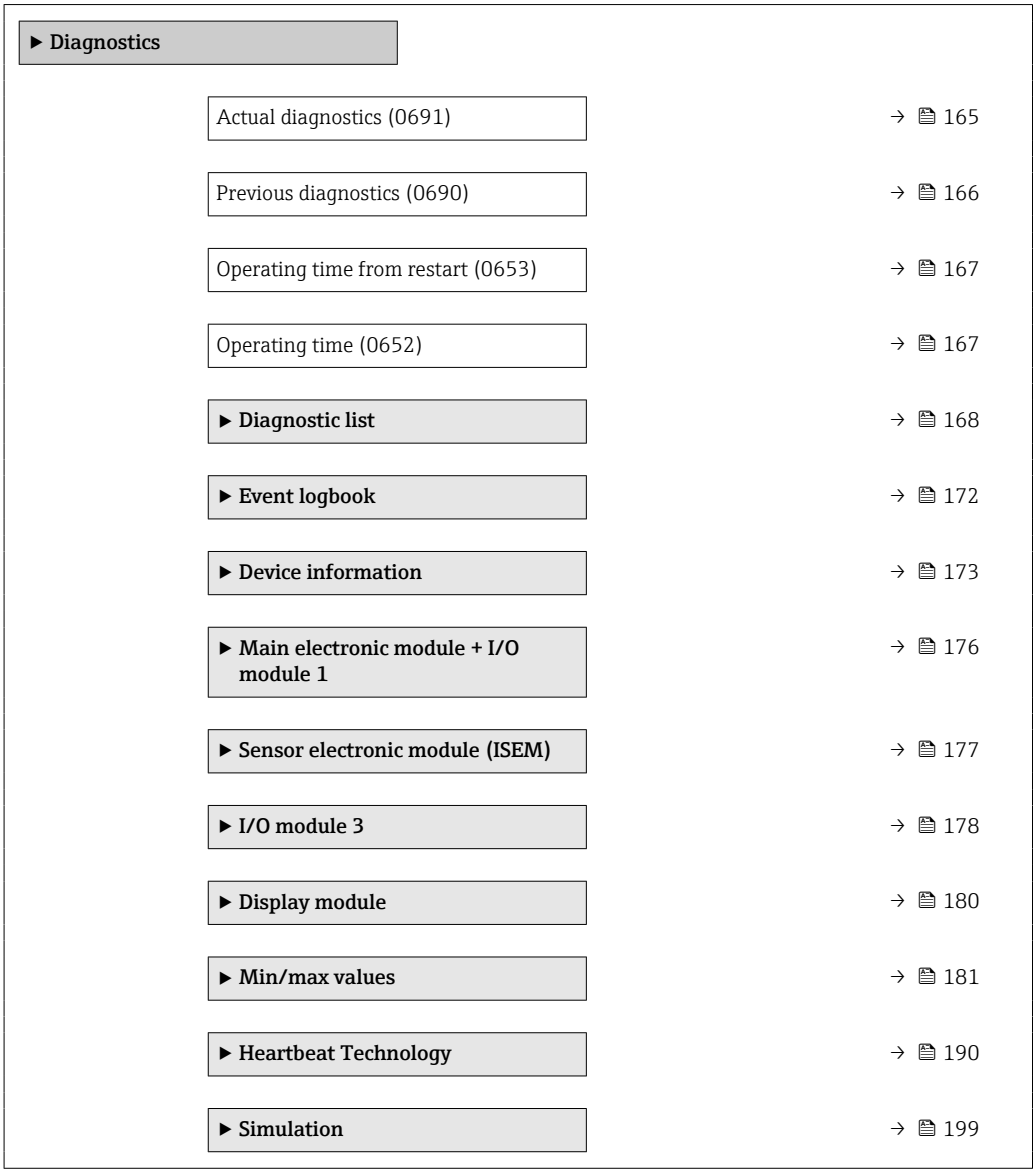
This setting does not affect the failsafe mode of other totalizers and the outputs. This is specified in separate parameters.

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 "Diagnostics" submenu

Navigation Expert → Diagnostics



Actual diagnostics

Navigation Expert → Diagnostics → Actual diagnos. (0691)

Prerequisite A diagnostic event has occurred.

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

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

Additional information *Display*

Additional pending diagnostic messages can be viewed in the **Diagnostic list** submenu (→ 168).

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

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 (→ 165).

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

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 (→ 166).

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.

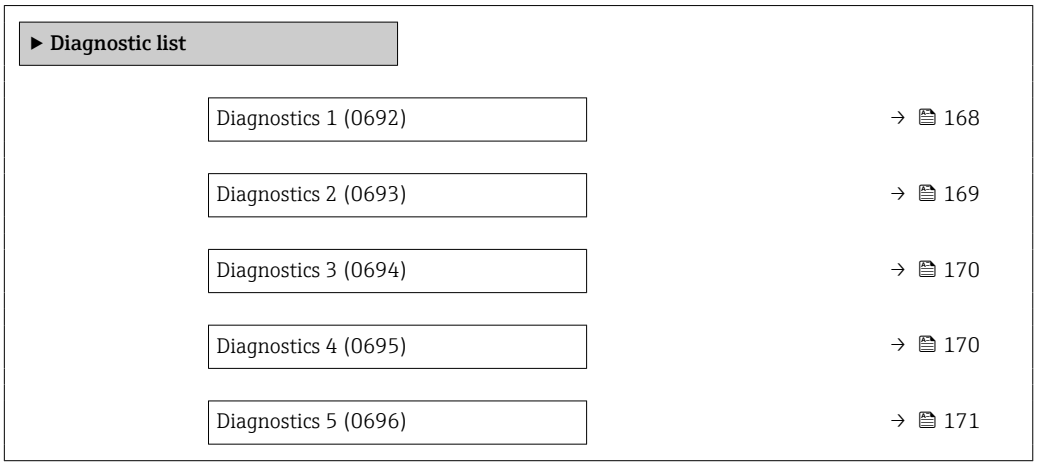
User interface Days (d), hours (h), minutes (m) and seconds (s)

Additional information *Indication*

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

3.7.1 "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

Navigation Expert → Diagnostics → Diagnostic list → Timestamp

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

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

Additional information *Display*

The diagnostic message can be viewed via the **Diagnostics 1** parameter (→ 168).

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

Navigation Expert → Diagnostics → Diagnostic list → Timestamp

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

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

Additional information *Display*

The diagnostic message can be viewed via the **Diagnostics 2** parameter (→ 169).

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

Navigation Expert → Diagnostics → Diagnostic list → Timestamp

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

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

Additional information *Display*

The diagnostic message can be viewed via the **Diagnostics 3** parameter (→ 170).

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

Navigation Expert → Diagnostics → Diagnostic list → Timestamp

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

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

Additional information *Display*

The diagnostic message can be viewed via the **Diagnostics 4** parameter (→ 170).

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

Navigation Expert → Diagnostics → Diagnostic list → Timestamp

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

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

Additional information *Display*

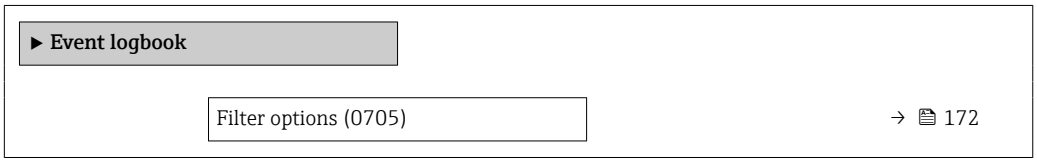
The diagnostic message can be viewed via the **Diagnostics 5** parameter (→ 171).

Example

For the display format:
24d12h13m00s

3.7.2 "Event logbook" submenu

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.

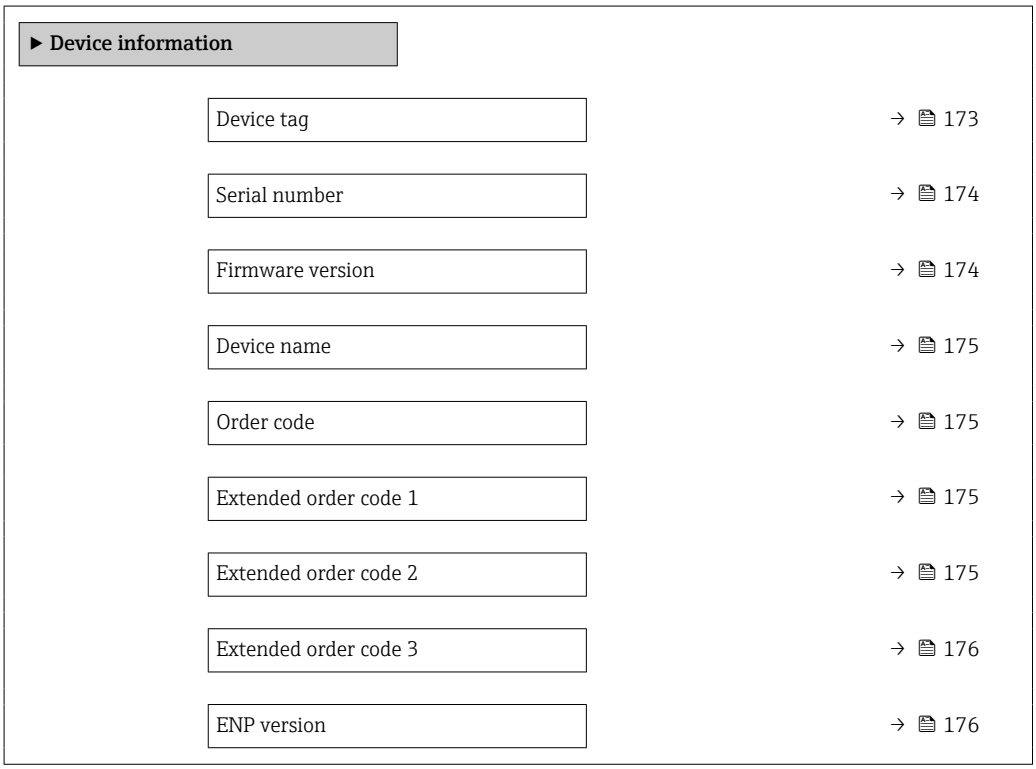
Selection
- All
- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- Information (I)

Additional information *Description*

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

3.7.3 "Device information" submenu

Navigation Expert → Diagnostics → Device info



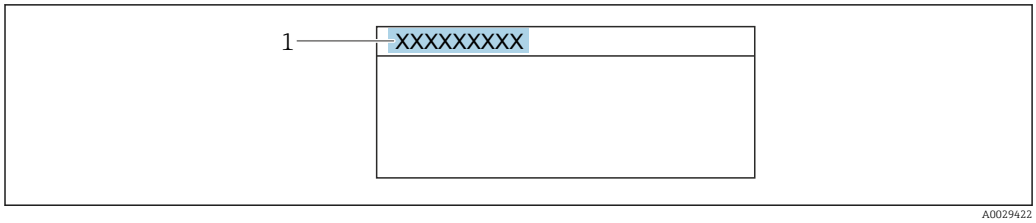
Device tag

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

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

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

Additional information *User interface*



1 Position of the header text on the display

The number of characters displayed depends on the characters used.

Serial number

Navigation Expert → Diagnostics → Device info → Serial number (0009)

Description Displays the serial number of the measuring device.

The number can be found on the nameplate of the sensor and transmitter.

User interface Max. 11-digit character string comprising letters and numbers.

Additional information *Description*

Uses of the serial number
- To identify the measuring device quickly, e.g. when contacting Endress+Hauser.
- To obtain specific information on the measuring device using the Device Viewer: www.endress.com/deviceviewer

Firmware version

Navigation Expert → Diagnostics → Device info → Firmware version (0010)

Description Displays the device firmware version installed.

User interface Character string in the format xx.yy.zz

Additional information *Display*

The Firmware version is also located:
- On the title page of the Operating instructions
- On the transmitter nameplate

Device name

Navigation Expert → Diagnostics → Device info → Device name (0020)

Description Displays the name of the transmitter. It can also be found on the nameplate of the transmitter.

User interface Character string comprising numbers, letters and special characters

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 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.

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 (→ 175)

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 (→ 175)

ENP version

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

Description Displays the version of the electronic nameplate.

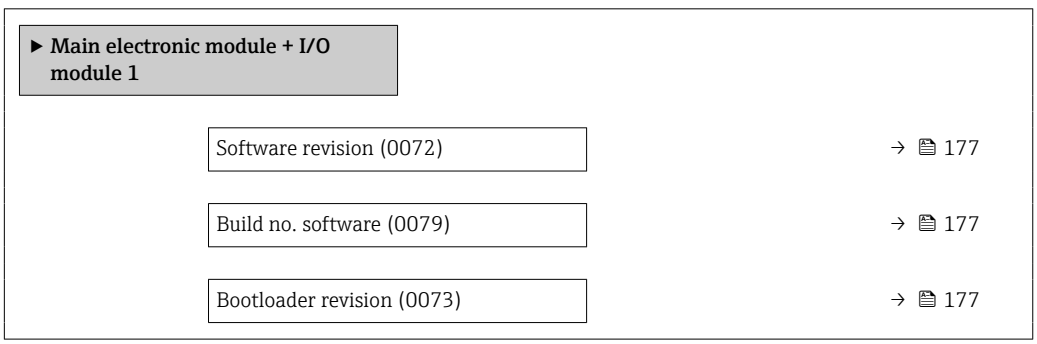
User interface Character string

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.

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

Navigation Expert → Diagnostics 1 → Main elec.+I/O1



Software revision

Navigation Expert → Diagnostics → Main elec.+I/O1 → Software rev. (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

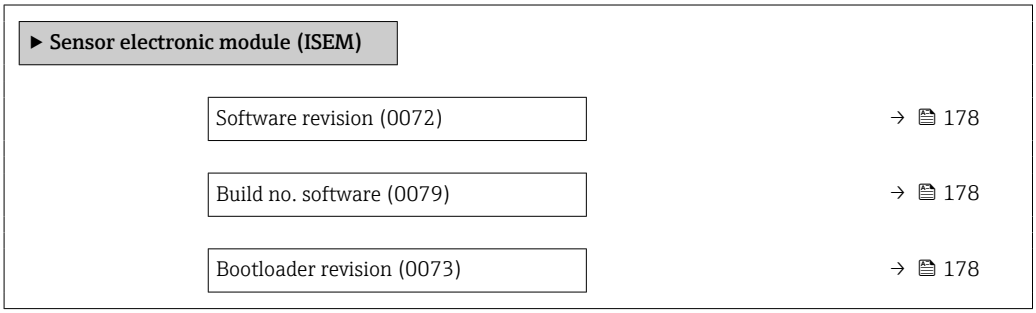
Navigation Expert → Diagnostics → Main elec.+I/O1 → Bootloader rev. (0073)

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

User interface Positive integer

3.7.5 "Sensor electronic module (ISEM)" submenu

Navigation Expert → Diagnostics → Sens. electronic



Software revision

Navigation Expert → Diagnostics → Sens. electronic → Software rev. (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

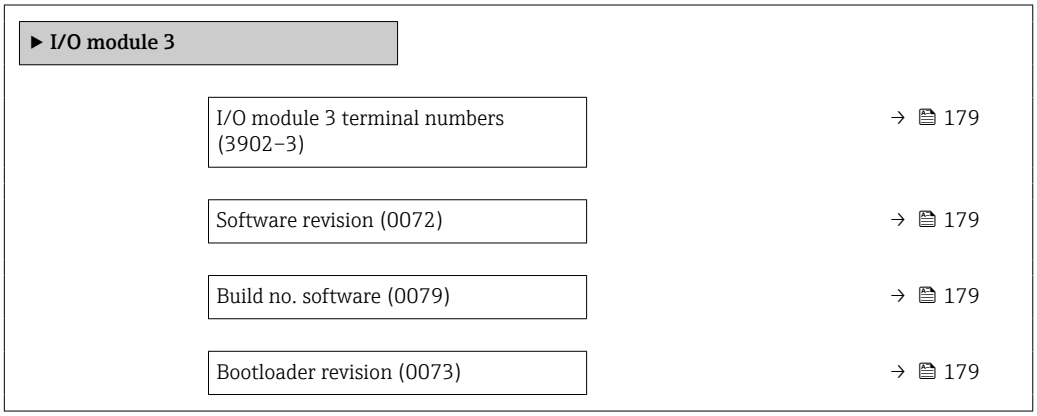
Navigation Expert → Diagnostics → Sens. electronic → Bootloader rev. (0073)

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

User interface Positive integer

3.7.6 "I/O module 3" submenu

Navigation Expert → Diagnostics → I/O module 3



I/O module 3 terminal numbers

Navigation Expert → Diagnostics → I/O module 3 → I/O 3 terminals (3902–3)

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

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

Software revision

Navigation Expert → Diagnostics → I/O module 3 → Software rev. (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

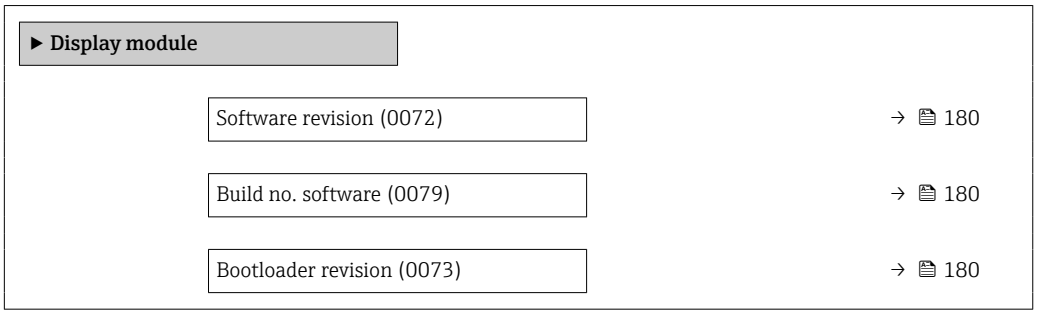
Navigation Expert → Diagnostics → I/O module 3 → Bootloader rev. (0073)

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

User interface Positive integer

3.7.7 "Display module" submenu

Navigation Expert → Diagnostics → Display module



Software revision

Navigation Expert → Diagnostics → Display module → Software rev. (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

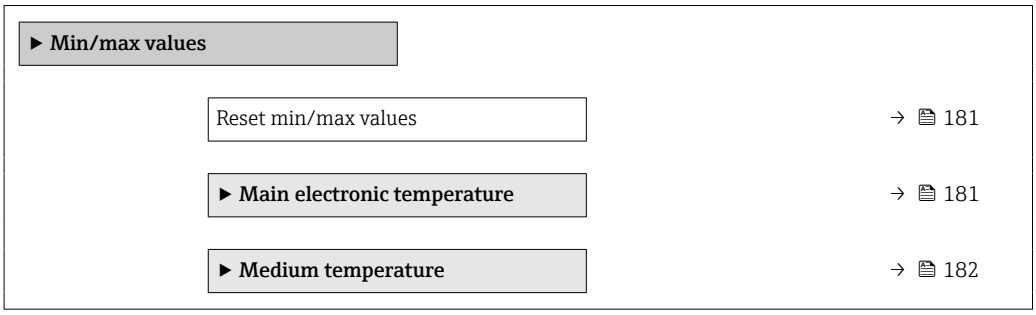
Navigation Expert → Diagnostics → Display module → Bootloader rev. (0073)

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

User interface Positive integer

3.7.8 "Min/max values" submenu

Navigation Expert → Diagnostics → Min/max val.



Reset min/max values

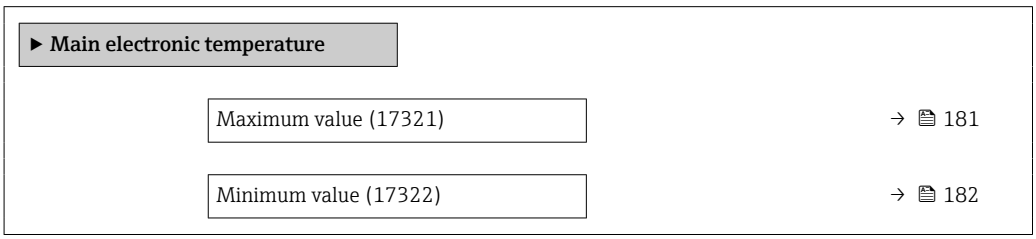
Navigation Expert → Diagnostics → Min/max val. → Reset min/max (17015)

Description Select measured variable whose minimum value and maximum value are to be reset.

Selection
- Main electronic temperature (→ 181)
- Medium temperature (→ 182)

"Main electronic temperature" submenu

Navigation Expert → Diagnostics → Min/max val. → Main elect.temp.



Maximum value

Navigation Expert → Diagnostics → Min/max val. → Main elect.temp. → Maximum value (17321)

Description Shows the highest previously measured temperature for the main electronic module in the transmitter.

User interface Signed floating-point number

Minimum value

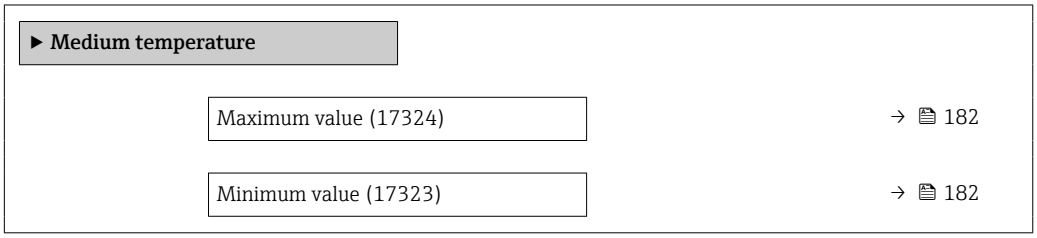
Navigation Expert → Diagnostics → Min/max val. → Main elect.temp. → Minimum value (17322)

Description Shows the lowest previously measured temperature for the main electronic module in the transmitter.

User interface Signed floating-point number

"Medium temperature" submenu

Navigation Expert → Diagnostics → Min/max val. → Medium temp.



Maximum value

Navigation Expert → Diagnostics → Min/max val. → Medium temp. → Maximum value (17324)

Description Shows the highest previously measured medium temperature.

User interface Signed floating-point number

Minimum value

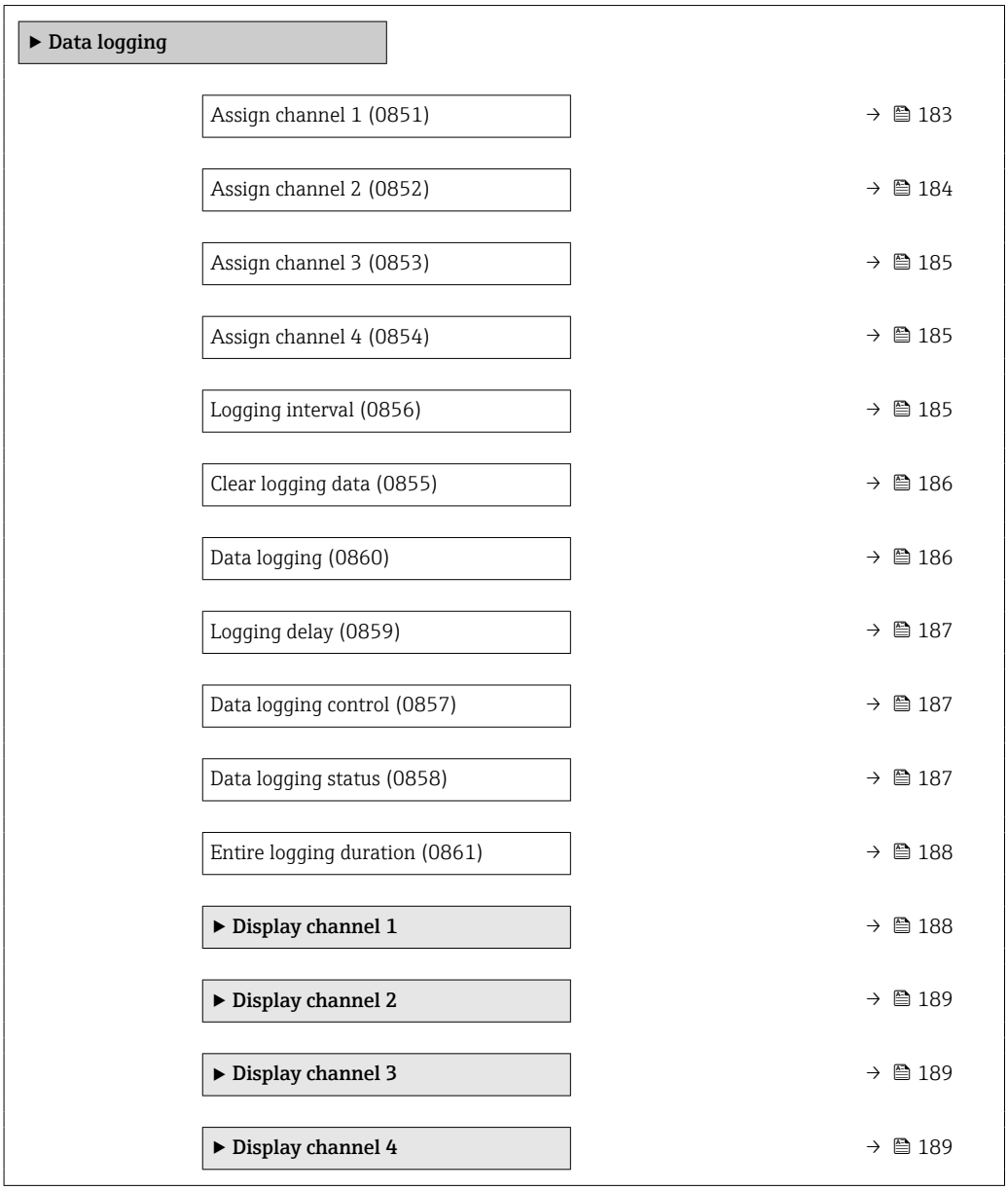
Navigation Expert → Diagnostics → Min/max val. → Medium temp. → Minimum value (17323)

Description Shows the lowest previously measured medium temperature.

User interface Signed floating-point number

3.7.9 "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 (→ 41).

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

Selection

- Off
- Temperature
- Mass flow
- Corrected volume flow
- FAD volume flow *
- Volume flow
- Energy flow *
- Heat flow *
- Density
- Flow velocity
- Pressure
- 2nd temperature delta heat *
- Electronic temperature
- Current output 1 *
- Current output 2 *
- Current output 3 *

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 (→ 41).

Description

Use this function to assign a process variable to the logging channel.

Selection

For the picklist, see **Assign channel 1** parameter (→ 183)

* 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 (→ 41).

Description Use this function to assign a process variable to the logging channel.

Selection For the picklist, see **Assign channel 1** parameter (→ 183)

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 (→ 41).

Description Use this function to assign a process variable to the logging channel.

Selection For the picklist, see **Assign channel 1** parameter (→ 183)

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 (→ 41).

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

User entry 0.1 to 3 600.0 s

Additional information *Description*

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

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

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

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

Example

If 1 logging channel is used:
- T_{log} = 1000 × 1 s = 1 000 s ≈15 min
- T_{log} = 1000 × 10 s = 10 000 s ≈ 3 h
- T_{log} = 1000 × 80 s = 80 000 s ≈ 1 d
- T_{log} = 1000 × 3 600 s = 3 600 000 s ≈ 41 d

Clear logging data

Navigation Expert → Diagnostics → Data logging → Clear logging (0855)

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

The software options currently enabled are displayed in the **Software option overview** parameter (→ 41).

Description Use this function to clear the entire logging data.

Selection
- Cancel
- Clear data

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

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 (→ 186), 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

Additional information *Description*

Once data logging has been started with the **Data logging control** parameter (→ 187), 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 (→ 186), the **Not overwriting** option is selected.

Description Use this function to start and stop measured value logging.

Selection
- None
- Delete + start
- Stop

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 (→ 186), the **Not overwriting** option is selected.

Description Displays the measured value logging status.

User interface
- Done
- Delay active
- Active
- Stopped

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)

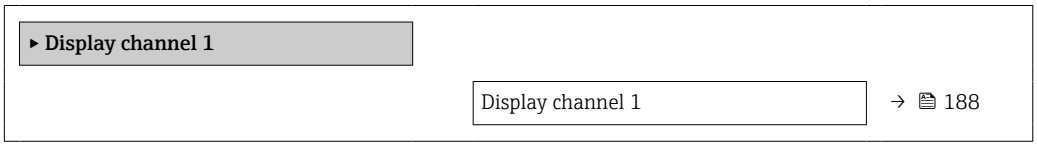
Prerequisite In the **Data logging** parameter (→ 186), the **Not overwriting** option is selected.

Description Displays the total logging duration.

User interface Positive floating-point number

"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 (→ 41).

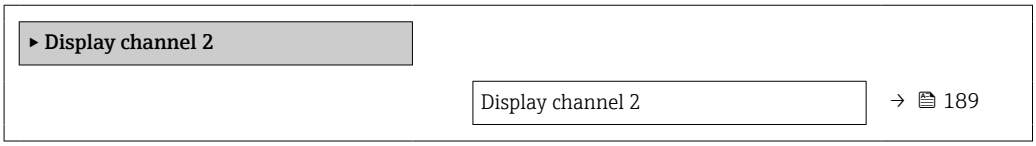
Description Displays the measured value trend for the logging channel in the form of a chart.

Additional information *Description*

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

"Display channel 2" submenu

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



Display channel 2

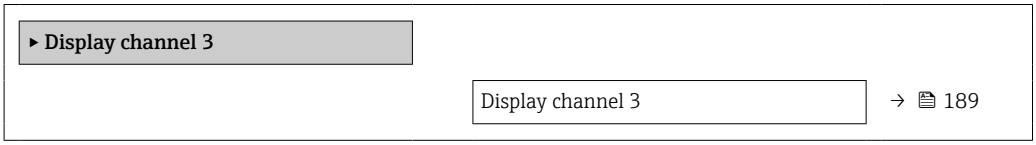
Navigation Expert → Diagnostics → Data logging → Displ.channel 2

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

Description See the **Display channel 1** parameter → 188

"Display channel 3" submenu

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



Display channel 3

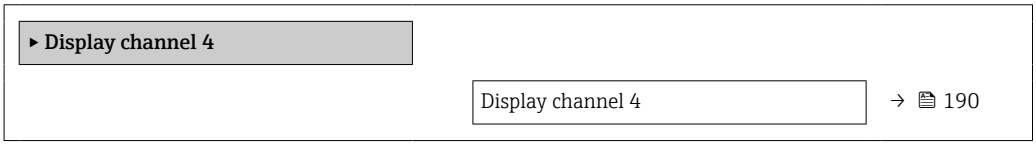
Navigation Expert → Diagnostics → Data logging → Displ.channel 3

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

Description See the **Display channel 1** parameter → 188

"Display channel 4" submenu

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



Display channel 4

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

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

Description See the **Display channel 1** parameter → 188

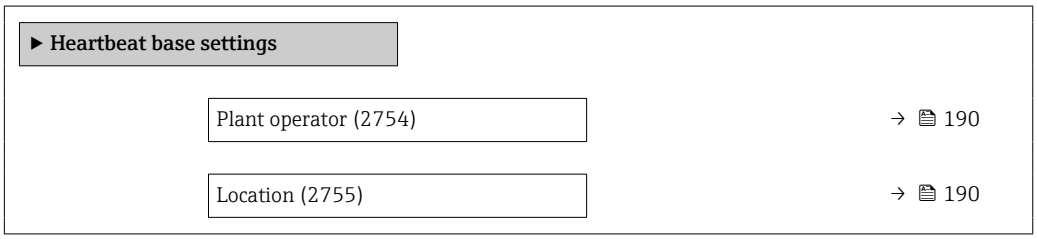
3.7.10 "Heartbeat Technology" submenu

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

Navigation Expert → Diagnostics → HBT

"Heartbeat base settings" submenu

Navigation Expert → Diagnostics → HBT → Base settings



Plant operator

Navigation Expert → Diagnostics → HBT → 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

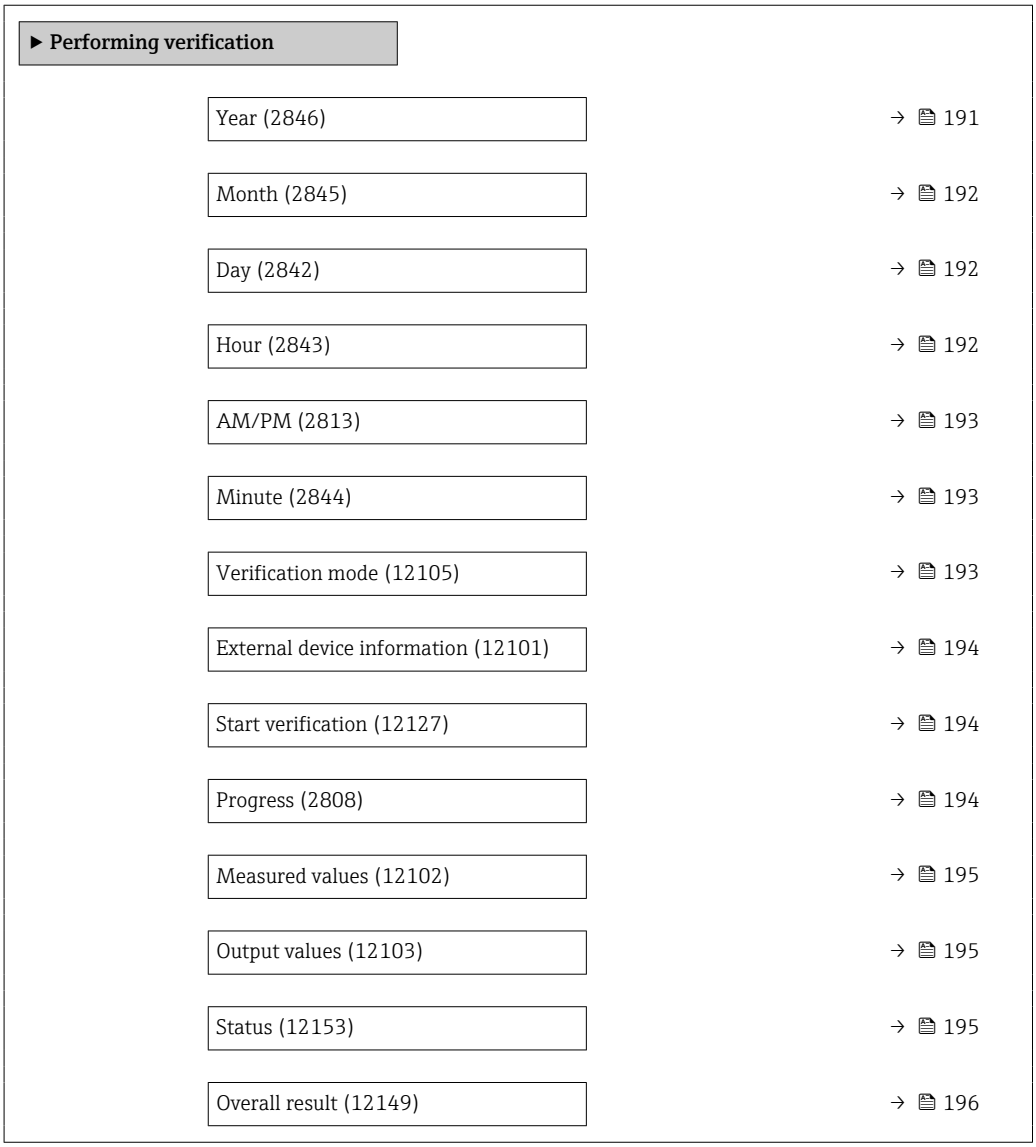
Navigation Expert → Diagnostics → HBT → Base settings → Location (2755)

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 → HBT → Perform.verific.



Year

Navigation Expert → Diagnostics → HBT → 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

Month

Navigation Expert → Diagnostics → HBT → 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

Day

Navigation Expert → Diagnostics → HBT → 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

Hour

Navigation Expert → Diagnostics → HBT → 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

AM/PM

Navigation Expert → Diagnostics → HBT → Perform.verific. → AM/PM (2813)

Prerequisite Can be edited if Heartbeat Verification is not active.

The **dd.mm.yy hh:mm am/pm** option or the **mm/dd/yy hh:mm am/pm** option is selected in the **Date/time format** parameter (2812) (→ 64).

Description Use this function to select the time entry in the morning (**AM** option) or afternoon (**PM** option) in the case of 12-hour notation.

Selection
- AM
- PM

Minute

Navigation Expert → Diagnostics → HBT → 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

Verification mode

Navigation Expert → Diagnostics → HBT → Perform.verific. → Verificat. mode (12105)

Prerequisite Can be edited if the verification status is not active.

Description Select verification mode.

Standard verification: Verification is performed automatically by the device and without manual checking of external measured variables.

Extended verification: Similar to internal verification but with the entry of external measured variables (see also "Measured values" parameter).

Selection
- Standard verification
- Extended verification

External device information

Navigation Expert → Diagnostics → HBT → Perform.verific. → Ext. device info (12101)

Prerequisite
With the following conditions:
- The **Extended verification** option is selected in the **Verification mode** parameter (→ 193).
- 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 → HBT → Perform.verific. → Start verificat. (12127)

Description
Start the verification.

To carry out a complete verification, select the selection parameters individually. Once the external measured values have been recorded, verification is started using the **Start** option.

Selection
- Cancel
- Start
- Output 1 low value *
- Output 1 high value *
- Output 2 low value *
- Output 2 high value *
- Output 3 low value *
- Output 3 high value *
- Frequency output 1 *
- Pulse output 1 *
- Frequency output 2 *
- Pulse output 2 *

Progress

Navigation Expert → Diagnostics → HBT → Perform.verific. → Progress (2808)

Description The progress of the process is indicated.

User interface 0 to 100 %

* Visibility depends on order options or device settings

Measured values

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

Prerequisite One of the following options is selected in the **Start verification** parameter (→ 194):
- Output 1 low value
- Output 1 high value
- Output 2 low value
- Output 2 high value
- Output 3 low value
- Output 3 high value
- Frequency output 1
- Pulse output 1
- Frequency output 2
- Pulse output 2

Description Use this function to enter the measured values (actual values) for the external measured variables:.
- Current output: Output current in [mA]
- Pulse/frequency output: Output frequency in [Hz]

User entry Signed floating-point number

Output values

Navigation Expert → Diagnostics → HBT → 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 → HBT → Perform.verific. → Status (12153)

Description Displays the current status of the verification.

User interface
- Done
- Busy
- Failed
- Not done

Overall result

Navigation Expert → Diagnostics → HBT → Perform.verific. → Overall result (12149)

Description Displays the overall result of the verification.

Detailed description of the classification of the results:

User interface
- Passed
- Not done
- Failed

"Verification results" submenu

Navigation Expert → Diagnostics → HBT → Verific. results

▶ Verification results	
Date/time (12142)	→ 196
Verification ID (12141)	→ 197
Operating time (12126)	→ 197
Overall result (12149)	→ 197
Sensor (12152)	→ 197
Sensor electronic module (ISEM) (12151)	→ 198
I/O module (12145)	→ 198
System status (12109)	→ 199

Date/time

Navigation Expert → Diagnostics → HBT → 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 → HBT → 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

Operating time

Navigation Expert → Diagnostics → HBT → 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 –

Overall result

Navigation Expert → Diagnostics → HBT → Verific. results → Overall result (12149)

Description Displays the overall result of the verification.

Detailed description of the classification of the results:

User interface
- Passed
- Not done
- Failed

Sensor

Navigation Expert → Diagnostics → HBT → Verific. results → Sensor (12152)

Prerequisite The **Failed** option was shown in the **Overall result** parameter (→ 196).

Description Displays the result for the sensor.

Detailed description of the classification of the results:

User interface
- Passed
- Not done
- Failed

HBSI

Navigation Expert → Diagnostics → Heartbeat → Verific. results → HBSI (12167)

Prerequisite The **Failed** option is shown in the **Overall result** parameter (→ 196).

Description Displays the relative change in the sensor with all the sensor components.

Detailed description of the classification of the results:

User interface
- Failed
- Passed
- Not done

Sensor electronic module (ISEM)

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

Prerequisite The **Failed** option was shown in the **Overall result** parameter (→ 196).

Description Displays the result for the sensor electronics module (ISEM).

Detailed description of the classification of the results:

User interface
- Passed
- Not done
- Failed

I/O module

Navigation Expert → Diagnostics → HBT → Verific. results → I/O module (12145)

Prerequisite The **Failed** option was shown in the **Overall result** parameter (→ 196).

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
- Relay output: Number of switching cycles

Heartbeat Verification does not check the digital inputs and outputs and does not issue a result for this.

Detailed description of the classification of the results:

User interface

- Passed
- Not done
- Not plugged
- Failed

System status

Navigation Expert → Diagnostics → HBT → Verific. results → System status (12109)

Prerequisite The **Failed** option was shown in the **Overall result** parameter (→ 196).

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

Detailed description of the classification of the results:

User interface

- Passed
- Not done
- Failed

"Monitoring results" submenu

Navigation Expert → Diagnostics → HBT → Monitor. results

▶ Monitoring results

3.7.11 "Simulation" submenu

Navigation Expert → Diagnostics → Simulation

▶ Simulation		
	Assign simulation process variable (1810)	→ 200
	Process variable value (1811)	→ 201

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
- Temperature
- Mass flow
- Corrected volume flow
- FAD volume flow *
- Volume flow
- Energy flow *
- Heat flow *
- Density
- Flow velocity

Additional information

Description

The simulation value of the process variable selected is defined in the **Process variable value** parameter (→ 201).

Process variable value

Navigation

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

Prerequisite

A process variable is selected in the **Assign simulation process variable** parameter (→ 200).

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

Additional information

User entry

The unit of the displayed measured value is taken from the **System units** submenu (→ 55).

Current input 1 to n simulation

Navigation

Expert → Diagnostics → Simulation → Curr.inp 1 to n sim. (1608–1 to n)

Description

Option for switching simulation of the current input on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

The desired simulation value is defined in the **Value current input 1 to n** parameter.

Selection

- Off
- On

* 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, the **On** option is selected.

Description Use this function to enter the current value for the simulation. In this way, users can verify the correct configuration of the current input and the correct function of upstream feed-in units.

User entry 0 to 22.5 mA

Status input simulation 1 to n

Navigation Expert → Diagnostics → Simulation → Status inp.sim 1 to n (1355–1 to n)

Description Use this function to switch simulation of the status input on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

Selection

- Off
- On

Additional information *Description*

The desired simulation value is defined in the **Input signal level** parameter (→ 202).

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 (→ 202), 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.out. 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

Additional information

Description

The desired simulation value is defined in the **Value current output 1 to n** parameter.

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

Value current output 1 to n

Navigation Expert → Diagnostics → Simulation → Value curr.out 1 to n (0355–1 to n)

Prerequisite In the **Current output 1 to n simulation** parameter, the **On** option is selected.

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

User entry 3.59 to 22.5 mA

Additional information

Dependency

The input range is dependent on the option selected in the **Current span** parameter (→ 112).

Frequency output simulation 1 to n

Navigation Expert → Diagnostics → Simulation → FreqOutputSim 1 to n (0472–1 to n)

Prerequisite In the **Operating mode** parameter (→ 123), 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

Additional information

Description

The desired simulation value is defined in the **Frequency value 1 to n** parameter.

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

Frequency value 1 to n

Navigation Expert → Diagnostics → Simulation → Freq value 1 to n (0473–1 to n)

Prerequisite In the **Frequency output simulation 1 to n** parameter, the **On** option is selected.

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

User entry 0.0 to 12 500.0 Hz

Pulse output simulation 1 to n

Navigation Expert → Diagnostics → Simulation → Puls.outp.sim. 1 to n (0458–1 to n)

Prerequisite In the **Operating mode** parameter (→ 123), 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

Additional information *Description*

The desired simulation value is defined in the **Pulse value 1 to n** parameter.

Selection

- Off
  Pulse simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
- Fixed value
  Pulses are continuously output with the pulse width specified in the **Pulse width** parameter (→ 125).
- Down-counting value
  The pulses specified in the **Pulse value** parameter (→ 205) are output.

Pulse value 1 to n

Navigation Expert → Diagnostics → Simulation → Pulse value 1 to n (0459–1 to n)

Prerequisite In the **Pulse output simulation 1 to n** parameter, the **Down-counting value** option is selected.

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

User entry 0 to 65 535

Switch output simulation 1 to n

Navigation Expert → Diagnostics → Simulation → Switch sim. 1 to n (0462–1 to n)

Prerequisite In the **Operating mode** parameter (→ 123), 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

Additional information *Description*

The desired simulation value is defined in the **Switch status 1 to n** parameter.

Selection

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

Switch status 1 to n

Navigation Expert → Diagnostics → Simulation → Switch status 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

Additional information *Description*

The desired simulation value is defined in the **Switch status 1 to n** parameter.

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

Switch status 1 to n

Navigation Expert → Diagnostics → Simulation → Switch status 1 to n (0803–1 to n)

Prerequisite The **On** option is selected in the **Switch output simulation 1 to n** parameter parameter.

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

Selection
- Open
- Closed

Additional information *Selection*
- Open
  Relay simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
- Closed
  Relay simulation is active.

Device alarm simulation

Navigation Expert → Diagnostics → Simulation → Dev. alarm sim. (0654)

Description Use this function to switch the device alarm on and off.

Selection
- Off
- On

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 (→ 207).

Selection
- Sensor
- Electronics
- Configuration
- Process

Diagnostic event simulation

Navigation Expert → Diagnostics → Simulation → Diag. event sim. (0737)

Description Use this function to select a diagnostic event for the simulation process that is activated.

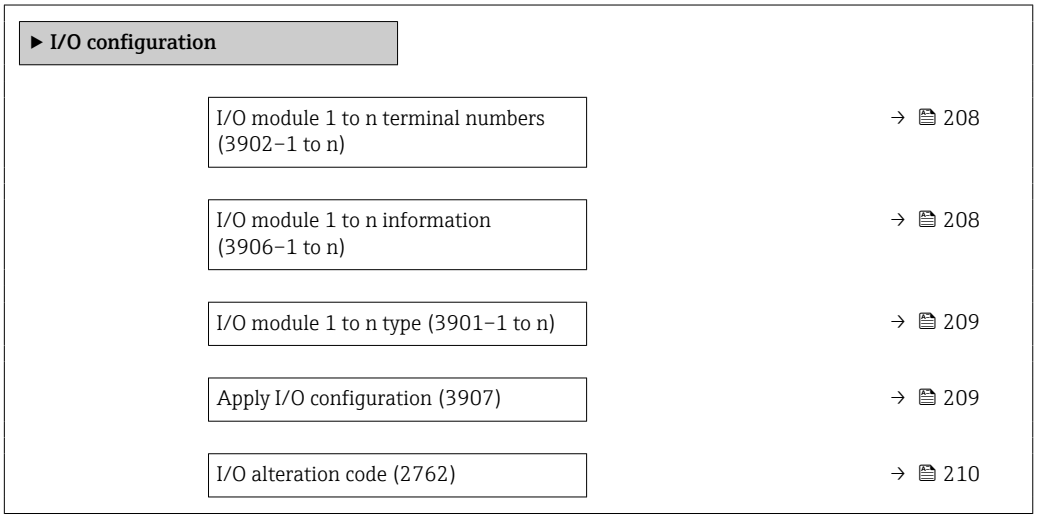
Selection
- Off
- Diagnostic event picklist (depends on the category selected)

Additional information *Description*

For the simulation, you can choose from the diagnostic events of the category selected in the **Diagnostic event category** parameter (→ 207).

3.8 "I/O configuration" submenu

Navigation Expert → I/O config.



I/O module 1 to n terminal numbers

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

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

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

I/O module 1 to n information

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

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

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

Additional information

"Not plugged" option

The I/O module is not plugged in.

"Invalid" option

The I/O module is not plugged correctly.

"Not configurable" option

The I/O module is not configurable.

"Configurable" option

The I/O module is configurable.

"MODBUS" option

The I/O module is configured for Modbus.

I/O module 1 to n type

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

Prerequisite

For the following order code:
- "Output; input 2", option **D** "Configurable I/O initial setting off"
- "Output; input 3", option **D** "Configurable I/O initial setting off"

Description

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

Selection

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

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

* 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

Additional information *Description*

The I/O configuration is changed in the **I/O module type** parameter (→ 209).

4 Country-specific factory settings

4.1 SI units

Not valid for USA and Canada.

4.1.1 System units

Volume flow	**m³/h** option
Volume	**m³** option
Mass flow	**kg/h** option
Mass	**kg** option
Corrected volume flow	**Nm³/h** option
Corrected volume	**Nm³** option
FAD volume flow	**m³ FAD/h** option
FAD volume	**m³ FAD** option
Density	**kg/m³** option
Reference density	kg/Nm³
Temperature	**°C** option
Length	**mm** option
Pressure	**bar a** option

4.1.2 Full scale values

The full scale values depend on the medium type, nominal diameter and rectifier.

The factory settings applie to the following parameters:
- 20 mA value (full scale value of the current output)
- 100% bar graph value 1

4.1.3 Output current span

Output	Current range
Current output 1...n	4 to 20 mA NAMUR

4.1.4 On value low flow cut off

The switch-on point depends on the type of medium and the nominal diameter.

4.2 US units

Only valid for USA and Canada.

4.2.1 System units

Volume flow	**ft³/h** option
Volume	**ft³** option

Mass flow	**lb/h** option
Mass	**lb** option
Corrected volume flow	**Sft³/min** option
Corrected volume	**Sft³** option
FAD volume flow	ft³ FAD/h
FAD volume	ft³ FAD
Density	**lb/ft³** option
Reference density	lb/Sft³
Temperature	**°F** option
Length	**in** option
Pressure	**psi a** option

4.2.2 Full scale values

The full scale values depend on the medium type, nominal diameter and rectifier.

The factory settings applie to the following parameters:
- 20 mA value (full scale value of the current output)
- 100% bar graph value 1

4.2.3 Output current span

Output	Current range
Current output 1…n	4 to 20 mA US

4.2.4 On value low flow cut off

The switch-on point depends on the type of medium and the nominal diameter.

5 Explanation of abbreviated units

5.1 SI units

Process variable	Units	Explanation
Density	g/cm³	Gram/volume unit
	kg/l, kg/dm³, kg/m³	Kilogram/volume unit
Pressure	kPa a, MPa a	Kilopascal, megapascal (absolute)
	bar	Bar
	mbar a	Millibar (absolute)
FAD volume	l FAD, m³ FAD	FAD liter, FAD cubic meter
FAD volume flow	l FAD/s, l FAD/min, l FAD/h, l FAD/d	FAD liter/time unit
	m³ FAD/s, m³ FAD/min, m³ FAD/h, m³ FAD/d	FAD cubic meter/time unit
Length	mm, m	Millimeter, meter
Mass	g, kg, t	Gram, kilogram, metric ton
Mass flow	g/s, g/min, g/h, g/d	Gram/time unit
	kg/s, kg/min, kg/h, kg/d	Kilogram/time unit
	t/s, t/min, t/h, t/d	Metric ton/time unit
Corrected volume	Nl, Nm³, Sl, Sm³	Normal liter, normal cubic meter, standard liter, standard cubic meter
Corrected volume flow	Nl/s, Nl/min, Nl/h, Nl/d	Normal liter/time unit
	Nm³/s, Nm³/min, Nm³/h, Nm³/d	Normal cubic meter/time unit
	Sl/s, Sl/min, Sl/h, Sl/d	Standard liter/time unit
	Sm³/s, Sm³/min, Sm³/h, Sm³/d	Standard cubic meter/time unit
Temperature	°C, K	Celsius, Kelvin
Volume	m³	Cubic meters
Volume flow	m³/s, m³/min, m³/h, m³/d	Cubic meter/time unit
	l/s, l/min, l/h, l/d	Liter/time unit
Time	s, m, h, d, y	Second, minute, hour, day, year

5.2 US units

Process variable	Units	Explanation
Density	lb/ft³	Pound/cubic foot
FAD volume	ft³ FAD	FAD cubic foot
FAD volume flow	cf FAD/s, cf FAD/min, cf FAD/h, cf FAD/d	FAD cubic foot/time unit
FAD volume flow	ft³ FAD/s, ft³ FAD/min, ft³ FAD/h, ft³ FAD/d,	FAD cubic foot/time unit
Length	in, ft	Inch, foot
Mass	lb, ton	Pound, standard ton
Mass flow	lb/s, lb/min, lb/h, lb/d	Pound/time unit
	ton/s, ton/min, ton/h, ton/d	Standard ton/time unit

Process variable	Units	Explanation
Corrected volume	Sft^3	Standard cubic foot
Corrected volume flow	Sft^3/s, Sft^3/min, Sft^3/h, Sft^3/d	Standard cubic foot/time unit
Temperature	°F, °R	Fahrenheit, Rankine
Volume	ft^3	Cubic foot
Volume flow	ft^3/s, ft^3/min, ft^3/h, ft^3/d	Cubic foot/time unit
Time	s, m, h, d, y	Second, minute, hour, day, year
	am, pm	Ante meridiem (before midday), post meridiem (after midday)

6 Modbus RS485 register information

6.1 Notes

6.1.1 Structure of the register information

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

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

NOTICE

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

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

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

6.1.2 Address model

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

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

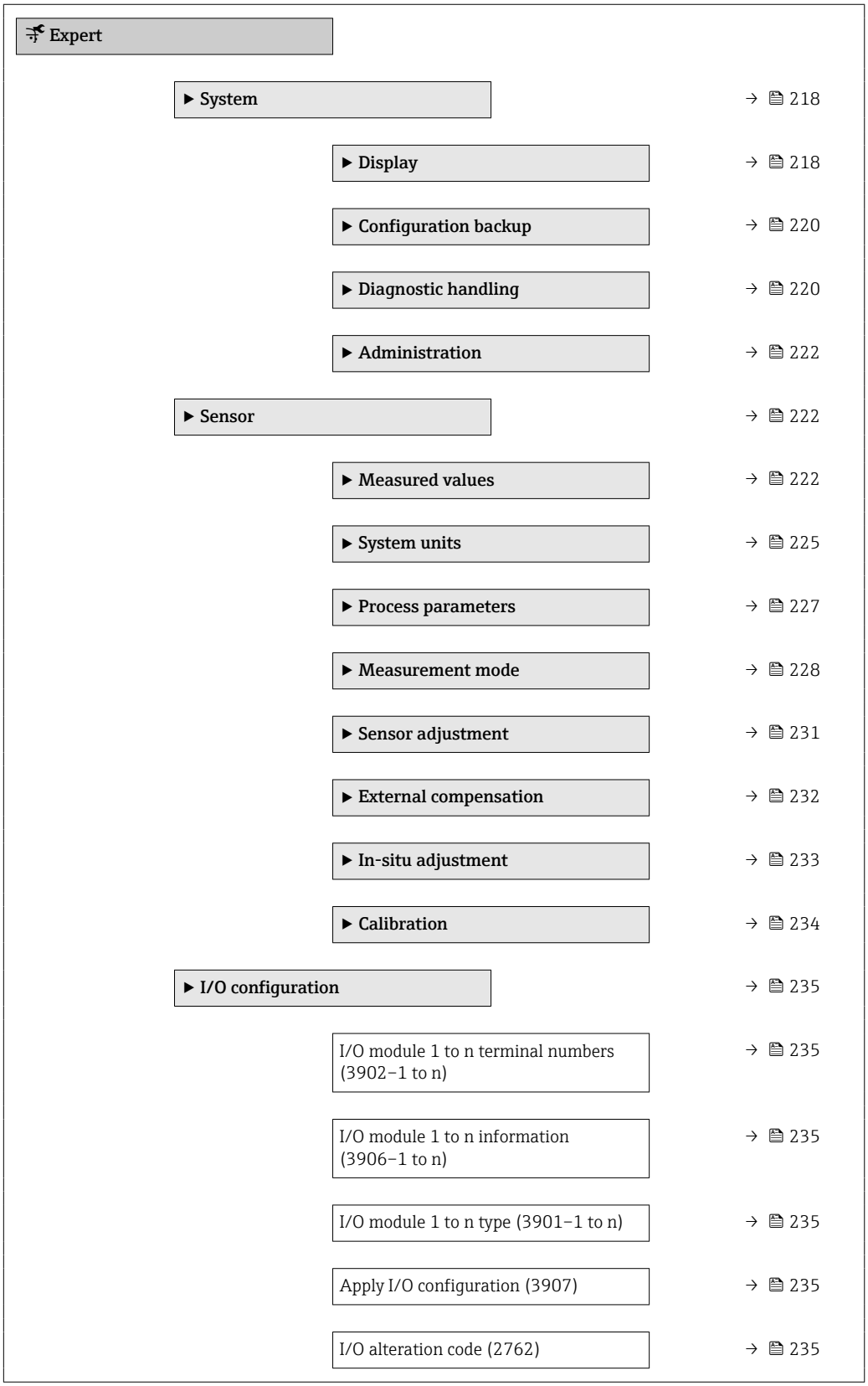
Depending on the function code used, a number is added at the start of the register address with this specification:

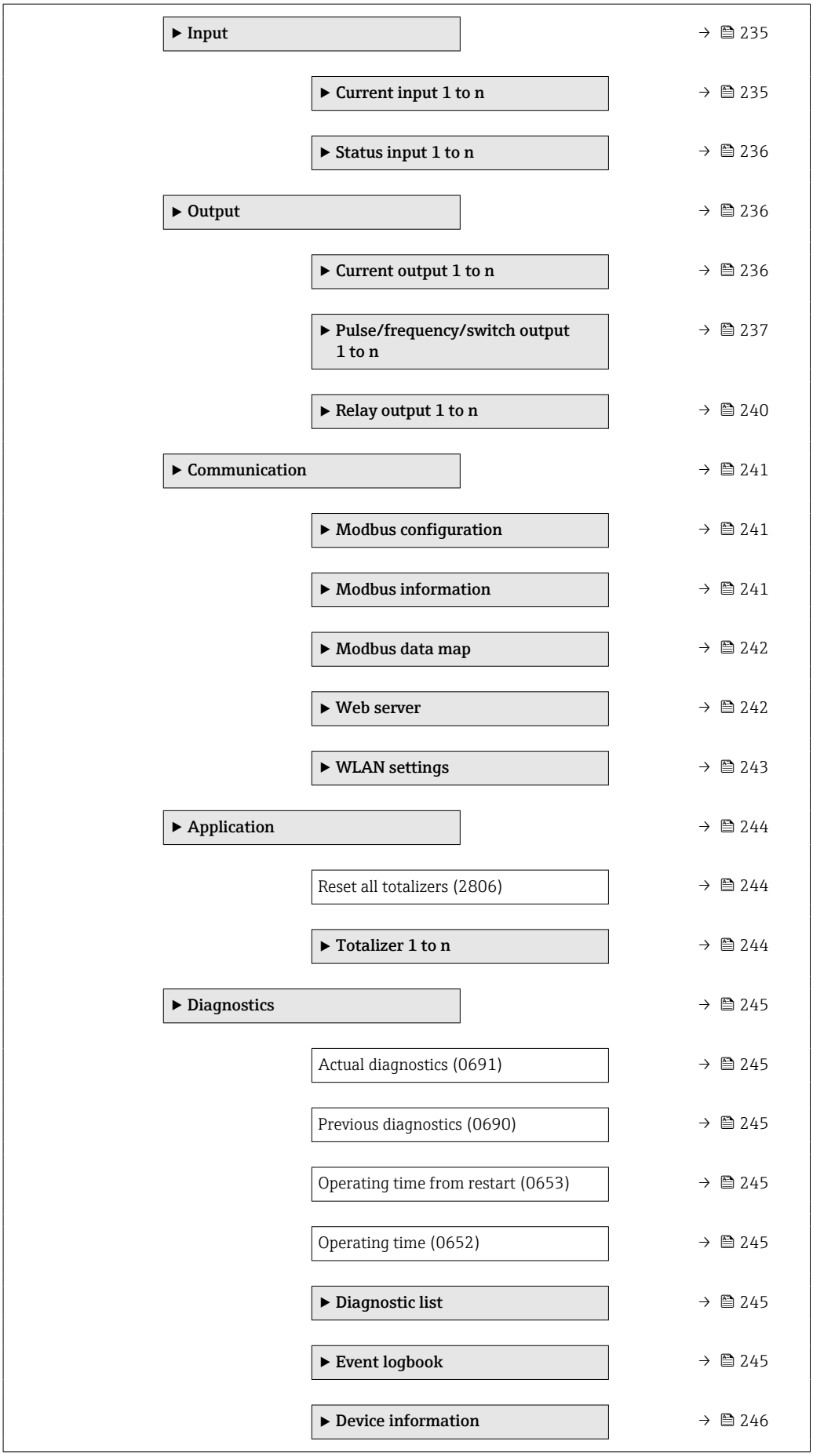
- "3" → "Read" access
- "4" → "Write" access

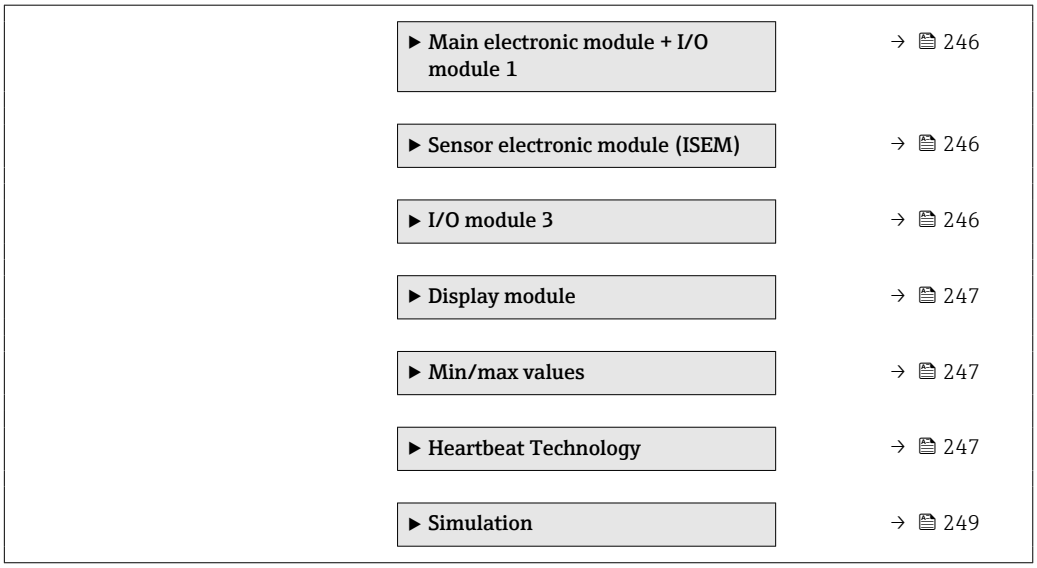
Function code	Access type	Register in accordance with "Modbus Applications Protocol Specification"	Register in accordance with "Modicon Modbus Protocol Reference Guide"
03 04 23	Read	XXXX Example: mass flow = 2007	3XXXX Example: mass flow = 32007
06 16 23	Write	XXXX Example: reset totalizer = 6401	4XXXX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

6.2 Overview of the Expert operating menu

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




▶ Input → 235
▶ Current input 1 to n → 235
▶ Status input 1 to n → 236
▶ Output → 236
▶ Current output 1 to n → 236
▶ Pulse/frequency/switch output 1 to n → 237
▶ Relay output 1 to n → 240
▶ Communication → 241
▶ Modbus configuration → 241
▶ Modbus information → 241
▶ Modbus data map → 242
▶ Web server → 242
▶ WLAN settings → 243
▶ Application → 244
Reset all totalizers (2806) → 244
▶ Totalizer 1 to n → 244
▶ Diagnostics → 245
Actual diagnostics (0691) → 245
Previous diagnostics (0690) → 245
Operating time from restart (0653) → 245
Operating time (0652) → 245
▶ Diagnostic list → 245
▶ Event logbook → 245
▶ Device information → 246



6.3 Register information

6.3.1 "System" submenu

"Display" submenu

Navigation: Expert → System → Display					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Display language (0104)	3673	Integer	Read / Write	0 = English 1 = Deutsch 2 = Français 3 = Español 4 = Italiano 5 = Nederlands 8 = Svenska 11 = 日本語 (Japanese) 12 = Portuguesa 13 = Polski 14 = русский язык (Russian) 15 = čeština (Czech) 16 = 中文 (Chinese) 18 = Türkçe 19 = tiếng Việt (Vietnamese) 20 = 한국어 (Korean)	16
Format display (0098)	3625	Integer	Read / Write	0 = 1 value, max. size 1 = 1 bargraph + 1 value 2 = 2 values 3 = 1 value large + 2 values 4 = 4 values	17

Navigation: Expert → System → Display					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→ 🖹**
Value 1 display (0107)	3963	Integer	Read / Write	3 = Corrected volume flow 4 = Density 7 = Temperature 9 = Volume flow 11 = Mass flow 16 = Totalizer 1 17 = Totalizer 2 18 = Totalizer 3 37 = Flow velocity 38 = Energy flow * 39 = Electronic temperature 66 = Pressure 73 = FAD volume flow * 121 = Current output 1 * 122 = Current output 2 * 123 = Current output 3 * 150 = Heat flow * 151 = 2nd temperature delta heat *	19
0% bargraph value 1 (0123)	4136 to 4137	Float	Read / Write	Signed floating-point number	19
100% bargraph value 1 (0125)	4142 to 4143	Float	Read / Write	Signed floating-point number	20
Decimal places 1 (0095)	3365	Integer	Read / Write	0 = x 1 = x.x 2 = x.xx 3 = x.xxx 4 = x.xxxx	20
Value 2 display (0108)	3964	Integer	Read / Write	For the picklist, see **Value 1 display** parameter (→ 🖹 19)	21
Decimal places 2 (0117)	4049	Integer	Read / Write	0 = x 1 = x.x 2 = x.xx 3 = x.xxx 4 = x.xxxx	21
Value 3 display (0110)	3966	Integer	Read / Write	For the picklist, see **Value 1 display** parameter (→ 🖹 19)	21
0% bargraph value 3 (0124)	4138 to 4139	Float	Read / Write	Signed floating-point number	22
100% bargraph value 3 (0126)	4140 to 4141	Float	Read / Write	Signed floating-point number	22
Decimal places 3 (0118)	4050	Integer	Read / Write	0 = x 1 = x.x 2 = x.xx 3 = x.xxx 4 = x.xxxx	23
Value 4 display (0109)	3965	Integer	Read / Write	For the picklist, see **Value 1 display** parameter (→ 🖹 19)	23
Decimal places 4 (0119)	4051	Integer	Read / Write	0 = x 1 = x.x 2 = x.xx 3 = x.xxx 4 = x.xxxx	24
Display interval (0096)	3604 to 3605	Float	Read / Write	1 to 10 s	24
Display damping (0094)	3554 to 3555	Float	Read / Write	0.0 to 999.9 s	24
Header (0097)	3624	Integer	Read / Write	0 = Device tag 1 = Free text	25
Header text (0112)	3968 to 3973	String	Read / Write	Max. 12 characters, such as letters, numbers or special characters (e.g. @, %, /)	25
Separator (0101)	3671	Integer	Read / Write	▪ . (point) ▪ , (comma)	26

Navigation: Expert → System → Display					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Contrast display (0105)	3674 to 3675	Float	Read / Write	20 to 80 %	26
Backlight (0111)	3967	Integer	Read / Write	0 = Disable 1 = Enable	27

* Visibility depends on order options or device settings

"Configuration backup" submenu

Navigation: Expert → System → Configuration backup					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Operating time (0652)	2631	String	Read	Days (d), hours (h), minutes (m) and seconds (s)	27
Last backup (2757)	6430	String	Read	Days (d), hours (h), minutes (m) and seconds (s)	28
Configuration management (2758)	5500	Integer	Read / Write	0 = Cancel 1 = Execute backup 2 = Restore * 4 = Clear backup data 5 = Compare *	28
Backup state (2759)	5502	Integer	Read	1 = Backup in progress 2 = Restoring in progress 4 = Delete in progress 5 = Compare in progress 6 = Restoring failed 7 = Backup failed 251 = None	29
Comparison result (2760)	5514	Integer	Read	0 = Settings identical 1 = Settings not identical 2 = No backup available 3 = Check not done 4 = Backup settings corrupt 5 = Dataset incompatible	29

* Visibility depends on order options or device settings

"Diagnostic handling" submenu

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

"Diagnostic behavior" submenu

Navigation: Expert → System → Diagnostic handling → Diagnostic behavior					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Assign behavior of diagnostic no. 144 (0631)	31189	Integer	Read / Write	0 = Off 1 = Logbook entry only 2 = Warning 3 = Alarm	32
Assign behavior of diagnostic no. 302 (0742)	6484	Integer	Read / Write	0 = Off 1 = Logbook entry only 2 = Warning 3 = Alarm	32

Navigation: Expert → System → Diagnostic handling → Diagnostic behavior					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Assign behavior of diagnostic no. 441 (0657)	4742	Integer	Read / Write	0 = Off 1 = Logbook entry only 2 = Warning 3 = Alarm	32
Assign behavior of diagnostic no. 442 (0658)	4919	Integer	Read / Write	0 = Off 1 = Logbook entry only 2 = Warning 3 = Alarm	33
Assign behavior of diagnostic no. 443 (0659)	5000	Integer	Read / Write	0 = Off 1 = Logbook entry only 2 = Warning 3 = Alarm	33
Assign behavior of diagnostic no. 444 (0740)	5120	Integer	Read / Write	0 = Off 1 = Logbook entry only 2 = Warning 3 = Alarm	34
Assign behavior of diagnostic no. 832 (0675)	6440	Integer	Read / Write	0 = Off 1 = Logbook entry only 2 = Warning 3 = Alarm	34
Assign behavior of diagnostic no. 833 (0676)	6439	Integer	Read / Write	0 = Off 1 = Logbook entry only 2 = Warning 3 = Alarm	34
Assign behavior of diagnostic no. 834 (0677)	6438	Integer	Read / Write	0 = Off 1 = Logbook entry only 2 = Warning 3 = Alarm	35
Assign behavior of diagnostic no. 835 (0678)	6437	Integer	Read / Write	0 = Off 1 = Logbook entry only 2 = Warning 3 = Alarm	35
Assign behavior of diagnostic no. 842 (0638)	9661	Integer	Read / Write	0 = Off 1 = Logbook entry only 2 = Warning 3 = Alarm	35
Assign behavior of diagnostic no. 976 (0629)	35077	Integer	Read / Write	0 = Off 1 = Logbook entry only 2 = Warning 3 = Alarm	36
Assign behavior of diagnostic no. 977 (0627)	27325	Integer	Read / Write	0 = Off 1 = Logbook entry only 2 = Warning 3 = Alarm	36
Assign behavior of diagnostic no. 979 (0630)	31188	Integer	Read / Write	0 = Off 1 = Logbook entry only 2 = Warning 3 = Alarm	36

"Administration" submenu

Navigation: Expert → System → Administration					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Device reset (0000)	6817	Integer	Read / Write	0 = Cancel 1 = Restart device 2 = To delivery settings 25 = Restore S-DAT backup *	39
Transmitter identifier (2765)	4510	Integer	Read	0 = Unknown 1 = 300 2 = 500	40
Activate SW option (0029)	2795	Integer	Read / Write	Max. 10-digit string of numbers.	40
Software option overview (0015)	2902	Integer	Read	1 = Extended HistoROM * 4 = Second gas 16384 = Heartbeat Monitoring * 32768 = Heartbeat Verification *	41

* Visibility depends on order options or device settings

"Define access code" wizard

Navigation: Expert → System → Administration → Define access code					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Define access code	8677 to 8684	String	Read / Write	Max. 16-digit character string comprising numbers, letters and special characters	37
Confirm access code	8685 to 8692	String	Read / Write	Max. 16-digit character string comprising numbers, letters and special characters	38

"Reset access code" submenu

Navigation: Expert → System → Administration → Reset access code					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Operating time (0652)	2631	String	Read	Days (d), hours (h), minutes (m) and seconds (s)	38
Reset access code (0024)	8880 to 8895	String	Read / Write	Character string comprising numbers, letters and special characters	39

6.3.2 "Sensor" submenu

"Measured values" submenu

"Process variables" submenu

Navigation: Expert → Sensor → Measured values → Process variables					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Mass flow (1838)	2007 to 2008	Float	Read	Signed floating-point number	43
Corrected volume flow (1847)	2009 to 2010	Float	Read	Signed floating-point number	43
Volume flow (1850)	2013 to 2014	Float	Read	Signed floating-point number	44
FAD volume flow (1851)	2011 to 2012	Float	Read	Signed floating-point number	44
Energy flow (1852)	2015 to 2016	Float	Read	Signed floating-point number	44

Navigation: Expert → Sensor → Measured values → Process variables					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Heat flow (1872)	2093 to 2094	Float	Read	Signed floating-point number	45
Temperature (1853)	2017 to 2018	Float	Read	Signed floating-point number	45
Density (1854)	2019 to 2020	Float	Read	Signed floating-point number	45
Process pressure (17343)	32677 to 32678	Float	Read	Signed floating-point number	45
2nd temperature heat flow (17344)	32683 to 32684	Float	Read	Signed floating-point number	46
Flow velocity (1857)	2083 to 2084	Float	Read	Signed floating-point number	46
Mach number (17302)	32627 to 32628	Float	Read	Signed floating-point number	46
Power coefficient fluctuation (12112)	27482 to 27483	Float	Read	Signed floating-point number	47
Level of flow fluctuation (12113)	27606 to 27607	Float	Read	Signed floating-point number	47

"System values" submenu

Navigation: Expert → Sensor → Measured values → System values					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Electronic temperature (17301)	32617 to 32618	Float	Read	Signed floating-point number	47

"Totalizer" submenu

Navigation: Expert → Sensor → Measured values → Totalizer					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Totalizer value 1 to n (0911–1 to n)	1: 2610 to 2611 2: 2810 to 2811 3: 3010 to 3011	Float	Read	Signed floating-point number	48
Totalizer overflow 1 to n (0910–1 to n)	1: 2612 to 2613 2: 2812 to 2813 3: 3012 to 3013	Float	Read	Integer with sign	48

"Input values" submenu

"Current input 1 to n" submenu

Navigation: Expert → Sensor → Measured values → Input values → Current input 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Measured values 1 to n (1603–1 to n)	1: 6151 to 6152 2: 6153 to 6154 3: 6155 to 6156	Float	Read	Signed floating-point number	50
Measured current 1 to n (1604–1 to n)	1: 6131 to 6132 2: 6133 to 6134 3: 6135 to 6136	Float	Read	0 to 22.5 mA	50

"Value status input 1 to n" submenu

Navigation: Expert → Sensor → Measured values → Input values → Value status input 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Value status input (1353–1 to n)	1: 2746 2: 4699 3: 4700	Integer	Read	0 = Low 1 = High	51

"Output values" submenu

"Value current output 1 to n" submenu

Navigation: Expert → Sensor → Measured values → Output values → Value current output 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Output current 1 to n (0361–1 to n)	1: 5931 to 5932 2: 5933 to 5934 3: 5935 to 5936	Float	Read	0 to 22.5 mA	52
Measured current 1 to n (0366–1 to n)	1: 5779 to 5780 2: 5781 to 5782 3: 5783 to 5784	Float	Read	0 to 30 mA	52

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

Navigation: Expert → Sensor → Measured values → Output values → Pulse/frequency/switch output 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Output frequency 1 to n (0471–1 to n)	1: 3462 to 3463 2: 3464 to 3465 3: 9910 to 9911	Float	Read	0.0 to 12 500.0 Hz	52
Pulse output 1 to n (0456–1 to n)	1: 3082 to 3083 2: 3084 to 3085 3: 4718 to 4719	Float	Read	Positive floating-point number	53
Switch status 1 to n (0461–1 to n)	1: 2485 2: 2486 3: 9917	Integer	Read	1 = Open 6 = Closed	53

"Relay output 1 to n" submenu

Navigation: Expert → Sensor → Measured values → Output values → Relay output 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Switch status (0801–1 to n)	1: 3518 2: 3519 3: 9875	Integer	Read	1 = Open 6 = Closed	54
Switch cycles (0815–1 to n)	1: 7625 2: 7627 3: 7629	Integer	Read	Positive integer	54
Max. switch cycles number (0817–1 to n)	1: 21919 2: 21921 3: 21923	Integer	Read	Positive integer	55

"System units" submenu

Navigation: Expert → Sensor → System units					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Mass flow unit (0554)	2101	Integer	Read / Write	0 = g/s 1 = g/min 2 = g/h 3 = g/d 4 = kg/s 5 = kg/min **6 = kg/h** (+) 7 = kg/d 8 = t/s 9 = t/min 10 = t/h 11 = t/d 16 = lb/s 17 = lb/min 18 = lb/h 19 = lb/d 20 = STon/s 21 = STon/min 22 = STon/h 23 = STon/d	56
Mass unit (0574)	2102	Integer	Read / Write	50 = g **51 = kg** (+) 52 = t 54 = lb 55 = STon	56
Corrected volume flow unit (0558)	2105	Integer	Read / Write	0 = Nl/s 1 = Nl/min 2 = Nl/h 3 = Nl/d 4 = Nm^3/s 5 = Nm^3/min **6 = Nm^3/h** (+) 7 = Nm^3/d 8 = Sm^3/s 9 = Sm^3/min 10 = Sm^3/h 11 = Sm^3/d 12 = Sft^3/s 13 = Sft^3/min 14 = Sft^3/h 15 = Sft^3/d 40 = Sl/s 41 = Sl/min 42 = Sl/h 43 = Sl/d	57
Corrected volume unit (0575)	2106	Integer	Read / Write	100 = Nl **101 = Nm^3** (+) 102 = Sm^3 103 = Sft^3 104 = Sl	57
Volume flow unit (0553)	2103	Integer	Read / Write	8 = m^3/s 9 = m^3/min 10 = m^3/h 11 = m^3/d 16 = l/s 17 = l/min **18 = l/h** (+) 19 = l/d 36 = ft^3/s 37 = ft^3/min 38 = ft^3/h 39 = ft^3/d	58

Navigation: Expert → Sensor → System units					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Volume unit (0563)	2104	Integer	Read / Write	2 = m^3 4 = l **9 = ft^3 (+)**	58
FAD volume flow unit (0601)	30587	Integer	Read / Write	15 = cf FAD/min 17 = l FAD/min **19 = m^3 FAD/h (+)** 24 = l FAD/s 26 = cf FAD/s 27 = cf FAD/d 28 = m^3 FAD/s 29 = m^3 FAD/d 130 = cf FAD/h 131 = m^3 FAD/min 138 = l FAD/h 240 = l FAD/d	59
FAD volume unit (0591)	30588	Integer	Read / Write	41 = l FAD 112 = cf FAD **166 = m^3 FAD (+)**	59
Energy flow unit (0565)	5786	Integer	Read / Write	0 = MW 1 = kJ/s 2 = kJ/min 3 = kJ/h 4 = kJ/d 5 = MJ/s 6 = MJ/min 7 = MJ/d 8 = Mcal/s 9 = Mcal/min 10 = Mcal/d 11 = kcal/s 12 = kcal/min 13 = kcal/h 14 = kcal/d 15 = MBtu/s 16 = MBtu/min 17 = MBtu/h 18 = MBtu/d 19 = MMBtu/s 20 = MMBtu/min 21 = MMBtu/h 22 = MMBtu/d 24 = GJ/s 25 = GJ/min 26 = GJ/h 27 = GJ/d 28 = Gcal/s 29 = Gcal/min 30 = Gcal/h 31 = Gcal/d 32 = Btu/s 33 = Btu/min 34 = Btu/day **127 = kW (+)** 140 = Mcal/h 141 = MJ/h 142 = Btu/h 144 = GW	60

Navigation: Expert → Sensor → System units					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→
Energy unit (0559)	5809	Integer	Read / Write	**128 = kWh** (+) 129 = GWh 130 = MWh 162 = Mcal 163 = kJ 164 = MJ 165 = Btu 167 = GJ 170 = Gcal 171 = kcal 172 = MBtu 173 = MMBtu	60
Calorific value unit (0552)	5785	Integer	Read / Write	0 = kJ/Nm³ **1 = kWh/Nm³** (+) 2 = kWh/Sm³ 3 = kJ/Sm³ 4 = Btu/Sm³ 5 = MBtu/Sm³ 6 = MBtu/Sft³ 7 = Btu/Sft³	61
Density unit (0555)	2107	Integer	Read / Write	0 = g/cm³ 2 = kg/dm³ 3 = kg/l **4 = kg/m³** (+) 11 = lb/ft³	61
Temperature unit (0557)	2109	Integer	Read / Write	**0 = °C** (+) 1 = K 2 = °F 3 = °R	62
Pressure unit (0564)	2130	Integer	Read / Write	1 = psi a 5 = kPa a 6 = MPa a **7 = bar a** (+) 8 = mbar a	62
Velocity unit (0566)	2600	Integer	Read / Write	20 = ft/s **21 = m/s** (+)	63
Length unit (0551)	2087	Integer	Read / Write	44 = ft 45 = m 47 = in **49 = mm** (+)	63
Date/time format (2812)	2150	Integer	Read / Write	0 = dd.mm.yy hh:mm 1 = mm/dd/yy hh:mm am/pm 2 = dd.mm.yy hh:mm am/pm 3 = mm/dd/yy hh:mm	64

"Process parameters" submenu

Navigation: Expert → Sensor → Process parameters					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→
Flow override (1839)	5503	Integer	Read / Write	0 = Off 1 = On	65
Flow damping (1802)	5510 to 5511	Float	Read / Write	0 to 999.9 s	65
Temperature damping (1822)	5127 to 5128	Float	Read / Write	0 to 999.9 s	66
Sensitivity (17032)	27323 to 27324	Float	Read / Write	1 to 9	66

"Low flow cut off" submenu

Navigation: Expert → Sensor → Process parameters → Low flow cut off					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Assign process variable (1837)	5101	Integer	Read / Write	0 = Off 3 = Corrected volume flow 9 = Volume flow 11 = Mass flow 73 = FAD volume flow *	67
On value low flow cutoff (1805)	5138 to 5139	Float	Read / Write	Positive floating-point number	67
Off value low flow cutoff (1804)	5104 to 5105	Float	Read / Write	0 to 100.0 %	67

* Visibility depends on order options or device settings

"Measurement mode" submenu

Navigation: Expert → Sensor → Measurement mode					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Measurement application (17350)	37384	Integer	Read / Write	0 = Air or compressed air 1 = Gas or gas mixture 2 = Energy	68
Calorific value type (3101)	24701	Integer	Read / Write	1 = Gross calorific value mass 3 = Net calorific value mass	69
Active gas (17001)	33278	Integer	Read / Write	11 = Gas 12 = Second gas	69

"Gas" submenu

Navigation: Expert → Sensor → Measurement mode → Gas					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Select gas type (3109)	25261	Integer	Read / Write	2 = Gas mixture 5 = Single gas 255 = Special gas *	70
Gas (3151)	25792	Integer	Read / Write	0 = Air 1 = Nitrogen N2 2 = Argon Ar 3 = Helium He 4 = Carbon dioxide CO2 5 = Oxygen O2 6 = Methane CH4 7 = Ammonia NH3 9 = Hydrogen H2 10 = Ethane C2H6 11 = Propane C3H8 12 = Butane C4H10 13 = Chlorine Cl2 14 = Hydrogen chloride HCl 15 = Carbon monoxide CO 18 = Hydrogen sulfide H2S 21 = Ozone O3 23 = Ethylene C2H4 30 = Krypton Kr 31 = Neon Ne 32 = Xenon Xe	71
Special gas name (3177)	26997 to 27004	String	Read	=	71

Navigation: Expert → Sensor → Measurement mode → Gas					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Gas composition (3110)	25282	Integer	Read / Write	1 = Air 2 = Hydrogen H2 4 = Helium He 8 = Neon Ne 16 = Argon Ar 32 = Krypton Kr 64 = Xenon Xe 128 = Nitrogen N2 256 = Oxygen O2 512 = Chlorine Cl2 1024 = Ammonia NH3 2048 = Carbon monoxide CO 4096 = Carbon dioxide CO2 16384 = Hydrogen sulfide H2S 32768 = Hydrogen chloride HCl 65536 = Methane CH4 131072 = Ethane C2H6 262144 = Propane C3H8 524288 = Butane C4H10 1048576 = Ethylene C2H4 8388608 = Water 16777216 = Ozone O3	71
Mol% Air (3170)	33126 to 33127	Float	Read / Write	0 to 100 %	72
Mol% Ar (3112)	25298 to 25299	Float	Read / Write	0 to 100 %	72
Mol% C2H4 (3114)	25888 to 25889	Float	Read / Write	0 to 100 %	72
Mol% C2H6 (3115)	25896 to 25897	Float	Read / Write	0 to 100 %	73
Mol% C3H8 (3116)	25904 to 25905	Float	Read / Write	0 to 100 %	73
Mol% CH4 (3117)	25912 to 25913	Float	Read / Write	0 to 100 %	73
Mol% Cl2 (3118)	26205 to 26206	Float	Read / Write	0 to 100 %	73
Mol% CO (3119)	26213 to 26214	Float	Read / Write	0 to 100 %	73
Mol% CO2 (3120)	26221 to 26222	Float	Read / Write	0 to 100 %	74
Mol% H2 (3121)	26229 to 26230	Float	Read / Write	0 to 100 %	74
Mol% H2O (3122)	26280 to 26281	Float	Read / Write	0 to 20 %	74
Mol% H2S (3123)	26291 to 26292	Float	Read / Write	0 to 100 %	74
Mol% HCl (3124)	26299 to 26300	Float	Read / Write	0 to 100 %	74
Mol% He (3125)	26307 to 26308	Float	Read / Write	0 to 100 %	75
Mol% i-C4H10 (3126)	26315 to 26316	Float	Read / Write	0 to 100 %	75
Mol% Kr (3128)	26327 to 26328	Float	Read / Write	0 to 100 %	75
Mol% N2 (3129)	26329 to 26330	Float	Read / Write	0 to 100 %	75
Mol% Ne (3137)	26355 to 26356	Float	Read / Write	0 to 100 %	75
Mol% NH3 (3138)	26359 to 26360	Float	Read / Write	0 to 100 %	76
Mol% O2 (3139)	26361 to 26362	Float	Read / Write	0 to 100 %	76
Mol% O3 (3174)	26601 to 26602	Float	Read / Write	0 to 100 %	76
Mol% Xe (3142)	26369 to 26370	Float	Read / Write	0 to 100 %	76

* Visibility depends on order options or device settings

"Second gas" submenu

Navigation: Expert → Sensor → Measurement mode → Second gas					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Select gas type (3109)	25261	Integer	Read / Write	2 = Gas mixture 5 = Single gas 255 = Special gas *	78
Gas (3151)	25792	Integer	Read / Write	0 = Air 1 = Nitrogen N2 2 = Argon Ar 3 = Helium He 4 = Carbon dioxide CO2 5 = Oxygen O2 6 = Methane CH4 7 = Ammonia NH3 9 = Hydrogen H2 10 = Ethane C2H6 11 = Propane C3H8 12 = Butane C4H10 13 = Chlorine Cl2 14 = Hydrogen chloride HCl 15 = Carbon monoxide CO 18 = Hydrogen sulfide H2S 21 = Ozone O3 23 = Ethylene C2H4 30 = Krypton Kr 31 = Neon Ne 32 = Xenon Xe	78
Special gas name (3177)	26997 to 27004	String	Read	=	79
Gas composition (3110)	25282	Integer	Read / Write	1 = Air 2 = Hydrogen H2 4 = Helium He 8 = Neon Ne 16 = Argon Ar 32 = Krypton Kr 64 = Xenon Xe 128 = Nitrogen N2 256 = Oxygen O2 512 = Chlorine Cl2 1024 = Ammonia NH3 2048 = Carbon monoxide CO 4096 = Carbon dioxide CO2 16384 = Hydrogen sulfide H2S 32768 = Hydrogen chloride HCl 65536 = Methane CH4 131072 = Ethane C2H6 262144 = Propane C3H8 524288 = Butane C4H10 1048576 = Ethylene C2H4 8388608 = Water 16777216 = Ozone O3	79
Mol% Air (3170)	33126 to 33127	Float	Read / Write	0 to 100 %	80
Mol% Ar (3112)	25298 to 25299	Float	Read / Write	0 to 100 %	80
Mol% C2H4 (3114)	25888 to 25889	Float	Read / Write	0 to 100 %	80
Mol% C2H6 (3115)	25896 to 25897	Float	Read / Write	0 to 100 %	80
Mol% C3H8 (3116)	25904 to 25905	Float	Read / Write	0 to 100 %	80
Mol% CH4 (3117)	25912 to 25913	Float	Read / Write	0 to 100 %	81
Mol% Cl2 (3118)	26205 to 26206	Float	Read / Write	0 to 100 %	81
Mol% CO (3119)	26213 to 26214	Float	Read / Write	0 to 100 %	81
Mol% CO2 (3120)	26221 to 26222	Float	Read / Write	0 to 100 %	81
Mol% H2 (3121)	26229 to 26230	Float	Read / Write	0 to 100 %	81

Navigation: Expert → Sensor → Measurement mode → Second gas					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Mol% H2O (3122)	26280 to 26281	Float	Read / Write	0 to 20 %	82
Mol% H2S (3123)	26291 to 26292	Float	Read / Write	0 to 100 %	82
Mol% HCl (3124)	26299 to 26300	Float	Read / Write	0 to 100 %	82
Mol% He (3125)	26307 to 26308	Float	Read / Write	0 to 100 %	82
Mol% i-C4H10 (3126)	26315 to 26316	Float	Read / Write	0 to 100 %	82
Mol% Kr (3128)	26327 to 26328	Float	Read / Write	0 to 100 %	83
Mol% N2 (3129)	26329 to 26330	Float	Read / Write	0 to 100 %	83
Mol% Ne (3137)	26355 to 26356	Float	Read / Write	0 to 100 %	83
Mol% NH3 (3138)	26359 to 26360	Float	Read / Write	0 to 100 %	83
Mol% O2 (3139)	26361 to 26362	Float	Read / Write	0 to 100 %	83
Mol% O3 (3174)	26601 to 26602	Float	Read / Write	0 to 100 %	84
Mol% Xe (3142)	26369 to 26370	Float	Read / Write	0 to 100 %	84

* Visibility depends on order options or device settings

"Reference conditions" submenu

Navigation: Expert → Sensor → Measurement mode → Reference conditions					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Reference conditions (3155)	26474	Integer	Read / Write	1 = 1000 mbara, 0 °C 2 = 1000 mbara, 15 °C 3 = 1000 mbara, 20 °C 4 = 1000 mbara, 25 °C 5 = 1013.25 mbara, 0 °C 6 = 1013.25 mbara, 15 °C 7 = 1013.25 mbara, 20 °C 8 = 1013.25 mbara, 25 °C 9 = 14.696 psia, 59 °F 10 = 14.696 psia, 60 °F 22 = User-defined	85
Reference pressure (3146)	26379 to 26380	Float	Read / Write	0 to 250 bar a	85
Reference temperature (3147)	26383 to 26384	Float	Read / Write	−200 to 450 °C	85
FAD conditions (3173)	26605	Integer	Read / Write	3 = 1000 mbara, 20 °C 12 = 14.504 psia, 68 °F 240 = User-defined	85
FAD pressure (3175)	26607 to 26608	Float	Read / Write	0 to 250 bar a	86
FAD temperature (3176)	26611 to 26612	Float	Read / Write	−200 to 450 °C	86
Reference combustion temperature (3143)	26371 to 26372	Float	Read / Write	−200 to 450 °C	86

"Sensor adjustment" submenu

Navigation: Expert → Sensor → Sensor adjustment					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Installation direction (1809)	5501	Integer	Read / Write	0 = Forward flow 1 = Reverse flow	87
Installation factor (17333)	35318 to 35319	Float	Read / Write	0.01 to 100.0	87
Pipe shape (17339)	35966	Integer	Read / Write	1 = Circular 2 = Rectangular	88

Navigation: Expert → Sensor → Sensor adjustment					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Pipe inner diameter (17009)	35973 to 35974	Float	Read / Write	0.050 to 5 m	88
Duct height (17010)	35975 to 35976	Float	Read / Write	0.050 to 5 m	88
Duct width (17011)	35977 to 35978	Float	Read / Write	0.050 to 5 m	88
Pipe wall thickness (17340)	35967 to 35968	Float	Read / Write	0 to 1 m	89
Mounting set height (17336)	35979 to 35980	Float	Read / Write	0 to 1 m	89
Insertion depth (17335)	35942 to 35943	Float	Read	Positive floating-point number	89

"External compensation" submenu

Navigation: Expert → Sensor → External compensation					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Pressure compensation (17326)	35023	Integer	Read / Write	1 = External value * 2 = Fixed value 11 = Current input 1 * 12 = Current input 2 * 13 = Current input 3 *	91
Pressure (17325)	35021 to 35022	Float	Read / Write	0.1 to 40 bar a	91
External pressure (17341)	32653 to 32654	Float	Read / Write	0.1 to 40 bar a	91
Input type 2nd temperature heat flow (17327)	35028	Integer	Read / Write	0 = Off 1 = External value * 2 = Fixed value 11 = Current input 1 * 12 = Current input 2 * 13 = Current input 3 *	92
Delta heat calculation (17006)	27145	Integer	Read / Write	0 = Off 1 = Upstream 2 = Downstream	92
2nd temperature heat flow (17328)	35029 to 35030	Float	Read / Write	233.15 to 453.15 °C	92
External 2nd temperature heat flow (17342)	32655 to 32656	Float	Read / Write	Signed floating-point number	93
Gas compensation (17003)	27041	Integer	Read / Write	0 = Off 1 = External value * 11 = Current input 1 * 12 = Current input 2 * 13 = Current input 3 *	93

Navigation: Expert → Sensor → External compensation					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Gas component (17005)	27162	Integer	Read / Write	0 = Air 1 = Nitrogen N2 2 = Argon Ar 3 = Helium He 4 = Carbon dioxide CO2 5 = Oxygen O2 6 = Methane CH4 7 = Ammonia NH3 9 = Hydrogen H2 10 = Ethane C2H6 11 = Propane C3H8 12 = Butane C4H10 13 = Chlorine Cl2 14 = Hydrogen chloride HCl 15 = Carbon monoxide CO 18 = Hydrogen sulfide H2S 21 = Ozone O3 23 = Ethylene C2H4 34 = Water	93
Mol% (17007)	27142 to 27143	Float	Read / Write	0 to 100 %	94

* Visibility depends on order options or device settings

"In-situ adjustment" submenu

Navigation: Expert → Sensor → In-situ adjustment					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Activate in-situ adjustment (17360)	37559	Integer	Read / Write	0 = Yes 1 = No	95
Input type reference value (17351)	37560	Integer	Read / Write	0 = Off 1 = External value * 3 = Manual 11 = Current input 1 * 12 = Current input 2 * 13 = Current input 3 *	95
Delete values (17355)	37533	Integer	Read / Write	0 = Yes 1 = No	95
Confirm (17356)	37534	Integer	Read / Write	0 = Yes 1 = No	96
Select flow reference (17354)	37794	Integer	Read / Write	3 = Corrected volume flow 9 = Volume flow 11 = Mass flow 73 = FAD volume flow *	96
Stability check (17366)	35317	Integer	Read / Write	0 = Yes 1 = No	96
Actual flow value (17365)	37817 to 37818	Float	Read	−2 000 to 2 000 %	96
External reference value (17352)	37798 to 37799	Float	Read / Write	Signed floating-point number	97
Reference value (17353)	37796 to 37797	Float	Read / Write	Signed floating-point number	97
Apply value (17364)	37795	Integer	Read / Write	0 = Yes 1 = No	97
Status (17367)	37386	Integer	Read	1 = Replaced 2 = Passed 3 = Invalid 4 = Unstable	97
Description 1 (17359)	37551 to 37558	String	Read / Write	=	97
Description 2 (17358)	37543 to 37550	String	Read / Write	=	98

Navigation: Expert → Sensor → In-situ adjustment					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Description 3 (17357)	37535 to 37542	String	Read / Write	=	98
Description 4 (17002)	27116 to 27123	String	Read / Write	=	98

* Visibility depends on order options or device settings

"Adjustment values in use" submenu

Navigation: Expert → Sensor → In-situ adjustment → Adjustment values in use					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Gas description 1/2 (17361)	37561 to 37576	String	Read	=	99
Gas description 2/2 (17362)	37577 to 37592	String	Read	=	100
Flow value 1 (17368)	37939 to 37940	Float	Read	−2 000 to 2 000 %	100
Flow value 2 (17369)	37941 to 37942	Float	Read	−2 000 to 2 000 %	100
Flow value 3 (17370)	37943 to 37944	Float	Read	−2 000 to 2 000 %	100
Flow value 4 (17371)	37945 to 37946	Float	Read	−2 000 to 2 000 %	101
Flow value 5 (17372)	37947 to 37948	Float	Read	−2 000 to 2 000 %	101
Flow value 6 (17373)	37949 to 37950	Float	Read	−2 000 to 2 000 %	101
Flow value 7 (17374)	37951 to 37952	Float	Read	−2 000 to 2 000 %	101
Flow value 8 (17375)	37953 to 37954	Float	Read	−2 000 to 2 000 %	101
Flow value 9 (17376)	37955 to 37956	Float	Read	−2 000 to 2 000 %	102
Flow value 10 (17377)	37957 to 37958	Float	Read	−2 000 to 2 000 %	102
Flow value 11 (17378)	37959 to 37960	Float	Read	−2 000 to 2 000 %	102
Flow value 12 (17379)	37961 to 37962	Float	Read	−2 000 to 2 000 %	102
Flow value 13 (17380)	37963 to 37964	Float	Read	−2 000 to 2 000 %	103
Flow value 14 (17381)	37965 to 37966	Float	Read	−2 000 to 2 000 %	103
Flow value 15 (17382)	37967 to 37968	Float	Read	−2 000 to 2 000 %	103
Flow value 16 (17383)	37969 to 37970	Float	Read	−2 000 to 2 000 %	103

"Calibration" submenu

Navigation: Expert → Sensor → Calibration					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Nominal diameter (2807)	2048 to 2057	String	Read	DNxx / x"	104

6.3.3 "I/O configuration" submenu

Navigation: Expert → I/O configuration					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
I/O module 1 to n terminal numbers (3902–1 to n)	1: 6541 2: 6542 3: 6543 4: 6544	Integer	Read	0 = Not used 1 = 26-27 (I/O 1) 2 = 24-25 (I/O 2) 3 = 22-23 (I/O 3)	208
I/O module 1 to n information (3906–1 to n)	1: 8659 2: 8660 3: 8661 4: 8662	Integer	Read	1 = MODBUS 2 = Configurable 3 = Not configurable 254 = Not plugged 255 = Invalid	208
I/O module 1 to n type (3901–1 to n)	1: 6417 2: 6418 3: 6419 4: 6420	Integer	Read / Write	0 = Off 1 = Current output * 2 = Current input * 3 = Pulse/frequency/switch output * 5 = Status input * 6 = Relay output *	209
Apply I/O configuration (3907)	8665	Integer	Read / Write	0 = Yes 1 = No	209
I/O alteration code (2762)	6427	Integer	Read / Write	Positive integer	210

* Visibility depends on order options or device settings

6.3.4 "Input" submenu

"Current input 1 to n" submenu

Navigation: Expert → Input → Current input 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Terminal number (1611–1 to n)	1: 6548 2: 6549 3: 6550	Integer	Read	0 = Not used 2 = 24-25 (I/O 2) 3 = 22-23 (I/O 3)	105
Signal mode (1610–1 to n)	1: 6424 2: 6425 3: 6426	Integer	Read / Write	0 = Passive 2 = Active *	105
Current span (1605–1 to n)	1: 6147 2: 6148 3: 6149	Integer	Read / Write	0 = 4...20 mA (4... 20.5 mA) 1 = 4...20 mA US (3.9...20.8 mA) **2 = 4...20 mA NAMUR (3.8...20.5 mA)** (+) 3 = 0...20 mA (0... 20.5 mA)	106
0/4 mA value (1606–1 to n)	1: 6111 to 6112 2: 6113 to 6114 3: 6115 to 6116	Float	Read / Write	Signed floating-point number	106
20 mA value (1607–1 to n)	1: 6119 to 6120 2: 6121 to 6122 3: 6123 to 6124	Float	Read / Write	Signed floating-point number	106
Failure mode (1601–1 to n)	1: 6159 2: 6160 3: 6161	Integer	Read / Write	1 = Last valid value 2 = Alarm 6 = Defined value	107
Failure value (1602–1 to n)	1: 6163 to 6164 2: 6165 to 6166 3: 6167 to 6168	Float	Read / Write	Signed floating-point number	107

* Visibility depends on order options or device settings

"Status input 1 to n" submenu

Navigation: Expert → Input → Status input 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Terminal number (1358–1 to n)	1: 6554 2: 6555 3: 6556	Integer	Read	0 = Not used 2 = 24-25 (I/O 2) 3 = 22-23 (I/O 3)	108
Assign status input (1352–1 to n)	1: 2506 2: 4687 3: 4688	Integer	Read / Write	0 = Off 1 = Flow override 2 = Reset all totalizers 3 = Reset totalizer 1 4 = Reset totalizer 2 5 = Reset totalizer 3 10 = Zero point adjustment 11 = Gas group *	108
Value status input (1353–1 to n)	1: 2746 2: 4699 3: 4700	Integer	Read	0 = Low 1 = High	109
Active level (1351–1 to n)	1: 2530 2: 4690 3: 4691	Integer	Read / Write	0 = Low 1 = High	109
Response time status input (1354–1 to n)	1: 3404 to 3405 2: 5753 to 5754 3: 5755 to 5756	Float	Read / Write	5 to 200 ms	109

* Visibility depends on order options or device settings

6.3.5 "Output" submenu

"Current output 1 to n" submenu

Navigation: Expert → Output → Current output 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Terminal number (0379–1 to n)	1: 6545 2: 6546 3: 6547	Integer	Read	0 = Not used 2 = 24-25 (I/O 2) 3 = 22-23 (I/O 3)	111
Signal mode (0377–1 to n)	1: 6421 2: 6422 3: 6423	Integer	Read / Write	0 = Passive * 2 = Active *	111
Assign current output 1 to n (0359–1 to n)	1: 5927 2: 5928 3: 5929	Integer	Read / Write	0 = Off * 3 = Corrected volume flow 4 = Density 7 = Temperature 9 = Volume flow 11 = Mass flow 37 = Flow velocity 38 = Energy flow * 39 = Electronic temperature 66 = Pressure 73 = FAD volume flow * 150 = Heat flow * 151 = 2nd temperature delta heat *	111
Current span (0353–1 to n)	1: 5923 2: 5924 3: 5925	Integer	Read / Write	0 = 4...20 mA (4... 20.5 mA) 1 = 4...20 mA US (3.9...20.8 mA) 2 = 4...20 mA NAMUR (3.8...20.5 mA) 3 = 0...20 mA (0... 20.5 mA) 4 = Fixed current	112
Fixed current (0365–1 to n)	1: 5987 to 5988 2: 5989 to 5990 3: 5991 to 5992	Float	Read / Write	0 to 22.5 mA	113

Navigation: Expert → Output → Current output 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
0/4 mA value (0367–1 to n)	1: 6195 to 6196 2: 6197 to 6198 3: 6199 to 6200	Float	Read / Write	Signed floating-point number	113
20 mA value (0372–1 to n)	1: 5915 to 5916 2: 5917 to 5918 3: 5919 to 5920	Float	Read / Write	Signed floating-point number	114
Measuring mode (0351–1 to n)	1: 5899 2: 5900 3: 5901	Integer	Read / Write	0 = Forward flow 2 = Reverse flow compensation 13 = Forward/Reverse flow *	115
Damping output 1 to n (0363–1 to n)	1: 5903 to 5904 2: 5905 to 5906 3: 5907 to 5908	Float	Read / Write	0.0 to 999.9 s	119
Failure mode (0364–1 to n)	1: 5911 2: 5912 3: 5913	Integer	Read / Write	0 = Min. 1 = Max. 4 = Actual value 5 = Last valid value 6 = Defined value	119
Failure current (0352–1 to n)	1: 5979 to 5980 2: 5981 to 5982 3: 5983 to 5984	Float	Read / Write	0 to 22.5 mA	120
Output current 1 to n (0361–1 to n)	1: 5931 to 5932 2: 5933 to 5934 3: 5935 to 5936	Float	Read	3.59 to 22.5 mA	120
Measured current 1 to n (0366–1 to n)	1: 5779 to 5780 2: 5781 to 5782 3: 5783 to 5784	Float	Read	0 to 30 mA	121

* Visibility depends on order options or device settings

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

Navigation: Expert → Output → Pulse/frequency/switch output 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Terminal number (0492–1 to n)	1: 6551 2: 6552 3: 6553	Integer	Read	0 = Not used 2 = 24-25 (I/O 2) 3 = 22-23 (I/O 3)	122
Signal mode (0490–1 to n)	1: 6235 2: 6236 3: 6237	Integer	Read / Write	0 = Passive 2 = Active * 3 = Passive NAMUR	123
Operating mode (0469–1 to n)	1: 4479 2: 4480 3: 9907	Integer	Read / Write	0 = Pulse 1 = Switch 53 = Frequency	123
Assign pulse output 1 to n (0460–1 to n)	1: 2461 2: 2462 3: 4685	Integer	Read / Write	0 = Off 3 = Corrected volume flow 9 = Volume flow 11 = Mass flow 38 = Energy flow * 73 = FAD volume flow * 150 = Heat flow *	124
Pulse scaling (0455–1 to n)	1: 3034 to 3035 2: 3036 to 3037 3: 4714 to 4715	Float	Read / Write	Positive floating point number	125
Pulse width (0452–1 to n)	1: 2836 to 2837 2: 2838 to 2839 3: 4702 to 4703	Float	Read / Write	0.05 to 2 000 ms	125

Navigation: Expert → Output → Pulse/frequency/switch output 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Measuring mode (0457–1 to n)	1: 2394 2: 2395 3: 4683	Integer	Read / Write	0 = Forward flow 1 = Reverse flow 2 = Reverse flow compensation 13 = Forward/Reverse flow	126
Failure mode (0480–1 to n)	1: 2948 2: 2949 3: 4708	Integer	Read / Write	0 = Actual value 1 = No pulses	127
Pulse output 1 to n (0456–1 to n)	1: 3082 to 3083 2: 3084 to 3085 3: 4718 to 4719	Float	Read	Positive floating-point number	127
Assign frequency output (0478–1 to n)	1: 2614 2: 2615 3: 9915	Integer	Read / Write	0 = Off 3 = Corrected volume flow 4 = Density 7 = Temperature 9 = Volume flow 11 = Mass flow 37 = Flow velocity 38 = Energy flow * 39 = Electronic temperature 66 = Pressure 73 = FAD volume flow * 150 = Heat flow * 151 = 2nd temperature delta heat *	128
Minimum frequency value (0453–1 to n)	1: 3526 to 3527 2: 3528 to 3529 3: 5767 to 5768	Float	Read / Write	0.0 to 10 000.0 Hz	128
Maximum frequency value (0454–1 to n)	1: 2996 to 2997 2: 2998 to 2999 3: 4710 to 4711	Float	Read / Write	0.0 to 10 000.0 Hz	129
Measuring value at minimum frequency (0476–1 to n)	1: 5887 to 5888 2: 5889 to 5890 3: 5891 to 5892	Float	Read / Write	Signed floating-point number	129
Measuring value at maximum frequency (0475–1 to n)	1: 3514 to 3515 2: 3516 to 3517 3: 5759 to 5760	Float	Read / Write	Signed floating-point number	129
Measuring mode (0479–1 to n)	1: 2922 2: 2923 3: 4706	Integer	Read / Write	0 = Forward flow 2 = Reverse flow compensation 13 = Forward/Reverse flow	130
Damping output 1 to n (0477–1 to n)	1: 3522 to 3523 2: 3524 to 3525 3: 5763 to 5764	Float	Read / Write	0 to 999.9 s	130
Response time (0491–1 to n)	1: 5875 to 5876 2: 5877 to 5878 3: 5879 to 5880	Float	Read	Positive floating-point number	131
Failure mode (0451–1 to n)	1: 2367 2: 2368 3: 4681	Integer	Read / Write	0 = Actual value 1 = 0 Hz 2 = Defined value	131
Failure frequency (0474–1 to n)	1: 3510 to 3511 2: 3512 to 3513 3: 9908 to 9909	Float	Read / Write	0.0 to 12 500.0 Hz	132
Output frequency 1 to n (0471–1 to n)	1: 3462 to 3463 2: 3464 to 3465 3: 9910 to 9911	Float	Read	0.0 to 12 500.0 Hz	132

Navigation: Expert → Output → Pulse/frequency/switch output 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Switch output function (0481–1 to n)	1: 3022 2: 3023 3: 9914	Integer	Read / Write	0 = Off 0 = Flow direction check * 1 = On 2 = Diagnostic behavior 4 = Limit 5 = Status	132
Assign diagnostic behavior (0482–1 to n)	1: 3096 2: 3097 3: 9913	Integer	Read / Write	0 = Alarm 1 = Warning 2 = Alarm or warning	133
Assign limit (0483–1 to n)	1: 3184 2: 3185 3: 4722	Integer	Read / Write	3 = Corrected volume flow 4 = Density 7 = Temperature 9 = Volume flow 11 = Mass flow 16 = Totalizer 1 17 = Totalizer 2 18 = Totalizer 3 37 = Flow velocity 38 = Energy flow * 39 = Electronic temperature 73 = FAD volume flow * 150 = Heat flow * 151 = 2nd temperature delta heat *	133
Switch-on value (0466–1 to n)	1: 3242 to 3243 2: 3244 to 3245 3: 4728 to 4729	Float	Read / Write	Signed floating-point number	135
Switch-off value (0464–1 to n)	1: 3234 to 3235 2: 3236 to 3237 3: 4724 to 4725	Float	Read / Write	Signed floating-point number	136
Assign status (0485–1 to n)	1: 3374 2: 3375 3: 4734	Integer	Read / Write	0 = Off 2 = Low flow cut off	136
Switch-on delay (0467–1 to n)	1: 6247 to 6248 2: 6249 to 6250 3: 6251 to 6252	Float	Read / Write	0.0 to 100.0 s	137
Switch-off delay (0465–1 to n)	1: 6239 to 6240 2: 6241 to 6242 3: 6243 to 6244	Float	Read / Write	0.0 to 100.0 s	137
Failure mode (0486–1 to n)	1: 3384 2: 3385 3: 9912	Integer	Read / Write	0 = Actual status 1 = Open 6 = Closed	137
Switch status 1 to n (0461–1 to n)	1: 2485 2: 2486 3: 9917	Integer	Read	1 = Open 6 = Closed	138
Invert output signal (0470–1 to n)	1: 2583 2: 2584 3: 9916	Integer	Read / Write	0 = Yes 1 = No	138

* Visibility depends on order options or device settings

"Relay output 1 to n" submenu

Navigation: Expert → Output → Relay output 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Terminal number (0812–1 to n)	1: 8278 2: 8279 3: 8280	Integer	Read	0 = Not used 2 = 24-25 (I/O 2) 3 = 22-23 (I/O 3)	139
Relay output function (0804–1 to n)	1: 2488 2: 2489 3: 9876	Integer	Read / Write	1 = Open 2 = Diagnostic behavior 3 = Flow direction check 4 = Limit 5 = Digital Output 6 = Closed	140
Assign limit (0807–1 to n)	1: 8248 2: 8249 3: 8250	Integer	Read / Write	3 = Corrected volume flow 4 = Density 7 = Temperature 9 = Volume flow 11 = Mass flow 16 = Totalizer 1 17 = Totalizer 2 18 = Totalizer 3 37 = Flow velocity 38 = Energy flow * 39 = Electronic temperature 73 = FAD volume flow * 150 = Heat flow * 151 = 2nd temperature delta heat *	140
Assign diagnostic behavior (0806–1 to n)	1: 8245 2: 8246 3: 8247	Integer	Read / Write	0 = Alarm 1 = Warning 2 = Alarm or warning	141
Assign status (0805–1 to n)	1: 8272 2: 8273 3: 8274	Integer	Read / Write	0 = Off 2 = Low flow cut off	141
Switch-off value (0809–1 to n)	1: 8260 to 8261 2: 8262 to 8263 3: 8264 to 8265	Float	Read / Write	Signed floating-point number	141
Switch-off delay (0813–1 to n)	1: 8254 to 8255 2: 8256 to 8257 3: 8258 to 8259	Float	Read / Write	0.0 to 100.0 s	142
Switch-on value (0810–1 to n)	1: 8233 to 8234 2: 8235 to 8236 3: 8237 to 8238	Float	Read / Write	Signed floating-point number	142
Switch-on delay (0814–1 to n)	1: 8266 to 8267 2: 8268 to 8269 3: 8270 to 8271	Float	Read / Write	0.0 to 100.0 s	143
Failure mode (0811–1 to n)	1: 8242 2: 8243 3: 8244	Integer	Read / Write	0 = Actual status 1 = Open 6 = Closed	143
Switch status (0801–1 to n)	1: 3518 2: 3519 3: 9875	Integer	Read	1 = Open 6 = Closed	143
Powerless relay status (0816–1 to n)	1: 7009 2: 7010 3: 7011	Integer	Read / Write	1 = Open 6 = Closed	144

* Visibility depends on order options or device settings

6.3.6 "Communication" submenu

"Modbus configuration" submenu

Navigation: Expert → Communication → Modbus configuration					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Bus address (7112)	4910	Integer	Read / Write	1 to 247	145
Baudrate (7111)	4912	Integer	Read / Write	0 = 1200 BAUD 1 = 2400 BAUD 2 = 4800 BAUD 3 = 9600 BAUD 4 = 19200 BAUD 5 = 38400 BAUD 6 = 57600 BAUD 7 = 115200 BAUD	145
Data transfer mode (7115)	4913	Integer	Read / Write	0 = RTU 1 = ASCII	145
Parity (7122)	4914	Integer	Read / Write	0 = Even 1 = Odd 2 = None / 2 stop bits 3 = None / 1 stop bit	146
Byte order (7113)	4915	Integer	Read / Write	0 = 0-1-2-3 1 = 3-2-1-0 2 = 2-3-0-1 3 = 1-0-3-2	146
Telegram delay (7146)	4916 to 4917	Float	Read / Write	0 to 100 ms	148
Failure mode (7116)	4920	Integer	Read / Write	1 = Last valid value 255 = NaN value	148
Bus termination (7155)	5774	Integer	Read	0 = Off 1 = On	148
Fieldbus writing access (7156)	6807	Integer	Read / Write	0 = Read + write 1 = Read only	149

"Modbus information" submenu

Navigation: Expert → Communication → Modbus information					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Device ID (7153)	2547	Integer	Read	4-digit hexadecimal number	149
Device revision (7154)	4481	Integer	Read	4-digit hexadecimal number	150

"Modbus data map" submenu

Navigation: Expert → Communication → Modbus data map					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Scan list register 0 to 15 (7114)	0: 5001 1: 5002 2: 5003 3: 5004 4: 5005 5: 5006 6: 5007 7: 5008 8: 5009 9: 5010 10: 5011 11: 5012 12: 5013 13: 5014 14: 5015 15: 5016	Integer	Read / Write	1 to 65 535	150

"Web server" submenu

Navigation: Expert → Communication → Web server					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Web server language (7221)	4219	Integer	Read / Write	0 = English 1 = Deutsch 2 = Français 3 = Español 4 = Italiano 5 = Nederlands 8 = Svenska 11 = 日本語 (Japanese) 12 = Portuguesa 13 = Polski 14 = русский язык (Russian) 15 = čeština (Czech) 16 = 中文 (Chinese) 18 = Türkçe 19 = tiếng Việt (Vietnamese) 20 = 한국어 (Korean)	151
MAC address (7214)	4210 to 4218	String	Read	Unique 12-digit character string comprising letters and numbers	151
DHCP client (7212)	21781	Integer	Read / Write	0 = Off **1 = On**	152
IP address (7209)	4155 to 4162	String	Read / Write	4 octet: 0 to 255 (in the particular octet)	152
Subnet mask (7211)	4163 to 4170	String	Read / Write	4 octet: 0 to 255 (in the particular octet)	152
Default gateway (7210)	4171 to 4178	String	Read / Write	4 octet: 0 to 255 (in the particular octet)	152
Web server functionality (7222)	4220	Integer	Read / Write	0 = Off 1 = On 2 = HTML Off	153
Login page (7273)	5802	Integer	Read / Write	0 = Without header 1 = With header	153

"WLAN settings" wizard

Navigation: Expert → Communication → WLAN settings					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
WLAN (2702)	6178	Integer	Read / Write	0 = Disable 1 = Enable	154
WLAN mode (2717)	28777	Integer	Read / Write	0 = WLAN access point 1 = WLAN Client	155
SSID name (2714)	28940 to 28955	String	Read / Write	–	155
Network security (2705)	6206	Integer	Read / Write	0 = Unsecured 1 = WPA2-PSK 2 = EAP-PEAP with MSCHAPv2 * 3 = EAP-TLS * 4 = EAP-PEAP MSCHAPv2 no server authentic. *	155
Security identification (2718)	28817	Integer	Read	1 = Trusted issuer certificate 2 = Device certificate 4 = Device private key	156
User name (2715)	28956 to 28971	String	Read / Write	–	156
WLAN password (2716)	28972 to 28987	String	Read / Write	–	156
WLAN IP address (2711)	8643 to 8650	String	Read / Write	4 octet: 0 to 255 (in the particular octet)	157
WLAN MAC address (2703)	8602 to 8610	String	Read	Unique 12-digit character string comprising letters and numbers	157
WLAN subnet mask (2709)	8651 to 8658	String	Read / Write	4 octet: 0 to 255 (in the particular octet)	157
WLAN MAC address (2703)	8602 to 8610	String	Read	Unique 12-digit character string comprising letters and numbers	157
WLAN passphrase (2706)	8611 to 8626	String	Read / Write	8 to 32-digit character string comprising numbers, letters and special characters (without spaces)	157
WLAN MAC address (2703)	8602 to 8610	String	Read	Unique 12-digit character string comprising letters and numbers	157
Assign SSID name (2708)	6218	Integer	Read / Write	0 = Device tag 1 = User-defined	158
SSID name (2707)	8627 to 8642	String	Read / Write	Max. 32-digit character string comprising numbers, letters and special characters	158
2.4 GHz WLAN channel (2704)	6182	Integer	Read / Write	1 to 11	158
Select antenna (2713)	6102	Integer	Read / Write	0 = External antenna 1 = Internal antenna	159
Connection state (2722)	29221	Integer	Read	0 = Not connected 1 = Connected	159
Received signal strength (2721)	28818	Integer	Read	0 = Low 1 = High 2 = Medium	159
WLAN IP address (2711)	8643 to 8650	String	Read / Write	4 octet: 0 to 255 (in the particular octet)	157
Gateway IP address (2719)	29227 to 29234	String	Read	Character string comprising numbers, letters and special characters	159
IP address domain name server (2720)	29283 to 29290	String	Read	Character string comprising numbers, letters and special characters	159

* Visibility depends on order options or device settings

6.3.7 "Application" submenu

Navigation: Expert → Application					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Reset all totalizers (2806)	2609	Integer	Read / Write	0 = Cancel 1 = Reset + totalize	160

"Totalizer 1 to n" submenu

Navigation: Expert → Application → Totalizer 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Assign process variable (0914–1 to n)	1: 2601 2: 2801 3: 3001	Integer	Read / Write	0 = Off 3 = Corrected volume flow 9 = Volume flow 11 = Mass flow 38 = Energy flow * 73 = FAD volume flow * 150 = Heat flow *	161
Unit totalizer 1 to n (0915–1 to n)	1: 4604 2: 4605 3: 4606	Integer	Read / Write	2 = m^3 * 4 = l * 9 = ft^3 * 23 = Mft^3 * 41 = l FAD * 50 = g * 51 = kg * 52 = t * 53 = oz * 54 = lb * 55 = STon * 100 = Nl * 101 = Nm^3 * 102 = Sm^3 * 103 = Sft^3 * 104 = Sl * 112 = cf FAD * 128 = kWh * 129 = GWh * 130 = MWh * 162 = Mcal * 163 = kJ * 164 = MJ * 165 = Btu * 166 = m^3 FAD * 167 = GJ * 170 = Gcal * 171 = kcal * 172 = MBtu * 173 = MMBtu * 251 = None *	161
Totalizer operation mode (0908–1 to n)	1: 2605 2: 2805 3: 3005	Integer	Read / Write	0 = Net flow total 1 = Forward flow total 2 = Reverse flow total	163
Control Totalizer 1 to n (0912–1 to n)	1: 2608 2: 2808 3: 3008	Integer	Read / Write	0 = Totalize 1 = Reset + totalize 2 = Preset + hold 3 = Reset + hold 4 = Preset + totalize 5 = Hold	163

Navigation: Expert → Application → Totalizer 1 to n					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Preset value 1 to n (0913–1 to n)	1: 2590 to 2591 2: 2592 to 2593 3: 2594 to 2595	Float	Read / Write	Signed floating-point number	164
Failure mode (0901–1 to n)	1: 2606 2: 2806 3: 3006	Integer	Read / Write	0 = Stop 1 = Actual value 2 = Last valid value	164

* Visibility depends on order options or device settings

6.3.8 "Diagnostics" submenu

Navigation: Expert → Diagnostics					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Actual diagnostics (0691)	2732	Integer	Read	Symbol for diagnostic behavior, diagnostic code and short message.	165
Previous diagnostics (0690)	2734	Integer	Read	Symbol for diagnostic behavior, diagnostic code and short message.	166
Operating time from restart (0653)	2624	String	Read	Days (d), hours (h), minutes (m) and seconds (s)	167
Operating time (0652)	--	String	Read		

"Diagnostic list" submenu

Navigation: Expert → Diagnostics → Diagnostic list					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Diagnostics 1 (0692)	2736	Integer	Read	Symbol for diagnostic behavior, diagnostic code and short message.	168
Diagnostics 2 (0693)	2738	Integer	Read	Symbol for diagnostic behavior, diagnostic code and short message.	169
Diagnostics 3 (0694)	2740	Integer	Read	Symbol for diagnostic behavior, diagnostic code and short message.	170
Diagnostics 4 (0695)	2742	Integer	Read	Symbol for diagnostic behavior, diagnostic code and short message.	170
Diagnostics 5 (0696)	2744	Integer	Read	Symbol for diagnostic behavior, diagnostic code and short message.	171

"Event logbook" submenu

Navigation: Expert → Diagnostics → Event logbook					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Filter options (0705)	4596	Integer	Read / Write	0 = Failure (F) 4 = Maintenance required (M) 8 = Function check (C) 12 = Out of specification (S) 16 = Information (I) 255 = All	172

"Device information" submenu

Navigation: Expert → Diagnostics → Device information					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Device tag (0011)	2026 to 2041	String	Read	Max. 32 characters, such as letters, numbers or special characters (e.g. @, %, /).	173
Serial number (0009)	7003 to 7008	String	Read	Max. 11-digit character string comprising letters and numbers.	174
Firmware version (0010)	7277 to 7280	String	Read	Character string in the format xx.yy.zz	174
Device name (0020)	7238 to 7245	String	Read	Character string comprising numbers, letters and special characters	175
Order code (0008)	2058 to 2067	String	Read	Character string composed of letters, numbers and certain punctuation marks (e.g. /).	175
Extended order code 1 (0023)	2212 to 2221	String	Read	Character string	175
Extended order code 2 (0021)	2222 to 2231	String	Read	Character string	175
Extended order code 3 (0022)	2232 to 2241	String	Read	Character string	176
ENP version (0012)	4003 to 4010	String	Read	Character string	176

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

Navigation: Expert → Diagnostics → Main electronic module + I/O module 1					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Software revision (0072)	7039	Integer	Read	Positive integer	177
Build no. software (0079)	2326	Integer	Read	Positive integer	177
Bootloader revision (0073)	2264	Integer	Read	Positive integer	177

"Sensor electronic module (ISEM)" submenu

Navigation: Expert → Diagnostics → Sensor electronic module (ISEM)					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Software revision (0072)	7039	Integer	Read	Positive integer	178
Build no. software (0079)	2326	Integer	Read	Positive integer	178
Bootloader revision (0073)	2264	Integer	Read	Positive integer	178

"I/O module 3" submenu

Navigation: Expert → Diagnostics → I/O module 3					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
I/O module 3 terminal numbers (3902–3)	6543	Integer	Read	0 = Not used 1 = 26-27 (I/O 1) 2 = 24-25 (I/O 2) 3 = 22-23 (I/O 3)	179
Software revision (0072)	7039	Integer	Read	Positive integer	179
Build no. software (0079)	2326	Integer	Read	Positive integer	179
Bootloader revision (0073)	2264	Integer	Read	Positive integer	179

"Display module" submenu

Navigation: Expert → Diagnostics → Display module					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Software revision (0072)	7039	Integer	Read	Positive integer	180
Build no. software (0079)	2326	Integer	Read	Positive integer	180
Bootloader revision (0073)	2264	Integer	Read	Positive integer	180

"Min/max values" submenu

Navigation: Expert → Diagnostics → Min/max values					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Reset min/max values (17015)	27163	Integer	Read / Write	= =	181

"Main electronic temperature" submenu

Navigation: Expert → Diagnostics → Min/max values → Main electronic temperature					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Maximum value (17321)	35013 to 35014	Float	Read	Signed floating-point number	181
Minimum value (17322)	35015 to 35016	Float	Read	Signed floating-point number	182

"Medium temperature" submenu

Navigation: Expert → Diagnostics → Min/max values → Medium temperature					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Maximum value (17324)	35019 to 35020	Float	Read	Signed floating-point number	182
Minimum value (17323)	35017 to 35018	Float	Read	Signed floating-point number	182

"Heartbeat Technology" submenu

"Heartbeat base settings" submenu

Navigation: Expert → Diagnostics → Heartbeat Technology → Heartbeat base settings					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Plant operator (2754)	3414 to 3429	String	Read / Write	Max. 32 characters such as letters, numbers or special characters (e.g. @, %, /)	190
Location (2755)	3430 to 3445	String	Read / Write	Max. 32 characters such as letters, numbers or special characters (e.g. @, %, /)	190

"Performing verification" submenu

Navigation: Expert → Diagnostics → Heartbeat Technology → Performing verification					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Year (2846)	2495	Integer	Read / Write	9 to 99	191
Month (2845)	2494	Integer	Read / Write	0 = January 1 = February 2 = March 3 = April 4 = May 5 = June 6 = July 7 = August 8 = September 9 = October 10 = November 11 = December	192
Day (2842)	2493	Integer	Read / Write	1 to 31 d	192
Hour (2843)	2492	Integer	Read / Write	0 to 23 h	192
AM/PM (2813)	2496	Integer	Read / Write	0 = AM 1 = PM	193
Minute (2844)	2467	Integer	Read / Write	0 to 59 min	193
Verification mode (12105)	2366	Integer	Read / Write	0 = Standard verification 1 = Extended verification	193
External device information (12101)	20493 to 20508	String	Read / Write	Free text entry	194
Start verification (12127)	2270	Integer	Read / Write	0 = Cancel 1 = Start 10 = Output 1 low value * 11 = Output 1 high value * 12 = Output 2 low value * 13 = Output 2 high value * 14 = Output 3 low value * 15 = Output 3 high value * 20 = Pulse output 1 * 21 = Frequency output 1 * 22 = Pulse output 2 * 23 = Frequency output 2 *	194
Progress (2808)	6797	Integer	Read	0 to 100 %	194
Measured values (12102)	5512 to 5513	Float	Read / Write	Signed floating-point number	195
Output values (12103)	5516 to 5517	Float	Read	Signed floating-point number	195
Status (12153)	2079	Integer	Read	0 = Failed 1 = Done 3 = Not done 8 = Busy	195
Overall result (12149)	2355	Integer	Read	0 = Failed 2 = Passed 3 = Not done	196

* Visibility depends on order options or device settings

"Verification results" submenu

Navigation: Expert → Diagnostics → Heartbeat Technology → Verification results					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Date/time (12142)	2372 to 2381	String	Read	dd.mmmm.yyyy; hh:mm	196
Verification ID (12141)	2315	Integer	Read	0 to 65 535	197

Navigation: Expert → Diagnostics → Heartbeat Technology → Verification results					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Operating time (12126)	3346	String	Read	Days (d), hours (h), minutes (m), seconds (s)	197
Overall result (12149)	2355	Integer	Read	0 = Failed 2 = Passed 3 = Not done	197
Sensor (12152)	2384	Integer	Read	0 = Failed 2 = Passed 3 = Not done	197
Sensor electronic module (ISEM) (12151)	2385	Integer	Read	0 = Failed 2 = Passed 3 = Not done	198
I/O module (12145)	2386	Integer	Read	0 = Failed 2 = Passed 3 = Not done 254 = Not plugged	198
System status (12109)	5790	Integer	Read	0 = Failed 2 = Passed 3 = Not done	199

"Simulation" submenu

Navigation: Expert → Diagnostics → Simulation					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Assign simulation process variable (1810)	6813	Integer	Read / Write	0 = Off 3 = Corrected volume flow 4 = Density 7 = Temperature 9 = Volume flow 11 = Mass flow 37 = Flow velocity 38 = Energy flow * 73 = FAD volume flow * 150 = Heat flow *	200
Process variable value (1811)	6814 to 6815	Float	Read / Write	Depends on the process variable selected	201
Current input 1 to n simulation (1608–1 to n)	1: 6127 2: 6128 3: 6129	Integer	Read / Write	0 = Off 1 = On	201
Value current input 1 to n (1609–1 to n)	1: 6139 to 6140 2: 6141 to 6142 3: 6143 to 6144	Float	Read / Write	0 to 22.5 mA	202
Status input simulation 1 to n (1355–1 to n)	1: 2620 2: 4693 3: 4694	Integer	Read / Write	0 = Off 1 = On	202
Input signal level 1 to n (1356–1 to n)	1: 2638 2: 4696 3: 4697	Integer	Read / Write	0 = Low 1 = High	202
Current output 1 to n simulation (0354–1 to n)	1: 5939 2: 5940 3: 5941	Integer	Read / Write	0 = Off 1 = On	203
Value current output 1 to n (0355–1 to n)	1: 5995 to 5996 2: 5997 to 5998 3: 5999 to 6000	Float	Read / Write	3.59 to 22.5 mA	203
Frequency output simulation 1 to n (0472–1 to n)	1: 6203 2: 6204 3: 6205	Integer	Read / Write	0 = Off 1 = On	204

Navigation: Expert → Diagnostics → Simulation					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Frequency value 1 to n (0473–1 to n)	1: 6207 to 6208 2: 6209 to 6210 3: 6211 to 6212	Float	Read / Write	0.0 to 12 500.0 Hz	204
Pulse output simulation 1 to n (0458–1 to n)	1: 6215 2: 6216 3: 6217	Integer	Read / Write	0 = Off 1 = Down-counting value 2 = Fixed value	204
Pulse value 1 to n (0459–1 to n)	1: 6219 2: 6220 3: 6221	Integer	Read / Write	0 to 65 535	205
Switch output simulation 1 to n (0462–1 to n)	1: 6223 2: 6224 3: 6225	Integer	Read / Write	0 = Off 1 = On	205
Switch status 1 to n (0463–1 to n)	1: 6227 2: 6228 3: 6229	Integer	Read / Write	1 = Open 6 = Closed	206
Relay output 1 to n simulation (0802–1 to n)	1: 7523 2: 7524 3: 7525	Integer	Read / Write	0 = Off 1 = On	206
Switch status 1 to n (0803–1 to n)	1: 8239 2: 8240 3: 8241	Integer	Read / Write	1 = Open 6 = Closed	206
Device alarm simulation (0654)	6812	Integer	Read / Write	0 = Off 1 = On	207
Diagnostic event category (0738)	4261	Integer	Read / Write	0 = Sensor 1 = Electronics 2 = Configuration 3 = Process	207
Diagnostic event simulation (0737)	4259	Integer	Read / Write	▪ Off ▪ Diagnostic event picklist (depends on the category selected)	207

* Visibility depends on order options or device settings

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