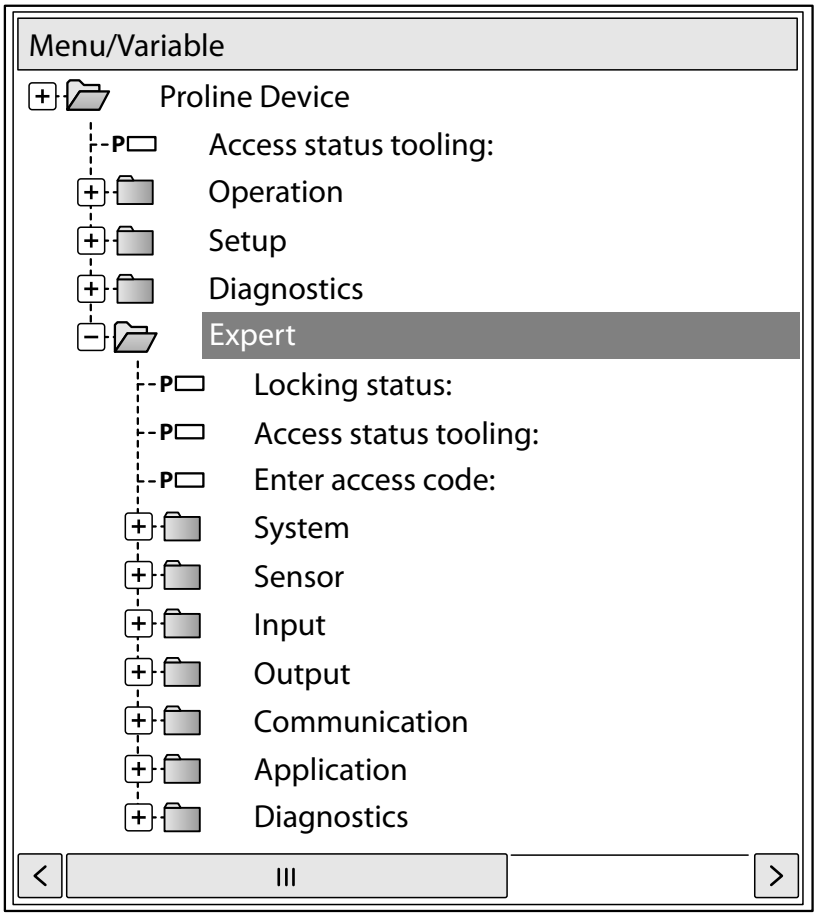
GP01040D/06/EN/01.15
71288061

Valid as of version
01.01.zz (Device firmware)

Description of Device Parameters
Proline Promag 100
Modbus RS485

Electromagnetic flowmeter



Endress+Hauser
People for Process Automation

Table of contents

1 Document information

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.

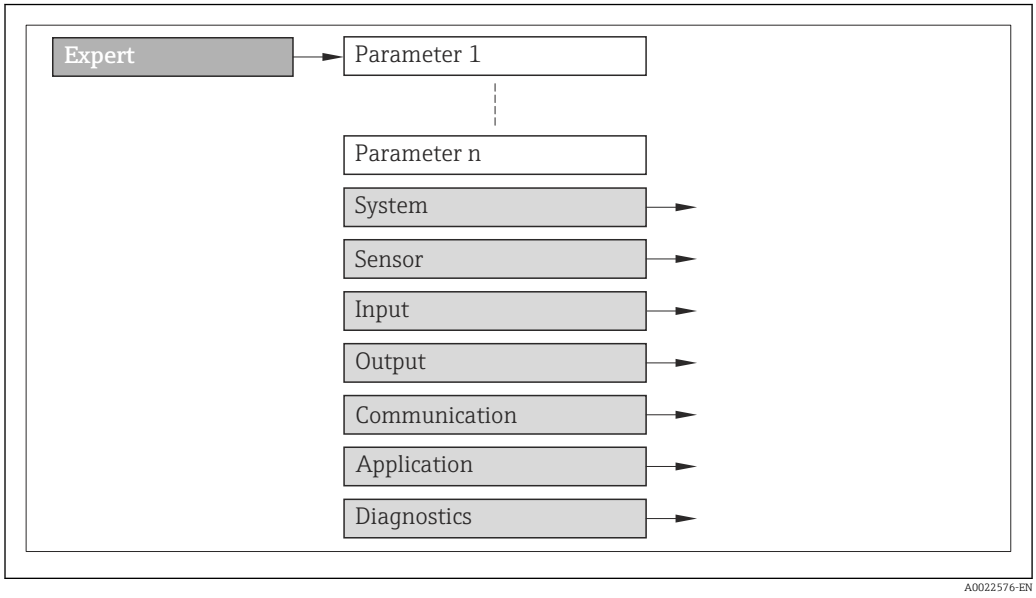
1.2 Target group

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

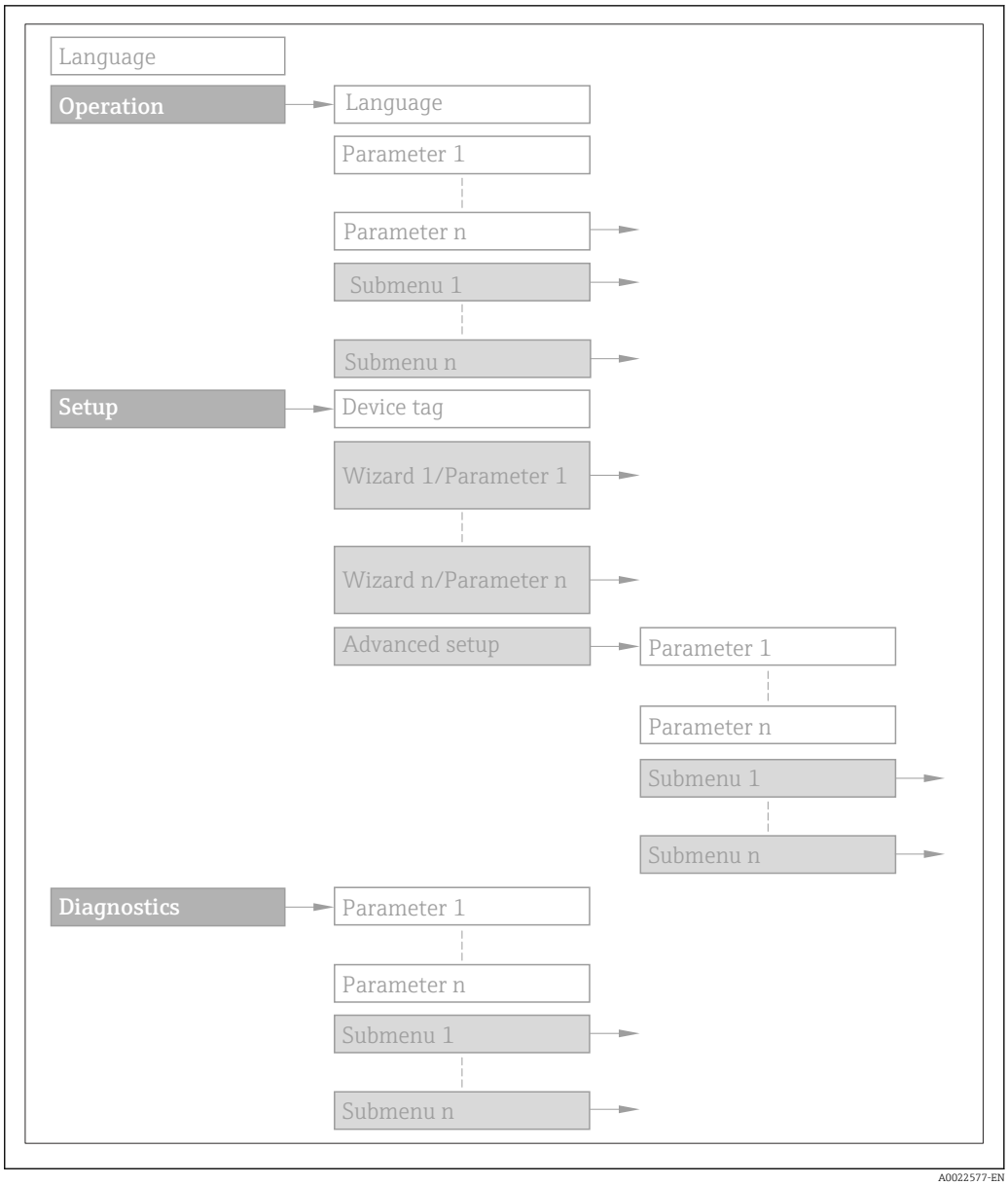
1.3.1 Information on the document structure

This document lists the submenus and their parameters according to the structure of the **Expert** menu (→ 7) menu that are available once the **"Operator" user role** or the **"Maintenance" user role** is enabled.



1 Sample graphic

For information on the arrangement of the parameters according to the structure of the **Operation** menu, **Setup** menu, **Diagnostics** menu (→ 66), along with a brief description, see the Operating Instructions for the device.



2 *Sample graphic*

For information about the operating philosophy, see the "Operating philosophy" chapter in the device's 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 operating tool The names of the menus, submenus and parameters are displayed in abbreviated format.
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	Input range for the parameter
User interface	Display value/data for the parameter
Factory setting	Default setting ex works
Additional information	Additional explanations (e.g. in examples): ▪ On individual options ▪ On display values/data ▪ On the input range ▪ On the factory setting ▪ On the parameter function

1.4 Symbols used

1.4.1 Symbols for certain types of information

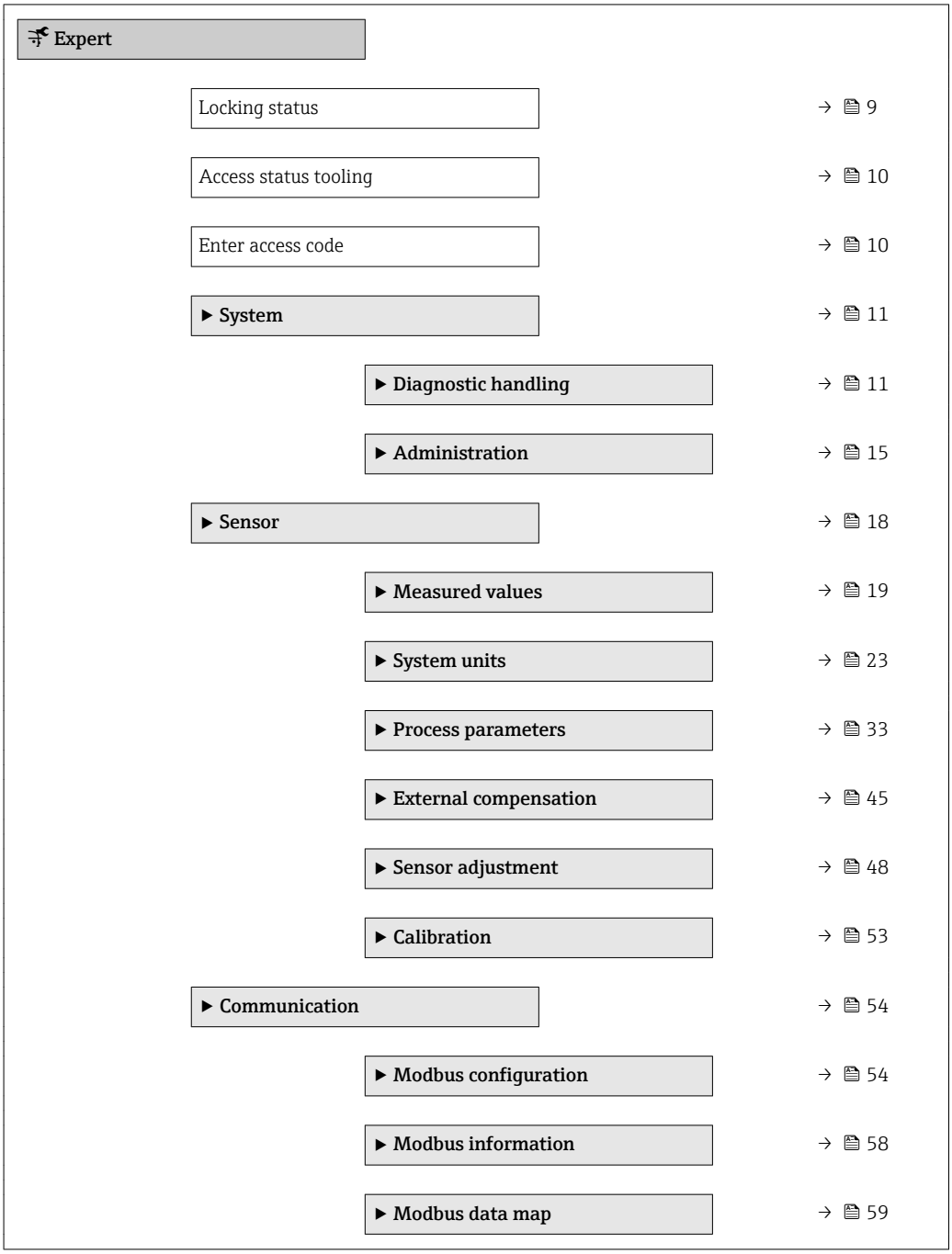
Symbol	Meaning
	Tip Indicates additional information.
	Reference to documentation
	Reference to page
	Reference to graphic
	Operation via operating tool
	Write-protected parameter

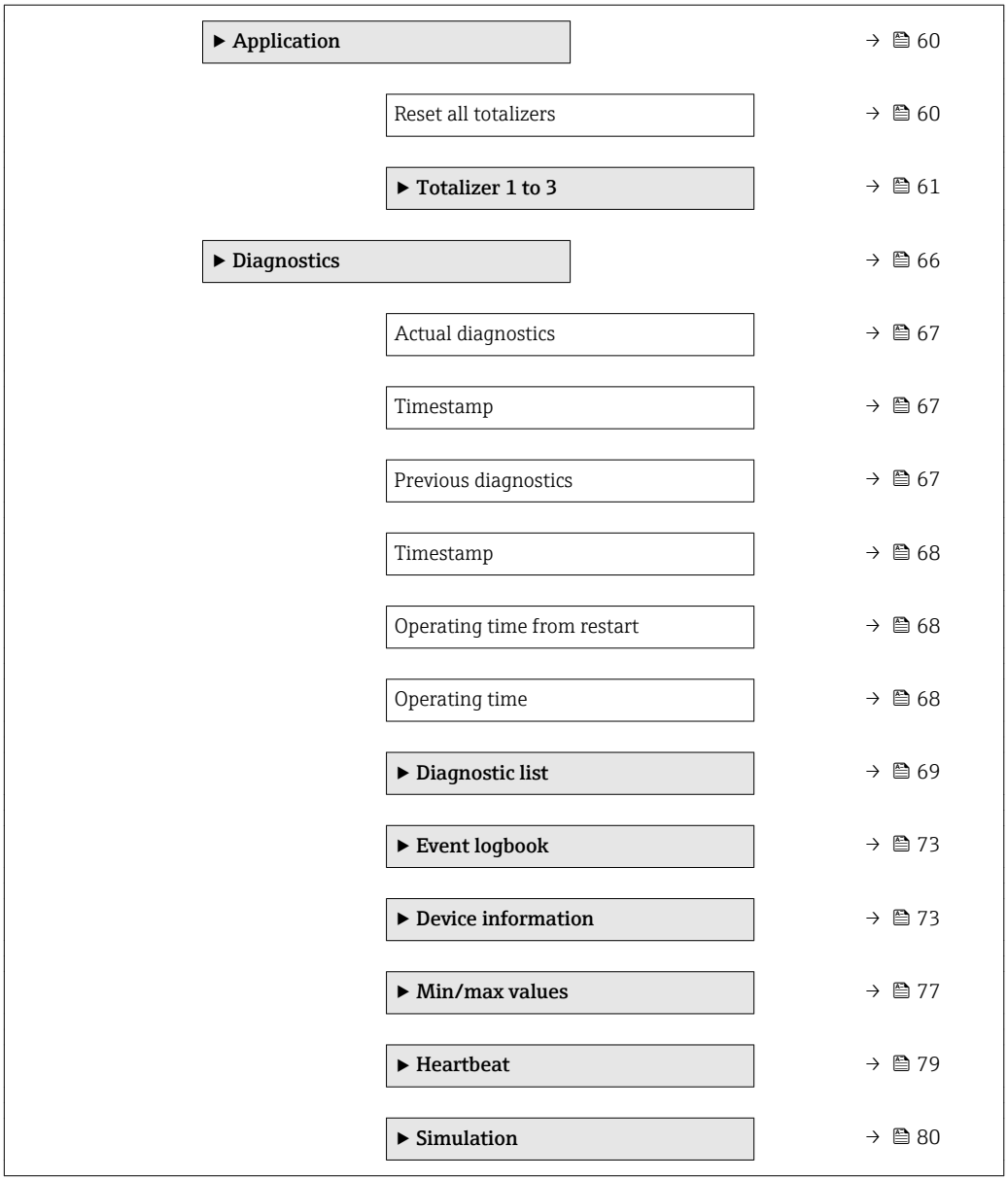
1.4.2 Symbols in graphics

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

2 Overview of the Expert operating menu

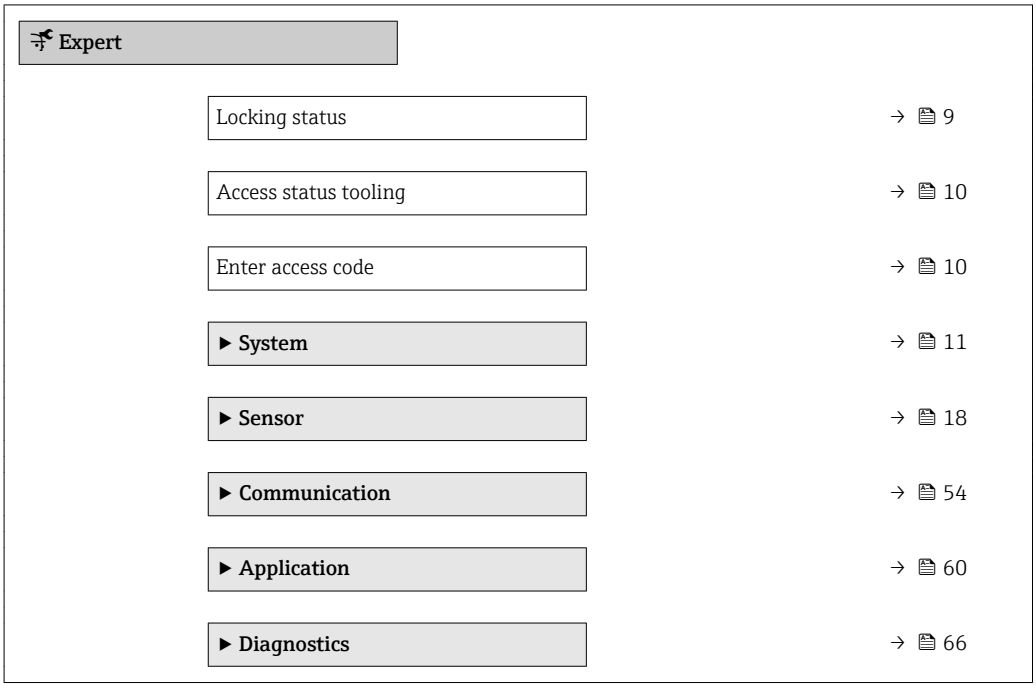
The following table provides an overview of the menu structure of the expert operating menu and its parameters. The page reference indicates where the associated description of the submenu or parameter can be found.




▶ Application → 60
Reset all totalizers → 60
▶ Totalizer 1 to 3 → 61
▶ Diagnostics → 66
Actual diagnostics → 67
Timestamp → 67
Previous diagnostics → 67
Timestamp → 68
Operating time from restart → 68
Operating time → 68
▶ Diagnostic list → 69
▶ Event logbook → 73
▶ Device information → 73
▶ Min/max values → 77
▶ Heartbeat → 79
▶ Simulation → 80

3 Description of device parameters

In the following section, the parameters are listed according to the menu structure of the operating tool.



Locking status

Navigation Expert → Locking status

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, all the active types of write protection are displayed in the operating tool.

If additional write protection is active, this restricts the current access authorization even further. The write protection status can be viewed via the **Locking status** parameter (→ 9).

"Hardware locked" option (priority 1)

The DIP switch for hardware locking is activated on the main electronics module. This locks write access to the parameters (e.g. via local display or operating tool).

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.

"Temporarily locked" option (priority 2)

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 tooling

Navigation Expert → Access stat.tool

Description Displays the access authorization to the parameters via the operating tool.

User interface

- Operator
- Maintenance

Factory setting Maintenance

Additional information

Description

Access authorization can be modified via the **Enter access code** parameter (→ 10).

If additional write protection is active, this restricts the current access authorization even further. The write protection status can be viewed via the **Locking status** parameter (→ 9).

Display

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

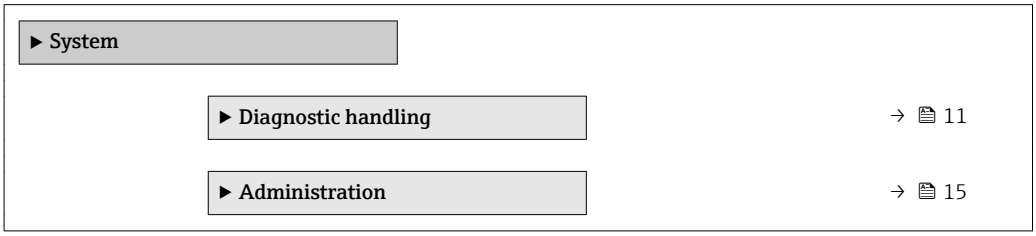
Navigation Expert → Ent. access code

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

User entry 0 to 9 999

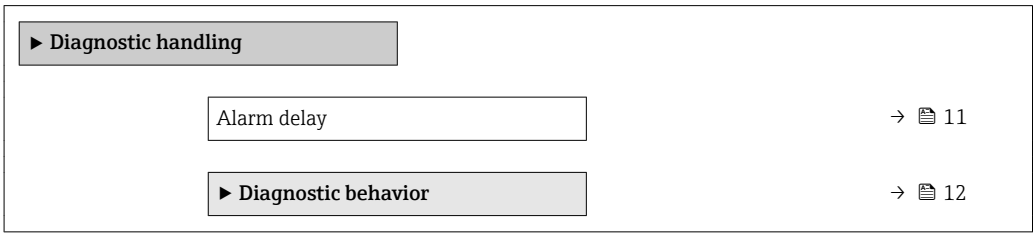
3.1 "System" submenu

Navigation Expert → System



3.1.1 "Diagnostic handling" submenu

Navigation Expert → System → Diagn. handling



Alarm delay

Navigation Expert → System → Diagn. handling → Alarm delay

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

The diagnostic message is reset without a time delay.

User entry 0 to 60 s

Factory setting 0 s

Additional information *Effect*

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

"Diagnostic behavior" submenu

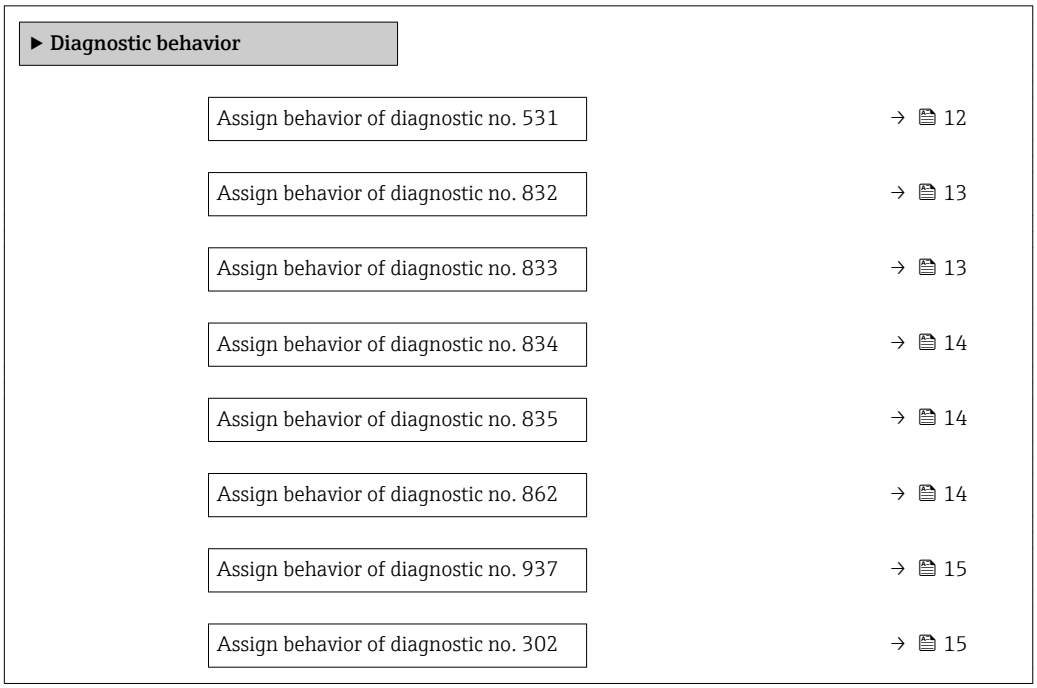
Each item of diagnostic information is assigned a specific diagnostic behavior at the factory. The user can change this assignment for specific diagnostic information in the **Diagnostic behavior** submenu (→ 12).

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.
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 entered only in the **Event logbook** submenu (→ 73).
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



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

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 531

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available, see → 12

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

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 832

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available, see → 12

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

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 833

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available, see → 12

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

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 834

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available, see → 12

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

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 835

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available, see → 12

Assign behavior of diagnostic no. 862 (Empty pipe)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 862

Description Use this function to change the diagnostic behavior of the diagnostic message **862 Empty pipe**.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available, see → 12

Assign behavior of diagnostic no. 937 (EMC interference)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 937

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available, see → 12

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

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 302

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

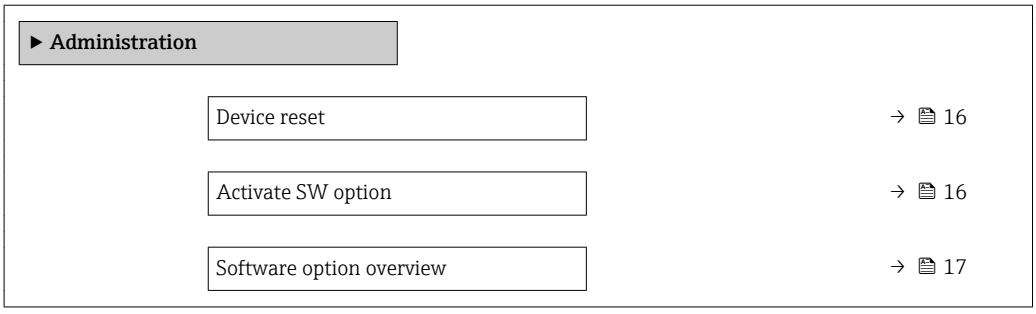
Selection
- Alarm
- Warning

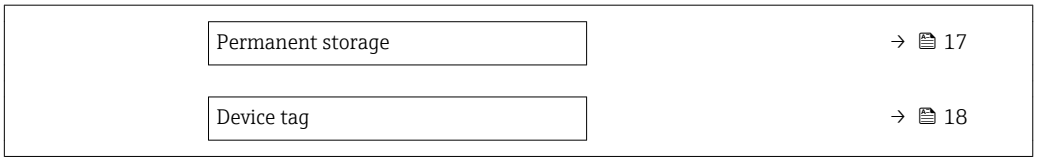
Factory setting Warning

Additional information For a detailed description of the options available, see → 12

3.1.2 "Administration" submenu

Navigation Expert → System → Administration





Device reset

Navigation Expert → System → Administration → Device reset

Description Use this function to choose whether to reset the device configuration - either entirely or in part - to a defined state.

Selection
- Cancel
- To fieldbus defaults *
- To delivery settings
- Restart device

Factory setting Cancel

Additional information

"Cancel" option

No action is executed and the user exits the parameter.

"To fieldbus defaults" option

Every parameter is reset to fieldbus default values.

"To delivery settings" option

Every parameter for which a customer-specific default setting was ordered is reset to this customer-specific value. All other parameters are reset to the factory setting.

This option is not visible if no customer-specific settings have been ordered.

"Restart device" option

The restart resets every parameter whose data are in the volatile memory (RAM) to the factory setting (e.g. measured value data). The device configuration remains unchanged.

Activate SW option

Navigation Expert → System → Administration → Activate SW opt.

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

User entry Max. 10-digit string consisting of numbers.

Factory setting 0

* Visibility depends on communication

Additional information *User entry*

Endress+Hauser provides the corresponding activation code for the software option with the order.

NOTICE! This activation code varies depending on the measuring device and the software option. If an incorrect or invalid code is entered, this can result in the loss of software options that are already been activated. After commissioning the measuring device: in this parameter only enter activation codes which Endress+Hauser has provided (e.g. when a new software option was ordered). If an incorrect or invalid activation code is entered, enter the activation code from the parameter protocol again and contact your Endress+Hauser sales organization, quoting the serial number of your device.

Example for a software option

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

Software option overview

Navigation Expert → System → Administration → SW option overv.

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

User interface
- Electrode cleaning circuit
- Heartbeat Verification
- Heartbeat Monitoring

Additional information *Description*

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

"Electrode cleaning circuit" option

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

"Heartbeat Verification" optionand"Heartbeat Monitoring" option

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

Permanent storage

Navigation Expert → System → Administration → Perm. storage

Description Use this function to switch permanent storage on and off.

Selection
- Off
- On

Factory setting On

Additional information *Description*

NOTE!

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.

Device tag

Navigation Expert → System → Administration → Device tag

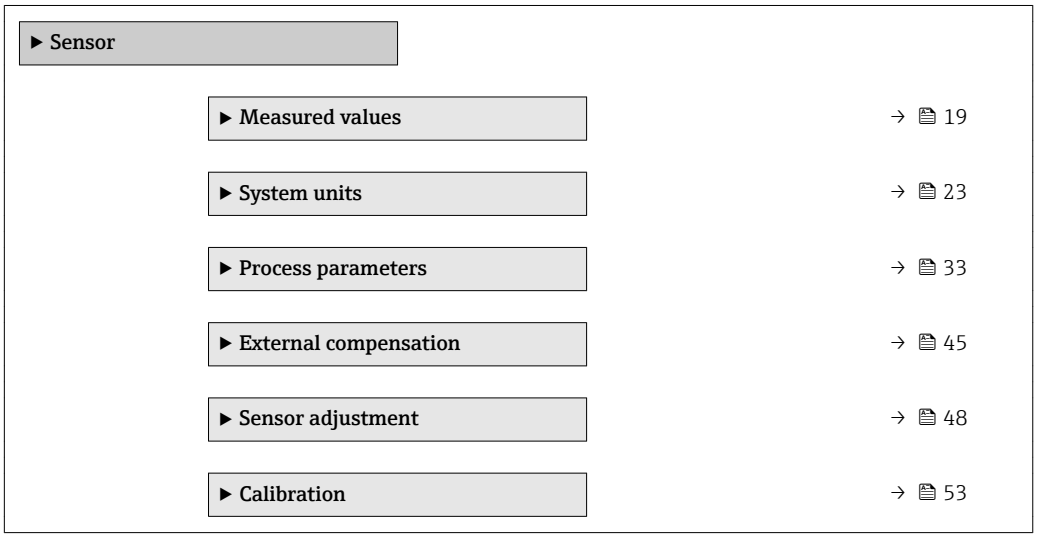
Description Use this function to enter the name for the measuring point.

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

Factory setting Promag

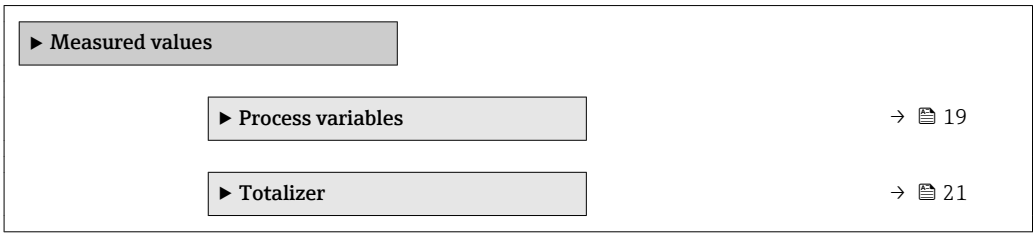
3.2 "Sensor" submenu

Navigation Expert → Sensor



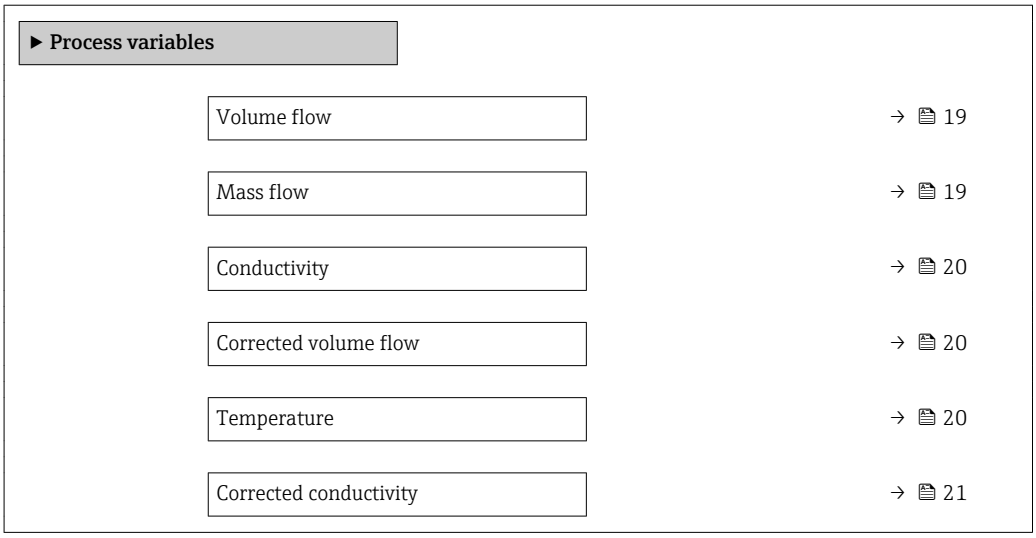
3.2.1 "Measured values" submenu

Navigation Expert → Sensor → Measured val.



"Process variables" submenu

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



Volume flow

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

Description Displays the volume flow currently measured.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Volume flow unit** parameter (→ 24)

Mass flow

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

Description Displays the mass flow currently calculated.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Mass flow unit** parameter (→ 27)

Conductivity

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

Prerequisite In the **Conductivity measurement** parameter (→ 37), the **On** option is selected.

Description Displays the conductivity currently measured.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Conductivity unit** parameter (→ 25)

Corrected volume flow

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

Description Displays the corrected volume flow currently measured.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Corrected volume flow unit** parameter (→ 29)

Temperature

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

Prerequisite For the following order code:
"Sensor Option", option CI "Fluid temperature probe"

Description Displays the temperature currently calculated.

User interface Positive floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 26)

Corrected conductivity

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

Prerequisite One of the following conditions is satisfied:
- Order code for "Sensor Option", option CI "Fluid temperature probe"
  or
- The temperature is read into the flowmeter from an external device.

Description Displays the conductivity currently corrected.

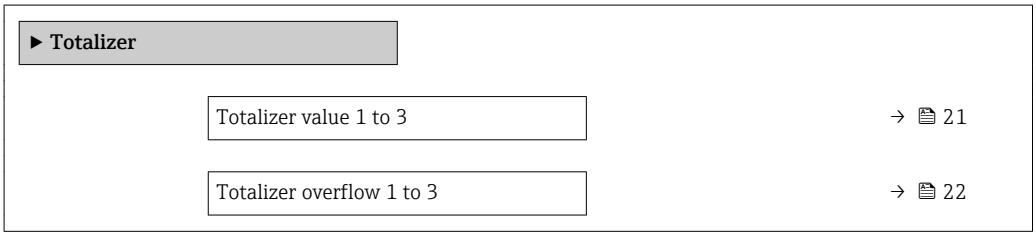
User interface Positive floating-point number

Additional information *Dependency*

The unit is taken from the **Conductivity unit** parameter (→ 25)

"Totalizer" submenu

Navigation Expert → Sensor → Measured val. → Totalizer



Totalizer value 1 to 3

Navigation Expert → Sensor → Measured val. → Totalizer → Totalizer val. 1 to 3

Prerequisite One of the following options is selected in the **Assign process variable** parameter (→ 61) of the **Totalizer 1 to 3** submenu:
- Volume flow
- Mass flow
- Corrected volume flow

Description Displays the current totalizer reading.

User interface Signed floating-point number

Additional information

Description

As it is only possible to display a maximum of 7 digits in the operating tool, the current counter value is the sum of the totalizer value and the overflow value from the **Totalizer overflow 1 to 3** parameter if the display range is exceeded.

In the event of an error, the totalizer adopts the mode defined in the **Failure mode** parameter (→ 65).

User interface

The value of the process variable totalized since measuring began can be positive or negative. This depends on the settings in the **Totalizer operation mode** parameter (→ 63).

The unit of the selected process variable is specified for the totalizer depending on the selection made in the **Assign process variable** parameter (→ 61):
- **Volume flow** option: **Volume flow unit** parameter (→ 24)
- **Mass flow** option: **Mass flow unit** parameter (→ 27)
- **Corrected volume flow** option: **Corrected volume unit** parameter (→ 63)

Example

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

Totalizer overflow 1 to 3

Navigation Expert → Sensor → Measured val. → Totalizer → Tot. overflow 1 to 3

Prerequisite One of the following options is selected in the **Assign process variable** parameter (→ 61) of the **Totalizer 1 to 3** submenu:
- Volume flow
- Mass flow
- Corrected volume flow

Description Displays the current totalizer overflow.

User interface Integer with sign

Additional information

Description

If the current totalizer reading has more than 7 digits, which is the maximum value range of the operating tool that can be displayed, 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 3** parameter

Display

The unit of the selected process variable is specified for the totalizer depending on the selection made in the **Assign process variable** parameter (→ 61):
- **Volume flow** option: **Volume flow unit** parameter (→ 24)
- **Mass flow** option: **Mass flow unit** parameter (→ 27)
- **Corrected volume flow** option: **Corrected volume unit** parameter (→ 63)

Example

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

3.2.2 "System units" submenu

Navigation Expert → Sensor → System units

▶ **System units**	
Volume flow unit	→ 24
Volume unit	→ 25
Conductivity unit	→ 25
Temperature unit	→ 26
Mass flow unit	→ 27
Mass unit	→ 27
Density unit	→ 28
Corrected volume flow unit	→ 29
Corrected volume unit	→ 30
Date/time format	→ 30
▶ **User-specific units**	→ 31

Volume flow unit

Navigation Expert → Sensor → System units → Volume flow unit

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

Selection

SI units
- cm^3/s
- cm^3/min
- cm^3/h
- cm^3/d
- dm^3/s
- dm^3/min
- dm^3/h
- dm^3/d
- m^3/s
- m^3/min
- m^3/h
- m^3/d
- ml/s
- ml/min
- ml/h
- ml/d
- l/s
- l/min
- l/h
- l/d
- hl/s
- hl/min
- hl/h
- hl/d
- Ml/s
- Ml/min
- Ml/h
- Ml/d

US units
- af/s
- af/min
- af/h
- af/d
- ft^3/s
- ft^3/min
- ft^3/h
- ft^3/d
- fl oz/s (us)
- fl oz/min (us)
- fl oz/h (us)
- fl oz/d (us)
- gal/s (us)
- gal/min (us)
- gal/h (us)
- gal/d (us)
- kgal/s (us)
- kgal/min (us)
- kgal/h (us)
- kgal/d (us)
- Mgal/s (us)
- Mgal/min (us)
- Mgal/h (us)
- Mgal/d (us)
- bbl/s (us;liq.)
- bbl/min (us;liq.)
- bbl/h (us;liq.)
- bbl/d (us;liq.)
- bbl/s (us;beer)
- bbl/min (us;beer)
- bbl/h (us;beer)
- bbl/d (us;beer)
- bbl/s (us;oil)
- bbl/min (us;oil)
- bbl/h (us;oil)
- bbl/d (us;oil)
- bbl/s (us;tank)
- bbl/min (us;tank)
- bbl/h (us;tank)
- bbl/d (us;tank)

Imperial units
- gal/s (imp)
- gal/min (imp)
- gal/h (imp)
- gal/d (imp)
- Mgal/s (imp)
- Mgal/min (imp)
- Mgal/h (imp)
- Mgal/d (imp)
- bbl/s (imp;beer)
- bbl/min (imp;beer)
- bbl/h (imp;beer)
- bbl/d (imp;beer)
- bbl/s (imp;oil)
- bbl/min (imp;oil)
- bbl/h (imp;oil)
- bbl/d (imp;oil)

Custom-specific units
- User vol./s
- User vol./min
- User vol./h
- User vol./d

Factory setting

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

Additional information

Result

The selected unit applies for:
Volume flow parameter (→ 19)

Selection

For an explanation of the abbreviated units: → 84

Customer-specific units

The unit for the customer-specific volume is specified in the **User volume text** parameter (→ 31).

Volume unit

Navigation Expert → Sensor → System units → Volume unit

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

Selection

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

US units
- af
- ft^3
- fl oz (us)
- gal (us)
- kgal (us)
- Mgal (us)
- bbl (us;oil)
- bbl (us;liq.)
- bbl (us;beer)
- bbl (us;tank)

Imperial units
- gal (imp)
- Mgal (imp)
- bbl (imp;beer)
- bbl (imp;oil)

Custom-specific units
User vol.

Factory setting

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

Additional information

Selection

For an explanation of the abbreviated units: → 84

Customer-specific units

The unit for the customer-specific volume is specified in the **User volume text** parameter (→ 31).

Conductivity unit

Navigation Expert → Sensor → System units → Conductiv. unit

Prerequisite In the **Conductivity measurement** parameter (→ 37), the **On** option is selected.

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

Selection

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

Factory setting µS/cm

Additional information

Result

The selected unit applies for:
- **Conductivity** parameter (→ 20)
- **Corrected conductivity** parameter (→ 21)

Selection

For an explanation of the abbreviated units: → 84

Temperature unit

Navigation Expert → Sensor → System units → Temperature unit

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 for:
- **Temperature** parameter (→ 20)
- **Maximum value** parameter (→ 78)
- **Minimum value** parameter (→ 78)
- **External temperature** parameter (→ 46)
- **Maximum value** parameter (→ 79)
- **Minimum value** parameter (→ 78)

Selection

For an explanation of the abbreviated units: → 84

Mass flow unit

Navigation Expert → Sensor → System units → Mass flow unit

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

Selection

SI units
- g/s
- g/min
- g/h
- g/d
- kg/s
- kg/min
- kg/h
- kg/d
- t/s
- t/min
- t/h
- t/d

US units
- oz/s
- oz/min
- oz/h
- oz/d
- lb/s
- lb/min
- lb/h
- lb/d
- STon/s
- STon/min
- STon/h
- STon/d

Custom-specific units
- User mass/s
- User mass/min
- User mass/h
- User mass/d

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

Additional information

Result

The selected unit applies for:
Mass flow parameter (→ 19)

Selection

For an explanation of the abbreviated units: → 84

Customer-specific units

The unit for the customer-specific mass is specified in the **User mass text** parameter (→ 32).

Mass unit

Navigation Expert → Sensor → System units → Mass unit

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

Selection

SI units
- g
- kg
- t

US units
- oz
- lb
- STon

Custom-specific units
User mass

Factory setting

Country-specific:
- kg
- lb

Additional information

Selection

For an explanation of the abbreviated units: → 84

Customer-specific units

The unit for the customer-specific mass is specified in the **User mass text** parameter (→ 32).

Density unit

Navigation

Expert → Sensor → System units → Density unit

Description

Use this function to select the unit for the density.

Selection

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

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

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

Factory setting

Country-specific:
- kg/l
- lb/ft³

Additional information

Result

The selected unit applies for:
- **External density** parameter (→ 47)
- **Fixed density** parameter (→ 47)

Selection

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

For an explanation of the abbreviated units: → 84

Corrected volume flow unit

Navigation Expert → Sensor → System units → Cor.volflow unit

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
- 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
- Sgal/s (us)
- Sgal/min (us)
- Sgal/h (us)
- Sgal/d (us)
- Sbbl/s (us;liq.)
- Sbbl/min (us;liq.)
- Sbbl/h (us;liq.)
- Sbbl/d (us;liq.)
- Sgal/s (imp)
- Sgal/min (imp)
- Sgal/h (imp)
- Sgal/d (imp)

Custom-specific units
- UserCrVol./s
- UserCrVol./min
- UserCrVol./h
- UserCrVol./d

Factory setting

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

Additional information

Result

The selected unit applies for:
Corrected volume flow parameter (→ 20)

Selection

For an explanation of the abbreviated units: → 84

Customer-specific units

The unit for the customer-specific corrected volume is defined in the **User corrected volume text** parameter (→ 33).

Corrected volume unit

Navigation Expert → Sensor → System units → Corr. vol. unit

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

Selection

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

US units
- Sft^3
- Sgal (us)
- Sbbl (us;liq.)

Imperial units
Sgal (imp)

Custom-specific units
UserCrVol.

Factory setting

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

Additional information

Selection

For an explanation of the abbreviated units: → 84

Customer-specific units

The unit for the customer-specific corrected volume is defined in the **User corrected volume text** parameter (→ 33).

Date/time format

Navigation Expert → Sensor → System units → Date/time format

Description Use this function to select the desired time format for calibration history.

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

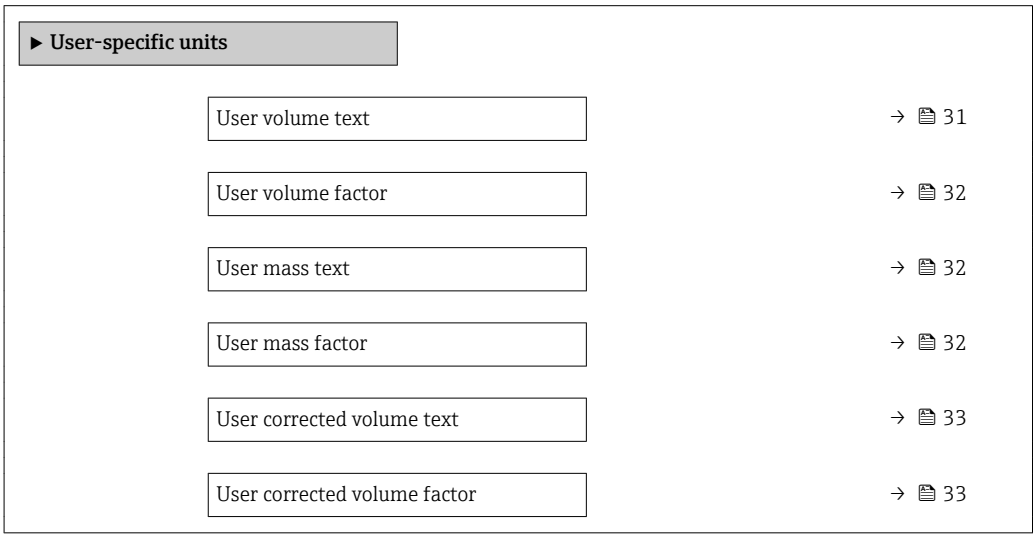
Factory setting dd.mm.yy hh:mm

Additional information *Selection*

For an explanation of the abbreviated units: → 84

"User-specific units" submenu

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



User volume text

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

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

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

Factory setting User vol.

Additional information *Result*

The defined unit is shown as an option in the choose list of the following parameters:
- **Volume flow unit** parameter (→ 24)
- **Volume unit** parameter (→ 25)

Example

If the text GLAS is entered, the choose list of the **Volume flow unit** parameter (→ 24) shows the following options:
- GLAS/s
- GLAS/min
- GLAS/h
- GLAS/d

User volume factor

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

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

User entry Signed floating-point number

Factory setting 1.0

User mass text

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

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

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

Factory setting User mass

Additional information *Result*

The defined unit is shown as an option in the choose list of the following parameters:
- **Mass flow unit** parameter (→ 27)
- **Mass unit** parameter (→ 27)

Example

If the text GLAS is entered, the following options are displayed in the picklist for the **Mass flow unit** parameter (→ 27):
- GLAS/s
- GLAS/min
- GLAS/h
- GLAS/d

User mass factor

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

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

User entry Signed floating-point number

Factory setting 1.0

User corrected volume text

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

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

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

Factory setting UserCrVol.

Additional information *Result*

The defined unit is shown as an option in the choose list of the following parameters:
- **Corrected volume flow unit** parameter (→ 29)
- **Corrected volume unit** parameter (→ 30)

Example

If the text GLAS is entered, the choose list of the **Corrected volume flow unit** parameter (→ 29) shows the following options:
- GLAS/s
- GLAS/min
- GLAS/h
- GLAS/d

User corrected volume factor

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

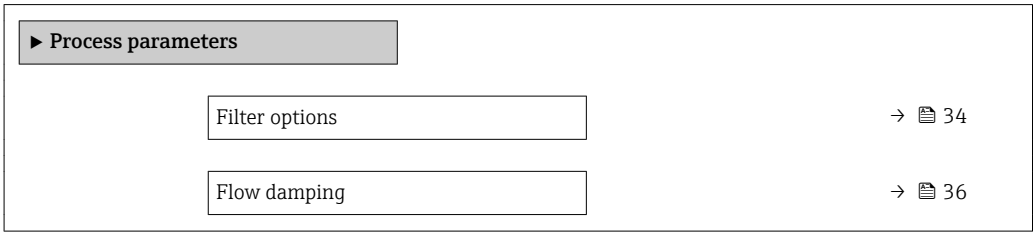
Description Use this function to enter a quantity factor (without time) for the user-specific corrected volume unit and corrected volume flow unit.

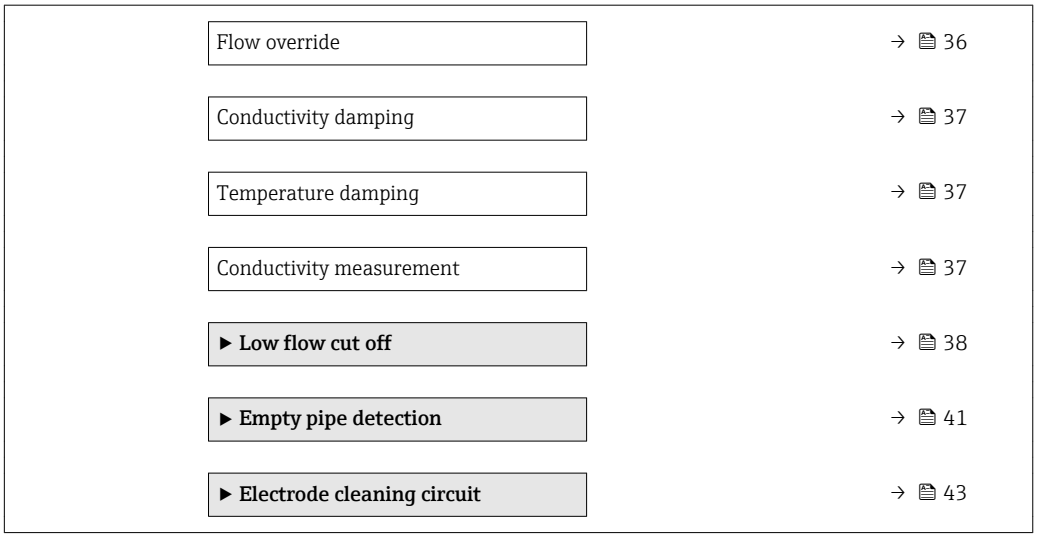
User entry Signed floating-point number

Factory setting 1.0

3.2.3 "Process parameters" submenu

Navigation Expert → Sensor → Process param.





Filter options

Navigation Expert → Sensor → Process param. → Filter options

Description Use this function to select a filter option.

Selection
- Standard CIP off
- Standard CIP on
- Dynamic CIP off
- Dynamic CIP on
- Binomial filter

Factory setting Standard CIP off

Additional information *Description*

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

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

Selection

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

Examples

Possible applications for the filters

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

1) Flow damping value < 6

Flow damping

Navigation Expert → Sensor → Process param. → Flow damping

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

User entry 0 to 15

Factory setting 7

Additional information

User entry

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

- 0 is a weak damping and 15 a strong one.
- A damping of 0 is not recommended, as the measuring signal is then so noisy that it is almost impossible to carry out a measurement.
- The damping depends on the measuring period and the filter type selected.
- An increase or decrease in the damping depends on the application.

Effect

The damping affects the following variables of the device:
- Outputs
- Low flow cut off → 38
- Totalizers

Flow override

Navigation Expert → Sensor → Process param. → Flow override

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

Selection
- Off
- On

Factory setting Off

Additional information

Result

This setting affects all the functions and outputs of the measuring device.

Description

Flow override is active
- The diagnostic message diagnostic message ⚠**C453 Flow override** is displayed.
- Output values
  - Output: Value at zero flow
  - Temperature: proceeding output
  - Totalizers 1-3: Stop being totalized

Conductivity damping

Navigation Expert → Sensor → Process param. → Conduct. damping

Prerequisite In the **Conductivity measurement** parameter (→ 37), the **On** option is selected.

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

User entry 0 to 999.9 s

Factory setting 0 s

Temperature damping

Navigation Expert → Sensor → Process param. → Temp. damping

Prerequisite For the following order code:
"Sensor Option", option CI "Fluid temperature probe"

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

User entry 0 to 999.9 s

Factory setting 0 s

Conductivity measurement

Navigation Expert → Sensor → Process param. → Conduct. measur.

Description Use this function to enable and disable conductivity measurement.

Selection
- Off
- On

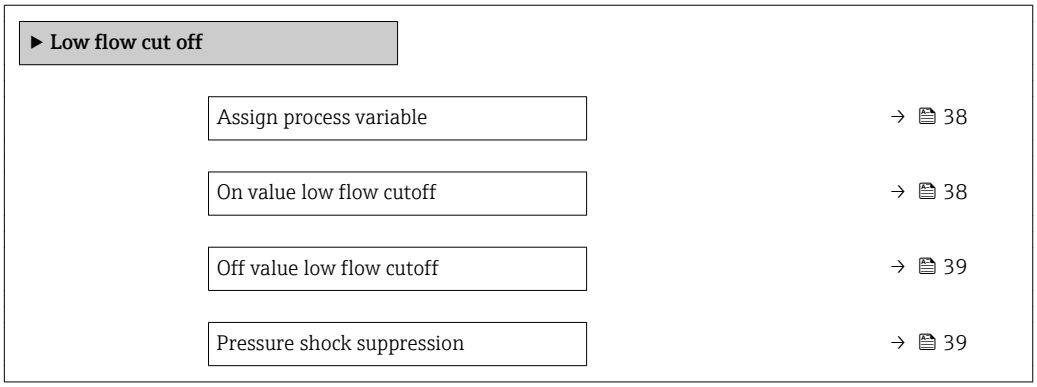
Factory setting Off

Additional information *Description*

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

"Low flow cut off" submenu

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



Assign process variable

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

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

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

Factory setting Volume flow

On value low flow cutoff

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

Prerequisite One of the following options is selected in the **Assign process variable** parameter (→ 38):
- Volume flow
- Mass flow
- Corrected volume flow

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 → 39.

User entry Signed floating-point number

Factory setting Depends on country and nominal diameter → 82

Additional information *Dependency*

The unit depends on the process variable selected in the **Assign process variable** parameter (→ 38).

Off value low flow cutoff

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

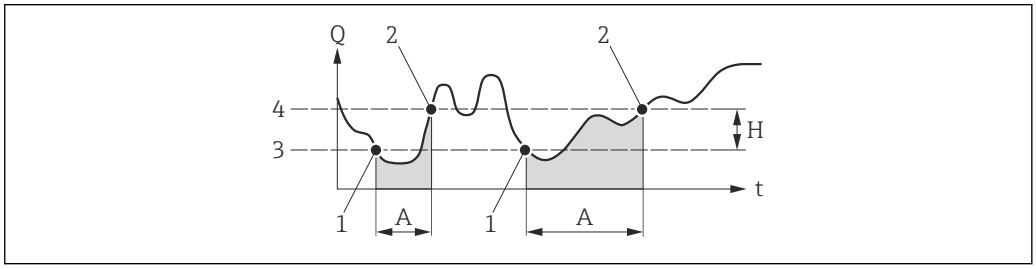
Prerequisite One of the following options is selected in the **Assign process variable** parameter (→ 38):
- Volume flow
- Mass flow
- Corrected volume flow

Description Use this function to enter a switch-off value for low flow cut off. The off value is entered as a positive hysteresis from the on value→ 38.

User entry 0 to 100.0 %

Factory setting 50 %

Additional information *Example*



A0012887

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

Pressure shock suppression

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

Prerequisite One of the following options is selected in the **Assign process variable** parameter (→ 38):
- Volume flow
- Mass flow
- Corrected volume flow

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

User entry 0 to 100 s

Factory setting 0 s

Additional information

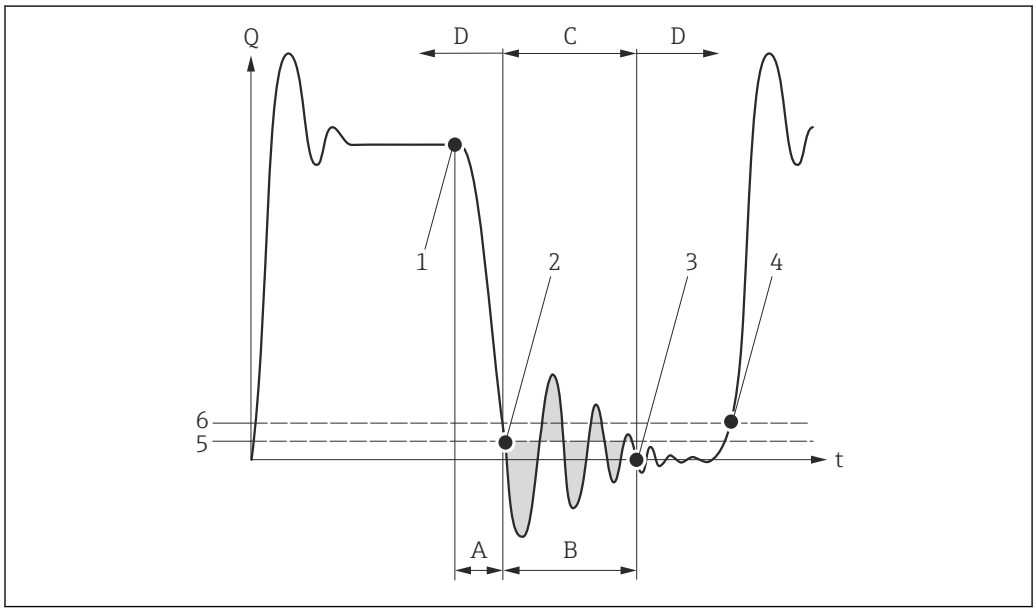
Description

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

Pressure shock suppression is disabled
- Prerequisite: the time interval set in this function has elapsed.
- If the flow also exceeds the switch-off value for low flow cut off, the device starts processing the current flow value again and displays it.

Example

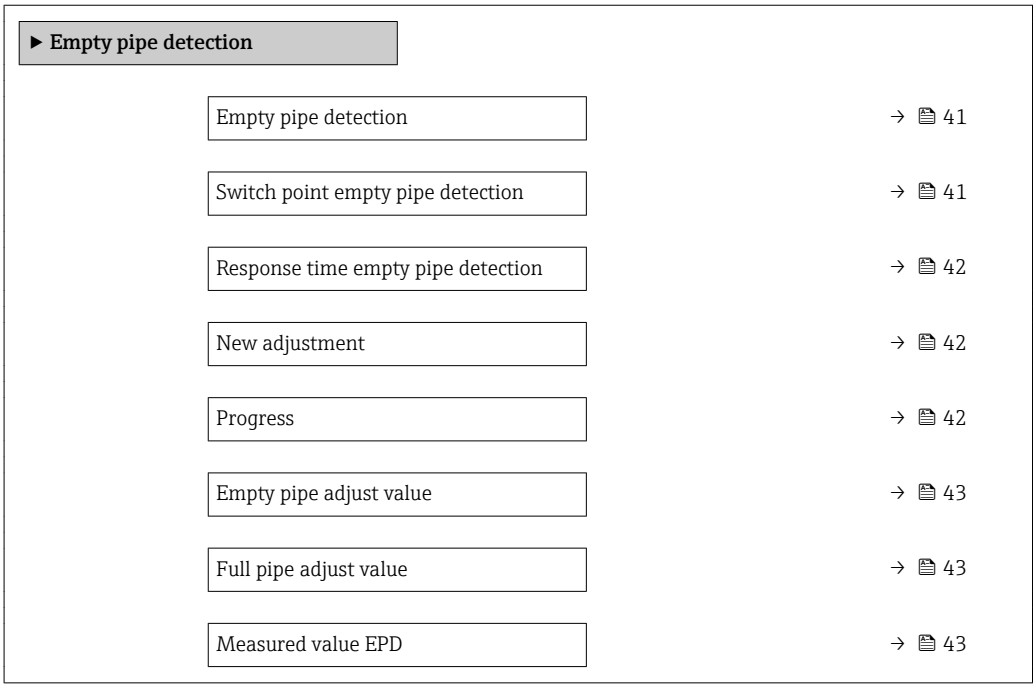
When closing a valve, momentarily strong fluid movements may occur in the pipeline, which are registered by the measuring system. These totalized flow values lead to a false totalizer status, particularly during batching processes.



Q Flow
t Time
A Drip
B Pressure shock
C Pressure shock suppression active as specified by the time entered
D Pressure shock suppression inactive
1 Valve closes
2 Flow falls below the on-value of the low flow cut off: pressure shock suppression is activated
3 The time entered has elapsed: pressure shock suppression is deactivated
4 The actual flow value is now displayed and output
5 On value for low flow cut off
6 Off value for low flow cut off

"Empty pipe detection" submenu

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



Empty pipe detection

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

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

Selection
- Off
- On

Factory setting Off

Switch point empty pipe detection

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

Prerequisite The **On** option is selected in the **Empty pipe detection** parameter (→ 41).

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

User entry 0 to 100 %

Factory setting 10 %

Response time empty pipe detection

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

Prerequisite In the **Empty pipe detection** parameter (→ 41), the **On** option is selected.

Description Enter the minimum length of time (debouncing time) the signal must be present for the diagnostic message ⚠**S862 Empty pipe** to be triggered if the measuring pipe is empty or partially full.

User entry 0 to 100 s

Factory setting 1 s

New adjustment

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

Prerequisite The **On** option is selected in the **Empty pipe detection** parameter (→ 41).

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

Selection
- Cancel
- Empty pipe adjust
- Full pipe adjust

Factory setting Cancel

Progress

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

Prerequisite The **On** option is selected in the **Empty pipe detection** parameter (→ 41).

Description Use this function to view the progress.

User interface
- Ok
- Busy
- Not ok

Empty pipe adjust value

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

Prerequisite
- In the **Empty pipe detection** parameter (→ 41), the **On** option is selected.
- Adjustment value > full pipe value.

Description Displays the adjustment value when the measuring pipe is empty.

User interface Positive floating-point number

Full pipe adjust value

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

Prerequisite
- In the **Empty pipe detection** parameter (→ 41), the **On** option is selected.
- Adjustment value < empty pipe value.

Description Displays the adjustment value when the measuring pipe is full.

User interface Positive floating-point number

Measured value EPD

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

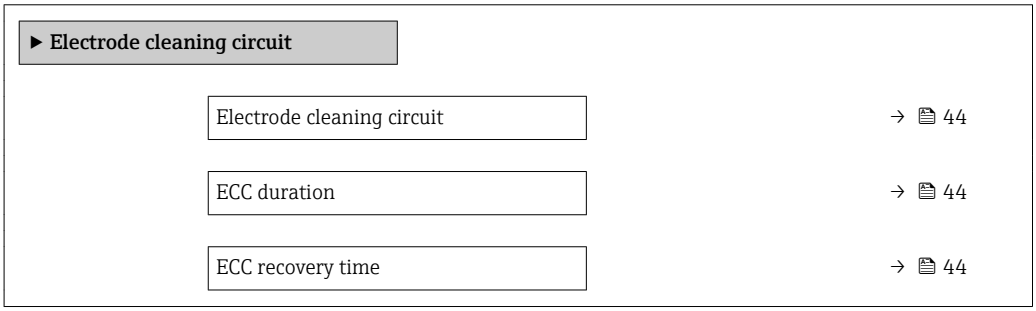
Prerequisite In the **Empty pipe detection** parameter (→ 41), the **On** option is selected.

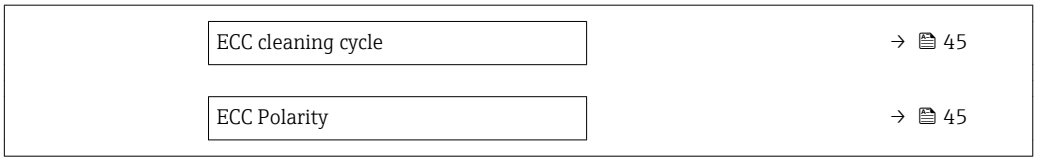
Description Displays the current measured value.

User interface Positive floating-point number

"Electrode cleaning circuit" submenu

Navigation Expert → Sensor → Process param. → ECC





Electrode cleaning circuit

Navigation Expert → Sensor → Process param. → ECC → ECC

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

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

Selection
- Off
- On

Factory setting Off

ECC duration

Navigation Expert → Sensor → Process param. → ECC → ECC duration

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

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

User entry 0.01 to 30 s

Factory setting 2 s

ECC recovery time

Navigation Expert → Sensor → Process param. → ECC → ECC recov. time

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

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

User entry 1 to 600 s

Factory setting 60 s

ECC cleaning cycle

Navigation Expert → Sensor → Process param. → ECC → ECC clean. cycle

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

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

User entry 0.5 to 168 h

Factory setting 0.5 h

ECC Polarity

Navigation Expert → Sensor → Process param. → ECC → ECC Polarity

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

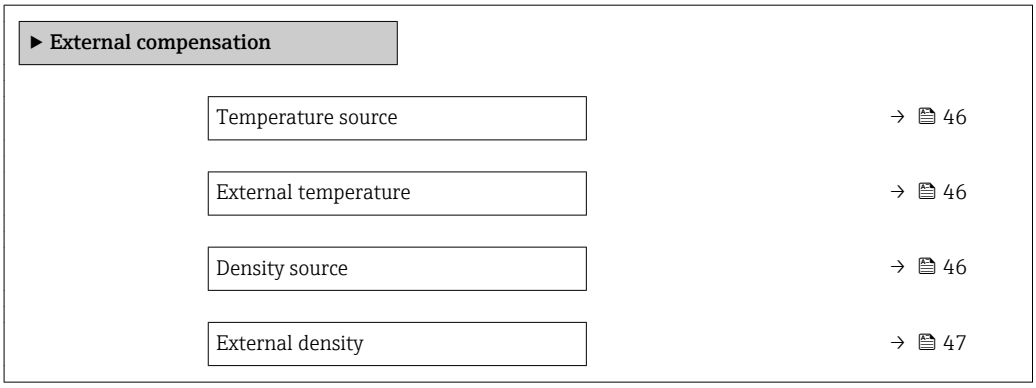
Description Displays the polarity of the electrode cleaning circuit.

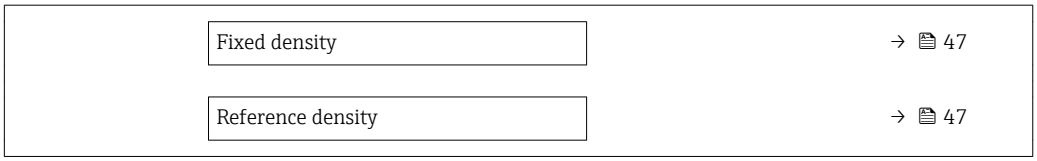
User interface
- Positive
- Negative

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

3.2.4 "External compensation" submenu

Navigation Expert → Sensor → External comp.





Temperature source

Navigation Expert → Sensor → External comp. → Temp. source

Description Use this function to select the temperature source.

Selection
- Internal temperature sensor
- External value

Factory setting External value

External temperature

Navigation Expert → Sensor → External comp. → External temp.

Prerequisite The **External value** option is selected in the **Temperature source** parameter (→ 46).

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

User entry Floating point number with sign

Factory setting −273.15 °C

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 26)

Density source

Navigation Expert → Sensor → External comp. → Density source

Description Use this function to select the density source.

Selection
- Fixed density
- External density

Factory setting Fixed density

External density

Navigation Expert → Sensor → External comp. → External density

Prerequisite In the **Density source** parameter (→ 46), the **External density** option is selected.

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

User entry Positive floating-point number

Factory setting 0 kg/l

Additional information *Dependency*

The unit is taken from the **Density unit** parameter (→ 28)

Fixed density

Navigation Expert → Sensor → External comp. → Fixed density

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

User entry Positive floating-point number

Factory setting Country-specific:
- 1 000 kg/l
- 1 000 lb/ft³

Additional information *Dependency*

The unit is taken from the **Density unit** parameter (→ 28)

Reference density

Navigation Expert → Sensor → External comp. → Ref.density

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

User entry Positive floating-point number

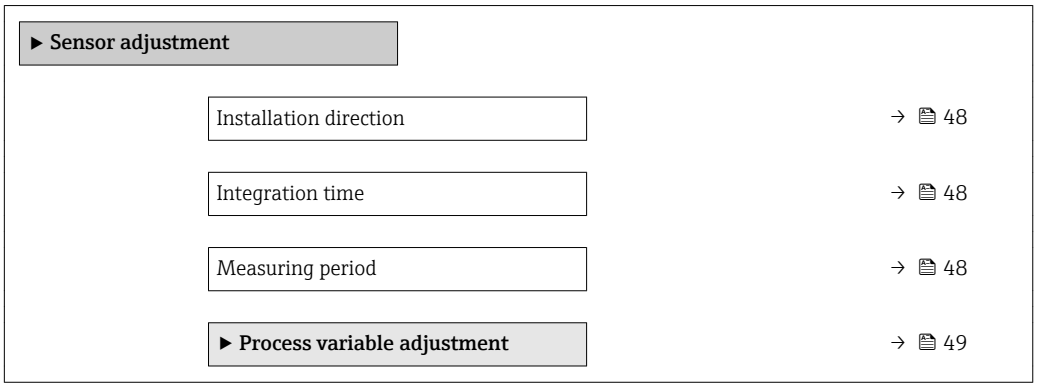
Factory setting Country-specific:
- 1 kg/l
- 1 lb/ft³

Additional information *Dependency*

The unit is taken from the **Density unit** parameter (→ 28)

3.2.5 "Sensor adjustment" submenu

Navigation Expert → Sensor → Sensor adjustm.



Installation direction

Navigation Expert → Sensor → Sensor adjustm. → Install. direct.

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

Selection
- Flow in arrow direction
- Flow against arrow direction

Factory setting Flow in arrow direction

Additional information *Description*

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

Integration time

Navigation Expert → Sensor → Sensor adjustm. → Integration time

Description Display the duration of an integration cycle.

User interface 1 to 65 ms

Measuring period

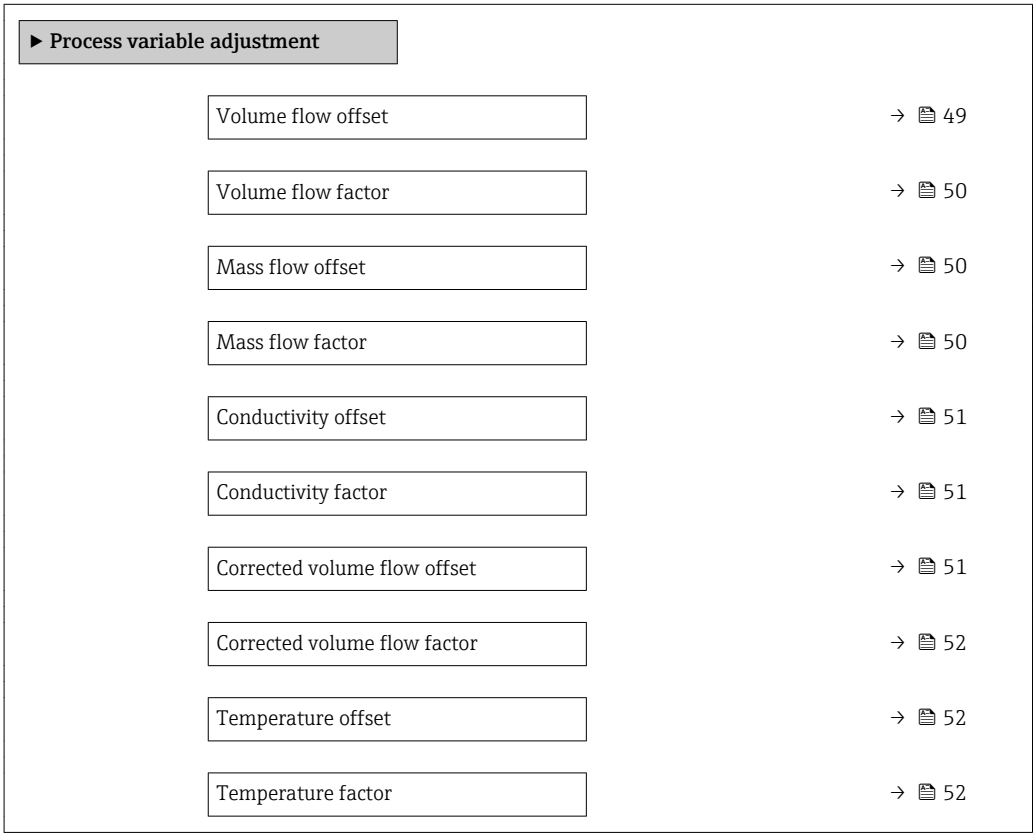
Navigation Expert → Sensor → Sensor adjustm. → Measuring period

Description Display the time of a full measuring period.

User interface 50 to 1 000 ms

"Process variable adjustment" submenu

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust



Volume flow offset

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Vol. flow offset

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

User entry Signed floating-point number

Factory setting 0 m^3/s

Additional information *Description*

Corrected value = (factor × value) + offset

Volume flow factor

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Vol. flow factor

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

User entry Positive floating-point number

Factory setting 1

Additional information *Description*

Corrected value = (factor × value) + offset

Mass flow offset

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Mass flow offset

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

User entry Signed floating-point number

Factory setting 0 kg/s

Additional information *Description*

Corrected value = (factor × value) + offset

Mass flow factor

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Mass flow factor

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

User entry Positive floating-point number

Factory setting 1

Additional information *Description*

Corrected value = (factor × value) + offset

Conductivity offset

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Conduct. offset

Prerequisite In the **Conductivity measurement** parameter (→ 37), the **On** option is selected.

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

User entry Signed floating-point number

Factory setting 0 S/m

Additional information *Description*

Corrected value = (factor × value) + offset

Conductivity factor

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Conduct. factor

Prerequisite In the **Conductivity measurement** parameter (→ 37), the **On** option is selected.

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

User entry Positive floating-point number

Factory setting 1

Additional information *Description*

Corrected value = (factor × value) + offset

Corrected volume flow offset

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Corr. vol offset

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

User entry Signed floating-point number

Factory setting 0 Nm^3/s

Additional information *Description*

Corrected value = (factor × value) + offset

Corrected volume flow factor

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Corr. vol factor

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

User entry Positive floating-point number

Factory setting 1

Additional information *Description*

Corrected value = (factor × value) + offset

Temperature offset

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Temp. offset

Prerequisite For the following order code:
"Sensor Option", option CI "Fluid temperature probe"

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

User entry Signed floating-point number

Factory setting 0 K

Additional information *Description*

Corrected value = (factor × value) + offset

Temperature factor

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Temp. factor

Prerequisite For the following order code:
"Sensor Option", option CI "Fluid temperature probe"

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

User entry Positive floating-point number

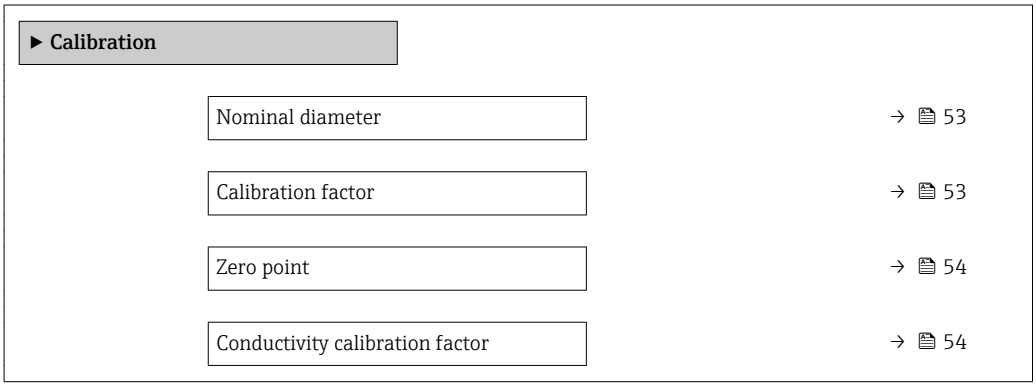
Factory setting 1

Additional information *Description*

Corrected value = (factor × value) + offset

3.2.6 "Calibration" submenu

Navigation Expert → Sensor → Calibration



Nominal diameter

Navigation Expert → Sensor → Calibration → Nominal diameter

Description Displays the nominal diameter of the sensor.

User interface DNxx / x"

Factory setting Depends on the size of the sensor

Additional information *Description*

The value is also specified on the sensor nameplate.

Calibration factor

Navigation Expert → Sensor → Calibration → Cal. factor

Description Displays the current calibration factor for the sensor.

User interface Positive floating-point number

Factory setting Depends on nominal diameter and calibration.

Zero point

Navigation Expert → Sensor → Calibration → Zero point

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

User interface Signed floating-point number

Factory setting Depends on nominal diameter and calibration

Conductivity calibration factor

Navigation Expert → Sensor → Calibration → Cond. cal. fact.

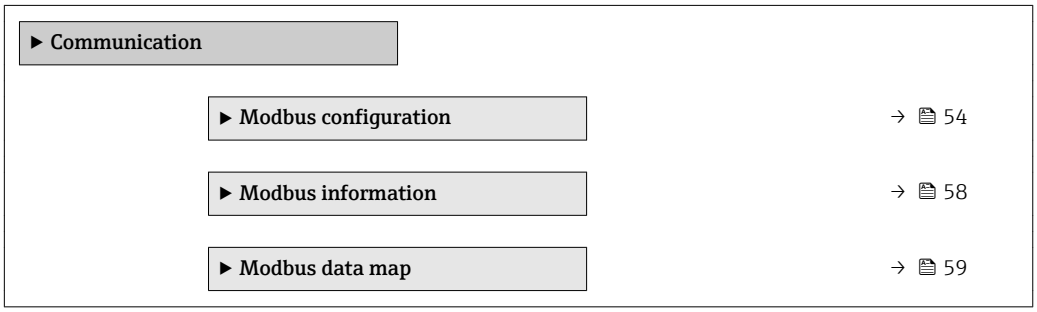
Prerequisite In the **Conductivity measurement** parameter (→ 37), the **On** option is selected.

Description Displays the calibration factor for the conductivity measurement.

User interface 0 to 10 000

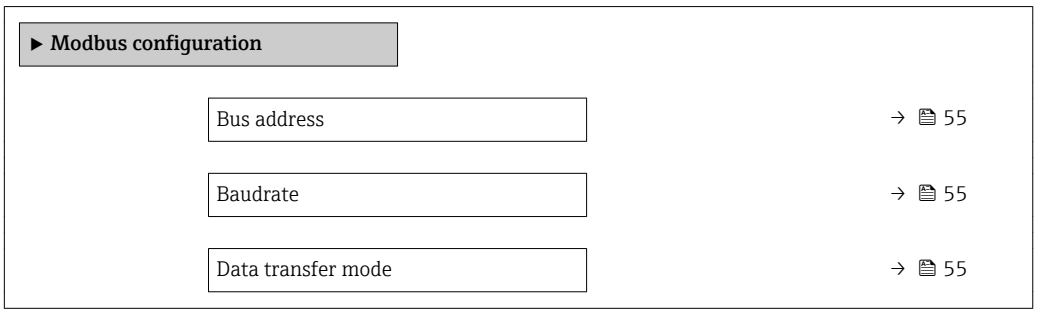
3.3 "Communication" submenu

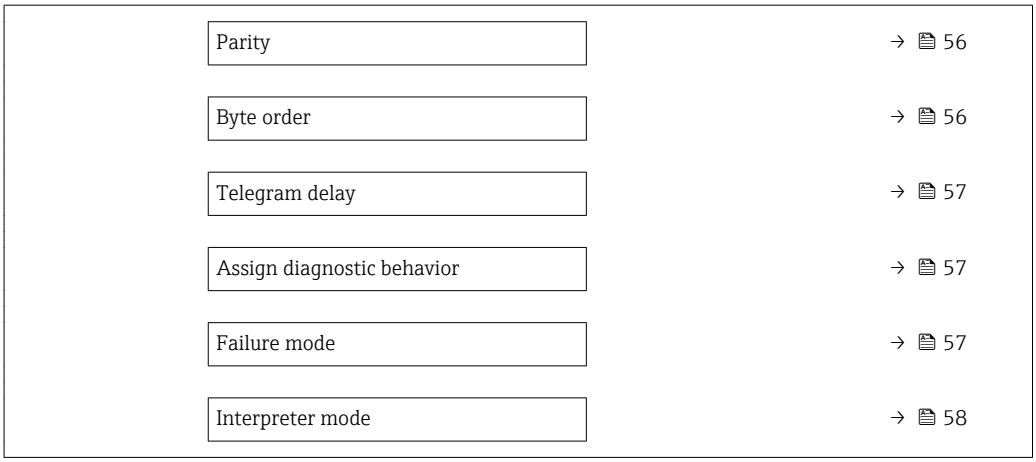
Navigation Expert → Communication



3.3.1 "Modbus configuration" submenu

Navigation Expert → Communication → Modbus config.





Bus address

Navigation Expert → Communication → Modbus config. → Bus address

Description For entering the device address.

User entry 1 to 247

Factory setting 247

Baudrate

Navigation Expert → Communication → Modbus config. → Baudrate

Description Use this function to select a transmission rate.

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

Factory setting 19200 BAUD

Data transfer mode

Navigation Expert → Communication → Modbus config. → Data trans. mode

Description Use this function to select the data transmission mode.

Selection
- ASCII
- RTU

Factory setting RTU

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

Parity

Navigation Expert → Communication → Modbus config. → Parity

Description Use this function to select the parity bit.

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

Factory setting Even

Additional information *Options*

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

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

Byte order

Navigation Expert → Communication → Modbus config. → Byte order

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

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

Factory setting 1-0-3-2

Telegram delay

Navigation Expert → Communication → Modbus config. → Telegram delay

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

User entry 0 to 100 ms

Factory setting 6 ms

Assign diagnostic behavior

Navigation Expert → Communication → Modbus config. → Assign diag. beh

Description Use this function to select the diagnostic behavior for Modbus communication.

Selection
- Off
- Alarm or warning
- Warning
- Alarm

Factory setting Alarm

Additional information *Description*

Defines the category of messages to which data transmission responds:
- Off
  The device continues to measure. The diagnostic event is ignored, and no diagnostic message is generated.
- Alarm or warning
  The device continues to measure. A diagnostic message is generated. In the event of an alarm, the signal outputs assume the specified alarm condition.
- Warning
  The device continues to measure. A diagnostic message is generated.
- Alarm
  The device continues to measure. The signal outputs assume the specified alarm condition. A diagnostic message is generated.

Failure mode

Navigation Expert → Communication → Modbus config. → Failure mode

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

Selection
- NaN value
- Last valid value

Factory setting NaN value

Additional information *Options*

- NaN value
  The device outputs the NaN value [1].
- 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 (→ 57).

Interpreter mode

Navigation Expert → Communication → Modbus config. → Interpreter mode

Description Use this function to select the interpreter mode. This mode defines the behavior of the telegram reception interpreter.

Selection

- Standard
- Ignore surplus bytes

Factory setting Standard

Additional information *"Standard" option*

Behaves according to the Modbus standard, i.e. the last two bytes received are the checksum CRC16.

NOTE!

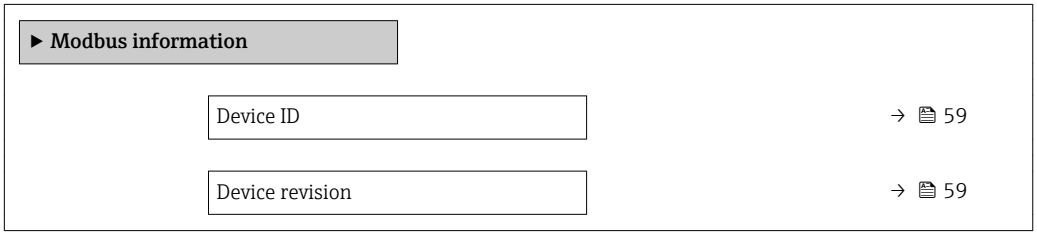
The selection is only relevant in the RTU mode. In the ASCII mode, the device always behaves according to the Modbus standard.

"Ignore surplus bytes" option

If supported by the function code, the two bytes for the checksum CRC16 are determined from the anticipated telegram length. Surplus bytes at the end of the actual telegram are ignored. This is not the standard Modbus behavior.

3.3.2 "Modbus information" submenu

Navigation Expert → Communication → Modbus info



1) Not a Number

Device ID

Navigation Expert → Communication → Modbus info → Device ID

Description Displays the device ID for identifying the measuring device.

User interface 4-digit hexadecimal number

Device revision

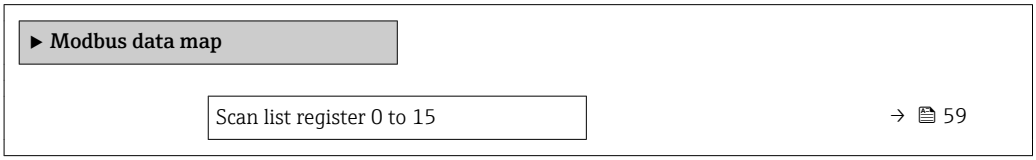
Navigation Expert → Communication → Modbus info → Device revision

Description Displays the device revision.

User interface 4-digit hexadecimal number

3.3.3 "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

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 in the auto-scan buffer by assigning them to the scan list registers 0 to 15. The data of the device parameters assigned here are read out via the register addresses 5051 to 5081.

User entry 1 to 65 535

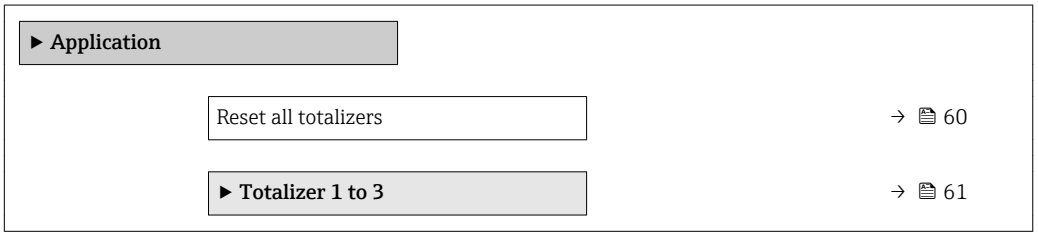
Factory setting 1

Additional information *Description*

- Scan list: Configuration area
  The device parameters to be grouped are defined in a list in that their Modbus RS485 register addresses are entered in the list.
- Data area
  The measuring device reads out the register addresses entered in the scan list cyclically and writes the associated device data (values) to the data area.

3.4 "Application" submenu

Navigation Expert → Application



Reset all totalizers

Navigation Expert → Application → Reset all tot.

Description Use this function to reset all totalizers to the value **0** and restart the totaling process. This deletes all the flow values previously totalized.

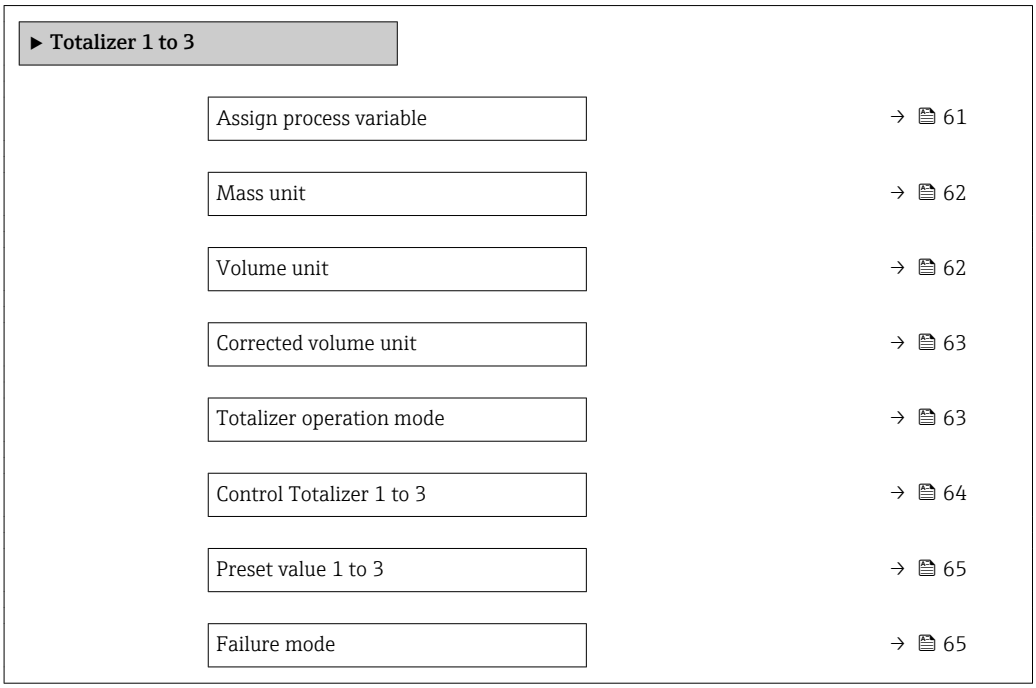
Selection
- Cancel
- Reset + totalize

Factory setting Cancel

Additional information *Selection*
- Cancel
  No action is executed and the user exits the parameter.
- Reset + totalize
  All totalizers are reset to 0 and the totaling process is restarted.

3.4.1 "Totalizer 1 to 3" submenu

Navigation Expert → Application → Totalizer 1 to 3



Assign process variable

Navigation Expert → Application → Totalizer 1 to 3 → Assign variable

Description Use this function to select a process variable for the Totalizer 1 to 3.

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

Factory setting Mass flow

Additional information *Description*

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

Selection

If the **Off** option is selected, only **Assign process variable** parameter (→ 61) is still displayed in the **Totalizer 1 to 3** submenu. All other parameters in the submenu are hidden.

Mass unit

Navigation Expert → Application → Totalizer 1 to 3 → Mass unit

Prerequisite The **Mass flow** option is selected in the **Assign process variable** parameter (→ 61) of the **Totalizer 1 to 3** submenu.

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

Selection

SI units
- g
- kg
- t

US units
- oz
- lb
- STon

Custom-specific units
User mass

Factory setting Country-specific:
- kg
- lb

Additional information *Selection*

For an explanation of the abbreviated units: → 84

Volume unit

Navigation Expert → Application → Totalizer 1 to 3 → Volume unit

Prerequisite The **Volume flow** option is selected in the **Assign process variable** parameter (→ 61) of the **Totalizer 1 to 3** submenu.

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

Selection

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

US units
- af
- ft^3
- fl oz (us)
- gal (us)
- kgal (us)
- Mgal (us)
- bbl (us;oil)
- bbl (us;liq.)
- bbl (us;beer)
- bbl (us;tank)

Imperial units
- gal (imp)
- Mgal (imp)
- bbl (imp;beer)
- bbl (imp;oil)

Custom-specific units
User vol.

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

Additional information *Selection*

For an explanation of the abbreviated units: → 84

Corrected volume unit

Navigation Expert → Application → Totalizer 1 to 3 → Corr. vol. unit

Prerequisite The **Corrected volume flow** option is selected in the **Assign process variable** parameter (→ 61) of the **Totalizer 1 to 3** submenu.

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

Selection

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

US units
- Sft^3
- Sgal (us)
- Sbbl (us;liq.)

Imperial units
Sgal (imp)

Custom-specific units
UserCrVol.

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

Additional information *Selection*

For an explanation of the abbreviated units: → 84

Totalizer operation mode

Navigation Expert → Application → Totalizer 1 to 3 → Operation mode

Prerequisite One of the following options is selected in the **Assign process variable** parameter (→ 61)**Totalizer 1 to 3** submenu:
- Volume flow
- Mass flow
- Corrected volume flow

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

Selection
- Net flow total
- Forward flow total
- Reverse flow total

Factory setting Net flow total

Additional information *Selection*

- Net flow total
  Positive and negative flow values 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 against the forward flow direction is totalized (= reverse flow total).

Control Totalizer 1 to 3

Navigation Expert → Application → Totalizer 1 to 3 → Control Tot. 1 to 3

Prerequisite One of the following options is selected in the **Assign process variable** parameter (→ 61) of the **Totalizer 1 to 3** submenu:
- Volume flow
- Mass flow
- Corrected volume flow

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

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

Factory setting Totalize

Additional information *Selection*

- Totalize
  The totalizer is started or continues totalizing with the current counter reading.
- Reset + hold
  The totaling process is stopped and the totalizer is reset to 0.
- Preset + hold
  The totaling process is stopped and the totalizer is set to its defined start value from the **Preset value** parameter (→ 65).
- Reset + totalize
  The totalizer is reset to 0 and the totaling process is restarted.
- Preset + totalize
  The totalizer is set to the defined start value from the **Preset value** parameter (→ 65) and the totaling process is restarted.

Preset value 1 to 3

Navigation Expert → Application → Totalizer 1 to 3 → Preset value 1 to 3

Prerequisite One of the following options is selected in the **Assign process variable** parameter (→ 61) of the **Totalizer 1 to 3** submenu:
- Volume flow
- Mass flow
- Corrected volume flow

Description Use this function to enter a start value for the Totalizer 1 to 3.

User entry Signed floating-point number

Factory setting 0 kg

Additional information *User entry*

The unit of the selected process variable is specified for the totalizer depending on the selection made in the **Assign process variable** parameter (→ 61):
- **Volume flow** option: **Volume flow unit** parameter (→ 24)
- **Mass flow** option: **Mass flow unit** parameter (→ 27)
- **Corrected volume flow** option: **Corrected volume unit** parameter (→ 63)

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 3 → Failure mode

Prerequisite One of the following options is selected in the **Assign process variable** parameter (→ 61) of the **Totalizer 1 to 3** submenu:
- Volume flow
- Mass flow
- Corrected volume flow

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

Selection
- Stop
- Actual value
- Last valid value

Factory setting Stop

Additional information

Description

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

Selection

- Stop
  Totalizing is stopped when a device alarm occurs.
- Actual value
  The totalizer continues to count based on the actual 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.

3.5 "Diagnostics" submenu

Navigation Expert → Diagnostics

▶ **Diagnostics**	
Actual diagnostics	→ 67
Timestamp	→ 67
Previous diagnostics	→ 67
Timestamp	→ 68
Operating time from restart	→ 68
Operating time	→ 68
▶ **Diagnostic list**	→ 69
▶ **Event logbook**	→ 73
▶ **Device information**	→ 73
▶ **Min/max values**	→ 77
▶ **Heartbeat**	→ 79
▶ **Simulation**	→ 80

Actual diagnostics

Navigation Expert → Diagnostics → Actual diagnos.

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 (→ 69).

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 (→ 67).

Example

For the display format:
24d12h13m00s

Previous diagnostics

Navigation Expert → Diagnostics → Prev.diagnostics

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 *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 (→ 67).

Example

For the display format:
24d12h13m00s

Operating time from restart

Navigation Expert → Diagnostics → Time fr. restart

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

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

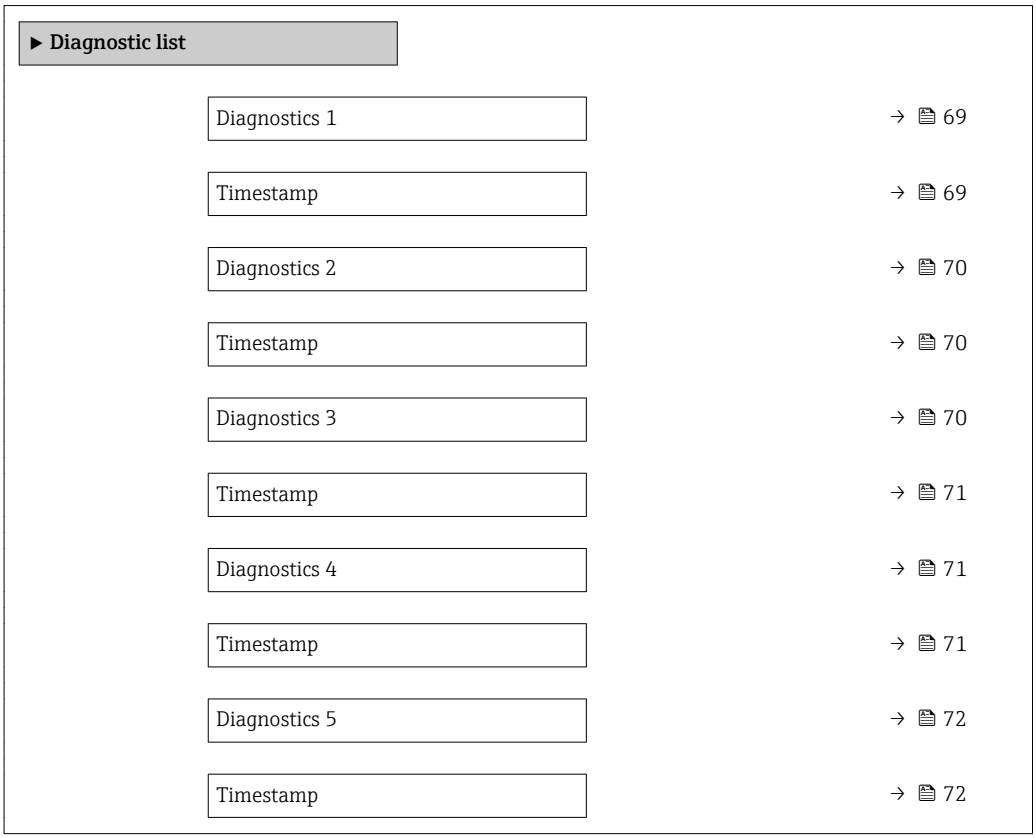
User interface Days (d), hours (h), minutes (m) and seconds (s)

Additional information *User interface*

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

3.5.1 "Diagnostic list" submenu

Navigation Expert → Diagnostics → Diagnostic list



Diagnostics 1

Navigation Expert → Diagnostics → Diagnostic list → Diagnostics 1

Description Displays the current diagnostics message with the highest priority.

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

Additional information *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 (→ 69).

Example

For the display format:
24d12h13m00s

Diagnostics 2

Navigation Expert → Diagnostics → Diagnostic list → Diagnostics 2

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

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

Additional information *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 (→ 70).

Example

For the display format:
24d12h13m00s

Diagnostics 3

Navigation Expert → Diagnostics → Diagnostic list → Diagnostics 3

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

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

Additional information *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 (→ 70).

Example

For the display format:
24d12h13m00s

Diagnostics 4

Navigation Expert → Diagnostics → Diagnostic list → Diagnostics 4

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

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

Additional information *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 (→ 71).

Example

For the display format:
24d12h13m00s

Diagnostics 5

Navigation Expert → Diagnostics → Diagnostic list → Diagnostics 5

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

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

Additional information *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*

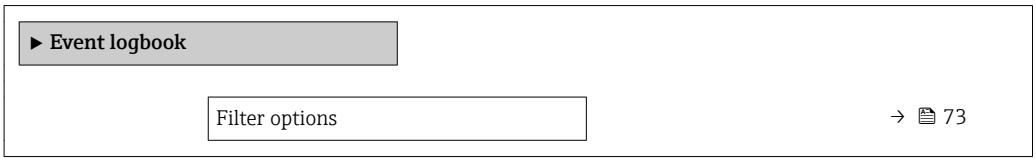
The diagnostic message can be viewed via the **Diagnostics 5** parameter (→ 72).

Example

For the display format:
24d12h13m00s

3.5.2 "Event logbook" submenu

Navigation Expert → Diagnostics → Event logbook



Filter options

Navigation Expert → Diagnostics → Event logbook → Filter options

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

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

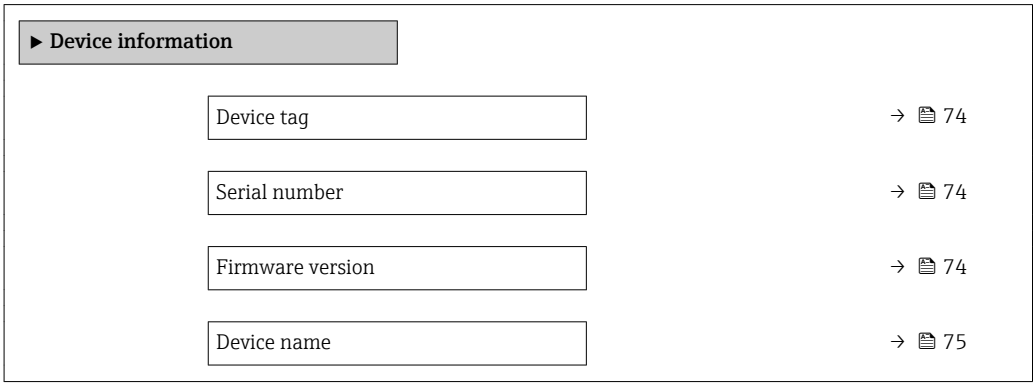
Factory setting All

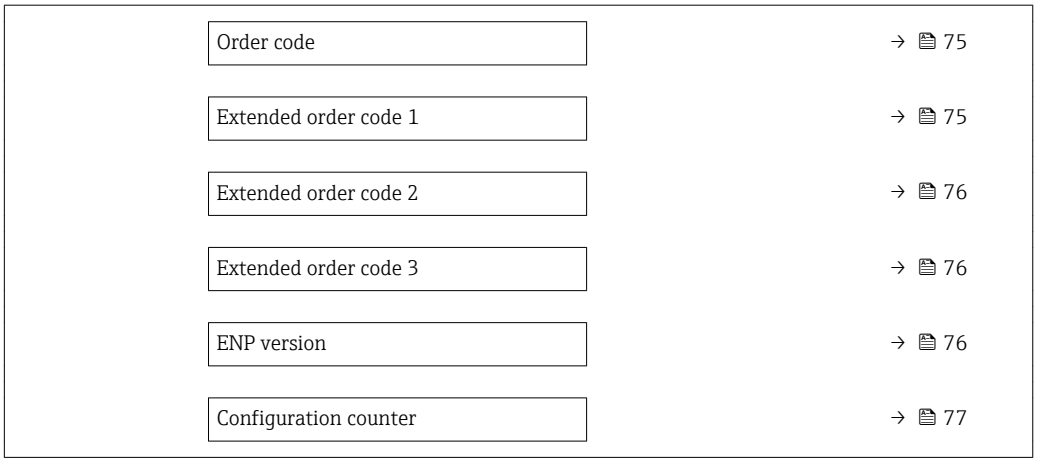
Additional information *Description*

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

3.5.3 "Device information" submenu

Navigation Expert → Diagnostics → Device info





Device tag

Navigation Expert → Diagnostics → Device info → Device tag

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

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

Factory setting Promag 100

Serial number

Navigation Expert → Diagnostics → Device info → Serial number

Description Displays the serial number of the measuring device.

The number can be found on the nameplate of the sensor and transmitter.

User interface A maximum of 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

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

Description Displays the name of the transmitter. It can also be found on the nameplate of the transmitter.

User interface Max. 32 characters such as letters or numbers.

Factory setting Promag 100

Order code

Navigation Expert → Diagnostics → Device info → Order code

Description Displays the device order code.

User interface Character string composed of letters, numbers and certain punctuation marks (e.g. /).

Additional information *Description*

The order code can be found on the nameplate of the sensor and transmitter in the "Order code" field.

The order code is generated from the extended order code through a process of reversible transformation. The extended order code indicates the attributes for all the device features in the product structure. The device features are not directly readable from the order code.

Uses of the order code
- To order an identical spare device.
- To identify the device quickly and easily, e.g. when contacting Endress+Hauser.

Extended order code 1

Navigation Expert → Diagnostics → Device info → Ext. order cd. 1

Description Displays the first part of the extended order code.

On account of length restrictions, the extended order code is split into a maximum of 3 parameters.

User interface Character string

Additional information *Description*

The extended order code indicates the version of all the features of the product structure for the measuring device and thus uniquely identifies the measuring device.

The extended order code can also be found on the nameplate of the sensor and transmitter in the "Ext. ord. cd." field.

Extended order code 2

Navigation Expert → Diagnostics → Device info → Ext. order cd. 2

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 (→ 75)

Extended order code 3

Navigation Expert → Diagnostics → Device info → Ext. order cd. 3

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 (→ 75)

ENP version

Navigation Expert → Diagnostics → Device info → ENP version

Description Displays the version of the electronic nameplate.

User interface Character string

Factory setting 2.02.00

Additional information *Description*

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

Configuration counter

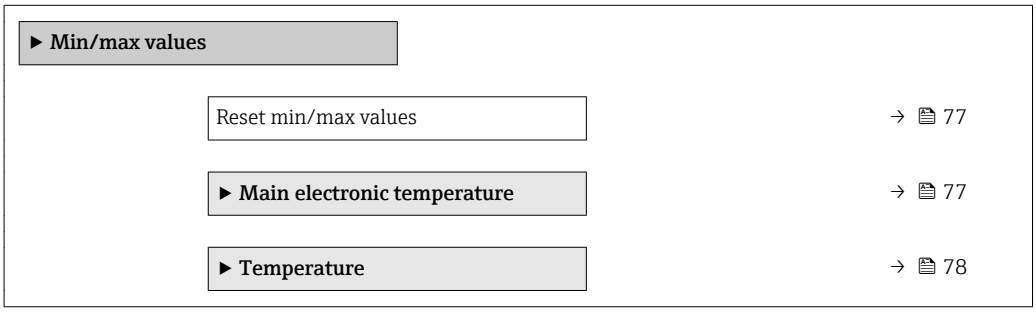
Navigation Expert → Diagnostics → Device info → Config. counter

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

User interface 0 to 65 535

3.5.4 "Min/max values" submenu

Navigation Expert → Diagnostics → Min/max val.



Reset min/max values

Navigation Expert → Diagnostics → Min/max val. → Reset min/max

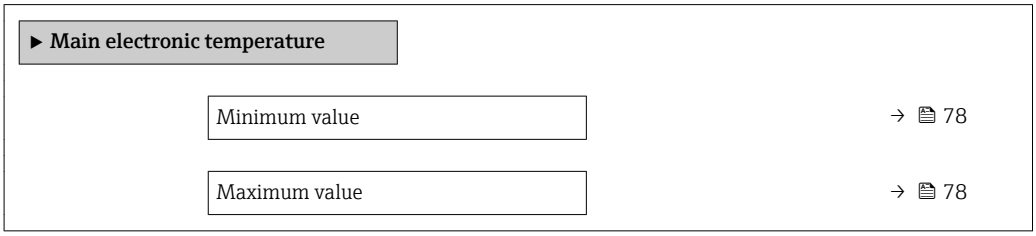
Description Use this function to select measured variables whose minimum, maximum and average measured values are to be reset.

Selection Cancel

Factory setting Cancel

"Main electronic temperature" submenu

Navigation Expert → Diagnostics → Min/max val. → Main elect.temp.



Minimum value

Navigation Expert → Diagnostics → Min/max val. → Main elect.temp. → Minimum value

Description Displays the lowest previously measured temperature value of the main electronics module.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 26)

Maximum value

Navigation Expert → Diagnostics → Min/max val. → Main elect.temp. → Maximum value

Description Displays the highest previously measured temperature value of the main electronics module.

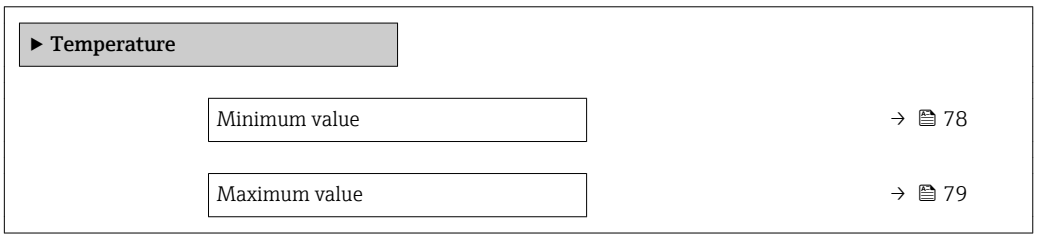
User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 26)

"Temperature" submenu

Navigation Expert → Diagnostics → Min/max val. → Temperature



Minimum value

Navigation Expert → Diagnostics → Min/max val. → Temperature → Minimum value

Prerequisite For the following order code:
"Sensor Option", option CI "Fluid temperature probe"

Description Displays the lowest previously measured medium temperature value.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 26)

Maximum value

Navigation Expert → Diagnostics → Min/max val. → Temperature → Maximum value

Prerequisite For the following order code:
"Sensor Option", option CI "Fluid temperature probe"

Description Displays the highest previously measured medium temperature value.

User interface Signed floating-point number

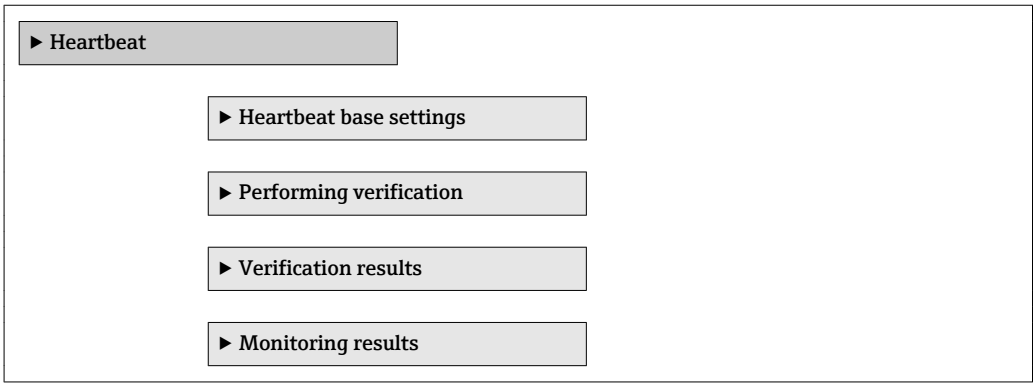
Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 26)

3.5.5 "Heartbeat" submenu

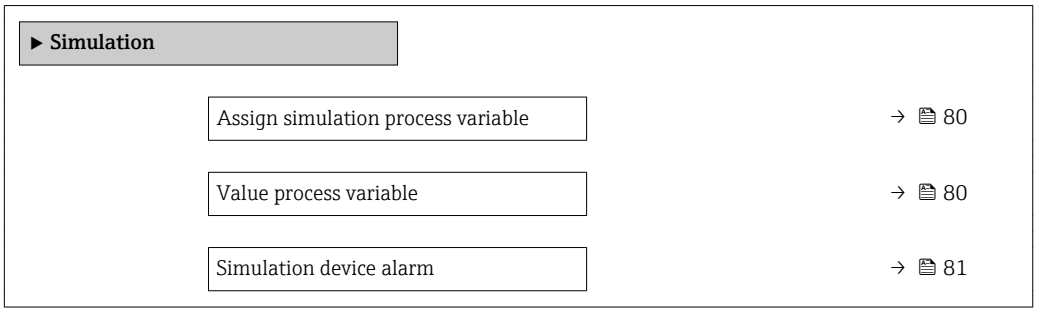
For detailed information on the parameter descriptions of the **Heartbeat Verification** application package, see the Special Documentation for the device

Navigation Expert → Diagnostics → Heartbeat



3.5.6 "Simulation" submenu

Navigation Expert → Diagnostics → Simulation



Assign simulation process variable

Navigation Expert → Diagnostics → Simulation → Assign proc.var.

Description Use this function to select a process variable for the simulation process that is activated.

Selection
- Off
- Volume flow
- Mass flow
- Corrected volume flow
- Conductivity **
- Corrected conductivity **
- Temperature **

Factory setting Off

Additional information *Description*

The simulation value of the process variable selected is defined in the **Value process variable** parameter (→ 80).

Value process variable

Navigation Expert → Diagnostics → Simulation → Value proc. var.

Prerequisite One of the following options is selected in the **Assign simulation process variable** parameter (→ 80):
- Volume flow
- Mass flow
- Corrected volume flow
- Conductivity **
- Corrected conductivity **
- Temperature **

** Visibility depends on order options or device settings

Description Use this function to enter a simulation value for the selected process variable. Subsequent measured value processing and the signal output use this simulation value. In this way, users can verify whether the measuring device has been configured correctly.

User entry Depends on the process variable selected

Factory setting 0

Additional information *User entry*

The unit of the displayed measured value is taken from the **System units** submenu (→ 23).

Simulation device alarm

Navigation Expert → Diagnostics → Simulation → Sim. alarm

Description Use this function to switch the device alarm on and off.

Selection
- Off
- On

Factory setting Off

4 Country-specific factory settings

4.1 SI units

Not valid for USA and Canada.

4.1.1 System units

Volume flow	l/h
Volume	m^3
Conductivity	µS/cm
Temperature	°C
Mass flow	kg/h
Mass	kg
Density	kg/l
Corrected volume flow	Nl/h
Corrected volume	Nm^3

4.1.2 On value low flow cut off

The switch-on point depends on the type of medium and the nominal diameter.

Nominal diameter [mm]	**(v ~ 0.04 m/s) [m^3/h]**
2	0.01
4	0.05
8	0.1
15	0.5
25	1
32	2
40	3
50	5
65	8
80	12
100	20
125	30
150	2.5
200	5
250	7.5
300	10
350	15
400	20
450	25
500	30
600	40

4.2 US units

Only valid for USA and Canada.

4.2.1 System units

Volume flow	gal/min (us)
Volume	gal (us)
Temperature	°F
Mass flow	lb/min
Mass	lb
Density	lb/ft³
Corrected volume flow	Sft³/h
Corrected volume	Sft³

4.2.2 On value low flow cut off

The switch-on point depends on the type of medium and the nominal diameter.

Nominal diameter [in]	**(v ~ 0.04 m/s) [gal/min]**
1/12	0.002
1/8	0.008
3/8	0.025
½	0.15
1	0.25
1½	0.75
2	1.25
3	2.5
4	4
5	7
6	12
8	15
10	30
12	45
14	60
16	60
18	90
20	120
24	180

5 Explanation of abbreviated units

5.1 SI units

Process variable	Units	Explanation
Density	g/cm³, g/m³	Gram/volume unit
	kg/dm³, kg/l, kg/m³	Kilogram/volume unit
	SD4°C, SD15°C, SD20°C	Specific density: The specific density is the ratio of the density of the fluid to the density of water at a water temperature of 4 °C (39 °F), 15 °C (59 °F), 20 °C (68 °F).
	SG4°C, SG15°C, SG20°C	Specific gravity: The specific gravity is the ratio of the density of the fluid to the density of water at a water temperature of 4 °C (39 °F), 15 °C (59 °F), 20 °C (68 °F).
Conductivity	µS/mm	Microsiemens/length unit
	nS/cm, µS/cm, mS/cm, S/cm	Nano- Micro- , Milli- , Siemens/length unit
	µS/m, mS/m, S/m, kS/m, MS/m	Micro- , Milli- , Siemens, Kilo-, Megasiemens/length unit
Mass	g, kg, t	Gram, kilogram, metric ton
Mass flow	g/s, g/min, g/h, g/d	Gram/time unit
	kg/s, kg/min, kg/h, kg/d	Kilogram/time unit
	t/s, t/min, t/h, t/d	Metric ton/time unit
Corrected volume	Nl, Nm³, Sm³	Normal liter, normal cubic meter, 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
	Sm³/s, Sm³/min, Sm³/h, Sm³/d	Standard cubic meter/time unit
Temperature	°C , K	Celsius, Kelvin
Volume	cm³, dm³, m³	Cubic centimeter, cubic decimeter, cubic meter
	ml, l, hl, Ml Mega	Milliliter, liter, hectoliter, megaliter
Volume flow	cm³/s, cm³/min, cm³/h, cm³/d	Cubic centimeter/time unit
	dm³/s, dm³/min, dm³/h, dm³/d	Cubic decimeter/time unit
	m³/s, m³/min, m³/h, m³/d	Cubic meter/time unit
	ml/s, ml/min, ml/h, ml/d	Milliliter/time unit
	l/s, l/min, l/h, l/d	Liter/time unit
	hl/s, hl/min, hl/h, hl/d	Hectoliter/time unit
	Ml/s, Ml/min, Ml/h, Ml/d	Megaliter/time unit
Time	s, m, h, d, y	Second, minute, hour, day, year

5.2 US units

Process variable	Units	Explanation
Density	lb/ft³, lb/gal (us)	Pound/cubic foot, pound/gallon
	lb/bbl (us;liq.), lb/bbl (us;beer), lb/bbl (us;oil), lb/bbl (us;tank)	Pound/volume unit
Mass	oz, lb, STon	Ounce, pound, standard ton
Mass flow	oz/s, oz/min, oz/h, oz/d	Ounce/time unit

Process variable	Units	Explanation
	lb/s, lb/min, lb/h, lb/d	Pound/time unit
	STon/s, STon/min, STon/h, STon/d	Standard ton/time unit
Corrected volume	Sft^3, Sgal (us), Sbbl (us;liq.)	Standard cubic foot, standard gallon, standard barrel
Corrected volume flow	Sft^3/s, Sft^3/min, Sft^3/h, Sft^3/d	Standard cubic foot/time unit
	Sgal/s (us), Sgal/min (us), Sgal/h (us), Sgal/d (us)	Standard gallon/time unit
	Sbbl/s (us;liq.), Sbbl/min (us;liq.), Sbbl/h (us;liq.), Sbbl/d (us;liq.)	Barrel/time unit (normal liquids)
Temperature	°F, °R	Fahrenheit, Rankine
Volume	af	Acre foot
	ft^3	Cubic foot
	fl oz (us), gal (us), kgal (us), Mgal (us)	Fluid ounce, gallon, kilogallon, million gallon
	bbl (us;liq.), bbl (us;beer), bbl (us;oil), bbl (us;tank)	Barrel (normal liquids), barrel (beer), barrel (petrochemicals), barrel (filling tanks)
Volume flow	af/s, af/min, af/h, af/d	Acre foot/time unit
	ft^3/s, ft^3/min, ft^3/h, ft^3/d	Cubic foot/time unit
	fl oz/s (us), fl oz/min (us), fl oz/h (us), fl oz/d (us)	Fluid ounce/time unit
	gal/s (us), gal/min (us), gal/h (us), gal/d (us)	Gallon/time unit
	kgal/s (us), kgal/min (us), kgal/h (us), kgal/d (us)	Kilogallon/time unit
	Mgal/s (us), Mgal/min (us), Mgal/h (us), Mgal/d (us)	Million gallon/time unit
	bbl/s (us;liq.), bbl/min (us;liq.), bbl/h (us;liq.), bbl/d (us;liq.)	Barrel/time unit (normal liquids) Normal liquids: 31.5 gal/bbl
	bbl/s (us;beer), bbl/min (us;beer), bbl/h (us;beer), bbl/d (us;beer)	Barrel /time unit (beer) Beer: 31.0 gal/bbl
	bbl/s (us;oil), bbl/min (us;oil), bbl/h (us;oil), bbl/d (us;oil)	Barrel/time unit (petrochemicals) Petrochemicals: 42.0 gal/bbl
	bbl/s (us;tank), bbl/min (us;tank), bbl/h (us;tank), bbl/d (us;tank)	Barrel/time unit (filling tank) Filling tanks: 55.0 gal/bbl
Time	s, m, h, d, y	Second, minute, hour, day, year
	am, pm	Ante meridiem (before midday), post meridiem (after midday)

5.3 Imperial units

Process variable	Units	Explanation
Density	lb/gal (imp), lb/bbl (imp;beer), lb/bbl (imp;oil)	Pound/volume unit
Corrected volume	Sgal (imp)	Standard gallon
Corrected volume flow	Sgal/s (imp), Sgal/min (imp), Sgal/h (imp), Sgal/d (imp)	Standard gallon/time unit
Volume	gal (imp), Mgal (imp)	Gallon, mega gallon
	bbl (imp;beer), bbl (imp;oil)	Barrel (beer), barrel (petrochemicals)

Process variable	Units	Explanation
Volume flow	gal/s (imp), gal/min (imp), gal/h (imp), gal/d (imp)	Gallon/time unit
	Mgal/s (imp), Mgal/min (imp), Mgal/h (imp), Mgal/d (imp)	Mega gallon/time unit
	bbl/s (imp;beer), bbl/min (imp;beer), bbl/h (imp;beer), bbl/d (imp;beer)	Barrel /time unit (beer) Beer: 36.0 gal/bbl
	bbl/s (imp;oil), bbl/min (imp;oil), bbl/h (imp;oil), bbl/d (imp;oil)	Barrel/time unit (petrochemicals) Petrochemicals: 34.97 gal/bbl
Time	s, m, h, d, y	Second, minute, hour, day, year
	am, pm	Ante meridiem (before midday), post meridiem (after midday)

6 Modbus RS485 Register Information

6.1 Notes

6.1.1 Structure of the register information

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

Navigation: navigation path to the parameter					
Parameter	**Register**	**Data type**	**Access type**	**Selection/input**	**→**
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	**Selection** List of the individual options for the parameter ▪ Option 1 ▪ **Option 2** ▪ **Option 3** (+) ▪ Factory setting highlighted in bold ▪ (+) = Factory setting depends on country, order options or device settings **User entry** Input range for the parameter	Specified number of pages and cross-reference to 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)".

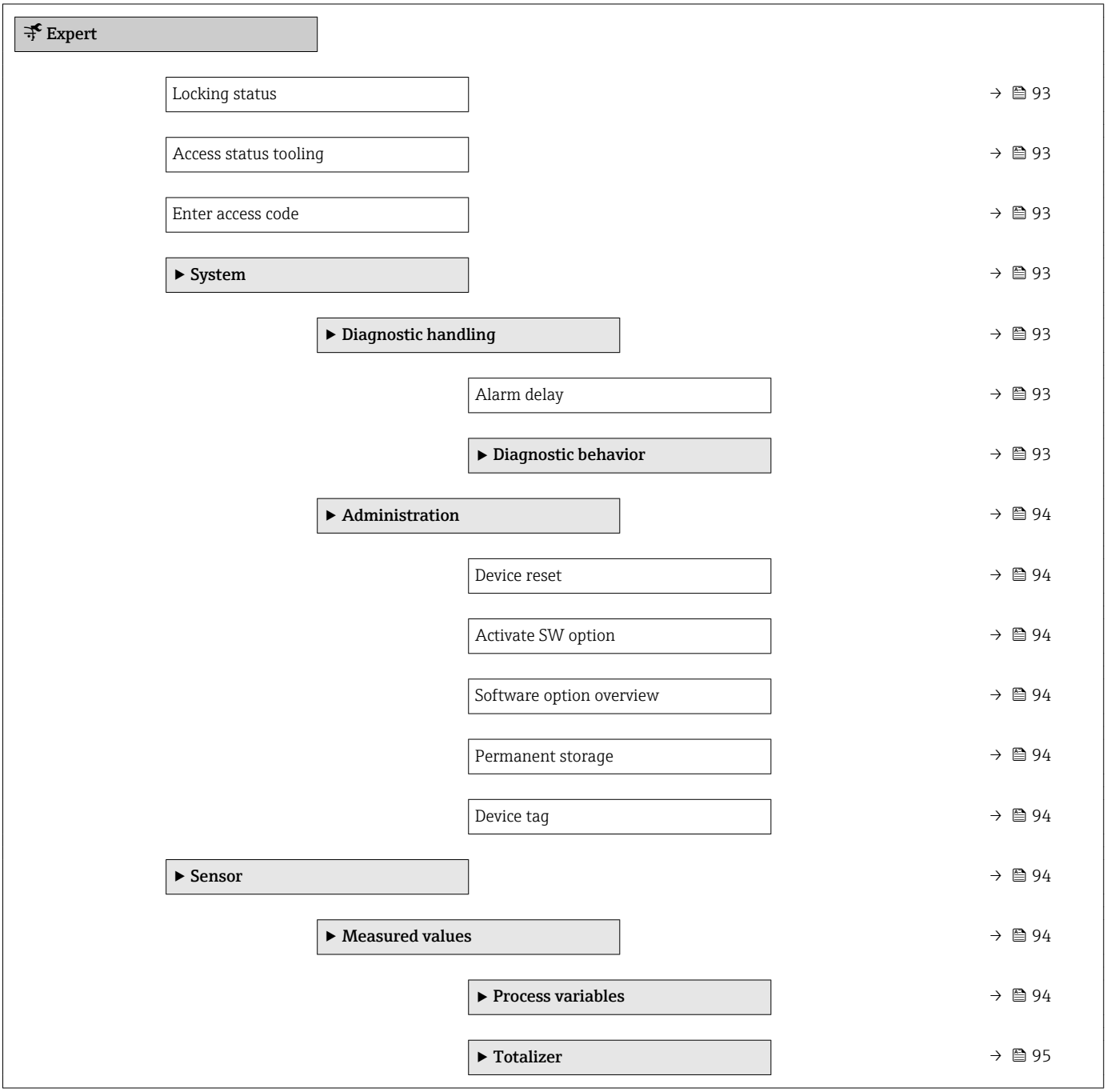
Depending on the function code used, a number is added at the start of the register address with this specification:

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

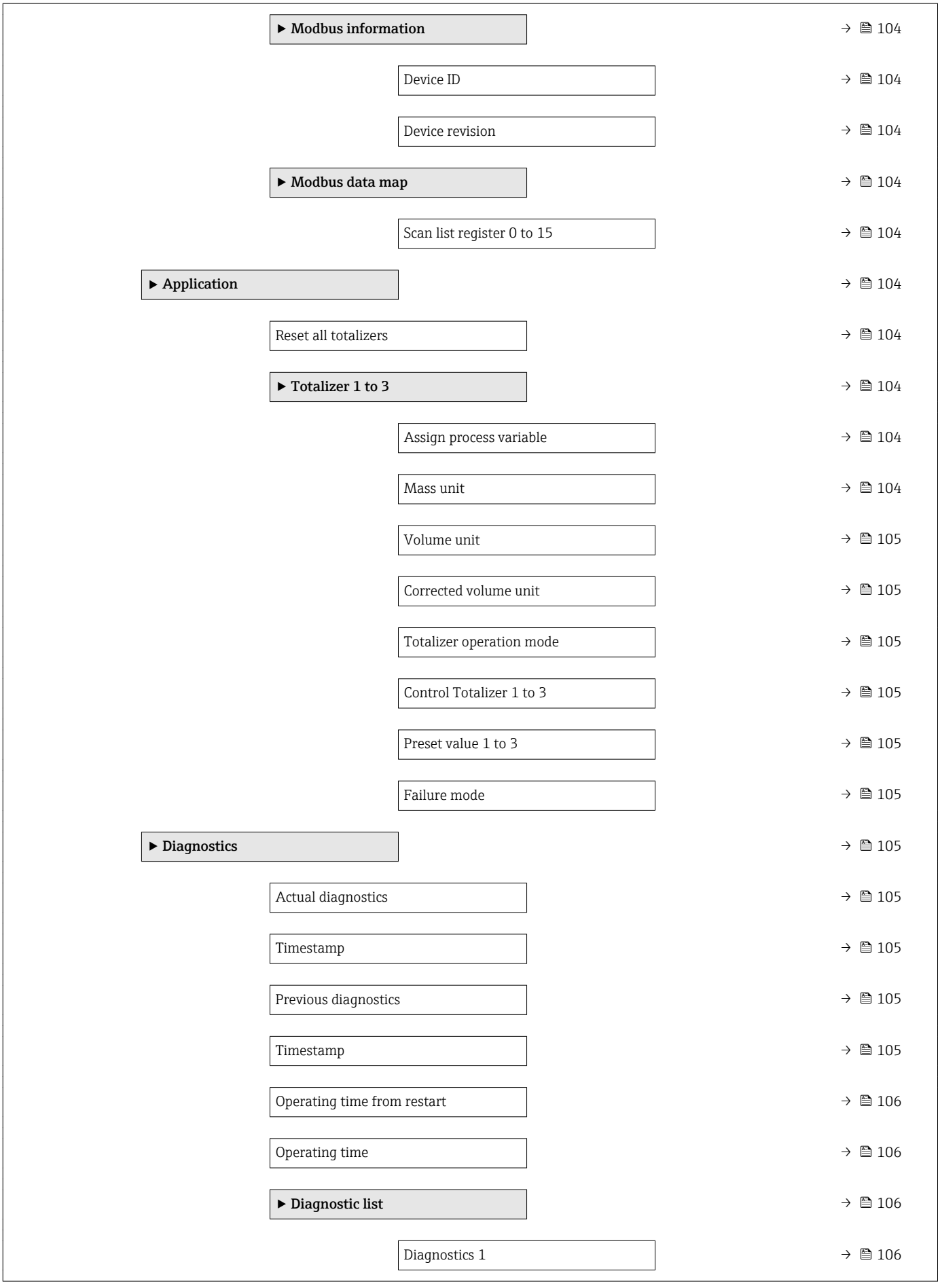
Function code	Access type	Register in accordance with "Modbus Applications Protocol Specification"	Register in accordance with "Modicon Modbus Protocol Reference Guide"
03 04 23	Read	XXXX Example: mass flow = 2007	3XXXX Example: mass flow = 32007
06 16 23	Write	XXXX Example: reset totalizer = 6401	4XXXX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



Density source	→ 102
External density	→ 102
Fixed density	→ 102
Reference density	→ 102
▶ **Sensor adjustment**	→ 102
Installation direction	→ 102
Integration time	→ 102
Measuring period	→ 102
▶ **Process variable adjustment**	→ 102
▶ **Calibration**	→ 103
Nominal diameter	→ 103
Calibration factor	→ 103
Zero point	→ 103
Conductivity calibration factor	→ 103
▶ **Communication**	→ 103
▶ **Modbus configuration**	→ 103
Bus address	→ 103
Baudrate	→ 103
Data transfer mode	→ 103
Parity	→ 103
Byte order	→ 103
Telegram delay	→ 103
Assign diagnostic behavior	→ 103
Failure mode	→ 103
Interpreter mode	→ 103


▶ Modbus information → 104
Device ID → 104
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▶ **Event logbook** → 106

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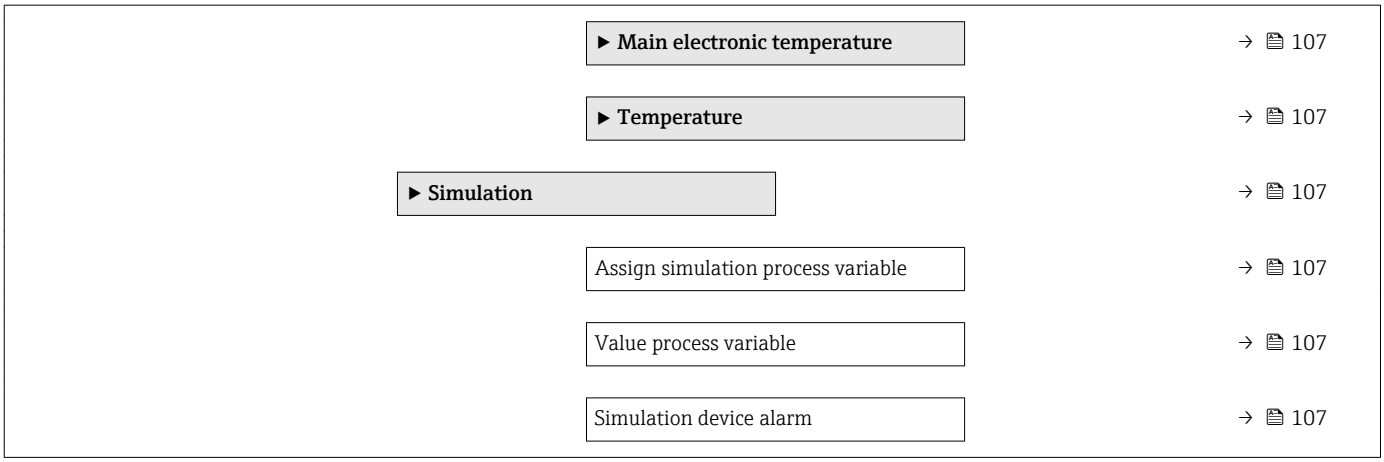

6.3 Register information

Navigation: Expert					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Locking status	4918	Integer	Read	256 = Hardware locked 512 = Temporarily locked	9
Access status tooling	2178	Integer	Read	0 = Operator **1 = Maintenance**	10
Enter access code	2177	Integer	Read / Write	0 to 9 999	10

6.3.1 "System" submenu

"Diagnostic handling" submenu

Navigation: Expert → System → Diagnostic handling					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Alarm delay	6808	Float	Read / Write	0 to 60 s	11

"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. 531	2397	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	12
Assign behavior of diagnostic no. 832	2759	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	13
Assign behavior of diagnostic no. 833	2762	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	13
Assign behavior of diagnostic no. 834	2761	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	14

Navigation: Expert → System → Diagnostic handling → Diagnostic behavior					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Assign behavior of diagnostic no. 835	2760	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	14
Assign behavior of diagnostic no. 862	2097	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	14
Assign behavior of diagnostic no. 937	2396	Integer	Read / Write	0 = Off 1 = Logbook entry only **2 = Warning** 3 = Alarm	15
Assign behavior of diagnostic no. 302	2312	Integer	Read / Write	**2 = Warning** 3 = Alarm	15

"Administration" submenu

Navigation: Expert → System → Administration					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Device reset	6817	Integer	Read / Write	**0 = Cancel** 1 = Restart device 2 = To delivery settings 14 = To fieldbus defaults *	16
Activate SW option	2795	Integer	Read / Write	Max. 10-digit string consisting of numbers.	16
Software option overview	2902	Integer	Read	32 = Electrode cleaning circuit 16384 = Heartbeat Monitoring 32768 = Heartbeat Verification	17
Permanent storage	6907	Integer	Read / Write	0 = Off **1 = On**	17
Device tag	4901	String	Read / Write	Max. 32 characters such as letters, numbers or special characters (e.g. @, %, /).	18

* Visibility depends on communication

6.3.2 "Sensor" submenu

"Measured values" submenu

"Process variables" submenu

Navigation: Expert → Sensor → Measured values → Process variables					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Volume flow	2007	Float	Read	Signed floating-point number	19
Mass flow	2009	Float	Read	Signed floating-point number	19
Conductivity	2013	Float	Read	Signed floating-point number	20
Corrected volume flow	2011	Float	Read	Signed floating-point number	20
Temperature	2015	Float	Read	Positive floating-point number	20
Corrected conductivity	2017	Float	Read	Positive floating-point number	21

"Totalizer" submenu

Navigation: Expert → Sensor → Measured values → Totalizer					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Totalizer value 1 to 3	1: 2610 2: 2810 3: 3010	Float	Read	Signed floating-point number	21
Totalizer overflow 1 to 3	1: 2612 2: 2812 3: 3012	Float	Read	Integer with sign	22

"System units" submenu

Navigation: Expert → Sensor → System units					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Volume flow unit	2103	Integer	Read / Write	0 = cm^3/s 1 = cm^3/min 2 = cm^3/h 3 = cm^3/d 4 = dm^3/s 5 = dm^3/min 6 = dm^3/h 7 = dm^3/d 8 = m^3/s 9 = m^3/min 10 = m^3/h 11 = m^3/d 12 = ml/s 13 = ml/min 14 = ml/h 15 = ml/d 16 = l/s 17 = l/min **18 = l/h** (+) 19 = l/d 20 = hl/s 21 = hl/min 22 = hl/h 23 = hl/d 24 = Ml/s 25 = Ml/min 26 = Ml/h 27 = Ml/d 32 = af/s 33 = af/min 34 = af/h 35 = af/d 36 = ft^3/s 37 = ft^3/min 38 = ft^3/h 39 = ft^3/d 40 = fl oz/s (us) 41 = fl oz/min (us) 42 = fl oz/h (us) 43 = fl oz/d (us) 44 = gal/s (us) 45 = gal/min (us) 46 = gal/h (us) 47 = gal/d (us) 48 = Mgal/s (us) 49 = Mgal/min (us) 50 = Mgal/h (us) 51 = Mgal/d (us) 52 = bbl/s (us;liq.) 53 = bbl/min (us;liq.) 54 = bbl/h (us;liq.) 55 = bbl/d (us;liq.) 56 = bbl/s (us;beer) 57 = bbl/min (us;beer) 58 = bbl/h (us;beer) 59 = bbl/d (us;beer) 60 = bbl/s (us;oil) 61 = bbl/min (us;oil) 62 = bbl/h (us;oil) 63 = bbl/d (us;oil) 64 = bbl/s (us;tank) 65 = bbl/min (us;tank) 66 = bbl/h (us;tank) 67 = bbl/d (us;tank) 68 = gal/s (imp) 69 = gal/min (imp) 70 = gal/h (imp)	24

Navigation: Expert → Sensor → System units					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
				71 = gal/d (imp) 72 = Mgal/s (imp) 73 = Mgal/min (imp) 74 = Mgal/h (imp) 75 = Mgal/d (imp) 76 = bbl/s (imp;beer) 77 = bbl/min (imp;beer) 78 = bbl/h (imp;beer) 79 = bbl/d (imp;beer) 80 = bbl/s (imp;oil) 81 = bbl/min (imp;oil) 82 = bbl/h (imp;oil) 83 = bbl/d (imp;oil) 84 = User vol./s 85 = User vol./min 86 = User vol./h 87 = User vol./d 88 = kgal/s (us) 89 = kgal/min (us) 90 = kgal/h (us) 91 = kgal/d (us)	
Volume unit	2104	Integer	Read / Write	0 = cm^3 1 = dm^3 **2 = m^3 (+)** 3 = ml 4 = l 5 = hl 6 = Ml Mega 8 = af 9 = ft^3 10 = fl oz (us) 11 = gal (us) 12 = Mgal (us) 13 = bbl (us;liq.) 14 = bbl (us;beer) 15 = bbl (us;oil) 16 = bbl (us;tank) 17 = gal (imp) 18 = Mgal (imp) 19 = bbl (imp;beer) 20 = bbl (imp;oil) 21 = User vol. 22 = kgal (us)	25
Conductivity unit	2121	Integer	Read / Write	1 = MS/m 2 = kS/m 3 = S/m 4 = S/cm 5 = mS/m 6 = mS/cm 7 = µS/m **8 = µS/cm** 9 = µS/mm 10 = nS/cm	25
Temperature unit	2109	Integer	Read / Write	**0 = °C (+)** 1 = K 2 = °F 3 = °R	26

Navigation: Expert → Sensor → System units					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→
Mass flow unit	2101	Integer	Read / Write	0 = g/s 1 = g/min 2 = g/h 3 = g/d 4 = kg/s 5 = kg/min **6 = kg/h** (+) 7 = kg/d 8 = t/s 9 = t/min 10 = t/h 11 = t/d 12 = oz/s 13 = oz/min 14 = oz/h 15 = oz/d 16 = lb/s 17 = lb/min 18 = lb/h 19 = lb/d 20 = STon/s 21 = STon/min 22 = STon/h 23 = STon/d 24 = User mass/s 25 = User mass/min 26 = User mass/h 27 = User mass/d	27
Mass unit	2102	Integer	Read / Write	0 = g **1 = kg** (+) 2 = t 3 = oz 4 = lb 5 = STon 6 = User mass	27
Density unit	2107	Integer	Read / Write	0 = g/cm³ 2 = kg/dm³ **3 = kg/l** (+) 4 = kg/m³ 5 = SD4°C 6 = SD15°C 7 = SD20°C 8 = SG4°C 9 = SG15°C 10 = SG20°C 11 = lb/ft³ 12 = lb/gal (us) 13 = lb/bbl (us;liq.) 14 = lb/bbl (us;beer) 15 = lb/bbl (us;oil) 16 = lb/bbl (us;tank) 17 = lb/gal (imp) 18 = lb/bbl (imp;beer) 19 = lb/bbl (imp;oil) 21 = g/m³	28

Navigation: Expert → Sensor → System units					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Corrected volume flow unit	2105	Integer	Read / Write	0 = Nl/s 1 = Nl/min **2 = Nl/h (+)** 3 = Nl/d 4 = Nm^3/s 5 = Nm^3/min 6 = Nm^3/h 7 = Nm^3/d 8 = Sm^3/s 9 = Sm^3/min 10 = Sm^3/h 11 = Sm^3/d 12 = Sft^3/s 13 = Sft^3/min 14 = Sft^3/h 15 = Sft^3/d 16 = Sgal/s (us) 17 = Sgal/min (us) 18 = Sgal/h (us) 19 = Sgal/d (us) 20 = Sbbl/s (us;liq.) 21 = Sbbl/min (us;liq.) 22 = Sbbl/h (us;liq.) 23 = Sbbl/d (us;liq.) 24 = Sgal/s (imp) 25 = Sgal/min (imp) 26 = Sgal/h (imp) 27 = Sgal/d (imp) 28 = UserCrVol./s 29 = UserCrVol./min 30 = UserCrVol./h 31 = UserCrVol./d	29
Corrected volume unit	2106	Integer	Read / Write	0 = Nl **1 = Nm^3 (+)** 2 = Sm^3 3 = Sft^3 5 = Sgal (us) 6 = Sbbl (us;liq.) 7 = Sgal (imp) 8 = UserCrVol.	30
Date/time format	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	30

"User-specific units" submenu

Navigation: Expert → Sensor → System units → User-specific units					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
User volume text	2542	String	Read / Write	Max. 10 characters such as letters, numbers or special characters (@, %, /)	31
User volume factor	2119	Float	Read / Write	Signed floating-point number	32
User mass text	2531	String	Read / Write	Max. 10 characters such as letters, numbers or special characters (@, %, /)	32
User mass factor	2115	Float	Read / Write	Signed floating-point number	32
User corrected volume text	2568	String	Read / Write	Max. 10 characters such as letters, numbers or special characters (@, %, /)	33
User corrected volume factor	2573	Float	Read / Write	Signed floating-point number	33

"Process parameters" submenu

Navigation: Expert → Sensor → Process parameters					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Filter options	2273	Integer	Read / Write	**1 = Standard CIP off** 2 = Standard CIP on 3 = Dynamic CIP off 4 = Dynamic CIP on 5 = Binomial filter	34
Flow damping	2274	Integer	Read / Write	0 to 15	36
Flow override	5503	Integer	Read / Write	**0 = Off** 1 = On	36
Conductivity damping	5508	Float	Read / Write	0 to 999.9 s	37
Temperature damping	2483	Float	Read / Write	0 to 999.9 s	37
Conductivity measurement	2268	Integer	Read / Write	**0 = Off** 1 = On	37

"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	5101	Integer	Read / Write	0 = Off **1 = Volume flow** 2 = Mass flow 3 = Corrected volume flow	38
On value low flow cutoff	5138	Float	Read / Write	Signed floating-point number	38
Off value low flow cutoff	5104	Float	Read / Write	0 to 100.0 %	39
Pressure shock suppression	5140	Float	Read / Write	0 to 100 s	39

"Empty pipe detection" submenu

Navigation: Expert → Sensor → Process parameters → Empty pipe detection					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Empty pipe detection	5106	Integer	Read / Write	**0 = Off** 1 = On	41
Switch point empty pipe detection	2890	Float	Read / Write	0 to 100 %	41
Response time empty pipe detection	5108	Float	Read / Write	0 to 100 s	42
New adjustment	2335	Integer	Read / Write	**0 = Cancel** 1 = Empty pipe adjust 2 = Full pipe adjust	42
Progress	2336	Integer	Read	0 = Not ok 6 = Ok 8 = Busy	42
Empty pipe adjust value	2181	Float	Read	Positive floating-point number	43
Full pipe adjust value	2832	Float	Read	Positive floating-point number	43
Measured value EPD	2298	Float	Read	Positive floating-point number	43

"Electrode cleaning circuit" submenu

Navigation: Expert → Sensor → Process parameters → Electrode cleaning circuit					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Electrode cleaning circuit	2280	Integer	Read / Write	**0 = Off** 1 = On	44
ECC duration	2330	Float	Read / Write	0.01 to 30 s	44
ECC recovery time	2332	Float	Read / Write	1 to 600 s	44
ECC cleaning cycle	2328	Float	Read / Write	0.5 to 168 h	45
ECC Polarity	2334	Integer	Read	0 = Positive 1 = Negative	45

"External compensation" submenu

Navigation: Expert → Sensor → External compensation					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Temperature source	2114	Integer	Read / Write	0 = Internal temperature sensor **1 = External value**	46
External temperature	2125	Float	Read / Write	Floating point number with sign	46
Density source	2497	Integer	Read / Write	**0 = Fixed density** 1 = External density	46
External density	2117	Float	Read / Write	Positive floating-point number	47
Fixed density	2830	Float	Read / Write	Positive floating-point number	47
Reference density	2536	Float	Read / Write	Positive floating-point number	47

"Sensor adjustment" submenu

Navigation: Expert → Sensor → Sensor adjustment					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Installation direction	5501	Integer	Read / Write	**0 = Flow in arrow direction** 1 = Flow against arrow direction	48
Integration time	2260	Float	Read	1 to 65 ms	48
Measuring period	2852	Float	Read	50 to 1 000 ms	48

"Process variable adjustment" submenu

Navigation: Expert → Sensor → Sensor adjustment → Process variable adjustment					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Volume flow offset	5521	Float	Read / Write	Signed floating-point number	49
Volume flow factor	5519	Float	Read / Write	Positive floating-point number	50
Mass flow offset	5525	Float	Read / Write	Signed floating-point number	50
Mass flow factor	5523	Float	Read / Write	Positive floating-point number	50
Conductivity offset	5529	Float	Read / Write	Signed floating-point number	51
Conductivity factor	5527	Float	Read / Write	Positive floating-point number	51
Corrected volume flow offset	2044	Float	Read / Write	Signed floating-point number	51
Corrected volume flow factor	2076	Float	Read / Write	Positive floating-point number	52

Navigation: Expert → Sensor → Sensor adjustment → Process variable adjustment					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Temperature offset	2046	Float	Read / Write	Signed floating-point number	52
Temperature factor	2042	Float	Read / Write	Positive floating-point number	52

"Calibration" submenu

Navigation: Expert → Sensor → Calibration					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Nominal diameter	2048	String	Read	DNxx / x"	53
Calibration factor	2313	Float	Read	Positive floating-point number	53
Zero point	2870	Float	Read	Signed floating-point number	54
Conductivity calibration factor	19806	Float	Read	0 to 10000	54

6.3.3 "Communication" submenu

"Modbus configuration" submenu

Navigation: Expert → Communication → Modbus configuration					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Bus address	4910	Integer	Read / Write	1 to 247	55
Baudrate	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	55
Data transfer mode	4913	Integer	Read / Write	**0 = RTU** 1 = ASCII	55
Parity	4914	Integer	Read / Write	**0 = Even** 1 = Odd 2 = None / 2 stop bits 3 = None / 1 stop bit	56
Byte order	4915	Integer	Read / Write	0 = 0-1-2-3 1 = 3-2-1-0 2 = 2-3-0-1 **3 = 1-0-3-2**	56
Telegram delay	4916	Float	Read / Write	0 to 100 ms	57
Assign diagnostic behavior	4921	Integer	Read / Write	0 = Off 1 = Warning **2 = Alarm** 3 = Alarm or warning	57
Failure mode	4920	Integer	Read / Write	**0 = NaN value** 1 = Last valid value	57
Interpreter mode	4925	Integer	Read / Write	**0 = Standard** 1 = Ignore surplus bytes	58

"Modbus information" submenu

Navigation: Expert → Communication → Modbus information					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Device ID	2547	Integer	Read	4-digit hexadecimal number	59
Device revision	4481	Integer	Read	4-digit hexadecimal number	59

"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	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	59

6.3.4 "Application" submenu

Navigation: Expert → Application					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Reset all totalizers	2609	Integer	Read / Write	**0 = Cancel** 1 = Reset + totalize	60

"Totalizer 1 to 3" submenu

Navigation: Expert → Application → Totalizer 1 to 3					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Assign process variable	1: 2601 2: 2801 3: 3001	Integer	Read / Write	0 = Off 1 = Volume flow **2 = Mass flow** 3 = Corrected volume flow	61
Mass unit	1: 2602 2: 2802 3: 3002	Integer	Read / Write	0 = g **1 = kg** (+) 2 = t 3 = oz 4 = lb 5 = STon 6 = User mass	62

Navigation: Expert → Application → Totalizer 1 to 3					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Volume unit	1: 2603 2: 2803 3: 3003	Integer	Read / Write	0 = cm^3 1 = dm^3 **2 = m^3 (+)** 3 = ml 4 = l 5 = hl 6 = Ml Mega 8 = af 9 = ft^3 10 = fl oz (us) 11 = gal (us) 12 = Mgal (us) 13 = bbl (us;liq.) 14 = bbl (us;beer) 15 = bbl (us;oil) 16 = bbl (us;tank) 17 = gal (imp) 18 = Mgal (imp) 19 = bbl (imp;beer) 20 = bbl (imp;oil) 21 = User vol. 22 = kgal (us)	62
Corrected volume unit	1: 2604 2: 2804 3: 3004	Integer	Read / Write	0 = Nl **1 = Nm^3 (+)** 2 = Sm^3 3 = Sft^3 5 = Sgal (us) 6 = Sbbl (us;liq.) 7 = Sgal (imp) 8 = UserCrVol.	63
Totalizer operation mode	1: 2605 2: 2805 3: 3005	Integer	Read / Write	**0 = Net flow total** 1 = Forward flow total 2 = Reverse flow total	63
Control Totalizer 1 to 3	1: 2608 2: 2808 3: 3008	Integer	Read / Write	**0 = Totalize** 1 = Reset + totalize 2 = Preset + hold 3 = Reset + hold 4 = Preset + totalize	64
Preset value 1 to 3	1: 2590 2: 2592 3: 2594	Float	Read / Write	Signed floating-point number	65
Failure mode	1: 2606 2: 2806 3: 3006	Integer	Read / Write	**0 = Stop** 1 = Actual value 2 = Last valid value	65

6.3.5 "Diagnostics" submenu

Navigation: Expert → Diagnostics					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Actual diagnostics	2732	Integer	Read	Symbol for diagnostic behavior, diagnostic code and short message.	67
Timestamp	2719	Integer	Read	Days (d), hours (h), minutes (m) and seconds (s)	67
Previous diagnostics	2734	Integer	Read	Symbol for diagnostic behavior, diagnostic code and short message.	67
Timestamp	2068	Integer	Read	Days (d), hours (h), minutes (m) and seconds (s)	68

Navigation: Expert → Diagnostics					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Operating time from restart	2624	Integer	Read	Days (d), hours (h), minutes (m) and seconds (s)	68
Operating time	2631	Integer	Read	Days (d), hours (h), minutes (m) and seconds (s)	68

"Diagnostic list" submenu

Navigation: Expert → Diagnostics → Diagnostic list					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Diagnostics 1	2736	Integer	Read	Symbol for diagnostic behavior, diagnostic code and short message.	69
Timestamp	2710	Integer	Read	Days (d), hours (h), minutes (m) and seconds (s)	69
Diagnostics 2	2738	Integer	Read	Symbol for diagnostic behavior, diagnostic code and short message.	70
Timestamp	2701	Integer	Read	Days (d), hours (h), minutes (m) and seconds (s)	70
Diagnostics 3	2740	Integer	Read	Symbol for diagnostic behavior, diagnostic code and short message.	70
Timestamp	2692	Integer	Read	Days (d), hours (h), minutes (m) and seconds (s)	71
Diagnostics 4	2742	Integer	Read	Symbol for diagnostic behavior, diagnostic code and short message.	71
Timestamp	2683	Integer	Read	Days (d), hours (h), minutes (m) and seconds (s)	71
Diagnostics 5	2744	Integer	Read	Symbol for diagnostic behavior, diagnostic code and short message.	72
Timestamp	2675	Integer	Read	Days (d), hours (h), minutes (m) and seconds (s)	72

"Event logbook" submenu

Navigation: Expert → Diagnostics → Event logbook					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Filter options	2639	Integer	Read / Write	0 = Failure (F) 4 = Maintenance required (M) 8 = Function check (C) 12 = Out of specification (S) 16 = Information (I) **255 = All**	73

"Device information" submenu

Navigation: Expert → Diagnostics → Device information					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	**→**
Device tag	2026	String	Read	Max. 32 characters, such as letters, numbers or special characters (e.g. @, %, /).	74
Serial number	7003	String	Read	A maximum of 11-digit character string comprising letters and numbers.	74

Navigation: Expert → Diagnostics → Device information					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→
Firmware version	7277	String	Read	Character string in the format xx.yy.zz	74
Device name	7263	String	Read	Max. 32 characters such as letters or numbers.	75
Order code	2058	String	Read	Character string composed of letters, numbers and certain punctuation marks (e.g. /).	75
Extended order code 1	2212	String	Read	Character string	75
Extended order code 2	2222	String	Read	Character string	76
Extended order code 3	2232	String	Read	Character string	76
ENP version	4003	String	Read	Character string	76
Configuration counter	3100	Integer	Read	0 to 65 535	77

"Min/max values" submenu

Navigation: Expert → Diagnostics → Min/max values					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→
Reset min/max values	2269	Integer	Read / Write	**0 = Cancel**	77

"Main electronic temperature" submenu

Navigation: Expert → Diagnostics → Min/max values → Main electronic temperature					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→
Minimum value	2292	Float	Read	Signed floating-point number	78
Maximum value	2294	Float	Read	Signed floating-point number	78

"Temperature" submenu

Navigation: Expert → Diagnostics → Min/max values → Temperature					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→
Minimum value	2339	Float	Read	Signed floating-point number	78
Maximum value	2337	Float	Read	Signed floating-point number	79

"Simulation" submenu

Navigation: Expert → Diagnostics → Simulation					
Parameter	**Register**	**Data type**	**Access**	**Selection / User entry / User interface**	→
Assign simulation process variable	6813	Integer	Read / Write	**0 = Off** 1 = Volume flow 2 = Mass flow 3 = Corrected volume flow 3 = Conductivity * 4 = Corrected conductivity * 5 = Temperature *	80
Value process variable	6814	Float	Read / Write	Depends on the process variable selected	80
Simulation device alarm	6812	Integer	Read / Write	**0 = Off** 1 = On	81

* Visibility depends on order options or device settings

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