

Description of Device Parameters

LNGmass

Modbus RS485

Coriolis flowmeter

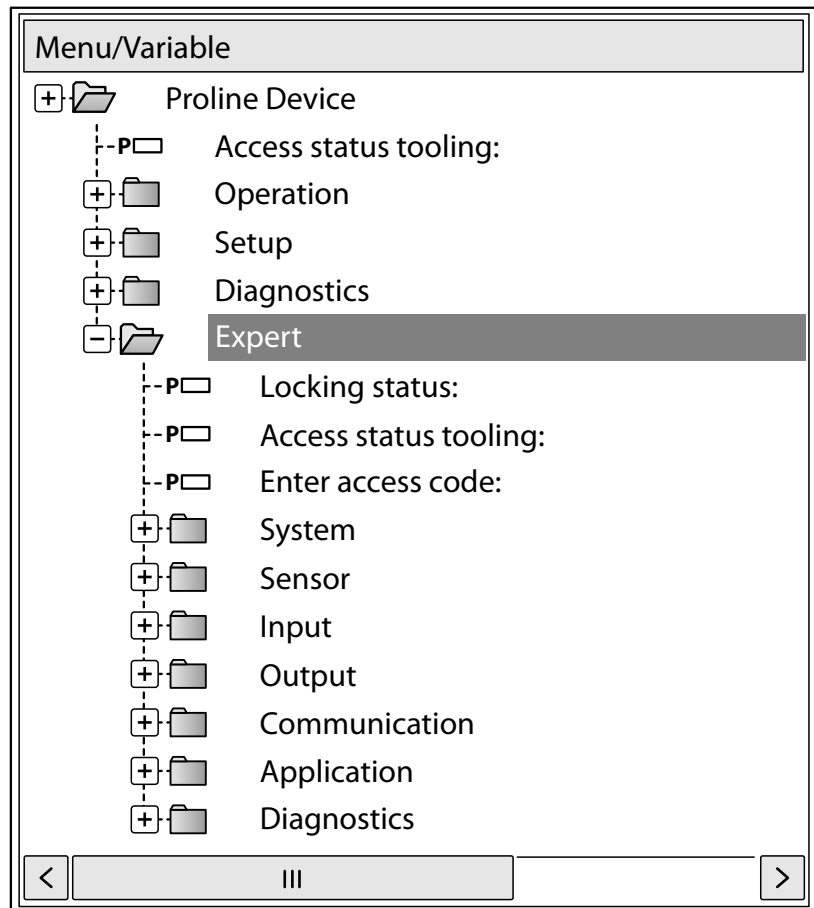


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1 Document information

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.

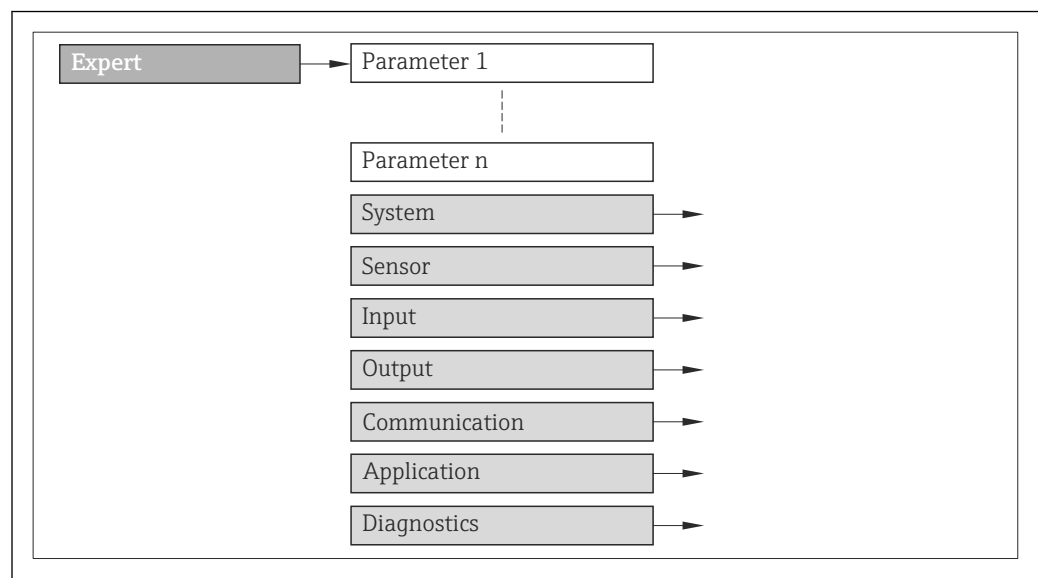
1.2 Target group

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

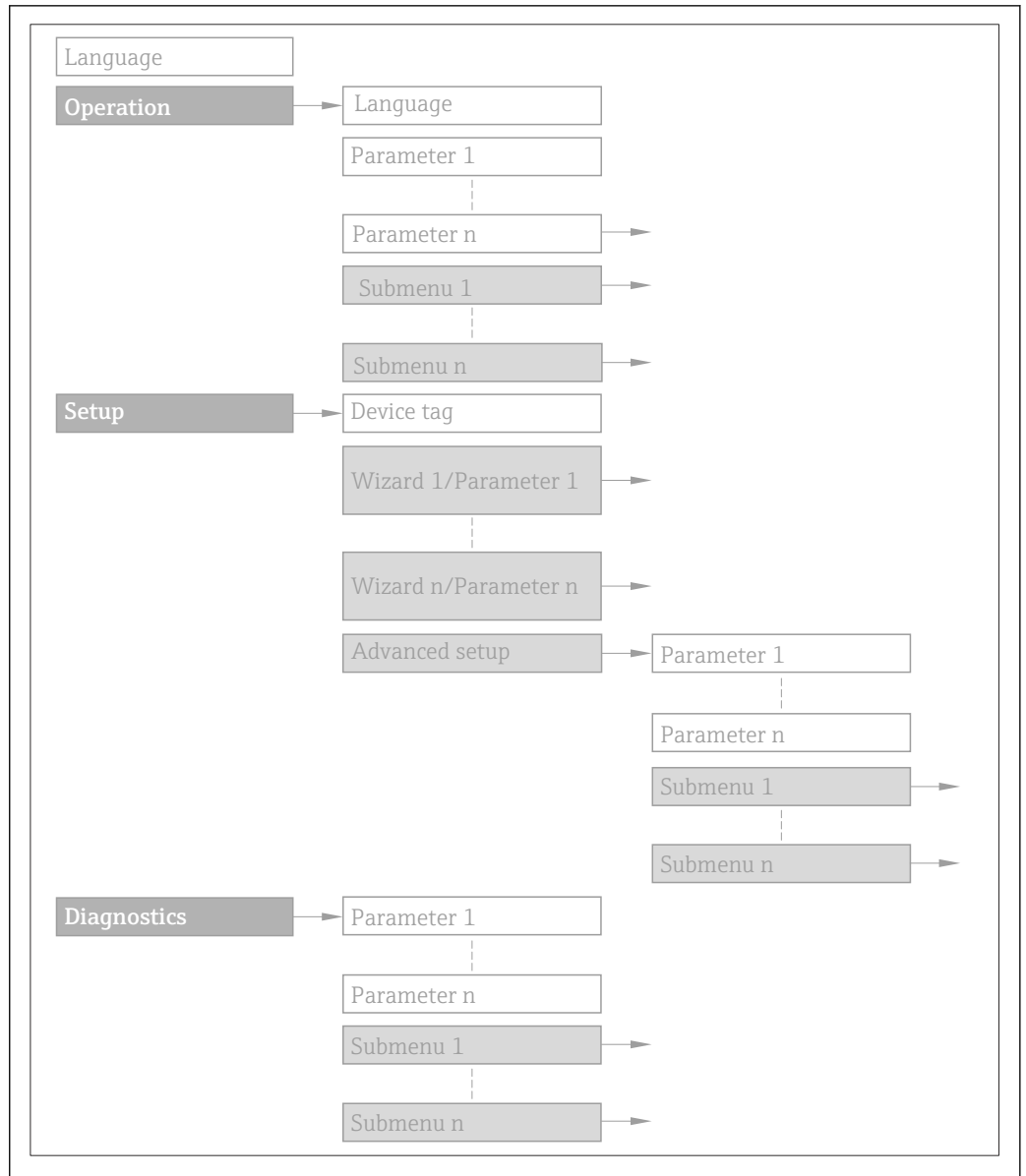
This document lists the submenus and their parameters according to the structure of the **Expert** menu (→  7) menu that are available once the **"Operator" user role** or the **"Maintenance" user role** is enabled.



A0022576-EN


 1 Sample graphic

 For information on the arrangement of the parameters according to the structure of the **Operation** menu, **Setup** menu, **Diagnostics** menu (→  78), along with a brief description, see the Operating Instructions for the device.





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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 <ul style="list-style-type: none"> ▪ 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): <ul style="list-style-type: none"> ▪ 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.

Expert		
Locking status		→ 9
Access status tooling		→ 10
Enter access code		→ 10
▶ System		→ 11
	▶ Diagnostic handling	→ 11
	▶ Administration	→ 19
▶ Sensor		→ 21
	▶ Measured values	→ 22
	▶ System units	→ 26
	▶ Process parameters	→ 40
	▶ Measurement mode	→ 48
	▶ External compensation	→ 49
	▶ Calculated values	→ 52
	▶ Sensor adjustment	→ 54
	▶ Calibration	→ 61
	▶ Testpoints	→ 62
	▶ Supervision	→ 66
▶ Communication		→ 67
	▶ Modbus configuration	→ 67
	▶ Modbus information	→ 71
	▶ Modbus data map	→ 72

▶ Application	→ 72
Reset all totalizers	→ 73
▶ Totalizer 1 to 3	→ 73
▶ Diagnostics	→ 78
Actual diagnostics	→ 79
Timestamp	→ 79
Previous diagnostics	→ 79
Timestamp	→ 80
Operating time from restart	→ 80
Operating time	→ 80
▶ Diagnostic list	→ 81
▶ Event logbook	→ 85
▶ Device information	→ 85
▶ Min/max values	→ 89
▶ Simulation	→ 95

3 Description of device parameters

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



Expert	
Locking status	→ 9
Access status tooling	→ 10
Enter access code	→ 10
▶ System	→ 11
▶ Sensor	→ 21
▶ Communication	→ 67
▶ Application	→ 72
▶ Diagnostics	→ 78

Locking status

Navigation	Expert → Locking status
Description	Displays the active write protection.
User interface	<ul style="list-style-type: none"> ■ 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 9999

3.1 "System" submenu

Navigation  Expert → System

▶ System


▶ Diagnostic handling →  11


▶ Administration →  19

3.1.1 "Diagnostic handling" submenu


Navigation  Expert → System → Diagn. handling

▶ Diagnostic handling


Alarm delay →  11

▶ Diagnostic behavior →  12

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:


- 046 Sensor limit exceeded
- 140 Sensor signal
- 144 Measuring error too high
- 190 Special event 1
- 191 Special event 5
- 192 Special event 9
- 830 Sensor temperature too high
- 831 Sensor temperature too low


- 832 Electronic temperature too high
- 833 Electronic temperature too low
- 834 Process temperature too high
- 835 Process temperature too low
- 843 Process limit
- 910 Tubes not oscillating
- 912 Medium inhomogeneous
- 913 Medium unsuitable
- 944 Monitoring failed
- 990 Special event 4
- 991 Special event 8
- 992 Special event 12

"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 (→  85).
Off	The diagnostic event is ignored, and no diagnostic message is generated or entered.

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




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

► Diagnostic behavior	
Assign behavior of diagnostic no. 140	→  13
Assign behavior of diagnostic no. 046	→  13
Assign behavior of diagnostic no. 144	→  14
Assign behavior of diagnostic no. 832	→  14
Assign behavior of diagnostic no. 833	→  14
Assign behavior of diagnostic no. 834	→  15
Assign behavior of diagnostic no. 835	→  15

Assign behavior of diagnostic no. 912	→  15
Assign behavior of diagnostic no. 913	→  16
Assign behavior of diagnostic no. 944	→  16
Assign behavior of diagnostic no. 192	→  17
Assign behavior of diagnostic no. 274	→  17
Assign behavior of diagnostic no. 392	→  18
Assign behavior of diagnostic no. 592	→  18
Assign behavior of diagnostic no. 992	→  18


Assign behavior of diagnostic no. 140 (Sensor signal)





Navigation	 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 140
Description	Option for changing the diagnostic behavior of the diagnostic message 140 Sensor signal .
Selection	<ul style="list-style-type: none"> ▪ 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. 046 (Sensor limit exceeded)



Navigation	 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 046
Description	Option for changing the diagnostic behavior of the diagnostic message 046 Sensor limit exceeded .
Selection	<ul style="list-style-type: none"> ▪ 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. 144 (Measuring error too high)


Navigation  Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 144

Description Option for changing the diagnostic behavior of the diagnostic message **144 Measuring error too high**.


Selection

- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Alarm

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. 912 (Medium inhomogeneous)

Navigation  Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 912




Description Option for changing the diagnostic behavior of the diagnostic message **912 Medium inhomogeneous**.

Selection	<ul style="list-style-type: none">■ 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. 913 (Medium unsuitable)

Navigation	 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 913
Description	Option for changing the diagnostic behavior of the diagnostic message 913 Medium unsuitable .
Selection	<ul style="list-style-type: none">■ 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. 944 (Monitoring failed)

Navigation	 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 944
Description	Option for changing the diagnostic behavior of the diagnostic message 944 Monitoring failed .
Selection	<ul style="list-style-type: none">■ 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. 948 (Tube damping too high)


Navigation	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 948
Description	Option for changing the diagnostic behavior of the diagnostic message 948 Tube damping too high .
Selection	<ul style="list-style-type: none"> ▪ 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. 192 (Special event 9)


Navigation	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 192
Description	Option for changing the diagnostic behavior of the diagnostic message 192 Special event 9 .
Selection	<ul style="list-style-type: none"> ▪ 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. 274 (Main electronic failure)


Navigation	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 274
Description	Option for changing the diagnostic behavior of the diagnostic message 274 Main electronic failure .
Selection	<ul style="list-style-type: none"> ▪ 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. 392 (Special event 10)


Navigation	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 392
Description	Option for changing the diagnostic behavior of the diagnostic message 392 Special event 10 .
Selection	<ul style="list-style-type: none"> ▪ 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. 592 (Special event 11)


Navigation	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 592
Description	Option for changing the diagnostic behavior of the diagnostic message 592 Special event 11 .
Selection	<ul style="list-style-type: none"> ▪ 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. 992 (Special event 12)


Navigation	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 992
Description	Option for changing the diagnostic behavior of the diagnostic message 992 Special event 12 .
Selection	<ul style="list-style-type: none"> ▪ Off ▪ Alarm ▪ Warning ▪ Logbook entry only
Factory setting	Warning

Additional information

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

3.1.2 "Administration" submenu

Navigation



Expert → System → Administration

▶ Administration	
Device reset	→ 19
Activate SW option	→ 20
Software option overview	→ 20
Permanent storage	→ 21
Device tag	→ 21

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


* Visibility depends on communication

Additional information	<p><i>"Cancel" option</i></p> <p>No action is executed and the user exits the parameter.</p> <p><i>"To fieldbus defaults" option</i></p> <p>Every parameter is reset to fieldbus default values.</p> <p><i>"To delivery settings" option</i></p> <p>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.</p> <p> This option is not visible if no customer-specific settings have been ordered.</p> <p><i>"Restart device" option</i></p> <p>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.</p>
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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
Additional information	<p><i>User entry</i></p> <p> Endress+Hauser provides the corresponding activation code for the software option with the order.</p> <p>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.</p> <p><i>Example for a software option</i></p> <p>Order code for "Application package", option EB "Heartbeat Verification + Monitoring"</p>

Software option overview

Navigation	 Expert → System → Administration → SW option overv.
Description	Displays all the software options that are enabled in the device.
User interface	Character string comprising letters

Additional information	<i>Description</i> Displays all the options that are available if ordered by the customer.
-------------------------------	---

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 LNGmass

3.2 "Sensor" submenu

Navigation Expert → Sensor

▶ Sensor	
▶ Measured values	→ 22
▶ System units	→ 26

▶ Process parameters	→ 40
▶ Measurement mode	→ 48
▶ External compensation	→ 49
▶ Calculated values	→ 52
▶ Sensor adjustment	→ 54
▶ Calibration	→ 61
▶ Testpoints	→ 62
▶ Supervision	→ 66

3.2.1 "Measured values" submenu

Navigation  Expert → Sensor → Measured val.




▶ Measured values	
▶ Process variables	→ 22
▶ Totalizer	→ 25

"Process variables" submenu




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

▶ Process variables	
Mass flow	→ 23
Volume flow	→ 23
Corrected volume flow	→ 23
Density	→ 23
Reference density	→ 24
Temperature	→ 24
Pressure value	→ 24




Mass flow

Navigation	 Expert → Sensor → Measured val. → Process variab. → Mass flow
Description	Displays the mass flow that is currently measured.
User interface	Signed floating-point number
Additional information	<i>Dependency</i>  The unit is taken from the Mass flow unit parameter (→  27)


Volume flow



Navigation	 Expert → Sensor → Measured val. → Process variab. → Volume flow
Description	Displays the volume flow currently calculated.
User interface	Signed floating-point number
Additional information	<i>Dependency</i>  The unit is taken from the Volume flow unit parameter (→  28)

Density


Navigation	 Expert → Sensor → Measured val. → Process variab. → Density
Description	Displays the density currently measured.
User interface	Signed floating-point number
Additional information	<i>Dependency</i>  The unit is taken from the Density unit parameter (→  32)

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 (→  30)

Reference density

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

Description Displays the reference density currently calculated.

User interface Signed floating-point number



Additional information *Dependency*
 The unit is taken from the **Reference density unit** parameter (→  33)

Temperature


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

Description Displays the medium temperature currently measured.

User interface Signed floating-point number

Additional information *Dependency*
 The unit is taken from the **Temperature unit** parameter (→  33)

Pressure value


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

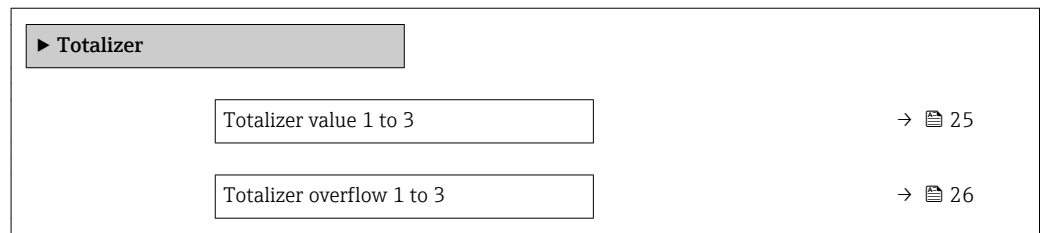
Description Displays the fixed or external pressure value.


User interface Signed floating-point number

Additional information *Dependency*
 The unit is taken from the **Pressure unit** parameter (→  34)


"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 (→  73) 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 (→  77).

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 (→  76).

 The unit of the selected process variable is specified for the totalizer depending on the selection made in the **Assign process variable** parameter (→  73):

- **Volume flow** option: **Volume flow unit** parameter (→  28)
- **Mass flow** option: **Mass flow unit** parameter (→  27)
- **Corrected volume flow** option: **Corrected volume unit** parameter (→  75)

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 m³
- Value in the **Totalizer overflow 1** parameter: 1 · 10⁷ (1 overflow) = 10 000 000 [m³]
- Current totalizer reading: 11 968 457 m³

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 (→ 73) 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 (→ 73):

- **Volume flow** option: **Volume flow unit** parameter (→ 28)
- **Mass flow** option: **Mass flow unit** parameter (→ 27)
- **Corrected volume flow** option: **Corrected volume unit** parameter (→ 75)

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: 1968457 m³
- Value in the **Totalizer overflow 1** parameter: $2 \cdot 10^7$ (2 overflows) = 20000000 [m³]
- Current totalizer reading: 21968457 m³

3.2.2 "System units" submenu

Navigation

Expert → Sensor → System units

▶ System units	
Mass flow unit	→ 27
Mass unit	→ 28
Volume flow unit	→ 28
Volume unit	→ 30
Corrected volume flow unit	→ 30

Corrected volume unit	→  31
Density unit	→  32
Reference density unit	→  33
Temperature unit	→  33
Pressure unit	→  34
Date/time format	→  34
► User-specific units	→  35

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/min
- lb/min

Additional information	<p><i>Result</i></p> <p>The selected unit applies for: Mass flow parameter (→  23)</p> <p><i>Selection</i></p> <p> For an explanation of the abbreviated units: →  99</p> <p><i>Customer-specific units</i></p> <p> The unit for the customer-specific mass is specified in the User mass text parameter (→  35).</p>
-------------------------------	--

Mass unit

Navigation	 Expert → Sensor → System units → Mass unit								
Description	Use this function to select the unit for the mass.								
Selection	<table> <tr> <td><i>SI units</i></td> <td><i>US units</i></td> </tr> <tr> <td>▪ g</td> <td>▪ oz</td> </tr> <tr> <td>▪ kg</td> <td>▪ lb</td> </tr> <tr> <td>▪ t</td> <td>▪ STon</td> </tr> </table> <p><i>Custom-specific units</i></p> <p>User mass</p>	<i>SI units</i>	<i>US units</i>	▪ g	▪ oz	▪ kg	▪ lb	▪ t	▪ STon
<i>SI units</i>	<i>US units</i>								
▪ g	▪ oz								
▪ kg	▪ lb								
▪ t	▪ STon								
Factory setting	<p>Country-specific:</p> <ul style="list-style-type: none"> ▪ kg ▪ lb 								
Additional information	<p><i>Selection</i></p> <p> For an explanation of the abbreviated units: →  99</p> <p><i>Customer-specific units</i></p> <p> The unit for the customer-specific mass is specified in the User mass text parameter (→  35).</p>								

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*

- cm³/s
- cm³/min
- cm³/h
- cm³/d
- dm³/s
- dm³/min
- dm³/h
- dm³/d
- m³/s
- m³/min
- m³/h
- m³/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
- ft³/s
- ft³/min
- ft³/h
- ft³/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/min
- gal/min (us)

Additional information	<p><i>Result</i></p> <p>The selected unit applies for: Volume flow parameter (→  23)</p> <p><i>Selection</i></p> <p> For an explanation of the abbreviated units: →  99</p> <p><i>Customer-specific units</i></p> <p> The unit for the customer-specific volume is specified in the User volume text parameter (→  36).</p>
-------------------------------	--

Volume unit

Navigation  Expert → Sensor → System units → Volume unit

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



Selection	<p><i>SI units</i></p> <ul style="list-style-type: none"> ▪ cm³ ▪ dm³ ▪ m³ ▪ ml ▪ l ▪ hl ▪ Ml Mega 	<p><i>US units</i></p> <ul style="list-style-type: none"> ▪ af ▪ ft³ ▪ fl oz (us) ▪ gal (us) ▪ kgal (us) ▪ Mgal (us) ▪ bbl (us;oil) ▪ bbl (us;liq.) ▪ bbl (us;beer) ▪ bbl (us;tank) 	<p><i>Imperial units</i></p> <ul style="list-style-type: none"> ▪ gal (imp) ▪ Mgal (imp) ▪ bbl (imp;beer) ▪ bbl (imp;oil)
------------------	--	--	---

Custom-specific units
User vol.



Factory setting Country-specific:

- l
- gal (us)


Additional information *Selection*

 For an explanation of the abbreviated units: →  99

Customer-specific units

 The unit for the customer-specific volume is specified in the **User volume text** parameter (→  36).


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	<i>SI units</i>	<i>US units</i>
	<ul style="list-style-type: none"> ■ NI/s ■ NI/min ■ NI/h ■ NI/d ■ Nm³/s ■ Nm³/min ■ Nm³/h ■ Nm³/d ■ Sm³/s ■ Sm³/min ■ Sm³/h ■ Sm³/d 	<ul style="list-style-type: none"> ■ Sft³/s ■ Sft³/min ■ Sft³/h ■ Sft³/d ■ Sgal/s (us) ■ Sgal/min (us) ■ Sgal/h (us) ■ Sgal/d (us) ■ Sdbl/s (us;liq.) ■ Sdbl/min (us;liq.) ■ Sdbl/h (us;liq.) ■ Sdbl/d (us;liq.) ■ Sgal/s (imp) ■ Sgal/min (imp) ■ Sgal/h (imp) ■ Sgal/d (imp)
	<i>Custom-specific units</i>	
	<ul style="list-style-type: none"> ■ UserCrVol./s ■ UserCrVol./min ■ UserCrVol./h ■ UserCrVol./d 	

Factory setting	Country-specific: <ul style="list-style-type: none"> ■ NI/min ■ Sft³/min
------------------------	---

Additional information	<p><i>Result</i></p> <p>The selected unit applies for: Corrected volume flow parameter (→  23)</p>
-------------------------------	---

SelectionFor an explanation of the abbreviated units: →  99**Corrected volume unit**

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

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

Selection	<i>SI units</i>	<i>US units</i>	<i>Imperial units</i>
	<ul style="list-style-type: none"> ■ NI ■ Nm³ ■ SI ■ Sm³ 	<ul style="list-style-type: none"> ■ Sft³ ■ Sgal (us) ■ Sdbl (us;liq.) 	Sgal (imp)
	<i>Custom-specific units</i>		
	UserCrVol.		

Factory setting	Country-specific: <ul style="list-style-type: none"> ■ NI ■ Sft³
------------------------	---

Additional information*Selection*

 For an explanation of the abbreviated units: →  99

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
- g/ml
- 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)

Custom-specific units

User dens.


Factory setting

Country-specific:

- kg/l
- g/cm³

Additional information*Result*



The selected unit applies for:

Density parameter (→  23)*Selection*

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

 For an explanation of the abbreviated units: →  99

Customer-specific units

 The unit for the customer-specific density is specified in the **User density text** parameter (→  38).






Reference density unit

Navigation	Expert → Sensor → System units → Ref. dens. unit										
Description	Use this function to select the unit for the reference density.										
Selection	<table> <thead> <tr> <th><i>SI units</i></th> <th><i>US units</i></th> </tr> </thead> <tbody> <tr> <td>▪ kg/Nm³</td> <td>lb/Sft³</td> </tr> <tr> <td>▪ kg/Nl</td> <td></td> </tr> <tr> <td>▪ g/Scm³</td> <td></td> </tr> <tr> <td>▪ kg/Sm³</td> <td></td> </tr> </tbody> </table>	<i>SI units</i>	<i>US units</i>	▪ kg/Nm ³	lb/Sft ³	▪ kg/Nl		▪ g/Scm ³		▪ kg/Sm ³	
<i>SI units</i>	<i>US units</i>										
▪ kg/Nm ³	lb/Sft ³										
▪ kg/Nl											
▪ g/Scm ³											
▪ kg/Sm ³											
Factory setting	Country-dependent <ul style="list-style-type: none"> ▪ kg/Nl ▪ g/Scm³ 										
Additional information	<p><i>Result</i></p> <p>The selected unit applies for:</p> <ul style="list-style-type: none"> ▪ External reference density parameter (→ 52) ▪ Fixed reference density parameter (→ 53) ▪ Reference density parameter (→ 24) <p><i>Selection</i></p> <p> For an explanation of the abbreviated units: → 99</p>										





Temperature unit







Navigation	Expert → Sensor → System units → Temperature unit						
Description	Use this function to select the unit for the temperature.						
Selection	<table> <thead> <tr> <th><i>SI units</i></th> <th><i>US units</i></th> </tr> </thead> <tbody> <tr> <td>▪ °C</td> <td>▪ °F</td> </tr> <tr> <td>▪ K</td> <td>▪ °R</td> </tr> </tbody> </table>	<i>SI units</i>	<i>US units</i>	▪ °C	▪ °F	▪ K	▪ °R
<i>SI units</i>	<i>US units</i>						
▪ °C	▪ °F						
▪ K	▪ °R						
Factory setting	Country-specific: <ul style="list-style-type: none"> ▪ °C ▪ °F 						
Additional information	<p><i>Result</i></p> <p>The selected unit applies for:</p> <ul style="list-style-type: none"> ▪ Maximum value parameter (→ 90) ▪ Minimum value parameter (→ 90) ▪ Maximum value parameter (→ 91) ▪ Minimum value parameter (→ 91) ▪ Maximum value parameter (→ 92) ▪ Minimum value parameter (→ 92) 						

- **External temperature** parameter (→  51)
- **Reference temperature** parameter (→  53)
- **Temperature** parameter (→  24)


Selection

 For an explanation of the abbreviated units: →  99

Pressure unit




Navigation	 Expert → Sensor → System units → Pressure unit				
Description	Use this function to select the unit for the pipe pressure.				
Selection	<table border="0" style="width: 100%;"> <tr> <td style="vertical-align: top;"><i>SI units</i></td> <td style="vertical-align: top;"><i>US units</i></td> </tr> <tr> <td> <ul style="list-style-type: none"> ▪ Pa a ▪ kPa a ▪ MPa a ▪ bar ▪ Pa g ▪ kPa g ▪ MPa g ▪ bar g </td> <td> <ul style="list-style-type: none"> ▪ psi a ▪ psi g </td> </tr> </table> <p><i>Custom-specific units</i> User pres.</p>	<i>SI units</i>	<i>US units</i>	<ul style="list-style-type: none"> ▪ Pa a ▪ kPa a ▪ MPa a ▪ bar ▪ Pa g ▪ kPa g ▪ MPa g ▪ bar g 	<ul style="list-style-type: none"> ▪ psi a ▪ psi g
<i>SI units</i>	<i>US units</i>				
<ul style="list-style-type: none"> ▪ Pa a ▪ kPa a ▪ MPa a ▪ bar ▪ Pa g ▪ kPa g ▪ MPa g ▪ bar g 	<ul style="list-style-type: none"> ▪ psi a ▪ psi g 				
Factory setting	Country-specific: <ul style="list-style-type: none"> ▪ bar g ▪ psi g 				
Additional information	<p><i>Result</i></p> <p>The unit is taken from:</p> <ul style="list-style-type: none"> ▪ Pressure value parameter (→  24) ▪ External pressure parameter (→  50) ▪ Pressure value parameter (→  50) <p><i>Selection</i></p> <p> For an explanation of the abbreviated units: →  99</p>				

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	<ul style="list-style-type: none"> ▪ 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: →  99

"User-specific units" submenu

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

► User-specific units	
User mass text	→  35
User mass factor	→  36
User volume text	→  36
User volume factor	→  37
User corrected volume text	→  37
User corrected volume factor	→  38
User density text	→  38
User density offset	→  38
User density factor	→  38
User pressure text	→  39
User pressure offset	→  39
User pressure factor	→  39

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 (→  28)

Example

If the text CENT for "centner" is entered, the following options are displayed in the picklist for the **Mass flow unit** parameter (→  27):

- CENT/s
- CENT/min
- CENT/h
- CENT/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

Additional information *Example*

Mass of 1 Zentner = 50 kg → 0.02 Zentner = 1 kg → entry: 0.02

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 (→ 28)
- **Volume unit** parameter (→ 30)

Example

If the text GLAS is entered, the choose list of the **Volume flow unit** parameter (→ 28) 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 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 (→ 30)
- **Corrected volume unit** parameter (→ 31)

Example

If the text GLAS is entered, the choose list of the **Corrected volume flow unit** parameter (→ 30) 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

User density text


Navigation	Expert → Sensor → System units → User-spec. units → Density text
Description	Use this function to enter a text or the user-specific unit of density.
User entry	Max. 10 characters such as letters, numbers or special characters (@, %, /)
Factory setting	User dens.
Additional information	<p><i>Result</i></p> <p> The defined unit is shown as an option in the choose list of the Density unit parameter (→ 32).</p> <p><i>Example</i></p> <p>Enter text “CE_L” for centners per liter</p>

User density offset


Navigation	Expert → Sensor → System units → User-spec. units → Density offset
Description	<p>Use this function to enter the zero point shift for the user-specific density unit.</p> <p> Value in user-specific unit = (factor × value in base unit) + offset</p>
User entry	Signed floating-point number
Factory setting	0

User density factor


Navigation	Expert → Sensor → System units → User-spec. units → Density factor
Description	Use this function to enter a quantity factor for the user-specific density unit.

User entry Signed floating-point number

Factory setting 1.0

User pressure text

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


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

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


Factory setting User pres.

Additional information *Result*



The defined unit is shown as an option in the choose list of the **Pressure unit** parameter (→  34).

User pressure offset


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

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

User entry Signed floating-point number

Factory setting 0

User pressure factor

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

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

User entry Signed floating-point number







Factory setting 1.0

Additional information *Example*


$1 \text{ Dyn/cm}^2 = 0.1 \text{ Pa} \rightarrow 10 \text{ Dyn/cm}^2 = 1 \text{ Pa} \rightarrow \text{user entry: } 10$

3.2.3 "Process parameters" submenu

Navigation  Expert → Sensor → Process param.

▶ Process parameters	
Flow damping	→  40
Density damping	→  40
Temperature damping	→  41
Flow override	→  41
▶ Low flow cut off	→  42
▶ Partially filled pipe detection	→  45

Flow damping

Navigation  Expert → Sensor → Process param. → Flow damping

Description Use this function to enter the time constant for the damping (PT1 element) of the mass flow value. 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 100


Factory setting 0 s

Additional information *User entry*


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

Effect

 The damping affects the following variables of the device:

- Outputs
- Low flow cut off →  42
- Totalizers

Density damping


Navigation  Expert → Sensor → Process param. → Density damping

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

User entry 0 to 999.9 s

Factory setting 0 s

Temperature damping


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

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

User entry 0 to 999.9 s

Factory setting 0 s

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


"Low flow cut off" submenu






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

▶ Low flow cut off	
Assign process variable	→  42
On value low flow cutoff	→  42
Off value low flow cutoff	→  43
Pressure shock suppression	→  43

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	<ul style="list-style-type: none"> ■ Off ■ Mass flow ■ Volume flow ■ Corrected volume flow
Factory setting	Mass 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 (→  42): <ul style="list-style-type: none"> ■ Mass flow ■ Volume 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 →  43.
User entry	Positive floating-point number
Factory setting	Depends on country and nominal diameter
Additional information	<p><i>Dependency</i></p> <p> The unit depends on the process variable selected in the Assign process variable parameter (→  42).</p>

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 (→ 42):

- Mass flow
- Volume 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 → 42.

User entry

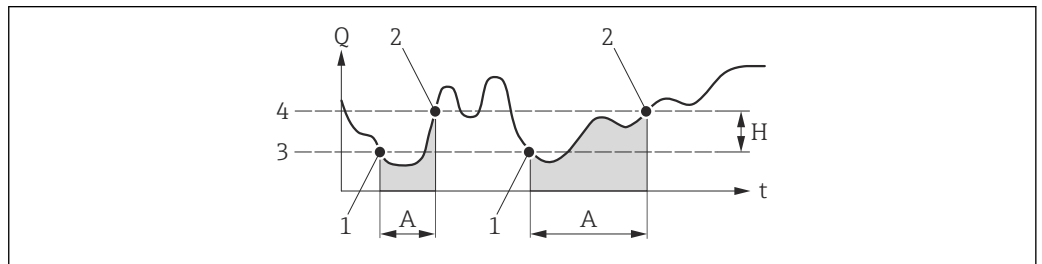
0 to 100.0 %

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 (→ 42):

- Mass flow
- Volume 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**

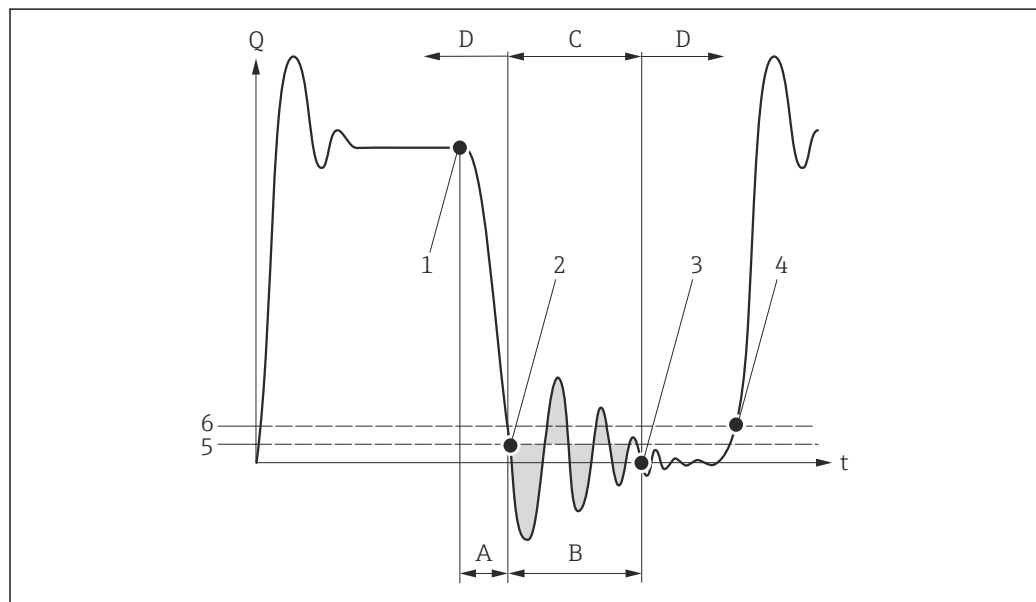
- Prerequisite:
 - Flow rate < on-value of low flow cut off
 - or
 - Changing the flow direction
- Output values
 - Flow displayed: 0
 - Totalizer: the totalizers are pegged at the last correct value

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.









A0012888

- 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

"Partially filled pipe detection" submenu

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

► Partially filled pipe detection	
Assign process variable	→  45
Low value partial filled pipe detection	→  45
High value partial filled pipe detection	→  46
Response time part. filled pipe detect.	→  47
Maximum damping partial filled pipe det.	→  47

Assign process variable **Navigation**

 Expert → Sensor → Process param. → Partial pipe det → Assign variable

Description

Use this function to select a process variable to detect empty or partially filled measuring tubes.


For gas measurement: Deactivate monitoring due to low gas density.

Selection

- Off
- Density
- Reference density


Factory setting

Off

Low value partial filled pipe detection **Navigation**

 Expert → Sensor → Process param. → Partial pipe det → Low value

Prerequisite

One of the following options is selected in the **Assign process variable** parameter (→  45):





- Density
- Reference density

Description







Use this function to enter a lower limit value to enable detection of empty or partially filled measuring tubes. If the measured density falls below this value, monitoring is enabled.

User entry

Signed floating-point number

Factory setting	Country-specific: <ul style="list-style-type: none"> ■ 200 kg/m³ ■ 12.5 lb/ft³
Additional information	<p><i>User entry</i></p> <p>The lower limit value must be less than the upper limit value defined in the High value partial filled pipe detection parameter (→  46).</p> <p> The unit depends on the process variable selected in the Assign process variable parameter (→  45).</p> <p><i>Limit value</i></p> <p> If the displayed value is outside the limit value, the measuring device displays the diagnostic message △S862 Partly filled pipe.</p>

High value partial filled pipe detection

Navigation	 Expert → Sensor → Process param. → Partial pipe det → High value
Prerequisite	One of the following options is selected in the Assign process variable parameter (→  45): <ul style="list-style-type: none"> ■ Density ■ Reference density
Description	Use this function to enter an upper limit value to enable detection of empty or partially filled measuring tubes. If the measured density exceeds this value, detection is enabled.
User entry	Signed floating-point number
Factory setting	Country-specific: <ul style="list-style-type: none"> ■ 6 000 kg/m³ ■ 374.6 lb/ft³
Additional information	<p><i>User entry</i></p> <p>The upper limit value must be greater than the lower limit value defined in the Low value partial filled pipe detection parameter (→  45).</p> <p> The unit depends on the process variable selected in the Assign process variable parameter (→  45).</p> <p><i>Limit value</i></p> <p> If the displayed value is outside the limit value, the measuring device displays the diagnostic message △S862 Partly filled pipe.</p>


Response time part. filled pipe detect.





Navigation	Expert → Sensor → Process param. → Partial pipe det → Response time
Prerequisite	One of the following options is selected in the Assign process variable parameter (→ 45): <ul style="list-style-type: none"> ▪ Density ▪ Reference density
Description	Enter the minimum length of time (debouncing time) the signal must be present for the diagnostic message △S862 Partly filled pipe to be triggered if the measuring pipe is empty or partially full.
User entry	0 to 100 s
Factory setting	1 s

Maximum damping partial filled pipe det.


Navigation	Expert → Sensor → Process param. → Partial pipe det → Max. damping
Prerequisite	One of the following options is selected in the Assign process variable parameter (→ 45): <ul style="list-style-type: none"> ▪ Density ▪ Reference density
Description	Use this function to enter a damping value to enable detection of empty or partially filled measuring tubes.
User entry	Positive floating-point number
Factory setting	0
Additional information	<p><i>Description</i></p> <p>If pipe damping (Testpoints submenu (→ 62)) exceeds the specified value, the measuring device presumes that the pipe is partially filled and the flow signal is set to 0. The measuring device displays the diagnostic message △S862 Partly filled pipe. In the case of non-homogeneous media or air pockets, the damping of the measuring tubes increases.</p> <p><i>User entry</i></p> <p>The function is enabled only if the input value is greater than 0.</p>

3.2.4 "Measurement mode" submenu



Navigation  Expert → Sensor → Measurement mode

▶ Measurement mode	
Select medium	→  48
Select gas type	→  48
Reference sound velocity	→  49
Temperature coefficient sound velocity	→  49

Select medium

Navigation	 Expert → Sensor → Measurement mode → Select medium
Description	Use this function to select the type of medium.
Selection	<ul style="list-style-type: none"> ▪ Liquid ▪ Gas
Factory setting	Liquid


Select gas type


Navigation	 Expert → Sensor → Measurement mode → Select gas type
Prerequisite	The Gas option is selected in the Select medium parameter (→  48).
Description	Use this function to select the type of gas for the measuring application.
Selection	<ul style="list-style-type: none"> ▪ Air ▪ Ammonia NH₃ ▪ Argon Ar ▪ Sulfur hexafluoride SF₆ ▪ Oxygen O₂ ▪ Ozone O₃ ▪ Nitrogen oxide NO_x ▪ Nitrogen N₂ ▪ Nitrous oxide N₂O ▪ Methane CH₄ ▪ Hydrogen H₂ ▪ Helium He ▪ Hydrogen chloride HCl ▪ Hydrogen sulfide H₂S ▪ Ethylene C₂H₄

- Carbon dioxide CO₂
- Carbon monoxide CO
- Chlorine Cl₂
- Butane C₄H₁₀
- Propane C₃H₈
- Propylene C₃H₆
- Ethane C₂H₆
- Others

Factory setting Methane CH₄

Reference sound velocity

Navigation  Expert → Sensor → Measurement mode → Sound velocity


Prerequisite The **Others** option is selected in the **Select gas type** parameter (→  48).


Description Use this function to enter the sound velocity of the gas at 0 °C (+32 °F).

User entry 1 to 99 999.9999 m/s

Factory setting 0 m/s

Temperature coefficient sound velocity

Navigation  Expert → Sensor → Measurement mode → Temp. coeff. SV

Prerequisite The **Others** option is selected in the **Select gas type** parameter (→  48).

Description Use this function to enter a temperature coefficient for the sound velocity of the gas.


User entry Positive floating-point number


Factory setting 0 (m/s)/K

3.2.5 "External compensation" submenu

Navigation  Expert → Sensor → External comp.



▶ External compensation

Pressure compensation →  50





Pressure value →  50

External pressure	→ 50
Temperature mode	→ 51
External temperature	→ 51



Pressure compensation



Navigation	 Expert → Sensor → External comp. → Pressure compen.
Prerequisite	The Gas option is selected in the Select medium parameter (→  48).
Description	Use this function select the type of pressure compensation.
Selection	<ul style="list-style-type: none"> ■ Off ■ Fixed value ■ External value
Factory setting	Off

Pressure value


Navigation	 Expert → Sensor → External comp. → Pressure value
Prerequisite	The Fixed value option is selected in the Pressure compensation parameter (→  50).
Description	Use this function to enter a value for the process pressure that is used for pressure correction.
User entry	Positive floating-point number
Factory setting	0 bar
Additional information	<p><i>User entry</i></p> <p> The unit is taken from the Pressure unit parameter (→  34)</p>

External pressure





Navigation	 Expert → Sensor → External comp. → External press.
Prerequisite	The External value option is selected in the Pressure compensation parameter (→  50).

Description	Use this function to enter an external pressure value.
User entry	Positive floating-point number
Factory setting	0 bar
Additional information	<i>User entry</i>  The unit is taken from the Pressure unit parameter (→  34)

Temperature mode

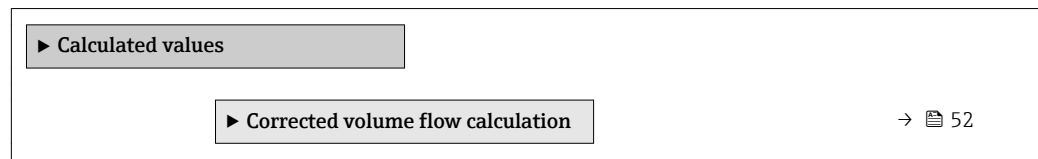
Navigation	 Expert → Sensor → External comp. → Temperature mode
Description	Use this function to select the temperature mode.
Selection	<ul style="list-style-type: none"> ■ Internal measured value ■ External value
Factory setting	Internal measured value

External temperature


Navigation	 Expert → Sensor → External comp. → External temp.
Prerequisite	The External value option is selected in the Temperature mode parameter (→  51) parameter.
Description	Use this function to enter the external temperature.
User entry	-273.15 to 99 999 °C
Factory setting	<ul style="list-style-type: none"> ■ 0 °C ■ +32 °F
Additional information	<i>Description</i>  The unit is taken from the Temperature unit parameter (→  33)

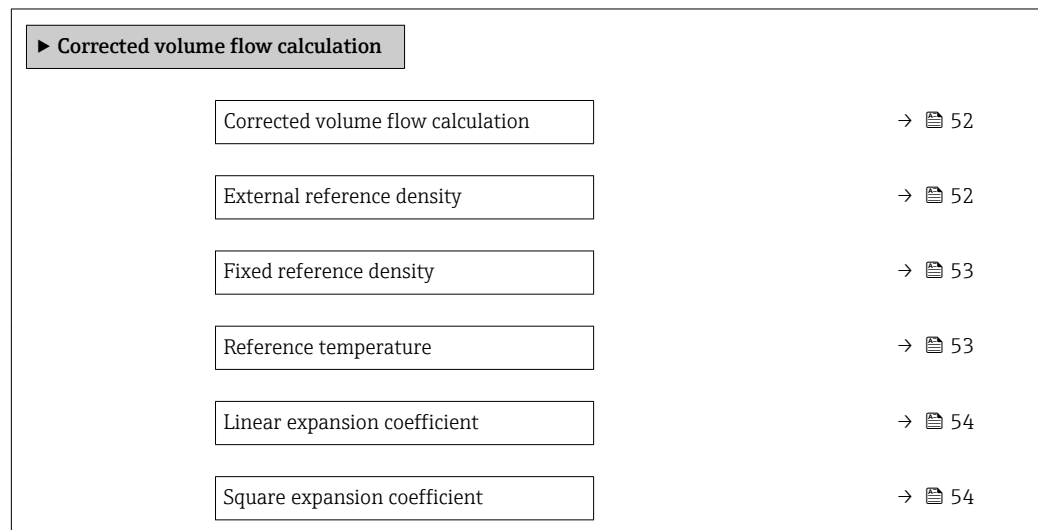
3.2.6 "Calculated values" submenu

Navigation  Expert → Sensor → Calculated value




"Corrected volume flow calculation" submenu



Navigation  Expert → Sensor → Calculated value → Corr. vol.flow.



Corrected volume flow calculation

Navigation	 Expert → Sensor → Calculated value → Corr. vol.flow. → Corr. vol.flow.
Description	Use this function to select the reference density for calculating the corrected volume flow.
Selection	<ul style="list-style-type: none"> ■ Fixed reference density ■ Calculated reference density ■ Reference density by API table 53 ■ External reference density
Factory setting	Calculated reference density

External reference density

Navigation	 Expert → Sensor → Calculated value → Corr. vol.flow. → Ext. ref.density
Prerequisite	The External reference density option is selected in the Corrected volume flow calculation parameter (→  52).

Description	Use this function to enter the external reference density.
User entry	Floating point number with sign
Factory setting	0 kg/Nl

Fixed reference density


Navigation	Expert → Sensor → Calculated value → Corr. vol.flow. → Fix ref.density
Prerequisite	The Fixed reference density option is selected in the Corrected volume flow calculation parameter (→ 52) parameter.
Description	Use this function to enter a fixed value for the reference density.
User entry	Positive floating-point number
Factory setting	0.0008 kg/Nl
Additional information	<p><i>Dependency</i></p> <p> The unit is taken from the Reference density unit parameter (→ 33).</p>

Reference temperature




Navigation	Expert → Sensor → Calculated value → Corr. vol.flow. → Ref. temperature
Prerequisite	In the Corrected volume flow calculation parameter (→ 52) the Calculated reference density option is selected.
Description	Use this function to enter a reference temperature for calculating the reference density.
User entry	-273.15 to 99 999 °C
Factory setting	Country-specific: <ul style="list-style-type: none"> ■ +20 °C ■ +68 °F
Additional information	<p><i>Dependency</i></p> <p> The unit is taken from the Temperature unit parameter (→ 33)</p> <p><i>Reference density calculation</i></p>

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


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

Linear expansion coefficient



Navigation	 Expert → Sensor → Calculated value → Corr. vol.flow. → Linear exp coeff
Prerequisite	In the Corrected volume flow calculation parameter (→  52) the Calculated reference density option is selected.
Description	Use this function to enter a linear, fluid-specific expansion coefficient for calculating the reference density.
User entry	Signed floating-point number
Factory setting	0.0

Square expansion coefficient

Navigation	 Expert → Sensor → Calculated value → Corr. vol.flow. → Square exp coeff
Description	For fluid with a non-linear expansion pattern: use this function to enter a quadratic, fluid-specific expansion coefficient for calculating the reference density.
User entry	Signed floating-point number
Factory setting	0.0

3.2.7 "Sensor adjustment" submenu

Navigation  Expert → Sensor → Sensor adjustm.

► Sensor adjustment	
Installation direction	→  55
► Zero point adjustment	
► Process variable adjustment	→  56

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

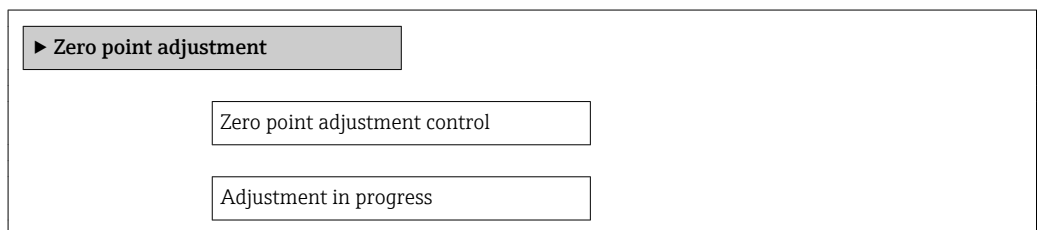
Additional information *Description*



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

"Zero point adjustment" submenu

Navigation Expert → Sensor → Sensor adjustm. → Zero point adj.



Zero point adjustment control


Navigation Expert → Sensor → Sensor adjustm. → Zero point adj. → Zero point adj.

Description Use this function to select the start of the zero point adjustment.



Note conditions .


Selection

- Cancel
- Busy
- Zero point adjust failure
- Start

Factory setting Cancel











Additional information	<p><i>Description</i></p> <ul style="list-style-type: none"> ■ Cancel If zero point adjustment has failed, select this option to cancel zero point adjustment. ■ Busy Is displayed during zero point adjustment. ■ Zero point adjust failure Is displayed if zero point adjustment has failed. ■ Start Select this option to start zero point adjustment.
-------------------------------	---

Progress

Navigation	 Expert → Sensor → Sensor adjustm. → Zero point adj. → Progress
Description	The progress of the process is indicated.
User interface	0 to 100 %

"Process variable adjustment" submenu

Navigation  Expert → Sensor → Sensor adjustm. → Variable adjust

► Process variable adjustment	
Mass flow offset	→  57
Mass flow factor	→  57
Volume flow offset	→  57
Volume flow factor	→  58
Density offset	→  58
Density factor	→  58
Corrected volume flow offset	→  59
Corrected volume flow factor	→  59
Reference density offset	→  59
Reference density factor	→  60

Temperature offset	→ 60
Temperature factor	→ 60

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	<p><i>Description</i></p> <p> Corrected value = (factor × value) + offset</p>


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	<p><i>Description</i></p> <p> Corrected value = (factor × value) + offset</p>

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

Density offset**Navigation**

 Expert → Sensor → Sensor adjustm. → Variable adjust → Density offset

Description

Use this function to enter the zero point shift for the density trim. The density unit on which the shift is based is kg/m³.


User entry

Signed floating-point number

Factory setting

0 kg/m³

Additional information*Description*

 Corrected value = (factor × value) + offset

Density factor**Navigation**

 Expert → Sensor → Sensor adjustm. → Variable adjust → Density factor

Description

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

DescriptionUse 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 Nm³/s.**User entry**

Signed floating-point number

Factory setting0 Nm³/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


Reference density offset**Navigation**

Expert → Sensor → Sensor adjustm. → Variable adjust → Ref.dens. offset


DescriptionUse this parameter to enter the zero point shift for the reference density trim. The reference density unit on which the shift is based is 1 kg/Nm³.**User entry**

Signed floating-point number

Factory setting0 kg/Nm³

Additional information *Description*
 Corrected value = (factor × value) + offset


Reference density factor

Navigation  Expert → Sensor → Sensor adjustm. → Variable adjust → Ref.dens. factor


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


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

User entry Signed floating-point number

Factory setting 0 K

Additional information *Description*
 Corrected value = (factor × value) + offset

Temperature factor

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

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

User entry Positive floating-point number

Factory setting 1

Additional information*Description*

Corrected value = (factor × value) + offset

3.2.8 "Calibration" submenu*Navigation*

Expert → Sensor → Calibration

► Calibration	
Calibration factor	→ 61
Zero point	→ 61
Nominal diameter	→ 62
CO to 5	→ 62

Calibration factor**Navigation**

Expert → Sensor → Calibration → Cal. factor

Description

Displays the current calibration factor for the sensor.

User interface

Signed floating-point number

Factory setting

Depends on nominal diameter and calibration.

Zero point**Navigation**

Expert → Sensor → Calibration → Zero point

Description

Use this function to enter the zero point correction value for the sensor.



User entry

Signed floating-point number


Factory setting

Depends on nominal diameter and 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	<i>Description</i>  The value is also specified on the sensor nameplate.







C0 to 5




Navigation	 Expert → Sensor → Calibration → C0 to 5
Description	Displays the current density coefficients C0 to 5 of the sensor.
User interface	Signed floating-point number
Factory setting	0

3.2.9 "Testpoints" submenu

-  The **Testpoints** submenu (→  62) is used to test the measuring device or the application.
- The parameters can only be accessed via CDI interface or Modbus.

Navigation  Expert → Sensor → Testpoints

▶ Testpoints	
Oscillation frequency 0	→  63
Frequency fluctuation 0	→  63
Oscillation amplitude 0	→  63
Oscillation damping 0	→  64
Tube damping fluctuation 0	→  65
Signal asymmetry	→  65

Electronic temperature	→  65
Exciter current 0	→  66
RawMassFlow	→  66

Oscillation frequency 0

Navigation  Expert → Sensor → Testpoints → Osc. freq. 0

Description Displays the current oscillation frequency.

User interface Positive floating point number

Additional information *Typical values*

Sensor	DN		f _{Air}		f _{Water}	
	[mm]	[in]	Min. nom. [Hz]	max. nom. [Hz]	Min. nom. [Hz]	max. nom. [Hz]
LNGmass	8	³ / ₈	531	611	479	551
	15	¹ / ₂	654	752	564	648
	25	1	770	886	649	747

Frequency fluctuation 0

Navigation  Expert → Sensor → Testpoints → Freq. fluct. 0

Description Displays the current frequency fluctuation.


User interface Signed floating-point number

Oscillation amplitude 0


Navigation  Expert → Sensor → Testpoints → Osc. ampl. 0

Description Displays the relative oscillation amplitude of the sensor in relation to the set point.

User interface Signed floating-point number

Additional information	<p><i>Description</i></p> <p>This value is 100 % under normal conditions. The value can fall in the case of complex media (two-phase, high viscosity or high gas velocity).</p> <p><i>Limit values</i></p> <p>5 %</p> <p> If the displayed value is outside the limit value, the measuring device displays the following diagnostic messages:</p> <ul style="list-style-type: none"> ▪ Diagnostic message △S913 Medium unsuitable, associated service ID 205 Osc Amp Limit Explanation: The measured oscillation amplitude has dropped below the xMin limit value. ▪ Diagnostic message △S912 Medium inhomogeneous, associated service ID 196 Fluid Inhomogeneous Amp <ul style="list-style-type: none"> – Explanation: The fluctuation (standard deviation) of the amplitude is too high. – Possible cause: Air or suspended solids in the medium (multiphase) <p>For detailed information about troubleshooting, refer to the section entitled "Overview of the service-specific diagnostics information"</p>
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Oscillation damping 0

Navigation	 Expert → Sensor → Testpoints → Osc. damping 0
Description	Displays the current oscillation damping.
User interface	Positive floating-point number
Additional information	<p><i>Description</i></p> <p>Oscillation damping is an indicator of the sensor's current need for excitation power.</p>


Typical values

Sensor	DN		Nominal value, air [A/m]	Nominal value, water [A/m]
	[mm]	[in]		
LNGmass	8	³ / ₈	230	270
	15	¹ / ₂	600	750
	25	1	320	380



Limit values

Damping depends on the viscosity and homogeneity of the medium. A high level of viscosity or an inhomogeneous medium (gas/liquid/solids mixture) can sometimes result in considerably higher damping (up to several tens of thousands).



Tube damping fluctuation 0

Navigation	 Expert → Sensor → Testpoints → Damping fluct 0
Description	Displays the current fluctuation of tube damping.
User interface	Signed floating-point number


Signal asymmetry

Navigation	 Expert → Sensor → Testpoints → Signal asymmetry
Description	Displays the relative difference between the oscillation amplitude measured at the inlet and outlet of the sensor.
User interface	Signed floating-point number
Additional information	<p><i>Description</i></p> <p>The measured value is the result of production tolerances of the sensor coils and should remain constant over the life time of a sensor.</p> <p><i>Limit values</i></p> <p>If the value is > 25 %, this is an indicator of a damaged sensor or sensor cable.</p> <p> If the displayed value is outside the limit value, the measuring device displays the following diagnostic message: Diagnostic message △S140 Sensor signal, associated service ID 204 El Dyn Sensor – Explanation: The amplitude asymmetry between the inlet and outlet sensor has exceeded the limit value. – Possible cause: Virtually only occurs if one of the two signal sensors is defective.</p> <p>For detailed information about troubleshooting, refer to the section entitled "Overview of the service-specific diagnostics information"</p>




Electronic temperature

Navigation	 Expert → Sensor → Testpoints → Electronic temp.
Description	Displays the current temperature inside the main electronics.
User interface	Signed floating-point number
Additional information	<p>NOTE!</p> <p>Stay within the specified ambient temperature range.</p> <p><i>Dependency</i></p> <p> The unit is taken from the Temperature unit parameter</p>

Exciter current 0

Navigation	 Expert → Sensor → Testpoints → Exc. current 0
Description	Displays the current excitation current.
User interface	Signed floating-point number

RawMassFlow

Navigation	 Expert → Sensor → Testpoints → RawMassFlow
Description	Displays the unprocessed mass flow (contains all sensor corrections etc.).
User interface	Signed floating-point number
Additional information	<p><i>Description</i></p> <p>Displays the mass flow value before offset and factor correction, damping, low flow cut off and monitoring of a partially filled pipe. This value can be used to check the current zero point, similar to the zero point adjustment function.</p> <p><i>Dependency</i></p> <p> The unit is taken from the Mass flow unit parameter (→  27)</p>


3.2.10 "Supervision" submenu

Navigation  Expert → Sensor → Supervision



Limit value measuring tube damping



Navigation	 Expert → Sensor → Supervision → Limit tube damp.
Description	Use this function to enter a limit value for measuring tube damping.
User entry	Positive floating-point number
Factory setting	Positive floating-point number




Additional information

Limit value


- i
 - If the displayed value is outside the limit value, the measuring device displays the diagnostic message **△S948 Tube damping too high.**
 - For detecting inhomogeneous media, for example










3.3 "Communication" submenu

Navigation  Expert → Communication


▶ Communication	
▶ Modbus configuration	→  67
▶ Modbus information	→  71
▶ Modbus data map	→  72

3.3.1 "Modbus configuration" submenu


Navigation  Expert → Communication → Modbus config.

▶ Modbus configuration	
Bus address	→  68
Baudrate	→  68
Data transfer mode	→  68
Parity	→  69
Byte order	→  69
Telegram delay	→  69
Assign diagnostic behavior	→  70
Failure mode	→  70
Interpreter mode	→  71


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	<ul style="list-style-type: none"> ■ 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	<ul style="list-style-type: none"> ■ ASCII ■ RTU
Factory setting	RTU
Additional information	<p><i>Options</i></p> <ul style="list-style-type: none"> ■ 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	<ul style="list-style-type: none"> ■ Off ■ Alarm or warning ■ Warning ■ Alarm
Factory setting	Alarm
Additional information	<p><i>Description</i></p> <p>Defines the category of messages to which data transmission responds:</p> <ul style="list-style-type: none"> ■ 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. The signal outputs assume the alarm condition specified in Failure mode parameter (→ 70). ■ Warning The device continues to measure. A diagnostic message is generated. The signal outputs assume the alarm condition specified in Failure mode parameter (→ 70). ■ Alarm The device continues to measure. A diagnostic message is generated. The signal outputs assume the alarm condition specified in Failure mode parameter (→ 70).

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	<ul style="list-style-type: none"> ■ NaN value ■ Last valid value
Factory setting	NaN value
Additional information	<p><i>Options</i></p> <ul style="list-style-type: none"> ■ NaN value The device outputs the NaN value ¹⁾. ■ Last valid value The device outputs the last valid measured value before the fault occurred. <p> This effect of this parameter depends on the option selected in the Assign diagnostic behavior parameter (→ 70).</p>

1) Not a Number

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	<ul style="list-style-type: none"> ■ Standard ■ Ignore surplus bytes
Factory setting	Standard
Additional information	<p><i>"Standard" option</i></p> <p>Behaves according to the Modbus standard, i.e. the last two bytes received are the checksum CRC16.</p> <p>NOTE!</p> <p>The selection is only relevant in the RTU mode. In the ASCII mode, the device always behaves according to the Modbus standard.</p> <p><i>"Ignore surplus bytes" option</i></p> <p>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.</p>

3.3.2 "Modbus information" submenu

Navigation Expert → Communication → Modbus info


▶ Modbus information

Device ID	→ 71
Device revision	→ 72


Device ID

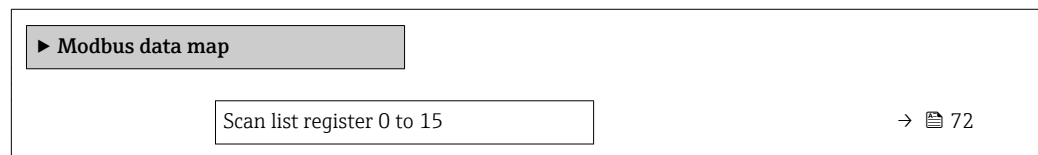
Navigation	Expert → Communication → Modbus info → Device ID
Description	Displays the device ID for identifying the measuring device.
User interface	4-digit hexadecimal number

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



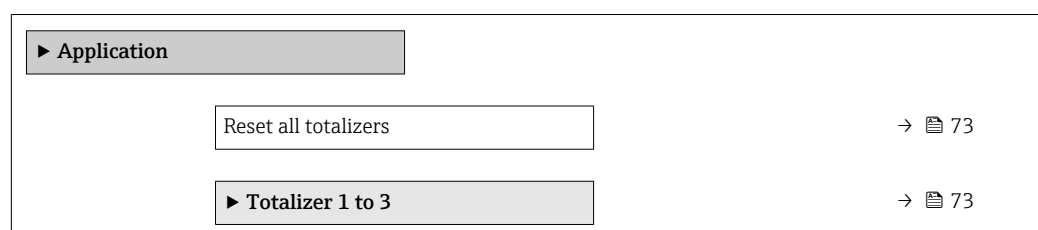
Scan list register 0 to 15




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 by assigning them to the scan list registers 0 to 15. The data of the device parameters assigned here are read out via the register addresses 5051 to 5081.
User entry	1 to 65 535
Factory setting	1

3.4 "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 totaled.
Selection	<ul style="list-style-type: none"> ■ Cancel ■ Reset + totalize
Factory setting	Cancel
Additional information	<p><i>Selection</i></p> <ul style="list-style-type: none"> ■ 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

► Totalizer 1 to 3	
Assign process variable	→  73
Mass unit	→  74
Volume unit	→  74
Corrected volume unit	→  75
Totalizer operation mode	→  76
Control Totalizer 1 to 3	→  76
Preset value 1 to 3	→  77
Failure mode	→  77

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
 - Mass flow
 - Volume 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 (→  73) 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 (→  73) of the **Totalizer 1 to 3** submenu.

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

Selection

<i>SI units</i>	<i>US units</i>
■ g	■ oz
■ kg	■ lb
■ t	■ STon

Custom-specific units

User mass


Factory setting Country-specific:


- kg
- lb

Additional information *Selection*



 For an explanation of the abbreviated units: →  99

Volume unit





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




Prerequisite The **Volume flow** option is selected in the **Assign process variable** parameter (→  73) of the **Totalizer 1 to 3** submenu.

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



Selection	<i>SI units</i> <ul style="list-style-type: none"> ■ cm³ ■ dm³ ■ m³ ■ ml ■ l ■ hl ■ Ml Mega <i>Custom-specific units</i> User vol.	<i>US units</i> <ul style="list-style-type: none"> ■ af ■ ft³ ■ fl oz (us) ■ gal (us) ■ kgal (us) ■ Mgal (us) ■ bbl (us;oil) ■ bbl (us;liq.) ■ bbl (us;beer) ■ bbl (us;tank) 	<i>Imperial units</i> <ul style="list-style-type: none"> ■ gal (imp) ■ Mgal (imp) ■ bbl (imp;beer) ■ bbl (imp;oil)
Factory setting	Country-specific: <ul style="list-style-type: none"> ■ l ■ gal (us) 		
Additional information	<i>Selection</i>  For an explanation of the abbreviated units: →  99		










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 (→  73) of the Totalizer 1 to 3 submenu.		
Description	Use this function to select the unit for the corrected volume.		
Selection	<i>SI units</i> <ul style="list-style-type: none"> ■ Nl ■ Nm³ ■ Sl ■ Sm³ <i>Custom-specific units</i> UserCrVol.	<i>US units</i> <ul style="list-style-type: none"> ■ Sft³ ■ Sgal (us) ■ Sbbl (us;liq.) 	<i>Imperial units</i> Sgal (imp)
Factory setting	Country-specific: <ul style="list-style-type: none"> ■ Nl ■ Sft³ 		
Additional information	<i>Selection</i>  For an explanation of the abbreviated units: →  99		

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 (→  73) Totalizer 1 to 3 submenu: <ul style="list-style-type: none"> ■ Volume flow ■ Mass flow ■ Corrected volume flow
Description	Use this function to select how the totalizer summates the flow.
Selection	<ul style="list-style-type: none"> ■ Net flow total ■ Forward flow total ■ Reverse flow total
Factory setting	Net flow total
Additional information	<i>Selection</i> <ul style="list-style-type: none"> ■ 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 (→  73) of the Totalizer 1 to 3 submenu: <ul style="list-style-type: none"> ■ Volume flow ■ Mass flow ■ Corrected volume flow
Description	Use this function to select the control of totalizer value 1-3.
Selection	<ul style="list-style-type: none"> ■ Totalize ■ Reset + hold ■ Preset + hold ■ Reset + totalize ■ Preset + totalize
Factory setting	Totalize

Additional information	<p><i>Selection</i></p> <ul style="list-style-type: none"> ■ 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 (→  77). ■ 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 (→  77) and the totaling process is restarted.
<hr/>	
Preset value 1 to 3	
<hr/>	
Navigation	 Expert → Application → Totalizer 1 to 3 → Preset value 1 to 3
Prerequisite	<p>One of the following options is selected in the Assign process variable parameter (→  73) of the Totalizer 1 to 3 submenu:</p> <ul style="list-style-type: none"> ■ 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	<p>Country-specific:</p> <ul style="list-style-type: none"> ■ 0 kg ■ 0 lb
Additional information	<p><i>User entry</i></p> <p> The unit of the selected process variable is specified for the totalizer depending on the selection made in the Assign process variable parameter (→  73):</p> <ul style="list-style-type: none"> ■ Volume flow option: Volume flow unit parameter (→  28) ■ Mass flow option: Mass flow unit parameter (→  27) ■ Corrected volume flow option: Corrected volume unit parameter (→  75)

Failure mode



Navigation	 Expert → Application → Totalizer 1 to 3 → Failure mode
Prerequisite	<p>One of the following options is selected in the Assign process variable parameter (→  73) of the Totalizer 1 to 3 submenu:</p> <ul style="list-style-type: none"> ■ 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		→ 79
Timestamp		→ 79
Previous diagnostics		→ 79
Timestamp		→ 80
Operating time from restart		→ 80
Operating time		→ 80
▶ Diagnostic list		→ 81
▶ Event logbook		→ 85
▶ Device information		→ 85
▶ Min/max values		→ 89
▶ Simulation		→ 95


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	<p><i>Display</i></p> <p> Additional pending diagnostic messages can be viewed in the Diagnostic list submenu (→  81).</p> <p><i>Example</i></p> <p>For the display format: F271 Main electronic failure</p>

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	<p><i>Display</i></p> <p> The diagnostic message can be viewed via the Actual diagnostics parameter (→  79).</p> <p><i>Example</i></p> <p>For the display format: 24d12h13m00s</p>

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	<i>Example</i> For the display format: ⊗F271 Main electronic failure
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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	<i>Display</i>  The diagnostic message can be viewed via the Previous diagnostics parameter (→  79). <i>Example</i> 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	<i>User interface</i> The maximum number of days is 9999, which is equivalent to 27 years.

3.5.1 "Diagnostic list" submenu


Navigation  Expert → Diagnostics → Diagnostic list

► Diagnostic list	
Diagnostics 1	→  81
Timestamp	→  81
Diagnostics 2	→  82
Timestamp	→  82
Diagnostics 3	→  82
Timestamp	→  83
Diagnostics 4	→  83
Timestamp	→  83
Diagnostics 5	→  84
Timestamp	→  84

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	<p><i>Examples</i></p> <p>For the display format:</p> <ul style="list-style-type: none"> ■  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 (→  81).

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 (→  82).

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 (→  82).

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	<p><i>Display</i></p> <p> The diagnostic message can be viewed via the Diagnostics 4 parameter (→  83).</p> <p><i>Example</i></p> <p>For the display format: 24d12h13m00s</p>
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Diagnostics 5

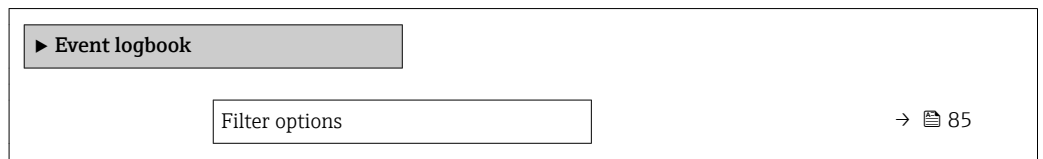
Navigation	 Expert → Diagnostics → Diagnostic list → Diagnostics 5
Description	Displays the current diagnostics message with the fifth-highest priority.
User interface	Symbol for diagnostic behavior, diagnostic code and short message.
Additional information	<p><i>Examples</i></p> <p>For the display format:</p> <ul style="list-style-type: none"> ■  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	<p><i>Display</i></p> <p> The diagnostic message can be viewed via the Diagnostics 5 parameter (→  84).</p> <p><i>Example</i></p> <p>For the display format: 24d12h13m00s</p>

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

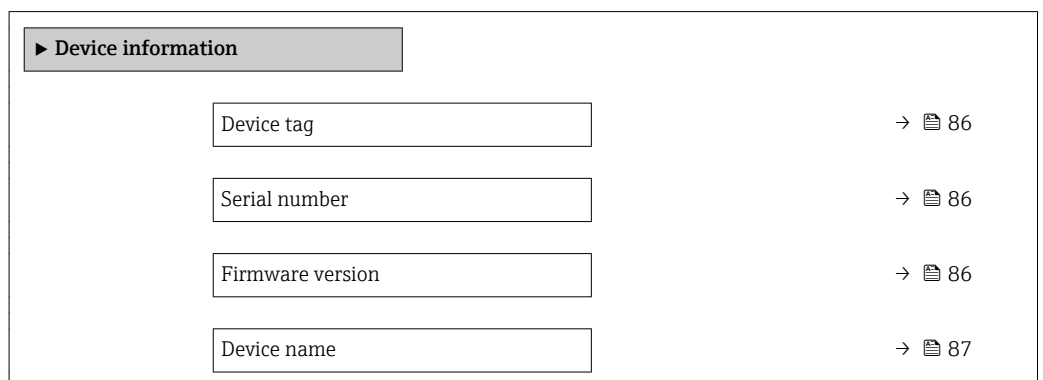
Additional information *Description*

 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





Order code	→ ⓘ 87
Extended order code 1	→ ⓘ 87
Extended order code 2	→ ⓘ 88
Extended order code 3	→ ⓘ 88
ENP version	→ ⓘ 88
Configuration counter	→ ⓘ 89

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	LNGmass

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	<i>Description</i>  Uses of the serial number <ul style="list-style-type: none"> ▪ 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 measuring device. It can also be found on the nameplate.

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

Factory setting LNGmass

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*



It can be found in the "Order code" field on the nameplate.

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	<p><i>Description</i></p> <p>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.</p> <p> It can be found in the "Ext. ord. cd." field on the nameplate.</p>
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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 (→  87)


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 (→  87)

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	<p><i>Description</i></p> <p>This electronic nameplate stores a data record for device identification that includes more data than the nameplates attached to the outside of the device.</p>









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.

▶ **Min/max values**

Reset min/max values	→  89
▶ Electronic temperature	→  90
▶ Medium temperature	→  91
▶ Carrier pipe temperature	→  91
▶ Oscillation frequency	→  92
▶ Oscillation amplitude	→  93
▶ Oscillation damping	→  94
▶ Signal asymmetry	→  94

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	<ul style="list-style-type: none"> ■ Cancel ■ Oscillation amplitude ■ Oscillation damping ■ Oscillation frequency ■ Signal asymmetry

Factory setting


Cancel

"Electronic temperature" submenu

Navigation  Expert → Diagnostics → Min/max val. → Electronic temp.

▶ Electronic temperature	
Minimum value	→  90
Maximum value	→  90

Minimum value**Navigation**

 Expert → Diagnostics → Min/max val. → Electronic 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 (→  33)

Maximum value**Navigation**

 Expert → Diagnostics → Min/max val. → Electronic 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 (→  33)


"Medium temperature" submenu

Navigation  Expert → Diagnostics → Min/max val. → Medium temp.

▶ **Medium temperature**



Minimum value	→  91
Maximum value	→  91

Minimum value


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

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 (→  33)

Maximum value

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

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 (→  33)




"Carrier pipe temperature" submenu

Navigation  Expert → Diagnostics → Min/max val. → Carr. pipe temp.




▶ **Carrier pipe temperature**

Minimum value	→  92
Maximum value	→  92


Minimum value



Navigation	 Expert → Diagnostics → Min/max val. → Carr. pipe temp. → Minimum value
Prerequisite	Order code for "Application package", option EB "Heartbeat Verification + Monitoring"
Description	Displays the lowest previously measured temperature value of the carrier pipe.
User interface	Signed floating-point number
Additional information	<i>Dependency</i>  The unit is taken from the Temperature unit parameter (→  33)

Maximum value


Navigation	 Expert → Diagnostics → Min/max val. → Carr. pipe temp. → Maximum value
Prerequisite	Order code for "Application package", option EB "Heartbeat Verification + Monitoring"
Description	Displays the highest previously measured temperature value of the carrier pipe.
User interface	Signed floating-point number
Additional information	<i>Dependency</i>  The unit is taken from the Temperature unit parameter (→  33)

"Oscillation frequency" submenu

Navigation  Expert → Diagnostics → Min/max val. → Oscil. frequency


▶ Oscillation frequency	
Minimum value	→  92
Maximum value	→  93

Minimum value

Navigation	 Expert → Diagnostics → Min/max val. → Oscil. frequency → Minimum value
Description	Displays the lowest previously measured oscillation frequency.

User interface Signed floating-point number


Maximum value

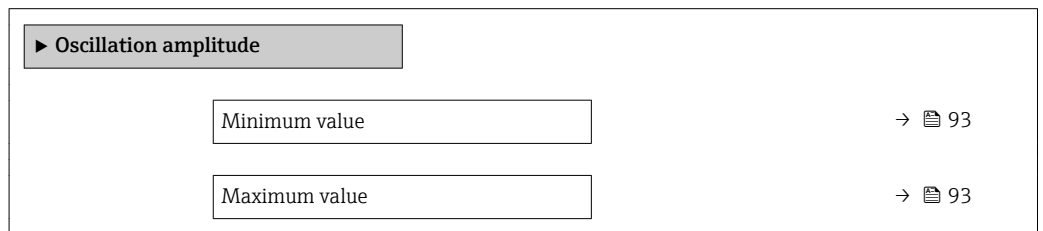
Navigation  Expert → Diagnostics → Min/max val. → Oscil. frequency → Maximum value

Description Displays the highest previously measured oscillation frequency.


User interface Signed floating-point number

"Oscillation amplitude" submenu

Navigation  Expert → Diagnostics → Min/max val. → Oscil. amplitude



Minimum value

Navigation  Expert → Diagnostics → Min/max val. → Oscil. amplitude → Minimum value

Description Displays the lowest previously measured oscillation amplitude.

User interface Signed floating-point number


Maximum value



Navigation  Expert → Diagnostics → Min/max val. → Oscil. amplitude → Maximum value

Description Displays the highest previously measured oscillation amplitude.

User interface Signed floating-point number

"Oscillation damping" submenu

Navigation  Expert → Diagnostics → Min/max val. → Oscil. damping

► Oscillation damping	
Minimum value	→  94
Maximum value	→  94


Minimum value

Navigation  Expert → Diagnostics → Min/max val. → Oscil. damping → Minimum value

Description Displays the lowest previously measured oscillation damping.

User interface Signed floating-point number


Maximum value



Navigation  Expert → Diagnostics → Min/max val. → Oscil. damping → Maximum value

Description Displays the highest previously measured oscillation damping.


User interface Signed floating-point number

"Signal asymmetry" submenu


Navigation  Expert → Diagnostics → Min/max val. → Signal asymmetry

► Signal asymmetry	
Minimum value	→  95
Maximum value	→  95

Minimum value

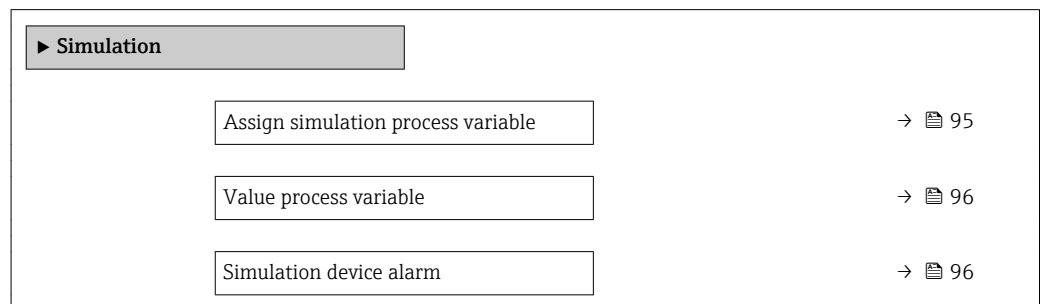
Navigation	 Expert → Diagnostics → Min/max val. → Signal asymmetry → Minimum value
Description	Displays the lowest previously measured signal asymmetry.
User interface	Signed floating-point number

Maximum value

Navigation	 Expert → Diagnostics → Min/max val. → Signal asymmetry → Maximum value
Description	Displays the highest previously measured signal asymmetry.
User interface	Signed floating-point number


3.5.5 "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	<ul style="list-style-type: none"> ■ Off ■ Mass flow ■ Volume flow ■ Corrected volume flow ■ Density ■ Reference density ■ Temperature
Factory setting	Off

Additional information *Description*

 The simulation value of the process variable selected is defined in the **Value process variable** parameter (→  96).

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 (→  95):



- Mass flow
- Volume flow
- Corrected volume flow
- Density
- Reference density
- Temperature


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 (→  26).

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

Mass	kg
Mass flow	kg/min
Volume	l
Volume flow	l/min
Corrected volume	Nl
Corrected volume flow	Nl/min
Density	kg/l
Reference density	kg/Nl
Temperature	°C
Pressure	bar g

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]	On-value for liquid [kg/min]
8	0.13
15	0.45
25	1.2


4.2 US units

 Only valid for USA and Canada.

4.2.1 System units

Mass	lb
Mass flow	lb/min
Volume	gal (us)
Volume flow	gal/min (us)
Corrected volume	Sft ³
Corrected volume flow	Sft ³ /min
Density	g/cm ³
Reference density	g/Scm ³
Temperature	lb/ft ³
Pressure	psi g

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]	[lb/min]
$\frac{3}{8}$	0.3
$\frac{1}{2}$	1.0
1	2.6

5 Explanation of abbreviated units

5.1 SI units

Process variable	Units	Explanation
Density	g/cm ³ , g/m ³	Gram/volume unit
	kg/dm ³ , kg/l, kg/m ³	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).
Pressure	Pa a, kPa a, MPa a	Pascal, kilopascal, megapascal (absolute)
	bar	Bar
	Pa g, kPa g, MPa g	Pascal, kilopascal, megapascal (relative/gauge)
	bar g	Bar (relative/gauge)
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
Reference density	kg/Nm ³ , kg/Nl, g/Scm ³ , kg/Sm ³	Kilogram, gram/standard volume unit
Corrected volume	Nl, Nm ³ , Sm ³	Normal liter, normal cubic meter, standard cubic meter
Corrected volume flow	Nl/s, Nl/min, Nl/h, Nl/d	Normal liter/time unit
	Nm ³ /s, Nm ³ /min, Nm ³ /h, Nm ³ /d	Normal cubic meter/time unit
	Sm ³ /s, Sm ³ /min, Sm ³ /h, Sm ³ /d	Standard cubic meter/time unit
Temperature	°C, K	Celsius, Kelvin
Volume	cm ³ , dm ³ , m ³	Cubic centimeter, cubic decimeter, cubic meter
	ml, l, hl, Ml Mega	Milliliter, liter, hectoliter, megaliter
Volume flow	cm ³ /s, cm ³ /min, cm ³ /h, cm ³ /d	Cubic centimeter/time unit
	dm ³ /s, dm ³ /min, dm ³ /h, dm ³ /d	Cubic decimeter/time unit
	m ³ /s, m ³ /min, m ³ /h, m ³ /d	Cubic meter/time unit
	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/ft ³ , 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

Process variable	Units	Explanation
Pressure	psi a	Pounds per square inch (absolute)
	psi g	Pounds per square inch (gauge)
Mass	oz, lb, STon	Ounce, pound, standard ton
Mass flow	oz/s, oz/min, oz/h, oz/d	Ounce/time unit
	lb/s, lb/min, lb/h, lb/d	Pound/time unit
	STon/s, STon/min, STon/h, STon/d	Standard ton/time unit
Reference density	lb/Sft ³	Weight unit/standard volume 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)
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	<ul style="list-style-type: none"> ▪ Float length = 4 byte ▪ Integer length = 2 byte ▪ String length, depending on parameter 	Possible type of access to parameter: <ul style="list-style-type: none"> ▪ 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 <ul style="list-style-type: none"> ▪ Option 1 ▪ Option 2 ▪ Option 3 ⁽⁺⁾  <ul style="list-style-type: none"> ▪ 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.

























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Alarm delay		→ 109
▶ Diagnostic behavior		→ 109
▶ Administration		→ 110
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
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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 9999	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. 140	2757	Integer	Read / Write	0 = Off 1 = Logbook entry only 2 = Warning 3 = Alarm	13
Assign behavior of diagnostic no. 046	2756	Integer	Read / Write	0 = Off 1 = Logbook entry only 2 = Warning 3 = Alarm	13
Assign behavior of diagnostic no. 144	2081	Integer	Read / Write	0 = Off 1 = Logbook entry only 2 = Warning 3 = Alarm	14
Assign behavior of diagnostic no. 832	2759	Integer	Read / Write	0 = Off 1 = Logbook entry only 2 = Warning 3 = Alarm	14
Assign behavior of diagnostic no. 833	2762	Integer	Read / Write	0 = Off 1 = Logbook entry only 2 = Warning 3 = Alarm	14
Assign behavior of diagnostic no. 834	2761	Integer	Read / Write	0 = Off 1 = Logbook entry only 2 = Warning 3 = Alarm	15
Assign behavior of diagnostic no. 835	2760	Integer	Read / Write	0 = Off 1 = Logbook entry only 2 = Warning 3 = Alarm	15
Assign behavior of diagnostic no. 912	2758	Integer	Read / Write	0 = Off 1 = Logbook entry only 2 = Warning 3 = Alarm	15

Navigation: Expert → System → Diagnostic handling → Diagnostic behavior					
Parameter	Register	Data type	Access	Selection / User entry / User interface	→ 
Assign behavior of diagnostic no. 913	2754	Integer	Read / Write	0 = Off 1 = Logbook entry only 2 = Warning 3 = Alarm	16
Assign behavior of diagnostic no. 944	2082	Integer	Read / Write	0 = Off 1 = Logbook entry only 2 = Warning 3 = Alarm	16
Assign behavior of diagnostic no. 192	2022	Integer	Read / Write	0 = Off 1 = Logbook entry only 2 = Warning 3 = Alarm	17
Assign behavior of diagnostic no. 274	2755	Integer	Read / Write	0 = Off 1 = Logbook entry only 2 = Warning 3 = Alarm	17
Assign behavior of diagnostic no. 392	2023	Integer	Read / Write	0 = Off 1 = Logbook entry only 2 = Warning 3 = Alarm	18
Assign behavior of diagnostic no. 592	2024	Integer	Read / Write	0 = Off 1 = Logbook entry only 2 = Warning 3 = Alarm	18
Assign behavior of diagnostic no. 992	2021	Integer	Read / Write	0 = Off 1 = Logbook entry only 2 = Warning 3 = Alarm	18

"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 *	19
Activate SW option	2795	Integer	Read / Write	Max. 10-digit string consisting of numbers.	20
Software option overview	2902	Integer	Read	Character string comprising letters	20
Permanent storage	6907	Integer	Read / Write	0 = Off 1 = On	21
Device tag	4901	String	Read / Write	Max. 32 characters such as letters, numbers or special characters (e.g. @, %, /).	21

* 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	→ 
Mass flow	2007	Float	Read	Signed floating-point number	23
Volume flow	2009	Float	Read	Signed floating-point number	23
Corrected volume flow	2011	Float	Read	Signed floating-point number	23
Density	2013	Float	Read	Signed floating-point number	23
Reference density	2015	Float	Read	Signed floating-point number	24
Temperature	2017	Float	Read	Signed floating-point number	24
Pressure value	2089	Float	Read	Signed floating-point number	24

"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	25
Totalizer overflow 1 to 3	1: 2612 2: 2812 3: 3012	Float	Read	Integer with sign	26


"System units" submenu

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	28


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)	28

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)	30


Navigation: Expert → Sensor → System units					
Parameter	Register	Data type	Access	Selection / User entry / User interface	→ 
Corrected volume flow unit	2105	Integer	Read / Write	0 = NI/s 1 = NI/min⁽⁺⁾ 2 = NI/h 3 = NI/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 = Sbbbl/s (us;liq.) 21 = Sbbbl/min (us;liq.) 22 = Sbbbl/h (us;liq.) 23 = Sbbbl/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	30
Corrected volume unit	2106	Integer	Read / Write	0 = NI⁽⁺⁾ 1 = Nm ³ 2 = Sm ³ 3 = Sft ³ 4 = Sl 5 = Sgal (us) 6 = Sbbbl (us;liq.) 7 = Sgal (imp) 8 = UserCrVol.	31
Density unit	2107	Integer	Read / Write	0 = g/cm ³ 2 = kg/dm ³ 3 = kg/l⁽⁺⁾ 4 = kg/m ³ 5 = SD4°C 6 = SD15°C 7 = SD20°C 8 = SG4°C 9 = SG15°C 10 = SG20°C 11 = lb/ft ³ 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) 20 = User dens. 21 = g/m ³ 22 = g/ml	32

Navigation: Expert → Sensor → System units					
Parameter	Register	Data type	Access	Selection / User entry / User interface	→ 
Reference density unit	2108	Integer	Read / Write	0 = g/Scm ³ 1 = kg/Nl ⁽⁺⁾ 2 = kg/Nm ³ 3 = kg/Sm ³ 4 = lb/Sft ³	33
Temperature unit	2109	Integer	Read / Write	0 = °C ⁽⁺⁾ 1 = K 2 = °F 3 = °R	33
Pressure unit	2130	Integer	Read / Write	0 = bar 1 = psi a 2 = bar g ⁽⁺⁾ 3 = psi g 4 = Pa a 5 = kPa a 6 = MPa a 7 = Pa g 8 = kPa g 9 = MPa g 10 = User pres.	34
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	34


"User-specific units" submenu

Navigation: Expert → Sensor → System units → User-specific units					
Parameter	Register	Data type	Access	Selection / User entry / User interface	→ 
User mass text	2531	String	Read / Write	Max. 10 characters such as letters, numbers or special characters (@, %, /)	35
User mass factor	2115	Float	Read / Write	Signed floating-point number	36
User volume text	2542	String	Read / Write	Max. 10 characters such as letters, numbers or special characters (@, %, /)	36
User volume factor	2119	Float	Read / Write	Signed floating-point number	37
User corrected volume text	2568	String	Read / Write	Max. 10 characters such as letters, numbers or special characters (@, %, /)	37
User corrected volume factor	2573	Float	Read / Write	Signed floating-point number	38
User density text	2549	String	Read / Write	Max. 10 characters such as letters, numbers or special characters (@, %, /)	38
User density offset	2556	Float	Read / Write	Signed floating-point number	38
User density factor	2123	Float	Read / Write	Signed floating-point number	38
User pressure text	2559	String	Read / Write	Max. 10 characters such as letters, numbers or special characters (@, %, /)	39
User pressure offset	2566	Float	Read / Write	Signed floating-point number	39
User pressure factor	2564	Float	Read / Write	Signed floating-point number	39


"Process parameters" submenu

Navigation: Expert → Sensor → Process parameters					
Parameter	Register	Data type	Access	Selection / User entry / User interface	→ 
Flow damping	5510	Float	Read / Write	0 to 100	40
Density damping	5508	Float	Read / Write	0 to 999.9 s	40
Temperature damping	5127	Float	Read / Write	0 to 999.9 s	41
Flow override	5503	Integer	Read / Write	0 = Off 1 = On	41


"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 = Mass flow 2 = Volume flow 3 = Corrected volume flow	42
On value low flow cutoff	5138	Float	Read / Write	Positive floating-point number	42
Off value low flow cutoff	5104	Float	Read / Write	0 to 100.0 %	43
Pressure shock suppression	5140	Float	Read / Write	0 to 100 s	43


"Partially filled pipe detection" submenu

Navigation: Expert → Sensor → Process parameters → Partially filled pipe detection					
Parameter	Register	Data type	Access	Selection / User entry / User interface	→ 
Assign process variable	5106	Integer	Read / Write	0 = Off 4 = Density 5 = Reference density	45
Low value partial filled pipe detection	5110	Float	Read / Write	Signed floating-point number	45
High value partial filled pipe detection	5112	Float	Read / Write	Signed floating-point number	46
Response time part. filled pipe detect.	5108	Float	Read / Write	0 to 100 s	47
Maximum damping partial filled pipe det.	2414	Float	Read / Write	Positive floating-point number	47


"Measurement mode" submenu


Navigation: Expert → Sensor → Measurement mode					
Parameter	Register	Data type	Access	Selection / User entry / User interface	→ 
Select medium	2442	Integer	Read / Write	0 = Liquid 1 = Gas	48
Select gas type	5229	Integer	Read / Write	0 = Air 1 = Nitrogen N2 2 = Argon Ar 3 = Helium He 4 = Carbon dioxide CO2 5 = Oxygen O2 6 = Methane CH4 7 = Ammonia NH3 9 = Hydrogen H2 10 = Ethane C2H6 11 = Propane C3H8 12 = Butane C4H10 13 = Chlorine Cl2 14 = Hydrogen chloride HCl 15 = Carbon monoxide CO 16 = Nitrous oxide N2O 17 = Nitrogen oxide NOx 18 = Hydrogen sulfide H2S 19 = Sulfur hexafluoride SF6 20 = Propylene C3H6 21 = Ozone O3 22 = Others 23 = Ethylene C2H4	48
Reference sound velocity	7413	Float	Read / Write	1 to 99 999.9999 m/s	49
Temperature coefficient sound velocity	7411	Float	Read / Write	Positive floating-point number	49

"External compensation" submenu


Navigation: Expert → Sensor → External compensation					
Parameter	Register	Data type	Access	Selection / User entry / User interface	→ 
Pressure compensation	5184	Integer	Read / Write	0 = Off 1 = Fixed value 2 = External value	50
Pressure value	5185	Float	Read / Write	Positive floating-point number	50
External pressure	2440	Float	Read / Write	Positive floating-point number	50
Temperature mode	5515	Integer	Read / Write	0 = Internal measured value 1 = External value	51
External temperature	2507	Float	Read / Write	-273.15 to 99 999 °C	51

"Calculated values" submenu*"Corrected volume flow calculation" submenu*


Navigation: Expert → Sensor → Calculated values → Corrected volume flow calculation					
Parameter	Register	Data type	Access	Selection / User entry / User interface	→ 
Corrected volume flow calculation	5129	Integer	Read / Write	0 = Calculated reference density 1 = Fixed reference density 2 = External reference density 3 = Reference density by API table 53	52
External reference density	2509	Float	Read / Write	Floating point number with sign	52

Navigation: Expert → Sensor → Calculated values → Corrected volume flow calculation					
Parameter	Register	Data type	Access	Selection / User entry / User interface	→ 
Fixed reference density	5130	Float	Read / Write	Positive floating-point number	53
Reference temperature	5136	Float	Read / Write	-273.15 to 99999 °C	53
Linear expansion coefficient	5132	Float	Read / Write	Signed floating-point number	54
Square expansion coefficient	5134	Float	Read / Write	Signed floating-point number	54


"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	55


"Zero point adjustment" submenu


Navigation: Expert → Sensor → Sensor adjustment → Zero point adjustment					
Parameter	Register	Data type	Access	Selection / User entry / User interface	→ 
Zero point adjustment control	5121	Integer	Read / Write	0 = Cancel 1 = Start 2 = Zero point adjust failure 8 = Busy	55
Progress	6797	Integer	Read	0 to 100 %	56

"Process variable adjustment" submenu


Navigation: Expert → Sensor → Sensor adjustment → Process variable adjustment					
Parameter	Register	Data type	Access	Selection / User entry / User interface	→ 
Mass flow offset	5521	Float	Read / Write	Signed floating-point number	57
Mass flow factor	5519	Float	Read / Write	Positive floating-point number	57
Volume flow offset	5525	Float	Read / Write	Signed floating-point number	57
Volume flow factor	5523	Float	Read / Write	Positive floating-point number	58
Density offset	5529	Float	Read / Write	Signed floating-point number	58
Density factor	5527	Float	Read / Write	Positive floating-point number	58
Corrected volume flow offset	2044	Float	Read / Write	Signed floating-point number	59
Corrected volume flow factor	2076	Float	Read / Write	Positive floating-point number	59
Reference density offset	2046	Float	Read / Write	Signed floating-point number	59
Reference density factor	2042	Float	Read / Write	Positive floating-point number	60
Temperature offset	5533	Float	Read / Write	Signed floating-point number	60
Temperature factor	5531	Float	Read / Write	Positive floating-point number	60

"Calibration" submenu

Navigation: Expert → Sensor → Calibration					
Parameter	Register	Data type	Access	Selection / User entry / User interface	→ 
Calibration factor	7513	Float	Read	Signed floating-point number	61
Zero point	7527	Float	Read / Write	Signed floating-point number	61


Navigation: Expert → Sensor → Calibration					
Parameter	Register	Data type	Access	Selection / User entry / User interface	→ 
Nominal diameter	2048	String	Read	DNxx / x"	62
C0 to 5	0: 7501 1: 7503 2: 7505 3: 7507 4: 7509 5: 7511	Float	Read	Signed floating-point number	62


"Testpoints" submenu

Navigation: Expert → Sensor → Testpoints					
Parameter	Register	Data type	Access	Selection / User entry / User interface	→ 
Oscillation frequency 0	0: 9501 1: 9503	Float	Read	Positive floating point number	63
Frequency fluctuation 0	0: 2498 1: 2500	Float	Read	Signed floating-point number	63
Oscillation amplitude 0	0: 2449 1: 2451	Float	Read	Signed floating-point number	63
Oscillation damping 0	0: 9505 1: 9507	Float	Read	Positive floating-point number	64
Tube damping fluctuation 0	0: 2502 1: 2504	Float	Read	Signed floating-point number	65
Signal asymmetry	2443	Float	Read	Signed floating-point number	65
Electronic temperature	2457	Float	Read	Signed floating-point number	65
Exciter current 0	0: 9509 1: 9511	Float	Read	Signed floating-point number	66
RawMassFlow	10232	Float	Read	Signed floating-point number	66


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	68
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	68
Data transfer mode	4913	Integer	Read / Write	0 = RTU 1 = ASCII	68
Parity	4914	Integer	Read / Write	0 = Even 1 = Odd 2 = None / 2 stop bits 3 = None / 1 stop bit	69

Navigation: Expert → Communication → Modbus configuration					
Parameter	Register	Data type	Access	Selection / User entry / User interface	→ 
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	69
Telegram delay	4916	Float	Read / Write	0 to 100 ms	69
Assign diagnostic behavior	4921	Integer	Read / Write	0 = Off 1 = Warning 2 = Alarm 3 = Alarm or warning	70
Failure mode	4920	Integer	Read / Write	0 = NaN value 1 = Last valid value	70
Interpreter mode	4925	Integer	Read / Write	0 = Standard 1 = Ignore surplus bytes	71


"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	71
Device revision	4481	Integer	Read	4-digit hexadecimal number	72


"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 65535	72


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	73


"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 = Mass flow 2 = Volume flow 3 = Corrected volume flow	73
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	74
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)	74
Corrected volume unit	1: 2604 2: 2804 3: 3004	Integer	Read / Write	0 = NI⁽⁺⁾ 1 = Nm ³ 2 = Sm ³ 3 = Sft ³ 4 = Sl 5 = Sgal (us) 6 = Sbbbl (us;liq.) 7 = Sgal (imp) 8 = UserCrVol.	75
Totalizer operation mode	1: 2605 2: 2805 3: 3005	Integer	Read / Write	0 = Net flow total 1 = Forward flow total 2 = Reverse flow total	76
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	76
Preset value 1 to 3	1: 2590 2: 2592 3: 2594	Float	Read / Write	Signed floating-point number	77
Failure mode	1: 2606 2: 2806 3: 3006	Integer	Read / Write	0 = Stop 1 = Actual value 2 = Last valid value	77


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.	79
Timestamp	2719	Integer	Read	Days (d), hours (h), minutes (m) and seconds (s)	79
Previous diagnostics	2734	Integer	Read	Symbol for diagnostic behavior, diagnostic code and short message.	79
Timestamp	2068	Integer	Read	Days (d), hours (h), minutes (m) and seconds (s)	80
Operating time from restart	2624	Integer	Read	Days (d), hours (h), minutes (m) and seconds (s)	80
Operating time	2631	Integer	Read	Days (d), hours (h), minutes (m) and seconds (s)	80


"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.	81
Timestamp	2710	Integer	Read	Days (d), hours (h), minutes (m) and seconds (s)	81
Diagnostics 2	2738	Integer	Read	Symbol for diagnostic behavior, diagnostic code and short message.	82
Timestamp	2701	Integer	Read	Days (d), hours (h), minutes (m) and seconds (s)	82
Diagnostics 3	2740	Integer	Read	Symbol for diagnostic behavior, diagnostic code and short message.	82
Timestamp	2692	Integer	Read	Days (d), hours (h), minutes (m) and seconds (s)	83
Diagnostics 4	2742	Integer	Read	Symbol for diagnostic behavior, diagnostic code and short message.	83
Timestamp	2683	Integer	Read	Days (d), hours (h), minutes (m) and seconds (s)	83
Diagnostics 5	2744	Integer	Read	Symbol for diagnostic behavior, diagnostic code and short message.	84
Timestamp	2675	Integer	Read	Days (d), hours (h), minutes (m) and seconds (s)	84


"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	85


"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. @, %, /).	86
Serial number	7003	String	Read	A maximum of 11-digit character string comprising letters and numbers.	86
Firmware version	7277	String	Read	Character string in the format xx.yy.zz	86
Device name	7263	String	Read	Max. 32 characters such as letters or numbers.	87
Order code	2058	String	Read	Character string composed of letters, numbers and certain punctuation marks (e.g. /).	87
Extended order code 1	2212	String	Read	Character string	87
Extended order code 2	2222	String	Read	Character string	88
Extended order code 3	2232	String	Read	Character string	88
ENP version	4003	String	Read	Character string	88
Configuration counter	3100	Integer	Read	0 to 65 535	89


"Min/max values" submenu

Navigation: Expert → Diagnostics → Min/max values					
Parameter	Register	Data type	Access	Selection / User entry / User interface	→ 
Reset min/max values	2525	Integer	Read / Write	0 = Cancel 8 = Oscillation amplitude 10 = Oscillation damping 12 = Oscillation frequency 13 = Signal asymmetry	89


"Electronic temperature" submenu

Navigation: Expert → Diagnostics → Min/max values → Electronic temperature					
Parameter	Register	Data type	Access	Selection / User entry / User interface	→ 
Minimum value	2421	Float	Read	Signed floating-point number	90
Maximum value	2419	Float	Read	Signed floating-point number	90


"Medium temperature" submenu

Navigation: Expert → Diagnostics → Min/max values → Medium temperature					
Parameter	Register	Data type	Access	Selection / User entry / User interface	→ 
Minimum value	7529	Float	Read	Signed floating-point number	91
Maximum value	7531	Float	Read	Signed floating-point number	91


"Carrier pipe temperature" submenu

Navigation: Expert → Diagnostics → Min/max values → Carrier pipe temperature					
Parameter	Register	Data type	Access	Selection / User entry / User interface	→ 
Minimum value	7533	Float	Read	Signed floating-point number	92
Maximum value	7535	Float	Read	Signed floating-point number	92


"Oscillation frequency" submenu

Navigation: Expert → Diagnostics → Min/max values → Oscillation frequency					
Parameter	Register	Data type	Access	Selection / User entry / User interface	→ 
Minimum value	2459	Float	Read	Signed floating-point number	92
Maximum value	2468	Float	Read	Signed floating-point number	93


"Oscillation amplitude" submenu

Navigation: Expert → Diagnostics → Min/max values → Oscillation amplitude					
Parameter	Register	Data type	Access	Selection / User entry / User interface	→ 
Minimum value	2472	Float	Read	Signed floating-point number	93
Maximum value	2470	Float	Read	Signed floating-point number	93


"Oscillation damping" submenu

Navigation: Expert → Diagnostics → Min/max values → Oscillation damping					
Parameter	Register	Data type	Access	Selection / User entry / User interface	→ 
Minimum value	2478	Float	Read	Signed floating-point number	94
Maximum value	2423	Float	Read	Signed floating-point number	94

"Signal asymmetry" submenu

Navigation: Expert → Diagnostics → Min/max values → Signal asymmetry					
Parameter	Register	Data type	Access	Selection / User entry / User interface	→ 
Minimum value	2474	Float	Read	Signed floating-point number	95
Maximum value	2476	Float	Read	Signed floating-point number	95

"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 = Mass flow 2 = Volume flow 3 = Corrected volume flow 4 = Density 5 = Reference density 7 = Temperature	95
Value process variable	6814	Float	Read / Write	Depends on the process variable selected	96
Simulation device alarm	6812	Integer	Read / Write	0 = Off 1 = On	96

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Assign behavior of diagnostic no. 192 (Parameter)	17
Assign behavior of diagnostic no. 274 (Parameter)	17
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