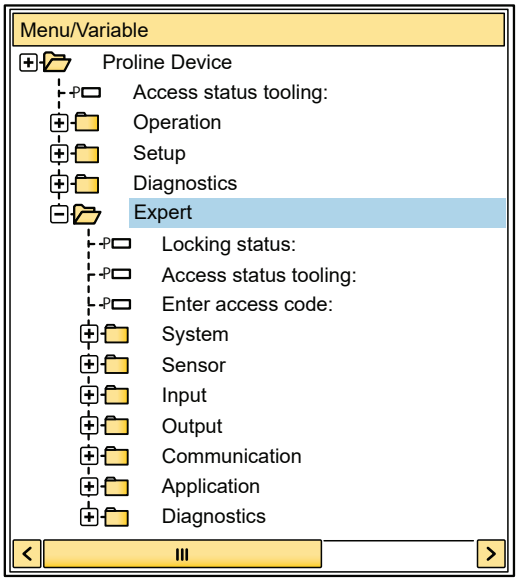
ISO 9001
ISO14001
CERTIFIED
ISO 9001 · ISO 14001
Manufacturer
TLV CO., LTD.
Kakogawa, Japan
is approved by LRQA Ltd. to ISO 9001/14001

Description of Device Parameters



Vortex flowmeter

EF200-C

Table of contents

1 About this document

1.1 Document function

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

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

1.2 Target group

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

1.3 Using this document

1.3.1 Information on the document structure

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

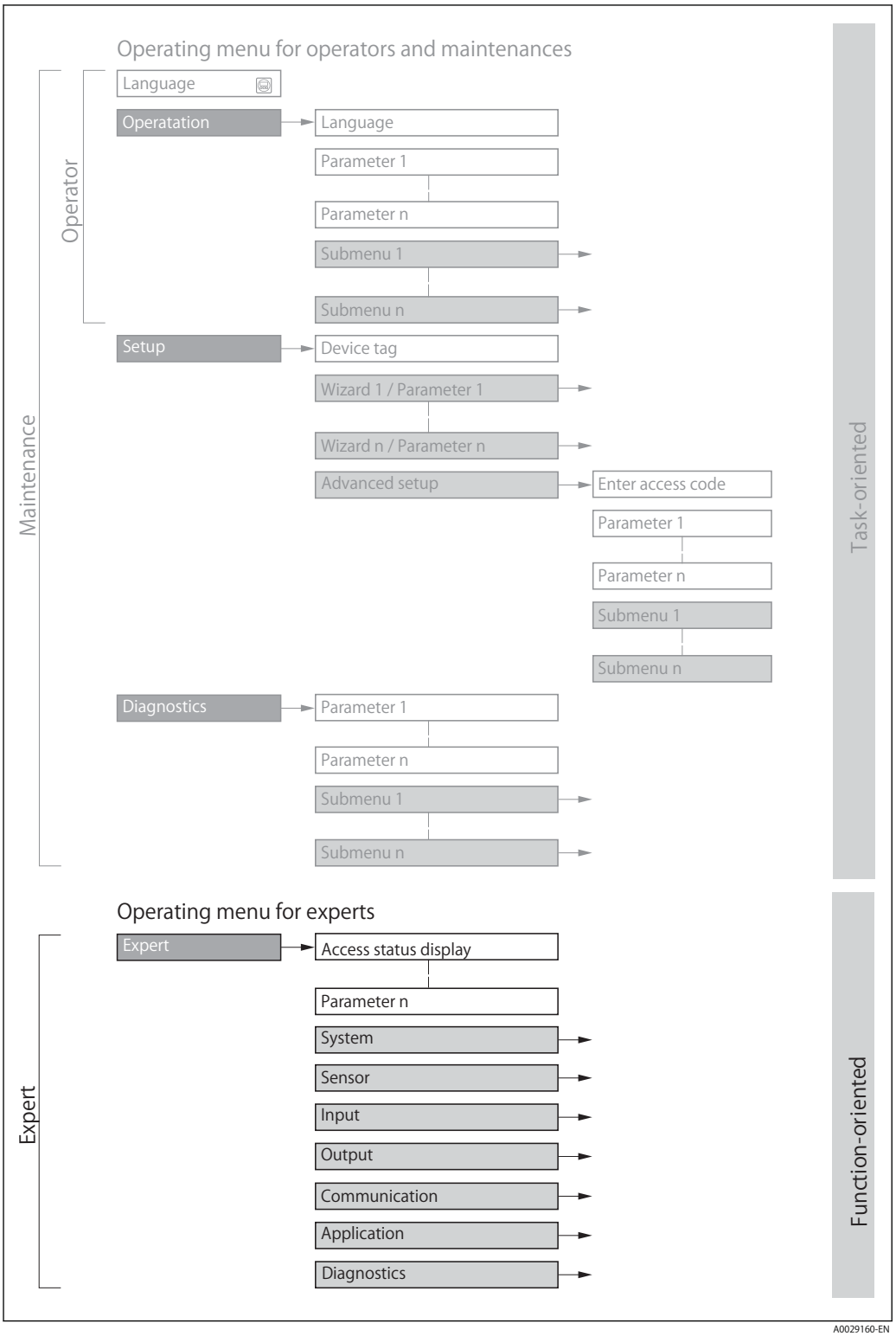


Fig. 1 Sample graphic for the schematic layout of the operating menu

Additional information regarding:
- The arrangement of the parameters according to the menu structure of the Operation menu, Setup menu, Diagnostics menu with a brief description: Operating Instructions → See page 7
- Operating concept of the operating menus: Operating Instructions → See page 7

1.3.2 Structure of a parameter description

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

Complete parameter name	Write-protected parameter

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

Prerequisite
The parameter is only available under these specific conditions

Description
Description of the parameter function

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

User entry
Input range for the parameter

User interface
Display value/data for the parameter

Factory setting
Default setting ex works

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

1.4 Symbols used

1.4.1 Symbols for certain types of information

Symbol	Meaning
	Tip Indicates additional information.
	Reference to documentation
	Reference to page
	Reference to graphic
	Operation via local display
	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		

1.5 Documentation

1.5.1 Standard documentation

Operating Instructions

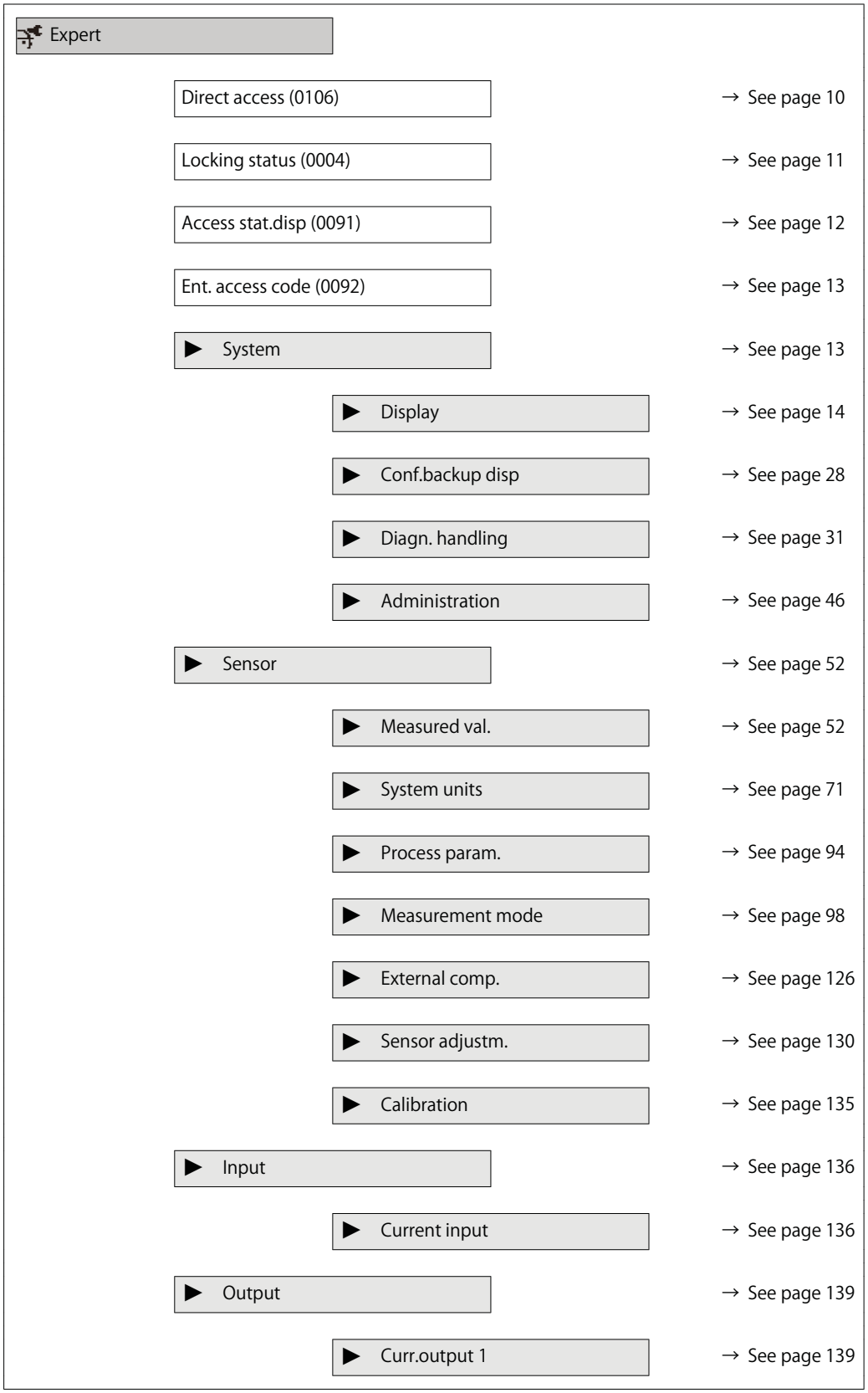
Measuring device	Documentation code
EF200W-C	172-65761M
EF200F-C	172-65657M
EF200R-C	172-65759M

1.5.2 Supplementary device-dependent documentation

Contents	Documentation code
Wet steam measurement (only for EF200F-C)	172-65763M

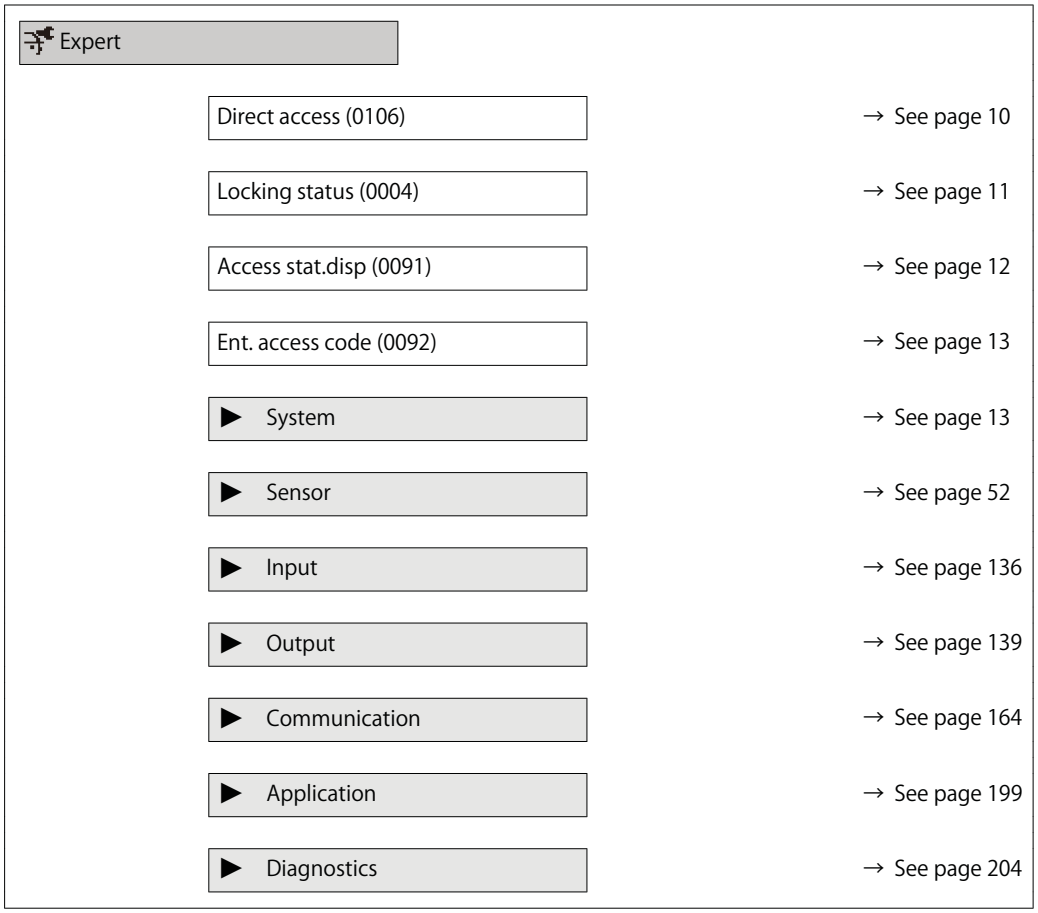
2 Overview of the Expert operating menu

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.



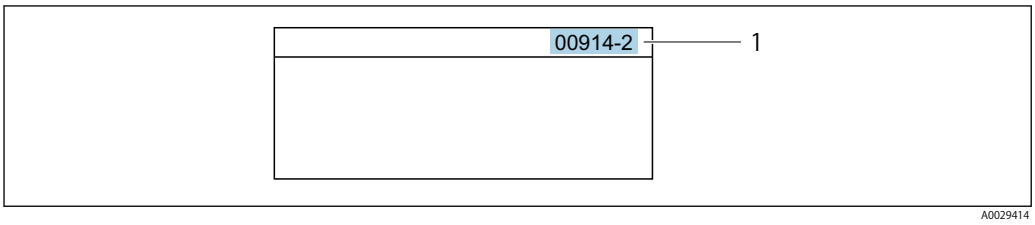
3 Description of device parameters

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



Direct access

Navigation	Expert → Direct access (0106)
Description	Use this function to enter the access code to enable direct access to the desired parameter via the local display. A parameter number is assigned to each parameter for this purpose.
User entry	0 to 65 535
Additional information	User entry The direct access code consists of a 5-digit number (at maximum) and the channel number, which identifies the channel of a process variable: e.g. 00914-2. In the navigation view, this appears on the right-hand side in the header of the selected parameter.



1 Direct access code

Note the following when entering the direct access code:
- The leading zeros in the direct access code do not have to be entered.
  Example: Enter"914" instead of"00914"
- If no channel number is entered, channel 1 is accessed automatically.
  Example: Enter00914 →Assign variable parameter
- If a different channel is accessed: Enter the direct access code with the corresponding channel number.
  Example: Enter00914-2 →Assign variable parameter

Locking status

Navigation: Expert → Locking status (0004)

Description: Displays the active write protection.

User interface:
- Hardware locked
- SIL locked
- Temp. locked

Additional information

Display

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

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

Selection

Options	Description
None	The access status displayed in the Access stat.disp parameter (→ See page 12) applies . Only appears on local display.
Hardware locked (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) .
SIL locked (priority 2)	The SIL mode is enabled. This locks write access to the parameters (e.g. via local display or operating tool).
Temp. locked (priority 3)	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 stat.disp

Navigation	Expert → Access stat.disp (0091)
Prerequisite	A local display is provided.
Description	Displays the access authorization to the parameters via the local display.
User interface	• Operator • Maintenance
Factory setting	Operator
Additional information	Description If the -symbol appears in front of a parameter, it cannot be modified via the local display with the current access authorization. The access authorization can be modified via the Ent. access code parameter (→ See page 13). For information about the Ent. access code parameter (→ See page 13): see the "Disabling write protection via the access code" section of the Operating Instructions for the device If additional write protection is active, this restricts the current access authorization even further. Display Detailed information on access authorization is provided in the "User roles and associated access authorization" and "Operating concept" sections of the Operations Instructions for the device

Access stat.tool

Navigation	Expert → Access stat.tool (0005)
Description	Displays the access authorization to the parameters via the operating tool.
User interface	• Operator • Maintenance
Factory setting	Maintenance

Additional information

Description

The access authorization can be modified via the Ent. access code parameter (→ See page 13).

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

Display

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

Ent. access code

Navigation Expert → Ent. access code (0092)

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

User entry 0 to 9999

Ent. access code

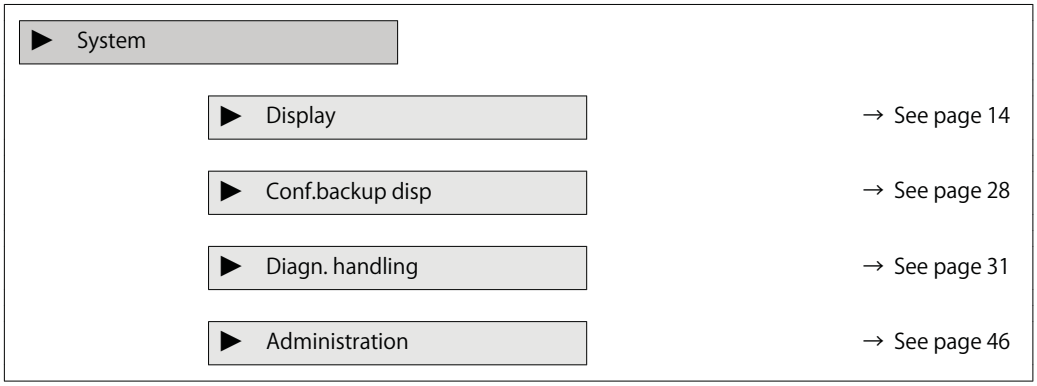
Navigation Expert → Ent. access code (0003)

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

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

3.1 "System" submenu

Navigation Expert → System



3.1.1 "Display" submenu

Navigation Expert → System → Display

▶ Display

Language

Navigation	Expert → System → Display → Language (0104)
Prerequisite	A local display is provided.
Description	Use this function to select the configured language on the local display.
Selection	• English • Deutsch * • Français * • Español * • Italiano * • Nederlands * • Portuguesa * • Polski * • р у с с к и й я з ы к (Ru) * • Svenska * • Türkçe * • 中文 (Chinese) * • 日本語 (Japanese) * • 한국어 (Korean) * • (Ara) * • Bahasa Indonesia * • ภาษาไทย (Thai) * • tiếng Việt (Vit) * • čeština (Czech) *
Factory setting	English (alternatively, the ordered language is preset in the device)

Format display

Navigation	Expert → System → Display → Format display (0098)
Prerequisite	A local display is provided.
Description	Use this function to select how the measured value is shown on the local display.
Selection	• 1 value, max. • Bargr. + 1 value • 2 values • Val. large+2val. • 4 values
Factory setting	1 value, max.

* Visibility depends on order options or device settings

Additional information

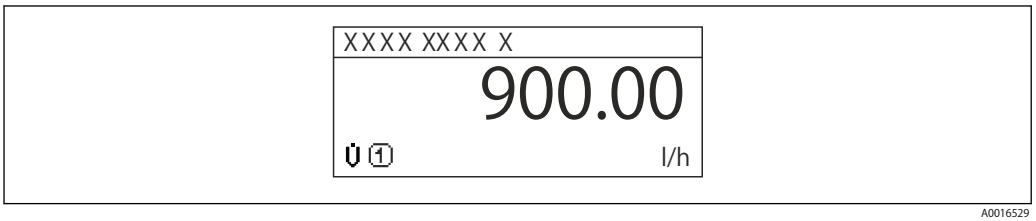
Description

The display format (size, bar graph etc.) and number of measured values displayed simultaneously (1 to 4) can be configured. This setting only applies to normal operation.

- The Value 1 display parameter (→ See page 18) to Value 4 display parameter (→ See page 23) are used to specify which measured values are shown on the local display and in what order.
- If more measured values are specified than the display mode selected permits, then the values alternate on the device display. The display time until the next change is configured via the Display interval parameter (→ See page 24).

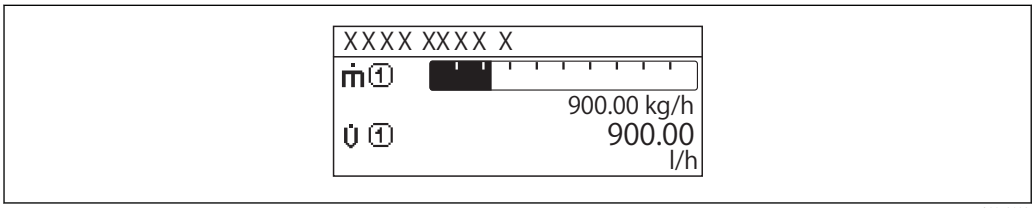
Possible measured values shown on the local display:

"1 value, max." option



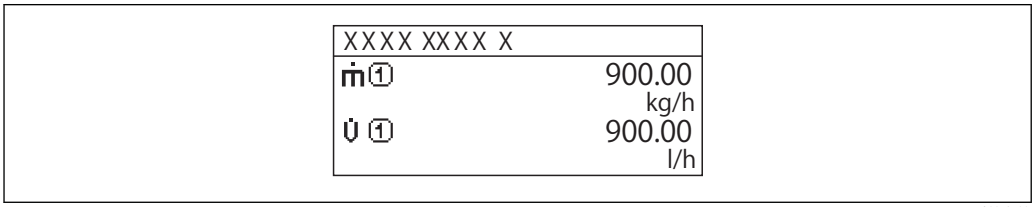
A0016529

"Bargr. + 1 value" option



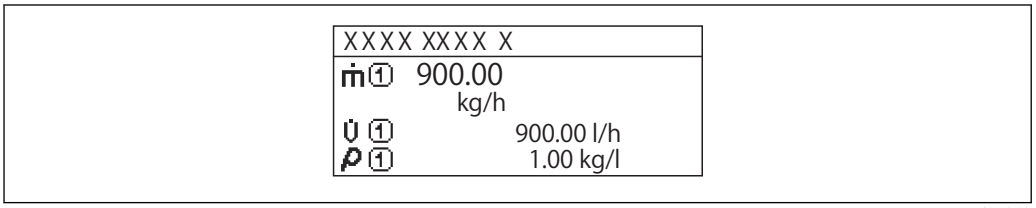
A0013098

"2 values" option



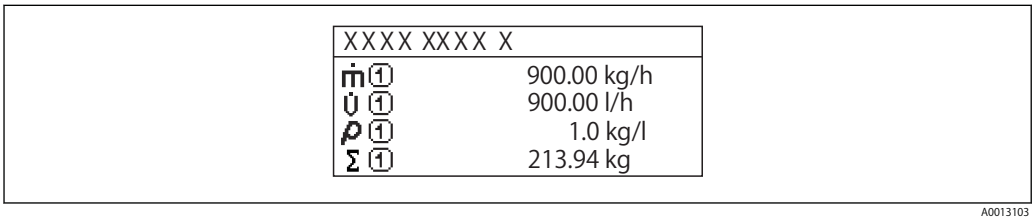
A0013100

"Val. large+2val." option



A0013102

"4 values" option



A0013103

Value 1 display

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

Prerequisite: A local display is provided.

Description: Use this function to select one of the measured values shown on the local display.

Selection:
- Volume flow
- Correct.vol.flow
- Mass flow
- Flow velocity
- Temperature
- CalcSatSteamPres*
- Steam quality*
- Total mass flow*
- CondensMassFlow*
- Energy flow*
- Heat flow diff.*
- Reynolds number*
- Density*
- Pressure*
- Specific volume*
- Degree superheat*
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Curr.output 1
- Curr.output 2*

Factory setting: Volume flow

Additional information:

Description

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

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

Dependency

The unit of the displayed measured value is taken from the System units submenu (→ See page 71).

0% bargraph 1

Navigation: Expert → System → Display → 0% bargraph 1 (0123)

Prerequisite: A local display is provided.

* Visibility depends on order options or device settings

Description	Use this function to enter the 0% bar graph value to be shown on the display for the measured value 1.
User entry	Signed floating-point number
Factory setting	Country-specific: • 0 m^3/h • 0 ft^3/h
Additional information	Description The Format display parameter (→ See page 15) is used to specify that the measured value is to be displayed as a bar graph. User entry The unit of the displayed measured value is taken from the System units submenu (→ See page 71).

100% bargraph 1

Navigation	Expert → System → Display → 100% bargraph 1 (0125)
Prerequisite	A local display is provided.
Description	Use this function to enter the 100% bar graph value to be shown on the display for the measured value 1.
User entry	Signed floating-point number
Factory setting	Depends on country and nominal diameter → See page 245
Additional information	Description The Format display parameter (→ See page 15) is used to specify that the measured value is to be displayed as a bar graph. User entry The unit of the displayed measured value is taken from the System units submenu (→ See page 71).

Decimal places 1

Navigation	Expert → System → Display → Decimal places 1 (0095)
Prerequisite	A measured value is specified in the Value 1 display parameter (→ See page 18).
Description	Use this function to select the number of decimal places for measured value 1.

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

Factory setting: x.xx

Additional information: Description

This setting does not affect the measuring or computational accuracy of the device. The arrow displayed between the measured value and the unit indicates that the device computes with more digits than are shown on the local display.

Value 2 display

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

Prerequisite: A local display is provided.

Description: Use this function to select one of the measured values shown on the local display.

Selection: For the picklist, see the Value 1 display parameter (→ See page 18)

Factory setting: None

Additional information: Description

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

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

Dependency

The unit of the displayed measured value is taken from the System units submenu (→ See page 71).

Decimal places 2

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

Prerequisite: A measured value is specified in the Value 2 display parameter (→ See page 20).

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

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

Factory setting x.xx

Additional information Description

This setting does not affect the measuring or computational accuracy of the device. The arrow displayed between the measured value and the unit indicates that the device computes with more digits than are shown on the local display.

Value 3 display

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

Prerequisite A local display is provided.

Description Use this function to select one of the measured values shown on the local display.

Selection For the picklist, see the Value 1 display parameter (→ See page 18)

Factory setting None

Additional information Description

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

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

Selection

The unit of the displayed measured value is taken from the System units submenu (→ See page 71).

0% bargraph 3

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

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

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

User entry Signed floating-point number

Factory setting Country-specific:
- 0 m^3/h
- 0 ft^3/h

Additional information

Description

The Format display parameter (→ See page 15) is used to specify that the measured value is to be displayed as a bar graph.

User entry

The unit of the displayed measured value is taken from the System units submenu (→ See page 71).

100% bargraph 3

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

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

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

User entry: Signed floating-point number

Factory setting: 0

Additional information

Description

The Format display parameter (→ See page 15) is used to specify that the measured value is to be displayed as a bar graph.

User entry

The unit of the displayed measured value is taken from the System units submenu (→ See page 71).

Decimal places 3

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

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

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

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

Factory setting: x.xx

Additional information

Description

This setting does not affect the measuring or computational accuracy of the device. The arrow displayed between the measured value and the unit indicates that the device computes with more digits than are shown on the local display.

Value 4 display

Navigation

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

Prerequisite

A local display is provided.

Description

Use this function to select one of the measured values shown on the local display.

Selection

For the picklist, see the Value 1 display parameter (→ See page 18)

Factory setting

None

Additional information

Description

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

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

Selection

The unit of the displayed measured value is taken from the System units submenu (→ See page 71).

Decimal places 4

Navigation

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

Prerequisite

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

Description

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

Selection

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

Factory setting

x.xx

Additional information

Description

This setting does not affect the measuring or computational accuracy of the device. The arrow displayed between the measured value and the unit indicates that the device computes with more digits than are shown on the local display.

Display interval

Navigation	Expert → System → Display → Display interval (0096)
Prerequisite	A local display is provided.
Description	Use this function to enter the length of time the measured values are displayed if the values alternate on the display.
User entry	1 to 10 s
Factory setting	5 s
Additional information	Description This type of alternating display only occurs automatically if the number of measured values defined exceeds the number of values the selected display format can display simultaneously. • The Value 1 display parameter (→ See page 18) to Value 4 display parameter (→ See page 23) are used to specify which measured values are shown on the local display. • The display format of the displayed measured values is specified using theFormat display parameter (→ See page 15).

Display damping

Navigation	Expert → System → Display → Display damping (0094)
Prerequisite	A local display is provided.
Description	Use this function to enter a time constant for the reaction time of the local display to fluctuations in the measured value caused by process conditions.
User entry	0.0 to 999.9 s
Factory setting	0.0 s
Additional information	User entry Use this function to enter a time constant (PT1 element [1)]) for display damping: • If a low time constant is entered, the display reacts particularly quickly to fluctuating measured variables. • On the other hand, the display reacts more slowly if a high time constant is entered. Damping is switched off if 0 is entered (factory setting).

1) proportional transmission behavior with first order delay

Header

Navigation: Expert → System → Display → Header (0097)

Prerequisite: A local display is provided.

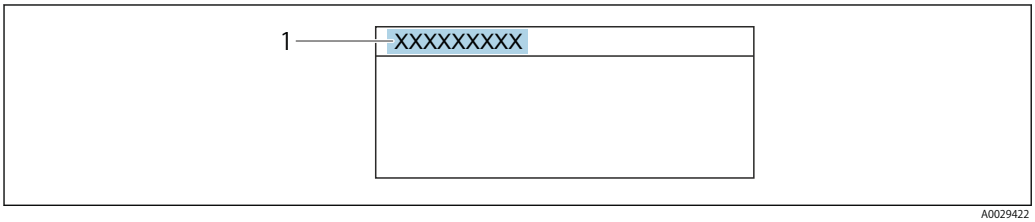
Description: Use this function to select the contents of the header of the local display.

Selection:
- Device tag
- Free text

Factory setting: Device tag

Additional information: Description

The header text only appears during normal operation.



1 Position of the header text on the display

Selection

- Device tag
  Is defined in the Device tag parameter (→ See page 214).
- Free text
  Is defined in the Header text parameter (→ See page 25).

Header text

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

Prerequisite: In the Header parameter (→ See page 25), the Free text option is selected.

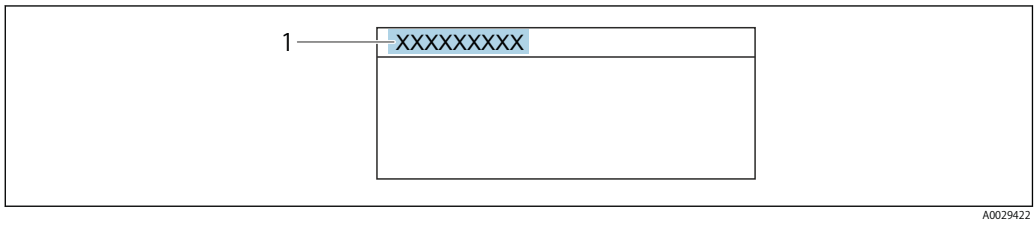
Description: Use this function to enter a customer-specific text for the header of the local display.

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

Factory setting: ----------

Additional information: Description

The header text only appears during normal operation.



1 Position of the header text on the display

User entry

The number of characters displayed depends on the characters used.

Separator

Navigation	Expert → System → Display → Separator (0101)
Prerequisite	A local display is provided.
Description	Use this function to select the decimal separator.
Selection	• . (point) • , (comma)
Factory setting	. (point)

Contrast display

Navigation	Expert → System → Display → Contrast display (0105)
Prerequisite	A local display is provided.
Description	Use this function to enter a value to adapt the display contrast to the ambient conditions (e.g. the lighting or viewing angle).
User entry	20 to 80 %
Factory setting	Depends on the display
Additional information	Set the contrast via the push-buttons: • Brighter: Press and hold down the ⊖ Ⓔ keys simultaneously. • Darker: Press and hold down the ⊕ Ⓔ keys simultaneously.

Backlight

Navigation: Expert → System → Display → Backlight (0111)

Prerequisite: Order code for "Display; operation", option E "SD03 4-line, illum.; touch control + data backup function"

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

Selection:
- Disable
- Enable

Factory setting: Disable

Access stat.disp

Navigation: Expert → System → Display → Access stat.disp (0091)

Prerequisite: A local display is provided.

Description: Displays the access authorization to the parameters via the local display.

User interface:
- Operator
- Maintenance

Factory setting: Operator

Additional information:

Description

If the -symbol appears in front of a parameter, it cannot be modified via the local display with the current access authorization.

The access authorization can be modified via the Ent. access code parameter (→ See page 13).

For information about the Ent. access code parameter (→ See page 13): see the "Disabling write protection via the access code" section of the Operating Instructions for the device

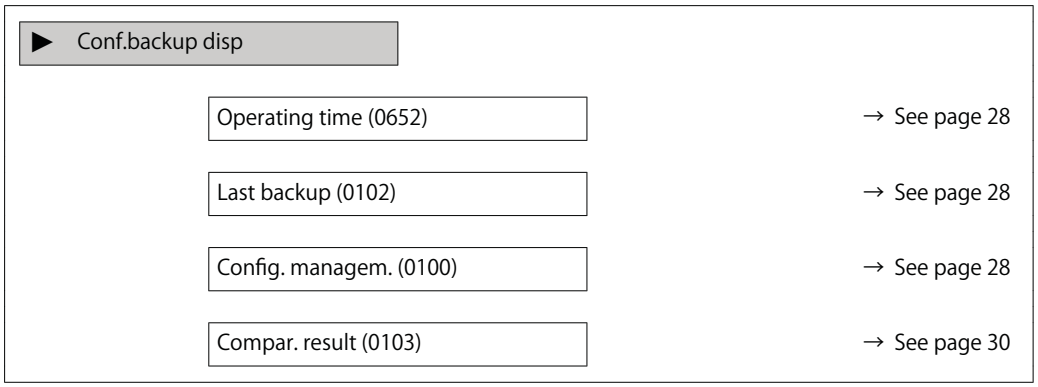
If additional write protection is active, this restricts the current access authorization even further.

Display

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

3.1.2 "Conf.backup disp" submenu

Navigation Expert → System → Conf.backup disp



Operating time

Navigation Expert → System → Conf.backup disp → Operating time (0652)

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

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

Additional information User interface
The maximum number of days is 9999, which is equivalent to 27 years.

Last backup

Navigation Expert → System → Conf.backup disp → Last backup (0102)

Prerequisite A local display is provided.

Description Use this function to display the time since a backup copy of the data was last saved to the display module.

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

Config. managem.

Navigation Expert → System → Conf.backup disp → Config. managem. (0100)

Prerequisite A local display is provided.

Description Use this function to select an action to save the data to the display module.

Selection
- Cancel
- Execute backup
- Restore
- Duplicate
- Compare
- Clear backup

Factory setting
Cancel

Additional information

Description

Configuration via the local display is disabled while the action is performed.

For information on the status message in the operating tool, see:Backup state parameter (→ See page 29)

Selection

Options	Description
Cancel	No action is executed and the user exits the parameter.
Execute backup	A backup copy of the current device configuration is saved from the HistoROM backup to the display module of the device. The backup copy includes the transmitter data of the device. The following message appears on local display: Backup active, please wait!
Restore	The last backup copy of the device configuration is restored from the display module to the device's HistoROM backup. The backup copy includes the transmitter data of the device. The following message appears on local display: Restore active! Do not interrupt power supply!
Compare	The device configuration saved in the display module is compared with the current device configuration of the HistoROM backup. The following message appears on local display: Comparing files The result can be viewed in Compar. result parameter (→ See page 30).
Duplicate	The transmitter configuration from another device is duplicated to the device using the display module. The following message appears on local display: Copy active! Do not interrupt power supply!
Clear backup	The backup copy of the device configuration is deleted from the display module of the device. The following message appears on local display: Deleting file

HistoROM

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

Backup state

Navigation
Expert → System → Conf.backup disp → Backup state (0121)

Prerequisite
A local display is provided.

Description
Use this function to view the status of the data backup process.

User interface
- None
- Backup in progr.
- Restore in progr

- Import in progr.
- Delete in progr.
- Comp. in progr.

Factory setting: None

Compar. result

Navigation: Expert → System → Conf.backup disp → Compar. result (0103)

Prerequisite: A local display is provided.

Description: Use this function to view the last result of comparing the current device configuration to the backup copy in the display module.

User interface:
- Set. identical
- Set. not ident.
- No backup
- Backup corrupt
- Check not done
- Dataset incomp.

Factory setting: Check not done

Additional information:

Description

The comparison is started via the Compare option in the Config. managem. parameter (→ See page 28).

Selection

- Set. identical
  - The current device configuration of the HistoROM is identical to the backup copy in the display module.
  - If the transmitter configuration of another device has been copied to the device via the display module and the Duplicate option in the Config. managem. parameter (→ See page 28), the current device configuration of the HistoROM only partly matches the backup copy in the display module: The settings for the transmitter are not identical.
- Set. not ident.
  The current device configuration of the HistoROM is not identical to the backup copy in the display module.
- No backup
  There is no backup copy of the device configuration of the HistoROM in the display module.

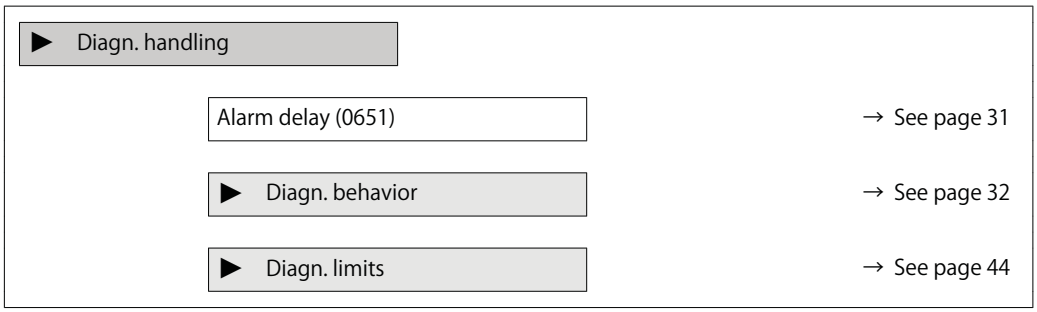
- Backup corrupt
  The current device configuration of the HistoROM is corrupt or not compatible with the backup copy in the display module.
- Check not done
  The device configuration of the HistoROM has not yet been compared to the backup copy in the display module.
- Dataset incomp.
  The backup copy in the display module is not compatible with the device.

HistoROM

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

3.1.3 "Diagnostic handling" submenu

Navigation Expert → System → Diagn. handling



Alarm delay

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

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

The diagnostic message is reset without a time delay.

User entry 0 to 60 s

Factory setting 0 s

Additional information Description

This setting affects the following diagnostic messages:
- 046 Sensor limit
- 828 Ambient temp.
- 829 Ambient temp.
- 832 Electronic temp.
- 833 Electronic temp.
- 834 Process temp.
- 835 Process temp.
- 841 Flow velocity

- 844 Sensor range
- 870 Meas. inaccuracy
- 871 Steam saturation
- 872 Wet steam
- 873 Water detected
- 874 X% spec invalid
- 945 Sensor range
- 946 Vibration
- 947 Vibration exceed
- 972 Degr.superh.lim.

"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 Diagn. behavior submenu (→ See page 32).

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

Options	Description
Alarm	The device stops measurement. The signal outputs and totalizers assume the defined alarm condition. A diagnostic message is generated. For local display with touch control: the background lighting changes to red.
Warning	The device continues to measure. The signal outputs and totalizers are not affected. A diagnostic message is generated.
Logbook only	The device continues to measure. The diagnostic message is displayed only in the Event logbook submenu (→ See page 211) (Event list submenu (→ See page 212)) and is not displayed in alternation with the operational display.
Off	The diagnostic event is ignored, and no diagnostic message is generated or entered.

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

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

▶ Diagn. behavior

Diagnostic no. 022 (0751)	→ See page 33
Diagnostic no. 122 (0752)	→ See page 34
Diagnostic no. 350 (0756)	→ See page 34
Diagnostic no. 371 (0757)	→ See page 35
Diagnostic no. 441 (0657)	→ See page 35
Diagnostic no. 442 (0658)	→ See page 35
Diagnostic no. 443 (0659)	→ See page 36

Diagnostic no. 022 (Temp. sensor)

Navigation	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 022 (0751)
Prerequisite	With order code for "Sensor version": • Option "Mass (integrated temperature measurement)" or • Option "Mass (integrated pressure/temperature measurement)"
Description	Use this function to change the diagnostic behavior of the diagnostic message 022 Temp. sensor

Selection
- Off
- Alarm
- Warning
- Logbook only

Factory setting: Alarm

Additional information: Selection

Detailed description of the options available for selection: → See page 32

Diagnostic no. 122 (Temp. sensor)

Navigation: Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 122 (0752)

Prerequisite: With order code for "Sensor version":
- Option "Mass (integrated temperature measurement)"
  or
- Option "Mass (integrated pressure/temperature measurement)"

Description: Use this function to change the diagnostic behavior of the diagnostic message 122 Temp. sensor

Selection
- Off
- Alarm
- Warning
- Logbook only

Factory setting: Warning

Additional information: Selection

Detailed description of the options available for selection: → See page 32

Diagnostic no. 350 (Pre-amplifier)

Navigation: Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 350 (0756)

Description: Use this function to change the diagnostic behavior of the diagnostic message 350 Pre-amplifier .

Selection
- Off
- Alarm
- Warning
- Logbook only

Factory setting: Alarm

Additional information	Selection Detailed description of the options available for selection: → See page 32

Diagnostic no. 371 (Temp. sensor)

Navigation	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 371 (0757)
Description	Use this function to change the diagnostic behavior of the diagnostic message 371 Temp. sensor
Selection	• Off • Alarm • Warning • Logbook only
Factory setting	Warning
Additional information	Selection Detailed description of the options available for selection: → See page 32

Diagnostic no. 441 (Curr.output 1 to n)

Navigation	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 441 (0657)
Description	Option for changing the diagnostic behavior of the diagnostic message 441 Curr.output 1 to n.
Selection	• Off • Alarm • Warning • Logbook only
Factory setting	Warning
Additional information	Selection Detailed description of the options available for selection: → See page 32

Diagnostic no. 442 (Freq. output)

Navigation	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 442 (0658)
Prerequisite	The measuring device has a pulse/frequency/switch output.

Description	Option for changing the diagnostic behavior of the diagnostic message 442 Freq. output .
Selection	• Off • Alarm • Warning • Logbook only
Factory setting	Warning
Additional information	Selection Detailed description of the options available for selection: → See page 32

Diagnostic no. 443 (Pulse output)

Navigation	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 443 (0659)
Prerequisite	The measuring device has a pulse/frequency/switch output.
Description	Option for changing the diagnostic behavior of the diagnostic message 443 Pulse output.
Selection	• Off • Alarm • Warning • Logbook only
Factory setting	Warning
Additional information	Selection Detailed description of the options available for selection: → See page 32

Diagnostic no. 444 (Current input 1)

Navigation	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 444 (0740)
Prerequisite	The device has one current input (I/O module 218).
Description	Use this function to change the diagnostic behavior of the diagnostic message 444 Current input 1 .
Selection	• Off • Alarm • Warning • Logbook only
Factory setting	Warning

Additional information	Selection Detailed description of the options available for selection: → See page 32

Diagnostic no. 801 (Supply voltage)

Navigation	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 801 (0660)
Description	Option for changing the diagnostic behavior of the diagnostic message 801 Supply voltage.
Selection	• Off • Alarm • Warning • Logbook only
Factory setting	Alarm
Additional information	Selection Detailed description of the options available for selection: → See page 32

Diagnostic no. 828 (Ambient temp.)

Navigation	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 828 (0755)
Description	Use this function to change the diagnostic behavior of the diagnostic message 828 Ambient temp..
Selection	• Off • Alarm • Warning • Logbook only
Factory setting	Warning
Additional information	Description The ambient temperature of the pre-amplifier is too low. Selection Detailed description of the options available for selection: → See page 32

Diagnostic no. 829 (Ambient temp.)

Navigation	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 829 (0754)
Description	Use this function to change the diagnostic behavior of the diagnostic message 829 Ambient temp..
Selection	• Off • Alarm • Warning • Logbook only
Factory setting	Warning
Additional information	Description The ambient temperature of the pre-amplifier is too high. Selection Detailed description of the options available for selection: → See page 32

Diagnostic no. 832 (Electronic temp.)

Navigation	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 832 (0675)
Description	Option for changing the diagnostic behavior of the diagnostic message 832 Electronic temp..
Selection	• Off • Alarm • Warning • Logbook only
Factory setting	Warning
Additional information	Description The electronics temperature of the transmitter is too high. Selection Detailed description of the options available for selection: → See page 32

Diagnostic no. 833 (Electronic temp.)

Navigation	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 833 (0676)
Description	Option for changing the diagnostic behavior of the diagnostic message 833 Electronic temp..

Selection
- Off
- Alarm
- Warning
- Logbook only

Factory setting: Warning

Additional information

Description

The electronics temperature of the transmitter is too low.

Selection

Detailed description of the options available for selection: → See page 32

Diagnostic no. 834 (Process temp.)

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

Description: Option for changing the diagnostic behavior of the diagnostic message 834 Process temp.

Selection
- Off
- Alarm
- Warning
- Logbook only

Factory setting: Warning

Additional information

Description

The process temperature is too high.

Selection

Detailed description of the options available for selection: → See page 32

Diagnostic no. 835 (Process temp.)

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

Description: Option for changing the diagnostic behavior of the diagnostic message 835 Process temp.

Selection
- Off
- Alarm
- Warning
- Logbook only

Factory setting: Warning

Additional information

Description

The process temperature is too low.

Selection

Detailed description of the options available for selection: → See page 32

Diagnostic no. 841 (Flow velocity)

Navigation

Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 841 (0729)

Description

Use this function to change the diagnostic behavior of the diagnostic message 841 Flow velocity.

Selection

- Off
- Alarm
- Warning
- Logbook only

Factory setting

Warning

Additional information

Description

The flow velocity is too high.

Selection

Detailed description of the options available for selection: → See page 32

Diagnostic no. 844 (Sensor range)

Navigation

Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 844 (0747)

Description

Use this function to change the diagnostic behavior of the diagnostic message 844 Sensor range.

Selection

- Off
- Alarm
- Warning
- Logbook only

Factory setting

Warning

Additional information

Description

The sensor range has been exceeded: "overspeeding".

Selection

Detailed description of the options available for selection: → See page 32

Diagnostic no. 870 (Meas. inaccuracy)

Navigation	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 870 (0726)
Description	Option for changing the diagnostic behavior of the diagnostic message 870 Meas. inaccuracy.
Selection	• Off • Alarm • Warning • Logbook only
Factory setting	Warning
Additional information	Description The Reynolds number is too low. Selection Detailed description of the options available for selection: → See page 32

Diagnostic no. 871 (Steam saturation)

Navigation	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 871 (0748)
Prerequisite	The Steam option is selected in the Select medium parameter (→ See page 99) parameter.
Description	Use this function to change the diagnostic behavior of the diagnostic message 871 Steam saturation.
Selection	• Off • Alarm • Warning • Logbook only
Factory setting	Off
Additional information	Selection Detailed description of the options available for selection: → See page 32

Diagnostic no. 872 (Wet steam)

Navigation	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 872 (0746)
Prerequisite	The Wet Steam Detection application package has been enabled. The software options currently enabled are displayed in the SW option overv. parameter (→ See page 50).

Description	Use this function to change the diagnostic behavior of the diagnostic message 872 Wet steam.
Selection	• Off • Alarm • Warning • Logbook only
Factory setting	Warning
Additional information	Selection Detailed description of the options available for selection: → See page 32

Diagnostic no. 873 (Water detected)

Navigation	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 873 (0749)
Prerequisite	The Steam option is selected in the Select medium parameter (→ See page 99) parameter.
Description	Use this function to change the diagnostic behavior of the diagnostic message 873 Water detected.
Selection	• Off • Alarm • Warning • Logbook only
Factory setting	Off
Additional information	Selection Detailed description of the options available for selection: → See page 32

Diagnostic no. 874 (X% spec invalid)

Navigation	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 874 (0772)
Prerequisite	The Steam option is selected in the Select medium parameter (→ See page 99) parameter.
Description	Use this function to change the diagnostic behavior of the diagnostic message 874 X% spec invalid.
Selection	• Off • Alarm • Warning • Logbook only
Factory setting	Off

Additional information	Description The conditions for calculating the steam quality are not met. Selection Detailed description of the options available for selection: → See page 32

Diagnostic no. 945 (Sensor range)

Navigation	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 945 (0750)
Prerequisite	With order code for "Sensor version": • Option "Mass (integrated temperature measurement)" or • Option "Mass (integrated pressure/temperature measurement)"
Description	Use this function to change the diagnostic behavior of the diagnostic message 945 Sensor range.
Selection	• Off • Alarm • Warning • Logbook only
Factory setting	Warning
Additional information	Description The sensor range is outside the pressure-temperature curve of the measuring tube. Selection Detailed description of the options available for selection: → See page 32

Diagnostic no. 947 (Vibration exceed)

Navigation	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 947 (0753)
Description	Use this function to change the diagnostic behavior of the diagnostic message 947 Vibration exceed.
Selection	• Off • Alarm • Warning • Logbook only
Factory setting	Alarm

Additional information

Selection

Detailed description of the options available for selection: → See page 32

Diagnostic no. 972 (Degr.superh.lim.)

Navigation

Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 972 (0758)

Prerequisite

If the Steam option is selected in the Select medium parameter (→ See page 99).

Description

Use this function to change the diagnostic behavior of the diagnostic message 972 Degr.superh.lim. .

Selection

- Off
- Alarm
- Warning
- Logbook only

Factory setting

Off

Additional information

Description

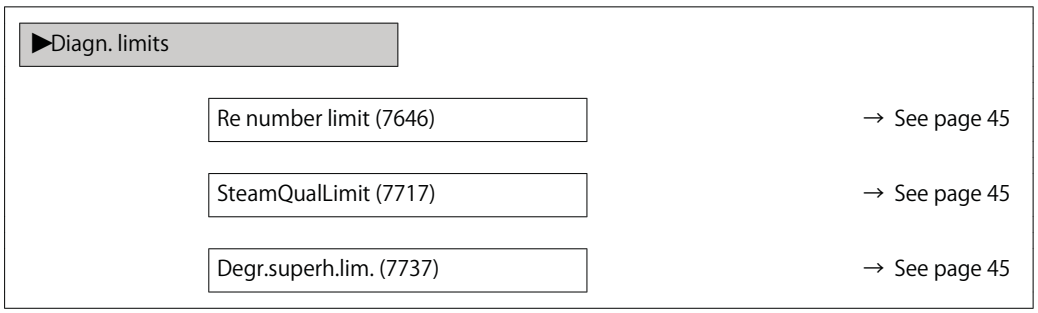
The upper limit for superheated steam has been exceeded.

Selection

Detailed description of the options available for selection: → See page 32

"Diagnostic limits" submenu

Navigation Expert → System → Diagn. handling → Diagn. limits



Re number limit

Navigation	Expert → System → Diagn. handling → Diagn. limits → Re number limit (7646)
Prerequisite	With order code for "Sensor version": • Option "Mass (integrated temperature measurement)" or • Option "Mass (integrated pressure/temperature measurement)"
Description	Use this function to enter the lower limit value for the Reynolds number. If the Reynolds number falls short of this limit value, the diagnostic message 870 Meas. inaccuracy is triggered.
User entry	4 000 to 100 000
Factory setting	5 000
Additional information	Limit value If the Reynolds number falls short of the limit value configured here, the diagnostic behavior selected in the Diagnostic no. 870 parameter (→ See page 41) is triggered.

SteamQualLimit

Navigation	Expert → System → Diagn. handling → Diagn. limits → SteamQualLimit (7717)
Prerequisite	The following conditions are met: • The Steam option is selected in the Select medium parameter (→ See page 99) parameter. • The Calculated value option is selected in the Steam quality parameter (→ See page 99) parameter.
Description	Use this function to enter the threshold value for the steam quality which, if undershot, triggers the diagnostic message ☒S872 Wet steam
User entry	0 to 100 %
Factory setting	80 %
Additional information	Limit value This limit value has a hysteresis of 5 %, i.e. the diagnostic message is reset at a threshold value of +5 % or if 100 % is reached (at 85 % for the factory setting of 80 %). If the steam quality has dropped below the limit value configured here, the diagnostic behavior selected in the Diagnostic no. 872 parameter (0746) (→ See page 41) is triggered.

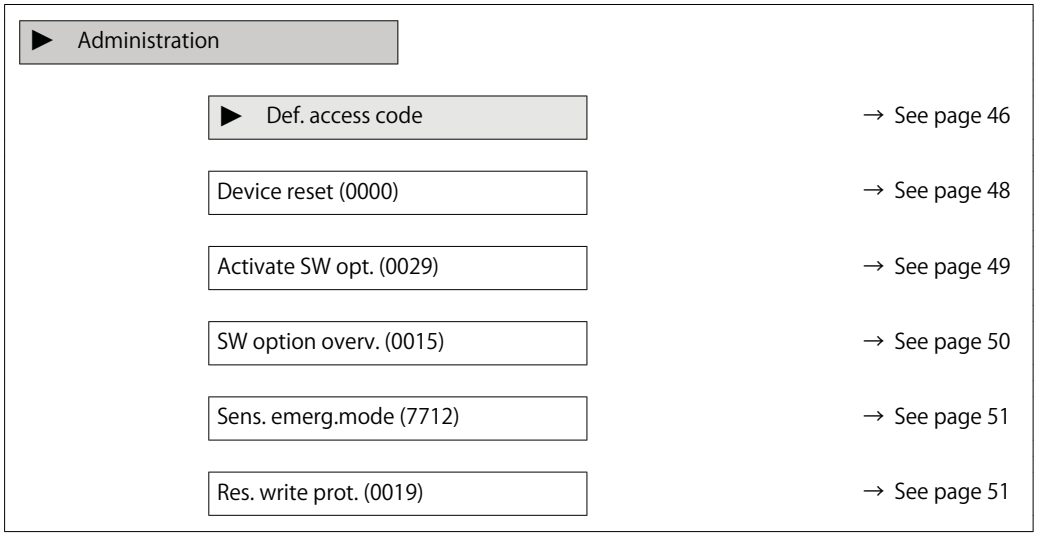
Degr.superh.lim.

Navigation	Expert → System → Diagn. handling → Diagn. limits → Degr.superh.lim. (7737)
Prerequisite	In the Select medium parameter (→ See page 99), the Steam option is selected.

Description	Use this function to enter the threshold value for the degree of superheat which, if exceeded, triggers the diagnostic message 972 Degr.superh.lim.
User entry	0 to 500 K
Factory setting	5 K
Additional information	Limit value This limit value has a hysteresis of 1 K, i.e. the diagnostic message is triggered if the threshold value +1 K is reached and is reset again when the value drops below the threshold value. If the degree of superheat has exceeded the limit value configured here, the diagnostic behavior selected in the Diagnostic no. 972 parameter (→ See page 44) is triggered.

3.1.4 "Administration" submenu

Navigation Expert → System → Administration

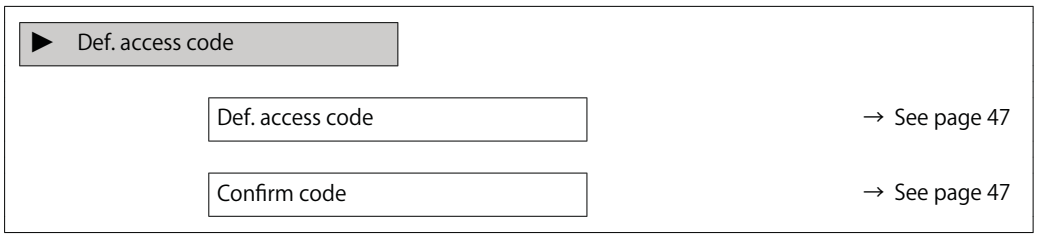


"Def. access code" wizard

The Def. access codewizard (→ See page 46) is only available when operating via the local display.

If operating via the operating tool, the Def. access codeparameter (→ See page 48) can be found directly in the Administration submenu. There is no Confirm code parameter if the device is operated via the operating tool.

Navigation Expert → System → Administration → Def. access code



Def. access code

Navigation	Expert → System → Administration → Def. access code → Def. access code
Description	Use this function to enter a user-specific release code to restrict write-access to the parameters. This protects the configuration of the device against any inadvertent changes via the local display.
User entry	0 to 9999
Factory setting	0
Additional information	Description The write protection affects all parameters in the document marked with the symbol. On the local display, the symbol in front of a parameter indicates that the parameter is write-protected. Once the access code has been defined, write-protected parameters can only be modified if the access code is entered in the Ent. access code parameter (→ See page 13). If you lose the access code, please contact your sales organization. User entry A message is displayed if the access code is not in the input range. Factory setting If the factory setting is not changed or 0 is defined as the access code, the parameters are not write-protected and the device configuration data can be modified. The user is logged on in the "Maintenance" role.

Confirm code

Navigation	Expert → System → Administration → Def. access code → Confirm code
Description	Enter the defined release code a second time to confirm the release code.
User entry	0 to 9999
Factory setting	0

Additional parameters in the "Administration" submenu

Def. access code

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

Description: Use this function to enter a user-specific release code to restrict write-access to the parameters. This protects the configuration of the device against any inadvertent changes via the operating tool.

User entry: 0 to 9999

Factory setting: 0

Additional information:

Description

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

Once the access code has been defined, write-protected parameters can only be modified if the access code is entered in the Ent. access code parameter (→ See page 13).

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

User entry

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

Factory setting

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

Device reset

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

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

Selection:
- Cancel
- To fact.defaults
- To delivery set.
- Restart device

Factory setting: Cancel

Additional information:

Selection

Options	Description
Cancel	No action is executed and the user exits the parameter.
To fact.defaults	Every parameter is reset to its factory setting.

Options	Description
To delivery set.	Every parameter for which a customer-specific default setting was ordered is reset to this customer-specific value. All other parameters are reset to the factory setting. This option is not visible if no customer-specific settings have been ordered.
Restart device	The restart resets every parameter whose data are in the volatile memory (RAM) to the factory setting (e.g. measured value data). The device configuration remains unchanged.

Activate SW opt.

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

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

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

Factory setting: Depends on the software option ordered

Additional information:

Description

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

The activation code is documented in the parameter protocol supplied.

User entry

To activate a software option subsequently, please contact your TLV sales organization.

NOTE!

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

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

► Before you enter a new activation code, make a note of the current activation code from the parameter protocol.

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

► Once the activation code has been entered, check if the new software option is displayed in the SW option overv. parameter (→ See page 50).

↳ The new software option is active if it is displayed.

↳ If the new software option is not displayed or all software options have been deleted, the code entered was either incorrect or invalid.

► If the code entered is incorrect or invalid, enter the old activation code from the parameter protocol.

► Have your Endress+Hauser sales organization check the new activation code remembering to specify the serial number or ask for the code again.

The software options currently enabled are displayed in the SW option overv. parameter (→ See page 50).

SW option overv.

Navigation	Expert → System → Administration → SW option overv. (0015)
Description	Displays all the software options that are enabled in the device.
User interface	• Extend. HistoROM • SIL • Mass flow • Natural gas • Air+industr.gas • Wet steam detec. • Wet steam meas. • HBT Verification
Additional information	Description Displays all the options that are available if ordered by the customer. "Mass flow" option, "Natural gas" option, "Air+industr.gas" option Order code for "Sensor version": • Option "Mass (integrated temperature measurement)" or • Option "Mass (integrated pressure/temperature measurement)" "Wet steam detec." option Only available for EF200F-C. Order code for "Application package", option ES "Wet steam detection" "Wet steam meas." option Only available for EF200F-C. Order code for "Application package", option EU "Wet steam measurement"

Sens. emerg.mode

Navigation	Expert → System → Administration → Sens. emerg.mode (7712)
Prerequisite	The device has identified an error during verification of the characteristics in the sensor data storage or electronics module. A diagnostic message of status type F is output.
Description	Use this function to switch on the emergency mode of the sensor to use the backup of the sensor characteristics or main electronics characteristics stored in the HistoROM.
Selection	• Cancel • Ok
Factory setting	Cancel
Additional information	Description

This parameter becomes visible if the data in the S-DAT or on-board memory cannot be read on account of a defect or error. There is a copy of the data on the HistoROM (FT10). If the emergency mode is activated, this copy is used and the device measure correctly again at least up until the next device switch-off/switch-on. After switch-on/switch-off, the emergency mode would have to be reactivated again. This ensures that the client can operate the device until a new spare part arrives.

The status signal of the output diagnostic message changes from F (failure) to M (maintenance required), the diagnostic behavior changes from Alarm to Warning: ⚠M. The diagnostic message is output until the characteristics in the sensor data storage are again correct.

Information on what is causing the diagnostic message, and remedy measures, can be viewed by pressing the Ⓔ-button.

Information on status signals and diagnostic behavior: Operating Instructions about the device, "Diagnostic message" chapter

Res. write prot.

Navigation	Expert → System → Administration → Res. write prot. (0019)
Prerequisite	The SIL mode has been enabled.
Description	Use this function to enter the SIL locking code to reset write protection and disable the SIL mode.
User entry	0 to 65 535
Factory setting	0

Additional information

Prerequisite

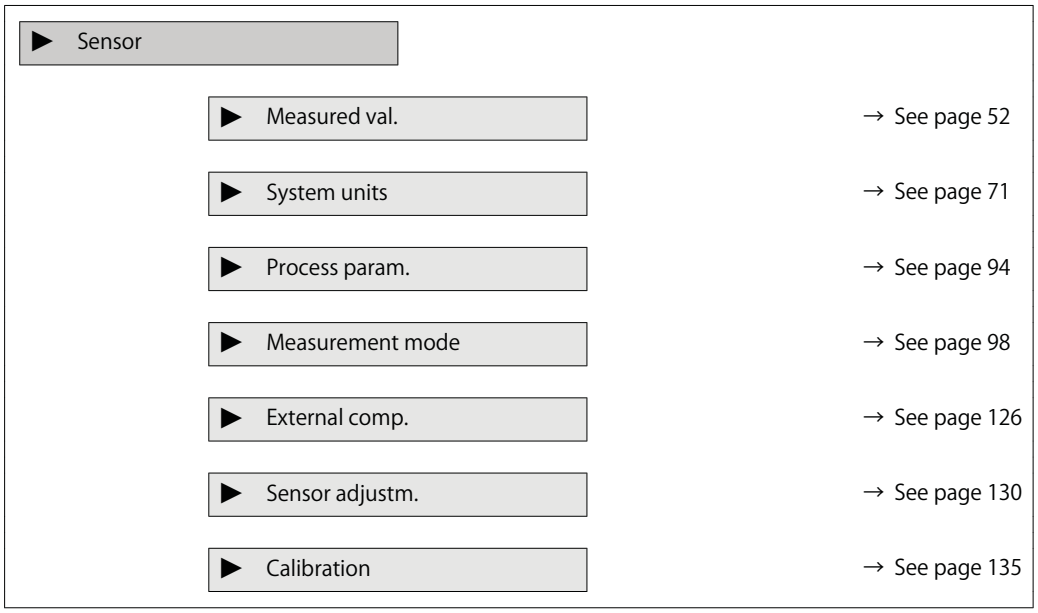
For detailed information about enabling and disabling the SIL mode, see the Special Documentation for the device

Description

Once the SIL mode has been activated, the process-related parameters are write protected, and thereby locked, for security reasons. It is still possible to read the parameters. When SIL locking is enabled, restrictions apply on all communication options, such as the service interface, the HART protocol and the local display.

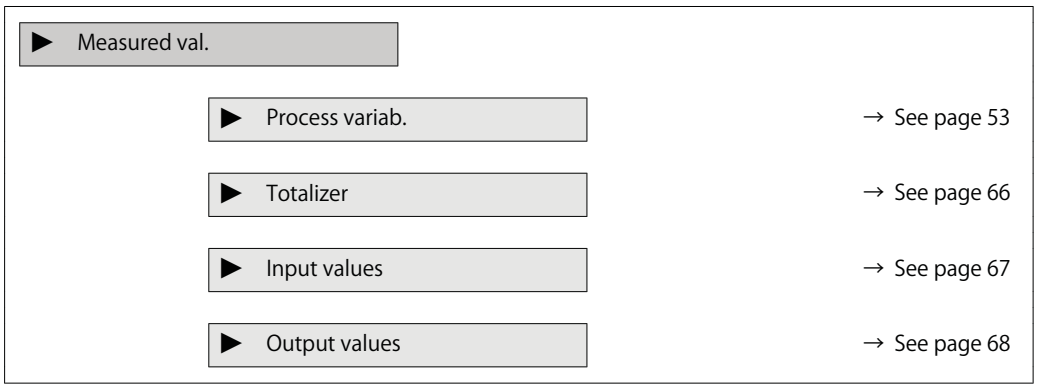
3.2 "Sensor" submenu

Navigation Expert → Sensor



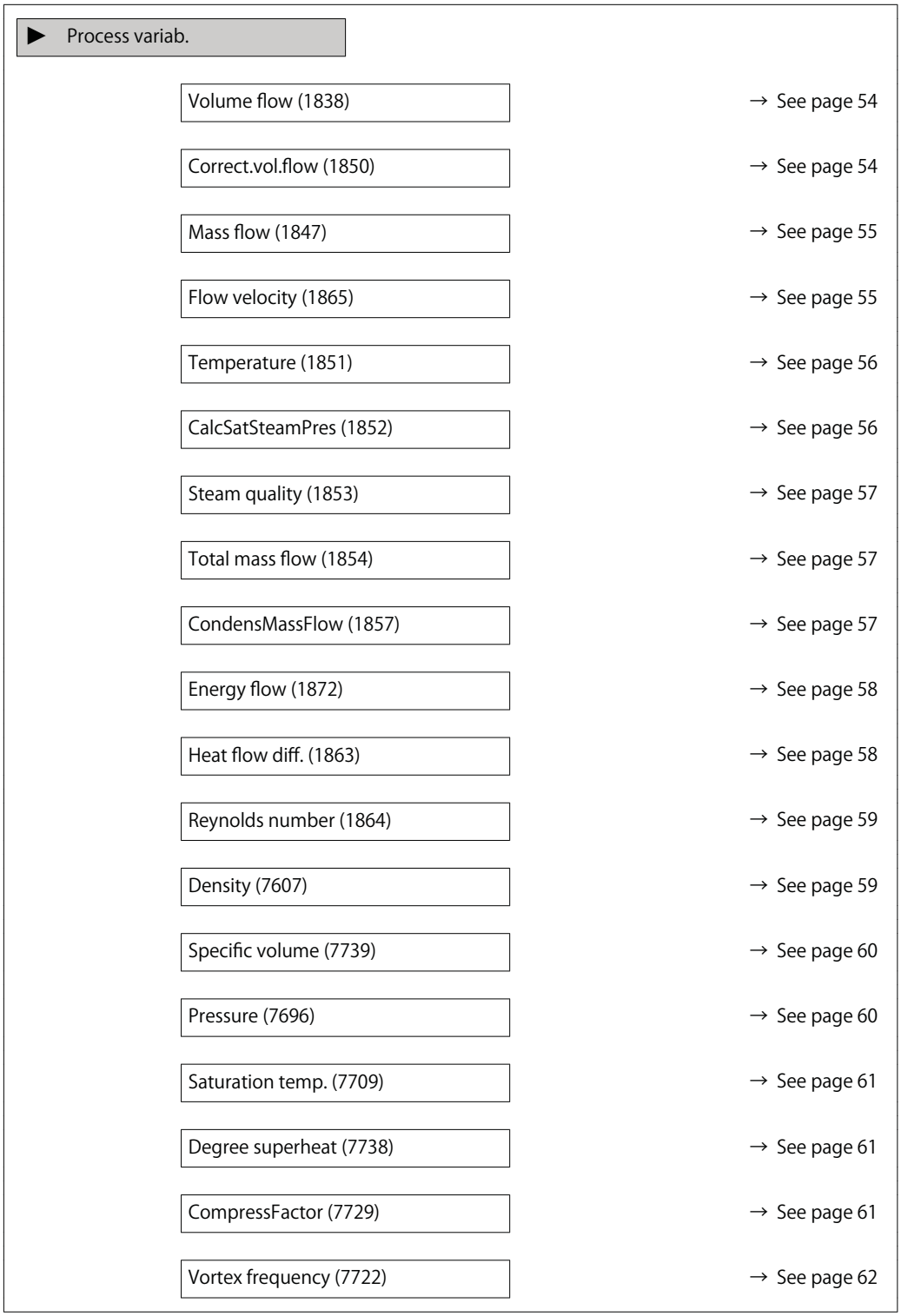
3.2.1 "Measured values" submenu

Navigation Expert → Sensor → Measured val.



"Process variables" submenu

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



Volume flow

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

Description: Displays the volume flow that is currently measured.

User interface: Signed floating-point number

Additional information: Dependency

The unit is taken from theVolume flow unit parameter (→ See page 72)

Correct.vol.flow

Navigation: Expert → Sensor → Measured val. → Process variab. → Correct.vol.flow (1850)

Description: Displays the corrected volume flow that is currently calculated.

User interface: Signed floating-point number

Additional information: Description

To calculate the corrected volume flow, the volume flow measured is multiplied by the ratio of density (Density parameter (→ See page 59)) to reference density. The density and reference density here depend on the sensor version and the selected medium (see table). The value output for corrected volume flow cannot be used in condensing gases (e.g. steam).

Sensor version	Medium	Medium type	Density	Reference density
Volume flow	All [1]	–	ρ	ρ_{Ref}
Mass flow	Steam	–	f(p, T)	–
	Gas	All except [2]	f(p, T)	$f(p_{Ref}, T_{Ref})$
	Liquid	All except [2]	f(T)	$f(T_{Ref})$
	Gas	[2]	$f(p, T, p_{Ref}, T_{Ref}, \rho_{Ref})$	ρ_{Ref}
	Liquid	[2]	$f(T, T_{Ref}, \rho_{Ref})$	ρ_{Ref}

ρ	Fixed density (→ See page 128)
ρ_{Ref}	Ref.density (→ See page 105)
p	Pressure (→ See page 60)
p_{Ref}	Ref. pressure (→ See page 106)
T	Temperature (→ See page 56)
T_{Ref}	Ref. temperature (→ See page 106)
f(⋯)	Calculation method as function of ⋯

1) Outputting the corrected volume flow cannot be used in condensing gases.
2) User-specific gas or liquid

Dependency

The unit is taken from theCor.volflow unit parameter (→ See page 75)

Mass flow

Navigation: Expert → Sensor → Measured val. → Process variab. → Mass flow (1847)

Description: Displays the mass flow currently calculated.

User interface: Signed floating-point number

Additional information

Description

To calculate the mass flow, the measured volume flow is multiplied by the density (Density parameter (→ See page 59)). The density depends on the sensor version and the selected medium (see table).

Sensor version	Medium	Medium type	Density
Volume flow	All	–	ρ
Mass flow	Steam	–	f(p, T)
	Gas	All except[1)]	f(p, T)
	Liquid	All except[1)]	f(T)
	Gas	[1)]	f(p, T, p_{Ref}, T_{Ref}, ρ_{Ref})
	Liquid	[1)]	f(T, T_{Ref}, ρ_{Ref})
ρ	Fixed density (→ See page 128)		
ρ_{Ref}	Ref.density (→ See page 105)		
p	Pressure (→ See page 60)		
p_{Ref}	Ref. pressure (→ See page 106)		
T	Temperature (→ See page 56)		
T_{Ref}	Ref. temperature (→ See page 106)		
f(⋯)	Calculation method as function of ⋯		

1) User-specific gas or liquid

Dependency

The unit is taken from the Mass flow unit parameter (→ See page 73)

Flow velocity

Navigation: Expert → Sensor → Measured val. → Process variab. → Flow velocity (1865)

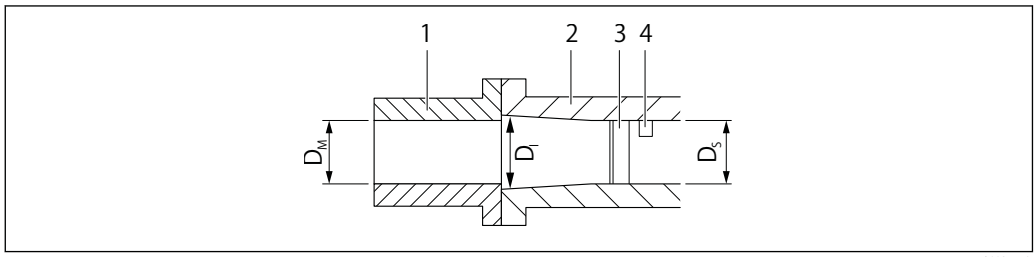
Description: Displays the flow velocity that is currently calculated.

User interface: Signed floating-point number

Additional information

Description

The flow velocity is calculated based on the aspect ratio of the diameter of the measuring tube (D_S) to the diameter of the sensor flange connection (D_I) or to the diameter of the mating pipe (D_M) if entered by the customer in the D mating pipe parameter (→ See page 132). The D_S and D_I are production data that are defined by the shape and size of the meter body.



1 Mating pipe
2 Sensor flange connection
3 Bluff body
4 DSC sensor
D_M Diameter of the mating pipe - "D mating pipe" parameter (→ See page 132)
D_I Diameter of the sensor flange connection
D_S Diameter of the measuring tube

Dependency

The unit is taken from the Velocity unit parameter (→ See page 81)

Temperature

Navigation	Expert → Sensor → Measured val. → Process variab. → Temperature (1851)
Description	Displays the temperature that is currently measured.
User interface	Signed floating-point number
Additional information	Dependency The unit is taken from the Temperature unit parameter (→ See page 77)

CalcSatSteamPres

Navigation	Expert → Sensor → Measured val. → Process variab. → CalcSatSteamPres (1852)
Prerequisite	The following conditions are met: • Order code for "Sensor version", • option "Mass (integrated temperature measurement)" or • option "Mass (integrated pressure/temperature measurement)" • The Steam option is selected in the Select medium parameter (→ See page 99).
Description	Displays the saturated steam pressure that is currently calculated.
User interface	Signed floating-point number
Additional information	Dependency The unit is taken from the Pressure unit parameter (→ See page 76)

Steam quality

Navigation	Expert → Sensor → Measured val. → Process variab. → Steam quality (1853)
Prerequisite	The following conditions are met: • Order code for "Sensor version", • option "Mass (integrated temperature measurement)" or • option "Mass (integrated pressure/temperature measurement)" • The Steam option is selected in the Select medium parameter (→ See page 99).
Description	Displays the current steam quality. Depends on the compensation mode of the steam quality: Steam quality parameter (→ See page 99).
User interface	Signed floating-point number

Total mass flow

Navigation	Expert → Sensor → Measured val. → Process variab. → Total mass flow (1854)
Prerequisite	The following conditions are met: • Order code for "Application package", option EU "Wet steam measurement" • The Steam option is selected in the Select medium parameter (→ See page 99).
Description	Displays the total mass flow (steam and condensate) that is currently calculated.
User interface	Signed floating-point number
Additional information	Dependency The unit is taken from the Mass flow unit parameter (→ See page 73)

CondensMassFlow

Navigation	Expert → Sensor → Measured val. → Process variab. → CondensMassFlow (1857)
Prerequisite	The following conditions are met: • Order code for "Application package", option EU "Wet steam measurement" • The Steam option is selected in the Select medium parameter (→ See page 99).
Description	Displays the condensate mass flow that is currently calculated.
User interface	Signed floating-point number
Additional information	Dependency The unit is taken from the Mass flow unit parameter (→ See page 73)

Energy flow

Navigation	Expert → Sensor → Measured val. → Process variab. → Energy flow (1872)
Prerequisite	With order code for "Sensor version": • option "Mass (integrated temperature measurement)" or • option "Mass (integrated pressure/temperature measurement)"
Description	Displays the energy flow that is currently calculated.
User interface	Signed floating-point number
Additional information	Dependency The unit is taken from the Energy flow unit parameter (→ See page 78)

Heat flow diff.

Navigation	Expert → Sensor → Measured val. → Process variab. → Heat flow diff. (1863)
Prerequisite	The following conditions are met: • Order code for "Sensor version" • option "Mass (integrated temperature measurement)" or • option "Mass (integrated pressure/temperature measurement)" • In the Select gas type parameter (→ See page 100), one of the following options is selected: Single gas Gas mixture Natural gas User-spec. gas
Description	Displays the heat flow difference that is currently calculated.
User interface	Signed floating-point number
Additional information	Description The measuring device requires the following to calculate the heat flow difference correctly: 1. Select the type of calculation in the Delta heat calc. parameter (→ See page 128). 2. Enter the value in the 2ndTempDeltaHeat parameter (→ See page 129). Dependency The unit is taken from the Energy flow unit parameter (→ See page 78)

Reynolds number

Navigation	Expert → Sensor → Measured val. → Process variab. → Reynolds number (1864)
Prerequisite	With order code for "Sensor version": • option "Mass (integrated temperature measurement)" or • option "Mass (integrated pressure/temperature measurement)"
Description	Displays the Reynolds number that is currently calculated.
User interface	Signed floating-point number
Additional information	Description

$$Re = \frac{\rho \cdot v \cdot d}{\eta}$$

Where:
- ρ is the density of the medium (Density parameter (→ See page 59))
- v is the flow velocity of the fluid in relation to the body (Flow velocity parameter (→ See page 55))
- d is the characteristic length of the body
- η is the viscosity of the medium
  - For gases: Dynam. viscosity parameter (→ See page 111)
  - For liquids: Dynam. viscosity parameter (→ See page 110)
- The mating pipe diameter D mating pipe parameter (→ See page 132)) is used as the characteristic length

Density

Navigation	Expert → Sensor → Measured val. → Process variab. → Density (7607)
Prerequisite	With order code for "Sensor version": • Option "Mass (integrated temperature measurement)" or • Option "Mass (integrated pressure/temperature measurement)"
Description	Displays the density currently calculated.
User interface	Positive floating-point number
Additional information	Description Depending on the selected medium the density is calculated with pressure and temperature and the corresponding method (e.g. IAPWS, NEL40...). Dependency The unit is taken from the Density unit parameter (→ See page 82)

Specific volume

Navigation
Expert → Sensor → Measured val. → Process variab. → Specific volume (7739)

Prerequisite
With order code for "Sensor version":
- Option "Mass (integrated temperature measurement)"
  or
- Option "Mass (integrated pressure/temperature measurement)"

Description
Displays the current value for the specific volume.

User interface
Positive floating-point number

Additional information
Description

The specific volume is a process variable that is common in steam applications.

For the calculation: reciprocal value of the density (Density parameter (→ See page 59))

Dependency

The unit is taken from the Spec. vol. unit parameter (→ See page 83).

Pressure

Navigation
Expert → Sensor → Measured val. → Process variab. → Pressure (7696)

Prerequisite
One of the following conditions is met:
- Order code for "Sensor version",
  - Option "Mass (integrated temperature measurement)"
    or
  - Option "Mass (integrated pressure/temperature measurement)"
    or
- The Pressure option is selected in the External value parameter (→ See page 127) parameter.

Description
Displays the current process pressure.

User interface
0 to 250 bar

Additional information
Description

The value of the pressure which is read in (e.g. via the current input module) is displayed.

If the Pressure option is not selected as the external value in the External value parameter (→ See page 127), the input value for the fixed process pressure (Fix. proc.press. parameter (→ See page 130)) is displayed.

Dependency

The unit is taken from the Pressure unit parameter (→ See page 76)

Saturation temp.

Navigation	Expert → Sensor → Measured val. → Process variab. → Saturation temp. (7709)
Prerequisite	The Steam option is selected in the Select medium parameter (→ See page 99) parameter.
Description	Displays the saturation temperature currently calculated.
User interface	Country-specific: • °C • °F
Additional information	The saturation temperature describes the temperature limit at which steam begins to condense. This value is calculated using the current process pressure (Pressure parameter (→ See page 60)) according to IAPWS-IF97. Dependency The unit is taken from the Temperature unit parameter (→ See page 77)

Degree superheat

Navigation	Expert → Sensor → Measured val. → Process variab. → Degree superheat (7738)
Prerequisite	In the Select medium parameter (→ See page 99), the Steam option is selected.
Description	Displays the degree of superheating currently calculated.
User interface	0 to 500 K
Additional information	Description The degree of superheating describes the difference between the temperature (Temperature parameter (→ See page 56)) and the saturation temperature (Saturation temp. parameter (→ See page 61)). If the temperature is below the current saturation temperature, the degree of superheating has the value 0

CompressFactor

Navigation	Expert → Sensor → Measured val. → Process variab. → CompressFactor (7729)
Prerequisite	The following conditions are met: Order code for "Sensor version" • Option "Mass (integrated temperature measurement)" or • Option "Mass (integrated pressure/temperature measurement)" The Gas option or the Steam option is selected in the Select medium parameter (→ See page 99).

Description — Displays the compressibility factor currently calculated.

User interface — 0 to 2

Additional information — Description

The compressibility factor describes the deviation of the medium from the ideal behavior under the current process conditions. If the medium is a user-specific gas/liquid, the compressibility factor is entered as the Z-factor (Z-factor parameter (→ See page 109)).

Vortex frequency

Navigation — Expert → Sensor → Measured val. → Process variab. → Vortex frequency (7722)

Description — Displays the measured variable for the flow in the measuring tube which is recorded directly with the DSC sensor.

User interface — Measuring range depending on the nominal diameter:
0.1 to 3 100 Hz

Additional information — Description

The filter settings specify the measuring range of the vortex frequency depending on the nominal diameter.

Filter settings for liquids

EF200W-C

Nominal diameter	Minimum vortex frequency	Maximum vortex frequency
	f_{vmin} [1] [Hz]	f_{vmax} [Hz]
DN 15 (½")	11.5	666.5
DN 25 (1")	6.7	388.8
DN 40 (1½")	3.9	224.3
DN 50 (2")	3.0	172.8
DN 80 (3")	2.1	122.8
DN 100 (4")	1.7	101.4
DN 150 (6")	1.1	66.6

1) For factory settingTurn down parameter (7755) (→ See page 96)

EF200F-C

Nominal diameter	Minimum vortex frequency	Maximum vortex frequency
	f_{vmin} [1] [Hz]	f_{vmax} [Hz]
DN 15 (½")	8.9	570
DN 25 (1")	5.1	330
DN 40 (1½")	3.2	210
DN 50 (2")	2.5	160

Nominal diameter	Minimum vortex frequency	Maximum vortex frequency
	f_{vmin} 1) [Hz]	f_{vmax} [Hz]
DN 80 (3")	1.7	110
DN 100 (4")	1.3	82
DN 150 (6")	0.84	54
DN 200 (8")	0.64	41
DN 250 (10")	0.51	33
DN 300 (12")	0.43	27

1) For factory settingTurn down parameter (7755) (→ See page 96)

EF200R-C

Nominal diameter	Minimum vortex frequency	Maximum vortex frequency
	f_{vmin} 1) [Hz]	f_{vmax} [Hz]
DN 25 (1") > DN 15 (½")	12.0	570
DN 40 (1½") > DN 25 (1")	6.9	330
DN 50 (2") > DN 40 (1½")	4.4	210
DN 80 (3") > DN 50 (2")	3.4	160
DN 100 (4") > DN 80 (3")	2.3	110
DN 150 (6") > DN 100 (4")	1.7	82
DN 200 (8") > DN 150 (6")	1.1	54

1) For factory settingTurn down parameter (7755) (→ See page 96)

Filter settings for gases/steam

EF200W-C

DN [mm (in)]	Minimum vortex frequency	Maximum vortex frequency
	f_{vmin} [1] [Hz]	f_{vmax} [Hz]
DN 15 (½")	209.9	3 100
DN 25 (1")	67.1	3 100
DN 40 (1½")	13.7	1 869.1
DN 50 (2")	10.5	2 303.8
DN 80 (3")	7.5	1 636.9
DN 100 (4")	6.2	1 352.3
DN 150 (6")	4.1	888.6

1) For factory settingTurn down parameter (7755) (→ See page 96)

EF200F-C

DN [mm (in)]	Minimum vortex frequency	Maximum vortex frequency
	f_{vmin} [1] [Hz]	f_{vmax} [Hz]
DN 15 (½")	45	2 900
DN 25 (1")	26	2 700
DN 40 (1½")	16	1 700
DN 50 (2")	13	2 100
DN 80 (3")	8.5	1 400
DN 100 (4")	6.4	1 100
DN 150 (6")	4.3	720
DN 200 (8")	3.2	540
DN 250 (10")	2.6	430
DN 300 (12")	2.2	370

1) For factory settingTurn down parameter (7755) (→ See page 96)

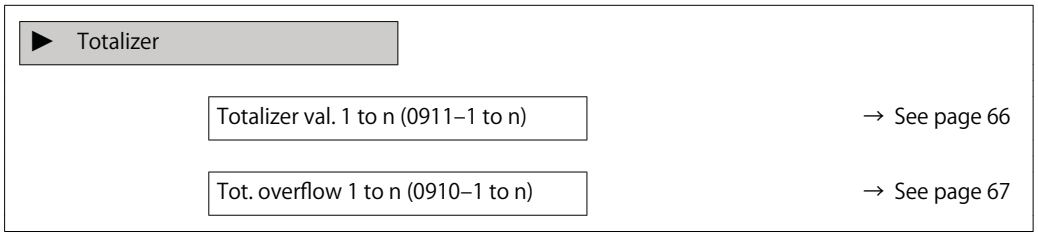
EF200R-C

DN [mm (in)]	Minimum vortex frequency	Maximum vortex frequency
	f_{vmin} [1] [Hz]	f_{vmax} [Hz]
DN 25 (1") > DN 15 (½")	60	2 900
DN 40 (1½") > DN 25 (1")	34	2 700
DN 50 (2") > DN 40 (1½")	22	1 700
DN 80 (3") > DN 50 (2")	17	2 100
DN 100 (4") > DN 80 (3")	11	1 400
DN 150 (6") > DN 100 (4")	8.6	1 100
DN 200 (8") > DN 150 (6")	5.7	720

1) For factory settingTurn down parameter (7755) (→ See page 96)

"Totalizer" submenu

Navigation Expert → Sensor → Measured val. → Totalizer



Totalizer val. 1 to n

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

Prerequisite One of the following options is selected in the Assign variable parameter (→ See page 200) of the Totalizer 1 to n submenu:
- Volume flow
- Correct.vol.flow
- Mass flow
- Total mass flow *
- CondensMassFlow*
- Energy flow *
- Heat flow diff. *

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 Tot. overflow 1 to n parameter if the display range is exceeded.

In the event of an error, the totalizer adopts the mode defined in the Failure mode parameter (→ See page 203).

User interface

The unit of the selected process variable is specified for the totalizer in the Unit totalizer parameter (→ See page 201).

Example

Calculation of the current totalizer reading when the value exceeds the 7-digit display range of the operating tool:
- Value in the Totalizer val. 1 parameter: 1968 457 m^3
- Value in the Tot. overflow 1 parameter: $1 \cdot 10^7$ (1 overflow) = 10000 000 [m^3]
- Current totalizer reading: 11968 457 m^3

* Visibility depends on order options or device settings

Tot. overflow 1 to n

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

Prerequisite: One of the following options is selected in the Assign variable parameter (→ See page 200) of the Totalizer 1 to n submenu:
- Volume flow
- Correct.vol.flow
- Mass flow
- Total mass flow *
- CondensMassFlow*
- Energy flow *
- Heat flow diff. *

Description: Displays the current totalizer overflow.

User interface: Integer with sign

Additional information:

Description

If the current totalizer reading exceeds 7 digits, which is the maximum value range that can be displayed by the operating tool, the value above this range is output as an overflow. The current totalizer value is therefore the sum of the overflow value and the totalizer value from theTotalizer val. 1 to n parameter.

User interface

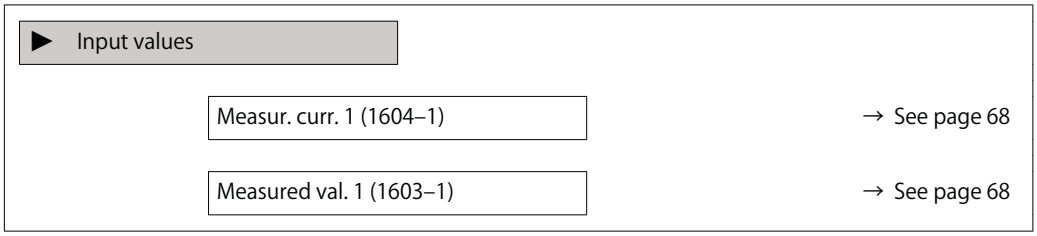
The unit of the selected process variable is specified for the totalizer in theUnit totalizer parameter (→ See page 201).

Example

Calculation of the current totalizer reading when the value exceeds the 7-digit display range of the operating tool:
- Value in the Totalizer val. 1 parameter: 1968 457 m^3
- Value in the Tot. overflow 1 parameter: $2 \cdot 10^7$ (2 overflows) = 20000 000 [m^3]
- Current totalizer reading: 21968 457 m^3

"Input values" submenu

Navigation: Expert → Sensor → Measured val. → Input values



* Visibility depends on order options or device settings

Measur. curr. 1

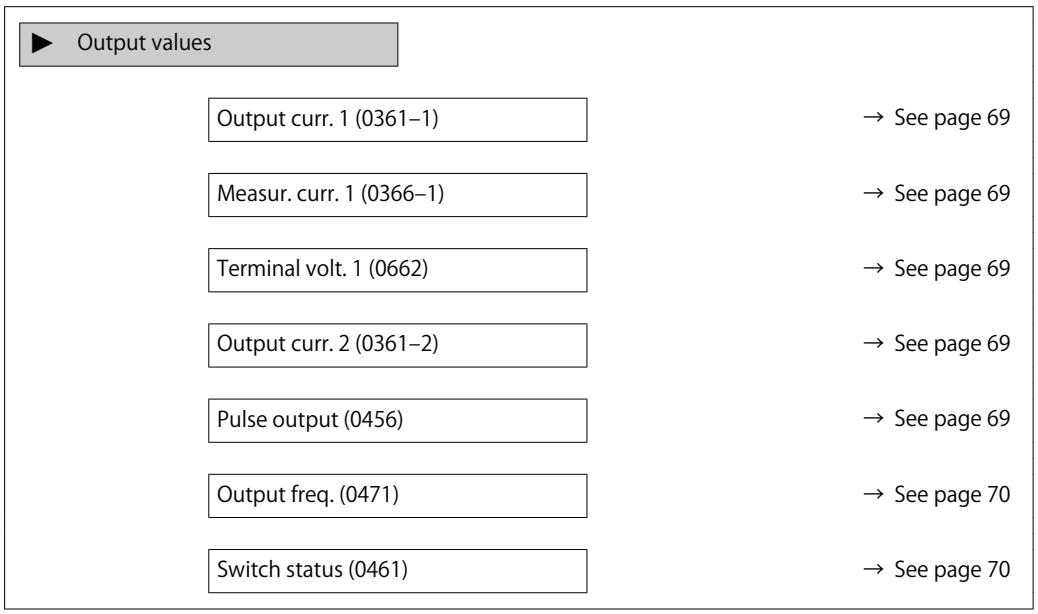
Navigation	Expert → Sensor → Measured val. → Input values → Measur. curr. 1 (1604–1)
Description	Displays the current value of the current input.
User interface	3.59 to 22.5 mA
Additional information	User interface Display depends on the process variable selected in the External valueparameter (→ See page 127).

Measured val. 1

Navigation	Expert → Sensor → Measured val. → Input values → Measured val. 1 (1603–1)
Description	Displays the current input value.
User interface	Signed floating-point number
Additional information	Dependency The display depends on the option selected in the External value parameter (→ See page 127).

"Output values" submenu

Navigation Expert → Sensor → Measured val. → Output values



Output curr. 1 to n

Navigation	Expert → Sensor → Measured val. → Output values → Output curr. 1 to n (0361–1 to n)
Description	Displays the current value currently calculated for the current output.
User interface	3.59 to 22.5 mA

Measur. curr. 1

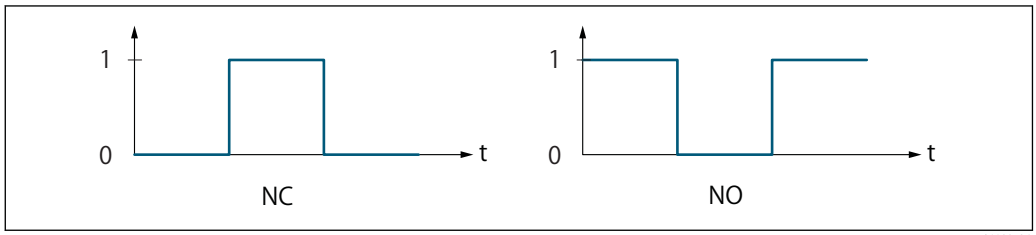
Navigation	Expert → Sensor → Measured val. → Output values → Measur. curr. 1 (0366–1)
Description	Use this function to display the actual measured value of the output current.
User interface	0 to 30 mA

Terminal volt. 1

Navigation	Expert → Sensor → Measured val. → Output values → Terminal volt. 1 (0662)
Description	Displays the current terminal voltage that is applied at the output.
User interface	0.0 to 50.0 V

Pulse output

Navigation	Expert → Sensor → Measured val. → Output values → Pulse output (0456)
Prerequisite	The Pulse option is selected in the Operating mode parameter (→ See page 149) parameter.
Description	Displays the pulse frequency currently output.
User interface	Positive floating-point number
Additional information	Description • The pulse output is an open collector output. • This is configured at the factory in such a way that the transistor is conductive for the duration of the pulse (NO contact) and is safety-oriented. • The Value per pulse parameter (→ See page 151) and Pulse width parameter (→ See page 151) can be used to define the value (i.e. the measured value amount that corresponds to a pulse) and the duration of the pulse.



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

The output behavior can be reversed via the Invert outp.sig. parameter (→ See page 164) i.e. the transistor does not conduct for the duration of the pulse.

In addition, the behavior of the output in the event of a device alarm (Failure mode parameter (→ See page 152)) can be configured.

Output freq.

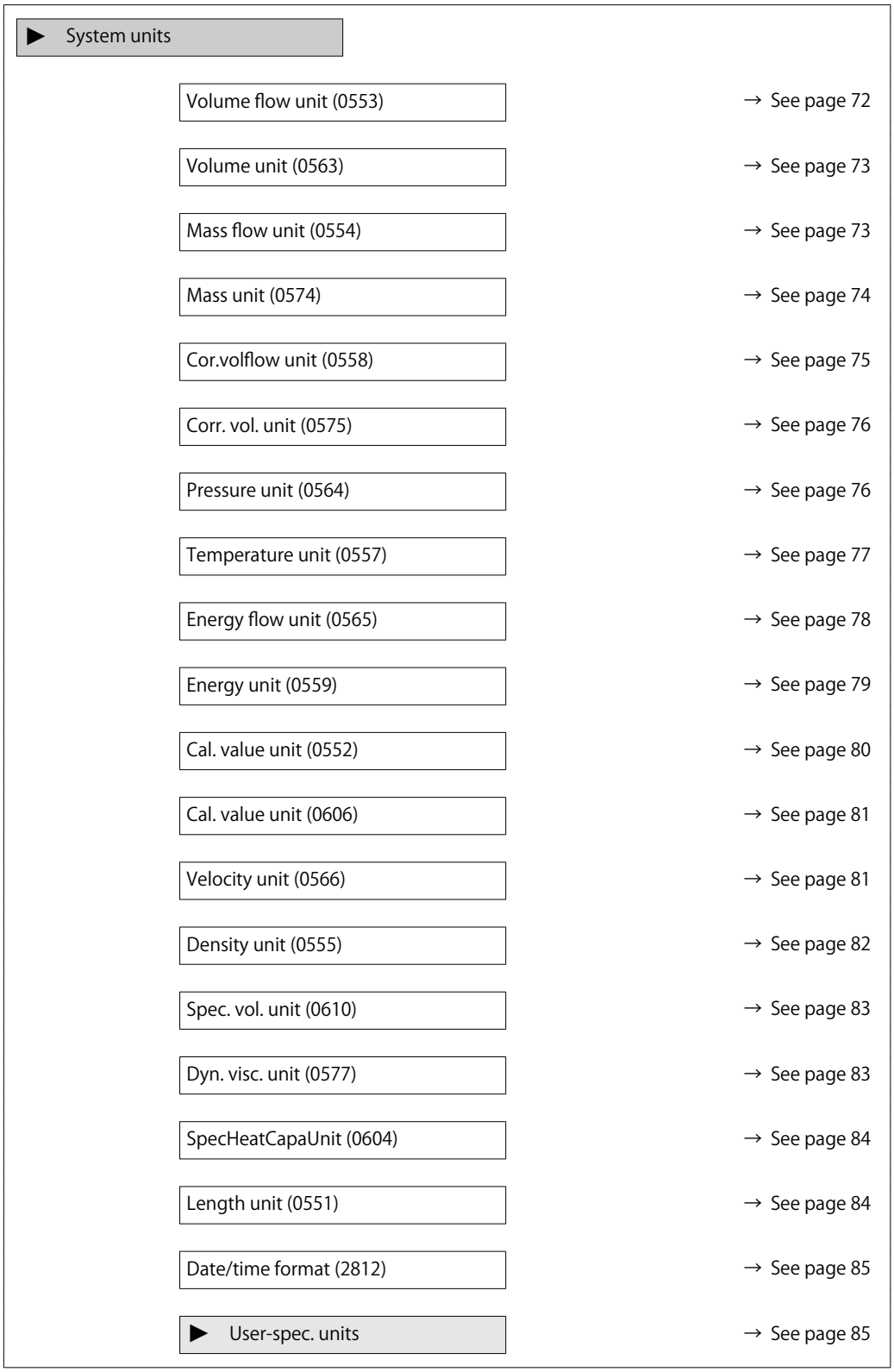
Navigation	Expert → Sensor → Measured val. → Output values → Output freq. (0471)
Prerequisite	In the Operating mode parameter (→ See page 149), the Frequency option is selected.
Description	Displays the actual value of the output frequency which is currently measured.
User interface	0 to 1 250 Hz

Switch status

Navigation	Expert → Sensor → Measured val. → Output values → Switch status (0461)
Prerequisite	The Switch option is selected in the Operating mode parameter (→ See page 149).
Description	Displays the current switch status of the status output.
User interface	• Open • Closed
Additional information	User interface • Open The switch output is not conductive. • Closed The switch output is conductive.

3.2.2 "System units" submenu

Navigation Expert → Sensor → System units



Volume flow unit

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

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

Selection

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

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

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

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

Factory setting
Country-specific:
- m^3/h
- ft^3/min

Additional information

Result

The selected unit applies for:
Volume flow parameter (→ See page 54)

Selection

For an explanation of the abbreviated units: → See page 241

Customer-specific units

The unit for the customer-specific volume is specified in the Volume text parameter (→ See page 86).

Volume unit

Navigation

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

Description

Use this function to select the unit for the volume.

Selection

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

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

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

Custom-specific units
User vol.

Factory setting

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

Additional information

Selection

For an explanation of the abbreviated units: → See page 241

Customer-specific units

The unit for the customer-specific volume is specified in the Volume text parameter (→ See page 86).

Mass flow unit

Navigation

Expert → Sensor → System units → Mass flow unit (0554)

Description

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

Selection

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

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

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

Factory setting

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

Additional information

Result

The selected unit applies for:
- Mass flow parameter (→ See page 55)
- Total mass flow parameter (→ See page 57)
- CondensMassFlow parameter (→ See page 57)

Selection

For an explanation of the abbreviated units: → See page 241

Customer-specific units

The unit for the customer-specific mass is specified in the Mass text parameter (→ See page 87).

Mass unit

Navigation

Expert → Sensor → System units → Mass unit (0574)

Description

Use this function to select the unit for the mass.

Selection

SI units
- g
- kg
- t

US units
- oz
- lb
- STon

Custom-specific units
User mass

Factory setting

Country-specific:
• kg
• lb

Additional information

Selection

For an explanation of the abbreviated units: → See page 241

Customer-specific units

The unit for the customer-specific mass is specified in the Mass text parameter (→ See page 87).

Cor.volflow unit

Navigation

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

Description

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

Selection

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

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

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

Factory setting

Country-specific:
• Nm^3/h
• Sft^3/h

Additional information

Result

The selected unit applies for:
Correct.vol.flow parameter (→ See page 54)

Selection

For an explanation of the abbreviated units: → See page 241

Customer-specific units

The unit for the customer-specific corrected volume is defined in the Corr. vol. text parameter (→ See page 88).

Corr. vol. unit

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

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

Selection

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

US units
Sft^3

Custom-specific units
UserCrVol.

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

Additional information

Selection

For an explanation of the abbreviated units: → See page 241

Customer-specific units

The unit for the customer-specific corrected volume is defined in the Corr. vol. text parameter (→ See page 88).

Pressure unit

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

Prerequisite
With order code for "Sensor version":
- option "Mass (integrated temperature measurement)"
  or
- option "Mass (integrated pressure/temperature measurement)"

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

Selection

SI units
- Pa
- kPa
- MPa
- mbar a
- bar
- torr
- atm
- gf/cm^2
- kgf/cm^2

US units
psi

Other units
- mmH2O (4° C)
- mmH2O (68° F)
- mmHg (0° C)
- inH2O (4° C)
- inH2O (68° F)
- ftH2O (68° F)
- inHg (0° C)

Custom-specific units
User pres.

Factory setting

Country-specific:
• bar
• psi

Additional information

Result

The unit is taken from:
• CalcSatSteamPres parameter (→ See page 56)
• Atmosph. press. parameter (→ See page 127)
• Maximum value parameter (→ See page 231)
• Fix. proc.press. parameter (→ See page 130)
• Pressure parameter (→ See page 60)
• Ref. pressure parameter (→ See page 106)

Selection

For an explanation of the abbreviated units: → See page 241

Customer-specific units

The unit for the customer-specific energy is defined in the Pressure text parameter (→ See page 93).

Temperature unit

Navigation

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

Description

Use this function to select the unit for the temperature.

Selection

SI units
• °C
• K

US units
• °F
• °R

Factory setting

Country-specific:
• °C
• °F

Additional information

Result

The selected unit applies for:
• Temperature parameter (→ See page 56)
• Maximum value parameter (→ See page 228)
• Minimum value parameter (→ See page 228)
• Average value parameter (→ See page 228)
• Maximum value parameter (→ See page 229)
• Minimum value parameter (→ See page 229)
• Maximum value parameter (→ See page 230)
• Minimum value parameter (→ See page 230)
• 2ndTempDeltaHeat parameter (→ See page 129)
• Fixed temp. parameter (→ See page 129)

- Ref. comb. temp. parameter (→ See page 104)
- Ref. temperature parameter (→ See page 106)
- Saturation temp. parameter (→ See page 61)

Selection

For an explanation of the abbreviated units: → See page 241

Energy flow unit

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

Prerequisite: With order code for "Sensor version":
- option "Mass (integrated temperature measurement)"
  or
- option "Mass (integrated pressure/temperature measurement)"

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

Selection:

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

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

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

Factory setting

Country-specific:
• kW
• Btu/h

Additional information

Result

The selected unit applies for:
• Heat flow diff. parameter (→ See page 58)
• Energy flow parameter (→ See page 58)

Selection

For an explanation of the abbreviated units: → See page 241

Customer-specific units

The unit for the customer-specific energy is specified in the Energy text parameter (→ See page 91).

Energy unit

Navigation

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

Prerequisite

With order code for "Sensor version":
• option "Mass (integrated temperature measurement)"
or
• option "Mass (integrated pressure/temperature measurement)"

Description

Use this function to select the unit for energy.

Selection

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

Imperial units
• Btu
• MBtu
• MMBtu

Custom-specific units
User en.

Factory setting

Country-specific:
• kWh
• Btu

Additional information

Selection

For an explanation of the abbreviated units: → See page 241

Customer-specific units

The unit for the customer-specific energy is specified in the Energy text parameter (→ See page 91).

Cal. value unit

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

Prerequisite
The following conditions are met:
- Order code for "Sensor version",
  - option "Mass (integrated temperature measurement)"
    or
  - option "Mass (integrated pressure/temperature measurement)"
- The GrossCalorValVol option or the NetCalorValVol option is selected in the Cal. value type parameter (→ See page 104).

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

Selection

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

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

Custom-specific units
User cval.

Factory setting
Country-specific:
- kJ/Nm³
- Btu/Sft³

Additional information

Result

The selected unit applies for:
Ref. GrossCalVal parameter (→ See page 105)

Selection

For an explanation of the abbreviated units: → See page 241

Customer-specific units

The unit for the customer-specific calorific value is specified in the Spec. enth. text parameter (→ See page 90).

Cal. value unit (Mass)

Navigation
Expert → Sensor → System units → Cal. value unit (0606)

Prerequisite
The following conditions are met:
- Order code for "Sensor version",
  - Option "Mass (integrated temperature measurement)"
    or
  - Option "Mass (integrated pressure/temperature measurement)"
- The GrossCalValMass option or the NetCalorValMass option is selected in the Cal. value type parameter (→ See page 104).

Description
Use this function to select the unit for the calorific value (mass).

Selection

SI units
- kJ/kg
- MJ/kg
- kWh/kg
- MWh/kg

US units
- kJ/lb
- MJ/lb
- kWh/lb
- MWh/lb

Imperial units
- Btu/lb
- MBtu/lb

Custom-specific units
User cval.

Factory setting
Country-specific:
- kJ/kg
- Btu/lb

Additional information
Selection

For an explanation of the abbreviated units: → See page 241

Customer-specific units

The unit for the customer-specific calorific value is specified in the Spec. enth. text parameter (→ See page 90).

Velocity unit

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

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

Selection

SI units
m/s

US units
ft/s

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

Additional information

Result

The selected unit applies for:
- Flow velocity parameter (→ See page 55)
- Maximum value parameter (→ See page 231)

Selection

For an explanation of the abbreviated units: → See page 241

Density unit

Navigation

Expert → Sensor → System units → Density unit (0555)

Description

Use this function to select the unit for the density.

Selection

SI units
- g/cm³
- kg/l
- kg/dm³
- 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/m³
- lb/ft³

Additional information

Result

The selected unit applies for:
- Density parameter (→ See page 59)
- Fixed density parameter (→ See page 128)
- Ref.density parameter (→ See page 105)

Selection

- SD = specific density
  The specific density is the ratio of the medium 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 medium 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: → See page 241

Customer-specific units

The unit for the customer-specific density is specified in the Density text parameter (→ See page 89).

Spec. vol. unit

Navigation	Expert → Sensor → System units → Spec. vol. unit (0610)
Prerequisite	With order code for "Sensor version": • Option "Mass (integrated temperature measurement)" or • Option "Mass (integrated pressure/temperature measurement)"
Description	Use this function to select the unit for the specific volume.
Selection	Other units • m^3/kg • ft3/lb
Factory setting	Country-specific: • m^3/kg • ft ^{3}/lb
Additional information	Result The selected unit applies for: Specific volume parameter (→ See page 60)
Additional information	Selection For an explanation of the abbreviated units: → See page 241

Dyn. visc. unit

Navigation	Expert → Sensor → System units → Dyn. visc. unit (0577)
Description	Use this function to select the unit for dynamic viscosity.
Selection	SI units • cP • Pa s • P
Factory setting	Pa s
Additional information	Result The selected unit applies for: • Dynam. viscosity parameter (→ See page 111) (gases) • Dynam. viscosity parameter (→ See page 110) (liquids)
Additional information	Selection For an explanation of the abbreviated units: → See page 241

SpecHeatCapaUnit

Navigation
Expert → Sensor → System units → SpecHeatCapaUnit (0604)

Prerequisite
The following conditions are met:
- Selected medium:
  - The User-spec. gas option is selected in the Select gas type parameter (→ See page 100) parameter.
    Or
  - The User-spec liquid option is selected in the Sel. liquid type parameter (→ See page 101) parameter.
- The Heat option is selected in the Enthalpy type parameter (→ See page 104) parameter.

Description
Use this function to select the unit for the specific heat capacity.

Selection

SI units	Imperial units
• kJ/(kgK) • MJ/(kgK) • kWh/(kgK) • kcal/(kgK)	Btu/(lb° R)

Factory setting
kJ/(kgK)

Additional information
Result

The selected unit applies for:
Spec. heat cap. parameter (→ See page 108)

Selection

For an explanation of the abbreviated units: → See page 241

Length unit

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

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

Selection

SI units	US units
• mm • m	• in • ft

Factory setting
Country-specific:
- mm
- in

Additional information

Result

The selected unit applies for:
- Inlet run parameter (→ See page 131)
- D mating pipe parameter (→ See page 132)

Selection

For an explanation of the abbreviated units: → See page 241

Date/time format

Navigation: Expert → Sensor → System units → Date/time format (2812)

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

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

Factory setting: dd.mm.yy hh:mm

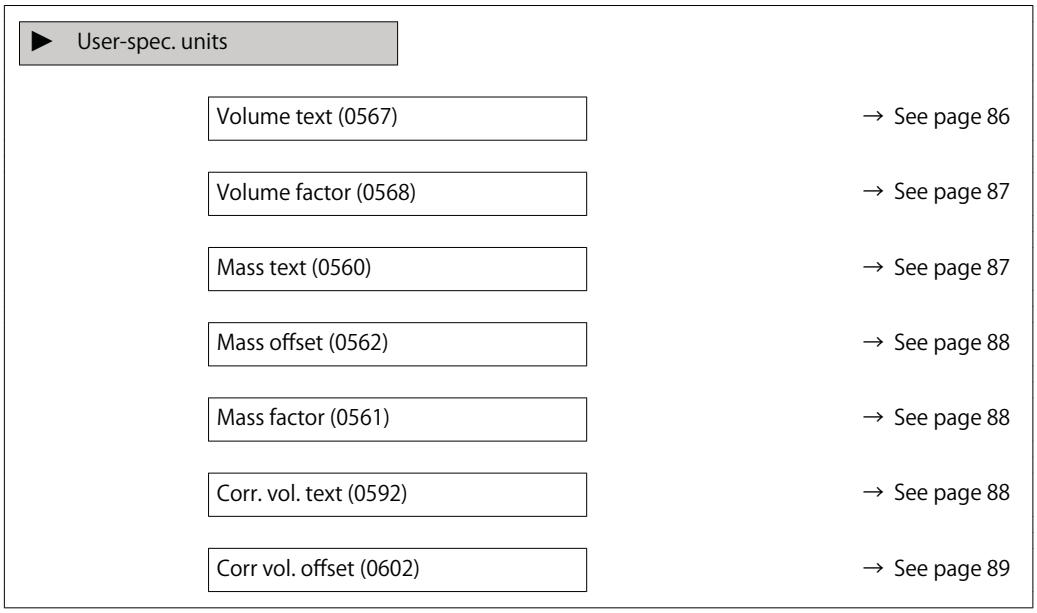
Additional information

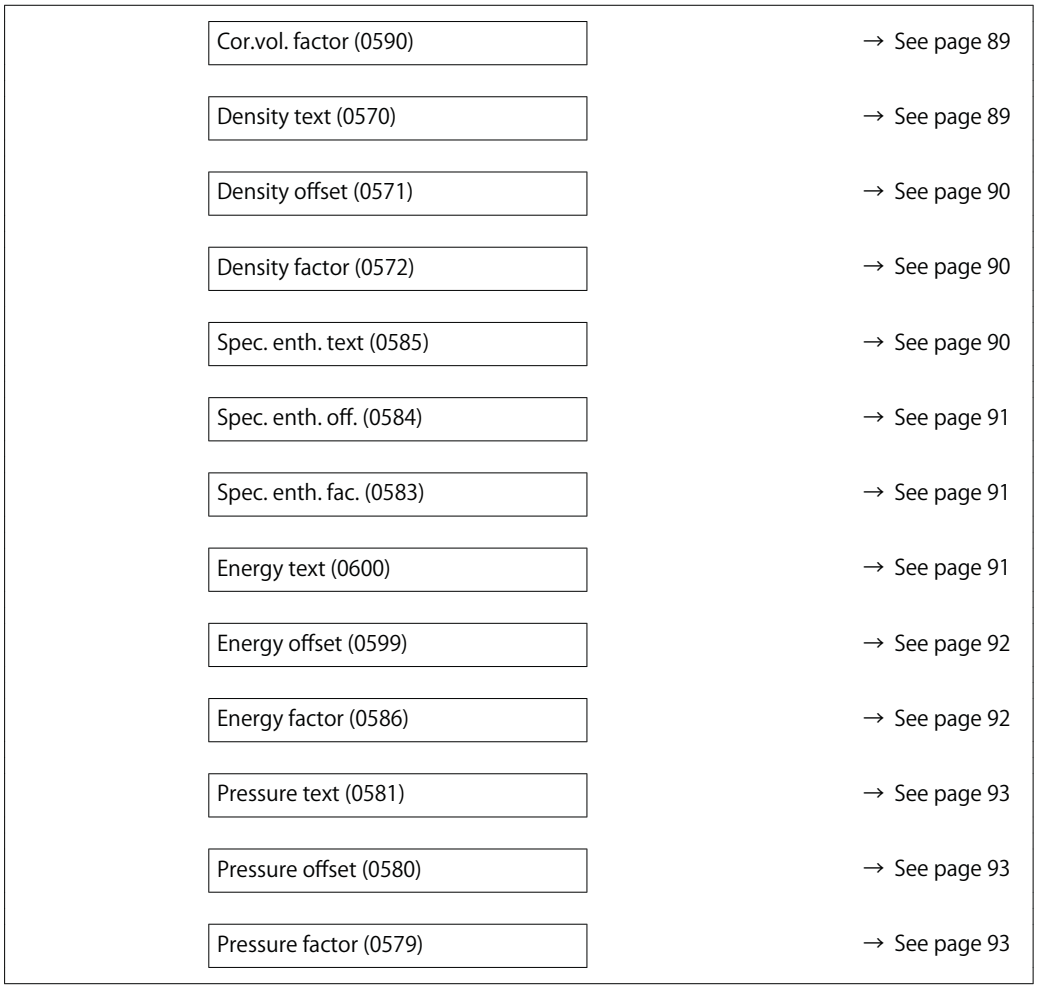
Selection

For an explanation of the abbreviated units: → See page 241

"User-specific units" submenu

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





Volume text

Navigation	Expert → Sensor → System units → User-spec. units → Volume text (0567)
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 (→ See page 72)
- Volume unit parameter (→ See page 73)

Example

If the text GLAS is entered, the choose list of the Volume flow unit parameter (→ See page 72) shows the following options:
- GLAS/s
- GLAS/min
- GLAS/h
- GLAS/d

Volume factor

Navigation: Expert → Sensor → System units → User-spec. units → Volume factor (0568)

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

Mass text

Navigation: Expert → Sensor → System units → User-spec. units → Mass text (0560)

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 (→ See page 73)
- Mass unit parameter (→ See page 74)

Example

If the text GLAS is entered, the following options are displayed in the picklist for the Mass flow unit parameter (→ See page 73):
- GLAS/s
- GLAS/min
- GLAS/h
- GLAS/d

Mass offset

Navigation	Expert → Sensor → System units → User-spec. units → Mass offset (0562)
Description	Use this function to enter the offset for adapting the user-specific mass unit and mass flow unit (without time).
User entry	Signed floating-point number
Factory setting	0
Additional information	Description Value in user-specific unit = (factor × value in basic unit) + offset

Mass factor

Navigation	Expert → Sensor → System units → User-spec. units → Mass factor (0561)
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

Corr. vol. text

Navigation	Expert → Sensor → System units → User-spec. units → Corr. vol. text (0592)
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:
- Cor.volflow unit parameter (→ See page 75)
- Corr. vol. unit parameter (→ See page 76)

Example

If the text GLAS is entered, the choose list of the Cor.volflow unit parameter (→ See page 75) shows the following options:
- GLAS/s
- GLAS/min
- GLAS/h
- GLAS/d

Corr vol. offset

Navigation: Expert → Sensor → System units → User-spec. units → Corr vol. offset (0602)

Description: Use this function to enter the offset for adapting the user-specific corrected volume unit and corrected volume flow unit (without time).

Value in user-specific unit = (factor × value in base unit) + offset

User entry: Signed floating-point number

Factory setting: 0

Cor.vol. factor

Navigation: Expert → Sensor → System units → User-spec. units → Cor.vol. factor (0590)

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

Density text

Navigation: Expert → Sensor → System units → User-spec. units → Density text (0570)

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

Result

The defined unit is shown as an option in the choose list of the Density unit parameter (→ See page 82).

Example

Enter text “CE_L” for centners per liter

Density offset

Navigation: Expert → Sensor → System units → User-spec. units → Density offset (0571)

Description: Use this function to enter the zero point shift for the user-specific density unit.

Value in user-specific unit = (factor × value in basic unit) + offset

User entry: Signed floating-point number

Factory setting: 0

Density factor

Navigation: Expert → Sensor → System units → User-spec. units → Density factor (0572)

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

Spec. enth. text

Navigation: Expert → Sensor → System units → User-spec. units → Spec. enth. text (0585)

Description: Use this function to enter a text for the user-specific calorific value unit. The corresponding volume units (cm^3, dm^3, m^3, ml, l, hl, Ml Mega, af, ft^3, fl oz, gal, kgal, Mgal, bbl) or mass units (g, kg, t, oz, lb, STon) for the calorific value are generated automatically.

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

Factory setting: User enth.

Additional information	Result The defined unit is shown as an option in the choose list of the following parameters: • Cal. value unit parameter (→ See page 80) (volume) • Cal. value unit parameter (→ See page 80) (mass) Example If the text CAL is entered, the choose list of the Cal. value unit parameter (→ See page 80) shows the following options: • CAL/Nm3 • CAL/m3 • CAL/ft3 • CAL/Sft3

Spec. enth. off.

Navigation	Expert → Sensor → System units → User-spec. units → Spec. enth. off. (0584)
Description	Use this function to enter the offset for adapting the user-specific calorific value unit (without volume).
User entry	Signed floating-point number
Factory setting	0

Spec. enth. fac.

Navigation	Expert → Sensor → System units → User-spec. units → Spec. enth. fac. (0583)
Description	Use this function to enter a quantity factor (without volume) for the user-specific calorific value unit.
User entry	Signed floating-point number
Factory setting	1.0
Additional information	Example 1 W × min = 60 J → 0.166 W × min = 1 J → user entry: 0.0166

Energy text

Navigation	Expert → Sensor → System units → User-spec. units → Energy text (0600)
Prerequisite	With order code for "Sensor version": • option "Mass (integrated temperature measurement)" or • option "Mass (integrated pressure/temperature measurement)"

Description	Use this function to enter a text for the user-specific energy unit.
User entry	Max. 10 characters such as letters, numbers or special characters (@, %, /)
Factory setting	User en.
Additional information	Result The defined unit is shown as an option in the choose list of the following parameters: • Energy unit parameter (→ See page 79) • Energy flow unit parameter (→ See page 78) Example If the text W is entered, the choose list of the Energy flow unit parameter (→ See page 78) shows the following options: • W/s • W/min • W/h • W/d

Energy offset

Navigation	Expert → Sensor → System units → User-spec. units → Energy offset (0599)
Prerequisite	With order code for "Sensor version": • option "Mass (integrated temperature measurement)" or • option "Mass (integrated pressure/temperature measurement)"
Description	Use this function to enter the offset for adapting the user-specific energy unit (without time).
User entry	Signed floating-point number
Factory setting	0

Energy factor

Navigation	Expert → Sensor → System units → User-spec. units → Energy factor (0586)
Prerequisite	With order code for "Sensor version": • option "Mass (integrated temperature measurement)" or • option "Mass (integrated pressure/temperature measurement)"
Description	Use this function to enter a quantity factor for the user-specific energy unit.
User entry	Signed floating-point number
Factory setting	1.0

Pressure text

Navigation	Expert → Sensor → System units → User-spec. units → Pressure text (0581)
Prerequisite	With order code for "Sensor version": • option "Mass (integrated temperature measurement)" or • option "Mass (integrated pressure/temperature measurement)"
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 (→ See page 76).

Pressure offset

Navigation	Expert → Sensor → System units → User-spec. units → Pressure offset (0580)
Prerequisite	With order code for "Sensor version": • option "Mass (integrated temperature measurement)" or • option "Mass (integrated pressure/temperature measurement)"
Description	Use this function to enter the offset for adapting the user-specific pressure unit.
User entry	Signed floating-point number
Factory setting	0

Pressure factor

Navigation	Expert → Sensor → System units → User-spec. units → Pressure factor (0579)
Prerequisite	With order code for "Sensor version": • option "Mass (integrated temperature measurement)" or • option "Mass (integrated pressure/temperature measurement)"
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

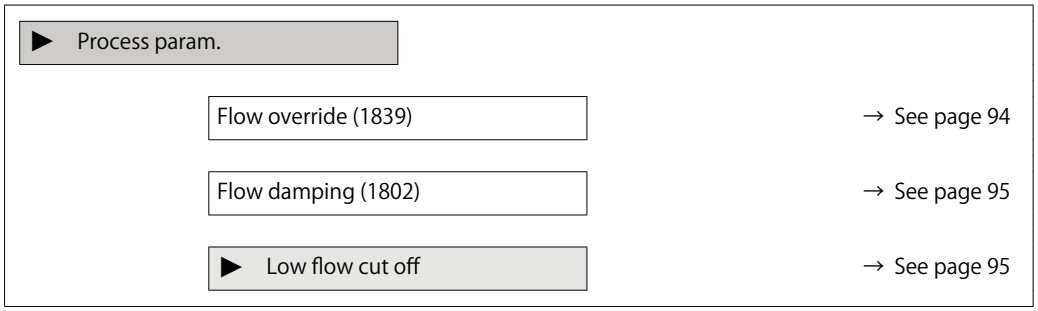
Additional information

Example

1 Dyn/cm² = 0.1 Pa → 10 Dyn/cm² = 1 Pa → user entry: 10

3.2.3 "Process parameters" submenu

Navigation Expert → Sensor → Process param.



Flow override

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

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

Selection
- Off
- On

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 ⚠C453 Flow override is output.
- Output values
  - Output: value at zero flow
  - Temperature: continues to be output
  - Totalizers 1-3: stop being totalized

The Flow override option can also be activated in the Status input submenu: Assign stat.inp. parameter.

Flow damping

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

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

User entry: 0 to 999.9 s

Factory setting: 5 s

Additional information

Description

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

User entry

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

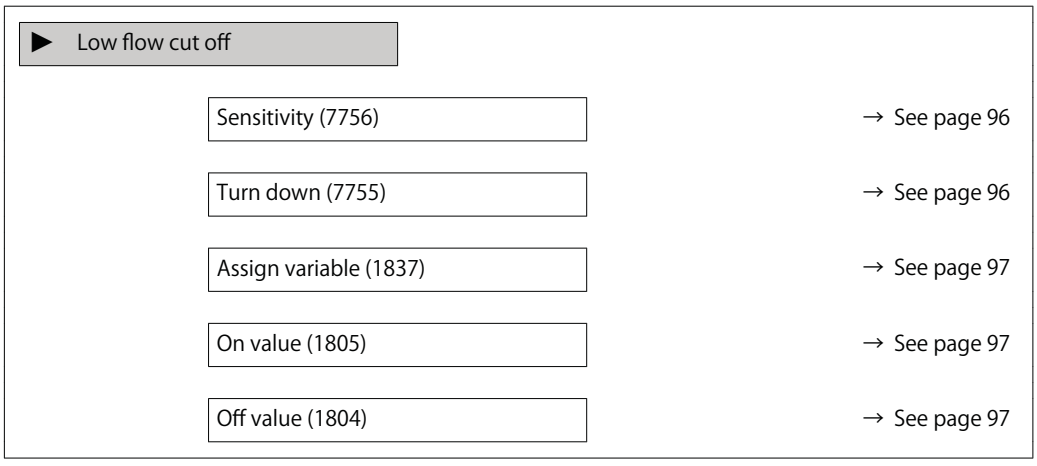
Damping is switched off if 0 is entered (factory setting).

Result

The damping affects the following variables of the device:
- Outputs → See page 139
- Low flow cut off
- Totalizers → See page 200

"Low flow cut off" submenu

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



2) Proportional behavior with first-order lag

Sensitivity

Navigation	Expert → Sensor → Process param. → Low flow cut off → Sensitivity (7756)
Description	Use this function to enter a value to control the device sensitivity in the lower flow range.
User entry	1 to 9
Factory setting	5
Additional information	Description The measuring signal must have a certain minimum signal amplitude so that the signals can be evaluated without any errors. Using the nominal diameter, the corresponding flow can also be derived from this amplitude. The minimum signal amplitude depends on the setting for the sensitivity of the DSC sensor (s), the steam quality (x) and the force of the vibrations present (a). The value mf corresponds to the lowest measurable flow velocity without vibration (no wet steam) at a density of 1 kg/m³ (0.0624 lbm/ft^3). The value mf can be set in the range from 6 to 20 m/s (1.8 to 6 ft/s) (factory setting 12 m/s (3.7 ft/s)) with the Sensitivity parameter (value range 1 to 9, factory setting 5). The lowest flow velocity that can be measured on account of the signal amplitude v_{AmpMin} is derived from the Sensitivity parameter and the steam quality (x) or from the force of vibrations present (a). User entry Increasing the sensitivity makes it possible to measure smaller flow signals. Reducing the sensitivity improves performance in relation to interference in the lower flow range.

Turn down

Navigation	Expert → Sensor → Process param. → Low flow cut off → Turn down (7755)
Description	Use this function to enter a setting for the turndown.
User entry	50 to 100 %
Factory setting	100 %
Additional information	Description The measuring range can be limited with this parameter, if necessary. The upper end of the measuring range is not affected. The start of the low end of the measuring range can be changed to a higher flow value, making it possible to cut off low flows, for example. User entry Reducing the turndown limits the lower measuring range in relation to the minimum measurable vortex frequency.

Assign variable

Navigation	Expert → Sensor → Process param. → Low flow cut off → Assign variable (1837)
Description	Use this function to select the process variable for low flow cutoff detection.
Selection	• Off • Volume flow • Correct.vol.flow • Mass flow • Reynolds number*
Factory setting	Off

On value

Navigation	Expert → Sensor → Process param. → Low flow cut off → On value (1805)
Prerequisite	A process variable is selected in the Assign variable parameter (→ See page 97).
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 → See page 97.
User entry	Positive floating-point number
Factory setting	0
Additional information	Dependency The unit depends on the process variable selected in the Assign variable parameter (→ See page 97).

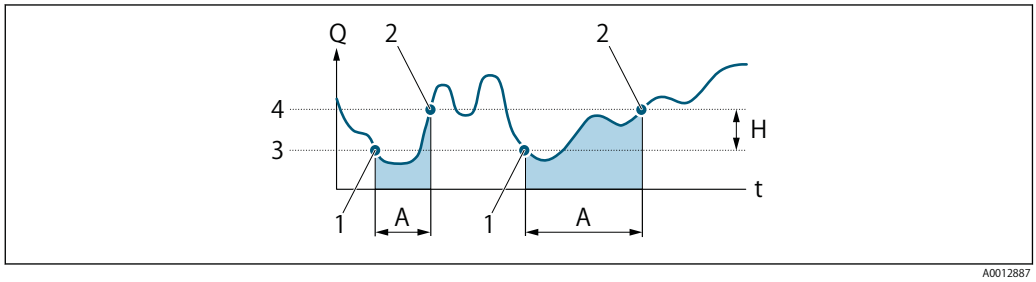
Off value

Navigation	Expert → Sensor → Process param. → Low flow cut off → Off value (1804)
Prerequisite	A process variable is selected in the Assign variable parameter (→ See page 97).
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→ See page 97.
User entry	0 to 100.0 %
Factory setting	50 %

* Visibility depends on order options or device settings

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

3.2.4 "Measurement mode" submenu

Navigation Expert → Sensor → Measurement mode

Select medium

Navigation: Expert → Sensor → Measurement mode → Select medium (7653)

Description: Use this function to select the type of medium for the measuring application.

Selection:
- Gas
- Liquid
- Steam

Factory setting: Steam

Steam calc. mode

Navigation: Expert → Sensor → Measurement mode → Steam calc. mode (7742)

Prerequisite: The Steam option is selected in the Select medium parameter (→ See page 99) parameter.

Description: Use this function to select the steam calculation mode for saturated steam measurement.

Selection:
- Sat. st (T-comp)
- Auto (p-/T-comp)

Factory setting: Sat. st (T-comp)

Additional information: Selection

- Sat. st (T-comp)
  Temperature-compensated
- Auto (p-/T-comp)
  Pressure/temperature-compensated

Steam quality

Navigation: Expert → Sensor → Measurement mode → Steam quality (7605)

Prerequisite: The following conditions are met:
- Order code for "Application package":
  - Option ES "Wet steam detection"
  - Option EU "Wet steam measurement"
- The Steam option is selected in the Select medium parameter (→ See page 99) parameter.

The software options currently enabled are displayed in the SW option overv. parameter (→ See page 50).

Description: Use this function to select the compensation mode for the steam quality.

Selection:
- Fixed value
- Calculated value

Factory setting	Fixed value
Additional information	Selection For detailed information on setting the parameter in steam applications, see the Special Documentation for the Wet Steam Detection and Wet Steam Measurement application package → See page 7

Steam qual. val.

Navigation	Expert → Sensor → Measurement mode → Steam qual. val. (7630)
Prerequisite	The following conditions are met: • The Steam option is selected in the Select medium parameter (→ See page 99) parameter. • The Fixed value option is selected in the Steam quality parameter (→ See page 99) parameter.
Description	Use this function to enter a fixed value for the steam quality.
User entry	0 to 100 %
Factory setting	100 %
Additional information	User entry For detailed information on setting the parameter in steam applications, see the Special Documentation for the Wet Steam Detection and Wet Steam Measurement application package → See page 7

Select gas type

Navigation	Expert → Sensor → Measurement mode → Select gas type (7635)

Prerequisite	The following conditions are met:
	• Order code for "Sensor version",
	  • Option "Mass (integrated temperature measurement)"
	  or
	  • Option "Mass (integrated pressure/temperature measurement)"
	• The Gas option is selected in the Select medium parameter (→ See page 99) parameter.

Description	Use this function to select the type of gas for the measuring application.
Selection	• Single gas • Gas mixture • Air • Natural gas • User-spec. gas
Factory setting	User-spec. gas

Additional information

"User-spec. gas" option

Applications: calculation of the mass flow of a user-specific gas

Calculated variables: the mass flow, the density, the corrected volume flow and the heat quantity are calculated from the measured volume flow and the measured temperature. Either the specific thermal capacity or the calorific value must be entered for calculating the heat quantity.

Formulate for calculation:
- Mass flow: $m = q \cdot \rho\ (T)$
- Density: $\rho = \rho_1\ (T_1) / (1 + \beta_p \cdot [T - T_1])$
- Corrected volume flow: $v_n = q \cdot (\rho\ (T) / \rho_{ref})$
- Heat quantity in the case of delta heat: $E = q \cdot \rho\ (T) \cdot c_p \cdot \Delta T$
- Heat quantity in the case of combustion: $E = q \cdot \rho\ (T) \cdot h$

m = Mass flow

q = Volume flow (measured)

v_n = Corrected volume flow

T = Process temperature (measured)

T_1 = Temperature (→ See page 56) at which the value for ρ_1 applies.

ρ = Density

ρ_{ref} = Reference density

= Density (→ See page 59) at which the value for T_1 applies.

β_p = Linear exp coeff (→ See page 107) of the liquid at T_1

Possible combinations of these values: Linear exp coeff parameter (→ See page 107)

Sel. liquid type

Navigation

Expert → Sensor → Measurement mode → Sel. liquid type (7636)

Prerequisite

The following conditions are met:
- Order code for "Sensor version",
  - Option "Mass (integrated temperature measurement)"
    or
  - Option "Mass (integrated pressure/temperature measurement)"
- The Liquid option is selected in the Select medium parameter (→ See page 99) parameter.

Description

Use this function to select the type of liquid for the measuring application.

Selection

- Water
- LPG (Liquefied Petroleum Gas)
- User-spec liquid

Factory setting

Water

Additional information

"User-spec liquid" option

Applications: calculation of the mass flow of a user-specific liquid, such as thermal oil.

Calculated variables: the mass flow, the density, the corrected volume flow and the heat quantity are calculated from the measured volume flow and the measured temperature. Either the specific thermal capacity or the calorific value must be entered for calculating the heat quantity.

Formulae for calculation:
- Mass flow: $m = q \cdot \rho\ (T)$
- Density: $\rho = \rho_1\ (T_1) / (1 + \beta_p \cdot [T - T_1])$
- Corrected volume flow: $v_n = q \cdot (\rho\ (T) / \rho_{ref})$
- Heat quantity in the case of delta heat: $E = q \cdot \rho\ (T) \cdot c_p \cdot \Delta T$
- Heat quantity in the case of combustion: $E = q \cdot \rho\ (T) \cdot h$

m = Mass flow

q = Volume flow (measured)

v_n = Corrected volume flow

T = Process temperature (measured)

T_1 = Temperature (→ See page 56) at which the value for ρ applies.

ρ = Density

ρ_{ref} = Reference density

= Density (→ See page 59) at which the value for T_1 applies.

β_p = Linear exp coeff (→ See page 107) of the liquid at T_1

Possible combinations of these values: Linear exp coeff parameter (→ See page 107)

Density calc.

Navigation	Expert → Sensor → Measurement mode → Density calc. (7608)
Prerequisite	The following conditions are met: • In the Select medium parameter (→ See page 99), the Gas option is selected. • In the Select gas type parameter (→ See page 100), the Natural gas option is selected.
Description	Use this function to select the standard on the basis of which the density is calculated.
Selection	• AGA Nx19 • ISO 12213- 2 • ISO 12213- 3
Factory setting	AGA Nx19

Enthalpy calc.

Navigation	Expert → Sensor → Measurement mode → Enthalpy calc. (7619)

Prerequisite	The following conditions are met:
	• Order code for "Sensor version",
	  • Option "Mass (integrated temperature measurement)"
	  or
	  • Option "Mass (integrated pressure/temperature measurement)"
	• In the Select medium parameter (→ See page 99), the Gas option is selected and in the Select gas type parameter (→ See page 100), the Natural gas option is selected.

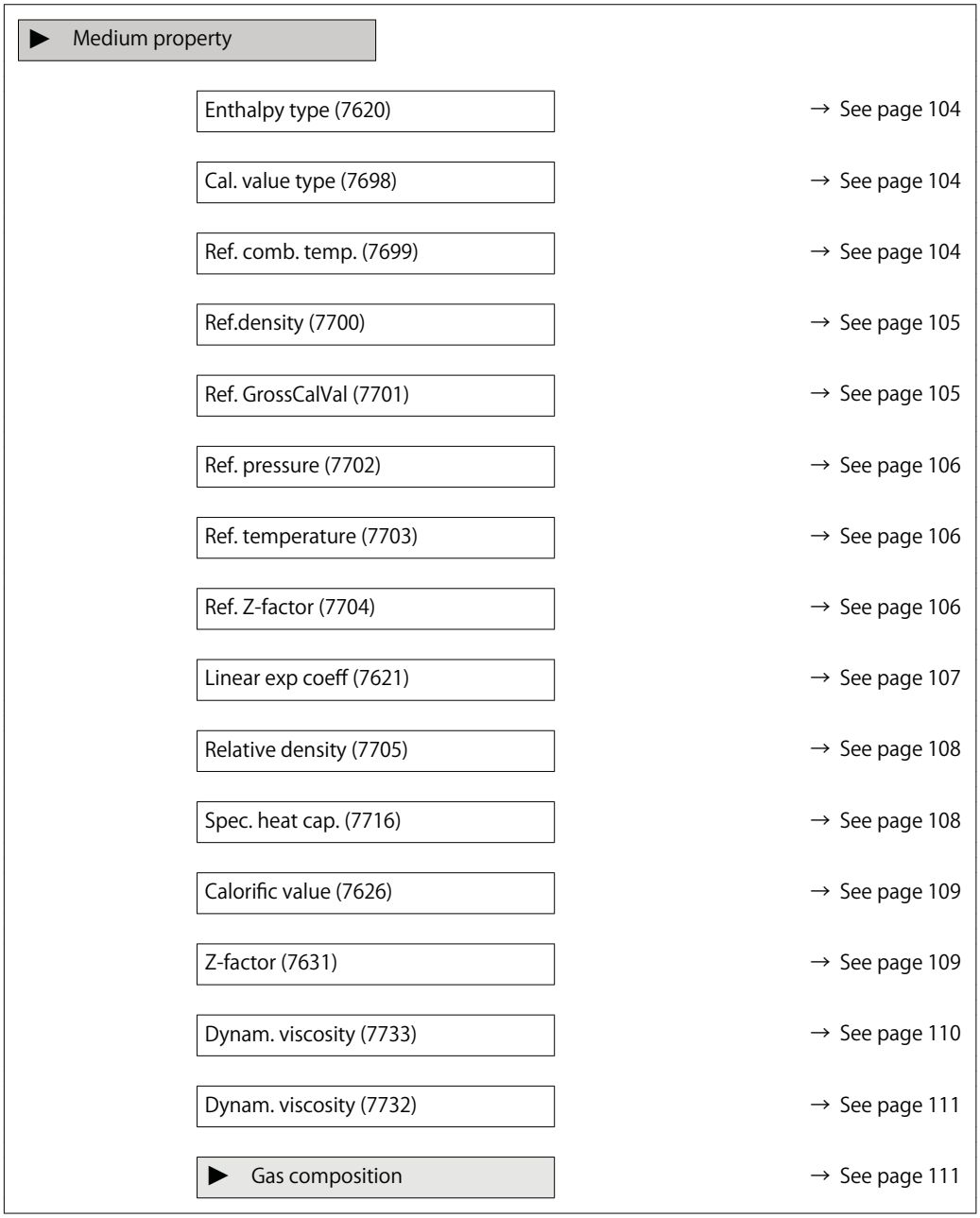
Description	Use this function to select the standard on the basis of which the enthalpy is calculated.

Selection
- AGA5
- ISO 6976

Factory setting AGA5

"Medium properties" submenu

Navigation Expert → Sensor → Measurement mode → Medium property



Enthalpy type

Navigation	Expert → Sensor → Measurement mode → Medium property → Enthalpy type (7620)
Prerequisite	The following conditions are met: • In the Select gas type parameter (→ See page 100), the User-spec. gas option is selected. Or • In the Sel. liquid type parameter (→ See page 101), the User-spec liquid option is selected.
Description	Use this function to select the type of enthalpy.
Selection	• Heat • Calorific value
Factory setting	Heat

Cal. value type

Navigation	Expert → Sensor → Measurement mode → Medium property → Cal. value type (7698)
Prerequisite	The Cal. value type parameter (→ See page 104) is visible.
Description	Use this function to select whether the net calorific value or the gross calorific value is used as the basis for calculation.
Selection	• GrossCalorValVol • NetCalorValVol • GrossCalValMass • NetCalorValMass
Factory setting	GrossCalValMass

Ref. comb. temp.

Navigation	Expert → Sensor → Measurement mode → Medium property → Ref. comb. temp. (7699)
Prerequisite	The Ref. comb. temp. parameter (→ See page 104) is visible.
Description	Use this function to enter the reference combustion temperature for calculating the natural gas energy value.
User entry	–200 to 450 °C
Factory setting	20 °C

Additional information	Dependency The unit is taken from the Temperature unit parameter (→ See page 77)

Ref.density

Navigation	Expert → Sensor → Measurement mode → Medium property → Ref.density (7700)
Prerequisite	The following conditions are met: • In the Select gas type parameter (→ See page 100), the User-spec. gas option is selected. Or • In the Sel. liquid type parameter (→ See page 101), the Water option or User-spec liquid option is selected.
Description	Use this function to enter a fixed value for the reference density.
User entry	0.01 to 15 000 kg/m³
Factory setting	1 000 kg/m³
Additional information	Dependency The unit is taken from the Density unit parameter (→ See page 82)

Ref. GrossCalVal

Navigation	Expert → Sensor → Measurement mode → Medium property → Ref. GrossCalVal (7701)
Prerequisite	The following conditions are met: • In the Select medium parameter (→ See page 99), the Gas option is selected. • In the Select gas type parameter (→ See page 100), the Natural gas option is selected. • In the Density calc. parameter (→ See page 102), the ISO 12213- 3 option is selected.
Description	Use this function to enter the reference gross calorific value of the natural gas.
User entry	Positive floating-point number
Factory setting	50 000 kJ/Nm³
Additional information	Dependency The unit is taken from the Cal. value unit parameter (→ See page 80)

Ref. pressure

Navigation: Expert → Sensor → Measurement mode → Medium property → Ref. pressure (7702)

Prerequisite:
The following conditions are met:
- Order code for "Sensor version",
  - Option "Mass (integrated temperature measurement)"
    or
  - Option "Mass (integrated pressure/temperature measurement)"
- The Gas option is selected in the Select medium parameter (→ See page 99) parameter.

Description: Use this function to enter the reference pressure for calculating the reference density.

User entry: 0 to 250 bar

Factory setting: 1.01325 bar

Additional information: Dependency

The unit is taken from the Pressure unit parameter (→ See page 76)

Ref. temperature

Navigation: Expert → Sensor → Measurement mode → Medium property → Ref. temperature (7703)

Prerequisite:
The following conditions are met:
- The Gas option is selected in the Select medium parameter (→ See page 99).
  Or
- The Liquid option is selected in the Select medium parameter (→ See page 99).

Description: Use this function to enter the reference temperature for calculating the reference density.

User entry: –200 to 450 °C

Factory setting: 20 °C

Additional information: Dependency

The unit is taken from theTemperature unit parameter (→ See page 77)

Ref. Z-factor

Navigation: Expert → Sensor → Measurement mode → Medium property → Ref. Z-factor (7704)

Prerequisite: In the Select gas type parameter (→ See page 100), the User-spec. gas option is selected.

Description: Use this function to enter the real gas constant Z for gas under reference conditions.

User entry 0.1 to 2

Factory setting 1

Linear exp coeff

Navigation Expert → Sensor → Measurement mode → Medium property → Linear exp coeff (7621)

Prerequisite The following conditions are met:
- The Liquid option is selected in the Select medium parameter (→ See page 99).
- The User-spec liquid option is selected in the Sel. liquid type parameter (→ See page 101).

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

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

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

Additional information

User entry

- If the value in this parameter is changed, it is advisable to reset the totalizer.
- If two density and temperature value pairs are known (density ρ_1 at temperature T_1 and density ρ_2 at temperature T_2), the expansion coefficient can be calculated according to the following formula:
  $\beta_p = ((\rho_1 / \rho_2) - 1)/(T_1 - +T_2)$

Sample values

The closer the process temperature is to the specific temperature value, the better the calculation of the density for application-specific liquids. If the process temperature deviates greatly from the value indicated, the expansion coefficient should be calculated according to the formula (see above).

Medium (liquid)	Temperature value [K]	Density value [kg/m³]	Expansion coefficient [10^{-4} 1/K]
Air	123.15	594	18.76
Ammonia	298.15	602	25
Argon	133.15	1 028	111.3
n-butane	298.15	573	20.7
Carbon dioxide	298.15	713	106.6
Chlorine	298.15	1 398	21.9
Cyclohexane	298.15	773	11.6
n-decane	298.15	728	10.2
Ethane	298.15	315	175.3
Ethylene	298.15	386	87.7
n-heptane	298.15	351	12.4
n-hexane	298.15	656	13.8
Hydrogen chloride	298.15	796	70.9

Medium (liquid)	Temperature value [K]	Density value [kg/m³]	Expansion coefficient [10⁻⁴ 1/K]
i-butane	298.15	552	22.5
Methane	163.15	331	73.5
Nitrogen	93.15	729	75.3
n-octane	298.15	699	11.1
Oxygen	133.15	876	95.4
n-pentane	298.15	621	16.2
Propane	298.15	493	32.1
Vinyl chloride	298.15	903	19.3
Table values according to Carl L. Yaws (2001): Matheson Gas Data Book, 7th edition			

Relative density

Navigation
Expert → Sensor → Measurement mode → Medium property → Relative density (7705)

Prerequisite
The following conditions are met:
- In the Select medium parameter (→ See page 99), the Gas option is selected.
- In the Select gas type parameter (→ See page 100), the Natural gas option is selected.
- In the Density calc. parameter (→ See page 102), the ISO 12213- 3 option is selected.

Description
Use this function to enter the relative density of the natural gas.

User entry
0.55 to 0.9

Factory setting
0.664

Spec. heat cap.

Navigation
Expert → Sensor → Measurement mode → Medium property → Spec. heat cap. (7716)

Prerequisite
The following conditions are met:
- Selected medium:
  - In the Select gas type parameter (→ See page 100), the User-spec. gas option is selected.
    Or
  - In the Sel. liquid type parameter (→ See page 101), the User-spec liquid option is selected.
- In the Enthalpy type parameter (→ See page 104), the Heat option is selected.

Description
Use this function to enter the specific heat capacity of the medium.

User entry
0 to 50 kJ/(kgK)

Factory setting
4.187 kJ/(kgK)

Additional information

Dependency

The unit is taken from the SpecHeatCapaUnit parameter (→ See page 84)

Calorific value

Navigation

Expert → Sensor → Measurement mode → Medium property → Calorific value (7626)

Prerequisite

The following conditions are met:
- Selected medium:
  - In the Select gas type parameter (→ See page 100), the User-spec. gas option is selected.
    Or
  - In the Sel. liquid type parameter (→ See page 101), the User-spec liquid option is selected.
- In the Enthalpy type parameter (→ See page 104), the Calorific value option is selected.
- In the Cal. value type parameter (→ See page 104), the GrossCalorValVol option or GrossCalValMass option is selected.

Description

Use this function to enter the calorific value for calculating the energy flow.

User entry

Positive floating-point number

Factory setting

50 000 kJ/kg

Z-factor

Navigation

Expert → Sensor → Measurement mode → Medium property → Z-factor (7631)

Prerequisite

In the Select gas type parameter (→ See page 100), the User-spec. gas option is selected.

Description

Use this function to enter the real gas constant Z for gas under operating conditions.

User entry

0.1 to 2.0

Factory setting

1

Dynam. viscosity (Liquids)

Navigation
Expert → Sensor → Measurement mode → Medium property → Dynam. viscosity (7733)

Prerequisite
The following conditions are met:
- Order code for "Sensor version",
  - Option "Volume"
    or
  - Option "Volume high temperature"
- The Liquid option is selected in the Select medium parameter (→ See page 99) parameter.
  or
- The User-spec liquid option is selected in the Sel. liquid type parameter (→ See page 101).

Description
Use this function to enter a fixed value for the dynamic viscosity for a liquid.

User entry
Positive floating-point number

Factory setting
1 cP

Additional information

Description

The viscosity entered is used to linearize the measured error in the lower Reynolds number range if the calculated viscosity is not available e.g. "Volume flow" sensor version or the fluid is a user-specific liquid (see table).

Dependencies

Sensor version	Medium	Dyn. viscosity
Volume flow	All	x
Mass flow	All except[1)]	–
	[1)]	x
x	Dynamic viscosity as the input value	

1) User-specific liquid

Dependency

The unit is taken from the Dyn. visc. unit parameter (→ See page 83).

Dynam. viscosity (Gases)

Navigation: Expert → Sensor → Measurement mode → Medium property → Dynam. viscosity (7732)

Prerequisite: The following conditions are met:
- Order code for "Sensor version",
  - Option "Volume"
    or
  - Option "Volume high temperature"
- The Gas option or the Steam option is selected in the Select medium parameter (→ See page 99).
  or
- The User-spec. gas option is selected in the Select gas type parameter (→ See page 100).

Description: Use this function to enter a fixed value for the dynamic viscosity for a gas or steam.

User entry: Positive floating-point number

Factory setting: 0.015 cP

Additional information:

Description

The viscosity entered is used to linearize the measured error in the lower Reynolds number range if the calculated viscosity is not available e.g. "Volume flow" sensor version or the fluid is a user-specific gas (see table).

Dependencies

Sensor version	Medium	Dyn. viscosity
Volume flow	All	x
Mass flow	All except[1)]	–
	[1)]	x
x	Dynamic viscosity as the input value	

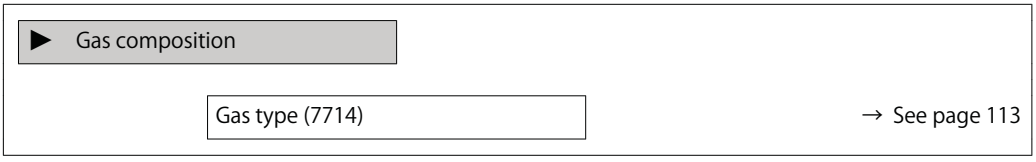
1) User-specific gas

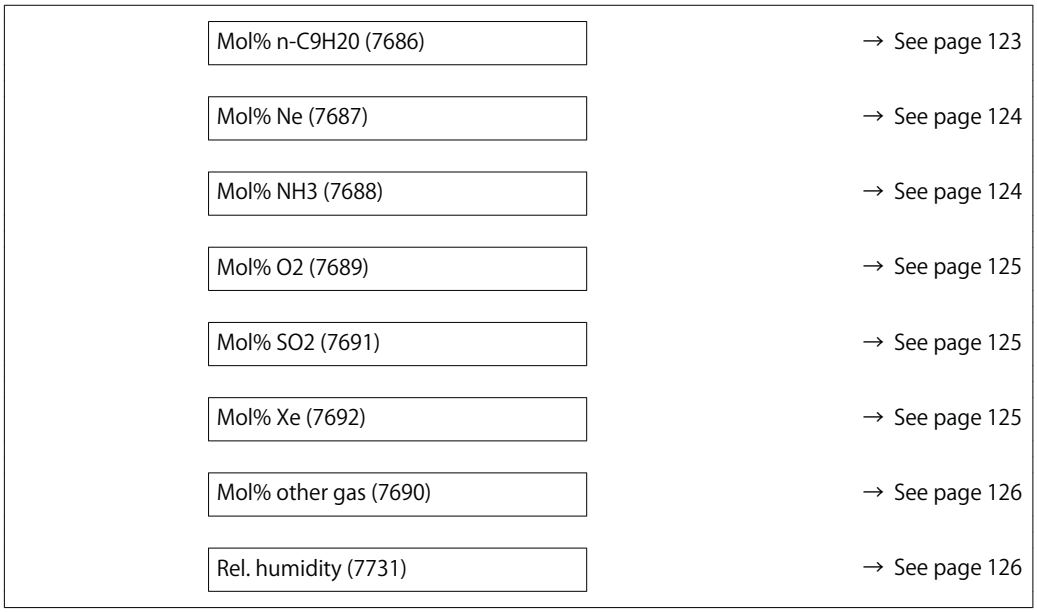
Dependency

The unit is taken from the Dyn. visc. unit parameter (→ See page 83).

"Gas composition" submenu

Navigation: Expert → Sensor → Measurement mode → Medium property → Gas composition





Gas type

Navigation	Expert → Sensor → Measurement mode → Medium property → Gas composition → Gas type (7714)
Prerequisite	The following conditions are met: • In the Select medium parameter (→ See page 99), the Gas option is selected. • In the Select gas type parameter (→ See page 100), the Single gas option is selected.
Description	Use this function to select the type of gas for the measuring application.
Selection	• Hydrogen H2 • Helium He • Neon Ne • Argon Ar • Krypton Kr • Xenon Xe • Nitrogen N2 • Oxygen O2 • Chlorine Cl2 • Ammonia NH3 • Carbon monox. CO • Carbon diox. CO2 • Sulfur diox. SO2 • Hydrog.sulf. H2S • Hydrog.chlor.HCl • Methane CH4 • Ethane C2H6 • Propane C3H8 • Butane C4H10 • Ethylene C2H4 • Vinyl Chloride
Factory setting	Methane CH4

Gas mixture

Navigation
Expert → Sensor → Measurement mode → Medium property → Gas composition → Gas mixture (7640)

Prerequisite
The following conditions are met:
- In the Select medium parameter (→ See page 99), the Gas option is selected.
- In the Select gas type parameter (→ See page 100), the Gas mixture option is selected.

Description
Use this function to select the gas mixture for the measuring application.

Selection
- Hydrogen H2
- Helium He
- Neon Ne
- Argon Ar
- Krypton Kr
- Xenon Xe
- Nitrogen N2
- Oxygen O2
- Chlorine Cl2
- Ammonia NH3
- Carbon monox. CO
- Carbon diox. CO2
- Sulfur diox. SO2
- Hydrog.sulf. H2S
- Hydrog.chlor.HCl
- Methane CH4
- Ethane C2H6
- Propane C3H8
- Butane C4H10
- Ethylene C2H4
- Vinyl Chloride
- Others

Factory setting
Methane CH4

Mol% Ar

Navigation
Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% Ar (7663)

Prerequisite
The following conditions are met:
In the Select medium parameter (→ See page 99), the Gas option is selected.
- In the Select gas type parameter (→ See page 100), the Gas mixture option is selected and in the Gas mixture parameter (→ See page 114), the Argon Ar option is selected.
  Or
- In the Select gas type parameter (→ See page 100), the Natural gas option is selected and in the Density calc. parameter (→ See page 102), the ISO 12213- 2 option is selected.

Description
Use this function to enter the amount of the gas constituent in the gas mixture.

User entry
0 to 100 %

Factory setting	0 %

Mol% C2H3Cl

Navigation	Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% C2H3Cl (7664)
Prerequisite	The following conditions are met: • In the Select medium parameter (→ See page 99), the Gas option is selected. • In the Select gas type parameter (→ See page 100), the Gas mixture option is selected. • In the Gas mixture parameter (→ See page 114), the Vinyl Chloride option is selected.
Description	Use this function to enter the amount of the gas constituent in the gas mixture.
User entry	0 to 100 %
Factory setting	0 %

Mol% C2H4

Navigation	Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% C2H4 (7665)
Prerequisite	The following conditions are met: • In the Select medium parameter (→ See page 99), the Gas option is selected. • In the Select gas type parameter (→ See page 100), the Gas mixture option is selected. • In the Gas mixture parameter (→ See page 114), the Ethylene C2H4 option is selected.
Description	Use this function to enter the amount of the gas constituent in the gas mixture.
User entry	0 to 100 %
Factory setting	0 %

Mol% C2H6

Navigation	Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% C2H6 (7666)
Prerequisite	The following conditions are met: In the Select medium parameter (→ See page 99), the Gas option is selected. • In the Select gas type parameter (→ See page 100), the Gas mixture option is selected and in the Gas mixture parameter (→ See page 114), the Ethane C2H6 option is selected. Or • In the Select gas type parameter (→ See page 100), the Natural gas option is selected and in the Density calc. parameter (→ See page 102), the ISO 12213- 2 option is selected.

Description	Use this function to enter the amount of the gas constituent in the gas mixture.
User entry	0 to 100 %
Factory setting	0 %

Mol% C3H8

Navigation	Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% C3H8 (7667)
Prerequisite	The following conditions are met: In the Select medium parameter (→ See page 99), the Gas option is selected. • In the Select gas type parameter (→ See page 100), the Gas mixture option is selected and in the Gas mixture parameter (→ See page 114), the Propane C3H8 option is selected. Or • In the Select gas type parameter (→ See page 100), the Natural gas option is selected and in the Density calc. parameter (→ See page 102), the ISO 12213- 2 option is selected.
Description	Use this function to enter the amount of the gas constituent in the gas mixture.
User entry	0 to 100 %
Factory setting	0 %

Mol% CH4

Navigation	Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% CH4 (7668)
Prerequisite	The following conditions are met: In the Select medium parameter (→ See page 99), the Gas option is selected. • In the Select gas type parameter (→ See page 100), the Gas mixture option is selected and in the Gas mixture parameter (→ See page 114), the Methane CH4 option is selected. Or • In the Select gas type parameter (→ See page 100), the Natural gas option is selected.
Description	Use this function to enter the amount of the gas constituent in the gas mixture.
User entry	0 to 100 %
Factory setting	100 %

Mol% Cl2

Navigation	Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% Cl2 (7707)
Prerequisite	The following conditions are met: • In the Select medium parameter (→ See page 99), the Gas option is selected. • In the Select gas type parameter (→ See page 100), the Gas mixture option is selected. • In the Gas mixture parameter (→ See page 114), the Chlorine Cl2 option is selected.
Description	Use this function to enter the amount of the gas constituent in the gas mixture.
User entry	0 to 100 %
Factory setting	0 %

Mol% CO

Navigation	Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% CO (7669)
Prerequisite	The following conditions are met: In the Select medium parameter (→ See page 99), the Gas option is selected. • In the Select gas type parameter (→ See page 100), the Gas mixture option is selected and in the Gas mixture parameter (→ See page 114), the Carbon monox. CO option is selected. Or • In the Select gas type parameter (→ See page 100), the Natural gas option is selected and in the Density calc. parameter (→ See page 102), the ISO 12213- 2 option is selected.
Description	Use this function to enter the amount of the gas constituent in the gas mixture.
User entry	0 to 100 %
Factory setting	0 %

Mol% CO2

Navigation	Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% CO2 (7670)
Prerequisite	The following conditions are met: In the Select medium parameter (→ See page 99), the Gas option is selected. • In the Select gas type parameter (→ See page 100), the Gas mixture option is selected and in the Gas mixture parameter (→ See page 114), the Carbon diox. CO2 option is selected. Or • In the Select gas type parameter (→ See page 100), the Natural gas option is selected.
Description	Use this function to enter the amount of the gas constituent in the gas mixture.

User entry	0 to 100 %
Factory setting	0 %

Mol% H2

Navigation	Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% H2 (7671)
Prerequisite	The following conditions are met: In the Select medium parameter (→ See page 99), the Gas option is selected. • In the Select gas type parameter (→ See page 100), the Gas mixture option is selected and in the Gas mixture parameter (→ See page 114), the Hydrogen H2 option is selected. Or • In the Select gas type parameter (→ See page 100), the Natural gas option is selected and in the Density calc. parameter (→ See page 102), the AGA Nx19 option is not selected.
Description	Use this function to enter the amount of the gas constituent in the gas mixture.
User entry	0 to 100 %
Factory setting	0 %

Mol% H2O

Navigation	Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% H2O (7672)
Prerequisite	The following conditions are met: • In the Select medium parameter (→ See page 99), the Gas option is selected. • In the Select gas type parameter (→ See page 100), the Natural gas option is selected. • In the Density calc. parameter (→ See page 102), the ISO 12213- 2 option is selected.
Description	Use this function to enter the amount of the gas constituent in the gas mixture.
User entry	0 to 100 %
Factory setting	0 %

Mol% H2S

Navigation	Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% H2S (7673)
Prerequisite	The following conditions are met: In the Select medium parameter (→ See page 99), the Gas option is selected. • In the Select gas type parameter (→ See page 100), the Gas mixture option is selected and in the Gas mixture parameter (→ See page 114), the Hydrog.sulf. H2S option is selected. Or • In the Select gas type parameter (→ See page 100), the Natural gas option is selected and in the Density calc. parameter (→ See page 102), the ISO 12213- 2 option is selected.
Description	Use this function to enter the amount of the gas constituent in the gas mixture.
User entry	0 to 100 %
Factory setting	0 %

Mol% HCl

Navigation	Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% HCl (7674)
Prerequisite	The following conditions are met: • In the Select medium parameter (→ See page 99), the Gas option is selected. • In the Select gas type parameter (→ See page 100), the Gas mixture option is selected. • In the Gas mixture parameter (→ See page 114), the Hydrog.chlor.HCl option is selected.
Description	Use this function to enter the amount of the gas constituent in the gas mixture.
User entry	0 to 100 %
Factory setting	0 %

Mol% He

Navigation	Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% He (7675)
Prerequisite	The following conditions are met: In the Select medium parameter (→ See page 99), the Gas option is selected. • In the Select gas type parameter (→ See page 100), the Gas mixture option is selected and in the Gas mixture parameter (→ See page 114), the Helium He option is selected. Or • In the Select gas type parameter (→ See page 100), the Natural gas option is selected and in the Density calc. parameter (→ See page 102), the ISO 12213- 2 option is selected.
Description	Use this function to enter the amount of the gas constituent in the gas mixture.

User entry	0 to 100 %
Factory setting	0 %

Mol% i-C4H10

Navigation	Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% i-C4H10 (7676)
Prerequisite	The following conditions are met: • In the Select medium parameter (→ See page 99), the Gas option is selected. • In the Select gas type parameter (→ See page 100), the Natural gas option is selected. • In the Density calc. parameter (→ See page 102), the ISO 12213- 2 option is selected.
Description	Use this function to enter the amount of the gas constituent in the gas mixture.
User entry	0 to 100 %
Factory setting	0 %

Mol% i-C5H12

Navigation	Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% i-C5H12 (7677)
Prerequisite	The following conditions are met: • In the Select medium parameter (→ See page 99), the Gas option is selected. • In the Select gas type parameter (→ See page 100), the Natural gas option is selected. • In the Density calc. parameter (→ See page 102), the ISO 12213- 2 option is selected.
Description	Use this function to enter the amount of the gas constituent in the gas mixture.
User entry	0 to 100 %
Factory setting	0 %

Mol% Kr

Navigation	Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% Kr (7678)
Prerequisite	The following conditions are met: • In the Select medium parameter (→ See page 99), the Gas option is selected. • In the Select gas type parameter (→ See page 100), the Gas mixture option is selected. • In the Gas mixture parameter (→ See page 114), the Krypton Kr option is selected.
Description	Use this function to enter the amount of the gas constituent in the gas mixture.

User entry	0 to 100 %
Factory setting	0 %

Mol% N2

Navigation	Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% N2 (7679)
Prerequisite	The following conditions are met: In the Select medium parameter (→ See page 99), the Gas option is selected. • In the Select gas type parameter (→ See page 100), the Gas mixture option is selected and in the Gas mixture parameter (→ See page 114), the Nitrogen N2 option is selected. Or • In the Select gas type parameter (→ See page 100), the Natural gas option is selected and in the Density calc. parameter (→ See page 102), the AGA Nx19 option or the ISO 12213- 2 option is selected.
Description	Use this function to enter the amount of the gas constituent in the gas mixture.
User entry	0 to 100 %
Factory setting	0 %

Mol% n-C10H22

Navigation	Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% n-C10H22 (7680)
Prerequisite	The following conditions are met: • In the Select medium parameter (→ See page 99), the Gas option is selected. • In the Select gas type parameter (→ See page 100), the Natural gas option is selected. • In the Density calc. parameter (→ See page 102), the ISO 12213- 2 option is selected.
Description	Use this function to enter the amount of the gas constituent in the gas mixture.
User entry	0 to 100 %
Factory setting	0 %

Mol% n-C4H10

Navigation
Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% n-C4H10 (7681)

Prerequisite
The following conditions are met:
- In the Select medium parameter (→ See page 99), the Gas option is selected.
  - In the Select gas type parameter (→ See page 100), the Gas mixture option is selected and in the Gas mixture parameter (→ See page 114), the Butane C4H10 option is selected.
    Or
  - In the Select gas type parameter (→ See page 100), the Natural gas option is selected and in the Density calc. parameter (→ See page 102), the ISO 12213- 2 option is selected.
- Or
  In the Select medium parameter (→ See page 99), the Liquid option is selected and in the Sel. liquid type parameter (→ See page 101), the LPG option is selected.

Description
Use this function to enter the amount of the gas constituent in the gas mixture.

User entry
0 to 100 %

Factory setting
0 %

Mol% n-C5H12

Navigation
Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% n-C5H12 (7682)

Prerequisite
The following conditions are met:
- In the Select medium parameter (→ See page 99), the Gas option is selected.
- In the Select gas type parameter (→ See page 100), the Natural gas option is selected.
- In the Density calc. parameter (→ See page 102), the ISO 12213- 2 option is selected.

Description
Use this function to enter the amount of the gas constituent in the gas mixture.

User entry
0 to 100 %

Factory setting
0 %

Mol% n-C6H14

Navigation
Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% n-C6H14 (7683)

Prerequisite
The following conditions are met:
- In the Select medium parameter (→ See page 99), the Gas option is selected.
- In the Select gas type parameter (→ See page 100), the Natural gas option is selected.
- In the Density calc. parameter (→ See page 102), the ISO 12213- 2 option is selected.

Description
Use this function to enter the amount of the gas constituent in the gas mixture.

User entry	0 to 100 %
Factory setting	0 %

Mol% n-C7H16

Navigation	Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% n-C7H16 (7684)
Prerequisite	The following conditions are met: • In the Select medium parameter (→ See page 99), the Gas option is selected. • In the Select gas type parameter (→ See page 100), the Natural gas option is selected. • In the Density calc. parameter (→ See page 102), the ISO 12213- 2 option is selected.
Description	Use this function to enter the amount of the gas constituent in the gas mixture.
User entry	0 to 100 %
Factory setting	0 %

Mol% n-C8H18

Navigation	Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% n-C8H18 (7685)
Prerequisite	The following conditions are met: • In the Select medium parameter (→ See page 99), the Gas option is selected. • In the Select gas type parameter (→ See page 100), the Natural gas option is selected. • In the Density calc. parameter (→ See page 102), the ISO 12213- 2 option is selected.
Description	Use this function to enter the amount of the gas constituent in the gas mixture.
User entry	0 to 100 %
Factory setting	0 %

Mol% n-C9H20

Navigation	Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% n-C9H20 (7686)
Prerequisite	The following conditions are met: • In the Select medium parameter (→ See page 99), the Gas option is selected. • In the Select gas type parameter (→ See page 100), the Natural gas option is selected. • In the Density calc. parameter (→ See page 102), the ISO 12213- 2 option is selected.
Description	Use this function to enter the amount of the gas constituent in the gas mixture.

User entry	0 to 100 %
Factory setting	0 %

Mol% Ne

Navigation	Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% Ne (7687)
Prerequisite	The following conditions are met: • In the Select medium parameter (→ See page 99), the Gas option is selected. • In the Select gas type parameter (→ See page 100), the Gas mixture option is selected. • In the Gas mixture parameter (→ See page 114), the Neon Ne option is selected.
Description	Use this function to enter the amount of the gas constituent in the gas mixture.
User entry	0 to 100 %
Factory setting	0 %

Mol% NH3

Navigation	Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% NH3 (7688)
Prerequisite	The following conditions are met: • In the Select medium parameter (→ See page 99), the Gas option is selected. • In the Select gas type parameter (→ See page 100), the Gas mixture option is selected. • In the Gas mixture parameter (→ See page 114), the Ammonia NH3 option is selected.
Description	Use this function to enter the amount of the gas constituent in the gas mixture.
User entry	0 to 100 %
Factory setting	0 %

Mol% O2

Navigation	Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% O2 (7689)
Prerequisite	The following conditions are met: In the Select medium parameter (→ See page 99), the Gas option is selected. • In the Select gas type parameter (→ See page 100), the Gas mixture option is selected and in the Gas mixture parameter (→ See page 114), the Oxygen O2 option is selected. Or • In the Select gas type parameter (→ See page 100), the Natural gas option is selected and in the Density calc. parameter (→ See page 102), the ISO 12213- 2 option is selected.
Description	Use this function to enter the amount of the gas constituent in the gas mixture.
User entry	0 to 100 %
Factory setting	0 %

Mol% SO2

Navigation	Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% SO2 (7691)
Prerequisite	The following conditions are met: • In the Select medium parameter (→ See page 99), the Gas option is selected. • In the Select gas type parameter (→ See page 100), the Gas mixture option is selected. • In the Gas mixture parameter (→ See page 114), the Sulfur diox. SO2 option is selected.
Description	Use this function to enter the amount of the gas constituent in the gas mixture.
User entry	0 to 100 %
Factory setting	0 %

Mol% Xe

Navigation	Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% Xe (7692)
Prerequisite	The following conditions are met: • In the Select medium parameter (→ See page 99), the Gas option is selected. • In the Select gas type parameter (→ See page 100), the Gas mixture option is selected. • In the Gas mixture parameter (→ See page 114), the Xenon Xe option is selected.
Description	Use this function to enter the amount of the gas constituent in the gas mixture.
User entry	0 to 100 %

Factory setting 0 %

Mol% other gas

Navigation Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% other gas (7690)

Prerequisite The following conditions are met:
• In the Select medium parameter (→ See page 99), the Gas option is selected.
• In the Select gas type parameter (→ See page 100), the Gas mixture option is selected.
• In the Gas mixture parameter (→ See page 114), the Others option is selected.

Description Use this function to enter the amount of the gas constituent in the gas mixture.

User entry 0 to 100 %

Factory setting 0 %

Rel. humidity

Navigation Expert → Sensor → Measurement mode → Medium property → Gas composition → Rel. humidity (7731)

Prerequisite The following conditions are met:
• In the Select medium parameter (→ See page 99), the Gas option is selected.
• In the Select gas type parameter (→ See page 100), the Air option is selected.

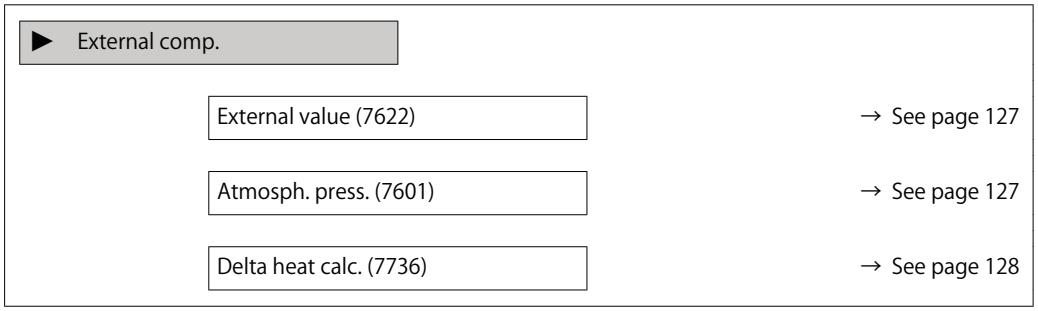
Description Use this function to enter the humidity content of the air in %.

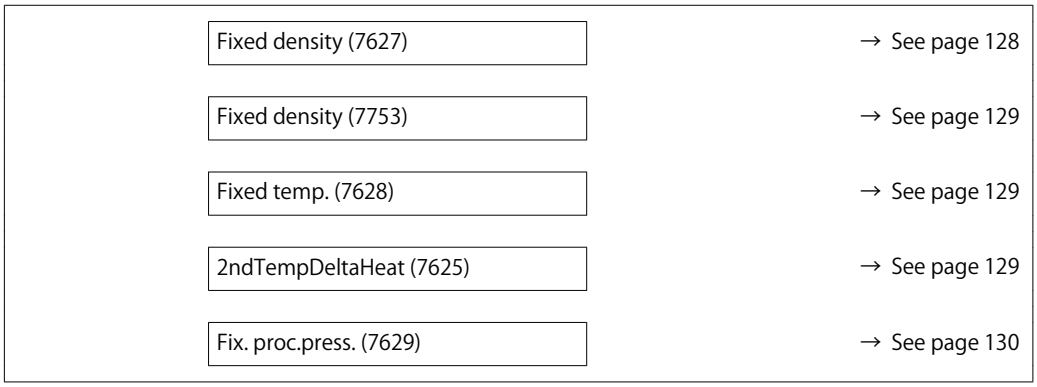
User entry 0 to 100 %

Factory setting 0 %

3.2.5 "External compensation" submenu

Navigation Expert → Sensor → External comp.





External value

Navigation: Expert → Sensor → External comp. → External value (7622)

Prerequisite: With order code for "Sensor version":
- Option "Mass (integrated temperature measurement)"
  or
- Option "Mass (integrated pressure/temperature measurement)"

Description: Use this function to select the process variable which is taken from an external device.

For detailed information on setting the parameter in steam applications, see the Special Documentation for the Wet Steam Detection and Wet Steam Measurement application package → See page 7

Selection:
- Off
- Pressure
- Gauge pressure
- Density
- Temperature
- 2ndTempDeltaHeat

Factory setting: Off

Atmosph. press.

Navigation: Expert → Sensor → External comp. → Atmosph. press. (7601)

Prerequisite: In the External value parameter (→ See page 127), the Gauge pressure option is selected.

Description: Use this function to enter the value for the ambient pressure to be used for pressure correction.

User entry: 0 to 250 bar

Factory setting: 1.01325 bar

Additional information

Dependency

The unit is taken from thePressure unit parameter (→ See page 76)

Delta heat calc.

Navigation

Expert → Sensor → External comp. → Delta heat calc. (7736)

Prerequisite

The Delta heat calc. parameter (→ See page 128) is visible.

Description

Use this function to select the option for calculating the heat transferred via a heat exchanger (=delta heat).

Selection

- Off
- Device cold side
- Device warm side

Factory setting

Device warm side

Fixed density

Navigation

Expert → Sensor → External comp. → Fixed density (7627)

Prerequisite

With order code for "Sensor version":
- Option "Volume"
  or
- Option "Volume high temperature"

Description

Use this function to enter a fixed value for the density if the medium is a liquid.

User entry

0.01 to 15 000 kg/m³

Factory setting

1 000 kg/m³

Additional information

Description

The density entered is used to linearize the measured error in the lower Reynolds number range if the calculated density is not available e.g. "Volume flow" sensor version or the fluid is a user-specific gas (see table).

Dependency

The unit is taken from theDensity unit parameter (→ See page 82)

Fixed density

Navigation	Expert → Sensor → External comp. → Fixed density (7753)
Prerequisite	With order code for "Sensor version": • Option "Volume" or • Option "Volume high temperature"
Description	Use this function to enter a fixed value for the density if the medium is gas or steam.
User entry	0.01 to 15 000 kg/m³
Factory setting	5 kg/m³
Additional information	Description The density entered is used to linearize the measured error in the lower Reynolds number range if the calculated density is not available e.g. "Volume flow" sensor version or the fluid is a user-specific gas (see table). Dependency The unit is taken from the Density unit parameter (→ See page 82)

Fixed temp.

Navigation	Expert → Sensor → External comp. → Fixed temp. (7628)
Description	Use this function to enter a fixed value for the process temperature.
User entry	–200 to 450 °C
Factory setting	20 °C
Additional information	Dependency The unit is taken from the Temperature unit parameter (→ See page 77)

2ndTempDeltaHeat

Navigation	Expert → Sensor → External comp. → 2ndTempDeltaHeat (7625)
Prerequisite	The 2ndTempDeltaHeat parameter (→ See page 129) is visible.
Description	Use this function to enter the second temperature value for calculating the delta heat.
User entry	–200 to 450 °C

Factory setting 20 ° C

Additional information Dependency

The unit is taken from theTemperature unit parameter (→ See page 77)

Fix. proc.press.

Navigation Expert → Sensor → External comp. → Fix. proc.press. (7629)

Prerequisite The following conditions are met:
- Order code for "Sensor version",
  - Option "Mass flow (integrated temperature measurement)"
    or
  - Option "Mass flow (integrated pressure/temperature measurement)"
- In the External value parameter (→ See page 127) thePressure option is not selected.

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

User entry 0 to 250 bar abs.

Factory setting 0 bar abs.

Additional information User entry

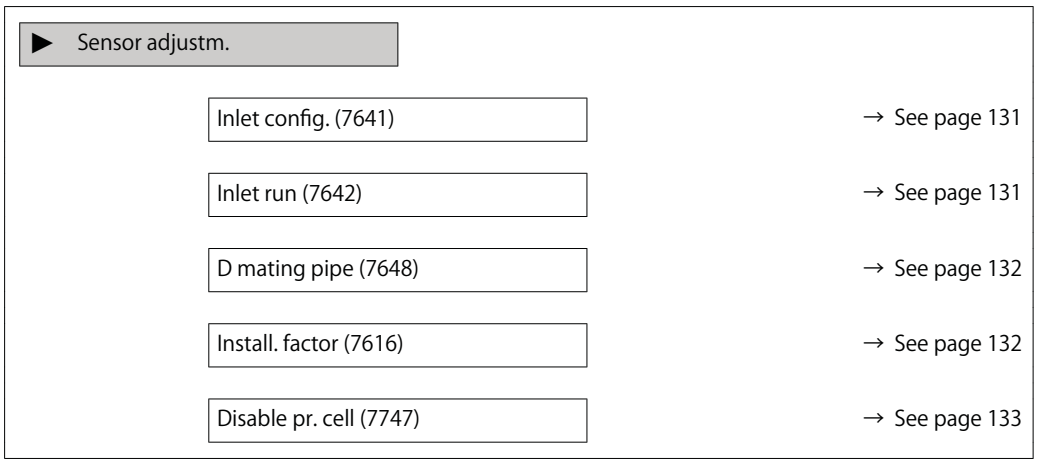
For detailed information on setting the parameter in steam applications, see the Special Documentation for the Wet Steam Detection and Wet Steam Measurement application package → See page 7

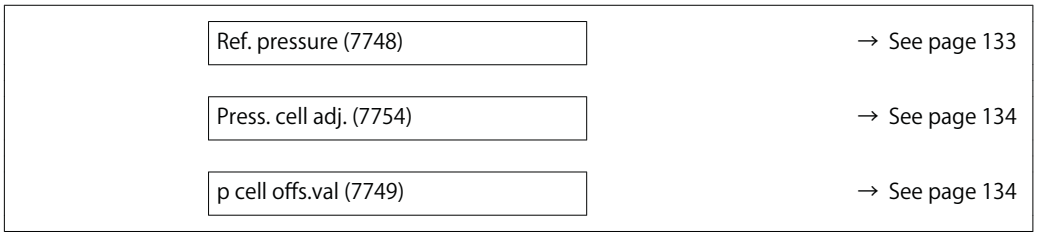
Dependency

The unit is taken from thePressure unit parameter (→ See page 76)

3.2.6 "Sensor adjustm." submenu

Navigation Expert → Sensor → Sensor adjustm.





Inlet config.

Navigation: Expert → Sensor → Sensor adjustm. → Inlet config. (7641)

Prerequisite: The inlet run correction feature:
- Is a standard feature and can only be used in Prowirl F 200.
- Can be used for the following pressure ratings and nominal diameters:
  DN 15 to 150 (1 to 6")
  - EN (DIN)
  - ASME B16.5, Sch. 40/80

Description: Use this function to select the inlet configuration.

Selection:
- Off
- Single elbow
- Double elbow
- Double elbow 3D
- Reduction

Factory setting: Off

Inlet run

Navigation: Expert → Sensor → Sensor adjustm. → Inlet run (7642)

Prerequisite: The inlet run correction feature:
- Is a standard feature and can only be used in Prowirl F 200.
- Can be used for the following pressure ratings and nominal diameters:
  DN 15 to 150 (1 to 6")
  - EN (DIN)
  - ASME B16.5, Sch. 40/80

Description: Use this function to enter the length of the straight inlet run.

User entry: 0 to 20 m

Factory setting: 0 m

Additional information: Dependency

The unit is taken from theLength unit parameter (→ See page 84)

D mating pipe

Navigation
Expert → Sensor → Sensor adjustm. → D mating pipe (7648)

Description
Use this function to enter the diameter of the mating pipe to enable diameter mismatch correction.

User entry
0 to 1 m (0 to 3 ft)

Factory setting
Country-specific:
• 0 m
• 0 ft

Additional information
Description

The device has diameter mismatch correction. This can be enabled by entering the actual internal diameter of the mating pipe in the D mating pipe parameter.

User entry

If the value entered is 0, diameter mismatch correction is disabled. If the standard internal diameter of the ordered process connection differs from the internal diameter of the mating pipe, an additional measuring uncertainty of up to 2 % must be expected if diameter mismatch correction is disabled.

Limit values

Diameter mismatch correction should be enabled only within the following limit values:

Flange connection:
• DN 15 (½"): ±20 % of the internal diameter
• DN 25 (1"): ±15 % of the internal diameter
• DN 40 (1½"): ±12 % of the internal diameter
• DN ≥ 50 (2"): ±10 % of the internal diameter

Disc (wafer version):
• DN 15 (½"): ±15 % of the internal diameter
• DN 25 (1"): ±12 % of the internal diameter
• DN 40 (1½"): ±9 % of the internal diameter
• DN ≥ 50 (2"): ±8 % of the internal diameter

Dependency

The unit is taken from the Length unit parameter (→ See page 84)

Install. factor

Navigation
Expert → Sensor → Sensor adjustm. → Install. factor (7616)

Description
Use this function to enter the factor to adjust installation conditions.

User entry
Positive floating-point number

Factory setting
1.0

Additional information

Description

The calculated volume flow and all measured variables derived from this are multiplied by the installation factor.

Disable pr. cell

Navigation

Expert → Sensor → Sensor adjustm. → Disable pr. cell (7747)

Prerequisite

With order code for "Sensor version":
• Option "Mass steam (integrated pressure/temperature measurement)"
• Option "Mass gas/liquid (integrated pressure/temperature measurement)"

Only available for EF200F-C, EF200R-C.

Description

Use this function to deactivate integrated pressure measurement.

Selection

• No
• Yes

Factory setting

No

Additional information

Description

If pressure measurement is disabled, the measuring device calculates with the value from the Fix. proc.press. parameter (→ See page 130) or with the value from the External value parameter (→ See page 127). This makes it possible to replace the pressure cell with minimum impact on the output variable. The setting is not stored persistently and is reset to the factory setting following a restart.

Selection

• No
  Pressure cell is not disabled.
• Yes
  Pressure cell is disabled.

Ref. pressure

Navigation

Expert → Sensor → Sensor adjustm. → Ref. pressure (7748)

Prerequisite

With order code for "Sensor version":
• Option "Mass steam (integrated pressure/temperature measurement)"
• Option "Mass gas/liquid (integrated pressure/temperature measurement)"

Only available for EF200F-C, EF200R-C.

Description

Use this function to enter the reference pressure for determining the offset value for integrated pressure measurement.

User entry

Positive floating-point number

Factory setting	1.01325 bar
Additional information	Dependency The unit is taken from the Pressure unit parameter (→ See page 76)

Press. cell adj.

Navigation	Expert → Sensor → Sensor adjustm. → Press. cell adj. (7754)
Prerequisite	With order code for "Sensor version": • Option "Mass steam (integrated pressure/temperature measurement)" • Option "Mass gas/liquid (integrated pressure/temperature measurement)" Only available for EF200F-C, EF200R-C.
Description	Description: adjustment process for an offset correction of the integrated pressure measurement.
Selection	• Cancel • Yes • Discard offset
Factory setting	Cancel
Additional information	Selection • Cancel Cancel the offset adjustment and keep the current offset value • Yes Accept the current values for reference pressure and measured pressure for calculating the offset value • Discard offset Reset the existing offset value to 0

p cell offs.val

Navigation	Expert → Sensor → Sensor adjustm. → p cell offs.val (7749)
Prerequisite	With order code for "Sensor version": • Option "Mass steam (integrated pressure/temperature measurement)" • Option "Mass gas/liquid (integrated pressure/temperature measurement)" Only available for EF200F-C, EF200R-C.
Description	Displays the current offset value that the measuring device uses to correct the internal pressure measured value.
User interface	Signed floating-point number

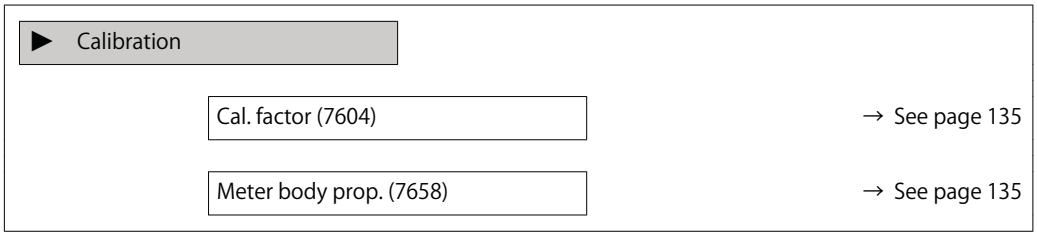
Additional information

Dependency

The unit is taken from the Pressure unit parameter (→ See page 76)

3.2.7 "Calibration" submenu

Navigation Expert → Sensor → Calibration



Cal. factor

Navigation Expert → Sensor → Calibration → Cal. factor (7604)

Description Displays the calibration factor. The calibration factor is determined during device calibration.

User interface Positive floating-point number

Factory setting This value is always >0 when the device is delivered from the factory.

Additional information

Description

Factor by which the measured vortex frequency must be divided in order to calculate the volume flow.

Unit

In $1/m^3$, or vortex pulses per cubic meter

Meter body prop.

Navigation Expert → Sensor → Calibration → Meter body prop. (7658)

Description Displays informative text about the measuring tube.

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

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

Additional information

Description

Summarized information about the meter body.

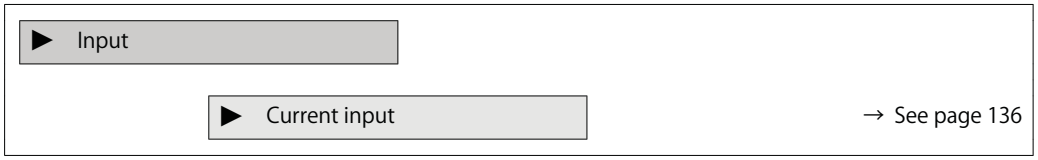
Example

DN25F-PN40: nominal diameter DN25, flange type, pressure rating 40 bar

3.3 "Input" submenu

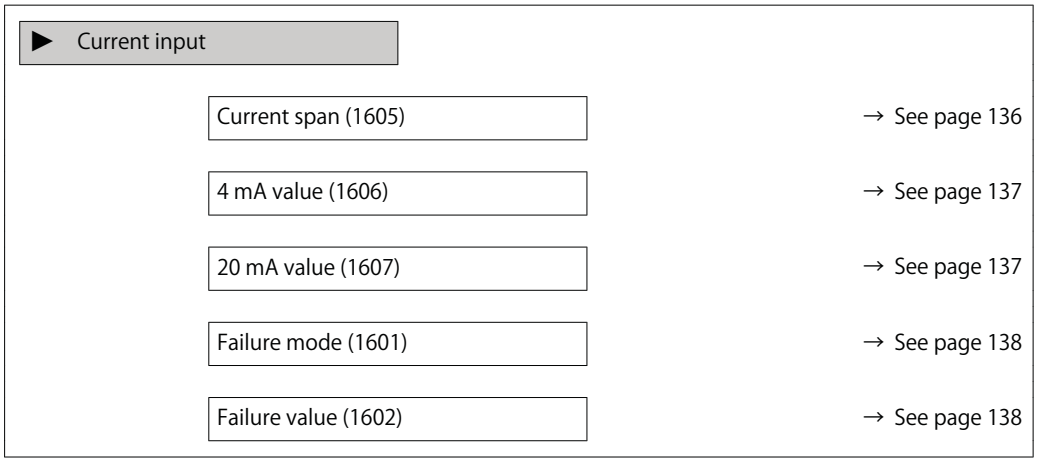
Submenu only available with order code for "Output; input", option D "4-20mA HART, pul./freq./switch; 4-20mA input"

Navigation Expert → Input



3.3.1 "Current input" submenu

Navigation Expert → Input → Current input



Current span

Navigation Expert → Input → Current input → Current span (1605)

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

Selection
- 4...20 mA
- 4...20 mA NAMUR
- 4...20 mA US

Factory setting	Country-specific: • 4...20 mA NAMUR • 4...20 mA US
Additional information	Examples Sample values for the current range: Current span parameter (→ See page 140)

4 mA value

Navigation	Expert → Input → Current input → 4 mA value (1606)
Description	Use this function to enter a value for the 4 mA current.
User entry	Signed floating-point number
Factory setting	0
Additional information	Dependency The entry depends on the process variable selected in the External value parameter (→ See page 127). Current input behavior The current input behaves differently depending on the settings configured in the following parameters: • Current span (→ See page 136) • Failure mode (→ See page 138) Configuration examples Pay attention to the configuration examples for 4 mA value parameter (→ See page 142).

20 mA value

Navigation	Expert → Input → Current input → 20 mA value (1607)
Description	Use this function to enter a value for the 20 mA current.
User entry	Signed floating-point number
Factory setting	Depends on country and nominal diameter
Additional information	Dependency The entry depends on the process variable selected in the External value parameter (→ See page 127). Configuration examples Pay attention to the configuration examples for 4 mA value parameter (→ See page 142).

Failure mode

Navigation: Expert → Input → Current input → Failure mode (1601)

Description: Use this function to select the input behavior when measuring a current outside the configured Current span parameter (→ See page 136).

Selection:
- Alarm
- Last valid value
- Defined value

Factory setting: Alarm

Additional information: Options

- Alarm
  An error message is set.
- Last valid value
  The last valid measured value is used.
- Defined value
  A user-defined measured value is used (Failure value parameter (→ See page 138)).

Failure value

Navigation: Expert → Input → Current input → Failure value (1602)

Prerequisite: In the Failure mode parameter (→ See page 138), the Defined value option is selected.

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

User entry: Signed floating-point number

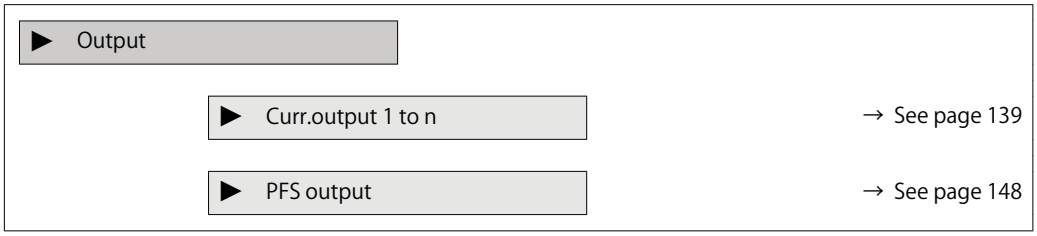
Factory setting: 0

Additional information: Dependency

The entry depends on the process variable selected in the External value parameter (→ See page 127).

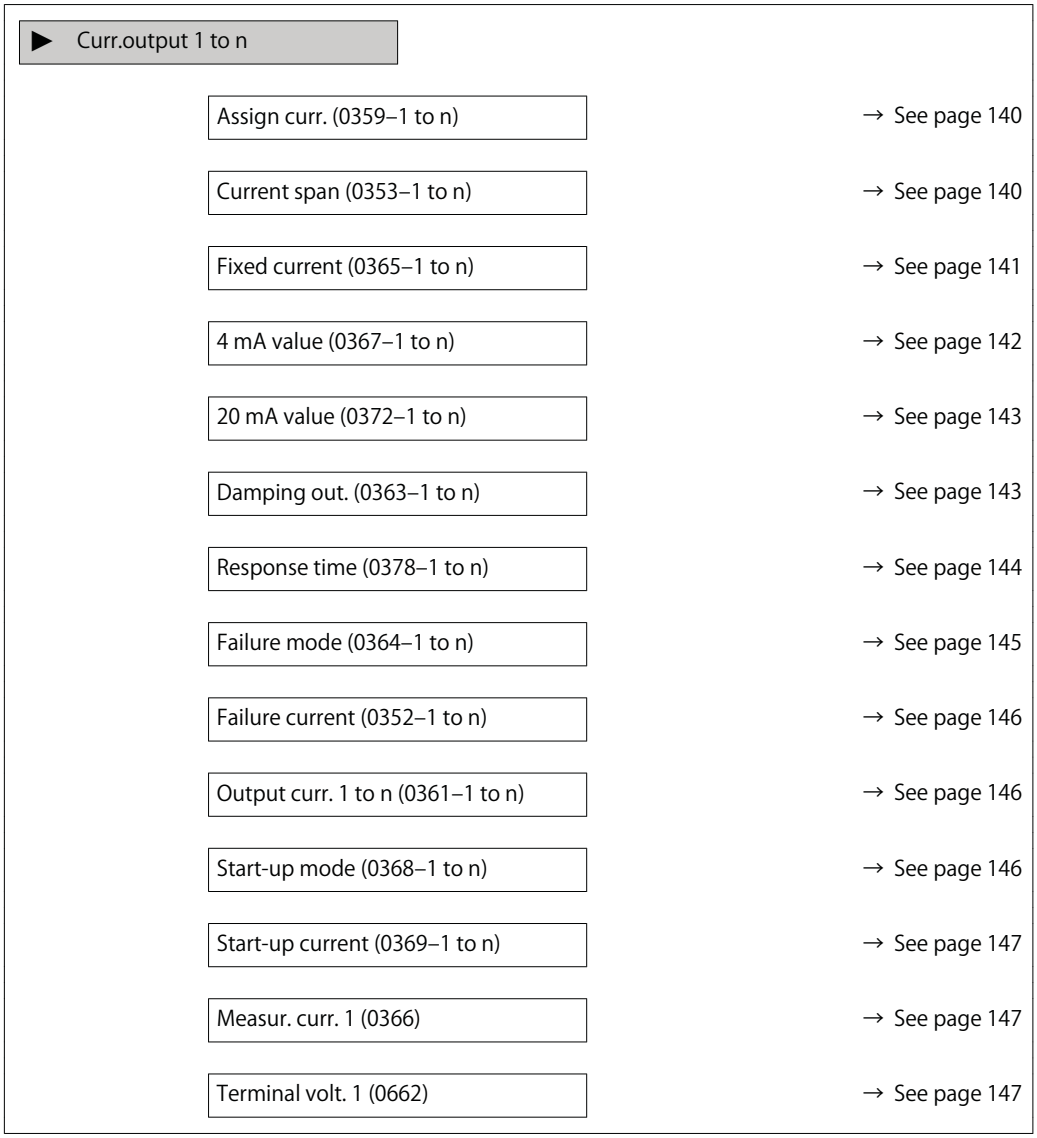
3.4 "Output" submenu

Navigation Expert → Output



3.4.1 "Current output 1 to n" submenu

Navigation Expert → Output → Curr.output 1 to n



Assign curr. 1 to n

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

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

Selection:
- Off
- Volume flow
- Correct.vol.flow
- Mass flow
- Flow velocity
- Temperature
- Pressure
- CalcSatSteamPres*
- Steam quality*
- Total mass flow*
- Energy flow*
- Heat flow diff.*

Factory setting: Volume flow

Current span

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

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

Selection:
- 4...20 mA NAMUR
- 4...20 mA US
- 4...20 mA
- Fixed current

Factory setting: Country-specific:
- 4...20 mA NAMUR
- 4...20 mA US

* Visibility depends on order options or device settings

Additional information

Description

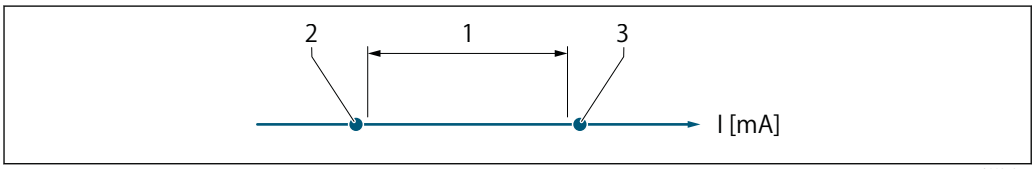
- In the event of a device alarm, the current output adopts the value specified in the Failure mode parameter (→ See page 145).
- If the measured value is outside the measuring range, the diagnostic message ⚠S441 Curr.output 1 to n is displayed.
- The measuring range is specified via the 4 mA value parameter (→ See page 142) and 20 mA value parameter (→ See page 143).

"Fixed current" option

- This option is used for a HART Multidrop network.
- It can only be used for the 4⋯20 mA HART current output (current output 1).
- The current value is set via theFixed current parameter (→ See page 141).

Example

Shows the relationship between the current span for the output of the process variable and the lower and upper alarm levels:



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

Selection

Selection	1	2	3
4...20 mA NAMUR	3.8 to 20.5 mA	< 3.6 mA	> 21.95 mA
4...20 mA US	3.9 to 20.8 mA US	< 3.6 mA	> 21.95 mA
4...20 mA	4 to 20.5 mA	< 3.6 mA	> 21.95 mA

If the flow exceeds or falls below the upper or lower signal on alarm level, the diagnostic message ⚠S441 Curr.output 1 to n is displayed.

Fixed current

Navigation: Expert → Output → Curr.output 1 to n → Fixed current (0365–1 to n)

Prerequisite: The Fixed current option is selected in the Current span parameter (→ See page 140).

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

User entry: 3.59 to 22.5 mA

Factory setting: 4 mA

4 mA value

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

Prerequisite
In the Current span parameter (→ See page 140), one of the following options is selected:
- 4...20 mA NAMUR
- 4...20 mA US
- 4...20 mA

Description
Use this function to enter a value for the 4 mA current.

User entry
Signed floating-point number

Factory setting
Country-specific:
- 0 m^3/h
- 0 ft^3/min

Additional information

Description

Positive and negative values are permitted depending on the process variable assigned in the Assign curr. parameter (→ See page 140). In addition, the value can be greater than or smaller than the value assigned for the 20 mA current in the 20 mA value parameter (→ See page 143).

Dependency

The unit depends on the process variable selected in the Assign curr. parameter (→ See page 140).

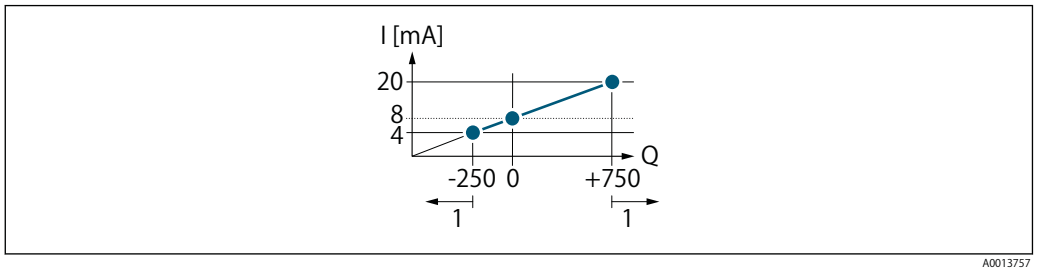
Current output behavior

The current output behaves differently depending on the settings configured in the following parameters:
- Current span (→ See page 140)
- Failure mode (→ See page 145)

Configuration examples

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

Configuration example
In theForward flow
- 4 mA value parameter (→ See page 142) = not equal to zero flow (e.g. –250 m^3/h)
- 20 mA value parameter (→ See page 143) = not equal to zero flow (e.g. +750 m^3/h)
- Calculated current value = 8 mA at zero flow



Q Flow
I Current
1 Measuring range is exceeded or undershot

The operational range of the measuring device is defined by the values entered for the4 mA value parameter (→ See page 142) and 20 mA value parameter (→ See page 143). If the effective flow exceeds or falls below this operational range, the diagnostic message ⚠S441 Curr.output 1 to n is displayed.

20 mA value

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

Prerequisite
One of the following options is selected in the Current span parameter (→ See page 140):
- 4...20 mA NAMUR
- 4...20 mA US
- 4...20 mA

Description
Use this function to enter a value for the 20 mA current.

User entry
Signed floating-point number

Factory setting
Depends on country and nominal diameter→ See page 245

Additional information

Description

Positive and negative values are permitted depending on the process variable assigned in the Assign curr. parameter (→ See page 140). In addition, the value can be greater than or smaller than the value assigned for the 4 mA current in the 4 mA value parameter (→ See page 142).

Dependency

The unit depends on the process variable selected in the Assign curr. parameter (→ See page 140).

Example

- Value assigned to 4 mA = –250 m³/h
- Value assigned to 20 mA = +750 m³/h
- Calculated current value = 8 mA (at zero flow)

Configuration examples

Pay attention to the configuration examples for 4 mA value parameter (→ See page 142).

Damping out. 1 to n

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

Prerequisite
A process variable is selected in the Assign curr. parameter (→ See page 140) and one of the following options is selected in the Current span parameter (→ See page 140):
- 4...20 mA NAMUR
- 4...20 mA US
- 4...20 mA

Description	Use this function to enter a time constant for the reaction time of the current output signal to fluctuations in the measured value caused by process conditions.
User entry	0.0 to 999.9 s
Factory setting	1.0 s
Additional information	User entry Use this function to enter a time constant (PT1 element[3)]) for current output damping: • If a low time constant is entered, the current output reacts particularly quickly to fluctuating measured variables. • On the other hand, the current output reacts more slowly if a high time constant is entered. Damping is switched off if 0 is entered (factory setting).

Response time

Navigation	Expert → Output → Curr.output 1 to n → Response time (0378–1 to n)
Prerequisite	One of the following options is selected in the Assign curr. parameter (→ See page 140): • Volume flow • Correct.vol.flow • Mass flow • Flow velocity • Temperature • CalcSatSteamPres* • Steam quality* • Total mass flow* • Energy flow* • Heat flow diff.* One of the following options is selected in the Current span parameter (→ See page 140): • 4...20 mA NAMUR • 4...20 mA US • 4...20 mA
Description	Displays the response time. This specifies how quickly the current output reaches the measured value change of 63 % of 100 % of the measured value change.
User interface	Positive floating-point number
Additional information	Description The response time is made up of the time specified for the following dampings: • Current output damping → See page 143 and • Depending on the measured variable assigned to the output. Flow damping

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

Failure mode

Navigation	Expert → Output → Curr.output 1 to n → Failure mode (0364–1 to n)
Prerequisite	A process variable is selected in the Assign curr. parameter (→ See page 140) and one of the following options is selected in the Current span parameter (→ See page 140): • 4...20 mA NAMUR • 4...20 mA US • 4...20 mA
Description	Use this function to select the value of the current output in the event of a device alarm.
Selection	• Min. • Max. • Last valid value • Actual value • Defined value
Factory setting	Max.
Additional information	Description This setting does not affect the failsafe mode of other outputs and totalizers. This is specified in separate parameters. "Min." option The current output adopts the value of the lower level for signal on alarm. The signal on alarm level is defined via the Current span parameter (→ See page 140). "Max." option The current output adopts the value of the upper level for signal on alarm. The signal on alarm level is defined via the Current span parameter (→ See page 140). "Last valid value" option The current output adopts the last measured value that was valid before the device alarm occurred. "Actual value" option The current output adopts the measured value on the basis of the current flow measurement; the device alarm is ignored. "Defined value" option The current output adopts a defined measured value. The measured value is defined via the Failure current parameter (→ See page 146).

Failure current

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

Prerequisite: The Defined value option is selected in the Failure mode parameter (→ See page 145).

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

User entry: 3.59 to 22.5 mA

Factory setting: 22.5 mA

Output curr. 1 to n

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

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

User interface: 3.59 to 22.5 mA

Start-up mode

Navigation: Expert → Output → Curr.output 1 to n → Start-up mode (0368–1 to n)

Prerequisite: One of the following options is selected in the Current span parameter (→ See page 140):
- 4...20 mA NAMUR
- 4...20 mA US
- 4...20 mA

Description: Use this function to select the current value that the current output adopts during the device start-up phase as long as no measured value is present.

Selection:
- Min.
- Max.
- Defined value

Factory setting: Min.

Additional information

"Min." option

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

The signal on alarm level is defined via the Current span parameter (→ See page 140).

"Max." option

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

The signal on alarm level is defined via the Current span parameter (→ See page 140).

"Defined value" option

The current output outputs a defined current value.

The current value is defined via the Start-up current parameter (→ See page 147).

Start-up current

Navigation: Expert → Output → Curr.output 1 to n → Start-up current (0369–1 to n)

Prerequisite: The Defined value option is selected in the Start-up mode parameter (→ See page 146) parameter.

Description: Use this function to enter a fixed current value that the current output adopts during the device start-up phase as long as no measured value is present.

User entry: 3.59 to 22.5 mA

Factory setting: 3.6 mA

Measur. curr. 1

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

Description: Use this function to display the actual measured value of the output current.

User interface: 0 to 30 mA

Terminal volt. 1

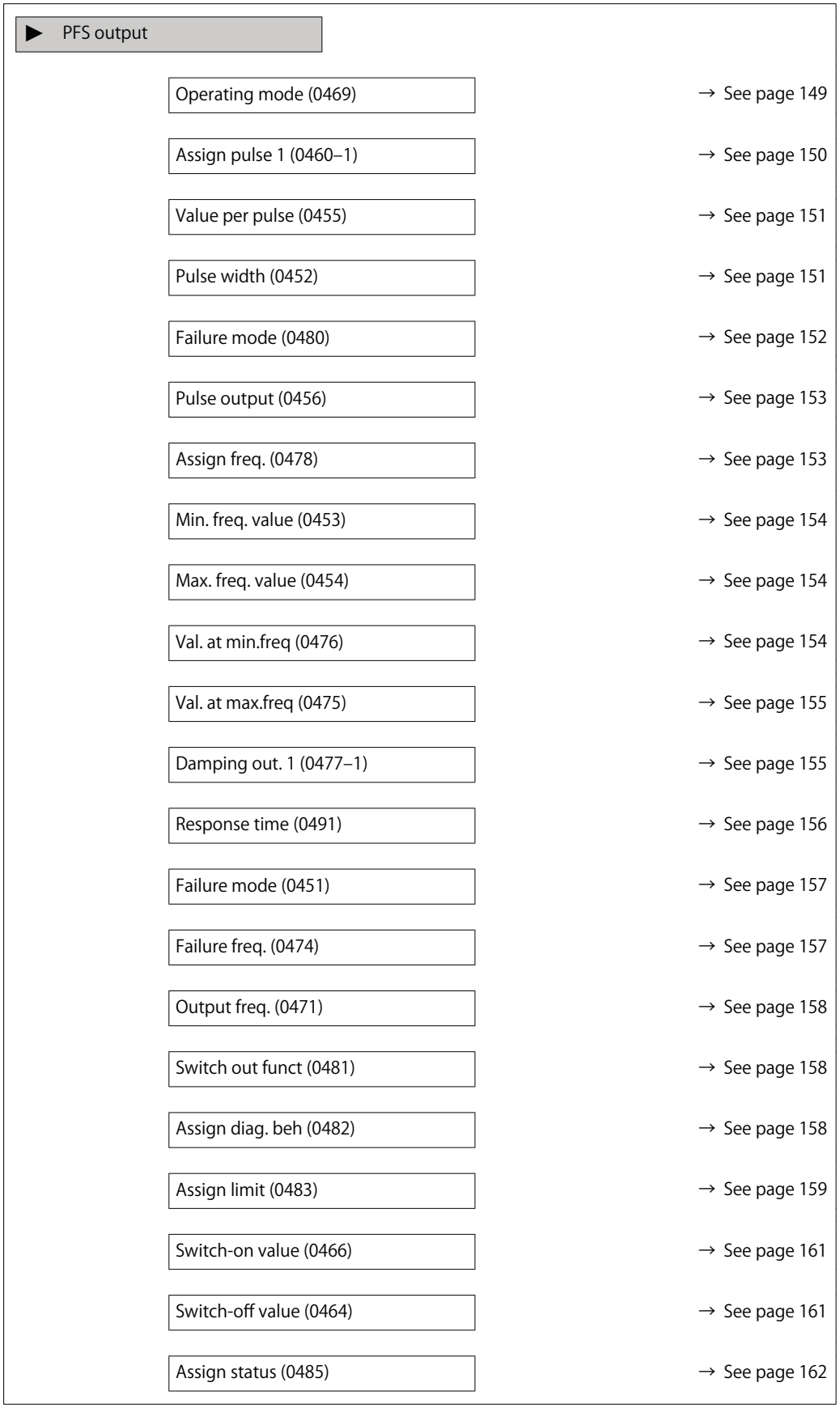
Navigation: Expert → Output → Curr.output 1 → Terminal volt. 1 (0662)

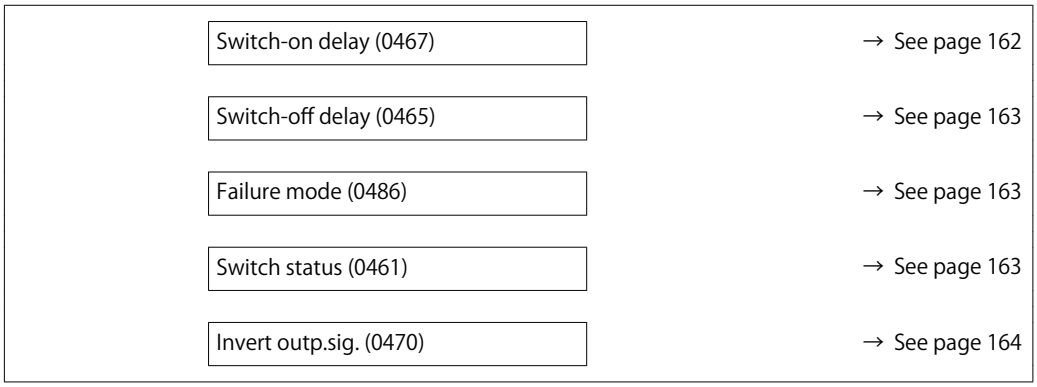
Description: Displays the current terminal voltage that is applied at the output.

User interface: 0.0 to 50.0 V

3.4.2 "Pulse/frequency/switch output" submenu

Navigation Expert → Output → PFS output





Operating mode

Navigation: Expert → Output → PFS output → Operating mode (0469)

Description: Use this function to select the operating mode of the output as a pulse, frequency or switch output.

Selection:
- Pulse
- Frequency
- Switch

Factory setting: Pulse

Additional information: "Pulse" option

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

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

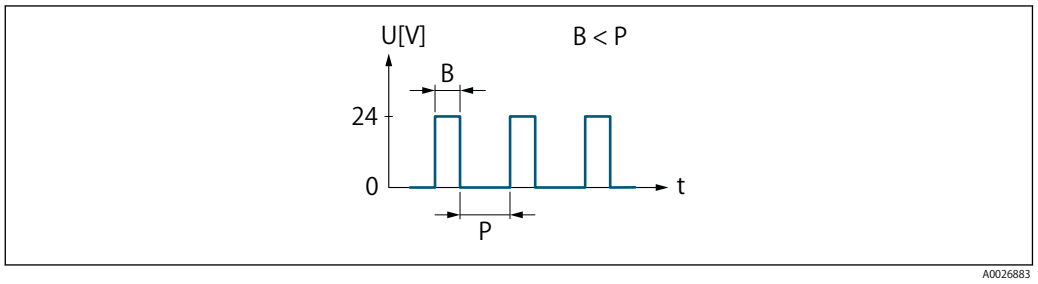


Fig. 2 Quantity-proportional pulse (pulse value) with pulse width to be configured

B Pulse width entered
P Pauses between the individual pulses

"Frequency" option

Flow-proportional frequency output with 1:1 on/off ratio
An output frequency is output that is proportional to the value of a process variable, such as volume flow, corrected volume flow, mass flow, flow velocity, temperature, calculated saturated steam pressure, steam quality, total mass flow, energy flow or heat flow difference.

Example
- Flow rate approx. 100 g/s
- Max. frequency 10 kHz
- Flow rate at max. frequency 1000 g/s
- Output frequency approx. 1000 Hz

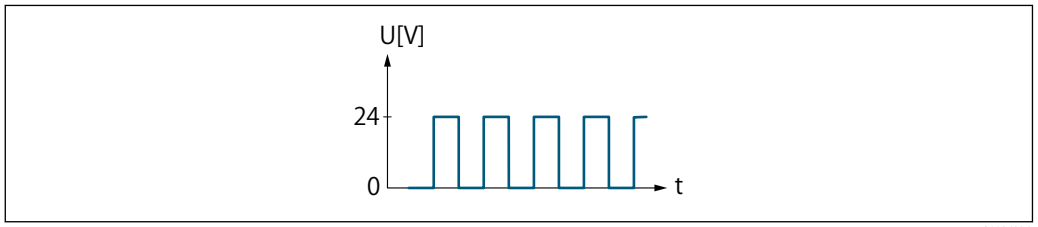


Fig. 3 Flow-proportional frequency output

Assign pulse 1

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

Prerequisite: The Pulse option is selected in the Operating mode parameter (→ See page 149) parameter.

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

Selection:
- Off
- Volume flow
- Correct.vol.flow
- Mass flow
- Total mass flow *
- Energy flow *
- Heat flow diff. *

* Visibility depends on order options or device settings

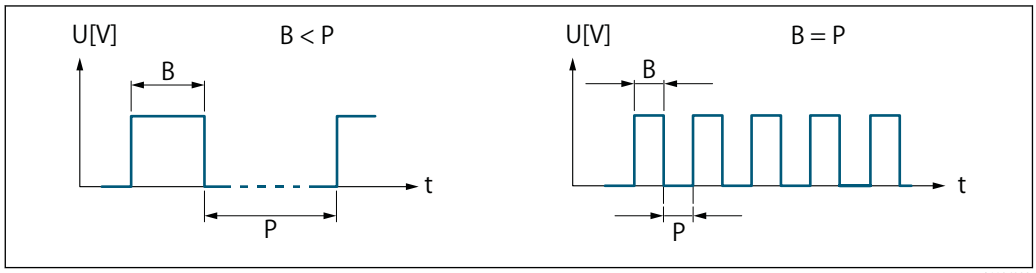
Factory setting	Volume flow

Value per pulse

Navigation	Expert → Output → PFS output → Value per pulse (0455)
Prerequisite	The Pulse option is selected in the Operating mode parameter (→ See page 149) and a process variable is selected in the Assign pulse parameter (→ See page 150).
Description	Use this function to enter the value for the measured value that a pulse is equivalent to.
User entry	Positive floating point number
Factory setting	Depends on country and nominal diameter→ See page 246
Additional information	User entry Weighting of the pulse output with a quantity. The lower the pulse value, the • better the resolution. • the higher the frequency of the pulse response.

Pulse width

Navigation	Expert → Output → PFS output → Pulse width (0452)
Prerequisite	The Pulse option is selected in the Operating mode parameter (→ See page 149) and a process variable is selected in the Assign pulse parameter (→ See page 150).
Description	Use this function to enter the duration of the output pulse.
User entry	5 to 2000 ms
Factory setting	100 ms
Additional information	Description • Define how long a pulse is (duration). • The maximum pulse rate is defined by $f_{max} = 1 / (2 \times \text{pulse width})$. • The interval between two pulses lasts at least as long as the set pulse width. • The maximum flow is defined by $Q_{max} = f_{max} \times \text{pulse value}$. • If the flow exceeds these limit values, the measuring device displays the diagnostic message ⚠ S443 Pulse output 1



B Pulse width entered
P Pauses between the individual pulses

Example

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

Failure mode

Navigation	Expert → Output → PFS output → Failure mode (0480)
Prerequisite	The Pulse option is selected in the Operating mode parameter (→ See page 149) and a process variable is selected in the Assign pulse parameter (→ See page 150).
Description	Use this function to select the failure mode of the pulse output in the event of a device alarm.
Selection	• Actual value • No pulses
Factory setting	No pulses
Additional information	Description The dictates of safety render it advisable to ensure that the pulse output shows a predefined behavior in the event of a device alarm. Selection • Actual value In the event of a device alarm, the pulse output continues on the basis of the current flow measurement. The fault is ignored. • No pulses In the event of a device alarm, the pulse output is "switched off". NOTICE! A device alarm is a measuring device error that must be taken seriously. It can affect the measurement quality such that the quality can no longer be guaranteed. The Actual value option is only recommended if it can be guaranteed that all possible alarm conditions will not affect the measurement quality.

Pulse output

Navigation: Expert → Output → PFS output → Pulse output (0456)

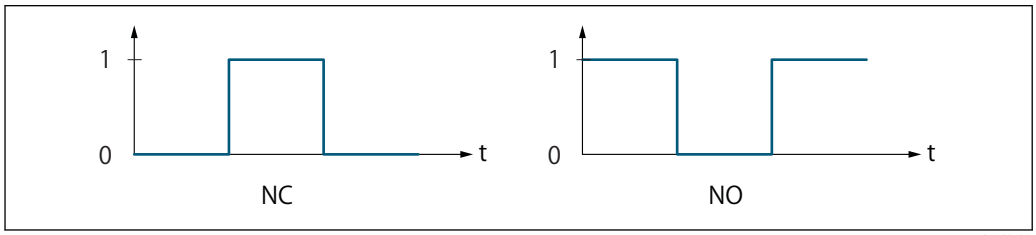
Prerequisite: The Pulse option is selected in the Operating mode parameter (→ See page 149) parameter.

Description: Displays the pulse frequency currently output.

User interface: Positive floating-point number

Additional information: Description

- The pulse output is an open collector output.
- This is configured at the factory in such a way that the transistor is conductive for the duration of the pulse (NO contact) and is safety-oriented.
- The Value per pulse parameter (→ See page 151) and Pulse width parameter (→ See page 151) can be used to define the value (i.e. the measured value amount that corresponds to a pulse) and the duration of the pulse.



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

The output behavior can be reversed via the Invert outp.sig. parameter (→ See page 164) i.e. the transistor does not conduct for the duration of the pulse.

In addition, the behavior of the output in the event of a device alarm (Failure mode parameter (→ See page 152)) can be configured.

Assign freq.

Navigation: Expert → Output → PFS output → Assign freq. (0478)

Prerequisite: The Frequency option is selected in the Operating mode parameter (→ See page 149).

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

Selection:

- Off
- Volume flow
- Correct.vol.flow
- Mass flow
- Flow velocity
- Temperature
- Pressure

- CalcSatSteamPres*
- Steam quality*
- Total mass flow*
- Energy flow*
- Heat flow diff.*

Factory setting: Off

Min. freq. value

Navigation: Expert → Output → PFS output → Min. freq. value (0453)

Prerequisite: The Frequency option is selected in the Operating mode parameter (→ See page 149) and a process variable is selected in the Assign freq. parameter (→ See page 153).

Description: Use this function to enter the minimum frequency.

User entry: 0 to 1 000 Hz

Factory setting: 0 Hz

Max. freq. value

Navigation: Expert → Output → PFS output → Max. freq. value (0454)

Prerequisite: The Frequency option is selected in the Operating mode parameter (→ See page 149) and a process variable is selected in the Assign freq. parameter (→ See page 153).

Description: Use this function to enter the end value frequency.

User entry: 0 to 1 000 Hz

Factory setting: 1 000 Hz

Val. at min.freq

Navigation: Expert → Output → PFS output → Val. at min.freq (0476)

Prerequisite: The Frequency option is selected in the Operating mode parameter (→ See page 149) and a process variable is selected in the Assign freq. parameter (→ See page 153).

Description: Use this function to enter the measured value for the start value frequency.

User entry: Signed floating-point number

* Visibility depends on order options or device settings

Factory setting	Depends on country and nominal diameter
Additional information	Dependency The entry depends on the process variable selected in the Assign freq. parameter (→ See page 153).

Val. at max.freq

Navigation	Expert → Output → PFS output → Val. at max.freq (0475)
Prerequisite	The Frequency option is selected in the Operating mode parameter (→ See page 149) and a process variable is selected in the Assign freq. parameter (→ See page 153).
Description	Use this function to enter the measured value for the end value frequency.
User entry	Signed floating-point number
Factory setting	Depends on country and nominal diameter
Additional information	Description Use this function to enter the maximum measured value at the maximum frequency. The selected process variable is output as a proportional frequency. Dependency The entry depends on the process variable selected in the Assign freq. parameter (→ See page 153).

Damping out. 1

Navigation	Expert → Output → PFS output → Damping out. 1 (0477–1)
Prerequisite	In the Operating mode parameter (→ See page 149), the Frequency option is selected, and one of the following options is selected in the Assign freq. parameter (→ See page 153): • Volume flow • Correct.vol.flow • Mass flow • Flow velocity • Temperature • Pressure • CalcSatSteamPres* • Steam quality* • Total mass flow* • Energy flow* • Heat flow diff.*
Description	Use this function to enter a time constant for the reaction time of the output signal to fluctuations in the measured value.

* Visibility depends on order options or device settings

User entry	0 to 999.9 s
Factory setting	5.0 s
Additional information	User entry

Use this function to enter a time constant (PT1 element [4]) for frequency output damping:
- If a low time constant is entered, the current output reacts particularly quickly to fluctuating measured variables.
- On the other hand, the current output reacts more slowly if a high time constant is entered.

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

The frequency output is subject to separate damping that is independent of all preceding time constants.

Response time

Navigation	Expert → Output → PFS output → Response time (0491)
Prerequisite	In the Operating mode parameter (→ See page 149), the Frequency option is selected, and one of the following options is selected in the Assign freq. parameter (→ See page 153): • Volume flow • Correct.vol.flow • Mass flow • Flow velocity • Temperature • Pressure • CalcSatSteamPres* • Steam quality* • Total mass flow* • Energy flow* • Heat flow diff.*
Description	Displays the response time. This specifies how quickly the pulse/frequency/switch output reaches the measured value change of 63 % of 100 % of the measured value change.
User interface	Positive floating-point number
Additional information	Description

The response time is made up of the time specified for the following dampings:
- Damping of pulse/frequency/switch output → See page 143
  and
- Depending on the measured variable assigned to the output.
  Flow damping

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

Failure mode

Navigation: Expert → Output → PFS output → Failure mode (0451)

Prerequisite: The Frequency option is selected in the Operating mode parameter (→ See page 149) and a process variable is selected in the Assign freq. parameter (→ See page 153).

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

Selection:
- Actual value
- Defined value
- 0 Hz

Factory setting: 0 Hz

Additional information: Selection

- Actual value
  In the event of a device alarm, the frequency output continues on the basis of the current flow measurement. The device alarm is ignored.
- Defined value
  In the event of a device alarm, the frequency output continues on the basis of a predefined value. The Failure freq. (→ See page 157) replaces the current measured value, making it possible to bypass the device alarm. The actual measurement is switched off for the duration of the device alarm.
- 0 Hz
  In the event of a device alarm, the frequency output is "switched off".

NOTICE! A device alarm is a measuring device error that must be taken seriously. It can affect the measurement quality such that the quality can no longer be guaranteed. The Actual value option is only recommended if it can be guaranteed that all possible alarm conditions will not affect the measurement quality.

Failure freq.

Navigation: Expert → Output → PFS output → Failure freq. (0474)

Prerequisite: The Frequency option is selected in the Operating mode parameter (→ See page 149) and a process variable is selected in the Assign freq. parameter (→ See page 153).

Description: Use this function to enter the value for the frequency output in the event of a device alarm in order to bypass the alarm.

User entry: 0.0 to 1 250.0 Hz

Factory setting: 0.0 Hz

Output freq.

Navigation	Expert → Output → PFS output → Output freq. (0471)
Prerequisite	In the Operating mode parameter (→ See page 149), the Frequency option is selected.
Description	Displays the actual value of the output frequency which is currently measured.
User interface	0 to 1 250 Hz

Switch out funct

Navigation	Expert → Output → PFS output → Switch out funct (0481)
Prerequisite	The Switch option is selected in the Operating mode parameter (→ See page 149).
Description	Use this function to select a function for the switch output.
Selection	• Off • On • Diag. behavior • Limit • Status
Factory setting	Off
Additional information	Selection • Off The switch output is permanently switched off (open, non-conductive). • On The switch output is permanently switched on (closed, conductive). • Diag. behavior Indicates if the diagnostic event is present or not. Is used to output diagnostic information and to react to it appropriately at the system level. • Limit Indicates if a specified limit value has been reached for the process variable. Is used to output diagnostic information relating to the process and to react to it appropriately at the system level. • Status Indicates the device status depending on whether empty pipe detection or low flow cut off is selected.

Assign diag. beh

Navigation	Expert → Output → PFS output → Assign diag. beh (0482)
Prerequisite	• In the Operating mode parameter (→ See page 149), the Switch option is selected. • In the Switch out funct parameter (→ See page 158), the Diag. behavior option is selected.

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

Selection
- Alarm
- Alarm or warning
- Warning

Factory setting
Alarm

Additional information
Description

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

Selection

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

Assign limit

Navigation
Expert → Output → PFS output → Assign limit (0483)

Prerequisite
- The Switch option is selected in the Operating mode parameter (→ See page 149).
- The Limit option is selected in the Switch out funct parameter (→ See page 158).

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

Selection
- Volume flow
- Correct.vol.flow
- Mass flow
- Flow velocity
- Temperature
- Pressure
- CalcSatSteamPres*
- Steam quality*
- Total mass flow*
- Energy flow*
- Heat flow diff.*
- Reynolds number*
- Totalizer 1
- Totalizer 2
- Totalizer 3

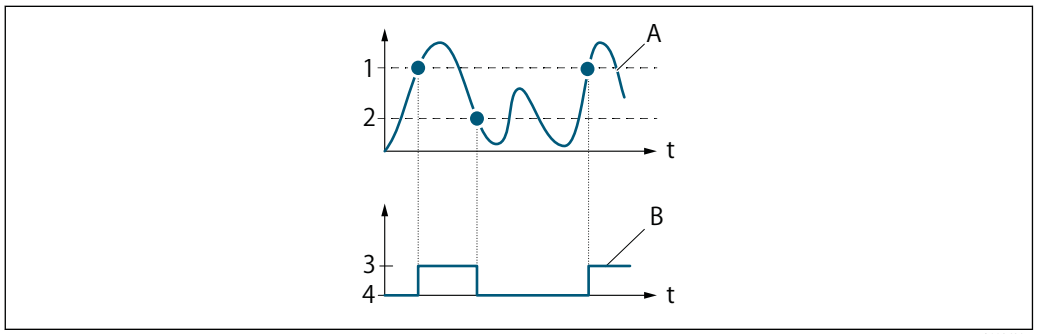
Factory setting
Volume flow

* Visibility depends on order options or device settings

Additional information

Description

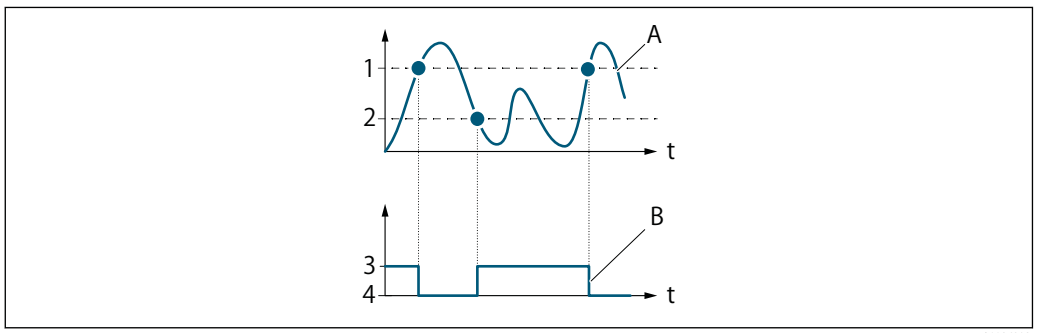
Behavior of status output when Switch-on value > Switch-off value:
- Process variable > Switch-on value: transistor is conductive
- Process variable < Switch-off value: transistor is non-conductive



A0026891

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

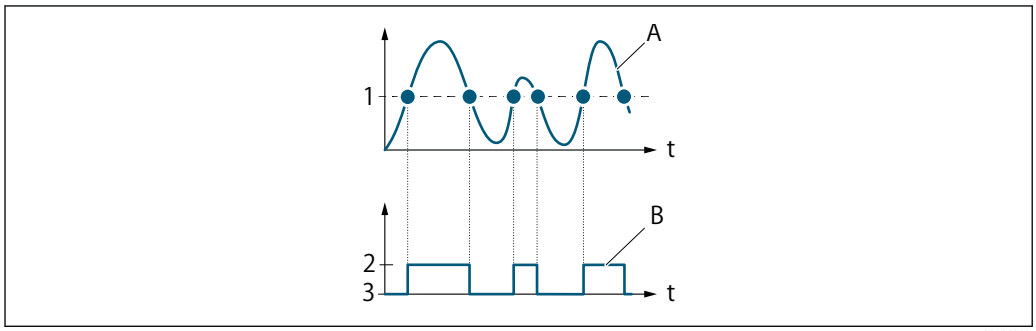
Behavior of status output when Switch-on value < Switch-off value:
- Process variable < Switch-on value: transistor is conductive
- Process variable > Switch-off value: transistor is non-conductive



A0026892

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

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



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

Switch-on value

Navigation
Expert → Output → PFS output → Switch-on value (0466)

Prerequisite
- The Switch option is selected in the Operating mode parameter (→ See page 149).
- The Limit option is selected in the Switch out funct parameter (→ See page 158).

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

User entry
Signed floating-point number

Factory setting
Country-specific:
- 0 m^3/h
- 0 ft^3/h

Additional information
Description

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

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

Dependency

The unit depends on the process variable selected in the Assign limit parameter (→ See page 159).

Switch-off value

Navigation
Expert → Output → PFS output → Switch-off value (0464)

Prerequisite
- The Switch option is selected in the Operating mode parameter (→ See page 149).
- The Limit option is selected in the Switch out funct parameter (→ See page 158).

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

User entry	Signed floating-point number
Factory setting	Country-specific: • 0 m^3/h • 0 ft^3/h
Additional information	Description Use this function to enter the limit value for the switch-off value (process variable < switch-off value = open, non-conductive). When using a hysteresis: Switch-on value > Switch-off value. Dependency The unit depends on the process variable selected in the Assign limit parameter (→ See page 159).

Assign status

Navigation	Expert → Output → PFS output → Assign status (0485)
Prerequisite	• The Switch option is selected in the Operating mode parameter (→ See page 149). • The Status option is selected in the Switch out funct parameter (→ See page 158).
Description	Use this function to select a device status for the switch output.
Selection	Low flow cut off
Factory setting	Low flow cut off
Additional information	Options If empty pipe detection or low flow cut off are enabled, the output is conductive. Otherwise, the switch output is non-conductive.

Switch-on delay

Navigation	Expert → Output → PFS output → Switch-on delay (0467)
Prerequisite	• The Switch option is selected in the Operating mode parameter (→ See page 149). • The Limit option is selected in the Switch out funct parameter (→ See page 158).
Description	Use this function to enter a delay time for switching on the switch output.
User entry	0.0 to 100.0 s
Factory setting	0.0 s

Switch-off delay

Navigation: Expert → Output → PFS output → Switch-off delay (0465)

Prerequisite:
- The Switch option is selected in the Operating mode parameter (→ See page 149).
- The Limit option is selected in the Switch out funct parameter (→ See page 158).

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

User entry: 0.0 to 100.0 s

Factory setting: 0.0 s

Failure mode

Navigation: Expert → Output → PFS output → Failure mode (0486)

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

Selection:
- Actual status
- Open
- Closed

Factory setting: Open

Additional information: Options

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

Switch status

Navigation: Expert → Output → PFS output → Switch status (0461)

Prerequisite: The Switch option is selected in the Operating mode parameter (→ See page 149).

Description: Displays the current switch status of the status output.

User interface:
- Open
- Closed

Additional information

User interface

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

Invert outp.sig.

Navigation

Expert → Output → PFS output → Invert outp.sig. (0470)

Description

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

Selection

- No
- Yes

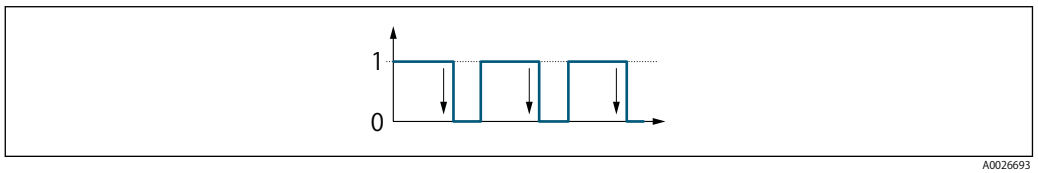
Factory setting

No

Additional information

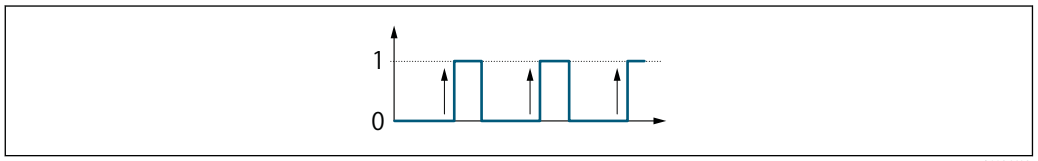
Selection

No option (passive - negative)



A0026693

Yes option (passive - positive)

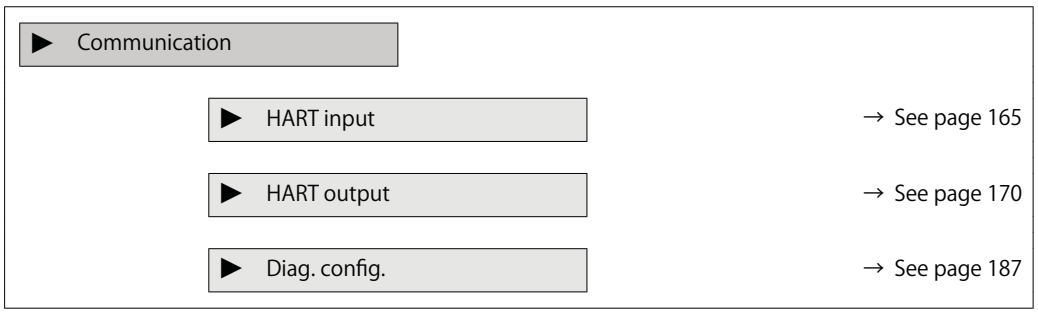


A0026692

3.5 "Communication" submenu

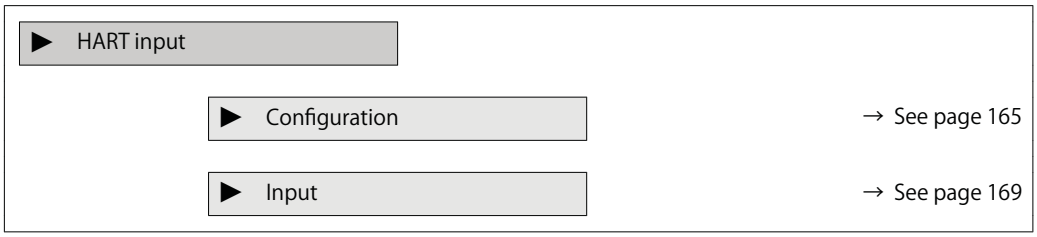
Navigation

Expert → Communication



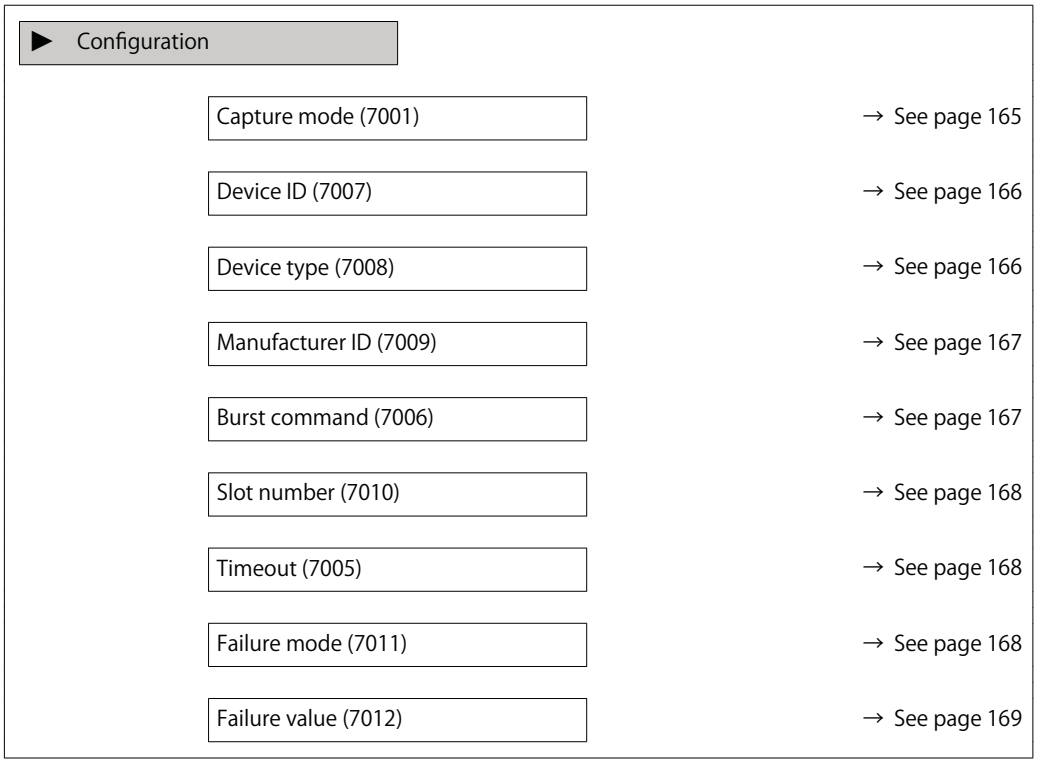
3.5.1 "HART input" submenu

Navigation Expert → Communication → HART input



"Configuration" submenu

Navigation Expert → Communication → HART input → Configuration



Capture mode

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

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

Selection
- Off
- Burst network
- Master network

Factory setting Off

Additional information

"Burst network" option

The device records data transmitted via burst in the network.

An external pressure, density or temperature sensor must be in the burst mode.

"Master network" option

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

Device ID

Navigation

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

Prerequisite

The Master network option is selected in the Capture mode parameter (→ See page 165).

Description

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

User entry

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

Factory setting

0

Additional information

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

Device type

Navigation

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

Prerequisite

In the Capture mode parameter (→ See page 165), the Master network option is selected.

Description

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

User entry

2-digit hexadecimal number

Factory setting

0x00

Additional information

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

Manufacturer ID

Navigation	Expert → Communication → HART input → Configuration → Manufacturer ID (7009)
Prerequisite	The Master network option is selected in the Capture mode parameter (→ See page 165).
Description	Use this function to enter the manufacturer ID of the HART slave device whose data are to be recorded.
User entry	2-digit value: • Via local operation: enter as hexadecimal or decimal number • Via operating tool: enter as decimal number
Factory setting	0
Additional information	In addition to the device ID and manufacturer ID, the device type is part of the unique ID. Each HART device is uniquely identified by the unique device ID.

Burst command

Navigation	Expert → Communication → HART input → Configuration → Burst command (7006)
Prerequisite	The Burst network option or the Master network option are selected in the Capture mode parameter (→ See page 165).
Description	Use this function to select the burst command to be recorded.
Selection	• Command 1 • Command 3 • Command 9 • Command 33
Factory setting	Command 1
Additional information	Selection • Command 1 Use this function to capture the primary variable. • Command 3 Use this function to capture the dynamic HART variables and the current. • Command 9 Use this function to capture the dynamic HART variables including the associated status. • Command 33 Use this function to capture the dynamic HART variables including the associated unit.

Slot number

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

Prerequisite: The Burst network option or the Master network option is selected in the Capture mode parameter (→ See page 165).

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

User entry: 1 to 8

Factory setting: 1

Additional information: User entry

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

Timeout

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

Prerequisite: The Burst network option or the Master network option is selected in the Capture mode parameter (→ See page 165).

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

User entry: 1 to 120 s

Factory setting: 5 s

Additional information: Description

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

Failure mode

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

Prerequisite: In the Capture mode parameter (→ See page 165), the Burst network option or Master network option is selected.

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

Selection:
- Alarm
- Last valid value
- Defined value

Factory setting: Alarm

Additional information: Options

- Alarm
  An error message is set.
- Last valid value
  The last valid measured value is used.
- Defined value
  A user-defined measured value is used: (Failure value parameter (→ See page 169)).

Failure value

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

Prerequisite: The following conditions are met:
- In the Capture mode parameter (→ See page 165), the Burst network option or Master network option is selected.
- In the Failure mode parameter (→ See page 168), the Defined value option is selected.

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

User entry: Signed floating-point number

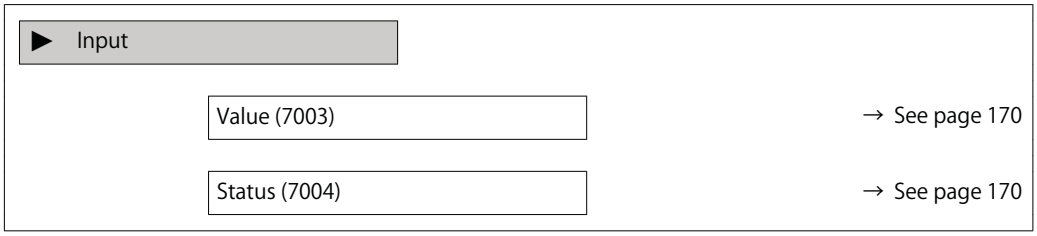
Factory setting: 0

Additional information: Dependency

The entry depends on the process variable selected in the External value parameter (→ See page 127).

"Input" submenu

Navigation: Expert → Communication → HART input → Input



Value

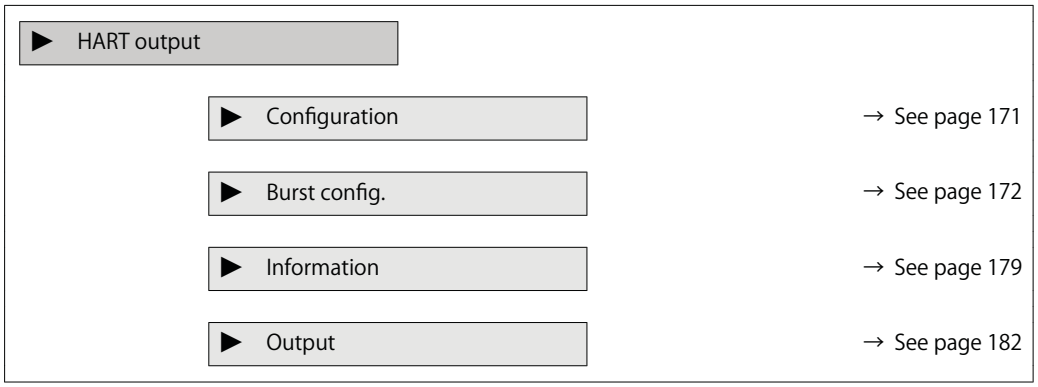
Navigation	Expert → Communication → HART input → Input → Value (7003)
Description	Displays the value of the device variable recorded by the HART input.
User interface	Signed floating-point number
Additional information	Dependency The unit is dependent on the process variable selected in the External value parameter (→ See page 127).

Status

Navigation	Expert → Communication → HART input → Input → Status (7004)
Description	Displays the value of the device variable recorded by the HART input in accordance with the HART specification.
User interface	• Manual/Fixed • Good • Poor accuracy • Bad

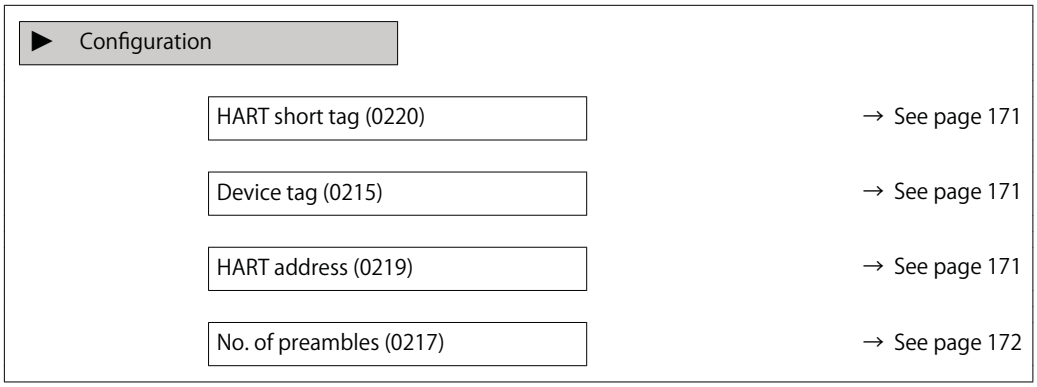
3.5.2 "HART output" submenu

Navigation Expert → Communication → HART output



"Configuration" submenu

Navigation Expert → Communication → HART output → Configuration



HART short tag

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

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

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

Factory setting PROWIRL

Device tag

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

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

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

Factory setting Prowirl

HART address

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

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

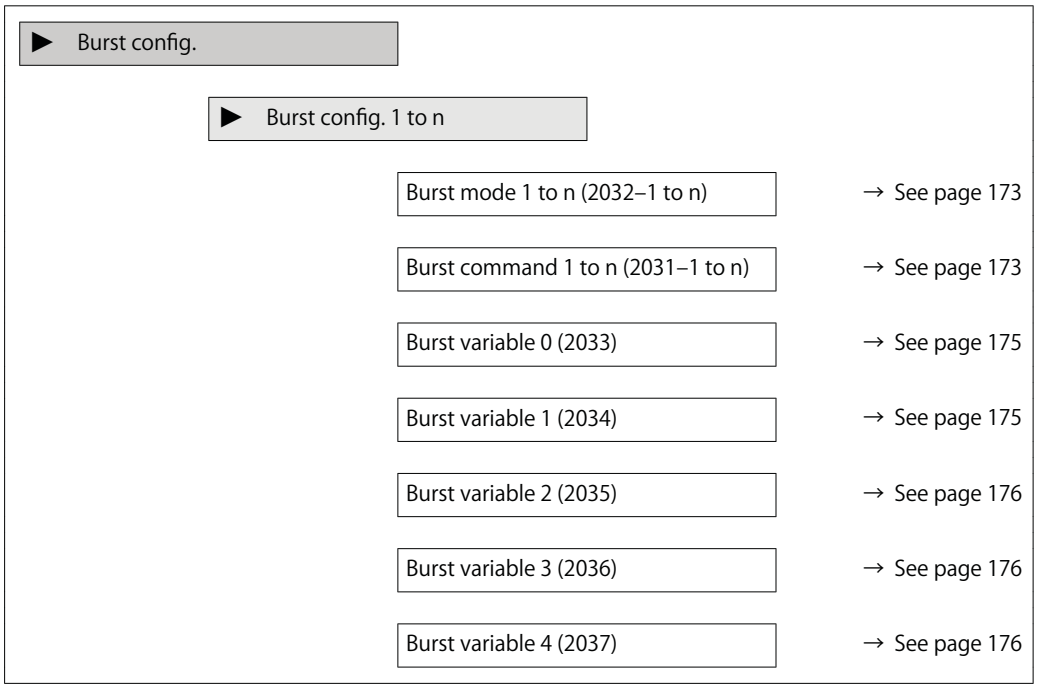
User entry	0 to 63
Factory setting	0
Additional information	Description For addressing in a HART Multidrop network, the Fixed current option must be set in the Current span parameter (→ See page 140) (current output 1).

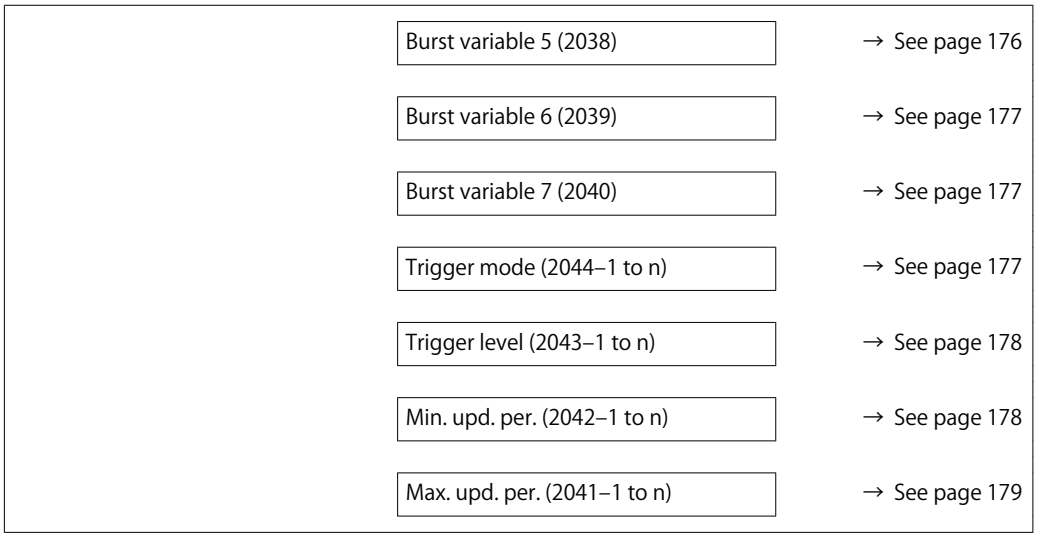
No. of preambles

Navigation	Expert → Communication → HART output → Configuration → No. of preambles (0217)
Description	Use this function to enter the number of preambles in the HART protocol.
User entry	2 to 20
Factory setting	5
Additional information	User entry As every modem component can "swallow" a byte, 2-byte preambles at least must be defined.

"Burst configuration 1 to n" submenu

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





Burst mode 1 to n

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

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

Selection
- Off
- On

Factory setting
Off

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

Burst command 1 to n

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

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

Selection
- Command 1
- Command 2
- Command 3
- Command 9
- Command 33
- Command 48

Factory setting
Command 2

Additional information

Selection

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

"Command 33" option

The HART device variables are defined via Command 107.

The following measured variables (HART device variables) can be read out:
- Volume flow
- Correct.vol.flow
- Mass flow
- Flow velocity
- Temperature
- CalcSatSteamPres*
- Steam quality
- Total mass flow *
- Energy flow *
- Heat flow diff. *
- CondensMassFlow*
- Reynolds number*
- Totalizer 1…3
- HART input
- Density *
- Pressure *
- Specific volume*
- Degree superheat*
- Percent of range
- Measur. curr.
- Primary var (PV)
- Second.var(SV)
- Tertiary var(TV)
- Quaterna.var(QV)

Commands

- Information about the defined details of the command: HART specifications
- The measured variables (HART device variables) are assigned to the dynamic variables in theOutput submenu (→ See page 139).

* Visibility depends on order options or device settings

Burst variable 0

Navigation	Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 0 (2033)
Description	For HART command 9 and 33: select the HART device variable or the process variable.
Selection	• Volume flow • Correct.vol.flow • Mass flow • Flow velocity • Temperature • CalcSatSteamPres* • Steam quality* • Total mass flow * • Energy flow * • Heat flow diff. * • CondensMassFlow* • Reynolds number* • Totalizer 1 • Totalizer 2 • Totalizer 3 • HART input • Density * • Pressure * • Specific volume* • Degree superheat* • Percent of range • Measur. curr. • Primary var (PV) • Second.var(SV) • Tertiary var(TV) • Quaterna.var(QV) • Not used
Factory setting	Volume flow
Additional information	Selection The Not used option is set if a burst message is not configured.

Burst variable 1

Navigation	Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 1 (2034)
Description	For HART command 9 and 33: select the HART device variable or the process variable.
Selection	See the Burst variable 0 parameter (→ See page 175).
Factory setting	Not used

* Visibility depends on order options or device settings

Burst variable 2

Navigation	Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 2 (2035)
Description	For HART command 9 and 33: select the HART device variable or the process variable.
Selection	See theBurst variable 0 parameter (→ See page 175).
Factory setting	Not used

Burst variable 3

Navigation	Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 3 (2036)
Description	For HART command 9 and 33: select the HART device variable or the process variable.
Selection	See theBurst variable 0 parameter (→ See page 175).
Factory setting	Not used

Burst variable 4

Navigation	Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 4 (2037)
Description	For HART command 9: select the HART device variable or the process variable.
Selection	See theBurst variable 0 parameter (→ See page 175).
Factory setting	Not used

Burst variable 5

Navigation	Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 5 (2038)
Description	For HART command 9: select the HART device variable or the process variable.
Selection	See theBurst variable 0 parameter (→ See page 175).
Factory setting	Not used

Burst variable 6

Navigation	Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 6 (2039)
Description	For HART command 9: select the HART device variable or the process variable.
Selection	See theBurst variable 0 parameter (→ See page 175).
Factory setting	Not used

Burst variable 7

Navigation	Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 7 (2040)
Description	For HART command 9: select the HART device variable or the process variable.
Selection	See theBurst variable 0 parameter (→ See page 175).
Factory setting	Not used

Trigger mode

Navigation	Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Trigger mode (2044–1 to n)
Description	Use this function to select the event that triggers burst message X.
Selection	• Continuous • Window • Rising • Falling • On change
Factory setting	Continuous

Additional information	Selection • Continuous The message is sent continuously, at least at intervals corresponding to the time frame specified in the Burst min per parameter (→ See page 178). • Window The message is sent if the specified measured value has changed by the value in the Trigger level parameter (→ See page 178). • Rising The message is sent if the specified measured value exceeds the value in the Trigger level parameter (→ See page 178). • Falling The message is sent if the specified measured value drops below the value in the Trigger level parameter (→ See page 178). • On change The message is sent if a measured value changes in the burst message.

Trigger level

Navigation	Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Trigger level (2043–1 to n)
Description	For entering the burst trigger value.
User entry	Signed floating-point number
Additional information	Description Together with the option selected in the Trigger mode parameter (→ See page 177) the burst trigger value determines the time of burst message X.

Min. upd. per.

Navigation	Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Min. upd. per. (2042–1 to n)
Description	Use this function to enter the minimum time span between two burst commands of burst message X.
User entry	Positive integer
Factory setting	1 000 ms

Max. upd. per.

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

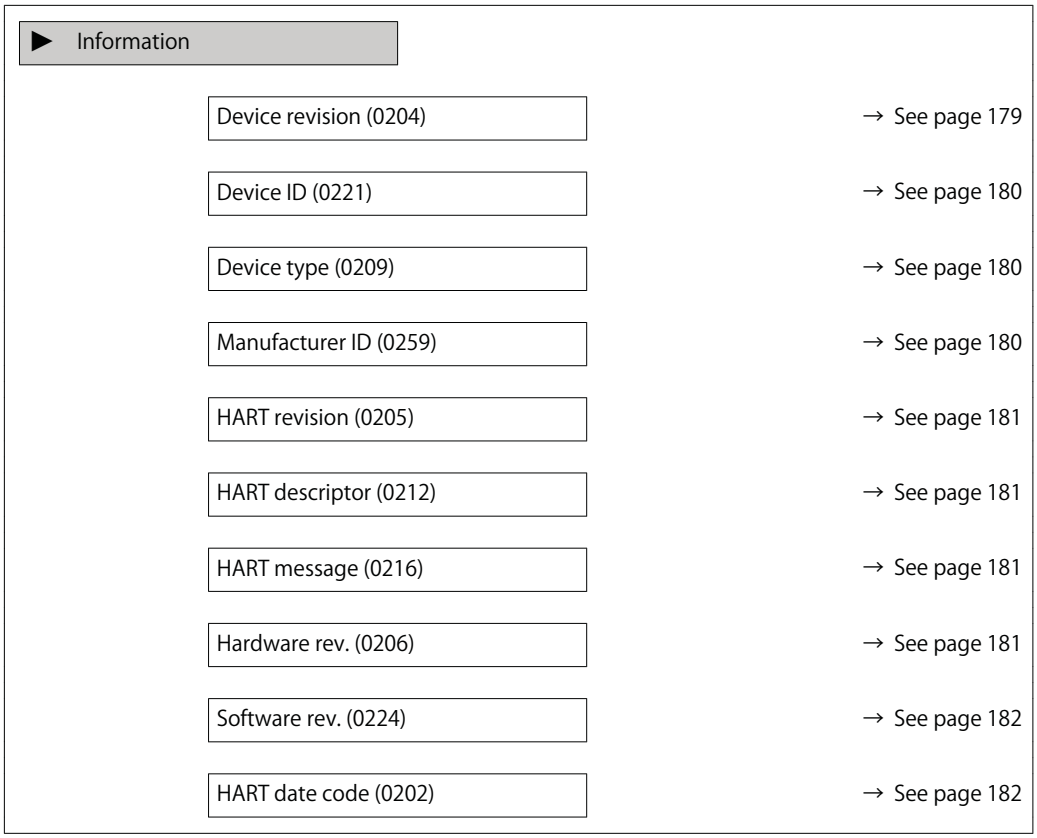
Description: Use this function to enter the maximum time span between two burst commands of bust message X.

User entry: Positive integer

Factory setting: 2 000 ms

"Information" submenu

Navigation: Expert → Communication → HART output → Information



Device revision

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

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

User interface	2-digit hexadecimal number
Factory setting	0x03
Additional information	Description The device revision is needed to assign the appropriate device description file (DD) to the device.

Device ID

Navigation	Expert → Communication → HART output → Information → Device ID (0221)
Description	Use this function to view the device ID for identifying the measuring device in a HART network.
User interface	6-digit hexadecimal number
Additional information	Description In addition to the device type and manufacturer ID, the device ID is part of the unique ID. Each HART device is uniquely identified by the unique device ID.

Device type

Navigation	Expert → Communication → HART output → Information → Device type (0209)
Description	Displays the device type with which the measuring device is registered with the HART Communication Foundation.
User interface	2-digit hexadecimal number
Factory setting	0x0038 (for EF200-C)
Additional information	Description The device type is specified by the manufacturer. It is needed to assign the appropriate device description file (DD) to the device.

Manufacturer ID

Navigation	Expert → Communication → HART output → Information → Manufacturer ID (0259)
Description	Use this function to view the manufacturer ID with which the measuring device is registered with the HART Communication Foundation.
User interface	2-digit hexadecimal number

Factory setting	0x11

HART revision

Navigation	Expert → Communication → HART output → Information → HART revision (0205)
Description	Use this function to display the HART protocol revision of the measuring device.
User interface	5 to 7
Factory setting	7

HART descriptor

Navigation	Expert → Communication → HART output → Information → HART descriptor (0212)
Description	Use this function to enter a description for the measuring point. This can be edited and displayed via HART protocol or using the local display.
User entry	Max. 16 characters such as letters, numbers or special characters (e.g. @, %, /)
Factory setting	Prowirl

HART message

Navigation	Expert → Communication → HART output → Information → HART message (0216)
Description	Use this function to enter a HART message which is sent via the HART protocol when requested by the master.
User entry	Max. 32 characters such as letters, numbers or special characters (e.g. @, %, /)
Factory setting	Prowirl

Hardware rev.

Navigation	Expert → Communication → HART output → Information → Hardware rev. (0206)
Description	Displays the hardware revision of the measuring device.
User interface	0 to 30
Factory setting	1

Software rev.

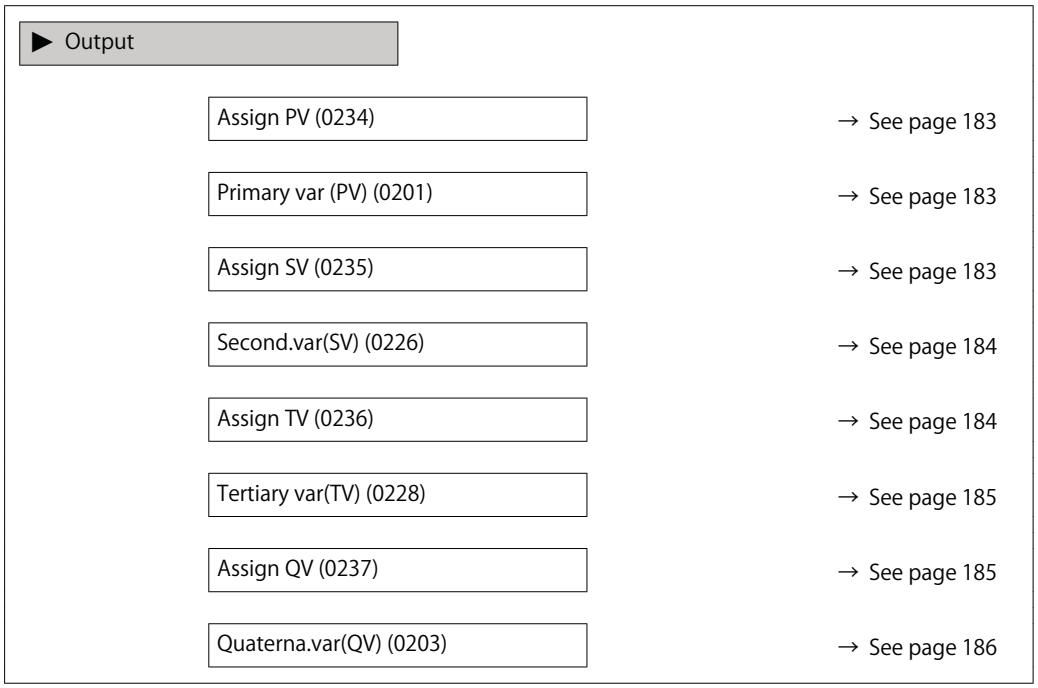
Navigation	Expert → Communication → HART output → Information → Software rev. (0224)
Description	Displays the software revision of the measuring device.
User interface	0 to 255
Factory setting	4

HART date code

Navigation	Expert → Communication → HART output → Information → HART date code (0202)
Description	Use this function to enter the date information for individual use.
User entry	Date entry format: yyyy-mm-dd
Factory setting	2009-07-20
Additional information	Example Device installation date

"Output" submenu

Navigation Expert → Communication → HART output → Output



Assign PV

Navigation	Expert → Communication → HART output → Output → Assign PV (0234)
Description	Use this function to select a measured variable (HART device variable) for the primary dynamic variable (PV).
Selection	• Off • Volume flow • Correct.vol.flow • Mass flow • Flow velocity • Temperature • Pressure • CalcSatSteamPres* • Steam quality* • Total mass flow * • Energy flow * • Heat flow diff. *
Factory setting	Volume flow

Primary var (PV)

Navigation	Expert → Communication → HART output → Output → Primary var (PV) (0201)
Description	Displays the current measured value of the primary dynamic variable (PV).
User interface	Signed floating-point number
Additional information	User interface The measured value displayed depends on the process variable selected in the Assign PV parameter (→ See page 183). Dependency The unit of the displayed measured value is taken from the System units submenu (→ See page 71).

Assign SV

Navigation	Expert → Communication → HART output → Output → Assign SV (0235)
Description	Use this function to select a measured variable (HART device variable) for the secondary dynamic variable (SV).

* Visibility depends on order options or device settings

Selection
- Volume flow
- Correct.vol.flow
- Mass flow
- Flow velocity
- Temperature
- CalcSatSteamPres*
- Steam quality*
- Total mass flow*
- Energy flow*
- Heat flow diff.*
- CondensMassFlow*
- Reynolds number*
- Totalizer 1
- Totalizer 2
- Totalizer 3
- HART input
- Density*
- Pressure*
- Specific volume*
- Degree superheat*

Factory setting: Temperature

Second.var(SV)

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

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

User interface: Positive floating point number

Additional information:

User interface

The measured value displayed depends on the process variable selected in the Assign SV parameter (→ See page 183).

Dependency

The unit of the displayed measured value is taken from the System units submenu (→ See page 71).

Assign TV

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

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

* Visibility depends on order options or device settings

Selection	• Volume flow • Correct.vol.flow • Mass flow • Flow velocity • Temperature • CalcSatSteamPres* • Steam quality* • Total mass flow * • Energy flow * • Heat flow diff. * • CondensMassFlow* • Reynolds number* • Totalizer 1 • Totalizer 2 • Totalizer 3 • HART input • Density * • Pressure * • Specific volume* • Degree superheat*
Factory setting	Totalizer 1

Tertiary var(TV)

Navigation	Expert → Communication → HART output → Output → Tertiary var(TV) (0228)
Description	Displays the current measured value of the tertiary dynamic variable (TV).
User interface	Signed floating-point number
Additional information	User interface The measured value displayed depends on the process variable selected in the Assign TV parameter (→ See page 184). Dependency The unit of the displayed measured value is taken from the System units submenu (→ See page 71).

Assign QV

Navigation	Expert → Communication → HART output → Output → Assign QV (0237)
Description	Use this function to select a measured variable (HART device variable) for the quaternary (fourth) dynamic variable (QV).

* Visibility depends on order options or device settings

Selection
- Volume flow
- Correct.vol.flow
- Mass flow
- Flow velocity
- Temperature
- CalcSatSteamPres*
- Steam quality*
- Total mass flow*
- Energy flow*
- Heat flow diff.*
- CondensMassFlow*
- Reynolds number*
- Totalizer 1
- Totalizer 2
- Totalizer 3
- HART input
- Density*
- Pressure*
- Specific volume*
- Degree superheat*

Factory setting: Totalizer 2

Quaterna.var(QV)

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

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

User interface: Signed floating-point number

Additional information:

User interface

The measured value displayed depends on the process variable selected in the Assign QV parameter (→ See page 185).

Dependency

The unit of the displayed measured value is taken from the System units submenu (→ See page 71).

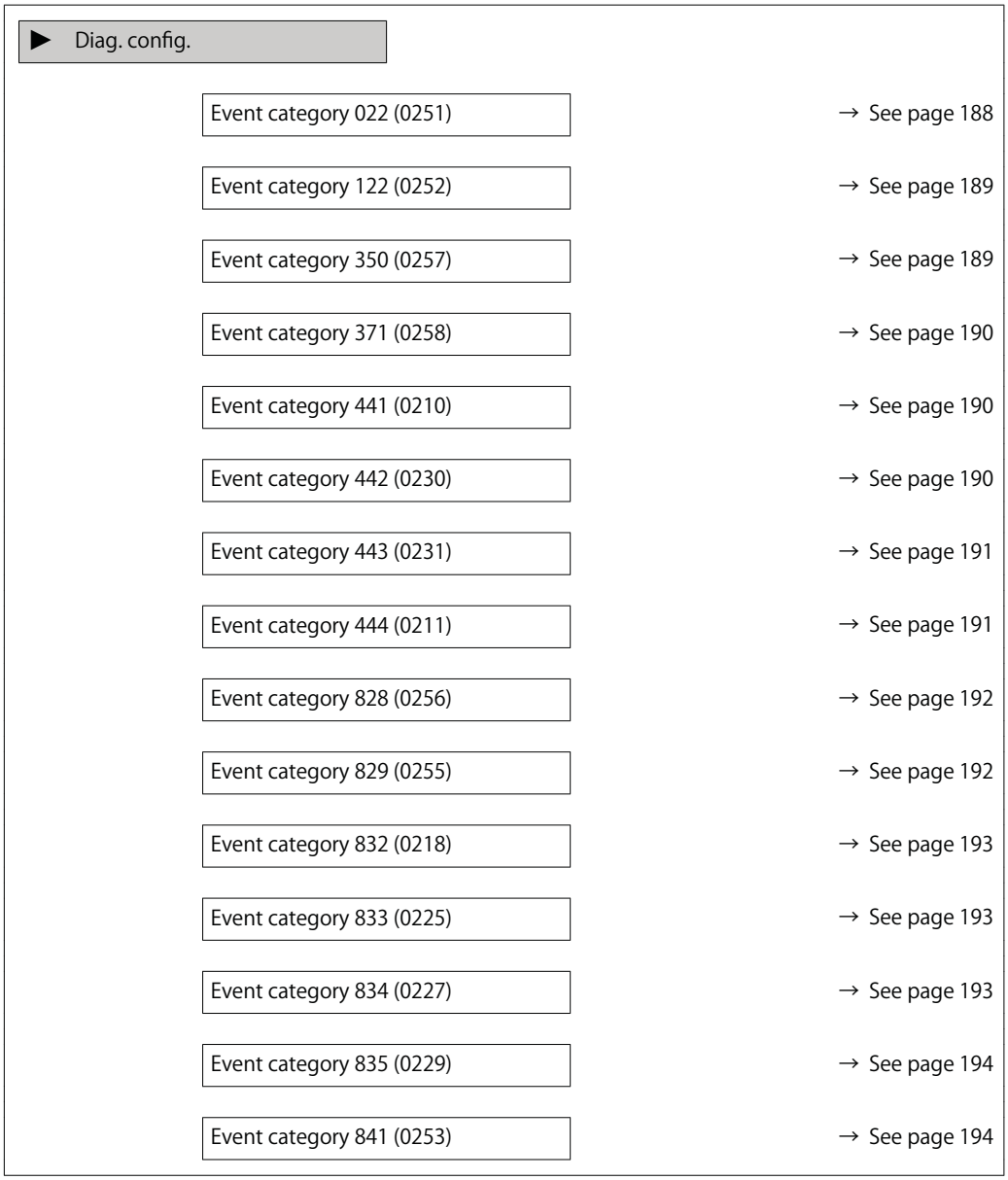
* Visibility depends on order options or device settings

3.5.3 "Diagnostic configuration" submenu

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

Assign a category to the particular diagnostic event:
- Failure (F) option
  A device error has occurred. The measured value is no longer valid.
- Funct. check (C) option
  The device is in service mode (e.g. during a simulation).
- Out of spec. (S) option
  The device is being operated:
  - Outside its technical specification limits (e.g. outside the process temperature range)
  - Outside of the configuration carried out by the user (e.g. maximum flow in parameter 20 mA value)
- Mainten. req.(M) option
  Maintenance is required. The measured value is still valid.
- No effect (N) option
  Has no effect on the condensed status.

Navigation Expert → Communication → Diag. config.



Event category 022 (Temp. sensor)

Navigation	Expert → Communication → Diag. config. → Event category 022 (0251)
Prerequisite	With order code for "Sensor version": • Option "Mass (integrated temperature measurement)" or • Option "Mass (integrated pressure/temperature measurement)"
Description	Use this function to select a category for the diagnostic message 022 Temp. sensor .
Selection	• Failure (F) • Funct. check (C) • Out of spec. (S) • Mainten. req.(M) • No effect (N)
Factory setting	Failure (F)
Additional information	Selection For a detailed description of the event categories available for selection:

Event category 122 (Temp. sensor)

Navigation	Expert → Communication → Diag. config. → Event category 122 (0252)
Prerequisite	With order code for "Sensor version": • Option "Mass (integrated temperature measurement)" or • Option "Mass (integrated pressure/temperature measurement)"
Description	Use this function to select a category for the diagnostic message 122 Temp. sensor .
Selection	• Failure (F) • Funct. check (C) • Out of spec. (S) • Mainten. req.(M) • No effect (N)
Factory setting	Mainten. req.(M)
Additional information	Selection For a detailed description of the event categories available for selection:

Event category 350 (Pre-amplifier)

Navigation	Expert → Communication → Diag. config. → Event category 350 (0257)
Prerequisite	With order code for "Sensor version": • Option "Mass (integrated temperature measurement)" or • Option "Mass (integrated pressure/temperature measurement)"
Description	Use this function to select a category for the diagnostic message 350 Pre-amplifier .
Selection	• Failure (F) • Funct. check (C) • Out of spec. (S) • Mainten. req.(M) • No effect (N)
Factory setting	Out of spec. (S)
Additional information	Selection For a detailed description of the event categories available for selection:

Event category 371 (Temp. sensor)

Navigation	Expert → Communication → Diag. config. → Event category 371 (0258)
Prerequisite	With order code for "Sensor version": • Option "Mass (integrated temperature measurement)" or • Option "Mass (integrated pressure/temperature measurement)"
Description	Use this function to select a category for the diagnostic message 371 Temp. sensor.
Selection	• Failure (F) • Funct. check (C) • Out of spec. (S) • Mainten. req.(M) • No effect (N)
Factory setting	Mainten. req.(M)
Additional information	Selection For a detailed description of the event categories available for selection:

Event category 441 (Curr.output 1 to n)

Navigation	Expert → Communication → Diag. config. → Event category 441 (0210)
Description	Use this function to select a category for the diagnostic message 441 Curr.output 1 to n
Selection	• Failure (F) • Funct. check (C) • Out of spec. (S) • Mainten. req.(M) • No effect (N)
Factory setting	Out of spec. (S)
Additional information	Selection For a detailed description of the event categories available for selection:

Event category 442 (Freq. output)

Navigation	Expert → Communication → Diag. config. → Event category 442 (0230)
Prerequisite	The pulse/frequency/switch output is available.
Description	Use this function to select the category assigned to diagnostic message 442 Freq. output.

Selection	• Failure (F) • Funct. check (C) • Out of spec. (S) • Mainten. req.(M) • No effect (N)
Factory setting	Out of spec. (S)
Additional information	Selection For a detailed description of the event categories available for selection:

Event category 443 (Pulse output)

Navigation	Expert → Communication → Diag. config. → Event category 443 (0231)
Prerequisite	The pulse/frequency/switch output is available.
Description	Use this function to select the category assigned to diagnostic message 443 Pulse output.
Selection	• Failure (F) • Funct. check (C) • Out of spec. (S) • Mainten. req.(M) • No effect (N)
Factory setting	Out of spec. (S)
Additional information	Selection For a detailed description of the event categories available for selection:

Event category 444 (Current input 1 to n)

Navigation	Expert → Communication → Diag. config. → Event category 444 (0211)
Prerequisite	The current input is available.
Description	Use this function to select a category for the diagnostic message 444 Current input 1 to n.
Selection	• Failure (F) • Funct. check (C) • Out of spec. (S) • Mainten. req.(M) • No effect (N)
Factory setting	Out of spec. (S)

Additional information

Selection

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

Event category 828 (Ambient temp.)

Navigation

Expert → Communication → Diag. config. → Event category 828 (0256)

Description

Use this function to select a category for the diagnostic message 828 Ambient temp.

Selection

- Failure (F)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req.(M)
- No effect (N)

Factory setting

Out of spec. (S)

Additional information

Description

The ambient temperature of the pre-amplifier is too low.

Selection

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

Event category 829 (Ambient temp.)

Navigation

Expert → Communication → Diag. config. → Event category 829 (0255)

Description

Use this function to select a category for the diagnostic message 829 Ambient temp.

Selection

- Failure (F)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req.(M)
- No effect (N)

Factory setting

Out of spec. (S)

Additional information

Description

The ambient temperature of the pre-amplifier is too high.

Selection

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

Event category 832 (Electronic temp.)

Navigation	Expert → Communication → Diag. config. → Event category 832 (0218)
Description	Use this function to select a category for the diagnostic message 832 Electronic temp.
Selection	• Failure (F) • Funct. check (C) • Out of spec. (S) • Mainten. req.(M) • No effect (N)
Factory setting	Out of spec. (S)
Additional information	Description The electronics temperature of the transmitter is too high. Selection For a detailed description of the event categories available for selection:

Event category 833 (Electronic temp.)

Navigation	Expert → Communication → Diag. config. → Event category 833 (0225)
Description	Use this option to select a category for the diagnostic message 833 Electronic temp.
Selection	• Failure (F) • Funct. check (C) • Out of spec. (S) • Mainten. req.(M) • No effect (N)
Factory setting	Out of spec. (S)
Additional information	Description The electronics temperature of the transmitter is too low. Selection For a detailed description of the event categories available for selection:

Event category 834 (Process temp.)

Navigation	Expert → Communication → Diag. config. → Event category 834 (0227)
Description	Use this option to select a category for the diagnostic message 834 Process temp.

Selection
- Failure (F)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req.(M)
- No effect (N)

Factory setting: Out of spec. (S)

Additional information:

Description

The process temperature is too high.

Selection

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

Event category 835 (Process temp.)

Navigation: Expert → Communication → Diag. config. → Event category 835 (0229)

Description: Use this option to select a category for the diagnostic message 835 Process temp.

Selection
- Failure (F)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req.(M)
- No effect (N)

Factory setting: Out of spec. (S)

Additional information:

Description

The process temperature is too low.

Selection

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

Event category 841 (Flow velocity)

Navigation: Expert → Communication → Diag. config. → Event category 841 (0253)

Description: Use this function to select a category for the diagnostic message 841 Flow velocity

Selection
- Failure (F)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req.(M)
- No effect (N)

Factory setting: Out of spec. (S)

Additional information

Description

The flow velocity is too high.

Selection

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

Event category 844 (Sensor range)

Navigation

Expert → Communication → Diag. config. → Event category 844 (0239)

Description

Use this function to select a category for the diagnostic message 844 Sensor range

Selection

- Failure (F)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req.(M)
- No effect (N)

Factory setting

Out of spec. (S)

Additional information

Description

The sensor range has been exceeded: "overspeeding".

Selection

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

Event category 870 (Meas. inaccuracy)

Navigation

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

Description

Use this function to select a category for the diagnostic message 870 Meas. inaccuracy

Selection

- Failure (F)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req.(M)
- No effect (N)

Factory setting

Out of spec. (S)

Additional information

Description

The Reynolds number is too low.

Selection

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

Event category 871 (Steam saturation)

Navigation	Expert → Communication → Diag. config. → Event category 871 (0247)
Prerequisite	The Steam option is selected in the Select medium parameter (→ See page 99) parameter.
Description	Use this function to select a category for the diagnostic message 871 Steam saturation.
Selection	• Failure (F) • Funct. check (C) • Out of spec. (S) • Mainten. req.(M) • No effect (N)
Factory setting	Out of spec. (S)
Additional information	For a detailed description of the event categories available for selection:

Event category 872 (Wet steam)

Navigation	Expert → Communication → Diag. config. → Event category 872 (0213)
Prerequisite	The Wet steam detection application package is enabled.
Description	Use this function to select a category for the diagnostic message 872 Wet steam
Selection	• Failure (F) • Funct. check (C) • Out of spec. (S) • Mainten. req.(M) • No effect (N)
Factory setting	Out of spec. (S)
Additional information	Prerequisite The software options currently enabled are displayed in the SW option overv. parameter (→ See page 50). Selection For a detailed description of the event categories available for selection:

Event category 873 (Water detected)

Navigation	Expert → Communication → Diag. config. → Event category 873 (0248)
Prerequisite	The Steam option is selected in the Select medium parameter (→ See page 99) parameter.

Description	Use this function to select a category for the diagnostic message 873 Water detected
Selection	• Failure (F) • Funct. check (C) • Out of spec. (S) • Mainten. req.(M) • No effect (N)
Factory setting	Out of spec. (S)
Additional information	Selection For a detailed description of the event categories available for selection:

Event category 874 (X% spec invalid)

Navigation	Expert → Communication → Diag. config. → Event category 874 (0264)
Prerequisite	The Steam option is selected in the Select medium parameter (→ See page 99) parameter.
Description	Use this function to select a category for the diagnostic message 874 X% spec invalid
Selection	• Failure (F) • Funct. check (C) • Out of spec. (S) • Mainten. req.(M) • No effect (N)
Factory setting	Out of spec. (S)
Additional information	Description The conditions for calculating the steam quality are not met. Selection For a detailed description of the event categories available for selection:

Event category 945 (Sensor range)

Navigation	Expert → Communication → Diag. config. → Event category 945 (0249)
Prerequisite	With order code for "Sensor version": • Option "Mass (integrated temperature measurement)" or • Option "Mass (integrated pressure/temperature measurement)"
Description	Use this function to select a category for the diagnostic message 945 Sensor range

Selection
- Failure (F)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req.(M)
- No effect (N)

Factory setting: Out of spec. (S)

Additional information

Description

The sensor range is outside the pressure-temperature curve of the measuring tube.

Selection

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

Event category 947 (Vibration exceed)

Navigation: Expert → Communication → Diag. config. → Event category 947 (0254)

Description: Use this function to select a category for the diagnostic message 947 Vibration exceed

Selection
- Failure (F)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req.(M)
- No effect (N)

Factory setting: Out of spec. (S)

Additional information

Selection

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

Event category 972 (Degr.superh.lim.)

Navigation: Expert → Communication → Diag. config. → Event category 972 (0263)

Prerequisite: The Steam option is selected in the Select medium parameter (→ See page 99) parameter.

Description: Use this function to select a category for the diagnostic message 972 Degr.superh.lim.

Selection
- Failure (F)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req.(M)
- No effect (N)

Factory setting: Out of spec. (S)

Additional information

Description

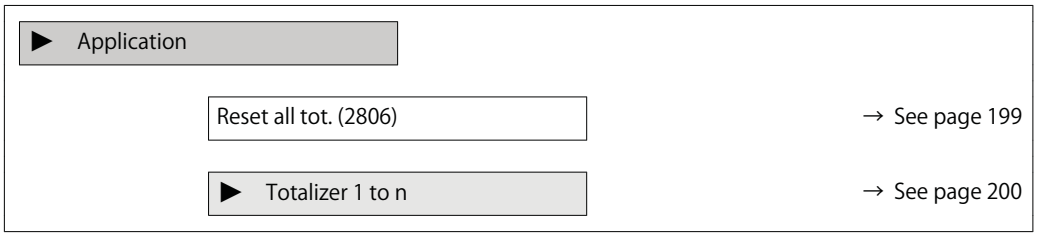
The upper limit for superheated steam was exceeded.

Selection

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

3.6 "Application" submenu

Navigation Expert → Application



Reset all tot.

Navigation Expert → Application → Reset all tot. (2806)

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

Selection
- Cancel
- Reset + totalize

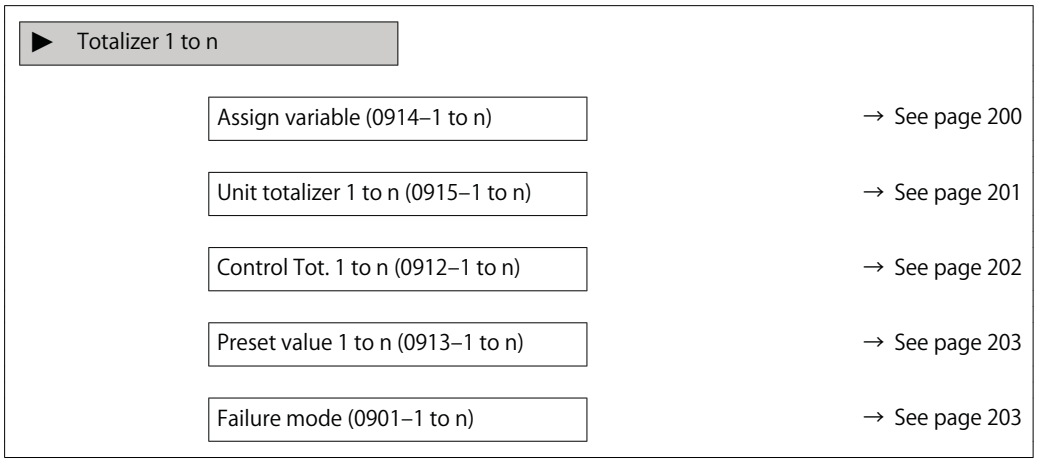
Factory setting Cancel

Additional information Selection

Options	Description
Cancel	No action is executed and the user exits the parameter.
Reset + totalize	Resets all totalizers to 0 and restarts the totaling process. This deletes all the flow values previously totalized.

3.6.1 "Totalizer 1 to n" submenu

Navigation Expert → Application → Totalizer 1 to n



Assign variable

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

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

Selection
- Off
- Volume flow
- Correct.vol.flow
- Mass flow
- Total mass flow *
- CondensMassFlow*
- Energy flow *
- Heat flow diff. *

Factory setting
- Totalizer 1: Volume flow
- Totalizer 2: Mass flow
- Totalizer 3: Corrected volume 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 variable parameter (→ See page 200) is still displayed in the Totalizer 1 to n submenu. All other parameters in the submenu are hidden.

* Visibility depends on order options or device settings

Unit totalizer 1 to n

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

Prerequisite
A process variable is selected in the Assign variable parameter (→ See page 200) of the Totalizer 1 to n submenu.

Description
Use this function to select the process variable unit for the Totalizer 1 to n (→ See page 200).

Selection

SI units
- g
- kg
- t

US units
- oz
- lb
- STon

Custom-specific units
User mass

or

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

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

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

Custom-specific units
User vol.

or

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

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

Imperial units
Sgal (imp)

Custom-specific units
UserCrVol.

or

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

Imperial units
- Btu
- MBtu
- MMBtu

Custom-specific units
User en.

or

Other units
None

Factory setting

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

Additional information

Description

The unit is selected separately for each totalizer. It is independent of the selection made in theSystem units submenu (→ See page 71).

Selection

The selection is dependent on the process variable selected in the Assign variable parameter (→ See page 200).

Control Tot. 1 to n

Navigation

Expert → Application → Totalizer 1 to n → Control Tot. 1 to n (0912–1 to n)

Prerequisite

A process variable is selected in the Assign variable parameter (→ See page 200) of the Totalizer 1 to n submenu.

Description

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

Selection

- Totalize
- Reset + hold
- Preset + hold
- Reset + totalize
- Preset+totalize
- Hold

Factory setting

Totalize

Additional information

Selection

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

Preset value 1 to n

Navigation

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

Prerequisite

A process variable is selected in the Assign variable parameter (→ See page 200) of the Totalizer 1 to n submenu.

Description

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

User entry

Signed floating-point number

Factory setting

Country-specific:
• 0 m^3
• 0 ft^3

Additional information

User entry

The unit of the selected process variable is specified for the totalizer in the Unit totalizer parameter (→ See page 201).

Example

This configuration is suitable for applications such as iterative filling processes with a fixed batch quantity.

Failure mode

Navigation

Expert → Application → Totalizer 1 to n → Failure mode (0901–1 to n)

Prerequisite

A process variable is selected in the Assign variable parameter (→ See page 200) of the Totalizer 1 to n submenu.

Description

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

Selection

• Stop
• Actual value
• Last valid value

Factory setting

Stop

Additional information

Description

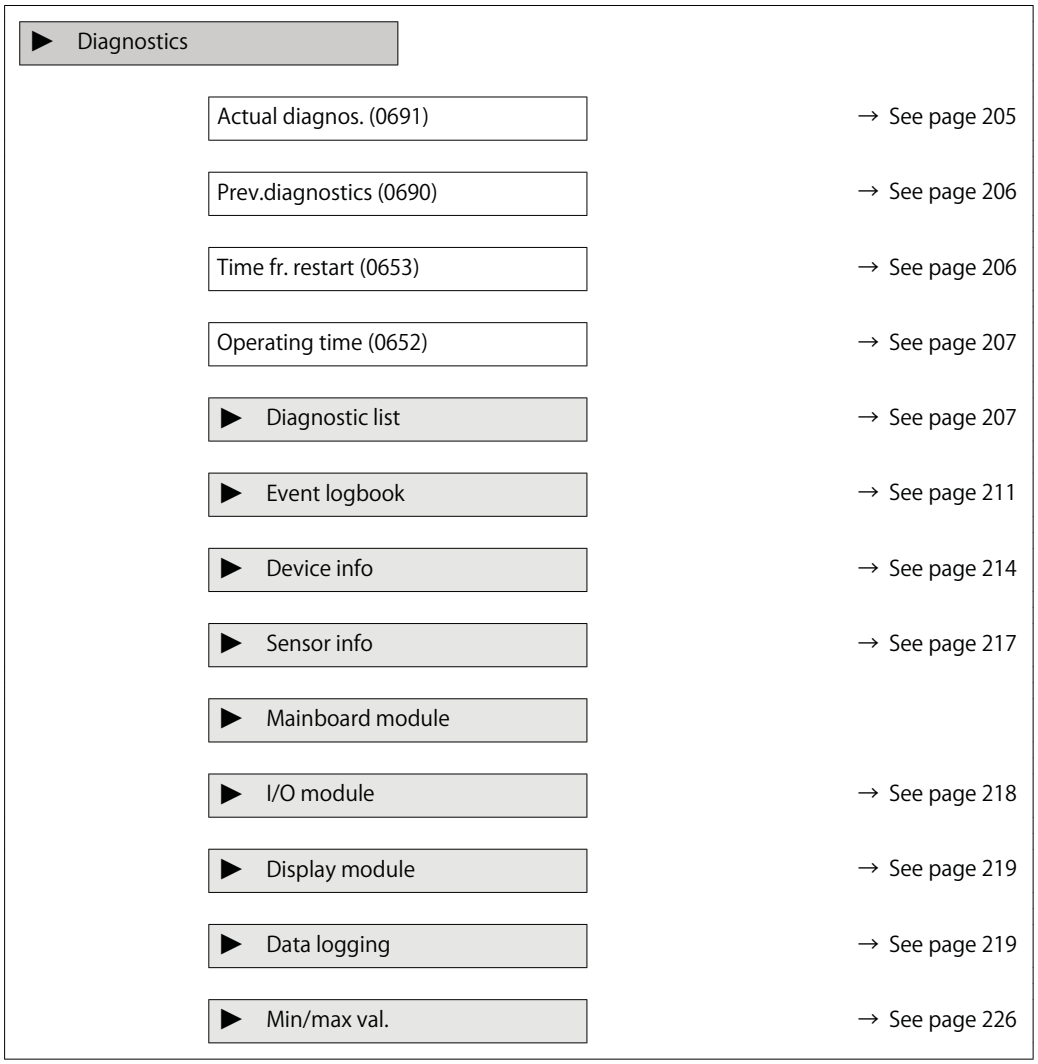
This setting does not affect the failsafe mode of other totalizers and the outputs. This is specified in separate parameters.

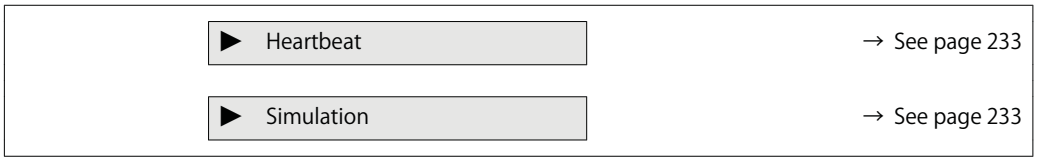
Selection

- Stop
  The totalizer is stopped in the event of a device alarm.
- Actual value
  The totalizer continues to count based on the actual measured value; the device alarm is ignored.
- Last valid value
  The totalizer continues to count based on the last valid measured value before the device alarm occurred.

3.7 "Diagnostics" submenu

Navigation Expert → Diagnostics





Actual diagnos.

Navigation	Expert → Diagnostics → Actual diagnos. (0691)
Prerequisite	A diagnostic event has occurred.
Description	Displays the current diagnostic message. If two or more messages occur simultaneously, the message with the highest priority is shown on the display.
User interface	Symbol for diagnostic behavior, diagnostic code and short message.
Additional information	Display Additional pending diagnostic messages can be viewed in the Diagnostic list submenu (→ See page 207). Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the ⓔ key. Example For the display format: F271 Main electronics

Timestamp

Navigation	Expert → Diagnostics → Timestamp
Description	Displays the operating time when the current diagnostic message occurred.
User interface	Days (d), hours (h), minutes (m) and seconds (s)
Additional information	Display The diagnostic message can be viewed via the Actual diagnos. parameter (→ See page 205). Example For the display format: 24d12h13m00s

Prev.diagnostics

Navigation	Expert → Diagnostics → Prev.diagnostics (0690)
Prerequisite	Two diagnostic events have already occurred.
Description	Displays the diagnostic message that occurred before the current message.
User interface	Symbol for diagnostic behavior, diagnostic code and short message.
Additional information	Display Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the E key. Example For the display format: F271 Main electronics

Timestamp

Navigation	Expert → Diagnostics → Timestamp
Description	Displays the operating time when the last diagnostic message before the current message occurred.
User interface	Days (d), hours (h), minutes (m) and seconds (s)
Additional information	Display The diagnostic message can be viewed via the Prev.diagnostics parameter (→ See page 206). Example For the display format: 24d12h13m00s

Time fr. restart

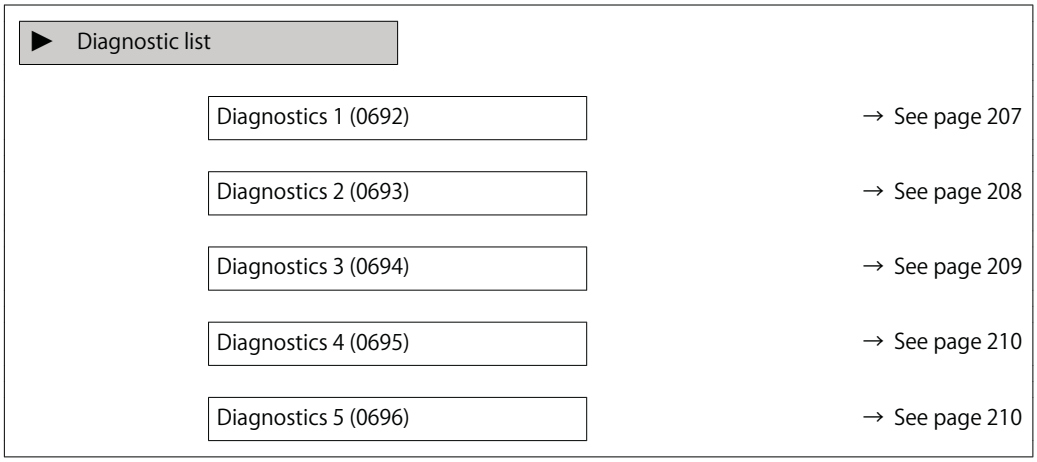
Navigation	Expert → Diagnostics → Time fr. restart (0653)
Description	Use this function to display the time the device has been in operation since the last device restart.
User interface	Days (d), hours (h), minutes (m) and seconds (s)

Operating time

Navigation	Expert → Diagnostics → Operating time (0652)
Description	Use this function to display the length of time the device has been in operation.
User interface	Days (d), hours (h), minutes (m) and seconds (s)
Additional information	User interface The maximum number of days is 9999, which is equivalent to 27 years.

3.7.1 "Diagnostic list" submenu

Navigation Expert → Diagnostics → Diagnostic list



Diagnostics 1

Navigation	Expert → Diagnostics → Diagnostic list → Diagnostics 1 (0692)
Description	Displays the current diagnostics message with the highest priority.
User interface	Symbol for diagnostic behavior, diagnostic code and short message.
Additional information	Display Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the ⓔ key. Examples For the display format: • ⚠ S442 Freq. output • ☣ F276 I/O module

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 (→ See page 207). Example For the display format: 24d12h13m00s

Diagnostics 2

Navigation	Expert → Diagnostics → Diagnostic list → Diagnostics 2 (0693)
Description	Displays the current diagnostics message with the second-highest priority.
User interface	Symbol for diagnostic behavior, diagnostic code and short message.
Additional information	Display Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the E key. Examples For the display format: • ⚠S442 Freq. output • F276 I/O module

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 (→ See page 208).

Example

For the display format:
24d12h13m00s

Diagnostics 3

Navigation

Expert → Diagnostics → Diagnostic list → Diagnostics 3 (0694)

Description

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

User interface

Symbol for diagnostic behavior, diagnostic code and short message.

Additional information

Display

Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the ⓔ key.

Examples

For the display format:
- ⚠S442 Freq. output
- F276 I/O module

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 (→ See page 209).

Example

For the display format:
24d12h13m00s

Diagnostics 4

Navigation	Expert → Diagnostics → Diagnostic list → Diagnostics 4 (0695)
Description	Displays the current diagnostics message with the fourth-highest priority.
User interface	Symbol for diagnostic behavior, diagnostic code and short message.
Additional information	Display Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the E key. Examples For the display format: • ⚠S442 Freq. output • ✖F276 I/O module

Timestamp

Navigation	Expert → Diagnostics → Diagnostic list → Timestamp
Description	Displays the operating time when the diagnostic message with the fourth-highest priority occurred.
User interface	Days (d), hours (h), minutes (m) and seconds (s)
Additional information	Display The diagnostic message can be viewed via the Diagnostics 4 parameter (→ See page 210). Example For the display format: 24d12h13m00s

Diagnostics 5

Navigation	Expert → Diagnostics → Diagnostic list → Diagnostics 5 (0696)
Description	Displays the current diagnostics message with the fifth-highest priority.
User interface	Symbol for diagnostic behavior, diagnostic code and short message.

Additional information

Display

Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the E key.

Examples

For the display format:
• ⚠S442 Freq. output
• F276 I/O module

Timestamp

Navigation

Expert → Diagnostics → Diagnostic list → Timestamp

Description

Displays the operating time when the diagnostic message with the fifth-highest priority occurred.

User interface

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

Additional information

Display

The diagnostic message can be viewed via the Diagnostics 5 parameter (→ See page 210).

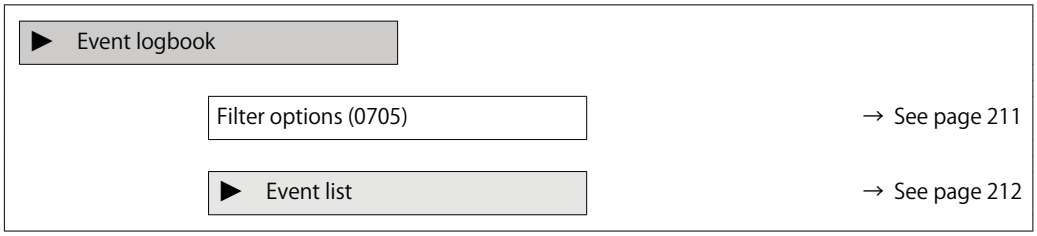
Example

For the display format:
24d12h13m00s

3.7.2 "Event logbook" submenu

Navigation

Expert → Diagnostics → Event logbook



Filter options

Navigation

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

Description

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

Selection
- All
- Failure (F)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req.(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

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)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req.(M)
- Information (I)

Factory setting
All

Additional information
Description

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

"Event list" submenu

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

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

Navigation Expert → Diagnostics → Event logbook → Event list

Event list

Navigation Expert → Diagnostics → Event logbook → Event list

Description Displays the history of event messages of the category selected in the Filter options parameter (→ See page 211).

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

Additional information

Description

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

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

Examples

For the display format:
- I1091 Configuration modified
  24d12h13m00s
- ⚠S442 Freq. output
  01d04h12min30s

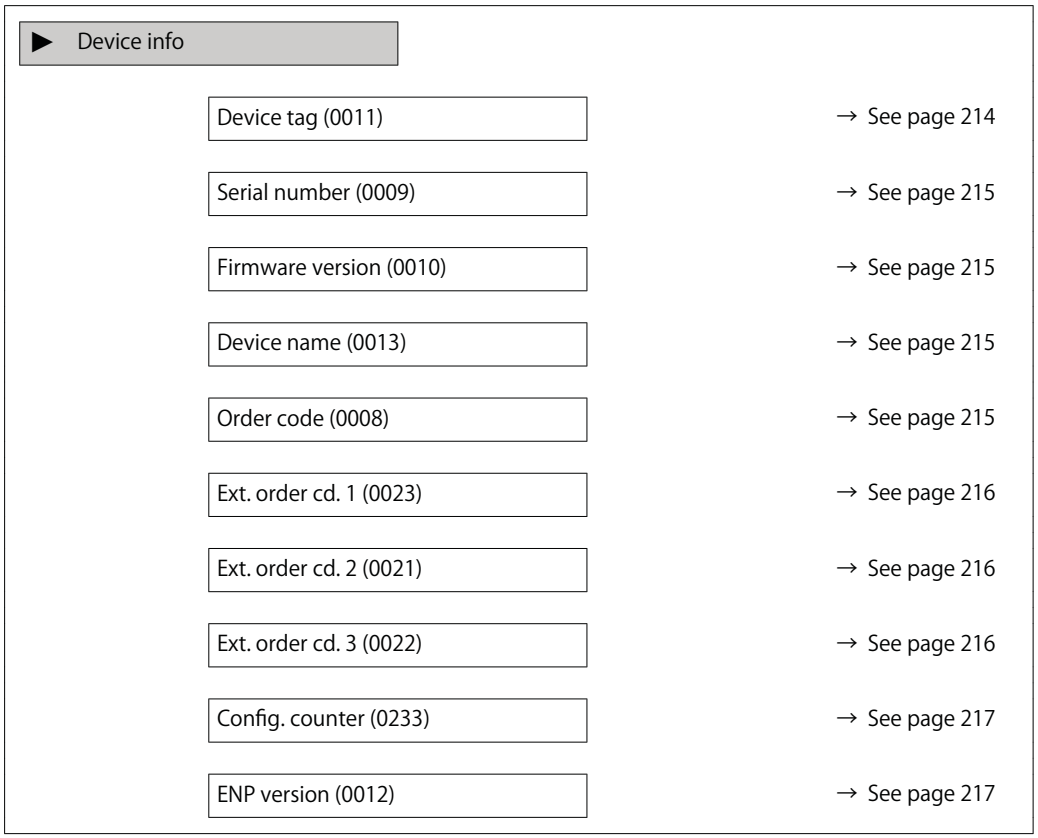
Additional information, such as remedial measures, can be retrieved via the Ⓔ key.

HistoROM

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

3.7.3 "Device info" submenu

Navigation Expert → Diagnostics → Device info



Device tag

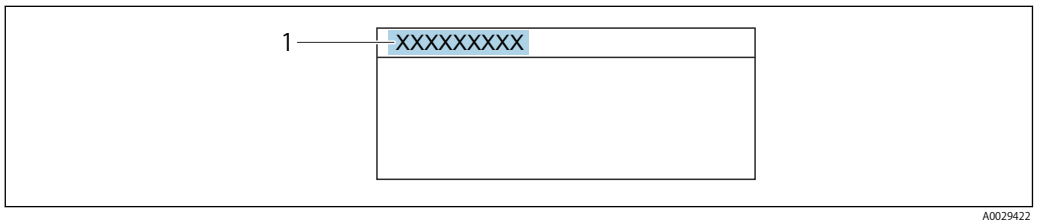
Navigation Expert → Diagnostics → Device info → Device tag (0011)

Description Displays a unique name for the measuring point so it can be identified quickly within the plant. The name is displayed in the header.

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

Factory setting EF200-C

Additional information User interface



1 Position of the header text on the display

The number of characters displayed depends on the characters used.

Serial number

Navigation	Expert → Diagnostics → Device info → Serial number (0009)
Description	Displays the serial number of the measuring device. The number can be found on the nameplate of the sensor and transmitter.
User interface	Max. 11-digit character string comprising letters and numbers.
Additional information	Description Uses of the serial number • To identify the measuring device quickly, e.g. when contacting TLV.

Firmware version

Navigation	Expert → Diagnostics → Device info → Firmware version (0010)
Description	Displays the device firmware version installed.
User interface	Character string in the format xx.yy.zz
Additional information	Display The Firmware version is also located: • On the title page of the Operating instructions • On the transmitter nameplate

Device name

Navigation	Expert → Diagnostics → Device info → Device name (0013)
Description	Displays the name of the transmitter. It can also be found on the nameplate of the transmitter.
User interface	Max. 32 characters such as letters or numbers.
Factory setting	EF200-C

Order code

Navigation	Expert → Diagnostics → Device info → Order code (0008)
Description	Displays the device order code.

User interface	Character string composed of letters, numbers and certain punctuation marks (e.g. /).
Additional information	Description The order code can be found on the nameplate of the sensor and transmitter in the "Order code" field. The order code is generated from the extended order code through a process of reversible transformation. The extended order code indicates the attributes for all the device features in the product structure. The device features are not directly readable from the order code. Uses of the order code • To order an identical spare device. • To identify the device quickly and easily, e.g. when contacting Endress+Hauser.

Ext. order cd. 1

Navigation	Expert → Diagnostics → Device info → Ext. order cd. 1 (0023)
Description	Displays the first part of the extended order code. On account of length restrictions, the extended order code is split into a maximum of 3 parameters.
User interface	Character string
Additional information	Description The extended order code indicates the version of all the features of the product structure for the measuring device and thus uniquely identifies the measuring device. The extended order code can also be found on the nameplate of the sensor and transmitter in the "Ext. ord. cd." field.

Ext. order cd. 2

Navigation	Expert → Diagnostics → Device info → Ext. order cd. 2 (0021)
Description	Displays the second part of the extended order code.
User interface	Character string
Additional information	For additional information, see Ext. order cd. 1 parameter (→ See page 216)

Ext. order cd. 3

Navigation	Expert → Diagnostics → Device info → Ext. order cd. 3 (0022)
Description	Displays the third part of the extended order code.

User interface	Character string
Additional information	For additional information, see Ext. order cd. 1 parameter (→ See page 216)

Config. counter

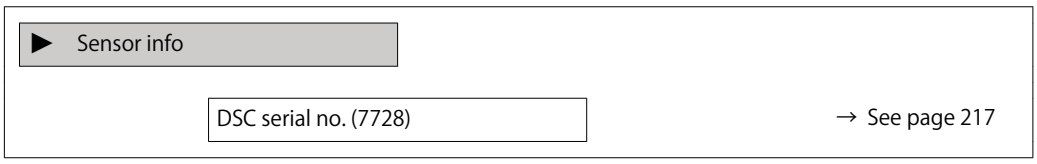
Navigation	Expert → Diagnostics → Device info → Config. counter (0233)
Description	Displays the number of parameter modifications for the device. When the user changes a parameter setting, this counter is incremented.
User interface	0 to 65 535

ENP version

Navigation	Expert → Diagnostics → Device info → ENP version (0012)
Description	Displays the version of the electronic nameplate.
User interface	Character string
Factory setting	2.02.00
Additional information	Description This electronic nameplate stores a data record for device identification that includes more data than the nameplates attached to the outside of the device.

3.7.4 "Sensor info" submenu

Navigation Expert → Diagnostics → Sensor info



DSC serial no.

Navigation	Expert → Diagnostics → Sensor info → DSC serial no. (7728)
Description	Displays the serial number of the DSC sensor that is used in the measuring tube.

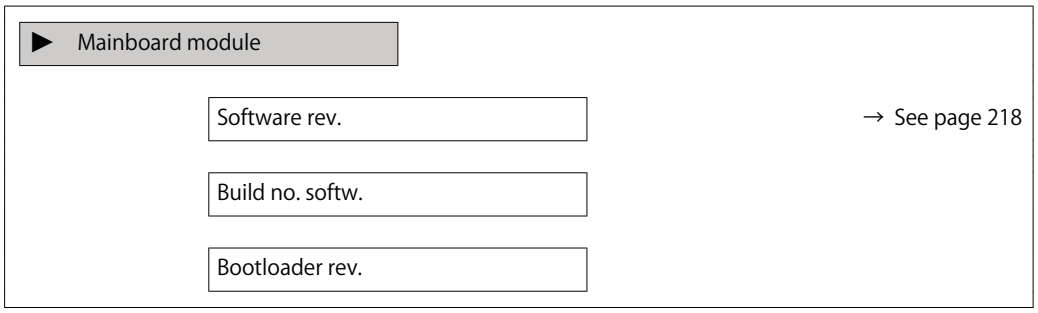
User interface Character string

Additional information Description

The serial number and other individual values of the DSC sensor, such as temperature range and reference values, are stored on the S-DAT.

If the DSC sensor is replaced, the S-DAT must also always be replaced.

3.7.5 "Main elec.+I/O1" submenu



Software rev.

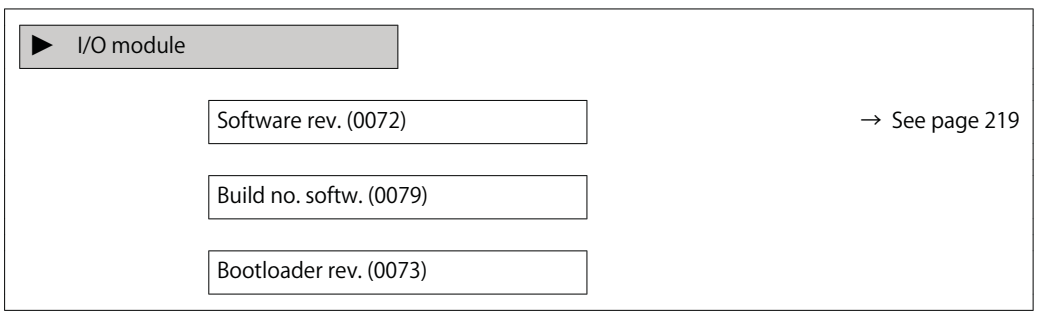
Navigation Expert → Diagnostics → Mainboard module → Software rev. (0072)
Expert → Diagnostics → Display module → Software rev. (0072)
Expert → Diagnostics → I/O module → Software rev. (0072)

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

User interface Positive integer

3.7.6 "I/O module" submenu

Navigation Expert → Diagnostics → I/O module



Software rev.

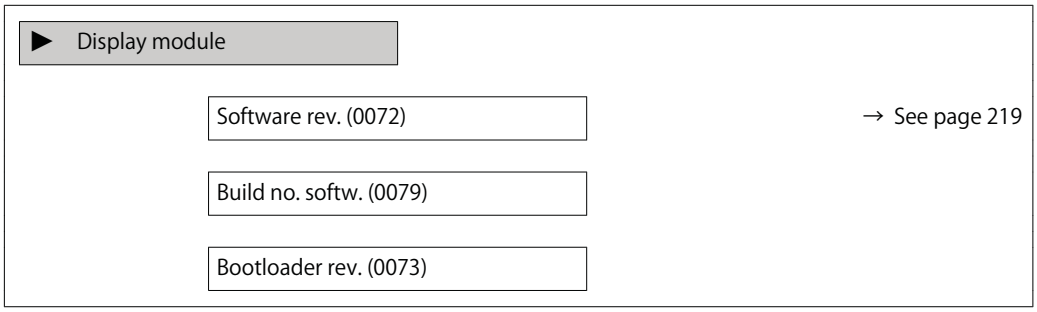
Navigation Expert → Diagnostics → I/O module → Software rev. (0072)

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

User interface Positive integer

3.7.7 "Display module" submenu

Navigation Expert → Diagnostics → Display module



Software rev.

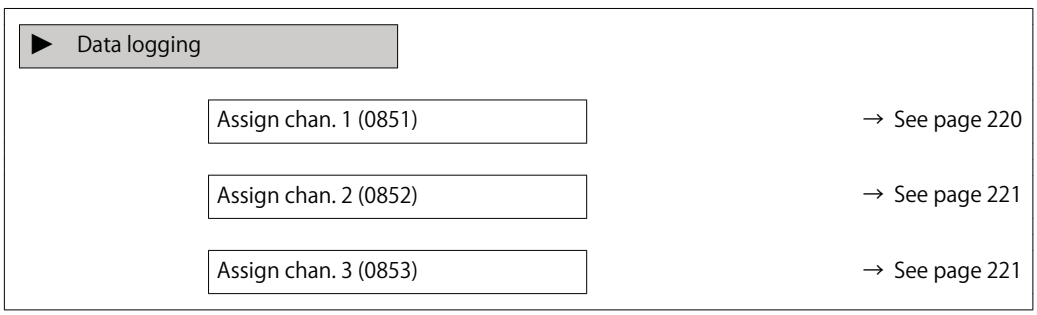
Navigation Expert → Diagnostics → Display module → Software rev. (0072)

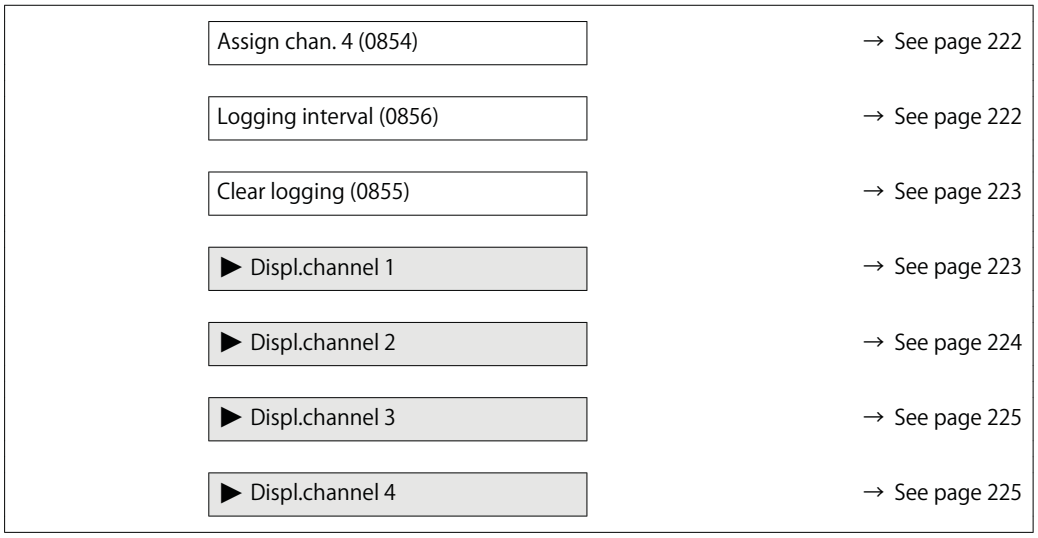
Description Use this function to display the software revision of the module.

User interface Positive integer

3.7.8 "Data logging" submenu

Navigation Expert → Diagnostics → Data logging





Assign chan. 1

Navigation: Expert → Diagnostics → Data logging → Assign chan. 1 (0851)

Prerequisite: The Extended HistoROM application package is available.

The software options currently enabled are displayed in the SW option overv. parameter (→ See page 50).

Description: Use this function to select a process variable for the data logging channel.

Selection:
- Off
- Volume flow
- Correct.vol.flow
- Mass flow
- Flow velocity
- Temperature
- CalcSatSteamPres*
- Steam quality*
- Total mass flow*
- CondensMassFlow*
- Energy flow*
- Heat flow diff.*
- Reynolds number*
- Curr.output 1
- Curr.output 2*
- Density*
- Pressure*
- Specific volume*
- Degree superheat*
- Vortex frequency
- Electronic temp.

Factory setting: Off

* Visibility depends on order options or device settings

Additional information

Description

A total of 1000 measured values can be logged. This means:
- 1000 data points if 1 logging channel is used
- 500 data points if 2 logging channels are used
- 333 data points if 3 logging channels are used
- 250 data points if 4 logging channels are used

Once the maximum number of data points is reached, the oldest data points in the data log are cyclically overwritten in such a way that the last 1000, 500, 333 or 250 measured values are always in the log (ring memory principle).

The log contents are cleared if the option selected is changed.

Assign chan. 2

Navigation

Expert → Diagnostics → Data logging → Assign chan. 2 (0852)

Prerequisite

The Extended HistoROM application package is available.

The software options currently enabled are displayed in the SW option overv. parameter (→ See page 50).

Description

Options for the assignment of a process variable to the data logging channel.

Selection

Picklist, see Assign channel 1 parameter (→ See page 220)

Factory setting

Off

Assign chan. 3

Navigation

Expert → Diagnostics → Data logging → Assign chan. 3 (0853)

Prerequisite

The Extended HistoROM application package is available.

The software options currently enabled are displayed in the SW option overv. parameter (→ See page 50).

Description

Options for the assignment of a process variable to the data logging channel.

Selection

Picklist, see Assign channel 1 parameter (→ See page 220)

Factory setting

Off

Assign chan. 4

Navigation: Expert → Diagnostics → Data logging → Assign chan. 4 (0854)

Prerequisite: The Extended HistoROM application package is available.

The software options currently enabled are displayed in the SW option overv. parameter (→ See page 50).

Description: Options for the assignment of a process variable to the data logging channel.

Selection: Picklist, see Assign channel 1 parameter (→ See page 220)

Factory setting: Off

Logging interval

Navigation: Expert → Diagnostics → Data logging → Logging interval (0856)

Prerequisite: The Extended HistoROM application package is available.

The software options currently enabled are displayed in the SW option overv. parameter (→ See page 50).

Description: Use this function to enter the logging interval T_{log} for data logging.

User entry: 1.0 to 3 600.0 s

Factory setting: 1.0 s

Additional information:

Description

This defines the interval between the individual data points in the data log, and thus the maximum loggable process time T_{log}:
- If 1 logging channel is used: $T_{log} = 1000 \times t_{log}$
- If 2 logging channels are used: $T_{log} = 500 \times t_{log}$
- If 3 logging channels are used: $T_{log} = 333 \times t_{log}$
- If 4 logging channels are used: $T_{log} = 250 \times t_{log}$

Once this time elapses, the oldest data points in the data log are cyclically overwritten such that a time of T_{log} always remains in the memory (ring memory principle).

The log contents are cleared if the length of the logging interval is changed.

Example

If 1 logging channel is used:
- $T_{log} = 1000 \times 1\ s = 1\ 000\ s \approx 15\ min$
- $T_{log} = 1000 \times 10\ s = 10\ 000\ s \approx 3\ h$
- $T_{log} = 1000 \times 80\ s = 80\ 000\ s \approx 1\ d$
- $T_{log} = 1000 \times 3\ 600\ s = 3\ 600\ 000\ s \approx 41\ d$

Clear logging

Navigation: Expert → Diagnostics → Data logging → Clear logging (0855)

Prerequisite: The Extended HistoROM application package is available.

The software options currently enabled are displayed in the SW option overv. parameter (→ See page 50).

Description: Use this function to clear the entire logging data.

Selection:
- Cancel
- Clear data

Factory setting: Cancel

Additional information: Selection

- Cancel
  The data is not cleared. All the data is retained.
- Clear data
  The logging data is cleared. The logging process starts from the beginning.

"Displ.channel 1" submenu

Navigation: Expert → Diagnostics → Data logging → Displ.channel 1

Display channel 1

Navigation: Expert → Diagnostics → Data logging → Displ.channel 1

Prerequisite: The Extended HistoROM application package is available.

The software options currently enabled are displayed in the SW option overv. parameter (→ See page 50).

In the Assign chan. 1 parameter (→ See page 220), one of the following options is selected:
- Volume flow
- Correct.vol.flow
- Mass flow
- Flow velocity
- Temperature
- CalcSatSteamPres*
- Steam quality*

* Visibility depends on order options or device settings

- Total mass flow *
- CondensMassFlow*
- Energy flow *
- Heat flow diff. *
- Reynolds number*
- Curr.output 1
- Curr.output 2 *
- Density *
- Pressure *
- Specific volume*
- Degree superheat*
- Vortex frequency
- Electronic temp.

Description — Displays the measured value trend for the logging channel in the form of a chart.

Additional information — Description

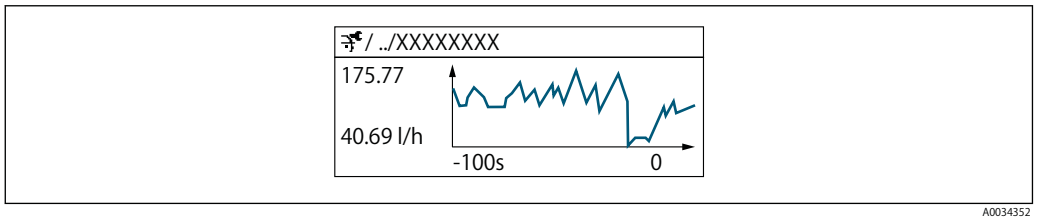


Fig. 4 Chart of a measured value trend

- x-axis: depending on the number of channels selected displays 250 to 1000 measured values of a process variable.
- y-axis: displays the approximate measured value span and constantly adapts this to the ongoing measurement.

"Displ.channel 2" submenu

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

Display channel 2

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

Prerequisite — A process variable is defined in the Assign chan. 2 parameter.

* Visibility depends on order options or device settings

Description See theDisplay channel 1 parameter → See page 223

"Displ.channel 3" submenu

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

Display channel 3

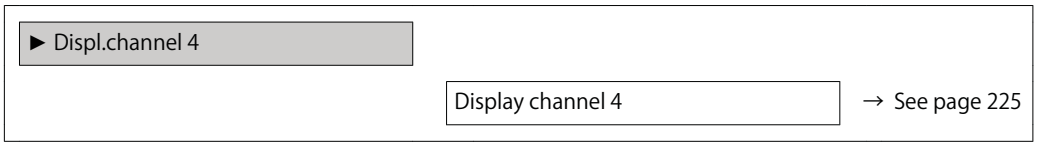
Navigation Expert → Diagnostics → Data logging → Displ.channel 3

Prerequisite A process variable is defined in the Assign chan. 3 parameter.

Description See theDisplay channel 1 parameter → See page 223

"Displ.channel 4" submenu

Navigation Expert → Diagnostics → Data logging → Displ.channel 4



Display channel 4

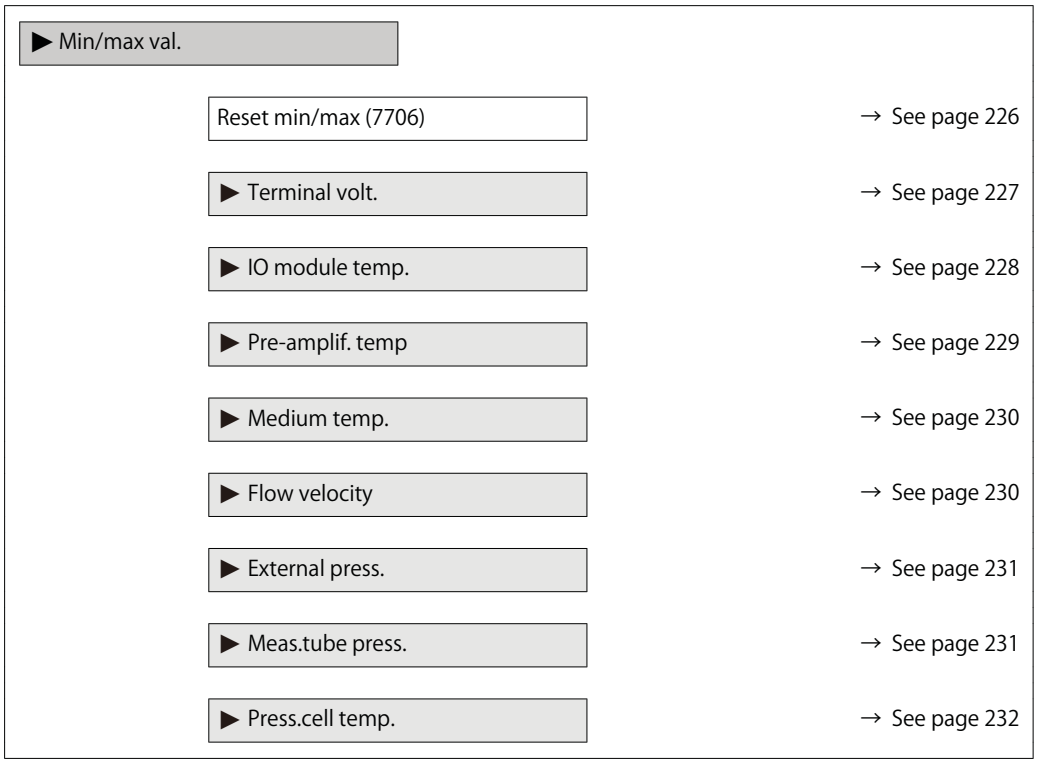
Navigation Expert → Diagnostics → Data logging → Displ.channel 4

Prerequisite A process variable is defined in the Assign chan. 4 parameter.

Description See theDisplay channel 1 parameter → See page 223

3.7.9 "Min/max values" submenu

Navigation Expert → Diagnostics → Min/max val.



Reset min/max

Navigation Expert → Diagnostics → Min/max val. → Reset min/max (7706)

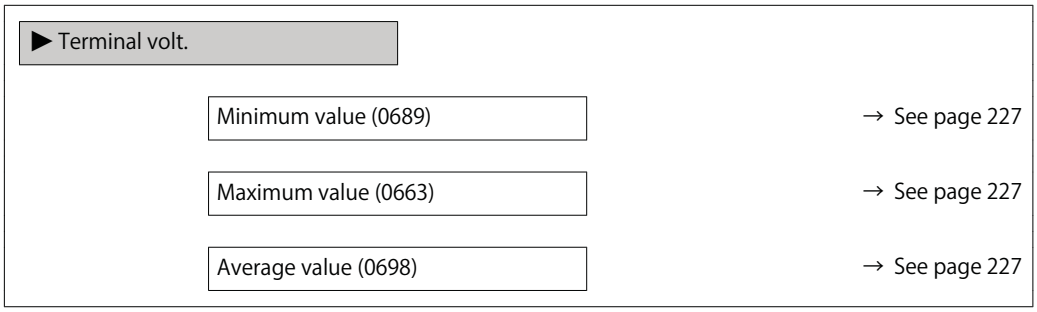
Description Use this function to select measured variables whose minimum, maximum and average measured values are to be reset.

Selection
- Cancel
- Terminal volt. 1
- Temperature
- Flow velocity
- Pressure

Factory setting Cancel

"Terminal volt." submenu

Navigation Expert → Diagnostics → Min/max val. → Terminal volt.



Minimum value

Navigation Expert → Diagnostics → Min/max val. → Terminal volt. → Minimum value (0689)

Description Use this function to display the smallest previously measured terminal voltage value in Volts.

User interface 0.0 to 50.0 V

Maximum value

Navigation Expert → Diagnostics → Min/max val. → Terminal volt. → Maximum value (0663)

Description Use this function to view the largest previously measured terminal voltage value in Volts.

User interface 0.0 to 50.0 V

Average value

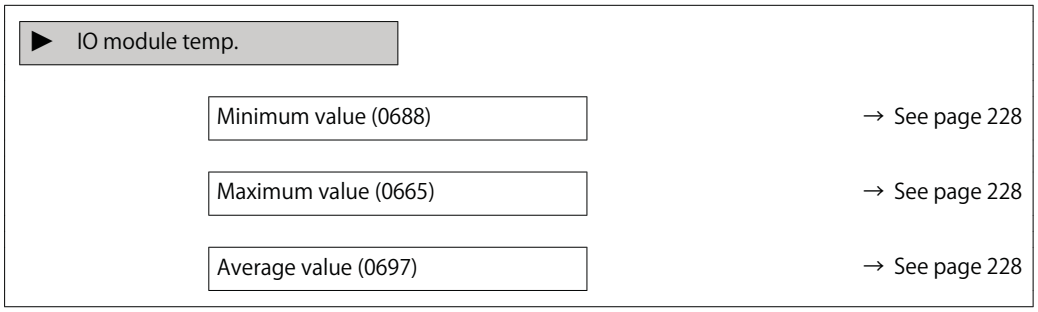
Navigation Expert → Diagnostics → Min/max val. → Terminal volt. → Average value (0698)

Description Use this function to view the average of all previously measured terminal voltage values in Volts.

User interface Signed floating-point number

"IO module temperature" submenu

Navigation Expert → Diagnostics → Min/max val. → IO module temp.



Minimum value

Navigation Expert → Diagnostics → Min/max val. → IO module temp. → Minimum value (0688)

Description Displays the lowest previously measured temperature value of the I/O electronics module.

User interface Signed floating-point number

Additional information Dependency

The unit is taken from theTemperature unit parameter (→ See page 77)

Maximum value

Navigation Expert → Diagnostics → Min/max val. → IO module temp. → Maximum value (0665)

Description Displays the highest previously measured temperature value of the I/O electronics module.

User interface Signed floating-point number

Additional information Dependency

The unit is taken from theTemperature unit parameter (→ See page 77)

Average value

Navigation Expert → Diagnostics → Min/max val. → IO module temp. → Average value (0697)

Description Displays the average value of all previously measured temperature values of the I/O electronics module.

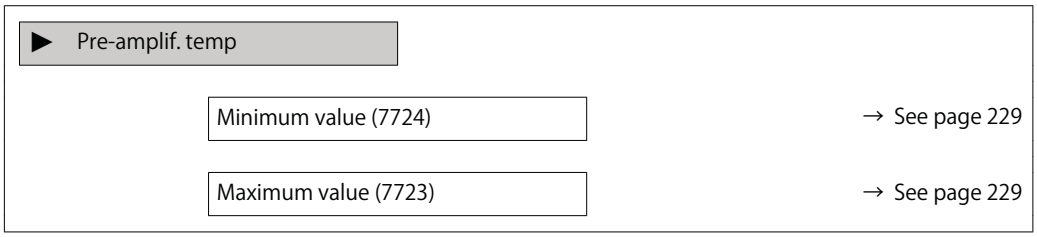
User interface –1 273.15 to 726.85 ° C

Additional information Dependency

The unit is taken from theTemperature unit parameter (→ See page 77)

"Pre-amplifier temperature" submenu

Navigation Expert → Diagnostics → Min/max val. → Pre-amplif. temp



Minimum value

Navigation Expert → Diagnostics → Min/max val. → Pre-amplif. temp → Minimum value (7724)

Description Displays the lowest previously measured temperature value of the pre-amplifier module.

User interface 0 to 1 000 °C

Additional information Dependency

The unit is taken from the Temperature unit parameter (→ See page 77)

Maximum value

Navigation Expert → Diagnostics → Min/max val. → Pre-amplif. temp → Maximum value (7723)

Description Displays the highest previously measured temperature value of the pre-amplifier module.

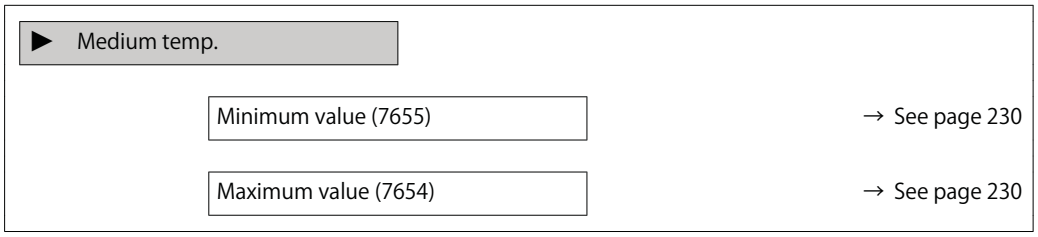
User interface 0 to 1 000 °C

Additional information Dependency

The unit is taken from the Temperature unit parameter (→ See page 77)

"Medium temperature" submenu

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



Minimum value

Navigation Expert → Diagnostics → Min/max val. → Medium temp. → Minimum value (7655)

Description Displays the lowest previously measured medium temperature.

User interface 0 to 1 000 ° C

Additional information Dependency

The unit is taken from the Temperature unit parameter (→ See page 77)

Maximum value

Navigation Expert → Diagnostics → Min/max val. → Medium temp. → Maximum value (7654)

Description Displays the highest previously measured medium temperature.

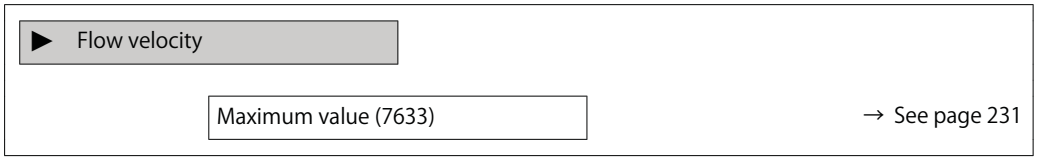
User interface 0 to 1 000 ° C

Additional information Dependency

The unit is taken from the Temperature unit parameter (→ See page 77)

"Flow velocity" submenu

Navigation Expert → Diagnostics → Min/max val. → Flow velocity



Maximum value

Navigation: Expert → Diagnostics → Min/max val. → Flow velocity → Maximum value (7633)

Description: Displays the highest previously measured flow velocity.

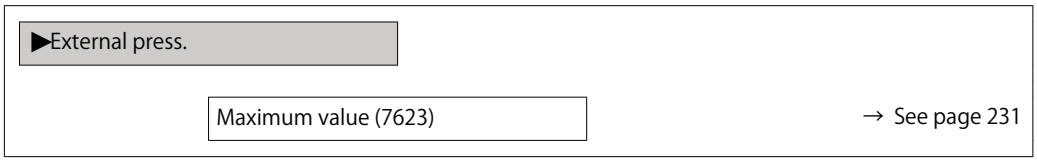
User interface: Positive floating-point number

Additional information: Dependency

The unit is taken from the Velocity unit parameter (→ See page 81)

"External press." submenu

Navigation: Expert → Diagnostics → Min/max val. → External press.



Maximum value

Navigation: Expert → Diagnostics → Min/max val. → External press. → Maximum value (7623)

Description: Displays the highest previously measured value for external pressure measurement.

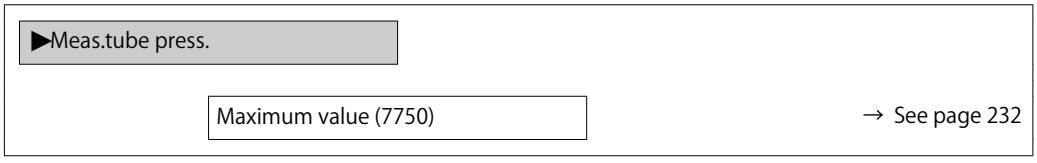
User interface: Positive floating-point number

Additional information: Dependency

The unit is taken from the Pressure unit parameter (→ See page 76)

"Measuring tube pressure" submenu

Navigation: Expert → Diagnostics → Min/max val. → Meas.tube press.

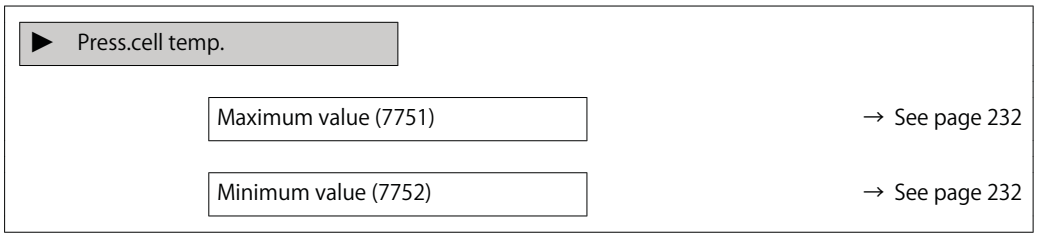


Maximum value

Navigation	Expert → Diagnostics → Min/max val. → Meas.tube press. → Maximum value (7750)
Description	Displays the highest previously measured value for internal pressure measurement.
User interface	Positive floating-point number
Factory setting	0 bar
Additional information	Dependency The unit is taken from the Pressure unit parameter (→ See page 76)

"Pressure cell temperature" submenu

Navigation Expert → Diagnostics → Min/max val. → Press.cell temp.



Maximum value

Navigation	Expert → Diagnostics → Min/max val. → Press.cell temp. → Maximum value (7751)
Description	Displays the highest previously measured temperature of the pressure cell.
User interface	0 to 1 000 ° C
Factory setting	0 ° C
Additional information	Dependency The unit is taken from the Temperature unit parameter (→ See page 77)

Minimum value

Navigation	Expert → Diagnostics → Min/max val. → Press.cell temp. → Minimum value (7752)
Description	Displays the lowest previously measured temperature of the pressure cell.

User interface 0 to 1 000 °C

Factory setting 1 000 °C

Additional information Dependency

The unit is taken from the Temperature unit parameter (→ See page 77)

3.7.10 "Heartbeat" submenu

For detailed information on the parameter descriptions for the Heartbeat Verification refer to the Special Documentation for the device

Navigation Expert → Diagnostics → Heartbeat

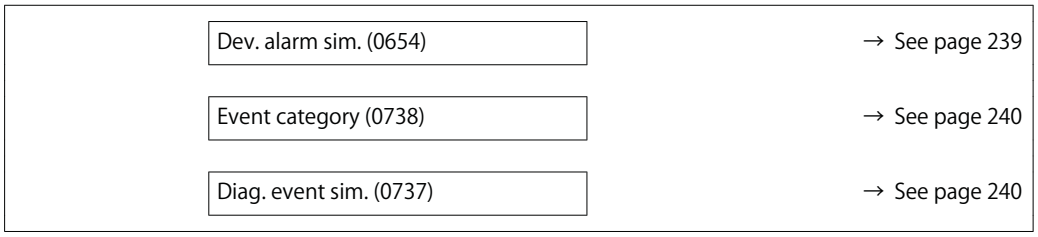
▶ Heartbeat

3.7.11 "Simulation" submenu

Navigation Expert → Diagnostics → Simulation

▶ Simulation

Assign proc.var. (1810)	→ See page 234
Proc. var. value (1811)	→ See page 234
Curr.inp 1 sim. (1608–1)	→ See page 235
Value curr.inp 1 (1609–1)	→ See page 235
Curr.out. 1 to n sim. (0354–1 to n)	→ See page 236
Value curr.out 1 to n (0355–1 to n)	→ See page 236
FreqOutputSim (0472)	→ See page 236
Freq value (0473)	→ See page 237
Puls.outp.sim. (0458)	→ See page 237
Pulse value (0459)	→ See page 238
Switch sim. (0462)	→ See page 238
Switch status (0463)	→ See page 239



Assign proc.var.

Navigation: Expert → Diagnostics → Simulation → Assign proc.var. (1810)

Description: Use this function to select a process variable for the simulation process that is activated. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

Selection:
- Off
- Mass flow
- Flow velocity
- Volume flow
- Correct.vol.flow
- Temperature
- CalcSatSteamPres*
- Steam quality*
- Total mass flow *
- CondensMassFlow*
- Energy flow
- Heat flow diff. *
- Reynolds number

Factory setting: Off

Additional information: Description

The simulation value of the process variable selected is defined in the Proc. var. value parameter (→ See page 234).

Proc. var. value

Navigation: Expert → Diagnostics → Simulation → Proc. var. value (1811)

Prerequisite: A process variable is selected in the Assign proc.var. parameter (→ See page 234).

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

* Visibility depends on order options or device settings

Factory setting 0

Additional information User entry

The unit of the displayed measured value is taken from the System units submenu (→ See page 71).

Curr.inp 1 sim.

Navigation Expert → Diagnostics → Simulation → Curr.inp 1 sim. (1608–1)

Description Option for switching simulation of the current input on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

The desired simulation value is defined in the Value curr.inp parameter (→ See page 235).

Selection
- Off
- On

Factory setting Off

Additional information Selection

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

Value curr.inp 1

Navigation Expert → Diagnostics → Simulation → Value curr.inp 1 (1609–1)

Prerequisite In the Curr.inp sim. parameter (→ See page 235), the On option is selected.

Description Use this function to enter the current value for the simulation. In this way, users can verify the correct configuration of the current input and the correct function of upstream feed-in units.

User entry 3.59 to 22.5 mA

Curr.out. 1 to n sim.

Navigation: Expert → Diagnostics → Simulation → Curr.out. 1 to n sim. (0354–1 to n)

Description: Use this function to switch simulation of the current output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

Selection:
- Off
- On

Factory setting: Off

Additional information:

Description

The desired simulation value is defined in the Value curr.out 1 to n parameter.

Selection

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

Value curr.out 1 to n

Navigation: Expert → Diagnostics → Simulation → Value curr.out 1 to n (0355–1 to n)

Prerequisite: In the Curr.out. 1 to n sim. parameter, the On option is selected.

Description: Use this function to enter a current value for the simulation. In this way, users can verify the correct adjustment of the current output and the correct function of downstream switching units.

User entry: 3.59 to 22.5 mA

Additional information:

Dependency

The input range is dependent on the option selected in the Current span parameter (→ See page 140).

FreqOutputSim

Navigation: Expert → Diagnostics → Simulation → FreqOutputSim (0472)

Prerequisite: In the Operating mode parameter (→ See page 149), the Frequency option is selected.

Description	Use this function to switch simulation of the frequency output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.
Selection	• Off • On
Factory setting	Off
Additional information	Description The desired simulation value is defined in the Freq value parameter (→ See page 237). Selection • Off Frequency simulation is switched off. The device is in normal measuring mode or another process variable is being simulated. • On Frequency simulation is active.

Freq value

Navigation	Expert → Diagnostics → Simulation → Freq value (0473)
Prerequisite	In the FreqOutputSim parameter (→ See page 236), the On option is selected.
Description	Use this function to enter a frequency value for the simulation. In this way, users can verify the correct adjustment of the frequency output and the correct function of downstream switching units.
User entry	0.0 to 1 250.0 Hz

Puls.outp.sim.

Navigation	Expert → Diagnostics → Simulation → Puls.outp.sim. (0458)
Prerequisite	In the Operating mode parameter (→ See page 149), the Pulse option is selected.
Description	Use this function to switch simulation of the pulse output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.
Selection	• Off • Fixed value • Down-count. val.
Factory setting	Off

Additional information

Description

The desired simulation value is defined in the Pulse value parameter (→ See page 238).

Selection

- Off
  Pulse simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
- Fixed value
  Pulses are continuously output with the pulse width specified in the Pulse width parameter (→ See page 151).
- Down-count. val.
  The pulses specified in the Pulse value parameter (→ See page 238) are output.

Pulse value

Navigation: Expert → Diagnostics → Simulation → Pulse value (0459)

Prerequisite: In the Puls.outp.sim. parameter (→ See page 237), the Down-count. val. option is selected.

Description: Use this function to enter a pulse value for the simulation. In this way, users can verify the correct adjustment of the pulse output and the correct function of downstream switching units.

User entry: 0 to 65 535

Switch sim.

Navigation: Expert → Diagnostics → Simulation → Switch sim. (0462)

Prerequisite: In the Operating mode parameter (→ See page 149), the Switch option is selected.

Description: Use this function to switch simulation of the switch output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

Selection:
- Off
- On

Factory setting: Off

Additional information

Description

The desired simulation value is defined in the Switch status parameter (→ See page 239).

Selection

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

Switch status

Navigation

Expert → Diagnostics → Simulation → Switch status (0463)

Prerequisite

In the Switch sim. parameter (→ See page 238) Switch sim. 1 to n parameterSwitch sim. 1 to n parameter, theOn option is selected.

Description

Use this function to select a switch value for the simulation. In this way, users can verify the correct adjustment of the switch output and the correct function of downstream switching units.

Selection

- Open
- Closed

Additional information

Selection

- Open
  Switch simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
- Closed
  Switch simulation is active.

Dev. alarm sim.

Navigation

Expert → Diagnostics → Simulation → Dev. alarm sim. (0654)

Description

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

Selection

- Off
- On

Factory setting

Off

Additional information

Description

The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

Event category

Navigation: Expert → Diagnostics → Simulation → Event category (0738)

Description: Use this function to select the category of the diagnostic events that are displayed for the simulation in theDiag. event sim. parameter (→ See page 240).

Selection:
- Sensor
- Electronics
- Configuration
- Process

Factory setting: Process

Diag. event sim.

Navigation: Expert → Diagnostics → Simulation → Diag. event sim. (0737)

Description: Use this function to select a diagnostic event for the simulation process that is activated.

Selection:
- Off
- Diagnostic event picklist (depends on the category selected)

Factory setting: Off

Additional information: Description

For the simulation, you can choose from the diagnostic events of the category selected in the Event category parameter (→ See page 240).

4 Explanation of abbreviated units

4.1 SI units

Process variable	Units	Explanation
Calorific value (volume)	kWh/Nm³, MWh/Nm³, kJ/Nm³, MJ/Nm³	Kilowatt hour, megawatt hour, kilojoule, megajoule/ standard cubic meter
	kWh/Sm³, MWh/Sm³, kJ/Sm³, MJ/Sm³	Kilowatt hour, megawatt hour, kilojoule, megajoule/ standard cubic meter
Calorific value (mass)	kWh/kg,MWh/kg, kJ/kg, MJ/kg	Kilowatt hour, megawatt hour, kilojoule, megajoule/ kilogram
Density	g/cm³	Gram/volume unit
	kg/dm³, kg/l, kg/m³	Kilogram/volume unit
	SD4° C, SD15° C, SD20° C	Specific density: The specific density is the ratio of the fluid density to the water density 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 fluid density to the water density 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
	mbar a	Millibar (absolute)
	bar, torr, atm	Bar, torr, physical atmosphere
	gf/cm², kgf/cm²	Gram force, kilogram force/square centimeter
Dynamic viscosity	Pa s	Pascal second
	cP, P	Centipoise, poise
Energy	kWh, MWh, GWh	Kilowatt hour, megawatt hour, gigawatt hour
	kJ, MJ, GJ	Kilojoule, megajoule, gigajoule
	kcal, Mcal, Gcal	Kilocalories, megacalories, gigacalories
Energy flow	kW, MW, GW	Kilowatt, megawatt
	kJ/s, kJ/min, kJ/h, kJ/d	Kilojoule/time unit
	MJ/s, MJ/min, MJ/h, MJ/d	Megajoule/time unit
	GJ/s, GJ/min, GJ/h, GJ/d	Gigajoule/time unit
	kcal/s, kcal/min, kcal/h, kcal/d	Kilocalories/time unit
	Mcal/s, Mcal/min, Mcal/h, Mcal/d	Megacalories/time unit
	Gcal/s, Gcal/min, Gcal/h, Gcal/d	Gigacalories/time unit
Velocity	m/s	Meter/time unit
Length	mm, m	Millimeter, meter
Mass	g, kg, t	Gram, kilogram, metric ton
Mass flow	g/s, g/min, g/h, g/d	Gram/time unit
	kg/s, kg/min, kg/h, kg/d	Kilogram/time unit
	t/s, t/min, t/h, t/d	Metric ton/time unit
Corrected volume	Nl, Nm³, Sm³	Normal liter, normal cubic meter, standard cubic meter
Correct.vol.flow	Nl/s, Nl/min, Nl/h, Nl/d	Normal liter/time unit
	Nm³/s, Nm³/min, Nm³/h, Nm³/d	Normal cubic meter/time unit
	Sm³/s, Sm³/min, Sm³/h, Sm³/d	Standard cubic meter/time unit

Process variable	Units	Explanation
Specific heat capacity	kJ/(kgK), MJ/(kgK)	Kilojoule, megajoule/kilogram Kelvin
	kWh/(kgK)	Kilowatt hour/kilogram Kelvin
	kcal/(kgK)	Kilocalories/kilogram Kelvin
Temperature	°C , K	Celsius, Kelvin
Volume	cm^3, dm^3, m^3	Cubic centimeter, cubic decimeter, cubic meter
	ml, l	Milliliter, liter
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
Time	s, m, h, d, y	Second, minute, hour, day, year

4.2 US units

Process variable	Units	Explanation
Calorific value (mass)	kWh/lb, MWh/lb, kJ/lb, MJ/lb	Kilowatt hour, kilojoule, British thermal unit, thousand British thermal units/pound
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
Pressure	psi	Psi
Velocity	ft/s	Foot/time unit
Length	in, ft	Inch, foot
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
Corrected volume	Sft^3	Standard cubic foot
Correct.vol.flow	Sft^3/s, Sft^3/min, Sft^3/h, Sft^3/d	Standard cubic foot/time unit
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

Process variable	Units	Explanation
	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)

4.3 Imperial units

Process variable	Units	Explanation
Calorific value (volume)	Btu/Sm³, MBtu/Sm³	British thermal unit, thousand British thermal units/ standard cubic meter
	Btu/Sft³, MBtu/Sft³	British thermal unit, thousand British thermal units/ standard cubic foot
Calorific value (mass)	Btu/lb, MBtu/lb	British thermal unit, thousand British thermal units/ pound
Density	lb/gal (imp), lb/bbl (imp;beer), lb/bbl (imp;oil)	Pound/volume unit
Energy	Btu, MBtu, MMBtu	British thermal unit, thousand British thermal units, million British thermal units
Energy flow	Btu/s, Btu/min, Btu/h, Btu/day	British thermal unit/time unit
	MBtu/s, MBtu/min, MBtu/h, MBtu/d	Thousand British thermal units/time unit
	MMBtu/s, MMBtu/min, MMBtu/h, MMBtu/d	Million British thermal units/time unit
Specific heat capacity	Btu/(lb° R)	British thermal unit/pound degree Rankine
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)

4.4 Other units

Process variable	Units	Explanation
Pressure	mmH2O (4° C)	Millimeter of water column (4 ° C)
	mmH2O (68° F)	Millimeter of water column (68 ° F)
	mmHg (0° C)	Millimeter of mercury column (0 ° C)
	inH2O (4° C)	Inch of water column (4 ° C)
	inH2O (68° F)	Inch of water column (68 ° F)
	ftH2O (68° F)	Foot of water column (68 ° F)
	inHg (0° C)	Inch of mercury (0 ° C)
Specific volume	m^3/kg	Cubic meter/kilogram
	ft^3/lb	Cubic foot/pound

5 Country-specific factory settings

5.1 SI units

Not valid for USA and Canada.

5.1.1 System units

Volume flow	m^3/h
Volume	m^3
Mass flow	kg/h
Mass	kg
Corrected volume flow	Nm^3/h
Corrected volume	Nm^3
Pressure	bar
Temperature	° C
Energy flow	kW
Energy	kWh
Calorific value (volume)	kJ/Nm^3
Calorific value (mass)	kJ/kg
Velocity	m/s
Density	kg/m^3
Specific volume	m^3/kg
Dynamic viscosity	Pa s
Specific heat capacity	kJ/(kgK)
Length	mm

5.1.2 Full scale values

The factory settings applie to the following parameters:
- 20 mA value (full scale value of the current output)
- 100% bar graph value 1

Nominal diameter [mm]	[m^3/h]
15 25 > 15 40 >> 15	25
25 40 > 25 50 >> 25	125
40 50 > 40 80 >> 40	308
50 80 > 50 100 >> 50	513
80 100 > 80 150 >> 80	1 152

Nominal diameter [mm]	[m³/h]
100 150 > 100 200 >> 100	1 995
150 200 > 150 250 >> 150	4 539
200 250 > 200 300 >> 200	8 713
250 300 > 250 350 >> 250	13 735
300 350 > 300 400 >> 300	19 701

5.1.3 Output current span

Current output 1	4 to 20 mA NAMUR
Current output 2	4 to 20 mA NAMUR

5.1.4 Pulse value

Nominal diameter	Volume flow	Mass flow
[mm]	(to 2 pulse/s) [m³/pulse]	(to 2 pulse/s) [kg/pulse]
15 25 > 15 40 >> 15	0.00067	0.0034
25 40 > 25 50 >> 25	0.0035	0.018
40 50 > 40 80 >> 40	0.0085	0.044
50 80 > 50 100 >> 50	0.023	0.12
80 100 > 80 150 >> 80	0.051	0.26
100 150 > 100 200 >> 100	0.089	0.46
150 200 > 150 250 >> 150	0.20	1.04
200 250 > 200 300 >> 200	0.39	1.99

Nominal diameter	Volume flow	Mass flow
[mm]	(to 2 pulse/s) [m^3/pulse]	(to 2 pulse/s) [kg/pulse]
250 300 > 250 350 >> 250	0.61	3.14
300 350 > 300 400 >> 300	0.88	4.51

5.2 US units

Only valid for USA and Canada.

5.2.1 System units

Volume flow	ft^3/min
Volume	ft^3
Mass flow	lb/min
Mass	lb
Corrected volume flow	Sft^3/min
Corrected volume	Sft^3
Pressure	psi
Temperature	° F
Energy flow	Btu/h
Energy	Btu
Calorific value (volume)	Btu/Sft^3
Calorific value (mass)	Btu/lb
Velocity	ft/s
Density	lb/ft^3
Specific volume	ft^3/lb
Length	in

5.2.2 Full scale values

The factory settings applie to the following parameters:
- 20 mA value (full scale value of the current output)
- 100% bar graph value 1

Nominal diameter [in]	[ft^3/h]
½ 1 > ½ 1½ >> ½	882
1 1½ > 1 2 >> 1	4 414

Nominal diameter [in]	[ft³/h]
1½ 2 > 1½ 3 >> 1½	10 876
2 3 > 2 4 >> 2	18 116
3 4 > 3 6 >> 3	40 682
4 6 > 4 8 >> 4	70 452
6 8 > 6 10 >> 6	160 293
8 10 > 8 12 >> 8	307 696
10 12 > 10 14 >> 10	485 046
12 14 > 12 16 >> 12	695 734

5.2.3 Output current span

Current output 1	4 to 20 mA US
Current output 2	4 to 20 mA US

5.2.4 Pulse value

Nominal diameter	Volume flow	Volume flow
[in]	to 2 pulse/s [gal/pulse]	to 2 pulse/s [lb/pulse]
½ 1 > ½ 1½ >> ½	0.18	0.0076
1 1½ > 1 2 >> 1	0.92	0.039
1½ 2 > 1½ 3 >> 1½	2.25	0.097
2 3 > 2 4 >> 2	6.02	0.26
3 4 > 3 6 >> 3	13.50	0.58
4 6 > 4 8 >> 4	23.42	1.01

Nominal diameter	Volume flow	Volume flow
[in]	to 2 pulse/s [gal/pulse]	to 2 pulse/s [lb/pulse]
6 8 > 6 10 >> 6	53.29	2.29
8 10 > 8 12 >> 8	102.29	4.40
10 12 > 10 14 >> 10	161.26	6.93
12 14 > 12 16 >> 12	231.30	9.94

Index

N

O

P

Q

R

S

T

U