

Description of Device Parameters

Proline Cubemass 500

Coriolis flowmeter
Modbus TCP

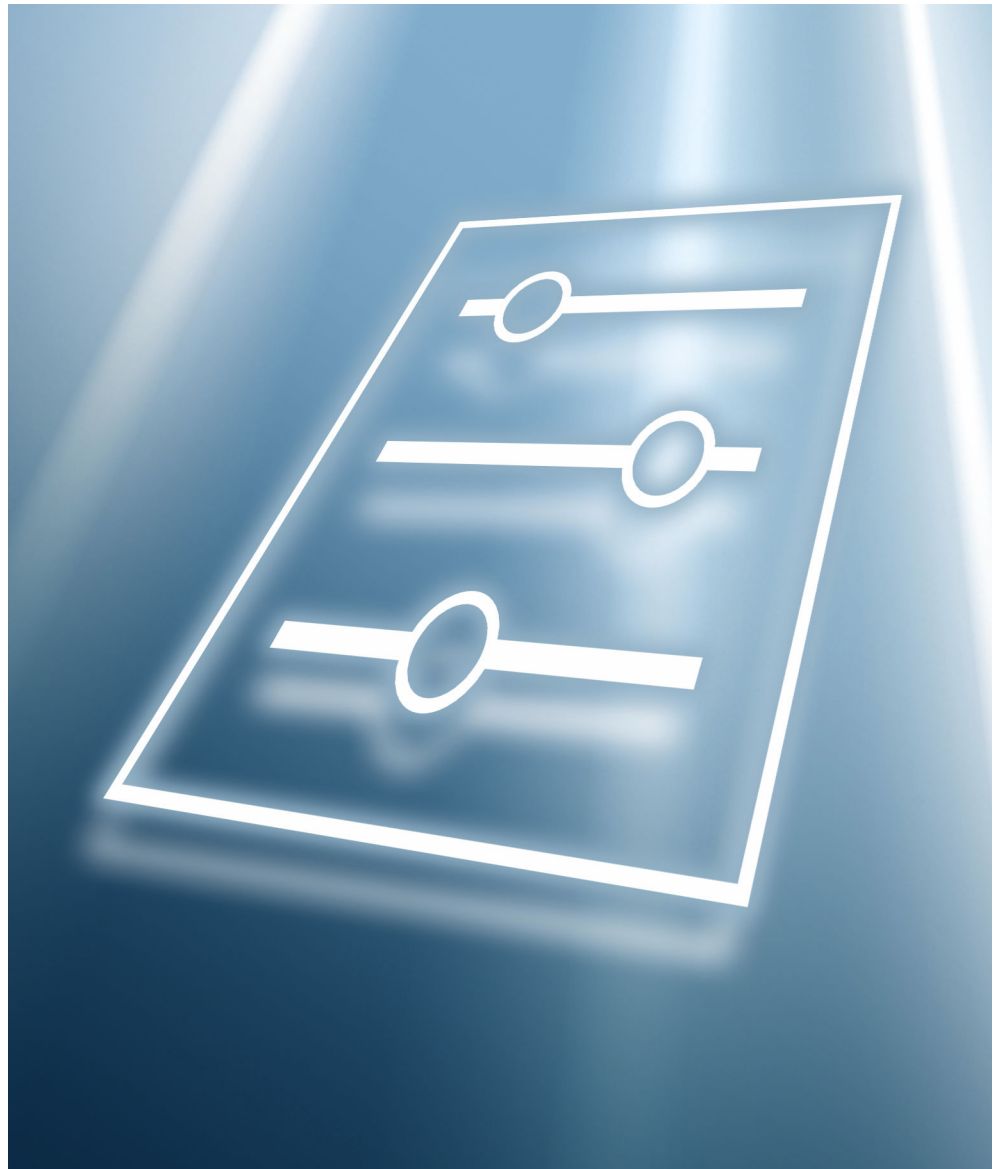


Table of contents

1	About this document	4		
1.1	Document function	4		
1.2	Target group	4		
1.3	Using this document	4		
1.3.1	Information on the document structure	4		
1.3.2	Structure of a parameter description	6		
1.4	Symbols	6		
1.4.1	Symbols for certain types of information	6		
1.4.2	Symbols in graphics	7		
1.5	Documentation	7		
1.5.1	Standard documentation	7		
1.5.2	Supplementary device-dependent documentation	7		
2	Overview of the Expert operating menu	8		
3	Description of device parameters	11		
3.1	"System" submenu	13		
3.1.1	"Display" submenu	14		
3.1.2	"Configuration backup" submenu	34		
3.1.3	"Diagnostic handling" submenu	37		
3.1.4	"Administration" submenu	50		
3.2	"Sensor" submenu	56		
3.2.1	"Measured values" submenu	57		
3.2.2	"System units" submenu	73		
3.2.3	"Process parameters" submenu	82		
3.2.4	"Calculated values" submenu	90		
3.2.5	"Measurement mode" submenu	93		
3.2.6	"External compensation" submenu	96		
3.2.7	"Sensor adjustment" submenu	99		
3.2.8	"Calibration" submenu	118		
3.2.9	"Testpoints" submenu	119		
3.2.10	"Disposable component" submenu	128		
3.3	"I/O configuration" submenu	129		
3.4	"Input" submenu	131		
3.4.1	"Current input 1 to n" submenu	131		
3.4.2	"Status input 1 to n" submenu	134		
3.5	"Output" submenu	136		
3.5.1	"Current output 1" submenu	136		
3.5.2	"Pulse/frequency/switch output" submenu	143		
3.5.3	"Relay output 1 to n" submenu	169		
3.5.4	"Double pulse output" submenu	175		
3.6	"Communication" submenu	180		
3.6.1	"Modbus configuration" submenu	180		
3.6.2	"Modbus information" submenu	183		
3.6.3	"Modbus data map" submenu	184		
3.6.4	"WLAN settings" wizard	185		
3.6.5	"APL port" submenu	191		
3.6.6	"Service interface" submenu	193		
3.6.7	"Web server" submenu	195		
3.7	"Application" submenu	198		
3.7.1	"Application specific calculations" submenu	198		
3.7.2	"Medium index" submenu	204		
3.8	"Diagnostics" submenu	206		
3.8.1	"Diagnostic list" submenu	209		
3.8.2	"Event logbook" submenu	211		
3.8.3	"Device information" submenu	212		
3.8.4	"Main electronic module + I/O module 1" submenu	215		
3.8.5	"Sensor electronic module (ISEM)" submenu	216		
3.8.6	"I/O module 2" submenu	217		
3.8.7	"I/O module 3" submenu	219		
3.8.8	"I/O module 4" submenu	220		
3.8.9	"Display module" submenu	221		
3.8.10	"Data logging" submenu	222		
3.8.11	"Min/max values" submenu	231		
3.8.12	"Heartbeat Technology" submenu	243		
3.8.13	"Simulation" submenu	253		
4	Country-specific factory settings	264		
4.1	SI units	264		
4.1.1	System units	264		
4.1.2	Full scale values	264		
4.1.3	Output current span	264		
4.1.4	Pulse value	264		
4.1.5	Switch-on point low flow cut off	265		
4.2	US units	265		
4.2.1	System units	265		
4.2.2	Full scale values	265		
4.2.3	Output current span	266		
4.2.4	Pulse value	266		
4.2.5	Switch-on point low flow cut off	266		
5	Explanation of abbreviated units	267		
5.1	SI units	267		
5.2	US units	267		
5.3	Imperial units	269		
	Index	270		

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

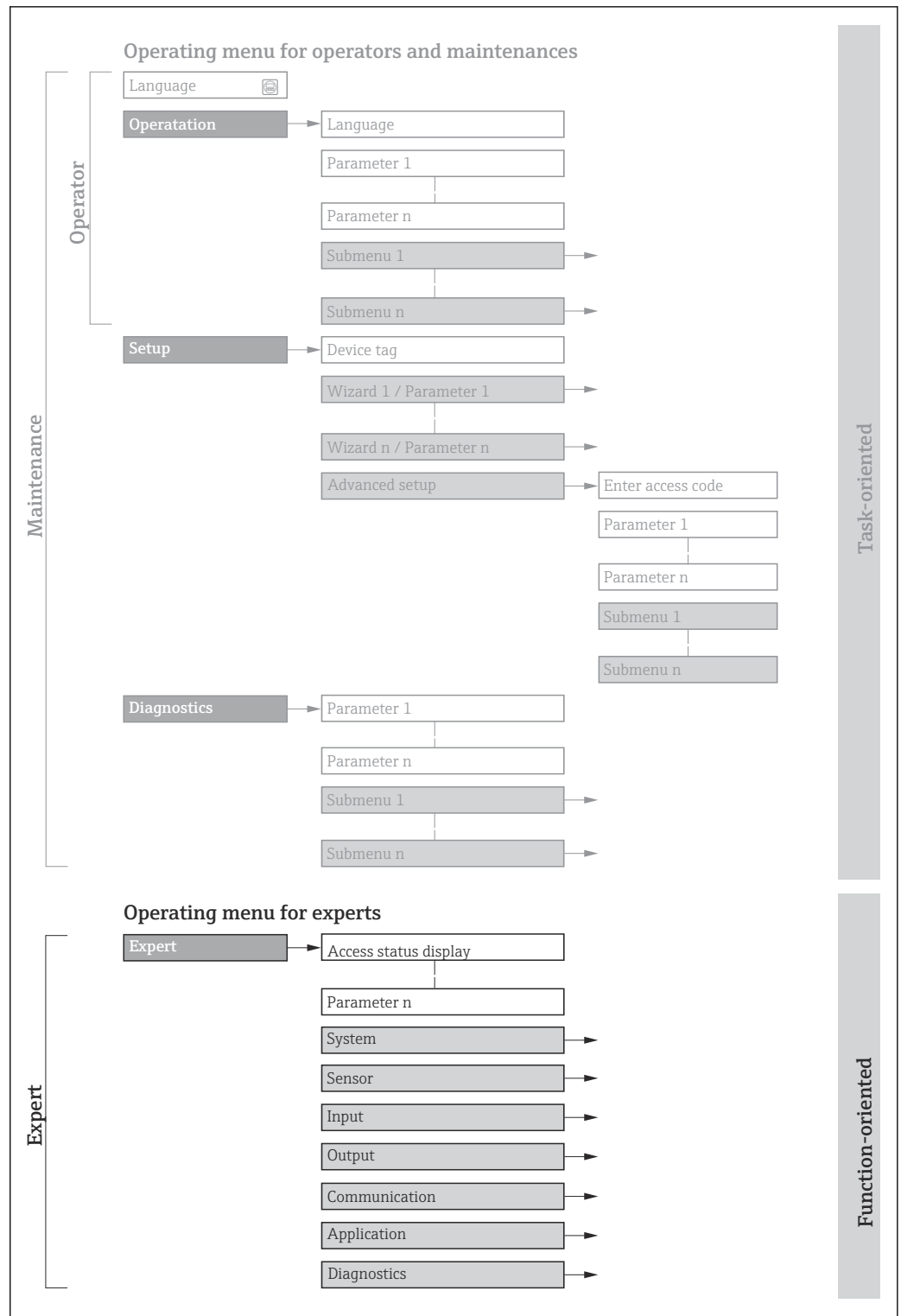
1.2 Target group

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

1.3 Using this document

1.3.1 Information on the document structure

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



1 Sample graphic for the schematic layout of the operating menu



Additional information regarding:

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

1.3.2 Structure of a parameter description

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

Complete parameter name		Write-protected parameter = 
Navigation	 Navigation path to the parameter via the local display (direct access code) or web browser  Navigation path to the parameter via the operating tool The names of the menus, submenus and parameters are abbreviated to the form in which they appear on the display and in the operating tool.	
Prerequisite	The parameter is only available under these specific conditions	
Description	Description of the parameter function	
Selection	List of the individual options for the parameter ■ Option 1 ■ Option 2	
User entry	Parameter entry range	
Display	Display value/data of the parameter	
Factory setting	Default setting ex works	
Additional information	Additional explanations (e.g. in examples): ■ For individual options ■ For display value/data ■ For the input range ■ For the factory setting ■ For the parameter function	

1.4 Symbols

1.4.1 Symbols for certain types of information

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

1.4.2 Symbols in graphics

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

1.5 Documentation

1.5.1 Standard documentation

Operating instructions

Measuring instrument	Documentation code
Cubemass C 500	BA02413D

1.5.2 Supplementary device-dependent documentation

Special documentation

Contents	Documentation code
Information on the Pressure Equipment Directive	SD01614D
Radio approvals for WLAN interface for A309/A310 display module	SD01793D
Web server	-
Heartbeat Technology	
Concentration measurement	
Gas fraction handler	SD02584D
Modbus TCP system integration	SD03383D

2 Overview of the Expert operating menu

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

Expert		
Direct access (0106)	→	11
Locking status (0004)	→	12
User role (0005)	→	13
Enter access code (0003)	→	13
▶ System	→	13
▶ Display	→	14
▶ Configuration backup	→	34
▶ Diagnostic handling	→	37
▶ Administration	→	50
▶ Sensor	→	56
▶ Measured values	→	57
▶ System units	→	73
▶ Process parameters	→	82
▶ Calculated values	→	90
▶ Measurement mode	→	93
▶ External compensation	→	96
▶ Sensor adjustment	→	99
▶ Calibration	→	118
▶ Testpoints	→	119
▶ Supervision		

► I/O configuration	→ 129
I/O module 1 to n terminal numbers (3902-1 to n)	→ 129
I/O module 1 to n information (3906-1 to n)	→ 129
I/O module 1 to n type (3901-1 to n)	→ 130
Apply I/O configuration (3907)	→ 130
I/O alteration code (2762)	→ 131
► Input	→ 131
► Current input 1 to n	→ 131
► Status input 1 to n	→ 134
► Output	→ 136
► Current output 1 to n	→ 136
► Pulse/frequency/switch output 1 to n	→ 70
► Relay output 1 to n	→ 169
► Double pulse output	→ 175
► Communication	→ 180
► Modbus configuration	→ 180
► Modbus information	→ 183
► Modbus data map	→ 184
► Web server	→ 195
► WLAN settings	→ 185
► Application	→ 198
Reset all totalizers (2806)	→ 198
► Totalizer 1 to n	→ 66
► Concentration	

► Application specific calculations	→ 198
► Medium index	→ 204
► Diagnostics	→ 206
Actual diagnostics (0691)	→ 207
Previous diagnostics (0690)	→ 208
Operating time from restart (0653)	→ 208
Operating time (0652)	→ 209
► Diagnostic list	→ 209
► Event logbook	→ 211
► Custody transfer logbook	
► Device information	→ 212
► Main electronic module + I/O module 1	→ 215
► Sensor electronic module (ISEM)	→ 216
► I/O module 2	→ 217
► I/O module 3	→ 219
► I/O module 4	→ 220
► Display module	→ 221
► Data logging	→ 222
► Min/max values	→ 231
► Heartbeat Technology	→ 243
► Simulation	→ 253

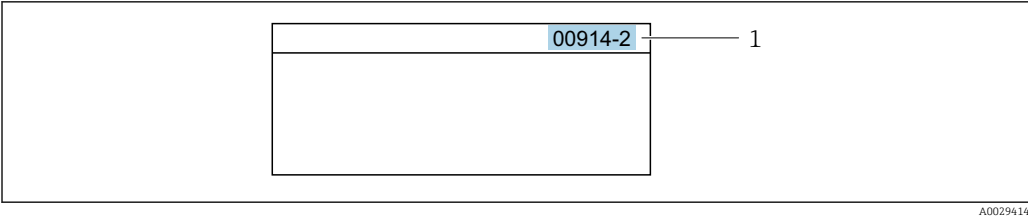
3 Description of device parameters

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

Expert		
Direct access (0106)	→	11
Locking status (0004)	→	12
Access status (0005)	→	13
Enter access code (0003)	→	13
► System	→	13
► Sensor	→	56
► I/O configuration	→	129
► Input	→	131
► Output	→	136
► Communication	→	180
► Application	→	198
► Diagnostics	→	206

Direct access

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



1 Direct access code

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

Locking status

Navigation Expert → Locking status (0004)

Description Displays the active write protection.

- User interface
- Hardware locked
 - CT active - all parameters
 - Temporarily locked

Additional information *User interface*

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

Detailed information on access authorization is provided in the "User roles and associated access authorization" and "Operating concept" sections of the Operations Instructions for the device → 7

Selection

Options	Description
None	The access authorization displayed in the Access status parameter (→ 13) applies . Only appears on local display.
Hardware locked (priority 1)	The DIP switch for hardware locking is activated on the PCB board. This locks write access to the parameters (e.g. via local display or operating tool) .
Temporarily locked	Write access to the parameters is temporarily locked on account of internal processes running in the device (e.g. data upload/download, reset, etc.). Once the internal processing has been completed, the parameters can be changed again.

Access status	
Navigation	 Expert → Access status (0005)
Description	Displays the access authorization to the parameters via the local display, Web browser or operating tool.
User interface	■ Maintenance ■ Service
Additional information	Description
	 Access authorization can be modified via the Enter access code parameter (→  13).
	 If additional write protection is active, this restricts the current access authorization even further.
	User interface
	 Detailed information on access authorization is provided in the "User roles and associated access authorization" and "Operating concept" sections of the Operations Instructions for the device →  7

Enter access code	
Navigation	 Expert → Ent. access code (0003)
Description	Use this function to enter the user-specific release code to remove parameter write protection.
User entry	Max. 16-digit character string comprising numbers, letters and special characters

3.1 "System" submenu

Navigation  Expert → System

► System	
► Display	→  14
► Configuration backup	→  34
► Diagnostic handling	→  37
► Administration	→  50

3.1.1 "Display" submenu

Navigation  Expert → System → Display

► Display

Display language

Format display

Value 1 display

0% bargraph value 1

100% bargraph value 1

Decimal places 1

Value 2 display

Decimal places 2

Value 3 display

0% bargraph value 3

100% bargraph value 3

Decimal places 3

Value 4 display

Decimal places 4

Display interval

Display damping

Header

Header text

Separator

Contrast display

Backlight

"Display" submenu

Navigation   Expert → System → Display → Display 1

► Display 1		
Display language	→ 	15
Format display	→ 	16
Value 1 display	→ 	16
0% bargraph value 1	→ 	18
100% bargraph value 1	→ 	18
Decimal places 1	→ 	19
Value 2 display	→ 	19
Decimal places 2	→ 	20
Value 3 display	→ 	21
0% bargraph value 3	→ 	21
100% bargraph value 3	→ 	22
Decimal places 3	→ 	22
Value 4 display	→ 	22
Decimal places 4	→ 	24

Display language

Navigation	  Operation → Display language (0104)
	  Expert → System → Display → Display language (0104)
	  Setup → Advanced setup → Display → Display language (0104)
Description	Set display language.
Selection	■ English ■ Deutsch ■ Français ■ Español ■ Italiano ■ Nederlands

- Portuguesa
- Polski
- русский язык (Russian)
- Svenska
- Türkçe
- 中文 (Chinese)
- 日本語 (Japanese)
- 한국어 (Korean)
- العربية (Arabic) *
- Bahasa Indonesia
- ภาษาไทย (Thai) *
- tiếng Việt (Vietnamese)
- čeština (Czech)

Format display

Navigation

-   Operation → Display → Format display (0098)
-   Expert → System → Display → Format display (0098)
-   Setup → Advanced setup → Display → Format display (0098)
-  Setup → Display → Format display (0098)

Description

Select how measured values are shown on the display.

Selection

- 1 value, max. size
- 1 bargraph + 1 value
- 2 values
- 1 value large + 2 values
- 4 values

Value 1 display



Navigation

-   Expert → System → Display → Value 1 display (0107)
-   Setup → Advanced setup → Display → Value 1 display (0107)
-  Setup → Display → Value 1 display (0107)

Description

Select the measured value that is shown on the local display.

Selection

- Mass flow
- Volume flow
- Corrected volume flow *
- Target mass flow *
- Carrier mass flow *
- Target volume flow *
- Carrier volume flow *
- Target corrected volume flow *
- Carrier corrected volume flow *
- Density

* Visibility depends on order options or device settings

- Reference density *
- Reference density alternative *
- GSV flow *
- GSV flow alternative *
- NSV flow *
- NSV flow alternative *
- S&W volume flow *
- Water cut *
- Oil density *
- Water density *
- Oil mass flow *
- Water mass flow *
- Oil volume flow *
- Water volume flow *
- Oil corrected volume flow *
- Water corrected volume flow *
- Weighted density average *
- Weighted temperature average *
- Concentration *
- Dynamic viscosity *
- Kinematic viscosity *
- Temp. compensated dynamic viscosity *
- Temp. compensated kinematic viscosity *
- Temperature
- Carrier pipe temperature *
- Electronic temperature
- Oscillation frequency 0
- Oscillation frequency 1 *
- Oscillation amplitude 0 *
- Oscillation amplitude 1 *
- Frequency fluctuation 0 *
- Frequency fluctuation 1 *
- Oscillation damping 0 *
- Oscillation damping 1 *
- Oscillation damping fluctuation 0 *
- Oscillation damping fluctuation 1 *
- Signal asymmetry *
- Exciter current 0 *
- Exciter current 1 *
- HBSI *
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Current output 1 *
- Current output 2 *
- Current output 3 *
- Current output 4 *
- Pressure
- Application specific output 1 *
- Index inhomogeneous medium
- Application specific output 0 *
- Index suspended bubbles *

* Visibility depends on order options or device settings

0% bargraph value 1 	
Navigation	  Expert → System → Display → 0% bargraph 1 (0123)   Setup → Advanced setup → Display → 0% bargraph 1 (0123)  Setup → Display → 0% bargraph 1 (0123)
Prerequisite	A local display is provided.
Description	Use this function to enter the 0% bar graph value to be shown on the display for the measured value 1.
User entry	Signed floating-point number
Factory setting	Country-specific: ■ 0 kg/h ■ 0 lb/min
Additional information	<i>Description</i>  The Format display parameter (→  16) is used to specify that the measured value is to be displayed as a bar graph.
	<i>User entry</i>  The unit of the displayed measured value is taken from the System units submenu (→  73).
100% bargraph value 1 	
Navigation	  Expert → System → Display → 100% bargraph 1 (0125)   Setup → Advanced setup → Display → 100% bargraph 1 (0125)  Setup → 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 →  264
Additional information	<i>Description</i>  The Format display parameter (→  16) is used to specify that the measured value is to be displayed as a bar graph.
	<i>User entry</i>  The unit of the displayed measured value is taken from the System units submenu (→  73).

Decimal places 1



Navigation

- Expert → System → Display → Decimal places 1 (0095)
- Setup → Advanced setup → Display → Decimal places 1 (0095)

Description

This selection does not affect the measurement and calculation accuracy of the device.

Selection

- X
- X.X
- X.XX
- X.XXX
- X.XXXX

Value 2 display



Navigation

- Expert → System → Display → Value 2 display (0108)
- Setup → Advanced setup → Display → Value 2 display (0108)
- Setup → Display → Value 2 display (0108)

Description

Select the measured value that is shown on the local display.

Selection

- None
- Mass flow
- Volume flow
- Corrected volume flow *
- Target mass flow *
- Carrier mass flow *
- Target volume flow *
- Carrier volume flow *
- Target corrected volume flow *
- Carrier corrected volume flow *
- Density
- Reference density *
- Reference density alternative *
- GSV flow *
- GSV flow alternative *
- NSV flow *
- NSV flow alternative *
- S&W volume flow *
- Water cut *
- Oil density *
- Water density *
- Oil mass flow *
- Water mass flow *
- Oil volume flow *
- Water corrected volume flow *
- Oil corrected volume flow *
- Water volume flow *
- Weighted density average *
- Weighted temperature average *

* Visibility depends on order options or device settings

- Concentration *
- Dynamic viscosity *
- Kinematic viscosity *
- Temp. compensated dynamic viscosity *
- Temp. compensated kinematic viscosity *
- Temperature
- Carrier pipe temperature *
- Electronic temperature
- Oscillation frequency 0
- Oscillation frequency 1 *
- Oscillation amplitude 0 *
- Oscillation amplitude 1 *
- Frequency fluctuation 0 *
- Frequency fluctuation 1 *
- Oscillation damping 0 *
- Oscillation damping 1 *
- Oscillation damping fluctuation 0 *
- Oscillation damping fluctuation 1 *
- Signal asymmetry *
- Exciter current 0 *
- Exciter current 1 *
- Raw value mass flow
- HBSI *
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Current output 1 *
- Current output 2 *
- Current output 3 *
- Current output 4 *
- Custody transfer counter *
- Pressure
- Index inhomogeneous medium
- Application specific output 0 *
- Index suspended bubbles *
- Application specific output 1 *

Decimal places 2

Navigation

- Expert → System → Display → Decimal places 2 (0117)
- Setup → Advanced setup → Display → Decimal places 2 (0117)

Description

This selection does not affect the measurement and calculation accuracy of the device.

Selection

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

* Visibility depends on order options or device settings

Value 3 display**Navigation**

-   Expert → System → Display → Value 3 display (0110)
-   Setup → Advanced setup → Display → Value 3 display (0110)
-  Setup → Display → Value 3 display (0110)

Prerequisite

A local display is provided.

Description

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

Selection

For the picklist, see **Value 1 display** parameter (→  16)

Additional information*Description*

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



The **Format display** parameter (→  16) is used to specify how many measured values are displayed simultaneously and how.

Options

The unit of the displayed measured value is taken from the **System units** submenu (→  73).

0% bargraph value 3**Navigation**

-   Expert → System → Display → 0% bargraph 3 (0124)
-   Setup → Advanced setup → Display → 0% bargraph 3 (0124)
-  Setup → Display → 0% bargraph 3 (0124)

Prerequisite

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

Description

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

User entry

Signed floating-point number

Factory setting

Country-specific:

- 0 kg/h
- 0 lb/min

Additional information*Description*

The **Format display** parameter (→  16) 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 (→  73).

100% bargraph value 3 	
Navigation	  Expert → System → Display → 100% bargraph 3 (0126)   Setup → Advanced setup → Display → 100% bargraph 3 (0126)  Setup → Display → 100% bargraph 3 (0126)
Prerequisite	A selection was made in the Value 3 display parameter (→  21).
Description	Use this function to enter the 100% bar graph value to be shown on the display for the measured value 3.
User entry	Signed floating-point number
Additional information	<i>Description</i>  The Format display parameter (→  16) is used to specify that the measured value is to be displayed as a bar graph. <i>User entry</i>  The unit of the displayed measured value is taken from the System units submenu (→  73).
Decimal places 3 	
Navigation	  Expert → System → Display → Decimal places 3 (0118)   Setup → Advanced setup → Display → Decimal places 3 (0118)
Description	This selection does not affect the measurement and calculation accuracy of the device.
Selection	■ X ■ X.X ■ X.XX ■ X.XXX ■ X.XXXX
Value 4 display 	
Navigation	  Expert → System → Display → Value 4 display (0109)   Setup → Advanced setup → Display → Value 4 display (0109)  Setup → Display → Value 4 display (0109)
Description	Select the measured value that is shown on the local display.
Selection	■ None ■ Mass flow ■ Volume flow

- Corrected volume flow *
- Target mass flow *
- Carrier mass flow *
- Target volume flow *
- Carrier volume flow *
- Target corrected volume flow *
- Carrier corrected volume flow *
- Density
- Reference density *
- Reference density alternative *
- GSV flow *
- GSV flow alternative *
- NSV flow *
- NSV flow alternative *
- S&W volume flow *
- Water cut *
- Oil density *
- Water density *
- Oil mass flow *
- Water mass flow *
- Oil volume flow *
- Water corrected volume flow *
- Oil corrected volume flow *
- Water volume flow *
- Weighted density average *
- Weighted temperature average *
- Concentration *
- Dynamic viscosity *
- Kinematic viscosity *
- Temp. compensated dynamic viscosity *
- Temp. compensated kinematic viscosity *
- Temperature
- Carrier pipe temperature *
- Electronic temperature
- Oscillation frequency 0
- Oscillation frequency 1 *
- Oscillation amplitude 0 *
- Oscillation amplitude 1 *
- Frequency fluctuation 0 *
- Frequency fluctuation 1 *
- Oscillation damping 0 *
- Oscillation damping 1 *
- Oscillation damping fluctuation 0 *
- Oscillation damping fluctuation 1 *
- Signal asymmetry *
- Exciter current 0 *
- Exciter current 1 *
- Raw value mass flow
- HBSI *
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Current output 1 *
- Current output 2 *
- Current output 3 *
- Current output 4 *

* Visibility depends on order options or device settings

- Custody transfer counter *
- Pressure
- Index inhomogeneous medium
- Application specific output 0 *
- Index suspended bubbles *
- Application specific output 1 *

Decimal places 4

Navigation

  Expert → System → Display → Decimal places 4 (0119)
  Setup → Advanced setup → Display → Decimal places 4 (0119)

Description

This selection does not affect the measurement and calculation accuracy of the device.

- Selection
- X
 - X.X
 - X.XX
 - X.XXX
 - X.XXXX

"Display" submenu

Navigation

  Expert → System → Display → Display 2

► Display 2

Value 5 display

0% bargraph value 5

100% bargraph value 5

Decimal places 5

Value 6 display

Decimal places 6

Value 7 display

0% bargraph value 7

100% bargraph value 7

→  25

→  25

→  26

→  26

→  27

→  27

→  28

→  28

→  29

* Visibility depends on order options or device settings

Decimal places 7	→ 29
Value 8 display	→ 30
Decimal places 8	→ 30

Value 5 display

Navigation	Expert → System → Display → Value 5 display (0145) Setup → Advanced setup → Display → Value 5 display (0145) Setup → Display → Value 5 display (0145)
Prerequisite	A local display is provided.
Description	Use this function to select a measured value that is shown on the local display.
Selection	For the picklist, see Value 1 display parameter (→ 16)
Additional information	<i>Description</i> If several measured values are displayed one below the other, the measured value selected here will be the fifth value to be displayed. The value is only displayed during normal operation. The Format display parameter (→ 16) is used to specify how many measured values are displayed simultaneously and how. <i>Options</i> The unit of the displayed measured value is taken from the System units submenu (→ 73).

0% bargraph value 5

Navigation	Expert → System → Display → 0% bargraph 5 (0153) Setup → Advanced setup → Display → 0% bargraph 5 (0153)
Prerequisite	An option was selected in the Value 5 display parameter (→ 25).
Description	Use this function to enter the 0% bar graph value to be shown on the display for the measured value 5.
User entry	Signed floating-point number
Factory setting	Depends on country: 0 kg/h 0 lb/min

Additional information

Description

 The **Format display** parameter (→  16) 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 (→  73).

100% bargraph value 5

Navigation

  Expert → System → Display → 100% bargraph 5 (0155)
  Setup → Advanced setup → Display → 100% bargraph 5 (0155)

Prerequisite

An option was selected in the **Value 5 display** parameter (→  25).

Description

Use this function to enter the 100% bar graph value to be shown on the display for the measured value 5.

User entry

Signed floating-point number

Additional information

Description

 The **Format display** parameter (→  16) 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 (→  73).

Decimal places 5

Navigation

  Expert → System → Display → Decimal places 5 (0149)
  Setup → Advanced setup → Display → Decimal places 5 (0149)

Prerequisite

A measured value is specified in the **Value 5 display** parameter (→  25).

Description

Use this function to select the number of decimal places for measured value 5.

Selection

- x
- x.x
- x.xx
- x.xxx
- x.xxxx
- x.xxxxx
- x.xxxxxx

Additional information

Description

 This setting does not affect the accuracy of the device for measuring or calculating the value.

Value 6 display

**Navigation**

- Expert → System → Display → Value 6 display (0146)
- Setup → Advanced setup → Display → Value 6 display (0146)
- Setup → Display → Value 6 display (0146)

Prerequisite

A local display is provided.

Description

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

Selection

For the picklist, see **Value 1 display** parameter (→ 16)

Additional information*Description*

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



The **Format display** parameter (→ 16) is used to specify how many measured values are displayed simultaneously and how.

Options

The unit of the displayed measured value is taken from the **System units** submenu (→ 73).

Decimal places 6

**Navigation**

- Expert → System → Display → Decimal places 6 (0150)
- Setup → Advanced setup → Display → Decimal places 6 (0150)

Prerequisite

A measured value is specified in the **Value 6 display** parameter (→ 27).

Description

Use this function to select the number of decimal places for measured value 6.

Selection

- x
- x.x
- x.xx
- x.xxx
- x.xxxx
- x.xxxxx
- x.xxxxxx

Additional information*Description*

This setting does not affect the accuracy of the device for measuring or calculating the value.

Value 7 display	
Navigation	  Expert → System → Display → Value 7 display (0147)   Setup → Advanced setup → Display → Value 7 display (0147)  Setup → Display → Value 7 display (0147)
Prerequisite	A local display is provided.
Description	Use this function to select a measured value that is shown on the local display.
Selection	For the picklist, see Value 1 display parameter (→  16)
Additional information	<i>Description</i> If several measured values are displayed one below the other, the measured value selected here will be the seventh value to be displayed. The value is only displayed during normal operation.  The Format display parameter (→  16) is used to specify how many measured values are displayed simultaneously and how. <i>Options</i>  The unit of the displayed measured value is taken from the System units submenu (→  73).
0% bargraph value 7	
Navigation	  Expert → System → Display → 0% bargraph 7 (0154)   Setup → Advanced setup → Display → 0% bargraph 7 (0154)
Prerequisite	An option was selected in the Value 7 display parameter (→  28).
Description	Use this function to enter the 0% bar graph value to be shown on the display for the measured value 7.
User entry	Signed floating-point number
Factory setting	Depends on country: ■ 0 kg/h ■ 0 lb/min
Additional information	<i>Description</i>  The Format display parameter (→  16) is used to specify that the measured value is to be displayed as a bar graph. <i>User entry</i>  The unit of the displayed measured value is taken from the System units submenu (→  73).

100% bargraph value 7	
Navigation	  Expert → System → Display → 100% bargraph 7 (0156)   Setup → Advanced setup → Display → 100% bargraph 7 (0156)
Prerequisite	An option was selected in the Value 7 display parameter (→  28).
Description	Use this function to enter the 100% bar graph value to be shown on the display for the measured value 7.
User entry	Signed floating-point number
Additional information	<i>Description</i>  The Format display parameter (→  16) is used to specify that the measured value is to be displayed as a bar graph. <i>User entry</i>  The unit of the displayed measured value is taken from the System units submenu (→  73).
Decimal places 7	
Navigation	  Expert → System → Display → Decimal places 7 (0151)   Setup → Advanced setup → Display → Decimal places 7 (0151)
Prerequisite	A measured value is specified in the Value 7 display parameter (→  28).
Description	Use this function to select the number of decimal places for measured value 7.
Selection	■ x ■ x.x ■ x.xx ■ x.xxx ■ x.xxxx ■ x.xxxxx ■ x.xxxxxx
Additional information	<i>Description</i>  This setting does not affect the accuracy of the device for measuring or calculating the value.

Value 8 display

Navigation	Expert → System → Display → Value 8 display (0148) Setup → Advanced setup → Display → Value 8 display (0148) Setup → Display → Value 8 display (0148)
Prerequisite	A local display is provided.
Description	Use this function to select a measured value that is shown on the local display.
Selection	For the picklist, see Value 1 display parameter (→ 16)
Additional information	Description If several measured values are displayed one below the other, the measured value selected here will be the eighth value to be displayed. The value is only displayed during normal operation. The Format display parameter (→ 16) is used to specify how many measured values are displayed simultaneously and how. Options The unit of the displayed measured value is taken from the System units submenu (→ 73).

Decimal places 8

Navigation	Expert → System → Display → Decimal places 8 (0152) Setup → Advanced setup → Display → Decimal places 8 (0152)
Prerequisite	A measured value is specified in the Value 8 display parameter (→ 30).
Description	Use this function to select the number of decimal places for measured value 8.
Selection	■ x ■ x.x ■ x.xx ■ x.xxx ■ x.xxxx ■ x.xxxxx ■ x.xxxxxx
Additional information	Description This setting does not affect the accuracy of the device for measuring or calculating the value.

"Display" submenu

Navigation  Expert → System → Display → Display 3

► Display 3

Display interval

→  31

Display damping

→  32

Header

→  32

Header text

→  33

Separator

→  33

Contrast display

→  33

Backlight

→  34

Display interval

Navigation	 Operation → Display → Display interval (0096)  Expert → System → Display → Display interval (0096)  Setup → Advanced setup → Display → Display interval (0096)
Prerequisite	A local display is provided.
Description	Use this function to enter the length of time the measured values are displayed if the values alternate on the display.
User entry	1 to 10 s
Additional information	Description This type of alternating display only occurs automatically if the number of measured values defined exceeds the number of values the selected display format can display simultaneously.  ▪ The Value 1 display parameter (→  16)...Value 8 display parameter (→  30) are used to specify which measured values are shown on the local display. ▪ The display format for the measured values displayed is defined in the Format display parameter (→  16).

Display damping

Navigation	Expert → System → Display → Display damping (0094) Setup → Advanced setup → Display → Display damping (0094)
Prerequisite	A local display is provided.
Description	Use this function to enter a time constant for the reaction time of the local display to fluctuations in the measured value caused by process conditions.
User entry	0.0 to 999.9 s
Additional information	User entry Use this function to enter a time constant (PT1 element ¹⁾) for display damping: - At a low time constant, the display reacts quickly to fluctuating measured variables. - If a high time constant is entered, the display reacts more slowly. i The damping is not active if the value 0 (factory setting) is entered.

Header

Navigation	Expert → System → Display → Header (0097) Setup → Advanced setup → Display → Header (0097)
Prerequisite	A local display is provided.
Description	Use this function to select the contents of the header of the local display.
Selection	- Device tag - Free text
Additional information	Description The header text only appears during normal operation. 1 XXXXXXXXXX 1 Position of the header text on the display Selection Free text Is defined in the Header text parameter (→ 33).

1) proportional transmission behavior with first order delay

Header text

Navigation	Expert → System → Display → Header text (0112) Setup → Advanced setup → Display → Header text (0112)
Prerequisite	The Free text option is selected in the Header parameter (→ 32).
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. @, %, /)
Additional information	Description The header text only appears during normal operation. 1 XXXXXXXXXX 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) Setup → Advanced setup → 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	Operation → Display → Contrast display (0105) Expert → System → Display → Contrast display (0105)
Prerequisite	A local display is provided.

Description	Use this function to enter a value to adapt the display contrast to the ambient conditions (e.g. the lighting or viewing angle).
User entry	20 to 80 %
Factory setting	Depends on the display

Backlight

Navigation	Operation → Display → Backlight (0111) Expert → System → Display → Backlight (0111) Setup → Advanced setup → Display → Backlight (0111)
Prerequisite	One of the following conditions is met: ▪ Order code for "Display; operation", option F "4-line, illum.; touch control" ▪ Order code for "Display; operation", option G "4-line, illum.; touch control +WLAN"
Description	Switch the local display backlight on and off.
Selection	▪ Disable ▪ Enable

3.1.2 "Configuration backup" submenu

Navigation

Expert → System → Config. backup

► Configuration backup		
Operating time (0652)	→	34
Last backup (2757)	→	35
Configuration management (2758)	→	35
Backup state (2759)	→	36
Comparison result (2760)	→	36

Operating time

Navigation	Expert → System → Config. backup → Operating time (0652)
Description	Displays the length of time the device has been in operation.

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

Additional information *Indication*

Maximum number of days: 9 999 (corresponds to approx. 27 years and 5 months)

Last backup

Navigation   Expert → System → Config. backup → Last backup (2757)

Description Displays the time since a backup copy of the data was last saved to the device memory.

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

Configuration management



Navigation   Expert → System → Config. backup → Config. managem. (2758)

Description Use this function to select an action to save the data to the device memory.

Selection

- Cancel
- Execute backup
- Restore *
- Compare *
- Clear backup data

Additional information *Selection*

Options	Description
Cancel	No action is executed and the user exits the parameter.
Execute backup	A backup copy of the current device configuration is saved from the HistoROM backup to the memory of the device. The backup copy includes the transmitter data of the device. The following message appears on the local display: Backup active, please wait!
Restore	The last backup copy of the device configuration is restored from the display module from the device memory to the device's HistoROM backup. The backup copy includes the transmitter data of the device. The following message appears on the local display: Restore active! Do not interrupt power supply!

* Visibility depends on order options or device settings

Options	Description
Compare	The device configuration saved in the device memory is compared with the current device configuration of the HistoROM backup. The following message appears on the local display: Comparing files The result can be viewed in Comparison result parameter.
Clear backup data	The backup copy of the device configuration is deleted from the memory of the device. The following message appears on the local display: Deleting file

HistoROM

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

Backup state

Navigation

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

Description

Displays the status of the data backup process.

User interface

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

Comparison result

Navigation

 Expert → System → Config. backup → Compar. result (2760)

Description

Displays the last result of the comparison of the data records in the device memory and in the HistoROM.

User interface

- Settings identical
- Settings not identical
- No backup available
- Backup settings corrupt
- Check not done
- Dataset incompatible

Additional information

Description

 The comparison is started via the **Compare** option in the **Configuration management** parameter (→  35).

Options

Options	Description
Settings identical	The current device configuration of the HistoROM is the same as its backup copy in the device memory. If the transmitter configuration of another device has been transmitted to the device via HistoROM in Configuration management parameter, the current device configuration of the HistoROM is only partially identical to the backup copy in the device memory: The settings for the transmitter are not identical.
Settings not identical	The current device configuration of the HistoROM differs from the backup copy in the device memory.
No backup available	There is no backup copy of the device configuration of the HistoROM in the device memory.
Backup settings corrupt	The current device configuration of the HistoROM is corrupt or not compatible with the backup copy in the device memory.
Check not done	The device configuration of the HistoROM has not yet been compared to the backup copy in the device memory.
Dataset incompatible	The backup copy in the device memory is not compatible with the device.

HistoROM

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

3.1.3 "Diagnostic handling" submenu

Navigation

  Expert → System → Diagn. handling

► Diagnostic handling	
Alarm delay (0651)	→  37
► Diagnostic behavior	→  38

Alarm delay

Navigation

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

Description

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

 The diagnostic message is reset without a time delay.

User entry

0 to 60 s

Additional information

Effect

This setting affects the following diagnostic messages:

- 046 Sensor limit exceeded
- 140 Sensor signal asymmetrical
- 142 Sensor index coil asymmetry too high
- 311 Sensor electronic (ISEM) faulty
- 599 Custody transfer logbook full
- 830 Sensor temperature too high
- 831 Sensor temperature too low
- 832 Electronic temperature too high
- 833 Electronic temperature too low
- 834 Process temperature too high
- 835 Process temperature too low
- 843 Process limit
- 862 Partly filled pipe
- 912 Medium inhomogeneous
- 913 Medium unsuitable
- 944 Monitoring failed
- 984 Condensation risk

"Diagnostic behavior" submenu

Each item of diagnostic information is assigned a specific diagnostic behavior at the factory. The user can change this assignment for specific diagnostic information in the **Diagnostic behavior** submenu (→  38).

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

Navigation

  Expert → System → Diagn. handling → Diagn. behavior

► Diagnostic behavior

Assign behavior of diagnostic no. 046
(0709)

→  40

Assign behavior of diagnostic no. 140
(0708)

→  40

Assign behavior of diagnostic no. 144
(0731)

→  41

Assign behavior of diagnostic no. 374
(0710)

→  41

Assign behavior of diagnostic no. 302
(0739)

→  42

Assign behavior of diagnostic no. 441
(0657)

→  42

Assign behavior of diagnostic no. 442
(0658)

→  43

Assign behavior of diagnostic no. 443 (0659)	→  43
Assign behavior of diagnostic no. 444 (0740)	→  43
Assign behavior of diagnostic no. 543 (0643)	
Assign behavior of diagnostic no. 830 (0800)	→  44
Assign behavior of diagnostic no. 831 (0641)	→  45
Assign behavior of diagnostic no. 832 (0681)	→  45
Assign behavior of diagnostic no. 833 (0682)	→  45
Assign behavior of diagnostic no. 834 (0700)	→  46
Assign behavior of diagnostic no. 835 (0702)	→  46
Assign behavior of diagnostic no. 842 (0638)	→  46
Assign behavior of diagnostic no. 862 (0679)	→  47
Assign behavior of diagnostic no. 912 (0703)	→  47
Assign behavior of diagnostic no. 913 (0712)	→  47
Assign behavior of diagnostic no. 941 (0632)	→  48
Assign behavior of diagnostic no. 942 (0633)	→  48
Assign behavior of diagnostic no. 943 (0634)	→  49
Assign behavior of diagnostic no. 944 (0732)	→  49
Assign behavior of diagnostic no. 948 (0744)	→  50

Assign behavior of diagnostic no. 140 (Sensor signal asymmetrical)



Navigation  Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 140 (0708)

Description Use this function to change the diagnostic behavior of the **140 Sensor signal asymmetrical** diagnostic message.

Selection

- Off
- Alarm
- Warning
- Logbook entry only

Additional information  For a detailed description of the options available:

Assign behavior of diagnostic no. 046 (Sensor limit exceeded)



Navigation  Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 046 (0709)

Description Use this function to change the diagnostic behavior of the **046 Sensor limit exceeded** diagnostic message.

Selection

- Off
- Alarm
- Warning
- Logbook entry only

Additional information  For a detailed description of the options available:

Assign behavior of diagnostic no. 142 (Sensor index coil asymmetry too high)



Navigation  Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 142 (0648)

Description Change behavior of diagnostic event with diagnostic number 142 'Sensor index coil asymmetry too high'.

Selection

- Off
- Alarm
- Warning
- Logbook entry only

Additional information*Selection*

- **Off** option
The diagnostic event is ignored and no diagnostic message is generated or logged.
- **Alarm** option
The device stops measuring. The signal outputs and totalizers assume the specified alarm condition. A diagnostic message is generated.
- **Warning** option
The device continues measuring. The signal outputs and totalizers are not affected. A diagnostic message is generated.
- **Logbook entry only** option
The device continues measuring. The diagnostic message is only displayed in the "Event logbook" submenu and does not alternate with the standard operational information displayed.

Assign behavior of diagnostic no. 144 (Measurement error too high)**Navigation**

 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 144 (0731)

Description

Select diagnostic behavior for the selected diagnostic number.

Selection

- Off
- Alarm
- Warning
- Logbook entry only

Additional information

For a detailed description of the options available:

Assign behavior of diagnostic no. 374 (Sensor electronic (ISEM) faulty)**Navigation**

 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 374 (0710)

Description

Use this function to change the diagnostic behavior of the **374 Sensor electronic (ISEM) faulty** diagnostic message.

Selection

- Off
- Alarm
- Warning
- Logbook entry only

Additional information

For a detailed description of the options available:

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



Navigation	 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 302 (0739)
Description	Use this function to change the diagnostic behavior of the 302 Device verification active diagnostic message.
Selection	■ Alarm ■ Warning
Additional information	 For a detailed description of the options available:

Assign behavior of diagnostic no. 304



Navigation	 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 304 (0644)
Description	Change behavior of diagnostic event with diagnostic number 304 'Device verification failed'.
Selection	■ Off ■ Alarm ■ Warning ■ Logbook entry only
Additional information	<i>Selection</i> ■ Off option The diagnostic event is ignored and no diagnostic message is generated or logged. ■ Alarm option The device stops measuring. The signal outputs and totalizers assume the specified alarm condition. A diagnostic message is generated. ■ Warning option The device continues measuring. The signal outputs and totalizers are not affected. A diagnostic message is generated. ■ Logbook entry only option The device continues measuring. The diagnostic message is only displayed in the "Event logbook" submenu and does not alternate with the standard operational information displayed.

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



Navigation	 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 441 (0657)
Description	Use this function to change the diagnostic behavior of the 441 Current output 1 to n diagnostic message.

- Selection**
- Off
 - Alarm
 - Warning
 - Logbook entry only

Additional information  For a detailed description of the options available:

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



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

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

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

- Selection**
- Off
 - Alarm
 - Warning
 - Logbook entry only

Additional information  For a detailed description of the options available:

Assign behavior of diagnostic no. 443 (Pulse output 1 to n)



Navigation  Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 443 (0659)

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

Description Use this function to change the diagnostic behavior of the **443 Pulse output 1 to n** diagnostic message.

- Selection**
- Off
 - Alarm
 - Warning
 - Logbook entry only

Additional information  For a detailed description of the options available:

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



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

Prerequisite The device has one current input.

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

Selection

- Off
- Alarm
- Warning
- Logbook entry only

Additional information  For a detailed description of the options available:

Assign behavior of diagnostic no. 599 (Custody transfer logbook full)



Navigation  Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 599 (0644)

Description Use this function to select the diagnostic behavior of the **△S599 Custody transfer logbook full** diagnostic message

Selection

- Off
- Alarm
- Warning
- Logbook entry only

Additional information *Selection*

- **Off** option
The diagnostic event is ignored and no diagnostic message is generated or logged.
- **Alarm** option
The device stops measuring. The signal outputs and totalizers assume the specified alarm condition. A diagnostic message is generated.
- **Warning** option
The device continues measuring. The signal outputs and totalizers are not affected. A diagnostic message is generated.
- **Logbook entry only** option
The device continues measuring. The diagnostic message is only displayed in the "Event logbook" submenu and does not alternate with the standard operational information displayed.

Assign behavior of diagnostic no. 830 (Sensor temperature too high)



Navigation  Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 830 (0800)

Description Use this function to change the diagnostic behavior of the **830 Sensor temperature too high** diagnostic message.

Selection

- Off
- Alarm
- Warning
- Logbook entry only

Additional information  For a detailed description of the options available:

Assign behavior of diagnostic no. 831 (Sensor temperature too low)



Navigation	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 831 (0641)
Description	Use this function to change the diagnostic behavior of the 831 Sensor temperature too low diagnostic message.
Selection	■ Off ■ Alarm ■ Warning ■ Logbook entry only
Additional information	For a detailed description of the options available:

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



Navigation	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 832 (0681)
Description	Use this function to change the diagnostic behavior of the 832 Electronic temperature too high diagnostic message.
Selection	■ Off ■ Alarm ■ Warning ■ Logbook entry only
Additional information	For a detailed description of the options available:

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



Navigation	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 833 (0682)
Description	Use this function to change the diagnostic behavior of the 833 Electronic temperature too low diagnostic message.
Selection	■ Off ■ Alarm ■ Warning ■ Logbook entry only
Additional information	For a detailed description of the options available:

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



Navigation  Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 834 (0700)

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

Selection

- Off
- Alarm
- Warning
- Logbook entry only

Additional information  For a detailed description of the options available:

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



Navigation  Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 835 (0702)

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

Selection

- Off
- Alarm
- Warning
- Logbook entry only

Additional information  For a detailed description of the options available:

Assign behavior of diagnostic no. 842 (Process limit)



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

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

Selection

- Off
- Alarm
- Warning
- Logbook entry only

Additional information  For a detailed description of the options available:

Assign behavior of diagnostic no. 862 (Empty pipe)



Navigation	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 862 (0679)
Description	Use this function to change the diagnostic behavior of the 862 Empty pipe diagnostic message.
Selection	■ Off ■ Alarm ■ Warning ■ Logbook entry only
Additional information	For a detailed description of the options available:

Assign behavior of diagnostic no. 912 (Medium inhomogeneous)



Navigation	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 912 (0703)
Description	Use this function to change the diagnostic behavior of the 912 Medium inhomogeneous diagnostic message.
Selection	■ Off ■ Alarm ■ Warning ■ Logbook entry only
Additional information	For a detailed description of the options available:

Assign behavior of diagnostic no. 913 (Medium unsuitable)



Navigation	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 913 (0712)
Description	Use this function to change the diagnostic behavior of the 913 Medium unsuitable diagnostic message.
Selection	■ Off ■ Alarm ■ Warning ■ Logbook entry only
Additional information	For a detailed description of the options available:

Assign behavior of diagnostic no. 915 (Viscosity out of specification)



Navigation	 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 915 (0649)
Description	Change behavior of diagnostic event with diagnostic number 915 'Viscosity out of specification'.
Selection	■ Off ■ Alarm ■ Warning ■ Logbook entry only
Additional information	<i>Selection</i> ■ Off option The diagnostic event is ignored and no diagnostic message is generated or logged. ■ Alarm option The device stops measuring. The signal outputs and totalizers assume the specified alarm condition. A diagnostic message is generated. ■ Warning option The device continues measuring. The signal outputs and totalizers are not affected. A diagnostic message is generated. ■ Logbook entry only option The device continues measuring. The diagnostic message is only displayed in the "Event logbook" submenu and does not alternate with the standard operational information displayed.

Assign behavior of diagnostic no. 941 (API/ASTM temperature outside specification)



Navigation	 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 941 (0632)
Prerequisite	For the following order code: "Application package", option EJ "Petroleum"
Description	Use this function to change the diagnostic behavior of the diagnostic message 'API/ASTM temperature outside specification'.
Selection	■ Off ■ Alarm ■ Warning ■ Logbook entry only
Additional information	 For a detailed description of the options available:

Assign behavior of diagnostic no. 942 (API/ASTM density out of specification)



Navigation	 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 942 (0633)
Prerequisite	For the following order code:

"Application package", option EJ "Petroleum"

Description	Use this function to change the diagnostic behavior of 'API/ASTM temperature outside specification'.
Selection	■ Off ■ Alarm ■ Warning ■ Logbook entry only
Additional information	 For a detailed description of the options available:

Assign behavior of diagnostic no. 943 (API/ASTM pressure outside specification)



Navigation	 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 943 (0634)
Prerequisite	For the following order code: "Application package", option EJ "Petroleum"
Description	Use this function to change the diagnostic behavior of 'API/ASTM pressure outside specification'.
Selection	■ Off ■ Alarm ■ Warning ■ Logbook entry only
Additional information	 For a detailed description of the options available:

Assign behavior of diagnostic no. 944 (Monitoring failed)



Navigation	 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 944 (0732)
Description	Use this function to change the diagnostic behavior of the 944 Monitoring failed diagnostic message.
Selection	■ Off ■ Alarm ■ Warning ■ Logbook entry only
Additional information	 For a detailed description of the options available:

Assign behavior of diagnostic no. 948 (Oscillation damping too high)



Navigation	 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 948 (0744)
Description	Use this function to change the diagnostic behavior of the 948 Oscillation damping too high diagnostic message.
Selection	■ Off ■ Alarm ■ Warning ■ Logbook entry only
Additional information	 For a detailed description of the options available:

Assign behavior of diagnostic no. 984 (Condensation risk)



Navigation	 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 984 (0646)
Description	Change behavior of diagnostic event with diagnostic number 984 'Condensation risk'.
Selection	■ Off ■ Alarm ■ Warning ■ Logbook entry only
Additional information	<i>Selection</i> ■ Off option The diagnostic event is ignored and no diagnostic message is generated or logged. ■ Alarm option The device stops measuring. The signal outputs and totalizers assume the specified alarm condition. A diagnostic message is generated. ■ Warning option The device continues measuring. The signal outputs and totalizers are not affected. A diagnostic message is generated. ■ Logbook entry only option The device continues measuring. The diagnostic message is only displayed in the "Event logbook" submenu and does not alternate with the standard operational information displayed.

3.1.4 "Administration" submenu

Navigation  Expert → System → Administration

► Administration

► Define access code

→ 51

▶ Reset access code	→ 52
Device reset	→ 53
Activate SW option	→ 54
Software option overview	→ 55

"Define access code" wizard

The **Define access code** wizard (→ 51) is only available when operating via the local display or Web browser.

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

Navigation Expert → System → Administration → Def. access code

▶ Define access code	
Define access code	→ 51
Confirm access code	→ 52

Define access code

Navigation	Expert → System → Administration → Def. access code → Def. access code
Description	Use this function to enter a user-specific release code to restrict write-access to the parameters. This protects the device configuration against any inadvertent modifications via the local display, Web browser, FieldCare or DeviceCare (via CDI-RJ45 service interface).
User entry	Max. 16-digit character string comprising numbers, letters and special characters
Additional information	<i>Description</i> The write protection affects all parameters in the document marked with the symbol. On the local display, the symbol in front of a parameter indicates that the parameter is write-protected.

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

-  Once the access code has been defined, write-protected parameters can only be modified if the access code is entered in the **Enter access code** parameter (→  13).
-  If you lose the access code, please contact your Endress+Hauser sales organization.

User entry

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

Factory setting

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

Confirm access code

Navigation	  Expert → System → Administration → Def. access code → Confirm code
Description	Enter the defined release code a second time to confirm the release code.
User entry	Max. 16-digit character string comprising numbers, letters and special characters

"Reset access code" submenu

Navigation   Expert → System → Administration → Reset acc. code

▶ Reset access code

Operating time (0652)

→  52

Reset access code (0024)

→  53

Operating time

Navigation	  Expert → System → Administration → Reset acc. code → Operating time (0652)
Description	Displays the length of time the device has been in operation.
User interface	Days (d), hours (h), minutes (m) and seconds (s)
Additional information	<i>Indication</i> Maximum number of days: 9 999(corresponds to approx. 27 years and 5 months)

Reset access code

Navigation	 Expert → System → Administration → Reset acc. code → Reset acc. code (0024)
Description	Use this function to enter a reset code to reset the user-specific access codes to the factory setting .
User entry	Character string comprising numbers, letters and special characters
Additional information	<i>Description</i>  For a reset code, contact your Endress+Hauser service organization. <i>User entry</i> The reset code can only be entered via: ■ Web browser ■ DeviceCare, FieldCare (via CDI RJ45 interface) ■ Fieldbus

Additional parameters in the "Administration" submenu

Device reset



Navigation	 Expert → System → Administration → Device reset (0000)
Description	Reset the device configuration - either entirely or in part - to a defined state.
Selection	■ Cancel ■ To delivery settings ■ Restart device ■ Restore S-DAT backup *
Additional information	<i>Selection</i>

Options	Description
Cancel	No action is executed and the user exits the parameter.
To delivery settings	Every parameter for which a customer-specific default setting was ordered is reset to the customer-specific value. All other parameters are reset to the factory setting.
Restart device	The restart resets every parameter with data stored in volatile memory (RAM) to the factory setting (e.g. measured value data). The device configuration remains unchanged.

* Visibility depends on order options or device settings

Transmitter identifier 	
Navigation	  Expert → System → Administration → Transm. identif. (2765)
Description	Select transmitter identifier.
Selection	■ Unknown ■ 500 ■ 300
Factory setting	500
Activate SW option 	
Navigation	  Expert → System → Administration → Activate SW opt. (0029)
Description	Use this function to enter an activation code to enable an additional, ordered software option.
User entry	Max. 10-digit string of numbers.
Factory setting	Depends on the software option ordered
Additional information	<i>Description</i> If a measuring device was ordered with an additional software option, the activation code is programmed in the device at the factory.  To activate a software option subsequently, please contact your Endress+Hauser sales organization. <i>Entering the activation code</i>  The activation code is linked to the serial number of the measuring device and varies according to the device and software option. If an incorrect or invalid code is entered, this results in the loss of software options that have already been activated. ▶ Before you enter a new activation code, make a note of the current activation code . ▶ Enter the new activation code provided by Endress+Hauser when the new software option was ordered. ▶ Once the activation code has been entered, check if the new software option is displayed in the Software option overview parameter (→  55). ↳ The new software option is active if it is displayed. ↳ If the new software option is not displayed or all software options have been deleted, the code entered was either incorrect or invalid. ▶ If the code entered is incorrect or invalid, enter the old activation code .

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

Example for a software option

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

 The software options currently enabled are displayed in the **Software option overview** parameter (→  55).

Web browser

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

Software option overview

Navigation

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

Description

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

User interface

- Extended HistoROM *
- Heartbeat Monitoring *
- Custody transfer
- Application specific calculations
- Heartbeat Verification *
- Concentration *
- Custody transfer

or

Additional information

Description

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

"Extended HistoROM" option

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

"Heartbeat Verification" option and "Heartbeat Monitoring" option

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

"Concentration" option

Order code for "Application package", option ED "Concentration"

"Extended density function" option

 Only available for Promass Q DN25 to DN100.

Order code for "Application package", option EH "Extended density function"

Option "Premium density + Extended density function"

 Only available for Promass Q DN25.

* Visibility depends on order options or device settings

Order code for "Application package", option EI "Premium density, ±0.1 kg/m³ + Extended density function"

Define Software Lock code

Navigation	  Expert → System → Administration → SoftwareLockCode (14409)
Description	Specify an access code that is required to obtain write access to the 'Software lock' parameter.
User entry	Character string comprising numbers, letters and special characters (16)
Additional information	The locking code can contain lower-case letters, upper-case letters, numbers and special characters.

Software Lock login

Navigation	  Expert → System → Administration → SoftwLockLogin (14410)
Description	Enter Software Lock code to obtain write access to the 'Software lock' parameter.
User entry	Character string comprising numbers, letters and special characters (16)

Software lock

Navigation	  Expert → System → Administration → Software lock (14411)
Description	Activate or deactivate the software lock (Software Lock access rights required).
Selection	■ Off ■ On

3.2 "Sensor" submenu

Navigation   Expert → Sensor

▶ Sensor

▶ Measured values

→  57

▶ System units

→  73

► Process parameters	→ 82
► Calculated values	→ 90
► Measurement mode	→ 93
► External compensation	→ 96
► Sensor adjustment	→ 99
► Calibration	→ 118

3.2.1 "Measured values" submenu

Navigation   Expert → Sensor → Measured val.

► Measured values	
► Process variables	→ 57
► Totalizer	→ 66
► Input values	→ 67
► Output values	→ 69

"Process variables" submenu

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

► Process variables	
Mass flow	→ 59
Volume flow	→ 60
Corrected volume flow	→ 60
Density	→ 60
Reference density	→ 60
Temperature	→ 61
Pressure value	→ 61
Dynamic viscosity	

Kinematic viscosity	
Temp. compensated dynamic viscosity	
Temp. compensated kinematic viscosity	
Concentration	→ 61
Target mass flow	→ 62
Carrier mass flow	→ 62
Target corrected volume flow	→ 62
Carrier corrected volume flow	→ 63
Target volume flow	→ 63
Carrier volume flow	→ 64
CTL	
CPL	
CTPL	
S&W volume flow	
S&W correction value	
Reference density alternative	
GSV flow	
GSV flow alternative	
NSV flow	
NSV flow alternative	
Oil CTL	
Oil CPL	
Oil CTPL	
Water CTL	
CTL alternative	

CPL alternative	
CTPL alternative	→ 64
Oil reference density	
Water reference density	
Oil density	
Water density	
Water cut	
Oil volume flow	
Oil corrected volume flow	
Oil mass flow	
Water volume flow	
Water corrected volume flow	
Water mass flow	
Weighted density average	
Weighted temperature average	
► Process variables	→ 64

Mass flow

Navigation	Expert → Sensor → Measured val. → Process variab. → Mass flow (1838)
Description	Displays the mass flow that is currently measured.
User interface	Signed floating-point number
Additional information	<i>Dependency</i> The unit is taken from the Mass flow unit parameter (→ 73)

Volume flow

Navigation	  Expert → Sensor → Measured val. → Process variab. → Volume flow (1847)
Description	Displays the volume flow that is currently calculated.
User interface	Signed floating-point number
Additional information	<i>Description</i> The volume flow is calculated from the mass flow currently measured and the density currently measured. <i>Dependency</i>  The unit is taken from the Volume flow unit parameter (→  75)

Corrected volume flow

Navigation	  Expert → Sensor → Measured val. → Process variab. → Correct.vol.flow (1851)
Description	Displays the corrected volume flow that is currently measured.
User interface	Signed floating-point number
Additional information	<i>Dependency</i>  The unit is taken from the Corrected volume flow unit parameter (→  76)

Density

Navigation	  Expert → Sensor → Measured val. → Process variab. → Density (1850)
Description	Displays the density that is currently measured.
User interface	Signed floating-point number
Additional information	<i>Dependency</i>  The unit is taken from the Density unit parameter (→  78)

Reference density

Navigation	  Expert → Sensor → Measured val. → Process variab. → Ref.density (1852)
Description	Displays the reference density that is currently calculated.

User interface Signed floating-point number

Additional information *Dependency*



The unit is taken from the **Reference density unit** parameter (→ 79)

Temperature

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

Description Displays the medium temperature that is currently measured.

User interface Signed floating-point number

Additional information *Dependency*



The unit is taken from the **Temperature unit** parameter (→ 81)

Pressure value

Navigation Expert → Sensor → Measured val. → Process variab. → Pressure value (6129)

Description Displays the fixed or external pressure value.

User interface Signed floating-point number

Additional information *Dependency*



The unit is taken from the **Pressure unit** parameter (→ 81)

Concentration

Navigation Expert → Sensor → Measured val. → Process variab. → Concentration (1887)

Prerequisite For the following order code:
Order code for "Application package", option **ED** "Concentration"



The software options currently enabled are displayed in the **Software option overview** parameter (→ 55).

Description Displays the concentration that is currently calculated.

User interface Signed floating-point number

Additional information *Dependency*



The unit is taken from the **Concentration unit** parameter (0613).

Target mass flow

Navigation	 Expert → Sensor → Measured val. → Process variab. → Target mass flow (1864)
Prerequisite	With the following conditions: Order code for "Application package", option ED "Concentration"  The software options currently enabled are displayed in the Software option overview parameter (→  55).
Description	Displays the mass flow that is currently measured for the target medium
User interface	Signed floating-point number
Additional information	<i>Dependency</i>  The unit is taken from the Mass flow unit parameter (→  73)

Carrier mass flow

Navigation	 Expert → Sensor → Measured val. → Process variab. → Carrier mass fl. (1865)
Prerequisite	With the following conditions: Order code for "Application package", option ED "Concentration"  The software options currently enabled are displayed in the Software option overview parameter (→  55).
Description	Displays the mass flow of the carrier medium that is currently measured
User interface	Signed floating-point number
Additional information	<i>Dependency</i>  The unit is taken from the Mass flow unit parameter (→  73)

Target corrected volume flow

Navigation	 Expert → Sensor → Measured val. → Process variab. → Targ.corr.vol.fl (1893)
Prerequisite	With the following conditions: ▪ Order code for "Application package", option ED "Concentration" ▪ The Ethanol in water option or %mass / %volume option is selected in the Liquid type parameter.  The software options currently enabled are displayed in the Software option overview parameter (→  55).
Description	Displays the corrected volume flow that is currently measured for the target fluid.
User interface	Signed floating-point number

Additional information*Dependency*

The unit is taken from the **Volume flow unit** parameter (→ 75)

Carrier corrected volume flow

Navigation

Expert → Sensor → Measured val. → Process variab. → Carr.corr.vol.fl (1894)

Prerequisite

With the following conditions:

- Order code for "Application package", option **ED** "Concentration"
- In the **Liquid type** parameter, the **Ethanol in water** option or **%mass / %volume** option is selected.



The software options currently enabled are displayed in the **Software option overview** parameter (→ 55).

Description

Displays the corrected volume flow currently measured for the carrier fluid.

User interface

Signed floating-point number

Additional information*Dependency*

The unit is taken from the **Volume flow unit** parameter (→ 75)

Target volume flow

Navigation

Expert → Sensor → Measured val. → Process variab. → Target vol. flow (1895)

Prerequisite

With the following conditions:

- Order code for "Application package", option **ED** "Concentration"
- The **Ethanol in water** option or **%mass / %volume** option is selected in the **Liquid type** parameter.
- The **%vol** option is selected in the **Concentration unit** parameter.



The software options currently enabled are displayed in the **Software option overview** parameter (→ 55).

Description

Displays the volume flow currently measured for the target medium.

User interface

Signed floating-point number

Additional information*Dependency*

The unit is taken from the **Volume flow unit** parameter (→ 75)

Carrier volume flow

Navigation	 Expert → Sensor → Measured val. → Process variab. → Carrier vol. fl. (1896)
Prerequisite	With the following conditions: ▪ Order code for "Application package", option ED "Concentration" ▪ The Ethanol in water option or %mass / %volume option is selected in the Liquid type parameter. ▪ The %vol option is selected in the Concentration unit parameter.  The software options currently enabled are displayed in the Software option overview parameter (→  55).
Description	Use this function to display the volume flow currently measured for the carrier medium.
User interface	Signed floating-point number
Additional information	<i>Dependency</i>  The unit is taken from the Volume flow unit parameter (→  75)

CTPL alternative

Navigation	 Expert → Sensor → Measured val. → Process variab. → CTPL alternative (4173)
Prerequisite	For the following order code: ▪ "Application package", option EJ "Petroleum" ▪ In the Petroleum mode parameter, the API referenced correction option is selected.  The software options currently enabled are displayed in the Software option overview parameter (→  55).
Description	Displays the combined correction factor which represents the effect of temperature and pressure on the fluid. This is used to convert the measured volume flow and the measured density to values at the alternative reference temperature and the alternative reference pressure.
User interface	Positive floating-point number

"Process variables" submenu

Navigation

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

► Process variables

Application specific input 0 (6366) →  65

Application specific input 1 (6367)	→ 65
Application specific output 0 (6364)	→ 65
Application specific output 1 (6365)	→ 65

Application specific input 0

Navigation	 Expert → Sensor → Measured val. → Process variab. → Process variab. → Spec. input 0 (6366)
Description	Shows the application specific input value 0 used for the application specific calculation.
User interface	Signed floating-point number

Application specific input 1

Navigation	 Expert → Sensor → Measured val. → Process variab. → Process variab. → Spec. input 1 (6367)
Description	Shows the application specific input value 1 used for the application specific calculation.
User interface	Signed floating-point number

Application specific output 0

Navigation	 Expert → Sensor → Measured val. → Process variab. → Process variab. → Spec. output 0 (6364)
Description	Shows the calculated application specific output value 0.
User interface	Signed floating-point number

Application specific output 1

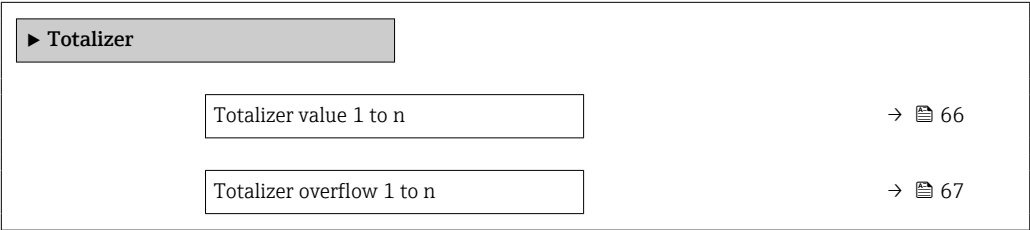
Navigation	 Expert → Sensor → Measured val. → Process variab. → Process variab. → Spec. output 1 (6365)
Description	Shows the calculated specific output value 1.

User interface

Signed floating-point number

"Totalizer" submenu

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



Totalizer value 1 to n

Navigation

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

Prerequisite

A process variable is selected in the **Assign process variable** parameter of the **Totalizer 1 to n** submenu.

Description

Displays the current totalizer reading.

User interface

Signed floating-point number

Additional information

Description

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

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

Display

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



Example

Calculation of the current totalizer reading when the value exceeds the 7-digit display range of the operating tool:

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

Totalizer overflow 1 to n



Navigation	Expert → Sensor → Measured val. → Totalizer → Tot. overflow 1 to n (0910-1 to n)
Prerequisite	A process variable is selected in the Assign process variable parameter of the Totalizer 1 to n submenu.
Description	Displays the current totalizer overflow.
User interface	Integer with sign
Additional information	<i>Description</i> If the current totalizer reading exceeds 7 digits, which is the maximum value range that can be displayed by the operating tool, the value above this range is output as an overflow. The current totalizer value is therefore the sum of the overflow value and the totalizer value from the Totalizer value 1 to n parameter.

Display



Example

Calculation of the current totalizer reading when the value exceeds the 7-digit display range of the operating tool:

- Value in the **Totalizer value 1** parameter: 1 968 457 m³
- Value in the **Totalizer overflow 1** parameter: $2 \cdot 10^7$ (2 overflows) = 20 000 000 [m³]
- Current totalizer value: 21 968 457 m³

"Input values" submenu

Navigation Expert → Sensor → Measured val. → Input values

► Input values	
► Current input 1 to n	→ 68
► Value status input 1 to n	→ 68

"Current input 1 to n" submenu

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

► Current input 1 to n

Measured values 1 to n (1603-1 to n)

→  68

Measured current 1 to n (1604-1 to n)

→  68

Measured values 1 to n

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

Description Displays the current input value.

User interface Signed floating-point number

Measured current 1 to n

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

Description Displays the current value of the current input.

User interface 0 to 22.5 mA

"Value status input 1 to n" submenu

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

► Value status input 1 to n

Value status input (1353-1 to n)

→  69

Value status input

Navigation	  Expert → Sensor → Measured val. → Input values → Val.stat.inp. 1 to n → Val.stat.inp. (1353-1 to n)
Description	Displays the current input signal level.
User interface	■ High ■ Low

"Output values" submenu

Navigation	  Expert → Sensor → Measured val. → Output values
------------	---

► Output values	
► Value current output 1 to n	→  69
► Pulse/frequency/switch output 1 to n	→  70
► Relay output 1 to n	→  72
► Double pulse output	→  175

"Value current output 1 to n" submenu

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

► Value current output 1 to n	
Output current 1 to n (0361-1 to n)	→  69
Measured current 1 to n (0366-1 to n)	→  70

Output current 1 to n

Navigation	  Expert → Sensor → Measured val. → Output values → Value curr.out 1 to n → Output curr. 1 to n (0361-1 to n)
Description	Displays the current value currently calculated for the current output.
User interface	0 to 22.5 mA

Measured current 1 to n

Navigation	  Expert → Sensor → Measured val. → Output values → Value curr.out 1 to n → Measur. curr. 1 to n (0366–1 to n)
Description	Displays the actual measured value of the output current.
User interface	0 to 30 mA

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

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

Pulse/frequency/switch output 1 to n

Output frequency 1 to n (0471–1 to n) →  70

Pulse output 1 to n (0456–1 to n) →  70

Switch status 1 to n (0461–1 to n) →  71

Output frequency 1 to n

Navigation	  Expert → Sensor → Measured val. → Output values → PFS output 1 to n → Output freq. 1 to n (0471–1 to n)
Prerequisite	In the Operating mode parameter (→  147), the Frequency option is selected.
Description	Displays the actual value of the output frequency which is currently measured.
User interface	0.0 to 12 500.0 Hz

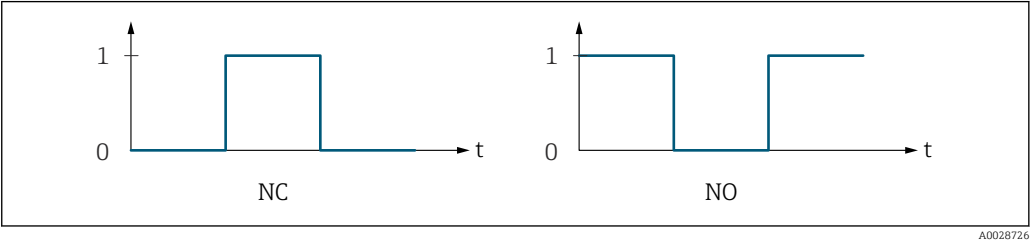
Pulse output 1 to n

Navigation	  Expert → Sensor → Measured val. → Output values → PFS output 1 to n → Pulse output 1 to n (0456–1 to n)
Prerequisite	The Pulse option is selected in the Operating mode parameter (→  147) parameter.
Description	Displays the pulse frequency currently output.

User interface Positive floating-point number

Additional information *Description*

- The pulse output is an open collector output.
- This is configured at the factory in such a way that the transistor is conductive for the duration of the pulse (NO contact) and is safety-oriented.



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

The output behavior can be reversed via the **Invert output signal** parameter (→ ⓘ 168) 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 (→ ⓘ 153)) can be configured.

Switch status 1 to n

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

Prerequisite The **Switch** option is selected in the **Operating mode** parameter (→ ⓘ 147).

Description Displays the current switch status of the status output.

User interface

- Open
- Closed

Additional information *User interface*

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

"Relay output 1 to n" submenu

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

► Relay output 1 to n

Switch status (0801–1 to n)

→  72

Switch cycles (0815–1 to n)

→  72

Max. switch cycles number (0817–1 to n)

→  72

Switch status

Navigation	 Expert → Sensor → Measured val. → Output values → Relay output 1 to n → Switch status (0801–1 to n)
Description	Displays the current status of the relay output.
User interface	■ Open ■ Closed
Additional information	<i>User interface</i> ■ Open The relay output is not conductive. ■ Closed The relay output is conductive.

Switch cycles

Navigation	 Expert → Sensor → Measured val. → Output values → Relay output 1 to n → Switch cycles (0815–1 to n)
Description	Displays all the switch cycles performed.
User interface	Positive integer

Max. switch cycles number

Navigation	 Expert → Sensor → Measured val. → Output values → Relay output 1 to n → Max. cycles no. (0817–1 to n)
Description	Displays the maximum number of guaranteed switch cycles.

User interface Positive integer

3.2.2 "System units" submenu

Navigation  Expert → Sensor → System units

► System units		
Mass flow unit (0554)	→ 	73
Mass unit (0574)	→ 	74
Volume flow unit (0553)	→ 	75
Volume unit (0563)	→ 	76
Corrected volume flow unit (0558)	→ 	76
Corrected volume unit (0575)	→ 	77
Density unit (0555)	→ 	78
Reference density unit (0556)	→ 	79
Temperature unit (0557)	→ 	81
Pressure unit (0564)	→ 	81
Date/time format (2812)	→ 	82

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	<i>SI units</i>	<i>US units</i>
	■ g/s	■ oz/s
	■ g/min	■ oz/min
	■ g/h	■ oz/h
	■ g/d	■ oz/d
	■ kg/s	■ lb/s
	■ kg/min	■ lb/min
	■ kg/h	■ lb/h
	■ kg/d	■ lb/d
	■ t/s	■ STon/s
	■ t/min	■ STon/min
	■ t/h	■ STon/h
	■ t/d	■ STon/d
Factory setting	Country-specific:	
	■ kg/h	
	■ lb/min	
Additional information	<i>Effect</i>	
	The selected unit applies to:	
	■ Target mass flow parameter (→ ⓘ 62)	
	■ Carrier mass flow parameter (→ ⓘ 62)	
	■ Mass flow parameter (→ ⓘ 59)	
	<i>Options</i>	
	 For an explanation of the abbreviated units: → ⓘ 267	

Mass unit

Navigation	  Expert → Sensor → System units → Mass unit (0574)	
Description	Use this function to select the unit for the mass.	
Selection	<i>SI units</i>	<i>US units</i>
	■ g ■ kg ■ t	■ oz ■ lb ■ STon
Factory setting	Country-specific: ■ kg ■ lb	
Additional information	<i>Options</i>  For an explanation of the abbreviated units: →  267	

**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*

- cm³/s
- cm³/min
- cm³/h
- cm³/d
- dm³/s
- dm³/min
- dm³/h
- dm³/d
- m³/s
- m³/min
- m³/h
- m³/d
- ml/s
- ml/min
- ml/h
- ml/d
- l/s
- l/min
- l/h
- l/d
- hl/s
- hl/min
- hl/h
- hl/d
- Ml/s
- Ml/min
- Ml/h
- Ml/d

US units

- af/s
- af/min
- af/h
- af/d
- ft³/s
- ft³/min
- ft³/h
- ft³/d
- MMft³/s
- MMft³/min
- MMft³/h
- Mft³/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)
- Mgal/s (us)
- Mgal/min (us)
- Mgal/h (us)
- Mgal/d (us)
- 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)
- kgal/s (us)
- kgal/min (us)
- kgal/h (us)
- kgal/d (us)

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;oil)
- bbl/min (imp;oil)
- bbl/h (imp;oil)
- bbl/d (imp;oil)

or

US units

- 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) *

Imperial units

- bbl/s (imp;beer) *
- bbl/min (imp;beer) *
- bbl/h (imp;beer) *
- bbl/d (imp;beer) *

* Visibility depends on order options or device settings

Factory setting	Country-specific: - l/h - gal/min (us)
Additional information	<i>Effect</i> The selected unit applies to: Volume flow parameter (→ ⓘ 60) <i>Options</i>  For an explanation of the abbreviated units: → ⓘ 267

Volume unit

ⓘ

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

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

Selection	<i>SI units</i> - cm³ - dm³ - m³ - ml - l - hl - Ml Mega	<i>US units</i> - af - ft³ - Mft³ - fl oz (us) - gal (us) - kgal (us) - Mgal (us) - bbl (us;oil) - bbl (us;tank)	<i>Imperial units</i> - gal (imp) - Mgal (imp) - bbl (imp;oil)
	or	<i>US units</i> - bbl (us;liq.) * - bbl (us;beer) *	<i>Imperial units</i> bbl (imp;beer) *
	* Visibility depends on order options or device settings		

Factory setting	Country-specific: - l - gal (us)
-----------------	--

Additional information	<i>Options</i>  For an explanation of the abbreviated units: → ⓘ 267
------------------------	--

Corrected volume flow unit

ⓘ

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

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

Selection	<i>SI units</i> ■ Nl/s ■ Nl/min ■ Nl/h ■ Nl/d ■ Nhl/s ■ Nhl/min ■ Nhl/h ■ Nhl/d ■ Nm^3/s ■ Nm^3/min ■ Nm^3/h ■ Nm^3/d ■ Sl/s ■ Sl/min ■ Sl/h ■ Sl/d ■ Sm^3/s ■ Sm^3/min ■ Sm^3/h ■ Sm^3/d ■ MMSft^3/d	<i>US units</i> ■ Sft^3/s ■ Sft^3/min ■ Sft^3/h ■ Sft^3/d ■ Sgal/s (us) ■ Sgal/min (us) ■ Sgal/h (us) ■ Sgal/d (us) ■ Sbbl/s (us;liq.) ■ $\text{Sbbl/min (us;liq.)}$ ■ Sbbl/h (us;liq.) ■ Sbbl/d (us;liq.) ■ MMSft^3/s ■ $\text{MMSft}^3/\text{min}$ ■ MMSft^3/h ■ Sbbl/s (us;oil) ■ Sbbl/min (us;oil) ■ Sbbl/h (us;oil) ■ Sbbl/d (us;oil)	<i>Imperial units</i> ■ Sgal/s (imp) ■ Sgal/min (imp) ■ Sgal/h (imp) ■ Sgal/d (imp)
Factory setting	Country-specific: ■ Nl/h ■ Sft^3/min		
Additional information	<i>Effect</i> The selected unit applies to: Corrected volume flow parameter (→ ⓘ 60) <i>Options</i>  For an explanation of the abbreviated units: → ⓘ 267		

Corrected volume unit


Navigation	 Expert → Sensor → System units → Corr. vol. unit (0575)
Description	Use this function to select the unit for the corrected volume.
Selection	<i>SI units</i> ■ Nl ■ Nhl ■ Nm^3 ■ Sl ■ Sm^3 <i>US units</i> ■ Sft^3 ■ MMSft^3 ■ Sgal (us) ■ Sbbl (us;liq.) ■ Sbbl (us;oil) <i>Imperial units</i> ■ Sgal (imp)
Factory setting	Country-specific: ■ Nl ■ Sft^3

Additional information

Options

 For an explanation of the abbreviated units: →  267

Density unit

Navigation

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

Description

Use this function to select the unit for the density.

Selection

SI units

■ g/cm³

■ g/m³

■ g/ml

■ kg/l

■ kg/dm³

■ kg/m³

■ SD4°C

■ SD15°C

■ SD20°C

■ SG4°C

■ SG15°C

■ SG20°C

or

US units

SG60°F*

Other units

°API*

*

Visibility depends on order options or device settings

or

US units

■ lb/bbl (us;liq.)*

■ lb/bbl (us;beer)*

Imperial units

lb/bbl (imp;beer)*

*

Visibility depends on order options or device settings

Factory setting

Country-specific:

■ kg/l

■ lb/ft³

Additional information*Effect*

The selected unit applies to:

- **Density setpoint 1** parameter (→  109)
- **Density setpoint 2** parameter (→  109)
- **Density** parameter (→  60)

Options

- 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: →  267

Reference density unit**Navigation**

  Expert → Sensor → System units → Ref. dens. unit (0556)

Description

Use this function to select the unit for the reference density.

Selection*SI units*

- kg/Nm³
- kg/Nl
- g/Scm³
- kg/Sm³
- RD15°C
- RD20°C

US units

- lb/Sft³
- RD60°F

or

Other units

°APIbase *

* Visibility depends on order options or device settings

Factory setting

Country-specific

- kg/Nl
- lb/Sft³

Additional information*Effect*

The selected unit applies to:

- **External reference density** parameter (→  91)
- **Fixed reference density** parameter (→  92)
- **Reference density** parameter (→  60)

Options

 For an explanation of the abbreviated units: →  267

Density 2 unit

Navigation

Expert → Sensor → System units → Density 2 unit (0619)

Description

Select second density unit

Selection

SI units

■ g/cm³

■ g/m³

■ g/ml

■ g/l

■ kg/l

■ kg/dm³

■ kg/m³

■ SD4°C

■ SD15°C

■ SD20°C

■ SG4°C

■ SG15°C

■ SG20°C

Other units

°API

or

US units

SG60°F^{*}

US units

■ lb/ft³

■ lb/gal (us)

■ lb/bbl (us;oil)

■ lb/bbl (us;tank)

■ lb/in³

■ STon/yd³

Imperial units

■ lb/gal (imp)

■ lb/bbl (imp;oil)

*

Visibility depends on order options or device settings

or

US units

■ lb/bbl (us;liq.)^{*}

■ lb/bbl (us;beer)^{*}

Imperial units

lb/bbl (imp;beer)^{*}

*

Visibility depends on order options or device settings

Factory setting

Country-specific:

■ kg/l

■ lb/ft³

Additional information

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: → 267

80

Endress+Hauser



Temperature unit

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

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

Selection	<i>SI units</i>	<i>US units</i>
	■ °C	■ °F
	■ K	■ °R

Factory setting Country-specific:

- °C
- °F

Additional information *Effect*

The selected unit applies to:

- **Maximum value** parameter (→  232)
- **Minimum value** parameter (→  232)
- **Maximum value** parameter (→  235)
- **Minimum value** parameter (→  235)
- **Maximum value** parameter (→  236)
- **Minimum value** parameter (→  236)
- **External temperature** parameter (→  98)
- **Temperature** parameter (→  61)
- **Reference temperature** parameter (→  92)

Options



For an explanation of the abbreviated units: →  267



Pressure unit

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

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

Selection	<i>SI units</i>	<i>US units</i>
	■ Pa a	■ psi a
	■ kPa a	■ psi g
	■ MPa a	
	■ bar	
	■ Pa g	
	■ kPa g	
	■ MPa g	
	■ bar g	

Factory setting Country-specific:

- bar a
- psi a

Additional information

Effect

The unit is taken from:

- **Pressure value** parameter (→ ⓘ 97)
- **External pressure** parameter (→ ⓘ 98)
- **Pressure value** parameter (→ ⓘ 61)

Options

 For an explanation of the abbreviated units: → ⓘ 267

Date/time format

Navigation

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

Description

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

- Selection

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

Additional information

Selection

 For an explanation of the abbreviated units: → ⓘ 267

3.2.3 "Process parameters" submenu

Navigation  Expert → Sensor → Process param.

► Process parameters

Flow damping (1802)

→ ⓘ 83

Density damping (1803)

→ ⓘ 83

Temperature damping (1822)

→ ⓘ 84

Flow override (1839)

→ ⓘ 84

► Low flow cut off

→ ⓘ 85

► Partially filled pipe detection

→ ⓘ 88



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 100.0 s
Additional information	<i>Description</i> The damping is performed by a PT1 element ²⁾. <i>User entry</i> ■ Value = 0: no damping ■ Value > 0: damping is increased Damping is switched off if 0 is entered (factory setting). <i>Effect</i> The damping affects the following variables of the device: ■ Outputs ■ Low flow cut off → 85 ■ Totalizers



Density damping

Navigation	Expert → Sensor → Process param. → Density damping (1803)
Description	Use this function to enter a time constant for the damping (PT1 element) of the density measured value.
User entry	0 to 999.9 s
Additional information	<i>Description</i> The damping is performed by a PT1 element ³⁾. <i>User entry</i> ■ Value = 0: no damping ■ Value > 0: damping is increased Damping is switched off if 0 is entered (factory setting).

2) Proportional behavior with first-order lag

3) Proportional behavior with first-order lag

Temperature damping 	
Navigation	  Expert → Sensor → Process param. → Temp. damping (1822)
Description	Use this function to enter a time constant for the damping (PT1 element) of the temperature measured value.
User entry	0 to 999.9 s
Additional information	<i>Description</i>  The damping is performed by a PT1 element ⁴⁾. <i>User entry</i> ▪ Value = 0: no damping ▪ Value > 0: damping is increased  Damping is switched off if 0 is entered (factory setting).
Flow override 	
Navigation	  Expert → Sensor → Process param. → Flow override (1839)
Description	Use this function to select whether to interrupt the evaluation of measured values. This is useful for the cleaning processes of a pipeline, for example.
Selection	▪ Off ▪ On
Additional information	<i>Description</i> Flow override is active ▪ The 453 Flow override diagnostic message is output. ▪ Output values ▪ Temperature: continues to be output ▪ Totalizer 1...3: stop being totalized  The Flow override option can also be activated in the Status input submenu: Assign status input parameter (→  135).
Density limit 	
Navigation	  Expert → Application → Petroleum → Density limit (4199)   Setup → Advanced setup → Petroleum → Density limit (4199)
Description	Enter limit value for the observed oil density. For higher °API values or lower kg/m ³ values this limit value will be output.

4) Proportional behavior with first-order lag

User entry Positive floating-point number

"Low flow cut off" submenu

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

► Low flow cut off

Assign process variable (1837)

On value low flow cutoff (1805)

Off value low flow cutoff (1804)

Pressure shock suppression (1806)

→  85

→  85

→  86

→  86

Assign process variable



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

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

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

On value low flow cutoff



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

Prerequisite A process variable is selected in the **Assign process variable** parameter (→  85).

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 →  86.

User entry Positive floating-point number

Factory setting Depends on country and nominal diameter →  265

* Visibility depends on order options or device settings

Additional information

Dependency
 The unit depends on the process variable selected in the **Assign process variable** parameter (→  85).

Off value low flow cutoff

Navigation

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

Prerequisite

A process variable is selected in the **Assign process variable** parameter (→  85).

Description

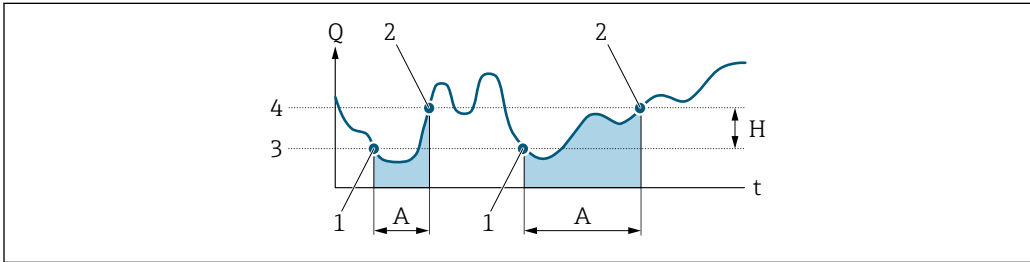
Use this function to enter a switch-off value for low flow cut off. The switch-off value is entered as a positive hysteresis from the switch-on value →  85.

User entry

0 to 100.0 %

Additional information

Example



A0012887

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

Pressure shock suppression

Navigation

  Expert → Sensor → Process param. → Low flow cut off → Pres. shock sup. (1806)

Prerequisite

A process variable is selected in the **Assign process variable** parameter (→  85).

Description

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

User entry

0 to 100 s

Additional information*Description***Pressure shock suppression is enabled**

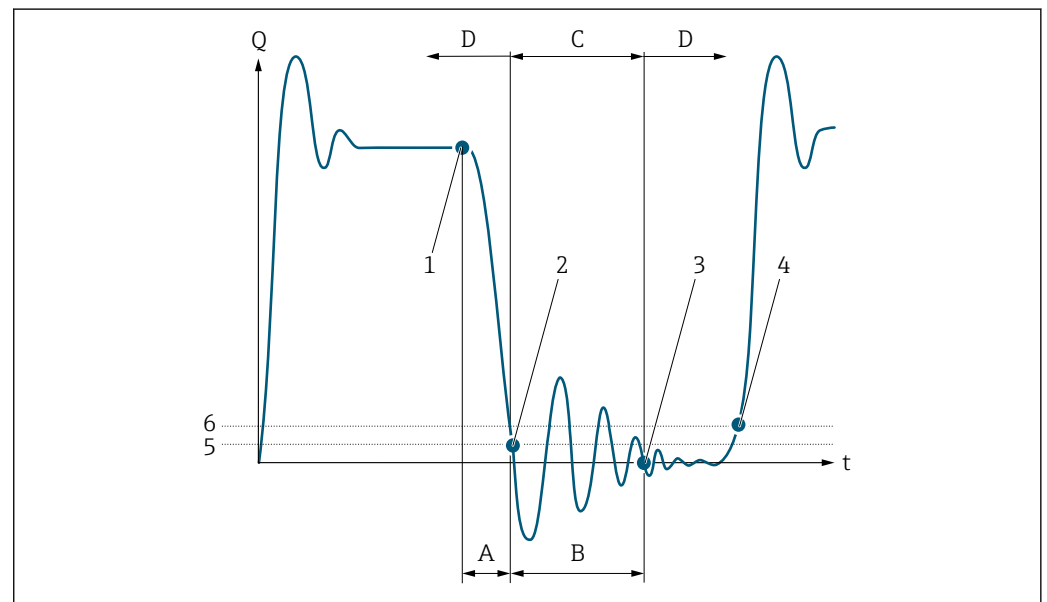
- Prerequisite:
 - Flow rate < on-value of low flow cut off
 - or
 - Change in the flow direction
- Output values
 - Flow displayed: 0
 - Totalizer: the totalizers are pegged at the last correct value

Pressure shock suppression is disabled

- Prerequisite: the time interval set in this function has elapsed.
- If the flow also exceeds the off value for low flow cut off, the device starts processing and displaying the current flow value again.

Example

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



A0012888

- Q* Flow
- t* Time
- A* After run
- B* Pressure shock
- C* Pressure shock suppression active according to the time entered
- D* Pressure shock suppression inactive
- 1* Valve closes
- 2* Flow falls below the on-value of the low flow cut off: pressure shock suppression is activated
- 3* The time entered has elapsed: pressure shock suppression is deactivated
- 4* The current flow value is processed and displayed again
- 5* On value for low flow cut off
- 6* Off value for low flow cut off

"Partially filled pipe detection" submenu

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

► Partially filled pipe detection

Assign process variable (1860)

→  88

Low value partial filled pipe detection (1861)

→  88

High value partial filled pipe detection (1858)

→  89

Response time part. filled pipe detect. (1859)

→  89

Maximum damping partial filled pipe det. (6040)

→  90

Assign process variable

Navigation  Expert → Sensor → Process param. → Partial pipe det → Assign variable (1860)

Description Use this function to select a process variable to detect empty or partially filled measuring tubes.
For gas measurement: Deactivate monitoring due to low gas density.

- Selection
- Off
 - Density
 - Reference density

Factory setting Density

Low value partial filled pipe detection

Navigation  Expert → Sensor → Process param. → Partial pipe det → Low value (1861)

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

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

User entry Signed floating-point number

- Factory setting Depends on country:
- 200 kg/m³
 - 12.5 lb/ft³

Additional information	<i>User entry</i> The lower limit value must be less than the upper limit value defined in the High value partial filled pipe detection parameter (→  89).  The unit depends on the process variable selected in the Assign process variable parameter (→  88). <i>Limit value</i>  If the displayed value is outside the limit value, the measuring device displays the 862 Partly filled pipe diagnostic message.
-------------------------------	---

High value partial filled pipe detection

Navigation	  Expert → Sensor → Process param. → Partial pipe det → High value (1858)
Prerequisite	A process variable is selected in the Assign process variable parameter (→  88).
Description	Use this function to enter an upper limit value to enable detection of empty or partially filled measuring tubes. If the measured density exceeds this value, detection is enabled.
User entry	Signed floating-point number
Factory setting	Depends on country: ■ 6 000 kg/m³ ■ 374.6 lb/ft³
Additional information	<i>User entry</i> The upper limit value must be greater than the lower limit value defined in the Low value partial filled pipe detection parameter (→  88).  The unit depends on the process variable selected in the Assign process variable parameter (→  88). <i>Limit value</i>  If the displayed value is outside the limit value, the measuring device displays the 862 Partly filled pipe diagnostic message.

Response time part. filled pipe detect.

Navigation	  Expert → Sensor → Process param. → Partial pipe det → Response time (1859)
Prerequisite	A process variable is selected in the Assign process variable parameter (→  88).
Description	Use this function to enter the minimum time (hold time) the signal must be present before diagnostic message S962 "Pipe only partly filled" is triggered in the event of a partially filled or empty measuring pipe.
User entry	0 to 100 s

Maximum damping partial filled pipe det.

Navigation	  Expert → Sensor → Process param. → Partial pipe det → Max. damping (6040)
Description	Use this function to enter a damping value to enable detection of empty or partially filled measuring tubes.
User entry	Positive floating-point number
Additional information	<i>Description</i> If oscillation damping exceeds the specified value, the measuring device presumes that the pipe is partially filled and the flow signal is set to 0. The measuring device displays the △S862 Partly filled pipe diagnostic message. In the case of non-homogeneous media or air pockets, the damping of the measuring tubes increases. <i>User entry</i> ■ Damping is disabled if 0 is entered (factory setting). ■ Damping is enabled if the value entered is greater than 0. ■ The value entered depends on application-specific influence variables, such as the medium, nominal diameter, sensor etc. <i>Example</i> ■ If the pipe is filled normally the value of the oscillation damping is 500. ■ If the pipe is partially filled the value of the oscillation damping is > 5000. ■ A practical damping value would then be 2000: enter 2000 as the value.

3.2.4 "Calculated values" submenu

Navigation   Expert → Sensor → Calculated value

► Calculated values

► Corrected volume flow calculation

→  90

"Corrected volume flow calculation" submenu

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

► Corrected volume flow calculation

Corrected volume flow calculation

→  91

External reference density

→  91

Fixed reference density

→  92

Reference temperature

→  92

Linear expansion coefficient	→ 93
Square expansion coefficient	→ 93

Corrected volume flow calculation



Navigation	Expert → Sensor → Calculated value → Corr. vol.flow. → Corr. vol.flow. (1812)
Description	Use this function to select the reference density for calculating the corrected volume flow.
Selection	■ Fixed reference density ■ Calculated reference density ■ Current input 1 * ■ Current input 2 * ■ Current input 3 *
Additional information	<i>Selection</i> The Reference density by API table 53 option is suitable only for applications involving LPG ⁵⁾, where the flow rate is measured on the basis of the corrected volume flow. Selecting this option means that the reference density is used, taking into account the values in table 53 E of API MPMS section 11.2. Temperature measurement (measured internally or read into the device from an external source → 96 → 96) and density measurement take place during operation while the medium is flowing. The mass flow is divided by the reference density to give the corrected volume flow and is issued as an output signal.

External reference density

Navigation	Expert → Sensor → Calculated value → Corr. vol.flow. → Ext. ref.density (6198)
Description	Displays the reference density which is read in externally, e.g. via the current input.
User interface	Floating point number with sign
Additional information	<i>Dependency</i> The unit is taken from the Reference density unit parameter (→ 79)

* Visibility depends on order options or device settings

5) liquefied petroleum gas

Fixed reference density

Navigation	Expert → Sensor → Calculated value → Corr. vol.flow. → Fix ref.density (1814)
Prerequisite	The Fixed reference density option is selected in the Corrected volume flow calculation parameter (→ 91) parameter.
Description	Use this function to enter a fixed value for the reference density.
User entry	Positive floating-point number
Additional information	<i>Dependency</i> The unit is taken from the Reference density unit parameter (→ 79)

Reference temperature

Navigation	Expert → Sensor → Calculated value → Corr. vol.flow. → Ref. temperature (1816)
Prerequisite	The Calculated reference density option is selected in the Corrected volume flow calculation parameter (→ 91) parameter.
Description	Use this function to enter a reference temperature for calculating the reference density.
User entry	−273.15 to 99 999 °C
Factory setting	Country-specific: ■ +20 °C ■ +68 °F
Additional information	<i>Dependency</i> The unit is taken from the Temperature unit parameter (→ 81)

Reference density calculation

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

A0023403

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

Linear expansion coefficient		
Navigation	Expert → Sensor → Calculated value → Corr. vol.flow. → Linear exp coeff (1817)	
Prerequisite	The Calculated reference density option is selected in the Corrected volume flow calculation parameter (→ 91) parameter.	
Description	Use this function to enter a linear, fluid-specific expansion coefficient for calculating the reference density.	
User entry	Signed floating-point number	
Square expansion coefficient		

Navigation	Expert → Sensor → Calculated value → Corr. vol.flow. → Square exp coeff (1818)
Prerequisite	The Calculated reference density option is selected in the Corrected volume flow calculation parameter (→ 91) parameter.
Description	For fluid with a non-linear expansion pattern: use this function to enter a quadratic, fluid-specific expansion coefficient for calculating the reference density.
User entry	Signed floating-point number

3.2.5 "Measurement mode" submenu

Navigation Expert → Sensor → Measurement mode

► Measurement mode

Select medium (6062)

→ 94

Select gas type (6074)

→ 94

Reference sound velocity (6147)

→ 95

Temperature coefficient sound velocity (6181)

→ 95

Gas Fraction Handler (6377)

→ 96

Multi-frequency activation 	
Navigation	  Expert → Sensor → Measurement mode → Multi-freq.activ (6242)
Description	Enable/disable multi-frequency technology to increase the measuring accuracy in the event of microbubbles in the medium.
Selection	■ No ■ Yes
Factory setting	Yes
Additional information	Multi-frequency technology increases the measuring accuracy in the event of microbubbles in the medium (e.g. when measuring ice-cream, cream cheese, milk, honey, jam, viscous heavy oils, gas-saturated media etc.).
Select medium 	
Navigation	  Expert → Sensor → Measurement mode → Select medium (6062)
Description	Use this function to select the type of medium: "Gas" or "Liquid". Select the "Other" option in exceptional cases in order to enter the properties of the medium manually (e.g. for highly compressive liquids such as sulfuric acid).
Selection	■ Liquid ■ Gas
Select gas type 	
Navigation	  Expert → Sensor → Measurement mode → Select gas type (6074)
Prerequisite	In the Medium selection submenu, the Gas option is selected.
Description	Select measured gas type.
Selection	■ Air ■ Ammonia NH3 ■ Argon Ar ■ Sulfur hexafluoride SF6 ■ Oxygen O2 ■ Ozone O3 ■ Nitrogen oxide NOx ■ Nitrogen N2 ■ Nitrous oxide N2O ■ Methane CH4 ■ Hydrogen H2 ■ Helium He ■ Hydrogen chloride HCl ■ Hydrogen sulfide H2S

- Ethylene C₂H₄
- Carbon dioxide CO₂
- Carbon monoxide CO
- Chlorine Cl₂
- Butane C₄H₁₀
- Propane C₃H₈
- Propylene C₃H₆
- Ethane C₂H₆
- Others

Reference sound velocity


Navigation	Expert → Sensor → Measurement mode → Sound velocity (6147)
Prerequisite	In the Select gas type parameter (→ 94), the Others option is selected.
Description	Enter sound velocity of gas at 0 °C (32 °F).
User entry	1 to 99 999.9999 m/s

Reference sound velocity


Navigation	Expert → Sensor → Measurement mode → Sound velocity
Prerequisite	In the Select medium type parameter (→ 94), the Others option is selected.
Description	Enter sound velocity of the medium at 0 °C (32 °F).
User entry	Signed floating-point number

Temperature coefficient sound velocity


Navigation	Expert → Sensor → Measurement mode → Temp. coeff. SV (6181)
Prerequisite	In the Select gas type parameter (→ 94), the Others option is selected.
Description	Enter temperature coefficient for the gas sound velocity.
User entry	Positive floating point number

Temperature coefficient sound velocity

Navigation	  Expert → Sensor → Measurement mode → Temp. coeff. SV
Prerequisite	In the Select medium type parameter (→  94), the Others option is selected.
Description	Enter the temperature coefficient for the medium sound velocity.
User entry	Signed floating-point number

Gas Fraction Handler

Navigation	  Expert → Sensor → Measurement mode → Gas Frac Handler (6377)
Description	Activates the Gas Fraction Handler function for two phase media.
Selection	■ Off ■ Moderate ■ Powerful
Additional information	■ When a second phase is detected, large fluctuations in the flow and density will occur. ■ The Gas Fraction Handler stabilizes the output values and enables better readability for operators and easier interpretation by the distributed control system. ■ The level of smoothing is adjusted according to the severity of the disturbances introduced by the second phase. The influence of the disturbances can be configured in two steps via this switch: ■ Off option: Deactivates the Gas Fraction Handler. When a second phase is present, large fluctuations of flow and density will occur. ■ Moderate option: Use for applications with low level or intermittent levels of second phase. ■ Powerful option: Use for applications with very significant levels of second phase. The Gas Fraction Handler is cumulative to any fixed damping constants applied to flow and density that are set elsewhere in the instrument parameterization. Additional information in the Medium index submenu (→  204)

3.2.6 "External compensation" submenu

Navigation   Expert → Sensor → External comp.

► External compensation

Pressure compensation (6130)

→  97

Pressure value (6059)

→  97

External pressure (6209)	→ 98
Temperature correction source (6184)	→ 98
External temperature (6080)	→ 98
Application specific input source 0 (6401)	→ 99
Application specific input source 1 (6402)	→ 99

Pressure compensation



Navigation	Expert → Sensor → External comp. → Pressure compen. (6130)
Description	Use this function to select the type of pressure compensation.
Selection	■ Off ■ Fixed value ■ External value ■ Current input 1 * ■ Current input 2 * ■ Current input 3 *
Additional information	<i>Selection</i> ■ Fixed value A fixed pressure value is used for compensation: Pressure value parameter (→ 97) ■ Current input 1 option, Current input 3 option The pressure value read in via the current input is used for compensation.

Pressure value



Navigation	Expert → Sensor → External comp. → Pressure value (6059)
Prerequisite	In the Pressure compensation parameter (→ 97), the Fixed value option is selected.
Description	Use this function to enter a value for the process pressure that is used for pressure correction.
User entry	Positive floating-point number
Additional information	<i>Dependency</i> The unit is taken from the Pressure unit parameter (→ 81)

* Visibility depends on order options or device settings

External pressure

Navigation	  Expert → Sensor → External comp. → External press. (6209)
Prerequisite	In the Pressure compensation parameter (→  97), the External value option or the Current input 1...n option is selected.
Description	Displays the external pressure value.
Additional information	<i>Dependency</i>  The unit is taken from the Pressure unit parameter (→  81)

Temperature correction source

Navigation	  Expert → Sensor → External comp. → Temp.corr.source (6184)
Description	Use this function to select the temperature mode.
Selection	■ Internal measured value ■ External value ■ Current input 1 * ■ Current input 2 * ■ Current input 3 *
Additional information	<i>Description</i> Use this function to select the type of temperature compensation. <i>Selection</i> All the options available for selection are used for measured value compensation. ■ Internal measured value The temperature value measured internally (temperature sensor of the measuring sensor) is used for compensation. ■ Current input 1 option, Visibility depends on order options or device settings. The temperature value read in via the current input is used for compensation.

External temperature

Navigation	  Expert → Sensor → External comp. → External temp. (6080)
Prerequisite	In the Temperature mode parameter (→  98), the External value option or the Current input 1...n option is selected.
Description	Displays the external temperature.

* Visibility depends on order options or device settings

Additional information

Dependency

 The unit is taken from the **Temperature unit** parameter (→  81)

Application specific input source 0



Navigation

  Expert → Sensor → External comp. → Spec. source 0 (6401)

Prerequisite

Only if application-specific calculation has been ordered as a special option.

Description

Select source for input value 0 used for the application specific calculation.

Selection

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

Application specific input source 1



Navigation

  Expert → Sensor → External comp. → Spec. source 1 (6402)

Prerequisite

Only if application-specific calculation has been ordered as a special option.

Description

Select source for the input value 1 used for the application specific calculation.

Selection

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

3.2.7 "Sensor adjustment" submenu

Navigation

  Expert → Sensor → Sensor adjustm.

► Sensor adjustment

Installation direction

→  100

Installation angle roll

→  100

* Visibility depends on order options or device settings

Installation angle pitch

→ 101

► Zero point adjustment

► Process variable adjustment

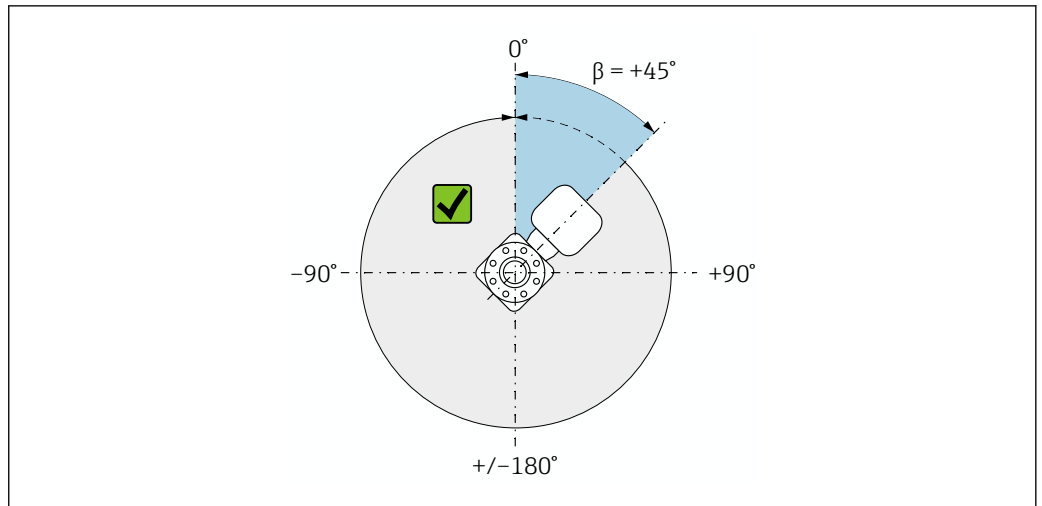
→ 114

Installation direction

Navigation	Expert → Sensor → Sensor adjustm. → Install. direct. (1809)
Description	Use this function to change the sign of the medium flow direction.
Selection	■ Flow in arrow direction ■ Flow against arrow direction
Additional information	<i>Description</i> Before changing the sign: ascertain the actual direction of fluid flow with reference to the direction indicated by the arrow on the sensor nameplate.

Installation angle roll

Navigation	Expert → Sensor → Sensor adjustm. → Inst. angle roll (6282)
Prerequisite	Available only with Promass Q.
Description	Use this function to enter the roll angle in degrees to improve measuring accuracy.
User entry	−180 to 180 °
Additional information	The technically relevant roll angle is the angle shaded gray = −180 to +180 °. Example (blue): Installation of the device with a roll angle $\beta = +45^\circ$



A0040033

2 Top view in flow direction

Installation angle pitch



Navigation

Expert → Sensor → Sensor adjustm. → Inst.angle pitch (6236)

Prerequisite

Available only with Promass Q.

Description

Use this function to enter the pitch angle in degrees to improve measuring accuracy.

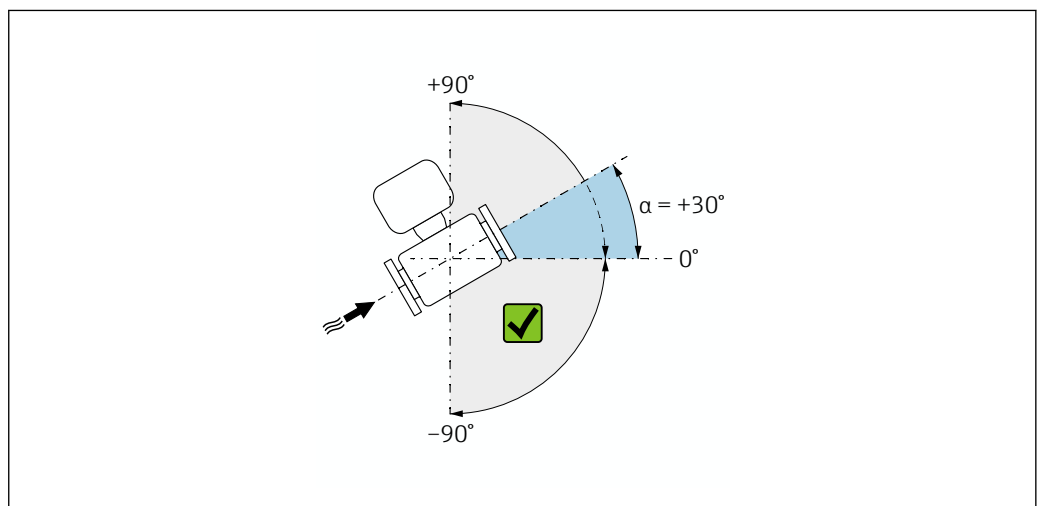
User entry

-90 to +90 °

Additional information

The technically relevant pitch angle is the angle shaded gray = -90 to +90 °.

Example (blue): Installation of the device with a pitch angle $\alpha = +30^\circ$



A0040032

3 Side view with flow direction from left to right.

"Zero verification" wizard

Navigation  Expert → Sensor → Sensor adjustm. → ZeroVerification

► Zero verification

Process conditions

→  102

Progress (2808)

→  103

Status (6253)

→  103

Additional information

→  103

Recommendation: (6000)

→  104

Root cause (6444)

→  104

Abort cause

→  104

Zero point measured (5999)

→  104

Zero point standard deviation (5996)

→  105

Process conditions

Navigation	 Expert → Sensor → Sensor adjustm. → ZeroVerification → Process condit.
Description	Ensure process conditions as follows.
Selection	■ Tubes are completely filled ■ Process operational pressure applied ■ No-flow conditions (closed valves) ■ Process and ambient temperatures stable
Factory setting	–

Progress

Navigation	  Diagnostics → Heartbeat → Perform.verific. → Progress (2808)
	 Expert → Diagnostics → Heartbeat → Base settings → Progress (2808)
	  Expert → Diagnostics → Heartbeat → Perform.verific. → Progress (2808)
	 Expert → Sensor → Sensor adjustm. → Density adjustm. → Progress (2808)
	 Expert → Sensor → Sensor adjustm. → Density adjustm. → Progress (2808)
	  Expert → Sensor → Sensor adjustm. → Zero point adj. → Progress (2808)
	 Setup → Advanced setup → Heartbeat setup → Base settings → Progress (2808)
	 Setup → Advanced setup → Sensor adjustm. → Zero point adj. → Progress (2808)
	 Setup → Advanced setup → Sensor adjustm. → Zero point adj. → Progress (2808)
Description	The progress of the process is indicated.
User interface	0 to 100 %

Zero point adjustment status

Navigation	 Expert → Sensor → Sensor adjustm. → Zero point adj. → Zero pt adj.stat (6253)
	 Expert → Sensor → Sensor adjustm. → Zero point adj. → Zero pt adj.stat (6253)
	 Setup → Advanced setup → Sensor adjustm. → Zero point adj. → Zero pt adj.stat (6253)
Description	Shows the status of the zero point adjustment.
User interface	■ Busy ■ Zero point adjust failure ■ Ok
Factory setting	–

Additional information

Navigation	 Expert → Sensor → Sensor adjustm. → ZeroVerification → Additional info.
Description	Indicate whether to display additional information.
Selection	■ Hide ■ Show

Recommendation:

Navigation	 Expert → Sensor → Sensor adjustm. → ZeroVerification → Recommendation: (6000)
Description	Indicates whether an adjustment is recommended. Only recommended if the measured zero point deviates significantly from the current zero point.
User interface	■ Do not adjust zero point ■ Adjust zero point
Factory setting	–

Root cause

Navigation	 Expert → Sensor → Sensor adjustm. → ZeroVerification → Root cause (6444)
Description	Shows the diagnostic and remedy.
User interface	■ Zero point too high. Ensure no-flow. ■ Zero point is unstable. Ensure no-flow. ■ Fluctuation high. Avoid 2-phase medium.
Factory setting	–

Abort cause

Navigation	 Expert → Sensor → Sensor adjustm. → ZeroVerification → Abort cause
Description	Indicates why the wizard was aborted.
User interface	■ Check process conditions! ■ A technical issue has occurred
Factory setting	–

Zero point measured

Navigation	 Expert → Sensor → Sensor adjustm. → ZeroVerification → ZeroPointMeasur. (5999)
Description	Shows the zero point measured for the adjustment.
User interface	Signed floating-point number
Factory setting	–

Zero point standard deviation

Navigation	 Expert → Sensor → Sensor adjustm. → ZeroVerification → ZeroStdDev (5996)
Description	Shows the standard deviation of the zero point measured.
User interface	Positive floating-point number
Factory setting	–

"Zero adjustment" wizard

Navigation

 Expert → Sensor → Sensor adjustm. → Zero adjustment

► Zero adjustment

Process conditions

→  106

Progress (2808)

→  106

Status (6253)

→  106

Root cause (6444)

→  107

Abort cause

→  107

Root cause (6444)

→  107

Reliability of measured zero point (5982)

→  107

Additional information

→  107

Reliability of measured zero point (5982)

→  107

Zero point measured (5999)

→  108

Zero point standard deviation (5996)

→  108

Select action (5995)

→  108

Process conditions

Navigation	 Expert → Sensor → Sensor adjustm. → Zero adjustment → Process condit.
Description	Ensure process conditions as follows.
Selection	■ Tubes are completely filled ■ Process operational pressure applied ■ No-flow conditions (closed valves) ■ Process and ambient temperatures stable
Factory setting	–

Progress

Navigation	  Diagnostics → Heartbeat → Perform.verific. → Progress (2808)
	 Expert → Diagnostics → Heartbeat → Base settings → Progress (2808)
	  Expert → Diagnostics → Heartbeat → Perform.verific. → Progress (2808)
	 Expert → Sensor → Sensor adjustm. → Density adjustm. → Progress (2808)
	 Expert → Sensor → Sensor adjustm. → Density adjustm. → Progress (2808)
	  Expert → Sensor → Sensor adjustm. → Zero point adj. → Progress (2808)
	 Setup → Advanced setup → Heartbeat setup → Base settings → Progress (2808)
	 Setup → Advanced setup → Sensor adjustm. → Zero point adj. → Progress (2808)
	 Setup → Advanced setup → Sensor adjustm. → Zero point adj. → Progress (2808)
Description	The progress of the process is indicated.
User interface	0 to 100 %

Zero point adjustment status

Navigation	 Expert → Sensor → Sensor adjustm. → Zero point adj. → Zero pt adj.stat (6253)
	 Expert → Sensor → Sensor adjustm. → Zero point adj. → Zero pt adj.stat (6253)
	 Setup → Advanced setup → Sensor adjustm. → Zero point adj. → Zero pt adj.stat (6253)
Description	Shows the status of the zero point adjustment.
User interface	■ Busy ■ Zero point adjust failure ■ Ok
Factory setting	–

Root cause

Navigation	 Expert → Sensor → Sensor adjustm. → Zero adjustment → Root cause (6444)
Description	Shows the diagnostic and remedy.
User interface	■ Zero point too high. Ensure no-flow. ■ Zero point is unstable. Ensure no-flow. ■ Fluctuation high. Avoid 2-phase medium.

Abort cause

Navigation	 Expert → Sensor → Sensor adjustm. → Zero adjustment → Abort cause
Description	Indicates why the wizard was aborted.
User interface	■ Check process conditions! ■ A technical issue has occurred
Factory setting	–

Reliability of measured zero point

Navigation	 Expert → Sensor → Sensor adjustm. → Zero adjustment → ZeroReliability (5982)
Description	Indicates the reliability of the zero point measured.
User interface	■ Not done ■ Good ■ Uncertain
Factory setting	–

Additional information

Navigation	 Expert → Sensor → Sensor adjustm. → Zero adjustment → Additional info.
Description	Indicate whether to display additional information.
Selection	■ Hide ■ Show

Zero point measured

Navigation	 Expert → Sensor → Sensor adjustm. → Zero adjustment → ZeroPointMeasur. (5999)
Description	Shows the zero point measured for the adjustment.
User interface	Signed floating-point number
Factory setting	–

Zero point standard deviation

Navigation	 Expert → Sensor → Sensor adjustm. → Zero adjustment → ZeroStdDev (5996)
Description	Shows the standard deviation of the zero point measured.
User interface	Positive floating-point number

Select action

Navigation	 Expert → Sensor → Sensor adjustm. → Zero adjustment → Select action (5995)
Description	Select the zero point value to apply.
Selection	■ Keep current zero point ■ Apply zero point measured ■ Apply factory zero point *

* Visibility depends on order options or device settings

"Density adjustment" submenu

-  Note the following before performing the adjustment:
- A density adjustment only makes sense if there is little variation in the operating conditions and the density adjustment is performed under the operating conditions.
 - The density adjustment scales the internally computed density value with a user-specific slope and offset.
 - A 1-point or 2-point density adjustment can be performed.
 - For a 2-point density adjustment, there must be a difference of at least 0.2 kg/l between the two target density values.
 - The reference media must be gas-free or pressurized so that any gas they contain is compressed.
 - The reference density measurements must be performed at the same medium temperature that prevails in the process, as otherwise the density adjustment will not be accurate.
 - The correction resulting from the density adjustment can be deleted with the **Restore original** option.

Navigation  Expert → Sensor → Sensor adjustm. → Density adjustm.

► Density adjustment

Progress (2808)

→  110

Density adjustment mode

- Navigation  Expert → Sensor → Sensor adjustm. → Density adjustm. → Adjustment mode (6043)

Description Displays the method for field density adjustment.

Selection
 - 1 point adjustment
 - 2 point adjustment

Density setpoint 1

- Navigation  Expert → Sensor → Sensor adjustm. → Density adjustm. → Density setpt 1 (6045)

Description Displays the existing density value.

User entry The entry depends on the unit selected in the **Density unit** parameter (0555) (→  78).

Density setpoint 2

- Navigation  Expert → Sensor → Sensor adjustm. → Density adjustm. → Density setpt 2 (6046)

Prerequisite In the **Density adjustment mode** parameter, the **2 point adjustment** option is selected.

Description	Displays the second density setpoint.
User entry	The entry depends on the unit selected in the Density unit parameter (0555) (→  78).

Execute density adjustment

Navigation	 Expert → Sensor → Sensor adjustm. → Density adjustm. → Density adjustm. (6041)
Description	Select the next step to be performed for the density adjustment.
Selection	■ Cancel [*] ■ Busy [*] ■ Ok [*] ■ Density adjust failure [*] ■ Measure density 1 [*] ■ Measure density 2 [*] ■ Calculate [*] ■ Restore original [*]

Progress

Navigation	 Expert → Sensor → Sensor adjustm. → Density adjustm. → Progress (2808)
Description	The progress of the process is indicated.
User interface	0 to 100 %

Density adjustment factor

Navigation	  Expert → Sensor → Sensor adjustm. → Density adjustm. → Dens. adj factor (6042)
Description	Displays the current correction factor for the density.
User interface	Signed floating-point number
Additional information	 Manual adjustment of the value: Density factor parameter (→  116)

* Visibility depends on order options or device settings

Density adjustment offset	
Navigation	 Expert → Sensor → Sensor adjustm. → Density adjustm. → Dens. adj offset (6044)
Description	Showsthe calculated correction offset for the density.
User interface	Signed floating-point number
Additional information	 Manual adjustment of the value: Density offset parameter (→  116)

"Extended density adjustment" submenu

 For detailed information on the parameter descriptions of the "Extended density adjustment" application package, see the Special Documentation for the device

Navigation	  Expert → Sensor → Sensor adjustm. → ExtendDensAdjust
► Extended density adjustment Constant offset (5968) →  112 Linear density factor (5967) →  112 Linear temperature factor (5966) →  112 Linear pressure factor (5965) →  112 Quadratic density factor (5964) →  112 Quadratic temperature factor (5963) →  113 Quadratic pressure factor (5962) →  113 Combined density-temperature factor (5961) →  113 Combined density-pressure factor (5971) →  113 Combined temperature-pressure factor (5970) →  113 Cubic temperature factor (5969) →  114	

Constant offset



Navigation  Expert → Sensor → Sensor adjustm. → ExtendDensAdjust → ConstantOffset (5968)

Description Shows the constant offset.

User entry Signed floating-point number

Linear density factor



Navigation  Expert → Sensor → Sensor adjustm. → ExtendDensAdjust → LinearDensFactor (5967)

Description Shows the linear density factor.

User entry Signed floating-point number

Linear temperature factor



Navigation  Expert → Sensor → Sensor adjustm. → ExtendDensAdjust → LinearTempFactor (5966)

Description Shows the linear temperature factor.

User entry Signed floating-point number

Linear pressure factor



Navigation  Expert → Sensor → Sensor adjustm. → ExtendDensAdjust → LinearPressFact (5965)

Description Shows the linear pressure factor.

User entry Signed floating-point number

Quadratic density factor



Navigation  Expert → Sensor → Sensor adjustm. → ExtendDensAdjust → QuadrDensFactor (5964)

Description Shows the quadratic density factor.

User entry Signed floating-point number

Quadratic temperature factor		
Navigation	  Expert → Sensor → Sensor adjustm. → ExtendDensAdjust → QuadrTempFactor (5963)	
Description	Shows the quadratic temperature factor.	
User entry	Signed floating-point number	
Quadratic pressure factor		
Navigation	  Expert → Sensor → Sensor adjustm. → ExtendDensAdjust → QuadrPressFactor (5962)	
Description	Shows the quadratic pressure factor.	
User entry	Signed floating-point number	
Combined density-temperature factor		
Navigation	  Expert → Sensor → Sensor adjustm. → ExtendDensAdjust → DensTempFactor (5961)	
Description	Shows the combined density-temperature factor.	
User entry	Signed floating-point number	
Combined density-pressure factor		
Navigation	  Expert → Sensor → Sensor adjustm. → ExtendDensAdjust → DensPressFactor (5971)	
Description	Shows the combined density-pressure factor.	
User entry	Signed floating-point number	
Combined temperature-pressure factor		
Navigation	  Expert → Sensor → Sensor adjustm. → ExtendDensAdjust → TempPressFactor (5970)	
Description	Shows the combined temperature-pressure factor.	

User entry Signed floating-point number

Cubic temperature factor

Navigation   Expert → Sensor → Sensor adjustm. → ExtendDensAdjust → CubicTempFactor (5969)

Description Shows the cubic temperature factor.

User entry Signed floating-point number

"Process variable adjustment" submenu

 The adjustments to the offsets and factors in the **Process variable adjustment** submenu (→  114) do not affect the calculated values, such as concentration, NSV.

Navigation   Expert → Sensor → Sensor adjustm. → Variable adjust

► Process variable adjustment

Mass flow offset (1831)

→  115

Mass flow factor (1832)

→  115

Volume flow offset (1841)

→  115

Volume flow factor (1846)

→  115

Density offset (1848)

→  116

Density factor (1849)

→  116

Corrected volume flow offset (1866)

→  116

Corrected volume flow factor (1867)

→  117

Reference density offset (1868)

→  117

Reference density factor (1869)

→  117

Temperature offset (1870)

→  117

Temperature factor (1871)

→  118

Mass flow offset 	
Navigation	  Expert → Sensor → Sensor adjustm. → Variable adjust → Mass flow offset (1831)
Description	Use this function to enter the zero point shift for the mass flow trim. The mass flow unit on which the shift is based is kg/s.
User entry	Signed floating-point number
Additional information	<i>Description</i>  Corrected value = (factor × value) + offset
Mass flow factor 	
Navigation	  Expert → Sensor → Sensor adjustm. → Variable adjust → Mass flow factor (1832)
Description	Use this function to enter a quantity factor (without time) for the mass flow. This multiplication factor is applied over the mass flow range.
User entry	Positive floating-point number
Additional information	<i>Description</i>  Corrected value = (factor × value) + offset
Volume flow offset 	
Navigation	  Expert → Sensor → Sensor adjustm. → Variable adjust → Vol. flow offset (1841)
Description	Use this function to enter the zero point shift for the volume flow trim. The volume flow unit on which the shift is based is m ³ /s.
User entry	Signed floating-point number
Additional information	<i>Description</i>  Corrected value = (factor × value) + offset
Volume flow factor 	
Navigation	  Expert → Sensor → Sensor adjustm. → Variable adjust → Vol. flow factor (1846)
Description	Use this function to enter a quantity factor (without time) for the volume flow. This multiplication factor is applied over the volume flow range.

User entry Positive floating-point number

Additional information *Description*

 Corrected value = (factor × value) + offset

Density offset

Navigation   Expert → Sensor → Sensor adjustm. → Variable adjust → Density offset (1848)

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

User entry Signed floating-point number

Additional information *Description*

 Corrected value = (factor × value) + offset

Density factor

Navigation   Expert → Sensor → Sensor adjustm. → Variable adjust → Density factor (1849)

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

User entry Positive floating-point number

Additional information *Description*

 Corrected value = (factor × value) + offset

Corrected volume flow offset

Navigation   Expert → Sensor → Sensor adjustm. → Variable adjust → Corr. vol offset (1866)

Description Use this function to enter the zero point shift for the corrected volume flow trim. The corrected volume flow unit on which the shift is based is 1 Nm³/s.

User entry Signed floating-point number

Additional information *Description*

 Corrected value = (factor × value) + offset

Corrected volume flow factor 	
Navigation	  Expert → Sensor → Sensor adjustm. → Variable adjust → Corr. vol factor (1867)
Description	Use this function to enter a quantity factor (without time) for the corrected volume flow. This multiplication factor is applied over the corrected volume flow range.
User entry	Positive floating-point number
Additional information	<i>Description</i>  Corrected value = (factor × value) + offset
Reference density offset 	
Navigation	  Expert → Sensor → Sensor adjustm. → Variable adjust → Ref.dens. offset (1868)
Description	Use this parameter to enter the zero point shift for the reference density trim. The reference density unit on which the shift is based is 1 kg/Nm ³ .
User entry	Signed floating-point number
Additional information	<i>Description</i>  Corrected value = (factor × value) + offset
Reference density factor 	
Navigation	  Expert → Sensor → Sensor adjustm. → Variable adjust → Ref.dens. factor (1869)
Description	Use this function to enter a quantity factor (without time) for the reference density. This multiplication factor is applied over the reference density range.
User entry	Positive floating-point number
Additional information	<i>Description</i>  Corrected value = (factor × value) + offset
Temperature offset 	
Navigation	  Expert → Sensor → Sensor adjustm. → Variable adjust → Temp. offset (1870)
Description	Use this function to enter the zero point shift for the temperature trim. The temperature unit on which the shift is based is K.

User entry	Signed floating-point number
Additional information	Description  Corrected value = (factor × value) + offset
Temperature factor 	
Navigation	  Expert → Sensor → Sensor adjustm. → Variable adjust → Temp. factor (1871)
Description	Use this function to enter a quantity factor for the temperature. In each case, this factor refers to the temperature in K.
User entry	Positive floating-point number
Additional information	Description  Corrected value = (factor × value) + offset

3.2.8 "Calibration" submenu

Navigation   Expert → Sensor → Calibration

► Calibration

Calibration factor

→  118

Zero point

→  119

Nominal diameter

→  119

C0 to 5

→  119

Calibration factor	
Navigation	  Expert → Sensor → Calibration → Cal. factor (6025)
Description	Displays the current calibration factor for the sensor.
User interface	Signed floating-point number
Factory setting	Depends on nominal diameter and calibration.

Zero point



Navigation	Expert → Sensor → Calibration → Zero point (6195)
Description	Use this function to enter the zero point correction value for the sensor.
User entry	Signed floating-point number
Factory setting	Depends on nominal diameter and calibration.

Nominal diameter

Navigation	Expert → Sensor → Calibration → Nominal diameter (2807)
Description	Displays the nominal diameter of the sensor.
User interface	DNxx / x"
Factory setting	Depends on the size of the sensor
Additional information	<i>Description</i> The value is also specified on the sensor nameplate.

C0 to 5

Navigation	Expert → Sensor → Calibration → C0 to 5 (6022)
Description	Displays the current density coefficients C0 to 5 of the sensor.
User interface	Signed floating-point number
Factory setting	Depends on nominal diameter and calibration.

3.2.9 "Testpoints" submenu

The **Testpoints** submenu (→ 119) is used to test the measuring device or the application.

Navigation   Diagnostics → Testpoints

Navigation   Expert → Sensor → Testpoints

► Testpoints

Oscillation frequency 0 to 1

Frequency fluctuation 0 to 1

Oscillation amplitude 0 to 1

Oscillation damping 0 to 1

Oscillation damping fluctuation 0 to 1

Signal asymmetry

Torsion signal asymmetry

Sensor electronic temperature (ISEM)

Carrier pipe temperature

Exciter current 0 to 1

Raw value mass flow

"Raw values" submenu

Navigation   Expert → Sensor → Testpoints → Raw values

Navigation   Diagnostics → Testpoints → Raw values

► Raw values

Raw value mass flow

→  120

Raw value mass flow

Navigation   Expert → Sensor → Testpoints → Raw mass flow (6140)

Description Shows the current measured raw value of the mass flow.

User interface Signed floating-point number

Additional information

Description

Displays the mass flow value before offset and factor correction, damping, low flow cut off and monitoring of a partially filled pipe. This value can be used to check the current zero point; similar to the zero point verification function.

Dependency

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

"Testpoints" submenu

Navigation   Expert → Sensor → Testpoints → Testpoints

Navigation   Diagnostics → Testpoints → Testpoints

► Testpoints		
Oscillation frequency 0 to 1	→ 	122
Frequency fluctuation 0 to 1	→ 	122
Oscillation amplitude 0 to 1	→ 	122
Oscillation damping 0 to 1	→ 	123
Oscillation damping fluctuation 0 to 1	→ 	124
Signal asymmetry 0	→ 	124
Torsion signal asymmetry	→ 	124
Sensor electronic temperature (ISEM)	→ 	124
Carrier pipe temperature	→ 	125
Casing pipe temperature	→ 	125
Exciter current 0 to 1	→ 	125
Test point 0	→ 	126
Test point 1	→ 	126
Temperature difference measuring tube	→ 	126
Temperat. difference meas. tube-carrier	→ 	127

Oscillation frequency 0 to 1

Navigation	  Expert → Sensor → Testpoints → Osc. freq. 0 to 1 (6067)
Prerequisite	■ Oscillation frequency 0 is available for all Promass sensors. ■ Oscillation frequency 1 is only available for the Promass I and Promass Q sensors.
Description	Shows the current oscillation frequency.
User interface	Positive floating point number

Frequency fluctuation 0 to 1

Navigation	  Expert → Sensor → Testpoints → Freq. fluct. 0 to 1 (6175)
Prerequisite	Order code for "Application package", option EB "Heartbeat Verification + Monitoring" available: ■ Frequency fluctuation 0 is available for all Promass sensors. ■ Frequency fluctuation 1 is only available for the Promass I and Promass Q sensors.
Description	Shows the current frequency fluctuation.
User interface	Signed floating-point number

Oscillation amplitude 0 to 1

Navigation	  Expert → Sensor → Testpoints → Osc. ampl. 0 to 1 (6006)
Prerequisite	Order code for "Application package", option EB "Heartbeat Verification + Monitoring" available: ■ Oscillation amplitude 0 is available for all Promass sensors. ■ Oscillation amplitude 1 is only available for the Promass I and Promass Q sensors.
Description	Use this function to display the relative oscillation amplitude of the sensor in relation to the optimum value.
User interface	Signed floating-point number

Additional information*Description*

This value is 100 % under optimum conditions. The value can fall in the case of complex media (two-phase, high viscosity or high gas velocity).

Limit values

5 %



If the displayed value is outside the limit value, the measuring device displays the following diagnostic messages:

- **△S913 Medium unsuitable** diagnostic message, associated service ID **205 Osc Amp Limit**

Explanation: The measured oscillation amplitude has dropped below the xMin limit value.

- **△S912 Medium inhomogeneous** diagnostic message, associated service ID **196 Fluid Inhomogeneous Amp**

- Explanation: The fluctuation (standard deviation) of the amplitude is too high.
- Possible cause: Air or suspended solids in the medium (multiphase)

Oscillation damping 0 to 1

Navigation

Expert → Sensor → Testpoints → Osc. damping 0 to 1 (6038)

Prerequisite

- Oscillation damping 0 is available for all Promass sensors.
- Oscillation damping 1 is only available for the Promass I and Promass Q sensors.

Description

Displays the current oscillation damping.

User interface

Positive floating-point number

Additional information*Description*

Oscillation damping is an indicator of the sensor's current need for excitation power.

Limit values

The damping depends on the transmitter type and model and changes with the type of medium (differences between models: approx. ±30 %). The minimum value is reached when the sensor is empty. The value can reach several 1 000 in the case of viscous media, and even several 10 000 in the case of multi-phase media. In such cases, the relative oscillation amplitude should also be used for diagnosis.



If the displayed value is outside the limit value, the measuring device displays the following diagnostic message:

- **△S862 Partly filled pipe** diagnostic message, associated service ID **146 Density Monitoring**

Oscillation damping fluctuation 0 to 1

Navigation	  Expert → Sensor → Testpoints → Osc.damp.fluct0 to 1 (6172)
Prerequisite	Order code for "Application package", option EB "Heartbeat Verification + Monitoring" available: ■ Tube damping fluctuation 0 is available for all Promass sensors. ■ Tube damping fluctuation 1 is only available for the Promass I and Promass Q sensors.
Description	Shows the current fluctuation of tube damping.
User interface	Signed floating-point number

Signal asymmetry

Navigation	  Expert → Sensor → Testpoints → Signal asymmetry (6013)
Description	Displays the relative difference between the oscillation amplitude measured at the inlet and outlet of the sensor.
User interface	Signed floating-point number
Additional information	<i>Description</i> The measured value is the result of production tolerances of the sensor coils and should remain constant over the life time of a sensor.

Torsion signal asymmetry

Navigation	  Expert → Sensor → Testpoints → Tors.sig.asymm. (6289)
Prerequisite	This parameter is only available: with the order code for "Application package", option EB "Heartbeat Verification + Monitoring" and the Promass I or Promass Q sensor.
Description	Shows the relative difference of the signal amplitudes of the inlet sensor and outlet sensor of the second oscillation mode.
User interface	Signed floating-point number

Sensor electronic temperature (ISEM)

Navigation	  Expert → Sensor → Testpoints → Sensor elec.temp (6053)
Description	Displays the current temperature inside the main electronics.
User interface	Signed floating-point number

Additional information**NOTE!**

Stay within the specified ambient temperature range.

Dependency

The unit is taken from the **Temperature unit** parameter (→ 81)

Carrier pipe temperature

Navigation

Expert → Sensor → Testpoints → Carr. pipe temp. (6027)

Prerequisite

- Order code for "Application package", option EB "Heartbeat Verification + Monitoring"
- If the carrier tube temperature is provided:
Cubemass C

Description

Use this function to display the current temperature of the measuring tube housing.
Displays the 2nd measured temperature for compensation.

User interface

Signed floating-point number

Additional information*Limit values*

In thermally insulated sensors, the carrier tube temperature can reach the temperature of the medium.

Dependency

The unit is taken from the **Temperature unit** parameter (0557)

Casing pipe temperature

Navigation

Diagnostics → Testpoints → CasingPipeTemp. (6411)

Expert → Sensor → Testpoints → CasingPipeTemp. (6411)

Prerequisite

This parameter is only available: with the order code for "Application package", option EB "Heartbeat Verification + Monitoring" and the Promass I sensor

Description

Displays the temperature of the casing pipe.

User interface

Signed floating-point number

Exciter current 0 to 1

Navigation

Expert → Sensor → Testpoints → Exc. current 0 to 1 (6055)

Prerequisite

- Exciter current 0 is available for all Promass sensors.
- Exciter current 1 is only available for the Promass I and Promass Q sensors.

Description	Rms value of the exciter current.
User interface	Signed floating-point number
Additional information	NOTE! The maximum available excitation current has been reached when the oscillation amplitude shown is less than 100 %.

Test point 0

Navigation	  Diagnostics → Testpoints → Test point 0 (6425)   Expert → Sensor → Testpoints → Test point 0 (6425)
Description	Shows the value for the selected test point. Can only be configured by Endress+Hauser.
Factory setting	0

Test point 1

Navigation	  Diagnostics → Testpoints → Test point 1 (6426)   Expert → Sensor → Testpoints → Test point 1 (6426)
Description	Shows the value for the selected test point. Can only be configured by Endress+Hauser.
Factory setting	0

Temperature difference measuring tube

Navigation	  Diagnostics → Testpoints → TempDiffMeasTube (6344)   Expert → Sensor → Testpoints → TempDiffMeasTube (6344)
Prerequisite	This parameter is only available for the Promass Q sensor.
Description	Shows the temperature difference between the outlet and the inlet of the measuring tube.
User interface	Signed floating-point number

Temperat. difference meas. tube-carrier

Navigation	  Diagnostics → Testpoints → TempDiffTubeCarr   Expert → Sensor → Testpoints → TempDiffTubeCarr
Description	Shows the temperature difference between the measuring tube and the carrier pipe.
User interface	Signed floating-point number

"Sensor index coil asymmetry" submenu

Navigation	  Diagnostics → Testpoints → SensIndCoilAsym.
Navigation	  Expert → Sensor → Testpoints → SensIndCoilAsym.
► Sensor index coil asymmetry Sensor index coil asymmetry Sensor index coil asymmetry reliability →  127 →  127	

Sensor index coil asymmetry

Navigation	  Diagnostics → Testpoints → SensIndCoilAsym. (5951)   Expert → Sensor → Testpoints → SensIndCoilAsym. (5951)
Description	Shows the sensor index coil asymmetry (SICA) currently measured.
User interface	Signed floating-point number

Sensor index coil asymmetry reliability

Navigation	  Diagnostics → Testpoints → SensIndCoilAReli (5952)   Expert → Sensor → Testpoints → SensIndCoilAReli (5952)
Description	Indicates the reliability of the sensor index coil asymmetry value (SICA) currently measured.
User interface	■ Good ■ Uncertain ■ Bad

Sensor index coil asymmetry limit	
Navigation	Diagnostics → Testpoints → SensIndCoilAsym. → SICA limit Expert → Sensor → Testpoints → SensIndCoilAsym. → SICA limit
Description	Enter the limit value. Diagnostic message No. 142 "Sensor index coil asymmetry too high" is generated if this value is exceeded.
User entry	Signed floating-point number

3.2.10 "Disposable component" submenu

Navigation Expert → Sensor → Disposable comp.

▶ Disposable component

Commissioning (4605) → 128

Commissioning	
Navigation	Expert → Sensor → Disposable comp. → Commissioning (4605)
Description	Start commissioning of the sensor manually if does not start automatically.
Selection	■ Start ■ Busy ■ Done ■ Not done
Additional information	Options ■ Start: Starts commissioning ■ Busy, Done, Not done: Status indicator for commissioning Once "Start" has been selected, the same parameter is used to indicate the commissioning status ("Busy" or "Done" / "Not done" if commissioning has never been carried out). The parameter also shows the current commissioning status if commissioning was started automatically by the device (by inserting a disposable measuring tube, which was then recognized by the device).

3.3 "I/O configuration" submenu

Navigation  Expert → I/O config.

► I/O configuration		
I/O module 1 to n terminal numbers (3902-1 to n)	→ 	129
I/O module 1 to n information (3906-1 to n)	→ 	129
I/O module 1 to n type (3901-1 to n)	→ 	130
Apply I/O configuration (3907)	→ 	130
I/O alteration code (2762)	→ 	131

I/O module 1 to n terminal numbers

Navigation	 Expert → I/O config. → I/O 1 to n terminals (3902-1 to n)
Description	Displays the terminal numbers used by the I/O module.
User interface	■ Not used ■ 26-27 (I/O 1) ■ 24-25 (I/O 2) ■ 22-23 (I/O 3) ■ 20-21 (I/O 4)

I/O module 1 to n information

Navigation	 Expert → I/O config. → I/O 1 to n info (3906-1 to n)
Description	Displays information about the plugged in I/O module.
User interface	■ Not plugged ■ Invalid ■ Not configurable ■ Configurable ■ MODBUS

Additional information	<i>"Not plugged" option</i> The I/O module is not plugged in. <i>"Invalid" option</i> The I/O module is not plugged correctly. <i>"Not configurable" option</i> The I/O module is not configurable. <i>"Configurable" option</i> The I/O module is configurable. <i>"MODBUS" option</i> The I/O module is configured for Modbus.
------------------------	--

I/O module 1 to n type

Navigation	  Expert → I/O config. → I/O 1 to n type (3901–1 to n)
Prerequisite	For the following order code: "Output; input 2", option D "Configurable I/O initial setting off"
Description	Use this function to select the I/O module type for the configuration of the I/O module.
Selection	■ Off ■ Current output * ■ Current input * ■ Status input * ■ Pulse/frequency/switch output * ■ Double pulse output * ■ Relay output *

Apply I/O configuration

Navigation	  Expert → I/O config. → Apply I/O config (3907)
Description	Use this function to activate the newly configured I/O module type.
Selection	■ No ■ Yes

* Visibility depends on order options or device settings

I/O alteration code		
Navigation	Expert → I/O config. → I/O alterat.code (2762)	
Description	Use this function to enter the ordered activation code to activate the I/O configuration change.	
User entry	Positive integer	
Additional information	<i>Description</i> The I/O configuration is changed in the I/O module type parameter (→ 130).	

3.4 "Input" submenu

Navigation Expert → Input

► Input

► Current input 1 to n

→ 131

► Status input 1 to n

→ 134

3.4.1 "Current input 1 to n" submenu

Navigation Expert → Input → Current input 1 to n

► Current input 1 to n

Terminal number (1611-1 to n)

→ 132

Signal mode (1610-1 to n)

→ 132

Current span (1605-1 to n)

→ 132

0/4 mA value (1606-1 to n)

→ 133

20 mA value (1607-1 to n)

→ 133

Failure mode (1601-1 to n)

→ 133

Failure value (1602-1 to n)

→ 134

Terminal number	
Navigation	 Expert → Input → Current input 1 to n → Terminal no. (1611–1 to n)
Description	Displays the terminal numbers used by the current input module.
User interface	■ Not used ■ 24-25 (I/O 2) ■ 22-23 (I/O 3) ■ 20-21 (I/O 4) *
Additional information	<i>"Not used" option</i> The current input module does not use any terminal numbers.
Signal mode	
Navigation	 Expert → Input → Current input 1 to n → Signal mode (1610–1 to n)
Prerequisite	The measuring device is not approved for use in the hazardous area with type of protection Ex-i.
Description	Use this function to select the signal mode for the current input.
Selection	■ Passive ■ Active *
Factory setting	Active
Current span	
Navigation	 Expert → Input → Current input 1 to n → Current span (1605–1 to n)
Description	Use this function to select the current range for the process value output and the upper and lower level for signal on alarm.
Selection	■ 4...20 mA (4... 20.5 mA) ■ 4...20 mA NAMUR (3.8...20.5 mA) ■ 4...20 mA US (3.9...20.8 mA) ■ 0...20 mA (0... 20.5 mA)
Factory setting	Country-specific: ■ 4...20 mA NAMUR (3.8...20.5 mA) ■ 4...20 mA US (3.9...20.8 mA)

* Visibility depends on order options or device settings

Additional information*Examples*

Sample values for the current range: **Current span** parameter (→ 139)

0/4 mA value**Navigation**

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

Description

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

User entry

Signed floating-point number

Additional information*Current input behavior*

The current input behaves differently depending on the settings configured in the following parameters:

- Current span (→ 132)
- Failure mode (→ 133)

Configuration examples

Pay attention to the configuration examples for **4 mA value** parameter (→ 140).

20 mA value**Navigation**

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

Description

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

User entry

Signed floating-point number

Factory setting

Depends on country and nominal diameter

Additional information*Configuration examples*

Pay attention to the configuration examples for **4 mA value** parameter (→ 140).

Failure mode**Navigation**

Expert → Input → Current input 1 to n → Failure mode (1601–1 to n)

Description

Use this function to select the input behavior when measuring a current outside the configured **Current span** parameter (→ 132).

Selection

- Alarm
- Last valid value
- Defined value

Additional information	Options
	■ Alarm An error message is set. ■ Last valid value The last valid measured value is used. ■ Defined value A user-defined measured value is used (Failure value parameter (→  134)).
Failure value 	
Navigation	  Expert → Input → Current input 1 to n → Failure value (1602–1 to n)
Prerequisite	In the Failure mode parameter (→  133), the Defined value option is selected.
Description	Use this function to enter the value that the device uses if it does not receive an input signal from the external device, or if the input signal is invalid.
User entry	Signed floating-point number

3.4.2 "Status input 1 to n" submenu

Navigation   Expert → Input → Status input 1 to n

► Status input 1 to n

Terminal number (1358–1 to n)

→  134

Assign status input (1352–1 to n)

→  135

Value status input (1353–1 to n)

→  135

Active level (1351–1 to n)

→  136

Response time status input (1354–1 to n)

→  136

Terminal number

Navigation	  Expert → Input → Status input 1 to n → Terminal no. (1358–1 to n)
Description	Displays the terminal numbers used by the status input module.

User interface	■ Not used ■ 24-25 (I/O 2) ■ 22-23 (I/O 3) ■ 20-21 (I/O 4) *
Additional information	<i>"Not used" option</i> The status input module does not use any terminal numbers.

Assign status input



Navigation	Expert → Input → Status input 1 to n → Assign stat.inp. (1352-1 to n)
Description	Use this function to select the function for the status input.
Selection	■ Off ■ Reset totalizer 1 ■ Reset totalizer 2 ■ Reset totalizer 3 ■ Reset all totalizers ■ Flow override ■ Zero point adjustment
Additional information	<i>Options</i> ■ Off The status input is switched off. ■ Reset totalizer 1...3 The individual totalizers are reset. ■ Reset all totalizers All totalizers are reset. ■ Flow override The Flow override (→ 84) is activated. Note on the Flow override (→ 84): ■ The Flow override (→ 84) is enabled as long as the level is at the status input (continuous signal). ■ All other assignments react to a change in level (pulse) at the status input.

Value status input

Navigation	Expert → Input → Status input 1 to n → Val.stat.inp. (1353-1 to n)
Description	Displays the current input signal level.
User interface	■ High ■ Low

* Visibility depends on order options or device settings

Active level

Navigation	  Expert → Input → Status input 1 to n → Active level (1351–1 to n)
Description	Use this function to determine the input signal level at which the assigned function is activated.
Selection	■ High ■ Low

Response time status input

Navigation	  Expert → Input → Status input 1 to n → Response time (1354–1 to n)
Description	Use this function to enter the minimum time period for which the input signal level must be present before the selected function is activated.
User entry	5 to 200 ms

3.5 "Output" submenu

Navigation   Expert → Output

► Output

► Current output 1 to n

→  136

► Pulse/frequency/switch output 1 to n

→  143

► Relay output 1 to n

→  169

► Double pulse output

→  175

3.5.1 "Current output 1" submenu

Navigation   Expert → Output → Curr.output 1 to n → Curr.output 1

► Current output 1

Terminal number

→  137

Signal mode

→  138

Process variable current output	→ 138
Current range output	→ 139
Fixed current	→ 139
Lower range value output	→ 140
Upper range value output	→ 140
Measuring mode current output	→ 140
Damping current output	→ 140

"Current output 1 to n" wizard | "Current output 1" submenu

Navigation   Setup → Curr.output 1 to n → Terminal no.

Navigation   Expert → Output → Curr.output 1 to n → Curr.output 1 → Terminal no.

► Current output 1	
Terminal number	→ 137
Signal mode	→ 138
Process variable current output	→ 138
Current range output	→ 139
Fixed current	→ 139
Lower range value output	→ 140
Upper range value output	→ 140
Measuring mode current output	→ 140
Damping current output	→ 140

Terminal number

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

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

User interface

- Not used
- 26-27 (I/O 1)
- 24-25 (I/O 2)
- 22-23 (I/O 3)
- 20-21 (I/O 4)

Signal mode**Navigation**

 Setup → Curr.output 1 to n → Signal mode (0377–1 to n)

Description

Select the signal mode for the current output.

Selection

- Active *
- Passive *

Assign current output 1 to n**Navigation**

 Setup → Curr.output 1 to n → Assign curr. 1 to n (0359–1 to n)

Description

Determines which process variable is transmitted via the current output.

Selection

- Off *
- Mass flow
- Volume flow
- Corrected volume flow *
- Target mass flow *
- Carrier mass flow *
- Target volume flow *
- Carrier volume flow *
- Target corrected volume flow *
- Carrier corrected volume flow *
- Density
- Reference density *
- Reference density alternative *
- GSV flow *
- GSV flow alternative *
- NSV flow *
- NSV flow alternative *
- S&W volume flow *
- Water cut *
- Oil density *
- Water density *
- Oil mass flow *
- Water mass flow *
- Oil volume flow *
- Water volume flow *
- Oil corrected volume flow *
- Water corrected volume flow *
- Concentration *

* Visibility depends on order options or device settings

- Dynamic viscosity *
- Kinematic viscosity *
- Temp. compensated dynamic viscosity *
- Temp. compensated kinematic viscosity *
- Temperature
- Carrier pipe temperature *
- Electronic temperature
- Oscillation frequency 0
- Oscillation frequency 1 *
- Oscillation amplitude 0 *
- Oscillation amplitude 1 *
- Frequency fluctuation 0 *
- Frequency fluctuation 1 *
- Oscillation damping 0 *
- Oscillation damping 1 *
- Oscillation damping fluctuation 0 *
- Oscillation damping fluctuation 1 *
- Signal asymmetry *
- Exciter current 0 *
- Exciter current 1 *
- HBSI *
- Pressure
- Application specific output 0 *
- Application specific output 1 *
- Index inhomogeneous medium
- Index suspended bubbles *

Current span



Navigation



Setup → Curr.output 1 to n → Current span (0353–1 to n)

Description

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

Selection

- 4...20 mA NAMUR (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)
- 4...20 mA (4... 20.5 mA)
- 0...20 mA (0... 20.5 mA)
- Fixed current

Fixed current



Navigation



Setup → Curr.output 1 to n → Fixed current (0365–1 to n)

Description

Defines the fixed output current.

User entry

3.59 to 22.5 mA

* Visibility depends on order options or device settings

0/4 mA value



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

Description Enter 4 mA value.

User entry Signed floating-point number

20 mA value



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

Description Enter 20 mA value.

User entry Signed floating-point number

Measuring mode



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

Description Select measuring mode for output.

Selection

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

Damping output 1 to n



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

Description Reaction time of the output signal on fluctuation in the measured value.

User entry 0.0 to 999.9 s

* Visibility depends on order options or device settings

"Current output 1" submenu

Navigation  Expert → Output → Curr.output 1 to n → Curr.output 1

► Current output 1

Failure behavior current output

→  141

Failure current

→  142

Output current

→  143

Measured current

→  143

Failure mode

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

Prerequisite A process variable is selected in the **Assign current output** parameter (→  138) and one of the following options is selected in the **Current span** parameter (→  139):

- 4...20 mA NAMUR (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)
- 4...20 mA (4... 20.5 mA)
- 0...20 mA (0... 20.5 mA)

Description Use this function to select the value of the current output in the event of a device alarm.

- Selection
- Min.
 - Max.
 - Last valid value
 - Actual value
 - Defined value

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 (→ 139).

"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 (→ 139).

"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 (→ 142).

Failure current**Navigation**

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



Setup → Curr.output 1 to n → Failure current (0352-1 to n)



Setup → Curr.output 1 to n → Failure current (0352-1 to n)

Prerequisite

The **Defined value** option is selected in the **Failure mode** parameter (→ 141).

Description

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

User entry

0 to 22.5 mA

Factory setting

22.5 mA

Output current 1 to n

Navigation	Diagnostics → Measured val. → Output values → Curr.output 1 to n → Output curr. 1 to n (0361-1 to n) Expert → Output → Curr.output 1 to n → Output curr. 1 to n (0361-1 to n) Expert → Sensor → Measured val. → Output values → Value curr.out 1 to n → Output curr. 1 to n (0361-1 to n)
Description	Displays the current value currently calculated for the current output.
User interface	0 to 22.5 mA

Measured current 1 to n

Navigation	Diagnostics → Measured val. → Output values → Curr.output 1 to n → Measur. curr. 1 to n (0366-1 to n) Expert → Output → Curr.output 1 to n → Measur. curr. 1 to n (0366-1 to n) Expert → Sensor → Measured val. → Output values → Value curr.out 1 to n → Measur. curr. 1 to n (0366-1 to n)
Description	Displays the actual measured value of the output current.
User interface	0 to 30 mA

3.5.2 "Pulse/frequency/switch output" submenu

Navigation

Expert → Output → PFS output 1 to n → PFS output

► Pulse/frequency/switch output
1 to n

Terminal number

Signal mode

Operating mode

Assign pulse output 1 to n

Pulse scaling

Pulse width

Measuring mode

Failure mode
Pulse output 1 to n
Assign frequency output
Minimum frequency value
Maximum frequency value
Measuring value at minimum frequency
Measuring value at maximum frequency
Measuring mode
Damping output 1 to n
Response time
Failure mode
Failure frequency
Output frequency 1 to n
Switch output function
Assign diagnostic behavior
Assign limit
Switch-on value
Switch-off value
Assign flow direction check
Assign status
Switch-on delay
Switch-off delay
Failure mode

Switch status 1 to n

Invert output signal

"Pulse/frequency/switch output" submenu

Navigation   Expert → Output → PFS output 1 to n → PFS output

► Pulse/frequency/switch output
1 to n

Terminal number

Signal mode

Operating mode

Assign pulse output 1 to n

Pulse scaling

Pulse width

Measuring mode

Failure mode

Pulse output 1 to n

Assign frequency output

Minimum frequency value

Maximum frequency value

Measuring value at minimum
frequency

Measuring value at maximum
frequency

Measuring mode

Damping output 1 to n

Response time

Failure mode

→  146

→  147

→  147

Failure frequency

Output frequency 1 to n

Switch output function

Assign diagnostic behavior

Assign limit

Switch-on value

Switch-off value

Assign flow direction check

Assign status

Switch-on delay

Switch-off delay

Failure mode

Switch status 1 to n

Invert output signal

Terminal number

Navigation

-   Expert → Output → PFS output 1 to n → Terminal no. (0492–1 to n)
-  Setup → PFS output 1 to n → Terminal no. (0492–1 to n)
-   Setup → PFS output 1 to n → Terminal no. (0492–1 to n)

Description

Displays the terminal numbers used by the pulse/frequency/switch output module.

User interface

- Not used
- 24-25 (I/O 2)
- 22-23 (I/O 3)
- 20-21 (I/O 4) *

Additional information

"Not used" option
The pulse/frequency/switch output module does not use any terminal numbers.

* Visibility depends on order options or device settings

Signal mode



Navigation

-   Expert → Output → PFS output 1 to n → Signal mode (0490–1 to n)
-  Setup → PFS output 1 to n → Signal mode (0490–1 to n)
-  Setup → PFS output 1 to n → Signal mode (0490–1 to n)

Description

Use this function to select the signal mode for the pulse/frequency/switch output.

Selection

- Passive
- Active
- Passive NAMUR

Operating mode



Navigation

-   Expert → Output → PFS output 1 to n → Operating mode (0469–1 to n)
-  Setup → PFS output 1 to n → Operating mode (0469–1 to n)
-  Setup → PFS output 1 to n → Operating mode (0469–1 to n)

Description

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

Selection

- Pulse
- Frequency
- Switch

Additional information

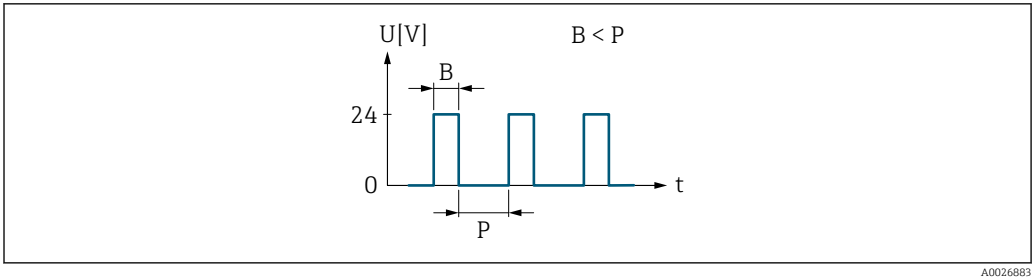
"Pulse" option

Quantity-dependent pulse with configurable pulse width

- Whenever a specific mass, volume, corrected volume, target mass or carrier mass 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 1000 Impuls/s

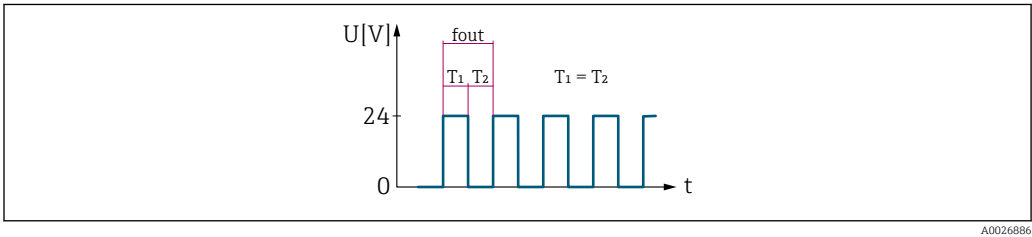


4 Quantity-proportional pulse (pulse value) with pulse width to be configured
B Pulse width entered
P Pauses between the individual pulses

"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 mass flow, volume flow, corrected volume flow, target mass flow, carrier mass flow, density, reference density, concentration, temperature, carrier pipe temperature, electronic temperature, oscillation frequency, frequency fluctuation, oscillation amplitude, oscillation damping, oscillation damping fluctuation, signal asymmetry or exciter current.

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

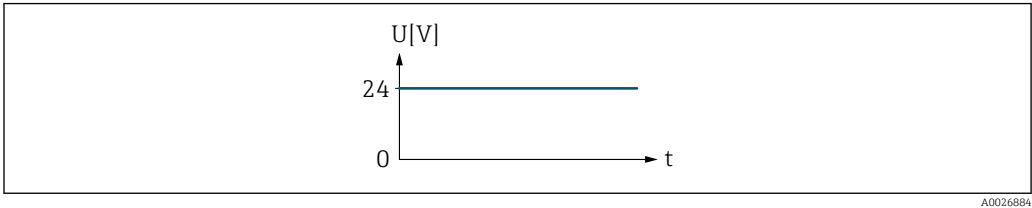


5 Flow-proportional frequency output

"Switch" option

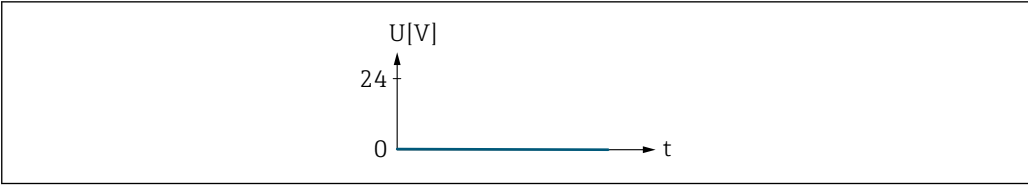
Contact for displaying a condition (e.g. alarm or warning if a limit value is reached)

- Example
- Alarm response without alarm



6 No alarm, high level

- Example
- Alarm response in case of alarm



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7 Alarm, low level

"Settings" submenu

Navigation Expert → Output → PFS output 1 to n → Settings

► Settings		
Assign pulse output	→	150
Pulse scaling	→	151
Pulse width	→	151
Measuring mode	→	152
Failure mode	→	153
Pulse output	→	154
Assign frequency output	→	154
Minimum frequency value	→	155
Maximum frequency value	→	156
Measuring value at minimum frequency	→	156
Measuring value at maximum frequency	→	156
Measuring mode	→	157
Output damping	→	158
Response time	→	159
Failure mode	→	160
Failure frequency	→	160

Output frequency	→  161
Switch output function	→  161
Assign diagnostic behavior	→  162
Assign limit	→  162
Switch-on value	→  164
Switch-off value	→  165
Assign flow direction check	→  165
Assign status	→  166
Switch-on delay	→  166
Switch-off delay	→  166
Failure mode	→  167
Switch status	→  167

Assign pulse output 1 to n



Navigation

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

Prerequisite

The **Pulse** option is selected in **Operating mode** parameter (→  147).

Description

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

Selection

- Off
- Mass flow
- Volume flow
- Corrected volume flow *
- Target mass flow *
- Carrier mass flow *
- Target volume flow *
- Carrier volume flow *
- Target corrected volume flow *
- Carrier corrected volume flow *
- GSV flow *
- GSV flow alternative *

* Visibility depends on order options or device settings

- NSV flow *
- NSV flow alternative *
- S&W volume flow *
- Oil mass flow *
- Water mass flow *
- Oil volume flow *
- Water volume flow *
- Oil corrected volume flow *
- Water corrected volume flow *

Pulse scaling



Navigation	Expert → Output → PFS output 1 to n → Pulse scaling (0455-1 to n) Setup → PFS output 1 to n → Pulse scaling (0455-1 to n) Setup → PFS output 1 to n → Pulse scaling (0455-1 to n)
Prerequisite	The Pulse option is selected in the Operating mode parameter (→ 147) and a process variable is selected in the Assign pulse output parameter (→ 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 → 264
Additional information	<i>User entry</i> Weighting of the pulse output with a quantity. The lower the pulse value, the ■ better the resolution. ■ the higher the frequency of the pulse response.

Pulse width



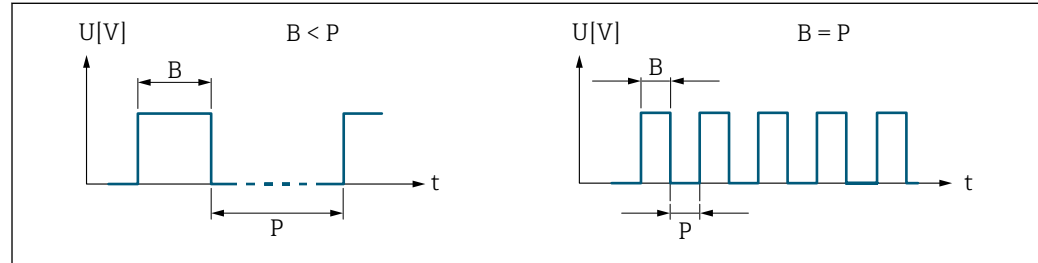
Navigation	Expert → Output → PFS output 1 to n → Pulse width (0452-1 to n) Setup → PFS output 1 to n → Pulse width (0452-1 to n) Setup → PFS output 1 to n → Pulse width (0452-1 to n)
Prerequisite	The Pulse option is selected in the Operating mode parameter (→ 147) and a process variable is selected in the Assign pulse output parameter (→ 150).
Description	Use this function to enter the duration of the output pulse.
User entry	0.05 to 2 000 ms

* Visibility depends on order options or device settings

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 **443 Pulse output 1 to n** diagnostic message.



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B Pulse width entered
P Pauses between the individual pulses

Example

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

Measuring mode



Navigation

 **Expert** → **Output** → **PFS output 1 to n** → **Measuring mode (0457-1 to n)**

Prerequisite

The **Pulse** option is selected in the **Operating mode** parameter (→  147) and one of the following options is selected in the **Assign pulse output** parameter (→  150):

- Mass flow
- Volume flow
- Corrected volume flow
- Target mass flow *
- Carrier mass flow *

Description

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

Selection

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

* Visibility depends on order options or device settings

Additional information*Options*

- **Forward flow**
Positive flow is output, negative flow is not output.
- **Forward/Reverse flow**
Positive and negative flow are output (absolute value), but a distinction is not made between positive and negative flow.
- **Reverse flow**
Negative flow is output, positive flow is not output.
- **Reverse flow compensation**
The flow components outside the measuring range are buffered, balanced and output after a maximum delay of 60 s.

 For a detailed description of the options available, see the **Measuring mode** parameter (→  140)

Examples

 For a detailed description of the configuration examples, see the **Measuring mode** parameter (→  140)

Failure mode**Navigation**

-   **Expert → Output → PFS output 1 to n → Failure mode (0480–1 to n)**
-  **Setup → PFS output 1 to n → Failure mode (0480–1 to n)**
-  **Setup → PFS output 1 to n → Failure mode (0480–1 to n)**

Prerequisite

The **Pulse** option is selected in the **Operating mode** parameter (→  147) and a process variable is selected in the **Assign pulse output** parameter (→  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**

Additional information*Description*

The dictates of safety render it advisable to ensure that the pulse output shows a predefined behavior in the event of a device alarm.

Options

- **Actual value**
In the event of a device alarm, the pulse output continues on the basis of the current flow measurement. The fault is ignored.
- **No pulses**
In the event of a device alarm, the pulse output is "switched off".

NOTICE! A device alarm indicates a serious fault with the measuring device. The measurement quality may possibly be influenced and may no longer be guaranteed. The **Actual value** option is only recommended if it is ensured that all possible alarm conditions do not influence the measurement quality.

Pulse output 1 to n

Navigation	Diagnostics → Measured val. → Output values → PFS output 1 to n → Pulse output 1 to n (0456-1 to n) Expert → Output → PFS output 1 to n → Pulse output 1 to n (0456-1 to n) Expert → Sensor → Measured val. → Output values → PFS output 1 to n → Pulse output 1 to n (0456-1 to n)
Prerequisite	The Pulse option is selected in the Operating mode parameter (→ 147) 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. 1 0 t NC 1 0 t NO 0 Non-conductive 1 Conductive NC NC contact (normally closed) NO NO contact (normally open) The output behavior can be reversed via the Invert output signal parameter (→ 168) 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 (→ 153)) can be configured.

Assign frequency output

Navigation	Expert → Output → PFS output 1 to n → Assign freq. (0478-1 to n) Setup → PFS output 1 to n → Assign freq. (0478-1 to n) Setup → PFS output 1 to n → Assign freq. (0478-1 to n)
Prerequisite	The Frequency option is selected in Operating mode parameter (→ 147).
Description	Use this function to select the process variable for the frequency output. i Detailed description of the options Oscillation frequency, Oscillation amplitude, Oscillation damping and Signal asymmetry: Value 1 display parameter (→ 16)

Selection	■ Off ■ Mass flow ■ Volume flow ■ Corrected volume flow * ■ Density ■ Reference density * ■ Temperature ■ Pressure ■ Concentration * ■ Target mass flow * ■ Carrier mass flow * ■ Target volume flow * ■ Carrier volume flow * ■ Target corrected volume flow * ■ Carrier corrected volume flow * ■ Application specific output 0 * ■ Application specific output 1 * ■ HBSI * ■ Exciter current 0 ■ Oscillation damping 0 ■ Oscillation damping fluctuation 0 * ■ Oscillation frequency 0 ■ Frequency fluctuation 0 * ■ Oscillation amplitude 0 * ■ Signal asymmetry ■ Carrier pipe temperature * ■ Electronic temperature ■ Index inhomogeneous medium ■ Index suspended bubbles *
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Minimum frequency value

Navigation	  Expert → Output → PFS output 1 to n → Min. freq. value (0453-1 to n)  Setup → PFS output 1 to n → Min. freq. value (0453-1 to n)  Setup → PFS output 1 to n → Min. freq. value (0453-1 to n)
Prerequisite	The Frequency option is selected in the Operating mode parameter (→  147) and a process variable is selected in the Assign frequency output parameter (→  154).
Description	Use this function to enter the minimum frequency.
User entry	0.0 to 10 000.0 Hz

* Visibility depends on order options or device settings

Maximum frequency value

Navigation	  Expert → Output → PFS output 1 to n → Max. freq. value (0454-1 to n)  Setup → PFS output 1 to n → Max. freq. value (0454-1 to n)  Setup → PFS output 1 to n → Max. freq. value (0454-1 to n)
Prerequisite	The Frequency option is selected in the Operating mode parameter (→  147) and a process variable is selected in the Assign frequency output parameter (→  154).
Description	Use this function to enter the end value frequency.
User entry	0.0 to 10 000.0 Hz

Measuring value at minimum frequency

Navigation	  Expert → Output → PFS output 1 to n → Val. at min.freq (0476-1 to n)  Setup → PFS output 1 to n → Val. at min.freq (0476-1 to n)  Setup → PFS output 1 to n → Val. at min.freq (0476-1 to n)
Prerequisite	The Frequency option is selected in the Operating mode parameter (→  147) and a process variable is selected in the Assign frequency output parameter (→  154).
Description	Use this function to enter the measured value for the start value frequency.
User entry	Signed floating-point number
Factory setting	Depends on country and nominal diameter
Additional information	<i>Dependency</i>  The entry depends on the process variable selected in the Assign frequency output parameter (→  154).

Measuring value at maximum frequency

Navigation	  Expert → Output → PFS output 1 to n → Val. at max.freq (0475-1 to n)  Setup → PFS output 1 to n → Val. at max.freq (0475-1 to n)  Setup → PFS output 1 to n → Val. at max.freq (0475-1 to n)
Prerequisite	The Frequency option is selected in the Operating mode parameter (→  147) and a process variable is selected in the Assign frequency output parameter (→  154).
Description	Use this function to enter the measured value for the end value frequency.
User entry	Signed floating-point number
Factory setting	Depends on country and nominal diameter

Additional information*Description*

Use this function to enter the maximum measured value at the maximum frequency. The selected process variable is output as a proportional frequency.

Dependency

The entry depends on the process variable selected in the **Assign frequency output** parameter (→ 154).

Measuring mode**Navigation**

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

Prerequisite

The **Frequency** option is selected in the **Operating mode** parameter (→ 147) and one of the following options is selected in the **Assign frequency output** parameter (→ 154):

- Mass flow
- Volume flow
- Corrected volume flow
- Target mass flow *
- Carrier mass flow *
- Density
- Reference density
- Concentration *
- Temperature
- Carrier pipe temperature *
- Electronic temperature
- Oscillation frequency 0
- Frequency fluctuation 0
- Oscillation amplitude 0 *
- Oscillation damping 0
- Oscillation damping fluctuation 0
- Signal asymmetry
- Exciter current 0



Detailed description of the options **Oscillation frequency**, **Oscillation amplitude**, **Oscillation damping** and **Signal asymmetry: Value 1 display** parameter (→ 16)

Description

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

Selection

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

Additional information*Options*

For a detailed description of the options available, see the **Measuring mode** parameter (→ 140)

Examples

For a detailed description of the configuration examples, see the **Measuring mode** parameter (→ 140)

* Visibility depends on order options or device settings

Damping output 1 to n	
Navigation	Expert → Output → PFS output 1 to n → Damping out. 1 to n (0477-1 to n) Setup → PFS output 1 to n → Damping out. 1 to n (0477-1 to n) Setup → PFS output 1 to n → Damping out. 1 to n (0477-1 to n)
Prerequisite	The Frequency option is selected in the Operating mode parameter (→ 147) and one of the following options is selected in the Assign frequency output parameter (→ 154): ■ Mass flow ■ Volume flow ■ Corrected volume flow ■ Target mass flow * ■ Carrier mass flow * ■ Density ■ Reference density ■ Concentration * ■ Temperature ■ Carrier pipe temperature * ■ Electronic temperature ■ Oscillation frequency 0 ■ Frequency fluctuation 0 ■ Oscillation amplitude 0 * ■ Oscillation damping 0 ■ Oscillation damping fluctuation 0 ■ Signal asymmetry ■ Exciter current 0 Detailed description of the options Oscillation frequency, Oscillation amplitude, Oscillation damping and Signal asymmetry: Value 1 display parameter (→ 16)
Description	Use this function to enter a time constant for the reaction time of the output signal to fluctuations in the measured value.
User entry	0 to 999.9 s
Additional information	<i>User entry</i> Use this function to enter a time constant (PT1 element ⁶⁾) 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.

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

Response time

Navigation
 **Expert → Output → PFS output 1 to n → Response time (0491-1 to n)**
Prerequisite

The **Frequency** option is selected in the **Operating mode** parameter (→  147) and one of the following options is selected in the **Assign frequency output** parameter (→  154):

- Mass flow
- Volume flow
- Corrected volume flow
- Target mass flow *
- Carrier mass flow *
- Density
- Reference density
- Concentration *
- Temperature
- Carrier pipe temperature *
- Electronic temperature
- Oscillation frequency 0
- Frequency fluctuation 0
- Oscillation amplitude 0 *
- Oscillation damping 0
- Oscillation damping fluctuation 0
- Signal asymmetry
- Exciter current 0



Detailed description of the options **Oscillation frequency**, **Oscillation amplitude**, **Oscillation damping** and **Signal asymmetry: Value 1 display** parameter (→  16)

Description

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

User interface

Positive floating-point number

Additional information*Description*

The response time is made up of the time specified for the following dampings:

- Damping of pulse/frequency/switch output
and
- Depending on the measured variable assigned to the output.
 - Flow damping
or
 - Density damping
or
 - Temperature damping

* Visibility depends on order options or device settings

Failure mode 	
Navigation	  Expert → Output → PFS output 1 to n → Failure mode (0451–1 to n)  Setup → PFS output 1 to n → Failure mode (0451–1 to n)  Setup → PFS output 1 to n → Failure mode (0451–1 to n)
Prerequisite	The Frequency option is selected in the Operating mode parameter (→  147) and a process variable is selected in the Assign frequency output parameter (→  154).
Description	Use this function to select the failure mode of the frequency output in the event of a device alarm.
Selection	■ Actual value ■ Defined value ■ 0 Hz
Additional information	<i>Options</i> ■ Actual value In the event of a device alarm, the frequency output continues on the basis of the current flow measurement. The device alarm is ignored. ■ Defined value In the event of a device alarm, the frequency output continues on the basis of a predefined value. The Failure frequency (→  160) replaces the current measured value, making it possible to bypass the device alarm. The actual measurement is switched off for the duration of the device alarm. ■ 0 Hz In the event of a device alarm, the frequency output is "switched off". NOTICE! A device alarm indicates a serious fault with the measuring device. The measurement quality may possibly be influenced and may no longer be guaranteed. The Actual value option is only recommended if it is ensured that all possible alarm conditions do not influence the measurement quality.
Failure frequency 	
Navigation	  Expert → Output → PFS output 1 to n → Failure freq. (0474–1 to n)  Setup → PFS output 1 to n → Failure freq. (0474–1 to n)  Setup → PFS output 1 to n → Failure freq. (0474–1 to n)
Prerequisite	In the Operating mode parameter (→  147), the Frequency option is selected, in the Assign frequency output parameter (→  154) a process variable is selected, and in the Failure mode parameter (→  160), the Defined value option is selected.
Description	Enter frequency output value in alarm condition.
User entry	0.0 to 12 500.0 Hz

Output frequency 1 to n

Navigation	  Diagnostics → Measured val. → Output values → PFS output 1 to n → Output freq. 1 to n (0471–1 to n)   Expert → Output → PFS output 1 to n → Output freq. 1 to n (0471–1 to n)   Expert → Sensor → Measured val. → Output values → PFS output 1 to n → Output freq. 1 to n (0471–1 to n)
Prerequisite	In the Operating mode parameter (→  147), the Frequency option is selected.
Description	Displays the actual value of the output frequency which is currently measured.
User interface	0.0 to 12 500.0 Hz

Switch output function

Navigation	  Expert → Output → PFS output 1 to n → Switch out funct (0481–1 to n)  Setup → PFS output 1 to n → Switch out funct (0481–1 to n)  Setup → PFS output 1 to n → Switch out funct (0481–1 to n)
Prerequisite	The Switch option is selected in the Operating mode parameter (→  147).
Description	Use this function to select a function for the switch output.
Selection	■ Off ■ On ■ Diagnostic behavior ■ Limit ■ Flow direction check ■ Status
Additional information	<i>Options</i> ■ Off The switch output is permanently switched off (open, non-conductive). ■ On The switch output is permanently switched on (closed, conductive). ■ Diagnostic behavior Indicates if the diagnostic event is present or not. Is used to output diagnostic information and to react to it appropriately at the system level. ■ Limit Indicates if a specified limit value has been reached for the process variable. Is used to output diagnostic information relating to the process and to react to it appropriately at the system level. ■ Flow direction check Indicates the flow direction (forward or reverse flow). ■ Status Displays the device status depending on whether empty pipe detection or low flow cut off is selected.

Assign diagnostic behavior 	
Navigation	  Expert → Output → PFS output 1 to n → Assign diag. beh (0482-1 to n)  Setup → PFS output 1 to n → Assign diag. beh (0482-1 to n)  Setup → PFS output 1 to n → Assign diag. beh (0482-1 to n)
Prerequisite	■ In the Operating mode parameter (→  147), the Switch option is selected. ■ In the Switch output function parameter (→  161), the Diagnostic behavior option is selected.
Description	Use this function to select the diagnostic event category that is displayed for the switch output.
Selection	■ Alarm ■ Alarm or warning ■ Warning
Additional information	<i>Description</i>  If no diagnostic event is pending, the switch output is closed and conductive.
	<i>Selection</i> ■ Alarm The switch output signals only diagnostic events in the alarm category. ■ Alarm or warning The switch output signals diagnostic events in the alarm and warning category. ■ Warning The switch output signals only diagnostic events in the warning category.
Assign limit 	
Navigation	  Expert → Output → PFS output 1 to n → Assign limit (0483-1 to n)  Setup → PFS output 1 to n → Assign limit (0483-1 to n)  Setup → PFS output 1 to n → Assign limit (0483-1 to n)
Prerequisite	■ The Switch option is selected in Operating mode parameter (→  147). ■ The Limit option is selected in Switch output function parameter (→  161).
Description	Use this function to select a process variable for the limit function.
Selection	■ Mass flow ■ Volume flow ■ Corrected volume flow * ■ Target mass flow * ■ Carrier mass flow * ■ Target volume flow * ■ Carrier volume flow * ■ Target corrected volume flow *

* Visibility depends on order options or device settings

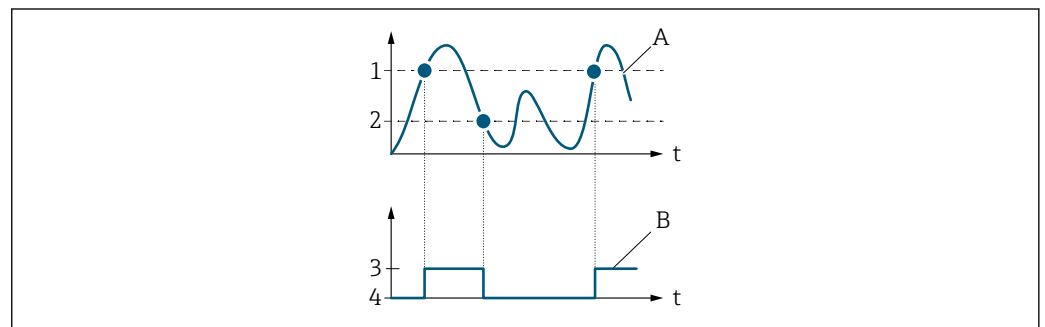
- Carrier corrected volume flow *
- Density
- Reference density *
- Reference density alternative *
- GSV flow *
- GSV flow alternative *
- NSV flow *
- NSV flow alternative *
- S&W volume flow *
- Water cut *
- Oil density *
- Water density *
- Oil mass flow *
- Water mass flow *
- Oil volume flow *
- Water volume flow *
- Oil corrected volume flow *
- Water corrected volume flow *
- Concentration *
- Temperature
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Oscillation damping
- Pressure
- Application specific output 0 *
- Application specific output 1 *
- Index inhomogeneous medium
- Index suspended bubbles *

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



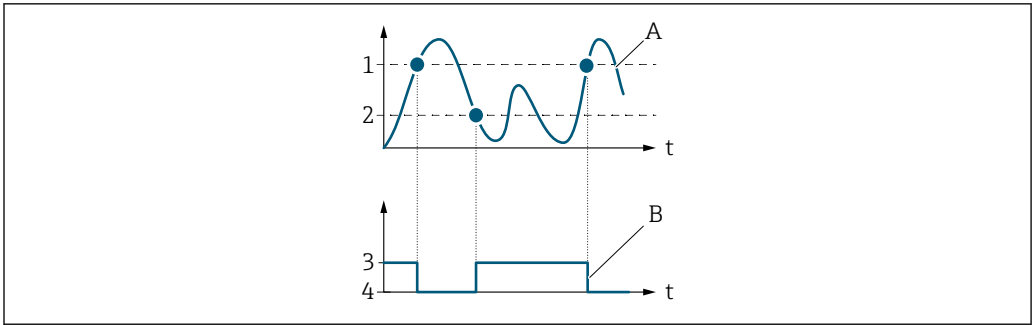
A0026891

- 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

* Visibility depends on order options or device settings

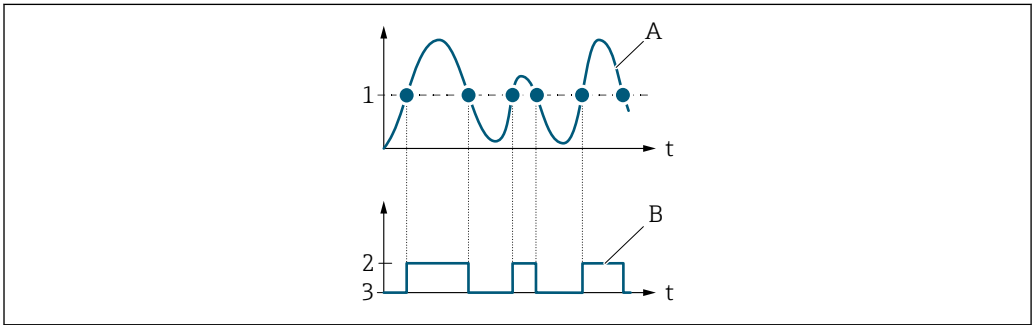


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- 1 Switch-off value
- 2 Switch-on value
- 3 Conductive
- 4 Non-conductive
- A Process variable
- B Status output

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



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

Switch-on value



Navigation

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

Prerequisite

- The **Switch** option is selected in the **Operating mode** parameter (→ 147).
- The **Limit** option is selected in the **Switch output function** parameter (→ 161).

Description

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

User entry

Signed floating-point number

Factory setting

- Depends on country:
- 0 kg/h
 - 0 lb/min

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 (→ 162).

**Switch-off value****Navigation**

Expert → Output → PFS output 1 to n → Switch-off value (0464-1 to n)



Setup → PFS output 1 to n → Switch-off value (0464-1 to n)



Setup → PFS output 1 to n → Switch-off value (0464-1 to n)

Prerequisite

- The **Switch** option is selected in the **Operating mode** parameter (→ 147).
- The **Limit** option is selected in the **Switch output function** parameter (→ 161).

Description

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

User entry

Signed floating-point number

Factory setting

Depends on country:

- 0 kg/h
- 0 lb/min

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 (→ 162).

**Assign flow direction check****Navigation**

Expert → Output → PFS output 1 to n → Assign dir.check (0484-1 to n)



Setup → PFS output 1 to n → Assign dir.check (0484-1 to n)



Setup → PFS output 1 to n → Assign dir.check (0484-1 to n)

Prerequisite

- The **Switch** option is selected in the **Operating mode** parameter (→ 147).
- The **Flow direction check** option is selected in the **Switch output function** parameter (→ 161).

Description Use this function to select a process variable for monitoring the flow direction.

Selection

Assign status



Navigation

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

Prerequisite

- The **Switch** option is selected in **Operating mode** parameter (→ 147).
- The **Status** option is selected in **Switch output function** parameter (→ 161).

Description

Select the device function whose status you want to display.

Selection

- Partially filled pipe detection
- Low flow cut off

Additional information

Options

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

Switch-on delay



Navigation

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

Prerequisite

- The **Switch** option is selected in the **Operating mode** parameter (→ 147).
- The **Limit** option is selected in the **Switch output function** parameter (→ 161).

Description

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

User entry

0.0 to 100.0 s

Switch-off delay



Navigation

- Expert → Output → PFS output 1 to n → Switch-off delay (0465–1 to n)
- Setup → PFS output 1 to n → Switch-off delay (0465–1 to n)
- Setup → PFS output 1 to n → Switch-off delay (0465–1 to n)

Prerequisite

- The **Switch** option is selected in the **Operating mode** parameter (→ 147).
- The **Limit** option is selected in the **Switch output function** parameter (→ 161).

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

User entry 0.0 to 100.0 s

Failure mode



Navigation

- Expert → Output → PFS output 1 to n → Failure mode (0486-1 to n)
- Setup → PFS output 1 to n → Failure mode (0486-1 to n)
- Setup → PFS output 1 to n → Failure mode (0486-1 to n)

Description Use this function to select a failsafe mode for the switch output in the event of a device alarm.

Selection

- Actual status
- Open
- Closed

Additional information *Options*

- Actual status
In the event of a device alarm, faults are ignored and the current behavior of the input value is output by the switch output. The **Actual status** option behaves in the same way as the current input value.
- Open
In the event of a device alarm, the switch output's transistor is set to **non-conductive**.
- Closed
In the event of a device alarm, the switch output's transistor is set to **conductive**.

Switch status 1 to n

Navigation

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

Prerequisite The **Switch** option is selected in the **Operating mode** parameter (→ 147).

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.

"Additional settings" submenu

Navigation   Expert → Output → PFS output 1 to n → Add. settings

► Additional settings

Invert output signal

→  168

Invert output signal



Navigation

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

 Setup → PFS output 1 to n → Invert outp.sig. (0470–1 to n)

 Setup → PFS output 1 to n → Invert outp.sig. (0470–1 to n)

Description

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

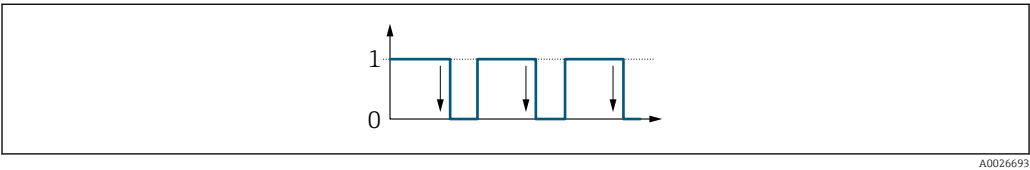
Selection

- No
- Yes

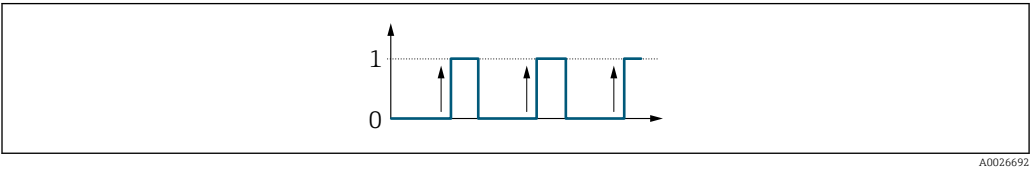
Additional information

Selection

No option (passive - negative)



Yes option (passive - positive)



3.5.3 "Relay output 1 to n" submenu

Navigation  Expert → Output → Relay output 1 to n

► Relay output 1 to n		
Terminal number	→ 	169
Relay output function	→ 	170
Assign flow direction check	→ 	170
Assign limit	→ 	170
Assign diagnostic behavior	→ 	171
Assign status	→ 	172
Switch-off value	→ 	172
Switch-off delay	→ 	173
Switch-on value	→ 	173
Switch-on delay	→ 	173
Failure mode	→ 	174
Switch status	→ 	174
Powerless relay status	→ 	174

Terminal number

Navigation	 Expert → Output → Relay output 1 to n → Terminal no. (0812–1 to n)
Description	Displays the terminal numbers used by the relay output module.
User interface	■ Not used ■ 24-25 (I/O 2) ■ 22-23 (I/O 3) ■ 20-21 (I/O 4)
Additional information	"Not used" option The relay output module does not use any terminal numbers.

Relay output function

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

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

Selection

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

Additional information *Selection*

- Closed
The relay output is permanently switched on (closed, conductive).
- Open
The relay output is permanently switched off (open, non-conductive).
- Diagnostic behavior
Indicates if the diagnostic event is present or not. Is used to output diagnostic information and to react to it appropriately at the system level.
- Limit
Indicates if a specified limit value has been reached for the process variable. Is used to output diagnostic information relating to the process and to react to it appropriately at the system level.
- Flow direction check
Indicates the flow direction (forward or reverse flow).
- Digital Output
Indicates the device status depending on whether empty pipe detection or low flow cut off is selected.

Assign flow direction check

Navigation   Expert → Output → Relay output 1 to n → Assign dir.check (0808–1 to n)

Prerequisite The **Flow direction check** option is selected in the **Relay output function** parameter (→  170).

Description Use this function to select a process variable for monitoring the flow direction.

Selection

Assign limit

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

Prerequisite The **Limit** option is selected in **Relay output function** parameter (→  170).

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

Selection	■ Mass flow ■ Volume flow ■ Corrected volume flow * ■ Target mass flow * ■ Carrier mass flow * ■ Target volume flow * ■ Carrier volume flow * ■ Target corrected volume flow * ■ Carrier corrected volume flow * ■ Density ■ Reference density * ■ Reference density alternative * ■ GSV flow * ■ GSV flow alternative * ■ NSV flow * ■ NSV flow alternative * ■ S&W volume flow * ■ Water cut * ■ Oil density * ■ Water density * ■ Oil mass flow * ■ Water mass flow * ■ Oil volume flow * ■ Water volume flow * ■ Oil corrected volume flow * ■ Water corrected volume flow * ■ Concentration * ■ Temperature ■ Totalizer 1 ■ Totalizer 2 ■ Totalizer 3 ■ Oscillation damping ■ Pressure ■ Application specific output 0 * ■ Application specific output 1 * ■ Index inhomogeneous medium ■ Index suspended bubbles *
------------------	--

Assign diagnostic behavior



Navigation	Expert → Output → Relay output 1 to n → Assign diag. beh (0806–1 to n)
Prerequisite	In the Relay output function parameter (→ 170), the Diagnostic behavior option is selected.
Description	Use this function to select the category of the diagnostic events that are displayed for the relay output.
Selection	■ Alarm ■ Alarm or warning ■ Warning

* Visibility depends on order options or device settings

Additional information*Description*

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

Selection

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

Assign status**Navigation**

Expert → Output → Relay output 1 to n → Assign status (0805–1 to n)

Prerequisite

In the **Relay output function** parameter (→ 170), the **Digital Output** option is selected.

Description

Use this function to select the device status for the relay output.

Selection

- Partially filled pipe detection
- Low flow cut off

Switch-off value**Navigation**

Expert → Output → Relay output 1 to n → Switch-off value (0809–1 to n)

Prerequisite

The **Limit** option is selected in the **Relay output function** parameter (→ 170).

Description

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

User entry

Signed floating-point number

Factory setting

Depends on country:

- 0 kg/h
- 0 lb/min

Additional information*Description*

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



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

Dependency

The unit is dependent on the process variable selected in the **Assign limit** parameter (→ 170).

Switch-off delay



Navigation	Expert → Output → Relay output 1 to n → Switch-off delay (0813–1 to n)
Prerequisite	In the Relay output function parameter (→ 170), the Limit option is selected.
Description	Use this function to enter a delay time for switching off the switch output.
User entry	0.0 to 100.0 s

Switch-on value



Navigation	Expert → Output → Relay output 1 to n → Switch-on value (0810–1 to n)
Prerequisite	The Limit option is selected in the Relay output function parameter (→ 170).
Description	Use this function to enter the measured value for the switch-on point.
User entry	Signed floating-point number
Factory setting	Depends on country: ■ 0 kg/h ■ 0 lb/min
Additional information	<i>Description</i> 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. <i>Dependency</i> The unit is dependent on the process variable selected in the Assign limit parameter (→ 170).

Switch-on delay



Navigation	Expert → Output → Relay output 1 to n → Switch-on delay (0814–1 to n)
Prerequisite	In the Relay output function parameter (→ 170), the Limit option is selected.
Description	Use this function to enter a delay time for switching on the switch output.
User entry	0.0 to 100.0 s

Failure mode 	
Navigation	  Expert → Output → Relay output 1 to n → Failure mode (0811–1 to n)
Description	Use this function to select the failure mode of the relay output in the event of a device alarm.
Selection	■ Actual status ■ Open ■ Closed
Additional information	<i>Selection</i> ■ Actual status In the event of a device alarm, faults are ignored and the current behavior of the input value is output by the relay output. The Actual status option behaves in the same way as the current input value. ■ Open In the event of a device alarm, the relay output's transistor is set to non-conductive. ■ Closed In the event of a device alarm, the relay output's transistor is set to conductive.
Switch status	
Navigation	  Expert → Output → Relay output 1 to n → Switch status (0801–1 to n)
Description	Displays the current status of the relay output.
User interface	■ Open ■ Closed
Additional information	<i>User interface</i> ■ Open The relay output is not conductive. ■ Closed The relay output is conductive.
Powerless relay status 	
Navigation	  Expert → Output → Relay output 1 to n → Powerless relay (0816–1 to n)
Description	Use this function to select the quiescent state for the relay output.
Selection	■ Open ■ Closed

Additional information

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

3.5.4 "Double pulse output" submenu

Navigation  Expert → Output → Double pulse out

► Double pulse output

Master terminal number (0981)

Slave terminal number (0990)

Signal mode (0991)

Assign pulse output 1 (0982-1)

Value per pulse (0983)

Pulse width (0986)

Phase shift (0992)

Measuring mode (0984)

Failure mode (0985)

Pulse output (0987)

Invert output signal (0993)

→  175

→  176

→  176

→  176

→  177

→  177

→  177

→  178

→  178

→  179

→  179

Master terminal number

Navigation  Expert → Output → Double pulse out → Master term. no. (0981)

Description Displays the master terminal number for the double pulse output.

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

Additional information

"Not used" option
The double pulse output does not use any terminal numbers.

Slave terminal number

Navigation

 Expert → Output → Double pulse out → Slave term. no. (0990)

Description

Displays the slave terminal number for the double pulse output.

User interface

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

Additional information

"Not used" option
The double pulse output does not use any terminal numbers.

Signal mode

Navigation

 Expert → Output → Double pulse out → Signal mode (0991)

Description

Use this function to select the signal mode for the double pulse output.

Selection

- Passive
- Active
- Passive NAMUR

Assign pulse output 1

Navigation

 Expert → Output → Double pulse out → Assign pulse 1 (0982-1)

Description

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

Selection

- Off
- Mass flow
- Volume flow
- Corrected volume flow ^{*}
- Target mass flow ^{*}
- Carrier mass flow ^{*}
- Target volume flow ^{*}
- Carrier volume flow ^{*}
- Target corrected volume flow ^{*}
- Carrier corrected volume flow ^{*}
- GSV flow ^{*}
- GSV flow alternative ^{*}

^{*} Visibility depends on order options or device settings

- NSV flow *
- NSV flow alternative *
- S&W volume flow *
- Oil mass flow *
- Water mass flow *
- Oil volume flow *
- Water volume flow *
- Oil corrected volume flow *
- Water corrected volume flow *

Value per pulse



Navigation	Expert → Output → Double pulse out → Value per pulse (0983)
Description	Use this function to enter the value for the measured value that a pulse is equivalent to.
User entry	Signed floating-point number
Factory setting	Depends on country and nominal diameter → 264
Additional information	<i>User entry</i> 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 → Double pulse out → Pulse width (0986)
Description	Use this function to enter the duration of the output pulse.
User entry	0.5 to 2 000 ms
Additional information	For a detailed description and example: Pulse width parameter (→ 151)

Phase shift



Navigation	Expert → Output → Double pulse out → Phase shift (0992)
Description	Use this function to select the degree of phase shift.

* Visibility depends on order options or device settings

Selection

- 90°
- 180°

Additional information*Selection*

- 90°
Phase shift by a quarter period.
- 180°
Phase shift by a half period, which is equivalent to a phase reversal.

Measuring mode**Navigation**

  Expert → Output → Double pulse out → Measuring mode (0984)

Description

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

Selection

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

Additional information*Selection*

- Forward flow
Positive flow is output, negative flow is not output.
- Forward/Reverse flow
Positive and negative flow are output (absolute value), but a distinction is not made between positive and negative flow.
- Reverse flow
Negative flow is output, positive flow is not output.
- Reverse flow compensation
The flow components outside the span are buffered, balanced and output after a maximum delay of 60 s.

 For a detailed description of the options available, see the **Measuring mode** parameter (→  140)

Examples

 For a detailed description of the configuration examples, see the **Measuring mode** parameter (→  140)

Failure mode**Navigation**

  Expert → Output → Double pulse out → Failure mode (0985)

Description

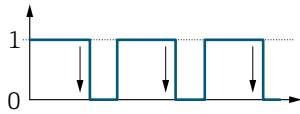
Use this function to select the failure mode of the double pulse output in the event of a device alarm.

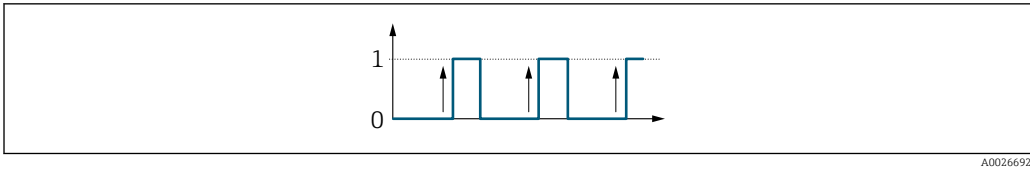
Selection

- Actual value
- No pulses

Additional information	<i>Description</i> The dictates of safety render it advisable to ensure that the double pulse output shows a predefined behavior in the event of a device alarm. <i>Options</i> ■ Actual value In the event of a device alarm, the double pulse output continues on the basis of the current flow measurement. The fault is ignored. ■ No pulses In the case of the double pulse output, if a device alarm occurs one pulse output is stopped and the other pulse output runs at the maximum pulse frequency. NOTICE! A device alarm indicates a serious fault with the measuring device. The measurement quality may possibly be influenced and may no longer be guaranteed. The Actual value option is only recommended if it is ensured that all possible alarm conditions do not influence the measurement quality.
-------------------------------	---

Pulse output	
Navigation	Expert → Output → Double pulse out → Pulse output (0987)
Description	Displays the pulse frequency of the double pulse output which is currently output.
User interface	Positive floating-point number
Additional information	For a detailed description and example: Pulse output parameter (→ 70)

Invert output signal		
Navigation	Expert → Output → Double pulse out → Invert outp.sig. (0993)	
Description	Use this function to select whether to invert the output signal.	
Selection	■ No ■ Yes	
Additional information	<i>Selection</i> No option (passive - negative)  Yes option (passive - positive)	



3.6 "Communication" submenu

Navigation  Expert → Communication

► Communication	
► Modbus configuration	→  180
► Modbus information	→  183
► Modbus data map	→  184
► Web server	→  195
► WLAN settings	→  185

3.6.1 "Modbus configuration" submenu

Navigation  Expert → Communication → Modbus config.

► Modbus configuration	
Bus address (7112)	
Baudrate (7111)	
Data transfer mode (7115)	
Parity (7122)	
Byte order (7113)	→  181
Telegram delay (7146)	
Failure mode (7116)	→  182
Bus termination (7155)	
Fieldbus writing access (7156)	→  182

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

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

Selection

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

Additional information*Description*

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

Changing the byte sequence in the host system often requires a extensive knowledge and significant programming efforts. Endress+Hauser introduced the **Byte order** parameter (→  181) for this reason.

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

Byte transmission sequence

Byte addressing, i.e. the transmission sequence of the bytes, is not specified in the Modbus specification. For this reason, it is important to coordinate or match the addressing method between the master and slave during commissioning. This can be configured in the measuring device using the **Byte order** parameter (→  181).

The bytes are transmitted depending on the selection in the **Byte order** parameter (→  181):

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

INTEGER		
	Sequence	
Options	1.	2.
1 - 0 - 3 - 2 *	Byte 1 (MSB)	Byte 0 (LSB)
3 - 2 - 1 - 0		

0 - 1 - 2 - 3 2 - 3 - 0 - 1	Byte 0 (LSB)	Byte 1 (MSB)
* = factory setting, MSB = most significant byte, LSB = least significant byte		

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

Failure mode

Navigation	  Expert → Communication → Modbus config. → Failure mode (7116)
Description	Use this function to select the measured value output in the event of a diagnostic message via Modbus communication.
Selection	■ NaN value ■ Last valid value
Additional information	<i>Options</i> ■ NaN value The device outputs the NaN value ⁷⁾. ■ Last valid value The device outputs the last valid measured value before the fault occurred.  This effect of this parameter depends on the option selected in the Assign diagnostic behavior parameter.

Fieldbus writing access

Navigation	  Expert → Communication → Modbus config. → Fieldb.writ.acc. (7156)
Description	Use this function to restrict access to the measuring device via fieldbus (Modbus protocol).
Selection	■ Read + write ■ Read only

7) Not a Number

Additional information

Description

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

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

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

3.6.2 "Modbus information" submenu

Navigation  Expert → Communication → Modbus info

► Modbus information

Device ID (7153)

→  183

Device revision (7154)

→  183

Device ID

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

Description Displays the device ID for identifying the measuring device.

User interface 4-digit hexadecimal number

Device revision

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

Description Displays the device revision.

User interface 4-digit hexadecimal number

3.6.3 "Modbus data map" submenu

Navigation  Expert → Communication → Modbus data map

► Modbus data map

Scan list register 0 to 15 (7114)

→  184

Scan list register 0 to 15



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

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

User entry 1 to 65 535

Factory setting

Additional information To read out the current values of the device parameters defined in the scan list register, the Modbus client accesses the data area of the Modbus data map.

Client access to data area	Via register addresses 5051-5081
----------------------------	----------------------------------

Data area					
Device parameter value	Modbus register	I/O data	Delivery status of registers 5001-5016	Data type*	Access**
Value of scan list register 0	5051	Mass flow	2007	Integer/Real	Read/write
Value of scan list register 1	5053	Volume flow	2009	Integer/Real	Read/write
Value of scan list register 2	5055	Corrected volume flow	2011	Integer/Real	Read/write
Value of scan list register 3	5057	Density	2013	Integer/Real	Read/write
Value of scan list register 4	5059	Reference density	2015	Integer/Real	Read/write
Value of scan list register 5	5061	Temperature	2017	Integer/Real	Read/write
Value of scan list register 6	5063	Totalizer 1	2610	Integer/Real	Read/write
Value of scan list register 7	5065	Totalizer 2	2810	Integer/Real	Read/write
* Data type depends on the device parameters entered in the scan list. ** Data access depends on the device parameters entered in the scan list. If the device parameter entered supports read and write access, the parameter can also be accessed via the data area.					

Data area					
Device parameter value	Modbus register	I/O data	Delivery status of registers 5001-5016	Data type*	Access**
Value of scan list register 8	5067	Totalizer 3	3010	Integer/Real	Read/write
Value of scan list register 9	5069	Actual diagnostics (no.)	6859	Integer/Real	Read/write
Value of scan list register 10	5071	Tot1 Control	2608	Integer/Real	Read/write
Value of scan list register 11	5073	Tot2 Control	2808	Integer/Real	Read/write
Value of scan list register 12	5075	Tot3 Control	3008	Integer/Real	Read/write
Value of scan list register 13	5077	-	-	Integer/Real	Read/write
Value of scan list register 14	5079	-	-	Integer/Real	Read/write
Value of scan list register 15	5081	-	-	Integer/Real	Read/write
* Data type depends on the device parameters entered in the scan list. ** Data access depends on the device parameters entered in the scan list. If the device parameter entered supports read and write access, the parameter can also be accessed via the data area.					

3.6.4 "WLAN settings" wizard

Navigation  Expert → Communication → WLAN settings

► WLAN settings

WLAN (2702)

→  186

WLAN mode (2717)

→  186

SSID name (2714)

→  187

Network security (2705)

→  187

Security identification (2718)

→  187

User name (2715)

→  188

WLAN password (2716)

→  188

WLAN IP address (2711)

→  188

WLAN MAC address (2703)

→  188

WLAN subnet mask (2709)	→ ⓘ 189
WLAN MAC address (2703)	→ ⓘ 188
WLAN passphrase (2706)	→ ⓘ 189
WLAN MAC address (2703)	→ ⓘ 188
Assign SSID name (2708)	→ ⓘ 189
SSID name (2707)	→ ⓘ 190
2.4 GHz WLAN channel (2704)	→ ⓘ 190
Select antenna (2713)	→ ⓘ 190
Connection state (2722)	→ ⓘ 190
Received signal strength (2721)	→ ⓘ 191
WLAN IP address (2711)	→ ⓘ 188
Gateway IP address (2719)	→ ⓘ 191
IP address domain name server (2720)	→ ⓘ 191

WLAN

🔒

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

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

- Selection**
- Disable
 - Enable

WLAN mode

🔒

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

Description Use this function to select the WLAN mode.

- Selection**
- WLAN access point
 - WLAN Client

SSID name



Navigation	Expert → Communication → WLAN settings → SSID name (2714)
Prerequisite	The client is activated.
Description	Use this function to enter the user-defined SSID name (max. 32 characters) of the WLAN network.
User entry	–
Factory setting	–

Network security



Navigation	Expert → Communication → WLAN settings → Network security (2705)
Description	Use this function to select the type of security for the WLAN interface.
Selection	■ Unsecured ■ WPA2-PSK ■ EAP-PEAP with MSCHAPv2 * ■ EAP-PEAP MSCHAPv2 no server authentic. * ■ EAP-TLS *
Additional information	<i>Selection</i> ■ Unsecured Access the WLAN connection without identification. ■ WPA2-PSK Access the WLAN connection with a network key. ■ EAP-PEAP with MSCHAPv2 Access the WLAN connection with a password-based authentication protocol. ■ EAP-PEAP MSCHAPv2 no server authentic. Access the WLAN connection with a password-based protocol without server authentication. ■ EAP-TLS Access the WLAN connection with a certificate-based, two-way authentication of the client and network.

Security identification

Navigation	Expert → Communication → WLAN settings → Sec. identific. (2718)
Description	Use this function to select the security settings (download via the menu: Data Management > Security > Download WLAN).

* Visibility depends on order options or device settings

User interface	■ Trusted issuer certificate ■ Device certificate ■ Device private key
-----------------------	--

User name	
------------------	---

Navigation	  Expert → Communication → WLAN settings → User name (2715)
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Description	Use this function to enter the username of the WLAN network.
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User entry	–
-------------------	---

Factory setting	–
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WLAN password	
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Navigation	  Expert → Communication → WLAN settings → WLAN password (2716)
-------------------	---

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

User entry	–
-------------------	---

Factory setting	–
------------------------	---

WLAN IP address	
------------------------	---

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

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

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

WLAN MAC address	
-------------------------	--

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

Description	Displays the MAC ⁸⁾ address of the measuring device.
--------------------	---

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

Factory setting	Each measuring device is given an individual address.
------------------------	---

8) Media Access Control

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

WLAN subnet mask

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

Description Use this function to enter the subnet mask.

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

WLAN passphrase

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

Prerequisite The **WPA2-PSK** option is selected in the **Security type** parameter (→  187).

Description Use this function to enter the network key.

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

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

Assign SSID name

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

Description Use this function to select which name is used for the SSID ⁹⁾.

Selection

- Device tag
- User-defined

Additional information *Selection*

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

9) Service Set Identifier

SSID name

Navigation	  Expert → Communication → WLAN settings → SSID name (2707)
Prerequisite	■ The User-defined option is selected in the Assign SSID name parameter (→  189). ■ The WLAN access point option is selected in the WLAN mode parameter (→  186).
Description	Use this function to enter a user-defined SSID name.
User entry	Max. 32-digit character string comprising numbers, letters and special characters
Factory setting	EH_device designation_last 7 digits of the serial number (e.g. EH_Cubemass_500_A802000)

2.4 GHz WLAN channel

Navigation	  Expert → Communication → WLAN settings → WLAN channel (2704)
Description	Use this function to enter the 2.4 GHz WLAN channel.
User entry	1 to 11
Additional information	<i>Description</i>  ■ It is only necessary to enter a 2.4 GHz WLAN channel if multiple WLAN devices are in use. ■ If just one measuring device is in use, it is recommended to keep the factory setting.

Select antenna

Navigation	  Expert → Communication → WLAN settings → Select antenna (2713)
Description	Use this function to select whether the external or internal antenna is used for reception.
Selection	■ External antenna ■ Internal antenna

Connection state

Navigation	 Expert → Communication → WLAN settings → Connection state (2722)
Description	The connection status is displayed.
User interface	■ Connected ■ Not connected

Received signal strength

Navigation	 Expert → Communication → WLAN settings → Rec.sig.strength (2721)
Description	Displays the signal strength received.
User interface	■ Low ■ Medium ■ High

Gateway IP address

Navigation	 Expert → Communication → WLAN settings → Gateway IP addr. (2719)
Description	Use this function to enter the IP address of the gateway.
User interface	Character string comprising numbers, letters and special characters

IP address domain name server

Navigation	 Expert → Communication → WLAN settings → IP address DNS (2720)
Description	Use this function to enter the IP address of the domain name server.
User interface	Character string comprising numbers, letters and special characters

3.6.5 "APL port" submenu

Navigation  Setup → Communication → APL port

▶ APL port

IP address

Subnet mask

Default gateway

MAC address

DHCP client

→  192

→  192

→  192

→  192

→  192

IP address		
Navigation	 Setup → Communication → APL port → IP address (7263)	
Description	Enter the IP address of the measuring device.	
User entry	Character string comprising numbers, letters and special characters (15)	
Subnet mask		
Navigation	 Setup → Communication → APL port → Subnet mask (7265)	
Description	Enter subnet mask of the measuring device.	
User entry	Character string comprising numbers, letters and special characters (15)	
Default gateway		
Navigation	 Setup → Communication → APL port → Default gateway (7264)	
Description	Enter IP address for the default gateway of the measuring device.	
User entry	Character string comprising numbers, letters and special characters (15)	
MAC address		
Navigation	 Setup → Communication → APL port → MAC Address (7262)	
Description	Shows the MAC address of the measuring device.	
User interface	Character string comprising numbers, letters and special characters	
DHCP client		
Navigation	 Setup → Communication → APL port → DHCP client	
Description	Switch the DHCP client functionality on and of.	
Selection	■ Off ■ On	

3.6.6 "Service interface" submenu

Navigation   Setup → Communication → ServiceInterface

► Service interface		
IP address	→ 	193
Subnet mask	→ 	193
Default gateway	→ 	193
MAC address	→ 	194
DHCP client	→ 	194
Duplex speed negotiation	→ 	194
Interface speed	→ 	195
Duplex status	→ 	195

IP address

Navigation	  Expert → Communication → Web server → IP address (7209)
Description	Display or enter the IP address of the web server integrated in the measuring instrument.
User entry	4 octet: 0 to 255 (in the particular octet)

Subnet mask

Navigation	  Expert → Communication → Web server → Subnet mask (7211)
Description	Display or enter the subnet mask.
User entry	4 octet: 0 to 255 (in the particular octet)

Default gateway

Navigation	  Expert → Communication → Web server → Default gateway (7210)
Description	Display or enter the Default gateway (→  193).

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

MAC address

Navigation  [Expert](#) → [Communication](#) → [Web server](#) → [MAC Address \(7214\)](#)

Description Displays the MAC ¹⁰⁾ address of the measuring instrument.

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

Factory setting Each measuring instrument is given an individual address.

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

DHCP client



Navigation  [Expert](#) → [Communication](#) → [Web server](#) → [DHCP client \(7212\)](#)

Description Switch the DHCP client functionality on and of.

Selection

- Off
- On

Duplex speed negotiation



Navigation  [Setup](#) → [Communication](#) → [ServiceInterface](#) → [DuplexSpeedNegot](#)

Description Select the duplex mode and transmission speed for the connected devices. When changing the setting, the new setting is applied after a device restart.

Selection

- Auto
- 10 Mbit/s full duplex
- 10 Mbit/s half duplex
- 100 Mbit/s full duplex
- 100 Mbit/s half duplex

Additional information *Selection*
"Auto" option
The duplex mode and speed are auto-negotiated based on the highest-performance transmission mode the two connected devices both support.

¹⁰⁾ Media Access Control

Interface speed	
Navigation	  Setup → Communication → ServiceInterface → Interface speed
User interface	Positive integer
Factory setting	100 Mbit/s

Duplex status	
---------------	--

Navigation	  Setup → Communication → ServiceInterface → Duplex status
User interface	■ Full duplex ■ Half duplex ■ Unknown

3.6.7 "Web server" submenu

Navigation   Expert → Communication → Web server

Web server	
Web server language	→  196
MAC address	
DHCP client	
IP address	→  196
Subnet mask	→  196
Default gateway	→  197
Web server functionality	→  197
Login page	→  197

Web server language

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

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

Selection

- English
- Deutsch
- Français
- Español
- Italiano
- Nederlands
- Portuguesa
- Polski
- русский язык (Russian)
- Svenska
- Türkçe
- 中文 (Chinese)
- 日本語 (Japanese)
- 한국어 (Korean)
- العربية (Arabic) *
- Bahasa Indonesia
- ภาษาไทย (Thai) *
- tiếng Việt (Vietnamese)
- čeština (Czech)

IP address

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

Description Display or enter the IP address of the web server integrated in the measuring instrument.

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

Subnet mask

Navigation  Expert → Communication → Web server → Subnet mask (7211)

Description Display or enter the subnet mask.

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

* Visibility depends on order options or device settings

Default gateway



- Navigation**  Expert → Communication → Web server → Default gateway (7210)
- Description** Display or enter the Default gateway (→  193).
- User entry** 4 octet: 0 to 255 (in the particular octet)

Web server functionality



- Navigation**  Expert → Communication → Web server → Webserver funct. (7222)
- Description** Use this function to switch the Web server on and off.
- Selection**
- Off
 - HTML Off
 - On
- Additional information** *Description*
-  Once disabled, the Web server functionality can only be enabled again via the local display, the FieldCare operating tool or the DeviceCare operating tool.

Selection

Option	Description
Off	■ The Web server is completely disabled. ■ Port 80 is locked.
HTML Off	The HTML version of the Web server is not available.
On	■ The complete Web server functionality is available. ■ JavaScript is used. ■ The password is transferred in an encrypted state. ■ Any change to the password is also transferred in an encrypted state.

Login page



- Navigation**  Expert → Communication → Web server → Login page (7273)
- Description** Use this function to select the format of the login page.
- Selection**
- Without header
 - With header

3.7 "Application" submenu

Navigation  Expert → Application

▶ Application

Reset all totalizers (2806) →  198

▶ Totalizer →  66

▶ Concentration

▶ Petroleum

▶ Application specific calculations

▶ Medium index

Reset all totalizers

Navigation

 Expert → Application → Reset all tot. (2806)

Description

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

Selection

■ Cancel

■ Reset + totalize

Additional information

Selection

Options	Description
Cancel	No action is executed and the user exits the parameter.
Reset + totalize	Resets all totalizers to 0 and restarts the totaling process. This deletes all the previously aggregated flow values.

3.7.1 "Application specific calculations" submenu

 Only available if "Application-specific calculations" has been ordered.

Navigation  Expert → Application → Appl.spec. calc.

► Application specific calculations

► Application-specific parameters

→  199

► Process variables

→  201

"Application-specific parameters" submenu

 Only available if "Application-specific calculations" has been ordered.

Navigation  Expert → Application → Appl.spec. calc. → Appl.spec.param.

► Application-specific parameters

Parameter 0 (6358)

→  199

Parameter 1 (6359)

→  200

Parameter 2 (6360)

→  200

Parameter 3 (6361)

→  200

Parameter 4 (6345)

→  200

Parameter 5 (6346)

→  200

Parameter 6 (6347)

→  201

Parameter 7 (6348)

→  201

Parameter 8 (6349)

→  201

Parameter 9 (6350)

→  201

Parameter 0

Navigation  Expert → Application → Appl.spec. calc. → Appl.spec.param. → Parameter 0 (6358)

Description Enter application specific value 0 for application specific calculation.

User entry Signed floating-point number

Parameter 1		
Navigation	  Expert → Application → Appl.spec. calc. → Appl.spec.param. → Parameter 1 (6359)	
Description	Enter application specific value 1 for application specific calculation.	
User entry	Signed floating-point number	
Parameter 2		
Navigation	  Expert → Application → Appl.spec. calc. → Appl.spec.param. → Parameter 2 (6360)	
Description	Enter application specific value 2 for application specific calculation.	
User entry	Signed floating-point number	
Parameter 3		
Navigation	  Expert → Application → Appl.spec. calc. → Appl.spec.param. → Parameter 3 (6361)	
Description	Enter application specific value 3 for application specific calculation.	
User entry	Signed floating-point number	
Parameter 4		
Navigation	  Expert → Application → Appl.spec. calc. → Appl.spec.param. → Parameter 4 (6345)	
Description	Enter application specific value 4 for application specific calculation.	
User entry	Signed floating-point number	
Parameter 5		
Navigation	  Expert → Application → Appl.spec. calc. → Appl.spec.param. → Parameter 5 (6346)	
Description	Enter application specific value 5 for application specific calculation.	
User entry	Signed floating-point number	

Parameter 6		
Navigation	  Expert → Application → Appl.spec. calc. → Appl.spec.param. → Parameter 6 (6347)	
Description	Enter application specific value 6 for application specific calculation.	
User entry	Signed floating-point number	
Parameter 7		
Navigation	  Expert → Application → Appl.spec. calc. → Appl.spec.param. → Parameter 7 (6348)	
Description	Enter application specific value 7 for application specific calculation.	
User entry	Signed floating-point number	
Parameter 8		
Navigation	  Expert → Application → Appl.spec. calc. → Appl.spec.param. → Parameter 8 (6349)	
Description	Enter application specific value 8 for application specific calculation.	
User entry	Signed floating-point number	
Parameter 9		
Navigation	  Expert → Application → Appl.spec. calc. → Appl.spec.param. → Parameter 9 (6350)	
Description	Enter application specific value 9 for application specific calculation.	
User entry	Signed floating-point number	

"Process variables" submenu

Only available if "Application-specific calculations" has been ordered.

Navigation  Expert → Application → Appl.spec. calc. → Process variab.

► Process variables

Application specific input 0 (6366)

→  202

Application specific input 1 (6367)

→  203

Application specific output 0 (6364)

→  203

Application specific output 1 (6365)

→  203

Application specific input 0

Navigation	 Expert → Application → Appl.spec. calc. → Process variab. → Spec. input 0 (6366)
Description	Shows the application specific input value 0 used for the application specific calculation.
User interface	Signed floating-point number

Fail-safe type application specific 0

Navigation	 Expert → Application → Appl.spec. calc. → Process variab. → FSTypeAppSpec 0 (2098)
Description	Use this function to select the failsafe mode for the application-specific input value 0.
Selection	■ Fail-safe value ■ Fallback value ■ Off

Fail-safe value application specific 0



Navigation	 Expert → Application → Appl.spec. calc. → Process variab. → FSValueAppSpec 0 (2099)
Description	Use this function to enter the failsafe value for the application-specific input value 0.
User entry	Signed floating-point number

Application specific input 1

Navigation	  Expert → Application → Appl.spec. calc. → Process variab. → Spec. input 1 (6367)
Description	Shows the application specific input value 1 used for the application specific calculation.
User interface	Signed floating-point number

Fail-safe type application specific 1

Navigation	  Expert → Application → Appl.spec. calc. → Process variab. → FSTypeAppSpec 1 (2100)
Description	Use this function to select the failsafe mode for the application-specific input value 1.
Selection	■ Fail-safe value ■ Fallback value ■ Off

Fail-safe value application specific 1



Navigation	  Expert → Application → Appl.spec. calc. → Process variab. → FSValueAppSpec 1 (65535)
Description	Use this function to enter the failsafe value for the application-specific input value 1.
User entry	Signed floating-point number

Application specific output 0

Navigation	  Expert → Application → Appl.spec. calc. → Process variab. → Spec. output 0 (6364)
Description	Shows the calculated application specific output value 0.
User interface	Signed floating-point number

Application specific output 1

Navigation	  Expert → Application → Appl.spec. calc. → Process variab. → Spec. output 1 (6365)
Description	Shows the calculated specific output value 1.

User interface

Signed floating-point number

3.7.2 "Medium index" submenu

The following additional parameters and settings are part of the Gas Fraction Handler function. Due to its use of two operating frequencies (MFT - Multi-Frequency-Technology), Promass Q can provide additional diagnostic information about entrained gas that is suspended in the process liquid and the measured density is > 400 kg/m³. The gas typically occurs in viscous liquids in the form of microbubbles or small bubbles.

Navigation

 Expert → Application → Medium index

► Medium index

Index inhomogeneous medium (6368)

→  204

Cut off inhomogeneous wet gas (6375)

→  205

Cut off inhomogeneous liquid (6374)

→  205

Index suspended bubbles (6376)

→  205

Cut off suspended bubbles (6370)

→  206

Index inhomogeneous medium

Navigation

 Expert → Application → Medium index → Index inh.medium (6368)

Description

Shows the degree of inhomogeneity of the medium.

User interface

Signed floating-point number

- Additional information
- The 'Index inhomogeneous medium' diagnostic indicates the overall scale of two-phase flow associated with free bubbles.
 - If the liquid does not contain entrained gas, the value is 0. For very high levels of gas content (e.g. associated with slug flow), the value is over 10.
 - The diagnostic index generally increases with an increasing gas volume content. The index will not saturate with an excessive second phase.
 - Although the index shows a qualitative correlation to the severity of gas entrainment, it should not be understood on a one-to-one basis as the gas volume content.
 - The 'Index inhomogeneous medium' is reproducible under the same entrained gas conditions and can help to better understand the process conditions and the level of gas entrainment in relative terms.
 - Similarly, the diagnostic index can also be used to describe the relative share of solids in a liquid application or the relative share of a liquid phase in a wet gas application.

Cut off inhomogeneous wet gas		
Navigation	  Expert → Application → Medium index → Cut off inh. gas (6375)	
Description	Enter cut off value for wet gas applications. Below this value the Index inhomogeneous medium is set to 0.	
User entry	Positive floating-point number	
Additional information	This parameter is used for wet gas applications. If the 'Index inhomogeneous medium' drops below this value and the measured density is $< 400 \text{ kg/m}^3$, the 'Index inhomogeneous medium' is reported as zero.	
Cut off inhomogeneous liquid		
Navigation	  Expert → Application → Medium index → Cut off liquid (6374)	
Description	Enter cut off value for liquid applications. Below this value the Index inhomogeneous medium is set to 0.	
User entry	Positive floating-point number	
Additional information	This parameter is used for entrained gas in liquid applications or for solids in liquid applications. If the 'Index inhomogeneous medium' drops below this value and the measured density is $< 400 \text{ kg/m}^3$, the 'Index inhomogeneous medium' is reported as zero.	
Index suspended bubbles		
Navigation	  Expert → Application → Medium index → Index sus.bubble (6376)	
Prerequisite	The diagnostic index is only available for Promass Q.	
Description	Shows the relative amount of suspended bubbles in the medium.	
User interface	Signed floating-point number	
Additional information	■ This diagnostic index value describes the relative amount of microbubbles or small suspended bubbles in a process medium. ■ If there is no entrained gas in the form of suspended bubbles in a liquid, the value is 0 or nearly 0, and for very high levels of suspended gas the value exceeds 10. ■ The diagnostic index generally increases with increasing gas volumes, but the scaling is not linear in relation to the percentage gas content. ■ The index will not saturate with an excessive second phase. ■ The 'Index inh. medium' can help to better understand the process conditions and the level of gas entrainment in relative terms, but the index values cannot be interpreted on an absolute basis.	

Cut off suspended bubbles	
Navigation	 Expert → Application → Medium index → Cut off bubbles (6370)
Prerequisite	The parameter is only available for Promass Q.
Description	Enter the cut off value for suspended bubbles. Below this value the 'Index for suspended bubbles' is set to 0.
User entry	Positive floating-point number
Additional information	This parameter is used for gas entrained in liquid applications in the form of suspended bubbles. If the 'Index inhomogeneous medium' drops below this value, the 'Index inhomogeneous medium' is reported as zero.

3.8 "Diagnostics" submenu

Navigation  Expert → Diagnostics

► Diagnostics	
Actual diagnostics (0691)	→  207
Previous diagnostics (0690)	→  208
Operating time from restart (0653)	→  208
Operating time (0652)	→  209
► Diagnostic list	→  209
► Event logbook	→  211
► Custody transfer logbook	
► Device information	→  212
► Main electronic module + I/O module 1	→  215
► Sensor electronic module (ISEM)	→  216
► I/O module 2	→  217
► I/O module 3	→  219
► I/O module 4	→  220

► Display module	→ ⓘ 221
► Data logging	→ ⓘ 222
► Min/max values	→ ⓘ 231
► Heartbeat Technology	→ ⓘ 243
► Simulation	→ ⓘ 253

Actual diagnostics

Navigation	ⓘ ⓘ Expert → Diagnostics → Actual diagnos. (0691)
Prerequisite	A diagnostic event has occurred.
Description	Displays the current diagnostic message. If two or more messages occur simultaneously, the message with the highest priority is shown on the display.
User interface	Symbol for diagnostic behavior, diagnostic code and short message.
Additional information	<i>Display</i> ⓘ Additional pending diagnostic messages can be viewed in the Diagnostic list submenu (→ ⓘ 209). ⓘ Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the ⓘ key. <i>Example</i> For the display format: ⊗F271 Main electronic failure

Timestamp

Navigation	ⓘ Expert → Diagnostics → Timestamp
Description	Displays the operating time when the current diagnostic message occurred.
User interface	Days (d), hours (h), minutes (m) and seconds (s)
Additional information	<i>Display</i> ⓘ The diagnostic message can be viewed via the Actual diagnostics parameter (→ ⓘ 207). <i>Example</i> For the display format: 24d12h13m00s

Previous diagnostics

Navigation	 Expert → Diagnostics → Prev.diagnostics (0690)
Prerequisite	Two diagnostic events have already occurred.
Description	Displays the diagnostic message that occurred before the current message.
User interface	Symbol for diagnostic behavior, diagnostic code and short message.
Additional information	<i>Display</i>  Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the  key. <i>Example</i> For the display format: ⊗F271 Main electronic failure

Timestamp

Navigation	 Expert → Diagnostics → Timestamp
Description	Displays the operating time when the last diagnostic message before the current message occurred.
User interface	Days (d), hours (h), minutes (m) and seconds (s)
Additional information	<i>Display</i>  The diagnostic message can be viewed via the Previous diagnostics parameter (→  208). <i>Example</i> For the display format: 24d12h13m00s

Operating time from restart

Navigation	 Expert → Diagnostics → Time fr. restart (0653)
Description	Use this function to display the time the device has been in operation since the last device restart.
User interface	Days (d), hours (h), minutes (m) and seconds (s)

Operating time	
Navigation	 Expert → Diagnostics → Operating time (0652)
Description	Displays the length of time the device has been in operation.
User interface	Days (d), hours (h), minutes (m) and seconds (s)
Additional information	<i>Indication</i>
	Maximum number of days: 9 999 (corresponds to approx. 27 years and 5 months)

3.8.1 "Diagnostic list" submenu

Navigation  Expert → Diagnostics → Diagnostic list

► Diagnostic list

Diagnostics 1 (0692)

Diagnostics 2 (0693)

Diagnostics 3 (0694)

Diagnostics 4 (0695)

Diagnostics 5 (0696)

→  209

→  210

→  210

→  210

→  211

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	<i>Display</i>
	 Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the  key.
	<i>Examples</i> For the display format: ■  F271 Main electronic failure ■  F276 I/O module failure

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	<i>Display</i>  Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the  key. <i>Examples</i> For the display format: ■  F271 Main electronic failure ■  F276 I/O module failure

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	<i>Display</i>  Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the  key. <i>Examples</i> For the display format: ■  F271 Main electronic failure ■  F276 I/O module failure

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.

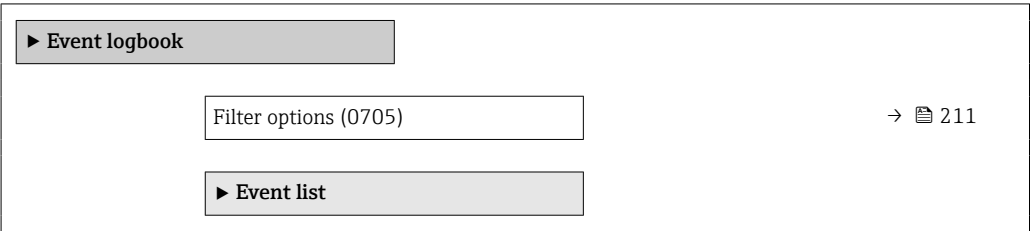
Additional information	<i>Display</i>  Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the  key. <i>Examples</i> For the display format: ■  F271 Main electronic failure ■  F276 I/O module failure
-------------------------------	---

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	<i>Display</i>  Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the  key. <i>Examples</i> For the display format: ■  F271 Main electronic failure ■  F276 I/O module failure

3.8.2 "Event logbook" submenu

Navigation  Expert → Diagnostics → Event logbook



Filter options

Navigation	 Expert → Diagnostics → Event logbook → Filter options (0705)
Description	Use this function to select the category whose event messages are displayed in the event list of the local display.

Selection

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

Additional information

Description

 The status signals are categorized in accordance with VDI/VDE 2650 and NAMUR Recommendation NE 107:

- F = Failure
- C = Function Check
- S = Out of Specification
- M = Maintenance Required

3.8.3 "Device information" submenu

Navigation

 Expert → Diagnostics → Device info

► Device information

Device tag

Serial number

Firmware version

Device name

Order code

Extended order code 1

Extended order code 2

Extended order code 3

ENP version

→  212

→  213

→  213

→  214

→  214

→  214

→  215

→  215

→  215

Device tag

Navigation

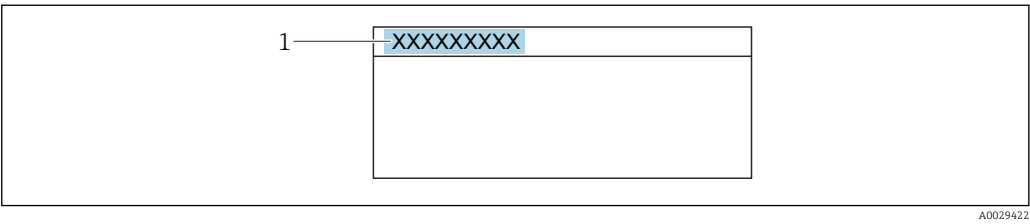
 Expert → Diagnostics → Device info → Device tag (0011)

Description

Displays a unique name for the measuring point so it can be identified quickly within the plant. It is displayed in the header.

User interface Character string comprising numbers, letters and special characters

Additional information *User interface*



1 Position of the header text on the display

A0029422

The number of characters displayed depends on the characters used.

Serial number

Navigation Expert → Diagnostics → Device info → Serial number (0009)

Description Displays the serial number of the measuring device.
 The number can be found on the nameplate of the sensor and transmitter.

User interface Max. 11-digit character string comprising letters and numbers.

Additional information *Description*
 Uses of the serial number

- To identify the measuring device quickly, e.g. when contacting Endress+Hauser.
- To obtain specific information on the measuring device using the Device Viewer:
www.endress.com/deviceviewer

Firmware version

Navigation Expert → Diagnostics → Device info → Firmware version (0010)

Description Displays the device firmware version installed.

User interface Character string in the format xx.yy.zz

Additional information *Display*
 The Firmware version is also located:

- On the title page of the Operating instructions
- On the transmitter nameplate

Device name	
Navigation	 Expert → Diagnostics → Device info → Device name (0020)
Description	Displays the name of the transmitter. It can also be found on the nameplate of the transmitter.
User interface	Cubemass 300/500
Order code	
Navigation	 Expert → Diagnostics → Device info → Order code (0008)
Description	Displays the device order code
User interface	Character string composed of letters, numbers and certain punctuation marks (e.g. /).
Additional information	<i>Description</i>  The order code can be found on the nameplate of the sensor and transmitter in the "Order code" field. The order code is generated from the extended order code through a process of reversible transformation. The extended order code indicates the attributes for all the device features in the product structure. The device features are not directly readable from the order code.  Uses of the order code ■ To order an identical spare device. ■ To identify the device quickly and easily, e.g. when contacting Endress+Hauser.
Extended order code 1	
Navigation	 Expert → Diagnostics → Device info → Ext. order cd. 1 (0023)
Description	Displays the first part of the extended order code On account of length restrictions, the extended order code is split into a maximum of 3 parameters.
User interface	Character string
Additional information	<i>Description</i> The extended order code indicates the version of all the features of the product structure for the measuring device and thus uniquely identifies the measuring device.  The extended order code can also be found on the nameplate of the sensor and transmitter in the "Ext. ord. cd." field.

Extended order code 2		
Navigation	 Expert → Diagnostics → Device info → Ext. order cd. 2 (0021)	
Description	Displays the second part of the extended order code.	
User interface	Character string	
Additional information	For additional information, see Extended order code 1 parameter (→  214)	
Extended order code 3		
Navigation	 Expert → Diagnostics → Device info → Ext. order cd. 3 (0022)	
Description	Displays the third part of the extended order code.	
User interface	Character string	
Additional information	For additional information, see Extended order code 1 parameter (→  214)	
ENP version		
Navigation	 Expert → Diagnostics → Device info → ENP version (0012)	
Description	Displays the version of the electronic nameplate.	
User interface	Character string	
Additional information	<i>Description</i> This electronic nameplate stores a data record for device identification that includes more data than the nameplates attached to the outside of the device.	

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

Navigation  Expert → Diagnostics 1 → Main elec.+I/O1

► Main electronic module + I/O module 1

Software revision (0072)

→  216

Build no. software (0079)	→ 216
Bootloader revision (0073)	→ 216

Software revision

Navigation	Expert → Diagnostics → Main elec.+I/O1 → Software rev. (0072)
Description	Use this function to display the software revision of the module.
User interface	Positive integer

Build no. software

Navigation	Expert → Diagnostics → Main elec.+I/O1 → Build no. softw. (0079)
Description	Use this function to display the software build number of the module.
User interface	Positive integer

Bootloader revision

Navigation	Expert → Diagnostics → Main elec.+I/O1 → Bootloader rev. (0073)
Description	Use this function to display the bootloader revision of the software.
User interface	Positive integer

3.8.5 "Sensor electronic module (ISEM)" submenu

Navigation Expert → Diagnostics → Sens. electronic

► Sensor electronic module (ISEM)	
Software revision (0072)	→  217
Build no. software (0079)	→  217
Bootloader revision (0073)	→  217

Software revision

Navigation	 Expert → Diagnostics → Sens. electronic → Software rev. (0072)
Description	Use this function to display the software revision of the module.
User interface	Positive integer

Build no. software

Navigation	 Expert → Diagnostics → Sens. electronic → Build no. softw. (0079)
Description	Use this function to display the software build number of the module.
User interface	Positive integer

Bootloader revision

Navigation	 Expert → Diagnostics → Sens. electronic → Bootloader rev. (0073)
Description	Use this function to display the bootloader revision of the software.
User interface	Positive integer

3.8.6 "I/O module 2" submenu

Navigation  Expert → Diagnostics → I/O module 2

► I/O module 2		
I/O module 2 terminal numbers (3902-2)	→	 218
Software revision (0072)	→	 218
Build no. software (0079)	→	 218
Bootloader revision (0073)	→	 218

I/O module 2 terminal numbers

Navigation	  Expert → Diagnostics → I/O module 2 → I/O 2 terminals (3902-2)
Description	Displays the terminal numbers used by the I/O module.
User interface	■ Not used ■ 26-27 (I/O 1) ■ 24-25 (I/O 2) ■ 22-23 (I/O 3) ■ 20-21 (I/O 4)

Software revision

Navigation	  Expert → Diagnostics → I/O module 2 → Software rev. (0072)
Description	Use this function to display the software revision of the module.
User interface	Positive integer

Build no. software

Navigation	  Expert → Diagnostics → I/O module 2 → Build no. softw. (0079)
Description	Use this function to display the software build number of the module.
User interface	Positive integer

Bootloader revision

Navigation	  Expert → Diagnostics → I/O module 2 → Bootloader rev. (0073)
Description	Use this function to display the bootloader revision of the software.
User interface	Positive integer

3.8.7 "I/O module 3" submenu

Navigation  Expert → Diagnostics → I/O module 3

► I/O module 3		
I/O module 3 terminal numbers (3902–3)	→ 	219
Software revision (0072)	→ 	219
Build no. software (0079)	→ 	219
Bootloader revision (0073)	→ 	220

I/O module 3 terminal numbers

Navigation	 Expert → Diagnostics → I/O module 3 → I/O 3 terminals (3902–3)
Description	Displays the terminal numbers used by the I/O module.
User interface	■ Not used ■ 26-27 (I/O 1) ■ 24-25 (I/O 2) ■ 22-23 (I/O 3) ■ 20-21 (I/O 4)

Software revision

Navigation	 Expert → Diagnostics → I/O module 3 → Software rev. (0072)
Description	Use this function to display the software revision of the module.
User interface	Positive integer

Build no. software

Navigation	 Expert → Diagnostics → I/O module 3 → Build no. softw. (0079)
Description	Use this function to display the software build number of the module.
User interface	Positive integer

Bootloader revision

Navigation	 Expert → Diagnostics → I/O module 3 → Bootloader rev. (0073)
Description	Use this function to display the bootloader revision of the software.
User interface	Positive integer

3.8.8 "I/O module 4" submenu

Navigation

 Expert → Diagnostics → I/O module 4

► I/O module 4

I/O module 4 terminal numbers
(3902–4)

→  220

Software revision (0072)

→  220

Build no. software (0079)

→  221

Bootloader revision (0073)

→  221

I/O module 4 terminal numbers

Navigation	 Expert → Diagnostics → I/O module 4 → I/O 4 terminals (3902–4)
Description	Displays the terminal numbers used by the I/O module.
User interface	■ Not used ■ 26-27 (I/O 1) ■ 24-25 (I/O 2) ■ 22-23 (I/O 3) ■ 20-21 (I/O 4)

Software revision

Navigation	 Expert → Diagnostics → I/O module 4 → Software rev. (0072)
Description	Use this function to display the software revision of the module.
User interface	Positive integer

Build no. software	
Navigation	  Expert → Diagnostics → I/O module 4 → Build no. softw. (0079)
Description	Use this function to display the software build number of the module.
User interface	Positive integer

Bootloader revision	
Navigation	  Expert → Diagnostics → I/O module 4 → Bootloader rev. (0073)
Description	Use this function to display the bootloader revision of the software.
User interface	Positive integer

3.8.9 "Display module" submenu

Navigation   Expert → Diagnostics → Display module

► Display module

Software revision (0072)

Build no. software (0079)

Bootloader revision (0073)

→  221

→  222

→  222

Software revision	
Navigation	  Expert → Diagnostics → Display module → Software rev. (0072)
Description	Use this function to display the software revision of the module.
User interface	Positive integer

Build no. software

Navigation	 Expert → Diagnostics → Display module → Build no. softw. (0079)
Description	Use this function to display the software build number of the module.
User interface	Positive integer

Bootloader revision

Navigation	 Expert → Diagnostics → Display module → Bootloader rev. (0073)
Description	Use this function to display the bootloader revision of the software.
User interface	Positive integer

3.8.10 "Data logging" submenu

Navigation  Expert → Diagnostics → Data logging

► Data logging		
Assign channel 1 (0851)	→	 223
Assign channel 2 (0852)	→	 224
Assign channel 3 (0853)	→	 225
Assign channel 4 (0854)	→	 225
Logging interval (0856)	→	 225
Clear logging data (0855)	→	 226
Data logging (0860)	→	 226
Logging delay (0859)	→	 227
Data logging control (0857)	→	 227
Data logging status (0858)	→	 227
Entire logging duration (0861)	→	 228

► Display channel 1	→ 228
► Display channel 2	→ 229
► Display channel 3	→ 230
► Display channel 4	→ 230

Assign channel 1



Navigation

Expert → Diagnostics → Data logging → Assign chan. 1 (0851)

Prerequisite

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



The software options currently enabled are displayed in the **Software option overview** parameter (→ 55).

Description

Use this function to assign a process variable to the data logging channel.

Selection

- Off
- Mass flow
- Volume flow
- Corrected volume flow *
- Target mass flow *
- Carrier mass flow *
- Target volume flow *
- Carrier volume flow *
- Target corrected volume flow *
- Carrier corrected volume flow *
- Density
- Reference density *
- Reference density alternative *
- GSV flow *
- GSV flow alternative *
- NSV flow *
- NSV flow alternative *
- S&W volume flow *
- Water cut *
- Oil density *
- Water density *
- Oil mass flow *
- Water mass flow *
- Oil volume flow *
- Water volume flow *
- Oil corrected volume flow *
- Water corrected volume flow *
- Concentration *
- Temperature
- Carrier pipe temperature *
- Electronic temperature
- Oscillation frequency 0

* Visibility depends on order options or device settings

- Frequency fluctuation 0 *
- Oscillation amplitude *
- Frequency fluctuation 0 *
- Oscillation damping 0 *
- Oscillation damping fluctuation 0 *
- Signal asymmetry *
- Exciter current 0 *
- HBSI *
- Current output 1 *
- Current output 2 *
- Current output 3 *
- Current output 4 *
- Pressure
- Application specific output 1 *
- Index inhomogeneous medium
- Application specific output 0 *
- Index suspended bubbles *

Additional information*Description*

A total of 1000 measured values can be logged. This means:

- 1000 data points if 1 logging channel is used
- 500 data points if 2 logging channels are used
- 333 data points if 3 logging channels are used
- 250 data points if 4 logging channels are used

Once the maximum number of data points is reached, the oldest data points in the data log are cyclically overwritten in such a way that the last 1000, 500, 333 or 250 measured values are always in the log (ring memory principle).



The log contents are cleared if the option selected is changed.

Assign channel 2**Navigation**

Expert → Diagnostics → Data logging → Assign chan. 2 (0852)

Prerequisite

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



The software options currently enabled are displayed in the **Software option overview** parameter (→ 55).

Description

Use this function to assign a process variable to the logging channel.

Selection

For the picklist, see **Assign channel 1** parameter (→ 223)

* Visibility depends on order options or device settings

Assign channel 3



Navigation	Expert → Diagnostics → Data logging → Assign chan. 3 (0853)
Prerequisite	The Extended HistoROM application package is available. The software options currently enabled are displayed in the Software option overview parameter (→ 55).
Description	Use this function to assign a process variable to the logging channel.
Selection	For the picklist, see Assign channel 1 parameter (→ 223)

Assign channel 4



Navigation	Expert → Diagnostics → Data logging → Assign chan. 4 (0854)
Prerequisite	The Extended HistoROM application package is available. The software options currently enabled are displayed in the Software option overview parameter (→ 55).
Description	Use this function to assign a process variable to the logging channel.
Selection	For the picklist, see Assign channel 1 parameter (→ 223)

Logging interval



Navigation	Expert → Diagnostics → Data logging → Logging interval (0856)
Prerequisite	The Extended HistoROM application package is available. The software options currently enabled are displayed in the Software option overview parameter (→ 55).
Description	Use this function to enter the logging interval $T_{\log}$ for data logging.
User entry	0.1 to 3 600.0 s
Additional information	<i>Description</i> 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:

- $T_{log} = 1000 \times 1 \text{ s} = 1\,000 \text{ s} \approx 15 \text{ min}$
- $T_{log} = 1000 \times 10 \text{ s} = 10\,000 \text{ s} \approx 3 \text{ h}$
- $T_{log} = 1000 \times 80 \text{ s} = 80\,000 \text{ s} \approx 1 \text{ d}$
- $T_{log} = 1000 \times 3\,600 \text{ s} = 3\,600\,000 \text{ s} \approx 41 \text{ d}$

Clear logging data

Navigation  Expert → Diagnostics → Data logging → Clear logging (0855)

Prerequisite The **Extended HistoROM** application package is available.
 The software options currently enabled are displayed in the **Software option overview** parameter (→  55).

Description Use this function to clear the entire logging data.

- Selection**
- Cancel
 - Clear data

Additional information *Selection*

- Cancel
The data is not cleared. All the data is retained.
- Clear data
The logging data is cleared. The logging process starts from the beginning.

Data logging

Navigation  Expert → Diagnostics → Data logging → Data logging (0860)

Description Use this function to select the data logging method.

- Selection**
- Overwriting
 - Not overwriting

Additional information *Selection*

- Overwriting
The device memory applies the FIFO principle.
- Not overwriting
Data logging is canceled if the measured value memory is full (single shot).

Logging delay



Navigation	 Expert → Diagnostics → Data logging → Logging delay (0859)
Prerequisite	In the Data logging parameter (→  226), the Not overwriting option is selected.
Description	Use this function to enter the time delay for measured value logging.
User entry	0 to 999 h
Additional information	<i>Description</i> Once data logging has been started with the Data logging control parameter (→  227), the device does not save any data for the duration of the delay time entered.

Data logging control



Navigation	 Expert → Diagnostics → Data logging → Data log.control (0857)
Prerequisite	In the Data logging parameter (→  226), the Not overwriting option is selected.
Description	Use this function to start and stop measured value logging.
Selection	■ None ■ Delete + start ■ Stop
Additional information	<i>Selection</i> ■ None Initial measured value logging status. ■ Delete + start All the measured values recorded for all the channels are deleted and measured value logging starts again. ■ Stop Measured value logging is stopped.

Data logging status

Navigation	 Expert → Diagnostics → Data logging → Data log. status (0858)
Prerequisite	In the Data logging parameter (→  226), the Not overwriting option is selected.
Description	Displays the measured value logging status.
User interface	■ Done ■ Delay active ■ Active ■ Stopped

Additional information	Selection ■ Done Measured value logging has been performed and completed successfully. ■ Delay active Measured value logging has been started but the logging interval has not yet elapsed. ■ Active The logging interval has elapsed and measured value logging is active. ■ Stopped Measured value logging is stopped.
------------------------	---

Entire logging duration

Navigation	 Expert → Diagnostics → Data logging → Logging duration (0861)
Prerequisite	In the Data logging parameter (→  226), the Not overwriting option is selected.
Description	Displays the total logging duration.
User interface	Positive floating-point number

"Display channel 1" submenu

Navigation

 Expert → Diagnostics → Data logging → Displ.channel 1

► Display channel 1

Display channel 1 →  228

Display channel 1

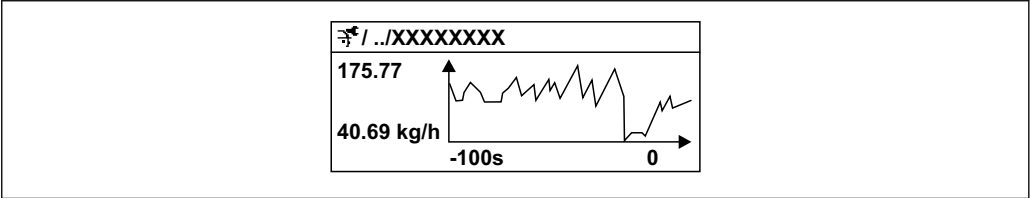
Navigation	 Expert → Diagnostics → Data logging → Displ.channel 1
Prerequisite	The Extended HistoROM application package is available.  The software options currently enabled are displayed in the Software option overview parameter (→  55). One of the following options is selected in the Assign channel 1 parameter (→  223): ■ Mass flow ■ Volume flow ■ Corrected volume flow ■ Target mass flow * ■ Carrier mass flow * ■ Density

* Visibility depends on order options or device settings

- Reference density
- Concentration *
- Carrier pipe temperature *
- Electronic temperature
- Current output 1
- Oscillation frequency 0
- Frequency fluctuation 0
- Oscillation amplitude *
- Oscillation damping 0
- Oscillation damping fluctuation 0
- Signal asymmetry
- Exciter current 0

Description Displays the measured value trend for the logging channel in the form of a chart.

Additional information *Description*



A0016357

 8 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.

"Display channel 2" submenu

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

► Display channel 2

Display channel 2 →  229

Display channel 2

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

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

* Visibility depends on order options or device settings

Description See the **Display channel 1** parameter →  228

"Display channel 3" submenu

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

► Display channel 3

Display channel 3 →  230

Display channel 3

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

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

Description See the **Display channel 1** parameter →  228

"Display channel 4" submenu

Navigation  Expert → Diagnostics → Data logging → Displ.channel 4

► Display channel 4

Display channel 4 →  230

Display channel 4

Navigation  Expert → Diagnostics → Data logging → Displ.channel 4

Prerequisite A process variable is specified in the **Assign channel 4** parameter.

Description See the **Display channel 1** parameter →  228

3.8.11 "Min/max values" submenu

Navigation   Expert → Diagnostics → Min/max val.

▶ Min/max values		
Reset min/max values (6151)	→ 	231
▶ Electronic temperature	→ 	232
▶ Main electronic temperature	→ 	233
▶ Sensor electronic temperature (ISEM)	→ 	234
▶ Medium temperature	→ 	235
▶ Carrier pipe temperature	→ 	235
▶ Oscillation frequency	→ 	236
▶ Torsion oscillation frequency	→ 	237
▶ Oscillation amplitude	→ 	238
▶ Torsion oscillation amplitude	→ 	239
▶ Oscillation damping	→ 	240
▶ Torsion oscillation damping	→ 	240
▶ Signal asymmetry	→ 	241
▶ Torsion signal asymmetry	→ 	242

Reset min/max values



Navigation   Expert → Diagnostics → Min/max val. → Reset min/max (6151)

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

- Selection
- Cancel
 - Oscillation amplitude *
 - Oscillation amplitude 1 *
 - Oscillation damping

* Visibility depends on order options or device settings

- Torsion oscillation damping *
- Oscillation frequency
- Torsion oscillation frequency *
- Signal asymmetry
- Torsion signal asymmetry *

"Electronic temperature" submenu

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

▶ Electronic temperature

Minimum value

→  232

Maximum value

→  232

Minimum value

Navigation	  Expert → Diagnostics → Min/max val. → Electronic temp. → Minimum value (6052)
Description	Displays the lowest previously measured temperature value of the electronics module in the sensor connection housing.
User interface	Signed floating-point number
Additional information	Dependency  The unit is taken from the Temperature unit parameter (→  81)

Maximum value

Navigation	  Expert → Diagnostics → Min/max val. → Electronic temp. → Maximum value (6051)
Description	Displays the highest previously measured temperature value of the electronics module in the sensor connection housing.
User interface	Signed floating-point number

* Visibility depends on order options or device settings

Additional information

Dependency

 The unit is taken from the **Temperature unit** parameter (→  81)

"Main electronic temperature" submenu

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

► Main electronic temperature

Minimum value (0688)

→  233

Maximum value (0665)

→  233

Minimum value

Navigation   Expert → Diagnostics → Min/max val. → Main elect.temp. → Minimum value (0688)

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

User interface Signed floating-point number

Additional information Dependency

 The unit is taken from the **Temperature unit** parameter (→  81)

Maximum value

Navigation   Expert → Diagnostics → Min/max val. → Main elect.temp. → Maximum value (0665)

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

User interface Signed floating-point number

Additional information Dependency

 The unit is taken from the **Temperature unit** parameter (→  81)

"Sensor electronic temperature (ISEM)" submenu

Navigation  Expert → Diagnostics → Min/max val. → Sensor elec.temp

► Sensor electronic temperature (ISEM)

Minimum value (6052)

→  234

Maximum value (6051)

→  234

Maximum value

Navigation	 Expert → Diagnostics → Min/max val. → Sensor elec.temp → Maximum value (6051)
Description	Displays the highest previously measured temperature value of the electronics module in the sensor connection housing.
User interface	Signed floating-point number
Additional information	<i>Dependency</i>  The unit is taken from the Temperature unit parameter (→  81)

Minimum value

Navigation	 Expert → Diagnostics → Min/max val. → Sensor elec.temp → Minimum value (6052)
Description	Displays the lowest previously measured temperature value of the electronics module in the sensor connection housing.
User interface	Signed floating-point number
Additional information	<i>Dependency</i>  The unit is taken from the Temperature unit parameter (→  81)

"Medium temperature" submenu

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

► Medium temperature

Minimum value (6109)

→  235

Maximum value (6108)

→  235

Minimum value

Navigation	 Expert → Diagnostics → Min/max val. → Medium temp. → Minimum value (6109)
Description	Displays the lowest previously measured medium temperature value.
User interface	Signed floating-point number
Additional information	Dependency  The unit is taken from the Temperature unit parameter (→  81)

Maximum value

Navigation	 Expert → Diagnostics → Min/max val. → Medium temp. → Maximum value (6108)
Description	Displays the highest previously measured medium temperature value.
User interface	Signed floating-point number
Additional information	Dependency  The unit is taken from the Temperature unit parameter (→  81)

"Carrier pipe temperature" submenu

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

► Carrier pipe temperature

Minimum value (6030)

→  236

Maximum value (6029)

→  236

Minimum value

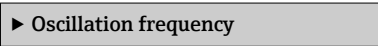
Navigation	 Expert → Diagnostics → Min/max val. → Carr. pipe temp. → Minimum value (6030)
Prerequisite	For the following order code "Application package", option EB "Heartbeat Verification + Monitoring"
Description	Displays the lowest previously measured temperature value of the carrier pipe.
User interface	Signed floating-point number
Additional information	<i>Dependency</i>  The unit is taken from the Temperature unit parameter (→  81)

Maximum value

Navigation	 Expert → Diagnostics → Min/max val. → Carr. pipe temp. → Maximum value (6029)
Prerequisite	For the following order code "Application package", option EB "Heartbeat Verification + Monitoring"
Description	Displays the highest previously measured temperature value of the carrier pipe.
User interface	Signed floating-point number
Additional information	<i>Dependency</i>  The unit is taken from the Temperature unit parameter (→  81)

"Oscillation frequency" submenu

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

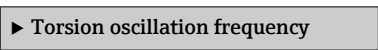
	
Minimum value (6071)	→  237
Maximum value (6070)	→  237

Minimum value	
Navigation	  Expert → Diagnostics → Min/max val. → Oscil. frequency → Minimum value (6071)
Description	Displays the lowest previously measured oscillation frequency.
User interface	Signed floating-point number

Maximum value	
Navigation	  Expert → Diagnostics → Min/max val. → Oscil. frequency → Maximum value (6070)
Description	Displays the highest previously measured oscillation frequency.
User interface	Signed floating-point number

"Torsion oscillation frequency" submenu

Navigation   Expert → Diagnostics → Min/max val. → Tors.oscil.freq.

	
Minimum value (6069)	→  237
Maximum value (6068)	→  238

Minimum value	
Navigation	  Expert → Diagnostics → Min/max val. → Tors.oscil.freq. → Minimum value (6069)
Prerequisite	 Only available for Promass I and Q. For the following order code: "Application package", option EB "Heartbeat Verification + Monitoring"
Description	Displays the lowest previously measured torsion oscillation frequency.
User interface	Signed floating-point number

Maximum value

Navigation	 Expert → Diagnostics → Min/max val. → Tors.oscil.freq. → Maximum value (6068)
Prerequisite	 Only available for Promass I and Q. For the following order code: "Application package", option EB "Heartbeat Verification + Monitoring"
Description	Displays the highest previously measured torsion oscillation frequency.
User interface	Signed floating-point number

"Oscillation amplitude" submenu

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

► Oscillation amplitude

Minimum value (6010)

→  238

Maximum value (6009)

→  238

Minimum value

Navigation	 Expert → Diagnostics → Min/max val. → Oscil. amplitude → Minimum value (6010)
Description	Displays the lowest previously measured oscillation amplitude.
User interface	Signed floating-point number

Maximum value

Navigation	 Expert → Diagnostics → Min/max val. → Oscil. amplitude → Maximum value (6009)
Description	Displays the highest previously measured oscillation amplitude.
User interface	Signed floating-point number

"Torsion oscillation amplitude" submenu

Navigation   Expert → Diagnostics → Min/max val. → Tor. osc. amp.

► Torsion oscillation amplitude

Minimum value (6008)

→  239

Maximum value (6007)

→  239

Minimum value

Navigation	  Expert → Diagnostics → Min/max val. → Tor. osc. amp. → Minimum value (6008)
Prerequisite	 Only available for Promass I and Q. For the following order code: "Application package", option EB "Heartbeat Verification + Monitoring"
Description	Displays the lowest previously measured torsion oscillation amplitude.
User interface	Signed floating-point number

Maximum value

Navigation	  Expert → Diagnostics → Min/max val. → Tor. osc. amp. → Maximum value (6007)
Prerequisite	 Only available for Promass I and Q. For the following order code: "Application package", option EB "Heartbeat Verification + Monitoring"
Description	Displays the highest previously measured torsion oscillation amplitude.
User interface	Signed floating-point number

"Oscillation damping" submenu

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

► Oscillation damping

Minimum value (6122)

→  240

Maximum value (6121)

→  240

Minimum value

Navigation	 Expert → Diagnostics → Min/max val. → Oscil. damping → Minimum value (6122)
Description	Displays the lowest previously measured oscillation damping.
User interface	Signed floating-point number

Maximum value

Navigation	 Expert → Diagnostics → Min/max val. → Oscil. damping → Maximum value (6121)
Description	Displays the highest previously measured oscillation damping.
User interface	Signed floating-point number

"Torsion oscillation damping" submenu

Navigation  Expert → Diagnostics → Min/max val. → Tors.oscil.damp.

► Torsion oscillation damping

Minimum value (6120)

→  241

Maximum value (6119)

→  241

Minimum value

Navigation	 Expert → Diagnostics → Min/max val. → Tors.oscil.damp. → Minimum value (6120)
Prerequisite	 Only available for Promass I and Q. For the following order code: "Application package", option EB "Heartbeat Verification + Monitoring"
Description	Displays the lowest previously measured torsion oscillation damping.
User interface	Signed floating-point number

Maximum value

Navigation	 Expert → Diagnostics → Min/max val. → Tors.oscil.damp. → Maximum value (6119)
Prerequisite	 Only available for Promass I and Q. For the following order code: "Application package", option EB "Heartbeat Verification + Monitoring"
Description	Displays the highest previously measured torsion oscillation damping.
User interface	Signed floating-point number

"Signal asymmetry" submenu

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

► Signal asymmetry

Minimum value (6015)

→  241

Maximum value (6014)

→  242

Minimum value

Navigation	 Expert → Diagnostics → Min/max val. → Signal asymmetry → Minimum value (6015)
Description	Displays the lowest previously measured signal asymmetry.

User interface

Signed floating-point number

Maximum value

Navigation

  Expert → Diagnostics → Min/max val. → Signal asymmetry → Maximum value (6014)

Description

Displays the highest previously measured signal asymmetry.

User interface

Signed floating-point number

"Torsion signal asymmetry" submenu

Navigation

  Expert → Diagnostics → Min/max val. → Tors.sig.asymm.

► Torsion signal asymmetry

Minimum value (6284)

→  242

Maximum value (6283)

→  242

Minimum value

Navigation

  Expert → Diagnostics → Min/max val. → Tors.sig.asymm. → Minimum value (6284)

Prerequisite

 Only available for Promass I and Q.
For the following order code:
"Application package", option **EB** "Heartbeat Verification + Monitoring"

Description

Displays the lowest previously measured torsion signal asymmetry.

User interface

Signed floating-point number

Maximum value

Navigation

  Expert → Diagnostics → Min/max val. → Tors.sig.asymm. → Maximum value (6283)

Prerequisite

 Only available for Promass I and Q.

For the following order code:
"Application package", option **EB** "Heartbeat Verification + Monitoring"

Description	Displays the highest previously measured torsion signal asymmetry.
User interface	Signed floating-point number

3.8.12 "Heartbeat Technology" submenu

 For detailed information on the parameter descriptions for the **Heartbeat Verification+Monitoring**: Special Documentation for the device

Navigation   Expert → Diagnostics → HBT

▶ Heartbeat	
▶ Heartbeat base settings	→  243
▶ Performing verification	→  244
▶ Verification results	→  248
▶ Heartbeat Monitoring	→  251
▶ Monitoring results	→  252

"Heartbeat base settings" submenu

Navigation   Expert → Diagnostics → Heartbeat Techn. → Base settings

▶ Heartbeat base settings	
Plant operator (2754)	→  243
Location (2755)	→  244

Plant operator	
----------------	---

Navigation	  Expert → Diagnostics → Heartbeat → Base settings → Plant operator (2754)
Description	Use this function to enter the plant operator.
User entry	Max. 32 characters such as letters, numbers or special characters (e.g. @, %, /)

Location

Navigation

 Expert → Diagnostics → Heartbeat → Base settings → Location (2755)

Description

Use this function to enter the location.

User entry

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

"Performing verification" wizard

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

► Performing verification

Year (2846)

→  245

Month (2845)

→  245

Day (2842)

→  245

Hour (2843)

→  246

AM/PM (2813)

→  246

Minute (2844)

→  246

Verification mode (12105)

External device information (12101)

Start verification (12127)

→  246

Progress (2808)

→  247

Measured values (12102)

Output values (12103)

Status (12153)

→  247

Overall result (12149)

→  247

Year		
Navigation	 Expert → Diagnostics → Heartbeat → Perform.verific. → Year (2846)	
Prerequisite	 Can be edited if Heartbeat Verification is not active.	
Description	Use this function to enter the year of recalibration.	
User entry	9 to 99	
Month		
Navigation	 Expert → Diagnostics → Heartbeat → Perform.verific. → Month (2845)	
Prerequisite	 Can be edited if Heartbeat Verification is not active.	
Description	Use this function to select the month of recalibration.	
Selection	▪ January ▪ February ▪ March ▪ April ▪ May ▪ June ▪ July ▪ August ▪ September ▪ October ▪ November ▪ December	
Day		
Navigation	 Expert → Diagnostics → Heartbeat → Perform.verific. → Day (2842)	
Prerequisite	 Can be edited if Heartbeat Verification is not active.	
Description	Use this function to enter the day of the month of recalibration.	
User entry	1 to 31 d	

Hour		
Navigation	 Expert → Diagnostics → Heartbeat → Perform.verific. → Hour (2843)	
Prerequisite	 Can be edited if Heartbeat Verification is not active.	
Description	Use this function to enter the hour of recalibration.	
User entry	0 to 23 h	
AM/PM		
Navigation	 Expert → Diagnostics → Heartbeat → Perform.verific. → AM/PM (2813)	
Prerequisite	 Can be edited if Heartbeat Verification is not active. The dd.mm.yy hh:mm am/pm option or the mm/dd/yy hh:mm am/pm option is selected in the Date/time format parameter (2812) (→  82).	
Description	Use this function to select the time entry in the morning (AM option) or afternoon (PM option) in the case of 12-hour notation.	
Selection	■ AM ■ PM	
Minute		
Navigation	 Expert → Diagnostics → Heartbeat → Perform.verific. → Minute (2844)	
Prerequisite	 Can be edited if Heartbeat Verification is not active.	
Description	Use this function to enter the minutes of recalibration.	
User entry	0 to 59 min	
Start verification		
Navigation	 Expert → Diagnostics → Heartbeat → Perform.verific. → Start verificat. (12127)	
Description	Start the verification. To carry out a complete verification, select the selection parameters individually. Once the external measured values have been recorded, verification is started using the Start option.	

Selection	■ Cancel ■ Output 1 low value * ■ Output 1 high value * ■ Output 2 low value * ■ Output 2 high value * ■ Output 3 low value * ■ Output 3 high value * ■ Output 4 low value * ■ Output 4 high value * ■ Frequency output 1 * ■ Pulse output 1 * ■ Frequency output 2 * ■ Pulse output 2 * ■ Frequency output 3 * ■ Double pulse output * ■ Start
------------------	--

Progress

Navigation	 Expert → Diagnostics → Heartbeat → Perform.verific. → Progress (2808)
Description	The progress of the process is indicated.
User interface	0 to 100 %

Status

Navigation	 Expert → Diagnostics → Heartbeat → Perform.verific. → Status (12153)
Description	Displays the current status of the verification.
User interface	■ Done ■ Busy ■ Failed ■ Not done

Overall result

Navigation	 Expert → Diagnostics → Heartbeat → Perform.verific. → Overall result (12149)
Description	Displays the overall result of the verification.  Detailed description of the classification of the results:

* Visibility depends on order options or device settings

User interface

■ Passed

■ Not done

■ Failed

Factory setting

Not done

"Verification results" submenu

Navigation

  Expert → Diagnostics → Heartbeat Techn. → Verific. results

► Verification results

Date/time (12142)

→  248

Verification ID (12141)

→  249

Operating time (12126)

→  249

Overall result (12149)

→  249

Sensor (12152)

→  249

HBSI (12167)

→  250

Sensor electronic module (ISEM)
(12151)

→  250

I/O module (12145)

→  250

System status (12109)

→  251

Date/time

Navigation

  Expert → Diagnostics → Heartbeat → Verific. results → Date/time (12142)

Prerequisite

The verification has been performed.

Description

Date and time.

User interface

dd.mmmm.yyyy; hh:mm

Factory setting

1 January 2010; 12:00

Verification ID	
Navigation	  Expert → Diagnostics → Heartbeat → Verific. results → Verification ID (12141)
Prerequisite	The verification has been performed.
Description	Displays consecutive numbering of the verification results in the measuring device.
User interface	0 to 65 535
Operating time	
Navigation	  Expert → Diagnostics → Heartbeat → Verific. results → Operating time (12126)
Prerequisite	The verification has been performed.
Description	Indicates how long the device has been in operation up to the verification.
User interface	Days (d), hours (h), minutes (m), seconds (s)
Factory setting	–
Overall result	
Navigation	  Expert → Diagnostics → Heartbeat → Verific. results → Overall result (12149)
Description	Displays the overall result of the verification.  Detailed description of the classification of the results:
User interface	■ Passed ■ Not done ■ Failed
Factory setting	Not done
Sensor	
Navigation	  Expert → Diagnostics → Heartbeat → Verific. results → Sensor (12152)
Prerequisite	The Failed option was shown in the Overall result parameter (→  247).
Description	Displays the result for the sensor.  Detailed description of the classification of the results:

User interface	■ Passed ■ Not done ■ Failed
----------------	--

HBSI

Navigation	  Expert → Diagnostics → Heartbeat → Verific. results → HBSI (12167)
Prerequisite	The Failed option is shown in the Overall result parameter (→  247).
Description	Displays the relative change in the sensor with all the sensor components.  Detailed description of the classification of the results:
User interface	■ Passed ■ Not done ■ Failed

Sensor electronic module (ISEM)

Navigation	  Expert → Diagnostics → Heartbeat → Verific. results → Sens. electronic (12151)
Prerequisite	The Failed option was shown in the Overall result parameter (→  247).
Description	Displays the result for the sensor electronics module (ISEM).  Detailed description of the classification of the results:
User interface	■ Passed ■ Not done ■ Failed

I/O module

Navigation	  Expert → Diagnostics → Heartbeat → Verific. results → I/O module (12145)
Prerequisite	The Failed option was shown in the Overall result parameter (→  247).
Description	Displays the result for I/O module monitoring of the I/O module. ■ For current output: Accuracy of the current ■ For pulse output: Accuracy of pulses ■ For frequency output: Accuracy of frequency

- Current input: Accuracy of the current
- Double pulse output: Accuracy of the pulses
- Relay output: Number of switching cycles
-  **Heartbeat Verification** does not check the digital inputs and outputs and does not issue a result for this.
-  Detailed description of the classification of the results:

- User interface
- Passed
 - Not done
 - Not plugged
 - Failed

System status

- Navigation   Expert → Diagnostics → Heartbeat → Verific. results → System status (12109)
- Prerequisite The **Failed** option was shown in the **Overall result** parameter (→  247).
- Description Displays the system condition. Tests the measuring device for active errors.
 Detailed description of the classification of the results:
- User interface
- Passed
 - Not done
 - Failed

"Heartbeat Monitoring" submenu

Navigation   Expert → Diagnostics → Heartbeat Techn. → HBT Monitoring

▶ Heartbeat Monitoring

Activate monitoring (12129) →  251

HBSI cycle time (12110) →  252

Activate monitoring

- Navigation   Expert → Diagnostics → Heartbeat → HBT Monitoring → Act. monitoring (12129)
- Description  **Continuous HBSI** option does not apply for Promass I and Promass Q.

- Selection
- Off

■ Time-controlled HBSI

■ Continuous HBSI

HBSI cycle time

Navigation

Expert → Diagnostics → Heartbeat → HBT Monitoring → HBSI cycle time (12110)

Prerequisite

In the **Activate monitoring** parameter (→ 251), the **Time-controlled HBSI** option is selected.

Description

Use this function to enter the cycle time for determining the HBSI measured value. The HBSI measured value may only be determined in the configured cycle time in the firmware if the **Activate monitoring** parameter (→ 251) is set to **Scheduled HBSI** option.

User entry

0.5 to 4 320 h

"Monitoring results" submenu

Navigation

Expert → Diagnostics → Heartbeat Techn. → Monitor. results

► Monitoring results

HBSI (12115)

→ 252

HBSI status (6380)

→ 253

HBSI

Navigation

Expert → Diagnostics → Heartbeat → Monitor. results → HBSI (12115)

Description

Displays the relative change of the entire sensor, with all its electrical, mechanical and electromechanical components incorporated in the sensor housing (including the measuring tube, electrodynamic pick-ups, excitation system, cables etc.), in % of the reference value.

User interface

Signed floating-point number

Factory setting

0...4 %

HBSI status	
Navigation	  Expert → Diagnostics → Heartbeat → Monitor. results → HBSI status (6380)
Description	Shows the status of the HBSI value. Uncertain or Bad: Due to difficult process conditions over a long time no HBSI value could be determined.
User interface	■ Good ■ Uncertain ■ Bad

3.8.13 "Simulation" submenu

Navigation   Expert → Diagnostics → Simulation

► Simulation

Assign simulation process variable

Process variable value

Current input 1 to n simulation

Value current input 1 to n

Status input simulation 1 to n

Input signal level 1 to n

Current output 1 to n simulation

Value current output 1 to n

Frequency output simulation 1 to n

Frequency value 1 to n

Pulse output simulation 1 to n

Pulse value 1 to n

Switch output simulation 1 to n

Switch status 1 to n

Relay output 1 to n simulation

Switch status 1 to n

Pulse output simulation

Pulse value

Device alarm simulation

Diagnostic event category

Diagnostic event simulation

"Process value simulation" submenu

Navigation  Expert → Diagnostics → Simulation → Proc. val. sim.

► Process value simulation

Process variable simulation

→  254

Process value

→  255

Assign simulation process variable

Navigation  Diagnostics → Simulation → Assign proc.var. (1810)
 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
 - Volume flow
 - Corrected volume flow *
 - Target volume flow *
 - Carrier volume flow *
 - Target corrected volume flow *
 - Carrier corrected volume flow *
 - Density
 - Reference density *
 - Reference density alternative *
 - GSV flow *
 - GSV flow alternative *
 - NSV flow *
 - NSV flow alternative *

* Visibility depends on order options or device settings

- S&W volume flow *
- Water cut *
- Oil density *
- Water density *
- Oil mass flow *
- Water mass flow *
- Oil volume flow *
- Water volume flow *
- Oil corrected volume flow *
- Water corrected volume flow *
- Temperature *
- Concentration *
- Target mass flow *
- Carrier mass flow *

Additional information

Description

 The simulation value of the process variable selected is defined in the **Process variable value** parameter (→  255).

Process variable value



Navigation

-   [Diagnostics → Simulation → Proc. var. value \(1811\)](#)
-   [Expert → Diagnostics → Simulation → Proc. var. value \(1811\)](#)

Prerequisite

A process variable is selected in the **Assign simulation process variable** parameter (→  254).

Description

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

User entry

Depends on the process variable selected

Additional information

User entry

 The unit of the displayed measured value is taken from the **System units** submenu (→  73).

"Input simulation" submenu

Navigation

-   [Expert → Diagnostics → Simulation → Input simulation](#)

► Input simulation

Current input 1 to n simulation

→  256

* Visibility depends on order options or device settings

Value current input 1 to n	→ 256
Status input simulation	→ 257
Input signal level	→ 257

Current input 1 to n simulation



Navigation	Diagnostics → Simulation → Curr.inp 1 to n sim. (1608-1 to n) Expert → Diagnostics → Simulation → Curr.inp 1 to n sim. (1608-1 to n)
Description	Option for switching simulation of the current input on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.  The desired simulation value is defined in the Value current input 1 to n parameter.
Selection	■ Off ■ On
Additional information	<i>Selection</i> ■ Off Current simulation is switched off. The device is in normal measuring mode or another process variable is being simulated. ■ On Current simulation is active.

Value current input 1 to n



Navigation	Diagnostics → Simulation → Value curr.inp 1 to n (1609-1 to n) Expert → Diagnostics → Simulation → Value curr.inp 1 to n (1609-1 to n)
Prerequisite	In the Current input 1 to n simulation parameter, the On option is selected.
Description	Use this function to enter the current value for the simulation. In this way, users can verify the correct configuration of the current input and the correct function of upstream feed-in units.
User entry	0 to 22.5 mA

Status input simulation 1 to n

Navigation	Diagnostics → Simulation → Status inp.sim 1 to n (1355-1 to n) Expert → Diagnostics → Simulation → Status inp.sim 1 to n (1355-1 to n)
Description	Use this function to switch simulation of the status input on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.
Selection	■ Off ■ On
Additional information	Description i The desired simulation value is defined in the Input signal level parameter (→ 257). Selection ■ Off Simulation for the status input is switched off. The device is in normal measuring mode or another process variable is being simulated. ■ On Simulation for the status input is active.

Input signal level 1 to n

Navigation	Diagnostics → Simulation → Signal level 1 to n (1356-1 to n) Expert → Diagnostics → Simulation → Signal level 1 to n (1356-1 to n)
Prerequisite	In the Status input simulation parameter (→ 257), the On option is selected.
Description	Use this function to select the signal level for the simulation of the status input. In this way, users can verify the correct configuration of the status input and the correct function of upstream feed-in units.
Selection	■ High ■ Low

"Output simulation" submenu

Navigation

[Expert](#) → [Diagnostics](#) → [Simulation](#) → [Output sim.](#)

► Output simulation

Current output 1 to n simulation

→ [258](#)

Current output 1 to n value

→ [259](#)

Frequency output 1 to n simulation	→  259
Frequency output 1 to n value	→  260
Pulse output simulation 1 to n	→  260
Pulse value 1 to n	→  261
Switch output simulation 1 to n	→  261
Switch status 1 to n	→  261
Relay output 1 to n simulation	→  262
Switch status 1 to n	→  262
Pulse output simulation	→  263
Pulse value	→  263

Current output 1 to n simulation



Navigation

-   [Diagnostics → Simulation → Curr.out. 1 to n sim. \(0354–1 to n\)](#)
-   [Expert → Diagnostics → Simulation → Curr.out. 1 to n sim. \(0354–1 to n\)](#)

Description

Use this function to switch simulation of the current output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

Selection

- Off
- On

Additional information

- Description*
-  The desired simulation value is defined in the **Value current output 1 to n** parameter.
- Selection*
- Off
Current simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
 - On
Current simulation is active.

Value current output 1 to n

**Navigation**

[Diagnostics → Simulation → Value curr.out 1 to n \(0355-1 to n\)](#)
[Expert → Diagnostics → Simulation → Value curr.out 1 to n \(0355-1 to n\)](#)

Prerequisite

In the **Current output 1 to n simulation** parameter, the **On** option is selected.

Description

Use this function to enter a current value for the simulation. In this way, users can verify the correct adjustment of the current output and the correct function of downstream switching units.

User entry

3.59 to 22.5 mA

Additional information

Dependency

The input range is dependent on the option selected in the **Current span** parameter (→ 139).

Frequency output simulation 1 to n

**Navigation**

[Diagnostics → Simulation → FreqOutputSim 1 to n \(0472-1 to n\)](#)
[Expert → Diagnostics → Simulation → FreqOutputSim 1 to n \(0472-1 to n\)](#)

Prerequisite

In the **Operating mode** parameter (→ 147), the **Frequency** option is selected.

Description

Use this function to switch simulation of the frequency output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

Selection

- Off
- On

Additional information

Description



The desired simulation value is defined in the **Frequency value 1 to n** parameter.

Selection

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

Frequency value 1 to n 	
Navigation	  Diagnostics → Simulation → Freq value 1 to n (0473–1 to n)   Expert → Diagnostics → Simulation → Freq value 1 to n (0473–1 to n)
Prerequisite	In the Frequency output simulation 1 to n parameter, the On option is selected.
Description	Use this function to enter a frequency value for the simulation. In this way, users can verify the correct adjustment of the frequency output and the correct function of downstream switching units.
User entry	0.0 to 12 500.0 Hz
Pulse output simulation 1 to n 	
Navigation	  Diagnostics → Simulation → Puls.outp.sim. 1 to n (0458–1 to n)   Expert → Diagnostics → Simulation → Puls.outp.sim. 1 to n (0458–1 to n)
Prerequisite	In the Operating mode parameter (→  147), the Pulse option is selected.
Description	Use this function to switch simulation of the pulse output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.
Selection	■ Off ■ Fixed value ■ Down-counting value
Additional information	<i>Description</i>  The desired simulation value is defined in the Pulse value 1 to n parameter. <i>Selection</i> ■ 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 (→  151). ■ Down-counting value The pulses specified in the Pulse value parameter (→  261) are output.

Pulse value 1 to n

**Navigation**

[Diagnostics → Simulation → Pulse value 1 to n \(0459-1 to n\)](#)
[Expert → Diagnostics → Simulation → Pulse value 1 to n \(0459-1 to n\)](#)

Prerequisite

In the **Pulse output simulation 1 to n** parameter, the **Down-counting value** option is selected.

Description

Use this function to enter a pulse value for the simulation. In this way, users can verify the correct adjustment of the pulse output and the correct function of downstream switching units.

User entry

0 to 65 535

Switch output simulation 1 to n

**Navigation**

[Diagnostics → Simulation → Switch sim. 1 to n \(0462-1 to n\)](#)
[Expert → Diagnostics → Simulation → Switch sim. 1 to n \(0462-1 to n\)](#)

Prerequisite

In the **Operating mode** parameter (→ 147), the **Switch** option is selected.

Description

Use this function to switch simulation of the switch output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

Selection

- Off
- On

Additional information

Description



The desired simulation value is defined in the **Switch status 1 to n** parameter.

Selection

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

Switch status 1 to n

**Navigation**

[Diagnostics → Simulation → Switch status 1 to n \(0463-1 to n\)](#)
[Expert → Diagnostics → Simulation → Switch status 1 to n \(0463-1 to n\)](#)

Description

Use this function to select a switch value for the simulation. In this way, users can verify the correct adjustment of the switch output and the correct function of downstream switching units.

Selection	■ Open ■ Closed
Additional information	<i>Selection</i> ■ Open Switch simulation is switched off. The device is in normal measuring mode or another process variable is being simulated. ■ Closed Switch simulation is active.

Relay output 1 to n simulation



Navigation	Diagnostics → Simulation → Relay out. 1 to n sim (0802-1 to n) Expert → Diagnostics → Simulation → Relay out. 1 to n sim (0802-1 to n)
Description	Use this function to switch simulation of the relay output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.
Selection	■ Off ■ On
Additional information	<i>Description</i> The desired simulation value is defined in the Switch status 1 to n parameter. <i>Selection</i> ■ Off Relay simulation is switched off. The device is in normal measuring mode or another process variable is being simulated. ■ On Relay simulation is active.

Switch status 1 to n



Navigation	Diagnostics → Simulation → Switch status 1 to n (0803-1 to n) Expert → Diagnostics → Simulation → Switch status 1 to n (0803-1 to n)
Prerequisite	The On option is selected in the Switch output simulation 1 to n parameter parameter.
Description	Use this function to select a relay value for the simulation. In this way, users can verify the correct adjustment of the relay output and the correct function of downstream switching units.
Selection	■ Open ■ Closed

Additional information	<i>Selection</i> ■ Open Relay simulation is switched off. The device is in normal measuring mode or another process variable is being simulated. ■ Closed Relay simulation is active.
Pulse output simulation 	
Navigation	  Diagnostics → Simulation → Puls.outp.sim. (0988)   Expert → Diagnostics → Simulation → Puls.outp.sim. (0988)
Description	Use this function to switch simulation of the double pulse output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.
Selection	■ Off ■ Fixed value ■ Down-counting value
Additional information	<i>Description</i>  The desired simulation value is defined in the Pulse value parameter (→  263).
	<i>Selection</i> ■ Off Simulation of the double pulse output is switched off. The device is in normal measuring mode or another process variable is being simulated. ■ Fixed value Pulses are continuously output with the pulse width specified in the Pulse width parameter (→  177). ■ Down-counting value The pulses specified in the Pulse value parameter (→  263) are output.
Pulse value 	
Navigation	  Diagnostics → Simulation → Pulse value (0989)   Expert → Diagnostics → Simulation → Pulse value (0989)
Prerequisite	In the Pulse output simulation parameter (→  263), the Down-counting value option is selected.
Description	Use this function to enter a pulse value for simulation of the double pulse output. In this way, users can verify the correct adjustment of the double pulse output and the correct function of downstream switching units.
User entry	0 to 65 535

4 Country-specific factory settings

4.1 SI units



Not valid for USA and Canada.

4.1.1 System units

Process variable	Unit
Mass	kg
Mass flow	kg/h
Volume	l
Volume flow	l/h
Corrected volume	Nl
Corrected volume flow	Nl/h
Density	kg/l
Reference density	kg/Nl
Temperature	°C
Pressure	bar a

4.1.2 Full scale values



The factory settings apply to the following parameters:

- 20 mA value (full scale value of the current output)
- 100% bar graph value 1

Nominal diameter [mm]	[kg/h]
1	4
2	20
4	90
6	200

4.1.3 Output current span

Output	Current range
Current output 1...n	4 to 20 mA NAMUR

4.1.4 Pulse value

Nominal diameter [mm]	[kg/p]
1	0.001
2	0.01
4	0.01
6	0.1

4.1.5 Switch-on point low flow cut off



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

Nominal diameter [mm]	On-value for liquid [kg/h]
1	0.08
2	0.4
4	1.8
6	4

Nominal diameter [mm]	On-value for gas [kg/h]
1	0.02
2	0.1
4	0.45
6	1

4.2 US units



Only valid for USA and Canada.

4.2.1 System units

Process variable	Unit
Mass	lb
Mass flow	lb/min
Volume	gal (us)
Volume flow	gal/min (us)
Corrected volume	Sft ³
Corrected volume flow	Sft ³ /min
Density	lb/ft ³
Reference density	lb/Sft ³
Temperature	°F
Pressure	psi a

4.2.2 Full scale values



The factory settings apply to the following parameters:

- 20 mA value (full scale value of the current output)
- 100% bar graph value 1

Nominal diameter [in]	[lb/min]
$\frac{1}{24}$	0.15
$\frac{1}{12}$	0.75

Nominal diameter [in]	[lb/min]
$\frac{1}{8}$	3.3
$\frac{1}{4}$	7.4

4.2.3 Output current span

Output	Current range
Current output 1...n	4 to 20 mA US

4.2.4 Pulse value

Nominal diameter [in]	[lb/p]
$\frac{1}{24}$	0.002
$\frac{1}{12}$	0.02
$\frac{1}{8}$	0.02
$\frac{1}{4}$	0.2

4.2.5 Switch-on point low flow cut off



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

Nominal diameter [in]	On-value for liquid [lb/min]
$\frac{1}{24}$	0.003
$\frac{1}{12}$	0.015
$\frac{1}{8}$	0.066
$\frac{1}{4}$	0.15

Nominal diameter [in]	On-value for gas [lb/min]
$\frac{1}{24}$	0.001
$\frac{1}{12}$	0.004
$\frac{1}{8}$	0.016
$\frac{1}{4}$	0.0375

5 Explanation of abbreviated units

5.1 SI units

Process variable	Units	Explanation
Density	g/cm ³ , g/m ³	Gram/volume unit
	kg/dm ³ , kg/l, kg/m ³	Kilogram/volume unit
	SD4°C, SD15°C, SD20°C	Specific density: The specific density is the ratio of the density of the fluid to the density of water at a water temperature of 4 °C (39 °F), 15 °C (59 °F), 20 °C (68 °F).
	SG4°C, SG15°C, SG20°C	Specific gravity: The specific gravity is the ratio of the density of the fluid to the density of water at a water temperature of 4 °C (39 °F), 15 °C (59 °F), 20 °C (68 °F).
Pressure	Pa a, kPa a, MPa a	Pascal, kilopascal, megapascal (absolute)
	bar	Bar
	Pa g, kPa g, MPa g	Pascal, kilopascal, megapascal (relative/gauge)
	bar g	Bar (relative/gauge)
Mass	g, kg, t	Gram, kilogram, metric ton
Mass flow	g/s, g/min, g/h, g/d	Gram/time unit
	kg/s, kg/min, kg/h, kg/d	Kilogram/time unit
	t/s, t/min, t/h, t/d	Metric ton/time unit
Reference density	kg/Nm ³ , kg/Nl, g/Scm ³ , kg/Sm ³	Kilogram, gram/standard volume unit
Corrected volume	Nl, Nm ³ , Sm ³	Normal liter, normal cubic meter, standard cubic meter
Corrected volume flow	Nl/s, Nl/min, Nl/h, Nl/d	Normal liter/time unit
	Nm ³ /s, Nm ³ /min, Nm ³ /h, Nm ³ /d	Normal cubic meter/time unit
	Sm ³ /s, Sm ³ /min, Sm ³ /h, Sm ³ /d	Standard cubic meter/time unit
Temperature	°C, K	Celsius, Kelvin
Volume	cm ³ , dm ³ , m ³	Cubic centimeter, cubic decimeter, cubic meter
	ml, l, hl, Ml Mega	Milliliter, liter, hectoliter, megaliter
Volume flow	cm ³ /s, cm ³ /min, cm ³ /h, cm ³ /d	Cubic centimeter/time unit
	dm ³ /s, dm ³ /min, dm ³ /h, dm ³ /d	Cubic decimeter/time unit
	m ³ /s, m ³ /min, m ³ /h, m ³ /d	Cubic meter/time unit
	ml/s, ml/min, ml/h, ml/d	Milliliter/time unit
	l/s, l/min, l/h, l/d	Liter/time unit
	hl/s, hl/min, hl/h, hl/d	Hectoliter/time unit
	Ml/s, Ml/min, Ml/h, Ml/d	Megaliter/time unit
Time	s, m, h, d, y	Second, minute, hour, day, year

5.2 US units

Process variable	Units	Explanation
Density	lb/ft ³ , lb/gal (us)	Pound/cubic foot, pound/gallon
	lb/bbl (us;liq.), lb/bbl (us;beer), lb/bbl (us;oil), lb/bbl (us;tank)	Pound/volume unit

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

5.3 Imperial units

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

Index

0 ... 9	
0/4 mA value (Parameter)	133, 140
2.4 GHz WLAN channel (Parameter)	190
20 mA value (Parameter)	133, 140
A	
Abort cause (Parameter)	104, 107
Access status (Parameter)	13
Activate SW option (Parameter)	54
Active level (Parameter)	136
Actual diagnostics (Parameter)	207
Additional information (Parameter)	103, 107
Additional settings (Submenu)	168
Administration (Submenu)	50
Alarm delay (Parameter)	37
APL port (Submenu)	191
Application (Submenu)	198
Application specific calculations (Submenu)	198
Application specific input 0 (Parameter)	65, 202
Application specific input 1 (Parameter)	65, 203
Application specific input source 0 (Parameter)	99
Application specific input source 1 (Parameter)	99
Application specific output 0 (Parameter)	65, 203
Application specific output 1 (Parameter)	65, 203
Application-specific parameters (Submenu)	199
Apply I/O configuration (Parameter)	130
Assign behavior of diagnostic no. 046 (Parameter)	40
Assign behavior of diagnostic no. 140 (Parameter)	40
Assign behavior of diagnostic no. 142 (Parameter)	40
Assign behavior of diagnostic no. 144 (Parameter)	41
Assign behavior of diagnostic no. 302 (Parameter)	42
Assign behavior of diagnostic no. 304 (Parameter)	42
Assign behavior of diagnostic no. 374 (Parameter)	41
Assign behavior of diagnostic no. 441 (Parameter)	42
Assign behavior of diagnostic no. 442 (Parameter)	43
Assign behavior of diagnostic no. 443 (Parameter)	43
Assign behavior of diagnostic no. 444 (Parameter)	43
Assign behavior of diagnostic no. 599 (Parameter)	44
Assign behavior of diagnostic no. 830 (Parameter)	44
Assign behavior of diagnostic no. 831 (Parameter)	45
Assign behavior of diagnostic no. 832 (Parameter)	45
Assign behavior of diagnostic no. 833 (Parameter)	45
Assign behavior of diagnostic no. 834 (Parameter)	46
Assign behavior of diagnostic no. 835 (Parameter)	46
Assign behavior of diagnostic no. 842 (Parameter)	46
Assign behavior of diagnostic no. 862 (Parameter)	47
Assign behavior of diagnostic no. 912 (Parameter)	47
Assign behavior of diagnostic no. 913 (Parameter)	47
Assign behavior of diagnostic no. 915 (Parameter)	48
Assign behavior of diagnostic no. 941 (Parameter)	48
Assign behavior of diagnostic no. 942 (Parameter)	48
Assign behavior of diagnostic no. 943 (Parameter)	49
Assign behavior of diagnostic no. 944 (Parameter)	49
Assign behavior of diagnostic no. 948 (Parameter)	50
Assign behavior of diagnostic no. 984 (Parameter)	50
Assign channel 1 (Parameter)	223
Assign channel 2 (Parameter)	224
Assign channel 3 (Parameter)	225
Assign channel 4 (Parameter)	225
Assign current output 1 to n (Parameter)	138
Assign diagnostic behavior (Parameter)	171
Assign flow direction check (Parameter)	170
Assign limit (Parameter)	170
Assign process variable (Parameter)	85, 88
Assign pulse output 1 (Parameter)	176
Assign SSID name (Parameter)	189
Assign status (Parameter)	172
Assign status input (Parameter)	135
B	
Backup state (Parameter)	36
Bootloader revision (Parameter)	216, 217, 218, 220, 221, 222
Build no. software (Parameter)	216, 217, 218, 219, 221, 222
Byte order (Parameter)	181
C	
C0 to 5 (Parameter)	119
Calculated values (Submenu)	90
Calibration (Submenu)	118
Calibration factor (Parameter)	118
Carrier corrected volume flow (Parameter)	63
Carrier mass flow (Parameter)	62
Carrier pipe temperature (Submenu)	235
Carrier volume flow (Parameter)	64
Clear logging data (Parameter)	226
Combined density-pressure factor (Parameter)	113
Combined density-temperature factor (Parameter)	113
Combined temperature-pressure factor (Parameter)	113
Commissioning (Parameter)	128
Communication (Submenu)	180
Comparison result (Parameter)	36
Concentration (Parameter)	61
Configuration backup (Submenu)	34
Configuration management (Parameter)	35
Confirm access code (Parameter)	52
Connection state (Parameter)	190
Constant offset (Parameter)	112
Corrected volume flow (Parameter)	60
Corrected volume flow calculation (Parameter)	91
Corrected volume flow calculation (Submenu)	90
Corrected volume flow factor (Parameter)	117
Corrected volume flow offset (Parameter)	116
Corrected volume flow unit (Parameter)	76
Corrected volume unit (Parameter)	77
CTPL alternative (Parameter)	64
Cubic temperature factor (Parameter)	114
Current input 1 to n (Submenu)	68, 131
Current output 1 (Submenu)	136, 137, 141
Current output 1 to n (Wizard)	137
Current span (Parameter)	132, 139

Cut off inhomogeneous liquid (Parameter)	205
Cut off inhomogeneous wet gas (Parameter)	205
Cut off suspended bubbles (Parameter)	206

D

Damping output 1 to n (Parameter)	140
Data logging (Parameter)	226
Data logging (Submenu)	222
Data logging control (Parameter)	227
Data logging status (Parameter)	227
Date/time format (Parameter)	82
Default gateway (Parameter)	192, 197
Define access code (Parameter)	51
Define access code (Wizard)	51
Define Software Lock code (Parameter)	56
Density (Parameter)	60
Density 2 unit (Parameter)	80
Density adjustment (Wizard)	109
Density adjustment factor (Parameter)	110
Density adjustment mode (Parameter)	109
Density adjustment offset (Parameter)	111
Density damping (Parameter)	83
Density factor (Parameter)	116
Density offset (Parameter)	116
Density setpoint 1 (Parameter)	109
Density setpoint 2 (Parameter)	109
Density unit (Parameter)	78
Device ID (Parameter)	183
Device information (Submenu)	212
Device name (Parameter)	214
Device reset (Parameter)	53
Device revision (Parameter)	183
Device tag (Parameter)	212
DHCP client (Parameter)	192
Diagnostic behavior (Submenu)	38
Diagnostic handling (Submenu)	37
Diagnostic list (Submenu)	209
Diagnostics (Submenu)	206
Diagnostics 1 (Parameter)	209
Diagnostics 2 (Parameter)	210
Diagnostics 3 (Parameter)	210
Diagnostics 4 (Parameter)	210
Diagnostics 5 (Parameter)	211
Direct access	
0/4 mA value	
Current input 1 to n (1606–1 to n)	133
Current output 1 to n (0367–1 to n)	140
2.4 GHz WLAN channel (2704)	190
20 mA value	
Current input 1 to n (1607–1 to n)	133
Current output 1 to n (0372–1 to n)	140
Access status (0005)	13
Activate SW option (0029)	54
Active level	
Status input 1 to n (1351–1 to n)	136
Actual diagnostics (0691)	207
Alarm delay (0651)	37
Application specific input 0 (6366)	65, 202
Application specific input 1 (6367)	65, 203

Application specific input source 0 (6401)	99
Application specific input source 1 (6402)	99
Application specific output 0 (6364)	65, 203
Application specific output 1 (6365)	65, 203
Apply I/O configuration (3907)	130
Assign behavior of diagnostic no. 046 (0709)	40
Assign behavior of diagnostic no. 140 (0708)	40
Assign behavior of diagnostic no. 142 (0648)	40
Assign behavior of diagnostic no. 144 (0731)	41
Assign behavior of diagnostic no. 302 (0739)	42
Assign behavior of diagnostic no. 304 (0644)	42
Assign behavior of diagnostic no. 374 (0710)	41
Assign behavior of diagnostic no. 441 (0657)	42
Assign behavior of diagnostic no. 442 (0658)	43
Assign behavior of diagnostic no. 443 (0659)	43
Assign behavior of diagnostic no. 444 (0740)	43
Assign behavior of diagnostic no. 599 (0644)	44
Assign behavior of diagnostic no. 830 (0800)	44
Assign behavior of diagnostic no. 831 (0641)	45
Assign behavior of diagnostic no. 832 (0681)	45
Assign behavior of diagnostic no. 833 (0682)	45
Assign behavior of diagnostic no. 834 (0700)	46
Assign behavior of diagnostic no. 835 (0702)	46
Assign behavior of diagnostic no. 842 (0638)	46
Assign behavior of diagnostic no. 862 (0679)	47
Assign behavior of diagnostic no. 912 (0703)	47
Assign behavior of diagnostic no. 913 (0712)	47
Assign behavior of diagnostic no. 915 (0649)	48
Assign behavior of diagnostic no. 941 (0632)	48
Assign behavior of diagnostic no. 942 (0633)	48
Assign behavior of diagnostic no. 943 (0634)	49
Assign behavior of diagnostic no. 944 (0732)	49
Assign behavior of diagnostic no. 948 (0744)	50
Assign behavior of diagnostic no. 984 (0646)	50
Assign channel 1 (0851)	223
Assign channel 2 (0852)	224
Assign channel 3 (0853)	225
Assign channel 4 (0854)	225
Assign current output 1 to n (0359–1 to n)	138
Assign diagnostic behavior	
Relay output 1 to n (0806–1 to n)	171
Assign flow direction check	
Relay output 1 to n (0808–1 to n)	170
Assign limit	
Relay output 1 to n (0807–1 to n)	170
Assign process variable (1837)	85
Assign process variable (1860)	88
Assign pulse output 1 (0982–1)	176
Assign SSID name (2708)	189
Assign status	
Relay output 1 to n (0805–1 to n)	172
Assign status input	
Status input 1 to n (1352–1 to n)	135
Backup state (2759)	36
Bootloader revision	
I/O module 2 (0073)	218, 220, 221
I/O module 3 (0073)	218, 220, 221
I/O module 4 (0073)	218, 220, 221
Bootloader revision (0073)	216, 217, 222

Build no. software		
I/O module 2 (0079)	218, 219, 221	
I/O module 3 (0079)	218, 219, 221	
I/O module 4 (0079)	218, 219, 221	
Build no. software (0079)	216, 217, 222	
Byte order (7113)	181	
CO to 5 (6022)	119	
Calibration factor (6025)	118	
Carrier corrected volume flow (1894)	63	
Carrier mass flow (1865)	62	
Carrier volume flow (1896)	64	
Clear logging data (0855)	226	
Combined density-pressure factor (5971)	113	
Combined density-temperature factor (5961)	113	
Combined temperature-pressure factor (5970)	113	
Commissioning (4605)	128	
Comparison result (2760)	36	
Concentration (1887)	61	
Configuration management (2758)	35	
Connection state (2722)	190	
Constant offset (5968)	112	
Corrected volume flow (1851)	60	
Corrected volume flow calculation (1812)	91	
Corrected volume flow factor (1867)	117	
Corrected volume flow offset (1866)	116	
Corrected volume flow unit (0558)	76	
Corrected volume unit (0575)	77	
CTPL alternative (4173)	64	
Cubic temperature factor (5969)	114	
Current span		
Current input 1 to n (1605–1 to n)	132	
Current output 1 to n (0353–1 to n)	139	
Cut off inhomogeneous liquid (6374)	205	
Cut off inhomogeneous wet gas (6375)	205	
Cut off suspended bubbles (6370)	206	
Damping output 1 to n (0363–1 to n)	140	
Data logging (0860)	226	
Data logging control (0857)	227	
Data logging status (0858)	227	
Date/time format (2812)	82	
Default gateway (7210)	197	
Default gateway (7264)	192	
Define Software Lock code (14409)	56	
Density (1850)	60	
Density 2 unit (0619)	80	
Density adjustment factor (6042)	110	
Density adjustment mode (6043)	109	
Density adjustment offset (6044)	111	
Density damping (1803)	83	
Density factor (1849)	116	
Density offset (1848)	116	
Density setpoint 1 (6045)	109	
Density setpoint 2 (6046)	109	
Density unit (0555)	78	
Device ID (7153)	183	
Device name (0020)	214	
Device reset (0000)	53	
Device revision (7154)	183	
Device tag (0011)	212	
Diagnostics 1 (0692)	209	
Diagnostics 2 (0693)	210	
Diagnostics 3 (0694)	210	
Diagnostics 4 (0695)	210	
Diagnostics 5 (0696)	211	
Direct access (0106)	11	
ENP version (0012)	215	
Enter access code (0003)	13	
Entire logging duration (0861)	228	
Execute density adjustment (6041)	110	
Extended order code 1 (0023)	214	
Extended order code 2 (0021)	215	
Extended order code 3 (0022)	215	
External pressure (6209)	98	
External reference density (6198)	91	
External temperature (6080)	98	
Fail-safe type application specific 0 (2098)	202	
Fail-safe type application specific 1 (2100)	203	
Fail-safe value application specific 0 (2099)	202	
Fail-safe value application specific 1 (65535)	203	
Failure mode		
Current input 1 to n (1601–1 to n)	133	
Relay output 1 to n (0811–1 to n)	174	
Failure mode (0985)	178	
Failure mode (7116)	182	
Failure value		
Current input 1 to n (1602–1 to n)	134	
Fieldbus writing access (7156)	182	
Filter options (0705)	211	
Firmware version (0010)	213	
Fixed current		
Current output 1 to n (0365–1 to n)	139	
Fixed reference density (1814)	92	
Flow damping (1802)	83	
Flow override (1839)	84	
Gas Fraction Handler (6377)	96	
Gateway IP address (2719)	191	
High value partial filled pipe detection (1858)	89	
I/O alteration code (2762)	131	
I/O module 1 to n information (3906–1 to n)	129	
I/O module 1 to n terminal numbers (3902–1 to n)	129	
I/O module 1 to n type (3901–1 to n)	130	
I/O module 2 terminal numbers (3902–2)	218, 219, 220	
I/O module 3 terminal numbers (3902–3)	218, 219, 220	
I/O module 4 terminal numbers (3902–4)	218, 219, 220	
Index inhomogeneous medium (6368)	204	
Index suspended bubbles (6376)	205	
Installation angle pitch (6236)	101	
Installation angle roll (6282)	100	
Installation direction (1809)	100	
Invert output signal (0993)	179	
IP address (7209)	196	
IP address (7263)	192	
IP address domain name server (2720)	191	
Last backup (2757)	35	

Linear density factor (5967)	112	Parameter 2 (6360)	200
Linear expansion coefficient (1817)	93	Parameter 3 (6361)	200
Linear pressure factor (5965)	112	Parameter 4 (6345)	200
Linear temperature factor (5966)	112	Parameter 5 (6346)	200
Locking status (0004)	12	Parameter 6 (6347)	201
Logging delay (0859)	227	Parameter 7 (6348)	201
Logging interval (0856)	225	Parameter 8 (6349)	201
Login page (7273)	197	Parameter 9 (6350)	201
Low value partial filled pipe detection (1861)	88	Phase shift (0992)	177
MAC address (7262)	192	Powerless relay status	
Mass flow (1838)	59	Relay output 1 to n (0816–1 to n)	174
Mass flow factor (1832)	115	Pressure compensation (6130)	97
Mass flow offset (1831)	115	Pressure shock suppression (1806)	86
Mass flow unit (0554)	73	Pressure unit (0564)	81
Mass unit (0574)	74	Pressure value (6059)	97
Master terminal number (0981)	175	Pressure value (6129)	61
Max. switch cycles number		Previous diagnostics (0690)	208
Relay output 1 to n (0817–1 to n)	72	Progress (2808)	110
Maximum damping partial filled pipe det. (6040)	90	Pulse output (0987)	179
Maximum value (0665)	233	Pulse output 1 to n (0456–1 to n)	70
Maximum value (6007)	239	Pulse width (0986)	177
Maximum value (6009)	238	Quadratic density factor (5964)	112
Maximum value (6014)	242	Quadratic pressure factor (5962)	113
Maximum value (6029)	236	Quadratic temperature factor (5963)	113
Maximum value (6051)	232, 234	Received signal strength (2721)	191
Maximum value (6068)	238	Recommendation: (6000)	104
Maximum value (6070)	237	Reference density (1852)	60
Maximum value (6108)	235	Reference density factor (1869)	117
Maximum value (6119)	241	Reference density offset (1868)	117
Maximum value (6121)	240	Reference density unit (0556)	79
Maximum value (6283)	242	Reference sound velocity (6147)	95
Measured current 1 to n (0366–1 to n)	70	Reference temperature (1816)	92
Measured current 1 to n (1604–1 to n)	68	Relay output function	
Measured values 1 to n (1603–1 to n)	68	Relay output 1 to n (0804–1 to n)	170
Measuring mode (0984)	178	Reliability of measured zero point (5982)	107
Minimum value (0688)	233	Reset access code (0024)	53
Minimum value (6008)	239	Reset all totalizers (2806)	198
Minimum value (6010)	238	Reset min/max values (6151)	231
Minimum value (6015)	241	Response time part. filled pipe detect. (1859)	89
Minimum value (6030)	236	Response time status input	
Minimum value (6052)	232, 234	Status input 1 to n (1354–1 to n)	136
Minimum value (6069)	237	Root cause (6444)	104, 107
Minimum value (6071)	237	Scan list register 0 to 15 (7114)	184
Minimum value (6109)	235	Security identification (2718)	187
Minimum value (6120)	241	Select action (5995)	108
Minimum value (6122)	240	Select antenna (2713)	190
Minimum value (6284)	242	Select gas type (6074)	94
Multi-frequency activation (6242)	94	Select medium (6062)	94
Network security (2705)	187	Serial number (0009)	213
Nominal diameter (2807)	119	Signal mode	
Off value low flow cutoff (1804)	86	Current input 1 to n (1610–1 to n)	132
On value low flow cutoff (1805)	85	Current output 1 to n (0377–1 to n)	138
Operating time (0652)	34, 52, 209	Signal mode (0991)	176
Operating time from restart (0653)	208	Slave terminal number (0990)	176
Order code (0008)	214	Software lock (14411)	56
Output current 1 to n (0361–1 to n)	69	Software Lock login (14410)	56
Output frequency 1 to n (0471–1 to n)	70	Software option overview (0015)	55
Parameter 0 (6358)	199	Software revision	
Parameter 1 (6359)	200	I/O module 2 (0072)	218, 219, 220

I/O module 3 (0072)	218, 219, 220
I/O module 4 (0072)	218, 219, 220
Software revision (0072)	216, 217, 221
Square expansion coefficient (1818)	93
SSID name (2707)	190
SSID name (2714)	187
Subnet mask (7211)	196
Subnet mask (7265)	192
Switch cycles	
Relay output 1 to n (0815-1 to n)	72
Switch status	
Relay output 1 to n (0801-1 to n)	72, 174
Switch status 1 to n (0461-1 to n)	71
Switch-off delay	
Relay output 1 to n (0813-1 to n)	173
Switch-off value	
Relay output 1 to n (0809-1 to n)	172
Switch-on delay	
Relay output 1 to n (0814-1 to n)	173
Switch-on value	
Relay output 1 to n (0810-1 to n)	173
Target corrected volume flow (1893)	62
Target mass flow (1864)	62
Target volume flow (1895)	63
Temperature (1853)	61
Temperature coefficient sound velocity (6181)	95
Temperature correction source (6184)	98
Temperature damping (1822)	84
Temperature factor (1871)	118
Temperature offset (1870)	117
Temperature unit (0557)	81
Terminal number	
Current input 1 to n (1611-1 to n)	132
Current output 1 to n (0379-1 to n)	137
Relay output 1 to n (0812-1 to n)	169
Status input 1 to n (1358-1 to n)	134
Timestamp	207, 208
Totalizer overflow 1 to n (0910-1 to n)	67
Totalizer value 1 to n (0911-1 to n)	66
Transmitter identifier (2765)	54
User name (2715)	188
Value per pulse (0983)	177
Value status input	
Status input 1 to n (1353-1 to n)	135
Value status input 1 to n (1353-1 to n)	69
Volume flow (1847)	60
Volume flow factor (1846)	115
Volume flow offset (1841)	115
Volume flow unit (0553)	75
Volume unit (0563)	76
Web server functionality (7222)	197
Web server language (7221)	196
WLAN (2702)	186
WLAN IP address (2711)	188
WLAN MAC address (2703)	188
WLAN mode (2717)	186
WLAN passphrase (2706)	189
WLAN password (2716)	188
WLAN subnet mask (2709)	189

Zero point (6195)	119
Zero point measured (5999)	104, 108
Zero point standard deviation (5996)	105, 108
Direct access (Parameter)	11
Display (Submenu)	14
Display 1 (Submenu)	15
Display 2 (Submenu)	24
Display 3 (Submenu)	31
Display channel 1 (Submenu)	228
Display channel 2 (Submenu)	229
Display channel 3 (Submenu)	230
Display channel 4 (Submenu)	230
Display module (Submenu)	221
Disposable component (Submenu)	128
Document	
Design	4
Explanation of the structure of a parameter description	6
Function	4
Symbols	6
Target group	4
Using the document	4
Document function	4
Double pulse output (Submenu)	175
Duplex speed negotiation (Parameter)	194
Duplex status (Parameter)	195

E

Electronic temperature (Submenu)	232
ENP version (Parameter)	215
Enter access code (Parameter)	13
Entire logging duration (Parameter)	228
Event logbook (Submenu)	211
Execute density adjustment (Parameter)	110
Extended density adjustment (Submenu)	111
Extended order code 1 (Parameter)	214
Extended order code 2 (Parameter)	215
Extended order code 3 (Parameter)	215
External compensation (Submenu)	96
External pressure (Parameter)	98
External reference density (Parameter)	91
External temperature (Parameter)	98

F

Factory settings	264
SI units	264
US units	265
Fail-safe type application specific 0 (Parameter)	202
Fail-safe type application specific 1 (Parameter)	203
Fail-safe value application specific 0 (Parameter)	202
Fail-safe value application specific 1 (Parameter)	203
Failure mode (Parameter)	133, 174, 178, 182
Failure value (Parameter)	134
Fieldbus writing access (Parameter)	182
Filter options (Parameter)	211
Firmware version (Parameter)	213
Fixed current (Parameter)	139
Fixed reference density (Parameter)	92
Flow damping (Parameter)	83

Flow override (Parameter)	84
Function	
see Parameter	
G	
Gas Fraction Handler	
"Medium index" submenu	204
Gas Fraction Handler (Parameter)	96
Gateway IP address (Parameter)	191
H	
Heartbeat base settings (Submenu)	243
Heartbeat Monitoring (Submenu)	251
Heartbeat Technology (Submenu)	243
High value partial filled pipe detection (Parameter) ..	89
I	
I/O alteration code (Parameter)	131
I/O configuration (Submenu)	129
I/O module 1 to n information (Parameter)	129
I/O module 1 to n terminal numbers (Parameter) ...	129
I/O module 1 to n type (Parameter)	130
I/O module 2 (Submenu)	217
I/O module 2 terminal numbers (Parameter)	
.....	218, 219, 220
I/O module 3 (Submenu)	219
I/O module 3 terminal numbers (Parameter)	
.....	218, 219, 220
I/O module 4 (Submenu)	220
I/O module 4 terminal numbers (Parameter)	
.....	218, 219, 220
Index inhomogeneous medium (Parameter)	204
Index suspended bubbles (Parameter)	205
Input (Submenu)	131
Input simulation (Submenu)	255
Input values (Submenu)	67
Installation angle pitch (Parameter)	101
Installation angle roll (Parameter)	100
Installation direction (Parameter)	100
Interface speed (Parameter)	195
Invert output signal (Parameter)	179
IP address (Parameter)	192, 196
IP address domain name server (Parameter)	191
L	
Last backup (Parameter)	35
Linear density factor (Parameter)	112
Linear expansion coefficient (Parameter)	93
Linear pressure factor (Parameter)	112
Linear temperature factor (Parameter)	112
Locking status (Parameter)	12
Logging delay (Parameter)	227
Logging interval (Parameter)	225
Login page (Parameter)	197
Low flow cut off (Submenu)	85
Low value partial filled pipe detection (Parameter) ...	88
M	
MAC address (Parameter)	192
Main electronic module + I/O module 1 (Submenu) .	215

Main electronic temperature (Submenu)	233
Mass flow (Parameter)	59
Mass flow factor (Parameter)	115
Mass flow offset (Parameter)	115
Mass flow unit (Parameter)	73
Mass unit (Parameter)	74
Master terminal number (Parameter)	175
Max. switch cycles number (Parameter)	72
Maximum damping partial filled pipe det.	
(Parameter)	90
Maximum value (Parameter)	
232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242	
Measured current 1 to n (Parameter)	68, 70
Measured values (Submenu)	57
Measured values 1 to n (Parameter)	68
Measurement mode (Submenu)	93
Measuring mode (Parameter)	178
Medium index (Submenu)	204
Medium temperature (Submenu)	235
Min/max values (Submenu)	231
Minimum value (Parameter)	
232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242	
Modbus configuration (Submenu)	180
Modbus data map (Submenu)	184
Modbus information (Submenu)	183
Monitoring results (Submenu)	252
Multi-frequency activation (Parameter)	94
N	
Network security (Parameter)	187
Nominal diameter (Parameter)	119
O	
Off value low flow cutoff (Parameter)	86
On value low flow cutoff (Parameter)	85
Operating time (Parameter)	34, 52, 209
Operating time from restart (Parameter)	208
Order code (Parameter)	214
Oscillation amplitude (Submenu)	238
Oscillation damping (Submenu)	240
Oscillation frequency (Submenu)	236
Output (Submenu)	136
Output current 1 to n (Parameter)	69
Output frequency 1 to n (Parameter)	70
Output simulation (Submenu)	257
Output values (Submenu)	69
P	
Parameter	
Structure of description	6
Parameter 0 (Parameter)	199
Parameter 1 (Parameter)	200
Parameter 2 (Parameter)	200
Parameter 3 (Parameter)	200
Parameter 4 (Parameter)	200
Parameter 5 (Parameter)	200
Parameter 6 (Parameter)	201
Parameter 7 (Parameter)	201
Parameter 8 (Parameter)	201

Parameter 9 (Parameter)	201
Partially filled pipe detection (Submenu)	88
Performing verification (Submenu)	244
Phase shift (Parameter)	177
Powerless relay status (Parameter)	174
Pressure compensation (Parameter)	97
Pressure shock suppression (Parameter)	86
Pressure unit (Parameter)	81
Pressure value (Parameter)	61, 97
Previous diagnostics (Parameter)	208
Process conditions (Parameter)	102, 106
Process parameters (Submenu)	82
Process value simulation (Submenu)	254
Process variable adjustment (Submenu)	114
Process variables (Submenu)	57, 64, 201
Progress (Parameter)	110
Pulse output (Parameter)	179
Pulse output 1 to n (Parameter)	70
Pulse width (Parameter)	177
Pulse/frequency/switch output (Submenu)	143, 145
Pulse/frequency/switch output 1 to n (Submenu)	70

Q

Quadratic density factor (Parameter)	112
Quadratic pressure factor (Parameter)	113
Quadratic temperature factor (Parameter)	113

R

Raw values (Submenu)	120
Received signal strength (Parameter)	191
Recommendation: (Parameter)	104
Reference density (Parameter)	60
Reference density factor (Parameter)	117
Reference density offset (Parameter)	117
Reference density unit (Parameter)	79
Reference sound velocity (Parameter)	95
Reference temperature (Parameter)	92
Relay output 1 to n (Submenu)	72, 169
Relay output function (Parameter)	170
Reliability of measured zero point (Parameter)	107
Reset access code (Parameter)	53
Reset access code (Submenu)	52
Reset all totalizers (Parameter)	198
Reset min/max values (Parameter)	231
Response time part. filled pipe detect. (Parameter)	89
Response time status input (Parameter)	136
Root cause (Parameter)	104, 107

S

Scan list register 0 to 15 (Parameter)	184
Security identification (Parameter)	187
Select action (Parameter)	108
Select antenna (Parameter)	190
Select gas type (Parameter)	94
Select medium (Parameter)	94
Sensor (Submenu)	56
Sensor adjustment (Submenu)	99
Sensor electronic module (ISEM) (Submenu)	216
Sensor electronic temperature (ISEM) (Submenu)	234

Sensor index coil asymmetry (Submenu)	127
Sensor index coil asymmetry limit (Parameter)	128
Serial number (Parameter)	213
Service interface (Submenu)	193
Settings (Submenu)	149
Signal asymmetry (Submenu)	241
Signal mode (Parameter)	132, 138, 176
Simulation (Submenu)	253
Slave terminal number (Parameter)	176
Software lock (Parameter)	56
Software Lock login (Parameter)	56
Software option overview (Parameter)	55
Software revision (Parameter)	216, 217, 218, 219, 220, 221
Square expansion coefficient (Parameter)	93
SSID name (Parameter)	187, 190
Status input 1 to n (Submenu)	134
Submenu	
Additional settings	168
Administration	50
APL port	191
Application	198
Application specific calculations	198
Application-specific parameters	199
Calculated values	90
Calibration	118
Carrier pipe temperature	235
Communication	180
Configuration backup	34
Corrected volume flow calculation	90
Current input 1 to n	68, 131
Current output 1	136, 137, 141
Data logging	222
Device information	212
Diagnostic behavior	38
Diagnostic handling	37
Diagnostic list	209
Diagnostics	206
Display	14
Display 1	15
Display 2	24
Display 3	31
Display channel 1	228
Display channel 2	229
Display channel 3	230
Display channel 4	230
Display module	221
Disposable component	128
Double pulse output	175
Electronic temperature	232
Event logbook	211
Extended density adjustment	111
External compensation	96
Heartbeat base settings	243
Heartbeat Monitoring	251
Heartbeat Technology	243
I/O configuration	129
I/O module 2	217
I/O module 3	219

I/O module 4	220
Input	131
Input simulation	255
Input values	67
Low flow cut off	85
Main electronic module + I/O module 1	215
Main electronic temperature	233
Measured values	57
Measurement mode	93
Medium index	204
Medium temperature	235
Min/max values	231
Modbus configuration	180
Modbus data map	184
Modbus information	183
Monitoring results	252
Oscillation amplitude	238
Oscillation damping	240
Oscillation frequency	236
Output	136
Output simulation	257
Output values	69
Partially filled pipe detection	88
Performing verification	244
Process parameters	82
Process value simulation	254
Process variable adjustment	114
Process variables	57, 64, 201
Pulse/frequency/switch output	143, 145
Pulse/frequency/switch output 1 to n	70
Raw values	120
Relay output 1 to n	72, 169
Reset access code	52
Sensor	56
Sensor adjustment	99
Sensor electronic module (ISEM)	216
Sensor electronic temperature (ISEM)	234
Sensor index coil asymmetry	127
Service interface	193
Settings	149
Signal asymmetry	241
Simulation	253
Status input 1 to n	134
System	13
System units	73
Testpoints	119, 121
Torsion oscillation amplitude	239
Torsion oscillation damping	240
Torsion oscillation frequency	237
Torsion signal asymmetry	242
Totalizer	66
Value current output 1 to n	69
Value status input 1 to n	68
Verification results	248
Web server	195
Subnet mask (Parameter)	192, 196
Switch cycles (Parameter)	72
Switch status (Parameter)	72, 174
Switch status 1 to n (Parameter)	71

Switch-off delay (Parameter)	173
Switch-off value (Parameter)	172
Switch-on delay (Parameter)	173
Switch-on value (Parameter)	173
System (Submenu)	13
System units (Submenu)	73

T

Target corrected volume flow (Parameter)	62
Target group	4
Target mass flow (Parameter)	62
Target volume flow (Parameter)	63
Temperature (Parameter)	61
Temperature coefficient sound velocity (Parameter)	95, 96
Temperature correction source (Parameter)	98
Temperature damping (Parameter)	84
Temperature factor (Parameter)	118
Temperature offset (Parameter)	117
Temperature unit (Parameter)	81
Terminal number (Parameter)	132, 134, 137, 169
Testpoints (Submenu)	119, 121
Timestamp (Parameter)	207, 208
Torsion oscillation amplitude (Submenu)	239
Torsion oscillation damping (Submenu)	240
Torsion oscillation frequency (Submenu)	237
Torsion signal asymmetry (Submenu)	242
Totalizer (Submenu)	66
Totalizer overflow 1 to n (Parameter)	67
Totalizer value 1 to n (Parameter)	66
Transmitter identifier (Parameter)	54

U

User name (Parameter)	188
-----------------------	-----

V

Value current output 1 to n (Submenu)	69
Value per pulse (Parameter)	177
Value status input (Parameter)	69, 135
Value status input 1 to n (Submenu)	68
Verification results (Submenu)	248
Volume flow (Parameter)	60
Volume flow factor (Parameter)	115
Volume flow offset (Parameter)	115
Volume flow unit (Parameter)	75
Volume unit (Parameter)	76

W

Web server (Submenu)	195
Web server functionality (Parameter)	197
Web server language (Parameter)	196
Wizard	
Current output 1 to n	137
Define access code	51
Density adjustment	109
WLAN settings	185
Zero adjustment	105
Zero verification	102
WLAN (Parameter)	186
WLAN IP address (Parameter)	188

WLAN MAC address (Parameter)	188
WLAN mode (Parameter)	186
WLAN passphrase (Parameter)	189
WLAN password (Parameter)	188
WLAN settings (Wizard)	185
WLAN subnet mask (Parameter)	189

Z

Zero adjustment (Wizard)	105
Zero point (Parameter)	119
Zero point measured (Parameter)	104, 108
Zero point standard deviation (Parameter)	105, 108
Zero verification (Wizard)	102



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