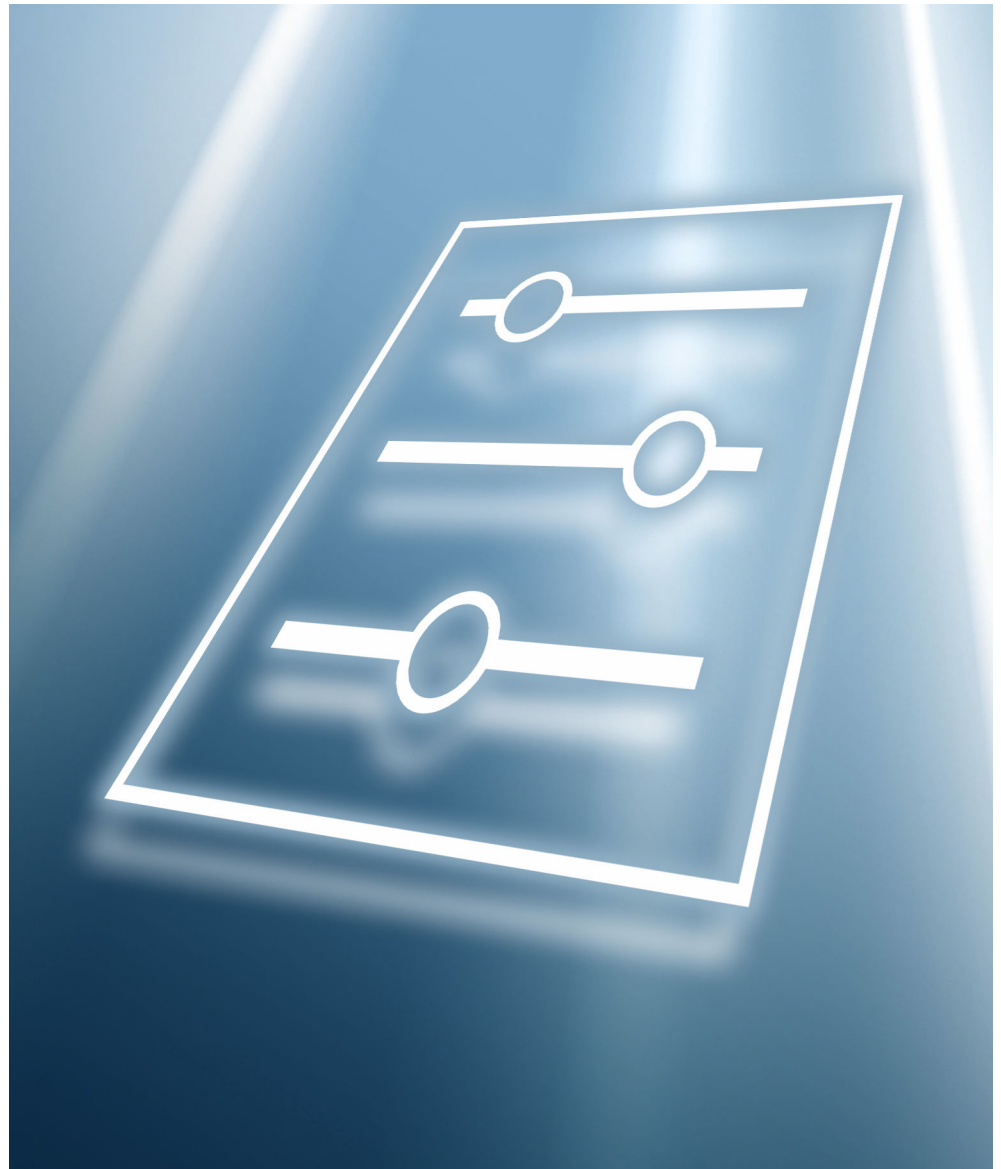


# Description of Device Parameters

## Proline Promass 500

Coriolis flowmeter  
Modbus TCP





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# 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

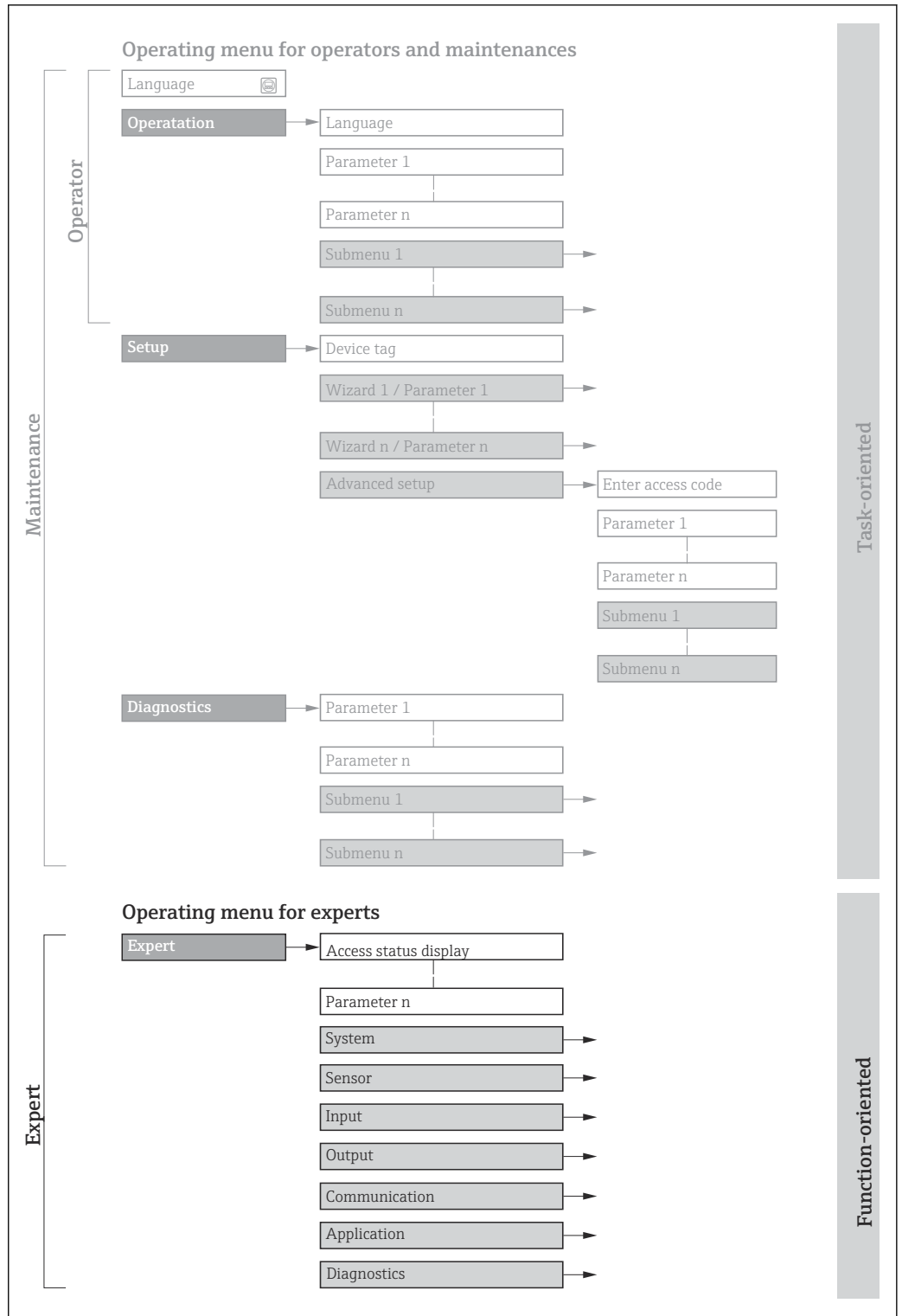
## 1.2 Target group

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 = 
<b>Navigation</b>	 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.
<b>Prerequisite</b>	The parameter is only available under these specific conditions
<b>Description</b>	Description of the parameter function
<b>Selection</b>	List of the individual options for the parameter <ul style="list-style-type: none"> <li>■ Option 1</li> <li>■ Option 2</li> </ul>
<b>User entry</b>	Parameter entry range
<b>Display</b>	Display value/data of the parameter
<b>Factory setting</b>	Default setting ex works
<b>Additional information</b>	Additional explanations (e.g. in examples): <ul style="list-style-type: none"> <li>■ For individual options</li> <li>■ For display value/data</li> <li>■ For the input range</li> <li>■ For the factory setting</li> <li>■ For the parameter function</li> </ul>

## 1.4 Symbols

### 1.4.1 Symbols for certain types of information

Symbol	Meaning
	<b>Tip</b> Indicates additional information.
	Reference to documentation
	Reference to page
	Reference to graphic
 <small>A0028662</small>	Operation via local display
 <small>A0028663</small>	Operation via operating tool
 <small>A0028665</small>	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
Promass A 500 (8A5C**-...)	BA02412D
Promass E 500	BA02414D
Promass F 500	BA02415D
Promass H 500	BA02416D
Promass I 500	BA02417D
Promass O 500	BA02418D
Promass P 500	BA02419D
Promass Q 500	BA02420D
Promass S 500	BA02421D
Promass U 500	BA02422D
Promass X 500	BA02423D

### 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	
Petroleum	
Gas fraction handler	SD02584D
Viscosity measurement Promass I	
Viscosity measurement Promass Q	SD03363D
Overrun measurement	SD02342D
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.














<b>► Expert</b>		
Direct access (0106)		→ 11
Locking status (0004)		→ 12
User role (0005)		→ 13
Enter access code (0003)		→ 13
<b>► System</b>		→ 14
<b>► Display</b>		→ 14
<b>► Configuration backup</b>		→ 35
<b>► Diagnostic handling</b>		→ 38
<b>► Administration</b>		→ 51
<b>► Sensor</b>		→ 57
<b>► Measured values</b>		→ 58
<b>► System units</b>		→ 89
<b>► Process parameters</b>		→ 99
<b>► Calculated values</b>		→ 108
<b>► Measurement mode</b>		→ 111
<b>► External compensation</b>		→ 115
<b>► Sensor adjustment</b>		→ 118
<b>► Calibration</b>		→ 138
<b>► Testpoints</b>		→ 139
<b>► I/O configuration</b>		→ 148
I/O module 1 to n terminal numbers (3902-1 to n)		→ 149

I/O module 1 to n information (3906-1 to n)	→ 149
I/O module 1 to n type (3901-1 to n)	→ 150
Apply I/O configuration (3907)	→ 150
I/O alteration code (2762)	→ 150
<b>▶ Input</b>	→ 151
<b>▶ Current input 1 to n</b>	→ 151
<b>▶ Status input 1 to n</b>	→ 154
<b>▶ Output</b>	→ 156
<b>▶ Current output 1 to n</b>	→ 156
<b>▶ Pulse/frequency/switch output     1 to n</b>	→ 86
<b>▶ Relay output 1 to n</b>	→ 189
<b>▶ Double pulse output</b>	→ 195
<b>▶ Communication</b>	→ 200
<b>▶ Modbus configuration</b>	→ 201
<b>▶ Modbus information</b>	→ 204
<b>▶ Modbus data map</b>	→ 204
<b>▶ Web server</b>	→ 217
<b>▶ WLAN settings</b>	→ 206
<b>▶ Application</b>	→ 219
Reset all totalizers (2806)	→ 220
<b>▶ Totalizer 1 to n</b>	→ 82
<b>▶ Viscosity</b>	→ 220
<b>▶ Custody transfer</b>	→ 227

▶ Application specific calculations	→ 229
▶ Medium index	→ 235
▶ Diagnostics	→ 237
Actual diagnostics (0691)	→ 238
Previous diagnostics (0690)	→ 239
Operating time from restart (0653)	→ 240
Operating time (0652)	→ 240
▶ Diagnostic list	→ 240
▶ Event logbook	→ 243
▶ Custody transfer logbook	→ 243
▶ Device information	→ 244
▶ Main electronic module + I/O module 1	→ 247
▶ Sensor electronic module (ISEM)	→ 248
▶ I/O module 2	→ 249
▶ I/O module 3	→ 250
▶ I/O module 4	→ 252
▶ Display module	→ 253
▶ Data logging	→ 254
▶ Min/max values	→ 263
▶ Heartbeat Technology	→ 275
▶ Simulation	→ 286

### 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
User role (0005)	→  13
Enter access code (0003)	→  13
▶ System	→  14
▶ Sensor	→  57
▶ I/O configuration	→  148
▶ Input	→  151
▶ Output	→  156
▶ Communication	→  200
▶ Application	→  219
▶ Diagnostics	→  237

#### 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.

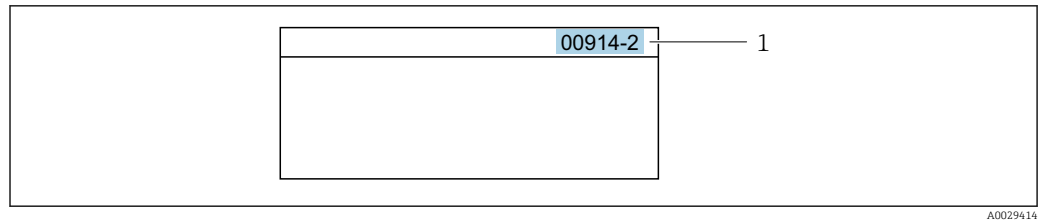
**User entry**

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.



A0029414

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 - defined parameters
- 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 <b>Access status</b> 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).
CT active - all parameters	<p> Only available for Promass F, O, Q and X.</p> <p>The DIP switch for custody transfer mode is activated on the PCB board. Locks the parameters that are relevant for custody transfer and also parameters that are predefined by Endress+Hauser and are not relevant for custody transfer (e.g. on local display or operating tool).</p> <p> For detailed information on custody transfer mode, see the Special Documentation for the device</p>

Options	Description
CT active - defined parameters	The DIP switch for the custody transfer mode is activated on the PCB board. Only locks the parameters that are relevant for custody transfer (e.g. on the local display or operating tool).  For detailed information on custody transfer mode, see the Special Documentation for the device
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.

---

## User role


---

<b>Navigation</b>	 Expert → User role (0005)
<b>Description</b>	Displays the access authorization to the parameters via the local display, Web browser or operating tool.
<b>User interface</b>	<ul style="list-style-type: none"> <li>■ Maintenance</li> <li>■ Service</li> </ul>
<b>Factory setting</b>	Maintenance
<b>Additional information</b>	<p><i>Description</i></p> <p> Access authorization can be modified via the <b>Enter access code</b> parameter (→  13).</p> <p> If additional write protection is active, this restricts the current access authorization even further.</p> <p><i>User interface</i></p> <p> 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</p>

---





## Enter access code

---


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

## 3.1 "System" submenu

Navigation  Expert → System

▶ System	
▶ Display	→  14
▶ Configuration backup	→  35
▶ Diagnostic handling	→  38
▶ Administration	→  51












### 3.1.1 "Display" submenu




Navigation  Expert → System → Display

▶ Display
-----------

#### "Display" submenu

Navigation  Expert → System → Display → Display 1

▶ Display 1	
Display language	→  15
Format display	→  15
Value 1 display	→  16
0% bargraph value 1	→  17
100% bargraph value 1	→  18
Decimal places 1	→  18
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	→  23
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)

### Factory setting





English

---

## 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.

---

\* Visibility depends on order options or device settings






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

**Factory setting** 1 value, max. size

---

## 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 \*
  - Density
  - Reference density \*
  - Density 2 \*
  - Time period signal frequency (TPS) \*
  - Time period signal (TPS) \*
  - Temperature
  - Pressure
  - Dynamic viscosity \*
  - Kinematic viscosity \*
  - Temp. compensated dynamic viscosity \*
  - Temp. compensated kinematic viscosity \*
  - Totalizer 1
  - Totalizer 2
  - Totalizer 3
  - GSV flow \*
  - GSV flow alternative \*
  - NSV flow \*
  - NSV flow alternative \*
  - S&W volume flow \*
  - Reference density alternative \*
  - Weighted density average \*
  - Weighted temperature average \*
  - 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 \*
  - Target mass flow \*

---

\* Visibility depends on order options or device settings

- 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 \*
- Inhomogeneous medium index
- Suspended bubbles index \*
- HBSI \*
- Raw value mass flow
- Exciter current 0
- Exciter current 1 \*
- Oscillation damping 0
- Oscillation damping 1 \*
- Oscillation damping fluctuation 0 \*
- Oscillation damping fluctuation 1 \*
- Oscillation frequency 0
- Oscillation frequency 1 \*
- Frequency fluctuation 0 \*
- Frequency fluctuation 1 \*
- Oscillation amplitude 0 \*
- Oscillation amplitude 1 \*
- Signal asymmetry
- Torsion signal asymmetry \*
- Carrier pipe temperature \*
- Electronics temperature
- Sensor index coil asymmetry
- Test point 0
- Test point 1
- Current output 1 \*
- Current output 2 \*
- Current output 3 \*
- Current output 4 \*

**Factory setting**

Mass flow

**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

---











\* Visibility depends on order options or device settings

<b>Factory setting</b>	Country-specific: <ul style="list-style-type: none"> <li>■ 0 kg/h</li> <li>■ 0 lb/min</li> </ul>
<b>Additional information</b>	<p><i>Description</i></p> <p> The <b>Format display</b> parameter (→  15) is used to specify that the measured value is to be displayed as a bar graph.</p> <p><i>User entry</i></p> <p> The unit of the displayed measured value is taken from the <b>System units</b> submenu (→  89).</p>

---

## 100% bargraph value 1





---

<b>Navigation</b>	<p>  Expert → System → Display → 100% bargraph 1 (0125)</p> <p>  Setup → Advanced setup → Display → 100% bargraph 1 (0125)</p> <p> Setup → Display → 100% bargraph 1 (0125)</p>
<b>Prerequisite</b>	A local display is provided.
<b>Description</b>	Use this function to enter the 100% bar graph value to be shown on the display for the measured value 1.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	Depends on country and nominal diameter →  297
<b>Additional information</b>	<p><i>Description</i></p> <p> The <b>Format display</b> parameter (→  15) is used to specify that the measured value is to be displayed as a bar graph.</p> <p><i>User entry</i></p> <p> The unit of the displayed measured value is taken from the <b>System units</b> submenu (→  89).</p>

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## Decimal places 1

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<b>Navigation</b>	<p>  Expert → System → Display → Decimal places 1 (0095)</p> <p>  Setup → Advanced setup → Display → Decimal places 1 (0095)</p>
<b>Description</b>	Select the number of decimal places for the display value.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ x</li> <li>■ x.x</li> <li>■ x.xx</li> <li>■ x.xxx</li> </ul>

- X.XXXX
- X.XXXXX
- X.XXXXXX

**Factory setting**

X.XX

---

**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 \*
- Density
- Reference density \*
- Density 2 \*
- Time period signal frequency (TPS) \*
- Time period signal (TPS) \*
- Temperature
- Pressure
- Dynamic viscosity \*
- Kinematic viscosity \*
- Temp. compensated dynamic viscosity \*
- Temp. compensated kinematic viscosity \*
- Totalizer 1
- Totalizer 2
- Totalizer 3
- GSV flow \*
- GSV flow alternative \*
- NSV flow \*
- NSV flow alternative \*
- S&W volume flow \*
- Reference density alternative \*
- Weighted density average \*
- Weighted temperature average \*
- 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 \*
- Target mass flow \*
- Carrier mass flow \*

\* Visibility depends on order options or device settings

- Target volume flow \*
- Carrier volume flow \*
- Target corrected volume flow \*
- Carrier corrected volume flow \*
- Custody transfer counter \*
- Application specific output 0 \*
- Application specific output 1 \*
- Inhomogeneous medium index
- Suspended bubbles index \*
- HBSI \*
- Raw value mass flow
- Exciter current 0
- Exciter current 1 \*
- Oscillation damping 0
- Oscillation damping 1 \*
- Oscillation damping fluctuation 0 \*
- Oscillation damping fluctuation 1 \*
- Oscillation frequency 0
- Oscillation frequency 1 \*
- Frequency fluctuation 0 \*
- Frequency fluctuation 1 \*
- Oscillation amplitude 0 \*
- Oscillation amplitude 1 \*
- Signal asymmetry
- Torsion signal asymmetry \*
- Carrier pipe temperature \*
- Electronics temperature
- Sensor index coil asymmetry
- Test point 0
- Test point 1
- Current output 1 \*
- Current output 2 \*
- Current output 3 \*
- Current output 4 \*

**Factory setting**

None

**Decimal places 2****Navigation** [Expert → System → Display → Decimal places 2 \(0117\)](#) [Setup → Advanced setup → Display → Decimal places 2 \(0117\)](#)**Description**

Select the number of decimal places for the display value.

**Selection**

- X
- X.X
- X.XX
- X.XXX
- X.XXXX
- X.XXXXX
- X.XXXXXX

\* Visibility depends on order options or device settings






**Factory setting** x.xx

---

## Value 3 display

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### 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)



### Factory setting

None



### 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 (→  15) 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 (→  89).

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## 0% bargraph value 3

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### 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

<b>Additional information</b>	<p><i>Description</i></p> <p> The <b>Format display</b> parameter (→  15) is used to specify that the measured value is to be displayed as a bar graph.</p> <p><i>User entry</i></p> <p> The unit of the displayed measured value is taken from the <b>System units</b> submenu (→  89).</p>
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### 100% bargraph value 3





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<b>Navigation</b>	<p>  Expert → System → Display → 100% bargraph 3 (0126)</p> <p>  Setup → Advanced setup → Display → 100% bargraph 3 (0126)</p> <p> Setup → Display → 100% bargraph 3 (0126)</p>
<b>Prerequisite</b>	A selection was made in the <b>Value 3 display</b> parameter (→  21).
<b>Description</b>	Use this function to enter the 100% bar graph value to be shown on the display for the measured value 3.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	0
<b>Additional information</b>	<p><i>Description</i></p> <p> The <b>Format display</b> parameter (→  15) is used to specify that the measured value is to be displayed as a bar graph.</p> <p><i>User entry</i></p> <p> The unit of the displayed measured value is taken from the <b>System units</b> submenu (→  89).</p>

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### Decimal places 3

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<b>Navigation</b>	<p>  Expert → System → Display → Decimal places 3 (0118)</p> <p>  Setup → Advanced setup → Display → Decimal places 3 (0118)</p>
<b>Description</b>	Select the number of decimal places for the display value.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ X</li> <li>■ X.X</li> <li>■ X.XX</li> <li>■ X.XXX</li> <li>■ X.XXXX</li> <li>■ X.XXXXX</li> <li>■ X.XXXXXX</li> <li>■ X.XXXXXXX</li> </ul>
<b>Factory setting</b>	x.xx

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**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 \*
- Density
- Reference density \*
- Density 2 \*
- Time period signal frequency (TPS) \*
- Time period signal (TPS) \*
- Temperature
- Pressure
- Dynamic viscosity \*
- Kinematic viscosity \*
- Temp. compensated dynamic viscosity \*
- Temp. compensated kinematic viscosity \*
- Totalizer 1
- Totalizer 2
- Totalizer 3
- GSV flow \*
- GSV flow alternative \*
- NSV flow \*
- NSV flow alternative \*
- S&W volume flow \*
- Reference density alternative \*
- Weighted density average \*
- Weighted temperature average \*
- 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 \*
- Target mass flow \*
- Carrier mass flow \*
- Target volume flow \*
- Carrier volume flow \*
- Target corrected volume flow \*
- Carrier corrected volume flow \*
- Custody transfer counter \*
- Application specific output 0 \*
- Application specific output 1 \*
- Inhomogeneous medium index

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\* Visibility depends on order options or device settings





- Suspended bubbles index \*
- HBSI \*
- Raw value mass flow
- Exciter current 0
- Exciter current 1 \*
- Oscillation damping 0
- Oscillation damping 1 \*
- Oscillation damping fluctuation 0 \*
- Oscillation damping fluctuation 1 \*
- Oscillation frequency 0
- Oscillation frequency 1 \*
- Frequency fluctuation 0 \*
- Frequency fluctuation 1 \*
- Oscillation amplitude 0 \*
- Oscillation amplitude 1 \*
- Signal asymmetry
- Torsion signal asymmetry \*
- Carrier pipe temperature
- Electronics temperature
- Sensor index coil asymmetry
- Test point 0
- Test point 1
- Current output 1 \*
- Current output 2 \*
- Current output 3 \*
- Current output 4 \*

**Factory setting**                      None

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## Decimal places 4

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**Navigation**                              [Expert → System → Display → Decimal places 4 \(0119\)](#)  
  [Setup → Advanced setup → Display → Decimal places 4 \(0119\)](#)

**Description**                            Select the number of decimal places for the display value.

**Selection**



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

**Factory setting**                      x.xx













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\* Visibility depends on order options or device settings

**"Display" submenu**

Navigation   Expert → System → Display → Display 2






▶ Display 2

Value 5 display	→  25
0% bargraph value 5	→  26
100% bargraph value 5	→  26
Decimal places 5	→  27
Value 6 display	→  27
Decimal places 6	→  28
Value 7 display	→  28
0% bargraph value 7	→  29
100% bargraph value 7	→  29
Decimal places 7	→  30
Value 8 display	→  30
Decimal places 8	→  31

**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)

**Factory setting**

None

**Additional information***Description*

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 (→  15) 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 (→  89).

**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 (→  15) is used to specify that the measured value is to be displayed as a bar graph.

*User entry*


 The unit of the displayed measured value is taken from the **System units** submenu (→  89).

**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



**Factory setting**

0

**Additional information***Description*



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

*User entry*

 The unit of the displayed measured value is taken from the **System units** submenu (→  89).

**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

**Factory setting**



x.xx


**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)







**Factory setting**

None

<b>Additional information</b>	<p><i>Description</i></p> <p>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.</p> <p> The <b>Format display</b> parameter (→  15) is used to specify how many measured values are displayed simultaneously and how.</p> <p><i>Options</i></p> <p> The unit of the displayed measured value is taken from the <b>System units</b> submenu (→  89).</p>
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## Decimal places 6

<b>Navigation</b>	<p>  Expert → System → Display → Decimal places 6 (0150)</p> <p>  Setup → Advanced setup → Display → Decimal places 6 (0150)</p>
<b>Prerequisite</b>	A measured value is specified in the <b>Value 6 display</b> parameter (→  27).
<b>Description</b>	Use this function to select the number of decimal places for measured value 6.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ X</li> <li>▪ X.X</li> <li>▪ X.XX</li> <li>▪ X.XXX</li> <li>▪ X.XXXX</li> <li>▪ X.XXXXX</li> <li>▪ X.XXXXXX</li> </ul>
<b>Factory setting</b>	x.xx
<b>Additional information</b>	<p><i>Description</i></p> <p> This setting does not affect the accuracy of the device for measuring or calculating the value.</p>

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## Value 7 display










<b>Navigation</b>	<p>  Expert → System → Display → Value 7 display (0147)</p> <p>  Setup → Advanced setup → Display → Value 7 display (0147)</p> <p> Setup → Display → Value 7 display (0147)</p>
<b>Prerequisite</b>	A local display is provided.
<b>Description</b>	Use this function to select a measured value that is shown on the local display.
<b>Selection</b>	For the picklist, see <b>Value 1 display</b> parameter (→  16)
<b>Factory setting</b>	None

<b>Additional information</b>	<p><i>Description</i></p> <p>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.</p> <p> The <b>Format display</b> parameter (→  15) is used to specify how many measured values are displayed simultaneously and how.</p> <p><i>Options</i></p> <p> The unit of the displayed measured value is taken from the <b>System units</b> submenu (→  89).</p>
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### 0% bargraph value 7






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<b>Navigation</b>	<p>  Expert → System → Display → 0% bargraph 7 (0154)</p> <p>  Setup → Advanced setup → Display → 0% bargraph 7 (0154)</p>
<b>Prerequisite</b>	An option was selected in the <b>Value 7 display</b> parameter (→  28).
<b>Description</b>	Use this function to enter the 0% bar graph value to be shown on the display for the measured value 7.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	<p>Depends on country:</p> <ul style="list-style-type: none"> <li>■ 0 kg/h</li> <li>■ 0 lb/min</li> </ul>
<b>Additional information</b>	<p><i>Description</i></p> <p> The <b>Format display</b> parameter (→  15) is used to specify that the measured value is to be displayed as a bar graph.</p> <p><i>User entry</i></p> <p> The unit of the displayed measured value is taken from the <b>System units</b> submenu (→  89).</p>








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### 100% bargraph value 7

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
<b>Navigation</b>	<p>  Expert → System → Display → 100% bargraph 7 (0156)</p> <p>  Setup → Advanced setup → Display → 100% bargraph 7 (0156)</p>
<b>Prerequisite</b>	An option was selected in the <b>Value 7 display</b> parameter (→  28).
<b>Description</b>	Use this function to enter the 100% bar graph value to be shown on the display for the measured value 7.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	0

<b>Additional information</b>	<p><i>Description</i></p> <p> The <b>Format display</b> parameter (→  15) is used to specify that the measured value is to be displayed as a bar graph.</p> <p><i>User entry</i></p> <p> The unit of the displayed measured value is taken from the <b>System units</b> submenu (→  89).</p>
<hr/>	
<b>Decimal places 7</b> 	
<b>Navigation</b>	<p>  <a href="#">Expert → System → Display → Decimal places 7 (0151)</a></p> <p>  <a href="#">Setup → Advanced setup → Display → Decimal places 7 (0151)</a></p>
<b>Prerequisite</b>	A measured value is specified in the <b>Value 7 display</b> parameter (→  28).
<b>Description</b>	Use this function to select the number of decimal places for measured value 7.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ x</li> <li>▪ x.x</li> <li>▪ x.xx</li> <li>▪ x.xxx</li> <li>▪ x.xxxx</li> <li>▪ x.xxxxx</li> <li>▪ x.xxxxxx</li> </ul>
<b>Factory setting</b>	x.xx
<b>Additional information</b>	<p><i>Description</i></p> <p> This setting does not affect the accuracy of the device for measuring or calculating the value.</p>



<hr/>	
<b>Value 8 display</b> 	
<b>Navigation</b>	<p>  <a href="#">Expert → System → Display → Value 8 display (0148)</a></p> <p>  <a href="#">Setup → Advanced setup → Display → Value 8 display (0148)</a></p> <p> <a href="#">Setup → Display → Value 8 display (0148)</a></p>
<b>Prerequisite</b>	A local display is provided.
<b>Description</b>	Use this function to select a measured value that is shown on the local display.
<b>Selection</b>	For the picklist, see <b>Value 1 display</b> parameter (→  16)
<b>Factory setting</b>	None

**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 (→  15) 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 (→  89).

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**Decimal places 8** 

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**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

**Factory setting** x.xx




**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	→  32
Display damping	→  32
Header	→  33

Header text	→  33
Separator	→  34
Contrast display	→  34
Backlight	→  35

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## Display interval





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<b>Navigation</b>	<p>  <a href="#">Operation → Display → Display interval (0096)</a></p> <p>  <a href="#">Expert → System → Display → Display interval (0096)</a></p> <p>  <a href="#">Setup → Advanced setup → Display → Display interval (0096)</a></p>
<b>Prerequisite</b>	A local display is provided.
<b>Description</b>	Use this function to enter the length of time the measured values are displayed if the values alternate on the display.
<b>User entry</b>	1 to 10 s
<b>Factory setting</b>	5 s
<b>Additional information</b>	<p><i>Description</i></p> <p>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.</p> <p> The <b>Value 1 display</b> parameter (→  16)...<b>Value 8 display</b> parameter (→  30) are used to specify which measured values are shown on the local display.</p> <ul style="list-style-type: none"> <li>▪ The display format for the measured values displayed is defined in the <b>Format display</b> parameter (→  15).</li> </ul>

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## Display damping

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<b>Navigation</b>	<p>  <a href="#">Expert → System → Display → Display damping (0094)</a></p> <p>  <a href="#">Setup → Advanced setup → Display → Display damping (0094)</a></p>
<b>Prerequisite</b>	A local display is provided.
<b>Description</b>	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.
<b>User entry</b>	0.0 to 999.9 s
<b>Factory setting</b>	0.0 s

<b>Additional information</b>	<p><i>User entry</i></p> <p>Use this function to enter a time constant (PT1 element <sup>1)</sup>) for display damping:</p> <ul style="list-style-type: none"> <li>▪ At a low time constant, the display reacts quickly to fluctuating measured variables.</li> <li>▪ If a high time constant is entered, the display reacts more slowly.</li> </ul> <p> The damping is not active if the value 0 (factory setting) is entered.</p>
-------------------------------	--

---

## Header



<b>Navigation</b>	<p>  Expert → System → Display → Header (0097)</p> <p>  Setup → Advanced setup → Display → Header (0097)</p>
-------------------	--

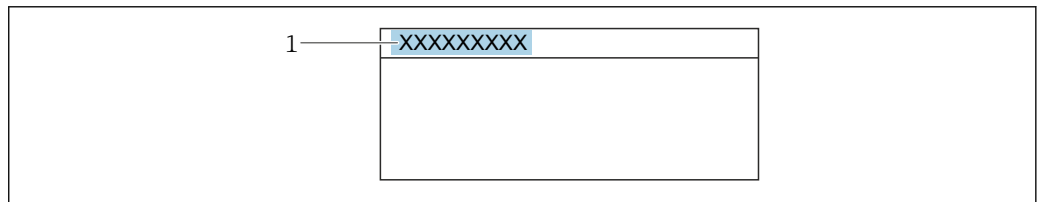
<b>Prerequisite</b>	A local display is provided.
---------------------	------------------------------

<b>Description</b>	Use this function to select the contents of the header of the local display.
--------------------	--

<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Device tag</li> <li>▪ Free text</li> </ul>
------------------	---


<b>Factory setting</b>	Device tag
------------------------	------------

<b>Additional information</b>	<p><i>Description</i></p> <p>The header text only appears during normal operation.</p>
-------------------------------	--



A0029422





1 Position of the header text on the display


<i>Selection</i>	<p>Free text</p> <p>Is defined in the <b>Header text</b> parameter (→  33).</p>
------------------	--

---

## Header text



<b>Navigation</b>	<p>  Expert → System → Display → Header text (0112)</p> <p>  Setup → Advanced setup → Display → Header text (0112)</p>
-------------------	--

<b>Prerequisite</b>	The <b>Free text</b> option is selected in the <b>Header</b> parameter (→  33).
---------------------	--

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

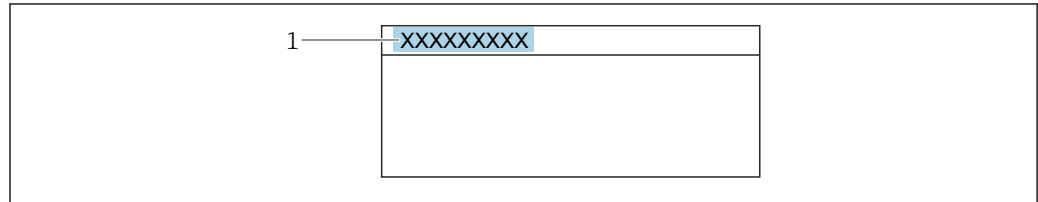
---

1) proportional transmission behavior with first order delay

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

**Factory setting** -----

**Additional information** *Description*  
The header text only appears during normal operation.



A0029422

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

---

<b>Navigation</b>	 Operation → Display → Backlight (0111)  Expert → System → Display → Backlight (0111)  Setup → Advanced setup → Display → Backlight (0111)
<b>Prerequisite</b>	<p>One of the following conditions is met:</p> <ul style="list-style-type: none"> <li>▪ Order code for "Display; operation", option <b>F</b> "4-line, illum.; touch control"</li> <li>▪ Order code for "Display; operation", option <b>G</b> "4-line, illum.; touch control +WLAN"</li> </ul>
<b>Description</b>	Switch the local display backlight on and off.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Disable</li> <li>▪ Enable</li> </ul>
<b>Factory setting</b>	Enable

### 3.1.2 "Configuration backup" submenu


*Navigation*  Expert → System → Config. backup

▶ Configuration backup	
Operating time (0652)	→  35
Last backup (2757)	→  36
Configuration management (2758)	→  36
Backup state (2759)	→  37
Comparison result (2760)	→  37

---

## Operating time


---

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

---

**Last backup**


---


<b>Navigation</b>	 Expert → System → Config. backup → Last backup (2757)
<b>Description</b>	Displays the time since a backup copy of the data was last saved to the device memory.
<b>User interface</b>	Days (d), hours (h), minutes (m) and seconds (s)

---

**Configuration management**


---



<b>Navigation</b>	 Expert → System → Config. backup → Config. managem. (2758)
<b>Description</b>	Use this function to select an action to save the data to the device memory.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Cancel</li> <li>■ Execute backup</li> <li>■ Restore *</li> <li>■ Compare *</li> <li>■ Clear backup data</li> </ul>
<b>Factory setting</b>	Cancel
<b>Additional information</b>	<i>Selection</i>

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!
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 <b>Comparison result</b> 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.


---

\* Visibility depends on order options or device settings

---

**Backup state**


---

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

**Description** Displays the status of the data backup process.

**User interface**

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

**Factory setting** None

---

**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

**Factory setting** Check not done

**Additional information** *Description*

 The comparison is started via the **Compare** option in the **Configuration management** parameter (→  36).

*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 <b>Configuration management</b> 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.



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

### HistoROM

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


## 3.1.3 "Diagnostic handling" submenu

Navigation  Expert → System → Diagn. handling

▶ Diagnostic handling	
Alarm delay (0651)	→  38
▶ Diagnostic behavior	→  39


### Alarm delay

#### Navigation

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

#### Description

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

 The diagnostic message is reset without a time delay.

#### User entry

0 to 60 s

#### Factory setting

0 s

#### Additional information


##### 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 electronics (ISEM) faulty
- 599 Custody transfer logbook full
- 830 Sensor temperature too high
- 831 Sensor temperature too low
- 832 Electronics temperature too high
- 833 Electronics 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
- 915 Viscosity out of specification
- 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 (→  39).

 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. 140 (0708)	→  41
Assign behavior of diagnostic no. 046 (0709)	→  41
Assign behavior of diagnostic no. 142 (0647)	→  41
Assign behavior of diagnostic no. 144 (0731)	→  42
Assign behavior of diagnostic no. 374 (0710)	→  42
Assign behavior of diagnostic no. 302 (0739)	→  42
Assign behavior of diagnostic no. 304 (0784)	→  43
Assign behavior of diagnostic no. 441 (0657)	→  43
Assign behavior of diagnostic no. 442 (0658)	→  43
Assign behavior of diagnostic no. 443 (0659)	→  44
Assign behavior of diagnostic no. 444 (0740)	→  44

Assign behavior of diagnostic no. 599 (0644)	→  44
Assign behavior of diagnostic no. 830 (0800)	→  45
Assign behavior of diagnostic no. 831 (0641)	→  45
Assign behavior of diagnostic no. 832 (0681)	→  45
Assign behavior of diagnostic no. 833 (0682)	→  46
Assign behavior of diagnostic no. 834 (0700)	→  46
Assign behavior of diagnostic no. 835 (0702)	→  46
Assign behavior of diagnostic no. 842 (0638)	→  47
Assign behavior of diagnostic no. 862 (0679)	→  47
Assign behavior of diagnostic no. 912 (0703)	→  48
Assign behavior of diagnostic no. 913 (0712)	→  48
Assign behavior of diagnostic no. 915 (0648)	→  48
Assign behavior of diagnostic no. 941 (0632)	→  49
Assign behavior of diagnostic no. 942 (0633)	→  49
Assign behavior of diagnostic no. 943 (0634)	→  49
Assign behavior of diagnostic no. 944 (0732)	→  50
Assign behavior of diagnostic no. 948 (0744)	→  50
Assign behavior of diagnostic no. 984 (0646)	→  51

---

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


<b>Navigation</b>	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 140 (0708)
<b>Description</b>	Use this function to change the diagnostic behavior of the <b>140 Sensor signal asymmetrical</b> diagnostic message.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Off</li> <li>▪ Alarm</li> <li>▪ Warning</li> <li>▪ Logbook entry only</li> </ul>
<b>Factory setting</b>	Alarm
<b>Additional information</b>	For a detailed description of the options available:

---

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


<b>Navigation</b>	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 046 (0709)
<b>Description</b>	Use this function to change the diagnostic behavior of the <b>046 Sensor limit exceeded</b> diagnostic message.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Off</li> <li>▪ Alarm</li> <li>▪ Warning</li> <li>▪ Logbook entry only</li> </ul>
<b>Factory setting</b>	Alarm
<b>Additional information</b>	For a detailed description of the options available:

---

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


<b>Navigation</b>	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 142 (0647)
<b>Description</b>	Change behavior of diagnostic event with diagnostic number 142 'Sensor index coil asymmetry too high'.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Off</li> <li>▪ Alarm</li> <li>▪ Warning</li> <li>▪ Logbook entry only</li> </ul>
<b>Factory setting</b>	Logbook entry only

---

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

---



<b>Navigation</b>	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 144 (0731)
<b>Description</b>	Change behavior of diagnostic event with diagnostic number 144 'Measurement error too high'.
<b>Selection</b>	<ul style="list-style-type: none"><li>▪ Off</li><li>▪ Alarm</li><li>▪ Warning</li><li>▪ Logbook entry only</li></ul>
<b>Factory setting</b>	Alarm
<b>Additional information</b>	For a detailed description of the options available:

---

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

---



<b>Navigation</b>	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 374 (0710)
<b>Description</b>	Use this function to change the diagnostic behavior of the <b>374 Sensor electronics (ISEM) faulty</b> diagnostic message.
<b>Selection</b>	<ul style="list-style-type: none"><li>▪ Off</li><li>▪ Alarm</li><li>▪ Warning</li><li>▪ Logbook entry only</li></ul>
<b>Factory setting</b>	Warning
<b>Additional information</b>	For a detailed description of the options available:

---

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

---



<b>Navigation</b>	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 302 (0739)
<b>Description</b>	Use this function to change the diagnostic behavior of the <b>302 Device verification active</b> diagnostic message.
<b>Selection</b>	<ul style="list-style-type: none"><li>▪ Off</li><li>▪ Warning</li><li>▪ Logbook entry only</li></ul>
<b>Factory setting</b>	Warning
<b>Additional information</b>	For a detailed description of the options available:

---

**Assign behavior of diagnostic no. 304**

---



<b>Navigation</b>	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 304 (0784)
<b>Description</b>	Change behavior of diagnostic event with diagnostic number 304 'Device verification failed'.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Off</li> <li>▪ Alarm</li> <li>▪ Warning</li> <li>▪ Logbook entry only</li> </ul>
<b>Factory setting</b>	Warning

---

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

---



<b>Navigation</b>	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 441 (0657)
<b>Description</b>	Use this function to change the diagnostic behavior of the <b>441 Current output 1 to n</b> diagnostic message.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Off</li> <li>▪ Alarm</li> <li>▪ Warning</li> <li>▪ Logbook entry only</li> </ul>
<b>Factory setting</b>	Warning
<b>Additional information</b>	For a detailed description of the options available:

---

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

---



<b>Navigation</b>	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 442 (0658)
<b>Prerequisite</b>	The measuring device has a pulse/frequency/switch output.
<b>Description</b>	Use this function to change the diagnostic behavior of the <b>442 Frequency output 1 to n</b> diagnostic message.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Off</li> <li>▪ Alarm</li> <li>▪ Warning</li> <li>▪ Logbook entry only</li> </ul>
<b>Factory setting</b>	Warning
<b>Additional information</b>	For a detailed description of the options available:

---

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


<b>Navigation</b>	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 443 (0659)
<b>Prerequisite</b>	The measuring device has a pulse/frequency/switch output.
<b>Description</b>	Use this function to change the diagnostic behavior of the <b>443 Pulse output 1 to n</b> diagnostic message.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Off</li> <li>▪ Alarm</li> <li>▪ Warning</li> <li>▪ Logbook entry only</li> </ul>
<b>Factory setting</b>	Warning
<b>Additional information</b>	For a detailed description of the options available:

---

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


<b>Navigation</b>	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 444 (0740)
<b>Prerequisite</b>	The device has one current input.
<b>Description</b>	Use this function to change the diagnostic behavior of the <b>444 Current input 1 to n</b> diagnostic message.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Off</li> <li>▪ Alarm</li> <li>▪ Warning</li> <li>▪ Logbook entry only</li> </ul>
<b>Factory setting</b>	Warning
<b>Additional information</b>	For a detailed description of the options available:

---

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




<b>Navigation</b>	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 599 (0644)
<b>Description</b>	Use this function to select the diagnostic behavior of the <b>△S599 Custody transfer logbook full</b> diagnostic message
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Off</li> <li>▪ Alarm</li> <li>▪ Warning</li> <li>▪ Logbook entry only</li> </ul>

**Factory setting**                      Warning

---

### 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

**Factory setting**                      Warning

**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

**Factory setting**                      Warning

**Additional information**             For a detailed description of the options available:

---

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

**Selection**                                 Off  
 Alarm  
 Warning  
 Logbook entry only

**Factory setting** Logbook entry only

**Additional information**  For a detailed description of the options available:

---

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

**Selection**

- Off
- Alarm
- Warning
- Logbook entry only

**Factory setting** 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

**Factory setting** Warning

**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.

<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Off</li> <li>▪ Alarm</li> <li>▪ Warning</li> <li>▪ Logbook entry only</li> </ul>
<b>Factory setting</b>	Warning
<b>Additional information</b>	 For a detailed description of the options available:

---

### Assign behavior of diagnostic no. 842 (Process limit)





<b>Navigation</b>	 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 842 (0638)
<b>Description</b>	Use this function to change the diagnostic behavior of the <b>842 Process limit</b> diagnostic message.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Off</li> <li>▪ Alarm</li> <li>▪ Warning</li> <li>▪ Logbook entry only</li> </ul>
<b>Factory setting</b>	Off
<b>Additional information</b>	 For a detailed description of the options available:

---

### Assign behavior of diagnostic no. 862 (Empty pipe)



<b>Navigation</b>	 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 862 (0679)
<b>Description</b>	Use this function to change the diagnostic behavior of the <b>862 Empty pipe</b> diagnostic message.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Off</li> <li>▪ Alarm</li> <li>▪ Warning</li> <li>▪ Logbook entry only</li> </ul>
<b>Factory setting</b>	Warning
<b>Additional information</b>	 For a detailed description of the options available:

---

**Assign behavior of diagnostic no. 912 (Medium inhomogeneous)**

---



<b>Navigation</b>	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 912 (0703)
<b>Description</b>	Use this function to change the diagnostic behavior of the <b>912 Medium inhomogeneous</b> diagnostic message.
<b>Selection</b>	<ul style="list-style-type: none"><li>▪ Off</li><li>▪ Alarm</li><li>▪ Warning</li><li>▪ Logbook entry only</li></ul>
<b>Factory setting</b>	Warning
<b>Additional information</b>	For a detailed description of the options available:

---

**Assign behavior of diagnostic no. 913 (Medium unsuitable)**

---



<b>Navigation</b>	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 913 (0712)
<b>Description</b>	Use this function to change the diagnostic behavior of the <b>913 Medium unsuitable</b> diagnostic message.
<b>Selection</b>	<ul style="list-style-type: none"><li>▪ Off</li><li>▪ Alarm</li><li>▪ Warning</li><li>▪ Logbook entry only</li></ul>
<b>Factory setting</b>	Warning
<b>Additional information</b>	For a detailed description of the options available:

---

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

---



<b>Navigation</b>	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 915 (0648)
<b>Description</b>	Change behavior of diagnostic event with diagnostic number 915 'Viscosity out of specification'.
<b>Selection</b>	<ul style="list-style-type: none"><li>▪ Off</li><li>▪ Alarm</li><li>▪ Warning</li><li>▪ Logbook entry only</li></ul>
<b>Factory setting</b>	Logbook entry only

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


<b>Navigation</b>	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 941 (0632)
<b>Prerequisite</b>	For the following order code: "Application package", option EJ "Petroleum"
<b>Description</b>	Use this function to change the diagnostic behavior of the diagnostic message 'API/ASTM temperature outside specification'.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Off</li> <li>■ Alarm</li> <li>■ Warning</li> <li>■ Logbook entry only</li> </ul>
<b>Factory setting</b>	Warning
<b>Additional information</b>	For a detailed description of the options available:

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

<b>Navigation</b>	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 942 (0633)
<b>Prerequisite</b>	For the following order code: "Application package", option EJ "Petroleum"
<b>Description</b>	Use this function to change the diagnostic behavior of 'API/ASTM temperature outside specification'.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Off</li> <li>■ Alarm</li> <li>■ Warning</li> <li>■ Logbook entry only</li> </ul>
<b>Factory setting</b>	Warning
<b>Additional information</b>	For a detailed description of the options available:

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



<b>Navigation</b>	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 943 (0634)
<b>Prerequisite</b>	For the following order code: "Application package", option EJ "Petroleum"

<b>Description</b>	Use this function to change the diagnostic behavior of 'API/ASTM pressure outside specification'.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Off</li> <li>▪ Alarm</li> <li>▪ Warning</li> <li>▪ Logbook entry only</li> </ul>
<b>Factory setting</b>	Warning
<b>Additional information</b>	 For a detailed description of the options available:

---

### Assign behavior of diagnostic no. 944 (Monitoring failed)





<b>Navigation</b>	 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 944 (0732)
<b>Description</b>	Use this function to change the diagnostic behavior of the <b>944 Monitoring failed</b> diagnostic message.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Off</li> <li>▪ Alarm</li> <li>▪ Warning</li> <li>▪ Logbook entry only</li> </ul>
<b>Factory setting</b>	Warning
<b>Additional information</b>	 For a detailed description of the options available:

---

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



<b>Navigation</b>	 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 948 (0744)
<b>Description</b>	Use this function to change the diagnostic behavior of the <b>948 Oscillation damping too high</b> diagnostic message.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Off</li> <li>▪ Alarm</li> <li>▪ Warning</li> <li>▪ Logbook entry only</li> </ul>
<b>Factory setting</b>	Warning
<b>Additional information</b>	 For a detailed description of the options available:

## Assign behavior of diagnostic no. 984 (Condensation risk)



<b>Navigation</b>	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 984 (0646)
<b>Description</b>	Change behavior of diagnostic event with diagnostic number 984 'Condensation risk'.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Off</li> <li>▪ Alarm</li> <li>▪ Warning</li> <li>▪ Logbook entry only</li> </ul>
<b>Factory setting</b>	Warning

### 3.1.4 "Administration" submenu

*Navigation* Expert → System → Administration



▶ Administration	
▶ Define access code	→  51
▶ Reset access code	→  53
Device reset	→  54
Transmitter identifier	→  54
Activate SW option	→  54
Software option overview	→  55
Define Software Lock code	→  56
Software Lock login	→  57
Software lock	→  57

#### "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	→  52
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***Description*

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

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

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

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

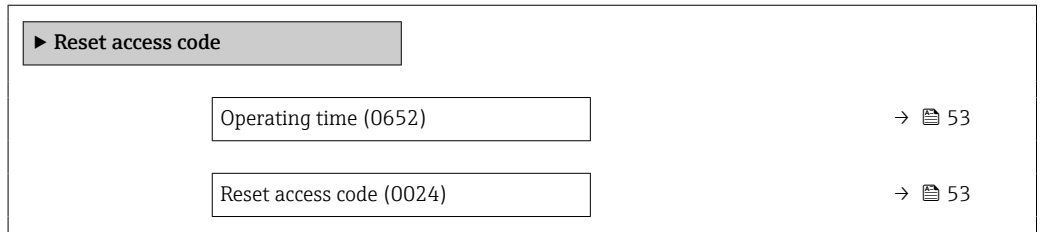
Enter the defined release code a second time to confirm the release code.

**User entry**

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

**"Reset access code" submenu**


*Navigation*  Expert → System → Administration → Reset acc. code




---

**Operating time**



---

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




---




**Reset access code**




---

<b>Navigation</b>	 Expert → System → Administration → Reset acc. code → Reset acc. code (0024)
<b>Description</b>	Use this function to enter a reset code to reset the user-specific access codes to the factory setting .
<b>User entry</b>	Character string comprising numbers, letters and special characters
<b>Factory setting</b>	0x00
<b>Additional information</b>	<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: <ul style="list-style-type: none"> <li>■ Web browser</li> <li>■ DeviceCare, FieldCare (via CDI RJ45 interface)</li> <li>■ Fieldbus</li> </ul>







### Additional parameters in the "Administration" submenu

Device reset 									
<b>Navigation</b>	  Expert → System → Administration → Device reset (0000)								
<b>Description</b>	Reset the device configuration - either entirely or in part - to a defined state.								
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Cancel</li> <li>■ To delivery settings</li> <li>■ Restart device</li> <li>■ Restore S-DAT backup *</li> </ul>								
<b>Factory setting</b>	Cancel								
<b>Additional information</b>	<i>Selection</i>								
	<table border="1"> <thead> <tr> <th>Options</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Cancel</td> <td>No action is executed and the user exits the parameter.</td> </tr> <tr> <td>To delivery settings</td> <td>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.</td> </tr> <tr> <td>Restart device</td> <td>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.</td> </tr> </tbody> </table>	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.
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.								

Transmitter identifier 	
<b>Navigation</b>	  Expert → System → Administration → Transm. identif. (2765)
<b>Description</b>	Select transmitter identifier.
<b>User interface</b>	<ul style="list-style-type: none"> <li>■ Unknown</li> <li>■ 500</li> <li>■ 300</li> </ul>
<b>Factory setting</b>	500

Activate SW option 	
<b>Navigation</b>	  Expert → System → Administration → Activate SW opt. (0029)
<b>Description</b>	Use this function to enter an activation code to enable an additional, ordered software option.



\* Visibility depends on order options or device settings

<b>User entry</b>	Max. 10-digit string of numbers.
<b>Factory setting</b>	Depends on the software option ordered
<b>Additional information</b>	<p><i>Description</i></p> <p>If a measuring device was ordered with an additional software option, the activation code is programmed in the device at the factory.</p> <p> To activate a software option subsequently, please contact your Endress+Hauser sales organization.</p> <p><i>Entering the activation code</i></p> <p> The activation code is linked to the serial number of the measuring device and varies according to the device and software option.</p> <p>If an incorrect or invalid code is entered, this results in the loss of software options that have already been activated.</p> <ul style="list-style-type: none"> <li>▶ Before you enter a new activation code, make a note of the current activation code .</li> <li>▶ Enter the new activation code provided by Endress+Hauser when the new software option was ordered.</li> <li>▶ Once the activation code has been entered, check if the new software option is displayed in the <b>Software option overview</b> parameter (→  55).</li> <li>↳ The new software option is active if it is displayed.</li> <li>↳ If the new software option is not displayed or all software options have been deleted, the code entered was either incorrect or invalid.</li> <li>▶ If the code entered is incorrect or invalid, enter the old activation code .</li> <li>▶ Have your Endress+Hauser sales organization check the new activation code remembering to specify the serial number or ask for the code again.</li> </ul> <p><i>Example for a software option</i></p> <p>Order code for "Application package", option <b>EA</b> "Extended HistoROM"</p> <p> The software options currently enabled are displayed in the <b>Software option overview</b> parameter (→  55).</p> <p><i>Web browser</i></p> <p> Once a software option has been activated, the page must be loaded again in the Web browser.</p>

---

## Software option overview

---

<b>Navigation</b>	  Expert → System → Administration → SW option overv. (0015)
<b>Description</b>	Displays all the software options that are enabled in the device.
<b>User interface</b>	<ul style="list-style-type: none"> <li>■ Extended HistoROM *</li> <li>■ Petroleum *</li> <li>■ Concentration *</li> <li>■ Viscosity/Hydrocarbon viscosity monitor. *</li> </ul>

---

\* Visibility depends on order options or device settings

- Custody transfer \*
- Application specific calculations \*
- Heartbeat Monitoring \*
- Heartbeat Verification \*
- Extended density function \*

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" and option EE "Special density"

##### *"Viscosity" option*

 Only available for Promass I.

Order code for "Application package", option EG "Viscosity"

##### *"Petroleum" option*

 Only available for Promass E, F, O, Q and X.

Order code for "Application package", option EJ "Petroleum"

##### *"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.

Order code for "Application package", option EI "Premium density,  $\pm 0.1 \text{ kg/m}^3$  + 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.

---

\* Visibility depends on order options or device settings

<b>User entry</b>	Character string comprising numbers, letters and special characters (16)
<b>Factory setting</b>	0000
<b>Additional information</b>	The locking code can contain lower-case letters, upper-case letters, numbers and special characters.

---

**Software Lock login**


---



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

---

**Software lock**


---



<b>Navigation</b>	Expert → System → Administration → Software lock (14411)
<b>Description</b>	Activate or deactivate the software lock (Software Lock access rights required).
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Off</li> <li>▪ On</li> </ul>
<b>Factory setting</b>	Off

## 3.2 "Sensor" submenu

*Navigation* Expert → Sensor

▶ Sensor	
▶ Measured values	→  58
▶ System units	→  89
▶ Process parameters	→  99
▶ Calculated values	→  108
▶ Measurement mode	→  111
▶ External compensation	→  115

▶ Sensor adjustment	→ 📖 118
▶ Calibration	→ 📖 138
▶ Testpoints	→ 📖 139
▶ Disposable component	→ 📖 148

### 3.2.1 "Measured values" submenu


























Navigation  Expert → Sensor → Measured val.


















▶ Measured values	
▶ Process variables	→ 📖 58
▶ Totalizer	→ 📖 82
▶ Input values	→ 📖 84
▶ Output values	→ 📖 85

#### "Process variables" submenu

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

▶ Process variables	
Mass flow	→ 📖 60
Volume flow	→ 📖 61
Corrected volume flow	→ 📖 61
Density	→ 📖 61
Reference density	→ 📖 61
Temperature	→ 📖 62
Pressure	→ 📖 62
Dynamic viscosity	→ 📖 62
Kinematic viscosity	→ 📖 63
Temp. compensated dynamic viscosity	→ 📖 63



Temp. compensated kinematic viscosity	→  64
Concentration	→  64
Target mass flow	→  64
Carrier mass flow	→  65
Target corrected volume flow	→  65
Carrier corrected volume flow	→  66
Target volume flow	→  66
Carrier volume flow	→  67
CTL	→  67
CPL	→  67
CTPL	→  68
S&W volume flow	→  68
S&W correction value	→  69
Reference density alternative	→  69
GSV flow	→  69
GSV flow alternative	→  70
NSV flow	→  70
NSV flow alternative	→  71
Oil CTL	→  71
Oil CPL	→  72
Oil CTPL	→  72
Water CTL	→  72
CTL alternative	→  73
CPL alternative	→  73
CTPL alternative	→  74

Oil reference density	→  74
Water reference density	→  74
Oil density	→  75
Water density	→  75
Density 2	→  76
Water cut	→  76
Oil volume flow	→  76
Oil corrected volume flow	→  77
Oil mass flow	→  77
Water volume flow	→  78
Water corrected volume flow	→  78
Water mass flow	→  79
Weighted density average	→  79
Weighted temperature average	→  80
Time period signal (TPS)	→  80
Time period signal frequency (TPS)	→  81
► Process variables	→  81

---

## Mass flow



---

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

**Description** Displays the mass flow that is currently measured.

**User interface** Signed floating-point number




**Additional information** *Dependency*

 The unit is taken from the **Mass flow unit** parameter (→  90)

---

**Volume flow**





---

<b>Navigation</b>	 Expert → Sensor → Measured val. → Process variab. → Volume flow (1847)
<b>Description</b>	Displays the volume flow that is currently calculated.
<b>User interface</b>	Signed floating-point number
<b>Additional information</b>	<p><i>Description</i></p> <p>The volume flow is calculated from the mass flow currently measured and the density currently measured.</p> <p><i>Dependency</i></p> <p> The unit is taken from the <b>Volume flow unit</b> parameter (→  91)</p>

---

**Corrected volume flow**





---

<b>Navigation</b>	 Expert → Sensor → Measured val. → Process variab. → CorrecVolumeFlow (1851)
<b>Description</b>	Displays the corrected volume flow that is currently measured.
<b>User interface</b>	Signed floating-point number
<b>Additional information</b>	<p><i>Dependency</i></p> <p> The unit is taken from the <b>Corrected volume flow unit</b> parameter (→  94)</p>

---

**Density**



---

<b>Navigation</b>	 Expert → Sensor → Measured val. → Process variab. → Density (1850)
<b>Description</b>	Displays the density that is currently measured.
<b>User interface</b>	Signed floating-point number
<b>Additional information</b>	<p><i>Dependency</i></p> <p> The unit is taken from the <b>Density unit</b> parameter (→  95)</p>

---



**Reference density**


---

<b>Navigation</b>	 Expert → Sensor → Measured val. → Process variab. → Ref.density (1852)
<b>Description</b>	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 (→  96)

---

## 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 (→  98)

---

## Pressure

---

**Navigation**   Expert → Sensor → Measured val. → Process variab. → Pressure (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 (→  98)

---

## Dynamic viscosity

---

**Navigation**   Expert → Sensor → Measured val. → Process variab. → Dynam. viscosity (1854)

**Prerequisite** For the following order code:

- "Application package", option EG "Viscosity"
- "Application package", option EK "Monitoring of hydrocarbon viscosity"

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

**Description** Displays the dynamic viscosity that is currently calculated.

**User interface** Signed floating-point number

**Additional information***Dependency*The unit is taken from the **Dynamic viscosity unit** parameter (→ 223).

---

**Kinematic viscosity**

---

**Navigation**

Expert → Sensor → Measured val. → Process variab. → Kinematic visc. (1857)

**Prerequisite**

For the following order code:

- "Application package", option EG "Viscosity"
- "Application package", option EK "Monitoring of hydrocarbon viscosity"

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

Displays the kinematic viscosity that is currently calculated.

**User interface**

Signed floating-point number

**Additional information***Dependency*The unit is taken from the **Kinematic viscosity unit** parameter (0578) (→ 225).

---

**Temp. compensated dynamic viscosity**

---

**Navigation**

Expert → Sensor → Measured val. → Process variab. → TempCompDynVisc (1872)

**Prerequisite**

For the following order code:

- "Application package", option EG "Viscosity"
- "Application package", option EK "Monitoring of hydrocarbon viscosity"

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

Displays the temperature compensation that is currently calculated for the viscosity.

**User interface**






Signed floating-point number

**Additional information***Dependency*The unit is taken from the **Dynamic viscosity unit** parameter (→ 223).

---

**Temp. compensated kinematic viscosity**






---

<b>Navigation</b>	 Expert → Sensor → Measured val. → Process variab. → TempCompKinVisc (1863)
<b>Prerequisite</b>	For the following order code: <ul style="list-style-type: none"> <li>▪ "Application package", option EG "Viscosity"</li> <li>▪ "Application package", option EK "Monitoring of hydrocarbon viscosity"</li> </ul>  The software options currently enabled are displayed in the <b>Software option overview</b> parameter (→  55).
<b>Description</b>	Displays the temperature compensation that is currently calculated for the kinetic viscosity
<b>User interface</b>	Signed floating-point number
<b>Additional information</b>	<i>Dependency</i>  The unit is taken from the <b>Kinematic viscosity unit</b> parameter (0578) (→  225).

---

**Concentration**





---

<b>Navigation</b>	 Expert → Sensor → Measured val. → Process variab. → Concentration (1887)
<b>Prerequisite</b>	For the following order code: Order code for "Application package", option <b>ED</b> "Concentration"  The software options currently enabled are displayed in the <b>Software option overview</b> parameter (→  55).
<b>Description</b>	Displays the concentration that is currently calculated.
<b>User interface</b>	Signed floating-point number
<b>Additional information</b>	<i>Dependency</i>  The unit is taken from the <b>Concentration unit</b> parameter (0613).



---

**Target mass flow**


---

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

**Additional information***Dependency*



 The unit is taken from the **Mass flow unit** parameter (→  90)

---

**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***Dependency*



 The unit is taken from the **Mass flow unit** parameter (→  90)

---

**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 (→  91)

---

**Carrier corrected volume flow**







---

<b>Navigation</b>	 Expert → Sensor → Measured val. → Process variab. → Carr.corr.vol.fl (1894)
<b>Prerequisite</b>	<p>With the following conditions:</p> <ul style="list-style-type: none"> <li>▪ Order code for "Application package", option <b>ED</b> "Concentration"</li> <li>▪ In the <b>Liquid type</b> parameter, the <b>Ethanol in water</b> option or <b>%mass / %volume</b> option is selected.</li> </ul> <p> The software options currently enabled are displayed in the <b>Software option overview</b> parameter (→  55).</p>
<b>Description</b>	Displays the corrected volume flow currently measured for the carrier fluid.
<b>User interface</b>	Signed floating-point number
<b>Additional information</b>	<p><i>Dependency</i></p> <p> The unit is taken from the <b>Volume flow unit</b> parameter (→  91)</p>

---

**Target volume flow**







---

<b>Navigation</b>	 Expert → Sensor → Measured val. → Process variab. → Target vol. flow (1895)
<b>Prerequisite</b>	<p>With the following conditions:</p> <ul style="list-style-type: none"> <li>▪ Order code for "Application package", option <b>ED</b> "Concentration"</li> <li>▪ The <b>Ethanol in water</b> option or <b>%mass / %volume</b> option is selected in the <b>Liquid type</b> parameter.</li> <li>▪ The <b>%vol</b> option is selected in the <b>Concentration unit</b> parameter.</li> </ul> <p> The software options currently enabled are displayed in the <b>Software option overview</b> parameter (→  55).</p>
<b>Description</b>	Displays the volume flow currently measured for the target medium.
<b>User interface</b>	Signed floating-point number
<b>Additional information</b>	<p><i>Dependency</i></p> <p> The unit is taken from the <b>Volume flow unit</b> parameter (→  91)</p>

---

**Carrier volume flow**





---

<b>Navigation</b>	 Expert → Sensor → Measured val. → Process variab. → Carrier vol. fl. (1896)
<b>Prerequisite</b>	<p>With the following conditions:</p> <ul style="list-style-type: none"> <li>▪ Order code for "Application package", option <b>ED</b> "Concentration"</li> <li>▪ The <b>Ethanol in water</b> option or <b>%mass / %volume</b> option is selected in the <b>Liquid type</b> parameter.</li> <li>▪ The <b>%vol</b> option is selected in the <b>Concentration unit</b> parameter.</li> </ul> <p> The software options currently enabled are displayed in the <b>Software option overview</b> parameter (→  55).</p>
<b>Description</b>	Use this function to display the volume flow currently measured for the carrier medium.
<b>User interface</b>	Signed floating-point number
<b>Additional information</b>	<p><i>Dependency</i></p> <p> The unit is taken from the <b>Volume flow unit</b> parameter (→  91)</p>

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**CTL**





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<b>Navigation</b>	 Expert → Sensor → Measured val. → Process variab. → CTL (4191)
<b>Prerequisite</b>	<p>For the following order code:</p> <ul style="list-style-type: none"> <li>▪ "Application package", option EJ "Petroleum"</li> <li>▪ The <b>API referenced correction</b> option is selected in <b>Petroleum mode</b> parameter.</li> </ul> <p> The software options currently enabled are displayed in the <b>Software option overview</b> parameter (→  55).</p>
<b>Description</b>	Displays the calibration factor which represents the effect of temperature on the fluid. This is used to convert the measured volume flow and the measured density to values at reference temperature.
<b>User interface</b>	Positive floating-point number
<b>Factory setting</b>	–

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**CPL**


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<b>Navigation</b>	 Expert → Sensor → Measured val. → Process variab. → CPL (4192)
<b>Prerequisite</b>	<p>For the following order code:</p> <ul style="list-style-type: none"> <li>▪ "Application package", option EJ "Petroleum"</li> <li>▪ The <b>API referenced correction</b> option is selected in <b>Petroleum mode</b> parameter.</li> </ul> <p> The software options currently enabled are displayed in the <b>Software option overview</b> parameter (→  55).</p>

<b>Description</b>	Displays the calibration factor which represents the effect of pressure on the fluid. This is used to convert the measured volume flow and the measured density to values at reference pressure.
<b>User interface</b>	Positive floating-point number
<b>Factory setting</b>	–

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**CTPL**








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<b>Navigation</b>	 Expert → Sensor → Measured val. → Process variab. → CTPL (4193)
<b>Prerequisite</b>	For the following order code: <ul style="list-style-type: none"> <li>▪ "Application package", option EJ "Petroleum"</li> <li>▪ The <b>API referenced correction</b> option is selected in <b>Petroleum mode</b> parameter.</li> </ul>  The software options currently enabled are displayed in the <b>Software option overview</b> parameter (→  55).
<b>Description</b>	Displays the combined calibration 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 reference temperature and reference pressure.
<b>User interface</b>	Positive floating-point number
<b>Factory setting</b>	–

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**S&W volume flow**





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<b>Navigation</b>	 Expert → Sensor → Measured val. → Process variab. → S&W volume flow (4161)
<b>Prerequisite</b>	For the following order code: <ul style="list-style-type: none"> <li>▪ "Application package", option EJ "Petroleum"</li> <li>▪ The <b>API referenced correction</b> option is selected in <b>Petroleum mode</b> parameter.</li> </ul>  The software options currently enabled are displayed in the <b>Software option overview</b> parameter (→  55).
<b>Description</b>	Displays the S&W volume flow which is calculated from the measured total volume flow minus the net volume flow. <i>Dependency</i> The unit is taken from: <b>Volume flow unit</b> parameter (→  91)
<b>User interface</b>	Signed floating-point number
<b>Factory setting</b>	–
<b>Additional information</b>	 The unit is taken from the <b>Volume flow unit</b> parameter (→  91)

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**S&W correction value**








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<b>Navigation</b>	 Expert → Sensor → Measured val. → Process variab. → S&W correction (4194)
<b>Prerequisite</b>	<p>For the following order code:</p> <ul style="list-style-type: none"> <li>▪ "Application package", option EJ "Petroleum"</li> <li>▪ The <b>External value</b> option or <b>Current input 1...n</b> option is selected in the <b>S&amp;W input mode</b> parameter.</li> </ul> <p> The software options currently enabled are displayed in the <b>Software option overview</b> parameter (→  55).</p>
<b>Description</b>	Shows the correction value for sediment and water.
<b>User interface</b>	Positive floating-point number
<b>Factory setting</b>	–

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**Reference density alternative**





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<b>Navigation</b>	 Expert → Sensor → Measured val. → Process variab. → Ref.dens.altern. (4168)
<b>Prerequisite</b>	<p>For the following order code:</p> <ul style="list-style-type: none"> <li>▪ "Application package", option EJ "Petroleum"</li> <li>▪ In the <b>Petroleum mode</b> parameter, the <b>API referenced correction</b> option is selected.</li> </ul> <p> The software options currently enabled are displayed in the <b>Software option overview</b> parameter (→  55).</p>
<b>Description</b>	<p>Displays the fluid density at the alternative reference temperature.</p> <p><i>Dependency</i></p> <p>The unit is taken from: <b>Reference density unit</b> parameter (→  96)</p>
<b>User interface</b>	Signed floating-point number
<b>Factory setting</b>	–
<b>Additional information</b>	 The unit is taken from the <b>Reference density unit</b> parameter (→  96)

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**GSV flow**


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<b>Navigation</b>	 Expert → Sensor → Measured val. → Process variab. → GSV flow (4157)
<b>Prerequisite</b>	<p>For the following order code:</p> <ul style="list-style-type: none"> <li>▪ "Application package", option EJ "Petroleum"</li> <li>▪ The <b>API referenced correction</b> option is selected in <b>Petroleum mode</b> parameter.</li> </ul> <p> The software options currently enabled are displayed in the <b>Software option overview</b> parameter (→  55).</p>

<b>Description</b>	Displays the measured total volume flow, corrected to the reference temperature and the reference pressure. <i>Dependency</i> The unit is taken from: <b>Corrected volume flow unit</b> parameter (→ ⓘ 94)
<b>User interface</b>	Signed floating-point number
<b>Factory setting</b>	–
<b>Additional information</b>	 The unit is taken from the <b>Corrected volume flow unit</b> parameter (→ ⓘ 94)

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### GSV flow alternative




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<b>Navigation</b>	  Expert → Sensor → Measured val. → Process variab. → GSVa (4158)
<b>Prerequisite</b>	For the following order code: <ul style="list-style-type: none"> <li>▪ "Application package", option <b>EJ</b> "Petroleum"</li> <li>▪ In the <b>Petroleum mode</b> parameter, the <b>API referenced correction</b> option is selected.</li> </ul>  The software options currently enabled are displayed in the <b>Software option overview</b> parameter (→ ⓘ 55).
<b>Description</b>	Displays the measured total volume flow, corrected to the alternative reference temperature and the alternative reference pressure. <i>Dependency</i> The unit is taken from: <b>Corrected volume flow unit</b> parameter (→ ⓘ 94)
<b>User interface</b>	Signed floating-point number
<b>Factory setting</b>	–
<b>Additional information</b>	 The unit is taken from the <b>Corrected volume flow unit</b> parameter (→ ⓘ 94)

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### NSV flow

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<b>Navigation</b>	  Expert → Sensor → Measured val. → Process variab. → NSV flow (4159)
<b>Prerequisite</b>	For the following order code: <ul style="list-style-type: none"> <li>▪ "Application package", option <b>EJ</b> "Petroleum"</li> <li>▪ The <b>API referenced correction</b> option is selected in <b>Petroleum mode</b> parameter.</li> </ul>  The software options currently enabled are displayed in the <b>Software option overview</b> parameter (→ ⓘ 55).
<b>Description</b>	Displays the net volume flow which is calculated from the measured total volume flow minus the value for sediment & water and minus the shrinkage. <i>Dependency</i> The unit is taken from: <b>Corrected volume flow unit</b> parameter (→ ⓘ 94)

<b>User interface</b>	Signed floating-point number
<b>Factory setting</b>	-
<b>Additional information</b>	 The unit is taken from the <b>Corrected volume flow unit</b> parameter (→  94)

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### NSV flow alternative





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<b>Navigation</b>	  Expert → Sensor → Measured val. → Process variab. → NSVa (4160)
<b>Prerequisite</b>	For the following order code: <ul style="list-style-type: none"> <li>▪ "Application package", option <b>EJ</b> "Petroleum"</li> <li>▪ In the <b>Petroleum mode</b> parameter, the <b>API referenced correction</b> option is selected.</li> </ul>  The software options currently enabled are displayed in the <b>Software option overview</b> parameter (→  55).
<b>Description</b>	Displays the net volume flow which is calculated from the measured alternative total volume minus the value for sediment & water and minus the shrinkage. <i>Dependency</i> The unit is taken from: <b>Corrected volume flow unit</b> parameter (→  94)
<b>User interface</b>	Signed floating-point number
<b>Factory setting</b>	-
<b>Additional information</b>	 The unit is taken from the <b>Corrected volume flow unit</b> parameter (→  94)

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### Oil CTL




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<b>Navigation</b>	  Expert → Sensor → Measured val. → Process variab. → Oil CTL (4175)
<b>Prerequisite</b>	For the following order code: <ul style="list-style-type: none"> <li>▪ "Application package", option <b>EJ</b> "Petroleum"</li> <li>▪ In the <b>Petroleum mode</b> parameter, the <b>Net oil &amp; water cut</b> option is selected.</li> </ul>  The software options currently enabled are displayed in the <b>Software option overview</b> parameter (→  55).
<b>Description</b>	Displays the correction factor which represents the effect of temperature on the oil. This is used to convert the measured oil volume flow and the measured oil density to values at reference temperature.
<b>User interface</b>	Positive floating-point number
<b>Factory setting</b>	-

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## Oil CPL




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<b>Navigation</b>	 Expert → Sensor → Measured val. → Process variab. → Oil CPL (4177)
<b>Prerequisite</b>	<p>For the following order code:</p> <ul style="list-style-type: none"> <li>▪ "Application package", option <b>EJ</b> "Petroleum"</li> <li>▪ In the <b>Petroleum mode</b> parameter, the <b>Net oil &amp; water cut</b> option is selected.</li> </ul> <p> The software options currently enabled are displayed in the <b>Software option overview</b> parameter (→  55).</p>
<b>Description</b>	Displays the correction factor which represents the effect of pressure on the oil. This is used to convert the measured oil volume flow and the measured oil density to values at reference pressure.
<b>User interface</b>	Positive floating-point number
<b>Factory setting</b>	–

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## Oil CTPL




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<b>Navigation</b>	 Expert → Sensor → Measured val. → Process variab. → Oil CTPL (4176)
<b>Prerequisite</b>	<p>For the following order code:</p> <ul style="list-style-type: none"> <li>▪ "Application package", option <b>EJ</b> "Petroleum"</li> <li>▪ In the <b>Petroleum mode</b> parameter, the <b>Net oil &amp; water cut</b> option is selected.</li> </ul> <p> The software options currently enabled are displayed in the <b>Software option overview</b> parameter (→  55).</p>
<b>Description</b>	Displays the combined correction factor which represents the effect of temperature and pressure on the oil. This is used to convert the measured oil volume flow and the measured oil density to values at reference temperature and reference pressure.
<b>User interface</b>	Positive floating-point number
<b>Factory setting</b>	–

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## Water CTL

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<b>Navigation</b>	 Expert → Sensor → Measured val. → Process variab. → Water CTL (4172)
<b>Prerequisite</b>	<p>For the following order code:</p> <ul style="list-style-type: none"> <li>▪ "Application package", option <b>EJ</b> "Petroleum"</li> <li>▪ In the <b>Petroleum mode</b> parameter, the <b>Net oil &amp; water cut</b> option is selected.</li> </ul> <p> The software options currently enabled are displayed in the <b>Software option overview</b> parameter (→  55).</p>

**Description** Displays the correction factor which represents the effect of temperature on the water. This is used to convert the measured water volume flow and the measured water density to values at reference temperature.

**User interface** Positive floating-point number

**Factory setting** –

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#### CTL alternative

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**Navigation**  Expert → Sensor → Measured val. → Process variab. → CTL alternative (4174)

**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 correction factor which represents the effect of temperature on the fluid. This is used to convert the measured volume flow and the measured density to values at the alternative reference temperature.


**User interface** Positive floating-point number

**Factory setting** –

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#### CPL alternative

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**Navigation**  Expert → Sensor → Measured val. → Process variab. → CPL alternative (4197)

**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 correction factor which represents the effect of pressure on the fluid. This is used to convert the measured volume flow and the measured density to values at the alternative reference pressure.




**User interface** Positive floating-point number

**Factory setting** –

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**CTPL alternative**







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<b>Navigation</b>	 Expert → Sensor → Measured val. → Process variab. → CTPL alternative (4173)
<b>Prerequisite</b>	<p>For the following order code:</p> <ul style="list-style-type: none"> <li>▪ "Application package", option <b>EJ</b> "Petroleum"</li> <li>▪ In the <b>Petroleum mode</b> parameter, the <b>API referenced correction</b> option is selected.</li> </ul> <p> The software options currently enabled are displayed in the <b>Software option overview</b> parameter (→  55).</p>
<b>Description</b>	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.
<b>User interface</b>	Positive floating-point number
<b>Factory setting</b>	1

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**Oil reference density**





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<b>Navigation</b>	 Expert → Sensor → Measured val. → Process variab. → Oil ref. density (4195)
<b>Prerequisite</b>	<p>For the following order code:</p> <ul style="list-style-type: none"> <li>▪ "Application package", option <b>EJ</b> "Petroleum"</li> <li>▪ In the <b>Petroleum mode</b> parameter, the <b>Net oil &amp; water cut</b> option is selected.</li> </ul> <p> The software options currently enabled are displayed in the <b>Software option overview</b> parameter (→  55).</p>
<b>Description</b>	Shows the oil density at the reference temperature.
<b>User interface</b>	Signed floating-point number
<b>Factory setting</b>	–
<b>Additional information</b>	<p><i>Dependency</i></p> <p> The unit is taken from the <b>Reference density unit</b> parameter (→  96)</p>

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**Water reference density**


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<b>Navigation</b>	 Expert → Sensor → Measured val. → Process variab. → Water ref. dens. (4196)
<b>Prerequisite</b>	<p>For the following order code:</p> <ul style="list-style-type: none"> <li>▪ "Application package", option <b>EJ</b> "Petroleum"</li> <li>▪ In the <b>Petroleum mode</b> parameter, the <b>Net oil &amp; water cut</b> option is selected.</li> </ul> <p> The software options currently enabled are displayed in the <b>Software option overview</b> parameter (→  55).</p>

<b>Description</b>	Shows the water density at the reference temperature.
<b>User interface</b>	Signed floating-point number
<b>Factory setting</b>	–
<b>Additional information</b>	<i>Dependency</i>  The unit is taken from: <b>Water reference density unit</b> parameter

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## Oil density





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<b>Navigation</b>	 Expert → Sensor → Measured val. → Process variab. → Oil density (4169)
<b>Prerequisite</b>	For the following order code: <ul style="list-style-type: none"> <li>▪ "Application package", option <b>EJ</b> "Petroleum"</li> <li>▪ In the <b>Petroleum mode</b> parameter, the <b>Net oil &amp; water cut</b> option is selected.</li> </ul>  The software options currently enabled are displayed in the <b>Software option overview</b> parameter (→  55).
<b>Description</b>	Displays the density of the oil currently measured.
<b>User interface</b>	Signed floating-point number
<b>Factory setting</b>	–
<b>Additional information</b>	<i>Dependency</i>  The unit is taken from: <b>Oil density unit</b> parameter

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## Water density




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<b>Navigation</b>	 Expert → Sensor → Measured val. → Process variab. → Water density (4170)
<b>Prerequisite</b>	For the following order code: <ul style="list-style-type: none"> <li>▪ "Application package", option <b>EJ</b> "Petroleum"</li> <li>▪ In the <b>Petroleum mode</b> parameter, the <b>Net oil &amp; water cut</b> option is selected.</li> </ul>  The software options currently enabled are displayed in the <b>Software option overview</b> parameter (→  55).
<b>Description</b>	Displays the density of the water currently measured.
<b>User interface</b>	Signed floating-point number
<b>Factory setting</b>	–
<b>Additional information</b>	<i>Dependency</i>  The unit is taken from: <b>Water density unit</b> parameter

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## Density 2




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<b>Navigation</b>	 Expert → Sensor → Measured val. → Process variab. → Density 2 (1905)
<b>Prerequisite</b>	<p>For the following order code:</p> <ul style="list-style-type: none"> <li>▪ "Application package", option <b>EH</b> "Extended density function"</li> <li>▪ "Application package", option <b>EI</b> "Premium density"</li> </ul> <p> The software options currently enabled are displayed in the <b>Software option overview</b> parameter (→  55).</p>
<b>Description</b>	Shows the density currently measured in the second density unit specified.
<b>User interface</b>	Signed floating-point number

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## Water cut






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<b>Navigation</b>	 Expert → Sensor → Measured val. → Process variab. → Water cut (4171)
<b>Prerequisite</b>	<p>For the following order code:</p> <ul style="list-style-type: none"> <li>▪ "Application package", option <b>EJ</b> "Petroleum"</li> <li>▪ In the <b>Petroleum mode</b> parameter, the <b>API referenced correction</b> option is selected.</li> </ul> <p> The software options currently enabled are displayed in the <b>Software option overview</b> parameter (→  55).</p>
<b>Description</b>	Displays the percentage water volume flow in relation to the total volume flow of the fluid.
<b>User interface</b>	0 to 100 %
<b>Factory setting</b>	–

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## Oil volume flow

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<b>Navigation</b>	 Expert → Sensor → Measured val. → Process variab. → Oil volume flow (4178)
<b>Prerequisite</b>	<p>For the following order code:</p> <ul style="list-style-type: none"> <li>▪ "Application package", option <b>EJ</b> "Petroleum"</li> <li>▪ In the <b>Petroleum mode</b> parameter, the <b>Net oil &amp; water cut</b> option is selected.</li> </ul> <p> The software options currently enabled are displayed in the <b>Software option overview</b> parameter (→  55).</p>
<b>Description</b>	<p>Displays the currently calculated volume flow of the oil.</p> <p>Dependency:</p> <ul style="list-style-type: none"> <li>▪ Based on the value displayed in the <b>Water cut</b> parameter (→  76)</li> <li>▪ The unit is taken from: <b>Volume flow unit</b> parameter (→  91)</li> </ul>
<b>User interface</b>	Signed floating-point number

**Factory setting** –



**Additional information** *Dependency*

 The unit is taken from the **Volume flow unit** parameter (→  91)

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## Oil corrected volume flow



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**Navigation**   Expert → Sensor → Measured val. → Process variab. → Oil corr.vol.fl. (4179)

**Prerequisite**

For the following order code:



- "Application package", option **EJ** "Petroleum"
- In the **Petroleum mode** parameter, the **Net oil & water cut** option is selected.

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

**Description**

Displays the currently calculated volume flow of the oil, calculated to values at reference temperature and reference pressure.

Dependency:

- Based on the value displayed in the **Water cut** parameter (→  76)
- The unit is taken from: **Corrected volume flow unit** parameter (→  94)



**User interface**

Signed floating-point number

**Factory setting**

–



**Additional information**

 The unit is taken from the **Corrected volume flow unit** parameter (→  94)

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## Oil mass flow


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**Navigation**   Expert → Sensor → Measured val. → Process variab. → Oil mass flow (4180)

**Prerequisite**

For the following order code:



- "Application package", option **EJ** "Petroleum"
- In the **Petroleum mode** parameter, the **Net oil & water cut** option is selected.

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

**Description**

Displays the currently calculated mass flow of the oil.

Dependency:











- Based on the value displayed in the **Water cut** parameter (→  76)
- The unit is taken from: **Mass flow unit** parameter (→  90)

**User interface**

Signed floating-point number

**Factory setting**









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<b>Additional information</b>	<p><i>Dependency</i></p> <p> The unit is taken from the <b>Mass flow unit</b> parameter (→  90)</p>
<hr/>	
<b>Water volume flow</b>	
<hr/>	
<b>Navigation</b>	  Expert → Sensor → Measured val. → Process variab. → Water vol. flow (4181)
<b>Prerequisite</b>	<p>For the following order code:</p> <ul style="list-style-type: none"> <li>▪ "Application package", option <b>EJ</b> "Petroleum"</li> <li>▪ In the <b>Petroleum mode</b> parameter, the <b>Net oil &amp; water cut</b> option is selected.</li> </ul> <p> The software options currently enabled are displayed in the <b>Software option overview</b> parameter (→  55).</p>
<b>Description</b>	<p>Displays the currently calculated volume flow of the water.</p> <p>Dependency:</p> <ul style="list-style-type: none"> <li>▪ Based on the value displayed in the <b>Water cut</b> parameter (→  76)</li> <li>▪ The unit is taken from: <b>Volume flow unit</b> parameter (→  91)</li> </ul>
<b>User interface</b>	Signed floating-point number
<b>Factory setting</b>	–
<b>Additional information</b>	<p><i>Dependency</i></p> <p> The unit is taken from the <b>Volume flow unit</b> parameter (→  91)</p>

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**Water corrected volume flow**









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<b>Navigation</b>	  Expert → Sensor → Measured val. → Process variab. → Water corr.v.fl. (4182)
<b>Prerequisite</b>	<p>For the following order code:</p> <ul style="list-style-type: none"> <li>▪ "Application package", option <b>EJ</b> "Petroleum"</li> <li>▪ In the <b>Petroleum mode</b> parameter, the <b>Net oil &amp; water cut</b> option is selected.</li> </ul> <p> The software options currently enabled are displayed in the <b>Software option overview</b> parameter (→  55).</p>
<b>Description</b>	<p>Displays the currently calculated volume flow of the water, calculated to values at reference temperature and reference pressure.</p> <p>Dependency:</p> <ul style="list-style-type: none"> <li>▪ Based on the value displayed in the <b>Water cut</b> parameter (→  76)</li> <li>▪ The unit is taken from: <b>Corrected volume flow unit</b> parameter (→  94)</li> </ul>
<b>User interface</b>	Signed floating-point number
<b>Factory setting</b>	–
<b>Additional information</b>	 The unit is taken from the <b>Corrected volume flow unit</b> parameter (→  94)

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**Water mass flow**








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<b>Navigation</b>	 Expert → Sensor → Measured val. → Process variab. → Water mass flow (4183)
<b>Prerequisite</b>	<p>For the following order code:</p> <ul style="list-style-type: none"> <li>▪ "Application package", option <b>EJ</b> "Petroleum"</li> <li>▪ In the <b>Petroleum mode</b> parameter, the <b>Net oil &amp; water cut</b> option is selected.</li> </ul> <p> The software options currently enabled are displayed in the <b>Software option overview</b> parameter (→  55).</p>
<b>Description</b>	<p>Displays the currently calculated mass flow of the water.</p> <p>Dependency:</p> <ul style="list-style-type: none"> <li>▪ Based on the value displayed in the <b>Water cut</b> parameter (→  76)</li> <li>▪ The unit is taken from: <b>Mass flow unit</b> parameter (→  90)</li> </ul>
<b>User interface</b>	Signed floating-point number
<b>Factory setting</b>	–
<b>Additional information</b>	<p><i>Dependency</i></p> <p> The unit is taken from the <b>Mass flow unit</b> parameter (→  90)</p>

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**Weighted density average**








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<b>Navigation</b>	 Expert → Sensor → Measured val. → Process variab. → Density average (4184)
<b>Prerequisite</b>	<p>For the following order code:</p> <ul style="list-style-type: none"> <li>▪ "Application package", option <b>EJ</b> "Petroleum"</li> <li>▪ "Application package", option <b>EM</b> "Petroleum + Locking function"</li> </ul> <p> The software options currently enabled are displayed in the <b>Software option overview</b> parameter (→  55).</p>
<b>Description</b>	<p>Displays the weighted average for the density since the last time the density averages were reset.</p> <p>Dependency:</p> <ul style="list-style-type: none"> <li>▪ The unit is taken from: <b>Density unit</b> parameter (→  95)</li> <li>▪ The value is reset to NaN (Not a Number) via the <b>Reset weighted averages</b> parameter</li> </ul>
<b>User interface</b>	Signed floating-point number
<b>Factory setting</b>	–
<b>Additional information</b>	<p><i>Dependency</i></p> <p> <ul style="list-style-type: none"> <li>▪ The unit is taken from: <b>Density unit</b> parameter (→  95)</li> <li>▪ The value is reset to NaN (Not a Number) via the <b>Reset weighted averages</b> parameter</li> </ul> </p>

---

**Weighted temperature average**





---

<b>Navigation</b>	 Expert → Sensor → Measured val. → Process variab. → Temp. average (4185)
<b>Prerequisite</b>	<p>For the following order code:</p> <ul style="list-style-type: none"> <li>▪ "Application package", option <b>EJ</b> "Petroleum"</li> <li>▪ "Application package", option <b>EM</b> "Petroleum + Locking function"</li> </ul> <p> The software options currently enabled are displayed in the <b>Software option overview</b> parameter (→  55).</p>
<b>Description</b>	<p>Displays the weighted average for the temperature since the last time the temperature averages were reset.</p> <p>Dependency:</p> <ul style="list-style-type: none"> <li>▪ The unit is taken from: <b>Temperature unit</b> parameter (→  98)</li> <li>▪ The value is reset to NaN (Not a Number) via the <b>Reset weighted averages</b> parameter</li> </ul>
<b>User interface</b>	Signed floating-point number
<b>Factory setting</b>	–
<b>Additional information</b>	<p><i>Dependency</i></p> <p> <ul style="list-style-type: none"> <li>▪ The unit is taken from: <b>Temperature unit</b> parameter (→  98)</li> <li>▪ The value is reset to NaN (Not a Number) via the <b>Reset weighted averages</b> parameter</li> </ul></p>

---



**Time period signal (TPS)**


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<b>Navigation</b>	 Expert → Sensor → Measured val. → Process variab. → TPS (1903)
<b>Prerequisite</b>	<p>For the following order code:</p> <ul style="list-style-type: none"> <li>▪ "Application package", option <b>EH</b> "Extended density function"</li> <li>▪ "Application package", option <b>EI</b> "Premium density"</li> </ul> <p> The software options currently enabled are displayed in the <b>Software option overview</b> parameter (→  55).</p>
<b>Description</b>	Shows the time period signal (TPS) currently calculated. Corresponds to the measured density.
<b>User interface</b>	Positive floating-point number

**Time period signal frequency (TPS)**



**Navigation**   Expert → Sensor → Measured val. → Process variab. → TPS frequency (1904)

**Prerequisite** For the following order code:  
 ■ "Application package", option **EH** "Extended density function"  
 ■ "Application package", option **EI** "Premium density"  
 The software options currently enabled are displayed in the **Software option overview** parameter (→  55).





**Description** Shows the frequency of the time period signal (TPS) currently calculated. Corresponds to the measured density.

**User interface** 0 to 10 000 Hz



*"Process variables" submenu*

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

▶ **Process variables**

Application specific input 0 (6366)	→  81
Application specific input 1 (6367)	→  82
Application specific output 0 (6364)	→  82
Application specific output 1 (6365)	→  82

**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

**Factory setting** 0

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**Application specific input 1**




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<b>Navigation</b>	  Expert → Sensor → Measured val. → Process variab. → Process variab. → Spec. input 1 (6367)
<b>Description</b>	Shows the application specific input value 1 used for the application specific calculation.
<b>User interface</b>	Signed floating-point number
<b>Factory setting</b>	0

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**Application specific output 0**




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



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**Application specific output 1**


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<b>Navigation</b>	  Expert → Sensor → Measured val. → Process variab. → Process variab. → Spec. output 1 (6365)
<b>Description</b>	Shows the calculated specific output value 1.
<b>User interface</b>	Signed floating-point number
<b>Factory setting</b>	0

**"Totalizer" submenu**




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

▶ Totalizer	
Totalizer 1 to n value	→  83
Totalizer 1 to n overflow	→  83

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**Totalizer 1 to n value**


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<b>Navigation</b>	 Expert → Sensor → Measured val. → Totalizer → Tot. 1 to n value (0911-1 to n)
<b>Prerequisite</b>	A process variable is selected in the <b>Assign process variable</b> parameter of the <b>Totalizer 1 to n</b> submenu.
<b>Description</b>	Displays the current totalizer reading.
<b>User interface</b>	Signed floating-point number
<b>Additional information</b>	<p><i>Description</i></p> <p>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 <b>Totalizer overflow 1 to n</b> parameter if the display range is exceeded.</p> <p> In the event of an error, the totalizer adopts the mode defined in the <b>Failure mode</b> parameter.</p> <p><i>Display</i></p> <p>The value of the process variable aggregated since measuring began can be positive or negative. This depends on the settings in the <b>Totalizer operation mode</b> parameter.</p> <p></p> <p><i>Example</i></p> <p>Calculation of the current totalizer reading when the value exceeds the 7-digit display range of the operating tool:</p> <ul style="list-style-type: none"> <li>▪ Value in the <b>Totalizer value 1</b> parameter: 1 968 457 m<sup>3</sup></li> <li>▪ Value in the <b>Totalizer overflow 1</b> parameter: <math>1 \cdot 10^7</math> (1 overflow) = 10 000 000 m<sup>3</sup></li> <li>▪ Current totalizer value: 11 968 457 m<sup>3</sup></li> </ul>

---

**Totalizer 1 to n overflow**


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<b>Navigation</b>	 Expert → Sensor → Measured val. → Totalizer → Tot. 1 to n overflow (0910-1 to n)
<b>Prerequisite</b>	A process variable is selected in the <b>Assign process variable</b> parameter of the <b>Totalizer 1 to n</b> submenu.
<b>Description</b>	Displays the current totalizer overflow.
<b>User interface</b>	Integer with sign
<b>Additional information</b>	<p><i>Description</i></p> <p>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.</p>

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 m<sup>3</sup>
- Value in the **Totalizer overflow 1** parameter:  $2 \cdot 10^7$  (2 overflows) = 20 000 000 [m<sup>3</sup>]
- Current totalizer value: 21 968 457 m<sup>3</sup>

### "Input values" submenu

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

▶ Input values	
▶ Current input 1 to n	→  84
▶ Value status input 1 to n	→  85

### "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)	→  84
Measured current 1 to n (1604-1 to n)	→  85



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## Measured values 1 to n



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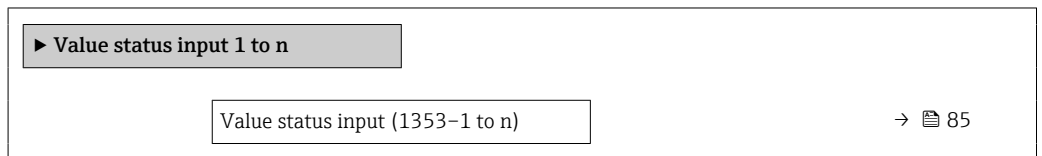
<b>Navigation</b>	Expert → Sensor → Measured val. → Input values → Current input 1 to n → Measured val. 1 to n (1603-1 to n)
<b>Description</b>	Displays the current input value.
<b>User interface</b>	Signed floating-point number

**Measured current 1 to n**



<b>Navigation</b>	  Expert → Sensor → Measured val. → Input values → Current input 1 to n → Measur. curr. 1 to n (1604-1 to n)
<b>Description</b>	Displays the current value of the current input.
<b>User interface</b>	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

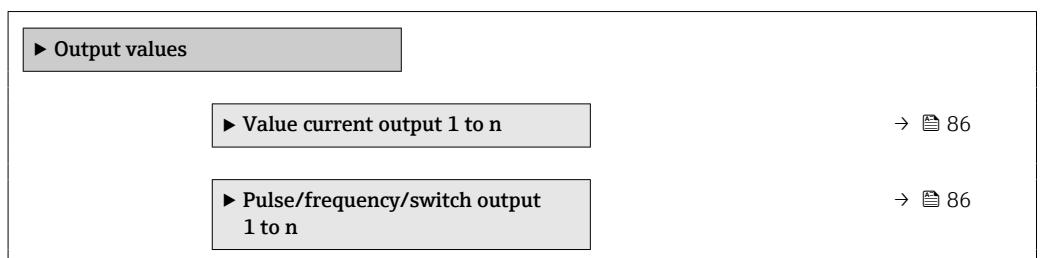


**Value status input**

<b>Navigation</b>	  Expert → Sensor → Measured val. → Input values → Val.stat.inp. 1 to n → Val.stat.inp. (1353-1 to n)
<b>Description</b>	Displays the current input signal level.
<b>User interface</b>	<ul style="list-style-type: none"> <li>■ High</li> <li>■ Low</li> </ul>



**"Output values" submenu**

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



▶ Relay output 1 to n	→ 88
▶ Double pulse output	→ 195

*"Value current output 1 to n" submenu*



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

▶ Value current output 1 to n	
Output current (0361-1 to n)	→ 86
Measured current (0366-1 to n)	→ 86

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## Output current



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



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## Measured current

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<b>Navigation</b>	  Expert → Sensor → Measured val. → Output values → Current output 1 to n → Measur. curr. (0366-1 to n)
<b>Description</b>	Displays the actual measured value of the output current.
<b>User interface</b>	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 (0471-1 to n)	→ 87
Pulse output (0456-1 to n)	→ 87
Switch state (0461-1 to n)	→ 88

### Output frequency

<b>Navigation</b>	Expert → Sensor → Measured val. → Output values → PFS output 1 to n → Output freq. (0471-1 to n)
<b>Prerequisite</b>	In the <b>Operating mode</b> parameter (→ 165), the <b>Frequency</b> option is selected.
<b>Description</b>	Displays the actual value of the output frequency which is currently measured.
<b>User interface</b>	0.0 to 12 500.0 Hz

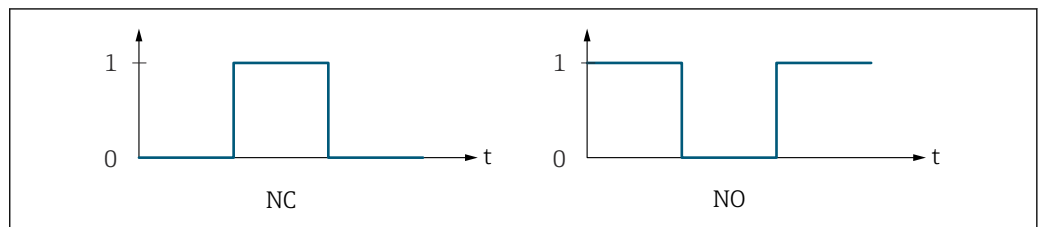
### Pulse output

<b>Navigation</b>	Expert → Sensor → Measured val. → Output values → PFS output 1 to n → Pulse output (0456-1 to n)
<b>Prerequisite</b>	The <b>Pulse</b> option is selected in the <b>Operating mode</b> parameter (→ 165) parameter.
<b>Description</b>	Displays the pulse frequency currently output.
<b>User interface</b>	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 (→ 188) 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 (→ 📄 171)) can be configured.

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## Switch state

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<b>Navigation</b>	📄📄 Expert → Sensor → Measured val. → Output values → PFS output 1 to n → Switch state (0461-1 to n)
<b>Prerequisite</b>	The <b>Switch</b> option is selected in the <b>Operating mode</b> parameter (→ 📄 165).
<b>Description</b>	Displays the current switch status of the status output.
<b>User interface</b>	<ul style="list-style-type: none"> <li>▪ Open</li> <li>▪ Closed</li> </ul>
<b>Additional information</b>	<p><i>User interface</i></p> <ul style="list-style-type: none"> <li>▪ Open The switch output is not conductive.</li> <li>▪ Closed The switch output is conductive.</li> </ul>

### "Relay output 1 to n" submenu

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

▶ Relay output 1 to n	
Switch state (0801-1 to n)	→ 📄 88
Switch cycles (0815-1 to n)	→ 📄 89
Max. switch cycles number (0817-1 to n)	→ 📄 89

---

## Switch state


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<b>Navigation</b>	📄📄 Expert → Sensor → Measured val. → Output values → Relay output 1 to n → Switch state (0801-1 to n)
<b>Description</b>	Displays the current status of the relay output.
<b>User interface</b>	<ul style="list-style-type: none"> <li>▪ Open</li> <li>▪ Closed</li> </ul>

**Additional information**      *User interface*

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


**Switch cycles**

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

**Description**                      Displays all the switch cycles performed.

**User interface**                      Positive integer

**Max. switch cycles number**

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








**Description**                      Displays the maximum number of guaranteed switch cycles.






**User interface**                      Positive integer

### 3.2.2 "System units" submenu

*Navigation*                       Expert → Sensor → System units



▶ System units

Mass flow unit (0554)	→  90
Mass unit (0574)	→  91
Volume flow unit (0553)	→  91
Volume unit (0563)	→  93
Corrected volume flow unit (0558)	→  94
Corrected volume unit (0575)	→  94
Density unit (0555)	→  95

Reference density unit (0556)	→  96
Density 2 unit (0619)	→  97
Temperature unit (0557)	→  98
Pressure unit (0564)	→  98
Date/time format (2812)	→  99

## Mass flow unit

### Navigation

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

### Description

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

### Selection

#### SI units

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

#### US units

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

### Factory setting




Country-specific:

- kg/h (DN > 150 (6"): **t/h** option)
- lb/min

### Additional information

#### Effect

The selected unit applies to:

- **Target mass flow** parameter (→  64)
- **Carrier mass flow** parameter (→  65)
- **Mass flow** parameter (→  60)

#### Options

 For an explanation of the abbreviated units: →  303

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**Mass unit**

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**Navigation**

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

**Description**

Use this function to select the unit for the mass.

**Selection***SI units*

- g
- kg
- t

*US units*

- oz
- lb
- STon

**Factory setting**

Country-specific:

- kg (DN > 150 (6"): **t** option)
- lb

**Additional information***Options*

For an explanation of the abbreviated units: → 303

---

**Volume flow unit**

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**Navigation**

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

**Description**

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

**Selection***SI units*

- cm<sup>3</sup>/s
- cm<sup>3</sup>/min
- cm<sup>3</sup>/h
- cm<sup>3</sup>/d
- dm<sup>3</sup>/s
- dm<sup>3</sup>/min
- dm<sup>3</sup>/h
- dm<sup>3</sup>/d
- m<sup>3</sup>/s
- m<sup>3</sup>/min
- m<sup>3</sup>/h
- m<sup>3</sup>/d
- ml/s
- ml/min
- ml/h
- ml/d
- l/s
- l/min
- l/h
- l/d
- hl/s
- hl/min
- hl/h
- hl/d
- Ml/s
- Ml/min
- Ml/h
- Ml/d

*US units*

- af/s
- af/min
- af/h
- af/d
- ft<sup>3</sup>/s
- ft<sup>3</sup>/min
- ft<sup>3</sup>/h
- ft<sup>3</sup>/d
- kft<sup>3</sup>/s
- kft<sup>3</sup>/min
- kft<sup>3</sup>/h
- kft<sup>3</sup>/d
- MMft<sup>3</sup>/s
- MMft<sup>3</sup>/min
- MMft<sup>3</sup>/h
- Mft<sup>3</sup>/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 (DN > 150 (6"): **m<sup>3</sup>/h** option)  
 ■ gal/min (us)

**Additional information** *Effect*  
 The selected unit applies to:  
**Volume flow** parameter (→ ⓘ 61)



*Options*

 For an explanation of the abbreviated units: → ⓘ 303

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**Volume unit**



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

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

**Selection**


<p><i>SI units</i></p> <ul style="list-style-type: none"> <li>■ cm<sup>3</sup></li> <li>■ dm<sup>3</sup></li> <li>■ m<sup>3</sup></li> <li>■ ml</li> <li>■ l</li> <li>■ hl</li> <li>■ Ml Mega</li> </ul>	<p><i>US units</i></p> <ul style="list-style-type: none"> <li>■ af</li> <li>■ ft<sup>3</sup></li> <li>■ Mft<sup>3</sup></li> <li>■ Mft<sup>3</sup></li> <li>■ fl oz (us)</li> <li>■ gal (us)</li> <li>■ kgal (us)</li> <li>■ Mgal (us)</li> <li>■ bbl (us;oil)</li> <li>■ bbl (us;tank)</li> </ul>	<p><i>Imperial units</i></p> <ul style="list-style-type: none"> <li>■ gal (imp)</li> <li>■ Mgal (imp)</li> <li>■ bbl (imp;oil)</li> </ul>
--	--	---

or




<p><i>US units</i></p> <ul style="list-style-type: none"> <li>■ bbl (us;liq.) *</li> <li>■ bbl (us;beer) *</li> </ul>	<p><i>Imperial units</i></p> <ul style="list-style-type: none"> <li>■ bbl (imp;beer) *</li> </ul>
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\* Visibility depends on order options or device settings

**Factory setting** Country-specific:  
 ■ l (DN > 150 (6"): **m<sup>3</sup>** option)  
 ■ gal (us)



**Additional information** *Options*  
 For an explanation of the abbreviated units: → ⓘ 303

Corrected volume flow unit 																																																																												
<b>Navigation</b>	  Expert → Sensor → System units → Cor.volflow unit (0558)																																																																											
<b>Description</b>	Use this function to select the unit for the corrected volume flow.																																																																											
<b>Selection</b>	<table border="0"> <thead> <tr> <th><i>SI units</i></th> <th><i>US units</i></th> <th><i>Imperial units</i></th> </tr> </thead> <tbody> <tr> <td>■ NI/s</td> <td>■ Sft<sup>3</sup>/s</td> <td>■ Sgal/s (imp)</td> </tr> <tr> <td>■ NI/min</td> <td>■ Sft<sup>3</sup>/min</td> <td>■ Sgal/min (imp)</td> </tr> <tr> <td>■ NI/h</td> <td>■ Sft<sup>3</sup>/h</td> <td>■ Sgal/h (imp)</td> </tr> <tr> <td>■ NI/d</td> <td>■ Sft<sup>3</sup>/d</td> <td>■ Sgal/d (imp)</td> </tr> <tr> <td>■ Nhl/s</td> <td>■ MSft<sup>3</sup>/s</td> <td></td> </tr> <tr> <td>■ Nhl/min</td> <td>■ MSft<sup>3</sup>/min</td> <td></td> </tr> <tr> <td>■ Nhl/h</td> <td>■ MSft<sup>3</sup>/h</td> <td></td> </tr> <tr> <td>■ Nhl/d</td> <td>■ MSft<sup>3</sup>/D</td> <td></td> </tr> <tr> <td>■ Nm<sup>3</sup>/s</td> <td>■ MMSft<sup>3</sup>/s</td> <td></td> </tr> <tr> <td>■ Nm<sup>3</sup>/min</td> <td>■ MMSft<sup>3</sup>/min</td> <td></td> </tr> <tr> <td>■ Nm<sup>3</sup>/h</td> <td>■ MMSft<sup>3</sup>/h</td> <td></td> </tr> <tr> <td>■ Nm<sup>3</sup>/d</td> <td>■ MMSft<sup>3</sup>/d</td> <td></td> </tr> <tr> <td>■ Sl/s</td> <td>■ Sgal/s (us)</td> <td></td> </tr> <tr> <td>■ Sl/min</td> <td>■ Sgal/min (us)</td> <td></td> </tr> <tr> <td>■ Sl/h</td> <td>■ Sgal/h (us)</td> <td></td> </tr> <tr> <td>■ Sl/d</td> <td>■ Sgal/d (us)</td> <td></td> </tr> <tr> <td>■ Sm<sup>3</sup>/s</td> <td>■ Sbbbl/s (us;liq.)</td> <td></td> </tr> <tr> <td>■ Sm<sup>3</sup>/min</td> <td>■ Sbbbl/min (us;liq.)</td> <td></td> </tr> <tr> <td>■ Sm<sup>3</sup>/h</td> <td>■ Sbbbl/h (us;liq.)</td> <td></td> </tr> <tr> <td>■ Sm<sup>3</sup>/d</td> <td>■ Sbbbl/d (us;liq.)</td> <td></td> </tr> <tr> <td></td> <td>■ Sbbbl/s (us;oil)</td> <td></td> </tr> <tr> <td></td> <td>■ Sbbbl/min (us;oil)</td> <td></td> </tr> <tr> <td></td> <td>■ Sbbbl/h (us;oil)</td> <td></td> </tr> <tr> <td></td> <td>■ Sbbbl/d (us;oil)</td> <td></td> </tr> </tbody> </table>	<i>SI units</i>	<i>US units</i>	<i>Imperial units</i>	■ NI/s	■ Sft <sup>3</sup> /s	■ Sgal/s (imp)	■ NI/min	■ Sft <sup>3</sup> /min	■ Sgal/min (imp)	■ NI/h	■ Sft <sup>3</sup> /h	■ Sgal/h (imp)	■ NI/d	■ Sft <sup>3</sup> /d	■ Sgal/d (imp)	■ Nhl/s	■ MSft <sup>3</sup> /s		■ Nhl/min	■ MSft <sup>3</sup> /min		■ Nhl/h	■ MSft <sup>3</sup> /h		■ Nhl/d	■ MSft <sup>3</sup> /D		■ Nm <sup>3</sup> /s	■ MMSft <sup>3</sup> /s		■ Nm <sup>3</sup> /min	■ MMSft <sup>3</sup> /min		■ Nm <sup>3</sup> /h	■ MMSft <sup>3</sup> /h		■ Nm <sup>3</sup> /d	■ MMSft <sup>3</sup> /d		■ Sl/s	■ Sgal/s (us)		■ Sl/min	■ Sgal/min (us)		■ Sl/h	■ Sgal/h (us)		■ Sl/d	■ Sgal/d (us)		■ Sm <sup>3</sup> /s	■ Sbbbl/s (us;liq.)		■ Sm <sup>3</sup> /min	■ Sbbbl/min (us;liq.)		■ Sm <sup>3</sup> /h	■ Sbbbl/h (us;liq.)		■ Sm <sup>3</sup> /d	■ Sbbbl/d (us;liq.)			■ Sbbbl/s (us;oil)			■ Sbbbl/min (us;oil)			■ Sbbbl/h (us;oil)			■ Sbbbl/d (us;oil)	
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<b>Factory setting</b>	Country-specific: <ul style="list-style-type: none"> <li>■ NI/h (DN &gt; 150 (6"): <b>Nm<sup>3</sup>/h</b> option)</li> <li>■ Sft<sup>3</sup>/min</li> </ul>																																																																											
<b>Additional information</b>	<p><i>Effect</i></p> <p>The selected unit applies to:  <b>Corrected volume flow</b> parameter (→  61)</p> <p><i>Options</i></p> <p> For an explanation of the abbreviated units: →  303</p>																																																																											

Corrected volume unit 	
<b>Navigation</b>	  Expert → Sensor → System units → Corr. vol. unit (0575)
<b>Description</b>	Use this function to select the unit for the corrected volume.

<b>Selection</b>	<i>SI units</i> <ul style="list-style-type: none"> <li>■ NI</li> <li>■ Nhl</li> <li>■ Nm<sup>3</sup></li> <li>■ Sl</li> <li>■ Sm<sup>3</sup></li> </ul>	<i>US units</i> <ul style="list-style-type: none"> <li>■ Sft<sup>3</sup></li> <li>■ MSft<sup>3</sup></li> <li>■ MMSft<sup>3</sup></li> <li>■ Sgal (us)</li> <li>■ Sbbl (us;liq.)</li> <li>■ Sbbl (us;oil)</li> </ul>	<i>Imperial units</i> Sgal (imp)
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<b>Factory setting</b>	Country-specific: <ul style="list-style-type: none"> <li>■ NI (DN &gt; 150 (6"): <b>Nm<sup>3</sup></b> option)</li> <li>■ Sft<sup>3</sup></li> </ul>
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<b>Additional information</b>	<i>Options</i>  For an explanation of the abbreviated units: →  303
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**Density unit** 

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

**Description** Use this function to select the unit for the density.

<b>Selection</b>	<i>SI units</i> <ul style="list-style-type: none"> <li>■ g/cm<sup>3</sup></li> <li>■ g/m<sup>3</sup></li> <li>■ g/ml</li> <li>■ g/l</li> <li>■ kg/l</li> <li>■ kg/dm<sup>3</sup></li> <li>■ kg/m<sup>3</sup></li> <li>■ SD4°C</li> <li>■ SD15°C</li> <li>■ SD20°C</li> <li>■ SG4°C</li> <li>■ SG15°C</li> <li>■ SG20°C</li> </ul>	<i>US units</i> <ul style="list-style-type: none"> <li>■ lb/ft<sup>3</sup></li> <li>■ lb/gal (us)</li> <li>■ lb/bbl (us;oil)</li> <li>■ lb/bbl (us;tank)</li> <li>■ lb/in<sup>3</sup></li> <li>■ STon/yd<sup>3</sup></li> </ul>	<i>Imperial units</i> <ul style="list-style-type: none"> <li>■ lb/gal (imp)</li> <li>■ lb/bbl (imp;oil)</li> </ul>
------------------	---	---	--

*Other units*  
°API

or

*US units*  
SG60°F\*

\* Visibility depends on order options or device settings

or

<i>US units</i>	<i>Imperial units</i>
■ lb/bbl (us;liq.) *	■ lb/bbl (imp;beer) *
■ lb/bbl (us;beer) *	

\* Visibility depends on order options or device settings

**Factory setting**

Country-specific:

- kg/l
- lb/ft<sup>3</sup>

**Additional information***Effect*

The selected unit applies to:

- **Density setpoint 1** parameter (→ ⓘ 128)
- **Density setpoint 2** parameter (→ ⓘ 128)
- **Density** parameter (→ ⓘ 61)

*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: → ⓘ 303

**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/Nm<sup>3</sup>
- kg/Nl
- g/Scm<sup>3</sup>
- kg/Sm<sup>3</sup>
- RD15°C
- RD20°C

*US units*

- lb/Sft<sup>3</sup>
- RD60°F

*Other units*

- °APIbase

**Factory setting**

Country-specific:

- kg/Nl
- lb/Sft<sup>3</sup>

**Additional information***Effect*

The selected unit applies to:

- **External reference density** parameter (→ ⓘ 109)
- **Fixed reference density** parameter (→ ⓘ 109)
- **Reference density** parameter (→ ⓘ 61)

*Options*

For an explanation of the abbreviated units: → ⓘ 303

**Density 2 unit****Navigation**

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

**Description**

Select second density unit.

**Selection***SI units*

- g/cm<sup>3</sup>
- g/m<sup>3</sup>
- g/ml
- g/l
- kg/l
- kg/dm<sup>3</sup>
- kg/m<sup>3</sup>
- SD4°C
- SD15°C
- SD20°C
- SG4°C
- SG15°C
- SG20°C

*Other units*

°API

or

*US units*

SG60°F \*

\* 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/ft<sup>3</sup>

**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: → 303

Temperature unit							
<b>Navigation</b>	 Expert → Sensor → System units → Temperature unit (0557)						
<b>Description</b>	Use this function to select the unit for the temperature.						
<b>Selection</b>	<table border="0"> <thead> <tr> <th><i>SI units</i></th> <th><i>US units</i></th> </tr> </thead> <tbody> <tr> <td>▪ °C</td> <td>▪ °F</td> </tr> <tr> <td>▪ K</td> <td>▪ °R</td> </tr> </tbody> </table>	<i>SI units</i>	<i>US units</i>	▪ °C	▪ °F	▪ K	▪ °R
<i>SI units</i>	<i>US units</i>						
▪ °C	▪ °F						
▪ K	▪ °R						
<b>Factory setting</b>	Country-specific: <ul style="list-style-type: none"> <li>▪ °C</li> <li>▪ °F</li> </ul>						
<b>Additional information</b>	<p><i>Effect</i></p> <p>The selected unit applies to:</p> <ul style="list-style-type: none"> <li>▪ <b>Maximum value</b> parameter (→  265)</li> <li>▪ <b>Minimum value</b> parameter (→  264)</li> <li>▪ <b>Maximum value</b> parameter (→  267)</li> <li>▪ <b>Minimum value</b> parameter (→  267)</li> <li>▪ <b>Maximum value</b> parameter (→  269)</li> <li>▪ <b>Minimum value</b> parameter (→  268)</li> <li>▪ <b>External temperature</b> parameter (→  117)</li> <li>▪ <b>Reference temperature</b> parameter (6222) (→  222)</li> <li>▪ <b>Temperature</b> parameter (→  62)</li> <li>▪ <b>Reference temperature</b> parameter (→  110)</li> </ul> <p><i>Options</i></p> <p> For an explanation of the abbreviated units: →  303</p>						

Pressure unit																			
<b>Navigation</b>	 Expert → Sensor → System units → Pressure unit (0564)																		
<b>Description</b>	Use this function to select the unit for the pipe pressure.																		
<b>Selection</b>	<table border="0"> <thead> <tr> <th><i>SI units</i></th> <th><i>US units</i></th> </tr> </thead> <tbody> <tr> <td>▪ MPa a</td> <td>▪ psi a</td> </tr> <tr> <td>▪ MPa g</td> <td>▪ psi g</td> </tr> <tr> <td>▪ kPa a</td> <td></td> </tr> <tr> <td>▪ kPa g</td> <td></td> </tr> <tr> <td>▪ Pa a</td> <td></td> </tr> <tr> <td>▪ Pa g</td> <td></td> </tr> <tr> <td>▪ bar</td> <td></td> </tr> <tr> <td>▪ bar g</td> <td></td> </tr> </tbody> </table>	<i>SI units</i>	<i>US units</i>	▪ MPa a	▪ psi a	▪ MPa g	▪ psi g	▪ kPa a		▪ kPa g		▪ Pa a		▪ Pa g		▪ bar		▪ bar g	
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▪ kPa a																			
▪ kPa g																			
▪ Pa a																			
▪ Pa g																			
▪ bar																			
▪ bar g																			
<b>Factory setting</b>	Country-specific: <ul style="list-style-type: none"> <li>▪ bar a</li> <li>▪ psi a</li> </ul>																		


**Additional information**

*Effect*

The unit is taken from:

- **Pressure value** parameter (→ ⓘ 116)
- **External pressure** parameter (→ ⓘ 116)
- **Pressure value** parameter (→ ⓘ 62)



*Options*

 For an explanation of the abbreviated units: → ⓘ 303

**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

**Factory setting**

dd.mm.yy hh:mm



**Additional information**

*Selection*

 For an explanation of the abbreviated units: → ⓘ 303

### 3.2.3 "Process parameters" submenu

*Navigation*

  Expert → Sensor → Process param.

▶ Process parameters

Flow damping (1802)	→ ⓘ 100
Density damping (1803)	→ ⓘ 100
Temperature damping (1822)	→ ⓘ 101
Flow override (1839)	→ ⓘ 101
Density limit (4199)	→ ⓘ 102
▶ Low flow cut off	→ ⓘ 102
▶ Partially filled pipe detection	→ ⓘ 105

---

**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

**Factory setting**

0 s

**Additional information***Description*

The damping is performed by a PT1 element <sup>2)</sup>.

*User entry*

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

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

*Effect*

The damping affects the following variables of the device:

- Outputs
- Low flow cut off → 102
- 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

**Factory setting**

0 s

---


2) Proportional behavior with first-order lag

**Additional information***Description*

 The damping is performed by a PT1 element <sup>3)</sup>.

*User entry*

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



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

---

**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

**Factory setting**


0 s

**Additional information***Description*

 The damping is performed by a PT1 element <sup>4)</sup>.

*User entry*

- 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

**Factory setting**

Off

3) Proportional behavior with first-order lag



4) Proportional behavior with first-order lag

<b>Additional information</b>	<p><i>Description</i></p> <p><b>Flow override is active</b></p> <ul style="list-style-type: none"> <li>▪ The <b>453 Flow override</b> diagnostic message is output.</li> <li>▪ Output values <ul style="list-style-type: none"> <li>▪ Temperature: continues to be output</li> <li>▪ Totalizer 1...3: stop being totalized</li> </ul> </li> </ul> <p> The <b>Flow override</b> option can also be activated in the <b>Status input</b> submenu: <b>Assign status input</b> parameter (→  155).</p>
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## Density limit

---

<b>Navigation</b>	  Expert → Sensor → Process param. → Density limit (4199)
<b>Description</b>	Enter limit value for the observed oil density. For higher °API values or lower kg/m <sup>3</sup> values this limit value will be output.
<b>User entry</b>	Positive floating-point number
<b>Factory setting</b>	0 kg/m <sup>3</sup>

### "Low flow cut off" submenu



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

<b>▶ Low flow cut off</b>	
Assign process variable (1837)	→  102
On value low flow cutoff (1805)	→  103
Off value low flow cutoff (1804)	→  103
Pressure shock suppression (1806)	→  104

---

## Assign process variable

---

<b>Navigation</b>	  Expert → Sensor → Process param. → Low flow cut off → Assign variable (1837)
<b>Description</b>	Use this function to select the process variable for low flow cutoff detection.



- Selection**
- Off
  - Mass flow
  - Volume flow
  - Corrected volume flow<sup>\*</sup>

**Factory setting**                      Mass 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 (→  102).

**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 →  103.

**User entry**                              Positive floating-point number

**Factory setting**                        Depends on country and nominal diameter →  298



**Additional information**              *Dependency*

 The unit depends on the process variable selected in the **Assign process variable** parameter (→  102).


---

### 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 (→  102).

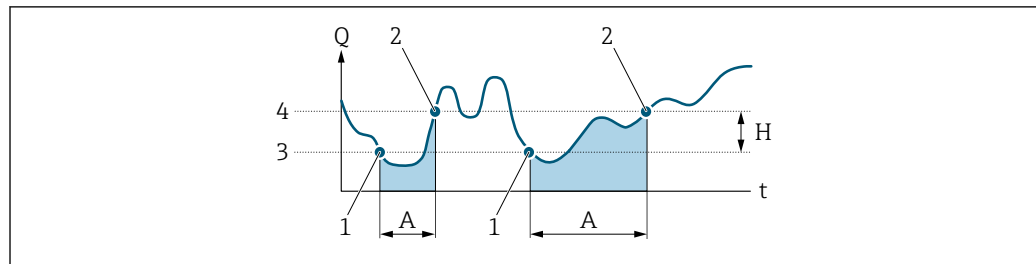
**Description**                            Use this function to enter a switch-off value for low flow cut off. The switch-off value is entered as a positive hysteresis from the switch-on value →  103.

**User entry**                              0 to 100.0 %

**Factory setting**                        50 %

---

\*      Visibility depends on order options or device settings

**Additional information** *Example*

A0012887

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

**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 (→ 102).

**Description**

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

**User entry**

0 to 100 s

**Factory setting**

0 s

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

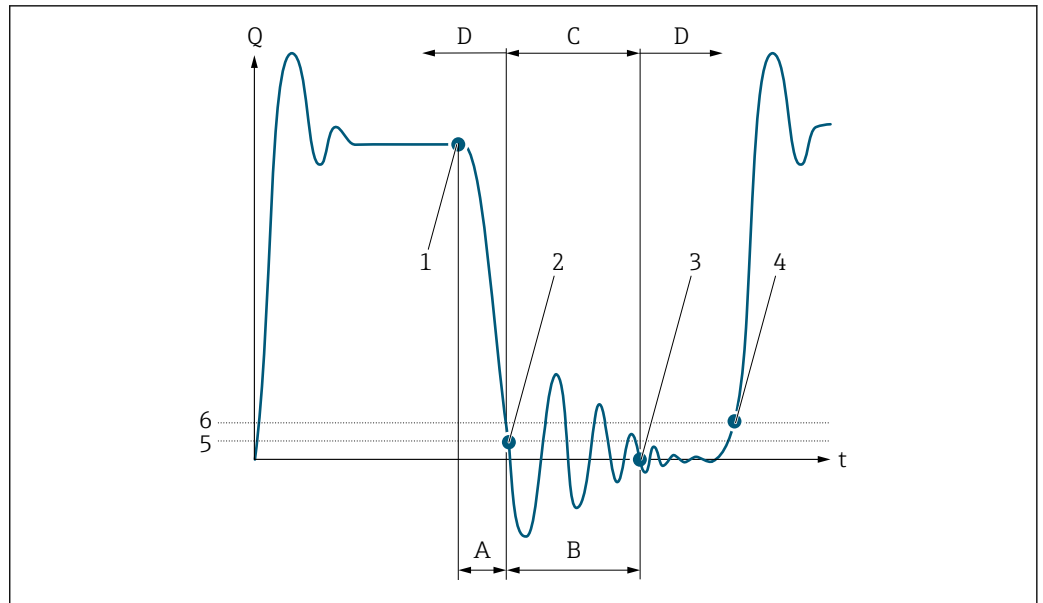
- Prerequisite:
  - Flow rate < on-value of low flow cut off  
or
  - Change in the flow direction
- Output values
  - Flow displayed: 0
  - Totalizer: the totalizers are pegged at the last correct value

**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.








- 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)	→  106
Low value partial filled pipe detection (1861)	→  106
High value partial filled pipe detection (1858)	→  106
Response time part. filled pipe detect. (1859)	→  107
Maximum damping partial filled pipe det. (6040)	→  107

---

**Assign process variable**


<b>Navigation</b>	Expert → Sensor → Process param. → Partial pipe det → Assign variable (1860)
<b>Description</b>	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.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Off</li> <li>▪ Density</li> <li>▪ Calculated reference density</li> </ul>
<b>Factory setting</b>	Density

---





**Low value partial filled pipe detection**


<b>Navigation</b>	Expert → Sensor → Process param. → Partial pipe det → Low value (1861)
<b>Prerequisite</b>	A process variable is selected in the <b>Assign process variable</b> parameter (→  106).
<b>Description</b>	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.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	Depends on country: <ul style="list-style-type: none"> <li>▪ 200 kg/m<sup>3</sup></li> <li>▪ 12.5 lb/ft<sup>3</sup></li> </ul>
<b>Additional information</b>	<p><i>User entry</i></p> <p>The lower limit value must be less than the upper limit value defined in the <b>High value partial filled pipe detection</b> parameter (→  106).</p> <p> The unit depends on the process variable selected in the <b>Assign process variable</b> parameter (→  106).</p> <p><i>Limit value</i></p> <p> If the displayed value is outside the limit value, the measuring device displays the <b>862 Partly filled pipe</b> diagnostic message.</p>

---




**High value partial filled pipe detection**


<b>Navigation</b>	Expert → Sensor → Process param. → Partial pipe det → High value (1858)
<b>Prerequisite</b>	A process variable is selected in the <b>Assign process variable</b> parameter (→  106).
<b>Description</b>	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.

<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	Depends on country: <ul style="list-style-type: none"> <li>■ 6 000 kg/m<sup>3</sup></li> <li>■ 374.6 lb/ft<sup>3</sup></li> </ul>
<b>Additional information</b>	<p><i>User entry</i></p> <p>The upper limit value must be greater than the lower limit value defined in the <b>Low value partial filled pipe detection</b> parameter (→  106).</p> <p> The unit depends on the process variable selected in the <b>Assign process variable</b> parameter (→  106).</p> <p><i>Limit value</i></p> <p> If the displayed value is outside the limit value, the measuring device displays the <b>862 Partly filled pipe</b> diagnostic message.</p>



---

**Response time part. filled pipe detect.**


<b>Navigation</b>	  Expert → Sensor → Process param. → Partial pipe det → Response time (1859)
<b>Prerequisite</b>	A process variable is selected in the <b>Assign process variable</b> parameter (→  106).
<b>Description</b>	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.
<b>User entry</b>	0 to 100 s
<b>Factory setting</b>	1 s

---

**Maximum damping partial filled pipe det.**


<b>Navigation</b>	  Expert → Sensor → Process param. → Partial pipe det → Max. damping (6040)
<b>Description</b>	Use this function to enter a damping value to enable detection of empty or partially filled measuring tubes.
<b>User entry</b>	Positive floating-point number
<b>Factory setting</b>	0
<b>Additional information</b>	<p><i>Description</i></p> <p>If oscillation damping exceeds the specified value, the measuring device presumes that the pipe is partially filled and the flow signal is set to <b>0</b>. The measuring device displays the</p>

△**S862 Partly filled pipe** diagnostic message. In the case of non-homogeneous media or air pockets, the damping of the measuring tubes increases.

*User entry*

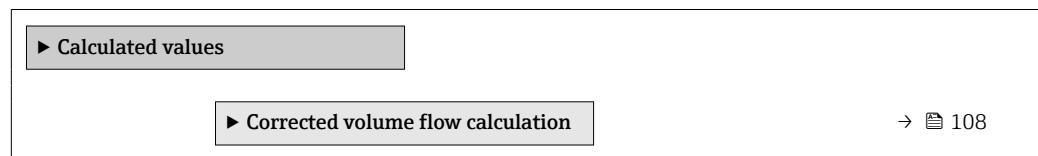
- Damping is disabled if **0** is entered (factory setting).
- Damping is enabled if the value entered is greater than **0**.
- The value entered depends on application-specific influence variables, such as the medium, nominal diameter, sensor etc.

*Example*

- 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.

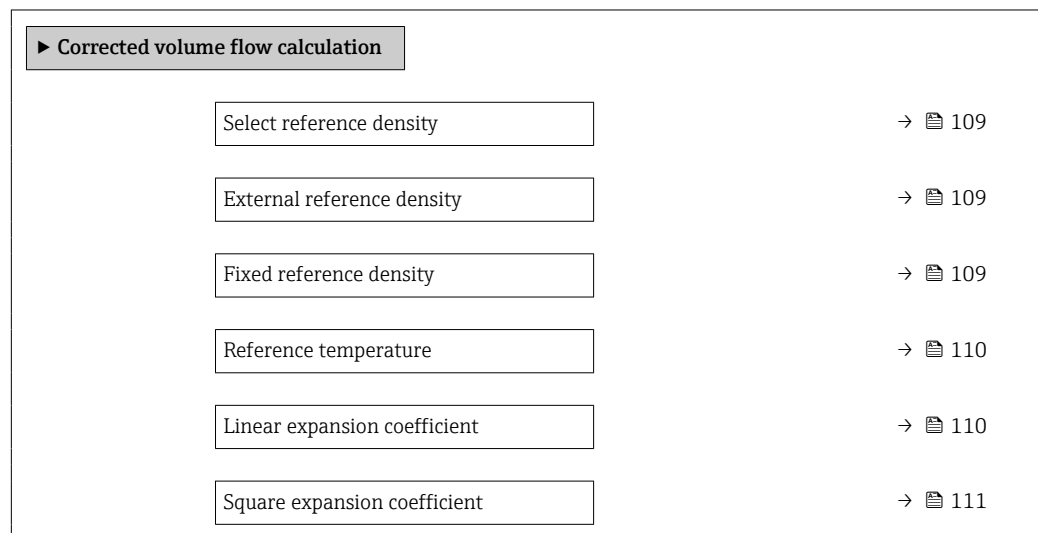
### 3.2.4 "Calculated values" submenu

*Navigation*   Expert → Sensor → Calculated value



#### "Corrected volume flow calculation" submenu

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



---

**Select reference density**


<b>Navigation</b>	Expert → Sensor → Calculated value → Corr. vol.flow. → Select ref. dens (1812)
<b>Description</b>	Use this function to select the reference density for calculating the corrected volume flow.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Fixed reference density</li> <li>■ Calculated reference density</li> <li>■ Current input 1 *</li> <li>■ Current input 2 *</li> <li>■ Current input 3 *</li> </ul>
<b>Factory setting</b>	Calculated reference density
<b>Additional information</b>	<p><i>Selection</i></p> <p>The <b>Reference density by API table 53</b> option is suitable only for applications involving LPG<sup>5)</sup>, where the flow rate is measured on the basis of the corrected volume flow.</p> <p>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 →  115 →  115) 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.</p>

---

**External reference density**

<b>Navigation</b>	Expert → Sensor → Calculated value → Corr. vol.flow. → Ext. ref.density (6198)
<b>Description</b>	Displays the reference density which is read in externally, e.g. via the current input.
<b>User interface</b>	Floating point number with sign
<b>Additional information</b>	<p><i>Dependency</i></p> <p> The unit is taken from the <b>Reference density unit</b> parameter (→  96)</p>

---



**Fixed reference density**


<b>Navigation</b>	Expert → Sensor → Calculated value → Corr. vol.flow. → Fix ref.density (1814)
<b>Prerequisite</b>	The <b>Fixed reference density</b> option is selected in the <b>Corrected volume flow calculation</b> parameter (→  109) parameter.
<b>Description</b>	Use this function to enter a fixed value for the reference density.

---






\* Visibility depends on order options or device settings

5) liquefied petroleum gas

<b>User entry</b>	Positive floating-point number
<b>Factory setting</b>	1 kg/Nl
<b>Additional information</b>	<i>Dependency</i>  The unit is taken from the <b>Reference density unit</b> parameter (→  96)

---

**Reference temperature**


<b>Navigation</b>	  Expert → Sensor → Calculated value → Corr. vol.flow. → Ref. temperature (1816)
<b>Prerequisite</b>	The <b>Calculated reference density</b> option is selected in the <b>Corrected volume flow calculation</b> parameter (→  109) parameter.
<b>Description</b>	Use this function to enter a reference temperature for calculating the reference density.
<b>User entry</b>	-273.15 to 99 999 °C
<b>Factory setting</b>	Country-specific: <ul style="list-style-type: none"> <li>■ +20 °C</li> <li>■ +68 °F</li> </ul>
<b>Additional information</b>	<i>Dependency</i>  The unit is taken from the <b>Temperature unit</b> parameter (→  98)

*Reference density calculation*




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

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- $\rho_n$ : reference density
- $\rho$ : fluid density currently measured
- $t$ : fluid temperature currently measured
- $t_n$ : reference temperature at which the reference density is calculated (e.g. 20 °C)
- $\Delta t$ :  $t - t_n$
- $\alpha$ : linear expansion coefficient of the fluid, unit = [1/K]; K = Kelvin
- $\beta$ : square expansion coefficient of the fluid, unit = [1/K<sup>2</sup>]

---

**Linear expansion coefficient**


<b>Navigation</b>	  Expert → Sensor → Calculated value → Corr. vol.flow. → Linear exp coeff (1817)
<b>Prerequisite</b>	The <b>Calculated reference density</b> option is selected in the <b>Corrected volume flow calculation</b> parameter (→  109) parameter.
<b>Description</b>	Use this function to enter a linear, fluid-specific expansion coefficient for calculating the reference density.



**User entry** Signed floating-point number


**Factory setting** 0.0 1/K

---

### 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 (→  109) 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

**Factory setting** 0.0 1/K<sup>2</sup>

### 3.2.5 "Measurement mode" submenu

*Navigation*   Expert → Sensor → Measurement mode

▶ **Measurement mode**

MFT (Multi-Frequency Technology) (6242)	→  112
Select medium type (6062)	→  112
Select gas type (6074)	→  112
Reference sound velocity (6147)	→  113
Reference sound velocity	→  113
Temperature coefficient sound velocity (6181)	→  113
Temperature coefficient sound velocity	→  114
Gas Fraction Handler (6377)	→  114

---

**MFT (Multi-Frequency Technology)**


<b>Navigation</b>	Expert → Sensor → Measurement mode → MFT (6242)
<b>Description</b>	Enable/disable multi-frequency technology to increase the measuring accuracy in the event of microbubbles in the medium.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ No</li> <li>■ Yes</li> </ul>
<b>Factory setting</b>	Yes
<b>Additional information</b>	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 type**


<b>Navigation</b>	Expert → Sensor → Measurement mode → SelectMediumType (6062)
<b>Description</b>	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).
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Liquid</li> <li>■ Gas</li> <li>■ Other</li> </ul>
<b>Factory setting</b>	Liquid

---

**Select gas type**


<b>Navigation</b>	Expert → Sensor → Measurement mode → Select gas type (6074)
<b>Prerequisite</b>	In the <b>Medium selection</b> submenu, the <b>Gas</b> option is selected.
<b>Description</b>	Select measured gas type.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Air</li> <li>■ Ammonia NH3</li> <li>■ Argon Ar</li> <li>■ Sulfur hexafluoride SF6</li> <li>■ Oxygen O2</li> <li>■ Ozone O3</li> <li>■ Nitrogen oxide NOx</li> <li>■ Nitrogen N2</li> <li>■ Nitrous oxide N2O</li> <li>■ Methane CH4</li> <li>■ Methane CH4 + 10% Hydrogen H2</li> </ul>


- Methane CH<sub>4</sub> + 20% Hydrogen H<sub>2</sub>
- Methane CH<sub>4</sub> + 30% Hydrogen H<sub>2</sub>
- Hydrogen H<sub>2</sub>
- Helium He
- Hydrogen chloride HCl
- Hydrogen sulfide H<sub>2</sub>S
- Ethylene C<sub>2</sub>H<sub>4</sub>
- Carbon dioxide CO<sub>2</sub>
- Carbon monoxide CO
- Chlorine Cl<sub>2</sub>
- Butane C<sub>4</sub>H<sub>10</sub>
- Propane C<sub>3</sub>H<sub>8</sub>
- Propylene C<sub>3</sub>H<sub>6</sub>
- Ethane C<sub>2</sub>H<sub>6</sub>
- Other

**Factory setting** Methane CH<sub>4</sub>

---

### Reference sound velocity

**Navigation**   Expert → Sensor → Measurement mode → Ref. sound veloc (6147)

**Prerequisite** In the **Select gas type** parameter (→  112), the **Other** option is selected.

**Description** Enter sound velocity of the gas at 0 °C (32 °F).

**User entry** 1 to 99 999.9999 m/s

**Factory setting** 415.0 m/s

---

### Reference sound velocity

**Navigation**   Expert → Sensor → Measurement mode → Ref. sound veloc

**Prerequisite** In the **Select medium type** parameter (→  112), the **Other** option is selected.

**Description** Enter sound velocity of the medium at 0 °C (32 °F).


**User entry** Signed floating-point number

**Factory setting** 1456 m/s

---

### Temperature coefficient sound velocity

**Navigation**   Expert → Sensor → Measurement mode → Temp. coeff. SV (6181)

**Prerequisite** In the **Select gas type** parameter (→  112), the **Other** option is selected.

<b>Description</b>	Enter the temperature coefficient for the gas sound velocity.
<b>User entry</b>	Positive floating point number
<b>Factory setting</b>	0.87 (m/s)/K

---

**Temperature coefficient sound velocity**


<b>Navigation</b>	Expert → Sensor → Measurement mode → Temp. coeff. SV
<b>Prerequisite</b>	In the <b>Select medium type</b> parameter (→  112), the <b>Other</b> option is selected.
<b>Description</b>	Enter temperature coefficient for the medium sound velocity.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	1.3 (m/s)/K

---








**Gas Fraction Handler**


<b>Navigation</b>	Expert → Sensor → Measurement mode → Gas Frac Handler (6377)
<b>Description</b>	Activates the Gas Fraction Handler function for two phase media.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Off</li> <li>▪ Moderate</li> <li>▪ Powerful</li> </ul>
<b>Factory setting</b>	Moderate
<b>Additional information</b>	<ul style="list-style-type: none"> <li>▪ When a second phase is detected, large fluctuations in the flow and density will occur.</li> <li>▪ The Gas Fraction Handler stabilizes the output values and enables better readability for operators and easier interpretation by the distributed control system.</li> <li>▪ The level of smoothing is adjusted according to the severity of the disturbances introduced by the second phase.</li> </ul> <p>The influence of the disturbances can be configured in two steps via this switch:</p> <ul style="list-style-type: none"> <li>▪ <b>Off</b> option: Deactivates the Gas Fraction Handler. When a second phase is present, large fluctuations of flow and density will occur.</li> <li>▪ <b>Moderate</b> option: Use for applications with low level or intermittent levels of second phase.</li> <li>▪ <b>Powerful</b> option: Use for applications with very significant levels of second phase.</li> </ul> <p>The Gas Fraction Handler is cumulative to any fixed damping constants applied to flow and density that are set elsewhere in the instrument parameterization.</p> <p>Additional information in the <b>Medium index</b> submenu (→  235)</p>



### 3.2.6 "External compensation" submenu

Navigation   Expert → Sensor → External comp.

▶ External compensation

Pressure compensation (6130)	→  115
Pressure value (6059)	→  116
External pressure (6209)	→  116
Temperature correction source (6184)	→  116
External temperature (6080)	→  117
Application specific input source 0 (6401)	→  117
Application specific input source 1 (6402)	→  118

#### 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 \*

**Factory setting** Off

**Additional information** *Selection*






- Fixed value  
A fixed pressure value is used for compensation: **Pressure value** parameter (→  116)
- **Current input 1** option, **Current input 3** option  
The pressure value read in via the current input is used for compensation.

\* Visibility depends on order options or device settings

---

**Pressure value** 







---

<b>Navigation</b>	  Expert → Sensor → External comp. → Pressure value (6059)
<b>Prerequisite</b>	In the <b>Pressure compensation</b> parameter (→  115), the <b>Fixed value</b> option is selected.
<b>Description</b>	Use this function to enter a value for the process pressure that is used for pressure correction.
<b>User entry</b>	Positive floating-point number
<b>Factory setting</b>	1.01325 bar
<b>Additional information</b>	<i>Dependency</i>  The unit is taken from the <b>Pressure unit</b> parameter (→  98)

---

**External pressure**




---

<b>Navigation</b>	  Expert → Sensor → External comp. → External press. (6209)
<b>Prerequisite</b>	In the <b>Pressure compensation</b> parameter (→  115), the <b>External value</b> option or the <b>Current input 1...n</b> option is selected.
<b>Description</b>	Displays the external pressure value.
<b>Additional information</b>	<i>Dependency</i>  The unit is taken from the <b>Pressure unit</b> parameter (→  98)

---

**Temperature correction source** 


---

<b>Navigation</b>	  Expert → Sensor → External comp. → Temp.corr.source (6184)
<b>Description</b>	Use this function to select the temperature mode.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Internal measured value</li> <li>■ External value</li> <li>■ Current input 1 *</li> <li>■ Current input 2 *</li> <li>■ Current input 3 *</li> </ul>
<b>Factory setting</b>	Internal measured value

---





\* Visibility depends on order options or device settings

<b>Additional information</b>	<p><i>Description</i></p> <p>Use this function to select the type of temperature compensation.</p> <p><i>Selection</i></p> <p>All the options available for selection are used for measured value compensation.</p> <ul style="list-style-type: none"> <li>■ Internal measured value The temperature value measured internally (temperature sensor of the measuring sensor) is used for compensation.</li> <li>■ <b>Current input 1</b> option, Visibility depends on order options or device settings. The temperature value read in via the current input is used for compensation.</li> </ul>
-------------------------------	--

---

## External temperature


---

<b>Navigation</b>	 Expert → Sensor → External comp. → External temp. (6080)
<b>Prerequisite</b>	In the <b>Temperature mode</b> parameter (→  116), the <b>External value</b> option or the <b>Current input 1...n</b> option is selected.
<b>Description</b>	Displays the external temperature.
<b>Additional information</b>	<p><i>Dependency</i></p> <p> The unit is taken from the <b>Temperature unit</b> parameter (→  98)</p>

---

## Application specific input source 0

---

<b>Navigation</b>	 Expert → Sensor → External comp. → Spec. source 0 (6401)
<b>Prerequisite</b>	Only if application-specific calculation has been ordered as a special option.
<b>Description</b>	Select source for input value 0 used for the application specific calculation.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Off</li> <li>■ External value</li> <li>■ Current input 1 *</li> <li>■ Current input 2 *</li> <li>■ Current input 3 *</li> </ul>
<b>Factory setting</b>	Off

---

\* Visibility depends on order options or device settings

---

**Application specific input source 1**


<b>Navigation</b>	Expert → Sensor → External comp. → Spec. source 1 (6402)
<b>Prerequisite</b>	Only if application-specific calculation has been ordered as a special option.
<b>Description</b>	Select source for the input value 1 used for the application specific calculation.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Off</li> <li>▪ External value</li> <li>▪ Current input 1 *</li> <li>▪ Current input 2 *</li> <li>▪ Current input 3 *</li> </ul>
<b>Factory setting</b>	Off

### 3.2.7 "Sensor adjustment" submenu

*Navigation* Expert → Sensor → Sensor adjustm.

▶ <b>Sensor adjustment</b>	
Installation direction	→  119
Installation angle roll	→  119
Installation angle pitch	→  120
▶ <b>Zero verification</b>	→  120
▶ <b>Zero adjustment</b>	→  123
▶ <b>Density adjustment</b>	→  127
▶ <b>Extended density adjustment</b>	→  129
▶ <b>Process variable adjustment</b>	→  133

---

\* Visibility depends on order options or device settings

---

**Installation direction**
**Navigation**

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

**Description**

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

**Selection**

- Forward flow
- Reverse flow

**Factory setting**

Forward flow

**Additional information***Description*

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

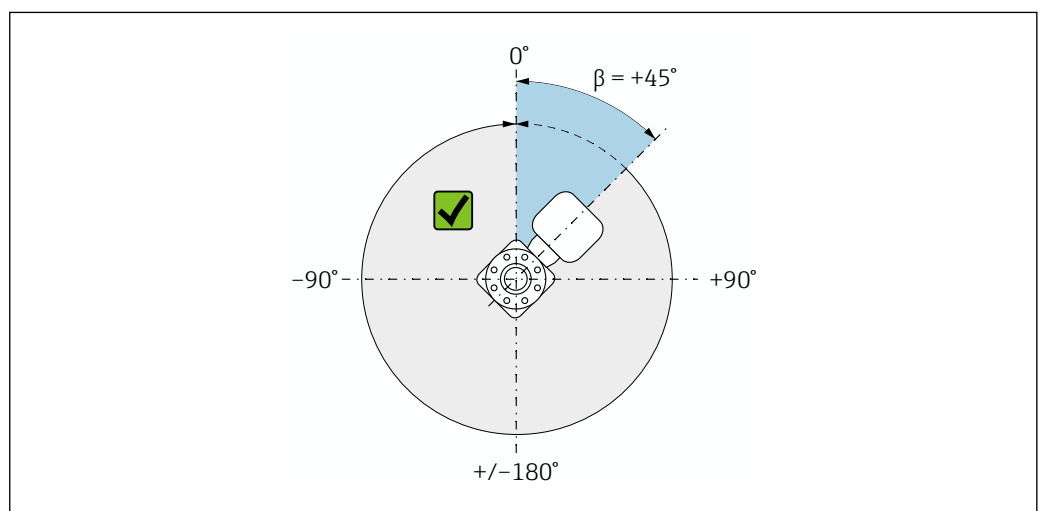
-180 to 180 °

**Factory setting**

0 °

**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  $\beta = +45^\circ$ 

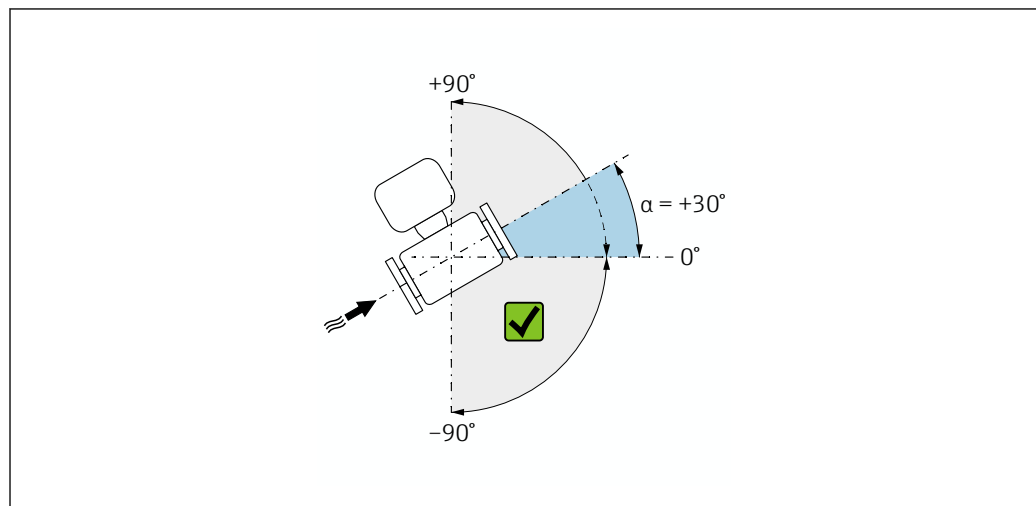
A0040033

2 Top view in flow direction

## Installation angle pitch



<b>Navigation</b>	Expert → Sensor → Sensor adjustm. → Inst.angle pitch (6236)
<b>Prerequisite</b>	Available only with Promass Q.
<b>Description</b>	Use this function to enter the pitch angle in degrees to improve measuring accuracy.
<b>User entry</b>	-90 to +90 °
<b>Factory setting</b>	0 °
<b>Additional information</b>	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

<b>► Zero verification</b>	
Process conditions	→  121
Progress (2808)	→  121
Status (6253)	→  121
Additional information	→  122
Recommendation: (6000)	→  122

Root cause (6444)	→ 📄 122
Abort cause	→ 📄 122
Zero point measured (5999)	→ 📄 123
Zero point standard deviation (5996)	→ 📄 123

---

## Process conditions

---

<b>Navigation</b>	📄 Expert → Sensor → Sensor adjustm. → ZeroVerification → Process condit.
<b>Description</b>	Ensure process conditions as follows.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Tubes are completely filled</li> <li>■ Process operational pressure applied</li> <li>■ No-flow conditions (closed valves)</li> <li>■ Process and ambient temperatures stable</li> </ul>
<b>Factory setting</b>	–

---

## Progress

---

<b>Navigation</b>	📄 Expert → Sensor → Sensor adjustm. → ZeroVerification → Progress (2808)
<b>Description</b>	The progress of the process is indicated.
<b>User interface</b>	0 to 100 %

---

## Status


---

<b>Navigation</b>	📄 Expert → Sensor → Sensor adjustm. → ZeroVerification → Status (6253)
<b>Description</b>	Shows the status of the process.
<b>User interface</b>	<ul style="list-style-type: none"> <li>■ Busy</li> <li>■ Failed</li> <li>■ Done</li> </ul>
<b>Factory setting</b>	–

---

**Additional information**



---

<b>Navigation</b>	 Expert → Sensor → Sensor adjustm. → ZeroVerification → Additional info.
<b>Description</b>	Indicate whether to display additional information.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Hide</li> <li>■ Show</li> </ul>
<b>Factory setting</b>	Hide

---

**Recommendation:**



---

<b>Navigation</b>	 Expert → Sensor → Sensor adjustm. → ZeroVerification → Recommendation: (6000)
<b>Description</b>	Indicates whether an adjustment is recommended. Only recommended if the measured zero point deviates significantly from the current zero point.
<b>User interface</b>	<ul style="list-style-type: none"> <li>■ Do not adjust zero point</li> <li>■ Adjust zero point</li> </ul>
<b>Factory setting</b>	–

---

**Root cause**



---

<b>Navigation</b>	 Expert → Sensor → Sensor adjustm. → ZeroVerification → Root cause (6444)
<b>Description</b>	Shows the diagnostic and remedy.
<b>User interface</b>	<ul style="list-style-type: none"> <li>■ Zero point too high. Ensure no-flow.</li> <li>■ Zero point is unstable. Ensure no-flow.</li> <li>■ Fluctuation high. Avoid 2-phase medium.</li> </ul>
<b>Factory setting</b>	–


---

**Abort cause**



---

<b>Navigation</b>	 Expert → Sensor → Sensor adjustm. → ZeroVerification → Abort cause
<b>Description</b>	Indicates why the wizard was aborted.
<b>User interface</b>	<ul style="list-style-type: none"> <li>■ Check process conditions!</li> <li>■ A technical issue has occurred</li> </ul>
<b>Factory setting</b>	–

**Zero point measured**

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










**Zero point standard deviation**




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

**"Zero adjustment" wizard**

*Navigation*  Expert → Sensor → Sensor adjustm. → Zero adjustment

**▶ Zero adjustment**


Process conditions	→  124
Progress (2808)	→  124
Status (6253)	→  124
Root cause (6444)	→  125
Abort cause	→  125
Root cause (6444)	→  125
Reliability of measured zero point (5982)	→  125
Additional information	→  125
Reliability of measured zero point (5982)	→  125

Zero point measured (5999)	→  126
Zero point standard deviation (5996)	→  126
Select action (5995)	→  126

---

## Process conditions


---

<b>Navigation</b>	 Expert → Sensor → Sensor adjustm. → Zero adjustment → Process condit.
<b>Description</b>	Ensure process conditions as follows.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Tubes are completely filled</li> <li>▪ Process operational pressure applied</li> <li>▪ No-flow conditions (closed valves)</li> <li>▪ Process and ambient temperatures stable</li> </ul>
<b>Factory setting</b>	–

---

## Progress


---

<b>Navigation</b>	 Expert → Sensor → Sensor adjustm. → Zero adjustment → Progress (2808)
<b>Description</b>	The progress of the process is indicated.
<b>User interface</b>	0 to 100 %

---

## Status



---

<b>Navigation</b>	 Expert → Sensor → Sensor adjustm. → Zero adjustment → Status (6253)
<b>Description</b>	Shows the status of the process.
<b>User interface</b>	<ul style="list-style-type: none"> <li>▪ Busy</li> <li>▪ Failed</li> <li>▪ Done</li> </ul>
<b>Factory setting</b>	–

---

**Root cause**



---

<b>Navigation</b>	  Expert → Sensor → Sensor adjustm. → Zero adjustment → Root cause (6444)
<b>Description</b>	Shows the diagnostic and remedy.
<b>User interface</b>	<ul style="list-style-type: none"> <li>■ Zero point too high. Ensure no-flow.</li> <li>■ Zero point is unstable. Ensure no-flow.</li> <li>■ Fluctuation high. Avoid 2-phase medium.</li> </ul>

---

**Abort cause**




---

<b>Navigation</b>	 Expert → Sensor → Sensor adjustm. → Zero adjustment → Abort cause
<b>Description</b>	Indicates why the wizard was aborted.
<b>User interface</b>	<ul style="list-style-type: none"> <li>■ Check process conditions!</li> <li>■ A technical issue has occurred</li> </ul>
<b>Factory setting</b>	–

---

**Reliability of measured zero point**



---

<b>Navigation</b>	  Expert → Sensor → Sensor adjustm. → Zero adjustment → ZeroReliability (5982)
<b>Description</b>	Indicates the reliability of the zero point measured.
<b>User interface</b>	<ul style="list-style-type: none"> <li>■ Not done</li> <li>■ Good</li> <li>■ Uncertain</li> </ul>
<b>Factory setting</b>	–

---

**Additional information**



---

<b>Navigation</b>	 Expert → Sensor → Sensor adjustm. → Zero adjustment → Additional info.
<b>Description</b>	Indicate whether to display additional information.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Hide</li> <li>■ Show</li> </ul>
<b>Factory setting</b>	Hide

---

**Zero point measured**



---

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

---

**Zero point standard deviation**



---

<b>Navigation</b>	 Expert → Sensor → Sensor adjustm. → Zero adjustment → ZeroStdDev (5996)
<b>Description</b>	Shows the standard deviation of the zero point measured.
<b>User interface</b>	Positive floating-point number
<b>Factory setting</b>	0

---

**Select action**



---

<b>Navigation</b>	 Expert → Sensor → Sensor adjustm. → Zero adjustment → Select action (5995)
<b>Description</b>	Select the zero point value to apply.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Keep current zero point</li> <li>■ Apply zero point measured</li> <li>■ Apply factory zero point<sup>*</sup></li> </ul>
<b>Factory setting</b>	Keep current 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

Density adjustment mode (6043)	→  127
Density setpoint 1 (6045)	→  128
Density setpoint 2 (6046)	→  128
Execute density adjustment (6041)	→  128
Progress (2808)	→  129
Density adjustment factor (6042)	→  129
Density adjustment offset (6044)	→  129

---

**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
- Factory setting** 1 point adjustment

---

### Density setpoint 1




---

<b>Navigation</b>	  Expert → Sensor → Sensor adjustm. → Density adjustm. → Density setpt 1 (6045)
<b>Description</b>	Displays the existing density value.
<b>User entry</b>	The entry depends on the unit selected in the <b>Density unit</b> parameter (0555) (→  95).
<b>Factory setting</b>	1 000 kg/m <sup>3</sup>

---

### Density setpoint 2


---

<b>Navigation</b>	  Expert → Sensor → Sensor adjustm. → Density adjustm. → Density setpt 2 (6046)
<b>Prerequisite</b>	In the <b>Density adjustment mode</b> parameter, the <b>2 point adjustment</b> option is selected.
<b>Description</b>	Displays the second density setpoint.
<b>User entry</b>	The entry depends on the unit selected in the <b>Density unit</b> parameter (0555) (→  95).
<b>Factory setting</b>	1 000 kg/m <sup>3</sup>

---

### Execute density adjustment


---

<b>Navigation</b>	 Expert → Sensor → Sensor adjustm. → Density adjustm. → Density adjustm. (6041)
<b>Description</b>	Select the next step to be performed for the density adjustment.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Cancel *</li> <li>■ Busy *</li> <li>■ Ok *</li> <li>■ Density adjust failure *</li> <li>■ Measure density 1 *</li> <li>■ Measure density 2 *</li> <li>■ Calculate *</li> <li>■ Restore original *</li> </ul>
<b>Factory setting</b>	Ok





---

\* Visibility depends on order options or device settings




**Progress**

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


**Density adjustment factor**



<b>Navigation</b>	  Expert → Sensor → Sensor adjustm. → Density adjustm. → Dens. adj factor (6042)
<b>Description</b>	Displays the current correction factor for the density.
<b>User interface</b>	Signed floating-point number
<b>Factory setting</b>	1
<b>Additional information</b>	 Manual adjustment of the value: <b>Density factor</b> parameter (→  135)

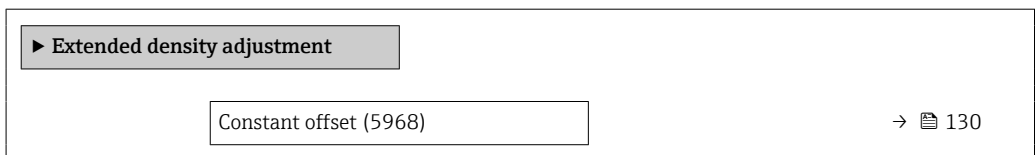
**Density adjustment offset**











<b>Navigation</b>	 Expert → Sensor → Sensor adjustm. → Density adjustm. → Dens. adj offset (6044)
<b>Description</b>	Shows the calculated correction offset for the density.
<b>User interface</b>	Signed floating-point number
<b>Factory setting</b>	0
<b>Additional information</b>	 Manual adjustment of the value: <b>Density offset</b> parameter (→  135)

**"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





Linear density factor (5967)	→  130
Linear temperature factor (5966)	→  131
Linear pressure factor (5965)	→  131
Quadratic density factor (5964)	→  131
Quadratic temperature factor (5963)	→  131
Quadratic pressure factor (5962)	→  132
Combined density-temperature factor (5961)	→  132
Combined density-pressure factor (5971)	→  132
Combined temperature-pressure factor (5970)	→  132
Cubic temperature factor (5969)	→  133

### Constant offset

<b>Navigation</b>	  Expert → Sensor → Sensor adjustm. → ExtendDensAdjust → ConstantOffset (5968)
<b>Description</b>	Shows the constant offset.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	0 kg/m <sup>3</sup>

### Linear density factor

<b>Navigation</b>	  Expert → Sensor → Sensor adjustm. → ExtendDensAdjust → LinearDensFactor (5967)
<b>Description</b>	Shows the linear density factor.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	1

---

**Linear temperature factor**

---



<b>Navigation</b>	Expert → Sensor → Sensor adjustm. → ExtendDensAdjust → LinearTempFactor (5966)
<b>Description</b>	Shows the linear temperature factor.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	0 (kg/m <sup>3</sup> )/°C

---

**Linear pressure factor**

---



<b>Navigation</b>	Expert → Sensor → Sensor adjustm. → ExtendDensAdjust → LinearPressFact (5965)
<b>Description</b>	Shows the linear pressure factor.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	0 (kg/m <sup>3</sup> )/bara

---

**Quadratic density factor**

---



<b>Navigation</b>	Expert → Sensor → Sensor adjustm. → ExtendDensAdjust → QuadrDensFactor (5964)
<b>Description</b>	Shows the quadratic density factor.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	0 1/(kg/m <sup>3</sup> )

---

**Quadratic temperature factor**

---



<b>Navigation</b>	Expert → Sensor → Sensor adjustm. → ExtendDensAdjust → QuadrTempFactor (5963)
<b>Description</b>	Shows the quadratic temperature factor.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	0 (kg/m <sup>3</sup> )/°C <sup>2</sup>

**Quadratic pressure factor**

<b>Navigation</b>	Expert → Sensor → Sensor adjustm. → ExtendDensAdjust → QuadrPressFactor (5962)
<b>Description</b>	Shows the quadratic pressure factor.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	0 (kg/m <sup>3</sup> )/bara <sup>2</sup>

**Combined density-temperature factor**

<b>Navigation</b>	Expert → Sensor → Sensor adjustm. → ExtendDensAdjust → DensTempFactor (5961)
<b>Description</b>	Shows the combined density-temperature factor.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	0 1/°C

**Combined density-pressure factor**

<b>Navigation</b>	Expert → Sensor → Sensor adjustm. → ExtendDensAdjust → DensPressFactor (5971)
<b>Description</b>	Shows the combined density-pressure factor.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	0 1/bara

**Combined temperature-pressure factor**

<b>Navigation</b>	Expert → Sensor → Sensor adjustm. → ExtendDensAdjust → TempPressFactor (5970)
<b>Description</b>	Shows the combined temperature-pressure factor.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	0 (kg/m <sup>3</sup> )/(°C bara)

**Cubic temperature factor**



<b>Navigation</b>	Expert → Sensor → Sensor adjustm. → ExtendDensAdjust → CubicTempFactor (5969)
<b>Description</b>	Shows the cubic temperature factor.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	0 (kg/m <sup>3</sup> )/°C <sup>3</sup>

**"Process variable adjustment" submenu**

The adjustments to the offsets and factors in the **Process variable adjustment** submenu (→ 133) do not affect the calculated values, such as concentration, NSV.

*Navigation*      Expert → Sensor → Sensor adjustm. → Variable adjust




▶ **Process variable adjustment**

Mass flow offset (1831)	→  134
Mass flow factor (1832)	→  134
Volume flow offset (1841)	→  134
Volume flow factor (1846)	→  135
Density offset (1848)	→  135
Density factor (1849)	→  135
Corrected volume flow offset (1866)	→  136
Corrected volume flow factor (1867)	→  136
Reference density offset (1868)	→  136
Reference density factor (1869)	→  137
Temperature offset (1870)	→  137
Temperature factor (1871)	→  137

---

**Mass flow offset** 





---

<b>Navigation</b>	  Expert → Sensor → Sensor adjustm. → Variable adjust → Mass flow offset (1831)
<b>Description</b>	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.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	0 kg/s
<b>Additional information</b>	<i>Description</i>  Corrected value = (factor × value) + offset

---

**Mass flow factor** 





---

<b>Navigation</b>	  Expert → Sensor → Sensor adjustm. → Variable adjust → Mass flow factor (1832)
<b>Description</b>	Use this function to enter a quantity factor (without time) for the mass flow. This multiplication factor is applied over the mass flow range.
<b>User entry</b>	Positive floating-point number
<b>Factory setting</b>	1
<b>Additional information</b>	<i>Description</i>  Corrected value = (factor × value) + offset

---

**Volume flow offset** 


---

<b>Navigation</b>	  Expert → Sensor → Sensor adjustm. → Variable adjust → Vol. flow offset (1841)
<b>Description</b>	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 <sup>3</sup> /s.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	0 m <sup>3</sup> /s
<b>Additional information</b>	<i>Description</i>  Corrected value = (factor × value) + offset

---

**Volume flow factor**

---



<b>Navigation</b>	Expert → Sensor → Sensor adjustm. → Variable adjust → Vol. flow factor (1846)
<b>Description</b>	Use this function to enter a quantity factor (without time) for the volume flow. This multiplication factor is applied over the volume flow range.
<b>User entry</b>	Positive floating-point number
<b>Factory setting</b>	1
<b>Additional information</b>	<i>Description</i> Corrected value = (factor × value) + offset

---

**Density offset**

---



<b>Navigation</b>	Expert → Sensor → Sensor adjustm. → Variable adjust → Density offset (1848)
<b>Description</b>	Use this function to enter the zero point shift for the density trim. The density unit on which the shift is based is kg/m <sup>3</sup> .
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	0 kg/m <sup>3</sup>
<b>Additional information</b>	<i>Description</i> Corrected value = (factor × value) + offset

---

**Density factor**

---



<b>Navigation</b>	Expert → Sensor → Sensor adjustm. → Variable adjust → Density factor (1849)
<b>Description</b>	Use this function to enter a quantity factor for the density. This multiplication factor is applied over the density range.
<b>User entry</b>	Positive floating-point number
<b>Factory setting</b>	1
<b>Additional information</b>	<i>Description</i> Corrected value = (factor × value) + offset

**Corrected volume flow offset**

<b>Navigation</b>	Expert → Sensor → Sensor adjustm. → Variable adjust → Corr. vol offset (1866)
<b>Description</b>	Use this function to enter the zero point shift for the corrected volume flow trim. The corrected volume flow unit on which the shift is based is 1 Nm <sup>3</sup> /s.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	0 Nm <sup>3</sup> /s
<b>Additional information</b>	<i>Description</i> Corrected value = (factor × value) + offset

**Corrected volume flow factor**

<b>Navigation</b>	Expert → Sensor → Sensor adjustm. → Variable adjust → Corr. vol factor (1867)
<b>Description</b>	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.
<b>User entry</b>	Positive floating-point number
<b>Factory setting</b>	1
<b>Additional information</b>	<i>Description</i> Corrected value = (factor × value) + offset

**Reference density offset**

<b>Navigation</b>	Expert → Sensor → Sensor adjustm. → Variable adjust → Ref.dens. offset (1868)
<b>Description</b>	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 <sup>3</sup> .
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	0 kg/Nm <sup>3</sup>
<b>Additional information</b>	<i>Description</i> Corrected value = (factor × value) + offset

---

**Reference density factor**

---



<b>Navigation</b>	Expert → Sensor → Sensor adjustm. → Variable adjust → Ref.dens. factor (1869)
<b>Description</b>	Use this function to enter a quantity factor (without time) for the reference density. This multiplication factor is applied over the reference density range.
<b>User entry</b>	Positive floating-point number
<b>Factory setting</b>	1
<b>Additional information</b>	<i>Description</i> Corrected value = (factor × value) + offset

---

**Temperature offset**

---



<b>Navigation</b>	Expert → Sensor → Sensor adjustm. → Variable adjust → Temp. offset (1870)
<b>Description</b>	Use this function to enter the zero point shift for the temperature trim. The temperature unit on which the shift is based is K.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	0 K
<b>Additional information</b>	<i>Description</i> Corrected value = (factor × value) + offset

---

**Temperature factor**





---



<b>Navigation</b>	Expert → Sensor → Sensor adjustm. → Variable adjust → Temp. factor (1871)
<b>Description</b>	Use this function to enter a quantity factor for the temperature. In each case, this factor refers to the temperature in K.
<b>User entry</b>	Positive floating-point number
<b>Factory setting</b>	1
<b>Additional information</b>	<i>Description</i> Corrected value = (factor × value) + offset

### 3.2.8 "Calibration" submenu



Navigation   Expert → Sensor → Calibration

▶ Calibration	
Calibration factor	→  138
Zero point	→  138
Nominal diameter	→  138
CO to 5	→  139

---

#### Calibration factor



---

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

---

#### Zero point



---

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

---

#### Nominal diameter

---

<b>Navigation</b>	  Expert → Sensor → Calibration → Nominal diameter (2807)
<b>Description</b>	Displays the nominal diameter of the sensor.
<b>User interface</b>	DNxx / x"
<b>Factory setting</b>	Depends on the size of the sensor

**Additional information***Description*

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 (→ 139) is used to test the measuring device or the application.*Navigation*

Diagnostics → Testpoints

*Navigation*

Expert → Sensor → Testpoints

► Testpoints

**"Raw values" submenu***Navigation*

Expert → Sensor → Testpoints → Raw values

*Navigation*

Diagnostics → Testpoints → Raw values

► Raw values

Raw value mass flow

→ 139

---

**Raw value mass flow**

---

**Navigation**

Diagnostics → Testpoints → Raw mass flow (6140)



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 (→  90)

**"Testpoints" submenu**

*Navigation*  Expert → Sensor → Testpoints → Testpoints

*Navigation*  Diagnostics → Testpoints → Testpoints

▶ Testpoints	
Oscillation frequency 0 to 1	→  141
Frequency fluctuation 0 to 1	→  141
Oscillation amplitude 0 to 1	→  141
Oscillation damping 0 to 1	→  142
Oscillation damping fluctuation 0 to 1	→  143
Signal asymmetry 0	→  143
Torsion signal asymmetry	→  143
Sensor electronics temperature (ISEM)	→  144
Carrier pipe temperature	→  144
Casing pipe temperature	→  145
Exciter current 0 to 1	→  145
Test point 0	→  145
Test point 1	→  145
Temperature difference measuring tube	→  146
Temperat. difference meas. tube-carrier	→  146

---

**Oscillation frequency 0 to 1**


---

<b>Navigation</b>	<a href="#">📄📄</a> <a href="#">Diagnostics</a> → <a href="#">Testpoints</a> → <a href="#">Osc. freq. 0 to 1 (6067)</a> <a href="#">📄📄</a> <a href="#">Expert</a> → <a href="#">Sensor</a> → <a href="#">Testpoints</a> → <a href="#">Osc. freq. 0 to 1 (6067)</a>
<b>Prerequisite</b>	<ul style="list-style-type: none"> <li>▪ Oscillation frequency 0 is available for all Promass sensors.</li> <li>▪ Oscillation frequency 1 is only available for the Promass I and Promass Q sensors.</li> </ul>
<b>Description</b>	Shows the current oscillation frequency of the measuring tubes. The frequency depends on the medium density.
<b>User interface</b>	Positive floating point number

---

**Frequency fluctuation 0 to 1**


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<b>Navigation</b>	<a href="#">📄📄</a> <a href="#">Diagnostics</a> → <a href="#">Testpoints</a> → <a href="#">Freq. fluct. 0 to 1 (6175)</a> <a href="#">📄📄</a> <a href="#">Expert</a> → <a href="#">Sensor</a> → <a href="#">Testpoints</a> → <a href="#">Freq. fluct. 0 to 1 (6175)</a>
<b>Prerequisite</b>	Order code for "Application package", option EB "Heartbeat Verification + Monitoring" available: <ul style="list-style-type: none"> <li>▪ Frequency fluctuation 0 is available for all Promass sensors.</li> <li>▪ Frequency fluctuation 1 is only available for the Promass I and Promass Q sensors.</li> </ul>
<b>Description</b>	Shows the current fluctuation of the oscillation frequency.
<b>User interface</b>	Signed floating-point number

---

**Oscillation amplitude 0 to 1**


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<b>Navigation</b>	<a href="#">📄📄</a> <a href="#">Diagnostics</a> → <a href="#">Testpoints</a> → <a href="#">Osc. ampl. 0 to 1 (6006)</a> <a href="#">📄📄</a> <a href="#">Expert</a> → <a href="#">Sensor</a> → <a href="#">Testpoints</a> → <a href="#">Osc. ampl. 0 to 1 (6006)</a>
<b>Prerequisite</b>	Order code for "Application package", option EB "Heartbeat Verification + Monitoring" available: <ul style="list-style-type: none"> <li>▪ Oscillation amplitude 0 is available for all Promass sensors.</li> <li>▪ Oscillation amplitude 1 is only available for the Promass I and Promass Q sensors.</li> </ul>
<b>Description</b>	Use this function to display the relative oscillation amplitude of the sensor in relation to the optimum value.
<b>User interface</b>	Signed floating-point number

<b>Additional information</b>	<p><i>Description</i></p> <p>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).</p> <p><i>Limit values</i></p> <p>5 %</p> <p> If the displayed value is outside the limit value, the measuring device displays the following diagnostic messages:</p> <ul style="list-style-type: none"> <li>▪ <b>△S913 Medium unsuitable</b> diagnostic message, associated service ID <b>205 Osc Amp Limit</b> Explanation: The measured oscillation amplitude has dropped below the xMin limit value.</li> <li>▪ <b>△S912 Medium inhomogeneous</b> diagnostic message, associated service ID <b>196 Fluid Inhomogeneous Amp</b> <ul style="list-style-type: none"> <li>▪ Explanation: The fluctuation (standard deviation) of the amplitude is too high.</li> <li>▪ Possible cause: Air or suspended solids in the medium (multiphase)</li> </ul> </li> </ul>
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## Oscillation damping 0 to 1

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<b>Navigation</b>	<p> <a href="#">Diagnostics</a> → <a href="#">Testpoints</a> → <a href="#">Osc. damping 0 to 1 (6038)</a></p> <p> <a href="#">Expert</a> → <a href="#">Sensor</a> → <a href="#">Testpoints</a> → <a href="#">Osc. damping 0 to 1 (6038)</a></p>
<b>Prerequisite</b>	<ul style="list-style-type: none"> <li>▪ Oscillation damping 0 is available for all Promass sensors.</li> <li>▪ Oscillation damping 1 is only available for the Promass I and Promass Q sensors.</li> </ul>
<b>Description</b>	Displays the current oscillation damping.
<b>User interface</b>	Positive floating-point number
<b>Additional information</b>	<p><i>Description</i></p> <p>Oscillation damping is an indicator of the sensor's current need for excitation power.</p> <p><i>Limit values</i></p> <p>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.</p> <p> If the displayed value is outside the limit value, the measuring device displays the following diagnostic message:</p> <ul style="list-style-type: none"> <li>▪ <b>△S862 Partly filled pipe</b> diagnostic message, associated service ID <b>146 Density Monitoring</b></li> </ul>

---

**Oscillation damping fluctuation 0 to 1**


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<b>Navigation</b>	<a href="#">📄📄</a> <a href="#">Diagnostics</a> → <a href="#">Testpoints</a> → <a href="#">Osc.damp.fluct0 to 1 (6172)</a> <a href="#">📄📄</a> <a href="#">Expert</a> → <a href="#">Sensor</a> → <a href="#">Testpoints</a> → <a href="#">Osc.damp.fluct0 to 1 (6172)</a>
<b>Prerequisite</b>	<p>Order code for "Application package", option EB "Heartbeat Verification + Monitoring" available:</p> <ul style="list-style-type: none"> <li>▪ Tube damping fluctuation 0 is available for all Promass sensors.</li> <li>▪ Tube damping fluctuation 1 is only available for the Promass I and Promass Q sensors.</li> </ul>
<b>Description</b>	Shows the current fluctuation of the oscillation damping.
<b>User interface</b>	Signed floating-point number

---

**Signal asymmetry 0**


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<b>Navigation</b>	<a href="#">📄📄</a> <a href="#">Diagnostics</a> → <a href="#">Testpoints</a> → <a href="#">Signal asymm. 0 (6013)</a> <a href="#">📄📄</a> <a href="#">Expert</a> → <a href="#">Sensor</a> → <a href="#">Testpoints</a> → <a href="#">Signal asymm. 0 (6013)</a>
<b>Description</b>	Displays the relative difference between the oscillation amplitude measured at the inlet and outlet of the sensor.
<b>User interface</b>	Signed floating-point number
<b>Additional information</b>	<p><i>Description</i></p> <p>The measured value is the result of production tolerances of the sensor coils and should remain constant over the life time of a sensor.</p>

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**Torsion signal asymmetry**






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<b>Navigation</b>	<a href="#">📄📄</a> <a href="#">Diagnostics</a> → <a href="#">Testpoints</a> → <a href="#">Tors.sig.asymm. (6289)</a> <a href="#">📄📄</a> <a href="#">Expert</a> → <a href="#">Sensor</a> → <a href="#">Testpoints</a> → <a href="#">Tors.sig.asymm. (6289)</a>
<b>Prerequisite</b>	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.
<b>Description</b>	Shows the relative difference of the signal amplitudes of the inlet sensor and outlet sensor of the second oscillation mode.
<b>User interface</b>	Signed floating-point number

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**Sensor electronics temperature (ISEM)**





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<b>Navigation</b>	 <a href="#">Diagnostics</a> → <a href="#">Testpoints</a> → <a href="#">Sensor elec.temp (6053)</a>  <a href="#">Expert</a> → <a href="#">Sensor</a> → <a href="#">Testpoints</a> → <a href="#">Sensor elec.temp (6053)</a>
<b>Description</b>	Displays the current temperature inside the main electronics.
<b>User interface</b>	Signed floating-point number
<b>Additional information</b>	<p><b>NOTE!</b></p> <p>Stay within the specified ambient temperature range.</p> <p><i>Dependency</i></p> <p> The unit is taken from the <b>Temperature unit</b> parameter (→  98)</p>

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**Carrier pipe temperature**


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<b>Navigation</b>	 <a href="#">Diagnostics</a> → <a href="#">Testpoints</a> → <a href="#">Carr. pipe temp. (6027)</a>  <a href="#">Expert</a> → <a href="#">Sensor</a> → <a href="#">Testpoints</a> → <a href="#">Carr. pipe temp. (6027)</a>
<b>Prerequisite</b>	<ul style="list-style-type: none"> <li>▪ Order code for "Application package", option EB "Heartbeat Verification + Monitoring"</li> <li>▪ If the carrier tube temperature is provided: <ul style="list-style-type: none"> <li>▪ Promass A</li> <li>▪ Promass F</li> <li>▪ Promass H</li> <li>▪ Promass I</li> <li>▪ Promass O</li> <li>▪ Promass P</li> <li>▪ Promass Q</li> <li>▪ Promass S</li> <li>▪ Promass X</li> </ul> </li> </ul>
<b>Description</b>	Use this function to display the current temperature of the measuring tube housing. Displays the 2nd measured temperature for compensation.
<b>User interface</b>	Signed floating-point number
<b>Additional information</b>	<p><i>Limit values</i></p> <p>In thermally insulated sensors, the carrier tube temperature can reach the temperature of the medium.</p> <p><i>Dependency</i></p> <p> The unit is taken from the <b>Temperature unit</b> parameter (0557)</p>

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### Casing pipe temperature

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<b>Navigation</b>	<a href="#">📄📄</a> <a href="#">Diagnostics → Testpoints → CasingPipeTemp. (6411)</a> <a href="#">📄📄</a> <a href="#">Expert → Sensor → Testpoints → CasingPipeTemp. (6411)</a>
<b>Prerequisite</b>	This parameter is only available: with the order code for "Application package", option EB "Heartbeat Verification + Monitoring" and the Promass I sensor
<b>Description</b>	Displays the temperature of the casing pipe.
<b>User interface</b>	Signed floating-point number

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### Exciter current 0 to 1

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<b>Navigation</b>	<a href="#">📄📄</a> <a href="#">Diagnostics → Testpoints → Exc. current 0 to 1 (6055)</a> <a href="#">📄📄</a> <a href="#">Expert → Sensor → Testpoints → Exc. current 0 to 1 (6055)</a>
<b>Prerequisite</b>	<ul style="list-style-type: none"> <li>▪ Exciter current 0 is available for all Promass sensors.</li> <li>▪ Exciter current 1 is only available for the Promass I and Promass Q sensors.</li> </ul>
<b>Description</b>	Rms value of the exciter current.
<b>User interface</b>	Signed floating-point number
<b>Additional information</b>	<p><b>NOTE!</b></p> <p>The maximum available excitation current has been reached when the oscillation amplitude shown is less than 100 %.</p>

---

### Test point 0

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<b>Navigation</b>	<a href="#">📄📄</a> <a href="#">Diagnostics → Testpoints → Test point 0 (6425)</a> <a href="#">📄📄</a> <a href="#">Expert → Sensor → Testpoints → Test point 0 (6425)</a>
<b>Description</b>	Shows the value for the selected test point. Can only be configured by Endress+Hauser.
<b>Factory setting</b>	0

---

### Test point 1

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<b>Navigation</b>	<a href="#">📄📄</a> <a href="#">Diagnostics → Testpoints → Test point 1 (6426)</a> <a href="#">📄📄</a> <a href="#">Expert → Sensor → Testpoints → Test point 1 (6426)</a>
<b>Description</b>	Shows the value for the selected test point. Can only be configured by Endress+Hauser.

**Factory setting** 0

---

### Temperature difference measuring tube

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**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

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### Temperat. difference meas. tube-carrier

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**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

**Factory setting** 0 K

#### "Sensor index coil asymmetry" submenu

*Navigation*   [Diagnostics → Testpoints → SensIndCoilAsym.](#)

*Navigation*   [Expert → Sensor → Testpoints → SensIndCoilAsym.](#)

<b>► Sensor index coil asymmetry</b>	
Sensor index coil asymmetry	→  147
Sensor index coil asymmetry reliability	→  147

---

### Sensor index coil asymmetry

---

<b>Navigation</b>	<a href="#">🔍📄</a> <a href="#">Diagnostics</a> → <a href="#">Testpoints</a> → <a href="#">SensIndCoilAsym. (5951)</a> <a href="#">🔍📄</a> <a href="#">Expert</a> → <a href="#">Sensor</a> → <a href="#">Testpoints</a> → <a href="#">SensIndCoilAsym. (5951)</a>
<b>Description</b>	Shows the sensor index coil asymmetry (SICA) currently measured.
<b>User interface</b>	Signed floating-point number
<b>Factory setting</b>	0 %

---

### Sensor index coil asymmetry reliability

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<b>Navigation</b>	<a href="#">🔍📄</a> <a href="#">Diagnostics</a> → <a href="#">Testpoints</a> → <a href="#">SensIndCoilAREli (5952)</a> <a href="#">🔍📄</a> <a href="#">Expert</a> → <a href="#">Sensor</a> → <a href="#">Testpoints</a> → <a href="#">SensIndCoilAREli (5952)</a>
<b>Description</b>	Indicates the reliability of the sensor index coil asymmetry value (SICA) currently measured.
<b>User interface</b>	<ul style="list-style-type: none"> <li>▪ Good</li> <li>▪ Uncertain</li> <li>▪ Bad</li> </ul>
<b>Factory setting</b>	Bad

---

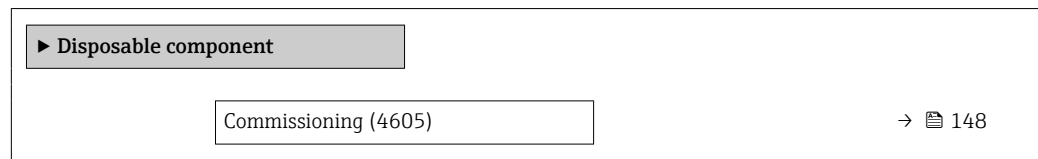
### Sensor index coil asymmetry limit 🔒

---




<b>Navigation</b>	<a href="#">🔍📄</a> <a href="#">Diagnostics</a> → <a href="#">Testpoints</a> → <a href="#">SICA limit</a> <a href="#">🔍📄</a> <a href="#">Expert</a> → <a href="#">Sensor</a> → <a href="#">Testpoints</a> → <a href="#">SICA limit</a>
<b>Description</b>	Enter the limit value for sensor index coil asymmetry. A diagnostic message is generated if this value is exceeded.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	2 %

### 3.2.10 "Disposable component" submenu

Navigation  Expert → Sensor → Disposable comp.

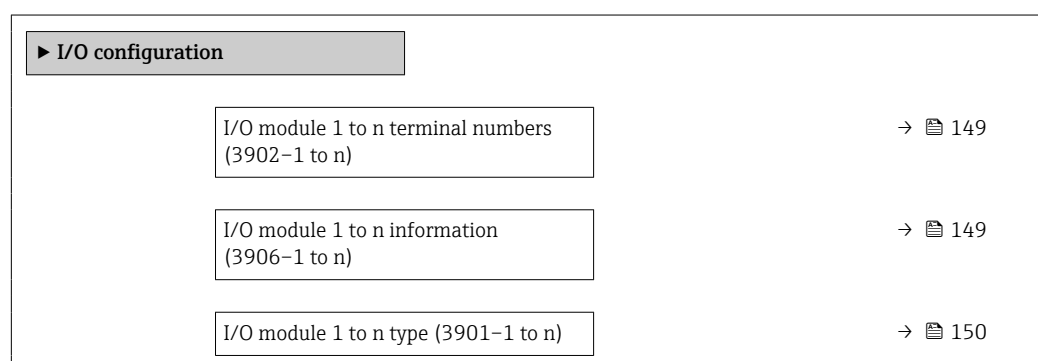


#### Commissioning

<b>Navigation</b>	 Expert → Sensor → Disposable comp. → Commissioning (4605)
<b>Description</b>	Start commissioning of the sensor manually if does not start automatically.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Start</li> <li>▪ Busy</li> <li>▪ Done</li> <li>▪ Not done</li> </ul>
<b>Factory setting</b>	Not done
<b>Additional information</b>	<p><b>Options</b></p> <ul style="list-style-type: none"> <li>▪ Start: Starts commissioning</li> <li>▪ Busy, Done, Not done: Status indicator for commissioning</li> </ul> <p> 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).</p> <p> 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).</p>

### 3.3 "I/O configuration" submenu

Navigation  Expert → I/O config.




Apply I/O configuration (3907)	→ 150
I/O alteration code (2762)	→ 150

---

### I/O module 1 to n terminal numbers


---

<b>Navigation</b>	 Expert → I/O config. → I/O 1 to n terminals (3902-1 to n)
<b>Description</b>	Displays the terminal numbers used by the I/O module.
<b>User interface</b>	<ul style="list-style-type: none"> <li>▪ Not used</li> <li>▪ 26-27 (I/O 1)</li> <li>▪ 24-25 (I/O 2)</li> <li>▪ 22-23 (I/O 3)</li> <li>▪ 20-21 (I/O 4)</li> </ul>

---

### I/O module 1 to n information

---


<b>Navigation</b>	 Expert → I/O config. → I/O 1 to n info (3906-1 to n)
<b>Description</b>	Displays information about the plugged in I/O module.
<b>User interface</b>	<ul style="list-style-type: none"> <li>▪ Not plugged</li> <li>▪ Invalid</li> <li>▪ Not configurable</li> <li>▪ Configurable</li> <li>▪ MODBUS</li> </ul>
<b>Additional information</b>	<p><i>"Not plugged" option</i> The I/O module is not plugged in.</p> <p><i>"Invalid" option</i> The I/O module is not plugged correctly.</p> <p><i>"Not configurable" option</i> The I/O module is not configurable.</p> <p><i>"Configurable" option</i> The I/O module is configurable.</p> <p><i>"MODBUS" option</i> The I/O module is configured for Modbus.</p>

---

**I/O module 1 to n type**

---




<b>Navigation</b>	 Expert → I/O config. → I/O 1 to n type (3901–1 to n)
<b>Prerequisite</b>	For the following order code: "Output; input 2", option <b>D</b> "Configurable I/O initial setting off"
<b>Description</b>	Use this function to select the I/O module type for the configuration of the I/O module.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Off</li> <li>▪ Current output *</li> <li>▪ Current input *</li> <li>▪ Status input *</li> <li>▪ Pulse/frequency/switch output *</li> <li>▪ Double pulse output *</li> <li>▪ Relay output *</li> </ul>
<b>Factory setting</b>	Off

---

**Apply I/O configuration**

---





<b>Navigation</b>	 Expert → I/O config. → Apply I/O config (3907)
<b>Description</b>	Use this function to activate the newly configured I/O module type.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ No</li> <li>▪ Yes</li> </ul>
<b>Factory setting</b>	No

---

**I/O alteration code**

---





<b>Navigation</b>	 Expert → I/O config. → I/O alterat.code (2762)
<b>Description</b>	Use this function to enter the ordered activation code to activate the I/O configuration change.
<b>User entry</b>	Positive integer
<b>Factory setting</b>	0
<b>Additional information</b>	<p><i>Description</i></p> <p>The I/O configuration is changed in the <b>I/O module type</b> parameter (→  150).</p>

---

\* Visibility depends on order options or device settings








### 3.4 "Input" submenu

Navigation  Expert → Input

▶ Input	
▶ Current input 1 to n	→  151
▶ Status input 1 to n	→  154

#### 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)	→  151
Signal mode (1610-1 to n)	→  152
Current span (1605-1 to n)	→  152
0/4 mA value (1606-1 to n)	→  152
20 mA value (1607-1 to n)	→  153
Failure mode (1601-1 to n)	→  153
Failure value (1602-1 to n)	→  154

---

#### 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** *"Not used" option*  
 The current input module does not use any terminal numbers.






---

\* Visibility depends on order options or device settings




---

<b>Signal mode</b>		
<b>Navigation</b>	  Expert → Input → Current input 1 to n → Signal mode (1610–1 to n)	
<b>Prerequisite</b>	The measuring device is <b>not</b> approved for use in the hazardous area with type of protection Ex-i.	
<b>Description</b>	Use this function to select the signal mode for the current input.	
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Passive</li> <li>▪ Active*</li> </ul>	
<b>Factory setting</b>	Active	

---

<b>Current span</b>		
<b>Navigation</b>	  Expert → Input → Current input 1 to n → Current span (1605–1 to n)	
<b>Description</b>	Use this function to select the current range for the process value output and the upper and lower level for signal on alarm.	
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ 4...20 mA (4...20.5 mA)</li> <li>▪ 4...20 mA NE (3.8...20.5 mA)</li> <li>▪ 4...20 mA US (3.9...20.8 mA)</li> <li>▪ 0...20 mA (0...20.5 mA)</li> </ul>	
<b>Factory setting</b>	Country-specific: <ul style="list-style-type: none"> <li>▪ 4...20 mA NE (3.8...20.5 mA)</li> <li>▪ 4...20 mA US (3.9...20.8 mA)</li> </ul>	
<b>Additional information</b>	<i>Examples</i>  Sample values for the current range: <b>Current span</b> parameter (→  159)	

---



<b>0/4 mA value</b>		
<b>Navigation</b>	  Expert → Input → Current input 1 to n → 0/4 mA value (1606–1 to n)	
<b>Description</b>	Use this function to enter a value for the 4 mA current.	
<b>User entry</b>	Signed floating-point number	
<b>Factory setting</b>	0	

---



\* Visibility depends on order options or device settings

**Additional information***Current input behavior*



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

- Current span (→  152)
- Failure mode (→  153)

*Configuration examples*

 Pay attention to the configuration examples for **4 mA value** parameter (→  160).

**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 (→  160).

**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 (→  152).


**Selection**

- Alarm
- Last valid value
- Defined value

**Factory setting**

Alarm

**Additional information***Options*

- Alarm  
An error message is set.
- Last valid value  
The last valid measured value is used.
- Defined value  
A user-defined measured value is used (**Failure value** parameter (→  154)).

**Failure value**

<b>Navigation</b>	Expert → Input → Current input 1 to n → Failure value (1602-1 to n)
<b>Prerequisite</b>	In the <b>Failure mode</b> parameter (→  153), the <b>Defined value</b> option is selected.
<b>Description</b>	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.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	0

**3.4.2 "Status input 1 to n" submenu**

*Navigation* Expert → Input → Status input 1 to n

<b>► Status input 1 to n</b>	
Terminal number (1358-1 to n)	→  154
Assign status input (1352-1 to n)	→  155
Value status input (1353-1 to n)	→  155
Active level (1351-1 to n)	→  156
Response time status input (1354-1 to n)	→  156

**Terminal number**

<b>Navigation</b>	Expert → Input → Status input 1 to n → Terminal no. (1358-1 to n)
<b>Description</b>	Displays the terminal numbers used by the status input module.
<b>User interface</b>	<ul style="list-style-type: none"> <li>■ Not used</li> <li>■ 24-25 (I/O 2)</li> <li>■ 22-23 (I/O 3)</li> <li>■ 20-21 (I/O 4)*</li> </ul>
<b>Additional information</b>	<p><i>"Not used" option</i></p> <p>The status input module does not use any terminal numbers.</p>

\* Visibility depends on order options or device settings

---

**Assign status input**


<b>Navigation</b>	Expert → Input → Status input 1 to n → Assign stat.inp. (1352-1 to n)
<b>Description</b>	Use this function to select the function for the status input.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Off</li> <li>■ Reset totalizer 1</li> <li>■ Reset totalizer 2</li> <li>■ Reset totalizer 3</li> <li>■ Reset all totalizers</li> <li>■ Flow override</li> <li>■ Zero adjustment</li> <li>■ Reset weighted averages *</li> <li>■ Reset weighted averages + totalizer 3 *</li> </ul>
<b>Factory setting</b>	Off
<b>Additional information</b>	<p><i>Options</i></p> <ul style="list-style-type: none"> <li>■ Off The status input is switched off.</li> <li>■ Reset totalizer 1...3 The individual totalizers are reset.</li> <li>■ Reset all totalizers All totalizers are reset.</li> <li>■ Flow override The Flow override (→  101) is activated.</li> </ul> <p> Note on the Flow override (→  101):</p> <ul style="list-style-type: none"> <li>■ The Flow override (→  101) is enabled as long as the level is at the status input (continuous signal).</li> <li>■ All other assignments react to a change in level (pulse) at the status input.</li> </ul>

---

**Value status input**

<b>Navigation</b>	Expert → Input → Status input 1 to n → Val.stat.inp. (1353-1 to n)
<b>Description</b>	Displays the current input signal level.
<b>User interface</b>	<ul style="list-style-type: none"> <li>■ High</li> <li>■ Low</li> </ul>

---

\* Visibility depends on order options or device settings

**Active level**

<b>Navigation</b>	Expert → Input → Status input 1 to n → Active level (1351-1 to n)
<b>Description</b>	Use this function to determine the input signal level at which the assigned function is activated.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ High</li> <li>■ Low</li> </ul>
<b>Factory setting</b>	High

**Response time status input**

<b>Navigation</b>	Expert → Input → Status input 1 to n → Response time (1354-1 to n)
<b>Description</b>	Use this function to enter the minimum time period for which the input signal level must be present before the selected function is activated.
<b>User entry</b>	5 to 200 ms
<b>Factory setting</b>	50 ms

### 3.5 "Output" submenu










*Navigation* Expert → Output

▶ Output	
▶ Current output 1 to n	→  156
▶ Pulse/frequency/switch output 1 to n	→  164
▶ Relay output 1 to n	→  189
▶ Double pulse output	→  195



#### 3.5.1 "Current output 1" submenu



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










▶ Current output 1
--------------------

Terminal number	→  158
Signal mode	→  158
Process variable current output	→  158
Current range output	→  159
Fixed current	→  160
Lower range value output	→  160
Upper range value output	→  160
Measuring mode current output	→  160
Damping current output	→  161

**"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.

<b>▶ Current output 1</b>	
Terminal number	→  158
Signal mode	→  158
Process variable current output	→  158
Current range output	→  159
Fixed current	→  160
Lower range value output	→  160
Upper range value output	→  160
Measuring mode current output	→  160
Damping current output	→  161

---

**Terminal number**



---


<b>Navigation</b>	 Setup → Curr.output 1 to n → Terminal no. (0379–1 to n)
<b>Description</b>	Shows the terminal numbers used by the current output module.
<b>User interface</b>	<ul style="list-style-type: none"> <li>■ Not used</li> <li>■ 26-27 (I/O 1)</li> <li>■ 24-25 (I/O 2)</li> <li>■ 22-23 (I/O 3)</li> <li>■ 20-21 (I/O 4)</li> </ul>
<b>Factory setting</b>	Not used

---

**Signal mode**


---





<b>Navigation</b>	 Setup → Curr.output 1 to n → Signal mode (0377–1 to n)
<b>Description</b>	Select the signal mode for the current output.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Active *</li> <li>■ Passive *</li> </ul>
<b>Factory setting</b>	Passive

---

**Process variable current output**


---



<b>Navigation</b>	 Setup → Curr.output 1 to n → Proc.var. outp (0359–1 to n)
<b>Description</b>	Select the process variable for the current output.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Off *</li> <li>■ Mass flow</li> <li>■ Volume flow</li> <li>■ Corrected volume flow *</li> <li>■ Density</li> <li>■ Reference density *</li> <li>■ Temperature</li> <li>■ Pressure</li> <li>■ Dynamic viscosity *</li> <li>■ Kinematic viscosity *</li> <li>■ Temp. compensated dynamic viscosity *</li> <li>■ Temp. compensated kinematic viscosity *</li> <li>■ GSV flow *</li> <li>■ GSV flow alternative *</li> <li>■ NSV flow *</li> <li>■ NSV flow alternative *</li> </ul>


---

\* Visibility depends on order options or device settings

- S&W volume flow \*
- Reference density alternative \*
- 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 \*
- 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 \*
- Inhomogeneous medium index
- Suspended bubbles index \*
- HBSI \*
- Raw value mass flow
- Exciter current 0
- Exciter current 1 \*
- Oscillation damping 0
- Oscillation damping 1 \*
- Oscillation damping fluctuation 0 \*
- Oscillation damping fluctuation 1 \*
- Oscillation frequency 0
- Oscillation frequency 1 \*
- Frequency fluctuation 0 \*
- Frequency fluctuation 1 \*
- Oscillation amplitude 0 \*
- Oscillation amplitude 1 \*
- Signal asymmetry
- Torsion signal asymmetry \*
- Carrier pipe temperature \*
- Electronics temperature
- Sensor index coil asymmetry
- Test point 0
- Test point 1

**Factory setting**

Mass flow

**Current range output****Navigation** Setup → Curr.output 1 to n → Curr.range out (0353-1 to n)**Description**

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

\* Visibility depends on order options or device settings

<b>Selection</b>	<ul style="list-style-type: none"> <li>■ 4...20 mA NE (3.8...20.5 mA)</li> <li>■ 4...20 mA US (3.9...20.8 mA)</li> <li>■ 4...20 mA (4...20.5 mA)</li> <li>■ 0...20 mA (0...20.5 mA)</li> <li>■ Fixed value</li> </ul>
------------------	---

<b>Factory setting</b>	4...20 mA NE (3.8...20.5 mA)
------------------------	------------------------------

---

**Fixed current**


<b>Navigation</b>	Setup → Curr.output 1 to n → Fixed current (0365-1 to n)
-------------------	--

<b>Description</b>	Defines the fixed output current.
--------------------	-----------------------------------

<b>User entry</b>	3.59 to 22.5 mA
-------------------	-----------------

<b>Factory setting</b>	22.5 mA
------------------------	---------

---

**Lower range value output**


<b>Navigation</b>	Setup → Curr.output 1 to n → Low.range outp (0367-1 to n)
-------------------	---

<b>Description</b>	Enter lower range value for the measured value range.
--------------------	---

<b>User entry</b>	Signed floating-point number
-------------------	------------------------------

<b>Factory setting</b>	0 kg/h
------------------------	--------

---

**Upper range value output**


<b>Navigation</b>	Setup → Curr.output 1 to n → Upp.range outp (0372-1 to n)
-------------------	---

<b>Description</b>	Enter upper range value for the measured value range.
--------------------	---

<b>User entry</b>	Signed floating-point number
-------------------	------------------------------

<b>Factory setting</b>	2.5 kg/h
------------------------	----------

---

**Measuring mode current output**


<b>Navigation</b>	Expert → Output → Curr.output 1 to n → Output mode (0351-1 to n)
-------------------	--

<b>Description</b>	Select measuring mode for output.
--------------------	-----------------------------------

**Selection**


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

**Factory setting** Forward flow

---

## Damping current output

---



**Navigation**  Setup → Curr.output 1 to n → Damp.curr.outp (0363-1 to n)





**Description** Enter time constant for output damping (PT1 element). Damping reduces the effect of fluctuations in the measured value on the output signal.

**User entry** 0.0 to 999.9 s

**Factory setting** 1.0 s

### "Current output 1" submenu

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

<b>► Current output 1</b>	
Failure behavior current output	→  162
Failure current	→  163
Output current	→  163
Measured current	→  163

---

\* Visibility depends on order options or device settings

---

**Failure behavior current output**
**Navigation**

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

**Prerequisite**

A process variable is selected in the **Assign current output** parameter (→ 158) and one of the following options is selected in the **Current span** parameter (→ 159):

- 4...20 mA NE (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
- Fixed value

**Factory setting**

Max.

**Additional information**

*Description*

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

*"Min." option*

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

The signal on alarm level is defined via the **Current span** parameter (→ 159).

*"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 (→ 159).

*"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 (→ 163).



---

**Failure current**

---

<b>Navigation</b>	<ul style="list-style-type: none"> <li>  Expert → Output → Curr.output 1 to n → Fail. current (0352-1 to n)</li> <li> Setup → Curr.output 1 to n → Fail. current (0352-1 to n)</li> <li> Setup → Curr.output 1 to n → Fail. current (0352-1 to n)</li> </ul>
<b>Prerequisite</b>	The <b>Defined value</b> option is selected in the <b>Failure mode</b> parameter (→  162).
<b>Description</b>	Use this function to enter a fixed value that the current output adopts in the event of a device alarm.
<b>User entry</b>	0 to 22.5 mA
<b>Factory setting</b>	22.5 mA

---

**Output current**

---

<b>Navigation</b>	<ul style="list-style-type: none"> <li>  Diagnostics → Measured val. → Output values → Curr.output 1 to n → Output curr. (0361-1 to n)</li> <li>  Expert → Output → Curr.output 1 to n → Output curr. (0361-1 to n)</li> <li>  Expert → Sensor → Measured val. → Output values → Current output 1 to n → Output curr. (0361-1 to n)</li> </ul>
<b>Description</b>	Displays the current value currently calculated for the current output.
<b>User interface</b>	0 to 22.5 mA

---

**Measured current**

---

<b>Navigation</b>	<ul style="list-style-type: none"> <li>  Diagnostics → Measured val. → Output values → Curr.output 1 to n → Measur. curr. (0366-1 to n)</li> <li>  Expert → Output → Curr.output 1 to n → Measur. curr. (0366-1 to n)</li> <li>  Expert → Sensor → Measured val. → Output values → Current output 1 to n → Measur. curr. (0366-1 to n)</li> </ul>
<b>Description</b>	Displays the actual measured value of the output current.
<b>User interface</b>	0 to 30 mA

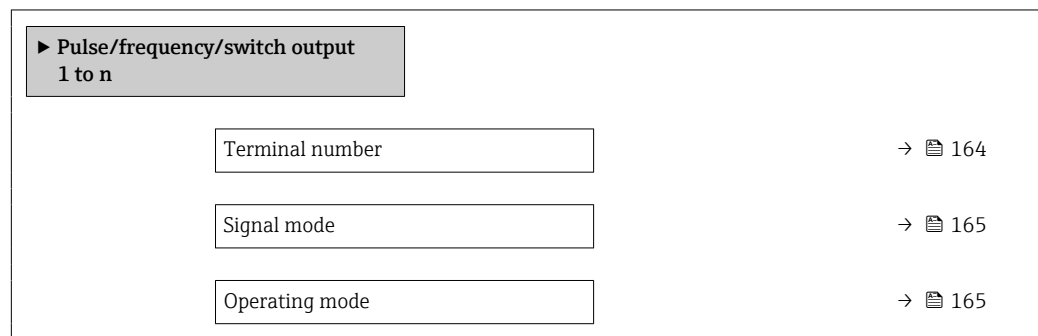
### 3.5.2 "Pulse/frequency/switch output" submenu

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








#### "Pulse/frequency/switch output" submenu

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



#### 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 NE

**Factory setting**

Passive

---

**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

**Factory setting**

Pulse

**Additional information**

*"Pulse" option*

Quantity-dependent pulse with configurable pulse width

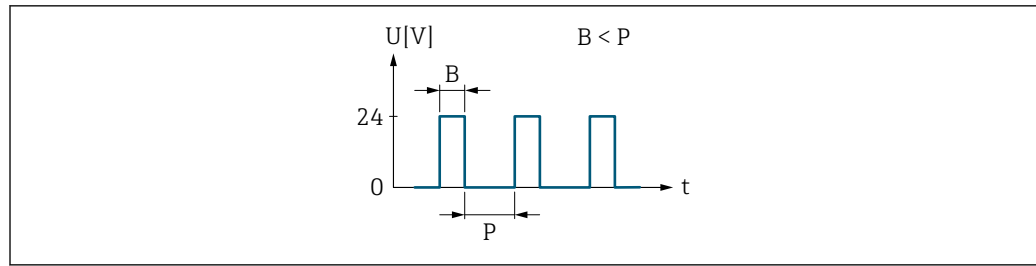
- Whenever a specific mass, volume, corrected volume, target mass or carrier mass is reached (pulse value), a pulse is output, the duration of which was set previously (pulse width).
- The pulses are never shorter than the set duration.

Example

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

---

\* Visibility depends on order options or device settings



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

*B* Pulse width entered

*P* Pauses between the individual pulses

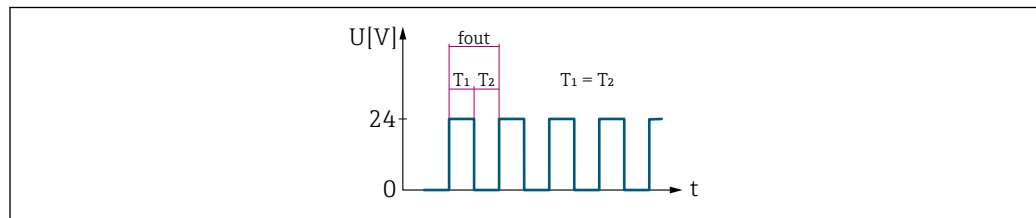
#### "Frequency" option

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, dynamic viscosity, kinematic viscosity, temperature-compensated dynamic viscosity, temperature-compensated kinematic viscosity, 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



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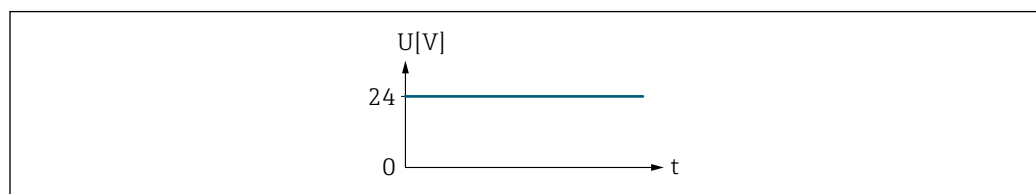
5 Flow-proportional frequency output

#### "Switch" option

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

#### Example

Alarm response without alarm

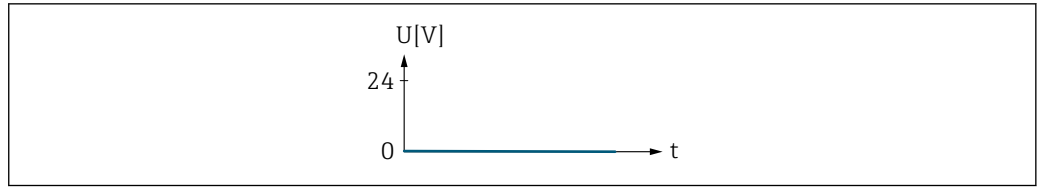


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6 No alarm, high level



#### Example

















Alarm response in case of alarm















7 Alarm, low level

### "Settings" submenu





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

► Settings	
Assign pulse output	→  168
Pulse scaling	→  169
Pulse width	→  169
Measuring mode	→  170
Failure mode	→  171
Pulse output	→  172
Assign frequency output	→  172
Minimum frequency value	→  174
Maximum frequency value	→  174
Measuring value at minimum frequency	→  175
Measuring value at maximum frequency	→  175
Measuring mode	→  176
Output damping	→  177
Response time	→  178
Failure mode	→  179
Failure frequency	→  180

Output frequency	→  180
Switch output function	→  180
Assign diagnostic behavior	→  181
Assign limit	→  182
Switch-on value	→  184
Switch-off value	→  185
Assign flow direction check	→  185
Assign status	→  186
Switch-on delay	→  186
Switch-off delay	→  186
Failure mode	→  187
Switch state	→  187

## Assign pulse output

### Navigation

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

### Prerequisite

The **Pulse** option is selected in **Operating mode** parameter (→  165).

### 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 \*

**Factory setting** Off

---


## 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 (→  165) and a process variable is selected in the **Assign pulse output** parameter (→  168).

**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 →  298



**Additional information** *User entry*  
 Weighting of the pulse output with a quantity.  
 The lower the pulse value, the
 

- better the resolution.
- the higher the frequency of the pulse response.

---

## Pulse width

**Navigation**   Expert → Output → PFS output 1 to n → Pulse width (0452-1 to n)  
 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 (→  165) and a process variable is selected in the **Assign pulse output** parameter (→  168).

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

**User entry** 0.05 to 2 000 ms

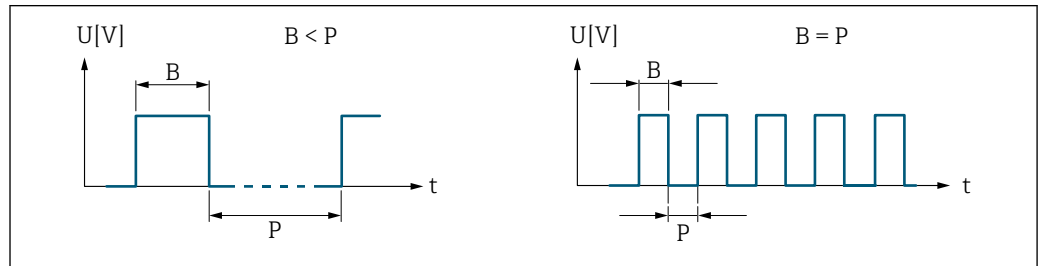
---

\* Visibility depends on order options or device settings

**Factory setting** 100 ms

**Additional information** *Description*

- Define how long a pulse is (duration).
- The maximum pulse rate is defined by  $f_{\max} = 1 / (2 \times \text{pulse width})$ .
- The interval between two pulses lasts at least as long as the set pulse width.
- The maximum flow is defined by  $Q_{\max} = f_{\max} \times \text{pulse value}$ .
- If the flow exceeds these limit values, the measuring device displays the **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 (→ 165) and one of the following options is selected in the **Assign pulse output** parameter (→ 168):

- 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

**Factory setting**

Forward flow







\* Visibility depends on order options or device settings

<b>Additional information</b>	<p><i>Options</i></p> <ul style="list-style-type: none"> <li>■ Forward flow Positive flow is output, negative flow is not output.</li> <li>■ Forward/Reverse flow Positive and negative flow are output (absolute value), but a distinction is not made between positive and negative flow.</li> <li>■ Reverse flow Negative flow is output, positive flow is not output.</li> <li>■ Reverse flow compensation The flow components outside the measuring range are buffered, balanced and output after a maximum delay of 60 s.</li> </ul> <p> For a detailed description of the options available, see the <b>Measuring mode</b> parameter (→  160)</p> <p><i>Examples</i></p> <p> For a detailed description of the configuration examples, see the <b>Measuring mode</b> parameter (→  160)</p>
-------------------------------	--

---

## Failure mode

---







<b>Navigation</b>	<p>  Expert → Output → PFS output 1 to n → Failure mode (0480-1 to n)</p> <p> Setup → PFS output 1 to n → Failure mode (0480-1 to n)</p> <p> Setup → PFS output 1 to n → Failure mode (0480-1 to n)</p>
<b>Prerequisite</b>	The <b>Pulse</b> option is selected in the <b>Operating mode</b> parameter (→  165) and a process variable is selected in the <b>Assign pulse output</b> parameter (→  168).
<b>Description</b>	Use this function to select the failure mode of the pulse output in the event of a device alarm.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Actual value</li> <li>■ No pulses</li> </ul>
<b>Factory setting</b>	No pulses
<b>Additional information</b>	<p><i>Description</i></p> <p>The dictates of safety render it advisable to ensure that the pulse output shows a predefined behavior in the event of a device alarm.</p> <p><i>Options</i></p> <ul style="list-style-type: none"> <li>■ 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.</li> <li>■ No pulses In the event of a device alarm, the pulse output is "switched off".</li> </ul> <p><b>NOTICE!</b> 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 <b>Actual value</b> option is only recommended if it is ensured that all possible alarm conditions do not influence the measurement quality.</p>

---


**Pulse output**


---

**Navigation**

-   [Diagnostics → Measured val. → Output values → PFS output 1 to n → Pulse output \(0456-1 to n\)](#)
-   [Expert → Output → PFS output 1 to n → Pulse output \(0456-1 to n\)](#)
-   [Expert → Sensor → Measured val. → Output values → PFS output 1 to n → Pulse output \(0456-1 to n\)](#)

**Prerequisite**

The **Pulse** option is selected in the **Operating mode** parameter (→  165) parameter.

**Description**

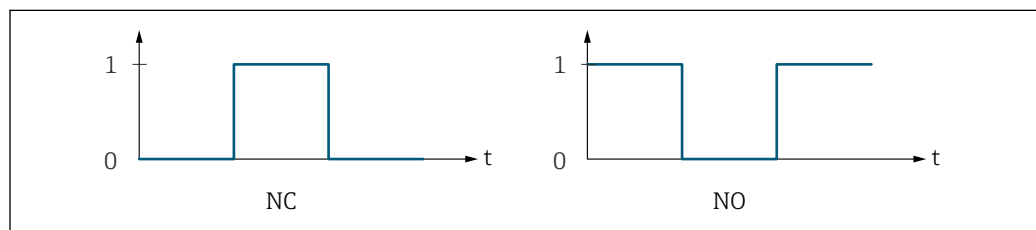
Displays the pulse frequency currently output.

**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.



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- 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 (→  188) 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 (→  171)) 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 (→  165).

**Description**

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

-  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 \*
- Time period signal frequency (TPS) \*
- Temperature
- Pressure
- Dynamic viscosity \*
- Kinematic viscosity \*
- Temp. compensated dynamic viscosity \*
- Temp. compensated kinematic viscosity \*
- GSV flow \*
- GSV flow alternative \*
- NSV flow \*
- NSV flow alternative \*
- S&W volume flow \*
- Reference density alternative \*
- 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 \*
- 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 \*
- Inhomogeneous medium index
- Suspended bubbles index \*
- HBSI \*
- Raw value mass flow
- Exciter current 0
- Exciter current 1 \*
- Oscillation damping 0
- Oscillation damping 1 \*
- Oscillation damping fluctuation 0 \*
- Oscillation damping fluctuation 1 \*
- Oscillation frequency 0
- Oscillation frequency 1 \*
- Frequency fluctuation 0 \*
- Frequency fluctuation 1 \*
- Oscillation amplitude 0 \*
- Oscillation amplitude 1 \*
- Signal asymmetry
- Torsion signal asymmetry \*
- Carrier pipe temperature

---

\* Visibility depends on order options or device settings





- Electronics temperature
- Sensor index coil asymmetry
- Test point 0
- Test point 1



**Factory setting** Off

---

### 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 (→  165) and a process variable is selected in the **Assign frequency output** parameter (→  172).

**Description** Use this function to enter the minimum frequency.





**User entry** 0.0 to 10 000.0 Hz



**Factory setting** 0.0 Hz

---

### 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 (→  165) and a process variable is selected in the **Assign frequency output** parameter (→  172).

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

**User entry** 0.0 to 10 000.0 Hz

**Factory setting** 10 000.0 Hz

---

**Measuring value at minimum frequency**


<b>Navigation</b>	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)
<b>Prerequisite</b>	The <b>Frequency</b> option is selected in the <b>Operating mode</b> parameter (→  165) and a process variable is selected in the <b>Assign frequency output</b> parameter (→  172).
<b>Description</b>	Use this function to enter the measured value for the start value frequency.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	Depends on country and nominal diameter
<b>Additional information</b>	<i>Dependency</i> The entry depends on the process variable selected in the <b>Assign frequency output</b> parameter (→  172).

---

**Measuring value at maximum frequency**


<b>Navigation</b>	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)
<b>Prerequisite</b>	The <b>Frequency</b> option is selected in the <b>Operating mode</b> parameter (→  165) and a process variable is selected in the <b>Assign frequency output</b> parameter (→  172).
<b>Description</b>	Use this function to enter the measured value for the end value frequency.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	Depends on country and nominal diameter
<b>Additional information</b>	<i>Description</i> Use this function to enter the maximum measured value at the maximum frequency. The selected process variable is output as a proportional frequency.  <i>Dependency</i> The entry depends on the process variable selected in the <b>Assign frequency output</b> parameter (→  172).

---

**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 (→ 165) and one of the following options is selected in the **Assign frequency output** parameter (→ 172):

- Mass flow
- Volume flow
- Corrected volume flow
- Target mass flow \*
- Carrier mass flow \*
- Density
- Reference density
- Concentration \*
- Dynamic viscosity \*
- Kinematic viscosity \*
- Temp. compensated dynamic viscosity \*
- Temp. compensated kinematic viscosity \*
- Temperature
- Carrier pipe temperature \*
- Electronics temperature
- Oscillation frequency 0
- Oscillation frequency 1 \*
- Frequency fluctuation 0
- Frequency fluctuation 1 \*
- Oscillation amplitude 0 \*
- Oscillation amplitude 1 \*
- Oscillation damping 0
- Oscillation damping 1 \*
- Oscillation damping fluctuation 0
- Oscillation damping fluctuation 1 \*
- Signal asymmetry
- Exciter current 0
- Exciter current 1 \*

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

**Factory setting**

Forward flow

**Additional information**

*Options*

For a detailed description of the options available, see the **Measuring mode** parameter (→ 160)

*Examples*

For a detailed description of the configuration examples, see the **Measuring mode** parameter (→ 160)




---

\* Visibility depends on order options or device settings




## Damping output

### Navigation


-  Expert → Output → PFS output 1 to n → Damping out. (0477-1 to n)
-  Setup → PFS output 1 to n → Damping out. (0477-1 to n)
-  Setup → PFS output 1 to n → Damping out. (0477-1 to n)

### Prerequisite

The **Frequency** option is selected in the **Operating mode** parameter (→  165) and one of the following options is selected in the **Assign frequency output** parameter (→  172):

- Mass flow
- Volume flow
- Corrected volume flow
- Target mass flow \*
- Carrier mass flow \*
- Density
- Reference density
- Concentration \*
- Dynamic viscosity \*
- Kinematic viscosity \*
- Temp. compensated dynamic viscosity \*
- Temp. compensated kinematic viscosity \*
- Temperature
- Carrier pipe temperature \*
- Electronics temperature
- Oscillation frequency 0
- Oscillation frequency 1 \*
- Frequency fluctuation 0
- Frequency fluctuation 1 \*
- Oscillation amplitude 0 \*
- Oscillation amplitude 1 \*
- Oscillation damping 0
- Oscillation damping 1 \*
- Oscillation damping fluctuation 0
- Oscillation damping fluctuation 1 \*
- Signal asymmetry
- Exciter current 0
- Exciter current 1 \*



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

### Factory setting


0.0 s

\* Visibility depends on order options or device settings

**Additional information***User entry*

Use this function to enter a time constant (PT1 element <sup>6)</sup>) for frequency output damping:

- If a low time constant is entered, the current output reacts particularly quickly to fluctuating measured variables.
- On the other hand, the current output reacts more slowly if a high time constant is entered.

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

The frequency output is subject to separate damping that is independent of all preceding time constants.



**Response time****Navigation**

 [Expert](#) → [Output](#) → [PFS output 1 to n](#) → [Response time \(0491-1 to n\)](#)

**Prerequisite**

The **Frequency** option is selected in the **Operating mode** parameter (→  165) and one of the following options is selected in the **Assign frequency output** parameter (→  172):

- Mass flow
- Volume flow
- Corrected volume flow
- Target mass flow \*
- Carrier mass flow \*
- Density
- Reference density
- Concentration \*
- Dynamic viscosity \*
- Kinematic viscosity \*
- Temp. compensated dynamic viscosity \*
- Temp. compensated kinematic viscosity \*
- Temperature
- Carrier pipe temperature \*
- Electronics temperature
- Oscillation frequency 0
- Oscillation frequency 1 \*
- Frequency fluctuation 0
- Frequency fluctuation 1 \*
- Oscillation amplitude 0 \*
- Oscillation amplitude 1 \*
- Oscillation damping 0
- Oscillation damping 1 \*
- Oscillation damping fluctuation 0
- Oscillation damping fluctuation 1 \*
- Signal asymmetry
- Exciter current 0
- Exciter current 1 \*

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


6) proportional transmission behavior with first order delay

\* Visibility depends on order options or device settings

**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



---

## Failure mode

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**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 (→  165) and a process variable is selected in the **Assign frequency output** parameter (→  172).


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

**Selection**









- Actual value
- Defined value
- 0 Hz








**Factory setting** 0 Hz







**Additional information** *Options*

- Actual value  
In the event of a device alarm, the frequency output continues on the basis of the current flow measurement. The device alarm is ignored.
- Defined value  
In the event of a device alarm, the frequency output continues on the basis of a predefined value. The Failure frequency (→  180) 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 	
<b>Navigation</b>	<p>  Expert → Output → PFS output 1 to n → Failure freq. (0474-1 to n)</p> <p> Setup → PFS output 1 to n → Failure freq. (0474-1 to n)</p> <p> Setup → PFS output 1 to n → Failure freq. (0474-1 to n)</p>
<b>Prerequisite</b>	In the <b>Operating mode</b> parameter (→  165), the <b>Frequency</b> option is selected, in the <b>Assign frequency output</b> parameter (→  172) a process variable is selected, and in the <b>Failure mode</b> parameter (→  179), the <b>Defined value</b> option is selected.
<b>Description</b>	Enter frequency output value in alarm condition.
<b>User entry</b>	0.0 to 12 500.0 Hz
<b>Factory setting</b>	0.0 Hz

Output frequency	
<b>Navigation</b>	<p>  Diagnostics → Measured val. → Output values → PFS output 1 to n → Output freq. (0471-1 to n)</p> <p>  Expert → Output → PFS output 1 to n → Output freq. (0471-1 to n)</p> <p>  Expert → Sensor → Measured val. → Output values → PFS output 1 to n → Output freq. (0471-1 to n)</p>
<b>Prerequisite</b>	In the <b>Operating mode</b> parameter (→  165), the <b>Frequency</b> option is selected.
<b>Description</b>	Displays the actual value of the output frequency which is currently measured.
<b>User interface</b>	0.0 to 12 500.0 Hz

Switch output function 	
<b>Navigation</b>	<p>  Expert → Output → PFS output 1 to n → Switch out funct (0481-1 to n)</p> <p> Setup → PFS output 1 to n → Switch out funct (0481-1 to n)</p> <p> Setup → PFS output 1 to n → Switch out funct (0481-1 to n)</p>
<b>Prerequisite</b>	The <b>Switch</b> option is selected in the <b>Operating mode</b> parameter (→  165).
<b>Description</b>	Use this function to select a function for the switch output.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Off</li> <li>▪ On</li> <li>▪ Diagnostic behavior</li> <li>▪ Limit</li> <li>▪ Flow direction check</li> <li>▪ Status</li> </ul>

**Factory setting** Off

**Additional information** *Options*





- Off  
The switch output is permanently switched off (open, non-conductive).
- On  
The switch output is permanently switched on (closed, conductive).
- Diagnostic behavior  
Indicates if the diagnostic event is present or not. Is used to output diagnostic information and to react to it appropriately at the system level.
- Limit  
Indicates if a specified limit value has been reached for the process variable. Is used to output diagnostic information relating to the process and to react to it appropriately at the system level.
- 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 (→  165), the **Switch** option is selected.
- In the **Switch output function** parameter (→  180), 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

**Factory setting**

Alarm

**Additional information**

*Description*





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

*Selection*



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

---

**Assign limit**
**Navigation**

-   Expert → Output → PFS output 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 (→  165).
- The **Limit** option is selected in **Switch output function** parameter (→  180).

**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 \*
- 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 \*
- Dynamic viscosity \*
- Concentration \*
- Kinematic viscosity \*
- Temp. compensated dynamic viscosity \*
- Temp. compensated kinematic viscosity \*
- Temperature
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Oscillation damping
- Pressure
- Application specific output 0 \*
- Application specific output 1 \*
- Inhomogeneous medium index
- Suspended bubbles index \*

**Factory setting**

Volume flow

---

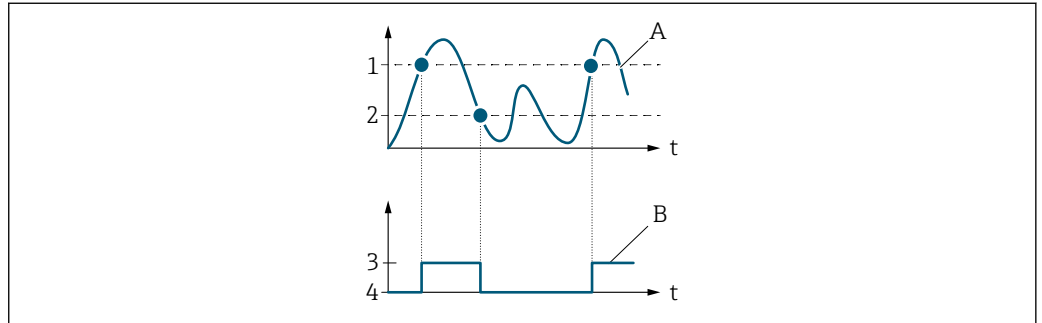
\* Visibility depends on order options or device settings

**Additional information**

*Description*

Behavior of status output when Switch-on value > Switch-off value:

- Process variable > Switch-on value: transistor is conductive
- Process variable < Switch-off value: transistor is non-conductive

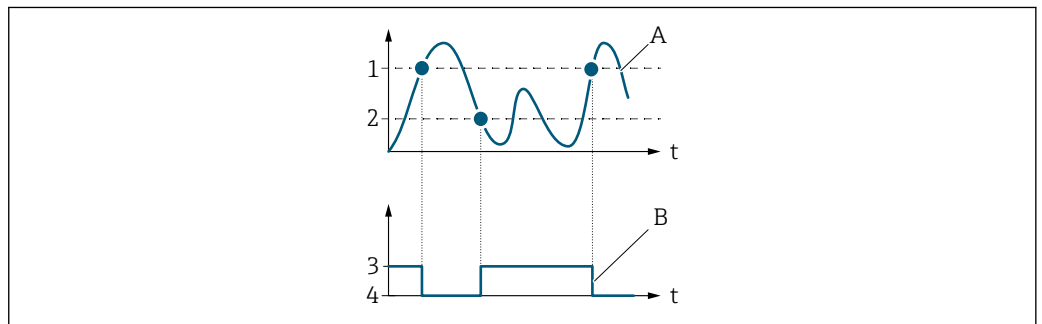


A0026891

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

Behavior of status output when Switch-on value < Switch-off value:

- Process variable < Switch-on value: transistor is conductive
- Process variable > Switch-off value: transistor is non-conductive

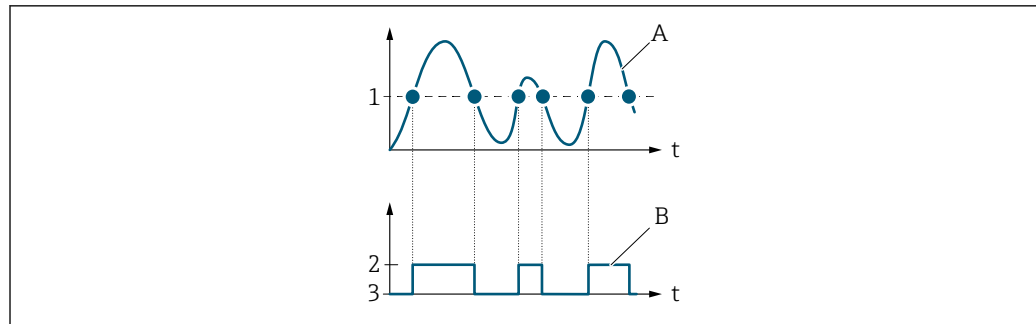


A0026892

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

Behavior of status output when Switch-on value = Switch-off value:

- Process variable > Switch-on value: transistor is conductive
- Process variable < Switch-off value: transistor is non-conductive







A0026893



- 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 (→  165).
- The **Limit** option is selected in the **Switch output function** parameter (→  180).

### 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 (→  182).

---

**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 (→ 165).
- The **Limit** option is selected in the **Switch output function** parameter (→ 180).

**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 (→ 182).

---

**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 (→ 165).
- The **Flow direction check** option is selected in the **Switch output function** parameter (→ 180).








**Description**








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

**Selection****Factory setting**

Mass flow

Assign status 	
<b>Navigation</b>	<p>  Expert → Output → PFS output 1 to n → Assign status (0485-1 to n)</p> <p> Setup → PFS output 1 to n → Assign status (0485-1 to n)</p> <p> Setup → PFS output 1 to n → Assign status (0485-1 to n)</p>
<b>Prerequisite</b>	<ul style="list-style-type: none"> <li>▪ The <b>Switch</b> option is selected in <b>Operating mode</b> parameter (→  165).</li> <li>▪ The <b>Status</b> option is selected in <b>Switch output function</b> parameter (→  180).</li> </ul>
<b>Description</b>	Select the device function whose status you want to display.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Partially filled pipe detection</li> <li>▪ Low flow cut off</li> </ul>
<b>Factory setting</b>	Partially filled pipe detection
<b>Additional information</b>	<p><i>Options</i></p> <p>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.</p>

Switch-on delay 	
<b>Navigation</b>	<p>  Expert → Output → PFS output 1 to n → Switch-on delay (0467-1 to n)</p> <p> Setup → PFS output 1 to n → Switch-on delay (0467-1 to n)</p> <p> Setup → PFS output 1 to n → Switch-on delay (0467-1 to n)</p>
<b>Prerequisite</b>	<ul style="list-style-type: none"> <li>▪ The <b>Switch</b> option is selected in the <b>Operating mode</b> parameter (→  165).</li> <li>▪ The <b>Limit</b> option is selected in the <b>Switch output function</b> parameter (→  180).</li> </ul>
<b>Description</b>	Use this function to enter a delay time for switching on the switch output.
<b>User entry</b>	0.0 to 100.0 s
<b>Factory setting</b>	0.0 s

Switch-off delay 	
<b>Navigation</b>	<p>  Expert → Output → PFS output 1 to n → Switch-off delay (0465-1 to n)</p> <p> Setup → PFS output 1 to n → Switch-off delay (0465-1 to n)</p> <p> Setup → PFS output 1 to n → Switch-off delay (0465-1 to n)</p>
<b>Prerequisite</b>	<ul style="list-style-type: none"> <li>▪ The <b>Switch</b> option is selected in the <b>Operating mode</b> parameter (→  165).</li> <li>▪ The <b>Limit</b> option is selected in the <b>Switch output function</b> parameter (→  180).</li> </ul>
<b>Description</b>	Use this function to enter a delay time for switching off the switch output.





**User entry** 0.0 to 100.0 s

**Factory setting** 0.0 s

---

## Failure mode

---

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

**Factory setting** Open







**Additional information** *Options*

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

---

## Switch state

---

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

**Prerequisite** The **Switch** option is selected in the **Operating mode** parameter (→  165).

**Description** Displays the current switch status of the status output.



**User interface**

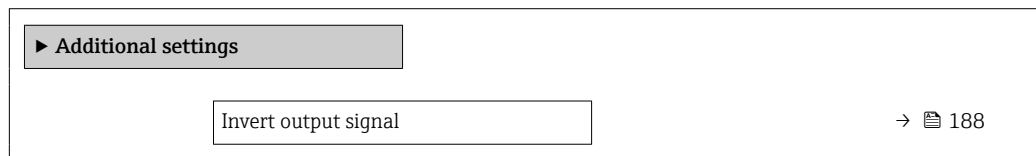
- Open
- Closed





**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

**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

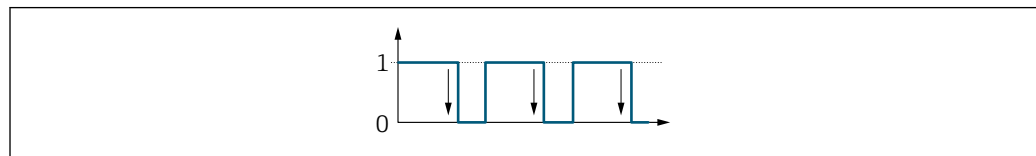
**Factory setting**

No

**Additional information**

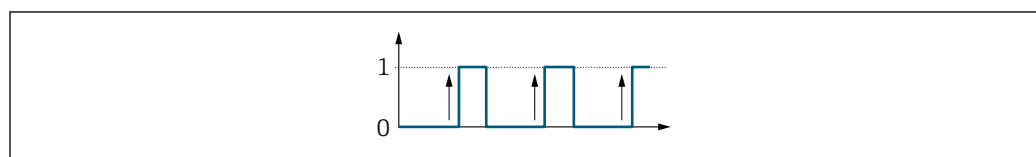
*Selection*

**No** option (passive - negative)




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**Yes** option (passive - positive)



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### 3.5.3 "Relay output 1 to n" submenu


Navigation  Expert → Output → Relay output 1 to n

► Relay output 1 to n	
Terminal number	→  189
Relay output function	→  190
Assign flow direction check	→  190
Assign limit	→  191
Assign diagnostic behavior	→  192
Assign status	→  192
Switch-off value	→  192
Switch-off delay	→  193
Switch-on value	→  193
Switch-on delay	→  194
Failure mode	→  194
Switch state	→  195
Powerless relay status	→  195

---

#### Terminal number



---

<b>Navigation</b>	 Expert → Output → Relay output 1 to n → Terminal no. (0812-1 to n)
<b>Description</b>	Displays the terminal numbers used by the relay output module.
<b>User interface</b>	<ul style="list-style-type: none"> <li>■ Not used</li> <li>■ 24-25 (I/O 2)</li> <li>■ 22-23 (I/O 3)</li> <li>■ 20-21 (I/O 4)</li> </ul>
<b>Additional information</b>	<p><i>"Not used" option</i></p> <p>The relay output module does not use any terminal numbers.</p>

---

**Relay output function** 





---

<b>Navigation</b>	  Expert → Output → Relay output 1 to n → Relay outp.func. (0804-1 to n)
<b>Description</b>	Use this function to select an output function for the relay output.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Closed</li> <li>■ Open</li> <li>■ Diagnostic behavior</li> <li>■ Limit</li> <li>■ Flow direction check</li> <li>■ Status</li> </ul>
<b>Factory setting</b>	Closed
<b>Additional information</b>	<p><i>Selection</i></p> <ul style="list-style-type: none"> <li>■ Closed The relay output is permanently switched on (closed, conductive).</li> <li>■ Open The relay output is permanently switched off (open, non-conductive).</li> <li>■ 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.</li> <li>■ 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.</li> <li>■ Flow direction check Indicates the flow direction (forward or reverse flow).</li> <li>■ Digital Output Indicates the device status depending on whether empty pipe detection or low flow cut off is selected.</li> </ul>

---

**Assign flow direction check** 


---

<b>Navigation</b>	  Expert → Output → Relay output 1 to n → Assign dir.check (0808-1 to n)
<b>Prerequisite</b>	The <b>Flow direction check</b> option is selected in the <b>Relay output function</b> parameter (→  190).
<b>Description</b>	Use this function to select a process variable for monitoring the flow direction.
<b>Selection</b>	
<b>Factory setting</b>	Mass flow






**Assign limit**

<b>Navigation</b>	Expert → Output → Relay output 1 to n → Assign limit (0807-1 to n)
<b>Prerequisite</b>	The <b>Limit</b> option is selected in <b>Relay output function</b> parameter (→  190).
<b>Description</b>	Use this function to select a process variable for the limit value function.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Mass flow</li> <li>■ Volume flow</li> <li>■ Corrected volume flow *</li> <li>■ Target mass flow *</li> <li>■ Carrier mass flow *</li> <li>■ Target volume flow *</li> <li>■ Carrier volume flow *</li> <li>■ Target corrected volume flow *</li> <li>■ Carrier corrected volume flow *</li> <li>■ Density</li> <li>■ Reference density *</li> <li>■ Reference density alternative *</li> <li>■ GSV flow *</li> <li>■ GSV flow alternative *</li> <li>■ NSV flow *</li> <li>■ NSV flow alternative *</li> <li>■ S&amp;W volume flow *</li> <li>■ Water cut *</li> <li>■ Oil density *</li> <li>■ Water density *</li> <li>■ Oil mass flow *</li> <li>■ Water mass flow *</li> <li>■ Oil volume flow *</li> <li>■ Water volume flow *</li> <li>■ Oil corrected volume flow *</li> <li>■ Water corrected volume flow *</li> <li>■ Dynamic viscosity *</li> <li>■ Concentration *</li> <li>■ Kinematic viscosity *</li> <li>■ Temp. compensated dynamic viscosity *</li> <li>■ Temp. compensated kinematic viscosity *</li> <li>■ Temperature</li> <li>■ Totalizer 1</li> <li>■ Totalizer 2</li> <li>■ Totalizer 3</li> <li>■ Oscillation damping</li> <li>■ Pressure</li> <li>■ Application specific output 0 *</li> <li>■ Application specific output 1 *</li> <li>■ Inhomogeneous medium index</li> <li>■ Suspended bubbles index *</li> </ul>
<b>Factory setting</b>	Mass flow





---

\* Visibility depends on order options or device settings





---




<b>Assign diagnostic behavior</b>		
<b>Navigation</b>	  Expert → Output → Relay output 1 to n → Assign diag. beh (0806-1 to n)	
<b>Prerequisite</b>	In the <b>Relay output function</b> parameter (→  190), the <b>Diagnostic behavior</b> option is selected.	
<b>Description</b>	Use this function to select the category of the diagnostic events that are displayed for the relay output.	
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Alarm</li> <li>▪ Alarm or warning</li> <li>▪ Warning</li> </ul>	
<b>Factory setting</b>	Alarm	
<b>Additional information</b>	<p><i>Description</i></p> <p> If no diagnostic event is pending, the relay output is closed and conductive.</p> <p><i>Selection</i></p> <ul style="list-style-type: none"> <li>▪ Alarm The relay output signals only diagnostic events in the alarm category.</li> <li>▪ Alarm or warning The relay output signals diagnostic events in the alarm and warning category.</li> <li>▪ Warning The relay output signals only diagnostic events in the warning category.</li> </ul>	

---

<b>Assign status</b>		
<b>Navigation</b>	  Expert → Output → Relay output 1 to n → Assign status (0805-1 to n)	
<b>Prerequisite</b>	In the <b>Relay output function</b> parameter (→  190), the <b>Digital Output</b> option is selected.	
<b>Description</b>	Use this function to select the device status for the relay output.	
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Partially filled pipe detection</li> <li>▪ Low flow cut off</li> </ul>	
<b>Factory setting</b>	Partially filled pipe detection	




---

<b>Switch-off value</b>		
<b>Navigation</b>	  Expert → Output → Relay output 1 to n → Switch-off value (0809-1 to n)	
<b>Prerequisite</b>	The <b>Limit</b> option is selected in the <b>Relay output function</b> parameter (→  190).	

<b>Description</b>	Use this function to enter the measured value for the switch-off point.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	Depends on country: <ul style="list-style-type: none"> <li>■ 0 kg/h</li> <li>■ 0 lb/min</li> </ul>
<b>Additional information</b>	<p><i>Description</i></p> <p>Use this function to enter the limit value for the switch-off value (process variable &lt; switch-off value = open, non-conductive).</p> <p> When using a hysteresis: Switch-on value &gt; Switch-off value.</p> <p><i>Dependency</i></p> <p> The unit is dependent on the process variable selected in the <b>Assign limit</b> parameter (→  191).</p>




---










**Switch-off delay**


<b>Navigation</b>	  Expert → Output → Relay output 1 to n → Switch-off delay (0813-1 to n)
<b>Prerequisite</b>	In the <b>Relay output function</b> parameter (→  190), the <b>Limit</b> option is selected.
<b>Description</b>	Use this function to enter a delay time for switching off the switch output.
<b>User entry</b>	0.0 to 100.0 s
<b>Factory setting</b>	0.0 s



---

**Switch-on value**


<b>Navigation</b>	  Expert → Output → Relay output 1 to n → Switch-on value (0810-1 to n)
<b>Prerequisite</b>	The <b>Limit</b> option is selected in the <b>Relay output function</b> parameter (→  190).
<b>Description</b>	Use this function to enter the measured value for the switch-on point.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	Depends on country: <ul style="list-style-type: none"> <li>■ 0 kg/h</li> <li>■ 0 lb/min</li> </ul>



<b>Additional information</b>	<p><i>Description</i></p> <p>Use this function to enter the limit value for the switch-on value (process variable &gt; switch-on value = closed, conductive).</p> <p> When using a hysteresis: Switch-on value &gt; Switch-off value.</p> <p><i>Dependency</i></p> <p> The unit is dependent on the process variable selected in the <b>Assign limit</b> parameter (→  191).</p>
<hr/>	
<b>Switch-on delay</b>	
<b>Navigation</b>	  Expert → Output → Relay output 1 to n → Switch-on delay (0814-1 to n)
<b>Prerequisite</b>	In the <b>Relay output function</b> parameter (→  190), the <b>Limit</b> option is selected.
<b>Description</b>	Use this function to enter a delay time for switching on the switch output.
<b>User entry</b>	0.0 to 100.0 s
<b>Factory setting</b>	0.0 s
<hr/>	
<b>Failure mode</b>	
<b>Navigation</b>	  Expert → Output → Relay output 1 to n → Failure mode (0811-1 to n)
<b>Description</b>	Use this function to select the failure mode of the relay output in the event of a device alarm.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Actual status</li> <li>■ Open</li> <li>■ Closed</li> </ul>
<b>Factory setting</b>	Open
<b>Additional information</b>	<p><i>Selection</i></p> <ul style="list-style-type: none"> <li>■ 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 <b>Actual status</b> option behaves in the same way as the current input value.</li> <li>■ Open In the event of a device alarm, the relay output's transistor is set to <b>non-conductive</b>.</li> <li>■ Closed In the event of a device alarm, the relay output's transistor is set to <b>conductive</b>.</li> </ul>

**Switch state**

<b>Navigation</b>	  Expert → Output → Relay output 1 to n → Switch state (0801–1 to n)
<b>Description</b>	Displays the current status of the relay output.
<b>User interface</b>	<ul style="list-style-type: none"> <li>■ Open</li> <li>■ Closed</li> </ul>
<b>Additional information</b>	<i>User interface</i> <ul style="list-style-type: none"> <li>■ Open The relay output is not conductive.</li> <li>■ Closed The relay output is conductive.</li> </ul>

**Powerless relay status**














<b>Navigation</b>	  Expert → Output → Relay output 1 to n → Powerless relay (0816–1 to n)
<b>Description</b>	Use this function to select the quiescent state for the relay output.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Open</li> <li>■ Closed</li> </ul>
<b>Factory setting</b>	Open
<b>Additional information</b>	<i>Selection</i> <ul style="list-style-type: none"> <li>■ Open The relay output is not conductive.</li> <li>■ Closed The relay output is conductive.</li> </ul>

### 3.5.4 "Double pulse output" submenu

*Navigation*        Expert → Output → Double pulse out

▶ Double pulse output



Master terminal number (0981)	→  196
Slave terminal number (0990)	→  196
Signal mode (0991)	→  197
Assign pulse output (0982)	→  197

Value per pulse (0983)	→  197
Pulse width (0986)	→  198
Phase shift (0992)	→  198
Measuring mode (0984)	→  198
Failure mode (0985)	→  199
Pulse output (0987)	→  200
Invert output signal (0993)	→  200

---

### Master terminal number



---

<b>Navigation</b>	  Expert → Output → Double pulse out → Master term. no. (0981)
<b>Description</b>	Displays the master terminal number for the double pulse output.
<b>User interface</b>	<ul style="list-style-type: none"> <li>■ Not used</li> <li>■ 24-25 (I/O 2)</li> <li>■ 22-23 (I/O 3)</li> </ul>
<b>Additional information</b>	<p><i>"Not used" option</i></p> <p>The double pulse output does not use any terminal numbers.</p>

---

### Slave terminal number

---

<b>Navigation</b>	  Expert → Output → Double pulse out → Slave term. no. (0990)
<b>Description</b>	Displays the slave terminal number for the double pulse output.
<b>User interface</b>	<ul style="list-style-type: none"> <li>■ Not used</li> <li>■ 24-25 (I/O 2)</li> <li>■ 22-23 (I/O 3)</li> </ul>
<b>Additional information</b>	<p><i>"Not used" option</i></p> <p>The double pulse output does not use any terminal numbers.</p>

---

**Signal mode**

---



<b>Navigation</b>	Expert → Output → Double pulse out → Signal mode (0991)
<b>Description</b>	Use this function to select the signal mode for the double pulse output.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Passive</li> <li>■ Active *</li> <li>■ Passive NE</li> </ul>
<b>Factory setting</b>	Passive

---

**Assign pulse output**

---



<b>Navigation</b>	Expert → Output → Double pulse out → Assign pulse (0982)
<b>Description</b>	Use this function to select a process variable for the double pulse output.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Off</li> <li>■ Mass flow</li> <li>■ Volume flow</li> <li>■ Corrected volume flow *</li> <li>■ Target mass flow *</li> <li>■ Carrier mass flow *</li> <li>■ Target volume flow *</li> <li>■ Carrier volume flow *</li> <li>■ Target corrected volume flow *</li> <li>■ Carrier corrected volume flow *</li> <li>■ GSV flow *</li> <li>■ GSV flow alternative *</li> <li>■ NSV flow *</li> <li>■ NSV flow alternative *</li> <li>■ S&amp;W volume flow *</li> <li>■ Oil mass flow *</li> <li>■ Water mass flow *</li> <li>■ Oil volume flow *</li> <li>■ Water volume flow *</li> <li>■ Oil corrected volume flow *</li> <li>■ Water corrected volume flow *</li> </ul>
<b>Factory setting</b>	Off

---

**Value per pulse**

---




<b>Navigation</b>	Expert → Output → Double pulse out → Value per pulse (0983)
<b>Description</b>	Use this function to enter the value for the measured value that a pulse is equivalent to.

---

\* Visibility depends on order options or device settings

**User entry** Signed floating-point number

**Factory setting** Depends on country and nominal diameter →  298



**Additional information** *User entry*  
Weighting of the pulse output with a quantity.  
The lower the pulse value, the

- better the resolution.
- the higher the frequency of the pulse response.

---

### Pulse width



---

**Navigation**   Expert → Output → 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



**Factory setting** 0.5 ms

**Additional information**  For a detailed description and example: **Pulse width** parameter (→  169)

---

### Phase shift

---

**Navigation**   Expert → Output → Double pulse out → Phase shift (0992)

**Description** Use this function to select the degree of phase shift.

**Selection**

- 90°
- 180°

**Factory setting** 90°

**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.

<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Forward flow</li> <li>■ Forward/Reverse flow</li> <li>■ Reverse flow</li> <li>■ Reverse flow compensation</li> </ul>
<b>Factory setting</b>	Forward flow
<b>Additional information</b>	<p><i>Selection</i></p> <ul style="list-style-type: none"> <li>■ Forward flow Positive flow is output, negative flow is not output.</li> <li>■ Forward/Reverse flow Positive and negative flow are output (absolute value), but a distinction is not made between positive and negative flow.</li> <li>■ Reverse flow Negative flow is output, positive flow is not output.</li> <li>■ Reverse flow compensation The flow components outside the span are buffered, balanced and output after a maximum delay of 60 s.</li> </ul> <p> For a detailed description of the options available, see the <b>Measuring mode</b> parameter (→  160)</p> <p><i>Examples</i></p> <p> For a detailed description of the configuration examples, see the <b>Measuring mode</b> parameter (→  160)</p>

---

## Failure mode




---

<b>Navigation</b>	  Expert → Output → Double pulse out → Failure mode (0985)
<b>Description</b>	Use this function to select the failure mode of the double pulse output in the event of a device alarm.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Actual value</li> <li>■ No pulses</li> </ul>
<b>Factory setting</b>	No pulses
<b>Additional information</b>	<p><i>Description</i></p> <p>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.</p> <p><i>Options</i></p> <ul style="list-style-type: none"> <li>■ 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.</li> <li>■ 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.</li> </ul> <p><b>NOTICE!</b> 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 <b>Actual value</b> option is only recommended if it is ensured that all possible alarm conditions do not influence the measurement quality.</p>

---

**Pulse output**


---


<b>Navigation</b>	 Expert → Output → Double pulse out → Pulse output (0987)
<b>Description</b>	Displays the pulse frequency of the double pulse output which is currently output.
<b>User interface</b>	Positive floating-point number
<b>Additional information</b>	 For a detailed description and example: <b>Pulse output</b> parameter (→  87)

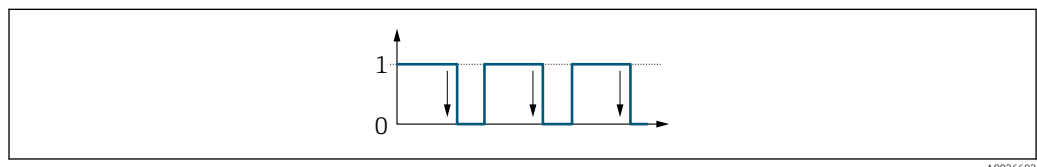
---

**Invert output signal**


---

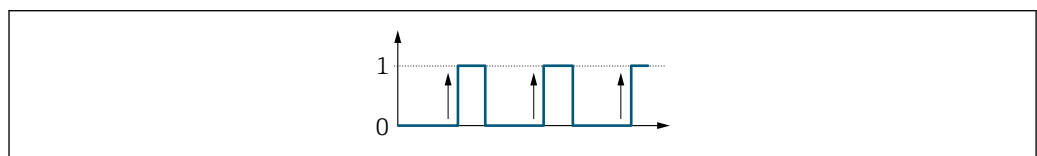


<b>Navigation</b>	 Expert → Output → Double pulse out → Invert outp.sig. (0993)
<b>Description</b>	Use this function to select whether to invert the output signal.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ No</li> <li>▪ Yes</li> </ul>
<b>Factory setting</b>	No
<b>Additional information</b>	<i>Selection</i> <b>No option (passive - negative)</b>



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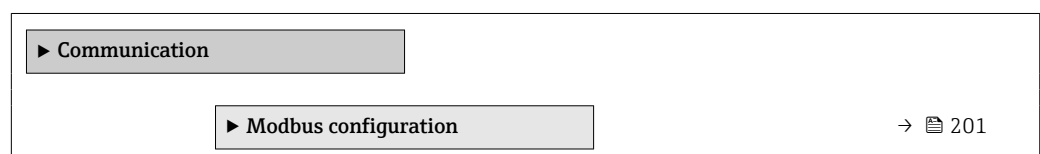
**Yes option (passive - positive)**



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### 3.6 "Communication" submenu

*Navigation*  Expert → Communication



▶ Modbus information	→ 📄 204
▶ Modbus data map	→ 📄 204
▶ Web server	→ 📄 217
▶ WLAN settings	→ 📄 206


### 3.6.1 "Modbus configuration" submenu

Navigation  Expert → Communication → Modbus config.

▶ Modbus configuration	
Byte order (7113)	→ 📄 201
Failure mode (7116)	→ 📄 203
Fieldbus writing access (7156)	→ 📄 203


---


#### Byte order

<b>Navigation</b>	 Expert → Communication → Modbus config. → Byte order (7113)
<b>Description</b>	Use this function to select the sequence in which the bytes are transmitted. The transmission sequence must be coordinated with the Modbus master.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ 0-1-2-3</li> <li>■ 3-2-1-0</li> <li>■ 1-0-3-2</li> <li>■ 2-3-0-1</li> </ul>
<b>Factory setting</b>	1-0-3-2
<b>Additional information</b>	<p><i>Description</i></p> <p>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.</p> <p>Changing the byte sequence in the host system often requires a extensive knowledge and significant programming efforts. Endress+Hauser introduced the <b>Byte order</b> parameter (→ 📄 201) for this reason.</p> <p>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</p>

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 (→  201).

The bytes are transmitted depending on the selection in the **Byte order** parameter (→  201):

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 * 3 - 2 - 1 - 0	Byte 1 (MSB)	Byte 0 (LSB)
0 - 1 - 2 - 3 2 - 3 - 0 - 1	Byte 0 (LSB)	Byte 1 (MSB)

\* = factory setting, MSB = most significant byte, LSB = least significant byte

STRING					
Presentation taking the example of a device parameter with a data length of 18 bytes.					
	Sequence				
Options	1.	2.	...	17.	18.
1 - 0 - 3 - 2 * 3 - 2 - 1 - 0	Byte 17 (MSB)	Byte 16	...	Byte 1	Byte 0 (LSB)
0 - 1 - 2 - 3 2 - 3 - 0 - 1	Byte 16	Byte 17 (MSB)	...	Byte 0 (LSB)	Byte 1

\* = factory setting, MSB = most significant byte, LSB = least significant byte



---

**Failure mode**

---

<b>Navigation</b>	Expert → Communication → Modbus config. → Failure mode (7116)
<b>Description</b>	Use this function to select the measured value output in the event of a diagnostic message via Modbus communication.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ NaN value</li> <li>■ Last valid value</li> </ul>
<b>Factory setting</b>	NaN value
<b>Additional information</b>	<p><i>Options</i></p> <ul style="list-style-type: none"> <li>■ NaN value The device outputs the NaN value <sup>7)</sup>.</li> <li>■ Last valid value The device outputs the last valid measured value before the fault occurred.</li> </ul> <p> This effect of this parameter depends on the option selected in the <b>Assign diagnostic behavior</b> parameter.</p>

---

**Fieldbus writing access**


---

<b>Navigation</b>	Expert → Communication → Modbus config. → Fieldb.writ.acc. (7156)
<b>Description</b>	Use this function to restrict access to the measuring device via fieldbus (Modbus protocol).
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Read + write</li> <li>■ Read only</li> </ul>
<b>Factory setting</b>	Read + write
<b>Additional information</b>	<p><i>Description</i></p> <p>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.</p> <p> This does not affect cyclic measured value transmission to the higher-order system, which is always guaranteed.</p> <p><i>Selection</i></p> <ul style="list-style-type: none"> <li>■ Read + write The parameters are read and write parameters.</li> <li>■ Read only</li> <li>■ The parameters are read only parameters.</li> </ul>

---


7) Not a Number

### 3.6.2 "Modbus information" submenu


Navigation  Expert → Communication → Modbus info

▶ **Modbus information**

Device ID (7153)

→  204

Device revision (7154)

→  204

---

#### 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)

→  205

## 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
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


\* 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 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)	→  207
WLAN mode (2717)	→  207
SSID name (2714)	→  207
Network security (2705)	→  208
Security identification (2718)	→  208
User name (2715)	→  209
WLAN password (2716)	→  209
WLAN IP address (2711)	→  209
WLAN MAC address (2703)	→  209
WLAN subnet mask (2709)	→  210
WLAN MAC address (2703)	→  209
WLAN passphrase (2706)	→  210
WLAN MAC address (2703)	→  209
Assign SSID name (2708)	→  210

SSID name (2707)	→ ⓘ 211
2.4 GHz WLAN channel (2704)	→ ⓘ 211
Select antenna (2713)	→ ⓘ 211
Connection state (2722)	→ ⓘ 211
Received signal strength (2721)	→ ⓘ 212
WLAN IP address (2711)	→ ⓘ 209
Gateway IP address (2719)	→ ⓘ 212
IP address domain name server (2720)	→ ⓘ 212

**WLAN**



<b>Navigation</b>	📄📄 Expert → Communication → WLAN settings → WLAN (2702)
<b>Description</b>	Use this function to enable and disable the WLAN connection.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Disable</li> <li>■ Enable</li> </ul>
<b>Factory setting</b>	Enable

**WLAN mode**



<b>Navigation</b>	📄📄 Expert → Communication → WLAN settings → WLAN mode (2717)
<b>Description</b>	Use this function to select the WLAN mode.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ WLAN access point</li> <li>■ WLAN Client</li> </ul>
<b>Factory setting</b>	WLAN access point

**SSID name**





<b>Navigation</b>	📄📄 Expert → Communication → WLAN settings → SSID name (2714)
<b>Prerequisite</b>	The client is activated.

<b>Description</b>	Use this function to enter the user-defined SSID name (max. 32 characters) of the WLAN network.
<b>User entry</b>	–
<b>Factory setting</b>	–

---

## 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 \*



**Factory setting** WPA2-PSK

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

---

## Security identification

---

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

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

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

---

\* Visibility depends on order options or device settings

---

**User name**

---



<b>Navigation</b>	Expert → Communication → WLAN settings → User name (2715)
<b>Description</b>	Use this function to enter the username of the WLAN network.
<b>User entry</b>	-
<b>Factory setting</b>	-

---

**WLAN password**

---



<b>Navigation</b>	Expert → Communication → WLAN settings → WLAN password (2716)
<b>Description</b>	Use this function to enter the WLAN password for the WLAN network.
<b>User entry</b>	-
<b>Factory setting</b>	-

---

**WLAN IP address**

---



<b>Navigation</b>	Expert → Communication → WLAN settings → WLAN IP address (2711)
<b>Description</b>	Use this function to enter the IP address of the measuring device's WLAN connection.
<b>User entry</b>	4 octet: 0 to 255 (in the particular octet)
<b>Factory setting</b>	192.168.1.212

---

**WLAN MAC address**

---

<b>Navigation</b>	Expert → Communication → WLAN settings → WLAN MAC address (2703)
<b>Description</b>	Displays the MAC <sup>8)</sup> address of the measuring device.
<b>User interface</b>	Unique 12-digit character string comprising letters and numbers
<b>Factory setting</b>	Each measuring device is given an individual address.
<b>Additional information</b>	<i>Example</i> For the display format

---

8) Media Access Control

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)**Factory setting** 255.255.255.0

---

**WLAN passphrase**

---

**Navigation** Expert → Communication → WLAN settings → WLAN passphrase (2706)**Prerequisite** The **WPA2-PSK** option is selected in the **Security type** parameter (→ 208).**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 <sup>9)</sup>.**Selection**














- Device tag
- User-defined

**Factory setting** 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

<b>SSID name</b> 	
<b>Navigation</b>	  Expert → Communication → WLAN settings → SSID name (2707)
<b>Prerequisite</b>	<ul style="list-style-type: none"> <li>▪ The <b>User-defined</b> option is selected in the <b>Assign SSID name</b> parameter (→  210).</li> <li>▪ The <b>WLAN access point</b> option is selected in the <b>WLAN mode</b> parameter (→  207).</li> </ul>
<b>Description</b>	Use this function to enter a user-defined SSID name.
<b>User entry</b>	Max. 32-digit character string comprising numbers, letters and special characters
<b>Factory setting</b>	EH_device designation_last 7 digits of the serial number (e.g. EH_Promass_500_A802000)
<b>2.4 GHz WLAN channel</b> 	
<b>Navigation</b>	  Expert → Communication → WLAN settings → WLAN channel (2704)
<b>Description</b>	Use this function to enter the 2.4 GHz WLAN channel.
<b>User entry</b>	1 to 11
<b>Factory setting</b>	6
<b>Additional information</b>	<p><i>Description</i></p> <ul style="list-style-type: none"> <li>▪  It is only necessary to enter a 2.4 GHz WLAN channel if multiple WLAN devices are in use.</li> <li>▪ If just one measuring device is in use, it is recommended to keep the factory setting.</li> </ul>
<b>Select antenna</b> 	
<b>Navigation</b>	  Expert → Communication → WLAN settings → Select antenna (2713)
<b>Description</b>	Use this function to select whether the external or internal antenna is used for reception.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ External antenna</li> <li>▪ Internal antenna</li> </ul>
<b>Factory setting</b>	Internal antenna
<b>Connection state</b>	
<b>Navigation</b>	 Expert → Communication → WLAN settings → Connection state (2722)
<b>Description</b>	The connection status is displayed.


**User interface**                   ▪ Connected  
   ▪ Not connected

**Factory setting**               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

**Factory setting**               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

**Factory setting**               192.168.1.212

---

### 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

**Factory setting**               192.168.1.212

### 3.6.5 "APL port" submenu


Navigation  Setup → Communication → APL port

▶ APL port

IP address	→  213
Subnet mask	→  213
Default gateway	→  213
MAC address	→  214
DHCP client	→  214

---

#### 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)

**Factory setting** 0.0.0.0

---

#### 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)

**Factory setting** 255.255.255.0

---

#### 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)

**Factory setting** 0.0.0.0

---

### 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

**Factory setting**

---

### DHCP client

---

**Navigation**   Setup → Communication → APL port → DHCP client



**Description** Switch the DHCP client functionality on and of.







**Selection**

- Off
- On

**Factory setting** On

### 3.6.6 "Service interface" submenu

*Navigation*   Setup → Communication → ServiceInterface



▶ Service interface	
IP address	→  215
Subnet mask	→  215
Default gateway	→  215
MAC address	→  215
DHCP client	→  216
Duplex speed negotiation	→  216

Interface speed	→ 📄 216
Duplex status	→ 📄 217

---

## IP address 🔒



---

<b>Navigation</b>	  <a href="#">Expert</a> → <a href="#">Communication</a> → <a href="#">Web server</a> → <a href="#">IP address (7209)</a>
<b>Description</b>	Display or enter the IP address of the web server integrated in the measuring instrument.
<b>User entry</b>	4 octet: 0 to 255 (in the particular octet)
<b>Factory setting</b>	192.168.1.212

---

## Subnet mask 🔒



---

<b>Navigation</b>	  <a href="#">Expert</a> → <a href="#">Communication</a> → <a href="#">Web server</a> → <a href="#">Subnet mask (7211)</a>
<b>Description</b>	Display or enter the subnet mask.
<b>User entry</b>	4 octet: 0 to 255 (in the particular octet)
<b>Factory setting</b>	255.255.255.0

---

## Default gateway 🔒



---

<b>Navigation</b>	  <a href="#">Expert</a> → <a href="#">Communication</a> → <a href="#">Web server</a> → <a href="#">Default gateway (7210)</a>
<b>Description</b>	Display or enter the Default gateway (→ 📄 215).
<b>User entry</b>	4 octet: 0 to 255 (in the particular octet)
<b>Factory setting</b>	0.0.0.0

---

## MAC address

---

<b>Navigation</b>	  <a href="#">Expert</a> → <a href="#">Communication</a> → <a href="#">Web server</a> → <a href="#">MAC Address (7214)</a>
<b>Description</b>	Displays the MAC <sup>10)</sup> address of the measuring instrument.

---



10) Media Access Control

<b>User interface</b>	Unique 12-digit character string comprising letters and numbers
<b>Factory setting</b>	Each measuring instrument is given an individual address.
<b>Additional information</b>	<i>Example</i> For the display format 00:07:05:10:01:5F

---

## DHCP client



---

<b>Navigation</b>	  <a href="#">Expert</a> → <a href="#">Communication</a> → <a href="#">Web server</a> → <a href="#">DHCP client (72.12)</a>
<b>Description</b>	Switch the DHCP client functionality on and of.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Off</li> <li>■ On</li> </ul>
<b>Factory setting</b>	Off

---

## Duplex speed negotiation



---

<b>Navigation</b>	  Setup → Communication → ServiceInterface → DuplexSpeedNegot
<b>Description</b>	Select the duplex mode and transmission speed for the connected devices.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Auto</li> <li>■ 10 Mbit/s full duplex</li> <li>■ 10 Mbit/s half duplex</li> <li>■ 100 Mbit/s full duplex</li> <li>■ 100 Mbit/s half duplex</li> </ul>
<b>Factory setting</b>	Auto

---

## Interface speed


---

<b>Navigation</b>	  Setup → Communication → ServiceInterface → Interface speed
<b>User interface</b>	Positive integer
<b>Factory setting</b>	100 Mbit/s


---







**Duplex status**


---

<b>Navigation</b>	 Setup → Communication → ServiceInterface → Duplex status
<b>User interface</b>	<ul style="list-style-type: none"> <li>■ Full duplex</li> <li>■ Half duplex</li> <li>■ Unknown</li> </ul>
<b>Factory setting</b>	Unknown

### 3.6.7 "Web server" submenu

*Navigation*       Expert → Communication → Web server

▶ Web server	
Web server language	→  217
IP address	→  218
Subnet mask	→  218
Default gateway	→  218
Web server functionality	→  219
Login page	→  219

---

**Web server language**


---

<b>Navigation</b>	 Expert → Communication → Web server → Webserv.language (7221)
<b>Description</b>	Use this function to select the language configured for the web server.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ English</li> <li>■ Deutsch</li> <li>■ Français</li> <li>■ Español</li> <li>■ Italiano</li> <li>■ Nederlands</li> <li>■ Portuguesa</li> <li>■ Polski</li> <li>■ русский язык (Russian)</li> <li>■ Svenska</li> <li>■ Türkçe</li> <li>■ 中文 (Chinese)</li> </ul>

- 日本語 (Japanese)
- 한국어 (Korean)
- العربية (Arabic) \*
- Bahasa Indonesia \*
- ภาษาไทย (Thai) \*
- tiếng Việt (Vietnamese)
- čeština (Czech)

**Factory setting** English

---

### 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)

**Factory setting** 192.168.1.212

---

### 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)


**Factory setting** 255.255.255.0

---

### Default gateway

---

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

**Description** Display or enter the Default gateway (→  215).

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

**Factory setting** 0.0.0.0

---

\* Visibility depends on order options or device settings

**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

**Factory setting** 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	<ul style="list-style-type: none"> <li>▪ The Web server is completely disabled.</li> <li>▪ Port 80 is locked.</li> </ul>
HTML Off	The HTML version of the Web server is not available.
On	<ul style="list-style-type: none"> <li>▪ The complete Web server functionality is available.</li> <li>▪ JavaScript is used.</li> <li>▪ The password is transferred in an encrypted state.</li> <li>▪ Any change to the password is also transferred in an encrypted state.</li> </ul>

**Login page**



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

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

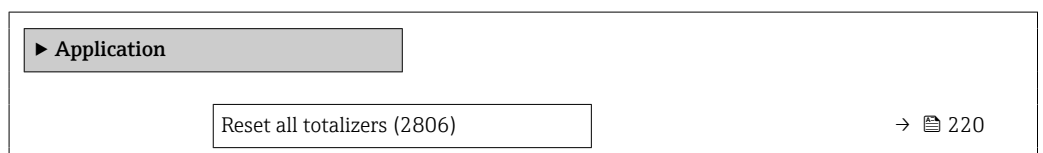
**Selection**

- Without header
- With header

**Factory setting** With header

### 3.7 "Application" submenu

*Navigation* Expert → Application



▶ Totalizer 1 to n	→ 82
▶ Viscosity	→ 220
▶ Custody transfer	→ 227
▶ Application specific calculations	→ 229
▶ Medium index	→ 235

---

### 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

**Factory setting**

Cancel


**Additional information**

*Selection*

Options	Description
Cancel	No action is executed and the user exits the parameter.
Reset + totalize	Resets all totalizers to 0 and restarts the totaling process. This deletes all the previously aggregated flow values.

### 3.7.1 "Viscosity" submenu

















 Only available for Promass I.

 For detailed information on the parameter descriptions for the **Viscosity** application package, refer to the Special Documentation for the device



**Navigation**

  Expert → Application → Viscosity

▶ Viscosity	
Viscosity damping (1883)	→ 221
▶ Temperature compensation	→ 222
Calculation model (6221)	→ 222





Reference temperature (6222)	→  222
Compensation coefficient X 1 (6223)	→  222
Compensation coefficient X 2 (6224)	→  223
► Dynamic viscosity	→  223
Dynamic viscosity unit (0577)	→  223
User dynamic viscosity text (0595)	→  224
User dynamic viscosity factor (0593)	→  224
User dynamic viscosity offset (0594)	→  224
► Kinematic viscosity	→  225
Kinematic viscosity unit (0578)	→  225
User kinematic viscosity text (0598)	→  225
User kinematic viscosity factor (0596)	→  226
User kinematic viscosity offset (0597)	→  226
► Hydrocarbon viscosity	→  226
Viscosity reliability	→  226
Medium type	→  227

## Viscosity damping


<b>Navigation</b>	  Expert → Application → Viscosity → Viscos. damping (1883)
<b>Description</b>	Enter value for damping the viscosity.
<b>User entry</b>	0 to 999.9 s
<b>Factory setting</b>	0 s

**"Temperature compensation" submenu**

Navigation  Expert → Application → Viscosity → Temp. compensat.

<b>► Temperature compensation</b>	
Calculation model (6221)	→  222
Reference temperature (6222)	→  222
Compensation coefficient X 1 (6223)	→  222
Compensation coefficient X 2 (6224)	→  223

**Calculation model**

Navigation  Expert → Application → Viscosity → Temp. compensat. → Calc. model (6221)


Description Select a formula for the temperature compensation of viscosity.

Selection

- Power law
- Exponential
- Polynomial

Factory setting Polynomial

**Reference temperature**


Navigation  Expert → Application → Viscosity → Temp. compensat. → Ref. temperature (6222)

Description Enter reference temperature used to calculate the temperature compensated viscosity.

User entry -273.15 to 99999 °C

Factory setting 0 °C

**Compensation coefficient X 1**

Navigation  Expert → Application → Viscosity → Temp. compensat. → Comp. coeff. X 1 (6223)

Description Enter compensation coefficient used to calculate the temperature compensated viscosity.

User entry Signed floating-point number

**Factory setting** 0

**Compensation coefficient X 2**



**Navigation** Expert → Application → Viscosity → Temp. compensat. → Comp. coeff. X 2 (6224)

**Description** Enter compensation coefficient used to calculate the temperature compensated viscosity.

**User entry** Signed floating-point number

**Factory setting** 0

**"Dynamic viscosity" submenu**

*Navigation* Expert → Application → Viscosity → Dynam. viscosity

▶ **Dynamic viscosity**

Dynamic viscosity unit (0577)	→  223
User dynamic viscosity text (0595)	→  224
User dynamic viscosity factor (0593)	→  224
User dynamic viscosity offset (0594)	→  224

**Dynamic viscosity unit**



**Navigation** Expert → Application → Viscosity → Dynam. viscosity → Dyn. visc. unit (0577)

**Description** Use this function to select the unit for dynamic viscosity.

**Selection**


*SI units*

- cP
- mPa s
- Pa s
- P



*Custom-specific units*

UserDynVis


**Factory setting** Pa s

**Additional information** *Selection* For an explanation of the abbreviated units: →  303



---

**User dynamic viscosity text** **Navigation**  Expert → Application → Viscosity → Dynam. viscosity → Dyn. visc. text (0595)**Description** Enter text for the user specific unit of the dynamic viscosity.**User entry** Character string comprising numbers, letters and special characters (10)**Factory setting** UserDynVis

---

**User dynamic viscosity factor** **Navigation**  Expert → Application → Viscosity → Dynam. viscosity → Dyn.visc. factor (0593)**Description** With user-specific unit: Enter a factor which is multiplied with the measured dynamic viscosity value.**User entry** Signed floating-point number**Factory setting** 1.0





---

**User dynamic viscosity offset** **Navigation**  Expert → Application → Viscosity → Dynam. viscosity → Dyn.visc. offset (0594)**Description** With user-specific unit: Enter zero point shift which is added or subtracted to/from the measured value of the dynamic viscosity.**User entry** Signed floating-point number**Factory setting** 0


**"Kinematic viscosity" submenu**


*Navigation*  Expert → Application → Viscosity → Kinematic visc.

▶ **Kinematic viscosity**

Kinematic viscosity unit (0578)	→  225
User kinematic viscosity text (0598)	→  225
User kinematic viscosity factor (0596)	→  226
User kinematic viscosity offset (0597)	→  226

---

**Kinematic viscosity unit** 

**Navigation**  Expert → Application → Viscosity → Kinematic visc. → Kin. visc. unit (0578)

**Description** Use this function to select the unit for the kinematic viscosity.

**Selection**

*SI units*


- cSt
- m<sup>2</sup>/s
- mm<sup>2</sup>/s
- St


*Custom-specific units*

UserKinVis

**Factory setting** cSt

---

**User kinematic viscosity text** 

**Navigation**  Expert → Application → Viscosity → Kinematic visc. → Kin. visc. text (0598)

**Description** Enter text for the user specific unit of the kinematic viscosity.

**User entry** Character string comprising numbers, letters and special characters (10)

**Factory setting** UserKinVis

**User kinematic viscosity factor**

<b>Navigation</b>	Expert → Application → Viscosity → Kinematic visc. → Kin.visc. factor (0596)
<b>Description</b>	With user-specific unit: Enter a factor which is multiplied with the measured kinematic viscosity value.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	1.0

**User kinematic viscosity offset**

<b>Navigation</b>	Expert → Application → Viscosity → Kinematic visc. → Kin.visc. offset (0597)
<b>Description</b>	With user-specific unit: Enter zero point shift which is added or subtracted to/from the measured value of the kinematic viscosity.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	0

**"Hydrocarbon viscosity" submenu**

*Navigation* Expert → Application → Viscosity → Hydrocarbon visc

▶ Hydrocarbon viscosity	
Viscosity reliability	→  226
Medium type	→  227

**Viscosity reliability**

<b>Navigation</b>	Expert → Application → Viscosity → Hydrocarbon visc → ViscosityReliab.
<b>Description</b>	
<b>User interface</b>	<ul style="list-style-type: none"> <li>■ Good</li> <li>■ Uncertain</li> <li>■ Bad</li> </ul>
<b>Factory setting</b>	-

---

**Medium type**

---



**Navigation** Expert → Application → Viscosity → Hydrocarbon visc → Medium type

**Description**

- Selection**
- Hydrocarbon-based medium
  - Water-based medium

**Factory setting** Hydrocarbon-based medium

### 3.7.2 "Custody transfer" submenu

Only available for Promass F, O, Q and X.

For detailed information on the parameter descriptions for custody transfer measurement, see the Special Documentation for the device

*Navigation* Expert → Application → Custody transfer

► Custody transfer	
Custody transfer mode	→  227
Checksum	→  228
Custody transfer locking	→  228
Custody transfer counter	→  228
Timestamp last custody transfer	→  228

---

**Custody transfer mode**

---

**Navigation** Expert → Application → Custody transfer → Cust.trans. mode (14405)

**Description** Shows if the device is in custody transfer mode.

- User interface**
- Off
  - On

**Factory setting** Off

---

**Checksum**


---

**Navigation**  Expert → Application → Custody transfer → Checksum (14407)

**Description** Shows the firmware's checksum.

**User interface** Positive integer

**Factory setting** –

---

**Custody transfer locking**


---



**Navigation**  Expert → Application → Custody transfer → Cust.trans.lock (14406)

**Description** Indicate whether all parameters or only parameters relevant to custody transfer should be write-protected.

**Selection**

- Defined parameters
- All parameters

**Factory setting** Defined parameters

---

**Custody transfer counter**


---

**Navigation**  Expert → Application → Custody transfer → Cust.trans.count (14402)

**Description** Displays the number of times custody transfer mode has been enabled so far.

**User interface** 0 to 65 535

**Additional information** *Custody transfer*



For information about the as-delivered state of the measuring instruments for custody transfer, see the Special Documentation for the device

---

**Timestamp last custody transfer**


---

**Navigation**  Expert → Application → Custody transfer → Time cust.trans. (14403)

**Description** Displays the time when the custody transfer mode was last enabled.


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


**Additional information**



*Example*

For the display format: 24d12h13m00s

**3.7.3 "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	→  229
▶ Process variables	→  232

**"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)	→  230
Parameter 1 (6359)	→  230
Parameter 2 (6360)	→  230
Parameter 3 (6361)	→  230
Parameter 4 (6345)	→  231
Parameter 5 (6346)	→  231
Parameter 6 (6347)	→  231
Parameter 7 (6348)	→  231
Parameter 8 (6349)	→  232
Parameter 9 (6350)	→  232



---

**Parameter 0** 

<b>Navigation</b>	  Expert → Application → Appl.spec. calc. → Appl.spec.param. → Parameter 0 (6358)
<b>Description</b>	Enter application specific value 0 for application specific calculation.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	0



---

**Parameter 1** 


<b>Navigation</b>	  Expert → Application → Appl.spec. calc. → Appl.spec.param. → Parameter 1 (6359)
<b>Description</b>	Enter application specific value 1 for application specific calculation.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	0



---

**Parameter 2** 

<b>Navigation</b>	  Expert → Application → Appl.spec. calc. → Appl.spec.param. → Parameter 2 (6360)
<b>Description</b>	Enter application specific value 2 for application specific calculation.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	0

---

**Parameter 3** 

<b>Navigation</b>	  Expert → Application → Appl.spec. calc. → Appl.spec.param. → Parameter 3 (6361)
<b>Description</b>	Enter application specific value 3 for application specific calculation.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	0

---

**Parameter 4**

---



<b>Navigation</b>	Expert → Application → Appl.spec. calc. → Appl.spec.param. → Parameter 4 (6345)
<b>Description</b>	Enter application specific value 4 for application specific calculation.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	0

---

**Parameter 5**

---



<b>Navigation</b>	Expert → Application → Appl.spec. calc. → Appl.spec.param. → Parameter 5 (6346)
<b>Description</b>	Enter application specific value 5 for application specific calculation.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	0

---

**Parameter 6**

---



<b>Navigation</b>	Expert → Application → Appl.spec. calc. → Appl.spec.param. → Parameter 6 (6347)
<b>Description</b>	Enter application specific value 6 for application specific calculation.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	0

---

**Parameter 7**

---



<b>Navigation</b>	Expert → Application → Appl.spec. calc. → Appl.spec.param. → Parameter 7 (6348)
<b>Description</b>	Enter application specific value 7 for application specific calculation.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	0

**Parameter 8**

<b>Navigation</b>	Expert → Application → Appl.spec. calc. → Appl.spec.param. → Parameter 8 (6349)
<b>Description</b>	Enter application specific value 8 for application specific calculation.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	0

**Parameter 9**

<b>Navigation</b>	Expert → Application → Appl.spec. calc. → Appl.spec.param. → Parameter 9 (6350)
<b>Description</b>	Enter application specific value 9 for application specific calculation.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	0

**"Process variables" submenu**

Only available if "Application-specific calculations" has been ordered.

*Navigation* Expert → Application → Appl.spec. calc. → Process variab.

<b>► Process variables</b>	
Application specific input 0 (6366)	→  232
Application specific input 1 (6367)	→  233
Application specific output 0 (6364)	→  234
Application specific output 1 (6365)	→  234

**Application specific input 0**

<b>Navigation</b>	Expert → Application → Appl.spec. calc. → Process variab. → Spec. input 0 (6366)
<b>Description</b>	Shows the application specific input value 0 used for the application specific calculation.


**User interface** Signed floating-point number

**Factory setting** 0

---

### 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

**Factory setting** 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

**Factory setting** 0

---

### 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

**Factory setting** 0

---

**Fail-safe type application specific 1**


---



<b>Navigation</b>	  Expert → Application → Appl.spec. calc. → Process variab. → FSTypeAppSpec 1 (2100)
<b>Description</b>	Use this function to select the failsafe mode for the application-specific input value 1.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Fail-safe value</li> <li>■ Fallback value</li> <li>■ Off</li> </ul>
<b>Factory setting</b>	Off

---

**Fail-safe value application specific 1**


---





<b>Navigation</b>	  Expert → Application → Appl.spec. calc. → Process variab. → FSValueAppSpec 1 (65535)
<b>Description</b>	Use this function to enter the failsafe value for the application-specific input value 1.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	0

---

**Application specific output 0**




---

<b>Navigation</b>	  Expert → Application → Appl.spec. calc. → Process variab. → Spec. output 0 (6364)
<b>Description</b>	Shows the calculated application specific output value 0.
<b>User interface</b>	Signed floating-point number
<b>Factory setting</b>	0

---


**Application specific output 1**







---

<b>Navigation</b>	  Expert → Application → Appl.spec. calc. → Process variab. → Spec. output 1 (6365)
<b>Description</b>	Shows the calculated specific output value 1.
<b>User interface</b>	Signed floating-point number
<b>Factory setting</b>	0

### 3.7.4 "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  $> 400 \text{ kg/m}^3$ . The gas typically occurs in viscous liquids in the form of microbubbles or small bubbles.

Navigation  Expert → Application → Medium index

► Medium index	
Inhomogeneous medium index (6368)	→  235
Cut off inhomogeneous wet gas (6375)	→  236
Cut off inhomogeneous liquid (6374)	→  236
Suspended bubbles index (6376)	→  236
Cut off suspended bubbles (6370)	→  237

---

#### Inhomogeneous medium index

---

**Navigation**  Expert → Application → Medium index → InhomogMedIndex (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**

---



<b>Navigation</b>	Expert → Application → Medium index → Cut off inh. gas (6375)
<b>Description</b>	Enter cut off value for wet gas applications. Below this value the 'Inhomogeneous medium index' is set to 0.
<b>User entry</b>	Positive floating-point number
<b>Factory setting</b>	0.25
<b>Additional information</b>	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**

---



<b>Navigation</b>	Expert → Application → Medium index → Cut off liquid (6374)
<b>Description</b>	Enter cut off value for liquid applications. Below this value the 'Inhomogeneous medium index' is set to 0.
<b>User entry</b>	Positive floating-point number
<b>Factory setting</b>	0.05
<b>Additional information</b>	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.

---

**Suspended bubbles index**

---



<b>Navigation</b>	Expert → Application → Medium index → SuspBubblesIndex (6376)
<b>Prerequisite</b>	The diagnostic index is only available for Promass Q.
<b>Description</b>	Shows the relative amount of suspended bubbles in the medium.
<b>User interface</b>	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

---

<b>Navigation</b>	  Expert → Application → Medium index → Cut off bubbles (6370)
<b>Prerequisite</b>	The parameter is only available for Promass Q.
<b>Description</b>	Enter the cut off value for suspended bubbles. Below this value the 'Index for suspended bubbles' is set to 0.
<b>User entry</b>	Positive floating-point number
<b>Factory setting</b>	0.05
<b>Additional information</b>	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

<b>► Diagnostics</b>	
Actual diagnostics (0691)	→  238
Previous diagnostics (0690)	→  239
Operating time from restart (0653)	→  240
Operating time (0652)	→  240
<b>► Diagnostic list</b>	→  240
<b>► Event logbook</b>	→  243

▶ Custody transfer logbook	→ 243
▶ Device information	→ 244
▶ Main electronic module + I/O module 1	→ 247
▶ Sensor electronic module (ISEM)	→ 248
▶ I/O module 2	→ 249
▶ I/O module 3	→ 250
▶ I/O module 4	→ 252
▶ Display module	→ 253
▶ Data logging	→ 254
▶ Min/max values	→ 263
▶ Heartbeat Technology	→ 275
▶ Simulation	→ 286




## Actual diagnostics

<b>Navigation</b>	 Expert → Diagnostics → Actual diagnos. (0691)
<b>Prerequisite</b>	A diagnostic event has occurred.
<b>Description</b>	Displays the current diagnostic message. If two or more messages occur simultaneously, the message with the highest priority is shown on the display.
<b>User interface</b>	Symbol for diagnostic behavior, diagnostic code and short message.
<b>Additional information</b>	<p><i>Display</i></p> <p> Additional pending diagnostic messages can be viewed in the <b>Diagnostic list</b> submenu (→ 240).</p> <p> Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the  key.</p> <p><i>Example</i></p> <p>For the display format:  F271 Main electronic failure</p>

---

**Timestamp**







---

<b>Navigation</b>	 Expert → Diagnostics → Timestamp
<b>Description</b>	Displays the operating time when the current diagnostic message occurred.
<b>User interface</b>	Days (d), hours (h), minutes (m) and seconds (s)
<b>Additional information</b>	<p><i>Display</i></p> <p> The diagnostic message can be viewed via the <b>Actual diagnostics</b> parameter (→  238).</p> <p><i>Example</i></p> <p>For the display format: 24d12h13m00s</p>

---

**Previous diagnostics**



---



<b>Navigation</b>	  Expert → Diagnostics → Prev.diagnostics (0690)
<b>Prerequisite</b>	Two diagnostic events have already occurred.
<b>Description</b>	Displays the diagnostic message that occurred before the current message.
<b>User interface</b>	Symbol for diagnostic behavior, diagnostic code and short message.
<b>Additional information</b>	<p><i>Display</i></p> <p> Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the  key.</p> <p><i>Example</i></p> <p>For the display format: F271 Main electronic failure</p>

---

**Timestamp**


---



<b>Navigation</b>	 Expert → Diagnostics → Timestamp
<b>Description</b>	Displays the operating time when the last diagnostic message before the current message occurred.
<b>User interface</b>	Days (d), hours (h), minutes (m) and seconds (s)

<b>Additional information</b>	<p><i>Display</i></p> <p> The diagnostic message can be viewed via the <b>Previous diagnostics</b> parameter (→  239).</p> <p><i>Example</i></p> <p>For the display format: 24d12h13m00s</p>
-------------------------------	--

---

### Operating time from restart



---

<b>Navigation</b>	  Expert → Diagnostics → Time fr. restart (0653)
<b>Description</b>	Use this function to display the time the device has been in operation since the last device restart.
<b>User interface</b>	Days (d), hours (h), minutes (m) and seconds (s)

---






### Operating time

---

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

### 3.8.1 "Diagnostic list" submenu






*Navigation*   Expert → Diagnostics → Diagnostic list

▶ Diagnostic list	
Diagnostics 1 (0692)	→  241
Diagnostics 2 (0693)	→  241
Diagnostics 3 (0694)	→  241
Diagnostics 4 (0695)	→  242
Diagnostics 5 (0696)	→  242

---

## Diagnostics 1






---

<b>Navigation</b>	 Expert → Diagnostics → Diagnostic list → Diagnostics 1 (0692)
<b>Description</b>	Displays the current diagnostics message with the highest priority.
<b>User interface</b>	Symbol for diagnostic behavior, diagnostic code and short message.
<b>Additional information</b>	<p><i>Display</i></p> <p> Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the  key.</p> <p><i>Examples</i></p> <p>For the display format:</p> <ul style="list-style-type: none"> <li>■  F271 Main electronic failure</li> <li>■  F276 I/O module failure</li> </ul>

---

## Diagnostics 2


---

<b>Navigation</b>	 Expert → Diagnostics → Diagnostic list → Diagnostics 2 (0693)
<b>Description</b>	Displays the current diagnostics message with the second-highest priority.
<b>User interface</b>	Symbol for diagnostic behavior, diagnostic code and short message.
<b>Additional information</b>	<p><i>Display</i></p> <p> Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the  key.</p> <p><i>Examples</i></p> <p>For the display format:</p> <ul style="list-style-type: none"> <li>■  F271 Main electronic failure</li> <li>■  F276 I/O module failure</li> </ul>





---

## Diagnostics 3

---

<b>Navigation</b>	 Expert → Diagnostics → Diagnostic list → Diagnostics 3 (0694)
<b>Description</b>	Displays the current diagnostics message with the third-highest priority.
<b>User interface</b>	Symbol for diagnostic behavior, diagnostic code and short message.







---

<b>Additional information</b>	<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: <ul style="list-style-type: none"><li>▪  F271 Main electronic failure</li><li>▪  F276 I/O module failure</li></ul>
-------------------------------	--

---

#### Diagnostics 4







---

<b>Navigation</b>	  Expert → Diagnostics → Diagnostic list → Diagnostics 4 (0695)
<b>Description</b>	Displays the current diagnostics message with the fourth-highest priority.
<b>User interface</b>	Symbol for diagnostic behavior, diagnostic code and short message.
<b>Additional information</b>	<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: <ul style="list-style-type: none"><li>▪  F271 Main electronic failure</li><li>▪  F276 I/O module failure</li></ul>

---

#### Diagnostics 5


---

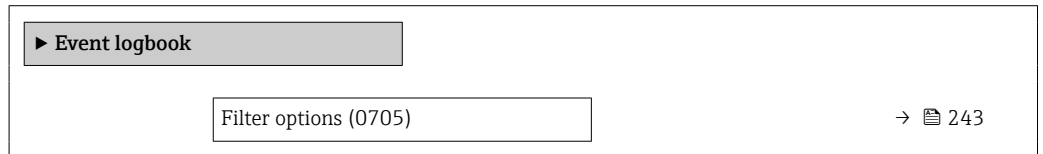
<b>Navigation</b>	  Expert → Diagnostics → Diagnostic list → Diagnostics 5 (0696)
<b>Description</b>	Displays the current diagnostics message with the fifth-highest priority.
<b>User interface</b>	Symbol for diagnostic behavior, diagnostic code and short message.
<b>Additional information</b>	<i>Display</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: <ul style="list-style-type: none"><li>▪  F271 Main electronic failure</li><li>▪  F276 I/O module failure</li></ul>

### 3.8.2 "Event logbook" submenu

Viewing event messages

Event messages are displayed in chronological order. The event history includes both diagnostic events and information events. The symbol in front of the timestamp indicates whether the event has started or ended.

*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)

**Factory setting**

All


**Additional information**



*Description*

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

### 3.8.3 "Custody transfer logbook" submenu

 Only available for Promass F, O, Q and X.










 For detailed information on the parameter descriptions for custody transfer measurement, see the Special Documentation for the device

*Navigation*   Expert → Diagnostics → Cust.transf.log.




### 3.8.4 "Device information" submenu

Navigation  Expert → Diagnostics → Device info

► Device information	
Device tag	→  244
Serial number	→  245
Firmware version	→  245
Device name	→  245
Order code	→  245
Extended order code 1	→  246
Extended order code 2	→  246
Extended order code 3	→  246
ENP version	→  247

#### 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

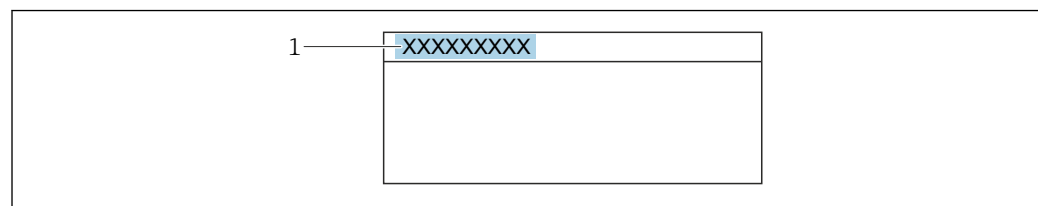
Character string comprising numbers, letters and special characters

##### Factory setting

Promass

##### 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**




---

<b>Navigation</b>	 Expert → Diagnostics → Device info → Serial number (0009)
<b>Description</b>	Displays the serial number of the measuring device.  The number can be found on the nameplate of the sensor and transmitter.
<b>User interface</b>	Max. 11-digit character string comprising letters and numbers.
<b>Additional information</b>	<i>Description</i>  <b>Uses of the serial number</b> <ul style="list-style-type: none"> <li>▪ To identify the measuring device quickly, e.g. when contacting Endress+Hauser.</li> <li>▪ To obtain specific information on the measuring device using the Device Viewer: <a href="http://www.endress.com/deviceviewer">www.endress.com/deviceviewer</a></li> </ul>

---

**Firmware version**



---

<b>Navigation</b>	 Expert → Diagnostics → Device info → Firmware version (0010)
<b>Description</b>	Displays the device firmware version installed.
<b>User interface</b>	Character string in the format xx.yy.zz
<b>Additional information</b>	<i>Display</i>  The Firmware version is also located: <ul style="list-style-type: none"> <li>▪ On the title page of the Operating instructions</li> <li>▪ On the transmitter nameplate</li> </ul>

---

**Device name**



---











<b>Navigation</b>	 Expert → Diagnostics → Device info → Device name (0020)
<b>Description</b>	Displays the name of the transmitter. It can also be found on the nameplate of the transmitter.
<b>User interface</b>	Promass 300/500


---

**Order code**


---

<b>Navigation</b>	 Expert → Diagnostics → Device info → Order code (0008)
<b>Description</b>	Displays the device order code
<b>User interface</b>	Character string composed of letters, numbers and certain punctuation marks (e.g. /).


<b>Additional information</b>	<p><i>Description</i></p> <p> The order code can be found on the nameplate of the sensor and transmitter in the "Order code" field.</p> <p>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.</p> <p> <b>Uses of the order code</b></p> <ul style="list-style-type: none"> <li>▪ To order an identical spare device.</li> <li>▪ To identify the device quickly and easily, e.g. when contacting Endress+Hauser.</li> </ul>
<hr/>	
<b>Extended order code 1</b> 	
<b>Navigation</b>	 Expert → Diagnostics → Device info → Ext. order cd. 1 (0023)
<b>Description</b>	<p>Displays the first part of the extended order code</p> <p>On account of length restrictions, the extended order code is split into a maximum of 3 parameters.</p>
<b>User interface</b>	Character string
<b>Additional information</b>	<p><i>Description</i></p> <p>The extended order code indicates the version of all the features of the product structure for the measuring device and thus uniquely identifies the measuring device.</p> <p> The extended order code can also be found on the nameplate of the sensor and transmitter in the "Ext. ord. cd." field.</p>
<hr/>	
<b>Extended order code 2</b> 	
<b>Navigation</b>	 Expert → Diagnostics → Device info → Ext. order cd. 2 (0021)
<b>Description</b>	Displays the second part of the extended order code.
<b>User interface</b>	Character string
<b>Additional information</b>	For additional information, see <b>Extended order code 1</b> parameter (→  246)
<hr/>	
<b>Extended order code 3</b> 	
<b>Navigation</b>	 Expert → Diagnostics → Device info → Ext. order cd. 3 (0022)
<b>Description</b>	Displays the third part of the extended order code.
<b>User interface</b>	Character string

**Additional information** For additional information, see **Extended order code 1** parameter (→  246)

---

### ENP version

---

**Navigation**   Expert → Diagnostics → Device info → ENP version (0012)

**Description** Displays the version of the electronic nameplate.



**User interface** Character string

**Factory setting** 2.02.00




**Additional information** *Description*

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

### 3.8.5 "Main electronic module + I/O module 1" submenu

*Navigation*   Expert → Diagnostics 1 → Main elec.+I/O1



▶ **Main electronic module + I/O module 1**

Firmware version (0072)	→  247
Build no. software (0079)	→  248
Bootloader revision (0073)	→  248

---

### Firmware version

---

**Navigation**   Expert → Diagnostics → Main elec.+I/O1 → Firmware version (0072)



**Description** Use this function to display the software revision of the module.

**User interface** Positive integer

---

**Build no. software**



---

<b>Navigation</b>	  Expert → Diagnostics → Main elec.+I/O1 → Build no. softw. (0079)
<b>Description</b>	Use this function to display the software build number of the module.
<b>User interface</b>	Positive integer



---




**Bootloader revision**

---

<b>Navigation</b>	  Expert → Diagnostics → Main elec.+I/O1 → Bootloader rev. (0073)
<b>Description</b>	Use this function to display the bootloader revision of the software.
<b>User interface</b>	Positive integer

### 3.8.6 "Sensor electronic module (ISEM)" submenu



*Navigation*   Expert → Diagnostics → Sens. electronic

<b>▶ Sensor electronic module (ISEM)</b>	
Firmware version (0072)	→  248
Build no. software (0079)	→  249
Bootloader revision (0073)	→  249

---

**Firmware version**



---

<b>Navigation</b>	  Expert → Diagnostics → Sens. electronic → Firmware version (0072)
<b>Description</b>	Use this function to display the software revision of the module.
<b>User interface</b>	Positive integer

---

**Build no. software**




---

<b>Navigation</b>	  Expert → Diagnostics → Sens. electronic → Build no. softw. (0079)
<b>Description</b>	Use this function to display the software build number of the module.
<b>User interface</b>	Positive integer

---





**Bootloader revision**


---

<b>Navigation</b>	  Expert → Diagnostics → Sens. electronic → Bootloader rev. (0073)
<b>Description</b>	Use this function to display the bootloader revision of the software.
<b>User interface</b>	Positive integer

### 3.8.7 "I/O module 2" submenu



*Navigation*   Expert → Diagnostics → I/O module 2

▶ I/O module 2	
I/O module 2 terminal numbers (3902-2)	→  249
Firmware version (0072)	→  250
Build no. software (0079)	→  250
Bootloader revision (0073)	→  250

---

**I/O module 2 terminal numbers**




---

<b>Navigation</b>	  Expert → Diagnostics → I/O module 2 → I/O 2 terminals (3902-2)
<b>Description</b>	Displays the terminal numbers used by the I/O module.
<b>User interface</b>	<ul style="list-style-type: none"> <li>■ Not used</li> <li>■ 26-27 (I/O 1)</li> <li>■ 24-25 (I/O 2)</li> <li>■ 22-23 (I/O 3)</li> <li>■ 20-21 (I/O 4)</li> </ul>

---

**Firmware version**




---

<b>Navigation</b>	  Expert → Diagnostics → I/O module 2 → Firmware version (0072)
<b>Description</b>	Use this function to display the software revision of the module.
<b>User interface</b>	Positive integer

---

**Build no. software**




---

<b>Navigation</b>	  Expert → Diagnostics → I/O module 2 → Build no. softw. (0079)
<b>Description</b>	Use this function to display the software build number of the module.
<b>User interface</b>	Positive integer

---





**Bootloader revision**


---

<b>Navigation</b>	  Expert → Diagnostics → I/O module 2 → Bootloader rev. (0073)
<b>Description</b>	Use this function to display the bootloader revision of the software.
<b>User interface</b>	Positive integer

### 3.8.8 "I/O module 3" submenu


*Navigation*   Expert → Diagnostics → I/O module 3

▶ I/O module 3	
I/O module 3 terminal numbers (3902-3)	→  251
Firmware version (0072)	→  251
Build no. software (0079)	→  251
Bootloader revision (0073)	→  251

---

**I/O module 3 terminal numbers**


---

<b>Navigation</b>	 Expert → Diagnostics → I/O module 3 → I/O 3 terminals (3902-3)
<b>Description</b>	Displays the terminal numbers used by the I/O module.
<b>User interface</b>	<ul style="list-style-type: none"><li>▪ Not used</li><li>▪ 26-27 (I/O 1)</li><li>▪ 24-25 (I/O 2)</li><li>▪ 22-23 (I/O 3)</li><li>▪ 20-21 (I/O 4)</li></ul>

---

**Firmware version**


---

<b>Navigation</b>	 Expert → Diagnostics → I/O module 3 → Firmware version (0072)
<b>Description</b>	Use this function to display the software revision of the module.
<b>User interface</b>	Positive integer

---

**Build no. software**


---

<b>Navigation</b>	 Expert → Diagnostics → I/O module 3 → Build no. softw. (0079)
<b>Description</b>	Use this function to display the software build number of the module.
<b>User interface</b>	Positive integer

---





**Bootloader revision**

---

<b>Navigation</b>	 Expert → Diagnostics → I/O module 3 → Bootloader rev. (0073)
<b>Description</b>	Use this function to display the bootloader revision of the software.
<b>User interface</b>	Positive integer

### 3.8.9 "I/O module 4" submenu


Navigation  Expert → Diagnostics → I/O module 4

▶ I/O module 4	
I/O module 4 terminal numbers (3902-4)	→  252
Firmware version (0072)	→  252
Build no. software (0079)	→  252
Bootloader revision (0073)	→  253

---

#### 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)

---

#### Firmware version

---

**Navigation**  Expert → Diagnostics → I/O module 4 → Firmware version (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**


---

<b>Navigation</b>	  Expert → Diagnostics → I/O module 4 → Bootloader rev. (0073)
<b>Description</b>	Use this function to display the bootloader revision of the software.
<b>User interface</b>	Positive integer

### 3.8.10 "Display module" submenu



*Navigation*   Expert → Diagnostics → Display module

▶ Display module	
Firmware version (0072)	→  253
Build no. software (0079)	→  253
Bootloader revision (0073)	→  254

---

**Firmware version**




---

<b>Navigation</b>	  Expert → Diagnostics → Display module → Firmware version (0072)
<b>Description</b>	Use this function to display the software revision of the module.
<b>User interface</b>	Positive integer

---

**Build no. software**




---

<b>Navigation</b>	  Expert → Diagnostics → Display module → Build no. softw. (0079)
<b>Description</b>	Use this function to display the software build number of the module.
<b>User interface</b>	Positive integer

---












**Bootloader revision**


---

<b>Navigation</b>	  Expert → Diagnostics → Display module → Bootloader rev. (0073)
<b>Description</b>	Use this function to display the bootloader revision of the software.
<b>User interface</b>	Positive integer

### 3.8.11 "Data logging" submenu

*Navigation*   Expert → Diagnostics → Data logging

▶ Data logging	
Assign channel 1 (0851)	→  254
Assign channel 2 (0852)	→  256
Assign channel 3 (0853)	→  257
Assign channel 4 (0854)	→  257
Logging interval (0856)	→  257
Clear logging data (0855)	→  258
Data logging (0860)	→  258
Logging delay (0859)	→  259
Data logging control (0857)	→  259
Data logging status (0858)	→  260
Entire logging duration (0861)	→  260

---


**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 \*
- Density
- Reference density \*
- Temperature
- Pressure
- GSV flow \*
- GSV flow alternative \*
- NSV flow \*
- NSV flow alternative \*
- S&W volume flow \*
- Reference density alternative \*
- 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 \*
- Target mass flow \*
- Carrier mass flow \*
- Concentration \*
- Dynamic viscosity \*
- Kinematic viscosity \*
- Temp. compensated dynamic viscosity \*
- Temp. compensated kinematic viscosity \*
- GSV flow \*
- GSV flow alternative \*
- NSV flow \*
- NSV flow alternative \*
- S&W volume flow \*
- Reference density alternative \*
- 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 \*
- Target volume flow \*
- Carrier volume flow \*
- Target corrected volume flow \*
- Carrier corrected volume flow \*
- Application specific output 0 \*
- Application specific output 1 \*
- Inhomogeneous medium index
- Suspended bubbles index \*
- HBSI \*

---

\* Visibility depends on order options or device settings

- Raw value mass flow
- Exciter current 0
- Oscillation damping 0
- Oscillation damping fluctuation 0 \*
- Oscillation frequency 0
- Frequency fluctuation 0 \*
- Signal asymmetry
- Torsion signal asymmetry \*
- Carrier pipe temperature
- Oscillation frequency 1 \*
- Frequency fluctuation 0 \*
- Frequency fluctuation 1 \*
- Oscillation amplitude \*
- Oscillation amplitude 1 \*
- Oscillation damping 1 \*
- Oscillation damping fluctuation 0 \*
- Oscillation damping fluctuation 1 \*
- Exciter current 1 \*
- Electronics temperature
- Sensor index coil asymmetry
- Test point 0
- Test point 1
- Current output 1 \*
- Current output 2 \*
- Current output 3 \*
- Current output 4 \*

**Factory setting** Off

**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.

---

\* Visibility depends on order options or device settings

**Selection** For the picklist, see **Assign channel 1** parameter (→  254)

**Factory setting** Off


---

### 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 (→  254)

**Factory setting** Off


---

### 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 (→  254)

**Factory setting** Off


---

### Logging interval

**Navigation**   Expert → Diagnostics → Data logging → Logging interval (0856)

**Prerequisite** The **Extended HistoROM** application package is available.




The software options currently enabled are displayed in the **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

**Factory setting** 1.0 s

<b>Additional information</b>	<p><i>Description</i></p> <p>This defines the interval between the individual data points in the data log, and thus the maximum loggable process time <math>T_{\log}</math>:</p> <ul style="list-style-type: none"> <li>▪ If 1 logging channel is used: <math>T_{\log} = 1000 \times t_{\log}</math></li> <li>▪ If 2 logging channels are used: <math>T_{\log} = 500 \times t_{\log}</math></li> <li>▪ If 3 logging channels are used: <math>T_{\log} = 333 \times t_{\log}</math></li> <li>▪ If 4 logging channels are used: <math>T_{\log} = 250 \times t_{\log}</math></li> </ul> <p>Once this time elapses, the oldest data points in the data log are cyclically overwritten such that a time of <math>T_{\log}</math> always remains in the memory (ring memory principle).</p> <p> The log contents are cleared if the length of the logging interval is changed.</p> <p><i>Example</i></p> <p>If 1 logging channel is used:</p> <ul style="list-style-type: none"> <li>▪ <math>T_{\log} = 1000 \times 1 \text{ s} = 1\,000 \text{ s} \approx 15 \text{ min}</math></li> <li>▪ <math>T_{\log} = 1000 \times 10 \text{ s} = 10\,000 \text{ s} \approx 3 \text{ h}</math></li> <li>▪ <math>T_{\log} = 1000 \times 80 \text{ s} = 80\,000 \text{ s} \approx 1 \text{ d}</math></li> <li>▪ <math>T_{\log} = 1000 \times 3\,600 \text{ s} = 3\,600\,000 \text{ s} \approx 41 \text{ d}</math></li> </ul>
-------------------------------	---


---

## Clear logging data

<b>Navigation</b>	 Expert → Diagnostics → Data logging → Clear logging (0855)
<b>Prerequisite</b>	The <b>Extended HistoROM</b> application package is available.  The software options currently enabled are displayed in the <b>Software option overview</b> parameter (→  55).
<b>Description</b>	Use this function to clear the entire logging data.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Cancel</li> <li>▪ Clear data</li> </ul>
<b>Factory setting</b>	Cancel
<b>Additional information</b>	<p><i>Selection</i></p> <ul style="list-style-type: none"> <li>▪ Cancel The data is not cleared. All the data is retained.</li> <li>▪ Clear data The logging data is cleared. The logging process starts from the beginning.</li> </ul>

---

## Data logging

<b>Navigation</b>	 Expert → Diagnostics → Data logging → Data logging (0860)
<b>Description</b>	Use this function to select the data logging method.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Overwriting</li> <li>▪ Not overwriting</li> </ul>

<b>Factory setting</b>	Overwriting
<b>Additional information</b>	<i>Selection</i> <ul style="list-style-type: none"> <li>■ Overwriting The device memory applies the FIFO principle.</li> <li>■ Not overwriting Data logging is canceled if the measured value memory is full (single shot).</li> </ul>

---

**Logging delay**


---



<b>Navigation</b>	Expert → Diagnostics → Data logging → Logging delay (0859)
<b>Prerequisite</b>	In the <b>Data logging</b> parameter (→  258), the <b>Not overwriting</b> option is selected.
<b>Description</b>	Use this function to enter the time delay for measured value logging.
<b>User entry</b>	0 to 999 h
<b>Factory setting</b>	0 h
<b>Additional information</b>	<i>Description</i> Once data logging has been started with the <b>Data logging control</b> parameter (→  259), the device does not save any data for the duration of the delay time entered.

---

**Data logging control**


---





<b>Navigation</b>	Expert → Diagnostics → Data logging → Data log.control (0857)
<b>Prerequisite</b>	In the <b>Data logging</b> parameter (→  258), the <b>Not overwriting</b> option is selected.
<b>Description</b>	Use this function to start and stop measured value logging.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ None</li> <li>■ Delete + start</li> <li>■ Stop</li> </ul>
<b>Factory setting</b>	None
<b>Additional information</b>	<i>Selection</i> <ul style="list-style-type: none"> <li>■ None Initial measured value logging status.</li> <li>■ Delete + start All the measured values recorded for all the channels are deleted and measured value logging starts again.</li> <li>■ Stop Measured value logging is stopped.</li> </ul>

---

**Data logging status**




---

<b>Navigation</b>	 Expert → Diagnostics → Data logging → Data log. status (0858)
<b>Prerequisite</b>	In the <b>Data logging</b> parameter (→  258), the <b>Not overwriting</b> option is selected.
<b>Description</b>	Displays the measured value logging status.
<b>User interface</b>	<ul style="list-style-type: none"> <li>▪ Done</li> <li>▪ Delay active</li> <li>▪ Active</li> <li>▪ Stopped</li> </ul>
<b>Factory setting</b>	Done
<b>Additional information</b>	<i>Selection</i> <ul style="list-style-type: none"> <li>▪ Done Measured value logging has been performed and completed successfully.</li> <li>▪ Delay active Measured value logging has been started but the logging interval has not yet elapsed.</li> <li>▪ Active The logging interval has elapsed and measured value logging is active.</li> <li>▪ Stopped Measured value logging is stopped.</li> </ul>

---

**Entire logging duration**


---

<b>Navigation</b>	 Expert → Diagnostics → Data logging → Logging duration (0861)
<b>Prerequisite</b>	In the <b>Data logging</b> parameter (→  258), the <b>Not overwriting</b> option is selected.
<b>Description</b>	Displays the total logging duration.
<b>User interface</b>	Positive floating-point number
<b>Factory setting</b>	0 s


**"Display channel 1" submenu**

*Navigation*  Expert → Diagnostics → Data logging → Displ.channel 1




## Display channel 1


### Navigation

 Expert → Diagnostics → Data logging → Displ.channel 1

### Prerequisite

The **Extended HistoROM** application package is available.

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

One of the following options is selected in the **Assign channel 1** parameter (→  254):

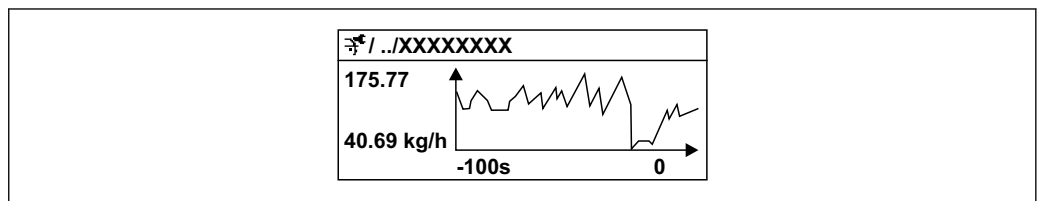
- Mass flow
- Volume flow
- Corrected volume flow
- Target mass flow \*
- Carrier mass flow \*
- Density
- Reference density
- Concentration \*
- Dynamic viscosity \*
- Kinematic viscosity \*
- Temp. compensated dynamic viscosity \*
- Temp. compensated kinematic viscosity \*
- Carrier pipe temperature \*
- Electronics temperature
- Current output 1
- Oscillation frequency 0
- Oscillation frequency 1 \*
- Frequency fluctuation 0
- Frequency fluctuation 1 \*
- Oscillation amplitude \*
- Oscillation amplitude 1 \*
- Oscillation damping 0
- Oscillation damping 1 \*
- Oscillation damping fluctuation 0
- Oscillation damping fluctuation 1 \*
- Signal asymmetry
- Exciter current 0
- Exciter current 1 \*


### Description

Displays the measured value trend for the logging channel in the form of a chart.

### Additional information

*Description*




 8 *Chart of a measured value trend*

A0016357

\* Visibility depends on order options or device settings

- x-axis: depending on the number of channels selected displays 250 to 1000 measured values of a process variable.
- y-axis: displays the approximate measured value span and constantly adapts this to the ongoing measurement.

### "Display channel 2" submenu


*Navigation*  Expert → Diagnostics → Data logging → Displ.channel 2




---

## Display channel 2

---

**Navigation**  Expert → Diagnostics → Data logging → Displ.channel 2

**Prerequisite** A process variable is specified in the **Assign channel 2** parameter.

**Description** See the **Display channel 1** parameter →  261

### "Display channel 3" submenu


*Navigation*  Expert → Diagnostics → Data logging → Displ.channel 3




---

## Display channel 3


---

**Navigation**  Expert → Diagnostics → Data logging → Displ.channel 3

**Prerequisite** A process variable is specified in the **Assign channel 3** parameter.

**Description** See the **Display channel 1** parameter →  261

### "Display channel 4" submenu

Navigation  Expert → Diagnostics → Data logging → Displ.channel 4

▶ Display channel 4


Display channel 4

→  263

---

## 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 →  261


### 3.8.12 "Min/max values" submenu


Navigation   Expert → Diagnostics → Min/max val.


▶ Min/max values


Reset min/max values (6151)


→  264


▶ Electronics temperature
→  264


▶ Main electronics temperature
→  265


▶ Sensor electronics temperature (ISEM)
→  266


▶ Medium temperature
→  267


▶ Carrier pipe temperature
→  268

▶ Oscillation frequency
→  269

▶ Torsion oscillation frequency
→  270

▶ Oscillation amplitude
→  271

▶ Torsion oscillation amplitude
→  271

▶ Oscillation damping
→  272

▶ Torsion oscillation damping	→ 📄 273
▶ Signal asymmetry	→ 📄 274
▶ Torsion signal asymmetry	→ 📄 274

---

**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
- Torsion oscillation damping \*
- Oscillation frequency
- Torsion oscillation frequency \*
- Signal asymmetry
- Torsion signal asymmetry \*

**Factory setting**

Cancel

**"Electronics temperature" submenu**

*Navigation*      🔍📄 Expert → Diagnostics → Min/max val. → Electronics temp

▶ Electronics temperature	
Minimum value	→ 📄 264
Maximum value	→ 📄 265

---

**Minimum value**
**Navigation**

🔍📄 Expert → Diagnostics → Min/max val. → Electronics temp → Minimum value (6052)

**Description**



Displays the lowest previously measured temperature value of the electronics module in the sensor connection housing.

---

\* Visibility depends on order options or device settings

**User interface** Signed floating-point number


**Additional information** *Dependency*

 The unit is taken from the **Temperature unit** parameter (→  98)

---

### Maximum value



---

**Navigation**   Expert → Diagnostics → Min/max val. → Electronics 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** *Dependency*

 The unit is taken from the **Temperature unit** parameter (→  98)

### "Main electronics temperature" submenu

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



▶ **Main electronics temperature**

Minimum electronics temperature (0688)	→  265
Maximum electronics temperature (0665)	→  266

---

### Minimum electronics temperature



---

**Navigation**   Expert → Diagnostics → Min/max val. → Main elect.temp. → Min.electr.temp. (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 (→  98)



---



## Maximum electronics temperature

---

<b>Navigation</b>	  Expert → Diagnostics → Min/max val. → Main elect.temp. → Max.electr.temp. (0665)
<b>Description</b>	Displays the highest previously measured temperature value of the electronics module in the transmitter.
<b>User interface</b>	Signed floating-point number
<b>Additional information</b>	<i>Dependency</i>  The unit is taken from the <b>Temperature unit</b> parameter (→  98)

### "Sensor electronics temperature (ISEM)" submenu





*Navigation*   Expert → Diagnostics → Min/max val. → Sensor elec.temp

<p>▶ <b>Sensor electronics temperature (ISEM)</b></p>	
<p>Minimum value (6052)</p>	<p>→  267</p>
<p>Maximum value (6051)</p>	<p>→  266</p>

---

## Maximum value




---

<b>Navigation</b>	  Expert → Diagnostics → Min/max val. → Sensor elec.temp → Maximum value (6051)
<b>Description</b>	Displays the highest previously measured temperature value of the electronics module in the sensor connection housing.
<b>User interface</b>	Signed floating-point number
<b>Additional information</b>	<i>Dependency</i>  The unit is taken from the <b>Temperature unit</b> parameter (→  98)


---



**Minimum value**


---

<b>Navigation</b>	 Expert → Diagnostics → Min/max val. → Sensor elec.temp → Minimum value (6052)
<b>Description</b>	Displays the lowest previously measured temperature value of the electronics module in the sensor connection housing.
<b>User interface</b>	Signed floating-point number
<b>Additional information</b>	<i>Dependency</i>  The unit is taken from the <b>Temperature unit</b> parameter (→  98)

**"Medium temperature" submenu**




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

▶ Medium temperature	
Minimum value (6109)	→  267
Maximum value (6108)	→  267

---

**Minimum value**



---

<b>Navigation</b>	 Expert → Diagnostics → Min/max val. → Medium temp. → Minimum value (6109)
<b>Description</b>	Displays the lowest previously measured medium temperature value.
<b>User interface</b>	Signed floating-point number
<b>Additional information</b>	<i>Dependency</i>  The unit is taken from the <b>Temperature unit</b> parameter (→  98)



---

**Maximum value**



---



<b>Navigation</b>	 Expert → Diagnostics → Min/max val. → Medium temp. → Maximum value (6108)
<b>Description</b>	Displays the highest previously measured medium temperature value.
<b>User interface</b>	Signed floating-point number

**Additional information***Dependency*


 The unit is taken from the **Temperature unit** parameter (→  98)

**"Carrier pipe temperature" submenu**

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

<b>► Carrier pipe temperature</b>	
Minimum value (6030)	→  268
Maximum value (6029)	→  269

**Minimum value****Navigation**

 Expert → Diagnostics → Min/max val. → Carr. pipe temp. → Minimum value (6030)

**Prerequisite**

 Only available for:

- Promass A
- Promass F
- Promass H
- Promass I
- Promass O
- Promass P
- PromassQ
- Promass S
- Promass X

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***Dependency*

 The unit is taken from the **Temperature unit** parameter (→  98)

**Maximum value**

**Navigation**  Expert → Diagnostics → Min/max val. → Carr. pipe temp. → Maximum value (6029)

**Prerequisite**  Only available for:

- Promass A
- Promass F
- Promass H
- Promass I
- Promass O
- Promass P
- PromassQ
- Promass S
- Promass X

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** *Dependency*

 The unit is taken from the **Temperature unit** parameter (→  98)


**"Oscillation frequency" submenu**

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

▶ Oscillation frequency

Minimum value (6071)	→  269
Maximum value (6070)	→  270

**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**




---

<b>Navigation</b>	 Expert → Diagnostics → Min/max val. → Oscil. frequency → Maximum value (6070)
<b>Description</b>	Displays the highest previously measured oscillation frequency.
<b>User interface</b>	Signed floating-point number

**"Torsion oscillation frequency" submenu**

*Navigation*  Expert → Diagnostics → Min/max val. → Tors.oscil.freq.



▶ **Torsion oscillation frequency**

Minimum value (6069)	→  270
Maximum value (6068)	→  270

---

**Minimum value**




---

<b>Navigation</b>	 Expert → Diagnostics → Min/max val. → Tors.oscil.freq. → Minimum value (6069)
<b>Prerequisite</b>	 Only available for Promass I and Q. For the following order code: "Application package", option <b>EB</b> "Heartbeat Verification + Monitoring"
<b>Description</b>	Displays the lowest previously measured torsion oscillation frequency.
<b>User interface</b>	Signed floating-point number

---

**Maximum value**


---



<b>Navigation</b>	 Expert → Diagnostics → Min/max val. → Tors.oscil.freq. → Maximum value (6068)
<b>Prerequisite</b>	 Only available for Promass I and Q. For the following order code: "Application package", option <b>EB</b> "Heartbeat Verification + Monitoring"
<b>Description</b>	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)	→  271
Maximum value (6009)	→  271

---

**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)	→  272
Maximum value (6007)	→  272

---

**Minimum value**




---

<b>Navigation</b>	 Expert → Diagnostics → Min/max val. → Tor. osc. amp. → Minimum value (6008)
<b>Prerequisite</b>	 Only available for Promass I and Q. For the following order code: "Application package", option <b>EB</b> "Heartbeat Verification + Monitoring"
<b>Description</b>	Displays the lowest previously measured torsion oscillation amplitude.
<b>User interface</b>	Signed floating-point number


---



**Maximum value**


---

<b>Navigation</b>	 Expert → Diagnostics → Min/max val. → Tor. osc. amp. → Maximum value (6007)
<b>Prerequisite</b>	 Only available for Promass I and Q. For the following order code: "Application package", option <b>EB</b> "Heartbeat Verification + Monitoring"
<b>Description</b>	Displays the highest previously measured torsion oscillation amplitude.
<b>User interface</b>	Signed floating-point number

**"Oscillation damping" submenu**


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

▶ Oscillation damping	
Minimum value (6122)	→  272
Maximum value (6121)	→  273

---

**Minimum value**




---

<b>Navigation</b>	 Expert → Diagnostics → Min/max val. → Oscil. damping → Minimum value (6122)
<b>Description</b>	Displays the lowest previously measured oscillation damping.
<b>User interface</b>	Signed floating-point number



---

**Maximum value**




---

<b>Navigation</b>	  Expert → Diagnostics → Min/max val. → Oscil. damping → Maximum value (6121)
<b>Description</b>	Displays the highest previously measured oscillation damping.
<b>User interface</b>	Signed floating-point number

**"Torsion oscillation damping" submenu**

*Navigation*   Expert → Diagnostics → Min/max val. → Tors.oscil.damp.




▶ **Torsion oscillation damping**

Minimum value (6120)	→  273
Maximum value (6119)	→  273

---

**Minimum value**





---

<b>Navigation</b>	  Expert → Diagnostics → Min/max val. → Tors.oscil.damp. → Minimum value (6120)
<b>Prerequisite</b>	 Only available for Promass I and Q. For the following order code: "Application package", option <b>EB</b> "Heartbeat Verification + Monitoring"
<b>Description</b>	Displays the lowest previously measured torsion oscillation damping.
<b>User interface</b>	Signed floating-point number

---


**Maximum value**


---



<b>Navigation</b>	  Expert → Diagnostics → Min/max val. → Tors.oscil.damp. → Maximum value (6119)
<b>Prerequisite</b>	 Only available for Promass I and Q. For the following order code: "Application package", option <b>EB</b> "Heartbeat Verification + Monitoring"
<b>Description</b>	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)	→  274
Maximum value (6014)	→  274

---

#### 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)	→  275
Maximum value (6283)	→  275

**Minimum value**


<b>Navigation</b>	 Expert → Diagnostics → Min/max val. → Tors.sig.asymm. → Minimum value (6284)
<b>Prerequisite</b>	 Only available for Promass I and Q.  For the following order code: "Application package", option <b>EB</b> "Heartbeat Verification + Monitoring"
<b>Description</b>	Displays the lowest previously measured torsion signal asymmetry.
<b>User interface</b>	Signed floating-point number






**Maximum value**

<b>Navigation</b>	 Expert → Diagnostics → Min/max val. → Tors.sig.asymm. → Maximum value (6283)
<b>Prerequisite</b>	 Only available for Promass I and Q.  For the following order code: "Application package", option <b>EB</b> "Heartbeat Verification + Monitoring"
<b>Description</b>	Displays the highest previously measured torsion signal asymmetry.
<b>User interface</b>	Signed floating-point number


### 3.8.13 "Heartbeat Technology" submenu



 For detailed information on the parameter descriptions for the **Heartbeat Verification+Monitoring**: Special Documentation for the device


*Navigation*  Expert → Diagnostics → Heartbeat Techn.


<b>▶ Heartbeat Technology</b>	
<b>▶ Heartbeat base settings</b>	→  276
<b>▶ Performing verification</b>	→  276
<b>▶ Verification results</b>	→  280
<b>▶ Heartbeat Monitoring</b>	→  284
<b>▶ Monitoring results</b>	→  285

**"Heartbeat base settings" submenu**

*Navigation*  Expert → Diagnostics → Heartbeat Techn. → Base settings


<b>▶ Heartbeat base settings</b>	
Plant operator (2754)	→  276
Location (2755)	→  276

**Plant operator** 

**Navigation**  Expert → Diagnostics → Heartbeat Techn. → 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 Techn. → 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.

<b>▶ Performing verification</b>	
Year (2846)	→  277
Month (2845)	→  277
Day (2842)	→  278
Hour (2843)	→  278
AM/PM (2813)	→  278

Minute (2844)	→  279
Start verification (12127)	→  279
Progress (2808)	→  279
Status (12153)	→  280
Verification result (12149)	→  280

---











### Year

<b>Navigation</b>	Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Year (2846)
<b>Prerequisite</b>	Can be edited if Heartbeat Verification is not active.
<b>Description</b>	Use this function to enter the year of recalibration.
<b>User entry</b>	9 to 99
<b>Factory setting</b>	21

---

### Month

<b>Navigation</b>	Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Month (2845)
<b>Prerequisite</b>	Can be edited if Heartbeat Verification is not active.
<b>Description</b>	Use this function to select the month of recalibration.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ January</li> <li>■ February</li> <li>■ March</li> <li>■ April</li> <li>■ May</li> <li>■ June</li> <li>■ July</li> <li>■ August</li> <li>■ September</li> <li>■ October</li> <li>■ November</li> <li>■ December</li> </ul>
<b>Factory setting</b>	January

Day 	
<b>Navigation</b>	 Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Day (2842)
<b>Prerequisite</b>	 Can be edited if Heartbeat Verification is not active.
<b>Description</b>	Use this function to enter the day of the month of recalibration.
<b>User entry</b>	1 to 31 d
<b>Factory setting</b>	1 d
Hour 	
<b>Navigation</b>	 Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Hour (2843)
<b>Prerequisite</b>	 Can be edited if Heartbeat Verification is not active.
<b>Description</b>	Use this function to enter the hour of recalibration.
<b>User entry</b>	0 to 23 h
<b>Factory setting</b>	12 h
AM/PM 	
<b>Navigation</b>	 Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → AM/PM (2813)
<b>Prerequisite</b>	 Can be edited if Heartbeat Verification is not active.  The <b>dd.mm.yy hh:mm am/pm</b> option or the <b>mm/dd/yy hh:mm am/pm</b> option is selected in the <b>Date/time format</b> parameter (2812) (→  99).
<b>Description</b>	Use this function to select the time entry in the morning ( <b>AM</b> option) or afternoon ( <b>PM</b> option) in the case of 12-hour notation.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ AM</li> <li>▪ PM</li> </ul>
<b>Factory setting</b>	AM

---

**Minute**

---



<b>Navigation</b>	Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Minute (2844)
<b>Prerequisite</b>	Can be edited if Heartbeat Verification is not active.
<b>Description</b>	Use this function to enter the minutes of recalibration.
<b>User entry</b>	0 to 59 min
<b>Factory setting</b>	0 min

---

**Start verification**

---



<b>Navigation</b>	Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Start verificat. (12127)
<b>Description</b>	<p>Start the verification.</p> <p>To carry out a complete verification, select the selection parameters individually. Once the external measured values have been recorded, verification is started using the <b>Start</b> option.</p>
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Cancel</li> <li>■ Output 1 low value *</li> <li>■ Output 1 high value *</li> <li>■ Output 2 low value *</li> <li>■ Output 2 high value *</li> <li>■ Output 3 low value *</li> <li>■ Output 3 high value *</li> <li>■ Output 4 low value *</li> <li>■ Output 4 high value *</li> <li>■ Frequency output 1 *</li> <li>■ Pulse output 1 *</li> <li>■ Frequency output 2 *</li> <li>■ Pulse output 2 *</li> <li>■ Frequency output 3 *</li> <li>■ Double pulse output *</li> <li>■ Start</li> </ul>
<b>Factory setting</b>	Cancel

---

**Progress**

---

<b>Navigation</b>	Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Progress (2808)
<b>Description</b>	The progress of the process is indicated.

---


\* Visibility depends on order options or device settings

**User interface** 0 to 100 %

---

## Status

---

**Navigation**  Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Status (12153)

**Description** Displays the current status of the verification.


**User interface**

- Done
- Busy
- Failed
- Not done


---

## Verification result

---

**Navigation**  Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Verific. result (12149)

**Description** Displays the overall result of the verification.


 Detailed description of the classification of the results:






**User interface**





- Not supported
- Passed
- Not done
- Failed

**Factory setting** Not done

### "Verification results" submenu

*Navigation*  Expert → Diagnostics → Heartbeat Techn. → Verific. results



► Verification results	
Date/time (manually entered) (12142)	→  281
Verification ID (12141)	→  281
Operating time (12126)	→  281
Verification result (12149)	→  282
Sensor (12152)	→  282

HBSI (12167)	→  282
Sensor electronic module (ISEM) (12151)	→  283
I/O module (12145)	→  283
System status (12109)	→  284

---

**Date/time (manually entered)**



---

<b>Navigation</b>	  Expert → Diagnostics → Heartbeat Techn. → Verific. results → Date/time (12142)
<b>Prerequisite</b>	The verification has been performed.
<b>Description</b>	Date and time.
<b>User interface</b>	dd.mmmm.yyyy; hh:mm
<b>Factory setting</b>	1 January 2010; 12:00

---

**Verification ID**



---

<b>Navigation</b>	  Expert → Diagnostics → Heartbeat Techn. → Verific. results → Verification ID (12141)
<b>Prerequisite</b>	The verification has been performed.
<b>Description</b>	Displays consecutive numbering of the verification results in the measuring device.
<b>User interface</b>	0 to 65 535
<b>Factory setting</b>	0

---

**Operating time**

---


<b>Navigation</b>	  Expert → Diagnostics → Heartbeat Techn. → Verific. results → Operating time (12126)
<b>Prerequisite</b>	The verification has been performed.
<b>Description</b>	Indicates how long the device has been in operation up to the verification.
<b>User interface</b>	Days (d), hours (h), minutes (m), seconds (s)

**Factory setting** -


---

### Verification result

---

**Navigation**  Expert → Diagnostics → Heartbeat Techn. → Verific. results → Verific. result (12149)

**Description** Displays the overall result of the verification.

 Detailed description of the classification of the results:

**User interface**


- Not supported
- Passed
- Not done
- Failed


**Factory setting** Not done

---


### Sensor

---

**Navigation**  Expert → Diagnostics → Heartbeat Techn. → Verific. results → Sensor (12152)

**Prerequisite** The **Failed** option was shown in the **Overall result** parameter (→  280).

**Description** Displays the result for the sensor.

 Detailed description of the classification of the results:

**User interface**


- Not supported
- Passed
- Not done
- Failed


**Factory setting** Not done

---


### HBSI

---

**Navigation**  Expert → Diagnostics → Heartbeat Techn. → Verific. results → HBSI (12167)

**Prerequisite** The **Failed** option is shown in the **Overall result** parameter (→  280).

**Description** Displays the relative change in the sensor with all the sensor components.

 Detailed description of the classification of the results:

**User interface**


- Not supported
- Passed
- Not done
- Failed


**Factory setting** Not done

---


### Sensor electronic module (ISEM)

---

**Navigation**  Expert → Diagnostics → Heartbeat Techn. → Verific. results → Sens. electronic (12151)

**Prerequisite** The **Failed** option was shown in the **Overall result** parameter (→  280).

**Description** Displays the result for the sensor electronics module (ISEM).

 Detailed description of the classification of the results:

**User interface**


- Not supported
- Passed
- Not done
- Failed


**Factory setting** Not done

---

### I/O module

---


**Navigation**  Expert → Diagnostics → Heartbeat Techn. → Verific. results → I/O module (12145)

**Prerequisite** The **Failed** option was shown in the **Overall result** parameter (→  280).

**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**

- Not supported
- Passed
- Not done
- Not plugged
- Failed


**Factory setting** Not done

---


## System status

---

**Navigation**  Expert → Diagnostics → Heartbeat Techn. → Verific. results → System status (12109)

**Prerequisite** The **Failed** option was shown in the **Overall result** parameter (→  280).

**Description** Displays the system condition. Tests the measuring device for active errors.


 Detailed description of the classification of the results:

**User interface**

- Not supported
- Passed
- Not done
- Failed


**Factory setting** Not done

### "Heartbeat Monitoring" submenu


*Navigation*  Expert → Diagnostics → Heartbeat Techn. → Heartbeat Mon.

▶ Heartbeat Monitoring

Activate monitoring (12129)

→  284


HBSI cycle time (12110)

→  285

---

## Activate monitoring

---

**Navigation**  Expert → Diagnostics → Heartbeat Techn. → Heartbeat Mon. → Act. monitoring (12129)

**Description**  **Continuous HBSI** option does not apply for Promass I and Promass Q.

**Selection**

- Off
- Time-controlled HBSI
- Continuous HBSI

**Factory setting** On

---

**HBSI cycle time**


<b>Navigation</b>	Expert → Diagnostics → Heartbeat Techn. → Heartbeat Mon. → HBSI cycle time (12110)
<b>Prerequisite</b>	In the <b>Activate monitoring</b> parameter (→  284), the <b>Time-controlled HBSI</b> option is selected. Not available for Promass I.
<b>Description</b>	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 <b>Activate monitoring</b> parameter (→  284) is set to <b>Scheduled HBSI</b> option.
<b>User entry</b>	0.5 to 4 320 h
<b>Factory setting</b>	12 h

**"Monitoring results" submenu**

*Navigation* Expert → Diagnostics → Heartbeat Techn. → Monitor. results

▶ <b>Monitoring results</b>	
HBSI (12115)	→  285
HBSI value reliability (6380)	→  286

---


**HBSI**

<b>Navigation</b>	Expert → Diagnostics → Heartbeat Techn. → Monitor. results → HBSI (12115)
<b>Description</b>	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.
<b>User interface</b>	Signed floating-point number
<b>Factory setting</b>	0...4 %

---

**HBSI value reliability**


---


<b>Navigation</b>	 Expert → Diagnostics → Heartbeat Techn. → Monitor. results → HBSI val.reliab. (6380)
<b>Description</b>	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.
<b>User interface</b>	<ul style="list-style-type: none"> <li>■ Good</li> <li>■ Uncertain</li> <li>■ Bad</li> </ul>
<b>Factory setting</b>	Uncertain

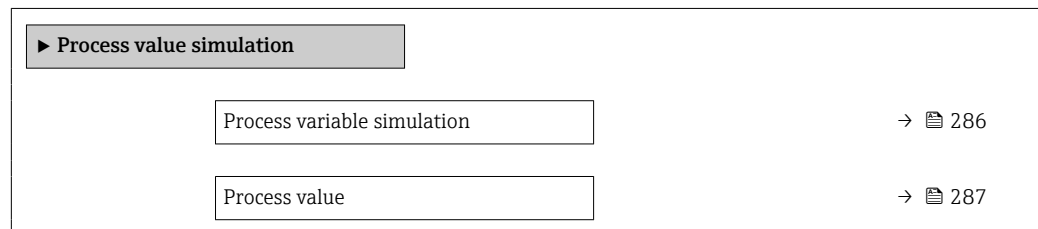
### 3.8.14 "Simulation" submenu

*Navigation*  Expert → Diagnostics → Simulation



#### "Process value simulation" submenu

*Navigation*  Expert → Diagnostics → Simulation → Proc. val. sim.






---

**Assign simulation process variable**


---



<b>Navigation</b>	<p> Diagnostics → Simulation → Assign proc.var. (1810)</p> <p> Expert → Diagnostics → Simulation → Assign proc.var. (1810)</p>
<b>Description</b>	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.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Off</li> <li>■ Mass flow</li> <li>■ Volume flow</li> </ul>

- 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 \*
- 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
- Dynamic viscosity \*
- Kinematic viscosity \*
- Temp. compensated dynamic viscosity \*
- Temp. compensated kinematic viscosity \*
- Concentration \*
- Target mass flow \*
- Carrier mass flow \*
- Time period signal frequency (TPS) \*

**Factory setting**

Off

**Additional information***Description*

The simulation value of the process variable selected is defined in the **Process variable value** parameter (→ 287).

**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 (→ 286).

**Description**

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



**User entry**

Depends on the process variable selected

\* Visibility depends on order options or device settings





**Factory setting** 0

**Additional information** *User entry*

 The unit of the displayed measured value is taken from the **System units** submenu (→  89).


### "Input simulation" submenu

*Navigation*  Expert → Diagnostics → Simulation → Input simulation

▶ <b>Input simulation</b>	
Current input 1 to n simulation	→  288
Value current input 1 to n	→  289
Status input simulation	→  289
Input signal level	→  289

## 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

**Factory setting** Off

**Additional information** *Selection*

- Off  
Current simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
- On  
Current simulation is active.

Value current input 1 to n 	
<b>Navigation</b>	<p>  Diagnostics → Simulation → Value curr.inp 1 to n (1609-1 to n)</p> <p>  Expert → Diagnostics → Simulation → Value curr.inp 1 to n (1609-1 to n)</p>
<b>Prerequisite</b>	In the <b>Current input 1 to n simulation</b> parameter, the <b>On</b> option is selected.
<b>Description</b>	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.
<b>User entry</b>	0 to 22.5 mA
Status input 1 to n simulation 	
<b>Navigation</b>	<p>  Diagnostics → Simulation → Status inp 1 to n sim (1355-1 to n)</p> <p>  Expert → Diagnostics → Simulation → Status inp 1 to n sim (1355-1 to n)</p>
<b>Description</b>	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.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Off</li> <li>▪ On</li> </ul>
<b>Factory setting</b>	Off
<b>Additional information</b>	<p><i>Description</i></p> <p> The desired simulation value is defined in the <b>Input signal level</b> parameter (→  289).</p> <p><i>Selection</i></p> <ul style="list-style-type: none"> <li>▪ Off Simulation for the status input is switched off. The device is in normal measuring mode or another process variable is being simulated.</li> <li>▪ On Simulation for the status input is active.</li> </ul>
Input signal level 1 to n 	
<b>Navigation</b>	<p>  Diagnostics → Simulation → Signal level 1 to n (1356-1 to n)</p> <p>  Expert → Diagnostics → Simulation → Signal level 1 to n (1356-1 to n)</p>
<b>Prerequisite</b>	In the <b>Status input simulation</b> parameter (→  289), the <b>On</b> 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	→  290
Current output 1 to n value	→  291
Frequency output 1 to n simulation	→  291
Frequency output 1 to n value	→  292
Pulse output simulation 1 to n	→  292
Pulse value 1 to n	→  293
Switch output simulation 1 to n	→  293
Switch state 1 to n	→  294
Relay output 1 to n simulation	→  294
Switch state 1 to n	→  295
Pulse output simulation	→  295
Pulse value	→  296

### Current output 1 to n simulation

**Navigation**  Diagnostics → Simulation → Curr.outp 1 to n sim. (0354-1 to n)  
 Expert → Diagnostics → Simulation → Curr.outp 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.

<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Off</li> <li>▪ On</li> </ul>
<b>Factory setting</b>	Off
<b>Additional information</b>	<p><i>Description</i></p> <p> The desired simulation value is defined in the <b>Value current output 1 to n</b> parameter.</p> <p><i>Selection</i></p> <ul style="list-style-type: none"> <li>▪ Off Current simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.</li> <li>▪ On Current simulation is active.</li> </ul>

---

## Current output value






---













<b>Navigation</b>	<p>  <a href="#">Diagnostics → Simulation → Curr.outp val. (0355)</a></p> <p>  <a href="#">Expert → Diagnostics → Simulation → Curr.outp val. (0355)</a></p>
<b>Prerequisite</b>	In the <b>Current output 1 to n simulation</b> parameter, the <b>On</b> option is selected.
<b>Description</b>	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.
<b>User entry</b>	3.59 to 22.5 mA
<b>Additional information</b>	<p><i>Dependency</i></p> <p>The input range is dependent on the option selected in the <b>Current span</b> parameter (→  159).</p>















---

## Frequency output 1 to n simulation

---

<b>Navigation</b>	<p>  <a href="#">Diagnostics → Simulation → Freq.outp 1 to n sim. (0472-1 to n)</a></p> <p>  <a href="#">Expert → Diagnostics → Simulation → Freq.outp 1 to n sim. (0472-1 to n)</a></p>
<b>Prerequisite</b>	In the <b>Operating mode</b> parameter (→  165), the <b>Frequency</b> option is selected.
<b>Description</b>	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.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Off</li> <li>▪ On</li> </ul>
<b>Factory setting</b>	Off

<b>Additional information</b>	<p><i>Description</i></p> <p> The desired simulation value is defined in the <b>Frequency value 1 to n</b> parameter.</p> <p><i>Selection</i></p> <ul style="list-style-type: none"> <li>■ Off Frequency simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.</li> <li>■ On Frequency simulation is active.</li> </ul>
<hr/>	
<b>Frequency output 1 to n value</b> 	
<b>Navigation</b>	<p>  <a href="#">Diagnostics</a> → <a href="#">Simulation</a> → <a href="#">Freq.outp 1 to n val. (0473-1 to n)</a></p> <p>  <a href="#">Expert</a> → <a href="#">Diagnostics</a> → <a href="#">Simulation</a> → <a href="#">Freq.outp 1 to n val. (0473-1 to n)</a></p>
<b>Prerequisite</b>	In the <b>Frequency simulation 1 to n</b> parameter, the <b>On</b> option is selected.
<b>Description</b>	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.
<b>User entry</b>	0.0 to 12 500.0 Hz
<hr/>	
<b>Pulse output simulation 1 to n</b> 	
<b>Navigation</b>	<p>  <a href="#">Diagnostics</a> → <a href="#">Simulation</a> → <a href="#">Puls.outp.sim. 1 to n (0458-1 to n)</a></p> <p>  <a href="#">Expert</a> → <a href="#">Diagnostics</a> → <a href="#">Simulation</a> → <a href="#">Puls.outp.sim. 1 to n (0458-1 to n)</a></p>
<b>Prerequisite</b>	In the <b>Operating mode</b> parameter (→  165), the <b>Pulse</b> option is selected.
<b>Description</b>	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.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Off</li> <li>■ Fixed value</li> <li>■ Down-counting value</li> </ul>
<b>Factory setting</b>	Off

<b>Additional information</b>	<p><i>Description</i></p> <p> The desired simulation value is defined in the <b>Pulse value 1 to n</b> parameter.</p> <p><i>Selection</i></p> <ul style="list-style-type: none"> <li>▪ Off Pulse simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.</li> <li>▪ Fixed value Pulses are continuously output with the pulse width specified in the <b>Pulse width</b> parameter (→  169).</li> <li>▪ Down-counting value The pulses specified in the <b>Pulse value</b> parameter (→  293) are output.</li> </ul>
<hr/>	
<b>Pulse value 1 to n</b> 	
<b>Navigation</b>	<p>  <a href="#">Diagnostics → Simulation → Pulse value 1 to n (0459-1 to n)</a></p> <p>  <a href="#">Expert → Diagnostics → Simulation → Pulse value 1 to n (0459-1 to n)</a></p>
<b>Prerequisite</b>	In the <b>Pulse output simulation 1 to n</b> parameter, the <b>Down-counting value</b> option is selected.
<b>Description</b>	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.
<b>User entry</b>	0 to 65 535
<hr/>	
<b>Switch output simulation 1 to n</b> 	
<b>Navigation</b>	<p>  <a href="#">Diagnostics → Simulation → Switch sim. 1 to n (0462-1 to n)</a></p> <p>  <a href="#">Expert → Diagnostics → Simulation → Switch sim. 1 to n (0462-1 to n)</a></p>
<b>Prerequisite</b>	In the <b>Operating mode</b> parameter (→  165), the <b>Switch</b> option is selected.
<b>Description</b>	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.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Off</li> <li>▪ On</li> </ul>
<b>Factory setting</b>	Off



**Additional information***Description*

 The desired simulation value is defined in the **Switch state 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 state 1 to n****Navigation**

 [Diagnostics](#) → [Simulation](#) → [Switch state 1 to n \(0463-1 to n\)](#)  
 [Expert](#) → [Diagnostics](#) → [Simulation](#) → [Switch state 1 to n \(0463-1 to n\)](#)

**Description**

Use this function to select a switch value for the simulation. In this way, users can verify the correct adjustment of the switch output and the correct function of downstream switching units.



**Selection**

- Open
- Closed

**Additional information***Selection*

- Open  
Switch simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
- Closed  
Switch simulation is active.

**Relay output 1 to n simulation****Navigation**

 [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

**Factory setting**



Off

<b>Additional information</b>	<p><i>Description</i></p> <p> The desired simulation value is defined in the <b>Switch state 1 to n</b> parameter.</p> <p><i>Selection</i></p> <ul style="list-style-type: none"> <li>▪ Off Relay simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.</li> <li>▪ On Relay simulation is active.</li> </ul>
<hr/>	
<b>Switch state 1 to n</b> 	
<b>Navigation</b>	<p>  <a href="#">Diagnostics</a> → <a href="#">Simulation</a> → <a href="#">Switch state 1 to n (0803-1 to n)</a></p> <p>  <a href="#">Expert</a> → <a href="#">Diagnostics</a> → <a href="#">Simulation</a> → <a href="#">Switch state 1 to n (0803-1 to n)</a></p>
<b>Prerequisite</b>	The <b>On</b> option is selected in the <b>Switch output simulation 1 to n</b> parameter parameter.
<b>Description</b>	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.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Open</li> <li>▪ Closed</li> </ul>
<b>Additional information</b>	<p><i>Selection</i></p> <ul style="list-style-type: none"> <li>▪ Open Relay simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.</li> <li>▪ Closed Relay simulation is active.</li> </ul>
<hr/>	
<b>Pulse output simulation</b> 	
<b>Navigation</b>	<p>  <a href="#">Diagnostics</a> → <a href="#">Simulation</a> → <a href="#">Puls.outp.sim. (0988)</a></p> <p>  <a href="#">Expert</a> → <a href="#">Diagnostics</a> → <a href="#">Simulation</a> → <a href="#">Puls.outp.sim. (0988)</a></p>
<b>Description</b>	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.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Off</li> <li>▪ Fixed value</li> <li>▪ Down-counting value</li> </ul>
<b>Factory setting</b>	Off

**Additional information***Description*

 The desired simulation value is defined in the **Pulse value** parameter (→  296).

*Selection*

- 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 (→  198).
- Down-counting value  
The pulses specified in the **Pulse value** parameter (→  296) are output.


---

**Pulse value****Navigation**

  [Diagnostics → Simulation → Pulse value \(0989\)](#)

  [Expert → Diagnostics → Simulation → Pulse value \(0989\)](#)

**Prerequisite**

In the **Pulse output simulation** parameter (→  295), 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	NI
Corrected volume flow	NI/h
Density	kg/l
Reference density	kg/NI
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
8	400
15	1300
15 FB	3600
25	3600
25 FB	9000
40	9000
40 FB	14000
50	14000
50 FB	36000
80	36000
100	60000
150	130 t/h
200	230 t/h
250	360 t/h
350	650 t/h

### 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
8	0.1
15	0.1
15 FB	1
25	1
25 FB	1
40	1
40 FB	10
50	10
50 FB	10
80	10
100	10
150	100
200	100
250	100
350	100

### 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
8	8
15	26
15 FB	72
25	72
25 FB	180
40	180
40 FB	300
50	300
50 FB	720

Nominal diameter [mm]	On-value for liquid [kg/h]
80	720
100	1200
150	2.6 t/h
200	1.15 t/h
250	4.6 t/h
350	13 t/h

Nominal diameter [mm]	On-value for gas [kg/h]
1	0.02
2	0.1
4	0.45
8	2
15	6.5
15 FB	18
25	18
25 FB	45
40	45
40 FB	75
50	75
50 FB	180
80	180
100	300
150	650
200	1.0 t/h
250	1.8 t/h
350	3.25 t/h

## 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 <sup>3</sup>
Corrected volume flow	Sft <sup>3</sup> /min
Density	lb/ft <sup>3</sup>

Process variable	Unit
Reference density	lb/Sft <sup>3</sup>
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]
1/24	0.15
1/12	0.75
1/8	3.3
3/8	15
1/2	50
1/2 FB	130
1	130
1 FB	330
1 1/2	330
1 1/2 FB	550
2	550
2 FB	1300
3	1300
4	2200
6	4800
8	8500
10	13000
14	23500

#### 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]
1/24	0.002
1/12	0.02
1/8	0.02
3/8	0.2
1/2	0.2

Nominal diameter [in]	[lb/p]
½ FB	2
1	2
1 FB	2
1½	2
1½ FB	20
2	20
2 FB	20
3	20
4	20
6	200
8	200
10	200
14	200

#### 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]
1/24	0.003
1/12	0.015
1/8	0.066
3/8	0.3
½	1
½ FB	2.6
1	2.6
1 FB	6.6
1½	6.6
1½ FB	11
2	11
2 FB	26
3	26
4	44
6	95
8	165
10	260
14	470

Nominal diameter [in]	On-value for gas [lb/min]
1/24	0.001
1/12	0.004

Nominal diameter [in]	On-value for gas [lb/min]
$\frac{1}{8}$	0.016
$\frac{3}{8}$	0.075
$\frac{1}{2}$	0.25
$\frac{1}{2}$ FB	0.65
1	0.65
1 FB	1.65
$1\frac{1}{2}$	1.65
$1\frac{1}{2}$ FB	2.75
2	2.75
2 FB	6.5
3	6.5
4	11
6	23.75
8	36.74
10	65
14	117.5

## 5 Explanation of abbreviated units

### 5.1 SI units

Process variable	Units	Explanation
Density	g/cm <sup>3</sup> , g/m <sup>3</sup>	Gram/volume unit
	kg/dm <sup>3</sup> , kg/l, kg/m <sup>3</sup>	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 <sup>3</sup> , kg/Nl, g/Scm <sup>3</sup> , kg/Sm <sup>3</sup>	Kilogram, gram/standard volume unit
Corrected volume	Nl, Nm <sup>3</sup> , Sm <sup>3</sup>	Normal liter, normal cubic meter, standard cubic meter
Corrected volume flow	Nl/s, Nl/min, Nl/h, Nl/d	Normal liter/time unit
	Nm <sup>3</sup> /s, Nm <sup>3</sup> /min, Nm <sup>3</sup> /h, Nm <sup>3</sup> /d	Normal cubic meter/time unit
	Sm <sup>3</sup> /s, Sm <sup>3</sup> /min, Sm <sup>3</sup> /h, Sm <sup>3</sup> /d	Standard cubic meter/time unit
Temperature	°C, K	Celsius, Kelvin
Volume	cm <sup>3</sup> , dm <sup>3</sup> , m <sup>3</sup>	Cubic centimeter, cubic decimeter, cubic meter
	ml, l, hl, Ml Mega	Milliliter, liter, hectoliter, megaliter
Volume flow	cm <sup>3</sup> /s, cm <sup>3</sup> /min, cm <sup>3</sup> /h, cm <sup>3</sup> /d	Cubic centimeter/time unit
	dm <sup>3</sup> /s, dm <sup>3</sup> /min, dm <sup>3</sup> /h, dm <sup>3</sup> /d	Cubic decimeter/time unit
	m <sup>3</sup> /s, m <sup>3</sup> /min, m <sup>3</sup> /h, m <sup>3</sup> /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 <sup>3</sup> , 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 <sup>3</sup>	Weight unit/standard volume unit
Corrected volume	Sft <sup>3</sup> , Sgal (us), Sbbl (us;liq.)	Standard cubic foot, standard gallon, standard barrel
Corrected volume flow	Sft <sup>3</sup> /s, Sft <sup>3</sup> /min, Sft <sup>3</sup> /h, Sft <sup>3</sup> /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 <sup>3</sup>	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 <sup>3</sup> /s, ft <sup>3</sup> /min, ft <sup>3</sup> /h, ft <sup>3</sup> /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)

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