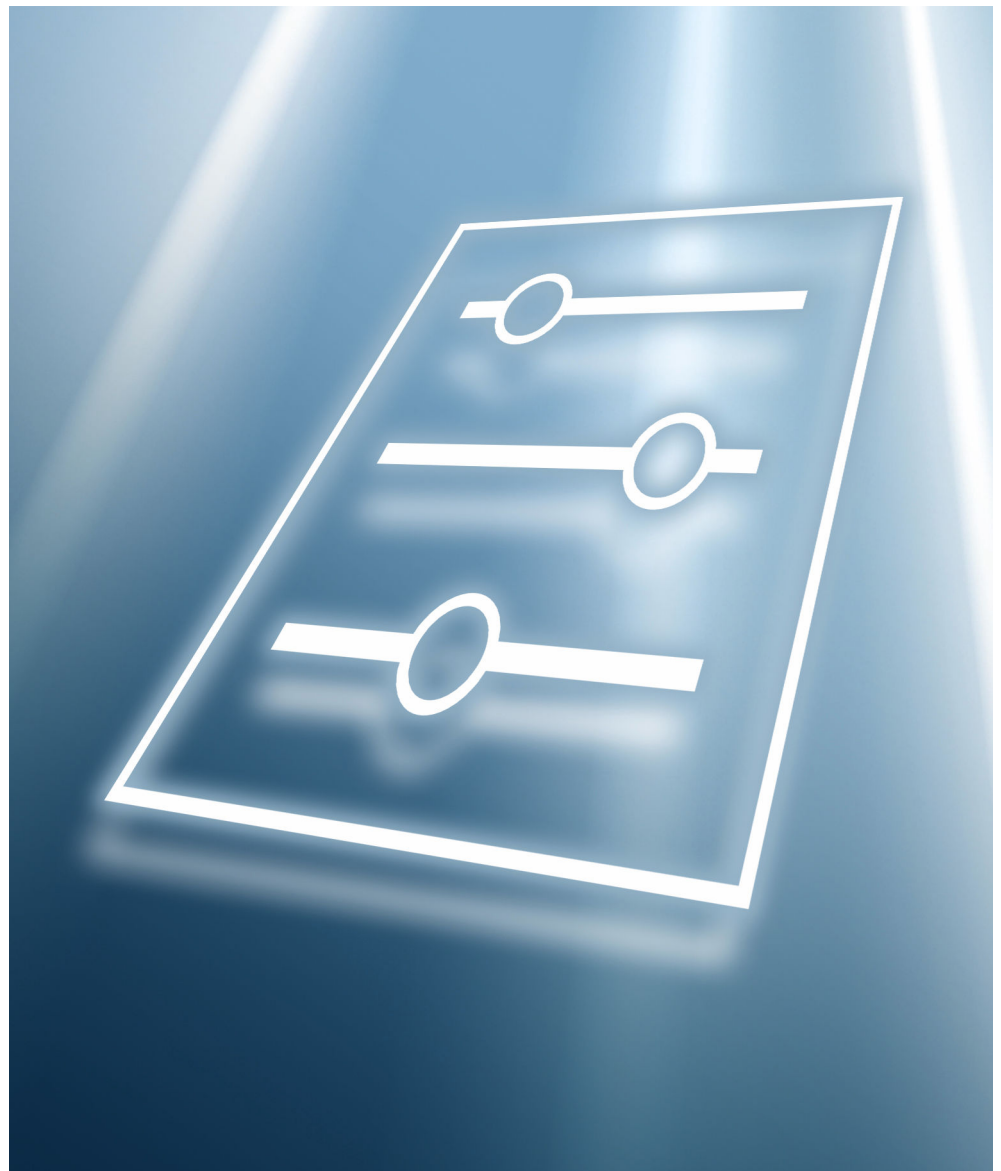


# Description of Device Parameters

## Proline Promass 10

Coriolis flowmeter  
IO-Link





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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 operating menus.

It is used to perform tasks that require detailed knowledge of the function of the device:

- Optimal adaptation of the measurement to difficult conditions
- Detailed configuration of the communication interface
- Error diagnostics in difficult cases








## 1.2 Target group

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

## 1.3 Using this document





### 1.3.1 Symbols

#### Types of information

-  Preferred procedures, processes or actions
-  Permitted procedures, processes or actions
-  Forbidden procedures, processes or actions
-  Additional information
-  Reference to documentation
-  Reference to page
-  Reference to graphic

### 1.3.2 Information on the document structure

The parameters of all the operating menus and the commissioning wizard are described in this document.

- **Guidance** menu with the **Commissioning** wizard (→  7), which guides the user automatically through all the device parameters that are required for commissioning
- **Application** menu (→  49)
- **Diagnostics** menu (→  26)
- **System** menu (→  82)

### 1.3.3 Operation concept

Operation method	Operation via: <ul style="list-style-type: none"> <li>SmartBlue app <sup>1)</sup></li> <li>Commubox FXA291</li> </ul>
Reliable operation	<ul style="list-style-type: none"> <li>Operation in local language</li> <li>Standardized operating concept on the device and in the SmartBlue app</li> <li>Write protection</li> <li>When electronics modules are replaced: configurations are transferred using the T-DAT Backup device memory. The device memory contains process data, device data and the event logbook. No reconfiguration is necessary.</li> </ul>
Diagnostic behavior	Efficient diagnostic behavior increases measurement availability: <ul style="list-style-type: none"> <li>Open troubleshooting measures via local display and SmartBlue app.</li> <li>Diverse simulation options</li> <li>Logbook of events that have occurred.</li> </ul>

1) Optional via order code "Display; operation", options H, J or K

#### IO-Link



The device-specific parameters are configured via IO-Link. There are specific configuration or operating programs from different manufacturers available to the user for this purpose. The device description file (IODD) is provided for the device

#### IO-Link operating concept

Operator-oriented menu structure for user-specific tasks. Efficient diagnostic behavior increases measurement availability:

- Diagnostic messages
- Remedial measures
- Simulation options

#### IODD download

Two options for downloading the IODD:

- [www.endress.com/download](http://www.endress.com/download)
- <https://ioddfinder.io-link.com/>

#### [www.endress.com/download](http://www.endress.com/download)

- Select "Device drivers".
- Under "Type", select the "IO Device Description (IODD)" item.
- Select "Product root".
- Click "Search ".
  - A list of search results is displayed.

Select and download the appropriate version.

#### <https://ioddfinder.io-link.com/>

- Enter and select "Endress" as the manufacturer.
- Select product name.
  - A list of search results is displayed.




Select and download the appropriate version.



For detailed IO-Link information, see "IO-Link" Special Documentation on the device  
→ 6

### 1.3.4 Structure of a parameter description

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

<b>Complete parameter name</b>	Write-protected parameter = 
<b>Navigation</b>	 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>	Input range for the parameter
<b>User interface</b>	Display value/data for the parameter
<b>Additional information</b>	Additional explanations (e.g. in examples): <ul style="list-style-type: none"> <li>■ On individual options</li> <li>■ On display values/data</li> <li>■ On the input range</li> <li>■ On the parameter function</li> </ul>

## 1.4 Related documentation

Technical information	Overview of the device with the most important technical data.
Operating instructions	All the information that is required in the various phases of the life cycle of the device: from product identification, incoming acceptance and storage, to mounting, connection, operation and commissioning through to troubleshooting, maintenance and disposal as well as the technical data and dimensions.
Sensor Brief Operating Instructions	Incoming acceptance, transport, storage and mounting of the device.
Transmitter Brief Operating Instructions	Electrical connection and commissioning of the device.
Description of Parameters	Detailed explanation of the menus and parameters.
Safety Instructions	Documents for the use of the device in hazardous areas.
Special Documentation	Documents with more detailed information on specific topics.
Installation Instructions	Installation of spare parts and accessories.

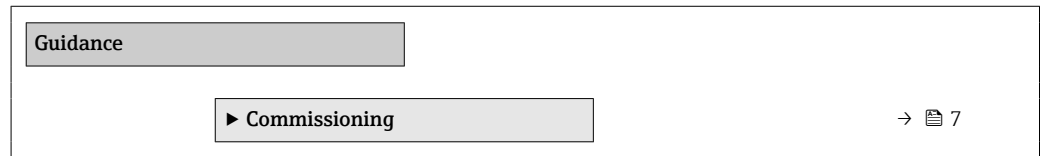
The related documentation is available online:

Device Viewer	On the <a href="http://www.endress.com/deviceviewer">www.endress.com/deviceviewer</a> website, enter the serial number of the device: nameplate
Endress+Hauser Operations App	<ul style="list-style-type: none"> <li>▶ Scan the Data Matrix code: nameplate</li> <li>▶ Enter the serial number of the device: nameplate</li> </ul>

## 2 "Guidance" menu

Main functions for use – from fast and safe commissioning to guided support during operation.

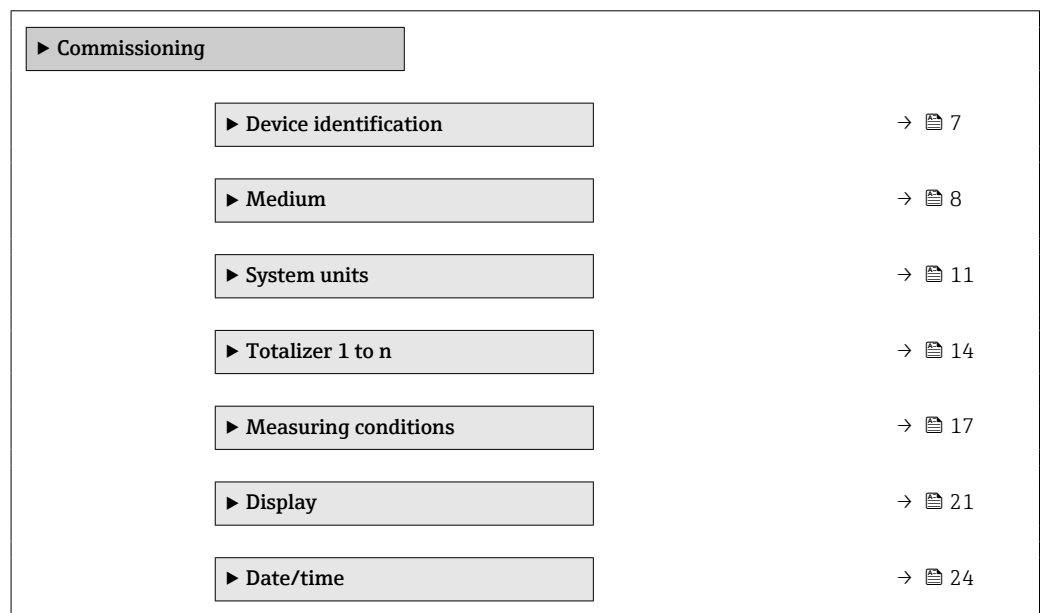
Navigation  Guidance



### 2.1 "Commissioning" menu

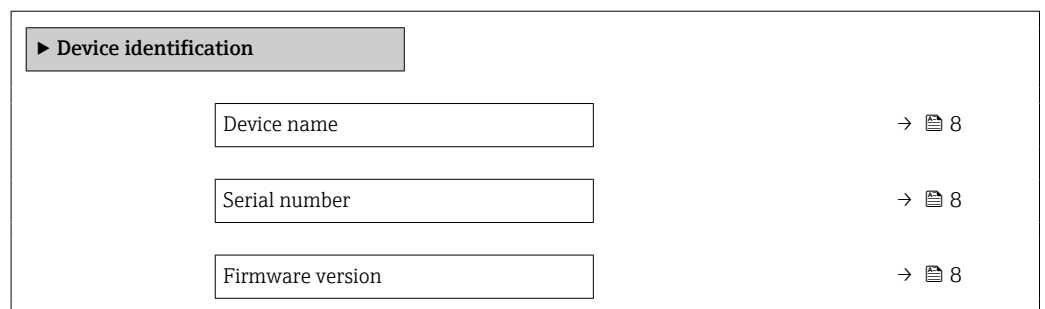
Complete this wizard to commission the device. NOTE: If you exit the wizard beforehand, the changes you made will be saved. For this reason, the device may be in an undefined state! In this case, reset the device to the default settings.

Navigation  Guidance → Commissioning




#### 2.1.1 "Device identification" wizard


Navigation  Guidance → Commissioning → Device ident.




**Device name**

<b>Navigation</b>	 Guidance → Commissioning → Device ident. → Device name
<b>Description</b>	Displays the name of the transmitter. The transmitter name is also provided on the nameplate of the transmitter.
<b>User interface</b>	Character string comprising numbers, letters and special characters

**Serial number**

<b>Navigation</b>	 Guidance → Commissioning → Device ident. → Serial number
<b>Description</b>	Displays the serial number of the measuring device. The serial number is also provided on the nameplate of the sensor and of the transmitter.  The serial number can also be used to retrieve further device-related information and documentation via the Operations app or the Device Viewer on the Endress+Hauser website.
<b>User interface</b>	Character string comprising numbers, letters and special characters





**Firmware version**

<b>Navigation</b>	 Guidance → Commissioning → Device ident. → Firmware version
<b>Description</b>	Displays the device firmware version installed.
<b>User interface</b>	Character string comprising numbers, letters and special characters

### 2.1.2 "Medium" wizard

*Navigation*   Guidance → Commissioning → Medium

▶ Medium

Select medium type	→  9
Select gas type	→  9
Reference sound velocity	→  10
Temperature coefficient sound velocity	→  10



Pressure compensation	→ 10
Pressure value	→ 10

---

### Select medium type

**Navigation**

Guidance → Commissioning → Medium → SelectMediumType

**Description**

Select the medium type.

**Selection**

- Liquid
- Gas

---

### Select gas type

**Navigation**

Guidance → Commissioning → Medium → Select gas type

**Prerequisite**

In the **Select medium** parameter in the **Medium settings** submenu, the **Gas** option is selected.


**Description**

Select the type of gas. For gas applications, the gas type must be specified to achieve accurate measurements.


**Selection**

- Air
- Ammonia NH<sub>3</sub>
- Argon Ar
- Sulfur hexafluoride SF<sub>6</sub>
- Oxygen O<sub>2</sub>
- Ozone O<sub>3</sub>
- Nitrogen oxide NO<sub>x</sub>
- Nitrogen N<sub>2</sub>
- Nitrous oxide N<sub>2</sub>O
- Methane CH<sub>4</sub>
- Methane CH<sub>4</sub> + 10% Hydrogen H<sub>2</sub>
- 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


---

**Reference sound velocity**




---

<b>Navigation</b>	 Guidance → Commissioning → Medium → Ref. sound veloc
<b>Prerequisite</b>	In the <b>Select gas type</b> parameter in the <b>Medium settings</b> submenu, the <b>Other</b> option is selected.
<b>Description</b>	Enter the sound velocity of the gas at 0 °C (32 °F).
<b>User entry</b>	1 to 99 999.9999 m/s


---

**Temperature coefficient sound velocity**




---

<b>Navigation</b>	 Guidance → Commissioning → Medium → Temp. coeff. SV
<b>Prerequisite</b>	In the <b>Select gas type</b> parameter in the <b>Medium settings</b> submenu, the <b>Other</b> option is selected.
<b>Description</b>	Enter the temperature coefficient for the gas sound velocity.
<b>User entry</b>	Positive floating-point number

---

**Pressure compensation**



---


<b>Navigation</b>	 Guidance → Commissioning → Medium → Pressure compen.
<b>Description</b>	Select the pressure compensation type.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Off</li> <li>■ Fixed value</li> </ul>

---


**Pressure value**









---

<b>Navigation</b>	 Guidance → Commissioning → Medium → Pressure value
<b>Prerequisite</b>	In the <b>Pressure compensation</b> parameter in the <b>External compensation</b> submenu, the <b>Fixed value</b> option is selected.
<b>Description</b>	Enter a fixed value for the pressure compensation. The unit is set in the "System units" menu.
<b>User entry</b>	Positive floating-point number

### 2.1.3 "System units" wizard


Navigation  Guidance → Commissioning → System units

▶ System units

Mass flow unit	→  11
Volume flow unit	→  12
Corrected volume flow unit	→  13
Density unit	→  13
Temperature unit	→  14
Pressure unit	→  14

#### Mass flow unit

**Navigation**

 Guidance → Commissioning → System units → Mass flow unit

**Description**

Select the mass flow unit.

**Selection**

- | <i>SI units</i> | <i>US units</i> |
|-----------------|-----------------|
| ▪ g/s           | ▪ oz/s          |
| ▪ g/min         | ▪ oz/min        |
| ▪ g/h           | ▪ oz/h          |
| ▪ g/d           | ▪ oz/d          |
| ▪ kg/s          | ▪ lb/s          |
| ▪ kg/min        | ▪ lb/min        |
| ▪ kg/h          | ▪ lb/h          |
| ▪ kg/d          | ▪ lb/d          |
| ▪ t/s           | ▪ STon/s        |
| ▪ t/min         | ▪ STon/min      |
| ▪ t/h           | ▪ STon/h        |
| ▪ t/d           | ▪ STon/d        |

**Additional information**

The system units do not affect cyclic IO-Link communication (Coriolis: Mass flow, Tot1, Density, Temp.; MID: Vol. flow, Tot1, Temp, Conductivity).

 The IO-Link interface only offers the **kg/s** option.

## Volume flow unit



## Navigation

Guidance → Commissioning → System units → Volume flow unit

## Description

Select the volume flow unit.

## 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
- 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;liq.)
- bbl/min (us;liq.)
- bbl/h (us;liq.)
- bbl/d (us;liq.)
- bbl/s (us;beer)
- bbl/min (us;beer)
- bbl/h (us;beer)
- bbl/d (us;beer)
- bbl/s (us;oil)
- bbl/min (us;oil)
- bbl/h (us;oil)
- bbl/d (us;oil)
- bbl/s (us;tank)
- bbl/min (us;tank)
- bbl/h (us;tank)
- bbl/d (us;tank)
- 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;beer)
- bbl/min (imp;beer)
- bbl/h (imp;beer)
- bbl/d (imp;beer)
- bbl/s (imp;oil)
- bbl/min (imp;oil)
- bbl/h (imp;oil)
- bbl/d (imp;oil)

## Additional information


*Options*

For an explanation of the abbreviated units: → 101




The IO-Link interface only offers the **m<sup>3</sup>/h** option.

Corrected volume flow unit 


**Navigation**  Guidance → Commissioning → System units → Cor.volflow unit

**Description** Select the corrected volume flow unit.

Selection	<i>SI units</i>	<i>US units</i>	<i>Imperial units</i>
	■ $\text{Nl/s}$	■ $\text{Sft}^3/\text{s}$	■ $\text{Sgal/s (imp)}$
	■ $\text{Nl/min}$	■ $\text{Sft}^3/\text{min}$	■ $\text{Sgal/min (imp)}$
	■ $\text{Nl/h}$	■ $\text{Sft}^3/\text{h}$	■ $\text{Sgal/h (imp)}$
	■ $\text{Nl/d}$	■ $\text{Sft}^3/\text{d}$	■ $\text{Sgal/d (imp)}$
	■ $\text{Nhl/s}$	■ $\text{MMSft}^3/\text{s}$	
	■ $\text{Nhl/min}$	■ $\text{MMSft}^3/\text{min}$	
	■ $\text{Nhl/h}$	■ $\text{MMSft}^3/\text{h}$	
	■ $\text{Nhl/d}$	■ $\text{MMSft}^3/\text{d}$	
	■ $\text{Nm}^3/\text{s}$	■ $\text{Sgal/s (us)}$	
	■ $\text{Nm}^3/\text{min}$	■ $\text{Sgal/min (us)}$	
	■ $\text{Nm}^3/\text{h}$	■ $\text{Sgal/h (us)}$	
	■ $\text{Nm}^3/\text{d}$	■ $\text{Sgal/d (us)}$	
	■ $\text{Sl/s}$	■ $\text{Sbbl/s (us;liq.)}$	
	■ $\text{Sl/min}$	■ $\text{Sbbl/min (us;liq.)}$	
	■ $\text{Sl/h}$	■ $\text{Sbbl/h (us;liq.)}$	
	■ $\text{Sl/d}$	■ $\text{Sbbl/d (us;liq.)}$	
	■ $\text{Sm}^3/\text{s}$	■ $\text{Sbbl/s (us;oil)}$	
	■ $\text{Sm}^3/\text{min}$	■ $\text{Sbbl/min (us;oil)}$	
	■ $\text{Sm}^3/\text{h}$	■ $\text{Sbbl/h (us;oil)}$	
	■ $\text{Sm}^3/\text{d}$	■ $\text{Sbbl/d (us;oil)}$	


**Additional information**  The IO-Link interface only offers the  **$\text{Nm}^3/\text{h}$**  option.


Density unit 


**Navigation**  Guidance → Commissioning → System units → Density unit



**Description** Select the density unit.


Selection	<i>SI units</i>	<i>US units</i>	<i>Imperial units</i>
	■ $\text{g/cm}^3$	■ $\text{lb/ft}^3$	■ $\text{lb/gal (imp)}$
	■ $\text{g/m}^3$	■ $\text{lb/gal (us)}$	■ $\text{lb/bbl (imp;beer)}$
	■ $\text{g/ml}$	■ $\text{lb/bbl (us;liq.)}$	■ $\text{lb/bbl (imp;oil)}$
	■ $\text{kg/l}$	■ $\text{lb/bbl (us;beer)}$	
	■ $\text{kg/dm}^3$	■ $\text{lb/bbl (us;oil)}$	
	■ $\text{kg/m}^3$	■ $\text{lb/bbl (us;tank)}$	



**Additional information** *Options*  
 For an explanation of the abbreviated units: →  101

 The IO-Link interface only offers the  **$\text{kg/m}^3$**  option.



Temperature unit 





<b>Navigation</b>	 Guidance → Commissioning → System units → Temperature unit						
<b>Description</b>	Select the temperature unit.						
<b>Selection</b>	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"><i>SI units</i></td> <td style="width: 50%; vertical-align: top;"><i>US units</i></td> </tr> <tr> <td>▪ °C</td> <td>▪ °F</td> </tr> <tr> <td>▪ K</td> <td>▪ °R</td> </tr> </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>Additional information</b>	 The IO-Link interface only offers the °C option.						

Pressure unit 

<b>Navigation</b>	 Guidance → Commissioning → System units → Pressure unit																		
<b>Description</b>	Select the pressure unit.																		
<b>Selection</b>	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"><i>SI units</i></td> <td style="width: 50%; vertical-align: top;"><i>US units</i></td> </tr> <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> </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	
<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																			
<b>Additional information</b>	 The IO-Link interface only offers the <b>bar</b> option.																		

### 2.1.4 Totalizer 1 to n

*Navigation*   Guidance → Commissioning → Totalizer 1 to n

<b>▶ Totalizer 1 to n</b>	
Assign process variable 1 to n	→  15
Process variable unit 1 to n	→  15
Totalizer 1 to n operation mode	→  16
Totalizer 1 to n failure behavior	→  17

**Assign process variable**



**Navigation** Guidance → Commissioning → Totalizer 1 to n → AssignVariab. 1 to n

**Description** Select a process variable to activate the totalizer.  
If the process variable is changed or the totalizer deactivated, the totalizer is reset to "0".

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

**Additional information** Totalizer 1 is permanently set to **Mass flow** option and cannot be changed. Totalizers 2 and 3 can be changed.

**Process variable unit**



**Navigation** Guidance → Commissioning → Totalizer 1 to n → VariableUnit 1 to n

**Prerequisite** A process variable has been selected in the **Assign process variable** parameter in the **Totalizer 1 to n** submenu.

**Description** Select the unit for the process variable of the totalizer.

- Selection**
- |                                                                                                                                             |                                                                                                                                                 |
|---------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><i>SI units</i></p> <ul style="list-style-type: none"> <li>■ g<sup>*</sup></li> <li>■ kg<sup>*</sup></li> <li>■ t<sup>*</sup></li> </ul> | <p><i>US units</i></p> <ul style="list-style-type: none"> <li>■ oz<sup>*</sup></li> <li>■ lb<sup>*</sup></li> <li>■ STon<sup>*</sup></li> </ul> |
|---------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|

\* Visibility depends on order options or device settings

or

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

\* Visibility depends on order options or device settings

or

*SI units*

- NI<sup>\*</sup>
- Nhl<sup>\*</sup>
- Nm<sup>3</sup><sup>\*</sup>
- Sl<sup>\*</sup>
- Sm<sup>3</sup><sup>\*</sup>

*US units*

- Sft<sup>3</sup><sup>\*</sup>
- MMSft<sup>3</sup><sup>\*</sup>
- Sgal (us)<sup>\*</sup>
- Sbbbl (us;liq.)<sup>\*</sup>
- Sbbbl (us;oil)<sup>\*</sup>

*Imperial units*

- Sgal (imp)<sup>\*</sup>

\* Visibility depends on order options or device settings

or


*Other units*

- None<sup>\*</sup>

\* Visibility depends on order options or device settings

**Additional information**

*Description*

The unit is selected separately for each totalizer. The unit is independent of the option selected in the **System units** submenu (→  11).

*Options*

The selection is dependent on the process variable selected in the **Assign process variable** parameter (→  15).


- The IO-Link interface only offers the **kg** option, **m<sup>3</sup>** option and **Nm<sup>3</sup>** option.
- Totalizer 1 is permanently set to **Mass flow** option and cannot be changed. Totalizers 2 and 3 can be changed.

---

**Totalizer operation mode**



**Navigation**

 Guidance → Commissioning → Totalizer 1 to n → Operat. mode 1 to n

**Prerequisite**

A process variable has been selected in the **Assign process variable** parameter in the **Totalizer 1 to n** submenu.

**Description**

Select the totalizer operation mode, e.g. only totalize forward flow or only totalize reverse flow.

**Selection**

- Net
- Forward
- Reverse

**Additional information**

*Selection*

- **Net** option  
The flow values in the forward and reverse flow directions are totalized and netted against each other. Net flow is recorded in the flow direction.
- **Forward** option  
Only the flow in the forward flow direction is totalized.
- **Reverse** option  
Only the flow in the reverse flow direction is totalized (= reverse flow quantity).



---

**Totalizer failure behavior**


<b>Navigation</b>	Guidance → Commissioning → Totalizer 1 to n → FailureBehav. 1 to n
<b>Prerequisite</b>	A process variable has been selected in the <b>Assign process variable</b> parameter in the <b>Totalizer 1 to n</b> submenu.
<b>Description</b>	Specify how the totalizer should behave in the event of a device alarm.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Hold</li> <li>■ Continue</li> <li>■ Last valid value + continue</li> </ul>
<b>Additional information</b>	<p><i>Selection</i></p> <ul style="list-style-type: none"> <li>■ <b>Hold</b> option The totalizer is stopped in the event of a device alarm.</li> <li>■ <b>Continue</b> option The totalizer continues to totalize based on the current value measured; the device alarm is ignored.</li> <li>■ <b>Last valid value + continue</b> option The totalizer continues to totalize based on the last valid value measured before the device alarm occurred.</li> </ul>

### 2.1.5 "Process conditions" wizard

*Navigation* Guidance → Commissioning → Process condit.

▶ Measuring conditions	
Flow damping	→  18
Low flow cutoff	→  18
On value low flow cutoff	→  18
Off value low flow cutoff	→  19
Pressure shock suppression	→  19
Partially filled pipe detection	→  20
Low value partial filled pipe detection	→  20
High value partial filled pipe detection	→  21

**Flow damping**



**Navigation**

Guidance → Commissioning → Meas. conditions → Flow damping

**Description**

Enter a time constant for flow damping.  
 Value = 0: No damping  
 Value > 0: Damping increases  
 Damping is implemented by means of a proportional transmission behavior with first order delay (PT1 element).

**User entry**

0 to 99.9 s

**Low flow cutoff**



**Navigation**

Guidance → Commissioning → Meas. conditions → Low flow cutoff

**Description**

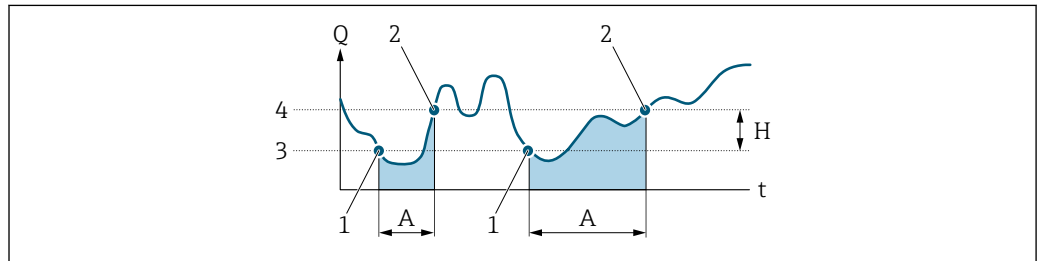
Select a process variable for low flow cutoff to activate low flow cutoff.

**Selection**

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

**Additional information**

Description



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

**On value low flow cutoff**



**Navigation**

Guidance → Commissioning → Meas. conditions → On value

**Description**


Enter on value to switch on low flow cutoff.  
 Value = 0: No low flow cutoff  
 Value > 0: Low flow cutoff is activated

**User entry** Positive floating-point number

---

### Off value low flow cutoff

---

**Navigation**  Guidance → Commissioning → Meas. conditions → Off value

**Description** Enter off value to switch off low flow cutoff. The off value is entered as a positive hysteresis with respect to the on value.

**User entry** 0 to 100.0 %

---

### Pressure shock suppression

---

**Navigation**  Guidance → Commissioning → Meas. conditions → Pres. shock sup.

**Description** Enter a time span for signal suppression (= pressure shock suppression active), for example to prevent the device from registering flow movements in the pipe when a valve is closed.

Pressure shock suppression is activated when the flow rate drops below the on value for low flow cutoff.

Values reported when pressure shock suppression is active:

Flow: 0

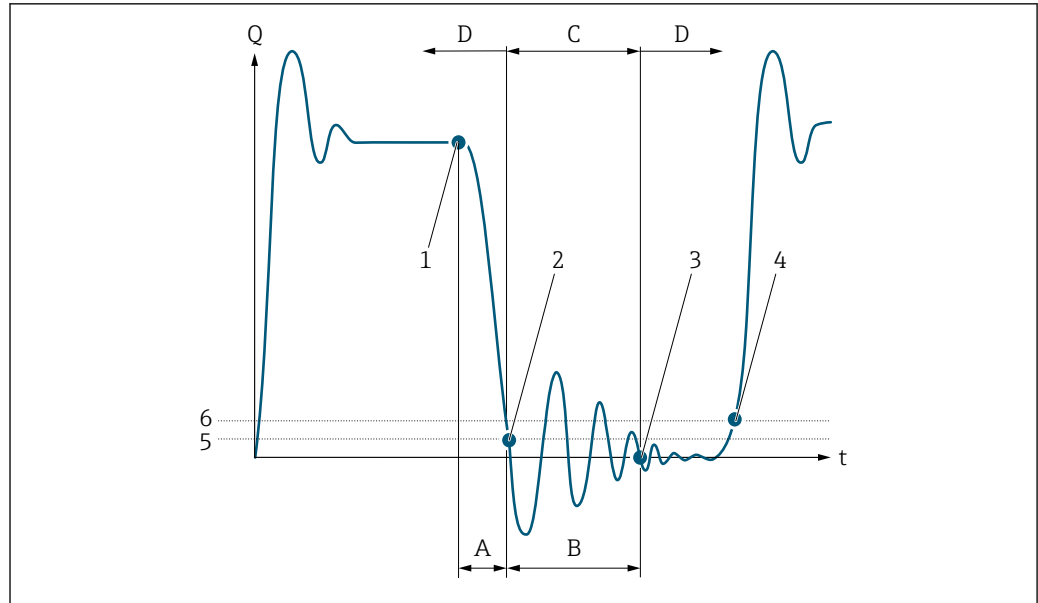
Totalizer: Last valid value

Pressure shock suppression is deactivated when the time span specified has elapsed and the flow rate exceeds the off value for low flow cutoff.

**User entry** 0 to 100 s

**Additional information** *Example*

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



A0012888

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

**Partially filled pipe detection**



**Navigation**

Guidance → Commissioning → Meas. conditions → Partial pipe det

**Description**

Switch empty pipe detection on or off. Switch on empty pipe detection to detect a partially filled or empty measuring tube.

**Selection**

- Off
- Density
- Calculated reference density

**Low value partial filled pipe detection**



**Navigation**

Guidance → Commissioning → Meas. conditions → Low value

**Prerequisite**

A process variable has been selected in the **Assign process variable** parameter in the **Empty pipe detection** submenu.

<b>Description</b>	<p>Enter the lower limit value for the selected process variable. If the measured value drops below the limit value, diagnostic message "862 Partly filled pipe" is generated.</p> <p>Additional information:</p> <ul style="list-style-type: none"> <li>- This setting applies only if the "Density unit" parameter is not set to °API.</li> <li>- The lower limit value must be lower than the upper limit value ("High value partial filled pipe detection" parameter).</li> </ul>
<b>User entry</b>	Signed floating-point number

---

**High value partial filled pipe detection**



<b>Navigation</b>	Guidance → Commissioning → Meas. conditions → High value
<b>Prerequisite</b>	A process variable has been selected in the <b>Assign process variable</b> parameter in the <b>Empty pipe detection</b> submenu.
<b>Description</b>	<p>Enter the upper limit value for the selected process variable. If the measured value exceeds the limit value, diagnostic message "862 Partly filled pipe" is generated.</p> <p>Additional information:</p> <p>This setting applies only if the "Density unit" parameter is set to °API.</p>
<b>User entry</b>	Signed floating-point number

### 2.1.6 Display

*Navigation*      Guidance → Commissioning → Display


▶ **Display**

Value 1 display	→  22
Value 2 display	→  22
Value 3 display	→  22
Value 4 display	→  23
Display damping	→  23

---

**Value 1 display**

---

**Navigation** Guidance → Commissioning → Display → Value 1 display**Description**

Select the measured value that is displayed first on the local display.

Additional information:

The applicable unit of measure is specified in the "System units" submenu.


**Selection**

- Mass flow
- Volume flow
- Corrected volume flow
- Temperature
- Density<sup>\*</sup>
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Inhomogeneous medium index
- Electronics temperature

---

**Value 2 display**

---

**Navigation** Guidance → Commissioning → Display → Value 2 display**Description**

Select the measured value to display in the second position on the local display.

The unit is set in the "System units" menu.

**Selection**

- None
- Mass flow
- Volume flow
- Corrected volume flow
- Temperature
- Density<sup>\*</sup>
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Inhomogeneous medium index
- Electronics temperature

---

**Value 3 display**

---

**Navigation** Guidance → Commissioning → Display → Value 3 display**Description**

Select the measured value to display in the third position on the local display.

The unit is set in the "System units" menu.

---


\* Visibility depends on order options or device settings

- Selection**
- None
  - Mass flow
  - Volume flow
  - Corrected volume flow
  - Temperature
  - Density \*
  - Totalizer 1
  - Totalizer 2
  - Totalizer 3
  - Inhomogeneous medium index
  - Electronics temperature

---

### Value 4 display

---

**Navigation**  Guidance → Commissioning → Display → Value 4 display


**Description** Select the measured value to display in the fourth position on the local display.  
The unit is set in the "System units" menu.

- Selection**
- None
  - Mass flow
  - Volume flow
  - Corrected volume flow
  - Temperature
  - Density \*
  - Totalizer 1
  - Totalizer 2
  - Totalizer 3
  - Inhomogeneous medium index
  - Electronics temperature

---

### Display damping

---

**Navigation**  Guidance → Commissioning → Display → Display damping


**Description** Enter a time constant to set the reaction time of the display to fluctuations in the measured value (PT1 element).  
The smaller the time constant, the faster the display reacts to fluctuations in the measured value.  
If the time constant is set to 0, damping is deactivated.

**User entry** 0.0 to 999.9 s




---

\* Visibility depends on order options or device settings

## 2.1.7 Date/time


Navigation  Guidance → Commissioning → Date/time

▶ **Date/time**

Time format	→  24
Time zone	→  24
Set date/time	→  25

---

### Time format


**Navigation**  Guidance → Commissioning → Date/time → Time format

**Description** Select the time format.

- Selection**
- 24 h
  - 12 h AM/PM

---

### Time zone

**Navigation**  Guidance → Commissioning → Date/time → Time zone

**Description** Select the time zone. Every time the time zone is changed, a logbook entry is created.



**Selection***Other units*

- UTC-12:00
- UTC-11:00
- UTC-10:00
- UTC-09:30
- UTC-09:00
- UTC-08:00
- UTC-07:00
- UTC-06:00
- UTC-05:00
- UTC-04:00
- UTC-03:30
- UTC-03:00
- UTC-02:00
- UTC-01:00
- UTC 00:00
- UTC+01:00
- UTC+02:00
- UTC+03:00
- UTC+03:30
- UTC+04:00
- UTC+04:30
- UTC+05:00
- UTC+05:30
- UTC+05:45
- UTC+06:00
- UTC+06:30
- UTC+07:00
- UTC+08:00
- UTC+08:45
- UTC+09:00
- UTC+09:30
- UTC+10:00
- UTC+10:30
- UTC+11:00
- UTC+12:00
- UTC+12:45
- UTC+13:00
- UTC+14:00

---

**Set date/time****Navigation**

Guidance → Commissioning → Date/time → Set date/time

**Description**

Set the date and local time. Every time the date or time is changed, a logbook entry is created.







**User entry**

Date and time

### 3 "Diagnostics" menu









Troubleshooting and preventive maintenance – settings for device behavior during process and device events as well as assistance and measures for diagnostic purposes.

*Navigation*  Diagnostics

<b>Diagnostics</b>	
▶ Active diagnostics	→  27
▶ Diagnostic list	→  30
▶ Event logbook	→  34
▶ Simulation	→  35
▶ Heartbeat Technology	→  37
▶ Diagnostic settings	→  38


### 3.1 "Active diagnostics" submenu

Navigation   Diagnostics → Active diagnos.

<b>► Active diagnostics</b>	
Actual diagnostics	→  27
Active diagnostic IO-Link	→  27
Timestamp	→  28
Previous diagnostics	→  28
Last diagnostic IO-Link	→  28
Timestamp	→  28
Operating time from restart	→  28
Operating time	→  29


---

#### Actual diagnostics

<b>Navigation</b>	 Diagnostics → Active diagnos. → Actual diagnos.
<b>Prerequisite</b>	A diagnostic event has occurred.
<b>Description</b>	Displays the currently active diagnostic message. If there is more than one pending diagnostic event, the message for the diagnostic event with the highest priority is displayed.
<b>User interface</b>	Positive integer

---


#### Active diagnostic IO-Link

<b>Navigation</b>	 Diagnostics → Active diagnos. → ActDiag IO-Link
<b>Description</b>	Displays the IO-Link event code for the currently active diagnostic message. If there is more than one pending diagnostic event, the code for the diagnostic message with the highest priority is displayed.
<b>User interface</b>	0 to 65 535

---

**Timestamp**



---

<b>Navigation</b>	 Diagnostics → Active diagnos. → Timestamp
<b>Description</b>	Displays the timestamp for the currently active diagnostic message.
<b>User interface</b>	Days (d), hours (h), minutes (m), seconds (s)

---

**Previous diagnostics**



---

<b>Navigation</b>	 Diagnostics → Active diagnos. → Prev.diagnostics
<b>Prerequisite</b>	At least two diagnostic events have already occurred.
<b>Description</b>	Displays the diagnostic message for the last diagnostic event that has ended.
<b>User interface</b>	Positive integer

---

**Timestamp**



---

<b>Navigation</b>	 Diagnostics → Active diagnos. → Timestamp
<b>Description</b>	Displays the timestamp of the diagnostic message generated for the last diagnostic event that has ended.
<b>User interface</b>	Days (d), hours (h), minutes (m), seconds (s)

---

**Operating time from restart**



---

<b>Navigation</b>	 Diagnostics → Active diagnos. → Time fr. restart
<b>Description</b>	Indicates how long the device has been in operation since the last time the device was restarted.
<b>User interface</b>	Days (d), hours (h), minutes (m), seconds (s)

---

**Last diagnostic IO-Link**


---


<b>Navigation</b>	 Diagnostics → Active diagnos. → LastDiag IO-Link
<b>Description</b>	Displays the IO-Link event code for the last diagnostic event that has ended.

**User interface**                    0 to 65 535

---

**Operating time**

---

**Navigation**                        Diagnostics → Active diagnos. → Operating time

**Description**                    Indicates how long the device has been in operation.

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

### 3.2 "Diagnostic list" submenu

Navigation  Diagnostics → Diagnostic list

▶ Diagnostic list		
Diagnostics 1	→	 30
Diagnostic 1 IO-Link	→	 31
Timestamp	→	 31
Diagnostics 2	→	 31
Diagnostic 2 IO-Link	→	 31
Timestamp	→	 31
Diagnostics 3	→	 32
Diagnostic 3 IO-Link	→	 32
Timestamp	→	 32
Diagnostics 4	→	 32
Diagnostic 4 IO-Link	→	 33
Timestamp	→	 32
Diagnostics 5	→	 33
Diagnostic 5 IO-Link	→	 33
Timestamp	→	 33

#### Diagnostics 1

Navigation  Diagnostics → Diagnostic list → Diagnostics 1


Description Displays the currently active diagnostic message with the highest priority.

User interface Positive integer

---

**Diagnostic 1 IO-Link**



---

<b>Navigation</b>	 Diagnostics → Diagnostic list → Diag. 1 IO-Link
<b>Description</b>	Displays the IO-Link event code for the currently active diagnostic message with the highest priority.
<b>User interface</b>	0 to 65 535

---

**Timestamp**



---

<b>Navigation</b>	 Diagnostics → Diagnostic list → Timestamp
<b>Description</b>	Displays the timestamp for the diagnostic message with the highest priority.
<b>User interface</b>	Days (d), hours (h), minutes (m), seconds (s)

---

**Diagnostics 2**



---

<b>Navigation</b>	 Diagnostics → Diagnostic list → Diagnostics 2
<b>Description</b>	Displays the currently active diagnostic message with the second highest priority.
<b>User interface</b>	Positive integer

---

**Timestamp**



---

<b>Navigation</b>	 Diagnostics → Diagnostic list → Timestamp
<b>Description</b>	Displays the timestamp for the diagnostic message with the second highest priority.
<b>User interface</b>	Days (d), hours (h), minutes (m), seconds (s)

---

**Diagnostic 2 IO-Link**



---

<b>Navigation</b>	 Diagnostics → Diagnostic list → Diag. 2 IO-Link
<b>Description</b>	Displays the IO-Link event code for the currently active diagnostic message with the second highest priority.
<b>User interface</b>	0 to 65 535

---

**Diagnostics 3**


---

<b>Navigation</b>	 Diagnostics → Diagnostic list → Diagnostics 3
<b>Description</b>	Displays the currently active diagnostic message with the third highest priority.
<b>User interface</b>	Positive integer

---

**Timestamp**


---

<b>Navigation</b>	 Diagnostics → Diagnostic list → Timestamp
<b>Description</b>	Displays the timestamp for the diagnostic message with the third highest priority.
<b>User interface</b>	Days (d), hours (h), minutes (m), seconds (s)

---

**Diagnostic 3 IO-Link**


---

<b>Navigation</b>	 Diagnostics → Diagnostic list → Diag. 3 IO-Link
<b>Description</b>	Displays the IO-Link event code for the currently active diagnostic message with the third highest priority.
<b>User interface</b>	0 to 65 535

---

**Diagnostics 4**


---

<b>Navigation</b>	 Diagnostics → Diagnostic list → Diagnostics 4
<b>Description</b>	Displays the currently active diagnostic message with the fourth highest priority.
<b>User interface</b>	Positive integer

---

**Timestamp**

---


<b>Navigation</b>	 Diagnostics → Diagnostic list → Timestamp
<b>Description</b>	Displays the timestamp for the diagnostic message with the fourth highest priority.
<b>User interface</b>	Days (d), hours (h), minutes (m), seconds (s)



---

**Diagnostics 5**



---

<b>Navigation</b>	 Diagnostics → Diagnostic list → Diagnostics 5
<b>Description</b>	Displays the currently active diagnostic message with the fifth-highest priority.
<b>User interface</b>	Positive integer

---

**Timestamp**



---

<b>Navigation</b>	 Diagnostics → Diagnostic list → Timestamp
<b>Description</b>	Displays the timestamp for the diagnostic message with the fifth highest priority.
<b>User interface</b>	Days (d), hours (h), minutes (m), seconds (s)

---

**Diagnostic 4 IO-Link**



---

<b>Navigation</b>	 Diagnostics → Diagnostic list → Diag. 4 IO-Link
<b>Description</b>	Displays the IO-Link event code for the currently active diagnostic message with the fourth highest priority.
<b>User interface</b>	0 to 65 535

---

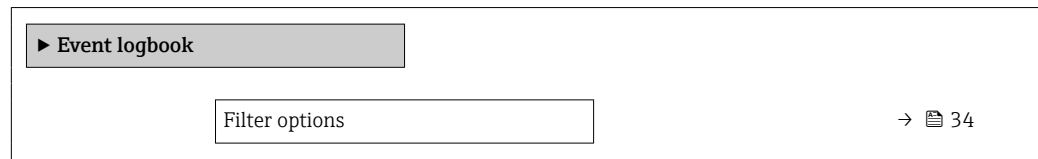
**Diagnostic 5 IO-Link**


---

<b>Navigation</b>	 Diagnostics → Diagnostic list → Diag. 5 IO-Link
<b>Description</b>	Displays the IO-Link event code for the currently active diagnostic message with the fifth highest priority.
<b>User interface</b>	0 to 65 535

### 3.3 "Event logbook" submenu

Navigation  Diagnostics → Event logbook



#### Filter options

#### Navigation

 Diagnostics → Event logbook → Filter options

#### Description

Select the category of event notification to display in the event list.

Additional information:

The status signals F, C, S and M are categorized in accordance with VDI/VDE 2650 and NAMUR Recommendation NE 107.

#### Selection

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

#### Clear event list

#### Navigation

 Diagnostics → Event logbook → Clear event list

#### Description

Deletes all entries from the events list. Once this function has been executed, the events list is empty and all the events are deleted.





#### Selection

- Cancel
- Clear data

### 3.4 "Simulation" submenu


Navigation  Diagnostics → Simulation

▶ Simulation

Assign simulation process variable	→  35
Process value	→  35
Device alarm simulation	→  36
Diagnostic event simulation	→  36

---

#### Assign simulation process variable

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

**Description** Select a process variable to activate the simulation.

- Selection**
- Off
  - Mass flow
  - Volume flow
  - Corrected volume flow
  - Density \*
  - Temperature

**Additional information** *Description*  
 The display alternates between the measured value and a diagnostics message of the "function check" category (C) when simulation is active.

---

#### Process value

**Navigation**  Diagnostics → Simulation → Process value

**Description** Enter the process value to simulate.  
 The unit is set in the "System units" menu.

**User entry** Signed floating-point number

---


\* Visibility depends on order options or device settings

---

**Device alarm simulation**

---

**Navigation**

 Diagnostics → Simulation → Dev. alarm sim.

**Description**

Switch the device alarm simulation on or off.

While simulation is in progress, a diagnostic message of the Function Check (C) category is displayed.

**Selection**


- Off
- On

---

**Diagnostic event simulation**

---

**Navigation**

 Diagnostics → Simulation → Diagnostic event


**Description**

Select the diagnostic event to simulate.

**Selection**

Off

### 3.5 "Heartbeat Technology" submenu

The **Heartbeat Technology** submenu (→  37) is only available with the optional "Heartbeat Verification + Monitoring" application package.

- Order code for: Application package
- Option: EB "Heartbeat Verification + Monitoring"



Detailed information and all descriptions of the device parameters of the application package are available in the "Heartbeat Verification + Monitoring" Special Documentation

*Navigation*





Diagnostics → Heartbeat Techn.


▶ Heartbeat Technology


### 3.6 "Diagnostic settings" submenu

Navigation  Diagnostics → Diag. settings


▶ Diagnostic settings		
▶ Properties		→  38
▶ Diagnostic configuration		→  38

#### 3.6.1 "Properties" submenu

Navigation  Diagnostics → Diag. settings → Properties

▶ Properties		
Alarm delay		→  38


#### Alarm delay




**Navigation**  Diagnostics → Diag. settings → Properties → Alarm delay

**Description** Enter a delay to suppress momentarily pending diagnostic messages.  
Only applies to diagnostic events that allow for a delay before the diagnostic message is generated.


**User entry** 0 to 60 s

#### 3.6.2 "Diagnostic configuration" submenu




Navigation  Diagnostics → Diag. settings → Diag. config.

▶ Diagnostic configuration		
▶ Sensor		→  39
▶ Electronics		→  40
▶ Process		→  43

**"Sensor" submenu**

*Navigation*  Diagnostics → Diag. settings → Diag. config. → Sensor


▶ **Sensor**

Assign behavior of diagnostic no. 046	→  39
Assign behavior of diagnostic no. 140	→  39
Assign behavior of diagnostic no. 144	→  40

---

**Assign behavior of diagnostic no. 046**



**Navigation**  Diagnostics → Diag. settings → Diag. config. → Sensor → Diagnostic no. 046

**Description** Select behavior for diagnostic event "046 Sensor limit exceeded".

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


**Additional information** *Selection*

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

---

**Assign behavior of diagnostic no. 140**



**Navigation**  Diagnostics → Diag. settings → Diag. config. → Sensor → Diagnostic no. 140

**Description** Select behavior for diagnostic event "140 Sensor signal asymmetrical".

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

**Additional information**

*Selection*

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

**Assign behavior of diagnostic no. 144**



**Navigation**

Diagnostics → Diag. settings → Diag. config. → Sensor → Diagnostic no. 144

**Description**

Select behavior for diagnostic event "144 Measurement error too high"

**Selection**

- Off
- Alarm
- Warning
- Logbook entry only

**Additional information**

*Selection*

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

**"Electronics" submenu**

*Navigation*

Diagnostics → Diag. settings → Diag. config. → Electronics

▶ **Electronics**

Assign behavior of diagnostic no. 230

→ 41

Assign behavior of diagnostic no. 231

→ 41



Assign behavior of diagnostic no. 302	→ 41
Assign behavior of diagnostic no. 374	→ 41

---

### Assign behavior of diagnostic no. 230



<b>Navigation</b>	Diagnostics → Diag. settings → Diag. config. → Electronics → Diagnostic no. 230
<b>Description</b>	Select behavior for diagnostic event "230 Date/time incorrect".
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Alarm</li> <li>▪ Warning</li> <li>▪ Logbook entry only</li> </ul>

---

### Assign behavior of diagnostic no. 231



<b>Navigation</b>	Diagnostics → Diag. settings → Diag. config. → Electronics → Diagnostic no. 231
<b>Description</b>	Select behavior for diagnostic event "231 Date/time not available".
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Alarm</li> <li>▪ Warning</li> <li>▪ Logbook entry only</li> </ul>

---

### Assign behavior of diagnostic no. 302



<b>Navigation</b>	Diagnostics → Diag. settings → Diag. config. → Electronics → Diagnostic no. 302
<b>Description</b>	Select behavior for diagnostic event "302 Device verification active".
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Off</li> <li>▪ Warning</li> <li>▪ Logbook entry only</li> </ul>

---

### Assign behavior of diagnostic no. 374




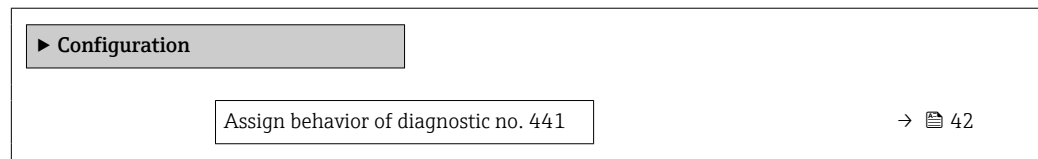
<b>Navigation</b>	Diagnostics → Diag. settings → Diag. config. → Electronics → Diagnostic no. 374
<b>Description</b>	Select behavior for diagnostic event "374 Sensor electronics (ISEM) faulty".

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

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

**"Configuration" submenu**


*Navigation*       Diagnostics → Diag. settings → Diag. config. → Configuration



---

**Assign behavior of diagnostic no. 441**



- Navigation**       Diagnostics → Diag. settings → Diag. config. → Configuration → Diagnostic no. 441
- Description**      Select behavior for diagnostic event "441 Current output faulty".
- Selection**
- Off
  - Alarm
  - Warning
  - Logbook entry only



**Additional information**

*Selection*











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

**"Process" submenu**

*Navigation*

  Diagnostics → Diag. settings → Diag. config. → Process


▶ Process

Assign behavior of diagnostic no. 832	→  43
Assign behavior of diagnostic no. 833	→  44
Assign behavior of diagnostic no. 834	→  44
Assign behavior of diagnostic no. 835	→  45
Assign behavior of diagnostic no. 842	→  45
Assign behavior of diagnostic no. 862	→  46
Assign behavior of diagnostic no. 912	→  46
Assign behavior of diagnostic no. 913	→  47
Assign behavior of diagnostic no. 944	→  47
Assign behavior of diagnostic no. 948	→  48

**Assign behavior of diagnostic no. 832**



**Navigation**

 Diagnostics → Diag. settings → Diag. config. → Process → Diagnostic no. 832

**Description**

Select behavior for diagnostic event "832 Sensor electronics temperature 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>Additional information</b>	<p><i>Selection</i></p> <ul style="list-style-type: none"> <li>■ <b>Off</b> option The diagnostic event is ignored and no diagnostic message is generated or logged.</li> <li>■ <b>Alarm</b> option The device stops measuring. The signal outputs and totalizers assume the specified alarm condition. A diagnostic message is generated.</li> <li>■ <b>Warning</b> option The device continues measuring. The signal outputs and totalizers are not affected. A diagnostic message is generated.</li> <li>■ <b>Logbook entry only</b> option The device continues measuring. The diagnostic message is only displayed in the "Event logbook" submenu and does not alternate with the standard operational information displayed.</li> </ul>

---

**Assign behavior of diagnostic no. 833**


<b>Navigation</b>	Diagnostics → Diag. settings → Diag. config. → Process → Diagnostic no. 833
<b>Description</b>	Select behavior for diagnostic event "833 Sensor electronics temperature too low".
<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>Additional information</b>	<p><i>Selection</i></p> <ul style="list-style-type: none"> <li>■ <b>Off</b> option The diagnostic event is ignored and no diagnostic message is generated or logged.</li> <li>■ <b>Alarm</b> option The device stops measuring. The signal outputs and totalizers assume the specified alarm condition. A diagnostic message is generated.</li> <li>■ <b>Warning</b> option The device continues measuring. The signal outputs and totalizers are not affected. A diagnostic message is generated.</li> <li>■ <b>Logbook entry only</b> option The device continues measuring. The diagnostic message is only displayed in the "Event logbook" submenu and does not alternate with the standard operational information displayed.</li> </ul>

---

**Assign behavior of diagnostic no. 834**



<b>Navigation</b>	Diagnostics → Diag. settings → Diag. config. → Process → Diagnostic no. 834
<b>Description</b>	Select behavior for diagnostic event "834 Process temperature 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>Additional information</b>	<p><i>Selection</i></p> <ul style="list-style-type: none"> <li>■ <b>Off</b> option The diagnostic event is ignored and no diagnostic message is generated or logged.</li> <li>■ <b>Alarm</b> option The device stops measuring. The signal outputs and totalizers assume the specified alarm condition. A diagnostic message is generated.</li> <li>■ <b>Warning</b> option The device continues measuring. The signal outputs and totalizers are not affected. A diagnostic message is generated.</li> <li>■ <b>Logbook entry only</b> option The device continues measuring. The diagnostic message is only displayed in the "Event logbook" submenu and does not alternate with the standard operational information displayed.</li> </ul>

---

#### Assign behavior of diagnostic no. 835




<b>Navigation</b>	 Diagnostics → Diag. settings → Diag. config. → Process → Diagnostic no. 835
<b>Description</b>	Select behavior for diagnostic event "835 Process temperature too low".
<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>Additional information</b>	<p><i>Selection</i></p> <ul style="list-style-type: none"> <li>■ <b>Off</b> option The diagnostic event is ignored and no diagnostic message is generated or logged.</li> <li>■ <b>Alarm</b> option The device stops measuring. The signal outputs and totalizers assume the specified alarm condition. A diagnostic message is generated.</li> <li>■ <b>Warning</b> option The device continues measuring. The signal outputs and totalizers are not affected. A diagnostic message is generated.</li> <li>■ <b>Logbook entry only</b> option The device continues measuring. The diagnostic message is only displayed in the "Event logbook" submenu and does not alternate with the standard operational information displayed.</li> </ul>

---

#### Assign behavior of diagnostic no. 842



<b>Navigation</b>	 Diagnostics → Diag. settings → Diag. config. → Process → Diagnostic no. 842
<b>Description</b>	Select behavior for diagnostic event "842 Process value below limit".

<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>Additional information</b>	<p><i>Selection</i></p> <ul style="list-style-type: none"> <li>■ <b>Off</b> option The diagnostic event is ignored and no diagnostic message is generated or logged.</li> <li>■ <b>Alarm</b> option The device stops measuring. The signal outputs and totalizers assume the specified alarm condition. A diagnostic message is generated.</li> <li>■ <b>Warning</b> option The device continues measuring. The signal outputs and totalizers are not affected. A diagnostic message is generated.</li> <li>■ <b>Logbook entry only</b> option The device continues measuring. The diagnostic message is only displayed in the "Event logbook" submenu and does not alternate with the standard operational information displayed.</li> </ul>

---

### Assign behavior of diagnostic no. 862



<b>Navigation</b>	Diagnostics → Diag. settings → Diag. config. → Process → Diagnostic no. 862
<b>Description</b>	Select behavior for diagnostic event "862 Partly filled pipe".
<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>Additional information</b>	<p><i>Selection</i></p> <ul style="list-style-type: none"> <li>■ <b>Off</b> option The diagnostic event is ignored and no diagnostic message is generated or logged.</li> <li>■ <b>Alarm</b> option The device stops measuring. The signal outputs and totalizers assume the specified alarm condition. A diagnostic message is generated.</li> <li>■ <b>Warning</b> option The device continues measuring. The signal outputs and totalizers are not affected. A diagnostic message is generated.</li> <li>■ <b>Logbook entry only</b> option The device continues measuring. The diagnostic message is only displayed in the "Event logbook" submenu and does not alternate with the standard operational information displayed.</li> </ul>

---

### Assign behavior of diagnostic no. 912



<b>Navigation</b>	Diagnostics → Diag. settings → Diag. config. → Process → Diagnostic no. 912
<b>Description</b>	Select behavior for diagnostic event "912 Medium inhomogeneous".

<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>Additional information</b>	<p><i>Selection</i></p> <ul style="list-style-type: none"> <li>■ <b>Off</b> option The diagnostic event is ignored and no diagnostic message is generated or logged.</li> <li>■ <b>Alarm</b> option The device stops measuring. The signal outputs and totalizers assume the specified alarm condition. A diagnostic message is generated.</li> <li>■ <b>Warning</b> option The device continues measuring. The signal outputs and totalizers are not affected. A diagnostic message is generated.</li> <li>■ <b>Logbook entry only</b> option The device continues measuring. The diagnostic message is only displayed in the "Event logbook" submenu and does not alternate with the standard operational information displayed.</li> </ul>

---

### Assign behavior of diagnostic no. 913



<b>Navigation</b>	Diagnostics → Diag. settings → Diag. config. → Process → Diagnostic no. 913
<b>Description</b>	Select behavior for diagnostic event "913 Medium unsuitable".
<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>Additional information</b>	<p><i>Selection</i></p> <ul style="list-style-type: none"> <li>■ <b>Off</b> option The diagnostic event is ignored and no diagnostic message is generated or logged.</li> <li>■ <b>Alarm</b> option The device stops measuring. The signal outputs and totalizers assume the specified alarm condition. A diagnostic message is generated.</li> <li>■ <b>Warning</b> option The device continues measuring. The signal outputs and totalizers are not affected. A diagnostic message is generated.</li> <li>■ <b>Logbook entry only</b> option The device continues measuring. The diagnostic message is only displayed in the "Event logbook" submenu and does not alternate with the standard operational information displayed.</li> </ul>

---

### Assign behavior of diagnostic no. 944



<b>Navigation</b>	Diagnostics → Diag. settings → Diag. config. → Process → Diagnostic no. 944
<b>Description</b>	Select behavior for diagnostic event "944 Monitoring 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>Additional information</b>	<p><i>Selection</i></p> <ul style="list-style-type: none"> <li>■ <b>Off</b> option The diagnostic event is ignored and no diagnostic message is generated or logged.</li> <li>■ <b>Alarm</b> option The device stops measuring. The signal outputs and totalizers assume the specified alarm condition. A diagnostic message is generated.</li> <li>■ <b>Warning</b> option The device continues measuring. The signal outputs and totalizers are not affected. A diagnostic message is generated.</li> <li>■ <b>Logbook entry only</b> option The device continues measuring. The diagnostic message is only displayed in the "Event logbook" submenu and does not alternate with the standard operational information displayed.</li> </ul>

---

### Assign behavior of diagnostic no. 948








<b>Navigation</b>	Diagnostics → Diag. settings → Diag. config. → Process → Diagnostic no. 948
<b>Description</b>	Select behavior for diagnostic event "948 Oscillation damping 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>Additional information</b>	<p><i>Selection</i></p> <ul style="list-style-type: none"> <li>■ <b>Off</b> option The diagnostic event is ignored and no diagnostic message is generated or logged.</li> <li>■ <b>Alarm</b> option The device stops measuring. The signal outputs and totalizers assume the specified alarm condition. A diagnostic message is generated.</li> <li>■ <b>Warning</b> option The device continues measuring. The signal outputs and totalizers are not affected. A diagnostic message is generated.</li> <li>■ <b>Logbook entry only</b> option The device continues measuring. The diagnostic message is only displayed in the "Event logbook" submenu and does not alternate with the standard operational information displayed.</li> </ul>



## 4 "Application" menu







Targeted optimization to the application – comprehensive device settings from sensor technology to system integration for optimum application adaptation.

Navigation  Application

<b>Application</b>	
▶ Measured values	→  49
▶ System units	→  53
▶ Totalizers	→  57
▶ Sensor	→  62
▶ IO-Link	→  80

### 4.1 "Measured values" submenu

Navigation  Application → Measured values

▶ <b>Measured values</b>	
Mass flow	→  49
Volume flow	→  50
Corrected volume flow	→  50
Density	→  50
Temperature	→  50
▶ Totalizer	→  51

---


#### Mass flow

---

**Navigation**  Application → Measured values → Mass flow

**Description** Displays the mass flow measured.  
The unit is set in the "System units" menu.


**User interface** Signed floating-point number

**Additional information**  The IO-Link interface only offers the **kg/s** option.

---


### Volume flow

---

**Navigation**  Application → Measured values → Volume flow

**Description** Displays the volume flow measured.  
The unit is set in the "System units" menu.

**User interface** Signed floating-point number

**Additional information**  The IO-Link interface only offers the **m<sup>3</sup>/h** option.

---

### Corrected volume flow

---

**Navigation**  Application → Measured values → CorrecVolumeFlow

**Description** Displays the volume flow measured compensated for the reference density. The reference density can be a calculated or a fixed value.  
The unit is set in the "System units" menu.

**User interface** Signed floating-point number

---

### Density

---

**Navigation**  Application → Measured values → Density

**Description** Displays the density measured.  
The unit is set in the "System units" menu.

**User interface** Positive floating-point number

---


### Temperature

---

**Navigation**  Application → Measured values → Temperature

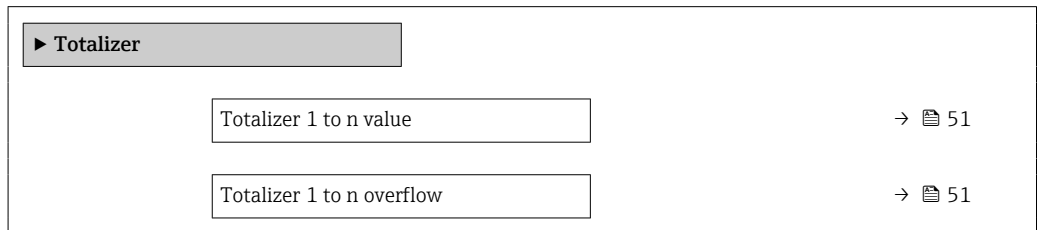
**Description** Displays the medium temperature measured.  
The unit is set in the "System units" menu.

**User interface** Positive floating-point number

**Additional information**  The IO-Link interface only offers the °C option.

### 4.1.1 "Totalizer" submenu


*Navigation*   Application → Measured values → Totalizer




---

#### Totalizer value

---

**Navigation**  Application → Measured values → Totalizer → Tot. 1 to n value

**Prerequisite** A process variable has been selected in the **Assign process variable** parameter in the **Totalizer 1 to n** submenu.

**Description** Displays the totalizer counter since the last reset.  
 This parameter can only display figures up to 7 digits. If the counter exceeds this range, the overflow is displayed in the "Totalizer overflow" parameter.

Example:

Value of "Totalizer value" parameter: 1,968,457 m<sup>3</sup>

Value of "Totalizer overflow" parameter: 1 × 10<sup>7</sup> (1 overflow) = 10,000,000 m<sup>3</sup>

Counter (total): 11,968,457 m<sup>3</sup>

In the event of a fault condition, the totalizer behaves as specified in the "Totalizer failure behavior" parameter.

**User interface** Signed floating-point number


**Additional information**  Totalizer 1 is permanently set to mass flow and cannot be changed. Totalizers 2 and 3 can be changed.

---

#### Totalizer overflow

---



**Navigation**  Application → Measured values → Totalizer → Tot. 1 to n overflow

**Prerequisite** A process variable has been selected in the **Assign process variable** parameter in the **Totalizer 1 to n** submenu.

**Description** Displays the number of overflows for the totalizer counter ("Totalizer value" parameter).








**User interface**

-32 000.0 to 32 000.0

## 4.2 "System units" submenu

Navigation  Application → System units

▶ System units

Mass flow unit	→  53
Volume flow unit	→  54
Corrected volume flow unit	→  55
Density unit	→  55
Reference density unit	→  56
Temperature unit	→  56
Pressure unit	→  56


### Mass flow unit

Navigation  Application → System units → Mass flow unit

Description Select the mass flow unit.

Selection	<i>SI units</i>	<i>US units</i>
	▪ g/s	▪ oz/s
	▪ g/min	▪ oz/min
	▪ g/h	▪ oz/h
	▪ g/d	▪ oz/d
	▪ kg/s	▪ lb/s
	▪ kg/min	▪ lb/min
	▪ kg/h	▪ lb/h
	▪ kg/d	▪ lb/d
	▪ t/s	▪ STon/s
	▪ t/min	▪ STon/min
	▪ t/h	▪ STon/h
	▪ t/d	▪ STon/d

Additional information The system units do not affect cyclic IO-Link communication (Coriolis: Mass flow, Tot1, Density, Temp.; MID: Vol. flow, Tot1, Temp, Conductivity).

 The IO-Link interface only offers the **kg/s** option.

## Volume flow unit



## Navigation

Application → System units → Volume flow unit

## Description

Select the volume flow unit.

## 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
- 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;liq.)
- bbl/min (us;liq.)
- bbl/h (us;liq.)
- bbl/d (us;liq.)
- bbl/s (us;beer)
- bbl/min (us;beer)
- bbl/h (us;beer)
- bbl/d (us;beer)
- bbl/s (us;oil)
- bbl/min (us;oil)
- bbl/h (us;oil)
- bbl/d (us;oil)
- bbl/s (us;tank)
- bbl/min (us;tank)
- bbl/h (us;tank)
- bbl/d (us;tank)
- 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;beer)
- bbl/min (imp;beer)
- bbl/h (imp;beer)
- bbl/d (imp;beer)
- bbl/s (imp;oil)
- bbl/min (imp;oil)
- bbl/h (imp;oil)
- bbl/d (imp;oil)

## Additional information

*Options*

For an explanation of the abbreviated units: → 101


The IO-Link interface only offers the **m<sup>3</sup>/h** option.

Corrected volume flow unit 

**Navigation**  Application → System units → Cor.volflow unit

**Description** Select the corrected volume flow unit.

Selection	<i>SI units</i>	<i>US units</i>	<i>Imperial units</i>
	<ul style="list-style-type: none"> <li>■ Nl/s</li> <li>■ Nl/min</li> <li>■ Nl/h</li> <li>■ Nl/d</li> <li>■ Nhl/s</li> <li>■ Nhl/min</li> <li>■ Nhl/h</li> <li>■ Nhl/d</li> <li>■ Nm<sup>3</sup>/s</li> <li>■ Nm<sup>3</sup>/min</li> <li>■ Nm<sup>3</sup>/h</li> <li>■ Nm<sup>3</sup>/d</li> <li>■ Sl/s</li> <li>■ Sl/min</li> <li>■ Sl/h</li> <li>■ Sl/d</li> <li>■ Sm<sup>3</sup>/s</li> <li>■ Sm<sup>3</sup>/min</li> <li>■ Sm<sup>3</sup>/h</li> <li>■ Sm<sup>3</sup>/d</li> </ul>	<ul style="list-style-type: none"> <li>■ Sft<sup>3</sup>/s</li> <li>■ Sft<sup>3</sup>/min</li> <li>■ Sft<sup>3</sup>/h</li> <li>■ Sft<sup>3</sup>/d</li> <li>■ MMSft<sup>3</sup>/s</li> <li>■ MMSft<sup>3</sup>/min</li> <li>■ MMSft<sup>3</sup>/h</li> <li>■ MMSft<sup>3</sup>/d</li> <li>■ Sgal/s (us)</li> <li>■ Sgal/min (us)</li> <li>■ Sgal/h (us)</li> <li>■ Sgal/d (us)</li> <li>■ Sbbl/s (us;liq.)</li> <li>■ Sbbl/min (us;liq.)</li> <li>■ Sbbl/h (us;liq.)</li> <li>■ Sbbl/d (us;liq.)</li> <li>■ Sbbl/s (us;oil)</li> <li>■ Sbbl/min (us;oil)</li> <li>■ Sbbl/h (us;oil)</li> <li>■ Sbbl/d (us;oil)</li> </ul>	<ul style="list-style-type: none"> <li>■ Sgal/s (imp)</li> <li>■ Sgal/min (imp)</li> <li>■ Sgal/h (imp)</li> <li>■ Sgal/d (imp)</li> </ul>



**Additional information**  The IO-Link interface only offers the **Nm<sup>3</sup>/h** option.


Density unit 


**Navigation**  Application → System units → Density unit

**Description** Select the density unit.

Selection	<i>SI units</i>	<i>US units</i>	<i>Imperial 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>■ kg/l</li> <li>■ kg/dm<sup>3</sup></li> <li>■ kg/m<sup>3</sup></li> </ul>	<ul style="list-style-type: none"> <li>■ lb/ft<sup>3</sup></li> <li>■ lb/gal (us)</li> <li>■ lb/bbl (us;liq.)</li> <li>■ lb/bbl (us;beer)</li> <li>■ lb/bbl (us;oil)</li> <li>■ lb/bbl (us;tank)</li> </ul>	<ul style="list-style-type: none"> <li>■ lb/gal (imp)</li> <li>■ lb/bbl (imp;beer)</li> <li>■ lb/bbl (imp;oil)</li> </ul>

**Additional information** *Options*  
 For an explanation of the abbreviated units: →  101

 The IO-Link interface only offers the **kg/m<sup>3</sup>** option.


Reference density unit 


**Navigation**  Application → System units → Ref. dens. unit

**Description** Select the reference density unit.

**Selection**

<i>SI units</i>	<i>US units</i>
▪ kg/m <sup>3</sup>	▪ lb/Sft <sup>3</sup>
▪ kg/Nm <sup>3</sup>	▪ RD60°F
▪ kg/Nl	
▪ g/Scm <sup>3</sup>	
▪ kg/Sm <sup>3</sup>	
▪ RD15°C	
▪ RD20°C	

**Additional information**  The IO-Link interface only offers the **kg/Nm<sup>3</sup>** option.

Temperature unit 

**Navigation**  Application → System units → Temperature unit

**Description** Select the temperature unit.

**Selection**

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

**Additional information**  The IO-Link interface only offers the **°C** option.


Pressure unit 

**Navigation**  Application → System units → Pressure unit

**Description** Select the pressure unit.

**Selection**



<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	

**Additional information**  The IO-Link interface only offers the **bar** option.




### 4.3 "Totalizers" submenu

Navigation   Application → Totalizers

▶ Totalizers		
▶ Totalizer handling		→  57
▶ Totalizer 1 to n		→  57

#### 4.3.1 "Totalizer handling" submenu

Navigation   Application → Totalizers → Totalizer


▶ Totalizer handling		
Reset all totalizers		→  57

---

#### Reset all totalizers

---

**Navigation**

 Application → Totalizers → Totalizer → Reset all tot.

**Description**





Reset all totalizers to "0" and restart the totalizers. The counter readings are not logged prior to the reset.

**Selection**

- Cancel
- Reset + totalize

#### 4.3.2 "Totalizer 1 to n" submenu

Navigation   Application → Totalizers → Totalizer 1 to n

▶ Totalizer 1 to n		
Assign process variable 1 to n		→  58
Process variable unit 1 to n		→  58
Totalizer 1 to n operation mode		→  59
Totalizer 1 to n control		→  60

Preset value 1 to n	→ 60
Totalizer 1 to n failure behavior	→ 61

**Assign process variable**



**Navigation**

Application → Totalizers → Totalizer 1 to n → AssignVariab. 1 to n

**Description**

Select a process variable to activate the totalizer.  
If the process variable is changed or the totalizer deactivated, the totalizer is reset to "0".

**Selection**

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

**Additional information**

Totalizer 1 is permanently set to **Mass flow** option and cannot be changed. Totalizers 2 and 3 can be changed.

**Process variable unit**



**Navigation**

Application → Totalizers → Totalizer 1 to n → VariableUnit 1 to n

**Prerequisite**

A process variable has been selected in the **Assign process variable** parameter in the **Totalizer 1 to n** submenu.

**Description**

Select the unit for the process variable of the totalizer.

**Selection**

- |                   |                     |
|-------------------|---------------------|
| <i>SI units</i>   | <i>US units</i>     |
| ■ g <sup>*</sup>  | ■ oz <sup>*</sup>   |
| ■ kg <sup>*</sup> | ■ lb <sup>*</sup>   |
| ■ t               | ■ STon <sup>*</sup> |

\* Visibility depends on order options or device settings

or

*SI units*

- cm<sup>3</sup> \*
- dm<sup>3</sup> \*
- m<sup>3</sup> \*
- ml \*
- l \*
- hl \*
- Ml Mega \*

*US units*

- af \*
- ft<sup>3</sup> \*
- Mft<sup>3</sup> \*
- fl oz (us) \*
- gal (us) \*
- kgal (us) \*
- Mgal (us) \*
- bbl (us;liq.) \*
- bbl (us;beer) \*
- bbl (us;oil) \*
- bbl (us;tank) \*

*Imperial units*

- gal (imp) \*
- Mgal (imp) \*
- bbl (imp;beer) \*
- bbl (imp;oil) \*

\* Visibility depends on order options or device settings

or

*SI units*

- Nl \*
- Nhl \*
- Nm<sup>3</sup> \*
- Sl \*
- Sm<sup>3</sup> \*

*US units*

- Sft<sup>3</sup> \*
- MMSft<sup>3</sup> \*
- Sgal (us) \*
- Sbbl (us;liq.) \*
- Sbbl (us;oil) \*

*Imperial units*

- Sgal (imp) \*

\* Visibility depends on order options or device settings

or


*Other units*

- None \*


\* Visibility depends on order options or device settings

**Additional information**

*Description*

The unit is selected separately for each totalizer. The unit is independent of the option selected in the **System units** submenu (→  11).

*Options*

The selection is dependent on the process variable selected in the **Assign process variable** parameter (→  15).

- The IO-Link interface only offers the **kg** option, **m<sup>3</sup>** option and **Nm<sup>3</sup>** option.
- Totalizer 1 is permanently set to **Mass flow** option and cannot be changed. Totalizers 2 and 3 can be changed.

**Totalizer operation mode**



**Navigation**

 Application → Totalizers → Totalizer 1 to n → Operat. mode 1 to n

**Prerequisite**


A process variable has been selected in the **Assign process variable** parameter in the **Totalizer 1 to n** submenu.

<b>Description</b>	Select the totalizer operation mode, e.g. only totalize forward flow or only totalize reverse flow.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Net</li> <li>▪ Forward</li> <li>▪ Reverse</li> </ul>
<b>Additional information</b>	<p><i>Selection</i></p> <ul style="list-style-type: none"> <li>▪ <b>Net</b> option The flow values in the forward and reverse flow directions are totalized and netted against each other. Net flow is recorded in the flow direction.</li> <li>▪ <b>Forward</b> option Only the flow in the forward flow direction is totalized.</li> <li>▪ <b>Reverse</b> option Only the flow in the reverse flow direction is totalized (= reverse flow quantity).</li> </ul>

---

## Totalizer control


---


<b>Navigation</b>	 Application → Totalizers → Totalizer 1 to n → Tot. 1 to n control
<b>Prerequisite</b>	A process variable has been selected in the <b>Assign process variable</b> parameter in the <b>Totalizer 1 to n</b> submenu.
<b>Description</b>	Operate the totalizer.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Totalize</li> <li>▪ Reset + hold</li> <li>▪ Preset + hold</li> <li>▪ Reset + totalize</li> <li>▪ Hold</li> </ul>
<b>Additional information</b>	<p><i>Selection</i></p> <ul style="list-style-type: none"> <li>▪ <b>Totalize</b> option The totalizer is started or continues running.</li> <li>▪ <b>Reset + hold</b> option The totalizer is reset to "0" and stopped.</li> <li>▪ <b>Preset + hold</b> option The totalizer is stopped and set to the start value specified in the "Preset value " parameter.</li> <li>▪ <b>Reset + totalize</b> option The totalizer is reset to "0" and restarted.</li> <li>▪ <b>Hold</b> option The totalizer is stopped.</li> </ul>

---

## Preset value

---


<b>Navigation</b>	 Application → Totalizers → Totalizer 1 to n → Preset value 1 to n
<b>Prerequisite</b>	A process variable has been selected in the <b>Assign process variable</b> parameter in the <b>Totalizer 1 to n</b> submenu.

<b>Description</b>	Specify a start value for the totalizer.
<b>User entry</b>	Signed floating-point number
<b>Additional information</b>	<p><i>Description</i></p> <p>The unit of the selected process variable is specified for the totalizer in the <b>Unit totalizer</b> parameter (→  15).</p> <p><i>Example</i></p> <p>This configuration is suitable for applications such as iterative filling processes with a fixed batch quantity.</p>

---










### Totalizer failure behavior

---

<b>Navigation</b>	 Application → Totalizers → Totalizer 1 to n → FailureBehav. 1 to n
<b>Prerequisite</b>	A process variable has been selected in the <b>Assign process variable</b> parameter in the <b>Totalizer 1 to n</b> submenu.
<b>Description</b>	Specify how the totalizer should behave in the event of a device alarm.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Hold</li> <li>■ Continue</li> <li>■ Last valid value + continue</li> </ul>
<b>Additional information</b>	<p><i>Selection</i></p> <ul style="list-style-type: none"> <li>■ <b>Hold</b> option The totalizer is stopped in the event of a device alarm.</li> <li>■ <b>Continue</b> option The totalizer continues to totalize based on the current value measured; the device alarm is ignored.</li> <li>■ <b>Last valid value + continue</b> option The totalizer continues to totalize based on the last valid value measured before the device alarm occurred.</li> </ul>





## 4.4 "Sensor" submenu

Navigation  Application → Sensor

▶ Sensor	
▶ Process parameters	→  62
▶ Low flow cutoff	→  64
▶ Partially filled pipe detection	→  65
▶ Medium settings	→  67
▶ Two phase flow	→  69
▶ External compensation	→  71
▶ Corrected volume flow calculation	→  71
▶ Sensor adjustment	→  73
▶ Calibration	→  78

### 4.4.1 "Process parameters" submenu

Navigation  Application → Sensor → Process param.

▶ Process parameters	
Flow damping	→  63
Flow override	→  63
Density damping	→  63
Temperature damping	→  64

---

**Flow damping**

---



<b>Navigation</b>	Application → Sensor → Process param. → Flow damping
<b>Description</b>	Enter a time constant for flow damping. Value = 0: No damping Value > 0: Damping increases  Damping is implemented by means of a proportional transmission behavior with first order delay (PT1 element).
<b>User entry</b>	0 to 99.9 s

---

**Flow override**

---



<b>Navigation</b>	Application → Sensor → Process param. → Flow override
<b>Description</b>	Reports the flow rate as zero until flow override is deactivated. Can be used for example when cleaning the pipeline.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Off</li> <li>■ On</li> </ul>
<b>Additional information</b>	<i>Selection</i> <b>"On" option</b> Activates flow override and the diagnostic message "453 Flow override active" is generated. Values reported: Flow variables: Zero Other process variables: As measured Totalizers: Stop totalizing

---

**Density damping**

---



<b>Navigation</b>	Application → Sensor → Process param. → Density damping
<b>Description</b>	Enter a time constant for the damping applied to the value measured for density. Value = 0: No damping Value > 0: Damping increases  Damping is implemented by means of a proportional transmission behavior with first order delay (PT1 element).
<b>User entry</b>	0 to 999.9 s

**Temperature damping**



<b>Navigation</b>	Application → Sensor → Process param. → Temp. damping
<b>Description</b>	<p>Enter a time constant for the damping applied to the value measured for temperature.            Value = 0: No damping            Value &gt; 0: Damping increases</p> <p>Damping is implemented by means of a proportional transmission behavior with first order delay (PT1 element).</p>
<b>User entry</b>	0 to 999.9 s

**4.4.2 "Low flow cutoff" submenu**

*Navigation* Application → Sensor → Low flow cutoff

▶ **Low flow cutoff**

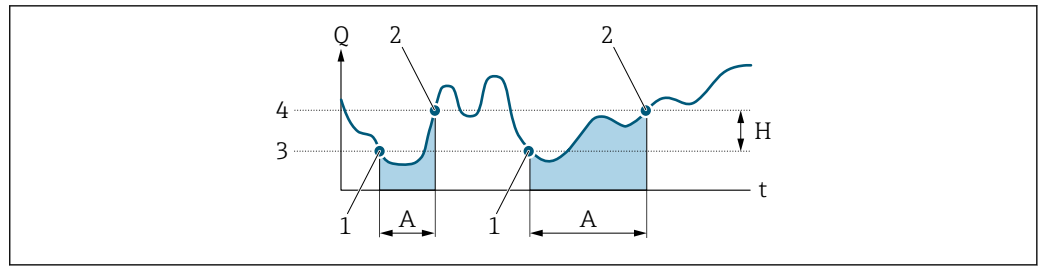
Low flow cutoff	→  64
On value low flow cutoff	→  65
Off value low flow cutoff	→  65

**Low flow cutoff**



<b>Navigation</b>	Application → Sensor → Low flow cutoff → Low flow cutoff
<b>Description</b>	Select a process variable for low flow cutoff to activate low flow cutoff.
<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> </ul>
<b>Additional information</b>	Description





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- 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

**On value low flow cutoff**



**Navigation**

☰ Application → Sensor → Low flow cutoff → On value

**Description**

Enter on value to switch on low flow cutoff.  
 Value = 0: No low flow cutoff  
 Value > 0: Low flow cutoff is activated

**User entry**

Positive floating-point number

**Off value low flow cutoff**



**Navigation**

☰ Application → Sensor → Low flow cutoff → Off value

**Description**

Enter off value to switch off low flow cutoff. The off value is entered as a positive hysteresis with respect to the on value.

**User entry**

0 to 100.0 %



**4.4.3 "Partially filled pipe detection" submenu**

Navigation ☰ Application → Sensor → Partial pipe det

▶ Partially filled pipe detection


Partially filled pipe detection

→ 66

Low value partial filled pipe detection	→  66
High value partial filled pipe detection	→  66


---

### Partially filled pipe detection

<b>Navigation</b>	 Application → Sensor → Partial pipe det → Partial pipe det
<b>Description</b>	Switch empty pipe detection on or off. Switch on empty pipe detection to detect a partially filled or empty measuring tube.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Off</li> <li>■ Density</li> <li>■ Calculated reference density</li> </ul>


---

### Low value partial filled pipe detection

<b>Navigation</b>	 Application → Sensor → Partial pipe det → Low value
<b>Prerequisite</b>	A process variable has been selected in the <b>Assign process variable</b> parameter in the <b>Empty pipe detection</b> submenu.
<b>Description</b>	<p>Enter the lower limit value for the selected process variable. If the measured value drops below the limit value, diagnostic message "862 Partly filled pipe" is generated.</p> <p>Additional information:</p> <ul style="list-style-type: none"> <li>- This setting applies only if the "Density unit" parameter is not set to °API.</li> <li>- The lower limit value must be lower than the upper limit value ("High value partial filled pipe detection" parameter).</li> </ul>
<b>User entry</b>	Signed floating-point number

---

### High value partial filled pipe detection





<b>Navigation</b>	 Application → Sensor → Partial pipe det → High value
<b>Prerequisite</b>	A process variable has been selected in the <b>Assign process variable</b> parameter in the <b>Empty pipe detection</b> submenu.
<b>Description</b>	<p>Enter the upper limit value for the selected process variable. If the measured value exceeds the limit value, diagnostic message "862 Partly filled pipe" is generated.</p> <p>Additional information:</p> <p>This setting applies only if the "Density unit" parameter is set to °API.</p>

**User entry** Signed floating-point number

#### 4.4.4 "Medium settings" submenu


*Navigation*  Application → Sensor → Medium settings

▶ **Medium settings**

Select medium type	→  67
Select gas type	→  67
Reference sound velocity	→  68
Temperature coefficient sound velocity	→  68

---

#### Select medium type

**Navigation**  Application → Sensor → Medium settings → SelectMediumType

**Description** Select the medium type.

- Selection**
- Liquid
  - Gas

---

#### Select gas type

**Navigation**  Application → Sensor → Medium settings → Select gas type

**Prerequisite** In the **Select medium** parameter in the **Medium settings** submenu, the **Gas** option is selected.

**Description** Select the type of gas. For gas applications, the gas type must be specified to achieve accurate measurements.

- Selection**
- Air
  - Ammonia NH3
  - Argon Ar
  - Sulfur hexafluoride SF6
  - Oxygen O2
  - Ozone O3
  - Nitrogen oxide NOx
  - Nitrogen N2
  - Nitrous oxide N2O

- Methane CH<sub>4</sub>
- Methane CH<sub>4</sub> + 10% Hydrogen H<sub>2</sub>
- 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

---

**Reference sound velocity**
**Navigation**

Application → Sensor → Medium settings → Ref. sound veloc

**Prerequisite**

In the **Select gas type** parameter in the **Medium settings** submenu, the **Other** option is selected.

**Description**

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

**User entry**

1 to 99 999.9999 m/s

---

**Temperature coefficient sound velocity**
**Navigation**

Application → Sensor → Medium settings → Temp. coeff. SV

**Prerequisite**

In the **Select gas type** parameter in the **Medium settings** submenu, the **Other** option is selected.

**Description**





Enter the temperature coefficient for the gas sound velocity.

**User entry**


Positive floating-point number

### 4.4.5 "Two phase flow" submenu

Navigation  Application → Sensor → Two phase flow

▶ 2-Phase flow	
Gas Fraction Handler	→  69
Index inhomogeneous medium	→  70
Cutoff inhomogeneous wet gas	→  70
Cutoff inhomogeneous liquid	→  70

#### Gas Fraction Handler

Navigation  Application → Sensor → Two phase flow → Gas Frac Handler

**Description** Activate the Gas Fraction Handler to improve measurement stability and repeatability of a two phase medium.

The Gas Fraction Handler continuously tests for the presence of disturbances in single phase flow, i.e. for gas bubbles in liquids or for droplets in gas.

In the presence of the second phase, when flow and density become increasingly unstable, the Gas Fraction Handler improves measurement stability with respect to the severity of the disturbances, with no effect under the condition of a single-phase flow.

The Gas Fraction Handler stabilizes the output values and enables better readability for operators and interpretation by the process control system. The level of smoothing is adjusted according to the severity of disturbances introduced by the second phase.

The Gas Fraction Handler applies cumulatively to any fixed damping constants applied to flow and density set elsewhere in the device.


- Selection**
- Off
  - Moderate
  - Powerful

- Additional information** *Selection*
- **Off** option  
Deactivates the Gas Fraction Handler. When a second phase is present, large fluctuations of flow and density will occur.
  - **Moderate** option  
Use for applications with low level or intermittent levels of second phase.
  - **Powerful** option  
Use for applications with very significant levels of second phase.

---

**Inhomogeneous medium index**


---


<b>Navigation</b>	 Application → Sensor → Two phase flow → InhomogMedIndex
<b>Description</b>	<p>Indicates the severity of the second phase.</p> <p>For applications with entrained gas for example, the index describes the relative amount of entrained gas in the liquid. If there is no entrained gas in the liquid, the value is 0, and for very high levels of gas volume (associated with severe slug flow, for example), the value exceeds 10.</p> <p>The index increases with an increase in the second phase, such as gas volume in a liquid, but scaling is not linear (i.e. no 1:1 correlation of index to gas volume fraction), and with increased flow velocity, which results in greater homogeneity, the index value decreases.</p> <p>The index will not saturate with excessive second phase.</p> <p>The diagnostic is repeatable under the same conditions, and thus can be used to better understand process conditions and the relative severity of the second phase.</p> <p>This index can also be used to determine the relative level of solids in a liquid or the relative level of a liquid phase in a wet gas.</p>
<b>User interface</b>	Signed floating-point number

---

**Cutoff inhomogeneous wet gas**


---




<b>Navigation</b>	 Application → Sensor → Two phase flow → Cutoff inh. gas
<b>Description</b>	Enter cut off value for inhomogeneous wet gas applications. Below this value the "Inhomogeneous medium index" is set to 0.
<b>User entry</b>	Positive floating-point number

---

**Cutoff inhomogeneous liquid**




---




<b>Navigation</b>	 Application → Sensor → Two phase flow → Cutoff liquid
<b>Description</b>	<p>Enter the cutoff value for inhomogeneous liquid applications. Below this value the "Inhomogeneous medium index" is set to 0.</p> <p>This setting is used for entrained gas in liquid applications or solids in liquid applications.</p>
<b>User entry</b>	Positive floating-point number

### 4.4.6 "External compensation" submenu

Navigation  Application → Sensor → External comp.

<b>► External compensation</b>	
Pressure compensation	→  71
Pressure value	→  71


#### Pressure compensation

Navigation  Application → Sensor → External comp. → Pressure compen.

Description Select the pressure compensation type.

- Selection
- Off
  - Fixed value

#### Pressure value

Navigation  Application → Sensor → External comp. → Pressure value




Prerequisite In the **Pressure compensation** parameter in the **External compensation** submenu, the **Fixed value** option is selected.



Description Enter a fixed value for the pressure compensation.  
The unit is set in the "System units" menu.

User entry Positive floating-point number

### 4.4.7 "Corrected volume flow calculation" submenu

Navigation  Application → Sensor → Corr. vol.flow.

<b>► Corrected volume flow calculation</b>	
Select reference density	→  72
Fixed reference density	→  72
Reference temperature	→  72

Linear expansion coefficient	→  73
Square expansion coefficient	→  73

---

**Select reference density**

**Navigation**
 Application → Sensor → Corr. vol.flow. → Select ref. dens
**Description**


Select the reference density to use to calculate the corrected volume flow.


**Selection**

- Fixed reference density
- Calculated reference density

---

**Fixed reference density**

**Navigation**
 Application → Sensor → Corr. vol.flow. → Fix ref.density
**Prerequisite**

In the **Select reference density** parameter (→  72), the **Fixed reference density** option is selected.


**Description**


Enter a fixed value for the reference density.

**User entry**

Positive floating-point number

---

**Reference temperature**

**Navigation**
 Application → Sensor → Corr. vol.flow. → Ref. temperature
**Prerequisite**

In the **Select reference density** parameter (→  72), the **Calculated reference density** option is selected.

**Description**

Enter a reference temperature to calculate the reference density.

**User entry**

-273.15 to 99 999 °C



**Additional information** *Calculation of the reference density*

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

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- $\rho_N$  Reference density
- $\rho$  Medium density currently measured
- $t$  Medium 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 medium, unit = [1/K]; K = Kelvin
- $\beta$  Square expansion coefficient of the medium, unit = [1/K<sup>2</sup>]

**Linear expansion coefficient**



**Navigation** Application → Sensor → Corr. vol.flow. → Linear exp coeff

**Prerequisite** In the **Select reference density** parameter (→ 72), the **Calculated reference density** option is selected.

**Description** Enter the linear expansion coefficient for the medium to calculate the reference density. For a medium with a non-linear expansion pattern, use the "Square expansion coefficient" parameter instead.

**User entry** Signed floating-point number

**Square expansion coefficient**



**Navigation** Application → Sensor → Corr. vol.flow. → Square exp coeff

**Prerequisite** In the **Select reference density** parameter (→ 72), the **Calculated reference density** option is selected.

**Description** Enter the square expansion coefficient for the medium to calculate the reference density. For a medium with a linear expansion pattern, use the "Linear expansion coefficient" parameter instead.

**User entry** 0 to 1 1/K<sup>2</sup>

**4.4.8 "Sensor adjustment" submenu**

*Navigation* Application → Sensor → Sensor adjustm.

▶ Sensor adjustment

Installation direction

→ 74

▶ Zero adjustment	→ 74
▶ Process variable adjustment	→ 75

**Installation direction**



**Navigation**

Application → Sensor → Sensor adjustm. → Install. direct.

**Description**

Select the sign of the flow direction.

**Selection**

- Forward flow
- Reverse flow

**"Zero adjustment" submenu**

Navigation Application → Sensor → Sensor adjustm. → Zero adjustment

▶ Zero adjustment	
Zero adjustment control	→ 74
Progress	→ 75
Status	→ 75

**Zero adjustment control**

**Navigation**

Application → Sensor → Sensor adjustm. → Zero adjustment → ZeroAdjustContr.

**Description**

Start or cancel a zero point adjustment.  
 The following conditions must be met to perform a zero point adjustment successfully:  
 The actual flow rate must be 0.  
 The pressure must be at least 1.034 bar.

**Selection**

- Cancel
- Busy
- Alarm

**Status**

<b>Navigation</b>	☰ Application → Sensor → Sensor adjustm. → Zero adjustment → Status
<b>Description</b>	Displays the status of the zero point adjustment.
<b>User interface</b>	<ul style="list-style-type: none"> <li>■ Busy</li> <li>■ Failed</li> <li>■ Done</li> </ul>

**Progress**

<b>Navigation</b>	☰ Application → Sensor → Sensor adjustm. → Zero adjustment → Progress
<b>Description</b>	Shows the progress of the process.
<b>User interface</b>	0 to 100 %

**"Process variable adjustment" submenu**

*Navigation* ☰☰ Application → Sensor → Sensor adjustm. → Variable adjust

<b>► Process variable adjustment</b>	
Mass flow offset	→ ☰ 76
Mass flow factor	→ ☰ 76
Volume flow offset	→ ☰ 76
Volume flow factor	→ ☰ 76
Density offset	→ ☰ 77
Density factor	→ ☰ 77
Corrected volume flow offset	→ ☰ 77
Corrected volume flow factor	→ ☰ 77
Temperature offset	→ ☰ 78
Temperature factor	→ ☰ 78

**Mass flow offset**

<b>Navigation</b>	Application → Sensor → Sensor adjustm. → Variable adjust → Mass flow offset
<b>Description</b>	Enter the offset by which to shift the zero point for mass flow in kg/s.
<b>User entry</b>	Signed floating-point number
<b>Additional information</b>	<i>Description</i> Corrected value = (factor × value) + offset

**Mass flow factor**

<b>Navigation</b>	Application → Sensor → Sensor adjustm. → Variable adjust → Mass flow factor
<b>Description</b>	Enter the multiplication factor to apply to the mass flow value.
<b>User entry</b>	Positive floating-point number
<b>Additional information</b>	<i>Description</i> Corrected value = (factor × value) + offset

**Volume flow offset**

<b>Navigation</b>	Application → Sensor → Sensor adjustm. → Variable adjust → Vol. flow offset
<b>Description</b>	Enter the offset by which to shift the zero point for volume flow in m <sup>3</sup> /s.
<b>User entry</b>	Signed floating-point number
<b>Additional information</b>	<i>Description</i> Corrected value = (factor × value) + offset

**Volume flow factor**

<b>Navigation</b>	Application → Sensor → Sensor adjustm. → Variable adjust → Vol. flow factor
<b>Description</b>	Enter the multiplication factor to apply to the volume flow.
<b>User entry</b>	Positive floating-point number
<b>Additional information</b>	<i>Description</i> Corrected value = (factor × value) + offset

---

**Density offset**

---



<b>Navigation</b>	Application → Sensor → Sensor adjustm. → Variable adjust → Density offset
<b>Description</b>	Enter the offset by which to shift the zero point for density in kg/m <sup>3</sup> .
<b>User entry</b>	Signed floating-point number
<b>Additional information</b>	<i>Description</i> Corrected value = (factor × value) + offset

---

**Density factor**

---



<b>Navigation</b>	Application → Sensor → Sensor adjustm. → Variable adjust → Density factor
<b>Description</b>	Enter the multiplication factor to apply to the density value.
<b>User entry</b>	Positive floating-point number
<b>Additional information</b>	<i>Description</i> Corrected value = (factor × value) + offset

---

**Corrected volume flow offset**

---



<b>Navigation</b>	Application → Sensor → Sensor adjustm. → Variable adjust → Corr. vol offset
<b>Description</b>	Enter the offset by which to shift the zero point for the corrected volume flow in Nm <sup>3</sup> /s.
<b>User entry</b>	Signed floating-point number
<b>Additional information</b>	<i>Description</i> Corrected value = (factor × value) + offset

---

**Corrected volume flow factor**

---



<b>Navigation</b>	Application → Sensor → Sensor adjustm. → Variable adjust → Corr. vol factor
<b>Description</b>	Enter the multiplication factor to apply to the corrected volume flow value.
<b>User entry</b>	Positive floating-point number
<b>Additional information</b>	<i>Description</i> Corrected value = (factor × value) + offset

**Temperature offset**



<b>Navigation</b>	Application → Sensor → Sensor adjustm. → Variable adjust → Temp. offset
<b>Description</b>	Enter the offset by which to shift the zero point for temperature in K.
<b>User entry</b>	Signed floating-point number
<b>Additional information</b>	<i>Description</i> Corrected value = (factor × value) + offset

**Temperature factor**



<b>Navigation</b>	Application → Sensor → Sensor adjustm. → Variable adjust → Temp. factor
<b>Description</b>	Enter the multiplication factor to apply to the temperature value.
<b>User entry</b>	Positive floating-point number
<b>Additional information</b>	<i>Description</i> Corrected value = (factor × value) + offset

**4.4.9 "Calibration" submenu**

*Navigation* Application → Sensor → Calibration

▶ Calibration

Nominal diameter	→  78
Calibration factor	→  79
Zero point	→  79


**Nominal diameter**

<b>Navigation</b>	Application → Sensor → Calibration → Nominal diameter
<b>Description</b>	Displays the nominal diameter of the sensor.
<b>User interface</b>	Character string comprising numbers, letters and special characters

---

**Calibration factor**

---


<b>Navigation</b>	 Application → Sensor → Calibration → Cal. factor
<b>Description</b>	Displays the current calibration factor for the sensor. The factory setting for the calibration factor can be found on the sensor's nameplate.
<b>User interface</b>	Signed floating-point number

---

**Zero point**

---




<b>Navigation</b>	 Application → Sensor → Calibration → Zero point
<b>Description</b>	Displays the zero point correction value for the sensor. Users logged on in the Service role have write access.
<b>User entry</b>	Signed floating-point number

---








**C0 to 5**

---

<b>Navigation</b>	 Application → Sensor → Calibration → C0 to 5
<b>Description</b>	Displays the current coefficients for density.
<b>User interface</b>	Signed floating-point number


## 4.5 "IO-Link" submenu

Navigation  Application → IO-Link

▶ IO-Link		
Vendor name		→  80
Product name		→  80
Product ID		→  81
Device ID		→  80
Application specific tag		→  81
Function tag		→  81
Location tag		→  81


---

### Vendor name

<b>Navigation</b>	 Application → IO-Link → Vendor name
<b>Description</b>	Displays the manufacturer.
<b>User interface</b>	Character string comprising numbers, letters and special characters


---

### Product name

<b>Navigation</b>	 Application → IO-Link → Product name
<b>Description</b>	Displays the name of the transmitter.
<b>User interface</b>	Character string comprising numbers, letters and special characters

---

### Device ID


<b>Navigation</b>	 Application → IO-Link → Device ID
<b>Description</b>	Displays the device ID registered with the IO-Link Community.
<b>User interface</b>	Positive integer



---

**Product ID**


---


<b>Navigation</b>	 Application → IO-Link → Product ID
<b>Description</b>	Displays the product root.
<b>User interface</b>	Character string comprising numbers, letters and special characters

---

**Application specific tag**

---





<b>Navigation</b>	 Application → IO-Link → Application tag
<b>Description</b>	Enter the tag of the application in which the device is used, e.g. the designation of the production process or step (max. 32 characters).
<b>User entry</b>	Character string comprising numbers, letters and special characters (32)

---

**Function tag**

---





<b>Navigation</b>	 Application → IO-Link → Function tag
<b>Description</b>	Enter the tag of the function the device performs in the application (max. 32 characters).
<b>User entry</b>	Character string comprising numbers, letters and special characters (32)

---

**Location tag**

---










<b>Navigation</b>	 Application → IO-Link → Location tag
<b>Description</b>	Enter the tag of the device location in the plant (max. 32 characters).
<b>User entry</b>	Character string comprising numbers, letters and special characters (32)

## 5 "System" menu

Overall device management and security settings – management of system settings and adaption to operational requirements.





Navigation  System

System	
▶ Device management	→  83
▶ User management	→  85
▶ Connectivity	→  88
▶ Date/time	→  89
▶ Information	→  91
▶ Display	→  96
▶ Software configuration	→  100

## 5.1 "Device management" submenu


Navigation  System → Device manag.

▶ Device management

Device tag	→  83
Locking status	→  83
Configuration counter	→  84
Device reset	→  84



---

### Device tag

- Navigation**  System → Device manag. → Device tag
- Description** Displays the name for the measuring point.
- User entry** Character string comprising numbers, letters and special characters (32)

---


### Locking status

- Navigation**  System → Device manag. → Locking status
- Description** Indicates the write protection with the highest priority that is currently active.
- User interface**
- Hardware locked
  - **Temporarily locked** option (e.g. during IO-Link block configuration or parameter upload)
- Additional information** 
- The DIP switch is on the back of the display.
  - While a block parameterization or the DataStorage mechanism is active via the IO-Link communication, the **Temporarily locked** option becomes active.

---

**Configuration counter**



---


<b>Navigation</b>	 System → Device manag. → Config. counter
<b>Description</b>	<p>Displays the counter for the number of times the device configuration has changed.</p> <p>If the value for a static parameter changes, the counter increments by 1. This is to enable tracking different parameter versions.</p> <p>When multiple parameters are changed simultaneously, e.g. when loading a configuration file into the device from an external source such as FieldCare, the counter may increment.</p> <p>The counter cannot be reset. Nor is it reset to a default value on performing a device reset. Once the counter has incremented to 65535, it restarts at 1.</p>
<b>User interface</b>	0 to 65 535

---

**Device reset**


---







<b>Navigation</b>	 System → Device manag. → Device reset
<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> <li>■ Create T-DAT backup</li> <li>■ Restore T-DAT backup *</li> </ul>
<b>Additional information</b>	<p><i>Selection</i></p> <ul style="list-style-type: none"> <li>■ <b>To delivery settings</b> option 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.</li> <li>■ <b>Restart device</b> option 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.</li> <li>■ <b>Restore S-DAT backup</b> option Restores the data that is saved on the S-DAT. This function can be used to resolve the memory issue "083 Memory content inconsistent" or to restore the S-DAT data when a new S-DAT has been installed.</li> <li>■ <b>Create T-DAT backup</b> option Creates T-DAT backup.</li> <li>■ <b>Restore T-DAT backup</b> option Restores the data saved on the T-DAT. This function can be used to resolve the memory issue "283 Memory content inconsistent" or to restore the T-DAT data when a new T-DAT has been installed.</li> </ul>

---

\* Visibility depends on order options or device settings

## 5.2 "User management" submenu

Navigation  System → User manag.

▶ User management	
User role	→  85
Enter access code	→  86
Reset Maintenance code	→  86
▶ Define Maintenance code	→  87

---

### User role

---

**Navigation**  System → User manag. → User role

**Description** Displays the role the user is currently logged on in.  
 The role determines the user's access rights for the parameters. Until a "Maintenance" code has been set in the "Define Maintenance code" parameter, all users are automatically logged on in the "Maintenance" role. Once the "Maintenance" code has been set, all users are automatically logged on in the "Operator" role. The access rights can be changed via the "Enter access code" parameter.

- User interface**
- Operator
  - Maintenance
  - Service
  - Production
  - Development

- Additional information** *User interface*
- **Operator** option  
Provides only read access to parameters.
  - **Maintenance** option  
Provides read and write access to parameters.  
For some parameters, the user must be logged on in the Service role to obtain write access.
  - **Service** option  
Provides read and write access to Service parameters.

---

**Enter access code**

---

**Navigation** System → User manag. → Ent. access code**Description**

For users logged on in the Operator role, enter the Maintenance code to change the access status to Maintenance and disable write protection of parameters. For users logged on in the Maintenance role, enter the Service code to change the access status to Service and enable read and write access to Service parameters.

**User entry**

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

---

**Reset Maintenance code**

---

**Navigation** System → User manag. → Reset Maint code**Description**


Enter the code provided by Endress+Hauser Technical Support to reset the Maintenance code.



**User entry**

Character string comprising numbers, letters and special characters (32)

### 5.2.1 "Define Maintenance code" wizard

Complete this wizard to specify an access code for the Maintenance role.

Navigation  System → User manag. → Def. Maint. code

▶ Define Maintenance code	
Define Maintenance code	→  87
Confirm Maintenance code	→  87

---

#### Define Maintenance code

**Navigation**  System → User manag. → Def. Maint. code → Def. Maint. code

**Description** Specify an access code that is required to obtain the access rights for the Maintenance role.

**User entry** 0 to 9999

---

#### Confirm Maintenance code

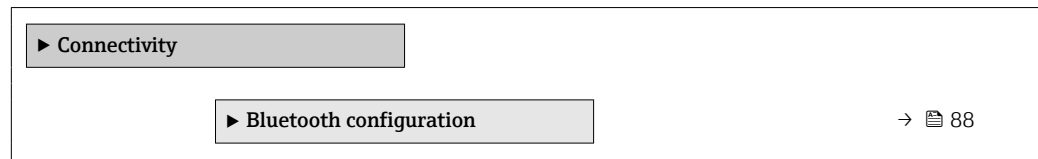
**Navigation**  System → User manag. → Def. Maint. code → Conf. Maint code

**Description** Confirm the access code entered for the Maintenance role.


**User entry** 0 to 9999

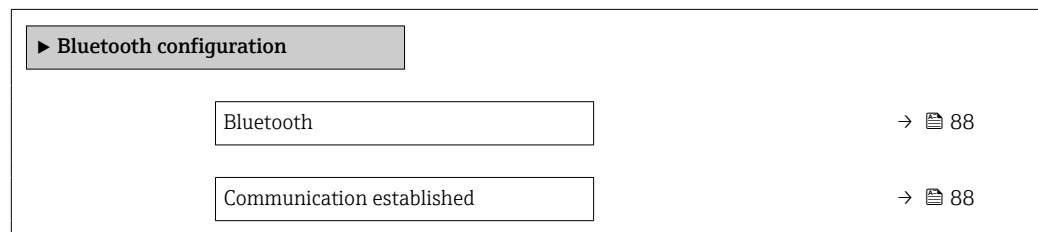
## 5.3 "Connectivity" submenu

Navigation  System → Connectivity




### 5.3.1 "Bluetooth configuration" submenu

Navigation  System → Connectivity → Bluetooth conf.




---

#### Bluetooth

**Navigation**  System → Connectivity → Bluetooth conf. → Bluetooth

**Description** Enable or disable Bluetooth.

**Selection**

- Enable
- Disable
- Not available \*

---

#### Communication established

**Navigation**  System → Connectivity → Bluetooth conf. → Communi. establ.

**User interface**

- No
- Yes

---




\* Visibility depends on order options or device settings



## 5.4 "Date / Time" submenu


Navigation   System → Date / Time

▶ **Date/time**

Set date/time	→  89
Time format	→  89
Time zone	→  89

---

### Set date/time


**Navigation**  System → Date/time → Set date/time

**Description** Set the date and local time. Every time the date or time is changed, a logbook entry is created.

**User entry** Date and time

---

### Time format

**Navigation**  System → Date/time → Time format


**Description** Select the time format.

**Selection**

- 24 h
- 12 h AM/PM

---

### Time zone

**Navigation**  System → Date/time → Time zone

**Description** Select the time zone. Every time the time zone is changed, a logbook entry is created.




**Selection**

*Other units*

- UTC-12:00
- UTC-11:00
- UTC-10:00
- UTC-09:30
- UTC-09:00
- UTC-08:00
- UTC-07:00
- UTC-06:00
- UTC-05:00
- UTC-04:00
- UTC-03:30
- UTC-03:00
- UTC-02:00
- UTC-01:00
- UTC 00:00
- UTC+01:00
- UTC+02:00
- UTC+03:00
- UTC+03:30
- UTC+04:00
- UTC+04:30
- UTC+05:00
- UTC+05:30
- UTC+05:45
- UTC+06:00
- UTC+06:30
- UTC+07:00
- UTC+08:00
- UTC+08:45
- UTC+09:00
- UTC+09:30
- UTC+10:00
- UTC+10:30
- UTC+11:00
- UTC+12:00
- UTC+12:45
- UTC+13:00
- UTC+14:00











## 5.5 "Information" submenu

Navigation  System → Information

▶ Information	
▶ Device	→  91
▶ Sensor electronic module (ISEM)	→  94
▶ Display module	→  94

### 5.5.1 "Device" submenu

Navigation  System → Information → Device

▶ Device	
Device name	→  91
Device tag	→  92
Serial number	→  92
Order code	→  92
Firmware version	→  92
Extended order code 1	→  93
Extended order code 2	→  93
Extended order code 3	→  93
ENP version	→  93
Manufacturer	→  94

---

#### Device name

---

#### Navigation





 System → Information → Device → Device name

#### Description

Displays the name of the transmitter. The transmitter name is also provided on the nameplate of the transmitter.

#### User interface

Character string comprising numbers, letters and special characters

Device tag	
<b>Navigation</b>	 System → Information → Device → Device tag
<b>Description</b>	Displays the name for the measuring point.
<b>User entry</b>	Character string comprising numbers, letters and special characters (32)
Serial number	
<b>Navigation</b>	 System → Information → Device → Serial number
<b>Description</b>	<p>Displays the serial number of the measuring device. The serial number is also provided on the nameplate of the sensor and of the transmitter.</p> <p>The serial number can also be used to retrieve further device-related information and documentation via the Operations app or the Device Viewer on the Endress+Hauser website.</p>
<b>User interface</b>	Character string comprising numbers, letters and special characters
Order code	
<b>Navigation</b>	 System → Information → Device → Order code
<b>Description</b>	<p>Displays the device order code.</p> <p>The order code is used for instance to order a replacement or spare device or to verify that the device features specified on the order form match the shipping note.</p>
<b>User interface</b>	Character string comprising numbers, letters and special characters
Firmware version	
<b>Navigation</b>	 System → Information → Device → Firmware version
<b>Description</b>	Displays the device firmware version installed.
<b>User interface</b>	Character string comprising numbers, letters and special characters

---

**Extended order code 1**

---

**Navigation**

System → Information → Device → Ext. order cd. 1

**Description**

Displays the first, second and/or third part of the extended order code.

Due to character length restrictions, the extended order code is split into a maximum of 3 parameters. The extended order code indicates for each feature in the product structure the selected option, thereby uniquely identifying the device model.

The extended order code can also be found on the nameplate.

**User interface**

Character string comprising numbers, letters and special characters

---

**Extended order code 2**

---

**Navigation**

System → Information → Device → Ext. order cd. 2

**Description**

Displays the first, second and/or third part of the extended order code.

Due to character length restrictions, the extended order code is split into a maximum of 3 parameters. The extended order code indicates for each feature in the product structure the selected option, thereby uniquely identifying the device model.

The extended order code can also be found on the nameplate.

**User interface**

Character string comprising numbers, letters and special characters

---

**Extended order code 3**

---

**Navigation**

System → Information → Device → Ext. order cd. 3

**Description**

Displays the first, second and/or third part of the extended order code.

Due to character length restrictions, the extended order code is split into a maximum of 3 parameters. The extended order code indicates for each feature in the product structure the selected option, thereby uniquely identifying the device model.

The extended order code can also be found on the nameplate.

**User interface**

Character string comprising numbers, letters and special characters

---

**ENP version**

---

**Navigation**

System → Information → Device → ENP version

**Description**

Displays the version of the electronic nameplate (ENP).


**User interface**

Character string comprising numbers, letters and special characters



---

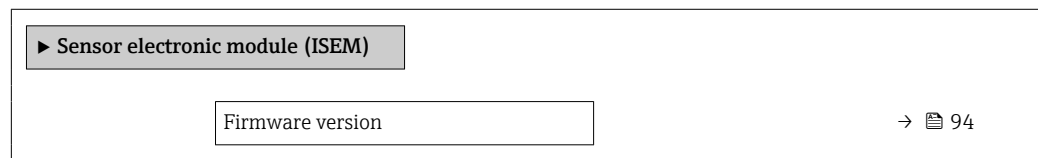
**Manufacturer**


---

<b>Navigation</b>	 System → Information → Device → Manufacturer
<b>Description</b>	Displays the manufacturer.
<b>User interface</b>	Character string comprising numbers, letters and special characters

### 5.5.2 "Sensor electronic module (ISEM)" submenu


*Navigation*   System → Information → Sens. electronic






---

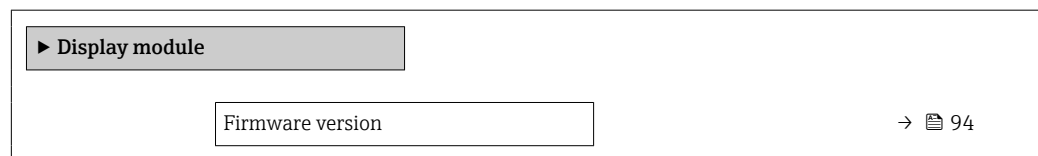
**Firmware version**


---

<b>Navigation</b>	 System → Information → Sens. electronic → Firmware version
<b>Description</b>	Displays the firmware version of the module.
<b>User interface</b>	Positive integer

### 5.5.3 "Display module" submenu


*Navigation*   System → Information → Display module




---

**Firmware version**


---










<b>Navigation</b>	 System → Information → Display module → Firmware version
<b>Description</b>	Displays the firmware version of the module.

**User interface**

Positive integer

## 5.6 "Display" submenu

Navigation  System → Display

► Display		
Language		→  96
Value 1 display		→  97
Value 2 display		→  97
Value 3 display		→  98
Value 4 display		→  98
Display damping		→  99
Rotation display		→  99
Brightness		→  99
Color scheme		→  99

### Language

Navigation  System → Display → Language

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 \*

\* Visibility depends on order options or device settings



- ภาษาไทย (Thai) \*
- tiếng Việt (Vietnamese) \*
- čeština (Czech)

---

### Value 1 display

---

**Navigation**

 System → Display → Value 1 display

**Description**

Select the measured value that is displayed first on the local display.

Additional information:

The applicable unit of measure is specified in the "System units" submenu.

**Selection**

- Mass flow
- Volume flow
- Corrected volume flow
- Temperature
- Density \*
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Inhomogeneous medium index
- Electronics temperature

---

### Value 2 display

---

**Navigation**

 System → Display → Value 2 display

**Description**

Select the measured value to display in the second position on the local display.

The unit is set in the "System units" menu.

**Selection**

- None
- Mass flow
- Volume flow
- Corrected volume flow
- Temperature
- Density \*
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Inhomogeneous medium index
- Electronics temperature

---


\* Visibility depends on order options or device settings

---

**Value 3 display**

---



**Navigation**  System → Display → Value 3 display

**Description** Select the measured value to display in the third position on the local display.  
The unit is set in the "System units" menu.

**Selection**


- None
- Mass flow
- Volume flow
- Corrected volume flow
- Temperature
- Density \*
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Inhomogeneous medium index
- Electronics temperature

---

**Value 4 display**

---



**Navigation**  System → Display → Value 4 display

**Description** Select the measured value to display in the fourth position on the local display.  
The unit is set in the "System units" menu.

**Selection**

- None
- Mass flow
- Volume flow
- Corrected volume flow
- Temperature
- Density \*
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Inhomogeneous medium index
- Electronics temperature

---

\* Visibility depends on order options or device settings

---

**Display damping**

---

**Navigation**

System → Display → Display damping

**Description**

Enter a time constant to set the reaction time of the display to fluctuations in the measured value (PT1 element).

The smaller the time constant, the faster the display reacts to fluctuations in the measured value.

If the time constant is set to 0, damping is deactivated.

**User entry**0.0 to 999.9 s

---

**Rotation display**

---

**Navigation**

System → Display → Rotation display

**Description**

Select rotation angle of the display text to optimize local display readability.

**Selection**

- Auto
  - 0 degree
  - 90 degree
  - 180 degree
  - 270 degree
- 

**Brightness**

---

**Navigation**

System → Display → Brightness

**Description**

Adjust brightness.

**User entry**0 to 100 %

---

**Color scheme**

---

**Navigation**

System → Display → Color scheme

**Description**

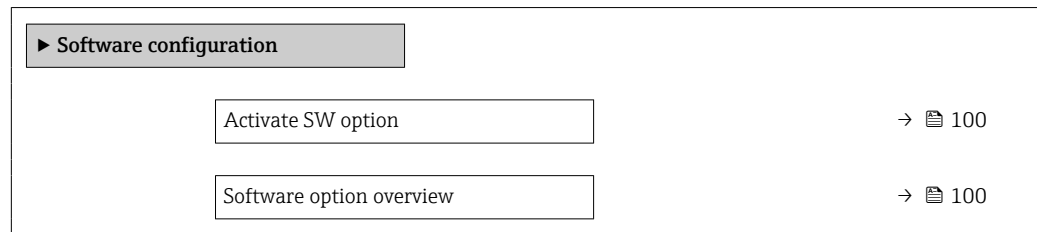
Select the preferred color scheme.

**Selection**

- Light
- Dark

## 5.7 "Software configuration" submenu

Navigation  System → Software config.



### Activate SW option

**Navigation**  System → Software config. → Activate SW opt.

**Description** Enter application package code or code of the functionality ordered separately to activate it.

Additional information:

- If a measuring device was ordered with an add-on software option, the activation code is programmed into the measuring device ex factory.
- After entering the activation code: Check whether the new software option is displayed in the "Software option overview" parameter and therefore active.

NOTE

If an invalid code is entered the software options that have already been activated are invalidated!

Before entering a new activation code: Create a record of the existing activation code.

**User entry** Positive integer

### Software option overview

**Navigation**  System → Software config. → SW option overv.

**Description** Displays all software options included in the order ex factory or ordered at a later date that have been enabled via the operating interface.

If a new software option is not displayed after entering the activation code, the code entered was inaccurate or invalid. In this case, contact the appropriate Endress+Hauser sales organization for assistance.

**User interface**

- Density
- Heartbeat Verification
- Heartbeat Monitoring

## 6 Explanation of abbreviated units

### 6.1 SI units

Process variable	Units	Explanation
	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
	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
	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
	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
	°C, K	Celsius, Kelvin
Time	s, m, h, d, y	Second, minute, hour, day, year

### 6.2 US units

Process variable	Units	Explanation
	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
Pressure	psi a	Pounds per square inch (absolute)
	psi g	Pounds per square inch (gauge)
Mass	oz, lb, STon	Ounce, pound, standard ton
	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
	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
	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

Process variable	Units	Explanation
	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)
	°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)
	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)

### 6.3 Imperial units

Process variable	Units	Explanation
	lb/gal (imp), lb/bbl (imp;beer), lb/bbl (imp;oil)	Pound/volume unit
Corrected volume	Sgal (imp)	Standard gallon
	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)
	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

Process variable	Units	Explanation
	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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