Description of Device Parameters

Dosimag

Electromagnetic flowmeter

Menu/Variable

Proline Device

- Access status tooling:
- Operation
- Setup
- Diagnostics

Expert

- Locking status:
- Access status tooling:
- Enter access code:
- System
- Sensor
- Input
- Output
- Communication
- Application
- Diagnostics
Table of contents

1 Document information .................. 4
  1.1 Document function ................... 4
  1.2 Target group ......................... 4
  1.3 Using this document .................. 4
    1.3.1 Information on the document structure .................. 4
    1.3.2 Structure of a parameter description ................... 6
  1.4 Symbols used .......................... 6
    1.4.1 Symbols for certain types of information .................. 6
    1.4.2 Symbols in graphics ................... 6

2 Overview of the Expert operating menu .................. 7

3 Description of device parameters ........ 9
  3.1 "System" submenu ..................... 10
    3.1.1 "Diagnostic handling" submenu .......... 11
    3.1.2 "Administration" submenu ............. 13
  3.2 "Sensor" submenu ..................... 14
    3.2.1 "Measured values" submenu ........... 15
    3.2.2 "System units" submenu ............... 19
    3.2.3 "Process parameters" submenu ........ 23
    3.2.4 "Sensor adjustment" submenu .......... 27
    3.2.5 "Calibration" submenu ............... 29
  3.3 "Output" submenu ...................... 30
    3.3.1 "Pulse/frequency/switch output 1 to 2" submenu ........... 30
  3.4 "Application" submenu ................ 49
    3.4.1 "Totalizer 1 to 3" submenu .......... 49
  3.5 "Diagnostics" submenu ............... 53
    3.5.1 "Diagnostic list" submenu .......... 56
    3.5.2 "Event logbook" submenu ........... 61
    3.5.3 "Device information" submenu ....... 62
    3.5.4 "Simulation" submenu ............... 65

4 Country-specific factory settings .... 68
  4.1 SI units ............................. 68
    4.1.1 System units ....................... 68
    4.1.2 On value low flow cut off .......... 68
  4.2 US units ............................. 68
    4.2.1 System units ....................... 68
    4.2.2 On value low flow cut off .......... 68

5 Explanation of abbreviated units .... 70
  5.1 SI units ............................. 70
  5.2 US units ............................. 70
  5.3 Imperial units ........................ 71

Index .................................. 72
1   Document information

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

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

1.3   Using this document

1.3.1   Information on the document structure
The document lists the submenus and their parameters according to the structure from the Expert menu (→ 7).

![Sample graphic](image)

For information on the arrangement of the parameters according to the structure of the Operation menu, Setup menu, Diagnostics menu (→ 53), along with a brief description, see the Operating Instructions for the device.
For information about the operating philosophy, see the "Operating philosophy" chapter in the device's Operating Instructions
1.3.2 Structure of a parameter description

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

<table>
<thead>
<tr>
<th>Complete parameter name</th>
<th>Write-protected parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Navigation</td>
<td></td>
</tr>
</tbody>
</table>

- **Navigation**
  - Navigation path to the parameter via the operating tool
  - The names of the menus, submenus and parameters are displayed in abbreviated format.

- **Prerequisite**
  - The parameter is only available under these specific conditions

- **Description**
  - Description of the parameter function

- **Options**
  - List of the individual options for the parameter
    - Option 1
    - Option 2

- **User entry**
  - Input range for the parameter

- **User interface**
  - Display value/data for the parameter

- **Factory setting**
  - Default setting ex works

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

1.4 Symbols used

1.4.1 Symbols for certain types of information

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tip</td>
<td>Indicates additional information.</td>
</tr>
<tr>
<td>Reference to documentation</td>
<td></td>
</tr>
<tr>
<td>Reference to page</td>
<td></td>
</tr>
<tr>
<td>Reference to graphic</td>
<td></td>
</tr>
<tr>
<td>Operation via operating tool</td>
<td></td>
</tr>
<tr>
<td>Write-protected parameter</td>
<td></td>
</tr>
</tbody>
</table>

1.4.2 Symbols in graphics

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 2, 3 ...</td>
<td>Item numbers</td>
</tr>
<tr>
<td>A, B, C, ...</td>
<td>Views</td>
</tr>
<tr>
<td>A-A, B-B, C-C, ...</td>
<td>Sections</td>
</tr>
</tbody>
</table>
## Overview of the Expert operating menu

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

<table>
<thead>
<tr>
<th>Expert</th>
<th>Locking status</th>
<th>→ 9</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Access status tooling</td>
<td>→ 10</td>
</tr>
<tr>
<td></td>
<td>Enter access code</td>
<td>→ 10</td>
</tr>
<tr>
<td>▶ System</td>
<td></td>
<td>→ 10</td>
</tr>
<tr>
<td></td>
<td>▶ Diagnostic handling</td>
<td>→ 11</td>
</tr>
<tr>
<td></td>
<td>▶ Administration</td>
<td>→ 13</td>
</tr>
<tr>
<td>▶ Sensor</td>
<td>▶ Measured values</td>
<td>→ 14</td>
</tr>
<tr>
<td></td>
<td>▶ System units</td>
<td>→ 15</td>
</tr>
<tr>
<td></td>
<td>▶ Process parameters</td>
<td>→ 19</td>
</tr>
<tr>
<td></td>
<td>▶ Sensor adjustment</td>
<td>→ 23</td>
</tr>
<tr>
<td></td>
<td>▶ Calibration</td>
<td>→ 27</td>
</tr>
<tr>
<td>▶ Output</td>
<td>▶ Pulse/frequency/switch output 1 to 2</td>
<td>→ 29</td>
</tr>
<tr>
<td></td>
<td>▶ Application</td>
<td>→ 30</td>
</tr>
<tr>
<td></td>
<td>▶ Totalizer 1 to 3</td>
<td>→ 30</td>
</tr>
<tr>
<td>▶ Diagnostics</td>
<td>▶ Reset all totalizers</td>
<td>→ 49</td>
</tr>
<tr>
<td></td>
<td>▶ Actual diagnostics</td>
<td>→ 53</td>
</tr>
<tr>
<td></td>
<td>▶ Timestamp</td>
<td>→ 54</td>
</tr>
<tr>
<td></td>
<td>▶ Actual diagnostics</td>
<td>→ 54</td>
</tr>
</tbody>
</table>
Overview of the Expert operating menu

- Previous diagnostics → 55
- Timestamp → 55
- Previous diagnostics → 55
- Operating time from restart → 56
- Operating time → 56

- Diagnostic list → 56
- Event logbook → 61
- Device information → 62
- Simulation → 65
3 Description of device parameters

In the following section, the parameters are listed according to the menu structure of the operating tool.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Menu Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Locking status</td>
<td>→ 9</td>
</tr>
<tr>
<td>Access status tooling</td>
<td>→ 10</td>
</tr>
<tr>
<td>Enter access code</td>
<td>→ 10</td>
</tr>
<tr>
<td>System</td>
<td>→ 10</td>
</tr>
<tr>
<td>Sensor</td>
<td>→ 14</td>
</tr>
<tr>
<td>Output</td>
<td>→ 30</td>
</tr>
<tr>
<td>Application</td>
<td>→ 49</td>
</tr>
<tr>
<td>Diagnostics</td>
<td>→ 53</td>
</tr>
</tbody>
</table>

**Locking status**

**Navigation**

Expert → Locking status

**Description**

Use this function to view the active write protection.

**User interface**

Temporarily locked

**Additional information**

Display

In the operating tool all active types of write protection are selected.

If additional write protection is active, this restricts the current access authorization even further. The write protection status can be viewed via the **Locking status** parameter (→ 9).

"Temporarily locked" option (priority 3)

Write access to the parameters is temporarily lock due to device-internal processing (e.g. data upload/download, reset). Once the internal processing has been completed, the parameters can be changed once again.
Access status tooling

Description
Use this function to view the access authorization to the parameters via the operating tool.

User interface
- Operator
- Maintenance

Factory setting
Maintenance

Additional information

Description
The access authorization can be modified via the Enter access code parameter.

If additional write protection is active, this restricts the current access authorization even further. The write protection status can be viewed via the Locking status parameter (→ 9).

Display
Information on access authorization is provided in the 'User roles and associated access authorization' and 'Operating concept' sections of the Operations Instructions for the device.

Enter access code

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

User entry
0 to 9999

3.1 "System" submenu

Navigation
Expert → System

- Diagnostic handling → 11
- Administration → 13
3.1.1 "Diagnostic handling" submenu

**Navigation**

Expert → System → Diagn. handling

- **Alarm delay**

  → 11

- **Diagnostic behavior**

  → 12

**Alarm delay**

**Description**

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

- The diagnostic message is reset without a time delay.

**User entry**

0 to 60 s

**Factory setting**

0 s

**Additional information**

This setting affects the following diagnostic messages:

- 004 Sensor
- 062 Sensor connection
- 082 Data storage
- 083 Memory content
- 242 Software incompatible
- 270 Main electronic failure
- 272 Main electronic failure
- 273 Main electronic failure
- 281 Electronic initialization
- 311 Electronic failure
- 322 Electronic drift
- 442 Frequency output 1 to 2
- 443 Pulse output 1 to 2
- 453 Flow override
- 500 Electrode difference voltage too high
- 832 Electronic temperature too high
- 833 Electronic temperature too low
- 834 Process temperature too high
- 835 Process temperature too low
- 937 EMC interference
- 938 EMC interference
“Diagnostic behavior” submenu

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

Modifying the diagnostic behavior of a diagnostic event. Each diagnostic event is assigned a certain diagnostic behavior at the factory. The user can change this assignment for certain diagnostics events.

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

- **Off** option
  The device continues to measure. The diagnostic event is ignored; it is neither entered into the Event logbook, nor is a diagnostic message generated.

- **Alarm** option
  The device continues to measure. The signal outputs assume the specified alarm condition. A diagnostic message is generated.

- **Warning** option
  The device continues to measure. A diagnostic message is generated.

- **Logbook entry only** option
  The device continues to measure. The diagnostic message is only entered in the Event logbook submenu (→ 12).

**Navigation**

Expert → System → Diagn. handling → Diagn. behavior

**Prerequisite**

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

**Description**

Use this function to change the diagnostic behavior of the diagnostic message 442 Frequency output 1 to 2.

**Selection**

- Off
- Alarm
- Warning
- Logbook entry only

**Factory setting**

Warning

**Additional information**

For a detailed description of the options available, see → 12
Assign behavior of diagnostic no. 443 (Pulse output 1 to 2)

Navigation
Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 443

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

Description
Use this function to change the diagnostic behavior of the diagnostic message **443 Pulse output 1 to 2**.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting
Warning

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

Assign behavior of diagnostic no. 937 (EMC interference)

Navigation
Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 937

Description
Use this function to change the diagnostic behavior of the diagnostic message **937 EMC interference**.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting
Warning

Additional information
For a detailed description of the options available for selection: → 12

3.1.2 "Administration” submenu

Navigation
Expert → System → Administration

- Administration

  - Device reset

  - Permanent storage

→ 14
Device reset

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

Selection
- Cancel
- To delivery settings
- Restart device

Factory setting
Cancel

Additional information
"Cancel" option
No action is executed and the user exits the parameter.

"To delivery settings" option
All the parameters are reset to their factory settings.

"Restart device" option
The restart resets every parameter whose data are in the volatile memory (RAM) to the factory setting (e.g. measured value data). The device configuration remains unchanged.

Permanent storage

Navigation
Expert → System → Administration → Perm. storage

Description
Use this function to switch permanent storage on and off.

Selection
- Off
- On

Factory setting
On

3.2 "Sensor" submenu

Navigation
Expert → Sensor

- Measured values → 15
- System units → 19
- Process parameters → 23
3.2.1 "Measured values" submenu

*Navigation*  
Expert → Sensor → Measured val.

```
- Sensor adjustment  →  27
- Calibration        →  29
```

### Volume flow

**Navigation**  

**Description**  
Use this function to view the volume flow currently measured.

**User interface**  
Signed floating-point number

**Additional information**  
*Dependency*  
The unit is taken from the **Volume flow unit** parameter (→  19)
**Totalizer**

**Navigation**

Expert → Sensor → Measured val. → Totalizer

- Totalizer value 1 to 3 ➞ 16
- Totalizer overflow 1 to 3 ➞ 17

**Prerequisite**

In the **Assign process variable** parameter (→ 50) of the **Totalizer 1 to 3** submenu, the **Volume flow** option is selected.

**Description**

Displays the current totalizer reading.

**User interface**

Signed floating-point number

**Additional information**

**Description**

As it is only possible to display a maximum of 7 digits, the current counter value is the sum of the totalizer value and the overflow value from the **Totalizer overflow 1 to 3** parameter if the display range is exceeded.

In the event of an error, the totalizer adopts the mode defined in the **Failure mode** parameter (→ 52).

**User interface**

The value of the process variable totalized since measuring began can be positive or negative. This depends on the settings in the **Totalizer operation mode** parameter (→ 51).

The unit of the selected process variable is specified for the totalizer in the **Assign process variable** parameter:

- **Volume flow** option: **Volume flow unit** parameter (→ 19)

**Example**

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

- Value in the **Totalizer value 1** parameter: 196845.7 m³
- Value in the **Totalizer overflow 1** parameter: 1 ⋅ 10⁷ (1 overflow) = 10000000 [m³]
- Current totalizer reading: 10196845.7 m³
Totalizer overflow 1 to 3

Navigation

Expert → Sensor → Measured val. → Totalizer → Tot. overflow 1 to 3

Prerequisite

In the Assign process variable parameter (→ 50) of the Totalizer 1 to 3 submenu, the Volume flow option is selected.

Description

Displays the current totalizer overflow.

User interface

Integer with sign

Additional information

Description

If the current reading has more than 7 digits, which is the maximum value range that can be displayed, the value above this range is given as an overflow. The current totalizer value is therefore the sum of the overflow value and the totalizer value from the Totalizer value 1 to 3 parameter.

User interface

The unit of the selected process variable is specified for the totalizer in the Assign process variable parameter. If the following is selected in the Assign process variable parameter:

Volume flow option: Volume flow unit parameter (→ 19)

Example

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

- Value in the Totalizer value 1 parameter: 196 845.7 m³
- Value in the Totalizer overflow 1 parameter: 2 \cdot 10^7 (2 overflows) = 20 000 000 [m³]
- Current totalizer reading: 20 196 845.7 m³

"Output values" submenu

Navigation

Expert → Sensor → Measured val. → Output values

<table>
<thead>
<tr>
<th>Output values</th>
<th>→ 18</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulse output 1</td>
<td></td>
</tr>
<tr>
<td>Output frequency 1</td>
<td>→ 19</td>
</tr>
<tr>
<td>Switch status 1</td>
<td>→ 19</td>
</tr>
<tr>
<td>Output frequency 2</td>
<td>→ 19</td>
</tr>
<tr>
<td>Pulse output 2</td>
<td>→ 18</td>
</tr>
<tr>
<td>Switch status 2</td>
<td>→ 19</td>
</tr>
</tbody>
</table>
Description of device parameters

Pulse output

Navigation

Expert → Sensor → Measured val. → Output values → Pulse output 1 to 2

Prerequisite

One of the following options is selected in the Operating mode parameter (→ 31):

- Pulse
- Automatic pulse

Description

Displays the pulse frequency currently output.

User interface

Positive floating-point number

Additional information

Description

- The pulse output is an open emitter output.
- This is configured at the factory in such a way that the transistor is conductive for the duration of the pulse (NO contact) and is safety-oriented.
- The Value per pulse parameter (→ 34) and the Pulse width parameter (→ 35) (Operating mode (→ 31) Pulse) can be used to define the value (i.e. the amount of the measured value that corresponds to a pulse) and the duration of the pulse.

![Diagram of pulse output]

0  Non-conductive
1  Conductive
NC  Normally closed
NO  Normally opened

The output behavior can be inverted via the Invert output signal parameter (→ 48), i.e., the transistor is not conductive for the duration of the pulse.

In addition, the behavior of the output in the event of an error (Failure mode parameter (→ 36)) can be configured.

The duration of the pulses must be defined as a function of the input card used. The pulse(s) must not exceed the maximum input frequency of the counter card.
### Output frequency

**Navigation**

Expert → Sensor → Measured val. → Output values → Output freq. 1 to 2

**Prerequisite**

In the **Operating mode** parameter (→ 31), the **Frequency** option is selected.

**Description**

Displays the actual value of the output frequency which is currently measured.

**User interface**

0.0 to 10 000.0 Hz

### Switch status

**Navigation**

Expert → Sensor → Measured val. → Output values → Switch status 1 to 2

**Prerequisite**

In the **Operating mode** parameter (→ 31), the **Switch** option is selected.

**Description**

Displays the current switch status of the status output.

**User interface**

- Open
- Closed

### 3.2.2 “System units” submenu

**Navigation**

Expert → Sensor → System units

#### Volume flow unit

**Description**

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

<table>
<thead>
<tr>
<th>SI units</th>
<th>US units</th>
<th>Imperial units</th>
</tr>
</thead>
<tbody>
<tr>
<td>cm³/s</td>
<td>af/s</td>
<td>gal/s (imp)</td>
</tr>
<tr>
<td>cm³/min</td>
<td>af/min</td>
<td>gal/min (imp)</td>
</tr>
<tr>
<td>cm³/h</td>
<td>af/h</td>
<td>gal/h (imp)</td>
</tr>
<tr>
<td>cm³/d</td>
<td>af/d</td>
<td>gal/d (imp)</td>
</tr>
<tr>
<td>dm³/s</td>
<td>ft³/s</td>
<td>Mgal/s (imp)</td>
</tr>
<tr>
<td>dm³/min</td>
<td>ft³/min</td>
<td>Mgal/min (imp)</td>
</tr>
<tr>
<td>dm³/h</td>
<td>ft³/h</td>
<td>Mgal/h (imp)</td>
</tr>
<tr>
<td>dm³/d</td>
<td>ft³/d</td>
<td>Mgal/d (imp)</td>
</tr>
<tr>
<td>m³/s</td>
<td>fl oz/s (us)</td>
<td>bbl/s (imp;beer)</td>
</tr>
<tr>
<td>m³/min</td>
<td>fl oz/min (us)</td>
<td>bbl/min (imp;beer)</td>
</tr>
<tr>
<td>m³/h</td>
<td>fl oz/h (us)</td>
<td>bbl/h (imp;beer)</td>
</tr>
<tr>
<td>m³/d</td>
<td>fl oz/d (us)</td>
<td>bbl/d (imp;beer)</td>
</tr>
<tr>
<td>ml/s</td>
<td>gal/s (us)</td>
<td>bbl/s (imp;oil)</td>
</tr>
<tr>
<td>ml/min</td>
<td>gal/min (us)</td>
<td>bbl/min (imp;oil)</td>
</tr>
<tr>
<td>ml/h</td>
<td>gal/h (us)</td>
<td>bbl/h (imp;oil)</td>
</tr>
<tr>
<td>ml/d</td>
<td>gal/d (us)</td>
<td>bbl/d (imp;oil)</td>
</tr>
<tr>
<td>l/s</td>
<td>kgal/s (us)</td>
<td>bbl/s (imp;beer)</td>
</tr>
<tr>
<td>l/min</td>
<td>kgal/min (us)</td>
<td>bbl/min (imp;beer)</td>
</tr>
<tr>
<td>l/h</td>
<td>kgal/h (us)</td>
<td>bbl/h (imp;beer)</td>
</tr>
<tr>
<td>l/d</td>
<td>kgal/d (us)</td>
<td>bbl/d (imp;beer)</td>
</tr>
<tr>
<td>hl/s</td>
<td>Mgal/s (us)</td>
<td>bbl/s (us;beer)</td>
</tr>
<tr>
<td>hl/min</td>
<td>Mgal/min (us)</td>
<td>bbl/min (us;beer)</td>
</tr>
<tr>
<td>hl/h</td>
<td>Mgal/h (us)</td>
<td>bbl/h (us;beer)</td>
</tr>
<tr>
<td>hl/d</td>
<td>Mgal/d (us)</td>
<td>bbl/d (us;beer)</td>
</tr>
<tr>
<td>Ml/s</td>
<td>bbl/s (us;liq.)</td>
<td>bbl/s (us;oil)</td>
</tr>
<tr>
<td>Ml/min</td>
<td>bbl/min (us;liq.)</td>
<td>bbl/min (us;oil)</td>
</tr>
<tr>
<td>Ml/h</td>
<td>bbl/h (us;liq.)</td>
<td>bbl/h (us;oil)</td>
</tr>
<tr>
<td>Ml/d</td>
<td>bbl/d (us;liq.)</td>
<td>bbl/d (us;oil)</td>
</tr>
</tbody>
</table>

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

### Factory setting
- Country-specific: ml/s, fl oz/s (us)

### Additional information
**Result**

The selected unit applies for:
- **Volume flow** parameter (→ 15)

**Options**

For an explanation of the abbreviated units: → 70
Customer-specific units

The unit for the customer-specific volume is specified in the User volume text parameter (→ 22).

Volume unit

Navigation

Expert → Sensor → System units → Volume unit

Description

Use this function to select the unit for the volume.

Selection

SI units

- cm³
- dm³
- m³
- ml
- 1
- hl
- Ml Mega

US units

- af
- ft³
- fl oz (us)
- gal (us)
- kgal (us)
- Mgal (us)
- bbl (us;oil)
- bbl (us;liq.)
- bbl (us;beer)
- bbl (us;tank)

Imperial units

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

Custom-specific units

User vol.

Factory setting

Country-specific:

- ml
- fl oz (us)

Additional information

Options

For an explanation of the abbreviated units: → 70

Customer-specific units

The unit for the customer-specific volume is specified in the User volume text parameter (→ 22).

Date/time format

Navigation

Expert → Sensor → System units → Date/time format

Description

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

Selection

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

Factory setting

dd.mm.yy hh:mm
Description of device parameters

Additional information

Selection

For an explanation of the abbreviated units: → 70

"User-specific units" submenu

Navigation

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

User volume text

*User-specific units*

User volume text

User volume factor

User volume text

User volume factor

Description

Use this function to enter a text for the user-specific unit of volume and volume flow. The corresponding time units (s, min, h, d) for volume flow are generated automatically.

User entry

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

Factory setting

User vol.

Additional information

Result

The defined unit is shown as an option in the choose list of the following parameters:

- **Volume flow unit** parameter (→ 19)
- **Volume unit** parameter (→ 21)

Example

If the text GLAS is entered, the choose list of the **Volume flow unit** parameter (→ 19) shows the following options:

- GLAS/s
- GLAS/min
- GLAS/h
- GLAS/d

User volume factor

Navigation

Expert → Sensor → System units → User-spec. units → Volume factor

Description

Use this function to enter a quantity factor for the user-specific volume and volume flow unit.
User entry: Signed floating-point number

Factory setting: 1.0

3.2.3 "Process parameters" submenu


<table>
<thead>
<tr>
<th>Process parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow override</td>
</tr>
<tr>
<td>Low flow cut off</td>
</tr>
</tbody>
</table>

**Flow override**

**Navigation**


**Description**

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

**Selection**

- Off
- On

**Factory setting**

Off

**Additional information**

**Effect**

- This setting affects all the functions of the measuring device.
- Positive zero return is not relevant for most applications.

**Description**

The volume flow is set to 0.

**Flow override is active**

- The diagnostic message diagnostic message C453 Flow override is displayed.
- Output values
  - Output: 0
  - Temperature: proceeding output
  - Totalizers 1-3: Stop being totalized
"Low flow cut off" submenu

Low flow cut off is an important function for many applications to shut out inherent noise from the measuring device and the application in the lower measuring range. If the flow drops below a certain minimum value, the value is set to 0 so that the flow signal can be kept at the zero point between two batches.

Navigation

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

<table>
<thead>
<tr>
<th>Assign process variable</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>On value low flow cutoff</td>
<td>24</td>
</tr>
<tr>
<td>Off value low flow cutoff</td>
<td>25</td>
</tr>
<tr>
<td>Pressure shock suppression</td>
<td>25</td>
</tr>
</tbody>
</table>

Assign process variable

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

Selection

- Off
- Volume flow

Factory setting

Volume flow

On value low flow cutoff

Description

Use this function to enter a switch-on value for low flow cut off. Low flow cut off is activated if the value entered is not equal to 0.

User entry

Signed floating-point number

Factory setting

Depends on country and nominal diameter

Factory setting

Depends on country and nominal diameter

Additional information

The unit depends on the process variable selected in the Assign process variable parameter.
### Off value low flow cutoff

**Navigation**

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

**Prerequisite**

In the Assign process variable parameter (→ 24), the Volume flow option is selected.

**Description**

Use this function to enter a switch-off value for low flow cut off. The off value is entered as a positive hysteresis from the on value→ 24.

**User entry**

0 to 100.0 %

**Factory setting**

50 %

**Additional information**

- **On value low flow cutoff** parameter (→ 24): 2 g/s
- **Off value low flow cutoff** parameter (→ 25): 50 %
- Switch-off value: 3 g/s

---

### Pressure shock suppression

**Navigation**


**Prerequisite**

In the Assign process variable parameter (→ 24), the Volume flow option is selected.

**Description**

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

**User entry**

0 to 100 s

**Factory setting**

0 s
Description of device parameters

Dosimag

Additional information

Description

**Pressure shock suppression is enabled**

- Prerequisite:
  - Flow rate < on-value of low flow cut off

- Output values
  - Flow displayed: 0
  - Totalizer: the totalizers are pegged at the last correct value

**Pressure shock suppression is disabled**

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

**Example**

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

---

**Diagram**

- Q: Flow
- t: Time
- A: Drip
- B: Pressure shock
- C: Pressure shock suppression active as specified by the time entered
- D: Pressure shock suppression inactive

1. Valve closes
2. Flow falls below the on-value of the low flow cut off: pressure shock suppression is activated
3. The time entered has elapsed: pressure shock suppression is deactivated
4. The actual flow value is now displayed and output
5. On value for low flow cut off
6. Off value for low flow cut off
3.2.4  "Sensor adjustment" submenu

Navigation  


Installation direction  

→  27

Integration time  

→  27

Measuring period  

→  27

Process variable adjustment  

→  28

Installation direction

Navigation  


Description  

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

Selection  

• Flow in arrow direction
• Flow against arrow direction

Factory setting  

Flow in arrow direction

Additional information  

Description  

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

Integration time

Navigation  

Expert → Sensor → Sensor adjustm. → Integration time

Description  

Display the duration of an integration cycle.

User interface  

1 to 65 ms

Factory setting  

5 ms

Measuring period

Navigation  

Expert → Sensor → Sensor adjustm. → Measuring period

Description  

Display the time of a full measuring period.
**User interface**
6 to 80 ms

**Factory setting**
12.5 ms

---

"**Process variable adjustment**" submenu

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

---

**Volume flow offset**

**Navigation**

**Description**
Use this function to enter the zero point shift for the volume flow trim. The volume flow unit on which the shift is based is m³/s.

**User entry**
Signed floating-point number

**Factory setting**
0 m³/s

**Additional information**

- Description
  Corrected value = (factor × value) + offset

---

**Volume flow factor**

**Navigation**

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

**User entry**
Positive floating-point number

**Factory setting**
1

**Additional information**

- Description
  Corrected value = (factor × value) + offset
### 3.2.5 "Calibration" submenu

**Navigation**

Expert → Sensor → Calibration

<table>
<thead>
<tr>
<th>Description</th>
<th>Nominal diameter</th>
<th>→ 29</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Calibration</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description</th>
<th>Calibration factor</th>
<th>→ 29</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Zero point</td>
<td>→ 29</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Nominal diameter

**Navigation**

Expert → Sensor → Calibration → Nominal diameter

**Description**

Displays the nominal diameter of the sensor.

**User interface**

DNxx / x" 

**Factory setting**

Depends on the size of the sensor

**Additional information**

The value is also specified on the sensor nameplate.

#### Calibration factor

**Navigation**

Expert → Sensor → Calibration → Cal. factor

**Description**

Displays the current calibration factor for the sensor.

**User interface**

Positive floating-point number

**Factory setting**

Depends on nominal diameter and calibration.

#### Zero point

**Navigation**

Expert → Sensor → Calibration → Zero point

**Description**

This function shows the zero point correction value for the sensor.

**User interface**

Signed floating-point number
Factory setting

Depends on nominal diameter and calibration

3.3 "Output" submenu

Navigation

Expert → Output

3.3.1 "Pulse/frequency/switch output 1 to 2" submenu

Navigation

Expert → Output → PFS output 1 to 2
Operating mode

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

**Selection**
- Off
- Pulse
- Automatic pulse
- Frequency
- Switch

**Factory setting**
- Pulse/freq./switch output 1: **Pulse** option
- Pulse/freq./switch output 2: **Switch** option

**Additional information**
*Off* option
The pulse/frequency/switch output is not used.
"Pulse" option

Quantity-dependent pulse with configurable pulse width
- Whenever a specific volume is reached (pulse value), a pulse is output, the duration of which was set previously (pulse width).
- The pulses are never shorter than the set duration.
- This option is used for most batching applications.
- Depending on the setting, when using this option it is important that the recorder can detect pulses that are output at a pulse rate of 10 kHz.

Example
- Flow rate approx. 100 g/s
- Pulse value 0.1 g
- Pulse width 0.05 ms
- Pulse rate 1000 Impuls/s

"Automatic pulse" option

Quantity-proportional pulse with on/off ratio of 1:1
- This is used if the duration of the active pulse is not known.
- Whenever a specific volume is reached (pulse value), a pulse with a pulse-off ratio of 1:1 is output.
- In this case, the pulse width is not relevant.
- When using this option, it is important that the recorder can detect pulses that are output at a pulse rate of 10 kHz.

Example
- Flow rate approx. 100 g/s
- Pulse value 0.1 g
- Automatic pulse width
- Pulse rate approx. 1000 Impuls/s
"Frequency" option
Flow-proportional frequency output with 1:1 on/off ratio
An output frequency is output that is proportional to the value of the volume flow process variable.
Example
- Flow rate approx. 100 g/s
- Max. frequency 10 kHz
- Flow rate at max. frequency 1000 g/s
- Output frequency approx. 1000 Hz

![Flow-proportional frequency output](A0026884)

"Switch" option
Switch to indicate a state (e.g. alarm or warning if a limit value is reached)
Example
Alarm response without alarm

![No alarm, high level](A0026884)

Alarm response in case of alarm

![Alarm, low level](A0026885)

**Channel 2**

**Navigation**
- Expert → Output → PFS output 1 to 2 → Channel 2

**Prerequisite**
The **Pulse** option is selected in the **Operating mode** parameter (→ 31).
Description

Description of device parameters

Use this function to output a redundant pulse with or without a time delay. With this setting, switch output 2 can be used as a redundant output. This is used primarily in metrological applications.

Selection

- Off
- Redundant 0°
- Redundant 90°
- Redundant 180°

Factory setting

Off

Additional information

Options

- Off
  Pulse output 2 is not used.
- Redundant 0°
  Redundant pulses are output without a time delay.
- Redundant 90°
  Redundant pulses are output with a time delay of half a pulse width.
- Redundant 180°
  Redundant pulses are output with a time delay of a full pulse width.

Assign pulse output

Navigation

Expert → Output → PFS output 1 to 2 → Assign pulse

Prerequisite

One of the following options is selected in the Operating mode parameter (→ 31):

- Pulse
- Automatic pulse

Description

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

Selection

- Off
- Volume flow

Factory setting

Off

Value per pulse

Navigation

Expert → Output → PFS output 1 to 2 → Value per pulse

Prerequisite

One of the following options is selected in the Operating mode parameter (→ 31):

- Pulse
- Automatic pulse

In the Assign pulse output parameter (→ 34), the Volume flow option is selected.

Description

Use this function to enter the value for the measured value that a pulse is equivalent to.

User entry

Signed floating-point number
Dosimag

Description of device parameters

**Factory setting**

Depends on the nominal diameter:
- DN 4 (¹/₈") : 0.005 ml (0.0002 fl oz)
- DN 8 (³/₈") : 0.02 ml (0.001 fl oz)
- DN 15 (½") : 0.1 ml (0.004 fl oz)
- DN 15K (½K") : 0.1 ml (0.004 fl oz)
- DN 25 (1") : 0.2 ml (0.007 fl oz)

**Additional information**

*User entry*

Weighting of the pulse output with a quantity.
The lower the pulse value, the
- better the resolution.
- the higher the frequency of the pulse response.

---

**Pulse width**

**Navigation**

Expert → Output → PFS output 1 to 2 → Pulse width

**Prerequisite**

In the **Operating mode** parameter (→ 31), the **Pulse** option is selected and in the **Assign pulse output** parameter (→ 34), the **Volume flow** option is selected.

**Description**

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

**User entry**

0.05 to 3.75 ms

**Factory setting**

0.05 ms

**Additional information**

*Description*

- Define how long a pulse is (duration).
- The duration must be defined depending on the input card used.
- The maximum pulse rate is defined by \( f_{\text{max}} = \frac{1}{2 \times \text{pulse width}} \).
- The interval between two pulses lasts at least as long as the set pulse width.
- The maximum flow is defined by \( Q_{\text{max}} = f_{\text{max}} \times \text{pulse value} \).
- If the flow exceeds these limit values, the measuring device displays the diagnostic message **S443 Pulse output 1 to 2**.

![Diagram](image.png)

- **B** = Pulse width entered
- **P** = Intervals between the individual pulses
Description of device parameters

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

The pulse width is not relevant for Automatic pulse option.

Measuring mode

Navigation
Expert → Output → PFS output 1 to 2 → Measuring mode

Prerequisite
One of the following options is selected in the Operating mode parameter (→ 31):
- Pulse
- Automatic pulse

In the Assign pulse output parameter (→ 34), the Volume flow option is selected.

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

Selection
- Forward flow
- Forward/Reverse flow
- Reverse flow

Factory setting
Forward flow

Additional information
Selection
- Forward flow
  Positive flow is output, negative flow is not output.
- Forward/Reverse flow
  Positive and negative flow are output (absolute value), but a distinction is not made between positive and negative flow.
- Reverse flow
  Negative flow is output, positive flow is not output.

For a detailed description of the options available, see the Measuring mode parameter (→ 39)

Failure mode

Navigation
Expert → Output → PFS output 1 to 2 → Failure mode

Prerequisite
One of the following options is selected in the Operating mode parameter (→ 31):
- Pulse
- Automatic pulse

In the Assign pulse output parameter (→ 34), the Volume flow option is selected.

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

- Actual value
- No pulses

Factory setting

Actual value

Additional information

Description

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

Options

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

NOTICE! A device alarm is a measuring device error that must be taken seriously. It can affect the measurement quality such that the quality can no longer be guaranteed. The Actual value option is only recommended if it can be guaranteed that all possible alarm conditions will not affect the measurement quality.

Pulse output

Navigation

- Expert → Output → PFS output 1 to 2 → Pulse output 1 to 2

Prerequisite

One of the following options is selected in the Operating mode parameter (→ 31):
- Pulse
- Automatic pulse

Description

Displays the pulse frequency currently output.

User interface

Positive floating-point number

Additional information

Description

- The pulse output is an open emitter output.
- This is configured at the factory in such a way that the transistor is conductive for the duration of the pulse (NO contact) and is safety-oriented.
- The Value per pulse parameter (→ 34) and the Pulse width parameter (→ 35) (Operating mode (→ 31) Pulse) can be used to define the value (i.e. the amount of the measured value that corresponds to a pulse) and the duration of the pulse.
The output behavior can be reversed via the **Invert output signal** parameter (→ 48), i.e. the transistor does not conduct for the duration of the pulse.

In addition, the behavior of the output in the event of an error (**Failure mode** parameter (→ 36)) can be configured.

The duration of the pulses must be defined as a function of the input card used. The pulse(s) must not exceed the maximum input frequency of the counter card.

### Assign frequency output

**Navigation**

Expert → Output → PFS output 1 to 2 → Assign freq.

**Prerequisite**

The **Frequency** option is selected in the **Operating mode** parameter (→ 31).

**Description**

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

**Selection**

- Off
- Volume flow

**Factory setting**

Off

### Minimum frequency value

**Navigation**

Expert → Output → PFS output 1 to 2 → Min. freq. value

**Prerequisite**

In the **Operating mode** parameter (→ 31), the **Frequency** option is selected and in the **Assign frequency output** parameter (→ 38), the **Volume flow** option is selected.

**Description**

Use this function to enter the start value frequency.

**User entry**

0.0 to 10 000.0 Hz
**Factory setting**

0.0 Hz

**Maximum frequency value**

<table>
<thead>
<tr>
<th>Navigation</th>
<th>Expert → Output → PFS output 1 to 2 → Max. freq. value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prerequisite</strong></td>
<td>In the Operating mode parameter (→ 31), the Frequency option is selected and in the Assign frequency output parameter (→ 38), the Volume flow option is selected.</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>Use this function to enter the end value frequency.</td>
</tr>
<tr>
<td><strong>User entry</strong></td>
<td>0.0 to 10 000.0 Hz</td>
</tr>
<tr>
<td><strong>Factory setting</strong></td>
<td>10 000.0 Hz</td>
</tr>
</tbody>
</table>

**Measuring value at maximum frequency**

<table>
<thead>
<tr>
<th>Navigation</th>
<th>Expert → Output → PFS output 1 to 2 → Val. at max.freq</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prerequisite</strong></td>
<td>In the Operating mode parameter (→ 31), the Frequency option is selected and in the Assign frequency output parameter (→ 38), the Volume flow option is selected.</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>Use this function to enter the measured value for the end value frequency.</td>
</tr>
<tr>
<td><strong>User entry</strong></td>
<td>Signed floating-point number</td>
</tr>
<tr>
<td><strong>Factory setting</strong></td>
<td>Depends on country and nominal diameter</td>
</tr>
</tbody>
</table>

**Additional information**

*Description*

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

*Dependency*

The entry depends on the process variable selected in the Assign frequency output parameter (→ 38).

---

**Measuring mode**

<table>
<thead>
<tr>
<th>Navigation</th>
<th>Expert → Output → PFS output 1 to 2 → Measuring mode</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prerequisite</strong></td>
<td>In the Operating mode parameter (→ 31), the Frequency option is selected and in the Assign frequency output parameter (→ 38), the Volume flow option is selected.</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>Use this function to select the measuring mode for the frequency output.</td>
</tr>
</tbody>
</table>
Description of device parameters

Dosimag

Selection

- Forward flow
- Forward/Reverse flow
- Reverse flow

Factory setting

Forward flow

Additional information

"Forward flow" option

The frequency output signal is proportional to the measured variable assigned. The measuring range is defined by the value that is assigned to the Measuring value at maximum frequency (A). The measured value for the minimum frequency is implicitly 0.

The flow components outside the scaled measuring range are taken into account for signal output as follows:

Measuring value at maximum frequency = 10kg/h

- If the effective flow exceeds the measured value A, the diagnostic message $\Delta S442$ Frequency output 1 to 2 is displayed. If the value is exceeded, the frequency remains at the maximum frequency, or at the failure frequency according to the configuration.

- If the value is undershot, i.e. flow is negative, 0 Hz is output and no diagnostic message is displayed.

![Graph](image1)

A  Measuring value at maximum frequency

"Forward/Reverse flow" option

The frequency output signal is independent of the direction of flow (absolute amount of the measured variable). The flow direction can be output via the configurable switch outputs.

The flow components outside the scaled measuring range are taken into account for signal output as follows:

If the effective flow exceeds the absolute value A, the diagnostic message $\Delta S442$ Frequency output 1 to 2 is displayed. If the value is exceeded, the frequency remains at the maximum frequency, or at the failure frequency according to the configuration.

![Graph](image2)

A  Measuring value at maximum frequency
"Reverse flow" option

The flow components outside the scaled measuring range are taken into account for signal output as follows:

- If the effective flow drops below the value A (normally a negative value for reverse flow), the diagnostic message \textit{S442 Frequency output 1 to 2} is displayed. If the value is undershot, the frequency remains at the maximum frequency, or at the failure frequency according to the configuration.
- If the value is exceeded, i.e. flow is positive, 0 Hz is output and no diagnostic message is displayed.

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{chart.png}
\caption{Measuring value at maximum frequency}
\end{figure}

Damping output

\begin{itemize}
  \item \textbf{Navigation} \quad Expert $\rightarrow$ Output $\rightarrow$ PFS output 1 to 2 $\rightarrow$ Damping out.
  \item \textbf{Prerequisite} \quad In the \textit{Operating mode} parameter ($\rightarrow$ 31), the \textit{Frequency} option is selected and in the \textit{Assign frequency output} parameter ($\rightarrow$ 38), the \textit{Volume flow} option is selected.
  \item \textbf{Description} \quad Use this function to enter the reaction time of the output signal to fluctuations in the measured value.
  \item \textbf{User entry} \quad 0 to 999.9 s
  \item \textbf{Factory setting} \quad 0.0 s
  \item \textbf{Additional information} \quad Use this function to enter a time constant (PT1 element) for frequency output damping. The frequency output is subject to separate damping that is independent of all preceding time constants. \textit{This damping is not recommended for applications with high-speed filling $t_{\text{fill}} < 5$ s.}
\end{itemize}

Failure mode

\begin{itemize}
  \item \textbf{Navigation} \quad Expert $\rightarrow$ Output $\rightarrow$ PFS output 1 to 2 $\rightarrow$ Failure mode
  \item \textbf{Prerequisite} \quad In the \textit{Operating mode} parameter ($\rightarrow$ 31), the \textit{Frequency} option is selected and in the \textit{Assign frequency output} parameter ($\rightarrow$ 38), the \textit{Volume flow} option is selected.
\end{itemize}
Description

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

Selection

- Actual value
- Defined value
- 0 Hz

Factory setting

0 Hz

Additional information

Options

- Actual value
  In the event of a device alarm, the frequency output continues on the basis of the current flow measurement. The fault is ignored.
- Defined value
  In the event of a device alarm, the frequency output continues on the basis of a predefined value. This Failure frequency (→ 42) replaces the current measured value and the alarm can be bypassed as a result. The actual measurement is switched off for the duration of the alarm.
- 0 Hz
  In the event of a device alarm, the frequency output is "switched off".

NOTICE! A device alarm is a measuring device error that must be taken seriously. It can affect the measurement quality such that the quality can no longer be guaranteed. The Actual value option is only recommended if it can be guaranteed that all possible alarm conditions will not affect the measurement quality.

### Failure frequency

#### Navigation

![Expert → Output → PFS output 1 to 2 → Failure freq.]

#### Prerequisite

In the **Operating mode** parameter (→ 31), the **Frequency** option is selected and in the **Assign frequency output** parameter (→ 38), the **Volume flow** option is selected.

#### Description

Use this function to enter the value for the frequency output in the event of a device alarm in order to bypass the alarm.

#### User entry

0.0 to 10 000.0 Hz

#### Factory setting

0.0 Hz

### Output frequency

#### Navigation

![Expert → Output → PFS output 1 to 2 → Output freq. 1 to 2]

#### Prerequisite

In the **Operating mode** parameter (→ 31), the **Frequency** option is selected.

#### Description

Displays the actual value of the output frequency which is currently measured.

#### User interface

0.0 to 10 000.0 Hz
Switch output function

Navigatin

Prerequisite

Description

Selection

Factory setting

Additional information

Assign diagnostic behavior

Navigatin

Prerequisite

Description

Selection

Factory setting
Description of device parameters

**Additional information**

*Description*

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

**Options**

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

**Assign limit**

**Navigation**

Expert → Output → PFS output 1 to 2 → Assign limit

**Prerequisite**

- The **Switch** option is selected in the Operating mode parameter (→ 31).
- The **Limit** option is selected in the **Switch output function** parameter (→ 43).

**Description**

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

**Selection**

Volume flow

**Factory setting**

Volume flow

**Description**

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

**Selection**

- Volume flow

**Additional information**

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

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

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

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

- Process variable < Switch-on value: transistor is conductive
- Process variable > Switch-off value: transistor is non-conductive
1  Switch-off value
2  Switch-on value
3  Conductive
4  Non-conductive
A  Process variable
B  Status output

Behavior of status output when Switch-on value = Switch-off value:
- Process variable > Switch-on value: transistor is conductive
- Process variable < Switch-off value: transistor is non-conductive

Switch-on value

Navigation

Expert → Output → PFS output 1 to 2 → Switch-on value

Prerequisite

- The Switch option is selected in the Operating mode parameter (→ 31).
- The Limit option is selected in the Switch output function parameter (→ 43).

Description

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

User entry

Signed floating-point number

Factory setting

Country-specific:
- 0 ml/s
- 0 fl oz/s
Description of device parameters

Additional information

Description
Use this function to enter the limit value for the switch-on value (process variable > switch-on value = closed, conductive).

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

Dependency
The unit depends on the process variable selected in the Assign limit parameter (→ 44).

Switch-off value

Navigation
- Expert → Output → PFS output 1 to 2 → Switch-off value

Prerequisite
- The Switch option is selected in the Operating mode parameter (→ 31).
- The Limit option is selected in the Switch output function parameter (→ 43).

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

User entry
Signed floating-point number

Factory setting
Country-specific:
- 0 ml/s
- 0 fl oz/s

Additional information

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

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

Dependency
The unit depends on the process variable selected in the Assign limit parameter (→ 44).

Assign flow direction check

Navigation
- Expert → Output → PFS output 1 to 2 → Assign dir.check

Prerequisite
- The Switch option is selected in the Operating mode parameter (→ 31).
- The Flow direction check option is selected in the Switch output function parameter (→ 43).

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

Selection
- Off
- Volume flow

Factory setting
Volume flow
Description of device parameters

Assign status

Description
If the value of the assigned process variable is ≥ 0, the status output is conductive. Otherwise, the switch output is non-conductive.

Prerequisite
- The Switch option is selected in the Operating mode parameter (→ 31).
- The Status option is selected in the Switch output function parameter (→ 43).

Selection
- Low flow cut off

Additional information
- Options
  - If empty pipe detection or low flow cut off are enabled, the output is conductive. Otherwise, the switch output is non-conductive.

Failure mode

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

Selection
- Actual status
- Open
- Closed

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

**Navigation**

Expert → Output → PFS output 1 to 2 → Switch status 1 to 2

**Prerequisite**

In the **Operating mode** parameter (→ 31), the **Switch** option is selected.

**Description**

Displays the current switch status of the status output.

**User interface**

- Open
- Closed

**Additional information**

**Selection**

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

Invert output signal

**Navigation**

Expert → Output → PFS output 1 to 2 → Invert outp.sig.

**Description**

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

**Selection**

- No
- Yes

**Factory setting**

- Pulse/freq./switch output 1: yes
- Pulse/freq./switch output 2: no

**Additional information**

**Selection**

**No** option (passive - negative)

![No option diagram](image)

**Yes** option (passive - positive)

![Yes option diagram](image)
3.4  "Application" submenu

**Navigation**  
Expert → Application

<table>
<thead>
<tr>
<th>Function</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reset all totalizers</td>
<td>49</td>
</tr>
<tr>
<td>Totalizer 1 to 3</td>
<td>49</td>
</tr>
</tbody>
</table>

**Description**  
Use this function to reset all totalizers to the value 0 and restart the totaling process. This deletes all the flow values previously totalized.

**Selection**  
- Cancel  
- Reset + totalize

**Factory setting**  
Cancel

**Additional information**  
Selection
- Cancel
  No action is executed and the user exits the parameter.  
- Reset + totalize
  All totalizers are reset to 0 and the totaling process is restarted.

3.4.1  "Totalizer 1 to 3" submenu

**Navigation**  
Expert → Application → Totalizer 1 to 3

<table>
<thead>
<tr>
<th>Function</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assign process variable</td>
<td>50</td>
</tr>
<tr>
<td>Volume unit</td>
<td>50</td>
</tr>
<tr>
<td>Totalizer operation mode</td>
<td>51</td>
</tr>
<tr>
<td>Control Totalizer 1 to 3</td>
<td>51</td>
</tr>
</tbody>
</table>
Assign process variable

Navigation

Expert → Application → Totalizer 1 to 3 → Assign variable

Description

Use this function to select a process variable for totalizer 1-3.

Selection

- Off
- Volume flow

Factory setting

Volume flow

Additional information

Description

If the option selected is changed, the device resets the totalizer to 0.

Options

If the Off option is selected, only Assign process variable parameter (→ 50) is displayed in the Totalizer 1 to 3 submenu. All other parameters in the submenu are hidden.

Volume unit

Navigation

Expert → Application → Totalizer 1 to 3 → Volume unit

Prerequisite

The Volume flow option is selected in the Assign process variable parameter (→ 50) of the Totalizer 1 to 3 submenu.

Description

Use this function to select the unit for the volume.

Selection

SI units
- cm³
- dm³
- m³
- ml
- l
- hl
- Ml Mega

US units
- af
- ft³
- fl oz (us)
- gal (us)
- kgal (us)
- Mgal (us)
- bbl (us;oil)
- bbl (us;liq.)
- bbl (us;beer)
- bbl (us;tank)

Custom-specific units
- User vol.

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

Depending on country:
- ml
- fl oz (us)

**Totalizer operation mode**

**Navigation**

Expert → Application → Totalizer 1 to 3 → Operation mode

**Prerequisite**

In the Assign process variable parameter (→ 50) of the Totalizer 1 to 3 submenu, the Volume flow option is selected.

**Description**

Use this function to select how the totalizer summates the flow.

**Selection**

- Net flow total
- Forward flow total
- Reverse flow total

**Factory setting**

Net flow total

**Additional information**

*Options*

- Net flow total
  Positive and negative flow values are totalized and balanced against one another. Net flow is registered in the flow direction.
- Forward flow total
  Only the flow in the forward flow direction is totalized.
- Reverse flow total
  Only the flow against the forward flow direction is totalized (= reverse flow total).

**Control Totalizer 1 to 3**

**Navigation**

Expert → Application → Totalizer 1 to 3 → Control Tot. 1 to 3

**Prerequisite**

In the Assign process variable parameter (→ 50) of the Totalizer 1 to 3 submenu, the Volume flow option is selected.

**Description**

Use this function to select the control of totalizer value 1-3.

**Selection**

- Totalize
- Reset + hold
- Preset + hold
- Reset + totalize
- Preset + totalize

**Factory setting**

Totalize
### Description of device parameters

**Endress+Hauser**

**Description of device parameters**

**Options**

- **Totalize**
  The totalizer is started or continues totalizing with the current counter reading.

- **Reset + hold**
  The totaling process is stopped and the totalizer is reset to 0.

- **Preset + totalize**
  The totalizer is set to the defined start value from the **Preset value** parameter (→ 52) and the totaling process is restarted.

**Additional information**

**Options**

- **Totalize**
  The totalizer is started or continues totalizing with the current counter reading.

- **Reset + hold**
  The totaling process is stopped and the totalizer is reset to 0.

- **Preset + totalize**
  The totalizer is set to the defined start value from the **Preset value** parameter (→ 52) and the totaling process is restarted.

**Preset value 1 to 3**

**Navigation**

Expert → Application → Totalizer 1 to 3 → Preset value 1 to 3

**Prerequisite**

In the **Assign process variable** parameter (→ 50) of the **Totalizer 1 to 3** submenu, the **Volume flow** option is selected.

**Description**

Use this function to enter a start value for totalizer 1-3.

**User entry**

Signed floating-point number

**Factory setting**

Country-specific:

- 0 m³
- 0 ft³

**Additional information**

**User entry**

The unit of the selected process variable is specified for the totalizer in the **Assign process variable** parameter. If the following is selected in the **Assign process variable** parameter:

- **Volume flow** option: **Volume flow unit** parameter (→ 19)

**Example**

This configuration is suitable for applications such as iterative filling processes with a fixed batch quantity.

**Failure mode**

**Navigation**

Expert → Application → Totalizer 1 to 3 → Failure mode

**Prerequisite**

In the **Assign process variable** parameter (→ 50) of the **Totalizer 1 to 3** submenu, the **Volume flow** option is selected.

**Description**

Use this function to select how a totalizer behaves in an alarm condition.
**Selection**
- Stop
- Actual value
- Last valid value

**Factory setting**
Stop

**Additional information**

*Description*
This setting does not affect the error response mode of other totalizers and the outputs. This is specified in separate parameters.

*Options*
- **Stop**
  Totalizing is stopped in an alarm condition.
- **Actual value**
  The totalizer continues to count based on the actual measured value; the error is ignored.
- **Last valid value**
  The totalizer continues to count based on the last valid measured value before the error occurred.

### 3.5 "Diagnostics" submenu

**Navigation**

- Expert → Diagnostics

<table>
<thead>
<tr>
<th>Item</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual diagnostics</td>
<td>54</td>
</tr>
<tr>
<td>Timestamp</td>
<td>54</td>
</tr>
<tr>
<td>Actual diagnostics</td>
<td>55</td>
</tr>
<tr>
<td>Previous diagnostics</td>
<td>55</td>
</tr>
<tr>
<td>Operating time from restart</td>
<td>56</td>
</tr>
<tr>
<td>Operating time</td>
<td>56</td>
</tr>
<tr>
<td>Diagnostic list</td>
<td>56</td>
</tr>
<tr>
<td>Event logbook</td>
<td>61</td>
</tr>
</tbody>
</table>
Actual diagnostics

Navigation  
Expert → Diagnostics → Actual diagnos.

Prerequisite  
A diagnostic event has occurred.

Description  
Displays the current diagnostic message. If two or more messages occur simultaneously, the message with the highest priority is shown on the display.

User interface  
Symbol for diagnostic behavior, diagnostic code and short message.

Additional information  
Additional pending diagnostic messages can be shown in the Diagnostic list submenu (→  page 56).

Example  
For the display format: 

**Actual diagnostics**

Navigation  
Expert → Diagnostics → Actual diagnos.

Prerequisite  
A diagnostic event has occurred.

Description  
Displays the operating time when the current diagnostic message occurred.

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

Additional information  
The diagnostic message can be displayed via the Actual diagnostics parameter (→  page 54).

Example  
For the display format: 

24d12h13m00s
### Description of device parameters

<table>
<thead>
<tr>
<th>Description</th>
<th>Displays the service ID of the current diagnostic message.</th>
</tr>
</thead>
<tbody>
<tr>
<td>User interface</td>
<td>0 to 65 535</td>
</tr>
</tbody>
</table>

#### Previous diagnostics

<table>
<thead>
<tr>
<th>Navigation</th>
<th>Expert → Diagnostics → Prev.diagnostics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prerequisite</td>
<td>Two diagnostic events have already occurred.</td>
</tr>
<tr>
<td>Description</td>
<td>Displays the diagnostic message that occurred before the current message.</td>
</tr>
<tr>
<td>User interface</td>
<td>Symbol for diagnostic behavior, diagnostic code and short message.</td>
</tr>
<tr>
<td>Additional information</td>
<td>Example</td>
</tr>
<tr>
<td></td>
<td>For the display format:</td>
</tr>
<tr>
<td></td>
<td>△S442 Frequency output</td>
</tr>
</tbody>
</table>

#### Timestamp

<table>
<thead>
<tr>
<th>Navigation</th>
<th>Expert → Diagnostics → Timestamp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Displays the operating time when the last diagnostic message occurred.</td>
</tr>
<tr>
<td>User interface</td>
<td>Days (d), hours (h), minutes (m) and seconds (s)</td>
</tr>
<tr>
<td>Additional information</td>
<td>User interface</td>
</tr>
<tr>
<td></td>
<td>The diagnostic message can be displayed via the Previous diagnostics parameter (→ 55).</td>
</tr>
<tr>
<td></td>
<td>Example</td>
</tr>
<tr>
<td></td>
<td>For the display format:</td>
</tr>
<tr>
<td></td>
<td>24d12h13m00s</td>
</tr>
</tbody>
</table>

#### Previous diagnostics

<table>
<thead>
<tr>
<th>Navigation</th>
<th>Expert → Diagnostics → Prev.diagnostics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prerequisite</td>
<td>Two diagnostic events have already occurred.</td>
</tr>
<tr>
<td>Description</td>
<td>Displays the service ID of the diagnostic message that occurred before the current diagnostic message.</td>
</tr>
<tr>
<td>User interface</td>
<td>0 to 65 535</td>
</tr>
</tbody>
</table>
### Operating time from restart

**Navigation**

Expert → Diagnostics → Time fr. restart

**Description**

Use this function to display the time the device has been in operation since the last device restart.

**User interface**

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

---

### Operating time

**Navigation**

Expert → Diagnostics → Operating time

**Description**

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

**User interface**

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

**Additional information**

*User interface*

The maximum number of days is 9999, which is equivalent to 27 years.

---

### 3.5.1 "Diagnostic list" submenu

**Navigation**

Expert → Diagnostics → Diagnostic list

```
<table>
<thead>
<tr>
<th>Diagnostic list</th>
<th>→</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostics 1</td>
<td>→</td>
<td>57</td>
</tr>
<tr>
<td>Timestamp</td>
<td>→</td>
<td>57</td>
</tr>
<tr>
<td>Diagnostics 2</td>
<td>→</td>
<td>58</td>
</tr>
<tr>
<td>Timestamp</td>
<td>→</td>
<td>58</td>
</tr>
<tr>
<td>Diagnostics 3</td>
<td>→</td>
<td>59</td>
</tr>
<tr>
<td>Timestamp</td>
<td>→</td>
<td>59</td>
</tr>
</tbody>
</table>
```
Diagnostics 1

**Navigation**

Expert → Diagnostics → Diagnostic list → Diagnostics 1

**Description**

Use this function to display the current diagnostics message with the highest priority.

**User interface**

Symbol for diagnostic behavior, diagnostic code and short message.

**Additional information**

*Examples*

- △S442 Frequency output
- ✗F276 I/O module failure

---

**Timestamp**

**Navigation**

Expert → Diagnostics → Diagnostic list → Timestamp

**Description**

Displays the operating time when the diagnostic message with the highest priority occurred.

**User interface**

Days (d), hours (h), minutes (m) and seconds (s)
**Description of device parameters**

**Dosimag**

**Additional information**

*User interface*

The diagnostic message can be displayed via the **Diagnostics 1** parameter (→ 57).

**Example**

For the display format:

24d12h13m00s

---

**Diagnostics 2**

**Navigation**

Expert → Diagnostics → Diagnostic list → Diagnostics 2

**Description**

Use this function to display the current diagnostics message with the second-highest priority.

**User interface**

Symbol for diagnostic behavior, diagnostic code and short message.

**Additional information**

*Examples*

For the display format:

- ☒ S442 Frequency output
- ☒ F276 I/O module failure

---

**Timestamp**

**Navigation**

Expert → Diagnostics → Diagnostic list → Timestamp

**Description**

Displays the operating time when the diagnostic message with the second-highest priority occurred.

**User interface**

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

**Additional information**

*User interface*

The diagnostic message can be displayed via the **Diagnostics 2** parameter (→ 58).

**Example**

For the display format:

24d12h13m00s
### Diagnostics 3

**Navigation**
- Expert → Diagnostics → Diagnostic list → Diagnostics 3

**Description**
Use this function to display the current diagnostics message with the third-highest priority.

**User interface**
Symbol for diagnostic behavior, diagnostic code and short message.

**Additional information**

*Examples*
For the display format:
- ⬡ S442 Frequency output
- ⬠ F276 I/O module failure

### Timestamp

**Navigation**
- Expert → Diagnostics → Diagnostic list → Timestamp

**Description**
Displays the operating time when the diagnostic message with the third-highest priority occurred.

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

**Additional information**

*Example*
For the display format:
24d12h13m00s

### Diagnostics 4

**Navigation**
- Expert → Diagnostics → Diagnostic list → Diagnostics 4

**Description**
Use this function to display the current diagnostics message with the fourth-highest priority.
Description of device parameters

Dosimag

User interface
Symbol for diagnostic behavior, diagnostic code and short message.

Additional information

*Examples*
For the display format:
- △S442 Frequency output
- F276 I/O module failure

---

**Diagnostics 4**

Navigation
Expert → Diagnostics → Diagnostic list → Diagnostics 4

Description
Displays the service ID of the current diagnostic message with the fourth-highest priority.

User interface
0 to 65535

---

**Timestamp**

Navigation
Expert → Diagnostics → Diagnostic list → Timestamp

Description
Displays the operating time when the diagnostic message with the fourth-highest priority occurred.

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

Additional information

*User interface*

The diagnostic message can be displayed via the **Diagnostics 4** parameter (→ 59).

*Example*
For the display format:
24d12h13m00s

---

**Diagnostics 5**

Navigation
Expert → Diagnostics → Diagnostic list → Diagnostics 5

Description
Use this function to display the current diagnostics message with the fifth-highest priority.

User interface
Symbol for diagnostic behavior, diagnostic code and short message.

Additional information

*Examples*
For the display format:
- △S442 Frequency output
- F276 I/O module failure
**Diagnostics 5**

**Navigation**

Expert → Diagnostics → Diagnostic list → Diagnostics 5

**Description**

Displays the service ID of the current diagnostic message with the fifth-highest priority.

**User interface**

0 to 65535

**Timestamp**

**Navigation**

Expert → Diagnostics → Diagnostic list → Timestamp

**Description**

Displays the operating time when the diagnostic message with the fifth-highest priority occurred.

**User interface**

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

**Additional information**

*User interface*

The diagnostic message can be displayed via the Diagnostics 5 parameter (→ 60).

*Example*

For the display format:

24d12h13m00s

---

**3.5.2 "Event logbook" submenu**

**Navigation**

Expert → Diagnostics → Event logbook

**Description**

Use this function to select the category whose event messages are displayed in the events list.

**Selection**

- All
- Failure (F)
- Function check (C)
Description of device parameters

- Out of specification (S)
- Maintenance required (M)
- Information (I)

Factory setting

All

Additional information

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

3.5.3 "Device information" submenu

Navigation

Expert → Diagnostics → Device info

Device tag →  62
Serial number →  63
Firmware version →  63
Device name →  63
Order code →  63
Extended order code 1 →  64
Extended order code 2 →  64
Extended order code 3 →  64
ENP version →  65
Configuration counter →  65

Device tag

Description

Use this function to enter the unique name for the measuring point so that it can be identified quickly within the plant. The name is displayed in the header.
User entry: A maximum of 32 characters such as letters, numbers or special characters (e.g. @, %, /)

Factory setting: Dosimag

**Serial number**

- **Navigation:** Expert → Diagnostics → Device info → Serial number
- **Description:** Displays the serial number of the measuring device. It can also be found on the nameplate.
- **User interface:** A maximum of 11-digit character string comprising letters and numbers.
- **Additional information**
  - **Description**
    - Uses of the serial number
      - To identify the measuring device quickly, e.g. when contacting Endress+Hauser.
      - To obtain specific information on the measuring device using the Device Viewer: www.endress.com/deviceviewer

**Firmware version**

- **Navigation:** Expert → Diagnostics → Device info → Firmware version
- **Description:** Displays the device firmware version installed.
- **User interface:** Character string in the format xx.yy.zz
- **Factory setting:** 03.00

**Device name**

- **Navigation:** Expert → Diagnostics → Device info → Device name
- **Description:** Displays the device name. It can also be found on the nameplate.
- **User interface:** Dosimag

**Order code**

- **Navigation:** Expert → Diagnostics → Device info → Order code
- **Description:** Displays the device order code.
Description of device parameters

User interface  Character string composed of letters, numbers and certain punctuation marks (e.g. /).

Additional information  

Description  

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

The order code is generated from the extended order code through a process of reversible transformation. The extended order code indicates the attributes for all the device features in the product structure. The device features are not directly readable from the order code.

Uses of the order code  

- To order an identical spare device.
- To identify the device quickly and easily, e.g. when contacting Endress+Hauser.

Extended order code 1

<table>
<thead>
<tr>
<th>Navigation</th>
<th>Expert → Diagnostics → Device info → Ext. order cd. 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Displays the first part of the extended order code. On account of length restrictions, the extended order code is split into a maximum of 3 parameters.</td>
</tr>
<tr>
<td>User interface</td>
<td>Character string</td>
</tr>
<tr>
<td>Additional information</td>
<td>The extended order code indicates the version of all the features of the product structure for the measuring device and thus uniquely identifies the measuring device. It can be found in the &quot;Ext. ord. cd.&quot; field on the nameplate.</td>
</tr>
</tbody>
</table>

Extended order code 2

<table>
<thead>
<tr>
<th>Navigation</th>
<th>Expert → Diagnostics → Device info → Ext. order cd. 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>For displaying the second part of the extended order code.</td>
</tr>
<tr>
<td>User interface</td>
<td>Character string</td>
</tr>
<tr>
<td>Additional information</td>
<td>For additional information, see Extended order code 1 parameter (→ 64)</td>
</tr>
</tbody>
</table>

Extended order code 3

<table>
<thead>
<tr>
<th>Navigation</th>
<th>Expert → Diagnostics → Device info → Ext. order cd. 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>For displaying the third part of the extended order code.</td>
</tr>
<tr>
<td>User interface</td>
<td>Character string</td>
</tr>
</tbody>
</table>
Dosimag

Description of device parameters

Additional information
For additional information, see **Extended order code 1** parameter (→ 64)

<table>
<thead>
<tr>
<th>ENP version</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Navigation</strong></td>
</tr>
</tbody>
</table>
Icon: Expert → Diagnostics → Device info → ENP version |
| **Description** | Displays the version of the electronic nameplate. |
| **User interface** | Character string |
| **Factory setting** | 2.02.00 |
| **Additional information** | This electronic nameplate stores a data record for device identification that includes more data than the nameplates attached to the outside of the device. |

<table>
<thead>
<tr>
<th>Configuration counter</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Navigation</strong></td>
</tr>
</tbody>
</table>
Icon: Expert → Diagnostics → Device info → Config. counter |
| **Description** | Displays the number of parameter modifications for the device. When the user changes a parameter setting, this counter is incremented. |
| **User interface** | 0 to 65535 |

3.5.4 "Simulation" submenu

**Navigation**  
Icon: Expert → Diagnostics → Simulation

<table>
<thead>
<tr>
<th>Simulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assign simulation process variable</td>
</tr>
<tr>
<td>Value process variable</td>
</tr>
<tr>
<td>Simulation device alarm</td>
</tr>
</tbody>
</table>
Assign simulation process variable

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

Description
Use this function to select a process variable for the simulation process that is activated.

Selection
- Off
- Volume flow

Factory setting
Off

Additional information
Description
The simulation value of the selected process variable is specified in the Value process variable parameter (→ 66).

Value process variable

Navigation
Expert → Diagnostics → Simulation → Value proc. var.

Prerequisite
In the Assign simulation process variable parameter (→ 66), the Volume flow option is selected.

Description
Use this function to enter a simulation value for the selected process variable. Subsequent measured value processing and the signal output use this simulation value. In this way, users can verify whether the measuring device has been configured correctly.

User entry
Depends on the process variable selected

Factory setting
0

Additional information
User entry
The unit of the displayed measured value is taken from the System units submenu (→ 19).

Simulation device alarm

Navigation
Expert → Diagnostics → Simulation → Sim. alarm

Description
Use this function to switch the device alarm on and off.

Selection
- Off
- On

Factory setting
Off
<table>
<thead>
<tr>
<th>Additional information</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In this way, users can verify the correct function of downstream switching units.</td>
</tr>
</tbody>
</table>
4 Country-specific factory settings

4.1 SI units

Not valid for USA and Canada.

4.1.1 System units

<table>
<thead>
<tr>
<th>Volume</th>
<th>ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume flow</td>
<td>ml/s</td>
</tr>
</tbody>
</table>

4.1.2 On value low flow cut off

The switch-on point depends on the type of medium and the nominal diameter.

<table>
<thead>
<tr>
<th>Nominal diameter [mm]</th>
<th>On value low flow cut off (v ~ 0.04 m/s) [ml/s]</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>0.5</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>15K 1)</td>
<td>7</td>
</tr>
<tr>
<td>15</td>
<td>7</td>
</tr>
<tr>
<td>25</td>
<td>16</td>
</tr>
</tbody>
</table>

1) Conical version (corresponds to DN 12)

4.2 US units

Only valid for USA and Canada.

4.2.1 System units

<table>
<thead>
<tr>
<th>Volume</th>
<th>fl oz (us)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume flow</td>
<td>fl oz/s (us)</td>
</tr>
</tbody>
</table>

4.2.2 On value low flow cut off

The switch-on point depends on the type of medium and the nominal diameter.

<table>
<thead>
<tr>
<th>Nominal diameter [in]</th>
<th>On value low flow cut off (v ~ 0.13 ft/s) [oz fl/s]</th>
</tr>
</thead>
<tbody>
<tr>
<td>⁵/₃₂</td>
<td>0.02</td>
</tr>
<tr>
<td>⁵/₁₆</td>
<td>0.08</td>
</tr>
<tr>
<td>½K 1)</td>
<td>0.25</td>
</tr>
</tbody>
</table>

1) Conical version (corresponds to DN 12)
<table>
<thead>
<tr>
<th>Nominal diameter [in]</th>
<th>On value low flow cut off ( v \approx 0.13 \text{ ft/s} ) [oz fl/s]</th>
</tr>
</thead>
<tbody>
<tr>
<td>½</td>
<td>0.25</td>
</tr>
<tr>
<td>1</td>
<td>0.53</td>
</tr>
</tbody>
</table>

1) Conical version (corresponds to DN 12)
## 5 Explanation of abbreviated units

### 5.1 SI units

<table>
<thead>
<tr>
<th>Process variable</th>
<th>Units</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume</td>
<td>cm³, dm³, m³</td>
<td>Cubic centimeter, cubic decimeter, cubic meter</td>
</tr>
<tr>
<td></td>
<td>ml, l, hl, Ml</td>
<td>Milliliter, liter, hectoliter, megaliter</td>
</tr>
<tr>
<td>Volume flow</td>
<td>cm³/s, cm³/min, cm³/h, cm³/d</td>
<td>Cubic centimeter/time unit</td>
</tr>
<tr>
<td></td>
<td>dm³/s, dm³/min, dm³/h, dm³/d</td>
<td>Cubic decimeter/time unit</td>
</tr>
<tr>
<td></td>
<td>m³/s, m³/min, m³/h, m³/d</td>
<td>Cubic meter/time unit</td>
</tr>
<tr>
<td></td>
<td>ml/s, ml/min, ml/h, ml/d</td>
<td>Milliliter/time unit</td>
</tr>
<tr>
<td></td>
<td>l/s, l/min, l/h, l/d</td>
<td>Liter/time unit</td>
</tr>
<tr>
<td></td>
<td>hl/s, hl/min, hl/h, hl/d</td>
<td>Hectoliter/time unit</td>
</tr>
<tr>
<td></td>
<td>Ml/s, Ml/min, Ml/h, Ml/d</td>
<td>Megaliter/time unit</td>
</tr>
<tr>
<td>Time</td>
<td>m, h, d, y</td>
<td>Minute, hour, day, year</td>
</tr>
</tbody>
</table>

### 5.2 US units

<table>
<thead>
<tr>
<th>Process variable</th>
<th>Units</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume</td>
<td>af</td>
<td>Acre foot</td>
</tr>
<tr>
<td></td>
<td>ft³</td>
<td>Cubic foot</td>
</tr>
<tr>
<td></td>
<td>fl oz (us), gal (us), kgal (us), Mgal (us)</td>
<td>Fluid ounce, gallon, kilogallon, million gallon</td>
</tr>
<tr>
<td></td>
<td>bbl (us;liq.), bbl (us;beer), bbl (us;oil), bbl (us;tank)</td>
<td>Barrel (normal liquids), barrel (beer), barrel (petrochemicals), barrel (filling tanks)</td>
</tr>
<tr>
<td>Volume flow</td>
<td>af/s, af/min, af/h, af/d</td>
<td>Acre foot/time unit</td>
</tr>
<tr>
<td></td>
<td>ft³/s, ft³/min, ft³/h, ft³/d</td>
<td>Cubic foot/time unit</td>
</tr>
<tr>
<td></td>
<td>fl oz/s (us), fl oz/min (us), fl oz/h (us), fl oz/d (us)</td>
<td>Fluid ounce/time unit</td>
</tr>
<tr>
<td></td>
<td>gal/s (us), gal/min (us), gal/h (us), gal/d (us)</td>
<td>Gallon/time unit</td>
</tr>
<tr>
<td></td>
<td>kgal/s (us), kgal/min (us), kgal/h (us), kgal/d (us)</td>
<td>Kilogallon/time unit</td>
</tr>
<tr>
<td></td>
<td>Mgal/s (us), Mgal/min (us), Mgal/h (us), Mgal/d (us)</td>
<td>Million gallon/time unit</td>
</tr>
<tr>
<td></td>
<td>bbl/s (us;beer), bbl/min (us;beer), bbl/h (us;beer), bbl/d (us;beer)</td>
<td>Barrel/time unit (beer)</td>
</tr>
<tr>
<td></td>
<td>Barrel/time unit (normal liquids) Normal liquids: 31.5 gal/bbl</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Barrel/time unit (petrochemicals) Petrochemicals: 42.0 gal/bbl</td>
<td></td>
</tr>
<tr>
<td></td>
<td>bbl/s (us;tank), bbl/min (us;tank), bbl/h (us;tank), bbl/d (us;tank)</td>
<td>Barrel/time unit (filling tank) Filling tanks: 55.0 gal/bbl</td>
</tr>
<tr>
<td>Time</td>
<td>m, h, d, y</td>
<td>Minute, hour, day, year</td>
</tr>
<tr>
<td></td>
<td>am, pm</td>
<td>Ante meridiem (before midday), post meridiem (after midday)</td>
</tr>
</tbody>
</table>
### 5.3 Imperial units

<table>
<thead>
<tr>
<th>Process variable</th>
<th>Units</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Volume</strong></td>
<td>gal (imp), Mgal (imp)</td>
<td>Gallon, mega gallon</td>
</tr>
<tr>
<td></td>
<td>bbl (imp;beer), bbl (imp;oil)</td>
<td>Barrel (beer), barrel (petrochemicals)</td>
</tr>
<tr>
<td><strong>Volume flow</strong></td>
<td>gal/s (imp), gal/min (imp), gal/h (imp), gal/d (imp)</td>
<td>Gallon/time unit</td>
</tr>
<tr>
<td></td>
<td>Mgal/s (imp), Mgal/min (imp), Mgal/h (imp), Mgal/d (imp)</td>
<td>Mega gallon/time unit</td>
</tr>
<tr>
<td></td>
<td>bbl/s (imp;beer), bbl/min (imp;beer), bbl/h (imp;beer), bbl/d (imp;beer)</td>
<td>Barrel/time unit (beer)</td>
</tr>
<tr>
<td></td>
<td>Beer: 36.0 gal/bbl</td>
<td></td>
</tr>
<tr>
<td></td>
<td>bbl/s (imp;oil), bbl/min (imp;oil), bbl/h (imp;oil), bbl/d (imp;oil)</td>
<td>Barrel/time unit (petrochemicals)</td>
</tr>
<tr>
<td></td>
<td>Petrochemicals: 34.97 gal/bbl</td>
<td></td>
</tr>
<tr>
<td><strong>Time</strong></td>
<td>m, h, d, y</td>
<td>Minute, hour, day, year</td>
</tr>
<tr>
<td></td>
<td>am, pm</td>
<td>Ante meridiem (before midday), post meridiem (after midday)</td>
</tr>
</tbody>
</table>
Index

A
Access status tooling (Parameter) ........................................ 10
Actual diagnostics (Parameter) ........................................... 54
Administration (Submenu) .................................................. 13
Alarm delay (Parameter) .................................................... 11
Application (Submenu) ...................................................... 49
Assign behavior of diagnostic no. 442 (Parameter) ............... 12
Assign behavior of diagnostic no. 443 (Parameter) ............... 13
Assign behavior of diagnostic no. 937 (Parameter) ............... 13
Assign diagnostic behavior (Parameter) .............................. 43
Assign flow direction check (Parameter) .............................. 46
Assign frequency output (Parameter) .................................. 38
Assign limit (Parameter) ................................................... 44
Assign process variable (Parameter) .................................. 24, 50
Assign pulse output (Parameter) ........................................ 34
Assign simulation process variable (Parameter) ..................... 66
Assign status (Parameter) .................................................. 47

C
Calibration (Submenu) ....................................................... 29
Calibration factor (Parameter) ............................................ 29
Channel 2 (Parameter) ...................................................... 33
Configuration counter (Parameter) ...................................... 65
Control Totalizer 1 to 3 (Parameter) .................................... 51

D
Damping output (Parameter) ................................................ 41
Date/time format (Parameter) ............................................. 21
Device information (Submenu) ........................................... 62
Device name (Parameter) ................................................... 63
Device reset (Parameter) ................................................... 14
Device tag (Parameter) ...................................................... 62
Diagnostic behavior (Submenu) ......................................... 12
Diagnostic handling (Submenu) ......................................... 11
Diagnostic list (Submenu) .................................................. 56
Diagnostics (Submenu) ..................................................... 53
Diagnostics 1 (Parameter) .................................................. 57
Diagnostics 2 (Parameter) .................................................. 58
Diagnostics 3 (Parameter) .................................................. 59
Diagnostics 4 (Parameter) .................................................. 59, 60
Diagnostics 5 (Parameter) .................................................. 60, 61

Document
Explanation of the structure of a parameter description ........... 6
Function ......................................................................... 4
Structure ....................................................................... 4
Symbols used ................................................................... 6
Target group .................................................................... 4
Using the document ....................................................... 4

E
ENP version (Parameter) ..................................................... 65
Enter access code (Parameter) ............................................ 10
Event logbook (Submenu) .................................................. 61
Extended order code 1 (Parameter) ..................................... 64
Extended order code 2 (Parameter) ..................................... 64
Extended order code 3 (Parameter) ..................................... 64

F
Factory settings ............................................................... 68
SI units ........................................................................... 68
US units ........................................................................... 68
Failure frequency (Parameter) ........................................... 42
Failure mode (Parameter) .................................................. 36, 41, 47, 52
Filter options (Parameter) ................................................ 61
Firmware version (Parameter) .......................................... 63
Flow override (Parameter) ................................................ 23
Function
see Parameter

I
Installation direction (Parameter) ...................................... 27
Integration time (Parameter) ............................................. 27
Invert output signal (Parameter) ......................................... 48

L
Locking status (Parameter) ................................................ 9
Low flow cut off (Submenu) ............................................ 24

M
Maximum frequency value (Parameter) ............................ 39
Measured values (Submenu) ............................................. 15
Measuring mode (Parameter) ............................................ 36, 39
Measuring period (Parameter) ............................................ 27
Measuring value at maximum frequency (Parameter) .......... 39
Minimum frequency value (Parameter) ............................. 38

N
Nominal diameter (Parameter) .......................................... 29

O
Off value low flow cutoff (Parameter) .............................. 25
On value low flow cutoff (Parameter) ............................... 24
Operating mode (Parameter) ............................................. 31
Operating time (Parameter) ................................................ 56
Operating time from restart (Parameter) ............................ 56
Order code (Parameter) ..................................................... 63
Output (Submenu) ............................................................ 30
Output frequency 1 to 2 (Parameter) ................................. 19, 42
Output values (Submenu) .................................................. 17

P
Parameter
Structure of a parameter description ................................ 6
Permanent storage (Parameter) .......................................... 14
Preset value 1 to 3 (Parameter) ......................................... 52
Pressure shock suppression (Parameter) ............................ 25
Previous diagnostics (Parameter) ...................................... 55
Process parameters (Submenu) ......................................... 23
Process variable adjustment (Submenu) ............................ 28
Process variables (Submenu) ............................................ 15
Pulse output 1 to 2 (Parameter) ......................................... 18, 37
## Index

<table>
<thead>
<tr>
<th>Submenu</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administration</td>
<td>13</td>
</tr>
<tr>
<td>Application</td>
<td>49</td>
</tr>
<tr>
<td>Calibration</td>
<td>29</td>
</tr>
<tr>
<td>Device information</td>
<td>62</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>12</td>
</tr>
<tr>
<td>Diagnostic handling</td>
<td>11</td>
</tr>
<tr>
<td>Diagnostic list</td>
<td>56</td>
</tr>
<tr>
<td>Diagnostics</td>
<td>53</td>
</tr>
<tr>
<td>Event logbook</td>
<td>61</td>
</tr>
<tr>
<td>Low flow cut off</td>
<td>24</td>
</tr>
<tr>
<td>Measured values</td>
<td>15</td>
</tr>
<tr>
<td>Output</td>
<td>30</td>
</tr>
<tr>
<td>Output values</td>
<td>17</td>
</tr>
<tr>
<td>Process parameters</td>
<td>23</td>
</tr>
<tr>
<td>Process variable adjustment</td>
<td>28</td>
</tr>
<tr>
<td>Process variables</td>
<td>15</td>
</tr>
<tr>
<td>Pulse/frequency/switch output 1 to 2</td>
<td>30</td>
</tr>
<tr>
<td>Sensor</td>
<td>14</td>
</tr>
<tr>
<td>Sensor adjustment</td>
<td>27</td>
</tr>
<tr>
<td>Simulation</td>
<td>65</td>
</tr>
<tr>
<td>System</td>
<td>10</td>
</tr>
<tr>
<td>System units</td>
<td>19</td>
</tr>
<tr>
<td>Totalizer</td>
<td>16</td>
</tr>
<tr>
<td>Totalizer 1 to 3</td>
<td>49</td>
</tr>
<tr>
<td>User-specific units</td>
<td>22</td>
</tr>
<tr>
<td>Switch output function (Parameter)</td>
<td>43</td>
</tr>
<tr>
<td>Switch status 1 to 2 (Parameter)</td>
<td>19, 48</td>
</tr>
<tr>
<td>Switch-off value (Parameter)</td>
<td>46</td>
</tr>
<tr>
<td>Switch-on value (Parameter)</td>
<td>45</td>
</tr>
<tr>
<td>System (Submenu)</td>
<td>10</td>
</tr>
<tr>
<td>System units (Submenu)</td>
<td>19</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value per pulse</td>
<td>34</td>
</tr>
<tr>
<td>Value process variable</td>
<td>66</td>
</tr>
<tr>
<td>Volume flow</td>
<td>15</td>
</tr>
<tr>
<td>Volume flow factor</td>
<td>28</td>
</tr>
<tr>
<td>Volume flow offset</td>
<td>28</td>
</tr>
<tr>
<td>Volume flow unit</td>
<td>19</td>
</tr>
<tr>
<td>Volume unit</td>
<td>21, 50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero point</td>
<td>29</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>User volume factor</td>
<td>22</td>
</tr>
<tr>
<td>User volume text</td>
<td>22</td>
</tr>
<tr>
<td>User-specific units</td>
<td>22</td>
</tr>
</tbody>
</table>