

Description of Device Parameters

Dosimag

Electromagnetic flowmeter
IO-Link

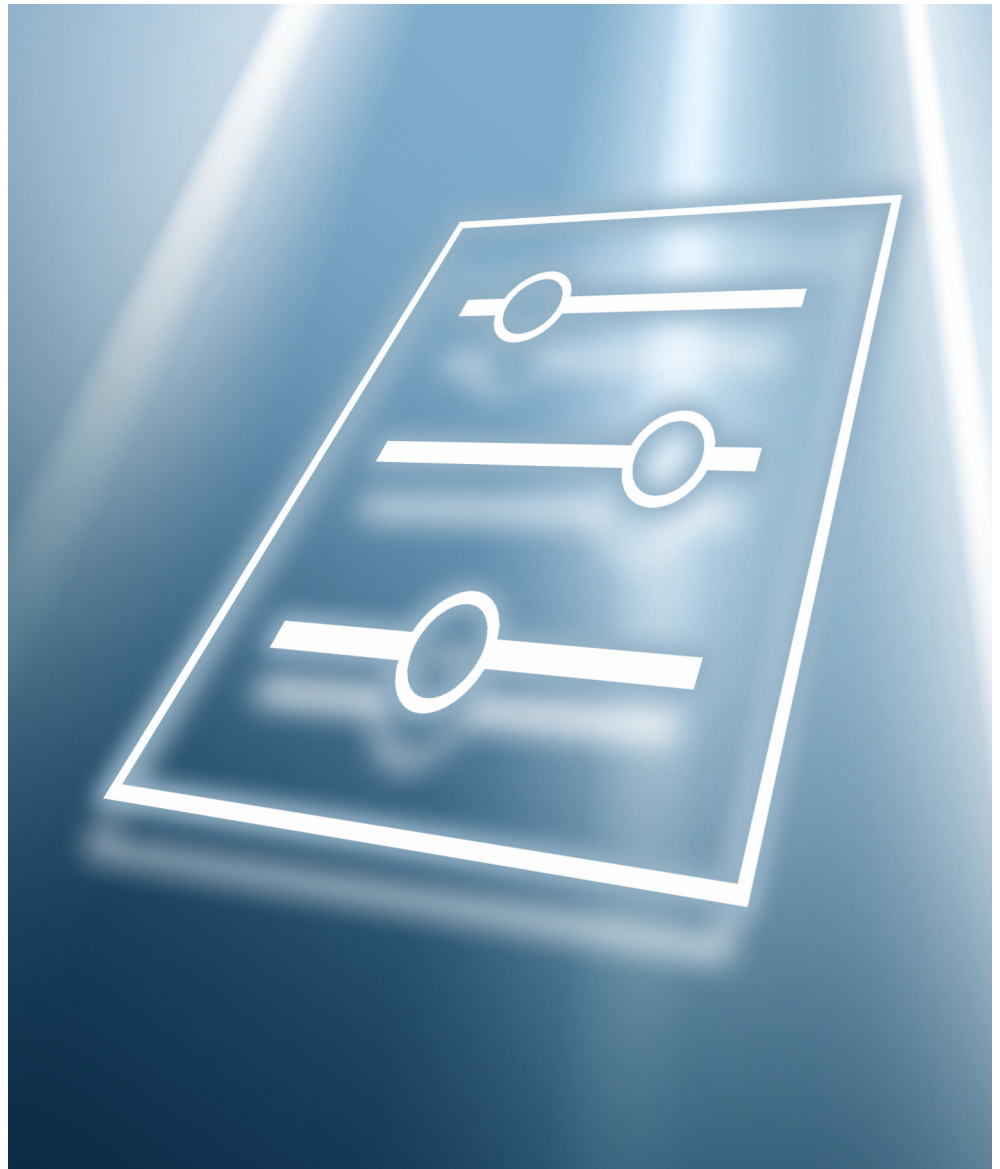
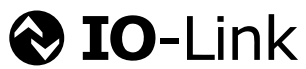


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1 About this document

1.1 Document function

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

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

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








1.2 Target group

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

1.3 Using this document





1.3.1 Symbols

Types of information

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

1.3.2 Information on the document structure

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


- **Guidance** menu with the **Commissioning** wizard (→  7), which guides the user automatically through all the device parameters that are required for commissioning
- **Application** menu (→  43)
- **Diagnostics** menu (→  26)
- **System** menu (→  85)

1.3.3 Operation concept

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

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

IO-Link

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

IO-Link operating concept

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

- Diagnostic messages
- Remedial measures
- Simulation options

IODD download

Two options for downloading the IODD:

- www.endress.com/download
- <https://ioddfinder.io-link.com/>

www.endress.com/download



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

Select and download the appropriate version.

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

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

Select and download the appropriate version.

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

1.3.4 Structure of a parameter description

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

Complete parameter name	Write-protected parameter =
Navigation	Navigation path to the parameter via the operating tool The names of the menus, submenus and parameters are abbreviated to the form in which they appear on the display and in the operating tool.
Prerequisite	The parameter is only available under these specific conditions
Description	Description of the parameter function
Selection	List of the individual options for the parameter <ul style="list-style-type: none"> ■ Option 1 ■ Option 2
User entry	Input range for the parameter
User interface	Display value/data for the parameter
Additional information	Additional explanations (e.g. in examples): <ul style="list-style-type: none"> ■ On individual options ■ On display values/data ■ On the input range ■ On the parameter function

1.4 Related documentation

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

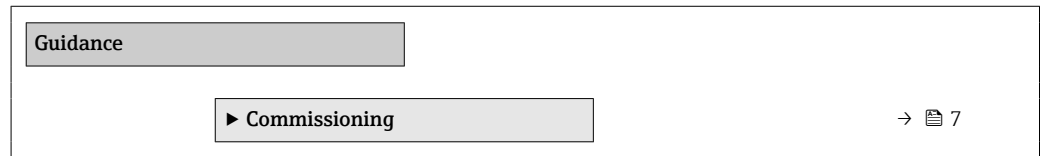
The related documentation is available online:

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

2 "Guidance" menu

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

Navigation   Guidance



2.1 "Commissioning" wizard

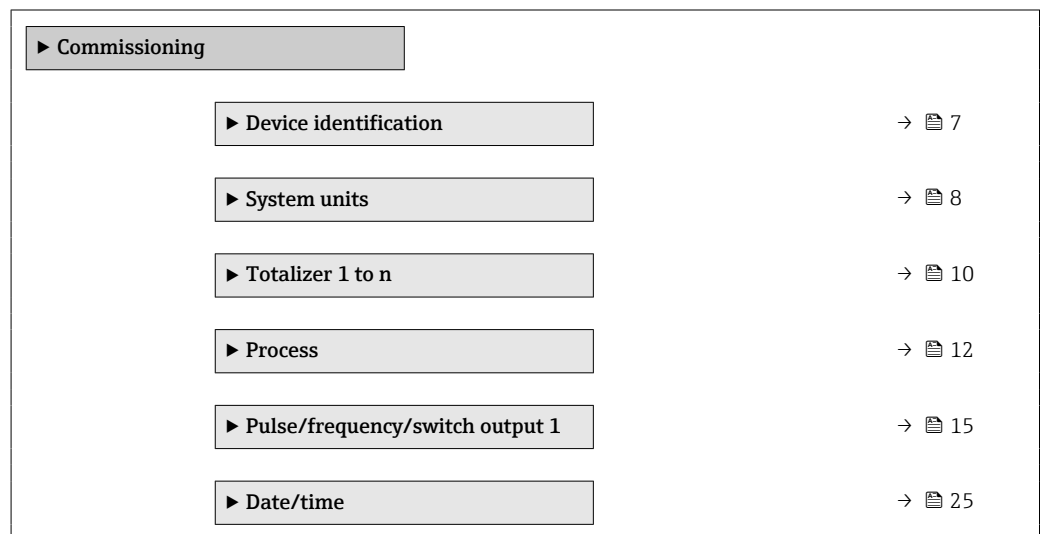
Complete this wizard to commission the device.

For each parameter, enter the appropriate value or select the appropriate option.

NOTE


If you exit the wizard before completing all required parameters, the changes you have made will be saved. For this reason, the device may then be in an undefined state! In this case, a reset to the default settings is recommended.

Navigation   Guidance → Commissioning




2.1.1 Device identification

Navigation   Guidance → Commissioning → Device ident.

Device name	
Navigation	 Guidance → Commissioning → Device ident. → Device name
Description	Displays the name of the transmitter. The transmitter name is also provided on the nameplate of the transmitter.

User interface Character string comprising numbers, letters and special characters

Serial number


Navigation  Guidance → Commissioning → Device ident. → Serial number

Description Displays the serial number of the measuring device. The serial number is also provided on the nameplate of the sensor and of the transmitter.

The serial number can also be used to retrieve further device-related information and documentation via the Operations app or the Device Viewer on the Endress+Hauser website.

User interface Character string comprising numbers, letters and special characters

Firmware version

Navigation  Guidance → Commissioning → Device ident. → Firmware version


Description Displays the device firmware version installed.

User interface Character string comprising numbers, letters and special characters

2.1.2 System units

Navigation   Guidance → Commissioning → System units

Volume flow unit

Navigation  Guidance → Commissioning → System units → Volume flow unit

Description Select the volume flow unit.

Selection

SI units

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

US units



- af/s
- af/min
- af/h
- af/d
- ft³/s
- ft³/min
- ft³/h
- ft³/d
- fl oz/s (us)
- fl oz/min (us)
- fl oz/h (us)
- fl oz/d (us)
- gal/s (us)
- gal/min (us)
- gal/h (us)
- gal/d (us)
- Mgal/s (us)
- Mgal/min (us)
- Mgal/h (us)
- Mgal/d (us)
- bbl/s (us;liq.)
- bbl/min (us;liq.)
- bbl/h (us;liq.)
- bbl/d (us;liq.)
- bbl/s (us;beer)
- bbl/min (us;beer)
- bbl/h (us;beer)
- bbl/d (us;beer)
- bbl/s (us;oil)
- bbl/min (us;oil)
- bbl/h (us;oil)
- bbl/d (us;oil)
- bbl/s (us;tank)
- bbl/min (us;tank)
- bbl/h (us;tank)
- bbl/d (us;tank)
- kgal/s (us)
- kgal/min (us)
- kgal/h (us)
- kgal/d (us)


Imperial units

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

Additional information

Options


 For an explanation of the abbreviated units: →  96

 The IO-Link interface only offers the **m³/h** option.

Volume unit





Navigation

 Guidance → Commissioning → System units → Volume unit




Description

Select the volume unit.


Selection	<i>SI units</i> <ul style="list-style-type: none"> ■ cm³ ■ dm³ ■ m³ ■ ml ■ l ■ hl ■ Ml Mega 	<i>US units</i> <ul style="list-style-type: none"> ■ af ■ ft³ ■ fl oz (us) ■ gal (us) ■ kgal (us) ■ Mgal (us) ■ bbl (us;oil) ■ bbl (us;liq.) ■ bbl (us;beer) ■ bbl (us;tank) 	<i>Imperial units</i> <ul style="list-style-type: none"> ■ gal (imp) ■ Mgal (imp) ■ bbl (imp;beer) ■ bbl (imp;oil)
------------------	---	---	--

Additional information	<i>Selection</i>  For an explanation of the abbreviated units: →  96
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Temperature unit


Navigation	 Guidance → Commissioning → System units → Temperature unit				
Prerequisite	Only available for nominal diameters DN 15 to DN 25 (½ to 1") with order code for "Sensor option", option CI "Medium temperature measurement".				
Description	Select the temperature unit.				
Selection	<table border="0"> <tr> <td style="vertical-align: top;"><i>SI units</i></td> <td style="vertical-align: top;"><i>US units</i></td> </tr> <tr> <td style="vertical-align: top;"> <ul style="list-style-type: none"> ■ °C ■ K </td> <td style="vertical-align: top;"> <ul style="list-style-type: none"> ■ °F ■ °R </td> </tr> </table>	<i>SI units</i>	<i>US units</i>	<ul style="list-style-type: none"> ■ °C ■ K 	<ul style="list-style-type: none"> ■ °F ■ °R
<i>SI units</i>	<i>US units</i>				
<ul style="list-style-type: none"> ■ °C ■ K 	<ul style="list-style-type: none"> ■ °F ■ °R 				
Additional information	<i>Selection</i>  For an explanation of the abbreviated units: →  96				

2.1.3 Totalizer 1 to n

Navigation  Guidance → Commissioning → Totalizer 1 to n

Assign process variable


Navigation	 Guidance → Commissioning → Totalizer 1 to n → AssignVariab. 1 to n
Description	<p>Select a process variable to activate the totalizer.</p> <p>If the process variable is changed or the totalizer deactivated, the totalizer is reset to "0".</p>
Selection	<ul style="list-style-type: none"> ■ Off ■ Volume flow

Additional information



Totalizer 1 is permanently set to and cannot be changed. Totalizers 2 and 3 can be changed.

Process variable unit



Navigation

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

Description

Select the unit for the process variable of the totalizer.

Selection

SI units

- cm³ *
- dm³ *
- m³ *
- ml *
- l *
- hl *
- Ml Mega *

US units

- af *
- ft³ *
- Mft³ *
- Mft³ *
- fl oz (us) *
- gal (us) *
- kgal (us) *
- Mgal (us) *
- bbl (us;liq.) *
- bbl (us;beer) *
- bbl (us;oil) *
- bbl (us;tank) *

Imperial units

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

* Visibility depends on order options or device settings

or

Other units

None *

* Visibility depends on order options or device settings

Totalizer operation mode



Navigation

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

Description

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

Selection

- Net
- Forward
- Reverse

Additional information	<i>Selection</i> <ul style="list-style-type: none"> ▪ Net option The flow values in the forward and reverse flow directions are totalized and netted against each other. Net flow is recorded in the flow direction. ▪ Forward option Only the flow in the forward flow direction is totalized. ▪ Reverse option Only the flow in the reverse flow direction is totalized (= reverse flow quantity).
-------------------------------	--

Totalizer failure behavior

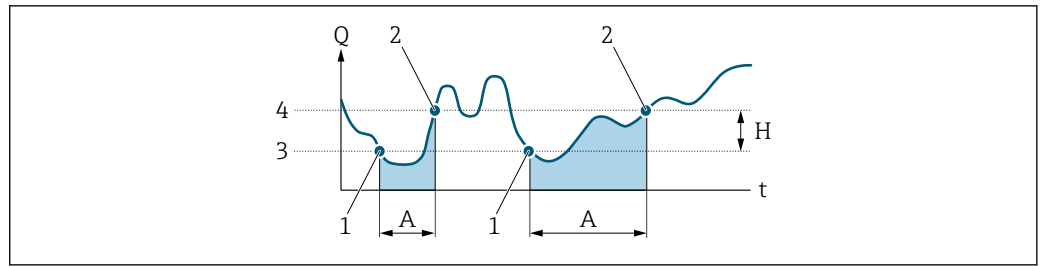

Navigation	Guidance → Commissioning → Totalizer 1 to n → FailureBehav. 1 to n
Description	Specify how the totalizer should behave in the event of a device alarm.
Selection	<ul style="list-style-type: none"> ▪ Hold ▪ Continue ▪ Last valid value + continue
Additional information	<i>Selection</i> <ul style="list-style-type: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

2.1.4 Process

Navigation Guidance → Commissioning → Process

Low flow cutoff


Navigation	Guidance → Commissioning → Process → Low flow cutoff
Description	Select a process variable for low flow cutoff to activate low flow cutoff.
Selection	<ul style="list-style-type: none"> ▪ Off ▪ Volume flow
Additional information	Description



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

On value low flow cutoff



Navigation

Guidance → Commissioning → Process → On value

Description

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

User entry

Signed floating-point number

Off value low flow cutoff



Navigation

Guidance → Commissioning → Process → Off value

Description

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

User entry

0 to 100.0 %

Pressure shock suppression



Navigation

Guidance → Commissioning → Process → Pres. shock sup.

Description

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

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

Values reported when pressure shock suppression is active:

Flow: 0

Totalizer: Last valid value

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

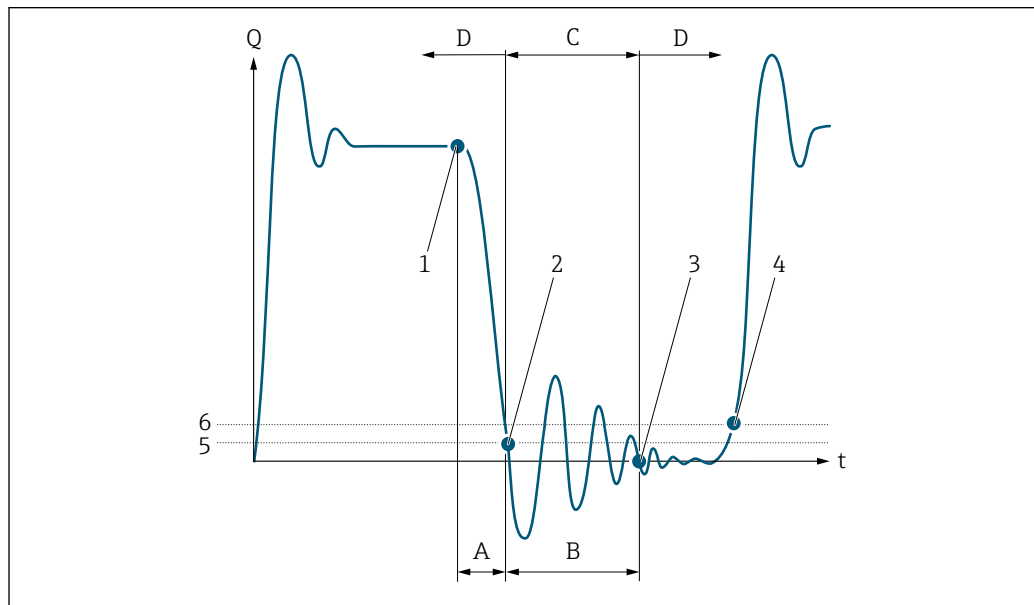
User entry

0 to 100 s

Additional information

Example


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



A0012888


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

2.1.5 Pulse/frequency/switch output 1 to n

Navigation  Guidance → Commissioning → PFS output 1 to n

Operating mode

Navigation

 Guidance → Commissioning → PFS output 1 → Operating mode

Description

Select the operating mode for the output.

Selection

- Off
- Pulse
- Automatic pulse
- Frequency
- Switch

Additional information

Selection

- **Pulse** option

Quantitatively proportional pulse with pulse width to be configured. Whenever the pulse value for the specified process variable is reached, a pulse is emitted, the duration of which is set within the "Pulse width" parameter.

The process variable for the pulse output is specified in the "Assign pulse output" parameter.

- **Automatic pulse** option

Quantitatively proportional pulse with a fixed 1:1 ratio of pulse-to-interval. Whenever the pulse value for the specified process variable is reached, a pulse is emitted.

The process variable for the pulse output is specified in the "Assign pulse output" parameter.

- **Frequency** option

The output frequency is proportional to the value for the process variable assigned, with a pulse-to-interval ratio of 1:1.

The process variable for the frequency output is specified in the "Assign frequency output" parameter.

- **Switch** option

Indicates when the state of the device changes, e.g. when a specified limit value is reached or an alarm or warning is triggered.

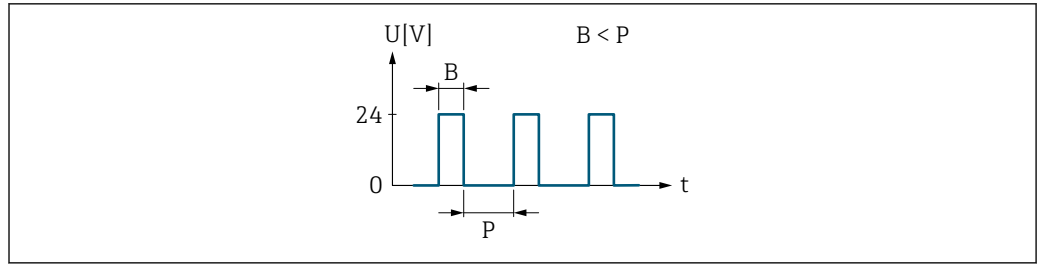
The switch output can be in one of two states: either it is conductive or it is non-conductive.

When the function assigned to the switch output is triggered, the switch output will depending on the output configuration either be continuously conductive or continuously non-conductive.

"Pulse" option

Example

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



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

B Pulse width entered

P Pauses between the individual pulses

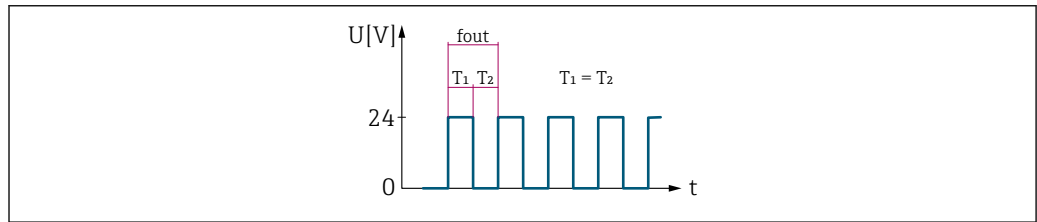
"Frequency" option

Example

- Flow rate Q approx. 100 g/s
- Min. frequency (f_{min}) 0 Hz
- Max. frequency (f_{max}) 1000 Hz
- Flow rate at min. frequency (Q_{min}) 0 g/s
- Flow rate at max. frequency (Q_{max}) 1000 g/s
- Output frequency (f_{out}) approx. 100 Hz

$$f_{out} = f_{min} + Q \times [(f_{max} - f_{min}) / (Q_{max} - Q_{min})] =$$

$$0 \text{ Hz} + 100 \text{ g/s} \times [(1000 \text{ Hz} - 0 \text{ Hz}) / (1000 \text{ g/s} - 0 \text{ g/s})] = \mathbf{100 \text{ Hz}}$$



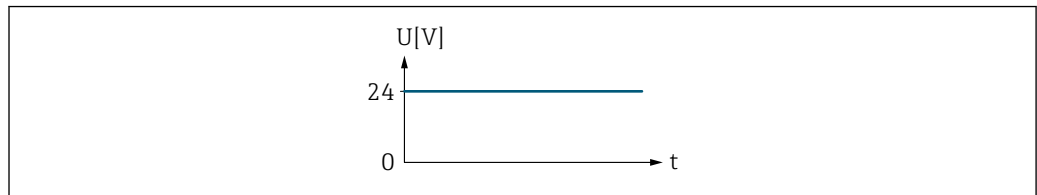
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2 Flow-proportional frequency output

"Switch" option

Example

Alarm response without alarm

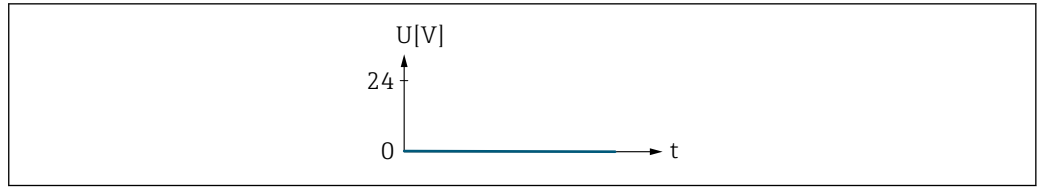


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3 No alarm, high level

Example

Alarm response in case of alarm



4 Alarm, low level

Assign frequency output



Navigation Guidance → Commissioning → PFS output 1 → Assign freq.

Description Select a process variable for the frequency output.

- Selection**
- Off
 - Volume flow
 - Temperature *

Minimum frequency value



Navigation Guidance → Commissioning → PFS output 1 → Min. freq. value

Description Enter the frequency to report for the lower range value of the measured value range.
The lower range value for the measured value range that corresponds to the minimum frequency is specified in the "Measuring value at minimum frequency" parameter.

User entry 0.0 to 10 000.0 Hz

Measuring value at minimum frequency



Navigation Guidance → Commissioning → PFS output 1 → Val. at min.freq

Description Enter the lower range value for the measured value range.
Depending on the setting selected for the "Measuring mode" parameter, the value specified for this parameter and the "Measuring value at maximum frequency" parameter must have the same algebraic sign or not.


As a rule, the lower range value is scaled to be lower than the upper range value. As a result, the behavior of the frequency output is proportional to the process variable assigned. If the lower range value is scaled to be higher than the upper range value, then the behavior of the frequency output will be inversely proportional to the process variable assigned.

User entry Signed floating-point number

* Visibility depends on order options or device settings

Maximum frequency value

**Navigation**

 Guidance → Commissioning → PFS output 1 → Max. freq. value

Description


Enter the frequency to report for the upper range value of the measured value range.
The upper range value for the measured value range that corresponds to the maximum frequency is specified in the "Measuring value at maximum frequency" parameter.

User entry

0.0 to 10 000.0 Hz

Measuring value at maximum frequency

**Navigation**

 Guidance → Commissioning → PFS output 1 → Val. at max.freq

Description


Enter upper range value for the measured value range.

User entry

Signed floating-point number

Failure mode

**Navigation**

 Guidance → Commissioning → PFS output 1 → Failure mode

Description

Specify how the output should behave in the event of a device alarm.
For safety reasons, it is recommended that the behavior of the output in the event of a device alarm be predefined.

Selection

- Actual value
- Defined value
- 0 Hz


Additional information

Selection

- **Actual value** option
The frequency output continues to report the actual flow rate measured. The fault condition is ignored.
- **Defined value** option
The frequency output reports the value specified.
The value is specified in the "Failure frequency" parameter.
- **0 Hz** option
The frequency output reports 0 Hz.

Failure frequency


**Navigation**


 Guidance → Commissioning → PFS output 1 → Failure freq.

Description

Enter the value for the "Defined value" option in the "Failure mode" parameter.


User entry 0.0 to 10 000.0 Hz


Assign pulse output 

Navigation  Guidance → Commissioning → PFS output 1 → Assign pulse

Description Select the process variable for the pulse output.

- Selection**
- Off
 - Volume flow

Pulse width 

Navigation  Guidance → Commissioning → PFS output 1 → Pulse width

Description Specify the duration of a pulse.

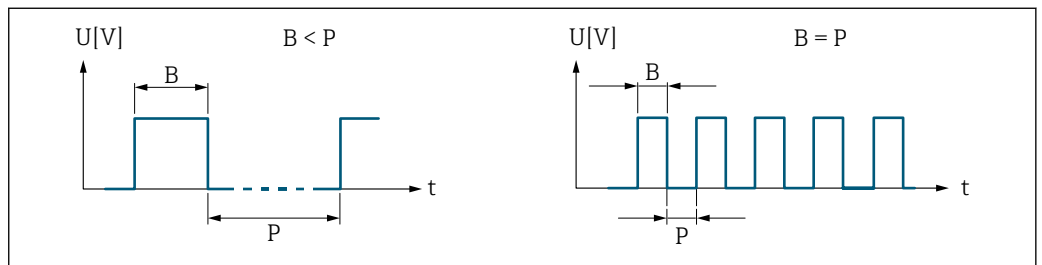
The maximum pulse rate is defined by $f_{max} = 1 / (2 \times \text{pulse width})$. The interval between two pulses (P) is at least as long as the specified pulse width (B).

The maximum flow is defined by $Q_{max} = f_{max} \times \text{pulse value}$. If the flow exceeds these limit values, the measuring device displays the diagnostic message "443 Pulse output saturated".

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



User entry 0.05 to 2 000 ms



Additional information *Description*





B Pulse width entered
P Pauses between the individual pulses

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Value per pulse		
Navigation		Guidance → Commissioning → PFS output 1 → Value per pulse
Description	Enter the measured value that corresponds to one pulse. The lower the value, the better the resolution and the higher the pulse frequency.	
User entry	Signed floating-point number	

Switch output function		
Navigation		Guidance → Commissioning → PFS output 1 → Switch out funct
Description	Assign a function to the switch output.	
Selection	<ul style="list-style-type: none"> ▪ Off ▪ On ▪ Diagnostic behavior ▪ Limit ▪ Flow direction check ▪ Status 	
Additional information	<p><i>Selection</i></p> <ul style="list-style-type: none"> ▪ Off option The switch output is permanently switched off (open, non-conductive). ▪ On option The switch output is permanently switched on (closed, conductive). ▪ Diagnostic behavior option The switch output is switched on (closed, conductive), if there is a pending diagnostic event of the assigned behavioral category. ▪ Limit option The switch output is switched on (closed, conductive), if the limit value specified for the process variable is reached. ▪ Flow direction check option The switch output is switched on (closed, conductive), when the flow direction changes (forward or reverse flow). ▪ Status option The switch output is switched on (closed, conductive) to indicate the status for the selected device function ("Assign status" parameter). 	


Assign diagnostic behavior		
Navigation		Guidance → Commissioning → PFS output 1 → Assign diag. beh
Description	The switch output is switched on (closed, conductive), if there is a pending diagnostic event of the assigned behavioral category.	

- Selection**
- Alarm
 - Alarm or warning
 - Warning

- Additional information** *Selection*
- **Alarm** option
The switch output is only switched on for diagnostic events of the "Alarm" category.
 - **Alarm or warning** option
The switch output is switched on for diagnostic events of the "Alarm" or "Warning" category.
 - **Warning** option
The switch output is only switched on for diagnostic events of the "Warning" category.

Assign limit



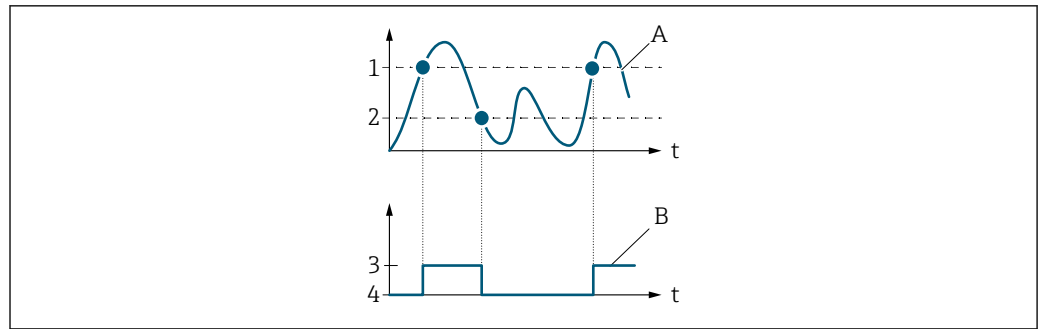
Navigation  Guidance → Commissioning → PFS output 1 → Assign limit

Description Select the process variable to monitor in case the specified limit value is exceeded. If a limit value for the selected process variable is exceeded, the output is switched on.

- Selection**
- Off
 - Volume flow
 - Flow velocity
 - Temperature *

- Additional information** *Switch-on point > switch-off point*
- Behavior of the status output if switch-on point > switch-off point:
- Process variable > switch-on point: transistor is conductive
 - Process variable < switch-off point: transistor is not conductive

* Visibility depends on order options or device settings



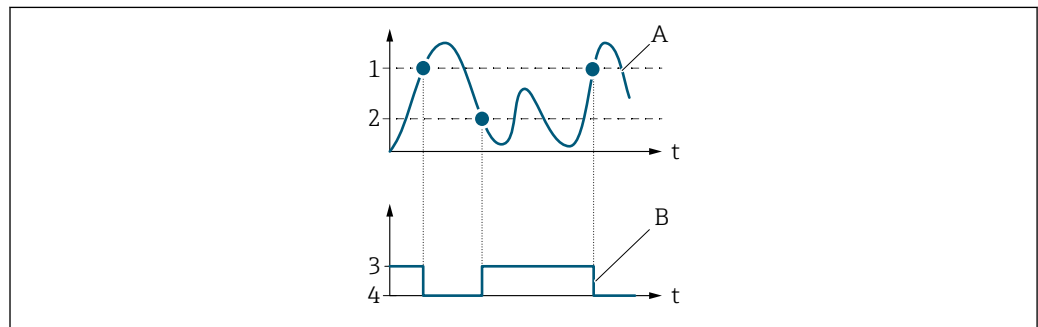
A0026891

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

Switch-on point < switch-off point

Behavior of the status output if switch-on point < switch-off point:

- Process variable < switch-on point: transistor is conductive
- Process variable > switch-off point: transistor is not conductive



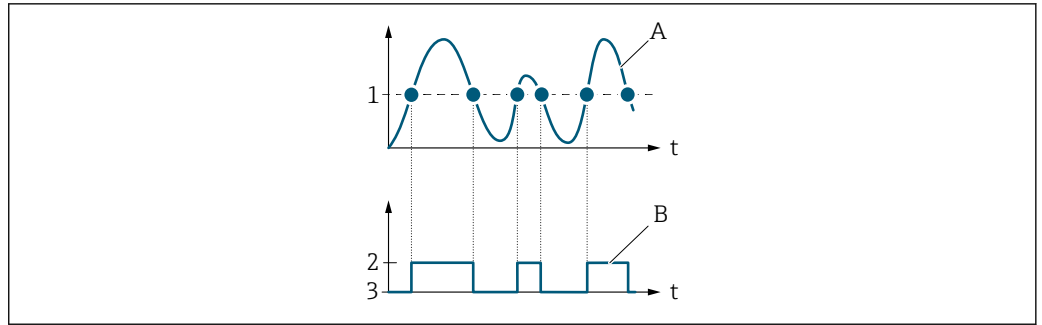
A0026892

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

Switch-on point = switch-off point

Behavior of the status output if switch-on point = switch-off point:

- Process variable > switch-on point: transistor is conductive
- Process variable < switch-off point: transistor is not conductive



A0026893

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

Switch-on value



Navigation

Guidance → Commissioning → PFS output 1 → Switch-on value

Description

Enter the limit value for the switch-on point (process variable > switch-on value = closed, conductive).

To use a hysteresis: Switch-on point > Switch-off point.

User entry

Signed floating-point number

Switch-off value



Navigation

Guidance → Commissioning → PFS output 1 → Switch-off value

Description

Enter the limit value for the switch-off point (process variable < switch-off value = open, non-conductive).

To use a hysteresis: Switch-on point > Switch-off point.

User entry

Signed floating-point number

Switch-on delay



Navigation







Guidance → Commissioning → PFS output 1 → Switch-on delay

Description


Enter delay before the switch output is switched on.

User entry


0.0 to 100.0 s

Switch-off delay 	
Navigation	 Guidance → Commissioning → PFS output 1 → Switch-off delay
Description	Enter delay before the switch output is switched off.
User entry	0.0 to 100.0 s
Assign status 	
Navigation	 Guidance → Commissioning → PFS output 1 → Assign status
Description	<p>Select the device function for which to report the status.</p> <p>If the switch-on point for the selected device function is reached, the output is switched on (closed and conductive). Otherwise, the output is non-conductive.</p> <p>The output behavior can be inverted in the "Invert output signal" parameter, i.e. in this case the output will be non-conductive when switched on and conductive when switched off. The "Invert output signal" parameter is not available for all devices.</p>
Selection	Low flow cutoff
Failure mode 	
Navigation	 Guidance → Commissioning → PFS output 1 → Failure mode
Description	<p>Specify how the output should behave in the event of a device alarm.</p> <p>For safety reasons, it is recommended that the behavior of the output in the event of a device alarm be predefined.</p>
Selection	<ul style="list-style-type: none"> ▪ Actual status ▪ Open ▪ Closed
Additional information	<p><i>Selection</i></p> <ul style="list-style-type: none"> ▪ Actual status option The switch output continues to report the actual state of the switch output based on the function assigned ("Switch output function" parameter). The fault condition is ignored. ▪ Open option In the event of a device alarm, the switch output's transistor is set to "non-conductive".

2.1.6 Time format

Navigation  Guidance → Commissioning → Time format

Time format



Navigation  Guidance → Commissioning → Date/time → Time format

Description Select the time format.

Selection

- 24 h
- 12 h AM/PM





Additional information *Selection*

 For an explanation of the abbreviated units: →  96


3 "Diagnostics" menu









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

Navigation  Diagnostics


Diagnostics	
▶ Active diagnostics	→  27
▶ Diagnostic list	→  30
▶ Simulation	→  32
▶ Diagnostic settings	→  36

3.1 Active diagnostics


Navigation   Diagnostics → Active diagnos.

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


Actual diagnostics

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


Active diagnostic IO-Link

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


Timestamp

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


Previous diagnostics

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


Timestamp

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

Last diagnostic IO-Link


Navigation	 Diagnostics → Active diagnos. → LastDiag IO-Link
Description	Displays the IO-Link event code for the last diagnostic event that has ended.
User interface	0 to 65 535

Operating time from restart

Navigation	 Diagnostics → Active diagnos. → Time fr. restart
Description	Indicates how long the device has been in operation since the last time the device was restarted.

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

Operating time





Navigation  Diagnostics → Active diagnos. → Operating time

Description Indicates how long the device has been in operation.


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

3.2 Diagnostic list

Navigation  Diagnostics → Diagnostic list

▶ Diagnostic list	
Diagnostic 2 IO-Link	→  30
Diagnostic 3 IO-Link	→  30
Diagnostic 4 IO-Link	→  30
Diagnostic 5 IO-Link	→  31

Diagnostic 2 IO-Link

Navigation  Diagnostics → Diagnostic list → Diag. 2 IO-Link

Description Displays the IO-Link event code for the currently active diagnostic message with the second highest priority.

User interface 0 to 65 535


Diagnostic 3 IO-Link

Navigation  Diagnostics → Diagnostic list → Diag. 3 IO-Link

Description Displays the IO-Link event code for the currently active diagnostic message with the third highest priority.

User interface 0 to 65 535


Diagnostic 4 IO-Link

Navigation  Diagnostics → Diagnostic list → Diag. 4 IO-Link

Description Displays the IO-Link event code for the currently active diagnostic message with the fourth highest priority.

User interface 0 to 65 535

Diagnostic 5 IO-Link

Navigation Diagnostics → Diagnostic list → Diag. 5 IO-Link**Description**











Displays the IO-Link event code for the currently active diagnostic message with the fifth highest priority.

User interface


0 to 65 535

3.3 Simulation

Navigation  Diagnostics → Simulation

▶ Simulation	
Assign simulation process variable	→  32
Process value	→  33
Frequency output 1 simulation	→  33
Frequency output 1 value	→  33
Pulse output simulation 1	→  33
Pulse value 1	→  34
Switch output simulation 1	→  34
Switch state 1	→  34
Device alarm simulation	→  35
Diagnostic event simulation	→  35

Assign simulation process variable

Navigation  Diagnostics → Simulation → Assign proc.var.

Description Select a process variable to activate the simulation.

Selection

- Off
- Volume flow
- Temperature *

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

* Visibility depends on order options or device settings

Process value



Navigation	Diagnostics → Simulation → Process value
Description	Enter the process value to simulate. The unit is set in the "System units" menu.
User entry	Signed floating-point number

Frequency output simulation



Navigation	Diagnostics → Simulation → Freq.outp 1 sim.
Description	Switch simulation of the frequency output on or off.
Selection	<ul style="list-style-type: none"> ■ Off ■ On
Additional information	<p><i>Description</i></p> <p>The display alternates between the measured value and a diagnostics message of the "function check" category (C) when simulation is active.</p>

Frequency output value





Navigation	Diagnostics → Simulation → Freq.outp 1 val.
Description	Enter the frequency to simulate.
User entry	0.0 to 10 000.0 Hz



Pulse output simulation





Navigation	Diagnostics → Simulation → Puls.outp.sim. 1
Description	Switch simulation of the pulse output on or off.
Selection	<ul style="list-style-type: none"> ■ Off ■ Fixed value ■ Down-counting value

Additional information	<p><i>Selection</i></p> <ul style="list-style-type: none"> ■ Fixed value option Pulses are emitted continuously with the pulse width specified in the "Pulse width" parameter. ■ Down-counting value option The number of pulses specified in the "Pulse value " parameter are emitted. <p><i>Description</i></p> <p>The display alternates between the measured value and a diagnostics message of the "function check" category (C) when simulation is active.</p>
-------------------------------	--


Pulse value		
Navigation	 Diagnostics → Simulation → Pulse value 1	
Description	Enter the number of pulses to simulate.	
User entry	0 to 65 535	

Switch output simulation		
Navigation	 Diagnostics → Simulation → Switch sim. 1	
Description	Switch simulation of the switch output on or off.	
Selection	<ul style="list-style-type: none"> ■ Off ■ On 	
Additional information	<p><i>Description</i></p> <p>The display alternates between the measured value and a diagnostics message of the "function check" category (C) when simulation is active.</p>	


Switch state		
Navigation	 Diagnostics → Simulation → Switch state 1	
Description	Select the switch state to simulate.	
Selection	<ul style="list-style-type: none"> ■ Open ■ Closed 	

Additional information	<i>Selection</i> <ul style="list-style-type: none">▪ Open option The switch output is not conductive.▪ Closed option The switch output is conductive.
-------------------------------	--

Device alarm simulation

Navigation	 Diagnostics → Simulation → Dev. alarm sim.
Description	Switch the device alarm simulation on or off. While simulation is in progress, a diagnostic message of the Function Check (C) category is displayed.
Selection	<ul style="list-style-type: none">▪ Off▪ On



Diagnostic event simulation

Navigation	 Diagnostics → Simulation → Diagnostic event
Description	Select the diagnostic event to simulate.
Selection	Off



3.4 Diagnostic settings

Navigation   Diagnostics → Diag. settings


▶ Diagnostic settings

- ▶ Properties →  36
- ▶ Diagnostic configuration →  36

3.4.1 Properties


Navigation   Diagnostics → Diag. settings → Properties

▶ Properties

- Alarm delay →  36

Alarm delay

Navigation

 Diagnostics → Diag. settings → Properties → Alarm delay



Description

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




User entry

0 to 60 s


3.4.2 Diagnostic configuration

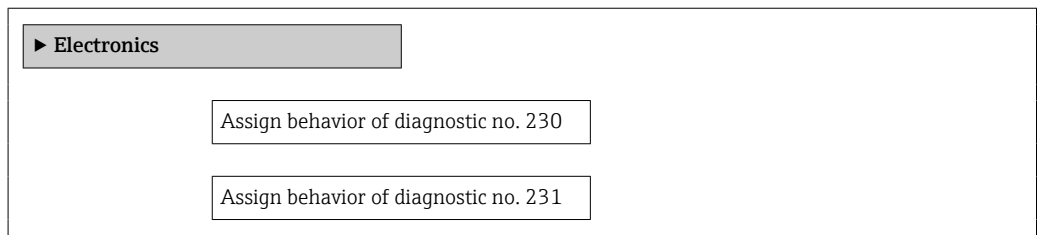
Navigation   Diagnostics → Diag. settings → Diag. config.

▶ Diagnostic configuration


- ▶ Electronics →  37
- ▶ Configuration →  37
- ▶ Process →  39

Electronics

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




Assign behavior of diagnostic no. 230

Navigation  Diagnostics → Diag. settings → Diag. config. → Electronics → Diagnostic no. 230

Description Select behavior for diagnostic event "230 Date/time incorrect".

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

Assign behavior of diagnostic no. 231

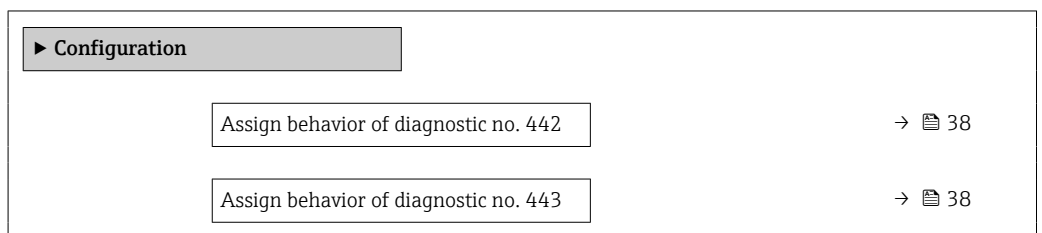
Navigation  Diagnostics → Diag. settings → Diag. config. → Electronics → Diagnostic no. 231

Description Select behavior for diagnostic event "231 Date/time not available".

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

Configuration

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




Assign behavior of diagnostic no. 442


Navigation	Diagnostics → Diag. settings → Diag. config. → Configuration → Diagnostic no. 442
Description	Select behavior for diagnostic event "442 Frequency output faulty".
Selection	<ul style="list-style-type: none"> ■ Off ■ Alarm ■ Warning ■ Logbook entry only
Additional information	<p><i>Selection</i></p> <ul style="list-style-type: none"> ■ Off option The diagnostic event is ignored and no diagnostic message is generated or logged. ■ Alarm option The device stops measuring. The signal outputs and totalizers assume the specified alarm condition. A diagnostic message is generated. ■ Warning option The device continues measuring. The signal outputs and totalizers are not affected. A diagnostic message is generated. ■ Logbook entry only option The device continues measuring. The diagnostic message is only displayed in the "Event logbook" submenu and does not alternate with the standard operational information displayed.







Assign behavior of diagnostic no. 443


Navigation	Diagnostics → Diag. settings → Diag. config. → Configuration → Diagnostic no. 443
Description	Select behavior for diagnostic event "443 Pulse output faulty".
Selection	<ul style="list-style-type: none"> ■ Off ■ Alarm ■ Warning ■ Logbook entry only
Additional information	<p><i>Selection</i></p> <ul style="list-style-type: none"> ■ Off option The diagnostic event is ignored and no diagnostic message is generated or logged. ■ Alarm option The device stops measuring. The signal outputs and totalizers assume the specified alarm condition. A diagnostic message is generated. ■ Warning option The device continues measuring. The signal outputs and totalizers are not affected. A diagnostic message is generated. ■ Logbook entry only option The device continues measuring. The diagnostic message is only displayed in the "Event logbook" submenu and does not alternate with the standard operational information displayed.

Process

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


▶ Process

Assign behavior of diagnostic no. 834	→  39
Assign behavior of diagnostic no. 835	→  40
Assign behavior of diagnostic no. 842	→  40
Assign behavior of diagnostic no. 937	→  41
Assign behavior of diagnostic no. 938	→  41
Assign behavior of diagnostic no. 961	→  42

Assign behavior of diagnostic no. 834



Navigation

 Diagnostics → Diag. settings → Diag. config. → Process → Diagnostic no. 834

Prerequisite

Only available for nominal diameters DN 15 to DN 25 (½ to 1") with order code "Sensor option", option CI "Fluid temperature measurement".

Description

Select behavior for diagnostic event "834 Process temperature too high".

Selection

- Off
- Alarm
- Warning
- Logbook entry only

Additional information

Selection

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

Assign behavior of diagnostic no. 835


Navigation	Diagnostics → Diag. settings → Diag. config. → Process → Diagnostic no. 835
Prerequisite	Only available for nominal diameters DN 15 to DN 25 (½ to 1") with order code "Sensor option", option CI "Fluid temperature measurement".
Description	Select behavior for diagnostic event "835 Process temperature too low".
Selection	<ul style="list-style-type: none"> ■ Off ■ Alarm ■ Warning ■ Logbook entry only
Additional information	<p><i>Selection</i></p> <ul style="list-style-type: none"> ■ Off option The diagnostic event is ignored and no diagnostic message is generated or logged. ■ Alarm option The device stops measuring. The signal outputs and totalizers assume the specified alarm condition. A diagnostic message is generated. ■ Warning option The device continues measuring. The signal outputs and totalizers are not affected. A diagnostic message is generated. ■ Logbook entry only option The device continues measuring. The diagnostic message is only displayed in the "Event logbook" submenu and does not alternate with the standard operational information displayed.

Assign behavior of diagnostic no. 842


Navigation	Diagnostics → Diag. settings → Diag. config. → Process → Diagnostic no. 842
Description	Select behavior for diagnostic event "842 Process value below limit".
Selection	<ul style="list-style-type: none"> ■ Off ■ Alarm ■ Warning ■ Logbook entry only
Additional information	<p><i>Selection</i></p> <ul style="list-style-type: none"> ■ Off option The diagnostic event is ignored and no diagnostic message is generated or logged. ■ Alarm option The device stops measuring. The signal outputs and totalizers assume the specified alarm condition. A diagnostic message is generated. ■ Warning option The device continues measuring. The signal outputs and totalizers are not affected. A diagnostic message is generated. ■ Logbook entry only option The device continues measuring. The diagnostic message is only displayed in the "Event logbook" submenu and does not alternate with the standard operational information displayed.

Assign behavior of diagnostic no. 937



Navigation	Diagnostics → Diag. settings → Diag. config. → Process → Diagnostic no. 937
Description	Select behavior for diagnostic event "937 Sensor symmetry".
Selection	<ul style="list-style-type: none"> ■ Off ■ Alarm ■ Warning ■ Logbook entry only
Additional information	<p><i>Selection</i></p> <ul style="list-style-type: none"> ■ Off option The diagnostic event is ignored and no diagnostic message is generated or logged. ■ Alarm option The device stops measuring. The signal outputs and totalizers assume the specified alarm condition. A diagnostic message is generated. ■ Warning option The device continues measuring. The signal outputs and totalizers are not affected. A diagnostic message is generated. ■ Logbook entry only option The device continues measuring. The diagnostic message is only displayed in the "Event logbook" submenu and does not alternate with the standard operational information displayed.

Assign behavior of diagnostic no. 938



Navigation	Diagnostics → Diag. settings → Diag. config. → Process → Diagnostic no. 938
Description	Select behavior for diagnostic event "938 Coil current not stable".
Selection	<ul style="list-style-type: none"> ■ Off ■ Alarm ■ Warning ■ Logbook entry only
Additional information	<p><i>Selection</i></p> <ul style="list-style-type: none"> ■ Off option The diagnostic event is ignored and no diagnostic message is generated or logged. ■ Alarm option The device stops measuring. The signal outputs and totalizers assume the specified alarm condition. A diagnostic message is generated. ■ Warning option The device continues measuring. The signal outputs and totalizers are not affected. A diagnostic message is generated. ■ Logbook entry only option The device continues measuring. The diagnostic message is only displayed in the "Event logbook" submenu and does not alternate with the standard operational information displayed.

Assign behavior of diagnostic no. 961

**Navigation**

Diagnostics → Diag. settings → Diag. config. → Process → Diagnostic no. 961

Description

Select behavior for diagnostic event "961 Electrode potential out of specification".

Selection

- Off
- Alarm
- Warning
- Logbook entry only

Additional information













Selection

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

4 "Application" menu




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

Navigation  Application



Application	
▶ Measured values	→  43
▶ System units	→  46
▶ Totalizers	→  49
▶ Sensor	→  53
▶ Pulse/frequency/switch output 1	→  64
▶ Pulse output	→  69
▶ Frequency output	→  72
▶ Switch output	→  76
▶ Limit	→  78
▶ Diagnostic behavior	→  82
▶ Flow direction check	→  83
▶ Status	→  84

4.1 Measured values


Navigation  Application → Measured values

▶ Measured values	
Volume flow	→  44
Temperature	→  44
▶ Totalizer	→  44

Volume flow



Navigation	 Application → Measured values → Volume flow
Description	Displays the volume flow measured. The unit is set in the "System units" menu.
User interface	Signed floating-point number
Additional information	 The IO-Link interface only offers the m³/h option.

Temperature


Navigation	 Application → Measured values → Temperature
Prerequisite	Only available for nominal diameters DN 15 to DN 25 (½ to 1") with order code for "Sensor option", option CI "Medium temperature measurement".
Description	Displays the medium temperature measured. The unit is set in the "System units" menu.
User interface	Positive floating-point number


4.1.1 Totalizer

Navigation   Application → Measured values → Totalizer

▶ Totalizer	
Totalizer 1 to n value	→  44
Totalizer 1 to n overflow	→  45


Totalizer value

Navigation	 Application → Measured values → Totalizer → Tot. 1 to n value
Prerequisite	A process variable has been selected in the Assign process variable parameter in the Totalizer 1 to n submenu.

Description	<p>Displays the totalizer counter since the last reset.</p> <p>This parameter can only display figures up to 7 digits. If the counter exceeds this range, the overflow is displayed in the "Totalizer overflow" parameter.</p> <p>Example:</p> <p>Value of "Totalizer value" parameter: 1,968,457 m³ Value of "Totalizer overflow" parameter: 1×10^7 (1 overflow) = 10,000,000 m³ Counter (total): 11,968,457 m³</p> <p>In the event of a fault condition, the totalizer behaves as specified in the "Totalizer failure behavior" parameter.</p>
User interface	Signed floating-point number
Additional information	 Totalizer 1 is permanently set to and cannot be changed. Totalizers 2 and 3 can be changed.

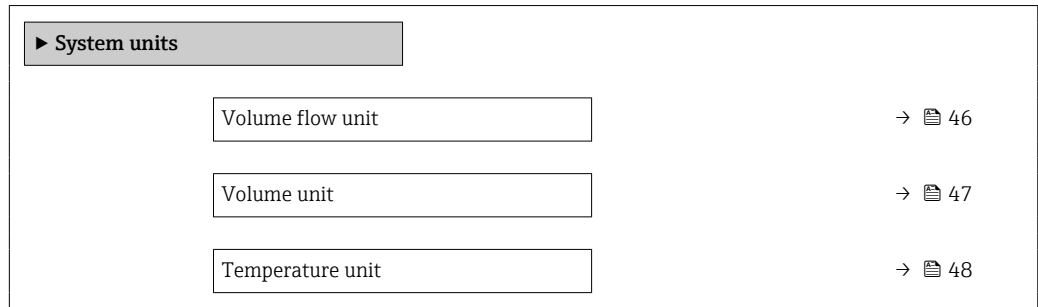
Totalizer overflow



Navigation	 Application → Measured values → Totalizer → Tot. 1 to n overflow
Prerequisite	A process variable has been selected in the Assign process variable parameter in the Totalizer 1 to n submenu.
Description	Displays the number of overflows for the totalizer counter ("Totalizer value" parameter).
User interface	-32 000.0 to 32 000.0

4.2 System units

Navigation  Application → System units



Volume flow unit

Navigation  Application → System units → Volume flow unit

Description Select the volume flow unit.

Selection

SI units

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

US units



- af/s
- af/min
- af/h
- af/d
- ft³/s
- ft³/min
- ft³/h
- ft³/d
- fl oz/s (us)
- fl oz/min (us)
- fl oz/h (us)
- fl oz/d (us)
- gal/s (us)
- gal/min (us)
- gal/h (us)
- gal/d (us)
- Mgal/s (us)
- Mgal/min (us)
- Mgal/h (us)
- Mgal/d (us)
- bbl/s (us;liq.)
- bbl/min (us;liq.)
- bbl/h (us;liq.)
- bbl/d (us;liq.)
- bbl/s (us;beer)
- bbl/min (us;beer)
- bbl/h (us;beer)
- bbl/d (us;beer)
- bbl/s (us;oil)
- bbl/min (us;oil)
- bbl/h (us;oil)
- bbl/d (us;oil)
- bbl/s (us;tank)
- bbl/min (us;tank)
- bbl/h (us;tank)
- bbl/d (us;tank)
- kgal/s (us)
- kgal/min (us)
- kgal/h (us)
- kgal/d (us)

Imperial units

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

Additional information

Options

 For an explanation of the abbreviated units: →  96

 The IO-Link interface only offers the **m³/h** option.

Volume unit



Navigation



 Application → System units → Volume unit

Description

Select the volume unit.

Selection	<i>SI units</i> <ul style="list-style-type: none"> ■ cm³ ■ dm³ ■ m³ ■ ml ■ l ■ hl ■ Ml Mega 	<i>US units</i> <ul style="list-style-type: none"> ■ af ■ ft³ ■ fl oz (us) ■ gal (us) ■ kgal (us) ■ Mgal (us) ■ bbl (us;oil) ■ bbl (us;liq.) ■ bbl (us;beer) ■ bbl (us;tank) 	<i>Imperial units</i> <ul style="list-style-type: none"> ■ gal (imp) ■ Mgal (imp) ■ bbl (imp;beer) ■ bbl (imp;oil)
------------------	---	---	--

Additional information *Selection*

 For an explanation of the abbreviated units: →  96

Temperature unit

Navigation  Application → System units → Temperature unit

Prerequisite Only available for nominal diameters DN 15 to DN 25 (½ to 1") with order code for "Sensor option", option CI "Medium temperature measurement".

Description Select the temperature unit.

Selection	<i>SI units</i> <ul style="list-style-type: none"> ■ °C ■ K 	<i>US units</i> <ul style="list-style-type: none"> ■ °F ■ °R
------------------	---	--


Additional information *Selection*


 For an explanation of the abbreviated units: →  96

4.3 Totalizers

Navigation   Application → Totalizers

▶ Totalizers


▶ Totalizer handling →  49

▶ Totalizer 1 to n →  49


4.3.1 Totalizer handling

Navigation   Application → Totalizers → Totalizer



▶ Totalizer handling

Reset all totalizers →  49


Reset all totalizers


Navigation	 Application → Totalizers → Totalizer → Reset all tot.
Description	Reset all totalizers to "0" and restart the totalizers. The counter readings are not logged prior to the reset.
Selection	<ul style="list-style-type: none"> ■ Cancel ■ Reset + totalize


4.3.2 Totalizer 1 to n


Navigation   Application → Totalizers → Totalizer 1 to n

▶ Totalizer 1 to n

Assign process variable 1 to n →  50

Process variable unit 1 to n →  50

Totalizer 1 to n operation mode →  51

Totalizer 1 to n control →  51

Preset value 1 to n	→ 52
Totalizer 1 to n failure behavior	→ 52

Assign process variable



Navigation

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

Description

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

Selection

- Off
- Volume flow

Additional information

Totalizer 1 is permanently set to and cannot be changed. Totalizers 2 and 3 can be changed.

Process variable unit



Navigation

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

Description

Select the unit for the process variable of the totalizer.

Selection

- | | | |
|---|--|---|
| <p><i>SI units</i></p> <ul style="list-style-type: none"> ■ cm³* ■ dm³* ■ m³* ■ ml ■ l ■ hl ■ Ml Mega | <p><i>US units</i></p> <ul style="list-style-type: none"> ■ af* ■ ft³* ■ Mft³* ■ Mft³* ■ fl oz (us) ■ gal (us) ■ kgal (us) ■ Mgal (us) ■ bbl (us;liq.) ■ bbl (us;beer) ■ bbl (us;oil) ■ bbl (us;tank) | <p><i>Imperial units</i></p> <ul style="list-style-type: none"> ■ gal (imp) ■ Mgal (imp) ■ bbl (imp;beer) ■ bbl (imp;oil) |
|---|--|---|

* Visibility depends on order options or device settings

or

Other units
None

* Visibility depends on order options or device settings

Totalizer operation mode





Navigation	Application → Totalizers → Totalizer 1 to n → Operat. mode 1 to n
Description	Select the totalizer operation mode, e.g. only totalize forward flow or only totalize reverse flow.
Selection	<ul style="list-style-type: none"> ■ Net ■ Forward ■ Reverse
Additional information	<p><i>Selection</i></p> <ul style="list-style-type: none"> ■ Net option The flow values in the forward and reverse flow directions are totalized and netted against each other. Net flow is recorded in the flow direction. ■ Forward option Only the flow in the forward flow direction is totalized. ■ Reverse option Only the flow in the reverse flow direction is totalized (= reverse flow quantity).

Totalizer control


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

Preset value

Navigation	 Application → Totalizers → Totalizer 1 to n → Preset value 1 to n
Prerequisite	A process variable has been selected in the Assign process variable parameter in the Totalizer 1 to n submenu.
Description	Specify a start value for the totalizer.
User entry	Signed floating-point number
Additional information	<p><i>Description</i></p> <p>The unit of the selected process variable is specified for the totalizer in the Unit totalizer parameter (→  11).</p> <p><i>Example</i></p> <p>This configuration is suitable for applications such as iterative filling processes with a fixed batch quantity.</p>





Totalizer failure behavior



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







4.4 Sensor

Navigation   Application → Sensor

▶ Sensor	
▶ Process parameters	→  53
▶ Low flow cutoff	→  55
▶ Sensor adjustment	→  58
▶ Calibration	→  62


4.4.1 Process parameters

Navigation   Application → Sensor → Process param.

▶ Process parameters	
Binomial filter depth	→  53
Median filter depth	→  54
Flow damping	→  54
Flow override	→  54
Coil current mode	→  55
Temperature damping time	→  55

Binomial filter depth

Navigation









 Application → Sensor → Process param. → Binomial filter

Description

Set the binomial filter depth (0 - 32). As the filter depth increases, so does the reaction time of the device, i.e. flow damping increases (0 = off).

User entry

0 to 32

Median filter depth 	
Navigation	 Application → Sensor → Process param. → Median filter
Description	Set the filter depth to reduce the sensitivity of the measuring signal to interference peaks. Value = 0: No damping Value > 0: Damping increases
User entry	0 to 32
Flow damping 	
Navigation	 Application → Sensor → Process param. → Flow damping
Description	Enter a time constant for flow damping. Value = 0: No damping Value > 0: Damping increases Damping is implemented by means of a proportional transmission behavior with first order delay (PT1 element).
User entry	0.0 to 100.0 s
Flow override 	
Navigation	 Application → Sensor → Process param. → Flow override
Description	Reports the flow rate as zero until flow override is deactivated. Can be used for example when cleaning the pipeline.
Selection	<ul style="list-style-type: none"> ■ Off ■ On
Additional information	<p><i>Selection</i></p> <p>"On" option Activates flow override and the diagnostic message "453 Flow override active" is generated. Values reported: Flow variables: Zero Other process variables: As measured Totalizers: Stop totalizing</p> <p><i>Effect</i></p> <p> This setting affects all the functions of the measuring device.</p> <p> Positive zero return is not relevant for most applications.</p>

Coil current mode



Navigation	Application → Sensor → Process param. → CoilCurrentMode
Description	Select the coil current mode.
Selection	<ul style="list-style-type: none"> ■ Automatic ■ Standard ■ Low
Additional information	<p><i>Selection</i></p> <ul style="list-style-type: none"> ■ Automatic option Reduced power consumption for cleaning processes at high temperatures ■ Standard option Nominal power consumption ■ Low option Reduced power consumption

Temperature damping time



Navigation	Application → Sensor → Process param. → TempDampingTime
Prerequisite	Only available for nominal diameters DN 15 to DN 25 (½ to 1") with order code for "Sensor option", option CI "Medium temperature measurement".
Description	Enter time constant for damping the temperature value.
User entry	0 to 999.9 s

4.4.2 Low flow cutoff

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 Application → Sensor → Low flow cutoff

▶ **Low flow cutoff**

Low flow cutoff	→ 56
On value low flow cutoff	→ 56
Off value low flow cutoff	→ 57

Pressure shock suppression	→ 57
Pressure shock suppression delay	→ 58

Low flow cutoff



Navigation

Application → Sensor → Low flow cutoff → Low flow cutoff

Description

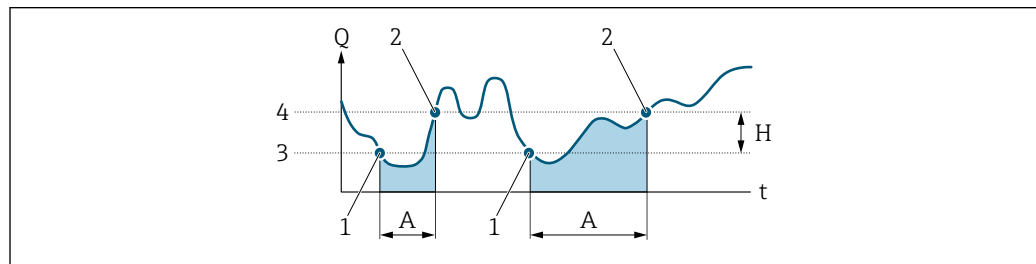
Select a process variable for low flow cutoff to activate low flow cutoff.

Selection

- Off
- Volume flow

Additional information

Description



A0012887

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

On value low flow cutoff



Navigation

Application → Sensor → Low flow cutoff → On value

Description

Enter on value to switch on low flow cutoff.

Value = 0: No low flow cutoff

Value > 0: Low flow cutoff is activated

User entry

Signed floating-point number

Off value low flow cutoff



Navigation

Application → Sensor → Low flow cutoff → Off value

Description

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

User entry

0 to 100.0 %

Pressure shock suppression



Navigation

Application → Sensor → Low flow cutoff → Pres. shock sup.

Description

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

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

Values reported when pressure shock suppression is active:

Flow: 0

Totalizer: Last valid value

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

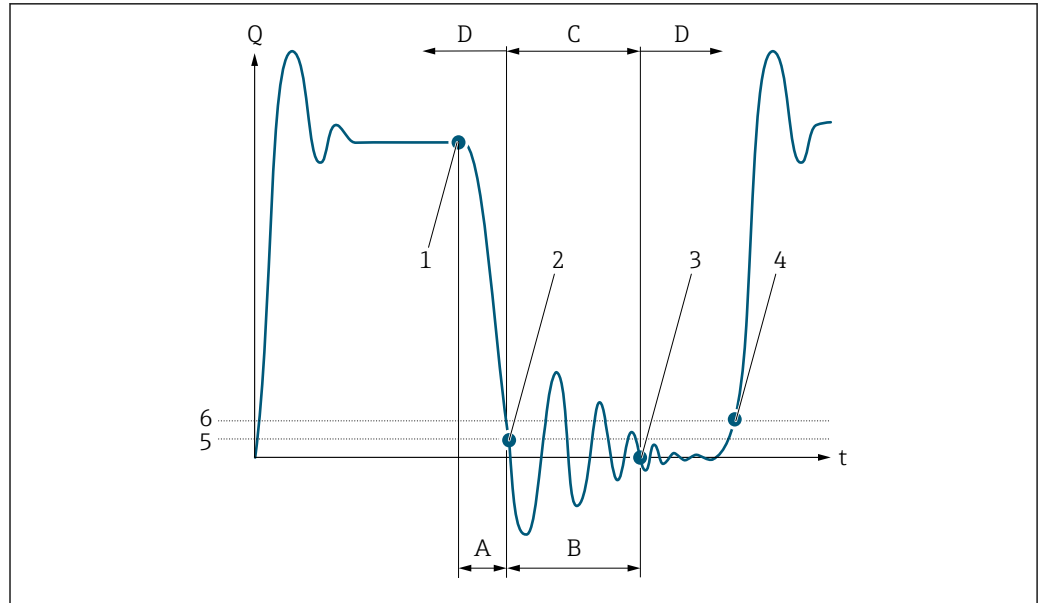
User entry

0 to 100 s

Additional information

Example

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



A0012888

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

Pressure shock suppression delay



Navigation

Application → Sensor → Low flow cutoff → PresShockSpDelay

Description

If required, enter a delay until pressure shock suppression is activated to suppress a response to momentary low flow.

User entry




Positive floating-point number

4.4.3 Sensor adjustment


Navigation Application → Sensor → Sensor adjustm.

▶ Sensor adjustment


Installation direction	→ 59
Integration time	→ 59

Measuring period	→  59
▶ Zero adjustment	→  60
▶ Process variable adjustment	→  61


Installation direction

Navigation	 Application → Sensor → Sensor adjustm. → Install. direct.
Description	Select the sign of the flow direction.
Selection	<ul style="list-style-type: none"> ■ Forward flow ■ Reverse flow

Integration time

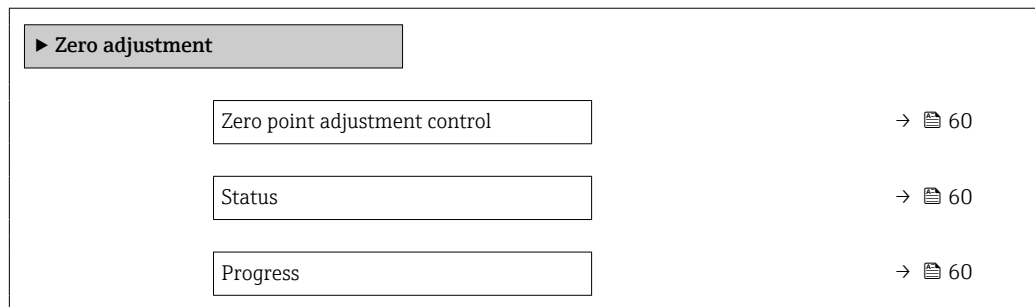
Navigation	 Application → Sensor → Sensor adjustm. → Integration time
Description	Set the duration of an integration cycle.
User entry	1 to 65 ms

Measuring period

Navigation	 Application → Sensor → Sensor adjustm. → Measuring period
Description	<p>Set the duration of a full measuring period.</p> <p>The measuring period is the time span over which a magnetic field is produced to create a measuring point.</p>
User entry	0 to 1 000 ms

Zero adjustment

Navigation  Application → Sensor → Sensor adjustm. → Zero adjustment



Zero point adjustment control

Navigation  Application → Sensor → Sensor adjustm. → Zero adjustment → Zero point adj.

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

Selection

- Cancel
- Start

Status

Navigation  Application → Sensor → Sensor adjustm. → Zero adjustment → Status

Description Displays the status of the zero point adjustment.

User interface

- Busy
- Failed
- Done

Progress

Navigation  Application → Sensor → Sensor adjustm. → Zero adjustment → Progress





Description Shows the progress of the process.


User interface 0 to 100 %


Process variable adjustment

Navigation  Application → Sensor → Sensor adjustm. → Variable adjust

▶ **Process variable adjustment**

Volume flow offset	→  61
Volume flow factor	→  61
Temperature offset	→  61
Temperature factor	→  62


Volume flow offset 


Navigation  Application → Sensor → Sensor adjustm. → Variable adjust → Vol. flow offset

Description Enter the offset by which to shift the zero point for volume flow in m³/s.

User entry Signed floating-point number

Additional information *Description*
Corrected value = (factor × value) + offset

Volume flow factor 


Navigation  Application → Sensor → Sensor adjustm. → Variable adjust → Vol. flow factor

Description Enter the multiplication factor to apply to the volume flow.

User entry Positive floating-point number

Additional information *Description*
Corrected value = (factor × value) + offset

Temperature offset 

Navigation  Application → Sensor → Sensor adjustm. → Variable adjust → Temp. offset

Prerequisite Only available for nominal diameters DN 15 to DN 25 (½ to 1") with order code "Sensor option", option CI "Fluid temperature measurement".

Description	Enter the offset by which to shift the zero point for temperature in K.
User entry	Signed floating-point number
Additional information	<i>Description</i> Corrected value = (factor × value) + offset

Temperature factor



Navigation	Application → Sensor → Sensor adjustm. → Variable adjust → Temp. factor
Prerequisite	Only available for nominal diameters DN 15 to DN 25 (½ to 1") with order code "Sensor option", option CI "Fluid temperature measurement".
Description	Enter the multiplication factor to apply to the temperature value.
User entry	Positive floating-point number
Additional information	<i>Description</i> Corrected value = (factor × value) + offset

4.4.4 Calibration

Navigation Application → Sensor → Calibration


▶ Calibration

Nominal diameter	→ 62
Calibration factor	→ 63
Zero point	→ 63

Nominal diameter


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

Calibration factor

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



Zero point



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

4.5 Pulse/frequency/switch output 1 to n

Navigation  Application → PFS output 1 to n

▶ Pulse/frequency/switch output 1	
Operating mode	→  64
Invert output signal	→  67

Operating mode

Navigation  Application → PFS output 1 → Operating mode

Description Select the operating mode for the output.

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

Additional information*Selection*■ **Pulse** option

Quantitatively proportional pulse with pulse width to be configured. Whenever the pulse value for the specified process variable is reached, a pulse is emitted, the duration of which is set within the "Pulse width" parameter.

The process variable for the pulse output is specified in the "Assign pulse output" parameter.

■ **Automatic pulse** option

Quantitatively proportional pulse with a fixed 1:1 ratio of pulse-to-interval. Whenever the pulse value for the specified process variable is reached, a pulse is emitted.

The process variable for the pulse output is specified in the "Assign pulse output" parameter.

■ **Frequency** option

The output frequency is proportional to the value for the process variable assigned, with a pulse-to-interval ratio of 1:1.

The process variable for the frequency output is specified in the "Assign frequency output" parameter.

■ **Switch** option

Indicates when the state of the device changes, e.g. when a specified limit value is reached or an alarm or warning is triggered.

The switch output can be in one of two states: either it is conductive or it is non-conductive.

When the function assigned to the switch output is triggered, the switch output will depending on the output configuration either be continuously conductive or continuously non-conductive.

"Off" option

The pulse/frequency/switch output is not used.

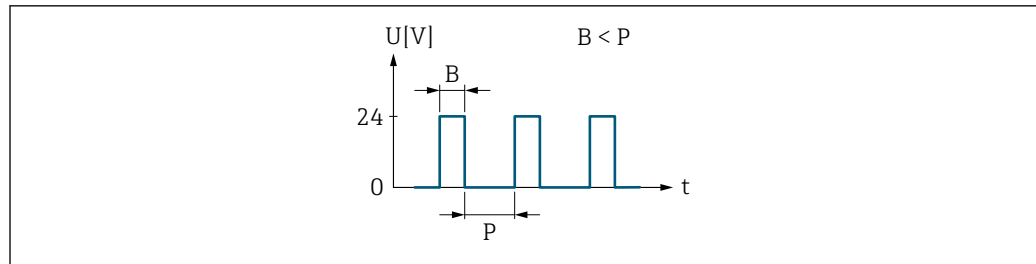
"Pulse" option

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, it is important when using this option that the recording device is capable of detecting pulses transmitted 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 1 000 Impuls/s



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

B Pulse width entered

P Pauses between the individual pulses

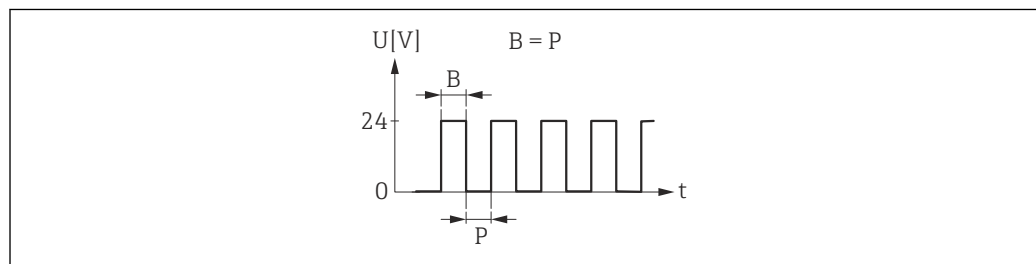
"Automatic pulse" option

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 recording device is capable of detecting pulses transmitted 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. 1 000 Impuls/s



A0026881

6 Quantity-proportional pulse (pulse value) with automatic pulse width

B Automatic pulse width

P Pauses between the individual pulses

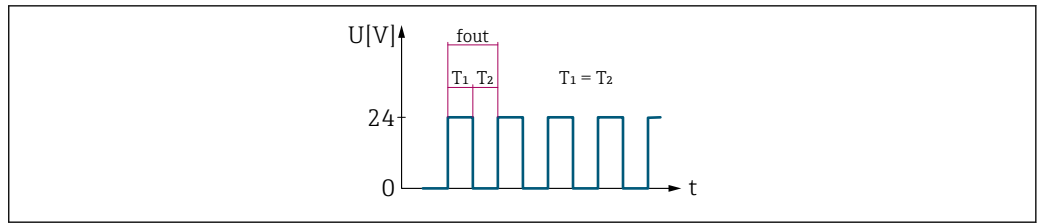
"Frequency" option

Flow-proportional frequency output with 1:1 on/off ratio

- An output frequency is output that is proportional to the value of a process variable, such as mass flow, volume flow, density or temperature.
- An output frequency is output that is proportional to the value of the volume flow process variable.
- Only this option can be used to output the density and temperature process variables.

Example

- Flow rate approx. 100 g/s
- Max. frequency 10 kHz
- Flow rate at max. frequency 1 000 g/s
- Output frequency approx. 1 000 Hz



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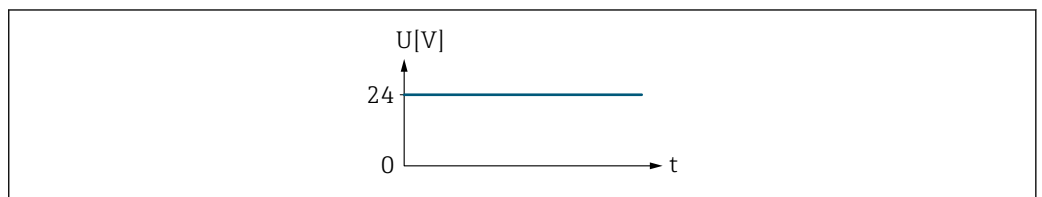
7 Flow-proportional frequency output

"Switch" option

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

Example

Alarm response without alarm

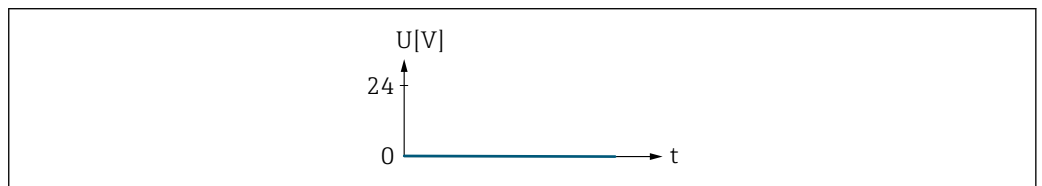


A0026884

8 No alarm, high level

Example

Alarm response in case of alarm



A0026885

9 Alarm, low level

Invert output signal



Navigation

Application → PFS output 1 → Invert outp.sig.

Description

Indicate whether to invert the output signal (Yes/No).

If the output signal is inverted, the output behavior is the reverse of its configuration. This setting does not apply to the frequency output.

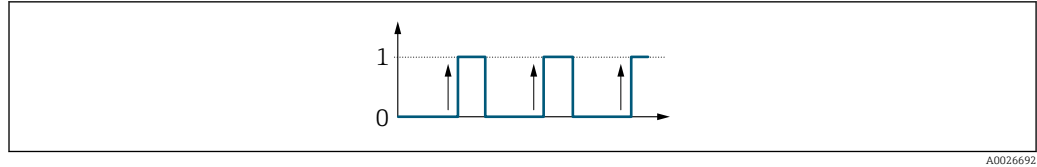
Selection

- No
- Yes

Additional information

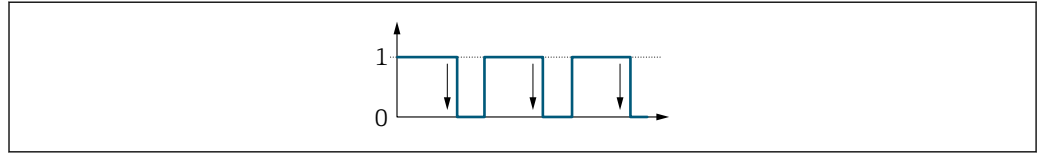
Selection

No option (passive - negative)



A0026692

Yes option (passive - positive)




A0026693

4.6 Pulse output


Navigation  Application → Pulse output





▶ Pulse output	
Assign pulse output	→ 69
Measuring mode	→ 69
Value per pulse	→ 70
Pulse width	→ 70
Failure mode	→ 71
Pulse output	→ 71

Assign pulse output

- Navigation**  Application → Pulse output → Assign pulse
- Description** Select the process variable for the pulse output.
- Selection**
- Off
 - Volume flow

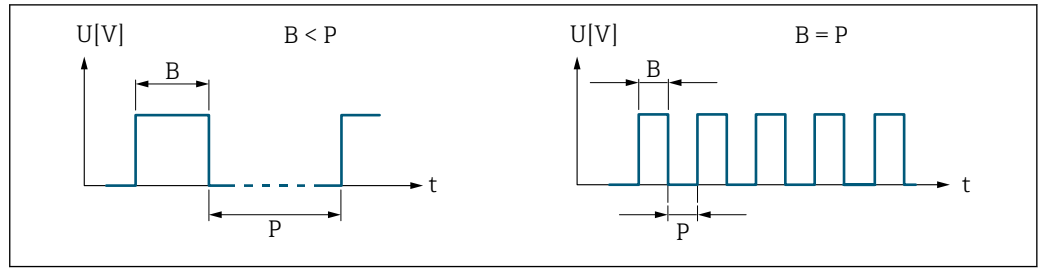
Measuring mode

- Navigation**  Application → Pulse output → Measuring mode
- Description** Select the measuring mode for the pulse output.
- Selection**
- Forward flow
 - Forward/Reverse flow
 - Reverse flow
 - Reverse flow compensation

Additional information	<p><i>Selection</i></p> <ul style="list-style-type: none"> ▪ Forward flow option Positive flow is reported, negative flow is not reported. ▪ Forward/Reverse flow option Both positive and negative flow are reported (absolute value), whereby no distinction is made between positive and negative flow. ▪ Reverse flow option Negative flow is reported, positive flow is not reported. ▪ Reverse flow compensation option Positive flow is reported. Negative flow quantities are buffered, processed, and reported after a maximum delay of 60 s. This option is used e.g. to compensate intermittent negative flow, which may occur in connection with positive displacement pumps as a result of wear and tear or high viscosity.
<hr/>	
Value per pulse	
<hr/>	
Navigation	 Application → Pulse output → Value per pulse
Description	Enter the measured value that corresponds to one pulse. The lower the value, the better the resolution and the higher the pulse frequency.
User entry	Signed floating-point number
<hr/>	
Pulse width	
<hr/>	
Navigation	 Application → Pulse output → Pulse width
Description	<p>Specify the duration of a pulse.</p> <p>The maximum pulse rate is defined by $f_{\max} = 1 / (2 \times \text{pulse width})$. The interval between two pulses (P) is at least as long as the specified pulse width (B).</p> <p>The maximum flow is defined by $Q_{\max} = f_{\max} \times \text{pulse value}$. If the flow exceeds these limit values, the measuring device displays the diagnostic message "443 Pulse output saturated".</p> <p>Example: Pulse value: 0.1 g Pulse width: 0.1 ms $f_{\max}: 1 / (2 \times 0.1 \text{ ms}) = 5 \text{ kHz}$ $Q_{\max}: 5 \text{ kHz} \times 0.1 \text{ g} = 0.5 \text{ kg/s}$</p>
User entry	0.05 to 2 000 ms

Additional information

Description



B Pulse width entered
P Pauses between the individual pulses

Failure mode



Navigation

☰ Application → Pulse output → Failure mode

Description

Specify how the output should behave in the event of a device alarm.
 For safety reasons, it is recommended that the behavior of the output in the event of a device alarm be predefined.

Selection

- Actual value
- No pulses

Additional information

Selection

- **Actual value** option
 The pulse output continues to emit pulses based on the actual value measured. The fault condition is ignored.
 A device alarm indicates a serious malfunction that may impact measurement quality to the point that accuracy can no longer be ensured. This option is only recommended if the necessary safeguards are in place to ensure that no alarm condition impacts measurement quality.
- **No pulses** option
 In the event of a device alarm, no pulses are emitted.

Pulse output

Navigation

☰ Application → Pulse output → Pulse output

Description










Displays the frequency at which pulses are currently emitted.
 The output behavior can be inverted in the "Invert output signal" parameter, i.e. in this case the transistor will be non-conductive for the duration of a pulse.
 The "Invert output signal" parameter is not available for all devices.

User interface

Positive floating-point number

4.7 Frequency output

Navigation  Application → Freq. output

▶ Frequency output	
Assign frequency output	→  72
Measuring mode	→  72
Minimum frequency value	→  73
Maximum frequency value	→  73
Measuring value at minimum frequency	→  74
Measuring value at maximum frequency	→  74
Damping output	→  74
Failure mode	→  74
Failure frequency	→  75
Output frequency	→  75

Assign frequency output

Navigation  Application → Freq. output → Assign freq.

Description Select a process variable for the frequency output.

Selection

- Off
- Volume flow
- Temperature *

Measuring mode

Navigation  Application → Freq. output → Measuring mode

Description Select the measuring mode for the frequency output.

* Visibility depends on order options or device settings

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

Additional information *Selection*

- **Forward flow** option
Positive flow is reported, negative flow is not reported.
- **Forward/Reverse flow** option
Both positive and negative flow are reported (absolute value), whereby no distinction is made between positive and negative flow.
- **Reverse flow** option
Negative flow is reported, positive flow is not reported.
- **Reverse flow compensation** option
Positive flow is reported. Negative flow quantities are buffered, processed, and reported after a maximum delay of 60 s.
This option is used e.g. to compensate intermittent negative flow, which may occur in connection with positive displacement pumps as a result of wear and tear or high viscosity.

Minimum frequency value



Navigation Application → Freq. output → Min. freq. value

Description Enter the frequency to report for the lower range value of the measured value range.
The lower range value for the measured value range that corresponds to the minimum frequency is specified in the "Measuring value at minimum frequency" parameter.

User entry 0.0 to 10 000.0 Hz

Maximum frequency value



Navigation Application → Freq. output → Max. freq. value

Description Enter the frequency to report for the upper range value of the measured value range.
The upper range value for the measured value range that corresponds to the maximum frequency is specified in the "Measuring value at maximum frequency" parameter.

User entry 0.0 to 10 000.0 Hz

Measuring value at minimum frequency



Navigation  Application → Freq. output → Val. at min.freq

Description Enter the lower range value for the measured value range.
Depending on the setting selected for the "Measuring mode" parameter, the value specified for this parameter and the "Measuring value at maximum frequency" parameter must have the same algebraic sign or not.
As a rule, the lower range value is scaled to be lower than the upper range value. As a result, the behavior of the frequency output is proportional to the process variable assigned. If the lower range value is scaled to be higher than the upper range value, then the behavior of the frequency output will be inversely proportional to the process variable assigned.

User entry Signed floating-point number

Measuring value at maximum frequency



Navigation  Application → Freq. output → Val. at max.freq

Description Enter upper range value for the measured value range.

User entry Signed floating-point number

Damping output



Navigation  Application → Freq. output → Damping out.

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

User entry 0 to 999.9 s

Failure mode



Navigation  Application → Freq. output → Failure mode

Description Specify how the output should behave in the event of a device alarm.
For safety reasons, it is recommended that the behavior of the output in the event of a device alarm be predefined.

- Selection**
- Actual value
 - Defined value
 - 0 Hz

- Additional information** *Selection*
- **Actual value** option
The frequency output continues to report the actual flow rate measured. The fault condition is ignored.
 - **Defined value** option
The frequency output reports the value specified.
The value is specified in the "Failure frequency" parameter.
 - **0 Hz** option
The frequency output reports 0 Hz.

Failure frequency






- Navigation** Application → Freq. output → Failure freq.
- Description** Enter the value for the "Defined value" option in the "Failure mode" parameter.
- User entry** 0.0 to 10 000.0 Hz

Output frequency

- Navigation** Application → Freq. output → Output freq.
- Description** Displays the frequency reported for the process value measured.
- User interface** 0.0 to 10 000.0 Hz

4.8 Switch output

Navigation  Application → Switch output

▶ Switch output	
Switch output function	→  76
Failure mode	→  77
Switch state	→  77

Switch output function

Navigation

 Application → Switch output → Switch out funct

Description

Assign a function to the switch output.

Selection

- Off
- On
- Diagnostic behavior
- Limit
- Flow direction check
- Status

Additional information

Selection

- **Off** option
The switch output is permanently switched off (open, non-conductive).
- **On** option
The switch output is permanently switched on (closed, conductive).
- **Diagnostic behavior** option
The switch output is switched on (closed, conductive), if there is a pending diagnostic event of the assigned behavioral category.
- **Limit** option
The switch output is switched on (closed, conductive), if the limit value specified for the process variable is reached.
- **Flow direction check** option
The switch output is switched on (closed, conductive), when the flow direction changes (forward or reverse flow).
- **Status** option
The switch output is switched on (closed, conductive) to indicate the status for the selected device function ("Assign status" parameter).

Failure mode



Navigation	Application → Switch output → Failure mode
Description	<p>Specify how the output should behave in the event of a device alarm.</p> <p>For safety reasons, it is recommended that the behavior of the output in the event of a device alarm be predefined.</p>
Selection	<ul style="list-style-type: none"> ▪ Actual status ▪ Open ▪ Closed
Additional information	<p><i>Selection</i></p> <ul style="list-style-type: none"> ▪ Actual status option The switch output continues to report the actual state of the switch output based on the function assigned ("Switch output function" parameter). The fault condition is ignored. ▪ Open option In the event of a device alarm, the switch output's transistor is set to "non-conductive".






Switch state

Navigation	Application → Switch output → Switch state
Description	<p>Indicates the current switch state of the switch output.</p>
User interface	<ul style="list-style-type: none"> ▪ Open ▪ Closed
Additional information	<p><i>User interface</i></p> <ul style="list-style-type: none"> ▪ Open option The switch output is not conductive. ▪ Closed option The switch output is conductive.

4.9 Limit Switch output

Navigation  Application → Limit

▶ Limit

Assign limit	→  78
Switch-on value	→  80
Switch-on delay	→  80
Switch-off value	→  80
Switch-off delay	→  81

Assign limit

Navigation  Application → Limit → Assign limit

Description Select the process variable to monitor in case the specified limit value is exceeded. If a limit value for the selected process variable is exceeded, the output is switched on.

Selection

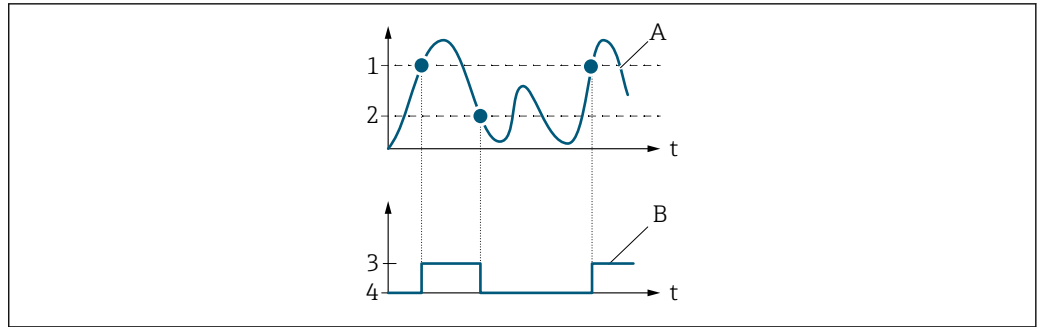
- Off
- Volume flow
- Flow velocity
- Temperature *

Additional information *Switch-on point > switch-off point*

Behavior of the status output if switch-on point > switch-off point:

- Process variable > switch-on point: transistor is conductive
- Process variable < switch-off point: transistor is not conductive

* Visibility depends on order options or device settings



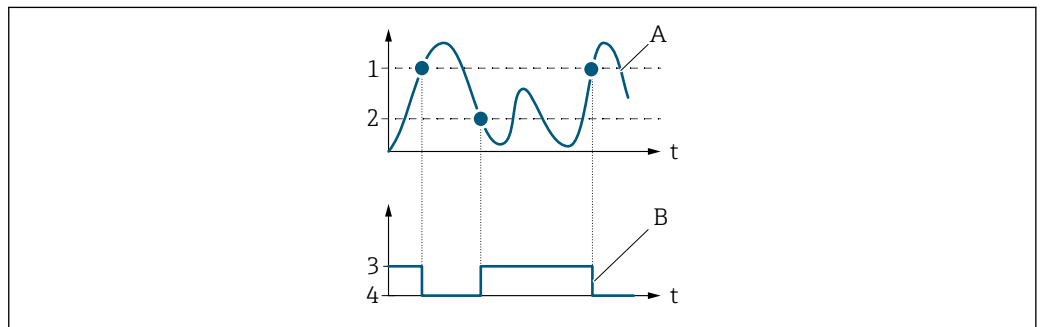
A0026891

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

Switch-on point < switch-off point

Behavior of the status output if switch-on point < switch-off point:

- Process variable < switch-on point: transistor is conductive
- Process variable > switch-off point: transistor is not conductive



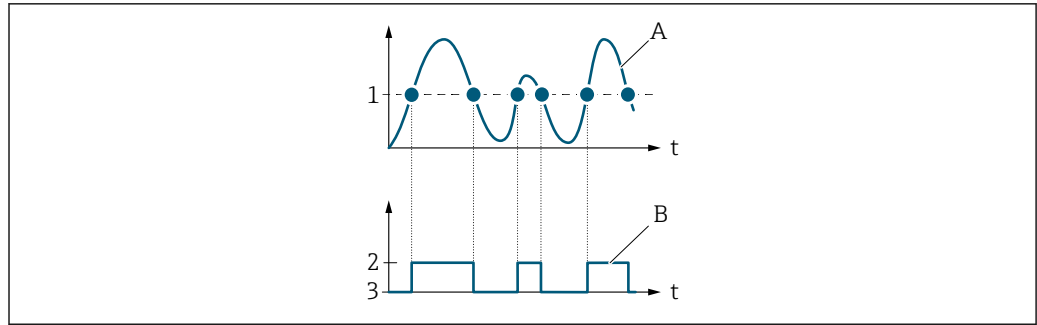
A0026892

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

Switch-on point = switch-off point

Behavior of the status output if switch-on point = switch-off point:

- Process variable > switch-on point: transistor is conductive
- Process variable < switch-off point: transistor is not conductive



A0026893

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

Switch-on value



Navigation  Application → Limit → Switch-on value

Description Enter the limit value for the switch-on point (process variable > switch-on value = closed, conductive).
To use a hysteresis: Switch-on point > Switch-off point.

User entry Signed floating-point number

Switch-on delay



Navigation  Application → Limit → Switch-on delay

Description Enter delay before the switch output is switched on.

User entry 0.0 to 100.0 s


Switch-off value



Navigation  Application → Limit → Switch-off value

Description Enter the limit value for the switch-off point (process variable < switch-off value = open, non-conductive).
To use a hysteresis: Switch-on point > Switch-off point.

User entry Signed floating-point number

Switch-off delay**Navigation** Application → Limit → Switch-off delay**Description**

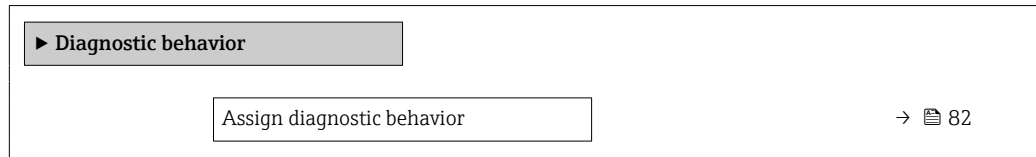
Enter delay before the switch output is switched off.

User entry

0.0 to 100.0 s

4.10 Diagnostic behavior Switch output

Navigation  Application → Diag. behavior



Assign diagnostic behavior

Navigation  Application → Diag. behavior → Assign diag. beh

Description The switch output is switched on (closed, conductive), if there is a pending diagnostic event of the assigned behavioral category.

Selection

- Alarm
- Alarm or warning
- Warning

Additional information *Selection*

- **Alarm** option
The switch output is only switched on for diagnostic events of the "Alarm" category.
- **Alarm or warning** option
The switch output is switched on for diagnostic events of the "Alarm" or "Warning" category.
- **Warning** option
The switch output is only switched on for diagnostic events of the "Warning" category.

4.11 Flow direction check Switch output

Navigation   Application → Fl. direct.check



Assign flow direction check



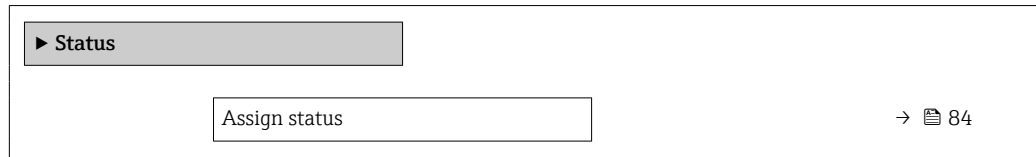
Navigation  Application → Fl. direct.check → Assign dir.check

Description Select a process variable for flow direction monitoring.

- Selection
- Off
 - Volume flow

4.12 Status Switch output

Navigation  Application → Status



Assign status

Navigation  Application → Status → Assign status





Description Select the device function for which to report the status.
 If the switch-on point for the selected device function is reached, the output is switched on (closed and conductive). Otherwise, the output is non-conductive.
 The output behavior can be inverted in the "Invert output signal" parameter, i.e. in this case the output will be non-conductive when switched on and conductive when switched off.
 The "Invert output signal" parameter is not available for all devices.

Selection Low flow cutoff

5 "System" menu

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





Navigation  System

System	
▶ Device management	→  86
▶ User management	→  88
▶ Date/time	→  89
▶ Information	→  90

5.1 Device management

Navigation   System → Device manag.

▶ Device management

Device tag	→  86
Locking status	→  86
Configuration counter	→  87
Device reset	→  87

Device tag

Navigation  System → Device manag. → Device tag

Description Displays the name for the measuring point.

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

Locking status

Navigation  System → Device manag. → Locking status

Description Indicates the write protection with the highest priority that is currently active.


User interface Temporarily locked

Additional information *User interface*

"Temporarily locked" option


Due to internal procedures that are currently in progress (e.g. data upload/download, reset, etc.), write access to the parameters is temporarily locked. The parameters can be modified again, once the internal procedures are complete.

Configuration counter

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

Device reset

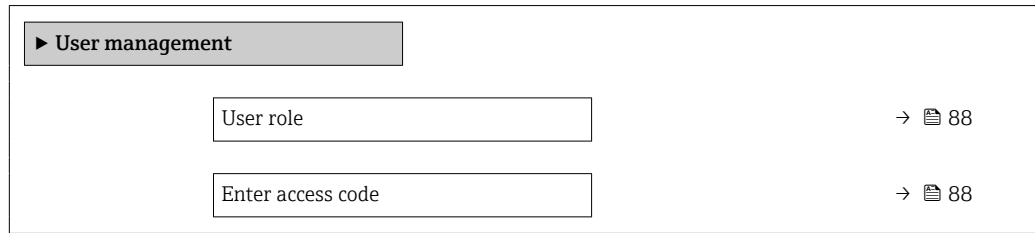


Navigation	 System → Device manag. → Device reset
Description	Reset the device configuration - either entirely or in part - to a defined state.
Selection	<ul style="list-style-type: none"> ■ Cancel ■ To delivery settings ■ Restart device ■ Restore S-DAT backup * ■ Create T-DAT backup ■ Restore T-DAT backup *
Additional information	<p><i>Selection</i></p> <ul style="list-style-type: none"> ■ To delivery settings option Every parameter for which a customer-specific default setting was ordered is reset to the customer-specific value. All other parameters are reset to the factory setting. ■ Restart device option The restart resets every parameter with data stored in volatile memory (RAM) to the factory setting (e.g. measured value data). The device configuration remains unchanged. ■ Restore S-DAT backup option Restores the data that is saved on the S-DAT. This function can be used to resolve the memory issue "083 Memory content inconsistent" or to restore the S-DAT data when a new S-DAT has been installed. ■ Create T-DAT backup option Creates T-DAT backup. ■ Restore T-DAT backup option Restores the data saved on the T-DAT. This function can be used to resolve the memory issue "283 Memory content inconsistent" or to restore the T-DAT data when a new T-DAT has been installed.


* Visibility depends on order options or device settings

5.2 User management


Navigation   System → User manag.



User role

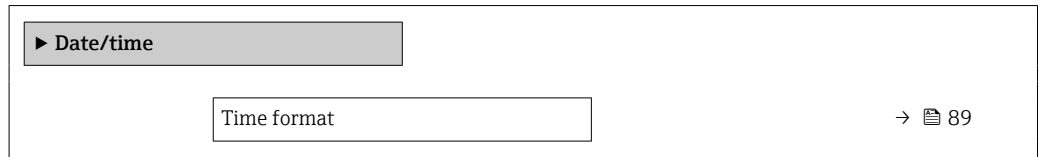
Navigation	 System → User manag. → User role
Description	Displays the role the user is currently logged on in. The role determines the user's access rights for the parameters. The access rights can be changed via the "Enter access code" parameter.
User interface	<ul style="list-style-type: none"> ▪ Operator ▪ Maintenance ▪ Service ▪ Production ▪ Development
Additional information	<p><i>User interface</i></p> <ul style="list-style-type: none"> ▪ Operator option Provides only read access to parameters. ▪ Maintenance option Provides read and write access to parameters. For some parameters, the user must be logged on in the Service role to obtain write access. ▪ Service option Provides read and write access to Service parameters.

Enter access code


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

5.3 Date/time

Navigation   System → Date/time



Time format



Navigation  System → Date/time → Time format

Description Select the time format.

Selection



- 24 h
- 12 h AM/PM

Additional information *Selection*

 For an explanation of the abbreviated units: →  96











5.4 Information

Navigation   System → Information

▶ Information	
▶ Device	→  90
▶ Electronic module	→  93

5.4.1 Device

Navigation   System → Information → Device

▶ Device	
Device name	→  90
Device tag	→  91
Serial number	→  91
Order code	→  91
Firmware version	→  91
Extended order code 1	→  92
Extended order code 2	→  92
Extended order code 3	→  92
ENP version	→  92
Manufacturer	→  93

Device name

Navigation  System → Information → Device → Device name

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

User interface Character string comprising numbers, letters and special characters

Device tag

**Navigation**

System → Information → Device → Device tag

Description

Displays the name for the measuring point.

User entry

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

Serial number

Navigation

System → Information → Device → Serial number

Description

Displays the serial number of the measuring device. The serial number is also provided on the nameplate of the sensor and of the transmitter.

The serial number can also be used to retrieve further device-related information and documentation via the Operations app or the Device Viewer on the Endress+Hauser website.

User interface

Character string comprising numbers, letters and special characters

Order code

**Navigation**

System → Information → Device → Order code

Description

Displays the device order code.

The order code is used for instance to order a replacement or spare device or to verify that the device features specified on the order form match the shipping note.

User interface

Character string comprising numbers, letters and special characters

Firmware version

Navigation


System → Information → Device → Firmware version


Description

Displays the device firmware version installed.

User interface

Character string comprising numbers, letters and special characters

Extended order code 1 

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

Description Displays the first, second and/or third part of the extended order code.
 Due to character length restrictions, the extended order code is split into a maximum of 3 parameters. The extended order code indicates for each feature in the product structure the selected option, thereby uniquely identifying the device model.
 The extended order code can also be found on the nameplate.

User interface Character string comprising numbers, letters and special characters

Extended order code 2 

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

Description Displays the first, second and/or third part of the extended order code.
 Due to character length restrictions, the extended order code is split into a maximum of 3 parameters. The extended order code indicates for each feature in the product structure the selected option, thereby uniquely identifying the device model.
 The extended order code can also be found on the nameplate.

User interface Character string comprising numbers, letters and special characters

Extended order code 3 

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

Description Displays the first, second and/or third part of the extended order code.
 Due to character length restrictions, the extended order code is split into a maximum of 3 parameters. The extended order code indicates for each feature in the product structure the selected option, thereby uniquely identifying the device model.
 The extended order code can also be found on the nameplate.

User interface Character string comprising numbers, letters and special characters


ENP version

Navigation  System → Information → Device → ENP version


Description Displays the version of the electronic nameplate (ENP).

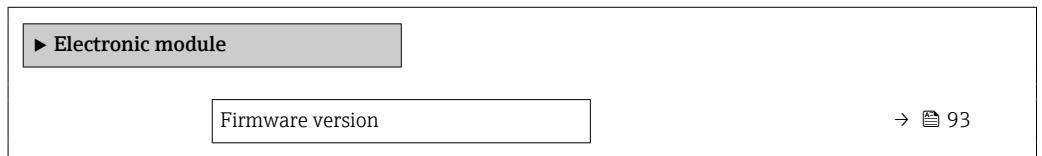
User interface Character string comprising numbers, letters and special characters

Manufacturer


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

5.4.2 Electronic module

Navigation  System → Information → Electr. module



Firmware version

Navigation	 System → Information → Electr. module → Firmware version
Description	Displays the firmware version of the module.
User interface	Positive integer

6 Country-specific factory settings

6.1 SI units

 Not valid for USA and Canada.


6.1.1 System units

Volume	ml
Volume flow	ml/s

6.1.2 Pulse value

Nominal diameter [mm]	[ml/p]
4	0.005
8	0.02
15	0.1
15K	0.1
25	0.2

6.1.3 On value low flow cut off

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

Nominal diameter [mm]	On value low flow cut off ($v \sim 0.04 \text{ m/s}$) [ml/s]
4	0.5
8	2
15K ¹⁾	7
15	7
25	16

1) Conical version (corresponds to DN 12)

6.2 US units

 Only valid for USA and Canada.


6.2.1 System units

Volume	fl oz (us)
Volume flow	fl oz/s (us)

6.2.2 Pulse value

Nominal diameter [in]	[fl oz/p]
1/8	0.0002
3/8	0.001
1/2	0.004
1/2K	0.004
1	0.007

6.2.3 On value low flow cut off

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

Nominal diameter [in]	On value low flow cut off (v ~ 0.13 ft/s) [oz fl/s]
5/32	0.02
5/16	0.08
1/2K ¹⁾	0.25
1/2	0.25
1	0.53

1) Conical version (corresponds to DN 12)

7 Explanation of abbreviated units

7.1 SI units

Process variable	Units	Explanation
Density	g/cm ³ , g/m ³	Gram/volume unit
	kg/dm ³ , kg/l, kg/m ³	Kilogram/volume unit
	SD4°C, SD15°C, SD20°C	Specific density: The specific density is the ratio of the density of the fluid to the density of water at a water temperature of 4 °C (39 °F), 15 °C (59 °F), 20 °C (68 °F).
	SG4°C, SG15°C, SG20°C	Specific gravity: The specific gravity is the ratio of the density of the fluid to the density of water at a water temperature of 4 °C (39 °F), 15 °C (59 °F), 20 °C (68 °F).
Mass	g, kg, t	Gram, kilogram, metric ton
Mass flow	g/s, g/min, g/h, g/d	Gram/time unit
	kg/s, kg/min, kg/h, kg/d	Kilogram/time unit
	t/s, t/min, t/h, t/d	Metric ton/time unit
Temperature	°C, K	Celsius, Kelvin
Volume	cm ³ , dm ³ , m ³	Cubic centimeter, cubic decimeter, cubic meter
	ml, l, hl, Ml Mega	Milliliter, liter, hectoliter, megaliter
Time	s, m, h, d, y	Second, minute, hour, day, year

7.2 US units

Process variable	Units	Explanation
Density	lb/ft ³ , lb/gal (us)	Pound/cubic foot, pound/gallon
	lb/bbl (us;liq.), lb/bbl (us;beer), lb/bbl (us;oil), lb/bbl (us;tank)	Pound/volume unit
Mass	oz, lb, STon	Ounce, pound, standard ton
Mass flow	oz/s, oz/min, oz/h, oz/d	Ounce/time unit
	lb/s, lb/min, lb/h, lb/d	Pound/time unit
	STon/s, STon/min, STon/h, STon/d	Standard ton/time unit
Temperature	°F, °R	Fahrenheit, Rankine
Volume	af	Acre foot
	ft ³	Cubic foot
	fl oz (us), gal (us), kgal (us), Mgal (us)	Fluid ounce, gallon, kilogallon, million gallon
	bbl (us;liq.), bbl (us;beer), bbl (us;oil), bbl (us;tank)	Barrel (normal liquids), barrel (beer), barrel (petrochemicals), barrel (filling tanks)
Volume flow	af/s, af/min, af/h, af/d	Acre foot/time unit
	ft ³ /s, ft ³ /min, ft ³ /h, ft ³ /d	Cubic foot/time unit
	fl oz/s (us), fl oz/min (us), fl oz/h (us), fl oz/d (us)	Fluid ounce/time unit
	gal/s (us), gal/min (us), gal/h (us), gal/d (us)	Gallon/time unit
	kgal/s (us), kgal/min (us), kgal/h (us), kgal/d (us)	Kilogallon/time unit

Process variable	Units	Explanation
	Mgal/s (us), Mgal/min (us), Mgal/h (us), Mgal/d (us)	Million gallon/time unit
	bbbl/s (us;liq.), bbl/min (us;liq.), bbl/h (us;liq.), bbl/d (us;liq.)	Barrel/time unit (normal liquids) Normal liquids: 31.5 gal/bbl
	bbbl/s (us;beer), bbl/min (us;beer), bbl/h (us;beer), bbl/d (us;beer)	Barrel /time unit (beer) Beer: 31.0 gal/bbl
	bbbl/s (us;oil), bbl/min (us;oil), bbl/h (us;oil), bbl/d (us;oil)	Barrel/time unit (petrochemicals) Petrochemicals: 42.0 gal/bbl
	bbbl/s (us;tank), bbl/min (us;tank), bbl/h (us;tank), bbl/d (us;tank)	Barrel/time unit (filling tank) Filling tanks: 55.0 gal/bbl
Time	s, m, h, d, y	Second, minute, hour, day, year
	am, pm	Ante meridiem (before midday), post meridiem (after midday)

7.3 Imperial units

Process variable	Units	Explanation
Density	lb/gal (imp), lb/bbl (imp;beer), lb/bbl (imp;oil)	Pound/volume unit
Volume	gal (imp), Mgal (imp)	Gallon, mega gallon
	bbl (imp;beer), bbl (imp;oil)	Barrel (beer), barrel (petrochemicals)
Volume flow	gal/s (imp), gal/min (imp), gal/h (imp), gal/d (imp)	Gallon/time unit
	Mgal/s (imp), Mgal/min (imp), Mgal/h (imp), Mgal/d (imp)	Mega gallon/time unit
	bbbl/s (imp;beer), bbl/min (imp;beer), bbl/h (imp;beer), bbl/d (imp;beer)	Barrel /time unit (beer) Beer: 36.0 gal/bbl
	bbbl/s (imp;oil), bbl/min (imp;oil), bbl/h (imp;oil), bbl/d (imp;oil)	Barrel/time unit (petrochemicals) Petrochemicals: 34.97 gal/bbl
Time	s, m, h, d, y	Second, minute, hour, day, year
	am, pm	Ante meridiem (before midday), post meridiem (after midday)

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