

Description of Device Parameters

Proline Promass 10

Coriolis flowmeter
HART

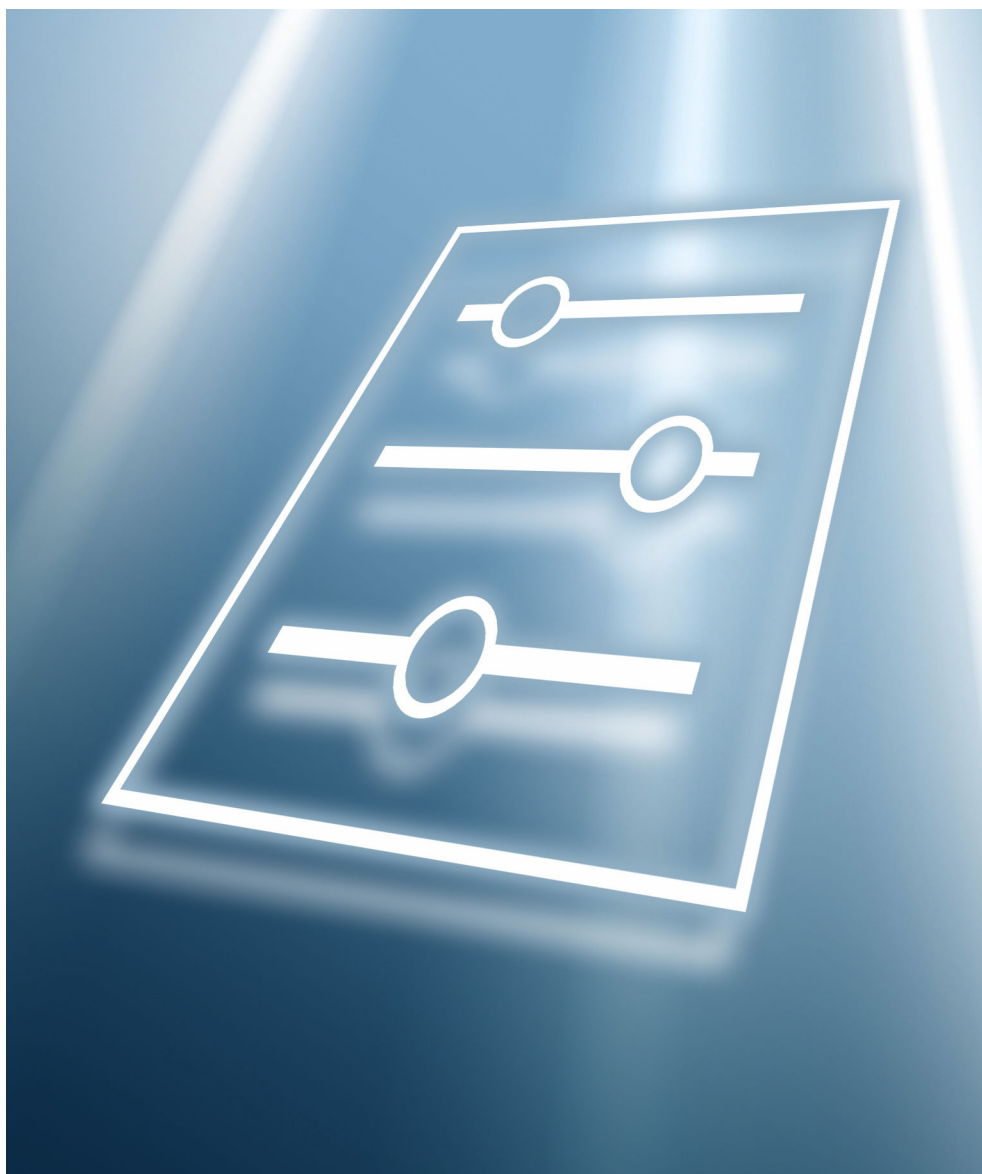


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1 About this document

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 (→  6), which guides the user automatically through all the device parameters that are required for commissioning
- **Application** menu (→  76)
- **Diagnostics** menu (→  45)
- **System** menu (→  147)

1.3.3 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 ■ 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): ■ On individual options ■ On display values/data ■ On the input range ■ On the parameter function

1.4 Associated 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:

W@M Device Viewer	On the www.endress.com/deviceviewer website, enter the serial number of the device: nameplate
Endress+Hauser Operations App	► 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

Guidance

► Commissioning

→  6

2.1 "Commissioning" wizard

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

Navigation  Guidance → Commissioning

► Commissioning

Device tag

Serial number

Firmware version

Device name

Select medium

Select gas type

Reference sound velocity

Temperature coefficient sound velocity

Pressure compensation

Pressure value

Mass flow unit

Mass unit

Volume flow unit

Volume unit

→  9

→  9

→  9

→  10

→  10

→  10

→  11

→  11

→  11

→  12

→  12

→  12

→  13

→  14

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2.1.1 Device identification

Navigation   Guidance → Commissioning

Device tag	
Navigation	  Guidance → Commissioning → Device tag
Description	Enter a unique name for the measuring point to identify the device quickly within the plant.
User entry	Character string comprising numbers, letters and special characters (#32)
Serial number	
Navigation	  Guidance → Commissioning → Serial number
Description	Displays the serial number of the measuring device. The serial number can be used to identify the measuring device and to retrieve further information on the measuring device, such as the related documentation, via the Device Viewer or Operations app. Additional information: The serial number can also be found on the nameplate of the sensor and transmitter.
User interface	Character string comprising numbers, letters and special characters (#11)
Firmware version	
Navigation	  Guidance → Commissioning → Firmware version
Description	Displays the device firmware version installed.
User interface	Character string comprising numbers, letters and special characters (#8)

Device name	
Navigation	  Guidance → Commissioning → Device name
Description	Displays the name of the transmitter. Additional information: The name can also be found on the transmitter's nameplate.
User interface	Character string comprising numbers, letters and special characters (#16)

2.1.2 Medium

Navigation   Guidance → Commissioning

Select medium

Navigation	  Guidance → Commissioning → Select medium
Description	Select the medium type.
Selection	■ Liquid ■ Gas

Select gas type

Navigation	  Guidance → Commissioning → Select gas type
Prerequisite	In the Select medium parameter in the Medium settings submenu, the Gas option is selected.
Description	Select the type of gas. Additional information: To achieve accurate measurements, it is necessary to specify the gas.
Selection	■ Air ■ Ammonia NH3 ■ Argon Ar ■ Sulfur hexafluoride SF6 ■ Oxygen O2 ■ Ozone O3 ■ Nitrogen oxide NOx ■ Nitrogen N2 ■ Nitrous oxide N2O ■ Methane CH4 ■ Hydrogen H2

- Helium He
- Hydrogen chloride HCl
- Hydrogen sulfide H₂S
- Ethylene C₂H₄
- Carbon dioxide CO₂
- Carbon monoxide CO
- Chlorine Cl₂
- Butane C₄H₁₀
- Propane C₃H₈
- Propylene C₃H₆
- Ethane C₂H₆
- Others

Reference sound velocity


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

Temperature coefficient sound velocity


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

Pressure compensation


Navigation	Guidance → Commissioning → Pressure compen.
Description	Select the pressure compensation type.
Selection	■ Off ■ Fixed value

Pressure value

Navigation	  Guidance → Commissioning → Pressure value
Prerequisite	In the Pressure compensation parameter in the External compensation submenu, the Fixed value option is selected.
Description	Enter fixed value for the pressure compensation. Additional information: The applicable unit of measure is specified in the "System units" submenu.
User entry	Positive floating-point number

2.1.3 System units

Navigation  Guidance → Commissioning

Mass flow unit

Navigation	  Guidance → Commissioning → Mass flow unit	
Description	Select mass flow unit.	
Selection	<i>SI units</i> ■ g/s ■ g/min ■ g/h ■ g/d ■ kg/s ■ kg/min ■ kg/h ■ kg/d ■ t/s ■ t/min ■ t/h ■ t/d	<i>US units</i> ■ oz/s ■ oz/min ■ oz/h ■ oz/d ■ lb/s ■ lb/min ■ lb/h ■ lb/d ■ STon/s ■ STon/min ■ STon/h ■ STon/d

Mass unit

Navigation	  Guidance → Commissioning → Mass unit
Description	Select mass unit.

Selection	<i>SI units</i>	<i>US units</i>
	■ g	■ oz
	■ kg	■ lb
	■ t	■ STon

Volume flow unit	
------------------	---

Navigation	  Guidance → Commissioning → Volume flow unit
------------	---

Description	Select 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
- MMft³/s
- MMft³/min
- MMft³/h
- Mft³/d
- fl oz/s (us)
- fl oz/min (us)
- fl oz/h (us)
- fl oz/d (us)
- gal/s (us)
- gal/min (us)
- gal/h (us)
- gal/d (us)
- Mgal/s (us)
- Mgal/min (us)
- Mgal/h (us)
- Mgal/d (us)
- bbl/s (us;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)

Volume unit



Navigation

Guidance → Commissioning → Volume unit

Description

Select volume unit.

Selection	<i>SI units</i>	<i>US units</i>	<i>Imperial units</i>
	■ cm³ ■ dm³ ■ m³ ■ ml ■ l ■ hl ■ Ml Mega	■ af ■ ft³ ■ Mft³ ■ fl oz (us) ■ gal (us) ■ kgal (us) ■ Mgal (us) ■ bbl (us;oil) ■ bbl (us;liq.) ■ bbl (us;beer) ■ bbl (us;tank)	■ gal (imp) ■ Mgal (imp) ■ bbl (imp;beer) ■ bbl (imp;oil)

Corrected volume flow unit



Navigation Guidance → Commissioning → Cor.volflow unit

Description Select corrected volume flow unit.

Selection	<i>SI units</i>	<i>US units</i>	<i>Imperial units</i>
	■ Nl/s ■ Nl/min ■ Nl/h ■ Nl/d ■ Nhl/s ■ Nhl/min ■ Nhl/h ■ Nhl/d ■ Nm³/s ■ Nm³/min ■ Nm³/h ■ Nm³/d ■ Sl/s ■ Sl/min ■ Sl/h ■ Sl/d ■ Sm³/s ■ Sm³/min ■ Sm³/h ■ Sm³/d	■ Sft³/s ■ Sft³/min ■ Sft³/h ■ Sft³/d ■ Sgal/s (us) ■ Sgal/min (us) ■ Sgal/h (us) ■ Sgal/d (us) ■ Sbbbl/s (us;liq.) ■ Sbbbl/min (us;liq.) ■ Sbbbl/h (us;liq.) ■ Sbbbl/d (us;liq.) ■ MMSft³/s ■ MMSft³/min ■ MMSft³/h ■ MMSft³/d ■ Sbbbl/s (us;oil) ■ Sbbbl/min (us;oil) ■ Sbbbl/h (us;oil) ■ Sbbbl/d (us;oil)	■ Sgal/s (imp) ■ Sgal/min (imp) ■ Sgal/h (imp) ■ Sgal/d (imp)

Corrected volume unit



Navigation Guidance → Commissioning → Corr. vol. unit

Description Select corrected volume unit.

Selection	<i>SI units</i>	<i>US units</i>	<i>Imperial units</i>
	■ NI ■ Nhl ■ Nm³ ■ Sl ■ Sm³	■ Sft³ ■ MMSft³ ■ Sgal (us) ■ Sbbbl (us;liq.) ■ Sbbbl (us;oil)	Sgal (imp)

Density unit

Navigation   Guidance → Commissioning → Density unit

Description Select density unit.

Selection	<i>SI units</i>	<i>US units</i>	<i>Imperial units</i>
	■ g/cm³ ■ g/m³ ■ g/ml ■ kg/l ■ kg/dm³ ■ kg/m³	■ lb/ft³ ■ lb/gal (us) ■ lb/bbl (us;liq.) ■ lb/bbl (us;beer) ■ lb/bbl (us;oil) ■ lb/bbl (us;tank)	■ lb/gal (imp) ■ lb/bbl (imp;beer) ■ lb/bbl (imp;oil)

Reference density unit

Navigation   Guidance → Commissioning → Ref. dens. unit

Description Select reference density unit.

Selection	<i>SI units</i>	<i>US units</i>
	■ kg/Nm³ ■ kg/NI ■ g/Scm³ ■ kg/Sm³ ■ RD15°C ■ RD20°C	■ lb/Sft³ ■ RD60°F

Temperature unit

Navigation   Guidance → Commissioning → Temperature unit

Description Select temperature unit.

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

Pressure unit 	
Navigation	  Guidance → Commissioning → Pressure unit
Description	Select pressure unit.
Selection	<i>SI units</i> ■ MPa a ■ MPa g ■ kPa a ■ kPa g ■ Pa a ■ Pa g ■ bar ■ bar g <i>US units</i> ■ psi a ■ psi g

2.1.4 Totalizer 1 to n

Navigation   Guidance → Commissioning

Assign process variable 	
Navigation	  Guidance → Commissioning → Assign variable
Description	Select process variable for totalizer. Additional information: If the option selected is changed, the device resets the totalizer to "0".
Selection	■ Off ■ Mass flow ■ Volume flow ■ Corrected volume flow

Unit totalizer 1 to n 	
Navigation	  Guidance → Commissioning → Unit totalizer 1 to n
Prerequisite	A process variable has been selected in the Assign process variable parameter in the Totalizer 1 to n submenu.
Description	Select process variable totalizer unit.

Selection

- SI units

■ g^{*}

■ kg^{*}

■ t^{*}
- US units

■ oz^{*}

■ lb^{*}

■ STon^{*}

*

Visibility depends on order options or device settings

or

- SI units

■ cm³^{*}

■ dm³^{*}

■ m³^{*}

■ ml^{*}

■ l^{*}

■ hl^{*}

■ Ml Mega^{*}
- US units

■ af^{*}

■ ft³^{*}

■ 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

- SI units

■ NI^{*}

■ Nhl^{*}

■ Nm³^{*}

■ Sl^{*}

■ Sm³^{*}
- US units

■ Sft³^{*}

■ MMSft³^{*}

■ Sgal (us)^{*}

■ Sbbbl (us;liq.)^{*}

■ Sbbbl (us;oil)^{*}
- Imperial units

Sgal (imp)^{*}

*

Visibility depends on order options or device settings

or

- Other units

None^{*}

*

Visibility depends on order options or device settings

Additional information

Description

The unit is selected separately for each totalizer. The unit is independent of the option selected in the **System units** submenu (→  80).

Selection

The selection is dependent on the process variable selected in the **Assign process variable** parameter (→  17).

Totalizer operation mode 	
Navigation	  Guidance → Commissioning → Operation mode
Prerequisite	A process variable has been selected in the Assign process variable parameter in the Totalizer 1 to n submenu.
Description	Select totalizer calculation mode.
Selection	■ Net flow total ■ Forward flow total ■ Reverse flow total
Additional information	<i>Selection</i> ■ Net flow total 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 flow total option Only the flow in the forward flow direction is totalized. ■ Reverse flow total option Only the flow in the reverse flow direction is totalized (= reverse flow quantity).
Failure mode 	
Navigation	  Guidance → Commissioning → Failure mode
Prerequisite	A process variable has been selected in the Assign process variable parameter in the Totalizer 1 to n submenu.
Description	Specify how the totalizer should behave in the event of a device alarm. Additional information: The failsafe mode that applies to any other totalizers or outputs is specified separately in other parameters and is not impacted by this setting.
Selection	■ Stop ■ Actual value ■ Last valid value
Additional information	<i>Selection</i> ■ Stop option The totalizer is stopped in the event of a device alarm. ■ Actual value option The totalizer continues to totalize based on the current value measured; the device alarm is ignored. ■ Last valid value option The totalizer continues to totalize based on the last valid value measured before the device alarm occurred.

2.1.5 Process parameters

Navigation  Guidance → Commissioning

Flow damping time

Navigation  Guidance → Commissioning → FlowDampingTime

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

User entry 0 to 99.9 s

2.1.6 Measuring conditions

Pressure shock suppression

Navigation  Guidance → Commissioning

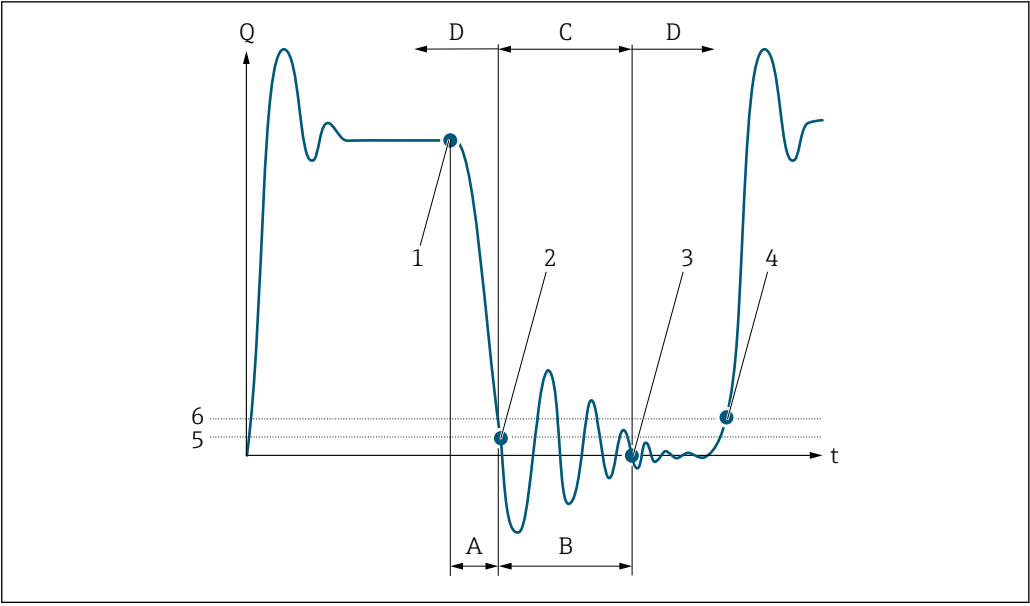
Pressure shock suppression

Navigation  Guidance → Commissioning → Pres. shock sup.

Description Enter time frame 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.
 Additional information:
 Pressure shock suppression is activated when the flow rate drops below the on value for low flow cutoff. Output values when pressure shock suppression is active:
 - Flow: 0
 - Totalizer: Last valid value
 Pressure shock suppression is deactivated when:
 - The time frame specified has elapsed and
 - Flow 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.

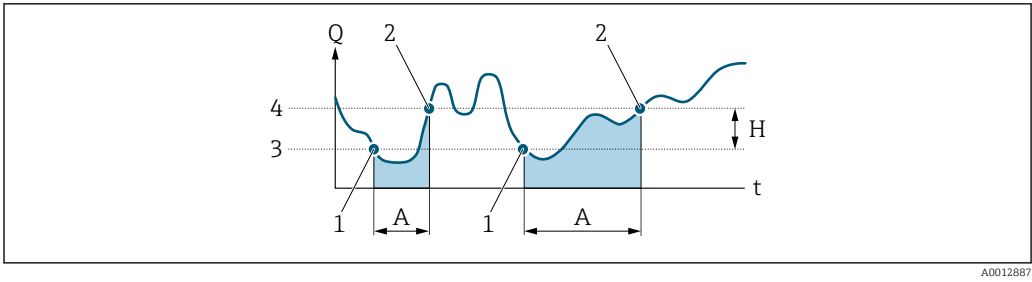


- Q Flow
- t Time
- A After run
- B Pressure shock
- C Pressure shock suppression active as specified by the time entered
- D Pressure shock suppression inactive
- 1 Valve closes
- 2 Flow falls below the on-value of the low flow cut off: pressure shock suppression is activated
- 3 The time entered has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

Low flow cut off

Navigation  Guidance → Commissioning

Low flow cut off 	
Navigation	 Guidance → Commissioning → Low flow cut off
Description	Select process variable for low flow cut off to activate low flow cut off.
Selection	■ Off ■ Mass flow ■ Volume flow ■ Corrected volume flow
Additional information	Description



- 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 → On value
Description	Enter on value to switch on low flow cut off. Value = 0: No low flow cut off Value > 0: Low flow cut off is activated
User entry	Positive floating-point number

Off value low flow cutoff

Navigation	 Guidance → Commissioning → Off value
Description	Enter off value to switch off low flow cut off. The off value is entered as a positive hysteresis with respect to the on value.
User entry	0 to 100.0 %

Partially filled pipe detection

Navigation  Guidance → Commissioning

Partially filled pipe detection

Navigation	 Guidance → Commissioning → Partial pipe det
Description	Select process variable for detection of an empty or partially filled pipe. NOTE Due to low density, deactivate partially filled pipe detection for a gas!
Selection	■ Off ■ Density ■ Calculated reference density

Low value partial filled pipe detection

Navigation	 Guidance → Commissioning → Low value
Prerequisite	A process variable has been selected in the Assign process variable parameter in the Empty pipe detection submenu.
Description	Enter the lower limit value for the selected process variable. If the measured value drops below the limit value, diagnostic message "862 Partly filled pipe" is generated. Additional information: - This setting applies only if the "Density unit" parameter is not set to °API. - The lower limit value must be lower than the upper limit value ("High value partial filled pipe detection" parameter).
User entry	Signed floating-point number

High value partial filled pipe detection

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

User entry Signed floating-point number

2.1.7 Current output

Navigation  Guidance → Commissioning

Process variable current output

Navigation  Guidance → Commissioning → Proc.var. outp

Description Select process variable for current output

Selection

- Off *
- Mass flow
- Volume flow
- Corrected volume flow
- Temperature
- Density *
- Index inhomogeneous medium
- Exciter current 0
- Oscillation frequency 0
- Oscillation amplitude 0 *
- Frequency fluctuation 0 *
- Oscillation damping 0
- Oscillation damping fluctuation 0 *
- Signal asymmetry
- HBSI *
- Electronics temperature

Current range output

Navigation  Guidance → Commissioning → Curr.range out

Description Select the current range for the measured value output and the upper and lower fault condition signal level.

Additional information:

- The measured value range is specified in the "Lower range value output" parameter and the "Upper range value output" parameter.
- If the measured value lies outside the scaled measured value range, diagnostic message "441 Current output faulty" is generated.
- In the event of a device alarm, the current output adopts the behavior specified in the "Failure behavior current output" parameter.

* Visibility depends on order options or device settings

- Selection**
- 4...20 mA NE (3.8...20.5 mA)
 - 4...20 mA US (3.9...20.8 mA)
 - 4...20 mA (4... 20.5 mA)
 - Fixed value

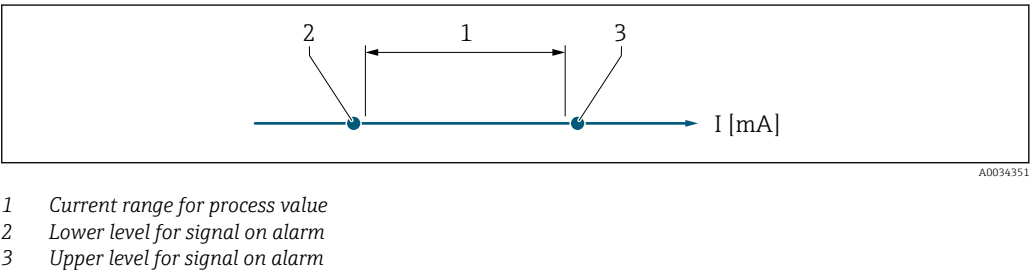
Additional information

Selection

- **4...20 mA NE (3.8...20.5 mA)** option
Select this option to set the current range in accordance with NAMUR recommendation NE43.
- **Fixed value** option
Select this option to set the current output to a current value instead of a range.

The current value is defined in the **Fixed current** parameter (→  27).

The graphic shows the relationship between the current range for the output of the process value and the lower and upper alarm levels:



Selection (current range for process value)	Lower level for signal on alarm	Upper level for signal on alarm
4...20 mA NE (3.8...20.5 mA)	< 3.6 mA	> 21.5 mA
4...20 mA US (3.9...20.8 mA)		
4...20 mA (4... 20.5 mA)		

Lower range value output

Navigation  Guidance → Commissioning → Low.range outp

Prerequisite

In the **Current range output** parameter, one of the following options is selected:

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

Description

Enter lower range value for the measured value range.

Additional information:

- Depending on the setting selected for the "Measuring mode current output" parameter, the value specified for this parameter and the "Upper range value output" 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 current 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 current output will be inversely proportional to the process variable assigned.

User entry

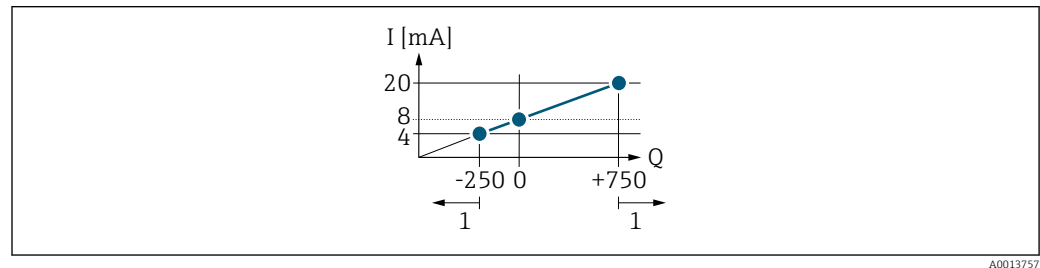
Signed floating-point number

Additional information

Examples of the behavior, depending on the option selected in the **Measuring mode current output** parameter (→  111).

Example: Measuring mode with "Forward flow" option

- **Lower range value output** parameter (→  25) = not equal to zero flow (e.g. -250 m³/h)
- **Upper range value output** parameter (→  27) = not equal to zero flow (e.g. +750 m³/h)
- Calculated current value = 8 mA at zero flow

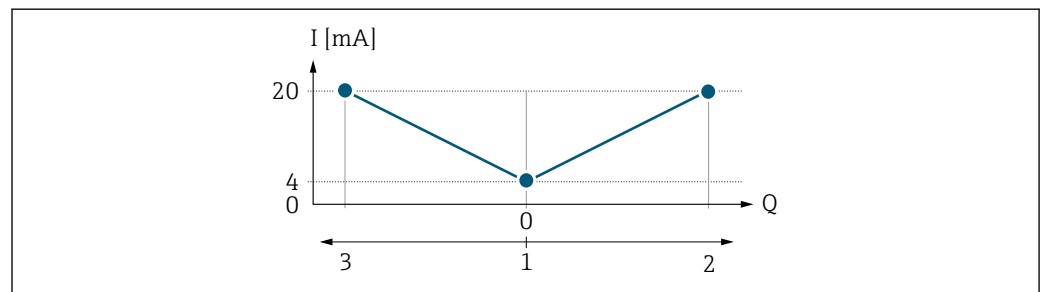


A0013757

Q Flow
I Current
1 Measuring range is exceeded or undershot

The linear operational range of the measuring device is defined by the values entered for the **Lower range value output** parameter (→  25) and **Upper range value output** parameter (→  27), and by the selected current range.

Example: Measuring mode with the "Forward/Reverse flow" option



A0013758

Q Flow
I Current
1 Value assigned to 0/4 mA current
2 Forward flow
3 Reverse flow

The current output signal is independent of the direction of flow (absolute amount of the measured variable). The values for the **Lower range value output** parameter (→  25) and **Upper range value output** parameter (→  27) must have the same algebraic sign.

The value for the **Upper range value output** parameter (→  27) (e.g. reverse flow) corresponds to the mirrored value for the **Upper range value output** parameter (→  27) (e.g. forward flow).

Example: Measuring mode with the "Reverse flow compensation" option

If flow is characterized by severe fluctuations (e.g. when using reciprocating pumps), flow components outside the measuring range are buffered, balanced and output after a maximum delay of 60 s.

Upper range value output 	
Navigation	  Guidance → Commissioning → Upp.range outp
Prerequisite	In the Current range output parameter, one of the following options is selected: ■ 4...20 mA NE (3.8...20.5 mA) ■ 4...20 mA US (3.9...20.8 mA) ■ 4...20 mA (4... 20.5 mA)
Description	Enter upper range value for the measured value range.
User entry	Signed floating-point number
Additional information	 Examples of the behavior, depending on the option selected in the Measuring mode current output parameter: Lower range value output parameter (→  25):

Damping current output 	
Navigation	  Guidance → Commissioning → Damp.curr.outp
Prerequisite	A process variable is selected in the Process variable current output parameter and one of the following options is selected in the Current range output parameter: ■ 4...20 mA NE (3.8...20.5 mA) ■ 4...20 mA US (3.9...20.8 mA) ■ 4...20 mA (4... 20.5 mA)
Description	Enter time constant (PT1 element) to set the reaction time of the output signal to fluctuations in the measured value caused by process conditions. Additional information: - 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	0.0 to 999.9 s

Fixed current 	
Navigation	  Guidance → Commissioning → Fixed current
Prerequisite	In the Current range output parameter in the Current output 1 submenu, the Fixed value option is selected.
Description	Enter the value for the "Fixed value" option.
User entry	3.59 to 21.5 mA

Failure behavior current output 	
Navigation	  Guidance → Commissioning → Fail.behav.out
Prerequisite	A process variable is selected in the Process variable current output parameter and one of the following options is selected in the Current range output parameter: ■ 4...20 mA NE (3.8...20.5 mA) ■ 4...20 mA US (3.9...20.8 mA) ■ 4...20 mA (4... 20.5 mA)
Description	Specify how the output should behave in the event of a device alarm.
Selection	■ Min. ■ Max. ■ Last valid value ■ Actual value ■ Fixed value
Additional information	<i>Selection</i> ■ Min. option The current output outputs the lower fault condition signal level for the specified current range. Additional information: The current range is specified in the "Current range output " parameter. ■ Max. option The current output outputs the upper fault condition signal level for the specified current range. Additional information: The current range is specified in the "Current range output " parameter. ■ Last valid value option The current output outputs the last valid value measured before the device alarm occurred. ■ Actual value option The current output outputs the flow value currently measured. The device alarm is ignored. ■ Fixed value option The current output outputs the value specified. Additional information: The value is specified in the "Failure current " parameter.
Failure current 	

Navigation	  Guidance → Commissioning → Fail. current
Prerequisite	In the Failure behavior current output parameter in the Current output 1 submenu, the Fixed value option is selected.
Description	Enter the value for the "Fixed value" option in the "Failure behavior current output " parameter.
User entry	3.59 to 21.5 mA

2.1.8 Pulse/frequency/switch output

Navigation   Guidance → Commissioning

Operating mode

Navigation   Guidance → Commissioning → Operating mode

Description Select the operating mode for the output.

Selection

- 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 has been reached, a pulse is emitted, the duration of which is set within the "Pulse width" parameter.

Additional information:

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.

Additional information:

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.

Additional information:

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

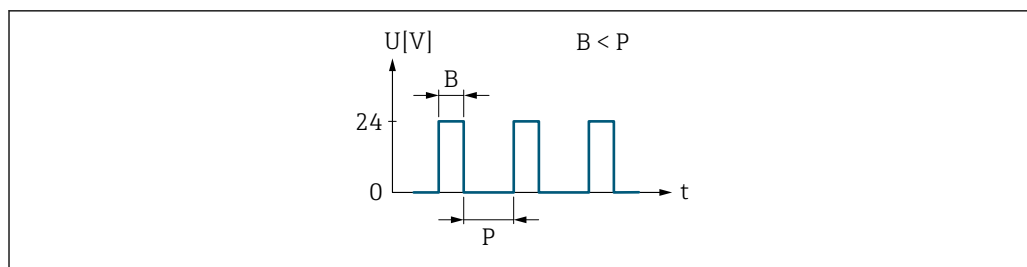
- When the function assigned to the switch output is triggered, the switch output will depending on the output configuration either be continuously conductive or continuously non-conductive.

- The switch output is used to display diagnostic information at the system level, e.g. by connecting a lamp that lights up when the function assigned is triggered.

"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



A0026883

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

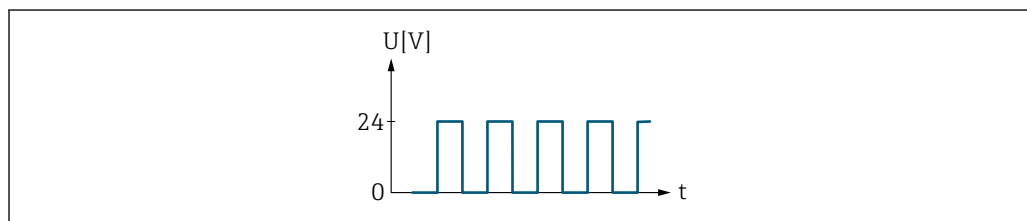
B Pulse width entered

P Pauses between the individual pulses

"Frequency" option

Example

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



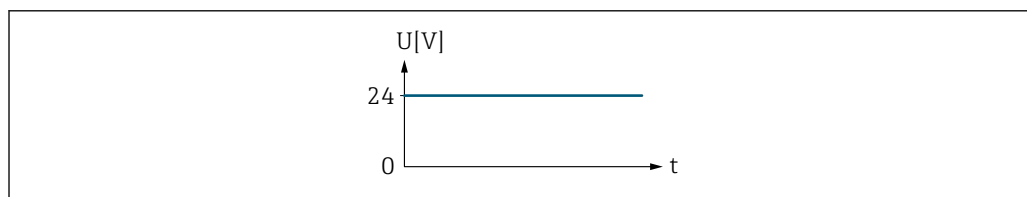
A0026886

2 Flow-proportional frequency output

"Switch" option

Example

Alarm response without alarm

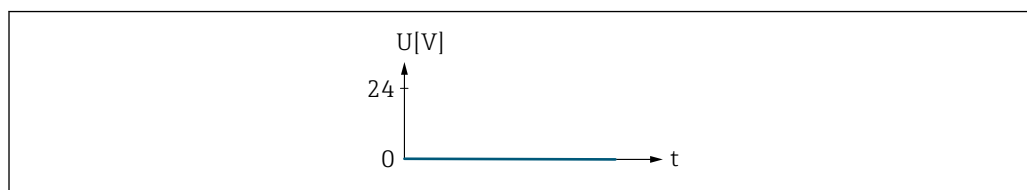


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3 No alarm, high level

Example

Alarm response in case of alarm



A0026885

4 Alarm, low level

Frequency output

Navigation   Guidance → Commissioning

Assign frequency output

Navigation	  Guidance → Commissioning → Assign freq.
Prerequisite	In the Operating mode parameter in the Pulse/frequency/switch output 1 submenu, the Frequency option is selected.
Description	Select process variable for frequency output.
Selection	■ Off ■ Mass flow ■ Volume flow ■ Corrected volume flow ■ Temperature ■ Density * ■ Index inhomogeneous medium ■ Exciter current 0 ■ Oscillation frequency 0 ■ Oscillation amplitude 0 * ■ Frequency fluctuation 0 * ■ Oscillation damping 0 ■ Oscillation damping fluctuation 0 * ■ Signal asymmetry ■ HBSI * ■ Electronics temperature

Minimum frequency value

Navigation	  Guidance → Commissioning → Min. freq. value
Prerequisite	In the Operating mode parameter in the Pulse/frequency/switch output 1 submenu, the Frequency option is selected.
Description	Enter the minimum frequency for the frequency range. Additional information: The lower range value for the measured value range is specified in the "Measuring value at minimum frequency" parameter.
User entry	0.0 to 10 000.0 Hz

* Visibility depends on order options or device settings

Measuring value at minimum frequency 	
Navigation	  Guidance → Commissioning → Val. at min.freq
Prerequisite	In the Operating mode parameter in the Pulse/frequency/switch output 1 submenu, the Frequency option is selected.
Description	Enter lower range value for the measured value range. Additional information: - 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
Maximum frequency value 	
Navigation	  Guidance → Commissioning → Max. freq. value
Prerequisite	In the Operating mode parameter in the Pulse/frequency/switch output 1 submenu, the Frequency option is selected.
Description	Enter the maximum frequency for the measured value output. Additional information: 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 → Val. at max.freq
Prerequisite	In the Operating mode parameter in the Pulse/frequency/switch output 1 submenu, the Frequency option is selected.
Description	Enter upper range value for the measured value range.
User entry	Signed floating-point number

Failure mode	
Navigation	Guidance → Commissioning → Failure mode
Prerequisite	In the Operating mode parameter in the Pulse/frequency/switch output 1 submenu, the Frequency option is selected.
Description	Specify how the output should behave in the event of a device alarm. Additional information: 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	<i>Selection</i> ■ Actual value option The frequency output outputs the flow value currently measured. ■ Defined value option The frequency output outputs the value specified. Additional information: The value is specified in the "Failure frequency" parameter. ■ 0 Hz option In the event of a device alarm, the frequency output outputs 0 Hz.
Failure frequency	
Navigation	Guidance → Commissioning → Failure freq.
Prerequisite	In the Operating mode parameter in the Pulse/frequency/switch output 1 submenu, the Frequency option is selected.
Description	Enter the value for the "Defined value" option in the "Failure mode" parameter.
User entry	0.0 to 12 500.0 Hz

Pulse output

Navigation  Guidance → Commissioning

Assign pulse output 1

Navigation

 Guidance → Commissioning → Assign pulse 1

Prerequisite

In the **Operating mode** parameter in the **Pulse/frequency/switch output 1** submenu, the **Pulse** option is selected.

Description

Select process variable for pulse output.

Selection

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

Pulse width

Navigation

 Guidance → Commissioning → Pulse width

Prerequisite

In the **Operating mode** parameter in the **Pulse/frequency/switch output 1** submenu, the **Pulse** option is selected.

Description

Specify the duration of the output pulse.

Additional information:

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 faulty".

Example:

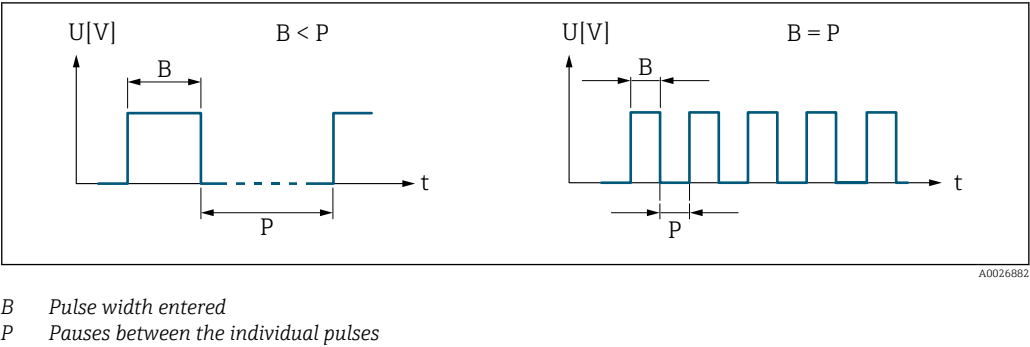
- Pulse value: 0.1 g
- Pulse width: 0.1 ms
- $f_{\max}: 1 / (2 \times 0.1 \text{ ms}) = 5 \text{ kHz}$
- $Q_{\max}: 5 \text{ kHz} \times 0.1 \text{ g} = 0.5 \text{ kg/s}$

User entry

0.05 to 2 000 ms

Additional information

Description



Value per pulse



Navigation

 Guidance → Commissioning → Value per pulse

Prerequisite

In the **Operating mode** parameter in the **Pulse/frequency/switch output 1** submenu, the **Pulse** option is selected.

Description

Enter the measured value to which a pulse corresponds.

Additional information:
Weighting of the pulse output with a quantity.
The lower the pulse value, the
– better the resolution.
– higher the frequency of the pulse response.

User entry

Signed floating-point number

Switch output

Navigation  Guidance → Commissioning

Switch output function



Navigation

 Guidance → Commissioning → Switch out funct

Prerequisite

In the **Operating mode** parameter in the **Pulse/frequency/switch output 1** submenu, the **Switch** option is selected.

Description

Assign a function to the switch output.

Additional information:
– The state of the switch output (on or off) when the assigned function is triggered can be inverted in the "Invert output signal" parameter
– The "Invert output signal" parameter is not available for all devices.

Selection	■ Off ■ On ■ Diagnostic behavior ■ Limit ■ Flow direction check ■ Status
Additional information	<i>Selection</i> ■ 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 a 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 device status for the selected detection method, e.g. partially filled pipe detection or low flow cut off.

Assign diagnostic behavior



Navigation	Guidance → Commissioning → Assign diag. beh
Prerequisite	In the Operating mode parameter in the Pulse/frequency/switch output 1 submenu, the Switch option is selected.
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	<i>Selection</i> ■ 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 → Assign limit

Prerequisite

In the **Operating mode** parameter in the **Pulse/frequency/switch output 1** submenu, the **Switch** option is selected.

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

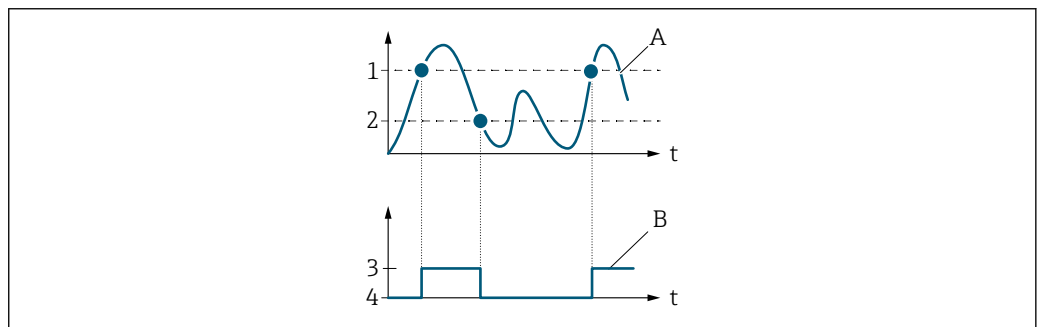
- Off
- Mass flow
- Volume flow
- Density*
- Corrected volume flow
- Temperature
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Oscillation damping

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



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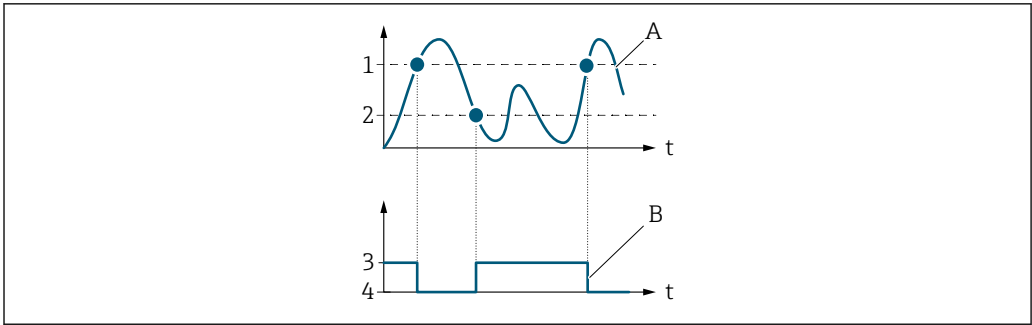
- 1 Switch-on point
- 2 Switch-off point
- 3 Conductive
- 4 Non-conductive
- A Process variable
- B Status output

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

* Visibility depends on order options or device settings



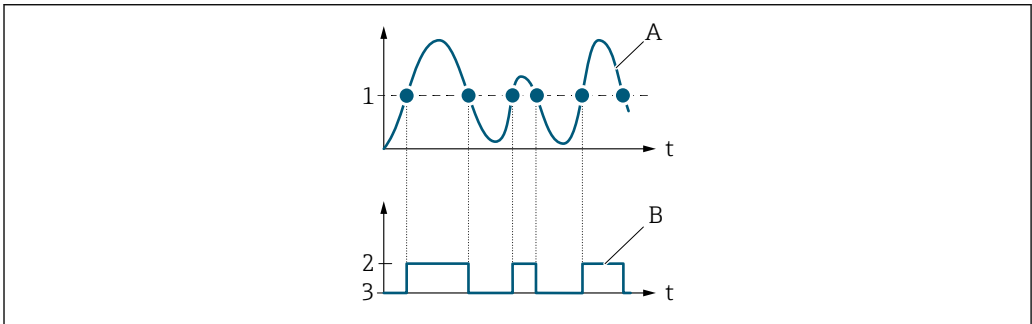
A0026892

- 1 Switch-on point
- 2 Switch-off point
- 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 → Switch-on value

Prerequisite

In the **Operating mode** parameter in the **Pulse/frequency/switch output 1** submenu, the **Switch** option is selected.

Description

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

Additional information:

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

User entry

Signed floating-point number

Switch-off value 	
Navigation	  Guidance → Commissioning → Switch-off value
Prerequisite	In the Operating mode parameter in the Pulse/frequency/switch output 1 submenu, the Switch option is selected.
Description	Enter limit value for the switch-off point (process variable < switch-off value = open, non-conductive). Additional information: To use a hysteresis: Switch-on point > Switch-off point.
User entry	Signed floating-point number
Switch-on delay 	
Navigation	  Guidance → Commissioning → Switch-on delay
Prerequisite	In the Operating mode parameter in the Pulse/frequency/switch output 1 submenu, the Switch option is selected.
Description	Enter delay before the switch output is switched on.
User entry	0.0 to 100.0 s
Switch-off delay 	
Navigation	  Guidance → Commissioning → Switch-off delay
Prerequisite	In the Operating mode parameter in the Pulse/frequency/switch output 1 submenu, the Switch option is selected.
Description	Enter delay before the switch output is switched off.
User entry	0.0 to 100.0 s
Assign status 	
Navigation	  Guidance → Commissioning → Assign status
Prerequisite	In the Operating mode parameter in the Pulse/frequency/switch output 1 submenu, the Switch option is selected.

Description	Select the device status to display for the switch output. Additional information: If the switch on point for the selected detection method is reached, the output is conductive. Otherwise, the switch output is non-conductive.	
Selection	■ Partially filled pipe detection ■ Low flow cut off	
Failure mode		

Navigation	  Guidance → Commissioning → Failure mode
Prerequisite	In the Operating mode parameter in the Pulse/frequency/switch output 1 submenu, the Switch option is selected.
Description	Specify how the output should behave in the event of a device alarm. Additional information: For safety reasons, it is recommended that the behavior of the output in the event of a device alarm be predefined.
Selection	■ Actual status ■ Open ■ Closed
Additional information	<i>Selection</i> ■ Actual status option In the event of a device alarm, the issue is ignored and the switch output adopts the behavior currently specified for the "Switch output function" parameter. ■ Open option In the event of a device alarm, the switch output's transistor is set to "non-conductive".

2.1.9 Display

Navigation   Guidance → Commissioning

Value 1 display		
Navigation	  Guidance → Commissioning → Value 1 display	
Description	Select the measured value that is displayed first on the local display. Additional information: The applicable unit of measure is specified in the "System units" submenu.	

- Selection**
- Mass flow
 - Volume flow
 - Corrected volume flow
 - Temperature
 - Density *
 - Totalizer 1
 - Totalizer 2
 - Totalizer 3
 - Index inhomogeneous medium
 - Electronics temperature

Value 2 display

Navigation  Guidance → Commissioning → Value 2 display

Description Select the measured value that is shown second on the local display.
Additional information:
The applicable unit of measure is specified in the "System units" submenu.

- Selection**
- None
 - Mass flow
 - Volume flow
 - Corrected volume flow
 - Temperature
 - Density *
 - Totalizer 1
 - Totalizer 2
 - Totalizer 3
 - Index inhomogeneous medium
 - Electronics temperature

Value 3 display

Navigation  Guidance → Commissioning → Value 3 display

Description Select the measured value that is shown third on the local display.
Additional information:
The applicable unit of measure is specified in the "System units" submenu.

- Selection**
- None
 - Mass flow
 - Volume flow
 - Corrected volume flow
 - Temperature
 - Density *
 - Totalizer 1
 - Totalizer 2

* Visibility depends on order options or device settings

- Totalizer 3
- Index inhomogeneous medium
- Electronics temperature

Value 4 display



Navigation

Guidance → Commissioning → Value 4 display

Description

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

Additional information:

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

Selection

- None
- Mass flow
- Volume flow
- Corrected volume flow
- Temperature
- Density^{*}
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Index inhomogeneous medium
- Electronics temperature

Display damping



Navigation

Guidance → Commissioning → Display damping

Description

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

Additional information:

- The smaller the time constant the faster the display reacts to fluctuations in the measured value.
- If the time constant is set to 0, damping is deactivated.

User entry

0.0 to 999.9 s

* Visibility depends on order options or device settings

2.1.10 Date/time

Navigation  Guidance → Commissioning

Time format

Navigation  Guidance → Commissioning → Time format

Description Select time format.

- Selection
- 24 h
 - 12 h AM/PM

Time zone

Navigation  Guidance → Commissioning → Time zone

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

Selection

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

Set date/time

Navigation

Guidance → Commissioning → Set date/time

Description

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

User entry

Date and time

3 "Diagnostics" menu

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

Navigation  Diagnostics

Diagnostics		
▶ Active diagnostics	→ 	46
▶ Diagnostic list	→ 	48
▶ Simulation	→ 	51
▶ Heartbeat Technology	→ 	56
▶ Diagnostic settings	→ 	57

3.1 "Actual diagnostics" submenu

Navigation   Diagnostics → Active diagnos.

▶ Active diagnostics		
Actual diagnostics	→ 	46
Timestamp	→ 	46
Previous diagnostics	→ 	46
Timestamp	→ 	47
Operating time from restart	→ 	47
Operating time	→ 	47

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

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)
-----------------------	---

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" submenu

Navigation  Diagnostics → Diagnostic list

► Diagnostic list		
Diagnostics 1	→ 	48
Timestamp	→ 	48
Diagnostics 2	→ 	49
Timestamp	→ 	49
Diagnostics 3	→ 	49
Timestamp	→ 	49
Diagnostics 4	→ 	49
Timestamp	→ 	50
Diagnostics 5	→ 	50
Timestamp	→ 	50

Diagnostics 1

Navigation  Diagnostics → Diagnostic list → Diagnostics 1

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

User interface Positive integer

Timestamp

Navigation  Diagnostics → Diagnostic list → Timestamp

Description Displays the timestamp for the diagnostic message with the highest priority.

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

Diagnostics 2

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

Timestamp

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

Diagnostics 3

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

Timestamp

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

Diagnostics 4

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

Timestamp

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

Diagnostics 5

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

Timestamp

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

3.3 "Simulation" submenu

Navigation   Diagnostics → Simulation

► Simulation		
Assign simulation process variable	→ 	51
Process variable value	→ 	52
Current output 1 simulation	→ 	52
Current output value	→ 	52
Frequency output 1 simulation	→ 	53
Frequency output 1 value	→ 	53
Pulse output simulation 1	→ 	53
Pulse value 1	→ 	54
Switch output simulation 1	→ 	54
Switch state 1	→ 	54
Device alarm simulation	→ 	55
Diagnostic event category	→ 	55
Diagnostic event simulation	→ 	55

Assign simulation process variable

Navigation   Diagnostics → Simulation → Assign proc.var.

Description Select a process variable for the simulation, thereby activating it.

- Selection
- Off
 - Mass flow
 - Volume flow
 - Corrected volume flow
 - Density^{*}
 - Temperature

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

Additional information	<i>Description</i> The display alternates between the measured value and a diagnostics message of the "function check" category (C) when simulation is active.
Process variable value 	
Navigation	  Diagnostics → Simulation → Proc. var. value
Description	Enter the simulation value for the selected process variable. Processing of measured values downstream as well as the signal output follow this value. In this way, it is possible to verify whether the measuring device has been configured correctly. Additional information: The applicable unit of measure is specified in the "System units" submenu.
User entry	Signed floating-point number

Current output 1 simulation 	
Navigation	  Diagnostics → Simulation → Curr.outp 1 sim.
Description	Switch simulation of the current output on or off. Additional information: When simulation is on, the current output signal is set to the value specified in the "Current output value" parameter.
Selection	■ Off ■ On
Additional information	<i>Description</i> The display alternates between the measured value and a diagnostics message of the "function check" category (C) when simulation is active.

Current output value 	
Navigation	  Diagnostics → Simulation → Curr.outp val.
Description	Enter the current value for the simulation. In this manner, it is possible to verify the current output is configured correctly and downstream processing units are functioning properly. Additional information: The valid input range is determined by the "Current range output" parameter.
User entry	3.59 to 21.5 mA

Frequency output 1 simulation



Navigation	Diagnostics → Simulation → Freq.outp 1 sim.
Description	Switch simulation of the frequency output on or off.
Selection	■ Off ■ On
Additional information	<i>Description</i> The display alternates between the measured value and a diagnostics message of the "function check" category (C) when simulation is active.

Frequency output 1 value



Navigation	Diagnostics → Simulation → Freq.outp 1 val.
Description	Enter the frequency value for the simulation. In this manner, it is possible to verify the frequency output is configured correctly and downstream processing units are functioning properly.
User entry	0.0 to 12 500.0 Hz

Pulse output simulation 1



Navigation	Diagnostics → Simulation → Puls.outp.sim. 1
Description	Switch simulation of the pulse output on or off.
Selection	■ Off ■ Fixed value ■ Down-counting value
Additional information	<i>Selection</i> ■ Off option Simulation of the pulse output is switched off. The device is in standard operation mode or another process variable is being simulated. ■ 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. <i>Description</i> The display alternates between the measured value and a diagnostics message of the "function check" category (C) when simulation is active.

Pulse value 1

Navigation	  Diagnostics → Simulation → Pulse value 1
Description	Enter the number of pulses to simulate the pulse output. In this manner, it is possible to verify the pulse output is configured correctly and downstream processing units are functioning properly.
User entry	0 to 65 535

Switch output simulation 1

Navigation	  Diagnostics → Simulation → Switch sim. 1
Description	Switch simulation of the switch output on or off. Additional information: When simulation is on, the switch output is set to the state specified in the "Switch state " parameter.
Selection	■ Off ■ On
Additional information	<i>Description</i> The display alternates between the measured value and a diagnostics message of the "function check" category (C) when simulation is active.

Switch state 1

Navigation	  Diagnostics → Simulation → Switch state 1
Description	Select a switch state. In this manner, it is possible to verify the switch output is configured correctly and downstream processing units are functioning properly.
Selection	■ Open ■ Closed
Additional information	<i>Selection</i> ■ 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, the display alternates between the measured value and a diagnostic message of the Function Check (C) category.
Selection	■ Off ■ On
Diagnostic event category 	
Navigation	 Diagnostics → Simulation → Event category
Description	Select the category of diagnostic events that should be available for selection in the "Diagnostic event simulation" parameter.
Selection	■ Sensor ■ Electronics ■ Configuration ■ Process
Diagnostic event simulation 	
Navigation	  Diagnostics → Simulation → Diag. event sim.
Description	Select the diagnostic event to simulate.
Selection	Off

3.4 "Heartbeat Technology" submenu

The **Heartbeat Technology** submenu (→  56) is only available with the optional "Heartbeat Verification + Monitoring" application package.

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

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

Navigation   Diagnostics → HBT

▶ Heartbeat Technology

▶ Performing verification

▶ Verification results

▶ Heartbeat Monitoring

3.5 "Diagnostic settings" submenu

Navigation   Diagnostics → Diag. settings

► Diagnostic settings

► Properties

→  57

► Diagnostic configuration

→  57

3.5.1 "Properties" submenu

Navigation   Diagnostics → Diag. settings → Properties

► Properties

Alarm delay

→  57

Alarm delay

Navigation	  Diagnostics → Diag. settings → Properties → Alarm delay
Description	Enter a duration for the alarm delay. When a diagnostic event of the "Alarm" category occurs, the diagnostic message is not generated until the delay has elapsed.
User entry	0 to 60 s

3.5.2 "Diagnostic configuration" submenu

Navigation   Diagnostics → Diag. settings → Diag. config.

► Diagnostic configuration

► Sensor

→  58

► Electronics

→  60

► Configuration

→  63

► Process

→  66

"Sensor" submenu

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

► Sensor

Assign behavior of diagnostic no. 046

→  58

Event category 046

→  59

Assign behavior of diagnostic no. 140

→  59

Event category 140

→  59

Assign behavior of diagnostic no. 144

→  60

Event category 144

→  60

Assign behavior of diagnostic no. 046



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

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

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

Additional information

Selection

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

Event category 046		
Navigation	  Diagnostics → Diag. settings → Diag. config. → Sensor → Event category 046	
Description	Select event category (status signal) for diagnostic event "046 Sensor build-up detected".	
Selection	■ Failure (F) ■ Function check (C) ■ Out of specification (S) ■ Maintenance required (M) ■ No effect (N)	
Assign behavior of diagnostic no. 140		
Navigation	  Diagnostics → Diag. settings → Diag. config. → Sensor → Diagnostic no. 140	
Description	Select behavior for diagnostic event "140 Sensor signal asymmetrical".	
Selection	■ Off ■ Alarm ■ Warning ■ Logbook entry only	
Additional information	<i>Selection</i> ■ Off option The diagnostic event is ignored and no diagnostic message is generated or logged. ■ Alarm option The device stops measuring. The signal outputs and totalizers assume the specified alarm condition. A diagnostic message is generated. ■ Warning option The device continues measuring. The signal outputs and totalizers are not affected. A diagnostic message is generated. ■ Logbook entry only option The device continues measuring. The diagnostic message is only displayed in the "Event logbook" submenu and does not alternate with the standard operational information displayed.	
Event category 140		
Navigation	  Diagnostics → Diag. settings → Diag. config. → Sensor → Event category 140	
Description	Select category for diagnostic message.	
Selection	■ Failure (F) ■ Function check (C) ■ Out of specification (S) ■ Maintenance required (M) ■ No effect (N)	

Assign behavior of diagnostic no. 144



Navigation	Diagnostics → Diag. settings → Diag. config. → Sensor → Diagnostic no. 144
Description	Select diagnostic behavior for the selected diagnostic number.
Selection	■ Off ■ Alarm ■ Warning ■ Logbook entry only
Additional information	<i>Selection</i> ■ Off option The diagnostic event is ignored and no diagnostic message is generated or logged. ■ Alarm option The device stops measuring. The signal outputs and totalizers assume the specified alarm condition. A diagnostic message is generated. ■ Warning option The device continues measuring. The signal outputs and totalizers are not affected. A diagnostic message is generated. ■ Logbook entry only option The device continues measuring. The diagnostic message is only displayed in the "Event logbook" submenu and does not alternate with the standard operational information displayed.

Event category 144



Navigation	Diagnostics → Diag. settings → Diag. config. → Sensor → Event category 144
Description	Select category for diagnostic message.
Selection	■ Failure (F) ■ Function check (C) ■ Out of specification (S) ■ Maintenance required (M) ■ No effect (N)

"Electronics" submenu

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

► Electronics

Assign behavior of diagnostic no. 230

→ 61

Event category 230

→ 61

Assign behavior of diagnostic no. 231	→ 61
Event category 231	→ 62
Assign behavior of diagnostic no. 302	→ 62
Event category 302	→ 62
Assign behavior of diagnostic no. 374	→ 62
Event category 374	→ 63

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

Event category 230



Navigation	Diagnostics → Diag. settings → Diag. config. → Electronics → Event category 230
Description	Select event category (status signal) for diagnostic event "230 Date/time incorrect".
Selection	■ Failure (F) ■ Function check (C) ■ Out of specification (S) ■ Maintenance required (M) ■ No effect (N)

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

Event category 231



Navigation	Diagnostics → Diag. settings → Diag. config. → Electronics → Event category 231
Description	Select event category (status signal) for diagnostic event "231 Date/time not available".
Selection	■ Failure (F) ■ Function check (C) ■ Out of specification (S) ■ Maintenance required (M) ■ No effect (N)

Assign behavior of diagnostic no. 302



Navigation	Diagnostics → Diag. settings → Diag. config. → Electronics → Diagnostic no. 302
Description	Select behavior for diagnostic event "302 Device verification active".
Selection	■ Off ■ Warning ■ Logbook entry only

Event category 302



Navigation	Diagnostics → Diag. settings → Diag. config. → Electronics → Event category 302
Description	Select event category (status signal) for diagnostic event "302 Device verification active".
Selection	■ Failure (F) ■ Function check (C) ■ Out of specification (S) ■ Maintenance required (M) ■ No effect (N)

Assign behavior of diagnostic no. 374



Navigation	Diagnostics → Diag. settings → Diag. config. → Electronics → Diagnostic no. 374
Description	Select behavior for diagnostic event "374 Sensor electronics (ISEM) faulty".
Selection	■ Off ■ Alarm ■ Warning ■ Logbook entry only

Additional information*Selection*

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

Event category 374**Navigation**

 Diagnostics → Diag. settings → Diag. config. → Electronics → Event category 374

Description

Select event category (status signal) for diagnostic event "374 Sensor electronics (ISEM) faulty".

Selection

- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- No effect (N)

"Configuration" submenu

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

► Configuration	
Assign behavior of diagnostic no. 441	→  64
Event category 441	→  64
Assign behavior of diagnostic no. 442	→  64
Event category 442	→  65
Assign behavior of diagnostic no. 443	→  65
Event category 443	→  66

Assign behavior of diagnostic no. 441

Navigation   Diagnostics → Diag. settings → Diag. config. → Configuration → Diagnostic no. 441

Description Select behavior for diagnostic event "441 Current output faulty".

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

Additional information *Selection*

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

Event category 441

Navigation   Diagnostics → Diag. settings → Diag. config. → Configuration → Event category 441

Description Select event category (status signal) for diagnostic event "441 Current output faulty".

- Selection**
- Failure (F)
 - Function check (C)
 - Out of specification (S)
 - Maintenance required (M)
 - No effect (N)

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**
- 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.

Event category 442**Navigation**

 Diagnostics → Diag. settings → Diag. config. → Configuration → Event category 442

Description

Select event category (status signal) for diagnostic event "442 Frequency output faulty".

Selection

- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- No effect (N)

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

- 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.

Event category 443



Navigation

  Diagnostics → Diag. settings → Diag. config. → Configuration → Event category 443

Description

Select event category (status signal) for diagnostic event "443 Pulse output faulty".

Selection

- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- No effect (N)

"Process" submenu

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

► Process		
Assign behavior of diagnostic no. 832		→  67
Event category 832		→  67
Assign behavior of diagnostic no. 833		→  68
Event category 833		→  68
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Event category 834		→  69
Assign behavior of diagnostic no. 835		→  69
Event category 835		→  70
Assign behavior of diagnostic no. 842		→  70
Event category 842		→  71
Assign behavior of diagnostic no. 862		→  71
Event category 862		→  72
Assign behavior of diagnostic no. 912		→  72
Event category 912		→  72
Assign behavior of diagnostic no. 913		→  73

Event category 913	→  73
Assign behavior of diagnostic no. 944	→  73
Event category 944	→  74
Assign behavior of diagnostic no. 948	→  74
Event category 948	→  75

Assign behavior of diagnostic no. 832



Navigation	  Diagnostics → Diag. settings → Diag. config. → Process → Diagnostic no. 832
Description	Select behavior for diagnostic event "832 Electronics temperature too high".
Selection	■ Off ■ Alarm ■ Warning ■ Logbook entry only
Additional information	<i>Selection</i> ■ Off option The diagnostic event is ignored and no diagnostic message is generated or logged. ■ Alarm option The device stops measuring. The signal outputs and totalizers assume the specified alarm condition. A diagnostic message is generated. ■ Warning option The device continues measuring. The signal outputs and totalizers are not affected. A diagnostic message is generated. ■ Logbook entry only option The device continues measuring. The diagnostic message is only displayed in the "Event logbook" submenu and does not alternate with the standard operational information displayed.

Event category 832



Navigation	  Diagnostics → Diag. settings → Diag. config. → Process → Event category 832
Description	Select event category (status signal) for diagnostic event "832 Electronics temperature too high".
Selection	■ Failure (F) ■ Function check (C) ■ Out of specification (S) ■ Maintenance required (M) ■ No effect (N)

Assign behavior of diagnostic no. 833



Navigation

Diagnostics → Diag. settings → Diag. config. → Process → Diagnostic no. 833

Description

Select behavior for diagnostic event "833 Electronics temperature too low".

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.

Event category 833



Navigation

Diagnostics → Diag. settings → Diag. config. → Process → Event category 833

Description

Select event category (status signal) for diagnostic event "833 Electronics temperature too low".

Selection

- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- No effect (N)

Assign behavior of diagnostic no. 834



Navigation

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

Description

Select event category (status signal) 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.

Event category 834**Navigation**

  Diagnostics → Diag. settings → Diag. config. → Process → Event category 834

Description

Select event category (status signal) for diagnostic event "834 Process temperature too high".

Selection

- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- No effect (N)

Assign behavior of diagnostic no. 835**Navigation**

  Diagnostics → Diag. settings → Diag. config. → Process → Diagnostic no. 835

Description

Select behavior for diagnostic event "835 Process temperature too low".

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.

Event category 835



Navigation

Diagnostics → Diag. settings → Diag. config. → Process → Event category 835

Description

Select event category (status signal) for diagnostic event "835 Process temperature too low".

Selection

- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- No effect (N)

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 above limit".

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.

Event category 842**Navigation**

 Diagnostics → Diag. settings → Diag. config. → Process → Event category 842

Description

Select event category (status signal) for diagnostic event "842 Process value above limit".

Selection

- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- No effect (N)

Assign behavior of diagnostic no. 862**Navigation**

 Diagnostics → Diag. settings → Diag. config. → Process → Diagnostic no. 862

Description

Select behavior for diagnostic event "862 Partly filled pipe".

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.

Event category 862		
Navigation	  Diagnostics → Diag. settings → Diag. config. → Process → Event category 862	
Description	Select event category (status signal) for diagnostic event "862 Partly filled pipe".	
Selection	■ Failure (F) ■ Function check (C) ■ Out of specification (S) ■ Maintenance required (M) ■ No effect (N)	
Assign behavior of diagnostic no. 912		
Navigation	  Diagnostics → Diag. settings → Diag. config. → Process → Diagnostic no. 912	
Description	Select behavior for diagnostic event "912 Medium inhomogeneous".	
Selection	■ Off ■ Alarm ■ Warning ■ Logbook entry only	
Additional information	<i>Selection</i> ■ Off option The diagnostic event is ignored and no diagnostic message is generated or logged. ■ Alarm option The device stops measuring. The signal outputs and totalizers assume the specified alarm condition. A diagnostic message is generated. ■ Warning option The device continues measuring. The signal outputs and totalizers are not affected. A diagnostic message is generated. ■ Logbook entry only option The device continues measuring. The diagnostic message is only displayed in the "Event logbook" submenu and does not alternate with the standard operational information displayed.	
Event category 912		
Navigation	  Diagnostics → Diag. settings → Diag. config. → Process → Event category 912	
Description	Select event category (status signal) for diagnostic event "912 Medium inhomogeneous".	
Selection	■ Failure (F) ■ Function check (C) ■ Out of specification (S) ■ Maintenance required (M) ■ No effect (N)	

Assign behavior of diagnostic no. 913 	
Navigation	  Diagnostics → Diag. settings → Diag. config. → Process → Diagnostic no. 913
Description	Select behavior for diagnostic event "913 Medium unsuitable".
Selection	■ Off ■ Alarm ■ Warning ■ Logbook entry only
Additional information	<i>Selection</i> ■ Off option The diagnostic event is ignored and no diagnostic message is generated or logged. ■ Alarm option The device stops measuring. The signal outputs and totalizers assume the specified alarm condition. A diagnostic message is generated. ■ Warning option The device continues measuring. The signal outputs and totalizers are not affected. A diagnostic message is generated. ■ Logbook entry only option The device continues measuring. The diagnostic message is only displayed in the "Event logbook" submenu and does not alternate with the standard operational information displayed.
Event category 913 	
Navigation	  Diagnostics → Diag. settings → Diag. config. → Process → Event category 913
Description	Select event category (status signal) for diagnostic event "913 Medium unsuitable".
Selection	■ Failure (F) ■ Function check (C) ■ Out of specification (S) ■ Maintenance required (M) ■ No effect (N)
Assign behavior of diagnostic no. 944 	
Navigation	  Diagnostics → Diag. settings → Diag. config. → Process → Diagnostic no. 944
Description	Select behavior for diagnostic event "944 Monitoring failed".
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.

Event category 944



Navigation

Diagnostics → Diag. settings → Diag. config. → Process → Event category 944

Description

Select event category (status signal) for diagnostic event "944 Monitoring failed".

Selection

- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- No effect (N)

Assign behavior of diagnostic no. 948



Navigation

Diagnostics → Diag. settings → Diag. config. → Process → Diagnostic no. 948

Description

Select behavior for diagnostic event "948 Oscillation damping 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.

Event category 948		
Navigation	  Diagnostics → Diag. settings → Diag. config. → Process → Event category 948	
Description	Select event category (status signal) for diagnostic event "948 Oscillation damping too high".	
Selection	■ Failure (F) ■ Function check (C) ■ Out of specification (S) ■ Maintenance required (M) ■ No effect (N)	

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	→ 	76
► System units	→ 	80
► Totalizers	→ 	86
► Sensor	→ 	91
► Current output 1	→ 	110
► Pulse/frequency/switch output 1	→ 	121
► Communication	→ 	139

4.1 "Measured values" submenu

Navigation  Application → Measured values

► Measured values		
Mass flow	→ 	77
Volume flow	→ 	77
Corrected volume flow	→ 	77
Density	→ 	77
Temperature	→ 	78
► Totalizer	→ 	78

Mass flow

Navigation	 Application → Measured values → Mass flow
Description	Displays the mass flow currently measured. Additional information: The applicable unit of measure is specified in the "System units" submenu.
User interface	Signed floating-point number

Volume flow

Navigation	 Application → Measured values → Volume flow
Description	Displays the volume flow currently measured. Additional information: The applicable unit of measure is specified in the "System units" submenu.
User interface	Signed floating-point number

Corrected volume flow

Navigation	 Application → Measured values → Correct.vol.flow
Description	Displays the currently calculated volume flow compensated for the reference density. Additional information: - The reference density can be calculated or fixed. - The applicable unit of measure is specified in the "System units" submenu.
User interface	Signed floating-point number

Density

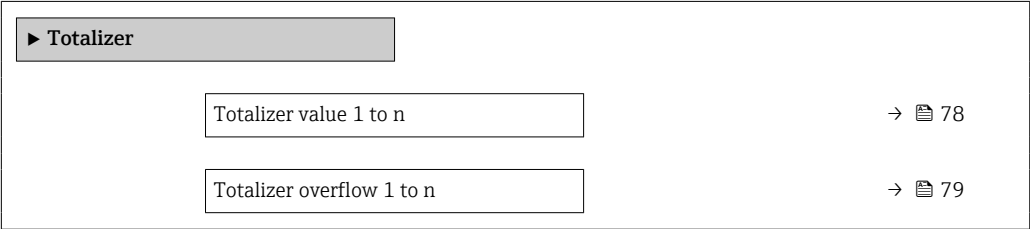
Navigation	 Application → Measured values → Density
Description	Displays the density currently measured. Additional information: The applicable unit of measure is specified in the "System units" submenu.
User interface	Positive floating-point number

Temperature

Navigation	 Application → Measured values → Temperature
Description	Displays the medium temperature currently measured. Additional information: The applicable unit of measure is specified in the "System units" submenu.
User interface	Positive floating-point number

4.1.1 "Totalizer" submenu

Navigation  Application → Measured values → Totalizer



Totalizer value 1 to n

Navigation	 Application → Measured values → Totalizer → Totalizer val. 1 to n
Prerequisite	A process variable has been selected in the Assign process variable parameter in the Totalizer 1 to n submenu.
Description	Displays the current totalizer counter. Additional information: Since the operating tool cannot display figures with more than 7 digits, the current counter above this range equals the sum of the totalizer counter plus the overflow displayed for the "Totalizer overflow" parameter. Example for how to calculate the current totalizer counter when the value exceeds the 7 digit display range limit of the operating tool: - Value of "Totalizer value" parameter: 1,968,457 m³ - Value of "Totalizer overflow" parameter: 1 × 10⁷ m³ = 10,000,000 m³ - Current totalizer reading: 11,968,457 m³ In the event of an error, the totalizer behaves as specified in the "Failure mode" parameter.
User interface	Signed floating-point number

Totalizer overflow 1 to n

**Navigation**

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

Prerequisite

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

Description

Displays the current totalizer overflow.

Additional information:

If the current totalizer counter exceeds the operating tool's maximum numerical display range of 7 digits, the amount above this range is expressed as an overflow. The current totalizer counter therefore equals the sum of the overflow and the totalizer value displayed in the "Totalizer value" parameter.

Example of how to calculate the current totalizer counter when the value exceeds the 7 digit display limit of the operating tool:

- Value of "Totalizer value" parameter: 1,968,457 m³
- Value of "Totalizer overflow" parameter: $1 \times 10^7 \text{ m}^3 = 10,000,000 \text{ m}^3$
- Current totalizer reading: 11,968,457 m³

User interface

–32 000.0 to 32 000.0

4.2 "System units" submenu

Navigation  Application → System units

► System units		
Mass flow unit	→ 	80
Mass unit	→ 	81
Volume flow unit	→ 	81
Volume unit	→ 	82
Corrected volume flow unit	→ 	83
Corrected volume unit	→ 	83
Density unit	→ 	84
Reference density unit	→ 	84
Temperature unit	→ 	84
Pressure unit	→ 	85

Mass flow unit

Navigation  Application → System units → Mass flow unit

Description Select mass flow unit.

Selection		SI units	US units
		■ g/s	■ oz/s
		■ g/min	■ oz/min
		■ g/h	■ oz/h
		■ g/d	■ oz/d
		■ kg/s	■ lb/s
		■ kg/min	■ lb/min
		■ kg/h	■ lb/h
		■ kg/d	■ lb/d
		■ t/s	■ STon/s
		■ t/min	■ STon/min
		■ t/h	■ STon/h
		■ t/d	■ STon/d

Mass unit

Navigation

  Application → System units → Mass unit

Description

Select mass unit.

- Selection
- SI units*
 - g
 - kg
 - t

US units
 - oz
 - lb
 - STon

Volume flow unit

Navigation

  Application → System units → Volume flow unit

Description

Select volume flow unit.

Selection	<i>SI units</i>	<i>US units</i>	<i>Imperial units</i>
	■ cm ³ /s	■ af/s	■ gal/s (imp)
	■ cm ³ /min	■ af/min	■ gal/min (imp)
	■ cm ³ /h	■ af/h	■ gal/h (imp)
	■ cm ³ /d	■ af/d	■ gal/d (imp)
	■ dm ³ /s	■ ft ³ /s	■ Mgal/s (imp)
	■ dm ³ /min	■ ft ³ /min	■ Mgal/min (imp)
	■ dm ³ /h	■ ft ³ /h	■ Mgal/h (imp)
	■ dm ³ /d	■ ft ³ /d	■ Mgal/d (imp)
	■ m ³ /s	■ MMft ³ /s	■ bbl/s (imp;beer)
	■ m ³ /min	■ MMft ³ /min	■ bbl/min (imp;beer)
	■ m ³ /h	■ MMft ³ /h	■ bbl/h (imp;beer)
	■ m ³ /d	■ Mft ³ /d	■ bbl/d (imp;beer)
	■ ml/s	■ fl oz/s (us)	■ bbl/s (imp;oil)
	■ ml/min	■ fl oz/min (us)	■ bbl/min (imp;oil)
	■ ml/h	■ fl oz/h (us)	■ bbl/h (imp;oil)
	■ ml/d	■ fl oz/d (us)	■ bbl/d (imp;oil)
	■ l/s	■ gal/s (us)	
	■ l/min	■ gal/min (us)	
	■ l/h	■ gal/h (us)	
	■ l/d	■ gal/d (us)	
	■ hl/s	■ Mgal/s (us)	
	■ hl/min	■ Mgal/min (us)	
	■ hl/h	■ Mgal/h (us)	
	■ hl/d	■ Mgal/d (us)	
	■ Ml/s	■ bbl/s (us;liq.)	
	■ Ml/min	■ bbl/min (us;liq.)	
	■ Ml/h	■ bbl/h (us;liq.)	
	■ Ml/d	■ 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)	

Volume unit



Navigation

Application → System units → Volume unit

Description

Select volume unit.

Selection	<i>SI units</i>	<i>US units</i>	<i>Imperial units</i>
	■ cm³ ■ dm³ ■ m³ ■ ml ■ l ■ hl ■ Ml Mega	■ af ■ ft³ ■ Mft³ ■ fl oz (us) ■ gal (us) ■ kgal (us) ■ Mgal (us) ■ bbl (us;oil) ■ bbl (us;liq.) ■ bbl (us;beer) ■ bbl (us;tank)	■ gal (imp) ■ Mgal (imp) ■ bbl (imp;beer) ■ bbl (imp;oil)

Corrected volume flow unit


Navigation  Application → System units → Cor.volflow unit

Description Select corrected volume flow unit.

Selection	<i>SI units</i>	<i>US units</i>	<i>Imperial units</i>
	■ Nl/s ■ Nl/min ■ Nl/h ■ Nl/d ■ Nhl/s ■ Nhl/min ■ Nhl/h ■ Nhl/d ■ Nm³/s ■ Nm³/min ■ Nm³/h ■ Nm³/d ■ Sl/s ■ Sl/min ■ Sl/h ■ Sl/d ■ Sm³/s ■ Sm³/min ■ Sm³/h ■ Sm³/d	■ Sft³/s ■ Sft³/min ■ Sft³/h ■ Sft³/d ■ Sgal/s (us) ■ Sgal/min (us) ■ Sgal/h (us) ■ Sgal/d (us) ■ Sbbbl/s (us;liq.) ■ Sbbbl/min (us;liq.) ■ Sbbbl/h (us;liq.) ■ Sbbbl/d (us;liq.) ■ MMSft³/s ■ MMSft³/min ■ MMSft³/h ■ MMSft³/d ■ Sbbbl/s (us;oil) ■ Sbbbl/min (us;oil) ■ Sbbbl/h (us;oil) ■ Sbbbl/d (us;oil)	■ Sgal/s (imp) ■ Sgal/min (imp) ■ Sgal/h (imp) ■ Sgal/d (imp)

Corrected volume unit


Navigation  Application → System units → Corr. vol. unit

Description Select corrected volume unit.

Selection	<i>SI units</i>	<i>US units</i>	<i>Imperial units</i>
	■ NI ■ Nhl ■ Nm³ ■ Sl ■ Sm³	■ Sft³ ■ MMSft³ ■ Sgal (us) ■ Sbbbl (us;liq.) ■ Sbbbl (us;oil)	Sgal (imp)

Density unit



Navigation Application → System units → Density unit

Description Select density unit.

Selection	<i>SI units</i>	<i>US units</i>	<i>Imperial units</i>
	■ g/cm³ ■ g/m³ ■ g/ml ■ kg/l ■ kg/dm³ ■ kg/m³	■ lb/ft³ ■ lb/gal (us) ■ lb/bbl (us;liq.) ■ lb/bbl (us;beer) ■ lb/bbl (us;oil) ■ lb/bbl (us;tank)	■ lb/gal (imp) ■ lb/bbl (imp;beer) ■ lb/bbl (imp;oil)

Reference density unit



Navigation Application → System units → Ref. dens. unit

Description Select reference density unit.

Selection	<i>SI units</i>	<i>US units</i>
	■ kg/Nm³ ■ kg/NI ■ g/Scm³ ■ kg/Sm³ ■ RD15°C ■ RD20°C	■ lb/Sft³ ■ RD60°F

Temperature unit



Navigation Application → System units → Temperature unit

Description Select temperature unit.

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

Pressure unit

Navigation

 Application → System units → Pressure unit

Description

Select pressure unit.

- Selection
- SI units

■ MPa a

■ MPa g

■ kPa a

■ kPa g

■ Pa a

■ Pa g

■ bar

■ bar g

US units

■ psi a

■ psi g

4.3 "Totalizers" submenu

Navigation  Application → Totalizers

► Totalizers

► Totalizer handling

→  86

► Totalizer 1 to n

→  86

4.3.1 "Totalizer handling" submenu

Navigation  Application → Totalizers → Totalizer

► Totalizer handling

Reset all totalizers

→  86

Reset all totalizers

Navigation	 Application → Totalizers → Totalizer → Reset all tot.
Description	Reset all totalizers to "0" and restart the totaling process. All flow quantities thus far totalized are thereby deleted.
Selection	■ Cancel ■ Reset + totalize

4.3.2 "Totalizer 1 to n" submenu

Navigation  Application → Totalizers → Totalizer 1 to n

► Totalizer 1 to n

Assign process variable

→  87

Unit totalizer 1 to n

→  87

Totalizer operation mode

→  88

Control Totalizer 1 to n

→  89

Preset value 1 to n	→ 89
Failure mode	→ 90

Assign process variable

Navigation	Application → Totalizers → Totalizer 1 to n → Assign variable
Description	Select process variable for totalizer. Additional information: If the option selected is changed, the device resets the totalizer to "0".
Selection	■ Off ■ Mass flow ■ Volume flow ■ Corrected volume flow

Unit totalizer 1 to n

Navigation	Application → Totalizers → Totalizer 1 to n → Unit totalizer 1 to n								
Prerequisite	A process variable has been selected in the Assign process variable parameter in the Totalizer 1 to n submenu.								
Description	Select process variable totalizer unit.								
Selection	<table><tr><td><i>SI units</i></td><td><i>US units</i></td></tr><tr><td>■ g[*]</td><td>■ oz[*]</td></tr><tr><td>■ kg[*]</td><td>■ lb[*]</td></tr><tr><td>■ t[*]</td><td>■ STon[*]</td></tr></table> * Visibility depends on order options or device settings	<i>SI units</i>	<i>US units</i>	■ g [*]	■ oz [*]	■ kg [*]	■ lb [*]	■ t [*]	■ STon [*]
<i>SI units</i>	<i>US units</i>								
■ g [*]	■ oz [*]								
■ kg [*]	■ lb [*]								
■ t [*]	■ STon [*]								

or

- SI units*

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

 - af *
 - ft³ *
 - 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

- SI units*

 - Nl *
 - Nhl *
 - Nm³ *
 - Sl *
 - Sm³ *
- US units*

 - Sft³ *
 - MMSft³ *
 - Sgal (us) *
 - Sbbbl (us;liq.) *
 - Sbbbl (us;oil) *
- Imperial units*

 - Sgal (imp) *

* Visibility depends on order options or device settings

or

- Other units*

 - None *

* Visibility depends on order options or device settings

Additional information

Description

The unit is selected separately for each totalizer. The unit is independent of the option selected in the **System units** submenu (→ ⓘ 80).

Selection

The selection is dependent on the process variable selected in the **Assign process variable** parameter (→ ⓘ 17).

Totalizer operation mode



Navigation

📄📄 Application → Totalizers → Totalizer 1 to n → Operation mode

Prerequisite

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

Description

Select totalizer calculation mode.

Selection	■ Net flow total ■ Forward flow total ■ Reverse flow total
Additional information	<i>Selection</i> ■ Net flow total 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 flow total option Only the flow in the forward flow direction is totalized. ■ Reverse flow total option Only the flow in the reverse flow direction is totalized (= reverse flow quantity).

Control Totalizer 1 to n

Navigation	 Application → Totalizers → Totalizer 1 to n → Control Tot. 1 to n
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	■ Totalize ■ Reset + hold ■ Preset + hold ■ Reset + totalize ■ Hold
Additional information	<i>Selection</i> ■ Totalize option The totalizer is started or continues running. ■ Reset + hold option The totaling process is stopped and the totalizer is reset to "0". ■ Preset + hold option The totaling process is stopped and the totalizer is set to the start value specified in the "Preset value" parameter. ■ Reset + totalize option The totalizer is reset to "0" and the totaling process is restarted. ■ Hold option Totalizing is stopped.

Preset value 1 to n

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 start value for totalizer.

User entry	Signed floating-point number
Additional information	<i>Description</i> The unit of the selected process variable is specified for the totalizer in the Unit totalizer parameter (→  17). <i>Example</i> This configuration is suitable for applications such as iterative filling processes with a fixed batch quantity.

Failure mode	
Navigation	  Application → Totalizers → Totalizer 1 to n → Failure mode
Prerequisite	A process variable has been selected in the Assign process variable parameter in the Totalizer 1 to n submenu.
Description	Specify how the totalizer should behave in the event of a device alarm. Additional information: The failsafe mode that applies to any other totalizers or outputs is specified separately in other parameters and is not impacted by this setting.
Selection	■ Stop ■ Actual value ■ Last valid value
Additional information	<i>Selection</i> ■ Stop option The totalizer is stopped in the event of a device alarm. ■ Actual value option The totalizer continues to totalize based on the current value measured; the device alarm is ignored. ■ Last valid value option The totalizer continues to totalize based on the last valid value measured before the device alarm occurred.

4.4 "Sensor" submenu

Navigation  Application → Sensor

▶ Sensor		
▶ Process parameters	→ 	91
▶ Low flow cut off	→ 	93
▶ Partially filled pipe detection	→ 	94
▶ Medium settings	→ 	96
▶ Two phase flow	→ 	97
▶ External compensation	→ 	100
▶ Corrected volume flow calculation	→ 	100
▶ Sensor adjustment	→ 	103
▶ Calibration	→ 	108

4.4.1 "Process parameters" submenu

Navigation  Application → Sensor → Process param.

▶ Process parameters		
Flow damping time	→ 	92
Flow override	→ 	92
Density damping	→ 	92
Temperature damping	→ 	93

Flow damping time		
Navigation	 Application → Sensor → Process param. → FlowDampingTime	
Description	Enter time constant for flow damping (PT1 element). - Value = 0: No damping - Value > 0: Damping increases Additional information: Damping is implemented by means of a proportional transmission behavior with first order delay (PT1 element).	
User entry	0 to 99.9 s	
Flow override		
Navigation	 Application → Sensor → Process param. → Flow override	
Description	Stops the measuring process. Can be used for example when cleaning the pipeline.	
Selection	■ Off ■ On	
Additional information	<i>Selection</i> "On" option Activates flow override. The diagnostic message "453 Flow override active" is generated. Additional information: Output values: - Temperature: Measurement continues - Totalizers 1 to 3: No longer totalize	
Density damping		
Navigation	 Application → Sensor → Process param. → Density damping	
Description	Enter time constant for damping (PT1 element) of the measured value for density: - Value = 0: No damping - Value > 0: Damping increases Additional information: Damping is implemented by means of a proportional transmission behavior with first order delay (PT1 element).	
User entry	0 to 999.9 s	

Temperature damping	
Navigation	Application → Sensor → Process param. → Temp. damping
Description	Enter time constant for temperature damping (PT1 element). - Value = 0: No damping - Value > 0: Damping increases Additional information: Damping is implemented by means of a proportional transmission behavior with first order delay (PT1 element).
User entry	0 to 999.9 s

4.4.2 "Low flow cut off" submenu

Navigation Application → Sensor → Low flow cut off

► Low flow cut off

Low flow cut off

→ 93

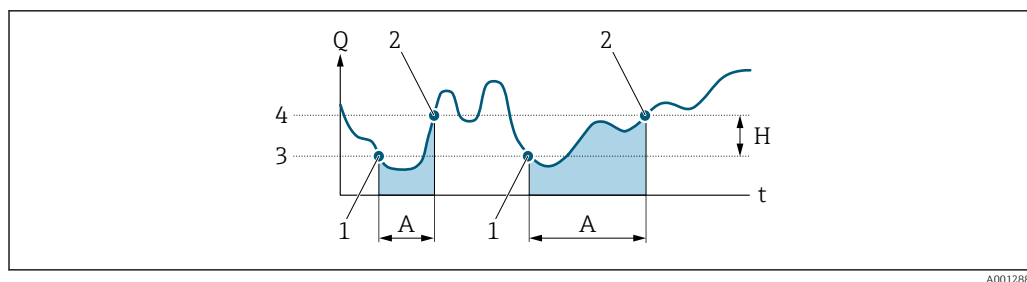
On value low flow cutoff

→ 94

Off value low flow cutoff

→ 94

Low flow cut off	
Navigation	Application → Sensor → Low flow cut off → Low flow cut off
Description	Select process variable for low flow cut off to activate low flow cut off.
Selection	■ Off ■ Mass flow ■ Volume flow ■ Corrected volume flow
Additional information	Description



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 cut off → On value

Description

Enter on value to switch on low flow cut off.

Value = 0: No low flow cut off

Value > 0: Low flow cut off is activated

User entry

Positive floating-point number

Off value low flow cutoff



Navigation

 Application → Sensor → Low flow cut off → Off value

Description

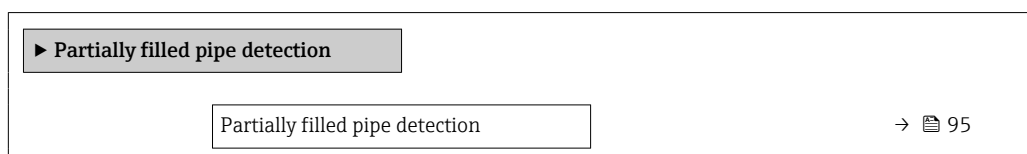
Enter off value to switch off low flow cut off. The off value is entered as a positive hysteresis with respect to the on value.

User entry

0 to 100.0 %

4.4.3 "Partially filled pipe detection" submenu

Navigation   Application → Sensor → Partial pipe det



Low value partial filled pipe detection	→ 95
High value partial filled pipe detection	→ 95

Partially filled pipe detection



Navigation	Application → Sensor → Partial pipe det → Partial pipe det
Description	Select process variable for detection of an empty or partially filled pipe. NOTE Due to low density, deactivate partially filled pipe detection for a gas!
Selection	■ Off ■ Density ■ Calculated reference density

Low value partial filled pipe detection



Navigation	Application → Sensor → Partial pipe det → Low value
Prerequisite	A process variable has been selected in the Assign process variable parameter in the Empty pipe detection submenu.
Description	Enter the lower limit value for the selected process variable. If the measured value drops below the limit value, diagnostic message "862 Partly filled pipe" is generated. Additional information: - This setting applies only if the "Density unit" parameter is not set to °API. - The lower limit value must be lower than the upper limit value ("High value partial filled pipe detection" parameter).
User entry	Signed floating-point number

High value partial filled pipe detection



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

User entry Signed floating-point number

4.4.4 "Medium settings" submenu

Navigation  Application → Sensor → Medium settings

► Medium settings

Select medium

→  96

Select gas type

→  96

Reference sound velocity

→  97

Temperature coefficient sound velocity

→  97

Select medium

Navigation  Application → Sensor → Medium settings → Select medium

Description Select the medium type.

- Selection
- Liquid
 - Gas

Select gas type

Navigation  Application → Sensor → Medium settings → Select gas type

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

Description Select the type of gas.
Additional information:
To achieve accurate measurements, it is necessary to specify the gas.

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

- Nitrous oxide N2O
- Methane CH4
- Hydrogen H2
- Helium He
- Hydrogen chloride HCl
- Hydrogen sulfide H2S
- Ethylene C2H4
- Carbon dioxide CO2
- Carbon monoxide CO
- Chlorine Cl2
- Butane C4H10
- Propane C3H8
- Propylene C3H6
- Ethane C2H6
- Others

Reference sound velocity		
Navigation	 Application → Sensor → Medium settings → Sound velocity	
Prerequisite	In the Select gas type parameter in the Medium settings submenu, the Others option is selected.	
Description	Enter sound velocity of the gas at 0 °C (32 °F).	
User entry	1 to 99 999.9999 m/s	
Temperature coefficient sound velocity		

Navigation	 Application → Sensor → Medium settings → Temp. coeff. SV
Prerequisite	In the Select gas type parameter in the Medium settings submenu, the Others option is selected.
Description	Enter the temperature coefficient for the gas sound velocity.
User entry	Positive floating-point number

4.4.5 "Two phase flow" submenu

Navigation  Application → Sensor → Two phase flow

► 2-Phase flow

Gas Fraction Handler

→ 98

Index inhomogeneous medium	→ 99
Cut off inhomogeneous wet gas	→ 99
Cut off inhomogeneous liquid	→ 99

Gas Fraction Handler



Navigation

  Application → Sensor → Two phase flow → Gas Frac Handler

Description

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

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

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

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

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

Selection

- Off
- Moderate
- Powerful

Additional information

Selection

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

Index inhomogeneous medium

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

Cut off inhomogeneous wet gas

Navigation	 Application → Sensor → Two phase flow → Cut off inh. gas
Description	Enter cut off value for inhomogeneous wet gas applications. Below this value the "Index inhomogeneous medium" is set to 0.
User entry	Positive floating-point number

Cut off inhomogeneous liquid

Navigation	 Application → Sensor → Two phase flow → Cut off liquid
Description	Enter cut off value for inhomogeneous liquid applications. Below this value the "Index inhomogeneous medium" is set to 0. Additional information: This parameter is used for entrained gas in liquid applications or solids in liquid applications.
User entry	Positive floating-point number

4.4.6 "External compensation" submenu

Navigation  Application → Sensor → External comp.

► External compensation

Pressure compensation

→  100

Pressure value

→  100

Pressure compensation

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

Description Select the pressure compensation type.

- Selection
- Off
 - Fixed value

Pressure value

Navigation  Application → Sensor → External comp. → Pressure value

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

Description Enter fixed value for the pressure compensation.
Additional information:
The applicable unit of measure is specified in the "System units" submenu.

User entry Positive floating-point number

4.4.7 "Corrected volume flow calculation" submenu

Navigation  Application → Sensor → Corr. vol.flow.

► Corrected volume flow calculation

Select reference density

→  101

Fixed reference density

→  101

Reference temperature	→  101
Linear expansion coefficient	→  102
Square expansion coefficient	→  102

Select reference density

Navigation	  Application → Sensor → Corr. vol.flow. → Select ref. dens
Description	Select the reference density to use to calculate the corrected volume flow.
Selection	■ Fixed reference density ■ Calculated reference density

Fixed reference density

Navigation	  Application → Sensor → Corr. vol.flow. → Fix ref.density
Prerequisite	In the Select reference density parameter (→  101), the Fixed reference density option is selected.
Description	Enter a fixed value for the reference density.
User entry	Positive floating-point number

Reference temperature

Navigation	  Application → Sensor → Corr. vol.flow. → Ref. temperature
Prerequisite	In the Select reference density parameter (→  101), the Calculated reference density option is selected.
Description	Enter a reference temperature to calculate the reference density.
User entry	−273.15 to 99 999 °C

Additional information

Calculation of the reference density

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

A0023403

- ρ_N Reference density
- ρ Medium density currently measured
- t Medium temperature currently measured
- t_N Reference temperature at which the reference density is calculated (e.g. 20 °C)
- Δt $t - t_N$
- α Linear expansion coefficient of the medium, unit = [1/K]; K = Kelvin
- β Square expansion coefficient of the medium, unit = [1/K²]

Linear expansion coefficient

Navigation	 Application → Sensor → Corr. vol.flow. → Linear exp coeff
Prerequisite	In the Select reference density parameter (→  101), the Calculated reference density option is selected.
Description	Enter a linear, medium-specific expansion coefficient to calculate the reference density. Additional information: For a medium with a non-linear expansion pattern, use the "Square expansion coefficient" parameter instead.
User entry	Signed floating-point number

Square expansion coefficient

Navigation	 Application → Sensor → Corr. vol.flow. → Square exp coeff
Prerequisite	In the Select reference density parameter (→  101), the Calculated reference density option is selected.
Description	Enter a quadratic, medium-specific expansion coefficient to calculate the reference density. Additional information: For a medium with a linear expansion pattern, use the "Linear expansion coefficient" parameter instead.
User entry	0 to 1 1/K ²

4.4.8 "Sensor adjustment" submenu

Navigation   Application → Sensor → Sensor adjustm.

► Sensor adjustment		
Installation direction	→ 	103
► Zero point adjustment	→ 	103
► Process variable adjustment	→ 	104

Installation direction

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

Description Select sign of flow direction

- Selection
- Forward flow
 - Reverse flow

"Zero point adjustment" submenu

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

► Zero point adjustment		
Zero point adjustment control	→ 	103
Zero point adjustment status	→ 	104
Progress	→ 	104

Zero point adjustment control

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

Description Start or cancel a zero point adjustment.

Additional information:

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

Zero point adjustment status

- NavigationApplication → Sensor → Sensor adjustm. → Zero point adj. → Zero pt adj.stat
- Description

Displays the status of the zero point adjustment.
- User interface

■ Busy

■ Zero point adjust failure

■ Ok
- Progress
- NavigationApplication → Sensor → Sensor adjustm. → Zero point adj. → Progress

Description

Shows the progress of the process.

User interface

0 to 100 %

"Process variable adjustment" submenu

NavigationApplication → Sensor → Sensor adjustm. → Variable adjust

► Process variable adjustment

Mass flow offset

→ 105

Mass flow factor

→ 105

Volume flow offset

→ 105

Volume flow factor

→ 106

Density offset

→ 106

Density factor

→ 106

Corrected volume flow offset

→ 106

Corrected volume flow factor

→ 107

104

Endress+Hauser

Temperature offset	→ 107
Temperature factor	→ 107

Mass flow offset

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

Mass flow factor

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

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. Additional information: The applicable unit of measure is m ³ /s.
User entry	Signed floating-point number
Additional information	<i>Description</i> 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	<i>Description</i> Corrected value = (factor × value) + offset

Density offset

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

Density factor

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

Corrected volume flow offset

Navigation	 Application → Sensor → Sensor adjustm. → Variable adjust → Corr. vol offset
Description	Enter the offset by which to shift the zero point for the corrected volume flow. Additional information: The applicable unit of measure is Nm ³ /s.

User entry Signed floating-point number

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

Corrected volume flow factor



Navigation  Application → Sensor → Sensor adjustm. → Variable adjust → Corr. vol factor

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

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

Description Enter the offset by which to shift the zero point for temperature.
Additional information:
The applicable unit of measure is K.

User entry Signed floating-point number

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

Temperature factor



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

Description Enter the multiplication factor to apply to the temperature value.

User entry Positive floating-point number

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

4.4.9 "Calibration" submenu

Navigation  Application → Sensor → Calibration

► Calibration

Nominal diameter

→  108

Calibration factor

→  108

Zero point

→  108

Nominal diameter

Navigation	 Application → Sensor → Calibration → Nominal diameter
Description	Shows the nominal diameter of the sensor.
User interface	Character string comprising numbers, letters and special characters (#20)

Calibration factor

Navigation	 Application → Sensor → Calibration → Cal. factor
Description	Displays the current calibration factor for the flow rate measuring sensor. Additional information: The factory setting for the calibration factor can be found on the sensor's nameplate.
User interface	Signed floating-point number

Zero point



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

C0 to 5

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

4.5 "Current output" submenu

Navigation  Application → Curr.output 1

▶ Current output 1		
Process variable current output	→ 	110
Measuring mode current output	→ 	111
Current range output	→ 	115
Fixed current	→ 	116
Lower range value output	→ 	116
Upper range value output	→ 	118
Damping current output	→ 	118
Failure behavior current output	→ 	119
Failure current	→ 	119
Output current 1	→ 	120

Process variable current output



Navigation   Application → Curr.output 1 → Proc.var. outp

Description Select process variable for current output

- Selection
- Off *
 - Mass flow
 - Volume flow
 - Corrected volume flow
 - Temperature
 - Density *
 - Index inhomogeneous medium
 - Exciter current 0
 - Oscillation frequency 0
 - Oscillation amplitude 0 *
 - Frequency fluctuation 0 *
 - Oscillation damping 0
 - Oscillation damping fluctuation 0 *

* Visibility depends on order options or device settings

- Signal asymmetry
- HBSI *
- Electronics temperature

Measuring mode current output



Navigation	 Application → Curr.output 1 → Meas.mode outp
Prerequisite	A process variable is selected in the Process variable current output parameter (→  24).
Description	Select the measuring mode for the output.
Selection	■ Forward flow ■ Forward/Reverse flow * ■ Reverse flow compensation

* Visibility depends on order options or device settings

Additional information

Selection

■ **Forward flow** option

The current output signal is proportional to the measured value for the process variable assigned.

Additional information:

- The lower limit value ("Lower range value output " parameter) and the upper limit value ("Upper range value output " parameter) of the measured value range do not have to have the same algebraic sign, i.e. the lower limit value can be negative and the upper limit value positive.
- If the measured value lies outside the scaled measured value range, diagnostic message "441 Current output faulty" is generated.

■ **Forward/Reverse flow** option

The current output outputs the absolute value for the assigned process variable (reflection across the lower limit value of the measured value range).

Additional information:

- The lower limit value ("Lower range value output " parameter) and the upper limit value ("Upper range value output " parameter) of the measured value range must have the same algebraic sign.
- If the absolute value exceeds the upper limit value of the measured value range, diagnostic message "441 Current output faulty" is generated.
- This setting is generally only used for flow-related process variables.

■ **Reverse flow compensation** option

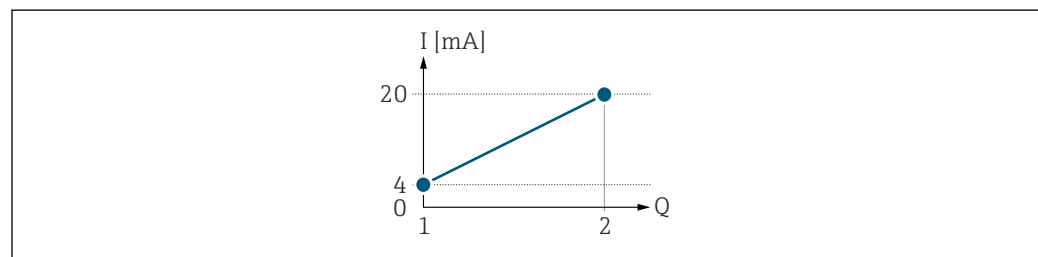
The current output signal is proportional to the measured value for the process variable assigned.

Additional information:

- The lower limit value ("Lower range value output " parameter) and the upper limit value ("Upper range value output " parameter) of the measured value range do not have to have the same algebraic sign, i.e. the lower limit value can be negative and the upper limit value positive.
- Reverse flow (a measured value below the lower limit value of the measured value range) is stored in a buffer and processed after a maximum delay of 60 s with the next forward flow.
- When the flow exceeds the maximum value or the reverse flow stored in the buffer cannot be processed within approx. 60 s, diagnostic message "441 Current output faulty" is generated.
- This option is used e.g. to compensate intermittent reverse flow, which may occur in connection with positive displacement pumps as a result of wear and tear or high viscosity.
- There is no flow damping with this setting.

1. Examples of the behavior of the current output

Defined measuring range: lower range value and upper range value with the **same** algebraic sign.



A0028084

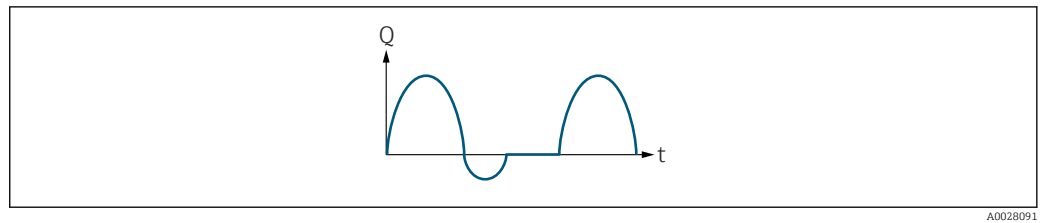
I Current

Q Flow

1 Lower range value (value assigned to 0/4 mA current)

2 Upper range value (value assigned to 20 mA current)

With the following flow response:

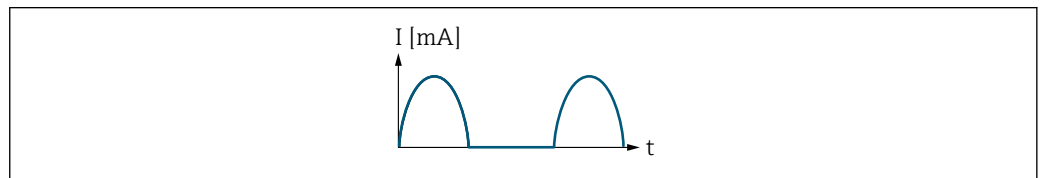


A0028091

Q Flow
 t Time

With the **Forward flow** option

The current output signal is proportional to the process variable assigned. The flow components outside the scaled measuring range are not taken into account for signal output..

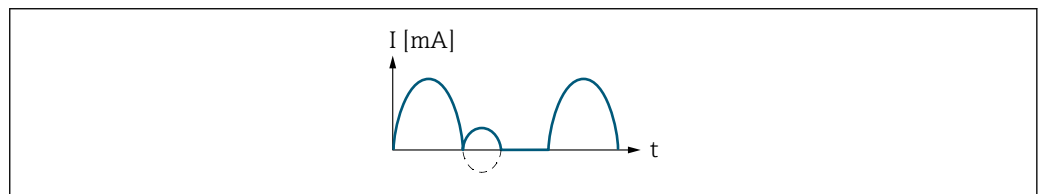


A0028092

I Current
 t Time

With the **Forward/Reverse flow** option

The current output signal is independent of the direction of flow.

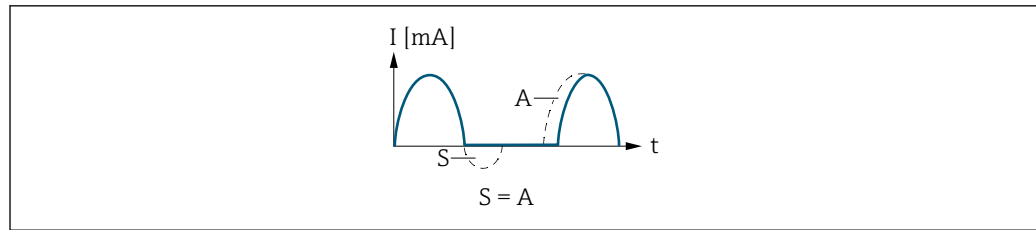


A0028093

I Current
 t Time

With the **Reverse flow compensation** option

Flow components outside the measuring range are buffered, balanced and output after a maximum delay of 60 s.

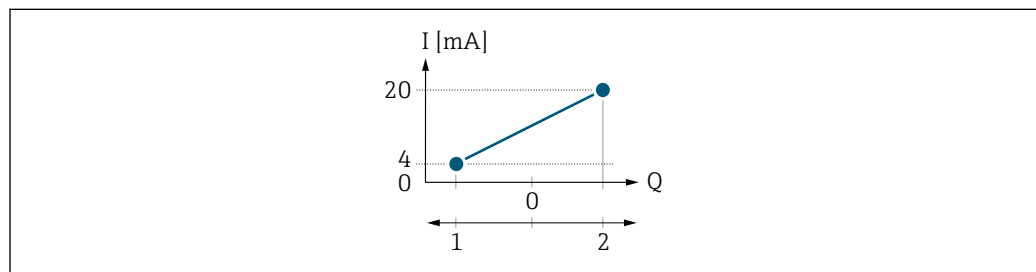


A0028094

I Current
 t Time
 S Flow components saved
 A Balancing of saved flow components

2. Examples of the behavior of the current output

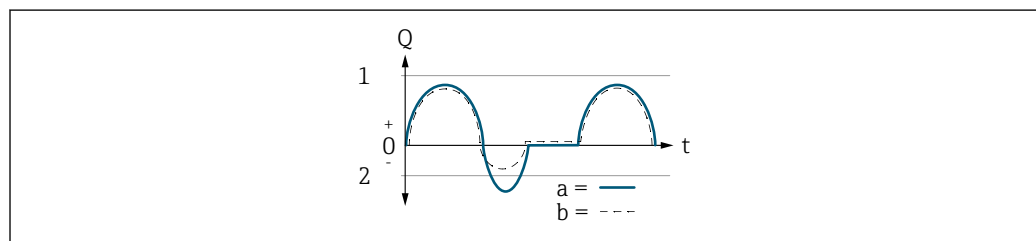
Defined measuring range: lower range value and upper range value with **different** algebraic signs.



A0028095

I Current
 Q Flow
 1 Lower range value (value assigned to 0/4 mA current)
 2 Upper range value (value assigned to 20 mA current)

With flow a (—) outside, b (---) inside the measuring range:

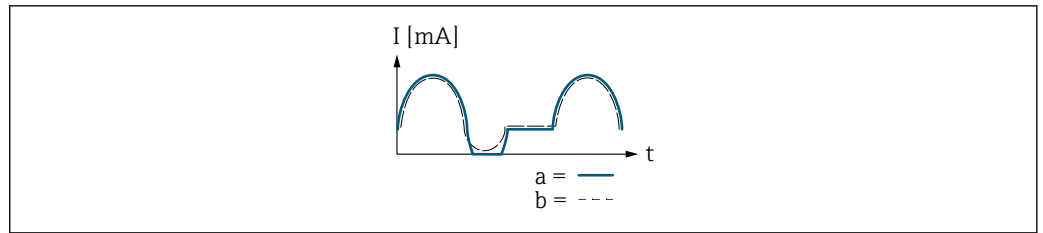


A0028096

Q Flow
 t Time
 a Lower range value (value assigned to 0/4 mA current)
 b Upper range value (value assigned to 20 mA current)

With the **Forward flow** option

- a (—): The flow components outside the scaled measuring range cannot be taken into account for signal output. The diagnostic message Δ **S441 Current output 1 to n** diagnostic message is displayed.
- b (---): The current output signal is proportional to the process variable assigned.



A0028100

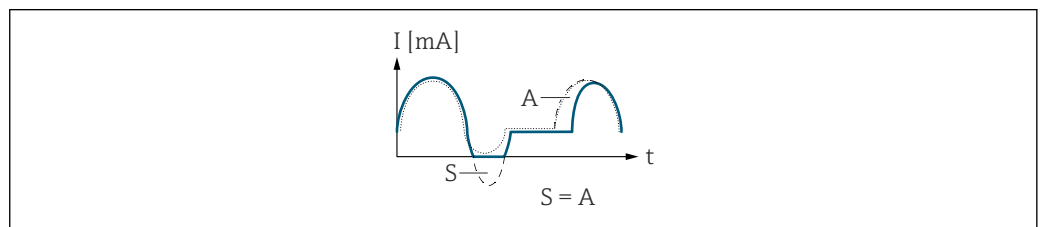
I Current
 t Time

With the **Forward/Reverse flow** option

This option cannot be selected here since the values for the **20 mA value** parameter (→ 27) and **20 mA value** parameter (→ 27) have different algebraic signs.

With the **Reverse flow compensation** option

Flow components outside the measuring range are buffered, balanced and output after a maximum delay of 60 s.



A0028101

I Current
 t Time
 S Flow components saved
 A Balancing of saved flow components

Current range output



Navigation

Application → Curr.output 1 → Curr.range out

Description

Select the current range for the measured value output and the upper and lower fault condition signal level.

Additional information:

- The measured value range is specified in the "Lower range value output" parameter and the "Upper range value output" parameter.
- If the measured value lies outside the scaled measured value range, diagnostic message "441 Current output faulty" is generated.
- In the event of a device alarm, the current output adopts the behavior specified in the "Failure behavior current output" parameter.

Selection

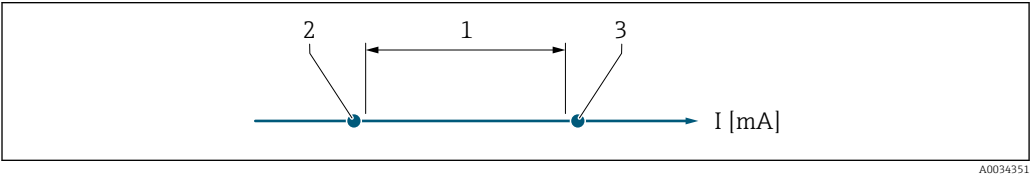
- 4...20 mA NE (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)
- 4...20 mA (4... 20.5 mA)
- Fixed value

Additional information

- Selection
- **4...20 mA NE (3.8...20.5 mA)** option
Select this option to set the current range in accordance with NAMUR recommendation NE43.
 - **Fixed value** option
Select this option to set the current output to a current value instead of a range.

The current value is defined in the **Fixed current** parameter (→  27).

The graphic shows the relationship between the current range for the output of the process value and the lower and upper alarm levels:



- 1 Current range for process value
2 Lower level for signal on alarm
3 Upper level for signal on alarm

Selection (current range for process value)	Lower level for signal on alarm	Upper level for signal on alarm
4...20 mA NE (3.8...20.5 mA)	< 3.6 mA	> 21.5 mA
4...20 mA US (3.9...20.8 mA)		
4...20 mA (4... 20.5 mA)		

Fixed current

Navigation  Application → Curr.output 1 → Fixed current

Prerequisite In the **Current range output** parameter in the **Current output 1** submenu, the **Fixed value** option is selected.

Description Enter the value for the "Fixed value" option.

User entry 3.59 to 21.5 mA

Lower range value output

Navigation  Application → Curr.output 1 → Low.range outp

Prerequisite In the **Current range output** parameter, one of the following options is selected:

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

Description

Enter lower range value for the measured value range.

Additional information:

- Depending on the setting selected for the "Measuring mode current output" parameter, the value specified for this parameter and the "Upper range value output" 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 current 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 current output will be inversely proportional to the process variable assigned.

User entry

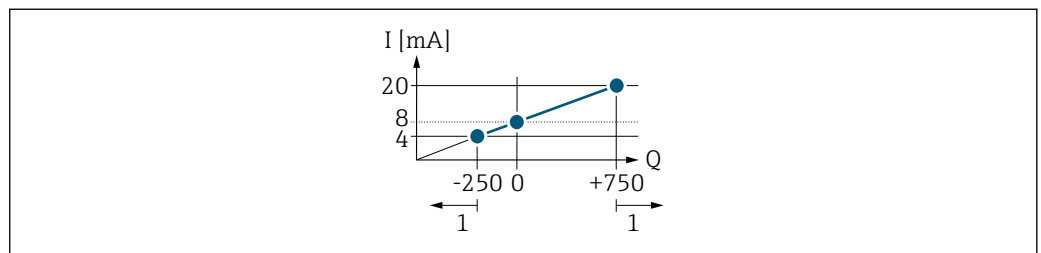
Signed floating-point number

Additional information

Examples of the behavior, depending on the option selected in the **Measuring mode current output** parameter (→  111).

Example: Measuring mode with "Forward flow" option

- **Lower range value output** parameter (→  25) = not equal to zero flow (e.g. -250 m³/h)
- **Upper range value output** parameter (→  27) = not equal to zero flow (e.g. +750 m³/h)
- Calculated current value = 8 mA at zero flow

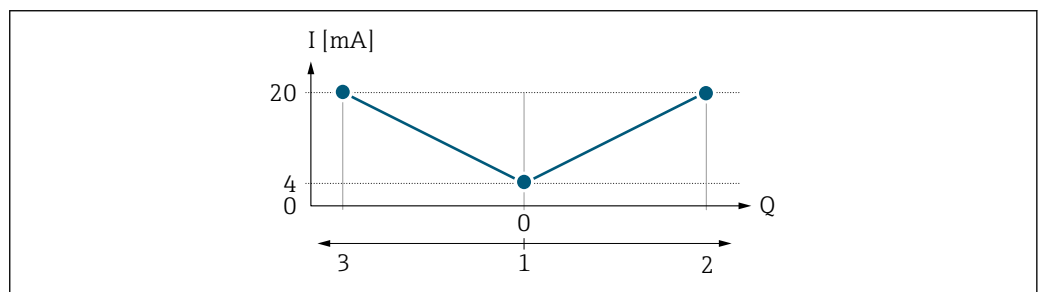


A0013757

Q Flow
I Current
1 Measuring range is exceeded or undershot

The linear operational range of the measuring device is defined by the values entered for the **Lower range value output** parameter (→  25) and **Upper range value output** parameter (→  27), and by the selected current range.

Example: Measuring mode with the "Forward/Reverse flow" option



A0013758

Q Flow
I Current
1 Value assigned to 0/4 mA current
2 Forward flow
3 Reverse flow

The current output signal is independent of the direction of flow (absolute amount of the measured variable). The values for the **Lower range value output** parameter (→  25) and **Upper range value output** parameter (→  27) must have the same algebraic sign.

The value for the **Upper range value output** parameter (→  27) (e.g. reverse flow) corresponds to the mirrored value for the **Upper range value output** parameter (→  27) (e.g. forward flow).

Example: Measuring mode with the "Reverse flow compensation" option

If flow is characterized by severe fluctuations (e.g. when using reciprocating pumps), flow components outside the measuring range are buffered, balanced and output after a maximum delay of 60 s.

Upper range value output

Navigation

  Application → Curr.output 1 → Upp.range outp

Prerequisite

In the **Current range output** parameter, one of the following options is selected:

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

Description

Enter upper range value for the measured value range.

User entry

Signed floating-point number

Additional information

 Examples of the behavior, depending on the option selected in the **Measuring mode current output** parameter: **Lower range value output** parameter (→  25):

Damping current output

Navigation

  Application → Curr.output 1 → Damp.curr.outp

Prerequisite

A process variable is selected in the **Process variable current output** parameter and one of the following options is selected in the **Current range output** parameter:

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

Description

Enter time constant (PT1 element) to set the reaction time of the output signal to fluctuations in the measured value caused by process conditions.

Additional information:

- 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

0.0 to 999.9 s

Failure behavior current output 	
Navigation	  Application → Curr.output 1 → Fail.behav.out
Prerequisite	A process variable is selected in the Process variable current output parameter and one of the following options is selected in the Current range output parameter: ■ 4...20 mA NE (3.8...20.5 mA) ■ 4...20 mA US (3.9...20.8 mA) ■ 4...20 mA (4... 20.5 mA)
Description	Specify how the output should behave in the event of a device alarm.
Selection	■ Min. ■ Max. ■ Last valid value ■ Actual value ■ Fixed value
Additional information	<i>Selection</i> ■ Min. option The current output outputs the lower fault condition signal level for the specified current range. Additional information: The current range is specified in the "Current range output" parameter. ■ Max. option The current output outputs the upper fault condition signal level for the specified current range. Additional information: The current range is specified in the "Current range output" parameter. ■ Last valid value option The current output outputs the last valid value measured before the device alarm occurred. ■ Actual value option The current output outputs the flow value currently measured. The device alarm is ignored. ■ Fixed value option The current output outputs the value specified. Additional information: The value is specified in the "Failure current" parameter.
Failure current 	

Navigation	  Application → Curr.output 1 → Fail. current
Prerequisite	In the Failure behavior current output parameter in the Current output 1 submenu, the Fixed value option is selected.
Description	Enter the value for the "Fixed value" option in the "Failure behavior current output" parameter.
User entry	3.59 to 21.5 mA

Output current

Navigation	 Application → Curr.output 1 → Output curr. 1
Description	Displays the current value currently calculated.
User interface	3.59 to 21.5 mA

4.6 "Pulse/frequency/switch output 1" submenu

Configuring the pulse/frequency/switch output

Navigation

  Application → PFS output 1

► Pulse/frequency/switch output 1		
Operating mode	→	 122
Assign pulse output 1	→	 124
Measuring mode	→	 125
Value per pulse	→	 125
Pulse width	→	 126
Failure mode	→	 126
Pulse output 1	→	 127
Assign frequency output	→	 128
Measuring mode	→	 128
Minimum frequency value	→	 129
Maximum frequency value	→	 130
Measuring value at minimum frequency	→	 130
Measuring value at maximum frequency	→	 130
Damping output 1	→	 131
Failure mode	→	 131
Failure frequency	→	 131
Output frequency 1	→	 132
Switch output function	→	 132
Assign diagnostic behavior	→	 133
Assign limit	→	 133

Switch-on value	→  135
Switch-off value	→  135
Switch-on delay	→  136
Switch-off delay	→  136
Assign flow direction check	→  136
Assign status	→  136
Failure mode	→  137
Invert output signal	→  137
Switch state 1	→  138

Operating mode



Navigation

  Application → PFS output 1 → Operating mode

Description

Select the operating mode for the output.

Selection

- 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 has been reached, a pulse is emitted, the duration of which is set within the "Pulse width" parameter.

Additional information:

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.

Additional information:

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.

Additional information:

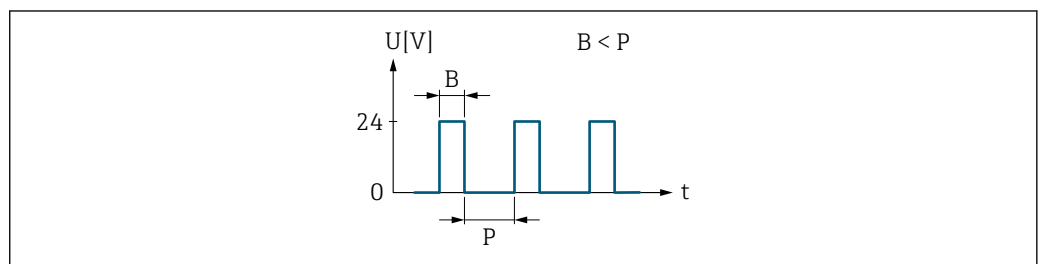
- The switch output can be in one of two states: either it is conductive or it is non-conductive.

- 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.

- The switch output is used to display diagnostic information at the system level, e.g. by connecting a lamp that lights up when the function assigned is triggered.

*"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



A0026883

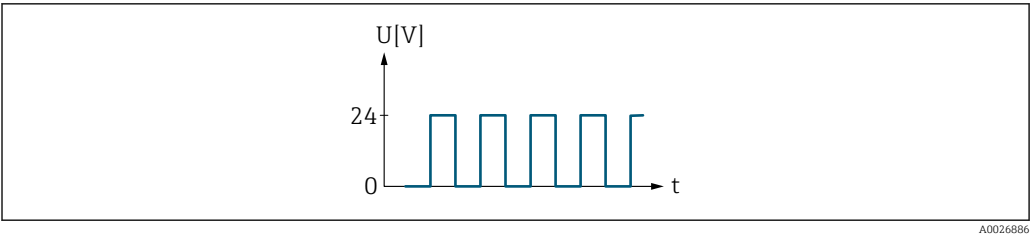
5 Quantity-proportional pulse (pulse value) with pulse width to be configured

B Pulse width entered

P Pauses between the individual pulses

*"Frequency" option***Example**

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

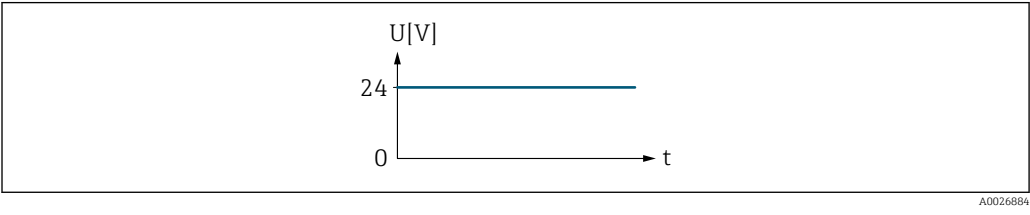


6 Flow-proportional frequency output

"Switch" option

Example

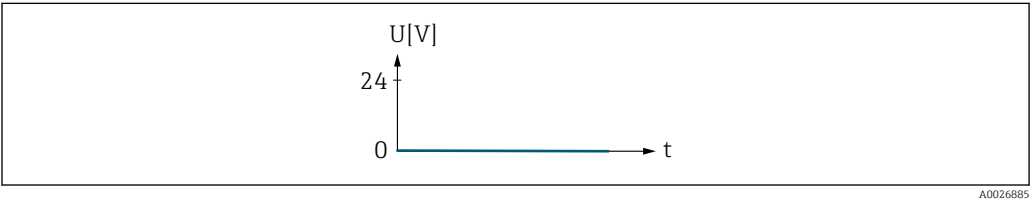
Alarm response without alarm



7 No alarm, high level

Example

Alarm response in case of alarm



8 Alarm, low level

Assign pulse output 1



Navigation

Application → PFS output 1 → Assign pulse 1

Prerequisite

In the **Operating mode** parameter in the **Pulse/frequency/switch output 1** submenu, the **Pulse** option is selected.

Description

Select process variable for pulse output.

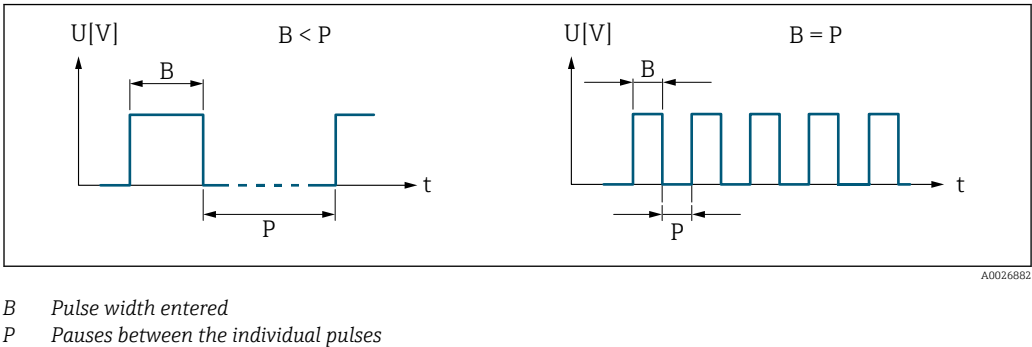
Selection

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

Measuring mode	
Navigation	Application → PFS output 1 → Measuring mode
Prerequisite	In the Operating mode parameter in the Pulse/frequency/switch output 1 submenu, the Pulse option is selected.
Description	Select measuring mode for pulse output.
Selection	■ Forward flow ■ Forward/Reverse flow ■ Reverse flow ■ Reverse flow compensation
Additional information	<i>Selection</i> ■ Forward flow option Positive flow is output, negative flow not output. ■ Forward/Reverse flow option Both positive and negative flow are output (absolute value), whereby no distinction is made between positive and negative flow. ■ Reverse flow option Negative flow is output, positive flow is not output. ■ Reverse flow compensation option Positive flow is output. Negative flow quantities are buffered, processed, and output after a maximum delay of 60 s. Additional information: 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.
Value per pulse	
Navigation	Application → PFS output 1 → Value per pulse
Prerequisite	In the Operating mode parameter in the Pulse/frequency/switch output 1 submenu, the Pulse option is selected.
Description	Enter the measured value to which a pulse corresponds. Additional information: Weighting of the pulse output with a quantity. The lower the pulse value, the – better the resolution. – higher the frequency of the pulse response.
User entry	Signed floating-point number

Pulse width

Navigation	Application → PFS output 1 → Pulse width
Prerequisite	In the Operating mode parameter in the Pulse/frequency/switch output 1 submenu, the Pulse option is selected.
Description	Specify the duration of the output pulse. Additional information: 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 faulty". 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	<i>Description</i>



Failure mode

Navigation	Application → PFS output 1 → Failure mode
Prerequisite	In the Operating mode parameter in the Pulse/frequency/switch output 1 submenu, the Pulse option is selected.
Description	Specify how the output should behave in the event of a device alarm. Additional information: 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

In the event of a device alarm, the pulse output continues based on the current flow measurement. The issue is ignored.

Additional information:

A device alarm indicates a serious malfunction of the measuring device that may impact the 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 can impact the measurement quality.

■ **No pulses** option

In the event of a device alarm, no pulses are emitted.

Pulse output 1**Navigation**

☰☰ Application → PFS output 1 → Pulse output 1

Prerequisite

In the **Operating mode** parameter in the **Pulse/frequency/switch output 1** submenu, the **Pulse** option is selected.

Description

Displays the pulse frequency currently output.

Additional information:

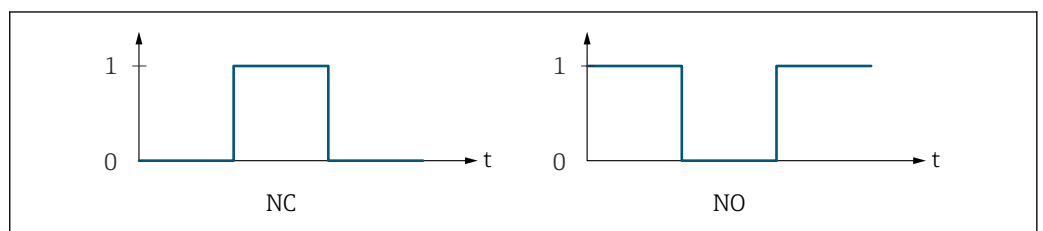
- The output behavior can be inverted in the "Invert output signal" parameter, i.e. in this case the transistor will be non-conductive for the duration of a pulse.
- The "Invert output signal" parameter is not available for all devices.

User interface

Positive floating-point number

Additional information*Description*

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



A0028726

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



The behavior of the output in the event of a device alarm can be configured: **Failure mode** parameter (→ ☰ 126)

Assign frequency output
**Navigation**

Application → PFS output 1 → Assign freq.

Prerequisite

In the **Operating mode** parameter in the **Pulse/frequency/switch output 1** submenu, the **Frequency** option is selected.

Description

Select process variable for frequency output.

Selection

- Off
- Mass flow
- Volume flow
- Corrected volume flow
- Temperature
- Density *
- Index inhomogeneous medium
- Exciter current 0
- Oscillation frequency 0
- Oscillation amplitude 0 *
- Frequency fluctuation 0 *
- Oscillation damping 0
- Oscillation damping fluctuation 0 *
- Signal asymmetry
- HBSI *
- Electronics temperature

Measuring mode
**Navigation**

Application → PFS output 1 → Measuring mode

Prerequisite

In the **Operating mode** parameter in the **Pulse/frequency/switch output 1** submenu, the **Frequency** option is selected.

Description

Select measuring mode for frequency output.

Selection

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

* Visibility depends on order options or device settings

Additional information*Selection*■ **Forward flow** option

The output signal is proportional to the measured value for the process variable assigned.

Additional information:

- The lower limit value ("Measuring value at minimum frequency" parameter) and the upper limit value ("Measuring value at maximum frequency" parameter) of the measured value range do not have to have the same algebraic sign, i.e. the lower limit value can be negative and the upper limit value positive.
- If the measured value lies outside the scaled measured value range, diagnostic message "442 Frequency output faulty" is generated.

■ **Forward/Reverse flow** option

The output outputs the absolute value for the assigned process variable (reflection across the lower limit value of the measured value range).

Additional information:

- The lower limit value ("Measuring value at minimum frequency" parameter) and the upper limit value ("Measuring value at maximum frequency" parameter) of the measured value range must have the same algebraic sign.
- If the absolute value exceeds the upper limit value of the measured value range, diagnostic message "442 Frequency output faulty" is generated.
- This setting is generally used for flow-related process variables.

■ **Reverse flow compensation** option

The output signal is proportional to the measured value for the process variable assigned.

Additional information:

- The lower limit value ("Measuring value at minimum frequency" parameter) and the upper limit value ("Measuring value at maximum frequency" parameter) of the measured value range do not have to have the same algebraic sign, i.e. the lower limit value can be negative and the upper limit value positive.
- Reverse flow (a measured value below the lower limit value of the measured value range) is stored in a buffer and processed after a maximum delay of 60 s with the next forward flow.
- When the flow exceeds the maximum value or the reverse flow stored in the buffer cannot be processed within approx. 60 s, diagnostic message "442 Frequency output faulty" is generated.
- This option is used e.g. to compensate intermittent reverse flow, which may occur in connection with positive displacement pumps as a result of wear and tear or high viscosity.
- There is no flow damping with this setting.

Minimum frequency value**Navigation**

Application → PFS output 1 → Min. freq. value

Prerequisite

In the **Operating mode** parameter in the **Pulse/frequency/switch output 1** submenu, the **Frequency** option is selected.

Description

Enter the minimum frequency for the frequency range.

Additional information:

The lower range value for the measured value range is specified in the "Measuring value at minimum frequency" parameter.

User entry

0.0 to 10 000.0 Hz

Maximum frequency value 	
Navigation	  Application → PFS output 1 → Max. freq. value
Prerequisite	In the Operating mode parameter in the Pulse/frequency/switch output 1 submenu, the Frequency option is selected.
Description	Enter the maximum frequency for the measured value output. Additional information: 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 → PFS output 1 → Val. at min.freq
Prerequisite	In the Operating mode parameter in the Pulse/frequency/switch output 1 submenu, the Frequency option is selected.
Description	Enter lower range value for the measured value range. Additional information: - 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 → PFS output 1 → Val. at max.freq
Prerequisite	In the Operating mode parameter in the Pulse/frequency/switch output 1 submenu, the Frequency option is selected.
Description	Enter upper range value for the measured value range.
User entry	Signed floating-point number

Damping output 1



Navigation	 Application → PFS output 1 → Damping out. 1
Prerequisite	In the Operating mode parameter in the Pulse/frequency/switch output 1 submenu, the Frequency option is selected.
Description	Enter time constant (PT1 element) to set the reaction time of the output signal to fluctuations in the measured value caused by process conditions. Additional information: - 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 → PFS output 1 → Failure mode
Prerequisite	In the Operating mode parameter in the Pulse/frequency/switch output 1 submenu, the Frequency option is selected.
Description	Specify how the output should behave in the event of a device alarm. Additional information: 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	<i>Selection</i> ■ Actual value option The frequency output outputs the flow value currently measured. ■ Defined value option The frequency output outputs the value specified. Additional information: The value is specified in the "Failure frequency" parameter. ■ 0 Hz option In the event of a device alarm, the frequency output outputs 0 Hz.

Failure frequency



Navigation	 Application → PFS output 1 → Failure freq.
Prerequisite	In the Operating mode parameter in the Pulse/frequency/switch output 1 submenu, the Frequency option is selected.

Description	Enter the value for the "Defined value" option in the "Failure mode" parameter.
User entry	0.0 to 12 500.0 Hz

Output frequency 1

Navigation	 Application → PFS output 1 → Output freq. 1
Prerequisite	In the Operating mode parameter in the Pulse/frequency/switch output 1 submenu, the Frequency option is selected.
Description	Displays the pulse frequency currently output.
User interface	0.0 to 12 500.0 Hz

Switch output function



Navigation	 Application → PFS output 1 → Switch out funct
Prerequisite	In the Operating mode parameter in the Pulse/frequency/switch output 1 submenu, the Switch option is selected.
Description	Assign a function to the switch output. Additional information: - The state of the switch output (on or off) when the assigned function is triggered can be inverted in the "Invert output signal" parameter - The "Invert output signal" parameter is not available for all devices.
Selection	■ Off ■ On ■ Diagnostic behavior ■ Limit ■ Flow direction check ■ Status
Additional information	<i>Selection</i> ■ 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 a 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 device status for the selected detection method, e.g. partially filled pipe detection or low flow cut off.

Assign diagnostic behavior



Navigation	Application → PFS output 1 → Assign diag. beh
Prerequisite	In the Operating mode parameter in the Pulse/frequency/switch output 1 submenu, the Switch option is selected.
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	<i>Selection</i> ■ 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	Application → PFS output 1 → Assign limit
Prerequisite	In the Operating mode parameter in the Pulse/frequency/switch output 1 submenu, the Switch option is selected.
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 ■ Mass flow ■ Volume flow ■ Density * ■ Corrected volume flow

* Visibility depends on order options or device settings

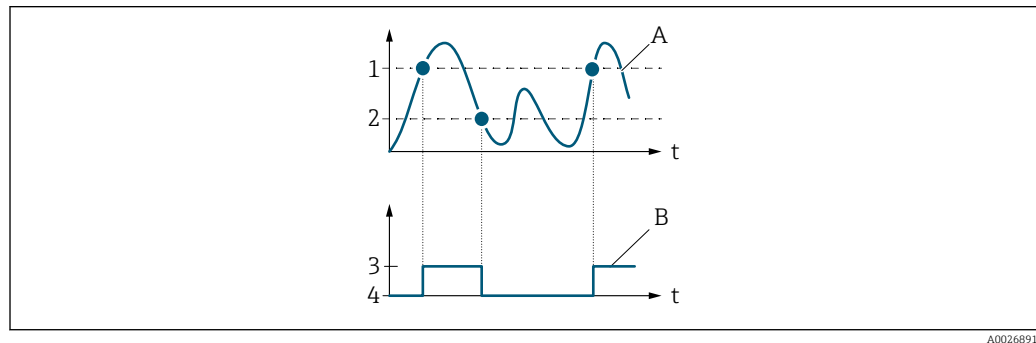
- Temperature
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Oscillation damping

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



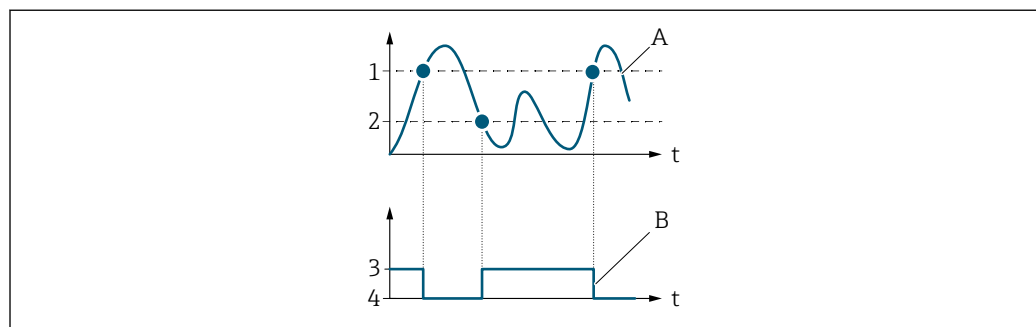
A0026891

- 1 Switch-on point
- 2 Switch-off point
- 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



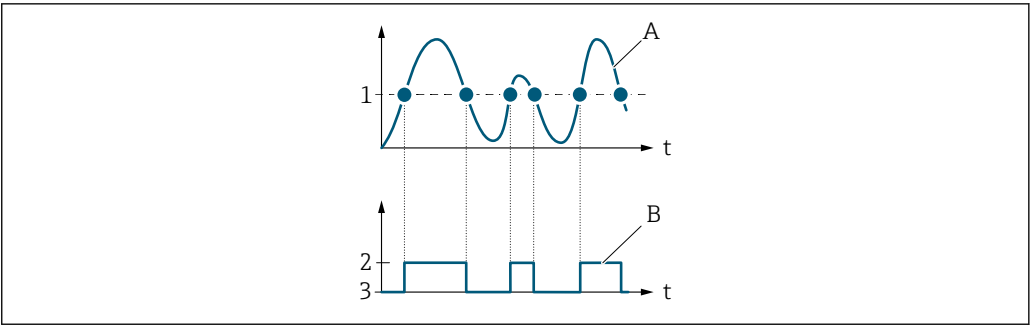
A0026892

- 1 Switch-on point
- 2 Switch-off point
- 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



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

Switch-on value

Navigation	Application → PFS output 1 → Switch-on value
Prerequisite	In the Operating mode parameter in the Pulse/frequency/switch output 1 submenu, the Switch option is selected.
Description	Enter limit value for the switch-on point (process variable > switch-on value = closed, conductive). Additional information: To use a hysteresis: Switch-on point > Switch-off point.
User entry	Signed floating-point number

Switch-off value

Navigation	Application → PFS output 1 → Switch-off value
Prerequisite	In the Operating mode parameter in the Pulse/frequency/switch output 1 submenu, the Switch option is selected.
Description	Enter limit value for the switch-off point (process variable < switch-off value = open, non-conductive). Additional information: To use a hysteresis: Switch-on point > Switch-off point.
User entry	Signed floating-point number

Switch-on delay

Navigation	  Application → PFS output 1 → Switch-on delay
Prerequisite	In the Operating mode parameter in the Pulse/frequency/switch output 1 submenu, the Switch option is selected.
Description	Enter delay before the switch output is switched on.
User entry	0.0 to 100.0 s

Switch-off delay

Navigation	  Application → PFS output 1 → Switch-off delay
Prerequisite	In the Operating mode parameter in the Pulse/frequency/switch output 1 submenu, the Switch option is selected.
Description	Enter delay before the switch output is switched off.
User entry	0.0 to 100.0 s

Assign flow direction check

Navigation	  Application → PFS output 1 → Assign dir.check
Prerequisite	In the Switch output function parameter in the Pulse/frequency/switch output 1 submenu, the Frequency option is selected.
Description	Select process variable for flow direction monitoring.
Selection	■ Off ■ Volume flow ■ Mass flow ■ Corrected volume flow

Assign status

Navigation	  Application → PFS output 1 → Assign status
Prerequisite	In the Operating mode parameter in the Pulse/frequency/switch output 1 submenu, the Switch option is selected.

Description Select the device status to display for the switch output.
 Additional information:
 If the switch on point for the selected detection method is reached, the output is conductive. Otherwise, the switch output is non-conductive.

Selection

- Partially filled pipe detection
- Low flow cut off

Failure mode

Navigation   Application → PFS output 1 → Failure mode

Prerequisite In the **Operating mode** parameter in the **Pulse/frequency/switch output 1** submenu, the **Switch** option is selected.

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

Selection

- Actual status
- Open
- Closed

Additional information *Selection*

- **Actual status** option
 In the event of a device alarm, the issue is ignored and the switch output adopts the behavior currently specified for the "Switch output function" parameter.
- **Open** option
 In the event of a device alarm, the switch output's transistor is set to "non-conductive".

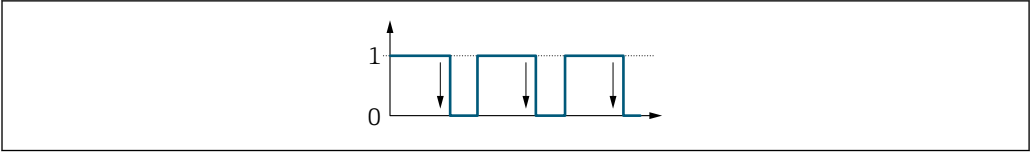
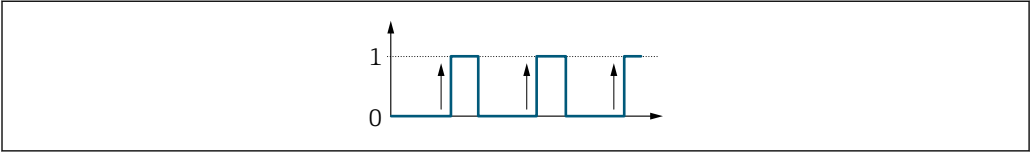
Invert output signal

Navigation   Application → PFS output 1 → Invert outp.sig.

Description Indicate whether to invert the output signal (Yes/No).
 Additional information:
 - 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 (passive - negative)  A0026693
	Selection: yes (passive - positive)  A0026692

Switch state 1

Navigation	 Application → PFS output 1 → Switch state 1
Description	Indicates the current switch output status.
User interface	■ Open ■ Closed
Additional information	User interface ■ Open option The switch output is not conductive. ■ Closed option The switch output is conductive.

4.7 "Communication" submenu

Navigation  Application → Communication

► Communication	
► HART configuration	→  139
► Information	→  140
► Output	→  142

4.7.1 "HART configuration" submenu

Navigation  Application → Communication → HART config.

► HART configuration	
HART short tag	→  139
Device tag	→  139
HART address	→  140

HART short tag	
----------------	---

Navigation  Application → Communication → HART config. → HART short tag

Description Enter a brief description for the measuring point.

User entry Character string comprising numbers, letters and special characters (#8)

Device tag	
------------	---

Navigation  Application → Communication → HART config. → Device tag

Description Enter a unique name for the measuring point to identify the device quickly within the plant.

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

HART address



Navigation	Application → Communication → HART config. → HART address
Description	Enter the address to exchange data via the HART protocol.
User entry	0 to 63

4.7.2 "Information" submenu

Navigation Application → Communication → Information

► Information

Device revision

→ 140

Device ID

→ 141

Device type

→ 141

Manufacturer ID

→ 141

HART revision

→ 141

HART descriptor

→ 141

HART message

→ 142

Hardware revision

→ 142

Software revision

→ 142

HART date code

→ 142

Device revision

Navigation	Application → Communication → Information → Device revision
Description	Displays device revision.
User interface	0 to 255

Device ID		
Navigation	  Application → Communication → Information → Device ID	
Description	Displays the device ID to identify the measuring device.	
User interface	Positive integer	
Device type		
Navigation	  Application → Communication → Information → Device type	
Description	Displays the device type registered with the HART Communication Foundation.	
User interface	0 to 65 535	
Manufacturer ID		
Navigation	  Application → Communication → Information → Manufacturer ID	
Description	Displays the manufacturer ID registered with the HART Communication Foundation.	
User interface	0 to 65 535	
HART revision		
Navigation	  Application → Communication → Information → HART revision	
Description	Displays the HART protocol revision of the measuring device.	
User interface	5 to 7	
HART descriptor		
Navigation	  Application → Communication → Information → HART descriptor	
Description	Enter description for the measuring point	
User entry	Character string comprising numbers, letters and special characters (#16)	

HART message

Navigation	 Application → Communication → Information → HART message
Description	Enter HART message to be sent via HART protocol when requested by the master.
User entry	Character string comprising numbers, letters and special characters (#32)

Hardware revision

Navigation	 Application → Communication → Information → Hardware rev.
Description	Displays the hardware revision of the measuring device.
User interface	0 to 255

Software revision

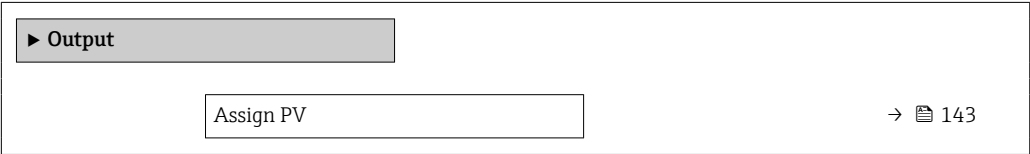
Navigation	 Application → Communication → Information → Software rev.
Description	Displays software revision of the measuring device.
User interface	0 to 255

HART date code

Navigation	 Application → Communication → Information → HART date code
Description	Enter date for individual use.
User entry	Character string comprising numbers, letters and special characters (#10)

4.7.3 "Output" submenu

Navigation  Application → Communication → Output



Primary variable (PV)	→ 143
Assign SV	→ 144
Secondary variable (SV)	→ 144
Assign TV	→ 144
Tertiary variable (TV)	→ 145
Assign QV	→ 145
Quaternary variable (QV)	→ 146

Assign PV

Navigation Application → Communication → Output → Assign PV

Description Assign a measured variable to the primary dynamic variable (PV).
Additional information:
The assigned measured variable is also used by the current output.

- Selection**
- Off *
 - Mass flow
 - Volume flow
 - Corrected volume flow
 - Temperature
 - Density *
 - Index inhomogeneous medium
 - Exciter current 0
 - Oscillation frequency 0
 - Oscillation amplitude 0 *
 - Frequency fluctuation 0 *
 - Oscillation damping 0
 - Oscillation damping fluctuation 0 *
 - Signal asymmetry
 - HBSI *
 - Electronics temperature

Primary variable (PV)

Navigation Application → Communication → Output → Primary var (PV)

Description Displays the value currently measured for the primary dynamic variable.

* Visibility depends on order options or device settings

User interface Signed floating-point number

Assign SV



Navigation Application → Communication → Output → Assign SV

Description Assign a measured variable to the second dynamic variable (SV).

Selection

- Mass flow
- Volume flow
- Corrected volume flow
- Density *
- Index inhomogeneous medium
- Exciter current 0
- Oscillation frequency 0
- Oscillation amplitude 0 *
- Frequency fluctuation 0 *
- Oscillation damping 0
- Oscillation damping fluctuation 0 *
- Signal asymmetry
- HBSI *
- Temperature
- Electronics temperature
- Totalizer 1
- Totalizer 2
- Totalizer 3

Secondary variable (SV)

Navigation Application → Communication → Output → Second.var(SV)

Description Displays the value currently measured for the secondary dynamic variable.

User interface Signed floating-point number

Assign TV



Navigation Application → Communication → Output → Assign TV

Description Assign a measured variable to the tertiary dynamic variable (TV).

Selection

- Mass flow
- Volume flow
- Corrected volume flow
- Density *

* Visibility depends on order options or device settings

- Index inhomogeneous medium
- Exciter current 0
- Oscillation frequency 0
- Oscillation amplitude 0 *
- Frequency fluctuation 0 *
- Oscillation damping 0
- Oscillation damping fluctuation 0 *
- Signal asymmetry
- HBSI *
- Temperature
- Electronics temperature
- Totalizer 1
- Totalizer 2
- Totalizer 3

Tertiary variable (TV)

Navigation	 Application → Communication → Output → Tertiary var(TV)
Description	Displays the value currently measured for the tertiary dynamic variable.
User interface	Signed floating-point number

Assign QV



Navigation	 Application → Communication → Output → Assign QV
Description	Assign a measured variable to the quaternary dynamic variable (QV).
Selection	■ Mass flow ■ Volume flow ■ Corrected volume flow ■ Density * ■ Index inhomogeneous medium ■ Exciter current 0 ■ Oscillation frequency 0 ■ Oscillation amplitude 0 * ■ Frequency fluctuation 0 * ■ Oscillation damping 0 ■ Oscillation damping fluctuation 0 * ■ Signal asymmetry ■ HBSI * ■ Temperature ■ Electronics temperature ■ Totalizer 1 ■ Totalizer 2 ■ Totalizer 3

* Visibility depends on order options or device settings

Quaternary variable (QV)

Navigation	 Application → Communication → Output → Quaterna.var(QV)
Description	Displays the value currently measured for the quaternary dynamic variable.
User interface	Signed floating-point number

5 "System" menu

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

Navigation  System

System		
▶ Device management	→ 	148
▶ User management	→ 	151
▶ Connectivity	→ 	154
▶ Date/time	→ 	155
▶ Information	→ 	157
▶ Display	→ 	162
▶ Software configuration	→ 	166

5.1 "Device management" submenu

Navigation  System → Device manag.

▶ Device management		
Device tag	→  148	
Locking status	→  148	
Configuration counter	→  149	
Device reset	→  149	

Device tag	
------------	---

Navigation  System → Device manag. → Device tag

Description Enter a unique name for the measuring point to identify the device quickly within the plant.

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

Locking status

Navigation  System → Device manag. → Locking status

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

- User interface
- Hardware locked
 - Temporarily locked

Additional information *User interface*

- **Hardware locked** option
The DIP switch for the hardware lock is enabled. As a result write access to the parameters is locked.
- **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

Displays the counter for changes to the device parameters.

Additional information:

- If the value for a static parameter is changed when optimizing or configuring the parameter, the counter is incremented by 1. This is to enable tracking different parameter versions.
- When multiple parameters are changed simultaneously, e.g. when loading parameters into the device from an external source such as FieldCare, the counter may display a higher value. The counter cannot be reset, nor is it reset to a default value on performing a device reset.
- Once the counter has reached the value 65535, it restarts at 0.

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

- Cancel
- To delivery settings
- Restart device
- Restore S-DAT backup *
- Create T-DAT backup
- Restore T-DAT backup *

Additional information

Selection

- **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.
- **Delete powerfail data** option
Deletes the powerfail data segment in the T-DAT or (if applicable) the T-DAT partition of the S-DAT.
Additional information:
This function resolves the following memory content error: "283 Memory content inconsistent" with Service ID 225 and Service ID 721.

* Visibility depends on order options or device settings

- **Delete T-DAT** option

Deletes the T-DAT or (if applicable) the T-DAT partition of the S-DAT. On performing this delete operation, all parameters on the T-DAT are reset to the default values.

Additional information:

This function can be used to resolve any memory content issue on the T-DAT.

NOTE

The powerfail data and device delivery settings will no longer be available on performing this delete operation!

- **Delete flash file system** option

Deletes the flash file system.

Additional information:

This function resolves the following memory content error: "387 HistoROM data faulty" with Service ID 648.

NOTE

The menu structure set up for the SmartBlue app and the files used to perform a firmware restore in the event the firmware is corrupted will no longer be available on performing this delete operation!

- **Reset faulty parameters** option

Resets all faulty parameters to default values when the following memory content error occurs: "283 Memory content inconsistent" with Service ID 367.

Additional information:

Only faulty parameters are reset. All parameters that are reset are logged in the logbook.

- **Delete delivery settings** option

Deletes the delivery settings on the T-DAT or (if applicable) T-DAT partition of the S-DAT.

Additional information:

This function resolves the following memory content error: "311 Sensor electronics (ISEM) faulty" with Service ID 226.

NOTE

The device delivery settings will no longer be available on performing this delete operation!

- **Restore S-DAT backup** option

Restore the data that is saved on the S-DAT. The data record is restored from the electronics memory to the S-DAT.

- **Create T-DAT backup** option

Create T-DAT backup.

5.2 "User management" submenu

Navigation  System → User manag.

► User management		
User role	→ 	151
Enter access code	→ 	152
Reset Maintenance code	→ 	152
► Define Maintenance code	→ 	153

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. Additional information: - Until a Maintenance code has been set in the "Define Maintenance code" parameter, all users are automatically logged on in the Maintenance role. Once the Maintenance code has been set, all users are automatically logged on in the Operator role. - The access rights can be changed via the "Enter access code" parameter.
User interface	■ Operator ■ Maintenance ■ Service ■ Production ■ Development
Additional information	User interface ■ Operator option Provides only read access to parameters. ■ Maintenance option Provides read and write access to parameters. Additional information: For some parameters, the user must be logged on in the Service role to obtain write access. ■ Service option Provides read and write access to Service parameters.

Enter access code

Navigation	 System → User manag. → Ent. access code
Description	For users logged on in the Operator role, enter the Maintenance code to change the access status to Maintenance and disable write protection of parameters. For users logged on in the Maintenance role, enter the Service code to change the access status to Service and enable read and write access to Service parameters.
User entry	0 to 9 999

Reset Maintenance code

Navigation	 System → User manag. → Reset Maint code
Description	Enter the code provided by Endress+Hauser Technical Support to reset the Maintenance code.
User entry	Character string comprising numbers, letters and special characters (#32)

5.2.1 "Define access code" wizard

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

Navigation  System → User manag. → Def. access code

► Define Maintenance code

Define Maintenance code

→  153

Confirm Maintenance code

→  153

Define Maintenance code

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

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

User entry 0 to 9 999

Confirm Maintenance code

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

Description Confirm the access code entered for the Maintenance role.

User entry 0 to 9 999

5.3 "Connectivity" submenu

Navigation   System → Connectivity

► Connectivity

► Bluetooth configuration

→  154

5.3.1 "Bluetooth configuration" submenu

Navigation   System → Connectivity → Bluetooth conf.

► Bluetooth configuration

Bluetooth

Communication established

→  154

→  154

Bluetooth

Navigation   System → Connectivity → Bluetooth conf. → Bluetooth

Description Enable or disable Bluetooth.

- Selection
- Enable
 - Disable
 - Not available *

Communication established

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

- User interface
- No
 - Yes

* Visibility depends on order options or device settings

5.4 "Date / Time" submenu

Navigation   System → Date / Time

► Date/time

Set date/time

→  155

Time format

→  155

Time zone

→  155

Set date/time

Navigation	 System → Date/time → Set date/time
Description	Set the date and local time. Every time the date or time is changed, a logbook entry is created.
User entry	Date and time

Time format

Navigation	  System → Date/time → Time format
Description	Select time format.
Selection	■ 24 h ■ 12 h AM/PM

Time zone

Navigation	  System → Date/time → Time zone
Description	Select the time zone. Every time the time zone is changed, a logbook entry is created.

Selection

Other units

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

5.5 "Information" submenu

Navigation  System → Information

► Information		
► Device		→ ⓘ 157
► Sensor electronic module (ISEM)		→ ⓘ 160
► Display module		→ ⓘ 160

5.5.1 "Device" submenu

Navigation  System → Information → Device

► Device		
Device name		→ ⓘ 157
Device tag		→ ⓘ 158
Serial number		→ ⓘ 158
Order code		→ ⓘ 158
Firmware version		→ ⓘ 158
Extended order code 1		→ ⓘ 159
Extended order code 2		→ ⓘ 159
Extended order code 3		→ ⓘ 159
ENP version		→ ⓘ 159
Manufacturer		→ ⓘ 160

Device name

Navigation  System → Information → Device → Device name

Description Displays the name of the transmitter.
Additional information:
The name can also be found on the transmitter's nameplate.

User interface Character string comprising numbers, letters and special characters (#16)

Device tag

Navigation  System → Information → Device → Device tag

Description Displays the name for the measuring point.

User interface 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 can be used to identify the measuring device and to retrieve further information on the measuring device, such as the related documentation, via the Device Viewer or Operations app.
Additional information:
The serial number can also be found on the nameplate of the sensor and transmitter.

User interface Character string comprising numbers, letters and special characters (#11)

Order code



Navigation  System → Information → Device → Order code

Description Displays the device order code.
Additional information:
The order code can be 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 (#20)

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 (#8)

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. Additional information: The extended order code can also be found on the nameplate.	
User interface	Character string comprising numbers, letters and special characters (#20)	
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. Additional information: The extended order code can also be found on the nameplate.	
User interface	Character string comprising numbers, letters and special characters (#20)	
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. Additional information: The extended order code can also be found on the nameplate.	
User interface	Character string comprising numbers, letters and special characters (#20)	
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 (#16)

Manufacturer

Navigation  System → Information → Device → Manufacturer

Description Displays the manufacturer.

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

5.5.2 "Sensor electronic module (ISEM)" submenu

Navigation  System → Information → Sens. electronic

► Sensor electronic module (ISEM)

Firmware version

→  160

Firmware version

Navigation  System → Information → Sens. electronic → Firmware version

Description Displays the firmware version of the module.

User interface Positive integer

5.5.3 "Display module" submenu

Navigation  System → Information → Display module

► Display module

Firmware version

→  161

Firmware version

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

5.6 "Display" submenu

Navigation  System → Display

► Display		
Language	→ 	162
Value 1 display	→ 	163
Value 2 display	→ 	163
Value 3 display	→ 	164
Value 4 display	→ 	164
Display damping	→ 	165
Rotation display	→ 	165
Brightness	→ 	165
Color scheme	→ 	165

Language

Navigation  System → Display → Language

Description Set display language.

- Selection
- English
 - Deutsch
 - Français
 - Español
 - Italiano
 - Nederlands
 - Portuguesa
 - Polski
 - русский язык (Russian)
 - Svenska
 - Türkçe
 - 中文 (Chinese)
 - 日本語 (Japanese)
 - 한국어 (Korean)
 - العربية (Arabic) *
 - Bahasa Indonesia

* Visibility depends on order options or device settings

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

Value 1 display
**Navigation**

System → Display → Value 1 display

Description

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

Additional information:

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

Selection

- Mass flow
- Volume flow
- Corrected volume flow
- Temperature
- Density *
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Index inhomogeneous medium
- Electronics temperature

Value 2 display
**Navigation**

System → Display → Value 2 display

Description

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

Additional information:

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

Selection

- None
- Mass flow
- Volume flow
- Corrected volume flow
- Temperature
- Density *
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Index inhomogeneous medium
- Electronics temperature

* Visibility depends on order options or device settings

Value 3 display

Navigation   System → Display → Value 3 display

Description Select the measured value that is shown third on the local display.
 Additional information:
 The applicable unit of measure is specified in the "System units" submenu.

- Selection**
- None
 - Mass flow
 - Volume flow
 - Corrected volume flow
 - Temperature
 - Density *
 - Totalizer 1
 - Totalizer 2
 - Totalizer 3
 - Index inhomogeneous medium
 - Electronics temperature

Value 4 display

Navigation   System → Display → Value 4 display

Description Select the measured value that is shown fourth on the local display.
 Additional information:
 The applicable unit of measure is specified in the "System units" submenu.

- Selection**
- None
 - Mass flow
 - Volume flow
 - Corrected volume flow
 - Temperature
 - Density *
 - Totalizer 1
 - Totalizer 2
 - Totalizer 3
 - Index inhomogeneous medium
 - Electronics temperature

* Visibility depends on order options or device settings

Display damping		
Navigation	  System → Display → Display damping	
Description	Enter time constant (PT1 element) to set reaction time of the display to fluctuations in the measured value. Additional information: - The smaller the time constant the faster the display reacts to fluctuations in the measured value. - If the time constant is set to 0, damping is deactivated.	
User entry	0.0 to 999.9 s	
Rotation display		
Navigation	  System → Display → Rotation display	
Description	Select rotation angle of the display text to optimize local display readability.	
Selection	■ Auto ■ 0 degree ■ 90 degree ■ 180 degree ■ 270 degree	
Brightness		
Navigation	  System → Display → Brightness	
Description	Adjust brightness.	
User entry	0 to 100 %	
Color scheme		
Navigation	  System → Display → Color scheme	
Description	Select preferred color scheme.	
Selection	■ Light ■ Dark	

5.7 "Software configuration" submenu

Navigation  System → Software config.

► Software configuration

Activate SW option

→  166

Software option overview

→  166

Activate SW option

Navigation  System → Software config. → Activate SW opt.

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

Additional information:

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

NOTE

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

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

User entry Positive integer

Software option overview

Navigation  System → Software config. → SW option overv.

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

Additional information:

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

- User interface
- Density
 - Heartbeat Verification
 - Heartbeat Monitoring

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