

Description of Device Parameters

Proline Teqwave M 300

Total solids measurement via microwave transmission
Modbus RS485

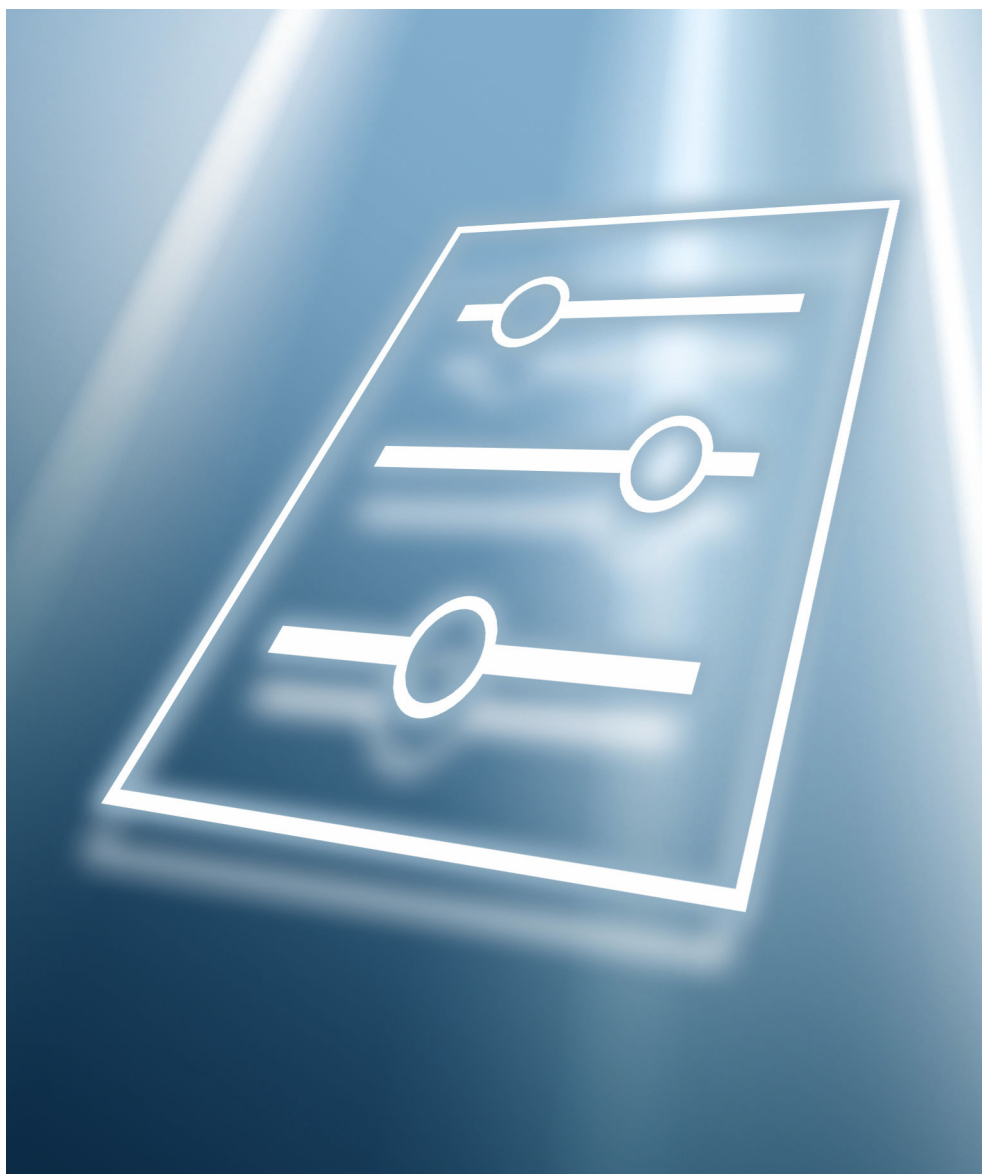


Table of contents

1	About this document	4		
1.1	Document function	4		
1.2	Target group	4		
1.3	Using this document	4		
1.3.1	Information on the document structure	4		
1.3.2	Structure of a parameter description ..	6		
1.4	Symbols	6		
1.4.1	Symbols for certain types of information	6		
1.4.2	Symbols in graphics	7		
1.5	Documentation	7		
1.5.1	Standard documentation	7		
1.5.2	Device-dependent additional documentation	7		
2	Overview of the Expert operating menu	8		
3	Description of device parameters ...	11		
3.1	"System" submenu	13		
3.1.1	"Display" submenu	13		
3.1.2	"Configuration backup" submenu	32		
3.1.3	"Diagnostic handling" submenu	35		
3.1.4	"Administration" submenu	41		
3.2	"Sensor" submenu	45		
3.2.1	"Measured values" submenu	46		
3.2.2	"System units" submenu	54		
3.2.3	"Process parameters" submenu	57		
3.2.4	"External compensation" submenu ...	61		
3.2.5	"Sensor adjustment" submenu	62		
3.2.6	"Factory adjustment" submenu	65		
3.3	"I/O configuration" submenu	66		
3.4	"Input" submenu	68		
3.4.1	"Current input 1 to n" submenu	68		
3.4.2	"Status input 1 to n" submenu	72		
3.5	"Output" submenu	74		
3.5.1	"Current output 1 to n" submenu	74		
3.5.2	"Pulse/frequency/switch output 1 to n" submenu	86		
3.5.3	"Relay output 1 to n" submenu	104		
3.6	"Communication" submenu	110		
3.6.1	"Modbus configuration" submenu ...	111		
3.6.2	"Modbus information" submenu	116		
3.6.3	"Modbus data map" submenu	117		
3.6.4	"Web server" submenu	117		
3.6.5	"WLAN settings" wizard	120		
3.7	"Application" submenu	127		
3.7.1	"Totalizer 1 to n" submenu	128		
3.8	"Diagnostics" submenu	132		
3.8.1	"Diagnostic list" submenu	135		
3.8.2	"Event logbook" submenu	137		
3.8.3	"Device information" submenu	139		
3.8.4	"Main electronic module + I/O module 1" submenu	142		
3.8.5	"Sensor electronic module (ISEM)" submenu	143		
3.8.6	"I/O module 2" submenu	144		
3.8.7	"I/O module 3" submenu	145		
3.8.8	"Display module" submenu	147		
3.8.9	"Data logging" submenu	148		
3.8.10	"Min/max values" submenu	155		
3.8.11	"Heartbeat Technology" submenu ...	160		
3.8.12	"Simulation" submenu	160		
4	Country-specific factory settings ..	169		
4.1	SI units	169		
4.1.1	System units	169		
4.1.2	Output current span	169		
4.2	US units	169		
4.2.1	System units	169		
4.2.2	Output current span	170		
	Index	171		

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 menu.

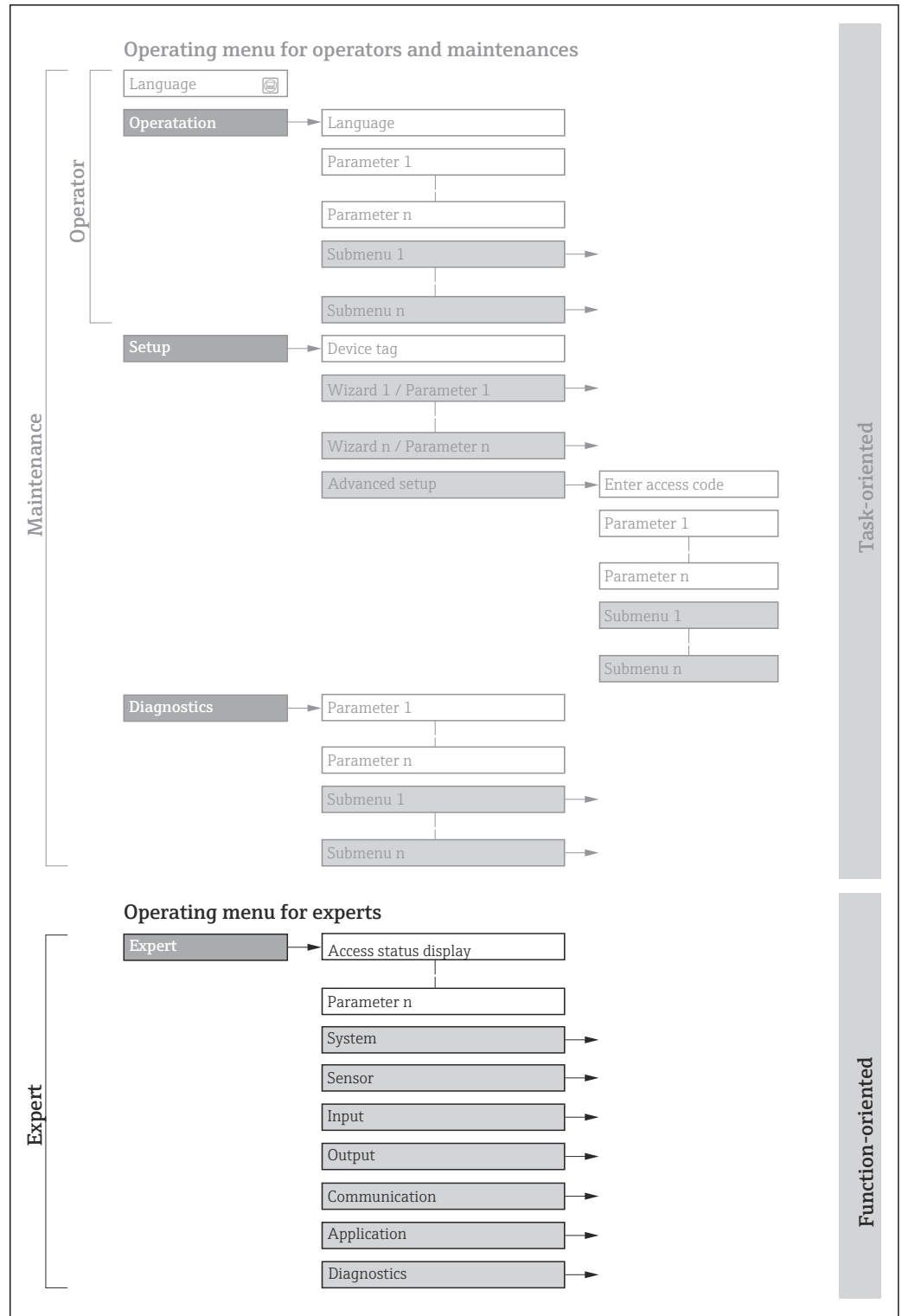
1.2 Target group

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

1.3 Using this document

1.3.1 Information on the document structure

The document lists the submenus and their parameters according to the structure from the **Expert** menu (→  8), which is displayed when the **"Maintenance" user role** is enabled.



1 Sample graphic for the schematic layout of the operating menu



Additional information regarding:

- The arrangement of the parameters according to the menu structure of the **Operation** menu, **Setup** menu, **Diagnostics** menu with a brief description:
Operating Instructions
- Operating concept of the operating menus: Operating Instructions

1.3.2 Structure of a parameter description

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

Complete parameter name		Write-protected parameter = 
Navigation	 Navigation path to the parameter via the local display or web browser  Navigation path to the parameter via the operating tool The names of the menus, submenus and parameters are abbreviated to the form in which they appear on the display and in the operating tool.	
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	Parameter entry range	
Display	Display value/data of the parameter	
Factory setting	Default setting ex works	
Additional information	Additional explanations (e.g. in examples): ■ For individual options ■ For display value/data ■ For the input range ■ For the factory setting ■ For the parameter function	

1.4 Symbols

1.4.1 Symbols for certain types of information

Symbol	Meaning
	Tip Indicates additional information.
	Reference to documentation
	Reference to page
	Reference to graphic
 A0028662	Operation via local display
 A0028663	Operation via operating tool
 A0028665	Write-protected parameter

1.4.2 Symbols in graphics

Symbol	Meaning
1, 2, 3 ...	Item numbers
A, B, C, ...	Views
A-A, B-B, C-C, ...	Sections

1.5 Documentation

1.5.1 Standard documentation

Technical information

Device	Documentation code
Proline Teqwave MW 300	TI01763D

Operating instructions

Device	Documentation code
Proline Teqwave MW 300 Modbus RS485	BA02321D

1.5.2 Device-dependent additional documentation

Special Documentation

Contents	Documentation code
Heartbeat Verification application package (Modbus RS485)	SD03169D
Modbus RS485 register information	SD03461D

2 Overview of the Expert operating menu

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

Expert		
Locking status	→	11
User role	→	12
Enter access code	→	13
▶ System	→	13
▶ Display	→	13
▶ Configuration backup	→	32
▶ Diagnostic handling	→	35
▶ Administration	→	41
▶ Sensor	→	45
▶ Measured values	→	46
▶ System units	→	54
▶ Process parameters	→	57
▶ External process variables	→	61
▶ Sensor adjustment	→	62
▶ Factory adjustment	→	65
▶ I/O configuration	→	66
I/O module 1 to n terminal numbers	→	66
I/O module 1 to n information	→	67
I/O module 1 to n type	→	67
Apply I/O configuration	→	68
I/O alteration code	→	68

► Input	→ 68
► Current input 1 to n	→ 68
► Status input 1 to n	→ 72
► Output	→ 74
► Current output 1 to n	→ 74
► Pulse/frequency/switch output 1 to n	→ 86
► Relay output 1 to n	→ 104
► Communication	→ 110
► Web server	→ 117
► WLAN settings	→ 120
► Application	→ 127
Reset all totalizers	→ 127
► Totalizer 1	→ 128
► Diagnostics	→ 132
Actual diagnostics	→ 132
Timestamp	→ 133
Previous diagnostics	→ 133
Timestamp	→ 134
Operating time from restart	→ 134
Operating time	→ 134
► Diagnostic list	→ 135
► Device information	→ 139
► Main electronic module + I/O module 1	→ 142
► Sensor electronic module (ISEM)	→ 143

► I/O module 2	→ 144
► I/O module 3	→ 145
► Display module	→ 147
► Data logging	→ 148
► Min/max values	→ 155
► Heartbeat Technology	→ 160
► Simulation	→ 160

3 Description of device parameters

In the following section, the parameters are listed according to the menu structure of the local display. Specific parameters for the operating tools are included at the appropriate points in the menu structure.

Navigation  Expert

 Expert		
Locking status	→ 	11
User role	→ 	12
Enter access code	→ 	13
▶ System	→ 	13
▶ Sensor	→ 	45
▶ I/O configuration	→ 	66
▶ Input	→ 	68
▶ Output	→ 	74
▶ Communication	→ 	110
▶ Application	→ 	127
▶ Diagnostics	→ 	132

Locking status

Navigation	 Expert → Locking status
Description	Displays the active write protection.
User interface	■ Hardware locked ■ Temporarily locked

Additional information

Display

If two or more types of write protection are active, the write protection with the highest priority is shown on the local display. In the operating tool all active types of write protection are displayed.

 Detailed information on access authorization is provided in the "User roles and associated access authorization" and "Operating concept" sections of the Operations Instructions for the device

Options

Options	Description
None	The access authorization displayed in the Access status parameter (→  12) applies . Only appears on local display.
Hardware locked (priority 1)	The DIP switch for hardware locking is activated on the PCB board. This locks write access to the parameters (e.g. via local display or operating tool) .
Temporarily locked	Write access to the parameters is temporarily locked on account of internal processes running in the device (e.g. data upload/download, reset, etc.). Once the internal processing has been completed, the parameters can be changed once again.

User role

Navigation   Expert → User role

Description Displays the access authorization to the parameters via the local display, Web browser or operating tool.

User interface

- Maintenance
- Service

Factory setting Maintenance

Additional information *Description*

 Access authorization can be modified via the **Enter access code** parameter (→  13).

 If additional write protection is active, this restricts the current access authorization even further.

User interface

 Detailed information on access authorization is provided in the "User roles and associated access authorization" and "Operating concept" sections of the Operations Instructions for the device

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

3.1 "System" submenu

Navigation  Expert → System

► System	
► Display	→  13
► Configuration backup	→  32
► Diagnostic handling	→  35
► Administration	→  41

3.1.1 "Display" submenu

Navigation  Expert → System → Display

► Display	
Format display	→  14
Value 1 display	→  17
0% bargraph value 1	→  17
100% bargraph value 1	→  18
Decimal places 1	→  18
Value 2 display	→  19
Decimal places 2	→  19
Value 3 display	→  20

0% bargraph value 3	→  20
100% bargraph value 3	→  21
Decimal places 3	→  21
Value 4 display	→  22
Decimal places 4	→  22
Display language	→  23
Display interval	→  29
Display damping	→  29
Header	→  30
Header text	→  30
Separator	→  31
Backlight	→  32

Format display

Navigation  Expert → System → Display → Format display

Prerequisite A local display is provided.

Description Use this function to select how the measured value is shown on the local display.

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

Factory setting 1 value, max. size

Additional information*Description*

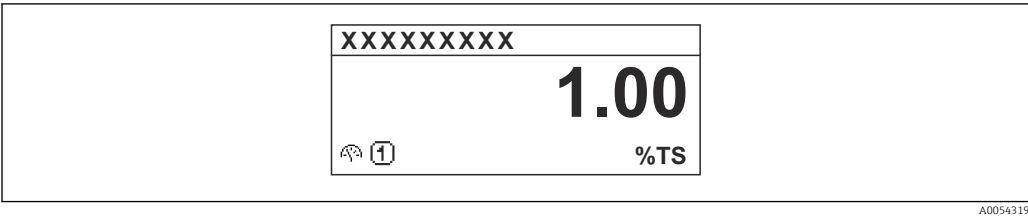
The display format (size, bar graph) and number of simultaneously displayed measured values (1 to 8) can be configured. This setting only applies to normal operation.



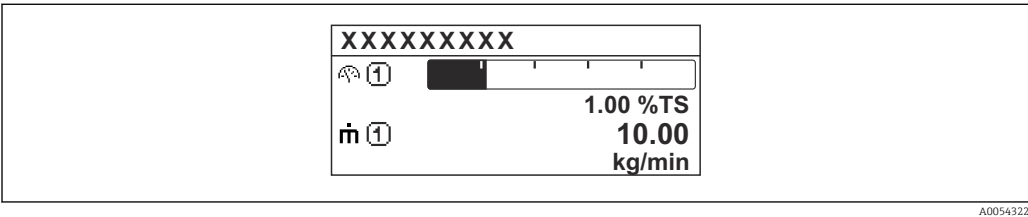
- The **Value 1 display** parameter (→ 17)...**Value 8 display** parameter (→ 28) are used to specify which measured values are shown on the local display and in what order.
- If more measured values are specified than the display mode selected permits, then the values alternate on the device display. The display time until the next change is configured using the **Display interval** parameter (→ 29).

Possible measured values shown on the local display:

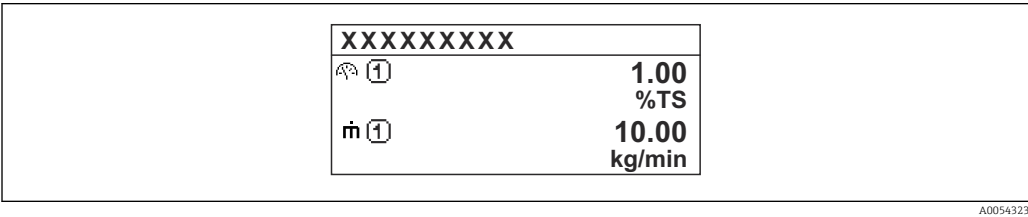
"1 value, max. size" option



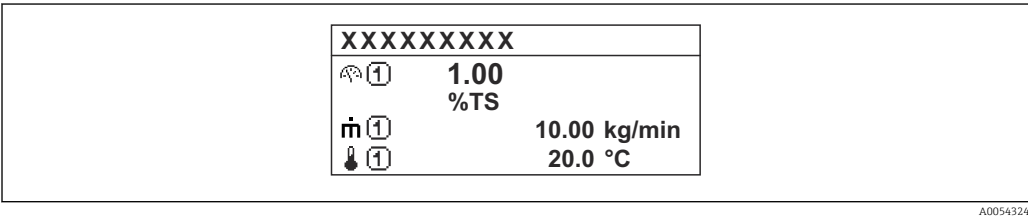
"1 bargraph + 1 value" option



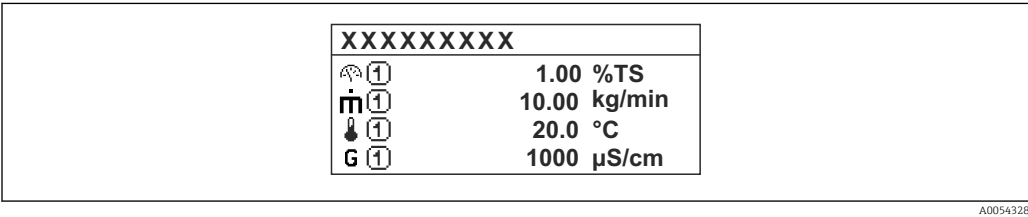
"2 values" option



"1 value large + 2 values" option



"4 values" option



Value 1 display	
Navigation	Expert → System → Display → Value 1 display
Prerequisite	■ A local display is provided. ■ The Load rate option is only available if the volume flow of the medium is read in via the Current input 1 to n (→ 49) or the fieldbus.
Description	Use this function to select a measured value that is shown on the local display.
Selection	■ Total solids ■ Temperature ■ Electronics temperature ■ Conductivity ■ Corrected conductivity ■ Load rate * ■ Totalizer 1 * ■ Current output 1 * ■ Current output 2 * ■ Current output 3 * ■ Current output 4 *
Factory setting	Total solids
Additional information	<i>Description</i> If several measured values are displayed one below the other, the measured value selected here will be the first value to be displayed. The value is only displayed during normal operation. The Format display parameter (→ 14) is used to specify how many measured values are displayed simultaneously and how. <i>Dependency</i> The unit of the displayed measured value is taken from the System units submenu (→ 54).
0% bargraph value 1	

Navigation	Expert → System → Display → 0% bargraph 1
Prerequisite	A local display is provided.
Description	Use this function to enter the 0% bar graph value to be shown on the display for the measured value 1.
User entry	Signed floating-point number
Factory setting	0 %TS

* Visibility depends on order options or device settings

Additional information

Description

 The **Format display** parameter (→  14) is used to specify that the measured value is to be displayed as a bar graph.

User entry

 The unit of the displayed measured value is taken from the **System units** submenu (→  54).

100% bargraph value 1



Navigation

  Expert → System → Display → 100% bargraph 1

Prerequisite

A local display is provided.

Description

Use this function to enter the 100% bar graph value to be shown on the display for the measured value 1.

User entry

Signed floating-point number

Factory setting

Depends on country and nominal diameter

Additional information

Description

 The **Format display** parameter (→  14) is used to specify that the measured value is to be displayed as a bar graph.

User entry

 The unit of the displayed measured value is taken from the **System units** submenu (→  54).

Decimal places 1



Navigation

  Expert → System → Display → Decimal places 1

Prerequisite

A measured value is specified in the **Value 1 display** parameter (→  17).

Description

Use this function to select the number of decimal places for measured value 1.

Selection

- x
- x.x
- x.xx
- x.xxx
- x.xxxx

Factory setting

x.xx

Additional information

Description

 This setting does not affect the accuracy of the device for measuring or calculating the value.

Value 2 display



Navigation

 Expert → System → Display → Value 2 display

Prerequisite

- A local display is provided.
- The **Load rate** option is only available if the volume flow of the medium is read in via the Current input 1 to n (→  49) or the fieldbus.

Description

Use this function to select a measured value that is shown on the local display.

Selection

- None
- Total solids
- Temperature
- Electronics temperature
- Conductivity
- Corrected conductivity
- Load rate *
- Totalizer 1 *
- Current output 1 *
- Current output 2 *
- Current output 3 *
- Current output 4 *

Factory setting

None

Additional information

Description

If several measured values are displayed one below the other, the measured value selected here will be the second value to be displayed. The value is only displayed during normal operation.



The **Format display** parameter (→  14) is used to specify how many measured values are displayed simultaneously and how.

Dependency

The unit of the displayed measured value is taken from the **System units** submenu (→  54).

Decimal places 2



Navigation

 Expert → System → Display → Decimal places 2

Prerequisite

A measured value is specified in the **Value 2 display** parameter (→  19).

Description

Use this function to select the number of decimal places for measured value 2.

Selection

- x
- x.x
- x.xx
- x.xxx
- x.xxxx

* Visibility depends on order options or device settings

Factory setting x.xx

Additional information *Description*



This setting does not affect the accuracy of the device for measuring or calculating the value.

Value 3 display

Navigation  Expert → System → Display → Value 3 display

Prerequisite

- A local display is provided.
- The **Load rate** option is only available if the volume flow of the medium is read in via the Current input 1 to n (→  49) or the fieldbus.

Description Use this function to select a measured value that is shown on the local display.

Selection For the picklist, see **Value 1 display** parameter (→  17)

Factory setting None

Additional information *Description*

If several measured values are displayed one below the other, the measured value selected here will be the third value to be displayed. The value is only displayed during normal operation.



The **Format display** parameter (→  14) is used to specify how many measured values are displayed simultaneously and how.

Options



The unit of the displayed measured value is taken from the **System units** submenu (→  54).

0% bargraph value 3

Navigation  Expert → System → Display → 0% bargraph 3

Prerequisite A selection was made in the **Value 3 display** parameter (→  20).

Description Use this function to enter the 0% bar graph value to be shown on the display for the measured value 3.

User entry Signed floating-point number

Factory setting 0

Additional information*Description*

The **Format display** parameter (→  14) is used to specify that the measured value is to be displayed as a bar graph.

User entry

The unit of the displayed measured value is taken from the **System units** submenu (→  54).

100% bargraph value 3**Navigation**

  Expert → System → Display → 100% bargraph 3

Prerequisite

A selection was made in the **Value 3 display** parameter (→  20).

Description

Use this function to enter the 100% bar graph value to be shown on the display for the measured value 3.

User entry

Signed floating-point number

Factory setting

0

Additional information*Description*

The **Format display** parameter (→  14) is used to specify that the measured value is to be displayed as a bar graph.

User entry

The unit of the displayed measured value is taken from the **System units** submenu (→  54).

Decimal places 3**Navigation**

  Expert → System → Display → Decimal places 3

Prerequisite

A measured value is specified in the **Value 3 display** parameter (→  20).

Description

Use this function to select the number of decimal places for measured value 3.

Selection

- x
- x.x
- x.xx
- x.xxx
- x.xxxx

Factory setting

x.xx

Additional information*Description*

This setting does not affect the accuracy of the device for measuring or calculating the value.

Value 4 display 	
Navigation	  Expert → System → Display → Value 4 display
Prerequisite	▪ A local display is provided. ▪ The Load rate option is only available if the volume flow of the medium is read in via the Current input 1 to n (→  49) or the fieldbus.
Description	Use this function to select a measured value that is shown on the local display.
Selection	For the picklist, see Value 1 display parameter (→  17)
Factory setting	None
Additional information	<i>Description</i>
	If several measured values are displayed one below the other, the measured value selected here will be the fourth value to be displayed. The value is only displayed during normal operation.
	 The Format display parameter (→  14) is used to specify how many measured values are displayed simultaneously and how.
	<i>Options</i>
	 The unit of the displayed measured value is taken from the System units submenu (→  54).
Decimal places 4 	
Navigation	  Expert → System → Display → Decimal places 4
Prerequisite	A measured value is specified in the Value 4 display parameter (→  22).
Description	Use this function to select the number of decimal places for measured value 4.
Selection	▪ x ▪ x.x ▪ x.xx ▪ x.xxx ▪ x.xxxx
Factory setting	x.xx
Additional information	<i>Description</i>
	 This setting does not affect the accuracy of the device for measuring or calculating the value.

Display language

Navigation	 Expert → System → Display → Display language
Prerequisite	A local display is provided.
Description	Use this function to select the configured language on the local display.
Selection	■ English ■ Deutsch ■ Français ■ Español ■ Italiano ■ Nederlands ■ Portuguesa ■ Polski ■ русский язык (Russian) ■ Svenska ■ Türkçe ■ 中文 (Chinese) ■ 日本語 (Japanese) ■ 한국어 (Korean) ■ čeština (Czech)
Factory setting	English (alternatively, the ordered language is preset in the device)

Value 5 display



Navigation	 Expert → System → Display → Value 5 display
Prerequisite	■ A local display is provided. ■ The Load rate option is only available if the volume flow of the medium is read in via the Current input 1 to n (→  49) or the fieldbus.
Description	Use this function to select a measured value that is shown on the local display.
Selection	For the picklist, see Value 1 display parameter (→  17)
Factory setting	None
Additional information	<i>Description</i> If several measured values are displayed one below the other, the measured value selected here will be the fifth value to be displayed. The value is only displayed during normal operation.  The Format display parameter (→  14) is used to specify how many measured values are displayed simultaneously and how. <i>Options</i>  The unit of the displayed measured value is taken from the System units submenu (→  54).

0% bargraph value 5



Navigation

Expert → System → Display → 0% bargraph 5

Prerequisite

An option was selected in the **Value 5 display** parameter (→ 23).

Description

Use this function to enter the 0% bar graph value to be shown on the display for the measured value 5.

User entry

Signed floating-point number

Factory setting

0

Additional information

Description

The **Format display** parameter (→ 14) is used to specify that the measured value is to be displayed as a bar graph.

User entry

The unit of the displayed measured value is taken from the **System units** submenu (→ 54).

100% bargraph value 5



Navigation

Expert → System → Display → 100% bargraph 5

Prerequisite

An option was selected in the **Value 5 display** parameter (→ 23).

Description

Use this function to enter the 100% bar graph value to be shown on the display for the measured value 5.

User entry

Signed floating-point number

Factory setting

0

Additional information

Description

The **Format display** parameter (→ 14) is used to specify that the measured value is to be displayed as a bar graph.

User entry

The unit of the displayed measured value is taken from the **System units** submenu (→ 54).

Decimal places 5



Navigation

Expert → System → Display → Decimal places 5

Prerequisite

A measured value is specified in the **Value 5 display** parameter (→ 23).

Description	Use this function to select the number of decimal places for measured value 5.
Selection	■ x ■ x.x ■ x.xx ■ x.xxx ■ x.xxxx ■ x.xxxxx ■ x.xxxxxx
Factory setting	x.xx
Additional information	<i>Description</i>  This setting does not affect the accuracy of the device for measuring or calculating the value.

Value 6 display

Navigation	 Expert → System → Display → Value 6 display
Prerequisite	■ A local display is provided. ■ The Load rate option is only available if the volume flow of the medium is read in via the Current input 1 to n (→  49) or the fieldbus.
Description	Use this function to select a measured value that is shown on the local display.
Selection	For the picklist, see Value 1 display parameter (→  17)
Factory setting	None
Additional information	<i>Description</i> If several measured values are displayed one below the other, the measured value selected here will be the sixth value to be displayed. The value is only displayed during normal operation.  The Format display parameter (→  14) is used to specify how many measured values are displayed simultaneously and how. <i>Options</i>  The unit of the displayed measured value is taken from the System units submenu (→  54).

Decimal places 6

Navigation	 Expert → System → Display → Decimal places 6
Prerequisite	A measured value is specified in the Value 6 display parameter (→  25).
Description	Use this function to select the number of decimal places for measured value 6.

Selection	■ X ■ X.X ■ X.XX ■ X.XXX ■ X.XXXX ■ X.XXXXX ■ X.XXXXXX
Factory setting	x.xx
Additional information	<i>Description</i>  This setting does not affect the accuracy of the device for measuring or calculating the value.

Value 7 display



Navigation	 Expert → System → Display → Value 7 display
Prerequisite	■ A local display is provided. ■ The Load rate option is only available if the volume flow of the medium is read in via the Current input 1 to n (→  49) or the fieldbus.
Description	Use this function to select a measured value that is shown on the local display.
Selection	For the picklist, see Value 1 display parameter (→  17)
Factory setting	None
Additional information	<i>Description</i> If several measured values are displayed one below the other, the measured value selected here will be the seventh value to be displayed. The value is only displayed during normal operation.  The Format display parameter (→  14) is used to specify how many measured values are displayed simultaneously and how. <i>Options</i>  The unit of the displayed measured value is taken from the System units submenu (→  54).

0% bargraph value 7



Navigation	 Expert → System → Display → 0% bargraph 7
Prerequisite	An option was selected in the Value 7 display parameter (→  26).
Description	Use this function to enter the 0% bar graph value to be shown on the display for the measured value 7.
User entry	Signed floating-point number

Factory setting 0

Additional information *Description*



The **Format display** parameter (→ 14) is used to specify that the measured value is to be displayed as a bar graph.

User entry



The unit of the displayed measured value is taken from the **System units** submenu (→ 54).

100% bargraph value 7

Navigation Expert → System → Display → 100% bargraph 7

Prerequisite An option was selected in the **Value 7 display** parameter (→ 26).

Description Use this function to enter the 100% bar graph value to be shown on the display for the measured value 7.

User entry Signed floating-point number

Factory setting 0

Additional information *Description*



The **Format display** parameter (→ 14) is used to specify that the measured value is to be displayed as a bar graph.

User entry



The unit of the displayed measured value is taken from the **System units** submenu (→ 54).

Decimal places 7

Navigation Expert → System → Display → Decimal places 7

Prerequisite A measured value is specified in the **Value 7 display** parameter (→ 26).

Description Use this function to select the number of decimal places for measured value 7.

Selection

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

Factory setting x.xx

Additional information	<i>Description</i>  This setting does not affect the accuracy of the device for measuring or calculating the value.
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Value 8 display	
------------------------	---

Navigation	 Expert → System → Display → Value 8 display
Prerequisite	■ A local display is provided. ■ The Load rate option is only available if the volume flow of the medium is read in via the Current input 1 to n (→  49) or the fieldbus.
Description	Use this function to select a measured value that is shown on the local display.
Selection	For the picklist, see Value 1 display parameter (→  17)
Factory setting	None
Additional information	<i>Description</i> If several measured values are displayed one below the other, the measured value selected here will be the eighth value to be displayed. The value is only displayed during normal operation.  The Format display parameter (→  14) is used to specify how many measured values are displayed simultaneously and how. <i>Options</i>  The unit of the displayed measured value is taken from the System units submenu (→  54).

Decimal places 8	
-------------------------	---

Navigation	 Expert → System → Display → Decimal places 8
Prerequisite	A measured value is specified in the Value 8 display parameter (→  28).
Description	Use this function to select the number of decimal places for measured value 8.
Selection	■ x ■ x.x ■ x.xx ■ x.xxx ■ x.xxxx ■ x.xxxxx ■ x.xxxxxx
Factory setting	x.xx

Additional information	<i>Description</i>
	 This setting does not affect the accuracy of the device for measuring or calculating the value.

Display interval

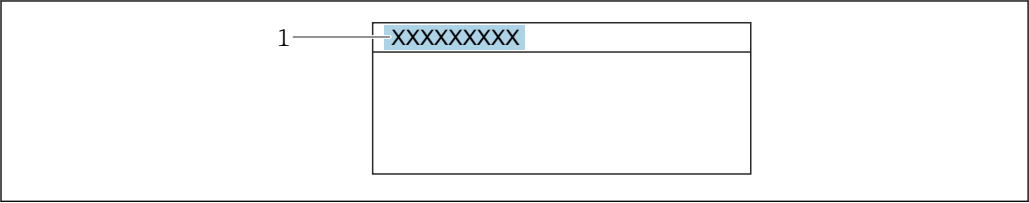
Navigation	 Expert → System → Display → Display interval
Prerequisite	A local display is provided.
Description	Use this function to enter the length of time the measured values are displayed if the values alternate on the display.
User entry	1 to 10 s
Factory setting	5 s
Additional information	<i>Description</i> This type of alternating display only occurs automatically if the number of measured values defined exceeds the number of values the selected display format can display simultaneously.  ▪ The Value 1 display parameter (→  17)...Value 8 display parameter (→  28) are used to specify which measured values are shown on the local display. ▪ The display format for the measured values displayed is defined in the Format display parameter (→  14).

Display damping

Navigation	 Expert → System → Display → Display damping
Prerequisite	A local display is provided.
Description	Use this function to enter a time constant for the reaction time of the local display to fluctuations in the measured value caused by process conditions.
User entry	0.0 to 999.9 s
Factory setting	0.0 s
Additional information	<i>User entry</i> Use this function to enter a time constant (PT1 element ¹⁾) for display damping: ▪ At a low time constant, the display reacts quickly to fluctuating measured variables. ▪ If a high time constant is entered, the display reacts more slowly.  The damping is not active if the value 0 (factory setting) is entered.

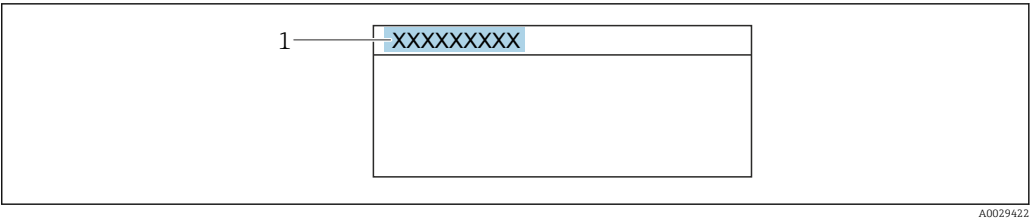
1) proportional transmission behavior with first order delay

Header

Navigation	 Expert → System → Display → Header
Prerequisite	A local display is provided.
Description	Use this function to select the contents of the header of the local display.
Selection	■ Device tag ■ Free text
Factory setting	Device tag
Additional information	Description The header text only appears during normal operation.  A0029422 1 Position of the header text on the display Selection ■ Device tag Is defined in the Device tag parameter (→  139). ■ Free text Is defined in the Header text parameter (→  30).

Header text

Navigation	 Expert → System → Display → Header text
Prerequisite	The Free text option is selected in the Header parameter (→  30).
Description	Use this function to enter a customer-specific text for the header of the local display.
User entry	Max. 12 characters, such as letters, numbers or special characters (e.g. @, %, /)
Factory setting	-----
Additional information	Description The header text only appears during normal operation.



1 Position of the header text on the display

User entry

The number of characters displayed depends on the characters used.

Separator		
Navigation	  Expert → System → Display → Separator	
Prerequisite	A local display is provided.	
Description	Use this function to select the decimal separator.	
Selection	▪ . (point) ▪ , (comma)	
Factory setting	. (point)	

Contrast display	
Navigation	  Expert → System → Display → Contrast display
Prerequisite	A local display is provided.
Description	Use this function to enter a value to adapt the display contrast to the ambient conditions (e.g. the lighting or viewing angle).
User entry	20 to 80 %
Factory setting	Depends on the display

Backlight

Navigation	  Expert → System → Display → Backlight
Prerequisite	One of the following conditions is met: ▪ Order code for "Display; operation", option F "4-line, illum.; touch control" ▪ Order code for "Display; operation", option G "4-line, illum.; touch control +WLAN" ▪ Order code for "Display; operation", option O "Remote display 4-line illuminated; 10m/30ft cable; touch control"
Description	Use this function to switch the backlight of the local display on and off.
Selection	▪ Disable ▪ Enable
Factory setting	Enable

3.1.2 "Configuration backup" submenu

Navigation  Expert → System → Config. backup

► Configuration backup

Operating time

→  32

Last backup

→  33

Configuration management

→  33

Backup state

→  34

Comparison result

→  34

Operating time

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

Last backup

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

Configuration management



Navigation	 Expert → System → Config. backup → Config. managem.
Description	Use this function to select an action to save the data to the device memory.
Selection	■ Cancel ■ Execute backup ■ Restore * ■ Compare * ■ Clear backup data
Factory setting	Cancel
Additional information	<i>Selection</i>

Options	Description
Cancel	No action is executed and the user exits the parameter.
Execute backup	A backup copy of the current device configuration is saved from the HistoROM backup to the memory of the device. The backup copy includes the transmitter data of the device. The following message appears on local display: Backup active, please wait!
Restore	The last backup copy of the device configuration is restored from the device memory to the device's HistoROM backup. The backup copy includes the transmitter data of the device. The following message appears on local display: Restore active! Do not interrupt power supply!
Compare	The device configuration saved in the device memory is compared with the current device configuration of the HistoROM backup. The following message appears on local display: Comparing files The result can be viewed in Comparison result parameter.
Clear backup data	The backup copy of the device configuration is deleted from the memory of the device. The following message appears on local display: Deleting file

HistoROM

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

* Visibility depends on order options or device settings

Backup state

Navigation  Expert → System → Config. backup → Backup state

Description Displays the status of the data backup process.

User interface

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

Factory setting None

Comparison result

Navigation  Expert → System → Config. backup → Compar. result

Description Anzeige des letzten Ergebnisses vom Vergleich der Datensätze im Gerätespeicher und im HistoROM.

User interface

- Settings identical
- Settings not identical
- No backup available
- Backup settings corrupt
- Check not done
- Dataset incompatible

Factory setting Check not done

Additional information *Beschreibung*

 The comparison is started via the **Compare** option in the **Configuration management** parameter (→  33).

Auswahl

Optionen	Beschreibung
Settings identical	Die aktuelle Gerätekonfiguration des HistoROM stimmt mit ihrer Sicherungskopie im Gerätespeicher überein. Wenn die Messumformerkonfiguration eines anderen Geräts auf das Gerät via HistoROM in Configuration management parameter übertragen wurde, stimmt die aktuelle Gerätekonfiguration des HistoROM mit ihrer Sicherungskopie im Gerätespeicher nur zum Teil überein: Die Einstellungen bezüglich Messumformer sind nicht identisch.
Settings not identical	Die aktuelle Gerätekonfiguration des HistoROM stimmt nicht mit ihrer Sicherungskopie im Gerätespeicher überein.
No backup available	Von der Gerätekonfiguration des HistoROM existiert keine Sicherungskopie im Gerätespeicher.
Backup settings corrupt	Die aktuelle Gerätekonfiguration des HistoROM ist mit ihrer Sicherungskopie im Gerätespeicher nicht kompatibel oder fehlerhaft.

Optionen	Beschreibung
Check not done	Es wurde noch kein Vergleich zwischen der Gerätekonfiguration des HistoROM und ihrer Sicherungskopie im Gerätespeicher durchgeführt.
Dataset incompatible	Die Sicherungskopie im Gerätespeicher ist mit dem Gerät nicht kompatibel.

HistoROM

Ein HistoROM ist ein "nichtflüchtiger" Gerätespeicher in Form eines EEPROM.

3.1.3 "Diagnostic handling" submenu

Navigation  Expert → System → Diagn. handling

► Diagnostic handling

Alarm delay →  35

► Diagnostic behavior →  36

Alarm delay

Navigation  Expert → System → Diagn. handling → Alarm delay

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

 The diagnostic message is reset without a time delay.

User entry 0 to 60 s

Factory setting 0 s

Additional information *Effect*
This setting affects the following diagnostic messages:

- 832 Electronics temperature too high
- 833 Electronics temperature too low
- 834 Process temperature too high
- 835 Process temperature too low
- 881 Signal to noise ratio too low
- 907 Permittivity out of specification
- 908 Volume fraction out of specification
- 909 Conductivity out of specification

"Diagnostic behavior" submenu

Each item of diagnostic information is assigned a specific diagnostic behavior at the factory. The user can change this assignment for specific diagnostic information in the **Diagnostic behavior** submenu (→  36).

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

Options	Description
Alarm	The device stops measurement. The measured value output via Modbus RS485 and the totalizers assume the defined alarm condition. A diagnostic message is generated. The background lighting changes to red.
Warning	The device continues to measure. The measured value output via Modbus RS485 and the totalizers are not affected. A diagnostic message is generated.
Logbook entry only	The device continues to measure. The diagnostic message is only displayed in the Event logbook submenu (→  137) (Event list submenu (→  138)) and is not displayed in alternating sequence with the operational display.
Off	The diagnostic event is ignored, and no diagnostic message is generated or entered.

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

Navigation  Expert → System → Diagn. handling → Diagn. behavior

► Diagnostic behavior

Assign behavior of diagnostic no. 302

→  38

Assign behavior of diagnostic no. 444

→  38

Assign behavior of diagnostic no. 441

→  37

Assign behavior of diagnostic no. 442

→  37

Assign behavior of diagnostic no. 443

→  37

Assign behavior of diagnostic no. 832

→  38

Assign behavior of diagnostic no. 833

→  39

Assign behavior of diagnostic no. 834

→  39

Assign behavior of diagnostic no. 835

→  40

Assign behavior of diagnostic no. 907

→  40

Assign behavior of diagnostic no. 908

→  40

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



Navigation	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 441
Description	Use this function to change the diagnostic behavior of the 441 Current output 1 to n diagnostic message.
Selection	■ Off ■ Alarm ■ Warning ■ Logbook entry only
Factory setting	Warning
Additional information	For a detailed description of the options available: → 36

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



Navigation	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 442
Prerequisite	The measuring device has a pulse/frequency/switch output.
Description	Use this function to change the diagnostic behavior of the 442 Frequency output 1 to n diagnostic message.
Selection	■ Off ■ Alarm ■ Warning ■ Logbook entry only
Factory setting	Warning
Additional information	For a detailed description of the options available: → 36

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



Navigation	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 443
Prerequisite	The measuring device has a pulse/frequency/switch output.
Description	Use this function to change the diagnostic behavior of the 443 Pulse output 1 to n diagnostic message.
Selection	■ Off ■ Alarm ■ Warning ■ Logbook entry only

Factory setting

Warning

Additional information

For a detailed description of the options available: → 36

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

Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 444

Prerequisite

The device has one current input.

DescriptionUse this function to change the diagnostic behavior of the **444 Current input 1 to n** diagnostic message.**Selection**

- Off
- Alarm
- Warning
- Logbook entry only

Factory setting

Warning

Additional information

For a detailed description of the options available: → 36

Assign behavior of diagnostic no. 302**Navigation**

Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 302

DescriptionUse this function to change the diagnostic behavior of the **302 Device verification active** diagnostic message.**Selection**

- Off
- Warning
- Logbook entry only

Factory setting

Warning

Additional information

For a detailed description of the options available: → 36

Assign behavior of diagnostic no. 832**Navigation**

Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 832

DescriptionUse this function to change the diagnostic behavior of the **832 Electronics temperature too high** diagnostic message.

Selection	■ Off ■ Alarm ■ Warning ■ Logbook entry only
Factory setting	Warning
Additional information	 For a detailed description of the options available: →  36

Assign behavior of diagnostic no. 833



Navigation	  Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 833
Description	Use this function to change the diagnostic behavior of the 833 Electronics temperature too low diagnostic message.
Selection	■ Off ■ Alarm ■ Warning ■ Logbook entry only
Factory setting	Warning
Additional information	 For a detailed description of the options available: →  36

Assign behavior of diagnostic no. 834



Navigation	  Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 834
Description	Use this function to change the diagnostic behavior of the 834 Process temperature too high diagnostic message.
Selection	■ Off ■ Alarm ■ Warning ■ Logbook entry only
Factory setting	Warning
Additional information	 For a detailed description of the options available: →  36

Assign behavior of diagnostic no. 835



Navigation	 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 835
Description	Use this function to change the diagnostic behavior of the 835 Process temperature too low diagnostic message.
Selection	■ Off ■ Alarm ■ Warning ■ Logbook entry only
Factory setting	Warning
Additional information	 For a detailed description of the options available: →  36

Assign behavior of diagnostic no. 907



Navigation	 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 907
Description	Use this function to change the diagnostic behavior of the 907 Permittivity out of specification diagnostic message.
Selection	■ Off ■ Alarm ■ Warning ■ Logbook entry only
Factory setting	Warning
Additional information	 For a detailed description of the options available: →  36

Assign behavior of diagnostic no. 908



Navigation	 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 908
Description	Use this function to change the diagnostic behavior of the 908 Volume fraction out of specification diagnostic message.
Selection	■ Off ■ Alarm ■ Warning ■ Logbook entry only
Factory setting	Warning

Additional information

 For a detailed description of the options available: →  36

3.1.4 "Administration" submenu

Navigation   Expert → System → Administration

▶ Administration

▶ Define access code

→  41

▶ Reset access code

→  42

Device reset

→  43

Transmitter identifier

→  44

Activate SW option

→  44

Software option overview

→  45

"Define access code" wizard

 The **Define access code** wizard (→  41) is only available when operating via the local display or Web browser.

If operating via the operating tool, the **Define access code** parameter can be found directly in the **Administration** submenu. There is no **Confirm access code** parameter if the device is operated via the operating tool.

Navigation  Expert → System → Administration → Def. access code

▶ Define access code

Define access code

→  41

Confirm access code

→  42

Define access code

Navigation   Expert → System → Administration → Def. access code → Def. access code

Description Use this function to enter a user-specific release code to restrict write-access to the parameters. This protects the device configuration against any inadvertent modifications via the local display, Web browser, FieldCare or DeviceCare (via CDI-RJ45 service interface).

User entry

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

Additional information

Description

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

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

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

 Once the access code has been defined, write-protected parameters can only be modified if the access code is entered in the **Enter access code** parameter (→  13).

 If you lose the access code, please contact your Endress+Hauser sales organization.

User entry

A message is displayed if the access code is not in the input range.

Factory setting

If the factory setting is not changed or **0** is defined as the access code, the parameters are not write-protected and the device configuration data can be modified. The user is logged on in the **"Maintenance"** role.

Confirm access code

Navigation

  Expert → System → Administration → Def. access code → Confirm code

Description

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

User entry

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

"Reset access code" submenu

Navigation

  Expert → System → Administration → Reset acc. code

▶ Reset access code

Operating time

→  42

Reset access code

→  43

Operating time

Navigation

  Expert → System → Administration → Reset acc. code → Operating time

Description

Displays the length of time the device has been in operation.

User interface	Days (d), hours (h), minutes (m) and seconds (s)
Additional information	<i>Indication</i> Maximum number of days: 9 999 (corresponds to approx. 27 years and 5 months)

Reset access code

Navigation	 Expert → System → Administration → Reset acc. code → Reset acc. code
Description	Use this function to enter a reset code to reset the user-specific access codes to the factory setting .
User entry	Character string comprising numbers, letters and special characters
Factory setting	0x00
Additional information	<i>Description</i>  For a reset code, contact your Endress+Hauser service organization. <i>User entry</i> The reset code can only be entered via: ■ Web browser ■ DeviceCare, FieldCare (via CDI RJ45 interface) ■ Fieldbus

Additional parameters in the "Administration" submenu

Device reset



Navigation	 Expert → System → Administration → 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 *
Factory setting	Cancel

* Visibility depends on order options or device settings

Additional information*Selection*

Options	Description
Cancel	No action is executed and the user exits the parameter.
To delivery settings	Every parameter for which a customer-specific default setting was ordered is reset to the customer-specific value. All other parameters are reset to the factory setting.
Restart device	The restart resets every parameter with data stored in volatile memory (RAM) to the factory setting (e.g. measured value data). The device configuration remains unchanged.
Restore S-DAT backup	Restores the data that is saved on the S-DAT. Additional information: This function can be used to resolve the memory issue "083 Memory content inconsistent" or to restore the S-DAT data when a new S-DAT has been installed.  This option is displayed only in an alarm condition.

Transmitter identifier**Navigation** Expert → System → Administration → Transm. identif.**Description**

Select transmitter identifier.

User interface

- Unknown
- 500
- 300

Factory setting

300

Activate SW option**Navigation** Expert → System → Administration → Activate SW opt.**Description**

Use this function to enter an activation code to enable an additional, ordered software option.

User entry

Max. 10-digit string of numbers.

Factory setting

Depends on the software option ordered

Additional information*Description*

If a measuring device was ordered with an additional software option, the activation code is programmed in the device at the factory.



To activate a software option subsequently, please contact your Endress+Hauser sales organization.

Entering the activation code

The activation code is linked to the serial number of the measuring device and varies according to the device and software option.

If an incorrect or invalid code is entered, this results in the loss of software options that have already been activated.

- ▶ Before you enter a new activation code, make a note of the current activation code .
- ▶ Enter the new activation code provided by Endress+Hauser when the new software option was ordered.
- ▶ If the code entered is incorrect or invalid, enter the old activation code .
- ▶ Have your Endress+Hauser sales organization check the new activation code remembering to specify the serial number or ask for the code again.

Example for a software option

Order code for "Application package", option **EA** "Extended HistoROM"

Web browser

 Once a software option has been activated, the page must be loaded again in the Web browser.

Software option overview

Navigation	 Expert → System → Administration → SW option overv.
Description	Displays all the software options that are enabled in the device.
User interface	
Additional information	Description Displays all the options that are available if ordered by the customer. "Extended HistoROM" option Order code for "Application package", option EA "Extended HistoROM"

3.2 "Sensor" submenu

Navigation  Expert → Sensor

▶ Sensor	
▶ Measured values	→  46
▶ System units	→  54
▶ Process parameters	→  57
▶ External process variables	→  61

► Sensor adjustment	→ 62
► Factory adjustment	→ 65

3.2.1 "Measured values" submenu

Navigation  Expert → Sensor → Measured val.

► Measured values	
► Process variables	→ 46
► Totalizer	→ 48
► Input values	→ 49
► Output values	→ 50

"Process variables" submenu

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

► Process variables	
Total solids	→ 46
Temperature	→ 47
Electronics temperature	→ 47
Conductivity	→ 47
Corrected conductivity	→ 47
Load rate	→ 47

Total solids

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

Description Shows total solids (fraction of total weight or concentration per volume unit).

User interface Signed floating-point number

Temperature

Navigation	  Expert → Sensor → Measured val. → Process variab. → Temperature
Description	Shows the medium temperature currently measured.
User interface	Signed floating-point number

Electronics temperature

Navigation	  Expert → Sensor → Measured val. → Process variab. → Electronics temp
Description	Shows the electronics temperature currently measured.
User interface	Signed floating-point number

Conductivity

Navigation	  Expert → Sensor → Measured val. → Process variab. → Conductivity
Description	Shows the conductivity currently measured.
User interface	Floating-point number

Corrected conductivity

Navigation	  Expert → Sensor → Measured val. → Process variab. → CorrConductivity
Description	Shows the conductivity measured compensated for temperature.
User interface	Floating-point number

Load rate

Navigation	  Expert → Sensor → Measured val. → Process variab. → Load rate
Prerequisite	The volume flow of the medium is read in via the Current input 1 to n (→  49) or the fieldbus.
Description	Shows the total solids flow rate.

User interface

Signed floating-point number

"Totalizer" submenu

Navigation  Expert → Sensor → Measured val. → Totalizer

► Totalizer

Totalizer 1 value

→  48

Totalizer 1 overflow

→  48

Totalizer 1 value

Navigation  Expert → Sensor → Measured val. → Totalizer → Tot. 1 value

Description Displays the current totalizer reading.

User interface Signed floating-point number

Additional information *Description*

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

 In the event of an error, the totalizer adopts the mode defined in the **Failure mode** parameter (→  131).

Display

 The unit of the selected process variable is defined in the **Unit totalizer** parameter (→  129) for the totalizer.

Totalizer 1 overflow

Navigation  Expert → Sensor → Measured val. → Totalizer → Tot. 1 overflow

Description Displays the current totalizer overflow.

User interface Integer with sign

Additional information *Description*

If the current totalizer reading exceeds 7 digits, which is the maximum value range that can be displayed by the operating tool, the value above this range is output as an overflow.

The current totalizer value is therefore the sum of the overflow value and the totalizer value from the **Totalizer value 1 to n** parameter.

Display

 The unit of the selected process variable is defined in the **Unit totalizer** parameter (→  129) for the totalizer.

"Input values" submenu

Navigation   Expert → Sensor → Measured val. → Input values

► Input values

► Current input 1 to n

→  49

► Value status input 1 to n

→  50

"Current input 1 to n" submenu

Navigation   Expert → Sensor → Measured val. → Input values → Current input 1 to n

► Current input 1 to n

Measured values 1 to n

→  49

Measured current 1 to n

→  50

Measured values 1 to n

Navigation	  Expert → Sensor → Measured val. → Input values → Current input 1 to n → Measured val. 1 to n
Description	Displays the current input value.
User interface	Signed floating-point number

Measured current 1 to n

Navigation	  Expert → Sensor → Measured val. → Input values → Current input 1 to n → Measur. curr. 1 to n
Description	Displays the current value of the current input.
User interface	0 to 22.5 mA

"Value status input 1 to n" submenu

Navigation	  Expert → Sensor → Measured val. → Input values → Val.stat.inp. 1 to n
------------	---

► Value status input 1 to n

Value status input

→  50

Value status input

Navigation	  Expert → Sensor → Measured val. → Input values → Val.stat.inp. 1 to n → Val.stat.inp.
Description	Displays the current input signal level.
User interface	■ High ■ Low

"Output values" submenu

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

► Output values

► Value current output 1 to n

→  51

► Pulse/frequency/switch output 1 to n

→  51

► Relay output 1 to n

→  53

"Value current output 1 to n" submenu

Navigation

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

► Value current output 1 to n

Output current

→  51

Measured current

→  51

Output current

Navigation	  Expert → Sensor → Measured val. → Output values → Current output 1 to n → Output curr.
Description	Displays the current value currently calculated for the current output.
User interface	0 to 22.5 mA

Measured current

Navigation	  Expert → Sensor → Measured val. → Output values → Current output 1 to n → Measur. curr.
Description	Displays the actual measured value of the output current.
User interface	0 to 30 mA

"Pulse/frequency/switch output 1 to n" submenu

Navigation

 Expert → Sensor → Measured val. → Output values → PFS output 1 to n

► Pulse/frequency/switch output 1 to n

Output frequency

→  52

Pulse output

→  52

Switch state

→  53

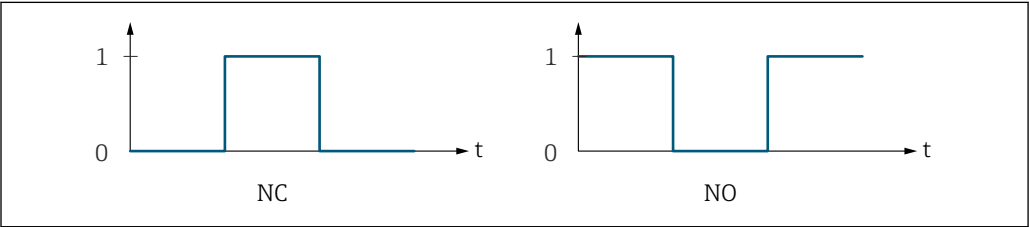
Output frequency

Navigation	 Expert → Sensor → Measured val. → Output values → PFS output 1 to n → Output freq.
Prerequisite	In the Operating mode parameter (→  88), the Frequency option is selected.
Description	Displays the actual value of the output frequency which is currently measured.
User interface	0.0 to 12 500.0 Hz

Pulse output

Navigation	 Expert → Sensor → Measured val. → Output values → PFS output 1 to n → Pulse output
Prerequisite	The Pulse option is selected in the Operating mode parameter (→  88) parameter.
Description	Displays the pulse frequency currently output.
User interface	Positive floating-point number

Additional information	<i>Description</i> ■ The pulse output is an open collector output. ■ This is configured at the factory in such a way that the transistor is conductive for the duration of the pulse (NO contact) and is safety-oriented.
------------------------	--



0 Non-conductive
1 Conductive
NC NC contact (normally closed)
NO NO contact (normally open)

The output behavior can be reversed via the **Invert output signal** parameter (→  104) i.e. the transistor does not conduct for the duration of the pulse.

In addition, the behavior of the output in the event of a device alarm (**Failure mode** parameter (→  92)) can be configured.

Switch state

Navigation	  Expert → Sensor → Measured val. → Output values → PFS output 1 to n → Switch state
Prerequisite	The Switch option is selected in the Operating mode parameter (→  88).
Description	Displays the current switch status of the status output.
User interface	■ Open ■ Closed
Additional information	<i>User interface</i> ■ Open The switch output is not conductive. ■ Closed The switch output is conductive.

"Relay output 1 to n" submenu

Navigation	  Expert → Sensor → Measured val. → Output values → Relay output 1 to n
► Relay output 1 to n Switch state →  53 Switch cycles →  54 Max. switch cycles number →  54	

Switch state

Navigation	  Expert → Sensor → Measured val. → Output values → Relay output 1 to n → Switch state
Description	Displays the current status of the relay output.
User interface	■ Open ■ Closed
Additional information	<i>User interface</i> ■ Open The relay output is not conductive. ■ Closed The relay output is conductive.

Switch cycles

Navigation	 Expert → Sensor → Measured val. → Output values → Relay output 1 to n → Switch cycles
Description	Displays all the switch cycles performed.
User interface	Positive integer

Max. switch cycles number

Navigation	 Expert → Sensor → Measured val. → Output values → Relay output 1 to n → Max. cycles no.
Description	Displays the maximum number of guaranteed switch cycles.
User interface	Positive integer

3.2.2 "System units" submenu

Navigation  Expert → Sensor → System units

► System units		
Total solids unit		→  55
Density unit		→  55
Mass flow unit		→  55
Mass unit		→  56
Volume flow unit		→  56
Temperature unit		→  56
Conductivity unit		→  57
Date/time format		→  57

Total solids unit

Navigation	 Expert → Sensor → System units → TotalSolidsUnit	
Description	Select total solids unit.	
Selection	<i>SI units</i> ■ %TS ■ ppm ■ g/l ■ mg/l ■ kg/m³ ■ mg/cm³	<i>US units</i> ■ lb/gal (us) ■ lb/ft³
Factory setting	Depends on country	

Density unit

Navigation	 Expert → Sensor → System units → Density unit	
Description	Select density unit.	
Selection	<i>SI units</i> ■ g/l ■ mg/l ■ kg/m³ ■ mg/cm³	<i>US units</i> ■ lb/gal (us) ■ lb/ft³
Factory setting	Depends on country	

Mass flow unit

Navigation	 Expert → Sensor → System units → Mass flow unit	
Prerequisite	The volume flow of the medium is read in via the Current input 1 to n (→  49).	
Description	Select mass flow unit.	
Selection	<i>SI units</i> ■ kg/h ■ kg/d ■ t/h ■ t/d	<i>US units</i> ■ oz/h ■ oz/d ■ lb/h ■ lb/d ■ STon/h ■ STon/d
Factory setting	Depends on country	

Mass unit		
Navigation	  Expert → Sensor → System units → Mass unit	
Prerequisite	The volume flow of the medium is read in via the Current input 1 to n (→  49) or the fieldbus.	
Description	Select mass unit.	
Selection	<i>SI units</i> ■ kg ■ t	<i>US units</i> ■ oz ■ lb ■ STon
Factory setting	Depends on country	

Volume flow unit		
Navigation	  Expert → Sensor → System units → Volume flow unit	
Prerequisite	The volume flow of the medium is read in via the Current input 1 to n (→  49).	
Description	Select volume flow unit.	
Selection	<i>SI units</i> ■ l/h ■ l/s ■ dm³/min ■ m³/h ■ m³/s	
Factory setting	l/h	

Temperature unit		
Navigation	  Expert → Sensor → System units → Temperature unit	
Description	Select temperature unit.	
Selection	<i>SI units</i> ☒ °C ☒ K	<i>US units</i> ☐ °F ☐ °R
Factory setting	Depends on country	

Conductivity unit		
Navigation	Expert → Sensor → System units → Conductiv. unit	
Description	Select conductivity unit.	
Selection	<i>SI units</i> ■ nS/cm ■ µS/cm ■ µS/m ■ µS/mm ■ mS/m ■ mS/cm ■ S/cm ■ S/m	
Factory setting	µS/cm	

Date/time format		
Navigation	Expert → Sensor → System units → Date/time format	
Description	Select date and time format.	
Selection	■ dd.mm.yy hh:mm ■ dd.mm.yy hh:mm am/pm ■ mm/dd/yy hh:mm ■ mm/dd/yy hh:mm am/pm	
Factory setting	dd.mm.yy hh:mm	

3.2.3 "Process parameters" submenu

Navigation Expert → Sensor → Process param.

► Process parameters		
Temperature damping	→	58
Conductivity damping	→	58
Total solids override	→	58
► Total solids monitoring	→	58
► Partially filled pipe detection	→	60

Temperature damping

Navigation	  Expert → Sensor → Process param. → Temp. damping
Description	Enter a time constant for damping (PT1 element) of the temperature measured value. Damping reduces the effect of measured value fluctuations.
User entry	0 to 999.9 s
Factory setting	0 s

Conductivity damping

Navigation	  Expert → Sensor → Process param. → Conduct. damping
Description	Enter a time constant for damping (PT1 element) of the conductivity measured value. Damping reduces the effect of measured value fluctuations.
User entry	0 to 999.9 s
Factory setting	0 s

Total solids override

Navigation	  Expert → Sensor → Process param. → TotalSolOverride
Description	If suppression of the total solids measurement is enabled (On option), zero is output for the measured value. This is suitable for the cleaning processes for the pipeline, for example.
Selection	■ Off ■ On
Factory setting	Off

"Total solids monitoring" submenu

Navigation   Expert → Sensor → Process param. → TotSolidsMonitor

► Total solids monitoring

Assign process variable

→  59

Lower range limit	→ 59
Upper range limit	→ 59
Response time	→ 60

Assign process variable

Navigation	Expert → Sensor → Process param. → TotSolidsMonitor → Assign variable
Description	Select the process variable for total solids monitoring.
Selection	Off Total solids
Factory setting	Total solids

Lower range limit

Navigation	Expert → Sensor → Process param. → TotSolidsMonitor → LowerRangeLimit
Description	Enter the lower limit value for the measuring range of the total solids.
User entry	Signed floating-point number
Factory setting	-1 %TS

Upper range limit

Navigation	Expert → Sensor → Process param. → TotSolidsMonitor → UpperRangeLimit
Description	Enter the upper limit value for the measuring range of the total solids.
User entry	Signed floating-point number
Factory setting	51 %TS

Response time

Navigation	 Expert → Sensor → Process param. → TotSolidsMonitor → Response time
Description	Enter a delay until the diagnostic message is generated in the event the measuring range is exceeded.
User entry	0 to 100 s
Factory setting	60 s

"Partially filled pipe detection" submenu

Navigation Expert → Sensor → Process param. → Partial pipe det

▶ Partially filled pipe detection

Partially filled pipe detection

→  60

Threshold

→  60

Response time

→  61

Partially filled pipe detection

Navigation	 Expert → Sensor → Process param. → Partial pipe det → Partial pipe det
Description	If activated, a diagnostic message is generated if the antennas are no longer in full contact with the medium.
Selection	■ Off ■ On
Factory setting	Off

Threshold

Navigation	 Expert → Sensor → Process param. → Partial pipe det → Threshold
Description	Enter threshold for partially filled pipe detection. If the measured value drops below the threshold, a diagnostic message is generated.
User entry	Decibel as negative floating point number

Factory setting -6 dB

Response time

Navigation   Expert → Sensor → Process param. → Partial pipe det → Response time

Description Enter a delay until the diagnostic message is generated in the event the pipe is detected as partially filled.

User entry 0 to 20.0 s

Factory setting 3 s

3.2.4 "External compensation" submenu

Navigation   Expert → Sensor → External comp.

► External process variables

Volume flow source

→  61

Volume flow

→  62

Volume flow source

Navigation   Expert → Sensor → ExternalProcVar. → VolumeFlowSource

Description Select the input via which the measured value of the volume flow is read in. The volume flow is used to calculate the load rate.

- Selection**
- Off
 - Current input 1 *
 - Current input 2 *
 - Current input 3 *
 - External value

Factory setting Off

* Visibility depends on order options or device settings

Volume flow

Navigation	 Expert → Sensor → ExternalProcVar. → Volume flow
Description	Shows the volume flow reported by the external measuring device.
User entry	Signed floating-point number

3.2.5 "Sensor adjustment" submenu

Navigation

 Expert → Sensor → Sensor adjustm.

► Sensor adjustment

Measuring interval

→  62

► Process variable adjustment

→  62

Measuring interval

Navigation	 Expert → Sensor → Sensor adjustm. → Measur. interval
Description	Displays the interval between two measuring periods.
User interface	0 to 10 000 ms

"Process variable adjustment" submenu

Navigation

 Expert → Sensor → Sensor adjustm. → Variable adjust

► Process variable adjustment

Temperature offset

→  63

Temperature factor

→  63

Conductivity offset

→  63

Conductivity factor

→  64

Corrected conductivity offset	→ 64
Corrected conductivity factor	→ 64
Electronics temperature offset	→ 64
Electronics temperature factor	→ 65
Load rate offset	→ 65
Load rate factor	→ 65

Temperature offset

Navigation	Expert → Sensor → Sensor adjustm. → Variable adjust → Temp. offset
Description	Enter the offset by which to shift the zero point for temperature.
User entry	Signed floating-point number
Factory setting	0

Temperature factor

Navigation	Expert → Sensor → Sensor adjustm. → Variable adjust → Temp. factor
Description	Enter the multiplication factor to apply to the temperature value.
User entry	Positive floating-point number
Factory setting	1

Conductivity offset

Navigation	Expert → Sensor → Sensor adjustm. → Variable adjust → Conduct. offset
Description	Enter the offset by which to shift the zero point for conductivity.
User entry	Signed floating-point number
Factory setting	0

Conductivity factor



Navigation  Expert → Sensor → Sensor adjustm. → Variable adjust → Conduct. factor

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

User entry Positive floating-point number

Factory setting 1

Corrected conductivity offset



Navigation  Expert → Sensor → Sensor adjustm. → Variable adjust → Corr.cond.offset

Description Enter the offset by which to shift the zero point for the corrected conductivity.

User entry Signed floating-point number

Factory setting 0

Corrected conductivity factor



Navigation  Expert → Sensor → Sensor adjustm. → Variable adjust → Corr.cond.factor

Description Enter the multiplication factor to apply to the corrected conductivity value.

User entry Positive floating-point number

Factory setting 1

Electronics temperature offset



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

Description Enter the offset by which to shift the zero point for the electronics temperature.

User entry Signed floating-point number

Factory setting 0

Electronics temperature factor		
Navigation	  Expert → Sensor → Sensor adjustm. → Variable adjust → ElectrTempFactor	
Description	Enter the multiplication factor to apply to the electronics temperature.	
User entry	Positive floating-point number	
Factory setting	1	
Load rate offset		
Navigation	  Expert → Sensor → Sensor adjustm. → Variable adjust → Load rate offset	
Prerequisite	The volume flow of the medium is read in via the Current input 1 to n (→  49).	
Description	Enter the offset by which to shift the zero point for the load rate.	
User entry	Signed floating-point number	
Factory setting	0	
Load rate factor		
Navigation	  Expert → Sensor → Sensor adjustm. → Variable adjust → Load rate factor	
Prerequisite	The volume flow of the medium is read in via the Current input 1 to n (→  49).	
Description	Enter the multiplication factor to apply to the load rate value.	
User entry	Positive floating-point number	
Factory setting	1	

3.2.6 "Factory adjustment" submenu

Navigation   Expert → Sensor → FactoryAdjustm.

► Factory adjustment

Nominal diameter

→  66

Date/time

→  66

Nominal diameter

Navigation	  Expert → Sensor → FactoryAdjustm. → Nominal diameter
Description	Shows the nominal diameter of the sensor.
User interface	Character string comprising numbers, letters and special characters

Date/time



Navigation	  Expert → Sensor → FactoryAdjustm. → Date/time
Description	Shows the date and time of the factory adjustment.
User interface	Character string comprising numbers, letters and special characters

3.3 "I/O configuration" submenu

Navigation   Expert → I/O config.

► I/O configuration

I/O module 1 to n terminal numbers

I/O module 1 to n information

I/O module 1 to n type

Apply I/O configuration

I/O alteration code

→  66

→  67

→  67

→  68

→  68

I/O module 1 to n terminal numbers

Navigation	  Expert → I/O config. → I/O 1 to n terminals
Description	Displays the terminal numbers used by the I/O module.
User interface	■ Not used ■ 26-27 (I/O 1) ■ 24-25 (I/O 2) ■ 22-23 (I/O 3)

I/O module 1 to n information

Navigation	 Expert → I/O config. → I/O 1 to n info
Description	Displays information about the plugged in I/O module.
User interface	■ Not plugged ■ Invalid ■ Not configurable ■ Configurable ■ MODBUS
Additional information	<i>"Not plugged" option</i> The I/O module is not plugged in. <i>"Invalid" option</i> The I/O module is not plugged correctly. <i>"Not configurable" option</i> The I/O module is not configurable. <i>"Configurable" option</i> The I/O module is configurable. <i>"MODBUS" option</i> The I/O module is configured for Modbus.

I/O module 1 to n type



Navigation	 Expert → I/O config. → I/O 1 to n type
Prerequisite	For the following order code: ■ "Output; input 2", option D "Configurable I/O initial setting off" ■ "Output; input 3", option D "Configurable I/O initial setting off"
Description	Use this function to select the I/O module type for the configuration of the I/O module.
Selection	■ Off ■ Current output * ■ Current input * ■ Status input * ■ Pulse/frequency/switch output * ■ Relay output *
Factory setting	Off

* Visibility depends on order options or device settings

Apply I/O configuration

Navigation	  Expert → I/O config. → Apply I/O config
Description	Use this function to activate the newly configured I/O module type.
Selection	■ No ■ Yes
Factory setting	No

I/O alteration code

Navigation	  Expert → I/O config. → I/O alterat.code
Description	Use this function to enter the ordered activation code to activate the I/O configuration change.
User entry	Positive integer
Factory setting	0
Additional information	Description The I/O configuration is changed in the I/O module type parameter (→  67).

3.4 "Input" submenu

Navigation   Expert → Input

► Input

► Current input 1 to n

→  68

► Status input 1 to n

→  72

3.4.1 "Current input 1 to n" submenu

Navigation   Expert → Input → Current input 1 to n

► Current input 1 to n

Terminal number

→  69

Signal mode	→  69
Current span	→  70
0/4 mA value	→  70
20 mA value	→  70
Failure mode	→  71
Failure value	→  71

Terminal number

Navigation	 Expert → Input → Current input 1 to n → Terminal no.
Description	Displays the terminal numbers used by the current input module.
User interface	■ Not used ■ 24-25 (I/O 2) ■ 22-23 (I/O 3)
Additional information	<i>"Not used" option</i> The current input module does not use any terminal numbers.

Signal mode



Navigation	 Expert → Input → Current input 1 to n → Signal mode
Description	Use this function to select the signal mode for the current input.
Selection	■ Passive ■ Active *
Factory setting	Passive

* Visibility depends on order options or device settings

Current span

Navigation	 Expert → Input → Current input 1 to n → Current span
Description	Use this function to select the current range for the process value output and the upper and lower level for signal on alarm.
Selection	■ 4...20 mA (4...20.5 mA) ■ 4...20 mA NE (3.8...20.5 mA) ■ 4...20 mA US (3.9...20.8 mA) ■ 0...20 mA (0...20.5 mA)
Factory setting	Country-specific: ■ 4...20 mA NE (3.8...20.5 mA) ■ 4...20 mA US (3.9...20.8 mA)
Additional information	<i>Examples</i>  Sample values for the current range: Current span parameter (→  76)

0/4 mA value

Navigation	 Expert → Input → Current input 1 to n → 0/4 mA value
Description	Enter 4 mA value.
User entry	Signed floating-point number
Factory setting	0 % TS
Additional information	<i>Current input behavior</i> The current input behaves differently depending on the settings configured in the following parameters: ■ Current span (→  70) ■ Failure mode (→  71) <i>Configuration examples</i>  Pay attention to the configuration examples for 4 mA value parameter (→  77).

20 mA value

Navigation	 Expert → Input → Current input 1 to n → 20 mA value
Description	Enter 20 mA value.
User entry	Signed floating-point number

Factory setting 12 %TS

Additional information *Configuration examples*



Pay attention to the configuration examples for **4 mA value** parameter (→ 77).

Failure mode



Navigation Expert → Input → Current input 1 to n → Failure mode

Description Use this function to select the input behavior when measuring a current outside the configured **Current span** parameter (→ 70).

Selection

- Alarm
- Last valid value
- Defined value

Factory setting Alarm

Additional information *Options*

- Alarm
An error message is set.
- Last valid value
The last valid measured value is used.
- Defined value
A user-defined measured value is used (**Failure value** parameter (→ 71)).

Failure value



Navigation Expert → Input → Current input 1 to n → Failure value

Prerequisite In the **Failure mode** parameter (→ 71), the **Defined value** option is selected.

Description Use this function to enter the value that the device uses if it does not receive an input signal from the external device, or if the input signal is invalid.

User entry Signed floating-point number

Factory setting 0

3.4.2 "Status input 1 to n" submenu

Navigation  Expert → Input → Status input 1 to n

► Status input 1 to n

Terminal number

→  72

Assign status input

→  72

Value status input

→  73

Active level

→  73

Response time status input

→  73

Terminal number

Navigation	 Expert → Input → Status input 1 to n → Terminal no.
Description	Displays the terminal numbers used by the status input module.
User interface	■ Not used ■ 24-25 (I/O 2) ■ 22-23 (I/O 3)
Additional information	"Not used" option The status input module does not use any terminal numbers.

Assign status input

Navigation	 Expert → Input → Status input 1 to n → Assign stat.inp.
Description	Use this function to select the function for the status input.
Selection	■ Off ■ Reset totalizer 1 ■ Flow override
Factory setting	Off

Additional information*Options*

- Off
The status input is switched off.
 - Reset totalizer 1
The totalizer is reset.
 - Flow override
The Flow override is activated.
-  Note on the Flow override:
- The Flow override is enabled as long as the level is at the status input (continuous signal).
 - All other assignments react to a change in level (pulse) at the status input.

Value status input

Navigation Expert → Input → Status input 1 to n → Val.stat.inp.**Description**

Displays the current input signal level.

User interface

- High
- Low

Active level

**Navigation** Expert → Input → Status input 1 to n → Active level**Description**

Use this function to determine the input signal level at which the assigned function is activated.

Selection

- High
- Low

Factory setting

High

Response time status input

**Navigation** Expert → Input → Status input 1 to n → Response time**Description**

Use this function to enter the minimum time period for which the input signal level must be present before the selected function is activated.

User entry

5 to 200 ms

Factory setting

50 ms

3.5 "Output" submenu

Navigation  Expert → Output

► Output	
► Current output 1 to n	→  74
► Pulse/frequency/switch output 1 to n	→  86
► Relay output 1 to n	→  104

3.5.1 "Current output 1 to n" submenu

Navigation  Expert → Output → Curr.output 1 to n

► Current output 1 to n	
Terminal number	→  75
Signal mode	→  75
Process variable current output	→  75
Current range output	→  76
Fixed current	→  77
Lower range value output	→  77
Upper range value output	→  78
Measuring mode current output	→  79
Damping current output	→  83
Failure behavior current output	→  84
Failure current	→  85
Output current	→  85
Measured current	→  86

Terminal number	
Navigation	  Expert → Output → Curr.output 1 to n → Terminal no.
Description	Displays the terminal numbers used by the current output module.
User interface	■ Not used ■ 24-25 (I/O 2) ■ 22-23 (I/O 3)
Additional information	<i>"Not used" option</i> The current output module does not use any terminal numbers.
Signal mode 	
Navigation	  Expert → Output → Curr.output 1 to n → Signal mode
Description	Use this function to select the signal mode for the current output.
Selection	■ Active * ■ Passive *
Factory setting	Active
Process variable current output 	
Navigation	  Expert → Output → Curr.output 1 to n → Proc.var. outp
Prerequisite	The Load rate option is only available if the volume flow of the medium is read in via the Current input 1 to n (→  49) or the fieldbus.
Description	Use this function to select a process variable for the current output.
Selection	■ Off ■ Total solids ■ Temperature ■ Electronics temperature ■ Conductivity ■ Corrected conductivity ■ Load rate *
Factory setting	Total solids

* Visibility depends on order options or device settings

Current range output

Navigation

Expert → Output → Curr.output 1 to n → Curr.range out

Description

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

- 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)
 - 0...20 mA (0...20.5 mA)
 - Fixed value

- Factory setting
- Depends on country:

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

Additional information

Description

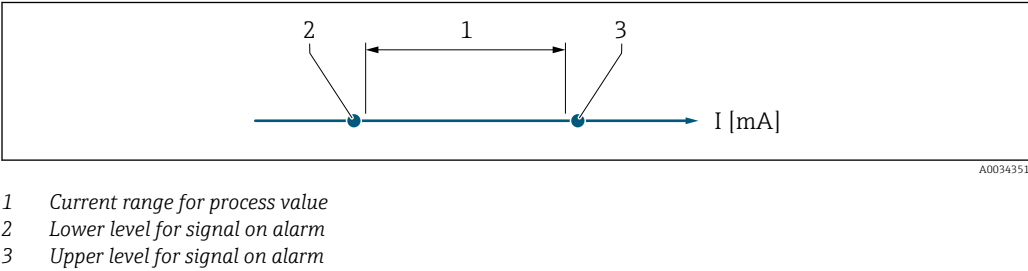
- In the event of a device alarm, the current output adopts the value specified in the **Failure mode** parameter (→ 84).
- The measuring range is specified via the **Lower range value output** parameter (→ 77) and **Upper range value output** parameter (→ 78).

"Fixed current" option

The current value is set via the **Fixed current** parameter (→ 77).

Example

Shows the relationship between the current range for the output of the process value and the two signal on alarm levels:



Selection

Selection	1	2	3
4...20 mA NE (3.8...20.5 mA)	3.8 to 20.5 mA	< 3.6 mA	> 21.95 mA
4...20 mA US (3.9...20.8 mA)	3.9 to 20.8 mA US	< 3.6 mA	> 21.95 mA
4...20 mA (4...20.5 mA)	4 to 20.5 mA	< 3.6 mA	> 21.95 mA
0...20 mA (0...20.5 mA)	0 to 20.5 mA	0 mA	> 21.95 mA

Fixed current



Navigation	 Expert → Output → Curr.output 1 to n → Fixed current
Prerequisite	The Fixed current option is selected in the Current span parameter (→  76).
Description	Use this function to enter a constant current value for the current output.
User entry	0 to 22.5 mA
Factory setting	22.5 mA

Lower range value output



Navigation	 Expert → Output → Curr.output 1 to n → Low.range outp
Prerequisite	In Current span parameter (→  76), 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) ■ 0...20 mA (0...20.5 mA)
Description	Use this function to enter a value for the start of measuring range.
User entry	Floating point number with sign
Factory setting	0 %TS
Additional information	<i>Description</i> Positive and negative values are permitted depending on the process variable assigned in the Assign current output parameter (→  75). In addition, the value can be greater

than or smaller than the value assigned for the 20 mA current in the **Upper range value output** parameter (→  78).

Dependency

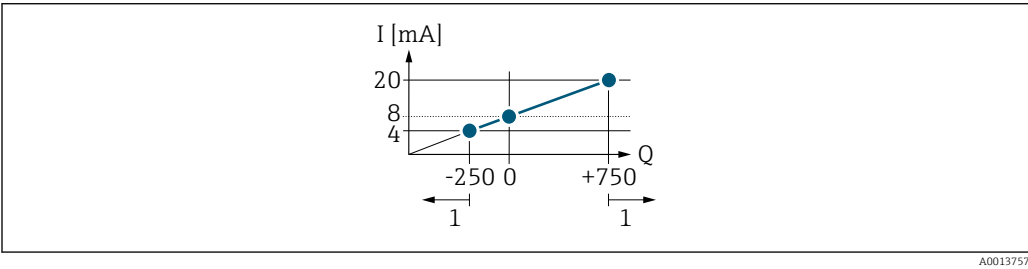
 The unit depends on the process variable selected in the **Assign current output** parameter (→  75).

Current output behavior

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

- Current span (→  76)
- Failure mode (→  84)

Configuration examples



A0013757

Q Flow
I Current
1 Measuring range is exceeded or undershot

Upper range value output



Navigation

  Expert → Output → Curr.output 1 to n → Upp.range outp

Prerequisite

In **Current span** parameter (→  76), 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)
- 0...20 mA (0...20.5 mA)

Description

Use this function to enter a value for the end of measuring range.

User entry

Floating point number with sign

Factory setting

12 %TS

Additional information

Description

Positive and negative values are permitted depending on the process variable assigned in the **Assign current output** parameter (→  75). In addition, the value can be greater

than or smaller than the value assigned for the 0/4 mA current in the **Lower range value output** parameter (→  77).

Dependency

 The unit depends on the process variable selected in the **Assign current output** parameter (→  75).

Example

Configuration examples

 Pay attention to the configuration examples for the **Lower range value output** parameter (→  77).

Measuring mode current output



Navigation	  Expert → Output → Curr.output 1 to n → Output mode
Prerequisite	The following option is selected in the Process variable current output parameter (→  75): Load rate One of the following options is selected in the Current span parameter (→  76): ■ 4...20 mA NE (3.8...20.5 mA) ■ 4...20 mA US (3.9...20.8 mA) ■ 4...20 mA (4...20.5 mA) ■ 0...20 mA (0...20.5 mA)
Description	Use this function to select the measuring mode for the current output.
Selection	■ Forward flow ■ Forward/Reverse flow * ■ Reverse flow compensation
Factory setting	Forward flow
Additional information	<i>Description</i>  The process variable that is assigned to the current output via the Assign current output parameter (→  75) is displayed below the parameter. <i>"Forward flow" option</i> The current output signal is proportional to the process variable assigned. The measuring range is defined by the values that are assigned to the Lower range value output parameter (→  77) and the Upper range value output parameter (→  78).

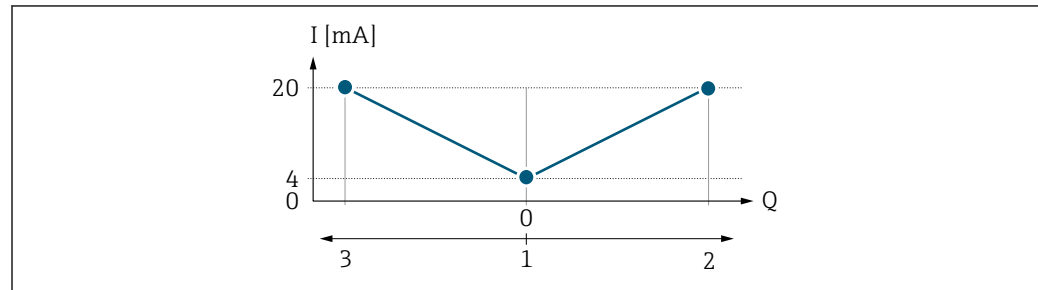
* Visibility depends on order options or device settings

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

Both values are defined such that they are not equal to zero flow e.g.:

- Start of measuring range = -50 kg/h
- End of measuring range = 100 kg/h

"Forward/Reverse flow" option



A0013758

- I* Current
- Q* Flow
- 1* Start of measuring range output (0/4 mA)
- 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 (→ 77) and **Upper range value output** parameter (→ 78) must have the same sign.
- The value for the **Upper range value output** parameter (→ 78) (e.g. reverse flow) corresponds to the mirrored value for the **Upper range value output** parameter (→ 78) (e.g. forward flow).

"Reverse flow compensation" option

The **Reverse flow compensation** option is primarily used to compensate for intermittent reverse flow that can arise with displacement pumps due to wear or high-viscosity medium. The reverse flow is recorded in a buffer memory and offset against the next forward flow.

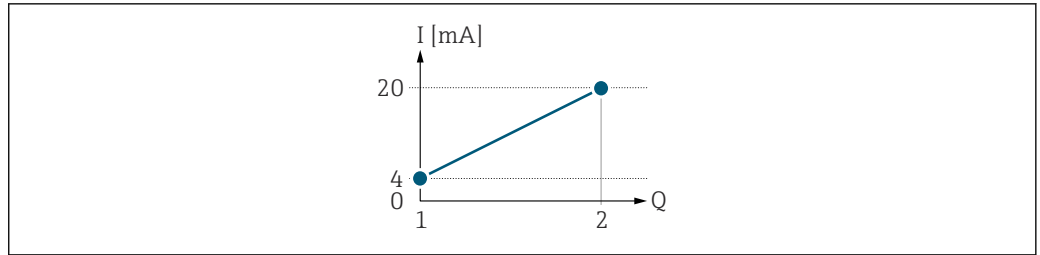
In the event of prolonged and undesired reverse flow, flow values can accumulate in the buffer memory. Due to the configuration of the current output, these values are not factored in, however, i.e. there is no compensation for the reverse flow.

If this option is set, the measuring device does not smoothen the flow signal. The flow signal is not attenuated.

Examples of how the current output behaves

Example 1

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



A0028084

2 Measuring range

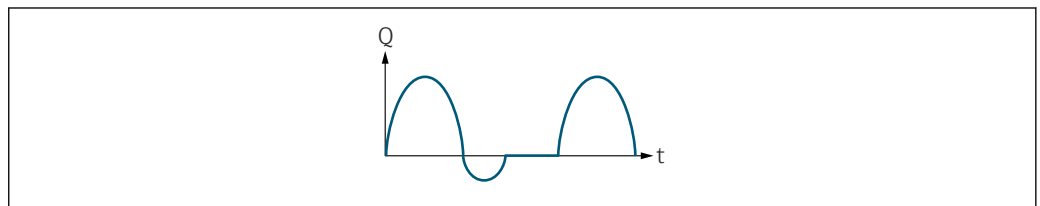
I Current

Q Flow

1 Lower range value (Start of measuring range output)

2 Upper range value (end of measuring range output)

With the following flow response:



A0028091

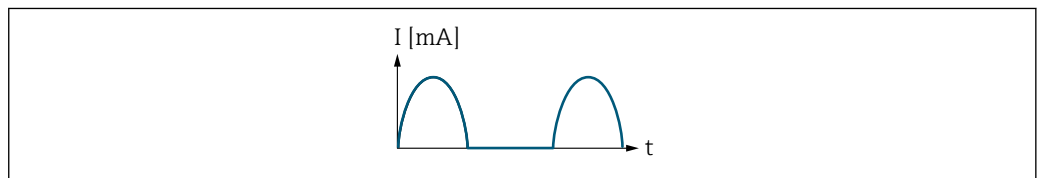
3 Flow response

Q Flow

t Time

With **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..



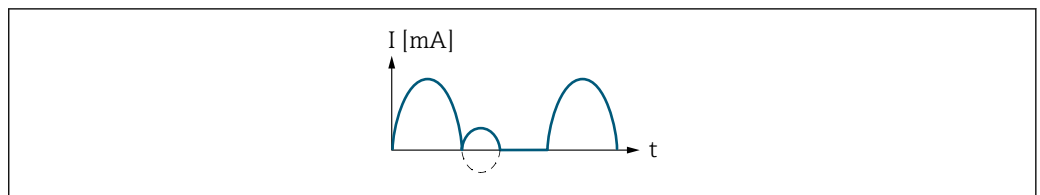
A0028092

I Current

t Time

With **Forward/Reverse flow** option

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



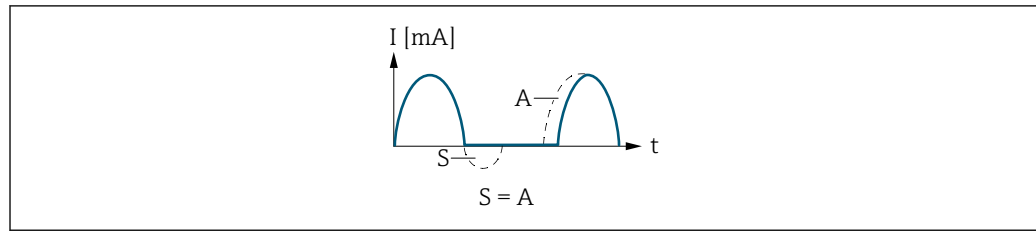
A0028093

I Current

t Time

With **Reverse flow compensation** option

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

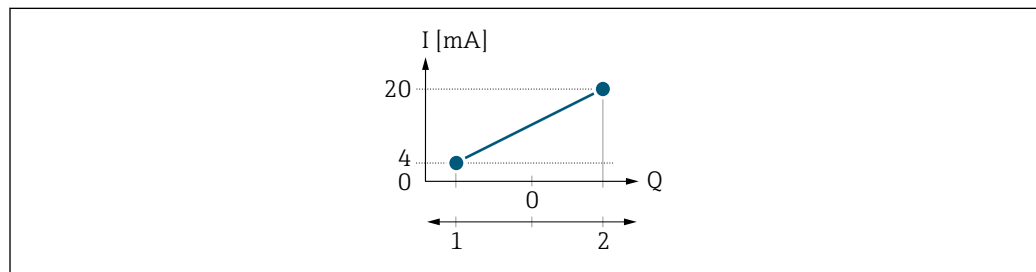


A0028094

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

Example 2

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

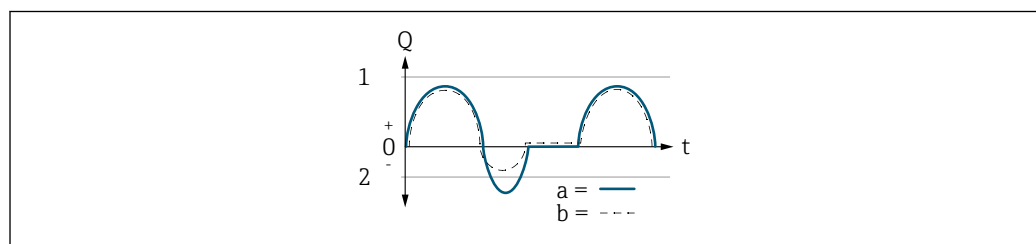


A0028095

4 Measuring range

I Current
 Q Flow
 1 Lower range value (Start of measuring range output)
 2 Upper range value (end of measuring range output)

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

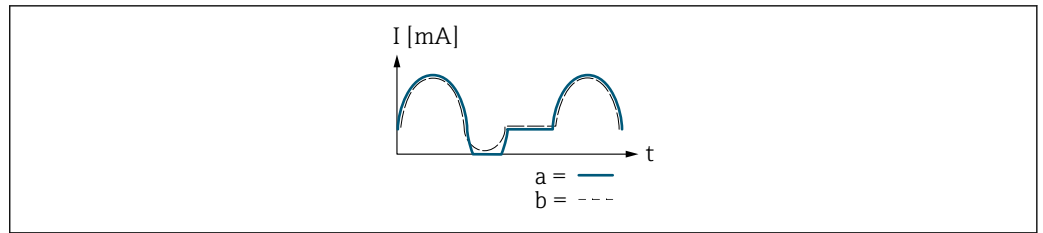


A0028098

Q Flow
 t Time
 1 Lower range value (Start of measuring range output)
 2 Upper range value (end of measuring range output)

With **Forward flow** option

- a (—): The flow components outside the scaled measuring range cannot be taken into account for signal output.
- b (---): The current output signal is proportional to the process variable assigned.



A0028100

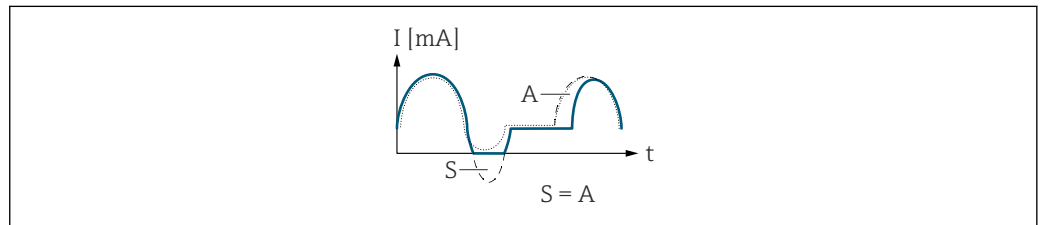
I Current
 t Time

With **Forward/Reverse flow** option

This option cannot be selected here since the values for the **Lower range value output** parameter (→ 77) and **Upper range value output** parameter (→ 78) have different signs.

With **Reverse flow compensation** option

Flow components outside the measuring span 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

Damping current output



Navigation

Expert → Output → Curr.output 1 to n → Damp.curr.outp

Prerequisite

A process variable is selected in the **Assign current output** parameter (→ 75) and one of the following options is selected in the **Current span** parameter (→ 76):

- 4...20 mA NE (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)
- 4...20 mA (4...20.5 mA)
- 0...20 mA (0...20.5 mA)

Description

Use this function to enter a time constant for the reaction time of the current output signal to fluctuations in the measured value caused by process conditions.

User entry

0.0 to 999.9 s

Factory setting

1.0 s

Additional information *User entry*

Use this function to enter a time constant (PT1 element²⁾) for current output damping:

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



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

Failure behavior current output**Navigation**

Expert → Output → Curr.output 1 to n → Failure behav.

Prerequisite

A process variable is selected in the **Assign current output** parameter (→ 75) and one of the following options is selected in the **Current span** parameter (→ 76):

- 4...20 mA NE (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)
- 4...20 mA (4...20.5 mA)
- 0...20 mA (0...20.5 mA)

Description

Use this function to select the value of the current output in the event of a device alarm.

Selection

- Min.
- Max.
- Last valid value
- Actual value
- Fixed value

Factory setting

Max.

2) proportional transmission behavior with first order delay

Additional information*Description*

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

"Min." option

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



The signal on alarm level is defined via the **Current span** parameter (→  76).

"Max." option

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



The signal on alarm level is defined via the **Current span** parameter (→  76).

"Last valid value" option

The current output adopts the last measured value that was valid before the device alarm occurred.

"Actual value" option

The current output adopts the measured value on the basis of the current flow measurement; the device alarm is ignored.

"Defined value" option

The current output adopts a defined measured value.



The measured value is defined via the **Failure current** parameter (→  85).

Failure current**Navigation**

Expert → Output → Curr.output 1 to n → Fail. current

Prerequisite

The **Defined value** option is selected in the **Failure mode** parameter (→  84).

Description

Use this function to enter a fixed value that the current output adopts in the event of a device alarm.

User entry

0 to 22.5 mA

Factory setting

22.5 mA

Output current**Navigation**

Expert → Output → Curr.output 1 to n → Output curr.

Description

Displays the current value currently calculated for the current output.

User interface

3.59 to 22.5 mA

Measured current

Navigation	 Expert → Output → Curr.output 1 to n → Measur. curr.
Description	Displays the actual measured value of the output current.
User interface	0 to 30 mA

3.5.2 "Pulse/frequency/switch output 1 to n" submenu

Navigation  Expert → Output → PFS output 1 to n

► Pulse/frequency/switch output 1 to n		
Terminal number	→ 	87
Signal mode	→ 	88
Operating mode	→ 	88
Assign pulse output	→ 	89
Pulse scaling	→ 	90
Pulse width	→ 	90
Measuring mode	→ 	91
Failure mode	→ 	92
Pulse output	→ 	92
Assign frequency output	→ 	93
Minimum frequency value	→ 	93
Maximum frequency value	→ 	94
Measuring value at minimum frequency	→ 	94
Measuring value at maximum frequency	→ 	94
Measuring mode	→ 	95

Damping output	→  95
Response time	→  96
Failure mode	→  96
Failure frequency	→  97
Output frequency	→  97
Switch output function	→  97
Assign diagnostic behavior	→  98
Assign limit	→  99
Switch-on value	→  101
Switch-off value	→  101
Assign flow direction check	→  102
Assign status	→  102
Switch-on delay	→  102
Switch-off delay	→  103
Failure mode	→  103
Switch state	→  103
Invert output signal	→  104

Terminal number

Navigation	 Expert → Output → PFS output 1 to n → Terminal no.
Description	Displays the terminal numbers used by the pulse/frequency/switch output module.
User interface	■ Not used ■ 24-25 (I/O 2) ■ 22-23 (I/O 3)
Additional information	<i>"Not used" option</i> The pulse/frequency/switch output module does not use any terminal numbers.

Signal mode

**Navigation** Expert → Output → PFS output 1 to n → Signal mode**Description**

Use this function to select the signal mode for the pulse/frequency/switch output.

Selection

- Passive
- Active *
- Passive NE

Factory setting

Passive

Operating mode

**Navigation** Expert → Output → PFS output 1 to n → Operating mode**Prerequisite**

If the **Pulse** option is selected, the **Load rate** option must be selected in the **Assign pulse output** parameter (→  89).

Description

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

Selection

- Pulse
- Frequency
- Switch

Factory setting

Pulse

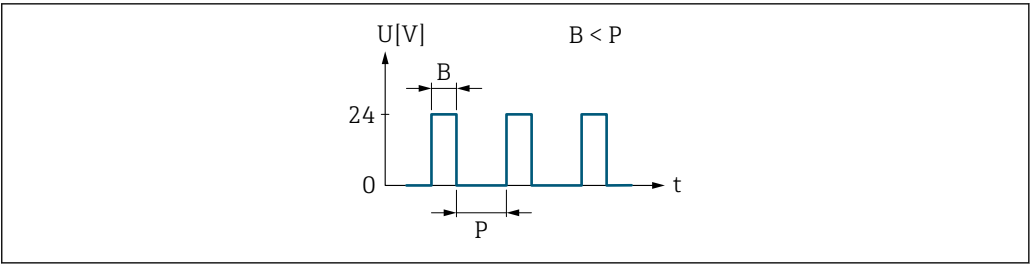
Additional information

"Pulse" option

Example

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

* Visibility depends on order options or device settings



A0026883

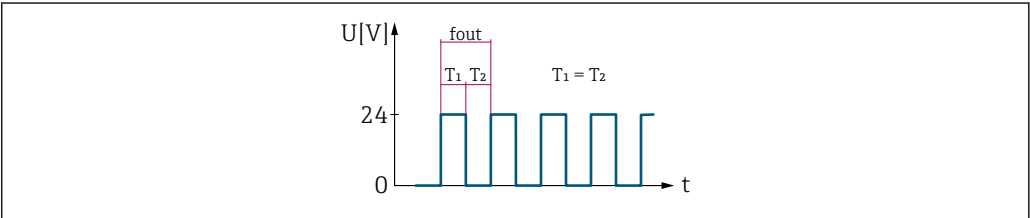
5 Quantity-proportional pulse (pulse value) with pulse width to be configured

B Pulse width entered
P Pauses between the individual pulses

"Frequency" option

Example

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



A0026886

6 Flow-proportional frequency output

Assign pulse output



Navigation

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

Prerequisite

The **Load rate** option is only available if the volume flow of the medium is read in via the Current input 1 to n (→ 49) or the fieldbus.

Prerequisite

The **Pulse** option is selected in **Operating mode** parameter (→ 88).

Description

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

Selection

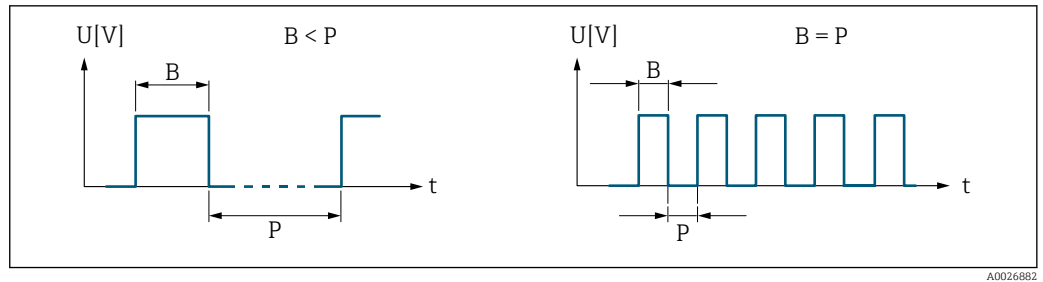
- Off
- Load rate *

Factory setting

Off

* Visibility depends on order options or device settings

Pulse scaling 	
Navigation	 Expert → Output → PFS output 1 to n → Pulse scaling
Prerequisite	The Pulse option is selected in the Operating mode parameter (→  88) and a process variable is selected in the Assign pulse output parameter (→  89).
Description	Use this function to enter the value for the measured value that a pulse is equivalent to.
User entry	Positive floating point number
Factory setting	Depends on country and nominal diameter
Additional information	<i>User entry</i> Weighting of the pulse output with a quantity. The lower the pulse value, the ■ better the resolution. ■ the higher the frequency of the pulse response.
Pulse width 	
Navigation	 Expert → Output → PFS output 1 to n → Pulse width
Prerequisite	The Pulse option is selected in the Operating mode parameter (→  88) and a process variable is selected in the Assign pulse output parameter (→  89).
Description	Use this function to enter the duration of the output pulse.
User entry	0.05 to 2 000 ms
Factory setting	100 ms
Additional information	<i>Description</i> ■ Define how long a pulse is (duration). ■ The maximum pulse rate is defined by $f_{\max} = 1 / (2 \times \text{pulse width})$. ■ The interval between two pulses lasts at least as long as the set pulse width. ■ The maximum flow is defined by $Q_{\max} = f_{\max} \times \text{pulse value}$. ■ If the flow exceeds these limit values, the measuring device displays the 443 Pulse output 1 to n diagnostic message.



A0026882

B Pulse width entered
P Pauses between the individual pulses

Example

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

Measuring mode



Navigation

Expert → Output → PFS output 1 to n → Measuring mode

Description

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

Selection

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

Factory setting

Forward flow

Additional information

Options

- Forward flow
Positive flow is output, negative flow is not output.
- Forward/Reverse flow
Positive and negative flow are output (absolute value), but a distinction is not made between positive and negative flow.
- Reverse flow
Negative flow is output, positive flow is not output.
- Reverse flow compensation
The flow components outside the measuring range are buffered, balanced and output after a maximum delay of 60 s.



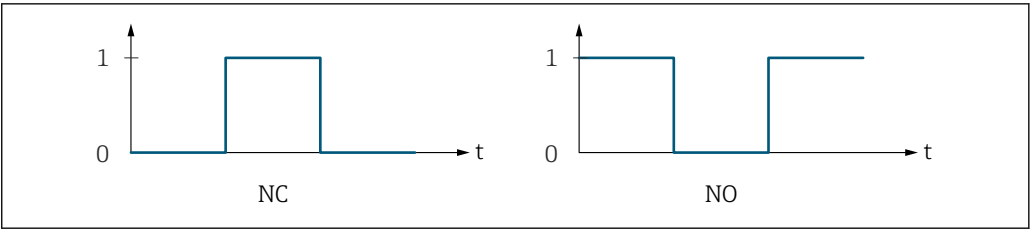
For a detailed description of the options available, see the **Measuring mode** parameter (→ 79)

Examples



For a detailed description of the configuration examples, see the **Measuring mode** parameter (→ 79)

Failure mode 	
Navigation	  Expert → Output → PFS output 1 to n → Failure mode
Prerequisite	The Pulse option is selected in the Operating mode parameter (→  88) and a process variable is selected in the Assign pulse output parameter (→  89).
Description	Use this function to select the failure mode of the pulse output in the event of a device alarm.
Selection	■ Actual value ■ No pulses
Factory setting	No pulses
Additional information	<i>Description</i> The dictates of safety render it advisable to ensure that the pulse output shows a predefined behavior in the event of a device alarm. <i>Options</i> ■ Actual value In the event of a device alarm, the pulse output continues on the basis of the current flow measurement. The fault is ignored. ■ No pulses In the event of a device alarm, the pulse output is "switched off". NOTICE! A device alarm indicates a serious fault with the measuring device. The measurement quality may possibly be influenced and may no longer be guaranteed. The Actual value option is only recommended if it is ensured that all possible alarm conditions do not influence the measurement quality.
Pulse output	
Navigation	  Expert → Output → PFS output 1 to n → Pulse output
Prerequisite	The Pulse option is selected in the Operating mode parameter (→  88) parameter.
Description	Displays the pulse frequency currently output.
User interface	Positive floating-point number
Additional information	<i>Description</i> ■ 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 NC contact (normally closed)
NO NO contact (normally open)

The output behavior can be reversed via the **Invert output signal** parameter (→ ⓘ 104) i.e. the transistor does not conduct for the duration of the pulse.

In addition, the behavior of the output in the event of a device alarm (**Failure mode** parameter (→ ⓘ 92)) can be configured.

Assign frequency output

ⓘ

Navigation	ⓘ ⓘ Expert → Output → PFS output 1 to n → Assign freq.
Prerequisite	▪ The Frequency option is selected in Operating mode parameter (→ ⓘ 88). ▪ The Load rate option is only available if the volume flow of the medium is read in via the Current input 1 to n (→ ⓘ 49) or the fieldbus.
Description	Use this function to select the process variable for the frequency output.
Selection	▪ Off ▪ Total solids ▪ Temperature ▪ Electronics temperature ▪ Conductivity ▪ Corrected conductivity ▪ Load rate *
Factory setting	Off

Minimum frequency value

ⓘ

Navigation	ⓘ ⓘ Expert → Output → PFS output 1 to n → Min. freq. value
Prerequisite	The Frequency option is selected in the Operating mode parameter (→ ⓘ 88) and a process variable is selected in the Assign frequency output parameter (→ ⓘ 93).
Description	Use this function to enter the minimum frequency.
User entry	0.0 to 10 000.0 Hz

* Visibility depends on order options or device settings

Factory setting 0.0 Hz

Maximum frequency value

Navigation   Expert → Output → PFS output 1 to n → Max. freq. value

Prerequisite The **Frequency** option is selected in the **Operating mode** parameter (→  88) and a process variable is selected in the **Assign frequency output** parameter (→  93).

Description Use this function to enter the end value frequency.

User entry 0.0 to 10 000.0 Hz

Factory setting 10 000.0 Hz

Measuring value at minimum frequency

Navigation   Expert → Output → PFS output 1 to n → Val. at min.freq

Prerequisite The **Frequency** option is selected in the **Operating mode** parameter (→  88) and a process variable is selected in the **Assign frequency output** parameter (→  93).

Description Use this function to enter the measured value for the start value frequency.

User entry Signed floating-point number

Factory setting Depends on country and nominal diameter

Additional information *Dependency*

 The entry depends on the process variable selected in the **Assign frequency output** parameter (→  93).

Measuring value at maximum frequency

Navigation   Expert → Output → PFS output 1 to n → Val. at max.freq

Prerequisite The **Frequency** option is selected in the **Operating mode** parameter (→  88) and a process variable is selected in the **Assign frequency output** parameter (→  93).

Description Use this function to enter the measured value for the end value frequency.

User entry Signed floating-point number

Factory setting Depends on country and nominal diameter

Additional information*Description*

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

Dependency

The entry depends on the process variable selected in the **Assign frequency output** parameter (→ 93).

Measuring mode**Navigation**

Expert → Output → PFS output 1 to n → Measuring mode

Description

Use this function to select the measuring mode for the frequency output.

Selection

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

Factory setting

Forward flow

Additional information*Options*

For a detailed description of the options available, see the **Measuring mode** parameter (→ 79)

Examples

For a detailed description of the configuration examples, see the **Measuring mode** parameter (→ 79)

Damping output**Navigation**

Expert → Output → PFS output 1 to n → Damping out.

Description

Use this function to enter a time constant for the reaction time of the output signal to fluctuations in the measured value.

User entry

0 to 999.9 s

Factory setting

0.0 s

Additional information	<i>User entry</i> Use this function to enter a time constant (PT1 element ³⁾) for frequency output damping: ■ If a low time constant is entered, the current output reacts particularly quickly to fluctuating measured variables. ■ On the other hand, the current output reacts more slowly if a high time constant is entered.  Damping is switched off if 0 is entered (factory setting). The frequency output is subject to separate damping that is independent of all preceding time constants.
-------------------------------	--

Response time

Navigation	 Expert → Output → PFS output 1 to n → Response time
Prerequisite	The Frequency option is selected in the Operating mode parameter (→  88) and an option is selected in the Assign frequency output parameter (→  93).
Description	Shows how quickly the output reaches 63% of a measured value change.
User interface	Positive floating-point number
Factory setting	0 s

Failure mode



Navigation	 Expert → Output → PFS output 1 to n → Failure mode
Prerequisite	The Frequency option is selected in the Operating mode parameter (→  88) and a process variable is selected in the Assign frequency output parameter (→  93).
Description	Use this function to select the failure mode of the frequency output in the event of a device alarm.
Selection	■ Actual value ■ Defined value ■ 0 Hz
Factory setting	0 Hz

³⁾ proportional transmission behavior with first order delay

Additional information*Options*■ **Actual value**

In the event of a device alarm, the frequency output continues on the basis of the current flow measurement. The device alarm is ignored.

■ **Defined value**

In the event of a device alarm, the frequency output continues on the basis of a predefined value. The Failure frequency (→  97) replaces the current measured value, making it possible to bypass the device alarm. The actual measurement is switched off for the duration of the device alarm.

■ **0 Hz**

In the event of a device alarm, the frequency output is "switched off".

NOTICE! A device alarm indicates a serious fault with the measuring device. The measurement quality may possibly be influenced and may no longer be guaranteed. The **Actual value** option is only recommended if it is ensured that all possible alarm conditions do not influence the measurement quality.

Failure frequency**Navigation**

  Expert → Output → PFS output 1 to n → Failure freq.

Prerequisite

In the **Operating mode** parameter (→  88), the **Frequency** option is selected, in the **Assign frequency output** parameter (→  93) a process variable is selected, and in the **Failure mode** parameter (→  96), the **Defined value** option is selected.

Description

Enter frequency output value in alarm condition.

User entry

0.0 to 12 500.0 Hz

Factory setting

0.0 Hz

Output frequency**Navigation**

  Expert → Output → PFS output 1 to n → Output freq.

Prerequisite

In the **Operating mode** parameter (→  88), the **Frequency** option is selected.

Description

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

User interface

0.0 to 12 500.0 Hz

Switch output function**Navigation**

  Expert → Output → PFS output 1 to n → Switch out funct

Prerequisite

The **Switch** option is selected in the **Operating mode** parameter (→  88).

Description	Use this function to select a function for the switch output.
Selection	■ Off ■ On ■ Diagnostic behavior ■ Limit ■ Flow direction check ■ Status
Factory setting	Off
Additional information	■ Off The switch output is permanently switched off (open, non-conductive). ■ On The switch output is permanently switched on (closed, conductive). ■ Diagnostic behavior The switch output is switched on (closed, conductive), if there is a pending diagnostic event of the assigned behavioral category. ■ Limit The switch output is switched on (closed, conductive), if a limit value specified for the process variable is reached. ■ Flow direction check The switch output is switched on (closed, conductive), when the flow direction changes (forward or reverse flow). ■ Status The switch output is switched on (closed/conductive) to display the device status for the selected detection method, e.g. empty pipe detection.

Assign diagnostic behavior

Navigation	  Expert → Output → PFS output 1 to n → Assign diag. beh
Prerequisite	■ In the Operating mode parameter (→  88), the Switch option is selected. ■ In the Switch output function parameter (→  97), the Diagnostic behavior option is selected.
Description	Use this function to select the diagnostic event category that is displayed for the switch output.
Selection	■ Alarm ■ Alarm or warning ■ Warning
Factory setting	Alarm

Additional information*Description*

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

Selection

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

Assign limit**Navigation**

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

Prerequisite

- The **Switch** option is selected in **Operating mode** parameter (→ 88).
- The **Limit** option is selected in **Switch output function** parameter (→ 97).
- The **Load rate** option is only available if the volume flow of the medium is read in via the Current input 1 to n (→ 49) or the fieldbus.

Description

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

Selection

- Off
- Total solids
- Temperature
- Electronics temperature
- Conductivity
- Corrected conductivity
- Load rate *
- Totalizer 1 *

Factory setting

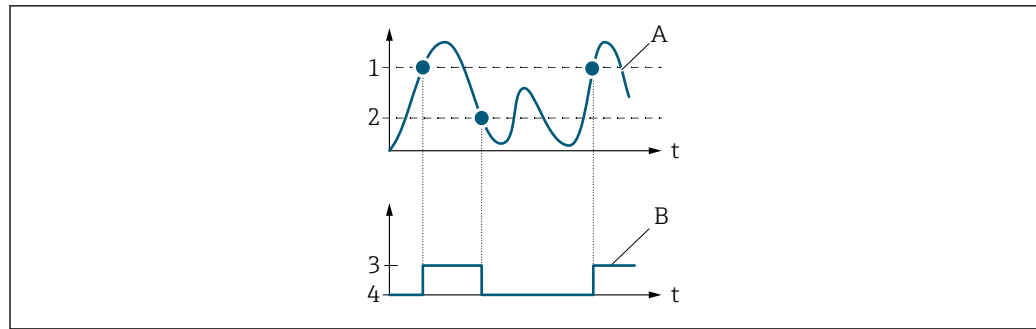
Temperature

Additional information*Description*

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

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

* Visibility depends on order options or device settings

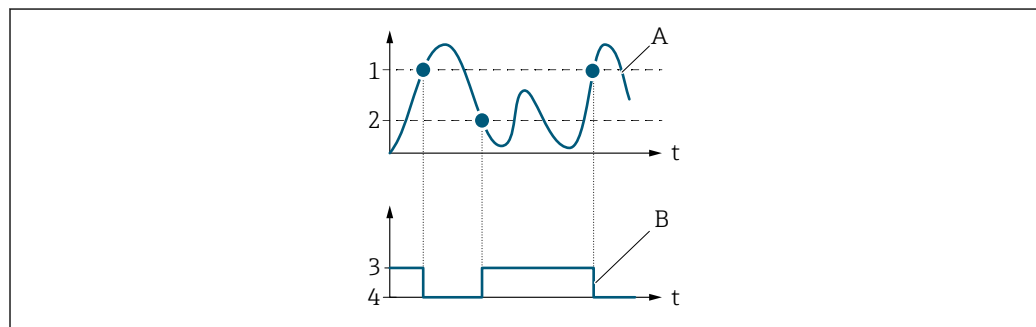


A0026891

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

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

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

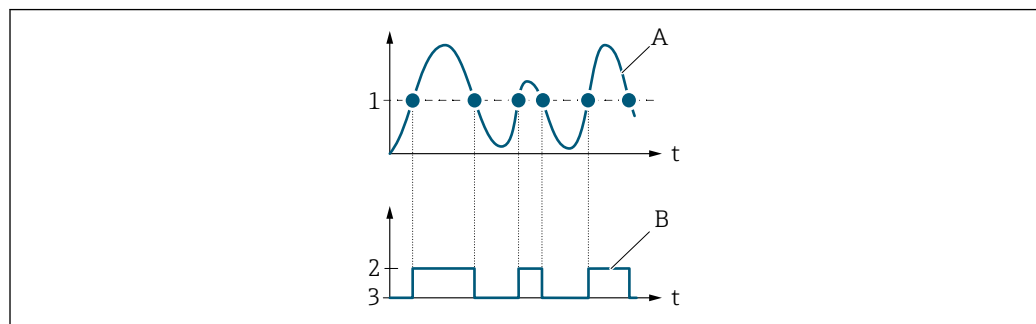


A0026892

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

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

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



A0026893

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

Switch-on value



Navigation	Expert → Output → PFS output 1 to n → Switch-on value
Prerequisite	▪ The Switch option is selected in the Operating mode parameter (→ 88). ▪ The Limit option is selected in the Switch output function parameter (→ 97).
Description	Use this function to enter the measured value for the switch-on point.
User entry	Floating point number with sign
Factory setting	0 °C
Additional information	<i>Description</i> Use this function to enter the limit value for the switch-on value (process variable > switch-on value = closed, conductive). When using a hysteresis: Switch-on value > Switch-off value. <i>Dependency</i> The unit depends on the process variable selected in the Assign limit parameter (→ 99).

Switch-off value



Navigation	Expert → Output → PFS output 1 to n → Switch-off value
Prerequisite	▪ The Switch option is selected in the Operating mode parameter (→ 88). ▪ The Limit option is selected in the Switch output function parameter (→ 97).
Description	Use this function to enter the measured value for the switch-off point.
User entry	Floating point number with sign
Factory setting	0 °C
Additional information	<i>Description</i> Use this function to enter the limit value for the switch-off value (process variable < switch-off value = open, non-conductive). When using a hysteresis: Switch-on value > Switch-off value. <i>Dependency</i> The unit depends on the process variable selected in the Assign limit parameter (→ 99).

Assign flow direction check

Navigation	 Expert → Output → PFS output 1 to n → Assign dir.check
Prerequisite	■ The Switch option is selected in the Operating mode parameter (→  88). ■ The Flow direction check option is selected in the Switch output function parameter (→  97).
Description	Use this function to select a process variable for monitoring the flow direction.
Selection	
Factory setting	Off

Assign status

Navigation	 Expert → Output → PFS output 1 to n → Assign status
Prerequisite	■ The Switch option is selected in Operating mode parameter (→  88). ■ The Status option is selected in Switch output function parameter (→  97).
Description	Select the device function whose status you want to display.
Selection	■ Off ■ Partially filled pipe detection
Factory setting	Partially filled pipe detection
Additional information	<i>Options</i> When the switch-on point for the selected device function is reached, the output is switched on (closed, conductive). Otherwise, the output is non-conductive.

Switch-on delay

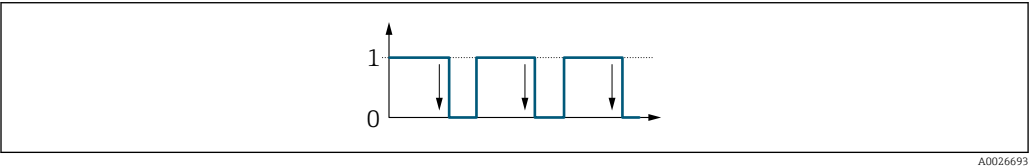
Navigation	 Expert → Output → PFS output 1 to n → Switch-on delay
Prerequisite	■ The Switch option is selected in the Operating mode parameter (→  88). ■ The Limit option is selected in the Switch output function parameter (→  97).
Description	Use this function to enter a delay time for switching on the switch output.
User entry	0.0 to 100.0 s
Factory setting	0.0 s

Switch-off delay		
Navigation	  Expert → Output → PFS output 1 to n → Switch-off delay	
Prerequisite	▪ The Switch option is selected in the Operating mode parameter (→  88). ▪ The Limit option is selected in the Switch output function parameter (→  97).	
Description	Use this function to enter a delay time for switching off the switch output.	
User entry	0.0 to 100.0 s	
Factory setting	0.0 s	
Failure mode		
Navigation	  Expert → Output → PFS output 1 to n → Failure mode	
Description	Use this function to select a failsafe mode for the switch output in the event of a device alarm.	
Selection	▪ Actual status ▪ Open ▪ Closed	
Factory setting	Open	
Additional information	<i>Options</i> ▪ Actual status In the event of a device alarm, faults are ignored and the current behavior of the input value is output by the switch output. The Actual status option behaves in the same way as the current input value. ▪ Open In the event of a device alarm, the switch output's transistor is set to non-conductive. ▪ Closed In the event of a device alarm, the switch output's transistor is set to conductive.	
Switch state		
Navigation	  Expert → Output → PFS output 1 to n → Switch state	
Prerequisite	The Switch option is selected in the Operating mode parameter (→  88).	
Description	Displays the current switch status of the status output.	
User interface	▪ Open ▪ Closed	

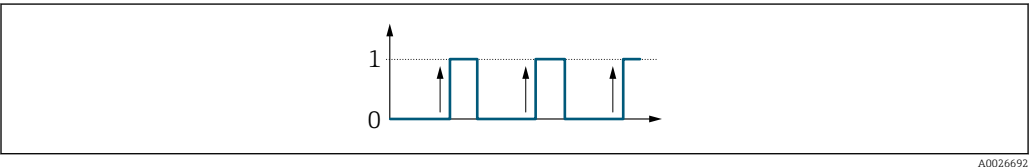
Additional information	User interface ■ Open The switch output is not conductive. ■ Closed The switch output is conductive.
------------------------	--

Invert output signal

Navigation	  Expert → Output → PFS output 1 to n → Invert outp.sig.
Description	Use this function to select whether to invert the output signal.
Selection	■ No ■ Yes
Factory setting	No
Additional information	Selection No option (passive - negative)



Yes option (passive - positive)



3.5.3 "Relay output 1 to n" submenu

Navigation	  Expert → Output → Relay output 1 to n
	► Relay output 1 to n Terminal number →  105 Relay output function →  105 Assign flow direction check →  106

Assign limit	→  106
Assign diagnostic behavior	→  107
Assign status	→  107
Switch-off value	→  108
Switch-off delay	→  108
Switch-on value	→  108
Switch-on delay	→  109
Failure mode	→  109
Switch state	→  110
Powerless relay status	→  110

Terminal number

Navigation	  Expert → Output → Relay output 1 to n → Terminal no.
Description	Displays the terminal numbers used by the relay output module.
User interface	■ Not used ■ 24-25 (I/O 2) ■ 22-23 (I/O 3)
Additional information	<i>"Not used" option</i> The relay output module does not use any terminal numbers.

Relay output function



Navigation	  Expert → Output → Relay output 1 to n → Relay outp.func.
Description	Use this function to select an output function for the relay output.
Selection	■ Closed ■ Open ■ Diagnostic behavior ■ Limit ■ Flow direction check ■ Status

Factory setting Closed

Additional information *Selection*

- Closed
The relay output is permanently switched on (closed, conductive).
- Open
The relay output is permanently switched off (open, non-conductive).
- Diagnostic behavior
Indicates if the diagnostic event is present or not. Is used to output diagnostic information and to react to it appropriately at the system level.
- Limit
Indicates if a specified limit value has been reached for the process variable. Is used to output diagnostic information relating to the process and to react to it appropriately at the system level.
- Flow direction check
Indicates the flow direction (forward or reverse flow).
- Digital Output
Indicates the device status depending on whether empty pipe detection or low flow cut off is selected.

Assign flow direction check

Navigation   Expert → Output → Relay output 1 to n → Assign dir.check

Prerequisite The **Flow direction check** option is selected in the **Relay output function** parameter (→  105).

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

Selection

Factory setting Off

Assign limit

Navigation   Expert → Output → Relay output 1 to n → Assign limit

Prerequisite

- The **Limit** option is selected in **Relay output function** parameter (→  105).
- The **Load rate** option is only available if the volume flow of the medium is read in via the Current input 1 to n (→  49) or the fieldbus.

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

Selection

- Off
- Total solids
- Temperature
- Electronics temperature
- Conductivity

- Corrected conductivity
- Load rate *
- Totalizer 1 *

Factory setting Temperature

Assign diagnostic behavior

Navigation	  Expert → Output → Relay output 1 to n → Assign diag. beh
Prerequisite	In the Relay output function parameter (→  105), the Diagnostic behavior option is selected.
Description	Use this function to select the category of the diagnostic events that are displayed for the relay output.
Selection	■ Alarm ■ Alarm or warning ■ Warning
Factory setting	Alarm
Additional information	<i>Description</i>  If no diagnostic event is pending, the relay output is closed and conductive. <i>Selection</i> ■ Alarm The relay output signals only diagnostic events in the alarm category. ■ Alarm or warning The relay output signals diagnostic events in the alarm and warning category. ■ Warning The relay output signals only diagnostic events in the warning category.

Assign status

Navigation	  Expert → Output → Relay output 1 to n → Assign status
Prerequisite	In the Relay output function parameter (→  105), the Digital Output option is selected.
Description	Use this function to select the device status for the relay output.
Selection	■ Off ■ Partially filled pipe detection
Factory setting	Off

* Visibility depends on order options or device settings

Switch-off value



Navigation

Expert → Output → Relay output 1 to n → Switch-off value

Prerequisite

The **Limit** option is selected in the **Relay output function** parameter (→ 105).

Description

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

User entry

Floating point number with sign

Factory setting

0 °C

Additional information

Description

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

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

Dependency The unit is dependent on the process variable selected in the **Assign limit** parameter (→ 106).

Switch-off delay



Navigation

Expert → Output → Relay output 1 to n → Switch-off delay

Prerequisite

In the **Relay output function** parameter (→ 105), the **Limit** option is selected.

Description

Use this function to enter a delay time for switching off the switch output.

User entry

0.0 to 100.0 s

Factory setting

0.0 s

Switch-on value



Navigation

Expert → Output → Relay output 1 to n → Switch-on value

Prerequisite

The **Limit** option is selected in the **Relay output function** parameter (→ 105).

Description

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

User entry

Floating point number with sign

Factory setting

0 °C

Additional information	<i>Description</i> Use this function to enter the limit value for the switch-on value (process variable > switch-on value = closed, conductive).  When using a hysteresis: Switch-on value > Switch-off value. <i>Dependency</i>  The unit is dependent on the process variable selected in the Assign limit parameter (→  106).
Switch-on delay 	
Navigation	  Expert → Output → Relay output 1 to n → Switch-on delay
Prerequisite	In the Relay output function parameter (→  105), the Limit option is selected.
Description	Use this function to enter a delay time for switching on the switch output.
User entry	0.0 to 100.0 s
Factory setting	0.0 s
Failure mode 	
Navigation	  Expert → Output → Relay output 1 to n → Failure mode
Description	Use this function to select the failure mode of the relay output in the event of a device alarm.
Selection	■ Actual status ■ Open ■ Closed
Factory setting	Open
Additional information	<i>Selection</i> ■ Actual status In the event of a device alarm, faults are ignored and the current behavior of the input value is output by the relay output. The Actual status option behaves in the same way as the current input value. ■ Open In the event of a device alarm, the relay output's transistor is set to non-conductive. ■ Closed In the event of a device alarm, the relay output's transistor is set to conductive.

Switch state

Navigation	 Expert → Output → Relay output 1 to n → Switch state
Description	Displays the current status of the relay output.
User interface	■ Open ■ Closed
Additional information	<i>User interface</i> ■ Open The relay output is not conductive. ■ Closed The relay output is conductive.

Powerless relay status



Navigation	 Expert → Output → Relay output 1 to n → Powerless relay
Description	Use this function to select the quiescent state for the relay output.
Selection	■ Open ■ Closed
Factory setting	Open
Additional information	<i>Selection</i> ■ Open The relay output is not conductive. ■ Closed The relay output is conductive.

3.6 "Communication" submenu

Navigation  Expert → Communication

► Communication	
► Modbus configuration	→  111
► Modbus information	→  116
► Modbus data map	→  117
► Web server	→  117

3.6.1 "Modbus configuration" submenu

Navigation  Expert → Communication → Modbus config.

► Modbus configuration		
Bus address	→ 	111
Baudrate	→ 	111
Data transfer mode	→ 	112
Parity	→ 	112
Byte order	→ 	113
Telegram delay	→ 	114
Failure mode	→ 	114
Bus termination	→ 	115
Fieldbus writing access	→ 	115

Bus address

Navigation	 Expert → Communication → Modbus config. → Bus address
Description	For entering the device address.
User entry	1 to 247
Factory setting	247

Baudrate

Navigation	 Expert → Communication → Modbus config. → Baudrate
Description	Use this function to select a transmission rate.
Selection	■ 1200 BAUD ■ 2400 BAUD ■ 4800 BAUD ■ 9600 BAUD ■ 19200 BAUD ■ 38400 BAUD

- 57600 BAUD
- 115200 BAUD
- 230400 BAUD

Factory setting 19200 BAUD

Data transfer mode

Navigation   Expert → Communication → Modbus config. → Data trans. mode

Description Use this function to select the data transmission mode.

- Selection**
- ASCII
 - RTU

Factory setting RTU

Additional information *Options*

- ASCII
Transmission of data in the form of readable ASCII characters. Error protection via LRC.
- RTU
Transmission of data in binary form. Error protection via CRC16.

Parity

Navigation   Expert → Communication → Modbus config. → Parity

Description Use this function to select the parity bit.

- Selection**
- Odd
 - Even
 - None / 1 stop bit
 - None / 2 stop bits

Factory setting Even

Additional information *Options*

Picklist **ASCII** option:

- 0 = **Even** option
- 1 = **Odd** option

Picklist **RTU** option:

- 0 = **Even** option
- 1 = **Odd** option
- 2 = **None / 1 stop bit** option
- 3 = **None / 2 stop bits** option

**Byte order****Navigation**
 Expert → Communication → Modbus config. → Byte order
Description

Use this function to select the sequence in which the bytes are transmitted. The transmission sequence must be coordinated with the Modbus master.

Selection

- 0-1-2-3
- 3-2-1-0
- 1-0-3-2
- 2-3-0-1

Factory setting

1-0-3-2

Additional information*Description*

The byte sequence is not standardized by the Modbus protocol. However, if the host system and the measuring device do not use the same byte sequence, correct data exchange is not possible.

Changing the byte sequence in the host system often requires a extensive knowledge and significant programming efforts. Endress+Hauser introduced the **Byte order** parameter (→  113) for this reason.

This makes it possible to use the standard settings of the host system and change the byte sequence on the measuring device by trial and error. If correct data exchange cannot be achieved by changing the byte sequence, the settings for the byte sequence of the host system must be adapted accordingly.

Byte transmission sequence

Byte addressing, i.e. the transmission sequence of the bytes, is not specified in the Modbus specification. For this reason, it is important to coordinate or match the addressing method between the master and slave during commissioning. This can be configured in the measuring device using the **Byte order** parameter (→  113).

The bytes are transmitted depending on the selection in the **Byte order** parameter (→  113):

FLOAT				
	Sequence			
Options	1.	2.	3.	4.
1 - 0 - 3 - 2 *	Byte 1 (MMMMMMMM)	Byte 0 (MMMMMMMM)	Byte 3 (SEEEEEEE)	Byte 2 (EMMMMMMM)
0 - 1 - 2 - 3	Byte 0 (MMMMMMMM)	Byte 1 (MMMMMMMM)	Byte 2 (EMMMMMMM)	Byte 3 (SEEEEEEE)
2 - 3 - 0 - 1	Byte 2 (EMMMMMMM)	Byte 3 (SEEEEEEE)	Byte 0 (MMMMMMMM)	Byte 1 (MMMMMMMM)
3 - 2 - 1 - 0	Byte 3 (SEEEEEEE)	Byte 2 (EMMMMMMM)	Byte 1 (MMMMMMMM)	Byte 0 (MMMMMMMM)
* = factory setting, S = sign, E = exponent, M = mantissa				

INTEGER		
	Sequence	
Options	1.	2.

1 - 0 - 3 - 2 * 3 - 2 - 1 - 0	Byte 1 (MSB)	Byte 0 (LSB)
0 - 1 - 2 - 3 2 - 3 - 0 - 1	Byte 0 (LSB)	Byte 1 (MSB)
* = factory setting, MSB = most significant byte, LSB = least significant byte		

STRING Presentation taking the example of a device parameter with a data length of 18 bytes.					
	Sequence				
Options	1.	2.	...	17.	18.
1 - 0 - 3 - 2 * 3 - 2 - 1 - 0	Byte 17 (MSB)	Byte 16	...	Byte 1	Byte 0 (LSB)
0 - 1 - 2 - 3 2 - 3 - 0 - 1	Byte 16	Byte 17 (MSB)	...	Byte 0 (LSB)	Byte 1
* = factory setting, MSB = most significant byte, LSB = least significant byte					

Telegram delay

Navigation	Expert → Communication → Modbus config. → Telegram delay
Description	Use this function to enter a delay time after which the measuring device replies to the request telegram of the Modbus master. This allows communication to be adapted to slow Modbus RS485 masters.
User entry	0 to 100 ms
Factory setting	6 ms

Failure mode

Navigation	Expert → Communication → Modbus config. → Failure mode
Description	Use this function to select the measured value output in the event of a diagnostic message via Modbus communication.
Selection	■ NaN value ■ Last valid value
Factory setting	NaN value

Additional information*Options*

- NaN value
The device outputs the NaN value ⁴⁾.
- Last valid value
The device outputs the last valid measured value before the fault occurred.



This effect of this parameter depends on the option selected in the **Assign diagnostic behavior** parameter.

Bus termination

Navigation

Expert → Communication → Modbus config. → Bus termination

Description

Displays whether the terminating resistor is enabled or disabled.

User interface

- Off
- On

Factory setting

Off

Additional information*Selection*

- Off
The terminating resistor is disabled.
- On
The terminating resistor is enabled.



For detailed information about enabling the terminating resistor, see the Operating Instructions for the device, "Enabling the terminating resistor" section

Fieldbus writing access

Navigation

Expert → Communication → Modbus config. → Fieldb.writ.acc.

Description

Use this function to restrict access to the measuring device via fieldbus (Modbus protocol).

Selection

- Read + write
- Read only

Factory setting

Read + write

⁴⁾ Not a Number

Additional information	Description
	If read and/or write protection is enabled, the parameter can only be controlled and reset via local operation. Access is no longer possible via operating tools.
	 This does not affect cyclic measured value transmission to the higher-order system, which is always guaranteed.
	Selection
	■ Read + write The parameters are read and write parameters. ■ Read only ■ The parameters are read only parameters.

3.6.2 "Modbus information" submenu

Navigation  Expert → Communication → Modbus info

► Modbus information

Device ID

→  116

Device revision

→  116

Device ID

Navigation	 Expert → Communication → Modbus info → Device ID
Description	Displays the device ID for identifying the measuring device.
User interface	4-digit hexadecimal number

Device revision

Navigation	 Expert → Communication → Modbus info → Device revision
Description	Displays the device revision.
User interface	4-digit hexadecimal number

3.6.3 "Modbus data map" submenu

Navigation  Expert → Communication → Modbus data map

► Modbus data map

Scan list register 0 to 15

→  117

Scan list register 0 to 15



Navigation   Expert → Communication → Modbus data map → Scan list reg.0 to 15

Description Use this function to enter the scan list register. By entering the register address (1-based), up to 16 device parameters can be grouped by assigning them to the scan list registers 0 to 15. The data of the device parameters assigned here are read out via the register addresses 5051 to 5081.

User entry 1 to 65 535

Factory setting 1

3.6.4 "Web server" submenu

Navigation   Expert → Communication → Web server

► Web server

Web server language

MAC address

DHCP client

IP address

Subnet mask

Default gateway

Web server functionality

Login page

→  118

→  118

→  118

→  119

→  119

→  119

→  120

→  120

Web server language

Navigation	 Expert → Communication → Web server → Webserv.language
Description	Use this function to select the language configured for the Web server.
Selection	■ English ■ Deutsch ■ Français ■ Español ■ Italiano ■ Nederlands ■ Portuguesa ■ Polski ■ русский язык (Russian) ■ Svenska ■ Türkçe ■ 中文 (Chinese) ■ 日本語 (Japanese) ■ 한국어 (Korean) ■ čeština (Czech)
Factory setting	English

MAC address

Navigation	 Expert → Communication → Web server → MAC Address
Description	Displays the MAC ⁵⁾ address of the measuring device.
User interface	Unique 12-digit character string comprising letters and numbers
Factory setting	Each measuring device is given an individual address.
Additional information	<i>Example</i> For the display format 00:07:05:10:01:5F

DHCP client



Navigation	 Expert → Communication → Web server → DHCP client
Description	Use this function to activate and deactivate the DHCP client functionality.
Selection	■ Off ■ On

5) Media Access Control

Factory setting On

Additional information *Effect*

If the DHCP client functionality of the web server is selected, the IP address (→ ) 119), Subnet mask (→ ) 119) and Default gateway (→ ) 119) are set automatically.



- Identification is via the MAC address of the measuring device.
- The IP address (→ ) 119) in the **IP address** parameter (→ ) 119) is ignored as long as the **DHCP client** parameter (→ ) 118) is active. This is also the case, in particular, if the DHCP server cannot be reached. The IP address (→ ) 119) in the parameter of the same name is only used if the **DHCP client** parameter (→ ) 118) is inactive.

IP address

Navigation   Expert → Communication → Web server → IP address

Description Display or enter the IP address of the Web server integrated in the measuring device.

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

Factory setting 192.168.1.212

Subnet mask

Navigation   Expert → Communication → Web server → Subnet mask

Description Display or enter the subnet mask.

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

Factory setting 255.255.255.0

Default gateway

Navigation   Expert → Communication → Web server → Default gateway

Description Display or enter the Default gateway (→ ) 119).

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

Factory setting 0.0.0.0

Web server functionality

Navigation

 Expert → Communication → Web server → Webserver funct.

Description

Use this function to switch the Web server on and off.

- Selection
- Off
 - HTML Off
 - On

Factory setting

On

Additional information

Description

 Once disabled, the Web server functionality can only be enabled again via the local display, the FieldCare operating tool or the DeviceCare operating tool.

Selection

Option	Description
Off	■ The Web server is completely disabled. ■ Port 80 is locked.
HTML Off	The HTML version of the Web server is not available.
On	■ The complete Web server functionality is available. ■ JavaScript is used. ■ The password is transferred in an encrypted state. ■ Any change to the password is also transferred in an encrypted state.

Login page

Navigation

 Expert → Communication → Web server → Login page

Description

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

- Selection
- Without header
 - With header

Factory setting

With header

3.6.5 "WLAN settings" wizard

Navigation

 Expert → Communication → WLAN settings

▶ WLAN settings

WLAN

→ 121

WLAN mode	→ ⓘ 122
SSID name	→ ⓘ 122
Network security	→ ⓘ 122
Security identification	→ ⓘ 123
User name	→ ⓘ 123
WLAN password	→ ⓘ 123
WLAN IP address	→ ⓘ 124
WLAN MAC address	→ ⓘ 124
WLAN subnet mask	→ ⓘ 124
WLAN MAC address	→ ⓘ 124
WLAN passphrase	→ ⓘ 124
WLAN MAC address	→ ⓘ 124
Assign SSID name	→ ⓘ 125
SSID name	→ ⓘ 125
2.4 GHz WLAN channel	→ ⓘ 125
Select antenna	→ ⓘ 126
Connection state	→ ⓘ 126
Received signal strength	→ ⓘ 126
WLAN IP address	→ ⓘ 124
Gateway IP address	→ ⓘ 127
IP address domain name server	→ ⓘ 127

WLAN

Navigation ⓘ ⓘ Expert → Communication → WLAN settings → WLAN

Description Use this function to enable and disable the WLAN connection.

Selection

- Disable
- Enable

Factory setting Enable

WLAN mode

Navigation   Expert → Communication → WLAN settings → WLAN mode

Description Use this function to select the WLAN mode.

Selection

- WLAN access point
- WLAN Client

Factory setting WLAN access point

SSID name

Navigation   Expert → Communication → WLAN settings → SSID name

Prerequisite The client is activated.

Description Use this function to enter the user-defined SSID name (max. 32 characters) of the WLAN network.

User entry –

Factory setting –

Network security

Navigation   Expert → Communication → WLAN settings → Network security

Description Use this function to select the type of security for the WLAN interface.

Selection

- Unsecured
- WPA2-PSK
- EAP-PEAP with MSCHAPv2 *
- EAP-PEAP MSCHAPv2 no server authentic. *
- EAP-TLS *

Factory setting WPA2-PSK

* Visibility depends on order options or device settings

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

Navigation	 Expert → Communication → WLAN settings → Sec. identific.
Description	Use this function to select the security settings (download via the menu: Data Management > Security > Download WLAN).
User interface	■ Trusted issuer certificate ■ Device certificate ■ Device private key

User name



Navigation	 Expert → Communication → WLAN settings → User name
Description	Use this function to enter the username of the WLAN network.
User entry	–
Factory setting	–

WLAN password



Navigation	 Expert → Communication → WLAN settings → WLAN password
Description	Use this function to enter the WLAN password for the WLAN network.
User entry	–
Factory setting	–

WLAN IP address



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

WLAN MAC address

Navigation	 Expert → Communication → WLAN settings → WLAN MAC address
Description	Displays the MAC ⁶⁾ address of the measuring device.
User interface	Unique 12-digit character string comprising letters and numbers
Factory setting	Each measuring device is given an individual address.
Additional information	<i>Example</i> For the display format 00:07:05:10:01:5F

WLAN subnet mask



Navigation	 Expert → Communication → WLAN settings → WLAN subnet mask
Description	Use this function to enter the subnet mask.
User entry	4 octet: 0 to 255 (in the particular octet)
Factory setting	255.255.255.0

WLAN passphrase



Navigation	 Expert → Communication → WLAN settings → WLAN passphrase
Prerequisite	The WPA2-PSK option is selected in the Security type parameter (→  122).
Description	Use this function to enter the network key.

6) Media Access Control

User entry	8 to 32-digit character string comprising numbers, letters and special characters (without spaces)
Factory setting	Serial number of the measuring device (e.g. L100A802000)

Assign SSID name

Navigation	  Expert → Communication → WLAN settings → Assign SSID name
Description	Use this function to select which name is used for the SSID ⁷⁾ .
Selection	■ Device tag ■ User-defined
Factory setting	User-defined
Additional information	<i>Selection</i> ■ Device tag The device tag name is used as the SSID. ■ User-defined A user-defined name is used as the SSID.

SSID name

Navigation	  Expert → Communication → WLAN settings → SSID name
Prerequisite	■ The User-defined option is selected in the Assign SSID name parameter (→  125). ■ The WLAN access point option is selected in the WLAN mode parameter (→  122).
Description	Use this function to enter a user-defined SSID name.
User entry	Max. 32-digit character string comprising numbers, letters and special characters
Factory setting	

2.4 GHz WLAN channel

Navigation	  Expert → Communication → WLAN settings → WLAN channel
Description	Use this function to enter the 2.4 GHz WLAN channel.
User entry	1 to 11
Factory setting	6

⁷⁾ Service Set Identifier

Additional information*Description*

- It is only necessary to enter a 2.4 GHz WLAN channel if multiple WLAN devices are in use.
- If just one measuring device is in use, it is recommended to keep the factory setting.

Select antenna**Navigation**

Expert → Communication → WLAN settings → Select antenna

Description

Use this function to select whether the external or internal antenna is used for reception.

Selection

- External antenna
- Internal antenna

Factory setting

Internal antenna

Connection state**Navigation**

Expert → Communication → WLAN settings → Connection state

Description

The connection status is displayed.

User interface

- Connected
- Not connected

Factory setting

Not connected

Received signal strength**Navigation**

Expert → Communication → WLAN settings → Rec.sig.strength

Description

Displays the signal strength received.

User interface

- Low
- Medium
- High

Factory setting

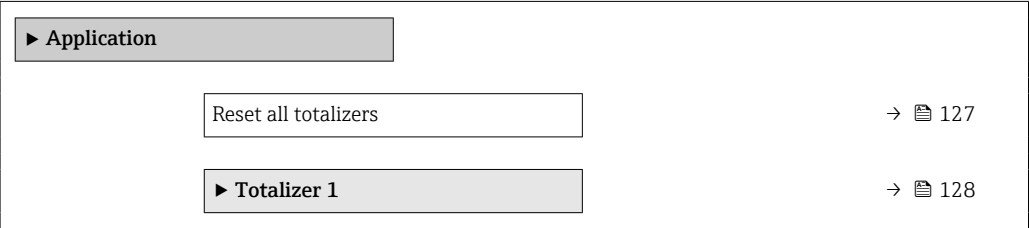
High

Gateway IP address	
Navigation	  Expert → Communication → WLAN settings → Gateway IP addr.
Description	Use this function to enter the IP address of the gateway.
User interface	Character string comprising numbers, letters and special characters
Factory setting	192.168.1.212

IP address domain name server	
Navigation	  Expert → Communication → WLAN settings → IP address DNS
Description	Use this function to enter the IP address of the domain name server.
User interface	Character string comprising numbers, letters and special characters
Factory setting	192.168.1.212

3.7 "Application" submenu

Navigation   Expert → Application

	
--	--

Reset all totalizers	
Navigation	  Expert → Application → Reset all tot.
Description	Use this function to reset all totalizers to the value 0 and restart the totaling process. This deletes all the previously aggregated flow values.
Selection	■ Cancel ■ Reset + totalize
Factory setting	Cancel

Additional information

Selection

Options	Description
Cancel	No action is executed and the user exits the parameter.
Reset + totalize	Resets the totalizer to 0 and restarts the totaling process. The previously aggregated load quantity is thus deleted.

3.7.1

"Totalizer 1 to n" submenu

Navigation

 Expert → Application → Totalizer 1 to n

► Totalizer 1

Assign process variable 1

→  128

Process variable unit 1

→  129

Totalizer 1 operation mode

→  129

Totalizer 1 control

→  130

Preset value 1

→  131

Totalizer 1 failure behavior

→  131

Assign process variable 1

Navigation

 Expert → Application → Totalizer 1 → AssignVariab. 1

Prerequisite

The **Load rate** option is only available if the volume flow of the medium is read in via the Current input 1 to n (→  49) or the fieldbus.

Description

Use this function to select a process variable for the Totalizer 1 to n.

- Selection
- Off

■ Load rate ^{*}

Factory setting

Off

*

Visibility depends on order options or device settings

Additional information*Description*

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

Options

If the **Off** option is selected, only the **Assign process variable** parameter (→  128) is still displayed in the **Totalizer 1 to n** submenu. All other parameters in the submenu are hidden.

Process variable unit 1**Navigation**

  Expert → Application → Totalizer 1 → VariableUnit 1

Prerequisite

A process variable is selected in the **Assign process variable** parameter (→  128) of the **Totalizer 1 to n** submenu.

Description

Use this function to select the process variable unit for the Totalizer 1 to n (→  128).

Selection*SI units*

- kg
- t

US units

- oz
- lb
- STon

or

Other units

None *

* Visibility depends on order options or device settings

Factory setting

Depends on country

Additional information*Description*

The unit is selected separately for the totalizer and is independent of the option selected in the **System units** submenu (→  54).

Options

The selection is dependent on the process variable selected in the **Assign process variable** parameter (→  128).

Totalizer 1 operation mode**Navigation**

  Expert → Application → Totalizer 1 → Operat. mode 1

Prerequisite

A process variable is selected in the **Assign process variable** parameter (→  128) of the **Totalizer 1 to n** submenu.

Description

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

Selection	■ Net ■ Forward ■ Reverse
Factory setting	Net
Additional information	<i>Selection</i> ■ Net flow total Flow values in the forward and reverse flow direction are totalized and balanced against one another. Net flow is registered in the flow direction. ■ Forward flow total Only the flow in the forward flow direction is totalized. ■ Reverse flow total Only the flow in the reverse flow direction is totalized (= reverse flow quantity).

Totalizer 1 control

Navigation	 Expert → Application → Totalizer 1 → Tot. 1 control
Prerequisite	A process variable is selected in the Assign process variable parameter (→  128) of the Totalizer 1 to n submenu.
Description	Use this function to select the control of totalizer value 1-3.
Selection	■ Totalize ■ Reset + hold ■ Preset + hold ■ Reset + totalize ■ Preset + totalize ■ Hold
Factory setting	Totalize
Additional information	<i>Selection</i>

Options	Description
Totalize	The totalizer is started or continues running.
Reset + hold	The totaling process is stopped and the totalizer is reset to 0.
Preset + hold ¹⁾	The totaling process is stopped and the totalizer is set to its defined start value from the Preset value parameter.
Reset + totalize	The totalizer is reset to 0 and the totaling process is restarted.
Preset + totalize ¹⁾	The totalizer is set to the defined start value in the Preset value parameter and the totaling process is restarted.
Hold	Totalizing is stopped.

1) Visible depending on the order options or device settings

Preset value 1

Navigation	 Expert → Application → Totalizer 1 → Preset value 1
Prerequisite	A process variable is selected in the Assign process variable parameter (→  128) of the Totalizer 1 to n submenu.
Description	Use this function to enter a start value for the Totalizer 1 to n.
User entry	Signed floating-point number
Factory setting	0 kg
Additional information	<i>User entry</i>  The unit of the selected process variable is defined in the Unit totalizer parameter (→  129) for the totalizer.

Totalizer 1 failure behavior



Navigation	 Expert → Application → Totalizer 1 → FailureBehav. 1
Prerequisite	A process variable is selected in the Assign process variable parameter (→  128) of the Totalizer 1 to n submenu.
Description	Use this function to select how a totalizer behaves in the event of a device alarm.
Selection	■ Hold ■ Continue ■ Last valid value + continue
Factory setting	Hold
Additional information	<i>Description</i>  This setting does not affect the failsafe mode of other totalizers and the outputs. This is specified in separate parameters.
	<i>Selection</i> ■ Stop The totalizer is stopped in the event of a device alarm. ■ Actual value The totalizer continues to count based on the actual (current) measured value; the device alarm is ignored. ■ Last valid value The totalizer continues to count based on the last valid measured value before the device alarm occurred.

3.8 "Diagnostics" submenu

Navigation  Expert → Diagnostics

► Diagnostics		
Actual diagnostics	→ 	132
Previous diagnostics	→ 	133
Operating time from restart	→ 	134
Operating time	→ 	134
► Diagnostic list	→ 	135
► Event logbook	→ 	137
► Device information	→ 	139
► Main electronic module + I/O module 1	→ 	142
► Sensor electronic module (ISEM)	→ 	143
► I/O module 2	→ 	144
► I/O module 3	→ 	145
► Display module	→ 	147
► Data logging	→ 	148
► Min/max values	→ 	155
► Heartbeat Technology	→ 	160
► Simulation	→ 	160

Actual diagnostics

Navigation  Expert → Diagnostics → Actual diagnos.

Prerequisite A diagnostic event has occurred.

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

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

Additional information *Display*

 Additional pending diagnostic messages can be viewed in the **Diagnostic list** submenu (→  135).

 Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the  key.

Example

For the display format:

⊗F271 Main electronic failure

Timestamp

Navigation  Expert → Diagnostics → Timestamp

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

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

Additional information *Display*

 The diagnostic message can be viewed via the **Actual diagnostics** parameter (→  132).

Example

For the display format:

24d12h13m00s

Previous diagnostics

Navigation   Expert → Diagnostics → Prev.diagnostics

Prerequisite Two diagnostic events have already occurred.

Description Displays the diagnostic message that occurred before the current message.

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

Additional information *Display*

 Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the  key.

Example

For the display format:

⊗F271 Main electronic failure

Timestamp

Navigation	 Expert → Diagnostics → Timestamp
Description	Displays the operating time when the last diagnostic message before the current message occurred.
User interface	Days (d), hours (h), minutes (m) and seconds (s)
Additional information	<i>Display</i>  The diagnostic message can be viewed via the Previous diagnostics parameter (→  133). <i>Example</i> For the display format: 24d12h13m00s

Operating time from restart

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

Operating time

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

3.8.1 "Diagnostic list" submenu

Navigation  Expert → Diagnostics → Diagnostic list

► Diagnostic list		
Diagnostics 1	→ 	135
Diagnostics 2	→ 	135
Diagnostics 3	→ 	136
Diagnostics 4	→ 	136
Diagnostics 5	→ 	137

Diagnostics 1

Navigation	 Expert → Diagnostics → Diagnostic list → Diagnostics 1
Description	Displays the current diagnostics message with the highest priority.
User interface	Symbol for diagnostic behavior, diagnostic code and short message.
Additional information	Display  Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the  key. Examples For the display format: ■  F271 Main electronic failure ■  F276 I/O module failure

Diagnostics 2

Navigation	 Expert → Diagnostics → Diagnostic list → Diagnostics 2
Description	Displays the current diagnostics message with the second-highest priority.
User interface	Symbol for diagnostic behavior, diagnostic code and short message.

Additional information*Display*

Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the key.

Examples

For the display format:

- F271 Main electronic failure
- F276 I/O module failure

Diagnostics 3

Navigation

Expert → Diagnostics → Diagnostic list → Diagnostics 3

Description

Displays the current diagnostics message with the third-highest priority.

User interface

Symbol for diagnostic behavior, diagnostic code and short message.

Additional information*Display*

Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the key.

Examples

For the display format:

- F271 Main electronic failure
- F276 I/O module failure

Diagnostics 4

Navigation

Expert → Diagnostics → Diagnostic list → Diagnostics 4

Description

Displays the current diagnostics message with the fourth-highest priority.

User interface

Symbol for diagnostic behavior, diagnostic code and short message.

Additional information*Display*

Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the key.

Examples

For the display format:

- F271 Main electronic failure
- F276 I/O module failure

Diagnostics 5

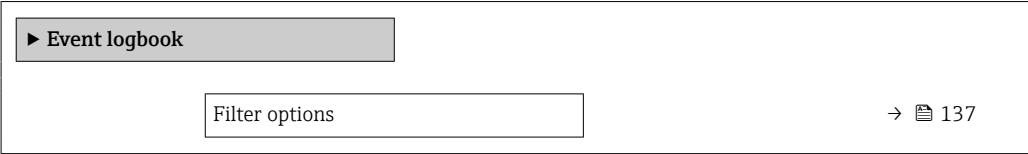
Navigation	 Expert → Diagnostics → Diagnostic list → Diagnostics 5
Description	Displays the current diagnostics message with the fifth-highest priority.
User interface	Symbol for diagnostic behavior, diagnostic code and short message.
Additional information	Display  Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the  key. Examples For the display format: ■  F271 Main electronic failure ■  F276 I/O module failure

3.8.2 "Event logbook" submenu

Displays event messages

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

Navigation  Expert → Diagnostics → Event logbook



Filter options

Navigation	 Expert → Diagnostics → Event logbook → Filter options
Description	Use this function to select the category whose event messages are displayed in the event list of the local display.
Selection	■ All ■ Failure (F) ■ Function check (C) ■ Out of specification (S) ■ Maintenance required (M) ■ Information (I)
Factory setting	All

Additional information	Description i The status signals are categorized in accordance with VDI/VDE 2650 and NAMUR Recommendation NE 107: ■ F = Failure ■ C = Function Check ■ S = Out of Specification ■ M = Maintenance Required
	"Event list" submenu i The Event list submenu is only displayed if operating via the local display. If operating via the FieldCare operating tool, the event list can be read out with a separate FieldCare module. If operating via the Web browser, the event messages can be found directly in the Event logbook submenu.
	Navigation Expert → Diagnostics → Event logbook → Event list
	► Event list Event list → 138
Event list	
Navigation	Expert → Diagnostics → Event logbook → Event list
Description	Displays the history of event messages of the category selected in the Filter options parameter (→ 137).
User interface	■ For a "Category I" event message Information event, short message, symbol for event recording and operating time when error occurred ■ For a "Category F, C, S, M" event message (status signal) Diagnostics code, short message, symbol for event recording and operating time when error occurred
Additional information	Description A maximum of 20 event messages are displayed in chronological order. If the Extended HistoROM application package (order option) is enabled in the device, the event list can contain up to 100 entries .

The following symbols indicate whether an event has occurred or has ended:

- ↻: Occurrence of the event
- ⌛: End of the event

Examples

For the display format:

- I1091 Configuration modified
 ↻ 24d12h13m00s
- ⌛F271 Main electronic failure
 ⌛ 01d04h12min30s

HistoROM

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

3.8.3 "Device information" submenu

Navigation   Expert → Diagnostics → Device info

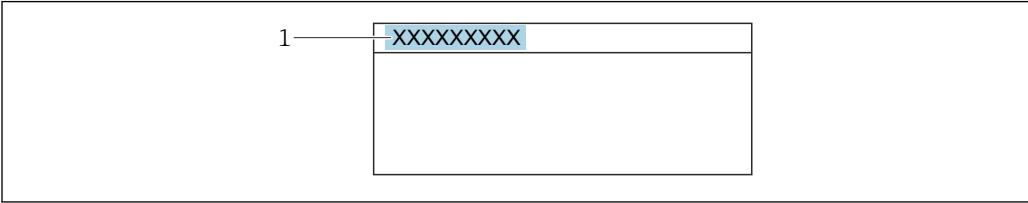
► Device information		
Device tag	→ 	139
Serial number	→ 	140
Firmware version	→ 	140
Device name	→ 	141
Order code	→ 	141
Extended order code 1	→ 	141
Extended order code 2	→ 	141
Extended order code 3	→ 	142
ENP version	→ 	142

Device tag

Navigation   Expert → Diagnostics → Device info → Device tag

Description Displays a unique name for the measuring point so it can be identified quickly within the plant. It is displayed in the header.

User interface	Max. 32 characters, such as letters, numbers or special characters (e.g. @, %, /).
Factory setting	Teqwave M
Additional information	User interface



A0029422

1 Position of the header text on the display

The number of characters displayed depends on the characters used.

Serial number

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

Firmware version

Navigation	 Expert → Diagnostics → Device info → Firmware version
Description	Displays the device firmware version installed.
User interface	Character string in the format xx.yy.zz
Additional information	Display  The Firmware version is also located: ▪ On the title page of the Operating instructions ▪ On the transmitter nameplate

Device name	
Navigation	  Expert → Diagnostics → Device info → Device name
Description	Displays the name of the transmitter. It can also be found on the nameplate of the transmitter.
User interface	Character string comprising numbers, letters and special characters
Order code	
Navigation	  Expert → Diagnostics → Device info → Order code
Description	Displays the device order code.
User interface	Character string composed of letters, numbers and certain punctuation marks (e.g. /).
Additional information	<i>Description</i> The order code is generated from the extended order code through a process of reversible transformation. The extended order code indicates the attributes for all the device features in the product structure. The device features are not directly readable from the order code.  Uses of the order code ■ To order an identical spare device. ■ To identify the device quickly and easily, e.g. when contacting Endress+Hauser.
Extended order code 1	
Navigation	  Expert → Diagnostics → Device info → Ext. order cd. 1
Description	Displays the first part of the extended order code. On account of length restrictions, the extended order code is split into a maximum of 3 parameters.
User interface	Character string
Additional information	<i>Description</i> The extended order code indicates the version of all the features of the product structure for the measuring device and thus uniquely identifies the measuring device.
Extended order code 2	
Navigation	  Expert → Diagnostics → Device info → Ext. order cd. 2
Description	Displays the second part of the extended order code.

User interface	Character string
Additional information	For additional information, see Extended order code 1 parameter (→  141)

Extended order code 3

Navigation	  Expert → Diagnostics → Device info → Ext. order cd. 3
Description	Displays the third part of the extended order code.
User interface	Character string
Additional information	For additional information, see Extended order code 1 parameter (→  141)

ENP version

Navigation	  Expert → Diagnostics → Device info → ENP version
Description	Displays the version of the electronic nameplate.
User interface	Character string
Factory setting	2.02.00
Additional information	<i>Description</i> This electronic nameplate stores a data record for device identification that includes more data than the nameplates attached to the outside of the device.

3.8.4 "Main electronic module + I/O module 1" submenu

Navigation   Expert → Diagnostics 1 → Main elec.+I/O1

► Main electronic module + I/O module 1

Firmware version

→  143

Build no. software

→  143

Bootloader revision

→  143

Firmware version

Navigation	  Expert → Diagnostics → Main elec.+I/O1 → Firmware version
Description	Use this function to display the software revision of the module.
User interface	Positive integer

Build no. software

Navigation	  Expert → Diagnostics → Main elec.+I/O1 → Build no. softw.
Description	Use this function to display the software build number of the module.
User interface	Positive integer

Bootloader revision

Navigation	  Expert → Diagnostics → Main elec.+I/O1 → Bootloader rev.
Description	Use this function to display the bootloader revision of the software.
User interface	Positive integer

3.8.5 "Sensor electronic module (ISEM)" submenu

Navigation   Expert → Diagnostics → Sens. electronic

► Sensor electronic module (ISEM)	
Firmware version	→  144
Build no. software	→  144
Bootloader revision	→  144

Firmware version

Navigation	  Expert → Diagnostics → Sens. electronic → Firmware version
Description	Use this function to display the software revision of the module.
User interface	Positive integer

Build no. software

Navigation	  Expert → Diagnostics → Sens. electronic → Build no. softw.
Description	Use this function to display the software build number of the module.
User interface	Positive integer

Bootloader revision

Navigation	  Expert → Diagnostics → Sens. electronic → Bootloader rev.
Description	Use this function to display the bootloader revision of the software.
User interface	Positive integer

3.8.6 "I/O module 2" submenu

Navigation   Expert → Diagnostics → I/O module 2

► I/O module 2

I/O module 2 terminal numbers

Firmware version

Build no. software

Bootloader revision

→  145

→  145

→  145

→  145

I/O module 2 terminal numbers

Navigation	 Expert → Diagnostics → I/O module 2 → I/O 2 terminals
Description	Displays the terminal numbers used by the I/O module.
User interface	■ Not used ■ 26-27 (I/O 1) ■ 24-25 (I/O 2) ■ 22-23 (I/O 3)

Firmware version

Navigation	 Expert → Diagnostics → I/O module 2 → Firmware version
Description	Use this function to display the software revision of the module.
User interface	Positive integer

Build no. software

Navigation	 Expert → Diagnostics → I/O module 2 → Build no. softw.
Description	Use this function to display the software build number of the module.
User interface	Positive integer

Bootloader revision

Navigation	 Expert → Diagnostics → I/O module 2 → Bootloader rev.
Description	Use this function to display the bootloader revision of the software.
User interface	Positive integer

3.8.7 "I/O module 3" submenu

Navigation  Expert → Diagnostics → I/O module 3



I/O module 3 terminal numbers	→ 146
Firmware version	→ 146
Build no. software	→ 146
Bootloader revision	→ 146

I/O module 3 terminal numbers

Navigation	  Expert → Diagnostics → I/O module 3 → I/O 3 terminals
Description	Displays the terminal numbers used by the I/O module.
User interface	■ Not used ■ 26-27 (I/O 1) ■ 24-25 (I/O 2) ■ 22-23 (I/O 3)

Firmware version

Navigation	  Expert → Diagnostics → I/O module 3 → Firmware version
Description	Use this function to display the software revision of the module.
User interface	Positive integer

Build no. software

Navigation	  Expert → Diagnostics → I/O module 3 → Build no. softw.
Description	Use this function to display the software build number of the module.
User interface	Positive integer

Bootloader revision

Navigation	  Expert → Diagnostics → I/O module 3 → Bootloader rev.
Description	Use this function to display the bootloader revision of the software.

User interface Positive integer

3.8.8 "Display module" submenu

Navigation   Expert → Diagnostics → Display module

► Display module

Firmware version

→  147

Build no. software

→  147

Bootloader revision

→  147

Firmware version

Navigation   Expert → Diagnostics → Display module → Firmware version

Description Use this function to display the software revision of the module.

User interface Positive integer

Build no. software

Navigation   Expert → Diagnostics → Display module → Build no. softw.

Description Use this function to display the software build number of the module.

User interface Positive integer

Bootloader revision

Navigation   Expert → Diagnostics → Display module → Bootloader rev.

Description Use this function to display the bootloader revision of the software.

User interface Positive integer

3.8.9 "Data logging" submenu

Navigation  Expert → Diagnostics → Data logging

► Data logging		
Assign channel 1	→ 	148
Assign channel 2	→ 	149
Assign channel 3	→ 	149
Assign channel 4	→ 	150
Logging interval	→ 	150
Clear logging data	→ 	151
Data logging	→ 	151
Logging delay	→ 	152
Data logging control	→ 	152
Data logging status	→ 	152
Entire logging duration	→ 	153

Assign channel 1

Navigation  Expert → Diagnostics → Data logging → Assign chan. 1

Prerequisite

- The **Load rate** option is only available if the volume flow of the medium is read in via the Current input 1 to n (→  49) or the fieldbus.
- The **Extended HistoROM** application package is available.

 The software options currently enabled are displayed in the **Software option overview** parameter (→  45).

Description Use this function to assign a process variable to the data logging channel.

- Selection
- Off
 - Total solids
 - Temperature
 - Electronics temperature
 - Conductivity
 - Corrected conductivity

- Load rate *
- Current output 1 *
- Current output 2 *
- Current output 3 *
- Current output 4 *

Factory setting Off

Additional information *Description*

A total of 1000 measured values can be logged. This means:

- 1000 data points if 1 logging channel is used
- 500 data points if 2 logging channels are used
- 333 data points if 3 logging channels are used
- 250 data points if 4 logging channels are used

Once the maximum number of data points is reached, the oldest data points in the data log are cyclically overwritten in such a way that the last 1000, 500, 333 or 250 measured values are always in the log (ring memory principle).

 The log contents are cleared if the option selected is changed.

Assign channel 2

Navigation   Expert → Diagnostics → Data logging → Assign chan. 2

Prerequisite

- The **Load rate** option is only available if the volume flow of the medium is read in via the Current input 1 to n (→  49) or the fieldbus.
- The **Extended HistoROM** application package is available.

 The software options currently enabled are displayed in the **Software option overview** parameter (→  45).

Description Use this function to assign a process variable to the logging channel.

Selection For the picklist, see **Assign channel 1** parameter (→  148)

Factory setting Off

Assign channel 3

Navigation   Expert → Diagnostics → Data logging → Assign chan. 3

Prerequisite

- The **Load rate** option is only available if the volume flow of the medium is read in via the Current input 1 to n (→  49) or the fieldbus.
- The **Extended HistoROM** application package is available.

 The software options currently enabled are displayed in the **Software option overview** parameter (→  45).

* Visibility depends on order options or device settings

Description	Use this function to assign a process variable to the logging channel.
Selection	For the picklist, see Assign channel 1 parameter (→  148)
Factory setting	Off

Assign channel 4

Navigation	  Expert → Diagnostics → Data logging → Assign chan. 4
Prerequisite	■ The Load rate option is only available if the volume flow of the medium is read in via the Current input 1 to n (→  49) or the fieldbus. ■ The Extended HistoROM application package is available.  The software options currently enabled are displayed in the Software option overview parameter (→  45).
Description	Use this function to assign a process variable to the logging channel.
Selection	For the picklist, see Assign channel 1 parameter (→  148)
Factory setting	Off

Logging interval

Navigation	  Expert → Diagnostics → Data logging → Logging interval
Prerequisite	The Extended HistoROM application package is available.  The software options currently enabled are displayed in the Software option overview parameter (→  45).
Description	Use this function to enter the logging interval T_{log} for data logging.
User entry	0.1 to 3 600.0 s
Factory setting	1.0 s
Additional information	<i>Description</i> This defines the interval between the individual data points in the data log, and thus the maximum loggable process time T_{log}: ■ If 1 logging channel is used: $T_{log} = 1000 \times t_{log}$ ■ If 2 logging channels are used: $T_{log} = 500 \times t_{log}$ ■ If 3 logging channels are used: $T_{log} = 333 \times t_{log}$ ■ If 4 logging channels are used: $T_{log} = 250 \times t_{log}$

Once this time elapses, the oldest data points in the data log are cyclically overwritten such that a time of $T_{\log}$ always remains in the memory (ring memory principle).



The log contents are cleared if the length of the logging interval is changed.

Example

If 1 logging channel is used:

- $T_{\log} = 1000 \times 1 \text{ s} = 1\,000 \text{ s} \approx 15 \text{ min}$
- $T_{\log} = 1000 \times 10 \text{ s} = 10\,000 \text{ s} \approx 3 \text{ h}$
- $T_{\log} = 1000 \times 80 \text{ s} = 80\,000 \text{ s} \approx 1 \text{ d}$
- $T_{\log} = 1000 \times 3\,600 \text{ s} = 3\,600\,000 \text{ s} \approx 41 \text{ d}$

Clear logging data



Navigation

Expert → Diagnostics → Data logging → Clear logging

Prerequisite

The **Extended HistoROM** application package is available.



The software options currently enabled are displayed in the **Software option overview** parameter (→ 45).

Description

Use this function to clear the entire logging data.

Selection

- Cancel
- Clear data

Factory setting

Cancel

Additional information

Selection

- Cancel
The data is not cleared. All the data is retained.
- Clear data
The logging data is cleared. The logging process starts from the beginning.

Data logging



Navigation

Expert → Diagnostics → Data logging → Data logging

Description

Use this function to select the data logging method.

Selection

- Overwriting
- Not overwriting

Factory setting

Overwriting

Additional information

Selection

- Overwriting
The device memory applies the FIFO principle.
- Not overwriting
Data logging is canceled if the measured value memory is full (single shot).

Logging delay

Navigation	  Expert → Diagnostics → Data logging → Logging delay
Prerequisite	In the Data logging parameter (→  151), the Not overwriting option is selected.
Description	Use this function to enter the time delay for measured value logging.
User entry	0 to 999 h
Factory setting	0 h
Additional information	<i>Description</i> Once data logging has been started with the Data logging control parameter (→  152), the device does not save any data for the duration of the delay time entered.

Data logging control

Navigation	  Expert → Diagnostics → Data logging → Data log.control
Prerequisite	In the Data logging parameter (→  151), the Not overwriting option is selected.
Description	Use this function to start and stop measured value logging.
Selection	■ None ■ Delete + start ■ Stop
Factory setting	None
Additional information	<i>Selection</i> ■ None Initial measured value logging status. ■ Delete + start All the measured values recorded for all the channels are deleted and measured value logging starts again. ■ Stop Measured value logging is stopped.

Data logging status

Navigation	  Expert → Diagnostics → Data logging → Data log. status
Prerequisite	In the Data logging parameter (→  151), the Not overwriting option is selected.
Description	Displays the measured value logging status.

User interface	■ Done ■ Delay active ■ Active ■ Stopped
Factory setting	Done
Additional information	<i>Selection</i> ■ Done Measured value logging has been performed and completed successfully. ■ Delay active Measured value logging has been started but the logging interval has not yet elapsed. ■ Active The logging interval has elapsed and measured value logging is active. ■ Stopped Measured value logging is stopped.

Entire logging duration

Navigation	 Expert → Diagnostics → Data logging → Logging duration
Prerequisite	In the Data logging parameter (→  151), the Not overwriting option is selected.
Description	Displays the total logging duration.
User interface	Positive floating-point number
Factory setting	0 s

"Display channel 1" submenu

Navigation  Expert → Diagnostics → Data logging → Displ.channel 1



Display channel 1

Navigation	 Expert → Diagnostics → Data logging → Displ.channel 1
Prerequisite	The Extended HistorOM application package is available.  The software options currently enabled are displayed in the Software option overview parameter (→  45).

Description

Displays the measured value trend for the logging channel in the form of a chart.

- Additional information
- Description
- x-axis: depending on the number of channels selected displays 250 to 1000 measured values of a process variable.
 - y-axis: displays the approximate measured value span and constantly adapts this to the ongoing measurement.

"Display channel 2" submenu

Navigation  Expert → Diagnostics → Data logging → Displ.channel 2

► Display channel 2

Display channel 2 →  154

Display channel 2

Navigation  Expert → Diagnostics → Data logging → Displ.channel 2

Prerequisite A process variable is specified in the **Assign channel 2** parameter.

Description See the **Display channel 1** parameter →  153

"Display channel 3" submenu

Navigation  Expert → Diagnostics → Data logging → Displ.channel 3

► Display channel 3

Display channel 3 →  154

Display channel 3

Navigation  Expert → Diagnostics → Data logging → Displ.channel 3

Prerequisite A process variable is specified in the **Assign channel 3** parameter.

Description See the **Display channel 1** parameter →  153

"Display channel 4" submenu

Navigation  Expert → Diagnostics → Data logging → Displ.channel 4

► Display channel 4

Display channel 4 →  155

Display channel 4

Navigation	 Expert → Diagnostics → Data logging → Displ.channel 4
Prerequisite	A process variable is specified in the Assign channel 4 parameter.
Description	See the Display channel 1 parameter →  153

3.8.10 "Min/max values" submenu

Navigation   Expert → Diagnostics → Min/max val.

► Min/max values

► Electronics temperature →  155

► Main electronics temperature →  156

► Sensor electronics temperature (ISEM) →  157

► Medium temperature →  158

► Total solids →  158

► Conductivity →  159

"Electronics temperature" submenu

Navigation   Expert → Diagnostics → Min/max val. → Electronics temp

► Electronics temperature

Minimum value

Navigation	  Expert → Diagnostics → Min/max val. → Electronics temp → Minimum value
Description	Shows the lowest electronics temperature measured to date.
User interface	Positive floating-point number

Maximum value

Navigation	  Expert → Diagnostics → Min/max val. → Electronics temp → Maximum value
Description	Shows the highest electronics temperature measured to date.
User interface	Positive floating-point number

"Main electronics temperature" submenu

Navigation   Expert → Diagnostics → Min/max val. → Main elect.temp.

► Main electronics temperature

Maximum value

→  157

Minimum value

→  156

Minimum value

Navigation	  Expert → Diagnostics → Min/max val. → Main elect.temp. → Minimum value
Description	Shows the lowest temperature measured to date for the main electronic module.
User interface	Signed floating-point number
Additional information	<i>Dependency</i>  The unit is taken from the Temperature unit parameter (→  56)

Maximum value

Navigation	 Expert → Diagnostics → Min/max val. → Main elect.temp. → Maximum value
Description	Shows the highest temperature measured to date for the main electronic module.
User interface	Signed floating-point number
Additional information	<i>Dependency</i>  The unit is taken from the Temperature unit parameter (→  56)

"Sensor electronics temperature (ISEM)" submenu

Navigation  Expert → Diagnostics → Min/max val. → Sensor elec.temp

► Sensor electronics temperature (ISEM)

Maximum value

→  157

Minimum value

→  157

Minimum value

Navigation	 Expert → Diagnostics → Min/max val. → Sensor elec.temp → Minimum value
Description	Shows the lowest temperature measured to date for the sensor electronic module.
User interface	Signed floating-point number

Maximum value

Navigation	 Expert → Diagnostics → Min/max val. → Sensor elec.temp → Maximum value
Description	Shows the highest temperature measured to date for the sensor electronic module.
User interface	Signed floating-point number

"Medium temperature" submenu

Navigation  Expert → Diagnostics → Min/max val. → Medium temp.

► Medium temperature

Maximum value

→  158

Minimum value

→  158

Minimum value

Navigation	 Expert → Diagnostics → Min/max val. → Medium temp. → Minimum value
Description	Shows the lowest medium temperature measured to date.
User interface	Signed floating-point number

Maximum value

Navigation	 Expert → Diagnostics → Min/max val. → Medium temp. → Maximum value
Description	Shows the highest medium temperature measured to date.
User interface	Signed floating-point number

"Total solids" submenu

Navigation  Expert → Diagnostics → Min/max val. → Total solids

► Total solids

Maximum value

→  159

Minimum value

→  159

Maximum value	
Navigation	  Expert → Diagnostics → Min/max val. → Total solids → Maximum value
Description	Shows the highest total solids value measured to date.
User interface	Positive floating-point number

Minimum value	
Navigation	  Expert → Diagnostics → Min/max val. → Total solids → Minimum value
Description	Shows the lowest total solids value measured to date.
User interface	Positive floating-point number

"Conductivity" submenu

Navigation   Expert → Diagnostics → Min/max val. → Conductivity

► Conductivity

Maximum value

→  159

Minimum value

→  159

Maximum value	
Navigation	  Expert → Diagnostics → Min/max val. → Conductivity → Maximum value
Description	Shows the highest conductivity measured to date.
User interface	Positive floating-point number

Minimum value	
Navigation	  Expert → Diagnostics → Min/max val. → Conductivity → Minimum value
Description	Shows the lowest conductivity measured to date.

User interface

Positive floating-point number

3.8.11 "Heartbeat Technology" submenu

 For detailed information on the parameter descriptions of the **Heartbeat Verification** application package, see the Special Documentation for the device →  7

Navigation  Expert → Diagnostics → Heartbeat Techn.

3.8.12 "Simulation" submenu

Navigation  Expert → Diagnostics → Simulation

► Simulation		
Assign simulation process variable	→ 	161
Process variable value	→ 	161
Current input 1 to n simulation	→ 	162
Value current input 1 to n	→ 	162
Status input 1 to n simulation	→ 	162
Input signal level 1 to n	→ 	163
Current output 1 to n simulation	→ 	163
Current output value	→ 	164
Frequency output 1 to n simulation	→ 	164
Frequency output 1 to n value	→ 	164
Pulse output simulation 1 to n	→ 	165
Pulse value 1 to n	→ 	165
Switch output simulation 1 to n	→ 	166
Switch state 1 to n	→ 	166
Relay output 1 to n simulation	→ 	167
Switch state 1 to n	→ 	167

Device alarm simulation	→ 168
Diagnostic event category	→ 168
Diagnostic event simulation	→ 168

Assign simulation process variable

Navigation	Expert → Diagnostics → Simulation → Assign proc.var.
Prerequisite	The Load rate option is only available if the volume flow of the medium is read in via the Current input 1 to n (→ 49) or the fieldbus.
Description	Select a process variable for the simulation process that is activated.
Selection	■ Off ■ Load rate * ■ Total solids ■ Temperature ■ Electronics temperature ■ Conductivity ■ Corrected conductivity
Factory setting	Off

Process variable value

Navigation	Expert → Diagnostics → Simulation → Proc. var. value
Description	Enter the simulation value for the selected process variable.
User entry	Signed floating-point number
Factory setting	0

* Visibility depends on order options or device settings

Current input 1 to n simulation		
Navigation	 Expert → Diagnostics → Simulation → Curr.inp 1 to n sim.	
Description	Option for switching simulation of the current input on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.  The desired simulation value is defined in the Value current input 1 to n parameter.	
Selection	■ Off ■ On	
Factory setting	Off	
Additional information	<i>Selection</i> ■ Off Current simulation is switched off. The device is in normal measuring mode or another process variable is being simulated. ■ On Current simulation is active.	
Value current input 1 to n		
Navigation	 Expert → Diagnostics → Simulation → Value curr.inp 1 to n	
Prerequisite	In the Current input 1 to n simulation parameter, the On option is selected.	
Description	Use this function to enter the current value for the simulation. In this way, users can verify the correct configuration of the current input and the correct function of upstream feed-in units.	
User entry	0 to 22.5 mA	
Status input 1 to n simulation		
Navigation	 Expert → Diagnostics → Simulation → Status inp 1 to n sim	
Description	Use this function to switch simulation of the status input on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.	
Selection	■ Off ■ On	
Factory setting	Off	

Additional information*Description*

The desired simulation value is defined in the **Input signal level** parameter (→ 163).

Selection

■ Off

Simulation for the status input is switched off. The device is in normal measuring mode or another process variable is being simulated.

■ On

Simulation for the status input is active.

Input signal level 1 to n**Navigation**

Expert → Diagnostics → Simulation → Signal level 1 to n

Prerequisite

In the **Status input simulation** parameter (→ 162), the **On** option is selected.

Description

Use this function to select the signal level for the simulation of the status input. In this way, users can verify the correct configuration of the status input and the correct function of upstream feed-in units.

Selection

■ High

■ Low

Current output 1 to n simulation**Navigation**

Expert → Diagnostics → Simulation → Curr.outp 1 to n sim.

Description

Use this function to switch simulation of the current output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

Selection

■ Off

■ On

Factory setting

Off

Additional information*Description*

The desired simulation value is defined in the **Value current output 1 to n** parameter.

Selection

■ Off

Current simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.

■ On

Current simulation is active.

Current output value

Navigation	  Expert → Diagnostics → Simulation → Curr.outp val.
Prerequisite	In the Current output 1 to n simulation parameter, the On option is selected.
Description	Use this function to enter a current value for the simulation. In this way, users can verify the correct adjustment of the current output and the correct function of downstream switching units.
User entry	3.59 to 22.5 mA
Additional information	<i>Dependency</i> The input range is dependent on the option selected in the Current span parameter (→  76).

Frequency output 1 to n simulation

Navigation	  Expert → Diagnostics → Simulation → Freq.outp 1 to n sim.
Prerequisite	In the Operating mode parameter (→  88), the Frequency option is selected.
Description	Use this function to switch simulation of the frequency output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.
Selection	■ Off ■ On
Factory setting	Off
Additional information	<i>Description</i>  The desired simulation value is defined in the Frequency value 1 to n parameter.
	<i>Selection</i> ■ Off Frequency simulation is switched off. The device is in normal measuring mode or another process variable is being simulated. ■ On Frequency simulation is active.

Frequency output 1 to n value

Navigation	  Expert → Diagnostics → Simulation → Freq.outp 1 to n val.
Prerequisite	In the Frequency simulation 1 to n parameter, the On option is selected.

Description	Use this function to enter a frequency value for the simulation. In this way, users can verify the correct adjustment of the frequency output and the correct function of downstream switching units.
User entry	0.0 to 12 500.0 Hz

Pulse output simulation 1 to n



Navigation	Expert → Diagnostics → Simulation → Puls.outp.sim. 1 to n
Prerequisite	In the Operating mode parameter (→ 88), the Pulse option is selected.
Description	Use this function to switch simulation of the pulse output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.
Selection	■ Off ■ Fixed value ■ Down-counting value
Factory setting	Off
Additional information	<i>Description</i> The desired simulation value is defined in the Pulse value 1 to n parameter. <i>Selection</i> ■ Off Pulse simulation is switched off. The device is in normal measuring mode or another process variable is being simulated. ■ Fixed value Pulses are continuously output with the pulse width specified in the Pulse width parameter (→ 90). ■ Down-counting value The pulses specified in the Pulse value parameter (→ 165) are output.

Pulse value 1 to n



Navigation	Expert → Diagnostics → Simulation → Pulse value 1 to n
Prerequisite	In the Pulse output simulation 1 to n parameter, the Down-counting value option is selected.
Description	Use this function to enter a pulse value for the simulation. In this way, users can verify the correct adjustment of the pulse output and the correct function of downstream switching units.
User entry	0 to 65 535

Switch output simulation 1 to n 	
Navigation	 Expert → Diagnostics → Simulation → Switch sim. 1 to n
Prerequisite	In the Operating mode parameter (→  88), the Switch option is selected.
Description	Use this function to switch simulation of the switch output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.
Selection	■ Off ■ On
Factory setting	Off
Additional information	<i>Description</i>  The desired simulation value is defined in the Switch state 1 to n parameter. <i>Selection</i> ■ Off Switch simulation is switched off. The device is in normal measuring mode or another process variable is being simulated. ■ On Switch simulation is active.
Switch state 1 to n 	

Navigation	 Expert → Diagnostics → Simulation → Switch state 1 to n
Description	Use this function to select a switch value for the simulation. In this way, users can verify the correct adjustment of the switch output and the correct function of downstream switching units.
Selection	■ Open ■ Closed
Additional information	<i>Selection</i> ■ Open Switch simulation is switched off. The device is in normal measuring mode or another process variable is being simulated. ■ Closed Switch simulation is active.

Relay output 1 to n simulation


Navigation	Expert → Diagnostics → Simulation → Relay out. 1 to n sim
Description	Use this function to switch simulation of the relay output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.
Selection	■ Off ■ On
Factory setting	Off
Additional information	<i>Description</i> The desired simulation value is defined in the Switch state 1 to n parameter. <i>Selection</i> ■ Off Relay simulation is switched off. The device is in normal measuring mode or another process variable is being simulated. ■ On Relay simulation is active.

Switch state 1 to n


Navigation	Expert → Diagnostics → Simulation → Switch state 1 to n
Prerequisite	The On option is selected in the Switch output simulation 1 to n parameter parameter.
Description	Use this function to select a relay value for the simulation. In this way, users can verify the correct adjustment of the relay output and the correct function of downstream switching units.
Selection	■ Open ■ Closed
Additional information	<i>Selection</i> ■ Open Relay simulation is switched off. The device is in normal measuring mode or another process variable is being simulated. ■ Closed Relay simulation is active.

Device alarm simulation		
Navigation	  Expert → Diagnostics → Simulation → Dev. alarm sim.	
Description	Use this function to switch the device alarm on and off.	
Selection	■ Off ■ On	
Factory setting	Off	
Additional information	<i>Description</i> The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.	
Diagnostic event category		
Navigation	 Expert → Diagnostics → Simulation → Event category	
Description	Use this function to select the category of the diagnostic events that are displayed for the simulation in the Diagnostic event simulation parameter (→  168).	
Selection	■ Sensor ■ Electronics ■ Configuration ■ Process	
Factory setting	Process	
Diagnostic event simulation		
Navigation	  Expert → Diagnostics → Simulation → Diagnostic event	
Description	Use this function to select a diagnostic event for the simulation process that is activated.	
Selection	■ Off ■ Diagnostic event picklist (depends on the category selected)	
Factory setting	Off	
Additional information	<i>Description</i>  For the simulation, you can choose from the diagnostic events of the category selected in the Diagnostic event category parameter (→  168).	

4 Country-specific factory settings

4.1 SI units



The country-specific factory setting in SI units is made for all countries except the USA and Canada.

4.1.1 System units

Process variable	Unit
Total solids	%TS
Density	g/l
Mass flow	kg/h
Mass	kg
Volume	l/h
Temperature	°C
Conductivity	µS/cm
Load rate	kg/h



For further information on system units, see: **System units** submenu (→ 54)

4.1.2 Output current span

Output	Current range
Current output 1 to n	4 to 20 mA NAMUR



For further information on the current ranges, see: **Current range output** parameter (→ 76)

4.2 US units



The country-specific factory setting in US units is made for the USA and Canada.

4.2.1 System units

Process variable	Unit
Total solids	%TS
Density	lb/ft ³
Mass flow	lb/h
Mass	lb
Volume	l/h
Temperature	°F

Process variable	Unit
Conductivity	µS/cm
Load rate	lb/h

 For further information on system units, see: **System units** submenu (→  54)

4.2.2 **Output current span**

Output	Current range
Current output 1 to n	4 to 20 mA US

 For further information on the current ranges, see: **Current range output** parameter (→  76)

Index

0 ... 9

0/4 mA value (Parameter)	70
0% bargraph value 1 (Parameter)	17
0% bargraph value 3 (Parameter)	20
0% bargraph value 5 (Parameter)	24
0% bargraph value 7 (Parameter)	26
2.4 GHz WLAN channel (Parameter)	125
20 mA value (Parameter)	70
100% bargraph value 1 (Parameter)	18
100% bargraph value 3 (Parameter)	21
100% bargraph value 5 (Parameter)	24
100% bargraph value 7 (Parameter)	27

A

Activate SW option (Parameter)	44
Active level (Parameter)	73
Actual diagnostics (Parameter)	132
Administration (Submenu)	41
Alarm delay (Parameter)	35
Application (Submenu)	127
Apply I/O configuration (Parameter)	68
Assign behavior of diagnostic no. 302 (Parameter) ...	38
Assign behavior of diagnostic no. 441 (Parameter) ...	37
Assign behavior of diagnostic no. 442 (Parameter) ...	37
Assign behavior of diagnostic no. 443 (Parameter) ...	37
Assign behavior of diagnostic no. 444 (Parameter) ...	38
Assign behavior of diagnostic no. 832 (Parameter) ...	38
Assign behavior of diagnostic no. 833 (Parameter) ...	39
Assign behavior of diagnostic no. 834 (Parameter) ...	39
Assign behavior of diagnostic no. 835 (Parameter) ...	40
Assign behavior of diagnostic no. 907 (Parameter) ...	40
Assign behavior of diagnostic no. 908 (Parameter) ...	40
Assign channel 1 (Parameter)	148
Assign channel 2 (Parameter)	149
Assign channel 3 (Parameter)	149
Assign channel 4 (Parameter)	150
Assign diagnostic behavior (Parameter)	98, 107
Assign flow direction check (Parameter)	102, 106
Assign frequency output (Parameter)	93
Assign limit (Parameter)	99, 106
Assign process variable (Parameter)	59
Assign process variable 1 (Parameter)	128
Assign pulse output (Parameter)	89
Assign simulation process variable (Parameter) ...	161
Assign SSID name (Parameter)	125
Assign status (Parameter)	102, 107
Assign status input (Parameter)	72

B

Backlight (Parameter)	32
Backup state (Parameter)	34
Baudrate (Parameter)	111
Bootloader revision (Parameter)	143, 144, 145, 146, 147
Build no. software (Parameter)	143, 144, 145, 146, 147
Bus address (Parameter)	111

Bus termination (Parameter)	115
Byte order (Parameter)	113

C

Clear logging data (Parameter)	151
Communication (Submenu)	110
Comparison result (Parameter)	34
Conductivity (Parameter)	47
Conductivity (Submenu)	159
Conductivity damping (Parameter)	58
Conductivity factor (Parameter)	64
Conductivity offset (Parameter)	63
Conductivity unit (Parameter)	57
Configuration backup (Submenu)	32
Configuration management (Parameter)	33
Confirm access code (Parameter)	42
Connection state (Parameter)	126
Contrast display (Parameter)	31
Corrected conductivity (Parameter)	47
Corrected conductivity factor (Parameter)	64
Corrected conductivity offset (Parameter)	64
Current input 1 to n (Submenu)	49, 68
Current input 1 to n simulation (Parameter)	162
Current output 1 to n (Submenu)	74
Current output 1 to n simulation (Parameter)	163
Current output value (Parameter)	164
Current range output (Parameter)	76
Current span (Parameter)	70

D

Damping current output (Parameter)	83
Damping output (Parameter)	95
Data logging (Parameter)	151
Data logging (Submenu)	148
Data logging control (Parameter)	152
Data logging status (Parameter)	152
Data transfer mode (Parameter)	112
Date/time (Parameter)	66
Date/time format (Parameter)	57
Decimal places 1 (Parameter)	18
Decimal places 2 (Parameter)	19
Decimal places 3 (Parameter)	21
Decimal places 4 (Parameter)	22
Decimal places 5 (Parameter)	24
Decimal places 6 (Parameter)	25
Decimal places 7 (Parameter)	27
Decimal places 8 (Parameter)	28
Default gateway (Parameter)	119
Define access code (Parameter)	41
Define access code (Wizard)	41
Density unit (Parameter)	55
Device alarm simulation (Parameter)	168
Device ID (Parameter)	116
Device information (Submenu)	139
Device name (Parameter)	141
Device reset (Parameter)	43

Device revision (Parameter)	116
Device tag (Parameter)	139
DHCP client (Parameter)	118
Diagnostic behavior (Submenu)	36
Diagnostic event category (Parameter)	168
Diagnostic event simulation (Parameter)	168
Diagnostic handling (Submenu)	35
Diagnostic list (Submenu)	135
Diagnostics (Submenu)	132
Diagnostics 1 (Parameter)	135
Diagnostics 2 (Parameter)	135
Diagnostics 3 (Parameter)	136
Diagnostics 4 (Parameter)	136
Diagnostics 5 (Parameter)	137
Direct access	
0% bargraph value 5	24
0% bargraph value 7	26
2.4 GHz WLAN channel	125
100% bargraph value 5	24
100% bargraph value 7	27
Assign SSID name	125
Connection state	126
Decimal places 5	24
Decimal places 6	25
Decimal places 7	27
Decimal places 8	28
Gateway IP address	127
IP address domain name server	127
Network security	122
Received signal strength	126
Relay output 1 to n simulation	167
Security identification	123
Select antenna	126
SSID name	122, 125
Switch state 1 to n	167
Timestamp	133, 134
User name	123
Value 5 display	23
Value 6 display	25
Value 7 display	26
Value 8 display	28
WLAN	121
WLAN IP address	124
WLAN MAC address	124
WLAN mode	122
WLAN passphrase	124
WLAN password	123
WLAN subnet mask	124
Display (Submenu)	13
Display channel 1 (Submenu)	153
Display channel 2 (Submenu)	154
Display channel 3 (Submenu)	154
Display channel 4 (Submenu)	155
Display damping (Parameter)	29
Display interval (Parameter)	29
Display language (Parameter)	23
Display module (Submenu)	147
Document	
Design	4

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

E

Electronics temperature (Parameter)	47
Electronics temperature (Submenu)	155
Electronics temperature factor (Parameter)	65
Electronics temperature offset (Parameter)	64
ENP version (Parameter)	142
Enter access code (Parameter)	13
Entire logging duration (Parameter)	153
Event list (Submenu)	138
Event logbook (Submenu)	137
Expert (Menu)	11
Extended order code 1 (Parameter)	141
Extended order code 2 (Parameter)	141
Extended order code 3 (Parameter)	142
External compensation (Submenu)	61

F

Factory adjustment (Submenu)	65
Factory settings	169
SI units	169
US units	169
Failure behavior current output (Parameter)	84
Failure current (Parameter)	85
Failure frequency (Parameter)	97
Failure mode (Parameter)	71, 92, 96, 103, 109, 114
Failure value (Parameter)	71
Fieldbus writing access (Parameter)	115
Filter options (Parameter)	137
Firmware version (Parameter)	
.	140, 143, 144, 145, 146, 147
Fixed current (Parameter)	77
Format display (Parameter)	14
Frequency output 1 to n simulation (Parameter)	164
Frequency output 1 to n value (Parameter)	164
Function	
see Parameter	

G

Gateway IP address (Parameter)	127
--	-----

H

Header (Parameter)	30
Header text (Parameter)	30
Heartbeat Technology (Submenu)	160

I

I/O alteration code (Parameter)	68
I/O configuration (Submenu)	66
I/O module 1 to n information (Parameter)	67
I/O module 1 to n terminal numbers (Parameter)	66
I/O module 1 to n type (Parameter)	67
I/O module 2 (Submenu)	144

I/O module 2 terminal numbers (Parameter) . . 145, 146
 I/O module 3 (Submenu) 145
 I/O module 3 terminal numbers (Parameter) . . 145, 146
 I/O module 4 terminal numbers (Parameter) . . 145, 146
 Input (Submenu) 68
 Input signal level 1 to n (Parameter) 163
 Input values (Submenu) 49
 Invert output signal (Parameter) 104
 IP address (Parameter) 119
 IP address domain name server (Parameter) 127

L

Last backup (Parameter) 33
 Load rate (Parameter) 47
 Load rate factor (Parameter) 65
 Load rate offset (Parameter) 65
 Locking status (Parameter) 11
 Logging delay (Parameter) 152
 Logging interval (Parameter) 150
 Login page (Parameter) 120
 Lower range limit (Parameter) 59
 Lower range value output (Parameter) 77

M

MAC address (Parameter) 118
 Main electronic module + I/O module 1 (Submenu) . 142
 Main electronics temperature (Submenu) 156
 Mass flow unit (Parameter) 55
 Mass unit (Parameter) 56
 Max. switch cycles number (Parameter) 54
 Maximum frequency value (Parameter) 94
 Maximum value (Parameter) 156, 157, 158, 159
 Measured current (Parameter) 51, 86
 Measured current 1 to n (Parameter) 50
 Measured values (Submenu) 46
 Measured values 1 to n (Parameter) 49
 Measuring interval (Parameter) 62
 Measuring mode (Parameter) 91, 95
 Measuring mode current output (Parameter) 79
 Measuring value at maximum frequency (Parameter) 94
 Measuring value at minimum frequency (Parameter) 94
 Medium temperature (Submenu) 158
 Menu

Expert 11

Min/max values (Submenu) 155
 Minimum frequency value (Parameter) 93
 Minimum value (Parameter) 156, 157, 158, 159
 Modbus configuration (Submenu) 111
 Modbus data map (Submenu) 117
 Modbus information (Submenu) 116

N

Network security (Parameter) 122
 Nominal diameter (Parameter) 66

O

Operating mode (Parameter) 88
 Operating time (Parameter) 32, 42, 134
 Operating time from restart (Parameter) 134
 Order code (Parameter) 141

Output (Submenu) 74
 Output current (Parameter) 51, 85
 Output frequency (Parameter) 52, 97
 Output values (Submenu) 50

P

Parameter

Structure of description 6
 Parity (Parameter) 112
 Partially filled pipe detection (Parameter) 60
 Partially filled pipe detection (Submenu) 60
 Powerless relay status (Parameter) 110
 Preset value 1 (Parameter) 131
 Previous diagnostics (Parameter) 133
 Process parameters (Submenu) 57
 Process variable adjustment (Submenu) 62
 Process variable current output (Parameter) 75
 Process variable unit 1 (Parameter) 129
 Process variable value (Parameter) 161
 Process variables (Submenu) 46
 Pulse output (Parameter) 52, 92
 Pulse output simulation 1 to n (Parameter) 165
 Pulse scaling (Parameter) 90
 Pulse value 1 to n (Parameter) 165
 Pulse width (Parameter) 90
 Pulse/frequency/switch output 1 to n (Submenu) 51, 86

R

Received signal strength (Parameter) 126
 Relay output 1 to n (Submenu) 53, 104
 Relay output 1 to n simulation (Parameter) 167
 Relay output function (Parameter) 105
 Reset access code (Parameter) 43
 Reset access code (Submenu) 42
 Reset all totalizers (Parameter) 127
 Response time (Parameter) 60, 61, 96
 Response time status input (Parameter) 73

S

Scan list register 0 to 15 (Parameter) 117
 Security identification (Parameter) 123
 Select antenna (Parameter) 126
 Sensor (Submenu) 45
 Sensor adjustment (Submenu) 62
 Sensor electronic module (ISEM) (Submenu) 143
 Sensor electronics temperature (ISEM) (Submenu) . . 157
 Separator (Parameter) 31
 Serial number (Parameter) 140
 Signal mode (Parameter) 69, 75, 88
 Simulation (Submenu) 160
 Software option overview (Parameter) 45
 SSID name (Parameter) 122, 125
 Status input 1 to n (Submenu) 72
 Status input 1 to n simulation (Parameter) 162
 Submenu

Administration 41
 Application 127
 Communication 110
 Conductivity 159

Configuration backup	32
Current input 1 to n	49, 68
Current output 1 to n	74
Data logging	148
Device information	139
Diagnostic behavior	36
Diagnostic handling	35
Diagnostic list	135
Diagnostics	132
Display	13
Display channel 1	153
Display channel 2	154
Display channel 3	154
Display channel 4	155
Display module	147
Electronics temperature	155
Event list	138
Event logbook	137
External compensation	61
Factory adjustment	65
Heartbeat Technology	160
I/O configuration	66
I/O module 2	144
I/O module 3	145
Input	68
Input values	49
Main electronic module + I/O module 1	142
Main electronics temperature	156
Measured values	46
Medium temperature	158
Min/max values	155
Modbus configuration	111
Modbus data map	117
Modbus information	116
Output	74
Output values	50
Partially filled pipe detection	60
Process parameters	57
Process variable adjustment	62
Process variables	46
Pulse/frequency/switch output 1 to n	51, 86
Relay output 1 to n	53, 104
Reset access code	42
Sensor	45
Sensor adjustment	62
Sensor electronic module (ISEM)	143
Sensor electronics temperature (ISEM)	157
Simulation	160
Status input 1 to n	72
System	13
System units	54
Total solids	158
Total solids monitoring	58
Totalizer	48
Totalizer 1 to n	128
Value current output 1 to n	51
Value status input 1 to n	50
Web server	117
Subnet mask (Parameter)	119

Switch cycles (Parameter)	54
Switch output function (Parameter)	97
Switch output simulation 1 to n (Parameter)	166
Switch state (Parameter)	53, 103, 110
Switch state 1 to n (Parameter)	166, 167
Switch-off delay (Parameter)	103, 108
Switch-off value (Parameter)	101, 108
Switch-on delay (Parameter)	102, 109
Switch-on value (Parameter)	101, 108
System (Submenu)	13
System units (Submenu)	54

T

Target group	4
Telegram delay (Parameter)	114
Temperature (Parameter)	47
Temperature damping (Parameter)	58
Temperature factor (Parameter)	63
Temperature offset (Parameter)	63
Temperature unit (Parameter)	56
Terminal number (Parameter)	69, 72, 75, 87, 105
Threshold (Parameter)	60
Timestamp (Parameter)	133, 134
Total solids (Parameter)	46
Total solids (Submenu)	158
Total solids monitoring (Submenu)	58
Total solids override (Parameter)	58
Total solids unit (Parameter)	55
Totalizer (Submenu)	48
Totalizer 1 control (Parameter)	130
Totalizer 1 failure behavior (Parameter)	131
Totalizer 1 operation mode (Parameter)	129
Totalizer 1 overflow (Parameter)	48
Totalizer 1 to n (Submenu)	128
Totalizer 1 value (Parameter)	48
Transmitter identifier (Parameter)	44

U

Upper range limit (Parameter)	59
Upper range value output (Parameter)	78
User name (Parameter)	123
User role (Parameter)	12

V

Value 1 display (Parameter)	17
Value 2 display (Parameter)	19
Value 3 display (Parameter)	20
Value 4 display (Parameter)	22
Value 5 display (Parameter)	23
Value 6 display (Parameter)	25
Value 7 display (Parameter)	26
Value 8 display (Parameter)	28
Value current input 1 to n (Parameter)	162
Value current output 1 to n (Submenu)	51
Value status input (Parameter)	50, 73
Value status input 1 to n (Submenu)	50
Volume flow unit (Parameter)	56

W

Web server (Submenu)	117
----------------------	-----

Web server functionality (Parameter) 120

Web server language (Parameter) 118

Wizard

 Define access code 41

 WLAN settings 120

WLAN (Parameter) 121

WLAN IP address (Parameter) 124

WLAN MAC address (Parameter) 124

WLAN mode (Parameter) 122

WLAN passphrase (Parameter) 124

WLAN password (Parameter) 123

WLAN settings (Wizard) 120

WLAN subnet mask (Parameter) 124



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