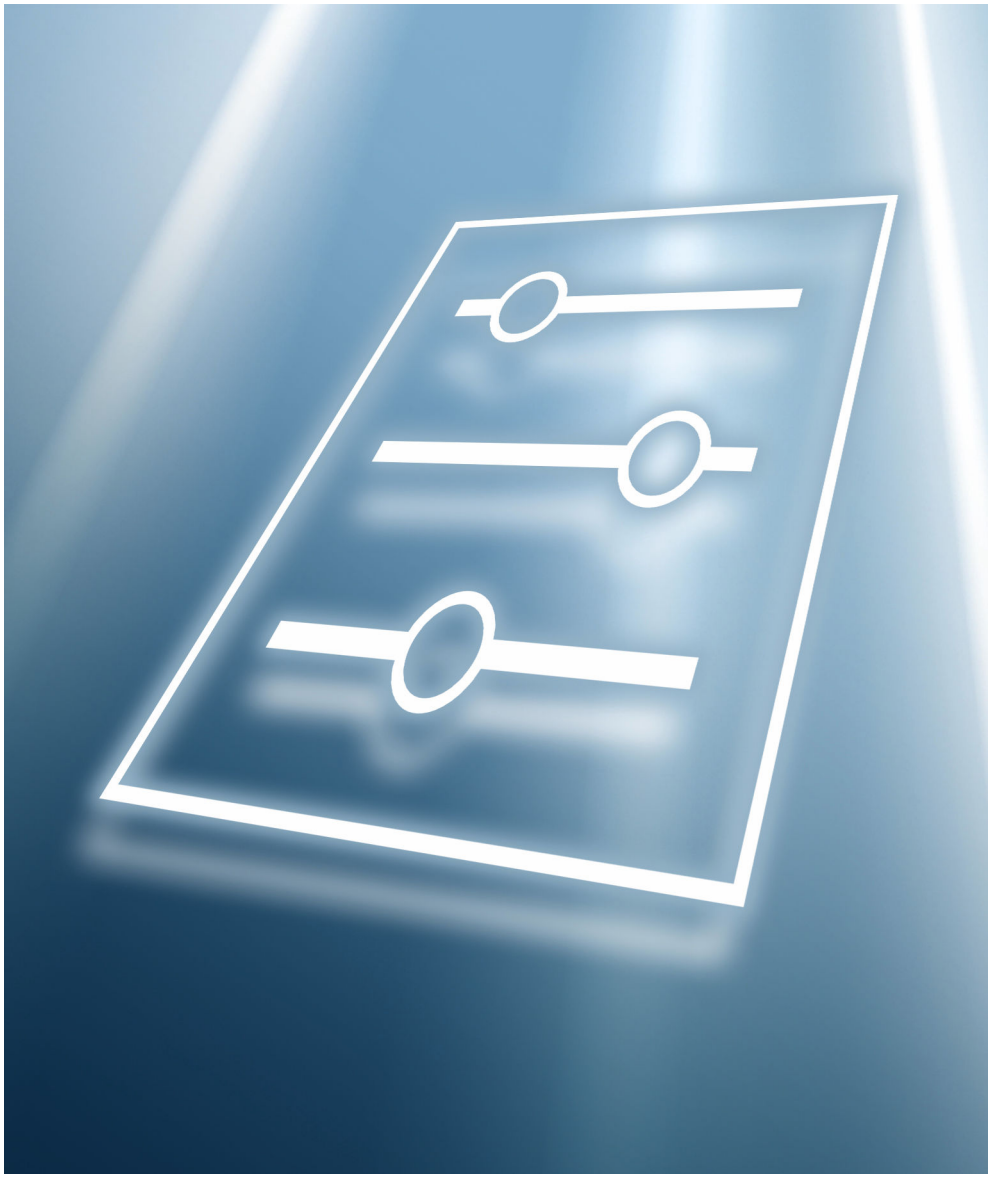
GP01225F/00/EN/01.24-00
71658010
2024-05-15

01.00.zz (Device firmware)

Description of Device Parameters
Micropilot FMR43
HART

Free-space radar



Endress+Hauser
People for Process Automation

1 About this document

1.1 Document function

The document is part of the Operating Instructions and serves as a reference for parameters.

Tasks that require detailed knowledge of the function of the device:
- Starting up measurements under difficult conditions
- Optimal adjustment of measurements to difficult conditions
- Detailed configuration of communication interface
- Fault diagnosis in difficult cases

1.2 Target group

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

1.3 Document structure

The document consists of a general part and a specific part.

The structure of the document and its components are explained in the general part (section 1).

The specific part starts with an overview of the device operating menu, which is the focus of this manual.

The description of the device parameters follows the overview of the operating menu. The description is divided into 4 main menus and their submenus.

The 4 main menus:
- Guidance
- Diagnostics
- Application
- System

In the **Description of device parameters** section, the menus, submenus and parameters are displayed in the same way that they are laid out in the menu structure for the operating tool.

An **operating** tool is a piece of software such as FieldCare, for example, which can be used to display and edit the data and parameters stored in the device on a PC or laptop. In contrast to operation via the onsite display, an operating tool offers more options for displaying additional information such as graphics and help text that explain the properties of the parameters.

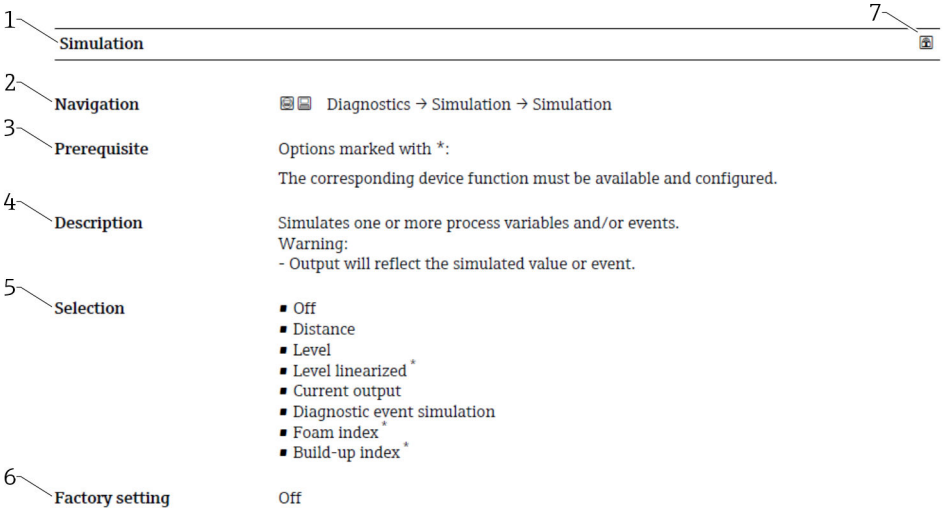
The submenus that are visible to users depend on the **user role** they are logged in on. This document lists the submenus and parameters that are available to the **Maintenance** user role.

The operating menu is dynamic and adapts the choice of parameters to the selected options.

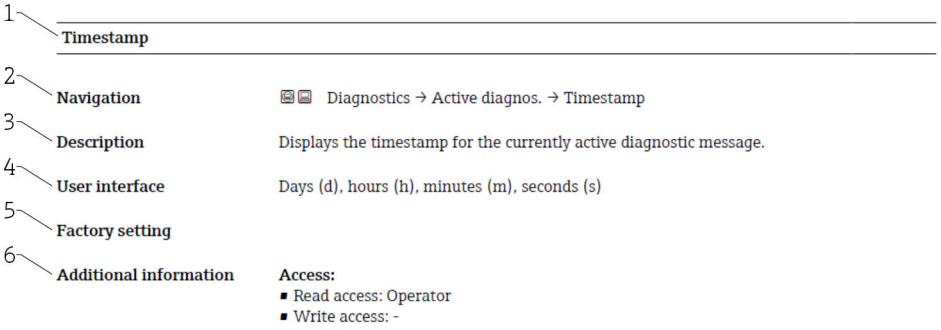
 For the operating concept of the operating menu, see the Operating Instructions.

1.4 Elements of parameter descriptions

Parameter descriptions are structured and made up of a number of elements. Depending on the parameter, more or fewer elements may be available. Two examples are provided here for different parameters:



1 Name: Parameter designation (Label)
2 Navigation: Navigation path to the parameter. The graphics indicate whether the path applies to the onsite display, the operating tool or both.
3 Prerequisite: The marked options can only be selected under the condition specified in each case
4 Description: Description of the parameter function
5 Selection: List of the individual options for the parameter
6 Factory setting: Default setting on leaving the factory
7 The lock symbol indicates that the parameter is write-protected



1 Name: Parameter designation (Label)
2 Navigation: Navigation path to the parameter. The graphics indicate whether the path applies to the onsite display, the operating tool or both.
3 Description: Description of the parameter function
4 User interface: Display value/data of the parameter
5 Factory setting: Default setting on leaving the factory
6 Additional information:
Read and write access: Information on access rights that users with certain roles have to the parameter

Additional information at the end of the parameter description can refer to, and expand, all elements of the parameter description.

1.5 Symbols

1.5.1 Symbols for certain types of information

Additional information:

Reference to documentation:

Operation via local display:

Operation via operating tool:

Write-protected parameter:

1.6 Documentation

For an overview of the scope of the associated Technical Documentation, refer to the following:
- *Device Viewer* (www.endress.com/deviceviewer): Enter the serial number from the nameplate
- *Endress+Hauser Operations app*: Enter serial number from nameplate or scan matrix code on nameplate.

1.6.1 Standard documentation

Operating Instructions

The Operating Instructions are available via the Internet: www.endress.com → Download

1.6.2 Supplementary device-dependent documentation

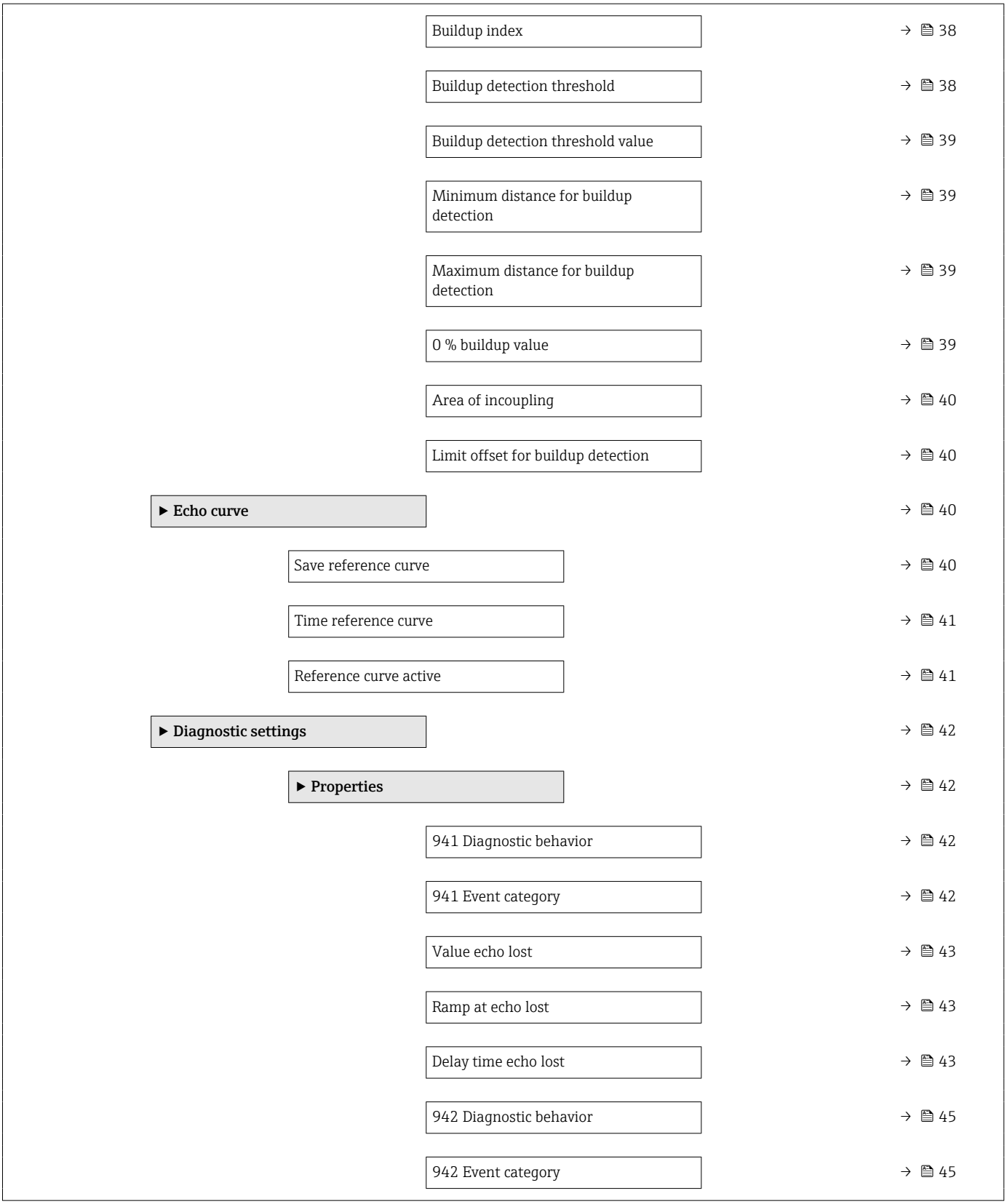
Special Documentation

The Special Documentation is available via the Internet: www.endress.com → Download

2 Overview of the operating menu

Navigation Operating tool

- ▶ **Heartbeat Verification** → 32
  - Date/time Heartbeat Verification → 32
  - Operating time (Verification) → 32
  - Verification result → 33
  - Status → 33
- ▶ **Loop diagnostics** → 33
  - Rebuild baseline → 33
  - Tolerated deviation +/- → 34
  - Baseline status → 34
  - Loop diagnostics → 34
  - Terminal voltage 1 → 35
  - Clamping voltage lower threshold → 35
  - Clamping voltage upper threshold → 35
  - 806 Event delay → 35
- ▶ **Foam detection** → 36
  - Foam detection → 36
  - Foam index → 36
  - Foam detec. threshold → 36
  - Foam detec. threshold value → 36
  - Lower level range limit → 37
  - Upper level range limit → 37
  - Distance at foam zero adjustment → 37
  - 0% foam value → 37
- ▶ **Buildup detection** → 38
  - Buildup detection → 38


Buildup index → 38
Buildup detection threshold → 38
Buildup detection threshold value → 39
Minimum distance for buildup detection → 39
Maximum distance for buildup detection → 39
0 % buildup value → 39
Area of incoupling → 40
Limit offset for buildup detection → 40
▶ Echo curve → 40
Save reference curve → 40
Time reference curve → 41
Reference curve active → 41
▶ Diagnostic settings → 42
▶ Properties → 42
941 Diagnostic behavior → 42
941 Event category → 42
Value echo lost → 43
Ramp at echo lost → 43
Delay time echo lost → 43
942 Diagnostic behavior → 45
942 Event category → 45

- Safety distance → 45
- Acknowledge alarm → 46
- ▶ **Configuration** → 46
  - ▶ **Sensor** → 46
    - 168 Diagnostic behavior → 46
    - 168 Event category → 46
  - ▶ **Process** → 47
    - 806 Diagnostic behavior → 47
    - 806 Event category → 47
    - 941 Diagnostic behavior → 48
    - 941 Event category → 48
    - 942 Diagnostic behavior → 48
    - 942 Event category → 49
    - 952 Diagnostic behavior → 49
    - 952 Event category → 49

Application → 50

- ▶ **Measuring units** → 50
  - Level unit → 50
  - Length unit → 50
  - Temperature unit → 50
- ▶ **Measured values** → 51
  - Level linearized → 51
  - Level → 51
  - Output current → 51
  - Distance → 52

- Unfiltered distance → 52
- Sensor temperature → 52
- Terminal voltage 1 → 52
- Electronics temperature → 53
- ▶ **Sensor** → 53
  - ▶ **Basic settings** → 53
    - Medium type → 53
    - Application → 53
    - Application → 54
    - Empty calibration → 54
    - Full calibration → 55
  - ▶ **Advanced settings** → 55
    - Maximum draining speed solid → 55
    - Maximum filling speed solid → 56
    - Maximum draining speed liquid → 56
    - Maximum filling speed liquid → 57
    - Damping output → 57
    - Evaluation sensitivity → 58
    - First echo sensitivity → 58
    - Frequency mode → 59
    - Active map → 59
    - Distance → 60
    - Confirm distance → 60
    - Mapping end point → 61
    - Record map → 62

- Maximum measuring distance → 63
- Upper blank out → 63
- Output mode → 63
- Level limit mode → 64
- High limit → 65
- Low limit → 65
- Level correction → 65
- **▶ Echo evaluation** → 66
  - Tank bottom range → 70
  - Evaluation mode → 71
  - Reset evaluation → 71
- **▶ Linearization** → 73
  - Linearization type → 73
  - Unit after linearization → 74
  - Free text → 74
  - Level linearized → 74
  - Maximum value → 75
  - Diameter → 75
  - Intermediate height → 75
  - Table mode → 75
  - Table number → 76
  - Level → 76
  - Level → 76
  - Customer value → 77

- Activate table → 77
- CRC linearization table → 77
- ▶ **Signal information** → 78
  - Signal quality → 78
  - Absolute echo amplitude → 78
  - Relative echo amplitude → 78
- ▶ **Current output** → 79
  - Assign PV → 79
  - Measuring mode current output → 80
  - Current range output → 80
  - Lower range value output → 80
  - Upper range value output → 80
  - Failure behavior current output → 81
  - Failure current → 81
  - Output current → 81
  - Terminal current → 81
- ▶ **HART output** → 84
  - ▶ **Configuration** → 83
    - HART address → 83
    - HART short tag → 83
    - Device tag → 83
    - No. of preambles → 84
    - Loop current mode → 84
  - ▶ **HART output** → 84
    - Assign PV → 84

- Primary variable (PV) → 85
- Assign SV → 85
- Secondary variable (SV) → 85
- Assign TV → 86
- Tertiary variable (TV) → 86
- Assign QV → 86
- Quaternary variable (QV) → 87
- **▶ Burst configuration 1** → 87
  - Burst mode 1 → 87
  - Burst command 1 → 88
  - Burst variable 0 → 88
  - Burst variable 1 → 89
  - Burst variable 2 → 89
  - Burst variable 3 → 90
  - Burst variable 4 → 90
  - Burst variable 5 → 91
  - Burst variable 6 → 92
  - Burst variable 7 → 92
  - Burst trigger mode → 93
  - Burst trigger level → 93
  - Min. update period → 93
  - Max. update period → 94
- **▶ Information** → 94
  - Device ID → 94
  - Device type → 94

- Device revision → 94
- HART short tag → 95
- HART revision → 95
- HART descriptor → 95
- HART message → 96
- HART date code → 96

System → 97

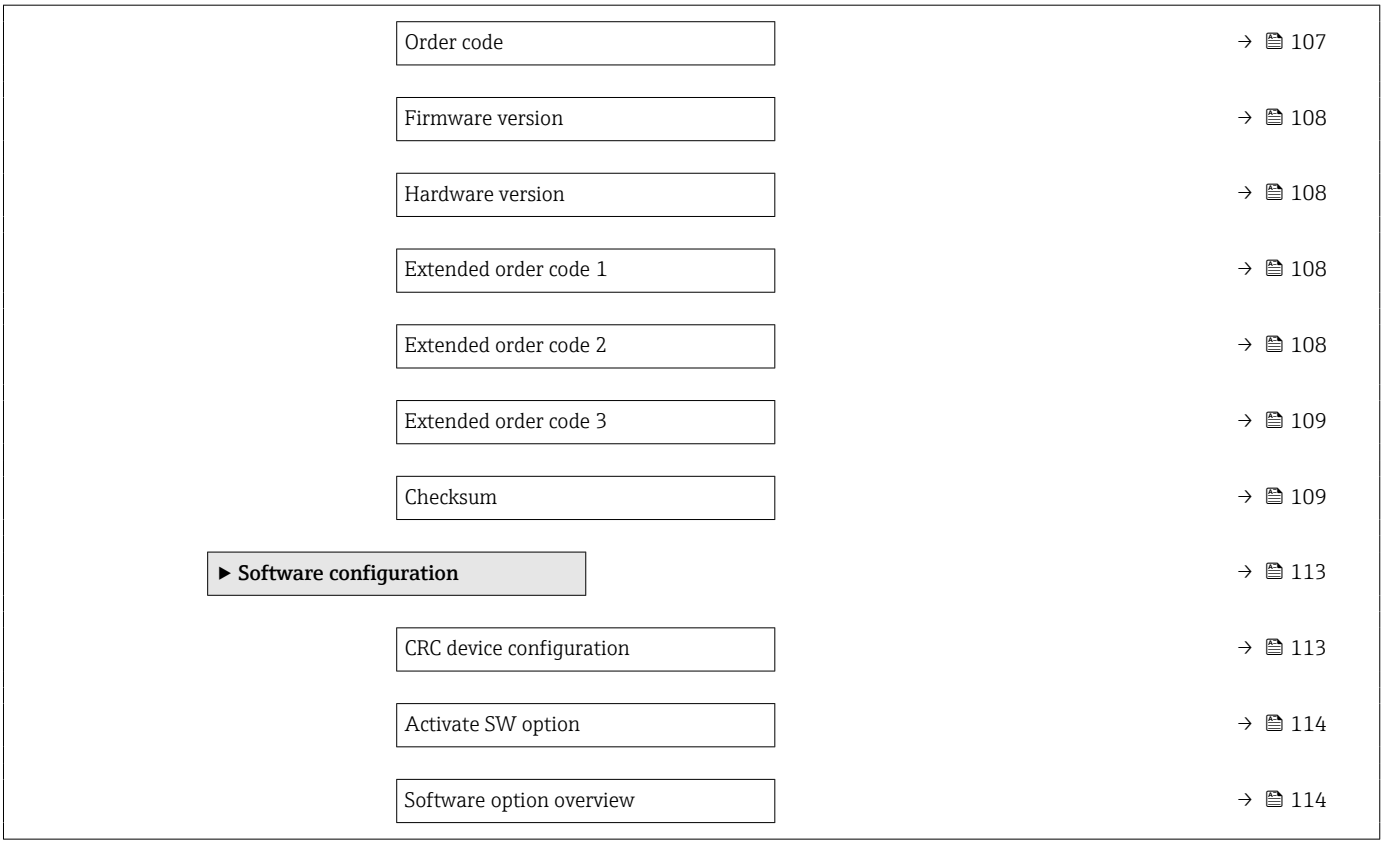
▶ Device management → 97

- Device tag → 97
- Locking status → 97
- Configuration counter → 98
- Reset device → 98

▶ User management → 98

- User role → 98
- Password → 99
- Enter access code → 99
- Status password entry → 99
- New password → 100
- Confirm new password → 100
- Status password entry → 99
- Old password → 100
- New password → 100
- Confirm new password → 100
- Status password entry → 99
- Reset password → 100

- Status password entry → 99
- Old password → 100
- Status password entry → 99
- ▶ **Bluetooth configuration** → 101
  - Bluetooth activation → 101
- ▶ **Display** → 102
  - Language → 102
  - Format display → 102
  - Value 1 display → 103
  - Decimal places 1 → 103
  - Value 2 display → 103
  - Decimal places 2 → 104
  - Rotation display → 104
  - Color scheme → 104
- ▶ **Geolocation** → 105
  - Process Unit Tag → 105
  - Location Description → 105
  - Longitude → 105
  - Latitude → 106
  - Altitude → 106
  - Location method → 106
- ▶ **Information** → 107
  - Device name → 107
  - Manufacturer → 107
  - Serial number → 107


Order code
→ 107
Firmware version
→ 108
Hardware version
→ 108
Extended order code 1
→ 108
Extended order code 2
→ 108
Extended order code 3
→ 109
Checksum
→ 109
▶ Software configuration
→ 113
CRC device configuration
→ 113
Activate SW option
→ 114
Software option overview
→ 114

3 Description of device parameters

3.1 Guidance

The Guidance main menu contains functions which enable users to perform basic tasks swiftly, e.g. commissioning.
These are primarily guided wizards and cross-subject special functions.

Navigation Guidance

3.1.1 Overview

The **Guidance** menu contains the following submenus and wizards:
- Commissioning
- Heartbeat Technology
  - Heartbeat Verification
  - Loop diagnostics
  - Foam detection
  - Buildup detection
- Safety mode
- Proof test
- Import / Export
- Compare

3.1.2 "Commissioning" wizard

Complete this wizard to commission the device.

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

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

Navigation Guidance → Commissioning

Parameters for "Commissioning" wizard

The following parameters are configured in this wizard:
- **Device identification**
  - Device tag
  - Device name
  - Serial number
  - Extended order code 1 ... 3
  - Locking status
  - HART short tag
  - HART date code
  - HART descriptor
  - HART message
  - HART address
- **Measurement adjustments**
  - Distance unit
  - Temperature unit
  - Level unit
  - Medium type
  - Operating mode
  - Application
  - Empty calibration
  - Full calibration
  - Level
  - Displayed level/distance correct?
  - Show possible signals in?
  - Distance
  - Level
  - Is a linearization required?
  - Linearization type
  - Unit after linearization
  - Maximum value
  - Diameter
  - Level linearized
  - Intermediate height
  - Diameter
  - Level linearized
- **Output settings**
  - Process variable output current
  - Current range output
  - Lower range value output
  - Upper range value output
  - Failure behavior current output
  - Failure current
  - Loop current mode
  - Assign HART variables?
    This function comprises several parameters, including the **Assign PV** parameter.

3.1.3 Heartbeat Technology

Heartbeat Technology offers diagnostic functionality through continuous self-monitoring, the transmission of additional measured variables to an external Condition Monitoring system and the in situ verification of measuring instruments in the application.

Special Documentation on Heartbeat Technology is available via the Internet:
www.endress.com → Download

Navigation Guidance → Heartbeat Techn.

Heartbeat Verification

This wizard is used to start an automatic verification of the device functionality.
The results can be documented as a verification report.

Navigation Guidance → Heartbeat Techn. → Heartbeat Verif.

Loop diagnostics

Using this wizard, changes in the current-voltage loop characteristics (baseline) can be used to detect unwanted installation anomalies such as creep currents caused by terminal corrosion or a deteriorating power supply that can lead to an incorrect 4-20 mA measured value.

Navigation Guidance → Heartbeat Techn. → Loop diagn.

Foam detection

This wizard configures the automatic foam detection.

Foam detection can be linked to an output variable or status information e.g. to control a sprinkler used to dissolve the foam. It is also possible to monitor the foam increase in a so called foam index. The foam index can also be linked to an output variable and can be shown on the display.

Preparation:
The Foam monitoring initialization should only be done without or less foam.

Navigation Guidance → Heartbeat Techn. → Foam detection

Buildup detection

This wizard configures the build-up detection.

Basic idea:
The build-up detection can, for example, be linked to a compressed-air system to clean the antenna.
With the build-up monitoring the maintenance cycles can be optimized.

Preparation:
The build-up monitoring initialization should only be done without or less build-up.

Navigation Guidance → Heartbeat Techn. → Buildup detect.

3.1.4 Safety mode

The write protection guards the device settings against overwriting. In addition, it is recommended for safety applications to confirm the safety relevant device settings. This ensures that the correct values have been entered and downloaded to device.

This input can be used as the confirmation sequence instead of manual checklists.
After the safety relevant device settings have been confirmed, the device is marked with the property Safety-locked. This indicates that the safety relevant parameter settings have been checked and evaluated as correct.

To unlock the safety locking the sequence needs to be restarted. The safety locking is deactivated when the safety unlocking code (= safety locking code) is entered.

Navigation Guidance → Safety mode

3.1.5 Proof test

The proof test will simulate the current output.
The safety function is not guaranteed during proof test. Alternative process control in manual must be taken to ensure process safety.

Note: It is only possible to perform a proof test when the device has no alarm and the hardware write protection switch is off.

Navigation Guidance → Proof test

3.1.6 Import / Export

Save/Load
- **Save:** The device settings can be saved in a .deh file.
- **Load:** The device settings saved in a .deh file can be written to the device.

Create documentation
- Device documentation can be saved in PDF format under "Create documentation".
- This documentation contains the following general device information:
  - Information on device parameters
  - Information on Linearization
  - Echo curve
  - Event list
  - Diagnostic list

Navigation Guidance → Import / Export

3.1.7 Compare

Compare datasets
This function can be used to compare the following datasets:
- Data records in the. deh file format from the function Import / Export
- Datasets with the configuration currently in the device

Navigation Guidance → Compare

3.2 Diagnostics

Navigation Diagnostics

3.2.1 Active diagnostics

Navigation Diagnostics → Active diagnos.

Active diagnostics

Navigation Diagnostics → Active diagnos. → Active diagnos.

Description Displays the currently active diagnostic message.

If there is more than one pending diagnostic event, the message for the diagnostic event with the highest priority is displayed.

The information displayed comprises:
- Symbol for event level
- Code for diagnostic behavior
- Operation time of occurrence
- Event text

User interface

Factory setting -

Additional information Information on what is causing the message, and remedy measures, can be viewed via the I-symbol on the display.

Access:
- Read access: Operator
- Write access: -

Timestamp

Navigation Diagnostics → Active diagnos. → Timestamp

Description Displays the timestamp for the currently active diagnostic message.

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

Factory setting

Additional information **Access:**
- Read access: Operator
- Write access: -

Previous diagnostics

Navigation Diagnostics → Active diagnos. → Prev.diagnostics

Description Displays the diagnostic message for the last diagnostic event that has ended.

User interface

Factory setting

Additional information The information displayed comprises:
- Symbol for event level
- Code for diagnostic behavior
- Operation time of occurrence
- Event text

The diagnostic message displayed can still be valid.

Information on what is causing the message, and remedy measures, can be viewed via the I-symbol on the display.

Access:
- Read access: Operator
- Write access: -

Timestamp

Navigation Diagnostics → Active diagnos. → Timestamp

Description Displays the timestamp of the diagnostic message generated for the last diagnostic event that has ended.

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

Factory setting

Additional information Access:
- Read access: Operator
- Write access: -

Operating time from restart

Navigation Diagnostics → Active diagnos. → Time fr. restart

Description Indicates how long the device has been in operation since the last time the device was restarted.

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

Factory setting

Additional information **Access:**
- Read access: Operator
- Write access: -

Operating time

Navigation Diagnostics → Active diagnos. → Operating time

Description Indicates how long the device has been in operation.

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

Factory setting

Additional information **Access:**
- Read access: Operator
- Write access: -

3.2.2 Diagnostic list

Navigation Diagnostics → Diagnostic list

3.2.3 Event logbook

Navigation Diagnostics → Event logbook

Clear event list

Navigation Diagnostics → Event logbook → Clear event list

Description Delete all entries of the event list.

Selection
- Cancel
- Clear data

Factory setting Cancel

Additional information **Access:**
- Read access: Expert
- Write access: Expert

3.2.4 Minimum/maximum values

Navigation Diagnostics → Min/max val.

Min. level value

Navigation Diagnostics → Min/max val. → Min. level value

Description Minimum or maximum measured value by device.

Note:
This value can be reset via the "Reset min./max." parameter.
This value is also reset when device is reset.

User interface Signed floating-point number

Factory setting

Time min. level

Navigation Diagnostics → Min/max val. → Time min. level

Description Displays operating time at which the lowest level was measured.

Note:
This value can be reset via the "Reset min./max. " parameter.
This value is also reset when device is reset.

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

Factory setting

Maximum draining speed

Navigation Diagnostics → Min/max val. → Max. drain speed

Description Displays highest draining speed measured since the last reset.

Note:
This value can be reset via the "Reset min./max. " parameter.
This value is also reset when device is reset.

User interface Positive floating-point number

Factory setting

Counter overfilling

Navigation Diagnostics → Min/max val. → Count overfill.

Description Displays the number of underfills (level < 0 %) or overfills (level > 100 %).

Note:
This value can be reset via the "Reset min./max. " parameter.
This value is also reset when device is reset.

User interface 0 to 65 535

Factory setting 0

Additional information **Access:**
- Read access: Operator
- Write access: -

Minimum sensor temperature

Navigation Diagnostics → Min/max val. → Min. sensor temp

Description Displays lowest or highest sensor temperature measured so far.

User interface −150 to 200 °C

Factory setting

Time min. sensor temperature

Navigation Diagnostics → Min/max val. → Time min s. temp

Description Displays operating time at which the lowest sensor temperature was measured so far.

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

Factory setting

Minimum terminal voltage

Navigation Diagnostics → Min/max val. → Min.term.volt.

Description Minimum or maximum measured terminal (supply) voltage.

User interface 0.0 to 50.0 V

Factory setting

Additional information **Access:**
- Read access: Operator
- Write access: -

Minimum electronics temperature

Navigation Diagnostics → Min/max val. → Min.electr.temp.

Description Minimum or maximum measured main electronics temperature.

User interface Signed floating-point number

Factory setting

Additional information **Access:**
- Read access: Operator
- Write access: -

Max. level value

Navigation Diagnostics → Min/max val. → Max. level value

Description Minimum or maximum measured value by device.

Note:
This value can be reset via the "Reset min./max." parameter.
This value is also reset when device is reset.

User interface Signed floating-point number

Factory setting

Time max. level

Navigation Diagnostics → Min/max val. → Time max. level

Description Displays operating time at which the highest level was measured.

Note:
This value can be reset via the "Reset min./max. " parameter.
This value is also reset when device is reset.

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

Factory setting

Maximum filling speed

Navigation Diagnostics → Min/max val. → Max. fill. speed

Description Displays highest filling speed measured since the last reset.

Note:
This value can be reset via the "Reset min./max. " parameter.
This value is also reset when device is reset.

User interface Positive floating-point number

Factory setting

Counter underfilling

Navigation Diagnostics → Min/max val. → Count underfill.

Description Displays the number of underfills (level < 0 %) or overfills (level > 100 %).

Note:
This value can be reset via the "Reset min./max. " parameter.
This value is also reset when device is reset.

User interface 0 to 65 535

Factory setting 0

Maximum sensor temperature

Navigation Diagnostics → Min/max val. → Max. sensor temp

Description Displays lowest or highest sensor temperature measured so far.

User interface −150 to 200 °C

Factory setting

Time max. sensor temperature

Navigation Diagnostics → Min/max val. → Time max s. temp

Description Displays operating time at which the highest sensor temperature was measured so far.

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

Factory setting

Maximum terminal voltage

Navigation Diagnostics → Min/max val. → Max.term.voltage

Description Minimum or maximum measured terminal (supply) voltage.

User interface 0.0 to 50.0 V

Factory setting

Maximum electronics temperature

Navigation Diagnostics → Min/max val. → Max.electr.temp.

Description Minimum or maximum measured main electronics temperature.

User interface Signed floating-point number

Factory setting

Reset min./max.

Navigation Diagnostics → Min/max val. → Reset min/max

Description Resets the drag indicator of the selected process variable.

Selection
- None
- Drain/fill speed
- Level
- Reset all

Factory setting None

3.2.5 Simulation

Navigation Diagnostics → Simulation

Simulation

Navigation Diagnostics → Simulation → Simulation

Prerequisite Selection options marked with *:

The corresponding device function must be available and configured.

Description Simulates one or more process variables and/or events.

Warning:
Output will reflect the simulated value or event.

Selection
- Off
- Distance
- Level
- Level linearized *
- Current output
- Diagnostic event simulation
- Foam index *
- Buildup index *

Factory setting Off

Simulation distance

Navigation Diagnostics → Simulation → Sim distance

Prerequisite Simulation = Distance (→ 52)

User entry −999 900 to 999 900 mm

Factory setting

Buildup index

Navigation Diagnostics → Simulation → Buildup index

Prerequisite Simulation = Buildup index

User entry 0 to 100.0 %

* Visibility depends on order options or device settings

Factory setting

Foam index

Navigation Diagnostics → Simulation → Foam index

Prerequisite Simulation = Foam index (→ 36)

User entry 0 to 100.0 %

Factory setting

Process variable value

Navigation Diagnostics → Simulation → Proc. var. value

Prerequisite Simulation = Level linearized (→ 51)

Description Defines the value of the selected variable.
The outputs assume values or states according to this value.

User entry Signed floating-point number

Factory setting

Value current output

Navigation Diagnostics → Simulation → Current output

Prerequisite Simulation = Current output (→ 79)

Description Defines the value of the simulated output current.

User entry 3.59 to 23 mA

Factory setting

Diagnostic event simulation

Navigation Diagnostics → Simulation → Diagnostic event

Prerequisite Simulation = Diagnostic event simulation

Description

Select the diagnostic event to be simulated.

Note:
To terminate the simulation, select "Off".

Selection

⊗F062 Sensor connection faulty
⊗F151 Sensor electronic failure
⚠M168 Buildup detected
⚠S203 HART Device Malfunction
⊗F204 HART Electronic Defect
⊗F242 Firmware incompatible
⊗F252 Module incompatible
⊗F270 Main electronics defective
⊗F272 Main electronics faulty
⊗F273 Main electronics defective
⊗F282 Data storage inconsistent
⊗F283 Memory content inconsistent
⚠M287 Memory content inconsistent
⊗F388 Electronics and HistoROM defective
⊗F410 Data transfer failed
⚠C412 Processing download
⚠S420 HART Device Configuration Locked
⚠S421 HART Loop Current fixed
⚠C431 Trim required
⊗F435 Linearization faulty
⊗F437 Configuration incompatible
⚠M438 Dataset different
⚠S441 Current output out of range
⊗C484 Failure mode simulation active
⚠C485 Process variable simulation active
⚠C491 Current output simulation active
⚠S495 Diagnostic event simulation active
⊗F538 Configuration Sensor Unit invalid
⚠C585 Simulation distance
⚠C586 Record map
⊗F801 Supply voltage too low
⚠S802 Supply voltage too high
⊗F805 Loop current faulty
⚠M806 Loop diagnostics
⚠M807 No Baseline due to insuf. volt. at 20 mA
⚠S825 Electronics temperature
⚠S826 Sensor temperature out of range
⚠S846 HART Non-Primary Variable Out of Limit
⚠S847 HART Primary Variable Out of Limit

⚠S848 HART Device Variable Alert
⚠S941 Echo lost
⚠S942 In safety distance
⚠C952 Foam detected
⚠S968 Level limited

Factory setting Off

3.2.6 Heartbeat Technology

Navigation Diagnostics → Heartbeat Techn.

Heartbeat Verification

Navigation Diagnostics → Heartbeat Techn. → Heartbeat Verif.

Date/time Heartbeat Verification

Navigation Diagnostics → Heartbeat Techn. → Heartbeat Verif. → Date/time Heartbeat Verification

Description Date and time of last Heartbeat Verification.

This value is updated with every Heartbeat verification.

Note:
If time information is not available, e.g. Heartbeat verification is started from display, '--------' is shown.

User interface Character string comprising numbers, letters and special characters

Factory setting

Operating time (Verification)

Navigation Diagnostics → Heartbeat Techn. → Heartbeat Verif. → Operating time

Description Value of the operating hours counter at the time of verification.

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

Factory setting

Verification result

Navigation Diagnostics → Heartbeat Techn. → Heartbeat Verif. → Verific. result

Description Result of Heartbeat verification

User interface
- Not done
- Passed
- Failed

Factory setting

Status

Navigation Diagnostics → Heartbeat Techn. → Heartbeat Verif. → Status

Description Shows the actual status.

User interface
- Done
- Busy
- Failed
- Not done

Factory setting

Loop diagnostics

Navigation Diagnostics → Heartbeat Techn. → Loop diagn.

Rebuild baseline

Navigation Diagnostics → Heartbeat Techn. → Loop diagn. → Reb. baseline

Description Notice
The current output is simulated.
Bridge the PLC or take other appropriate measures to prevent an erroneous triggering of alarm messages or changes in the control loop behavior.

The baseline should be rebuilt if planned changes have been made in the loop.

Selection
- No
- Yes

Factory setting No

Tolerated deviation +/-

Navigation Diagnostics → Heartbeat Techn. → Loop diagn. → Toler. deviation

Description A value should be chosen to ensure that normal voltage deviations do not lead to unwanted messages.

Default
1.5 V DC

User entry 0.5 to 3.0 V

Factory setting 1.5 V

Baseline status

Navigation Diagnostics → Heartbeat Techn. → Loop diagn. → Baseline status

Description "Failed"
Means, baseline is not available or creation not possible.

"Success"
Baseline is available.

User interface
- Failed
- Success

Factory setting Failed

Loop diagnostics

Navigation Diagnostics → Heartbeat Techn. → Loop diagn. → Loop diagn.

Description Enable/disable loop diagnostics.

Note:
If the function is disabled, there is no analysis and no event message.

Selection
- Disable
- Enable

Factory setting Disable

Terminal voltage 1

Navigation Diagnostics → Heartbeat Techn. → Loop diagn. → Terminal volt. 1

Description Shows the current terminal voltage that is applied at the output

User interface 0.0 to 50.0 V

Factory setting 0 V

Clamping voltage lower threshold

Navigation Diagnostics → Heartbeat Techn. → Loop diagn. → Lower threshold

User interface 0.0 to 50.0 V

Factory setting 0 V

Clamping voltage upper threshold

Navigation Diagnostics → Heartbeat Techn. → Loop diagn. → Upper threshold

User interface 0.0 to 50.0 V

Factory setting 0 V

806 Event delay

Navigation Diagnostics → Heartbeat Techn. → Loop diagn. → 806 Event delay

Description Displays how long the triggering status must be present until an event message is issued. Used to filter out short-term signal interference.

User entry 0 to 60 s

Factory setting 1 s

Foam detection

Navigation Diagnostics → Heartbeat Techn. → Foam detection

Foam detection

Navigation Diagnostics → Heartbeat Techn. → Foam detection → Foam detection

Selection
- Off
- On

Factory setting Off

Foam index

Navigation Diagnostics → Heartbeat Techn. → Foam detection → Foam index

Description Foam index 0% means: no foam.
Foam index 100% means: maximum detectable foam.

User interface 0 to 100 %

Factory setting 0 %

Foam detec. threshold

Navigation Diagnostics → Heartbeat Techn. → Foam detection → Foam threshold

Description Enter the threshold for the foam detection. As soon as the foam index has reached the preset switching point, an event is triggered.

Selection
- Sensitive (20%)
- Middle (40%)
- Insensitive (80%)
- User defined (xx%)

Factory setting Middle (40%)

Foam detec. threshold value

Navigation Diagnostics → Heartbeat Techn. → Foam detection → Foam detect val.

Description User-defined threshold value for the foam detection.

User entry 0 to 100.0 %

Factory setting 40 %

Lower level range limit

Navigation Diagnostics → Heartbeat Techn. → Foam detection → LLR limit

Description Assign lower limit of foam monitoring area.

Factory setting 0 %

Upper level range limit

Navigation Diagnostics → Heartbeat Techn. → Foam detection → ULR limit

Description Assign upper limit of foam monitoring area.

Factory setting 100.0 %

Distance at foam zero adjustment

Navigation Diagnostics → Heartbeat Techn. → Foam detection → Dist. @zero foam

Description Displays the distance when the 0 % foam value was set.

User entry Signed floating-point number

Factory setting 0 mm

0% foam value

Navigation Diagnostics → Heartbeat Techn. → Foam detection → 0% foam value

Description Displays the relative echo amplitude when the 0 % foam value was set.

User entry −999 999.9 to 999 999.9 dB

Factory setting 0 dB

Buildup detection

Navigation Diagnostics → Heartbeat Techn. → Buildup detect.

Buildup detection	
Navigation	Diagnostics → Heartbeat Techn. → Buildup detect. → Buildup detect.
Description	Activate or deactivate build-up detection.
Selection	▪ Off ▪ On
Factory setting	Off

Buildup index	
Navigation	Diagnostics → Heartbeat Techn. → Buildup detect. → Buildup index
Description	Build-up index 0% means: no build-up. Build-up index 100% means: maximum detectable build-up.
User interface	0 to 100 %
Factory setting	0 %

Buildup detection threshold	
Navigation	Diagnostics → Heartbeat Techn. → Buildup detect. → Buildup detec.
Description	Enter the threshold for the build-up detection. As soon as the build-up index has reached the preset switching point, an event is triggered.
Selection	▪ Sensitive (20%) ▪ Middle (40%) ▪ Insensitive (80%) ▪ User defined (xx%)
Factory setting	Middle (40%)

Buildup detection threshold value

Navigation Diagnostics → Heartbeat Techn. → Buildup detect. → Buildup value

Description User-defined threshold value for the build-up detection.

User entry 0 to 100.0 %

Factory setting 40 %

Minimum distance for buildup detection

Navigation Diagnostics → Heartbeat Techn. → Buildup detect. → Min dist buildup

Description Starting point for build-up detection area.

Note:
Build-up detection requires a minimum distance between the reference point of the measurement and the medium surface.

User entry –999 900 to 999 900 mm

Factory setting 0 mm

Maximum distance for buildup detection

Navigation Diagnostics → Heartbeat Techn. → Buildup detect. → Max dist buildup

Description Endpoint for build-up detection area.

Note:
Build-up detection requires a minimum distance between the reference point of the measurement and the medium surface.

User entry –999 900 to 999 900 mm

Factory setting 500 mm

0 % buildup value

Navigation Diagnostics → Heartbeat Techn. → Buildup detect. → 0 % buildup val

Description Displays the build up value at 0 % ("Area of incoupling" at 0 % build up).

Note:
This value is determined automatically in the guided commissioning and can be adjusted manually in the menu later.

User entry Positive floating-point number

Factory setting 0

Area of incoupling

Navigation Diagnostics → Heartbeat Techn. → Buildup detect. → Area incoupling

Description Ringing integral within the detection area.

User interface Positive floating-point number

Factory setting 0.0

Limit offset for buildup detection

Navigation Diagnostics → Heartbeat Techn. → Buildup detect. → Offset buildup

User entry –999 999.9 to 999 999.9 dB

Factory setting 10 dB

3.2.7 Echo curve

Navigation Diagnostics → Echo curve

Save reference curve

Navigation Diagnostics → Echo curve → Save ref. curve

Description Saves the currently measured echo curve as a reference curve in the device.

Note:
When the guided commissioning is executed the first time, the reference curve is automatically saved at the end.
In the case of manual commissioning (menu), it is recommended to actively save the reference curve immediately after commissioning.

Selection
- Customer reference curve
- Not active

Factory setting

Additional information

Access:
- Read access: Operator
- Write access: Maintenance

Time reference curve

Navigation Diagnostics → Echo curve → Time ref. curve

Description Displays the timestamp of the recording of the reference curve.

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

Factory setting

Additional information Timestamp of the recording of the reference curve

Access:
- Read access: Operator
- Write access: -

Reference curve active

Navigation Diagnostics → Echo curve → Ref.curve active

Description Displays if a customer reference curve has been stored in the device.

User interface
- Delivery reference curve available
- Customer reference curve available

Factory setting

Additional information The delivery reference curve is recorded at the factory before delivery.

A customer reference curve is recorded as standard at the end of the Guidance → Commissioning . These reference curves can be used for diagnosing problems when troubleshooting.

Access:
- Read access: Operator
- Write access: -

3.2.8 Diagnostic settings

Navigation Diagnostics → Diag. settings

Properties

Navigation Diagnostics → Diag. settings → Properties

941 Diagnostic behavior

Navigation Diagnostics → Diag. settings → Properties → 941 Diag. behav.

Description Defines the behavior of the output in case of an echo loss.

"Last valid value'
Last valid value is kept.

"Ramp at echo lost'
Output value is continuously shifted towards 0% or 100%.

"Value echo lost'
Output assumes a defined value.

"Alarm'
Device generates an alarm.

Selection
- Last valid value
- Ramp at echo lost
- Value echo lost
- Alarm

Factory setting Last valid value

941 Event category

Navigation Diagnostics → Diag. settings → Properties → 941Event category

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

Factory setting Out of specification (S)

Value echo lost

Navigation Diagnostics → Diag. settings → Properties → Value echo lost

Description Value of the output in case of an echo loss.

User entry Signed floating-point number

Factory setting 0 %

Ramp at echo lost

Navigation Diagnostics → Diag. settings → Properties → Ramp echo lost

Description Slope of the ramp in the case of an echo loss.

Note:
If the slope is positive (+), the output increases until it reaches 100%.

If the slope is negative (-), the output decreases until it reaches 0%.

User entry Signed floating-point number

Factory setting 0.0 %/min

Delay echo lost

Navigation Diagnostics → Diag. settings → Properties → Delay echo lost

Description Activate or deactivate the delay time in case of echo loss.
After an echo loss, the device allows the delay time to pass before the reaction defined in parameter "941 Diagnostic behavior" occurs. This way it can be avoided that temporary disturbances interrupt the measurement unnecessarily.

Selection
- Off
- On

Factory setting On

Delay time echo lost

Navigation Diagnostics → Diag. settings → Properties → DlyTimeEchoLost

Description Enter the delay time in case of echo loss.
After an echo loss, the device allows the delay time defined here to pass before the reaction defined in parameter "941 Diagnostic behavior" occurs. This way it can be avoided that temporary disturbances interrupt the measurement unnecessarily.

User entry 0 to 99 999.9 s

Factory setting 900 s

Delay time echo jump

Navigation Diagnostics → Diag. settings → Properties → DlyTimeEchoJump

Description Enter the delay time for the echo jump.

User entry 0 to 99 999.9 s

Factory setting 30 s

Echo lost window right

Navigation Diagnostics → Diag. settings → Properties → Echo l.win.right

Description Enter the initial width of the extended search window in the direction of decreasing levels.

User entry 0 to 99 900 mm

Factory setting 4 000 mm

Echo lost window left

Navigation Diagnostics → Diag. settings → Properties → Echo l.win.left

Description Enter the initial width of the extended search window in the direction of increasing levels.

User entry 0 to 99 000 mm

Factory setting 4 000 mm

Draining speed

Navigation Diagnostics → Diag. settings → Properties → Draining speed

Description Enter the opening speed of the extended search window in the direction of decreasing levels.

User entry Signed floating-point number

Factory setting 60 mm/s

Filling speed

Navigation Diagnostics → Diag. settings → Properties → Filling speed

Description Enter the opening speed of the extended search window in the direction of increasing levels.

User entry Signed floating-point number

Factory setting 60 mm/s

942 Diagnostic behavior

Navigation Diagnostics → Diag. settings → Properties → 942 Diag. behav.

Selection
- Off
- Alarm
- Warning
- Self holding

Factory setting Warning

942 Event category

Navigation Diagnostics → Diag. settings → Properties → 942Event category

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

Factory setting Out of specification (S)

Safety distance

Navigation Diagnostics → Diag. settings → Properties → Safety distance

User entry −200 000 to 125 000 mm

Factory setting 0 mm

Acknowledge alarm

Navigation Diagnostics → Diag. settings → Properties → Acknowl. alarm

Selection
- No
- Yes

Factory setting No

Configuration

Navigation Diagnostics → Diag. settings → Configuration

Sensor

Navigation Diagnostics → Diag. settings → Configuration → Sensor

168 Diagnostic behavior

Navigation Diagnostics → Diag. settings → Configuration → Sensor → 168 Diag. behav.

Description Select event behavior

"Logbook entry only":
no digital or analog transmission of the message

"Warning": Current output unchanged. Message is output digitally (default).

"Alarm": Current output assumes the set alarm current.

Regardless of the setting, the message appears on the display. If the permissible conditions are reached again, the warning is no longer available in the instrument.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

168 Event category

Navigation Diagnostics → Diag. settings → Configuration → Sensor → 168Event category

Description Select category for diagnostic message.

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

Factory setting Maintenance required (M)

Process

Navigation Diagnostics → Diag. settings → Configuration → Process

806 Diagnostic behavior

Navigation Diagnostics → Diag. settings → Configuration → Process → 806 Diag. behav.

Description Select event behavior

"Logbook entry only": no digital or analog transmission of the message.

"Warning": Current output unchanged. Message is output digitally (default).

If the permissible conditions are reached again, the warning is no longer available in the instrument.

Selection
- Warning
- Logbook entry only

Factory setting Warning

806 Event category

Navigation Diagnostics → Diag. settings → Configuration → Process → 806Event category

Description Select category for diagnostic message.

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

Factory setting Maintenance required (M)

941 Diagnostic behavior

Navigation Diagnostics → Diag. settings → Configuration → Process → 941 Diag. behav.

Description Defines the behavior of the output in case of an echo loss.

"Last valid value'
Last valid value is kept.

"Ramp at echo lost'
Output value is continuously shifted towards 0% or 100%.

"Value echo lost'
Output assumes a defined value.

"Alarm'
Device generates an alarm.

Selection
- Last valid value
- Ramp at echo lost
- Value echo lost
- Alarm

Factory setting Last valid value

941 Event category

Navigation Diagnostics → Diag. settings → Configuration → Process → 941Event category

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

Factory setting Out of specification (S)

942 Diagnostic behavior

Navigation Diagnostics → Diag. settings → Configuration → Process → 942 Diag. behav.

Selection
- Off
- Alarm
- Warning
- Self holding

Factory setting Warning

942 Event category

Navigation Diagnostics → Diag. settings → Configuration → Process → 942Event category

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

Factory setting Out of specification (S)

952 Diagnostic behavior

Navigation Diagnostics → Diag. settings → Configuration → Process → 952 Diag. behav.

Description Select event behavior

"Logbook entry only":
no digital or analog transmission of the message

"Warning": Current output unchanged. Message is output digitally (default).

"Alarm": Current output assumes the set alarm current.

Regardless of the setting, the message appears on the display. If the permissible conditions are reached again, the warning is no longer available in the instrument.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

952 Event category

Navigation Diagnostics → Diag. settings → Configuration → Process → 952Event category

Description Select category for diagnostic message.

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

Factory setting Out of specification (S)

3.3 Application

Navigation Application

3.3.1 Measuring units

Navigation Application → Measuring units

Level unit

Navigation Application → Measuring units → Level unit

Description Select unit for level measurement.

Selection

SI units	*US units*
▪ %	▪ ft
▪ m	▪ in
▪ mm	

Factory setting %

Length unit

Navigation Application → Measuring units → Length unit

Description Select the length unit for distance measurement.
It is used, e.g., for the basic calibration ("Empty calibration" or "Full calibration").

Selection

SI units	*US units*
▪ mm	▪ ft
▪ m	▪ in

Factory setting mm

Temperature unit

Navigation Application → Measuring units → Temperature unit

Description Select the temperature unit.

Selection

SI units	*US units*
▪ °C	°F
▪ K	

Factory setting ℃

3.3.2 Measured values

Navigation Application → Measured values

Level linearized

Navigation Application → Measured values → Level linearized

Description Displays the linearized level.

User interface Signed floating-point number

Factory setting 0 %

Level

Navigation Application → Measured values → Level

Description Displays the actual measured level.

User interface −99 999.9 to 200 000.0 %

Factory setting 0.0 %

Output current

Navigation Application → Measured values → Output curr.

Description Displays the value currently calculated for the current output

User interface 3.59 to 23 mA

Factory setting 3.59 mA

Distance

Navigation Application → Measured values → Distance

Description Distance from reference point to medium surface.

Note:
The reference point is specified in the respective Operating Instructions.

User interface Signed floating-point number

Factory setting 0 mm

Unfiltered distance

Navigation Application → Measured values → Unfiltered dist.

Description Displays the distance from the reference point of the measurement to the medium surface without the influence of the signal filters.

Note:
The reference point is specified in the respective Operating Instructions.

User interface Signed floating-point number

Factory setting 0 mm

Additional information **Access:**
- Read access: Maintenance
- Write access: -

Sensor temperature

Navigation Application → Measured values → Sensor temp.

Description Displays the current temperature of the sensor electronics.

User interface −150 to 200 °C

Factory setting −150 °C

Terminal voltage 1

Navigation Application → Measured values → Terminal volt. 1

Description Shows the current terminal voltage that is applied at the output

User interface 0.0 to 50.0 V

Factory setting 0 V

Electronics temperature

Navigation Application → Measured values → Electronics temp

Description Displays the current temperature of the main electronics.

User interface Signed floating-point number

Factory setting 0 °C

3.3.3 Sensor

Navigation Application → Sensor

Basic settings

Navigation Application → Sensor → Basic settings

Medium type

Navigation Application → Sensor → Basic settings → Medium type

Description Select whether the measured medium is liquid or solid.

Selection
- Liquid
- Solid

Factory setting Liquid

Application

Navigation Application → Sensor → Basic settings → Application

Description Select application type.

Selection
- Dosing vessel *
- Stirred vessel
- Storage vessel
- Workbench test

Factory setting Stirred vessel

Additional information
- Dosing vessel: Vessel in a dosing application with very fast level change.
- Stirred vessel: Vessel with agitator.
- Storage vessel: Vessel for storage with slow level change.
- Workbench test: All signal filters are deactivated. This mode should only be used for test purposes.

Application

Navigation Application → Sensor → Basic settings → Application

Description Select application type.

Selection
- Silo
- Feed hopper *
- Workbench test

Factory setting Silo

Additional information
- Silo: Silo for bulk material (tall and narrow).
- Feed hopper: Funnel shaped hopper.
- Workbench test: All signal filters are deactivated. This mode should only be used for test purposes.

Empty calibration

Navigation Application → Sensor → Basic settings → Empty calibr.

Description Enter the distance from the reference point of the measurement to the minimum level (0 %).

Note:
The reference point is specified in the respective Operating Instructions.

User entry 0 to 125 000 mm

Factory setting
- 15 000 mm at 80 GHz
- 10 000 mm at 180 GHz

* Visibility depends on order options or device settings

Full calibration

Navigation Application → Sensor → Basic settings → Full calibr.

Description Distance between minimum level (0 %) and maximum level (100 %).

User entry 1 to 125 000 mm

Factory setting
- 15 000 mm at 80 GHz
- 10 000 mm at 180 GHz

Advanced settings

Navigation Application → Sensor → Advanced set.

Maximum draining speed solid

Navigation Application → Sensor → Advanced set. → Max.drain solid

Description By selecting the maximum expected filling and draining speed the signal evaluation is automatically optimized for the process.

Note:
The filling and draining speeds can be set separately as the filling and draining procedures may be different.

Note:
With the 'No filter / test' option all signal evaluation filters are deactivated. This option should exclusively be used for tests.

Selection
- No filter / test *
- Very fast > 1000 mm (40 in)/min *
- Fast < 1000 mm (40 in)/min *
- Standard < 500 mm (20 in)/min *
- Medium < 100 mm (4 in)/min *
- Slow < 50 mm (2 in)/min *
- Very slow < 10 mm (0.4 in)/min *

Factory setting No filter / test

* Visibility depends on order options or device settings

Maximum filling speed solid

Navigation Application → Sensor → Advanced set. → Max. fill. solid

Description By selecting the maximum expected filling and draining speed the signal evaluation is automatically optimized for the process.

Note:
The filling and draining speeds can be set separately as the filling and draining procedures may be different.

Note:
With the 'No filter / test' option all signal evaluation filters are deactivated. This option should exclusively be used for tests.

Selection
- No filter / test *
- Very fast > 1000 mm (40 in)/min *
- Fast < 1000 mm (40 in)/min *
- Standard < 500 mm (20 in)/min *
- Medium < 100 mm (4 in)/min *
- Slow < 50 mm (2 in)/min *
- Very slow < 10 mm (0.4 in)/min *

Factory setting No filter / test

Maximum draining speed liquid

Navigation Application → Sensor → Advanced set. → Max drain liquid

Description By selecting the maximum expected filling and draining speed the signal evaluation is automatically optimized for the process.

Note:
The filling and draining speeds can be set separately as the filling and draining procedures may be different.

Note:
With the 'No filter / test' option all signal evaluation filters are deactivated. This option should exclusively be used for tests.

Selection
- No filter / test *
- Very fast > 60 mm (2.4 in)/sec *
- Fast < 60 mm (2.4 in)/sec *
- Standard < 20 mm (0.8 in)/sec *
- Medium < 5 mm (0.2 in)/sec *
- Slow < 1 mm (0.04 in)/sec *

Factory setting No filter / test

* Visibility depends on order options or device settings

Maximum filling speed liquid

Navigation Application → Sensor → Advanced set. → Max. fill liquid

Description By selecting the maximum expected filling and draining speed the signal evaluation is automatically optimized for the process.

Note:
The filling and draining speeds can be set separately as the filling and draining procedures may be different.

Note:
With the 'No filter / test' option all signal evaluation filters are deactivated. This option should exclusively be used for tests.

Selection
- No filter / test *
- Very fast > 60 mm (2.4 in)/sec *
- Fast < 60 mm (2.4 in)/sec *
- Standard < 20 mm (0.8 in)/sec *
- Medium < 5 mm (0.2 in)/sec *
- Slow < 1 mm (0.04 in)/sec *

Factory setting No filter / test

Damping output

Navigation Application → Sensor → Advanced set. → Damping out.

Description The damping is effective before the measured value is further processed, i.e., before the following processes:
- Scaling
- Limit value monitoring
- Forwarding to display
- Forwarding to Analog Input Block

Note:
The Analog Input Block has its own "Damping" parameter. In the measurement chain, only one of the two attenuation parameters shall have a value other than 0.
Otherwise, the signal will be attenuated several times.

User entry 0.0 to 1200.0 s

Factory setting 0.0 s

* Visibility depends on order options or device settings

Evaluation sensitivity

Navigation Application → Sensor → Advanced set. → Evaluation sens.

Description

Selection of the evaluation sensitivity

Options to select from:

- "Low"
Interferers but also small level signals are not recognized. The weighting curve is located high.

- "Medium"
The weighting curve is in a medium region.

- "High"
Small level signals but also interferers can be reliably detected. The weighting curve is located low.

Selection

- Low
- Medium
- High

Factory setting Medium

First echo sensitivity

Navigation Application → Sensor → Advanced set. → First echo sens.

Description

This parameter describes the band for First Echo evaluation.
Is measured / calculated down from the peak of the current level echo.

Options to select from:

"Low"
The band for the first echo evaluation is very narrow. The evaluation stays longer at the found echo respectively does not jump to the next Echo or distortion signal.

"Medium"
The band for the first echo evaluation has an average width.

"High"
The band for the first echo evaluation is broad. The evaluation jumps earlier to the next echo or distortion signal.

Selection

- Low
- Medium
- High

Factory setting Medium

Frequency mode

Navigation Application → Sensor → Advanced set. → Frequency mode

Description Displays the device-specific measurement configuration.

Selection
- Mode 1 *
- Mode 2 *
- Mode 3 *
- Mode 4 *
- Mode 5 *
- Mode 6 *
- Mode 7 *
- Mode 8 *
- Mode 9 *
- Mode 10 *

Factory setting
- Mode 1 at 80 GHz
- Mode 9 at 180 GHz

Additional information **Access:**
- Read access: Maintenance
- Write access: Maintenance

Active map

Navigation Application → Sensor → Advanced set. → Active map

Description Select the mapping curve that is to be active. Alternatively, the option "No map" can be selected.

Selection
- Factory map
- Customer map
- No map

Factory setting Factory map

Additional information
- Factory map: The device activates the mapping curve recorded in the factory. This curve cannot be edited or deleted.
- Customer map: If a customer map has been recorded, this can be activated in order to minimize distortions in the application. This curve can be edited.
- No map

* Visibility depends on order options or device settings

Distance

Navigation Application → Sensor → Advanced set. → Distance

Description Distance from reference point to medium surface.

Note:
The reference point is specified in the respective Operating Instructions.

User interface Signed floating-point number

Factory setting 0 mm

Confirm distance

Navigation Application → Sensor → Advanced set. → Confirm distance

Description State whether the measured distance and the actual distance are the same.

Selection
- Modify map
- Distance ok
- Distance unknown
- Level <=0

Factory setting Distance unknown

Additional information
- Modify map: To be selected if the range of mapping is to be defined manually in the Mapping end point parameter.
- Distance ok: To be selected if the measured distance matches the actual distance. The device does not perform a mapping.
- Distance unknown: To be selected if the actual distance is unknown. A mapping cannot be performed in this case.
- Level <=0: To be selected if the tank is completely empty. The device records a mapping covering the complete measuring range.

Mapping start point

Navigation Application → Sensor → Advanced set. → Map. start point

Description Enter the initial distance for the mapping.

User entry −999 900 to 999 900 mm

Factory setting −250 mm

Additional information **Access:**
- Read access: Expert
- Write access: Expert

Mapping end point

Navigation Application → Sensor → Advanced set. → Map. end point

Description Defines up to which distance the new mapping has to be recorded.
Remark: Make sure the level signal is not covered by the mapping.

User entry 0.1 to 125 mm

Factory setting 1200 mm

Map gap

Navigation Application → Sensor → Advanced set. → Map gap

Description Enter the distance between the defined and the actual end of the map.

User entry 0 to 100 000 mm

Factory setting
- 190 mm at 80 GHz
- 153 mm at 180 GHz

Additional information **Access:**
- Read access: Expert
- Write access: Expert

End of mapping

Navigation Application → Sensor → Advanced set. → End of mapping

Description Define the behavior of the mapping curve at the end of the map.

Selection
- Adjustable
- Last map value

Factory setting Adjustable

Additional information **Access:**
- Read access: Expert
- Write access: Expert

End map. ampl.

Navigation Application → Sensor → Advanced set. → End map. ampl.

Description Enter the minimum amplitude of the mapping curve.

User entry −99 999.0 to 99 999.0 dB

Factory setting −100 dB

Additional information **Access:**
- Read access: Expert
- Write access: Expert

Mapping overlay time

Navigation Application → Sensor → Advanced set. → Map overlay time

Description Enter the duration for which a map is recorded. During this time, the largest amplitude values that occur are overlapped.

User entry 0 to 1 200 s

Factory setting 5 s

Additional information **Access:**
- Read access: Expert
- Write access: Expert

Record map

Navigation Application → Sensor → Advanced set. → Record map

Selection
- No
- Overlay map
- Delete cust map

Factory setting No

Additional information
- No
- Overlay map: The new map is generated by overlaying the old map and the current envelope curve.
- Delete cust map: The complete map (if one exists) is deleted.

Maximum measuring distance

Navigation Application → Sensor → Advanced set. → Max. meas. dist.

Description If the preset measuring range differs significantly from the maximum measuring distance, it is recommended to enter the maximum measuring distance here.

Example:
Continuous level monitoring in the upper third of a tank/silo.

Note:
For tanks or silos with a conical outlet, this parameter should not be changed, as in this type of applications Empty calibration is usually not much smaller than the tank/silo height.

User entry 0 to 125 000 mm

Factory setting 20 000 mm

Upper blank out

Navigation Application → Sensor → Advanced set. → Upper blank out

Description Displays the distance from the reference point to slightly above the maximum level (100 %).
The value is calculated by the device to suppress signals in this range.
The value can also be adjusted manually.

Note:
No evaluation takes place in the upper blank out area.

User entry 0 to 125 000 mm

Factory setting 0 mm

Output mode

Navigation Application → Sensor → Advanced set. → Output mode

Description Select output mode between:

Ullage:
Displays the remaining ullage.

or

Level linearized:
Display the measured level.
Note: If linearization has been activated, the linearized level is displayed here.

Selection
- Ullage
- Level linearized

Factory setting Level linearized

L max. drain speed

Navigation Application → Sensor → Advanced set. → L max draining

Description Enter the maximum draining speed.

User entry 0.0 to 50 000.0 %/min

Factory setting 0.0 %/min

Additional information **Access:**
- Read access: Expert
- Write access: Expert

L max. fill speed

Navigation Application → Sensor → Advanced set. → L max.fill speed

Description Enter the maximum filling speed.

User entry 0.0 to 50 000.0 %/min

Factory setting 0.0 %/min

Additional information **Access:**
- Read access: Expert
- Write access: Expert

Level limit mode

Navigation Application → Sensor → Advanced set. → Level limit mode

Description Determines whether the output value is limited by an upper or lower limit (or by both).

Selection
- Off
- Low limit
- High limit
- Low and High Limit

Factory setting Low limit

High limit

Navigation Application → Sensor → Advanced set. → High limit

Description Defines the upper limit of the output value.

User entry Signed floating-point number

Factory setting 0 %

Low limit

Navigation Application → Sensor → Advanced set. → Low limit

Description Defines the lower limit of the output value.

User entry −200 000.0 to 200 000.0 %

Factory setting 0.0 %

Level correction

Navigation Application → Sensor → Advanced set. → Level correction

Description Value is added to the measured level to compensate for a constant level error.

Level correction > 0:
The level is increased by this value.

Level correction < 0:
The level is decreased by this value.

User entry −200 000.0 to 200 000.0 %

Factory setting 0.0 %

Antenna zero distance

Navigation Application → Sensor → Advanced set. → Ant. zero dist.

Description Displays the zero point adjustment of the antenna at state of delivery.

Note:
This parameter is adjusted to the device at the factory and should not be changed.

User entry 0 to 10 000 mm

Factory setting 230 mm

Additional information **Access:**
- Read access: Expert
- Write access: Expert

Echo evaluation

Navigation Application → Sensor → Advanced set. → Echo evaluation

Echo curve statistic

Navigation Application → Sensor → Advanced set. → Echo evaluation → Ec. curve stat.

Description Activate or deactivate the weighted echo curve statistics.

Selection
- Off
- On

Factory setting On

Additional information **Access:**
- Read access: Expert
- Write access: Expert

Echo curve statistics up

Navigation Application → Sensor → Advanced set. → Echo evaluation → EC. stat. up

Description Enter the number of measuring cycles to define the weighting of the last echo curve for ascending signals.

User entry 0 to 30

Factory setting 2

Additional information **Access:**
- Read access: Expert
- Write access: Expert

Echo curve statistic down

Navigation Application → Sensor → Advanced set. → Echo evaluation → ECS in down

Description Enter the number of measuring cycles to define the weighting of the last echo curve for descending signals.

User entry 0 to 30

Factory setting 3

Additional information **Access:**
- Read access: Expert
- Write access: Expert

Echo curve smoothing

Navigation Application → Sensor → Advanced set. → Echo evaluation → EC. smoothing

Description Enter window width for echo curve smoothing.

User entry 0 to 9 900 mm

Factory setting 35 mm

Additional information **Access:**
- Read access: Expert
- Write access: Expert

Weighting curve offset

Navigation Application → Sensor → Advanced set. → Echo evaluation → WgthCurveOffset

Description Enter offset of the weighting curve.

User entry −9 999.0 to 9 999.0 dB

Factory setting 14 dB

Additional information **Access:**
- Read access: Expert
- Write access: Expert

Window size weighting curve

Navigation Application → Sensor → Advanced set. → Echo evaluation → WindowWgthCurve

Description Enter width of the weighting curve window.

User entry 0 to 9 900 mm

Factory setting
- 800 mm at 80 GHz
- 427 mm at 180 GHz

Additional information **Access:**
- Read access: Expert
- Write access: Expert

Maximum value weighting curve

Navigation Application → Sensor → Advanced set. → Echo evaluation → MaxValWghtCurve

Description Enter maximum amplitude of the weighting curve.

User entry –9 999.0 to 9 999.0 dB

Factory setting 100 dB

Additional information **Access:**
- Read access: Expert
- Write access: Expert

First echo band

Navigation Application → Sensor → Advanced set. → Echo evaluation → First echo band

Description Enter width of the first echo band.

User entry 0.0 to 100.0 dB

Factory setting 10 dB

Additional information **Access:**
- Read access: Expert
- Write access: Expert

DSC Mode

Navigation Application → Sensor → Advanced set. → Echo evaluation → DSC Mode

Description Select DSC mode.

Selection
- Off
- Manual
- Auto

Factory setting Manual

Additional information
- Off: The signal control is deactivated.
- Manual: The signal control is activated with a fixed value.
- Auto: The signal control operates automatically.

Access:
- Read access: Expert
- Write access: Expert

DSC Factor

Navigation Application → Sensor → Advanced set. → Echo evaluation → DSC Factor

Description Displays the actual factor for signal control.

User entry 0 to 1

Factory setting 0.75

Additional information **Access:**
- Read access: Expert
- Write access: Expert

Actual DSC Factor

Navigation Application → Sensor → Advanced set. → Echo evaluation → ActualDSCFactor

Description Displays the actual factor for signal control.

User interface 0 to 1

Factory setting 0

Additional information **Access:**
- Read access: Expert
- Write access: -

Tank bottom range

Navigation Application → Sensor → Advanced set. → Echo evaluation → TB range

Description Determines the range in which the physical bottom echo is searched for.
The bottom range extends downwards and starts at level 0 % "Empty calibration". It ends at the entered value.

Note: If the level 0 % "Empty calibration" is far above the physical bottom, the bottom range starts at the entered "Maximum measuring distance".

User entry 0 to 312 500 mm

Factory setting 15 000 mm

Min. amplitude TBD

Navigation Application → Sensor → Advanced set. → Echo evaluation → Min. ampl. TBD

Description Enter the minimum amplitude for tank bottom detection.

User entry −99 to 9 999.0 dB

Factory setting 10 dB

Additional information **Access:**
- Read access: Expert
- Write access: Expert

Lower level area

Navigation Application → Sensor → Advanced set. → Echo evaluation → Lower level area

Description Enter lower level area.
In this defined range, the first echo band is lowered to the weighting curve.

User entry 0 to 125 000 mm

Factory setting 400 mm

Additional information **Access:**
- Read access: Expert
- Write access: Expert

Evaluation mode

Navigation Application → Sensor → Advanced set. → Echo evaluation → Evaluation mode

Description Defines the evaluation mode for the echo tracking.

Selection
- FlexTracking
- FlexTracking - Weak signals
- FixTracking
- FixTracking - Weak signals

Factory setting FlexTracking

Additional information
- FlexTracking: This is the standard setting with a self-correcting evaluation. If the device detects a more probable level signal than the currently evaluated signal, the device automatically corrects the evaluation after a preset time has elapsed. An evaluation below the map generally does not take place.
- FlexTracking - Weak signals: Like FlexTracking, additionally the level signal is also tracked under the map. In case of bad signal conditions (small DC value, strongly turbulent surfaces…) this evaluation mode can bring additional stability.
- FixTracking: This evaluation mode is optimized for applications with frequently changing, unwanted level jumps. As long as the evaluated echo is present, it is evaluated as a valid level echo An evaluation below the map generally does not take place.
- FixTracking - Weak signals: Like FixTracking, additionally the level signal is also tracked under the map. In case of bad signal conditions (small DC value, strongly turbulent surfaces…) this evaluation mode can bring additional stability.

Reset evaluation

Navigation Application → Sensor → Advanced set. → Echo evaluation → Reset evaluation

Description Restarts level determination.

Selection
- Reset done
- Yes

Factory setting Reset done

Window size tracking

Navigation Application → Sensor → Advanced set. → Echo evaluation → Wind.size track.

User entry 0 to 20 500 mm

Factory setting
- 250 mm at 80 GHz
- 213 mm at 180 GHz

Additional information **Access:**
- Read access: Expert
- Write access: Expert

Debug parameter index

Navigation Application → Sensor → Advanced set. → Echo evaluation → Debug parm. idx

User entry 0 to 65 535

Factory setting 2

Additional information **Access:**
- Read access: Expert
- Write access: Expert

Debug array index

Navigation Application → Sensor → Advanced set. → Echo evaluation → Debug array indx

User entry 0 to 255

Factory setting 0

Additional information **Access:**
- Read access: Expert
- Write access: Expert

Status

Navigation Application → Sensor → Advanced set. → Echo evaluation → Status

User entry 0 to 255

Factory setting 0

Additional information **Access:**
- Read access: Expert
- Write access: Expert

Debug value

Navigation Application → Sensor → Advanced set. → Echo evaluation → Debug value

User interface Signed floating-point number

Factory setting 4.0

Additional information **Access:**
- Read access: Expert
- Write access: Expert

Debug value integer32

Navigation Application → Sensor → Advanced set. → Echo evaluation → Debug val. int32

User interface Positive integer

Factory setting 0

Additional information **Access:**
- Read access: Expert
- Write access: Expert

Linearization

Navigation Application → Sensor → Linearization

Linearization type

Navigation Application → Sensor → Linearization → Lineariz. type

Description Select type of linearization.

Selection
- None
- Linear
- Table
- Pyramid bottom
- Conical bottom
- Angled bottom
- Horizontal cylinder
- Sphere

Factory setting None

Unit after linearization

Navigation Application → Sensor → Linearization → Unit lineariz.

Description Defines the unit of the linearized value.

Note:
The selected unit is only used to be indicated on the display. The measured value is not transformed according to the selected unit.

Note:
If "Free text" is selected, an additional parameter "Free text" appears in which the designation of the unit can be defined.

Selection

SI units
- STon
- t
- kg
- cm^3
- dm^3
- m^3
- hl
- l
- %
- mm
- m

US units
- lb
- UsGal
- ft^3
- ft
- in

Imperial units
impGal

Custom-specific units
Free text

Factory setting %

Free text

Navigation Application → Sensor → Linearization → Free text

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

Factory setting Free text

Level linearized

Navigation Application → Sensor → Linearization → Level linearized

Description Displays the linearized level.

User interface Signed floating-point number

Factory setting 0 %

Maximum value

Navigation Application → Sensor → Linearization → Maximum value

Description Linearized value corresponding to a level of 100 %.

User entry −200 000 to 200 000.0 %

Factory setting 100.0 %

Diameter

Navigation Application → Sensor → Linearization → Diameter

Description Diameter of the spherical tank or horizontal cylinder tank.

User entry 0.001 to 125 000 mm

Factory setting When the **Empty calibration** function is performed, the value in the **Diameter** parameter is automatically configured. Although manual adjustment of the value is possible here, changing the diameter does not affect the **Empty calibration** function.

Intermediate height

Navigation Application → Sensor → Linearization → Intermed. height

Description Height of the pyramid, conical or angled bottom

User entry 0 to 125 000 mm

Factory setting 0 mm

Table mode

Navigation Application → Sensor → Linearization → Table mode

Description Defines the editing mode of the linearization table.

Note:
DeviceCare and FieldCare contain a graphical tool for the easy creation of a linearization table.
Device Care: "Additional functions" -> "Linearization table"
FieldCare: "Device Operation" -> "Device Functions" -> "Additional functions" -> "Linearization table"

Selection
- Manual
- Semiautomatic *
- Clear table
- Sort table *

Factory setting Manual

Additional information
- Manual: Enter the level and the associated linearized value manually for each table point.
- Semiautomatic: The level is measured by the device for each table point. Enter the associated linearized value manually.
- Clear table: Deletes the existing linearization table.
- Sort table: Rearranges the linearization points into an ascending order.

Table number

Navigation Application → Sensor → Linearization → Table number

Description Enter or change the table point.

User entry 1 to 32

Factory setting 1

Level

Navigation Application → Sensor → Linearization → Level

Description Enter level value of the table point (value before linearization).

User entry Signed floating-point number

Factory setting 0 %

Level

Navigation Application → Sensor → Linearization → Level

Description Displays measured level (value before linearization). This value is transmitted to the table.

User interface Signed floating-point number

Factory setting 0.0 %

* Visibility depends on order options or device settings

Customer value

Navigation Application → Sensor → Linearization → Customer value

Description Enter linearized value for the table point.

User entry Signed floating-point number

Factory setting 0 %

Activate table

Navigation Application → Sensor → Linearization → Activate table

Description Activate or deactivate table.
The table can only be activated if the table values:
- are present in at least 2 value pairs
- do not exceed the sensor limits
- represent a function which is monotonically ascending or descending

Selection
- Disable
- Enable

Factory setting Disable

CRC linearization table

Navigation Application → Sensor → Linearization → CRC lin. table

Description CRC checksum based on the current parameter settings of the linearization table.
Can be used to detect changes in the parameter settings.

User interface 0 to 65 535

Factory setting 0

Signal information

Navigation Application → Sensor → Signal inform.

Signal quality

Navigation Application → Sensor → Signal inform. → Signal quality

Description Displays the quality of the evaluated level signal.

User interface
- Strong
- Medium
- Weak
- No signal

Factory setting Strong

Absolute echo amplitude

Navigation Application → Sensor → Signal inform. → Abs. echo ampl.

Description Shows the absolute amplitude of the evaluated level signal.

User interface −150.0 to 32.0 dB

Factory setting 0.0 dB

Relative echo amplitude

Navigation Application → Sensor → Signal inform. → Relat.echo ampl.

Description Shows the relative amplitude (i.e. the distance to the evaluation curve) of the evaluated level signal.

User interface 0.0 to 150.0 dB

Factory setting 0.0 dB

Sensor cycle time

Navigation Application → Sensor → Signal inform. → Sens. cycle time

Description Displays the cycle time of the measurement.

User interface 0 to 65 535 ms

Factory setting 0 ms

Additional information **Access:**
- Read access: Expert
- Write access: -

Actual IF gain

Navigation Application → Sensor → Signal inform. → Actual IF gain

Description Displays the actual gain of the intermediate frequency.

User interface 0 to 1 000

Factory setting 0

Additional information **Access:**
- Read access: Expert
- Write access: -

3.3.4 Current output

Navigation Application → Curr.output

Assign PV

Navigation Application → Curr.output → Assign PV

Description Assign a measured variable to the primary dynamic variable (PV).

Additional information:
The assigned measured variable is also used by the current output.

Selection
- Level linearized
- Distance

Factory setting Level linearized

Measuring mode current output

Navigation Application → Curr.output → Output mode

Description Select curve of current output.

Selection
- Standard
- Inverse

Factory setting Standard

Current range output

Navigation Application → Curr.output → Current range

Description Defines the current range used to transmit the measured or calculated value.
In brackets are indicated the “low saturation value” and the “high saturation value”.
If Measured value ≤ “low saturation”, the output current is set to “low saturation”.
If Measured value ≥ “high saturation”, the output current is set to ”high saturation”.

Note:
Currents below 3.6 mA or above 21.5 mA can be used to signal an 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)

Factory setting 4...20 mA NE (3.8...20.5 mA)

Lower range value output

Navigation Application → Curr.output → Low.range outp

Description Depending on which variable has been selected as "Process variable output current ", define the related lower (4 mA) and upper range values (20 mA).

User entry Signed floating-point number

Factory setting 0.0 %

Upper range value output

Navigation Application → Curr.output → Upp.range outp

Description Depending on which variable has been selected as "Process variable output current ", define the related lower (4 mA) and upper range values (20 mA).

User entry Signed floating-point number

Factory setting 100.0 %

Failure behavior current output

Navigation Application → Curr.output → Failure behav.

Description Defines which current the output assumes in the case of an error.
Min: < 3.6 mA
Max: >21.5 mA

Note: The hardware DIP Switch for alarm current has priority over software setting.

Selection
- Min.
- Max.

Factory setting Min.

Failure current

Navigation Application → Curr.output → Failure current

Description Enter current output value in alarm condition

User entry 21.5 to 23 mA

Factory setting 22.5 mA

Output current

Navigation Application → Curr.output → Output curr.

Description Displays the value currently calculated for the current output

User interface 3.59 to 23 mA

Factory setting 3.59 mA

Terminal current

Navigation Application → Curr.output → Terminal curr.

Description Shows the current value of the current output which is currently measured

User interface 0 to 30 mA

Factory setting 0 mA

4 mA trim value

Navigation Application → Curr.output → 4 mA trim value

Description Enter the trim value for the 4 mA current output.

Note:
Simulation must be active.

User entry 3 to 5 mA

Factory setting 4 mA

Additional information **Access:**
- Read access: Expert
- Write access: Expert

20 mA trim value

Navigation Application → Curr.output → 20 mA trim value

Description Enter the trim value for the 20 mA current output.

Note:
Simulation must be active.

User entry 18 to 22 mA

Factory setting 20 mA

Additional information **Access:**
- Read access: Expert
- Write access: Expert

3.3.5 HART output

Navigation Application → Curr.output

Configuration

Navigation Application → HART output → Configuration

HART address

Navigation Application → HART output → Configuration → HART address

Description Enter the address to exchange data via the HART protocol.

User entry 0 to 63

Factory setting 0

HART short tag

Navigation Application → HART output → Configuration → HART short tag

Description Defines the short tag for the measuring point.

Maximum length: 8 characters
Allowed characters: A-Z, 0-9, certain special characters

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

Factory setting SHORTTAG

Device tag

Navigation Application → HART output → Configuration → Device tag

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

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

Factory setting 43

No. of preambles

Navigation Application → HART output → Configuration → No. of preambles

Description Defines the number of preambles in the HART telegram

User entry 5 to 20

Factory setting 5

Loop current mode

Navigation Application → HART output → Configuration → Loop curr mode

Description If Loop current mode is disabled, Multi-drop communication mode is activated. Multi-drop is a HART digital communication mode where multiple devices may share the same pair of wires for power and communications.
In this mode the output current is fixed.

Selection
- Disable
- Enable

Factory setting Enable

HART output

Navigation Application → HART output → HART output

Assign PV

Navigation Application → HART output → HART output → Assign PV

Description Assign a measured variable to the primary dynamic variable (PV).

Additional information:
The assigned measured variable is also used by the current output.

Selection
- Level linearized
- Distance

Factory setting Level linearized

Primary variable (PV)

Navigation Application → HART output → HART output → Primary var (PV)

Description Shows the current measured value of the primary dynamic variable (PV)

User interface Signed floating-point number

Factory setting 100.0 %

Assign SV

Navigation Application → HART output → HART output → Assign SV

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

Selection
- Level linearized
- Distance
- Terminal voltage *
- Electronics temperature
- Sensor temperature
- Absolute echo amplitude
- Relative echo amplitude
- Area of incoupling
- Buildup index *
- Buildup detected *
- Foam index *
- Foam detected *
- Percent of range
- Loop current
- Terminal current *
- Not used

Factory setting Distance

Secondary variable (SV)

Navigation Application → HART output → HART output → Second.var(SV)

Description Shows the current measured value of the secondary dynamic variable (SV)

User interface 0 to 410.10498687664 mm

Factory setting 0 mm

* Visibility depends on order options or device settings

Assign TV

Navigation Application → HART output → HART output → Assign TV

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

Selection
- Level linearized
- Distance
- Terminal voltage *
- Electronics temperature
- Sensor temperature
- Absolute echo amplitude
- Relative echo amplitude
- Area of incoupling
- Buildup index *
- Buildup detected *
- Foam index *
- Foam detected *
- Percent of range
- Loop current
- Terminal current *
- Not used

Factory setting Absolute echo amplitude

Tertiary variable (TV)

Navigation Application → HART output → HART output → Tertiary var(TV)

Description Shows the current measured value of the tertiary (third) dynamic variable (TV)

User interface −150.0 to 0.0 deciBel

Factory setting −150.0 deciBel

Assign QV

Navigation Application → HART output → HART output → Assign QV

Description Assign a measured variable to the quaternary dynamic variable (QV).

Selection
- Level linearized
- Distance
- Terminal voltage *
- Electronics temperature
- Sensor temperature
- Absolute echo amplitude

* Visibility depends on order options or device settings

- Relative echo amplitude
- Area of incoupling
- Buildup index *
- Buildup detected *
- Foam index *
- Foam detected *
- Percent of range
- Loop current
- Terminal current *
- Not used

Factory setting Relative echo amplitude

Quaternary variable (QV)

Navigation Application → HART output → HART output → Quaterna.var(QV)

Description Shows the current measured value of the quaternary (fourth) dynamic variable (QV)

User interface −150.0 to 0.0 deciBel

Factory setting −150.0 deciBel

Burst configuration

Navigation Application → HART output → Burst config. 1

Burst mode

Navigation Application → HART output → Burst config. 1 → Burst mode 1

Description Switch HART burst mode for burst message on

Selection
- Off
- On

Factory setting Off

* Visibility depends on order options or device settings

Burst command

Navigation Application → HART output → Burst config. 1 → Burst command 1

Description Select the HART command that is sent to the HART master

Selection
- Primary variable (PV)
- Loop Current and Percent of Range
- Dynamic Variables
- Device variables with status
- Device variables
- Additional device status

Factory setting Loop Current and Percent of Range

Burst variable 0

Navigation Application → HART output → Burst config. 1 → Burst variable 0

Description For HART command 9 and 33, assign a HART device variable or process variable to burst variable

Selection
- Level linearized
- Distance
- Electronics temperature
- Sensor temperature
- Absolute echo amplitude
- Relative echo amplitude
- Area of incoupling
- Buildup index *
- Buildup detected *
- Foam index *
- Foam detected *
- Terminal voltage *
- Terminal current *
- Percent of range
- Loop current
- Primary variable (PV)
- Secondary variable (SV)
- Tertiary variable (TV)
- Quaternary variable (QV)
- Not used

Factory setting Level linearized

* Visibility depends on order options or device settings

Burst variable 1

Navigation Application → HART output → Burst config. 1 → Burst variable 1

Description For HART command 9 and 33, assign a HART device variable or process variable to burst variable

Selection
- Level linearized
- Distance
- Electronics temperature
- Sensor temperature
- Absolute echo amplitude
- Relative echo amplitude
- Area of incoupling
- Buildup index *
- Buildup detected *
- Foam index *
- Foam detected *
- Terminal voltage *
- Terminal current *
- Percent of range
- Loop current
- Primary variable (PV)
- Secondary variable (SV)
- Tertiary variable (TV)
- Quaternary variable (QV)
- Not used

Factory setting Level linearized

Burst variable 2

Navigation Application → HART output → Burst config. 1 → Burst variable 2

Description For HART command 9 and 33, assign a HART device variable or process variable to burst variable

Selection
- Level linearized
- Distance
- Electronics temperature
- Sensor temperature
- Absolute echo amplitude
- Relative echo amplitude
- Area of incoupling
- Buildup index *
- Buildup detected *
- Foam index *
- Foam detected *
- Terminal voltage *
- Terminal current *
- Percent of range

* Visibility depends on order options or device settings

- Loop current
- Primary variable (PV)
- Secondary variable (SV)
- Tertiary variable (TV)
- Quaternary variable (QV)
- Not used

Factory setting Level linearized

Burst variable 3

Navigation Application → HART output → Burst config. 1 → Burst variable 3

Description For HART command 9 and 33, assign a HART device variable or process variable to burst variable

Selection
- Level linearized
- Distance
- Electronics temperature
- Sensor temperature
- Absolute echo amplitude
- Relative echo amplitude
- Area of incoupling
- Buildup index *
- Buildup detected *
- Foam index *
- Foam detected *
- Terminal voltage *
- Terminal current *
- Percent of range
- Loop current
- Primary variable (PV)
- Secondary variable (SV)
- Tertiary variable (TV)
- Quaternary variable (QV)
- Not used

Factory setting Level linearized

Burst variable 4

Navigation Application → HART output → Burst config. 1 → Burst variable 4

Description For HART command 33, assign a HART device variable or process variable to burst variable

Selection
- Level linearized
- Distance
- Electronics temperature

* Visibility depends on order options or device settings

- Sensor temperature
- Absolute echo amplitude
- Relative echo amplitude
- Area of incoupling
- Buildup index *
- Buildup detected *
- Foam index *
- Foam detected *
- Terminal voltage *
- Terminal current *
- Percent of range
- Loop current
- Primary variable (PV)
- Secondary variable (SV)
- Tertiary variable (TV)
- Quaternary variable (QV)
- Not used

Factory setting Not used

Burst variable 5

Navigation Application → HART output → Burst config. 1 → Burst variable 5

Description For HART command 33, assign a HART device variable or process variable to burst variable

Selection

- Level linearized
- Distance
- Electronics temperature
- Sensor temperature
- Absolute echo amplitude
- Relative echo amplitude
- Area of incoupling
- Buildup index *
- Buildup detected *
- Foam index *
- Foam detected *
- Terminal voltage *
- Terminal current *
- Percent of range
- Loop current
- Primary variable (PV)
- Secondary variable (SV)
- Tertiary variable (TV)
- Quaternary variable (QV)
- Not used

Factory setting Not used

* Visibility depends on order options or device settings

Burst variable 6

Navigation Application → HART output → Burst config. 1 → Burst variable 6

Description For HART command 33, assign a HART device variable or process variable to burst variable

Selection
- Level linearized
- Distance
- Electronics temperature
- Sensor temperature
- Absolute echo amplitude
- Relative echo amplitude
- Area of incoupling
- Buildup index *
- Buildup detected *
- Foam index *
- Foam detected *
- Terminal voltage *
- Terminal current *
- Percent of range
- Loop current
- Primary variable (PV)
- Secondary variable (SV)
- Tertiary variable (TV)
- Quaternary variable (QV)
- Not used

Factory setting Not used

Burst variable 7

Navigation Application → HART output → Burst config. 1 → Burst variable 7

Description For HART command 33, assign a HART device variable or process variable to burst variable

Selection
- Level linearized
- Distance
- Electronics temperature
- Sensor temperature
- Absolute echo amplitude
- Relative echo amplitude
- Area of incoupling
- Buildup index *
- Buildup detected *
- Foam index *
- Foam detected *
- Terminal voltage *
- Terminal current *
- Percent of range
- Loop current
- Primary variable (PV)

* Visibility depends on order options or device settings

- Secondary variable (SV)
- Tertiary variable (TV)
- Quaternary variable (QV)
- Not used

Factory setting Not used

Burst trigger mode

Navigation Application → HART output → Burst config. 1 → Trigger mode

Description Select the event that triggers the burst message

Selection
- Continuous
- Window *
- Rising *
- Falling *
- On change

Factory setting Continuous

Burst trigger level

Navigation Application → HART output → Burst config. 1 → Trigger level

Description Enter the burst trigger value that determines together with the option selected in "Burst trigger mode" parameter the time of burst message

User entry Signed floating-point number

Factory setting 2.0E-38

Min. update period

Navigation Application → HART output → Burst config. 1 → Min. upd. per.

Description Enter the minimum time span between two burst responses of one burst message

User entry Positive integer

Factory setting 1000 ms

* Visibility depends on order options or device settings

Max. update period

Navigation Application → HART output → Burst config. 1 → Max. upd. per.

Description Enter the maximum time span between two burst responses of one burst message

User entry Positive integer

Factory setting 2 000 ms

Information

Navigation Application → HART output → Information

Device ID

Navigation Application → HART output → Information → Device ID

Description Shows the device ID for identifying the device in a HART network

User interface Positive integer

Factory setting 123 456

Device type

Navigation Application → HART output → Information → Device type

Description Displays the device type with which the device is registered with the HART FieldComm Group.

User interface 0 to 65 535

Factory setting 4 550

Device revision

Navigation Application → HART output → Information → Device revision

Description Displays the device revision with which the device is registered with the HART FieldComm Group.

User interface 0 to 255

Factory setting 1

HART short tag

Navigation Application → HART output → Information → HART short tag

Description Defines the short tag for the measuring point.

Maximum length: 8 characters
Allowed characters: A-Z, 0-9, certain special characters

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

Factory setting SHORTTAG

HART revision

Navigation Application → HART output → Information → HART revision

Description Displays the revision of the HART protocol for the device.

User interface 5 to 7

Factory setting 7

HART descriptor

Navigation Application → HART output → Information → HART descriptor

Description Use this function to define a description for the measuring point.

Maximum length: 16 characters
Allowed characters: A-Z, 0-9, certain special characters

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

Factory setting 43

HART message

Navigation Application → HART output → Information → HART message

Description Use this function to define a HART message which is sent via the HART protocol when requested by the master.

Maximum length: 32 characters
Allowed characters: A-Z, 0-9, certain special characters

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

Factory setting 43

HART date code

Navigation Application → HART output → Information → HART date code

Description Enter date of the last configuration change. Use this format yyyy-mm-dd

User entry Character string comprising numbers, letters and special characters (10)

Factory setting 2009-07-20

3.4 System

Navigation System

3.4.1 Device management

Navigation System → Device manag.

Device tag

Navigation System → Device manag. → Device tag

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

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

Factory setting 43

Locking status

Navigation System → Device manag. → Locking status

Description Indicates the type of locking.

"Safety locked" (SW)
Unlock the device by entering the appropriate access code in "Enter safety unlocking code".

"Temporarily locked" (SW)
The device is temporarily locked by processes in the device (e.g. data upload/download, reset). The device will automatically be unlocked after completion of these processes.

User interface
- Safety locked
- Temporarily locked

Configuration counter

Navigation System → Device manag. → Config. counter

Description Displays the counter for changes to the device parameters.

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

User interface 0 to 65 535

Factory setting 0

Reset device

Navigation System → Device manag. → Reset device

Description Reset the device configuration - either entirely or in part - to a defined state

Selection
- Cancel
- To fieldbus defaults **
- To factory defaults *
- To delivery settings *
- Restart device

Factory setting Cancel

3.4.2 User management

Navigation System → User manag.

User role

Navigation System → User manag. → User role

Description Shows the access authorization to the parameters via the operating tool

** Visibility depends on communication
* Visibility depends on order options or device settings

User interface
- Operator
- Maintenance
- Expert
- Production
- Development

Factory setting Maintenance

Password

Navigation System → User manag. → Password

Description Enter the password for the "Maintenance" user role to get access to the functionality of this role.

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

Factory setting

Enter access code

Navigation System → User manag. → Ent. access code

Description For authorized service personnel only.

User entry 0 to 9 999

Factory setting 0

Status password entry

Navigation System → User manag. → Status pw entry

Description Use this function to display the status of the password verification.

User interface
- --------
- Wrong password
- Password rule violated
- Password accepted
- Permission denied
- Confirm PW mismatch
- Reset password accepted
- Invalid user role
- Wrong sequence of entry

Factory setting --------

New password

Navigation System → User manag. → New password

Description Define the new "Maintenance" password.
A new password is valid after it has been confirmed within the "Confirm new password" parameter.
Any valid password consists of 4 to 16 characters and can contain letters and numbers.

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

Factory setting

Confirm new password

Navigation System → User manag. → Confirm password

Description Enter the new password again to confirm.

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

Factory setting

Reset password

Navigation System → User manag. → Reset password

Description Enter a code to reset the current "Maintenance" password.
The code is delivered by your local support.

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

Factory setting

Old password

Navigation System → User manag. → Old password

Description Enter the current password, to subsequently change the existing password.

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

Factory setting

Status password entry

Navigation System → User manag. → Status pw entry

Description Use this function to display the status of the password verification.

User interface
- --------
- Wrong password
- Password rule violated
- Password accepted
- Permission denied
- Confirm PW mismatch
- Reset password accepted
- Invalid user role
- Wrong sequence of entry

Factory setting --------

3.4.3 Bluetooth configuration

Navigation System → Bluetooth conf.

Bluetooth activation

Navigation System → Bluetooth conf. → Bluetooth active

Description If Bluetooth is deactivated, it can only be reactivated via the display or the operating tool. Reactivating via the SmartBlue app is not possible.

Selection
- Disable
- Enable

Factory setting Enable

3.4.4 Display

Navigation System → Display

Language

Navigation System → Display → Language

Description Set display language

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

Factory setting English

Format display

Navigation System → Display → Format display

Description Select how measured values are shown on the display

Selection
- 1 value, max. size
- Bargraph
- 2 values

Factory setting 1 value, max. size

* Visibility depends on order options or device settings

Value 1 display

Navigation System → Display → Value 1 display

Description Select the measured value that is shown on the local display

Selection
- Level linearized
- Distance
- Absolute echo amplitude
- Relative echo amplitude
- Area of incoupling
- Current output
- Buildup index *
- Foam index *
- Terminal voltage
- Electronics temperature
- Sensor temperature
- Unfiltered distance

Factory setting Level linearized

Decimal places 1

Navigation System → Display → Decimal places 1

Description This selection does not affect the measurement and calculation accuracy of the device.

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

Factory setting x.xx

Value 2 display

Navigation System → Display → Value 2 display

Description Select the measured value that is shown on the local display

Selection
- None
- Level linearized
- Distance
- Absolute echo amplitude
- Relative echo amplitude
- Area of incoupling

* Visibility depends on order options or device settings

- Buildup index*
- Foam index*
- Terminal voltage
- Electronics temperature
- Sensor temperature
- Current output
- Unfiltered distance

Factory setting Distance

Decimal places 2

Navigation System → Display → Decimal places 2

Description This selection does not affect the measurement and calculation accuracy of the device.

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

Factory setting x

Rotation display

Navigation System → Display → Rotation display

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

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

Factory setting 0 degree

Color scheme

Navigation System → Display → Color scheme

Description Select the preferred color scheme.

* Visibility depends on order options or device settings

Selection
- Light
- Dark

Factory setting Dark

3.4.5 Geolocation

Navigation System → Geolocation

Process Unit Tag

Navigation System → Geolocation → Process Unit Tag

Description Enter the process unit in which the device is installed.

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

Factory setting Process Unit Tag

Location Description

Navigation System → Geolocation → Location Descr.

Description Use this function to enter a description of the location so that the device can be located in the plant.

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

Factory setting somewhere

Longitude

Navigation System → Geolocation → Longitude

Description Use this function to enter the longitude coordinates that describe the device location.

User entry −180 to 180 °

Factory setting 0 °

Latitude

Navigation System → Geolocation → Latitude

Description Use this function to enter the latitude coordinates that describe the device location.

User entry −90 to 90 °

Factory setting 0 °

Altitude

Navigation System → Geolocation → Altitude

Description Use this function to enter the altitude data that describe the device location.

User entry Signed floating-point number

Factory setting 0 m

Location method

Navigation System → Geolocation → Location method

Description Use this function to select the data format for specifying the geographic location. The codes for specifying the location are based on the US National Marine Electronics Association (NMEA) Standard NMEA 0183.

Selection
- No fix
- GPS or Standard Positioning Service fix
- Differential GPS fix
- Precise positioning service (PPS) fix
- Real Time Kinetic (RTK) fixed solution
- Real Time Kinetic (RTK) float solution
- Estimated dead reckoning
- Manual input mode
- Simulation Mode

Factory setting No fix

3.4.6 Information

Navigation System → Information

Device name

Navigation System → Information → Device name

Description Use this function to display the device name. It can also be found on the nameplate.

User interface Character string comprising numbers, letters and special characters

Factory setting 43

Manufacturer

Navigation System → Information → Manufacturer

Description Displays the manufacturer.

User interface Character string comprising numbers, letters and special characters

Factory setting Endress+Hauser

Serial number

Navigation System → Information → Serial number

Description The serial number is a unique alphanumerical code identifying the device.
It is printed on the nameplate.
In combination with the Operations app it allows to access all device related documentation.

User interface Character string comprising numbers, letters and special characters

Factory setting AAFFFFAAFFF

Order code

Navigation System → Information → Order code

Description Shows the device order code.

User interface Character string comprising numbers, letters and special characters

Factory setting - none -

Firmware version

Navigation System → Information → Firmware version

Description Displays the device firmware version installed.

User interface Character string comprising numbers, letters and special characters

Factory setting 01.00

Hardware version

Navigation System → Information → Hardware version

User interface Character string comprising numbers, letters and special characters

Factory setting 01.00.00

Extended order code 1

Navigation System → Information → Ext. order cd. 1

Description The extended order code is an alphanumeric code containing all information to identify the device and its options.

User interface Character string comprising numbers, letters and special characters

Extended order code 2

Navigation System → Information → Ext. order cd. 2

Description The extended order code is an alphanumeric code containing all information to identify the device and its options.

User interface Character string comprising numbers, letters and special characters

Factory setting -

Extended order code 3

Navigation System → Information → Ext. order cd. 3

Description The extended order code is an alphanumeric code containing all information to identify the device and its options.

User interface Character string comprising numbers, letters and special characters

Factory setting -

XML build number

Navigation System → Information → XML build no.

User interface Positive integer

Factory setting 134

Checksum

Navigation System → Information → Checksum

Description Checksum for Firmware version.

User interface Positive integer

Factory setting 0

3.4.7 Additional information

Navigation System → Additional info

Sensor

Navigation System → Additional info → Sensor

Serial number

Navigation System → Additional info → Sensor → Serial number

Description Shows the serial number of the module

User interface Character string comprising numbers, letters and special characters

Factory setting AAFFFFAAFFF

Firmware version

Navigation System → Additional info → Sensor → Firmware version

Description Displays the firmware version of the module.

User interface Positive integer

Factory setting 0

Build no. software

Navigation System → Additional info → Sensor → Build no. softw.

Description Shows the build number of the module firmware

User interface 0 to 65 535

Factory setting 0

Hardware version

Navigation System → Additional info → Sensor → Hardware version

Description Displays the hardware version of the module.

User interface Character string comprising numbers, letters and special characters

Factory setting - none -

Checksum

Navigation System → Additional info → Sensor → Checksum

Description Checksum for Firmware version.

User interface Positive integer

Factory setting 0

Electronics

Navigation System → Additional info → Electronics

Serial number

Navigation System → Additional info → Electronics → Serial number

Description Shows the serial number of the module

User interface Character string comprising numbers, letters and special characters

Factory setting AAFFFFAAFFF

Firmware version

Navigation System → Additional info → Electronics → Firmware version

Description Displays the firmware version of the module.

User interface Positive integer

Factory setting 0

Build no. software

Navigation System → Additional info → Electronics → Build no. softw.

Description Shows the build number of the module firmware

User interface 0 to 65 535

Factory setting 0

Hardware version

Navigation System → Additional info → Electronics → Hardware version

Description Displays the hardware version of the module.

User interface Character string comprising numbers, letters and special characters

Factory setting - none -

Display/Bluetooth

Navigation System → Additional info → Displ./Bluetooth

Serial number

Navigation System → Additional info → Displ./Bluetooth → Serial number

Description Shows the serial number of the module

User interface Character string comprising numbers, letters and special characters

Factory setting AAFFFFAAFFF

Firmware version

Navigation System → Additional info → Displ./Bluetooth → Firmware version

Description Displays the firmware version of the module.

User interface Positive integer

Factory setting 0

Build no. software

Navigation System → Additional info → Displ./Bluetooth → Build no. softw.

Description Shows the build number of the module firmware

User interface 0 to 65 535

Factory setting 0

Hardware version

Navigation System → Additional info → Displ./Bluetooth → Hardware version

Description Displays the hardware version of the module.

User interface Character string comprising numbers, letters and special characters

Factory setting - none -

3.4.8 Software configuration

Navigation System → Softw. config.

CRC device configuration

Navigation System → Softw. config. → CRC device conf.

Description CRC device configuration based on current settings of safety relevant parameters. The CRC device configuration is unique and can be used to detect changes in safety relevant parameter settings.

User interface 0 to 65 535

Factory setting 65 535

Activate SW option

Navigation System → Softw. config. → Activate SW opt.

Description Enter the application package code or code of another re-ordered functionality to enable it

User entry Positive integer

Factory setting 0

Software option overview

Navigation System → Softw. config. → SW option overv.

Description Shows all enabled software options

User interface
- WHG
- Heartbeat Verification
- Heartbeat Monitoring *
- Bluetooth

* Visibility depends on order options or device settings

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