Description of Device Parameters
Micropilot FMRxxB; Operating tool
HART

Free space radar

HART
COMMUNICATION PROTOCOL

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. The document provides a detailed explanation of each individual parameter.

Performance of tasks that require detailed knowledge of the functioning of the device:
- Commissioning measurements under difficult conditions
- Optimal adaptation of the measurement to difficult conditions
- Detailed configuration of the communication interface
- Error diagnostics in difficult cases

1.2   Target group

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

1.3   Using this document

1.3.1   Information on the document structure

This document lists the submenus and parameters that are available when the **"Maintenance" option** user role is enabled.

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

1.3.2   Structure of a parameter description

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

- Navigation: Navigation path to the parameter via the local display
- Prerequisite: The parameter is only available under these specific conditions
- Description: Description of the parameter function
- Selection: List of the individual options for the parameter
- User entry: Input range for the parameter
- User interface: Display value/data of the parameter
- Factory setting: Default setting on leaving the factory
- Read and write authorization: Information about parameter access authorization
- Additional information:
  - On individual options
  - On display value/data
  - On the input range
  - On the factory setting
  - On the parameter function

1.4 Symbols

1.4.1 Symbols for certain types of information

Additional information: 🛈

Reference to documentation: 📖

Operation via local display: 🖳

Operation via operating tool: 🖥

Write-protected parameter: 🔒

1.5 Documentation

1.5.1 Standard documentation

Operating Instructions

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

1.5.2 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

	Configuration counter	→ 🖺 95
	Reset device	→ 🖺 95
‣ User management		→ 🖺 95
	User role	→ 🖺 95
	Password	→ 🖺 96
	Enter access code	→ 🖺 96
	Status password entry	→ 🖺 96
	New password	→ 🖺 97
	Confirm new password	→ 🖺 97
	Status password entry	→ 🖺 96
	Old password	→ 🖺 97
	New password	→ 🖺 97
	Confirm new password	→ 🖺 97
	Status password entry	→ 🖺 96
	Reset password	→ 🖺 97
	Status password entry	→ 🖺 96
	Old password	→ 🖺 97
	Status password entry	→ 🖺 96
‣ Bluetooth configuration		→ 🖺 98
	Bluetooth activation	→ 🖺 98
‣ Display		→ 🖺 98
	Language	→ 🖺 98
	Format display	→ 🖺 99
	Value 1 display	→ 🖺 99
	Decimal places 1	→ 🖺 100

Value 2 display	→ 🕮 100
Decimal places 2	→ 🕮 101
Value 3 display	→ 🕮 101
Decimal places 3	→ 🕮 101
Value 4 display	→ 🕮 102
Decimal places 4	→ 🕮 102
Contrast display	→ 🕮 102
▶ Geolocation	→ 🕮 103
Process Unit Tag	→ 🕮 103
Location Description	→ 🕮 103
Longitude	→ 🕮 103
Latitude	→ 🕮 104
Altitude	→ 🕮 104
Location method	→ 🕮 104
▶ Information	→ 🕮 105
Device name	→ 🕮 105
Manufacturer	→ 🕮 105
Serial number	→ 🕮 105
Order code	→ 🕮 105
Firmware version	→ 🕮 106
Hardware version	→ 🕮 106
Extended order code 1	→ 🕮 106

3   Description of device parameters

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

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

3.1   Guidance

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

Navigation   回目   Guidance

3.1.1   Overview of the operating menu

User navigation
- Commissioning
- Heartbeat Technology
  - Heartbeat Verification
  - Loop diagnostics
  - Foam detection
  - Buildup detection
- Safety mode
- Proof testing
- Import / Export
- Compare

3.1.2   Commissioning

Run this wizard to put the device into operation. Enter the appropriate value in each parameter or select the appropriate option.

> If the wizard is canceled before all the necessary parameters have been configured, any settings already made are saved. For this reason, the device may then be in an undefined state!

> In such situations, it is advisable to reset the device to the factory default settings.

The following parameters are configured in the Commissioning wizard:
- **Device identification**
  - Device tag
  - HART short tag
  - HART date code
  - HART descriptor
  - HART message
  - HART address
- **Measurement settings**
  - Level unit
  - Distance unit
  - Temperature unit
  - Tank type or vessel type
  - Media group
  - Empty calibration
  - Full calibration
  - Mapping
  - Linearization
- **Output settings**
  - Current range output
  - Failure behavior current output
  - Assignment HART variables

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 devices in the application.
Special Documentation "Heartbeat Monitoring + Verification"

📖 SD02953F

Heartbeat Verification

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

Loop diagnostics

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

Foam detection

This wizard configures 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 growth in what is known as a "foam index". The foam index can also be linked to an output variable and shown on the display.

Preparation: Foam monitoring initialization should only be performed with little or no foam

Buildup detection

This wizard configures buildup detection.

Buildup detection can, for example, be linked to a compressed air system to clean the antenna. The maintenance cycles can be optimized with buildup monitoring.

Preparation: Buildup monitoring initialization should only be performed with little or no buildup.

3.1.4   Safety mode

Write protection protects device settings from being overwritten. In addition, for safety applications it is also recommended to confirm the device settings that are relevant for safety (safety-related settings). This ensures that the correct values have been entered and downloaded to the device.

This entry can be used instead of manual checklists as the confirmation sequence.

If the safety-related device settings are confirmed, the device is marked with the "Safety-locked" feature. This indicates that the safety-related parameter settings have been checked and judged to be correct.

The sequence must be restarted to deactivate the safety lock. The safety lock is disabled if the unlocking code (= locking code) is entered.

3.1.5   Proof testing

A proof test simulates the current output. Safe operation during the test is not guaranteed. Manual, alternative measures must be taken to ensure process safety.

Caution: A proof test can only be performed if there is no active device error and if write protection has not been enabled via the hardware write protection switch.

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 curves
  ▪ Event list
  ▪ Diagnostic list

3.1.7   Compare

Compare datasets
This function can be used to compare the following datasets:
• Datasets in the .deh file format from the import/export function (Section 3.1.6)
• Datasets with the configuration currently in the device

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	ℹ️ 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

 Filter options

Navigation   ◨ Diagnostics → Event logbook → Filter options

Description   Select the category of event notification to display in the event list.

                              Additional information:
                              The status signals F, C, S and M are categorized in accordance with VDI/VDE 2650 and
                              NAMUR Recommendation NE 107.

Selection   • All
                              • Failure (F)
                              • Function check (C)
                              • Out of specification (S)
                              • Maintenance required (M)
                              • Information (I)
                              • Not categorized

Factory setting   All

Additional information   Access:
                               • Read access: Operator
                               • Write access: Maintenance

Clear event list   ⊞

Navigation   ⊟   Diagnostics → Event logbook → Clear event list

Description   Delete all entries of the event list.

Selection   • Cancel
                              • Clear data

Factory setting

3.2.4   Echo curve

Navigation   ⊞⊟   Diagnostics → Echo curve

Reference curve active

Navigation   ⊞⊟   Diagnostics → Echo curve → Ref.curve active

User interface   • Delivery reference curve available
                              • Customer reference curve available

Factory setting

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

                              A customer reference curve is usually recorded at the end of Guidance → Commissioning.
                              Should troubleshooting be necessary, these reference curves can be used for diagnostic
                              purposes.

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

Save reference curve	🔒

Navigation	🎛🖥 Diagnostics → Echo curve → Save ref. curve
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
User interface	Days (d), hours (h), minutes (m), seconds (s)
Factory setting	
Additional information	Time the reference curve is recorded Access: • Read access: Operator • Write access: -

3.2.5   Minimum/maximum values

Navigation   🎛🖥 Diagnostics → Min/max val.

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: -

Min. level value

Navigation	🖩🖵 Diagnostics → Min/max val. → Min. level value
User interface	Signed floating-point number
Factory setting	

Time min. level

Navigation	🖩🖵 Diagnostics → Min/max val. → Time min. level
User interface	Days (d), hours (h), minutes (m), seconds (s)
Factory setting	

Max. draining speed

Navigation	🖩🖵 Diagnostics → Min/max val. → Max.drain.speed
User interface	Positive floating-point number
Factory setting	

Minimum sensor temperature

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

User interface   −150 to 200 ℃

Factory setting

Time min. sensor temperature

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

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

Max. level value

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

User interface   Signed floating-point number

Factory setting

Time max. level

Navigation	◉▣ Diagnostics → Min/max val. → Time max. level
User interface	Days (d), hours (h), minutes (m), seconds (s)
Factory setting	

Max. filling speed

Navigation	◉▣ Diagnostics → Min/max val. → Max. fill. speed
User interface	Positive floating-point number
Factory setting	

Maximum sensor temperature

Navigation	◉▣ Diagnostics → Min/max val. → Max. Sensor temp
User interface	−150 to 200 ℃
Factory setting	

Time max. sensor temperature

Navigation	◉▣ Diagnostics → Min/max val. → Time max s. temp
User interface	Days (d), hours (h), minutes (m), seconds (s)
Factory setting	

3.2.6   Simulation

Navigation   ⧉▣   Diagnostics → Simulation

Simulation	🔒

Navigation	⧉▣ Diagnostics → Simulation → Simulation
Prerequisite	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 * • Build-up index *
Factory setting	Off

Value current output	🔒

Navigation	⧉▣ Diagnostics → Simulation → Val. curr.outp
Prerequisite	Simulation = Current output (→ 🖺 77)
Description	Defines the value of the simulated output current.
User entry	3.59 to 23 mA
Factory setting	

Simulation distance	🔒

Navigation	⧉▣ Diagnostics → Simulation → Sim distance
Prerequisite	Simulation = Distance (→ 🖺 51)

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*   Visibility depends on order options or device settings

| User entry | –999 900 to 999 900 mm |

Factory setting

Build-up index 🔒

| Navigation | 🔲🖵 Diagnostics → Simulation → Build-up index |

Prerequisite   Simulation = Build-up index

User entry   0 to 100.0 %

Factory setting

Foam index 🔒

| Navigation | 🔲🖵 Diagnostics → Simulation → Foam index |

Prerequisite   Simulation = Foam index (→ 🖺 33)

User entry   0 to 100.0 %

Factory setting

Process variable value 🔒

| Navigation | 🔲🖵 Diagnostics → Simulation → Proc. var. value |

Prerequisite   Simulation = Level linearized (→ 🖺 50)

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

Diagnostic event simulation 🔒

| Navigation | 🔲🖵 Diagnostics → Simulation → Diag. event sim. |

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 Build-up 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

3.2.7   Heartbeat Technology

Navigation   ▣▤   Diagnostics → Heartbeat Techn.

Navigation   ▤   Guidance → Heartbeat Techn.

Heartbeat Verification

Navigation   ▣▤   Diagnostics → Heartbeat Techn. → Heartbeat Verif.

Navigation   ▤   Guidance → Heartbeat Techn. → Heartbeat Verif.

Date/time Heartbeat Verification

Navigation	▣▤	Diagnostics → Heartbeat Techn. → Heartbeat Verif. → Date/time Heartbeat Verification
	▤	Guidance → Heartbeat Techn. → Heartbeat Verif. → Date/time Heartbeat Verification
Description		Date and time of last Hearbeat 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
	▤ Guidance → Heartbeat Techn. → Heartbeat Verif. → Operating time
Description	Value of the operating time 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
	▤ Guidance → 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.
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 Alarm delay	🔒

Navigation	🔀🖳 Diagnostics → Heartbeat Techn. → Loop diagn. → 806 Alarm delay
User entry	0 to 60 s

Factory setting   1 s

Foam detection

Navigation   🔘🖥️   Diagnostics → Heartbeat Techn. → Foam detection

Navigation   🖥️   Guidance → Heartbeat Techn. → Foam detection

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952 Foam detected   🔒

Navigation   🔘🖥️   Diagnostics → Heartbeat Techn. → Foam detection → 952 Foam detected
                      🖥️   Guidance → Heartbeat Techn. → Foam detection → 952 Foam detected

Selection   • Off
                      • On

Factory setting   Off

Lower level range limit   🔒

Navigation   🔘🖥️   Diagnostics → Heartbeat Techn. → Foam detection → LLR limit
                      🖥️   Guidance → 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
                      🖥️   Guidance → Heartbeat Techn. → Foam detection → ULR limit

Description   Assign upper limit of foam monitoring area.

Factory setting   100.0 %

Foam index	

Navigation	◉◻ Diagnostics → Heartbeat Techn. → Foam detection → Foam index
	◻ Guidance → 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
	◻ Guidance → 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.
	◻ Guidance → 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 %

Distance at foam zero adjustment	🔒

Navigation	◉◻ Diagnostics → Heartbeat Techn. → Foam detection → Dist. @zero foam
User entry	Signed floating-point number

Factory setting   0 mm

0% foam value	🔒

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

User entry   −999 999.9 to 999 999.9 dB

Factory setting   0 dB

Buildup detection

Navigation   🔢🖥 Diagnostics → Heartbeat Techn. → Build-up detect.

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168 Build-up detected	🔒

Navigation   🔢🖥 Diagnostics → Heartbeat Techn. → Build-up detect. → 168 Build-up det.

Selection   • Off
                        • On

Factory setting   Off

Build-up index	

Navigation   🔢🖥 Diagnostics → Heartbeat Techn. → Build-up detect. → Build-up 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 %

Build-up detection threshold	🔒

Navigation   🔢🖥 Diagnostics → Heartbeat Techn. → Build-up detect. → Build-up 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%)

Build-up detection threshold value

Navigation	Diagnostics → Heartbeat Techn. → Build-up detect. → Build-up value
Description	User-defined threshold value for the build-up detection.
User entry	0 to 100.0 %
Factory setting	40 %

0% build-up value

Navigation	Diagnostics → Heartbeat Techn. → Build-up detect. → 0% build-up val
User entry	Positive floating-point number
Factory setting	0

Limit offset for build-up detection

Navigation	Diagnostics → Heartbeat Techn. → Build-up detect. → Offset build-up
User entry	–999 999.9 to 999 999.9 dB
Factory setting	10 dB

Minimal distance for build-up detection

Navigation	Diagnostics → Heartbeat Techn. → Build-up detect. → Min dist buildup
User entry	–999 900 to 999 900 mm
Factory setting	0 mm

Maximum distance for build-up detection   🔒

Navigation	🔘🖳 Diagnostics → Heartbeat Techn. → Build-up detect. → Max dist buildup
User entry	–999 900 to 999 900 mm
Factory setting	1 000 mm

3.2.8   Self-test

Navigation   🔘🖳 Diagnostics → Self test

Navigation   🔘🖳 Diagnostics → Heartbeat Techn. → Build-up detect.

Start self check   🔒

Navigation	🔘🖳 Diagnostics → Self test → Start self check
Selection	• No • Yes
Factory setting	No

Result self check

Navigation	🔘🖳 Diagnostics → Self test → Result selfcheck
Description	A test signal is generated in the sensor module and fed into the analog path of the device. • Verification Test echo in the time window. • Verification of the test echo amplitude.
User interface	• Unknown • None • Not used • Valid range • Not ok • Ok • Invalid range • Not defined • Not done • Passed • Done • Failed • In progress • Finished

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Factory setting   Unknown

Start device check   🔒

Navigation   ◨◱   Diagnostics → Self test → Start dev. check

Selection   • No
                        • Yes

Factory setting   No

Result device check

Navigation   ◨◱   Diagnostics → Self test → Result dev.check

Description   The device has a function that detects and reports any interference by unfavorable
                        installation situation. Here, the amplitudes of measured signals are monitored, which refer
                        to interference in the near range.

User interface   • Installation ok
                        • Accuracy reduced
                        • Measurement capability reduced
                        • Check not done

Factory setting   Check not done

Last check time

Navigation   ◨◱   Diagnostics → Self test → Last check time

User interface   Character string comprising numbers, letters and special characters

Factory setting

Near distance   🔒

Navigation   ◨◱   Diagnostics → Self test → Near distance

Selection   • Check not done
                        • Check not OK
                        • Check OK

Factory setting   Check not done

Level signal	

Navigation   ◎◙   Diagnostics → Self test → Level signal

User interface   • Check not done
                        • Check not OK
                        • Check OK

Factory setting   Check not done

Area of incoupling	

Navigation   ◎◙   Diagnostics → Heartbeat Techn. → Build-up detect. → Area incoupling

Description   Ringing integral within the detection area.

User interface   Positive floating-point number
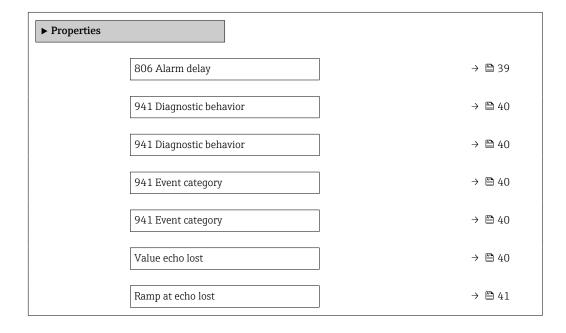
Factory setting   0.0

3.2.9   Diagnostic settings

Navigation   ◎◙   Diagnostics → Self test

Properties

Navigation   ◙   Diagnostics → Diag. settings → Properties

▶ Properties		
806 Alarm delay	→ 🖹	39
941 Diagnostic behavior	→ 🖹	40
941 Diagnostic behavior	→ 🖹	40
941 Event category	→ 🖹	40
941 Event category	→ 🖹	40
Value echo lost	→ 🖹	40
Ramp at echo lost	→ 🖹	41

Delay time echo lost	→ 🖺 41	
942 Diagnostic behavior	→ 🖺 42	
942 Diagnostic behavior	→ 🖺 42	
942 Event category	→ 🖺 43	
942 Event category	→ 🖺 43	
Safety distance	→ 🖺 43	
Acknowledge alarm	→ 🖺 43	

Alarm delay   🔒

Navigation   🔘🔲   Diagnostics → Diag. settings → Properties → Alarm delay

User entry   0 to 60 s

Factory setting   0 s

806 Alarm delay   🔒

Navigation   🔘🔲   Diagnostics → Diag. settings → Properties → 806 Alarm delay

User entry   0 to 60 s

Factory setting   1 s

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	0 to 200 000.0 %

Factory setting	0.0 %

---

*   Visibility depends on order options or device settings

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

Jump delay echo lost	🔒

Navigation	🎛🖥 Diagnostics → Diag. settings → Properties → Jump del. echol.
Selection	• Off
	• On
Factory setting	On

Delay time echo lost	🔒

Navigation	🎛🖥 Diagnostics → Diag. settings → Properties → Delay echo lost
Description	Time between the echo loss and the reaction defined for the output.
User entry	0 to 99 999.9 s
Factory setting	900 s

Echo lost window right	🔒

Navigation	🎛🖥 Diagnostics → Diag. settings → Properties → Echo l.win.right
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
User entry	0 to 99 000 mm
Factory setting	4 000 mm

Draining speed	🔒

Navigation	🔢🔲 Diagnostics → Diag. settings → Properties → Draining speed
User entry	Signed floating-point number
Factory setting	100 cm/min

Filling speed	🔒

Navigation	🔢🔲 Diagnostics → Diag. settings → Properties → Filling speed
User entry	Signed floating-point number
Factory setting	100 cm/min

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

Diagnostic settings

Navigation   ◎▣   Diagnostics → Self test

‣ Diagnostic settings		
‣ **Properties**		→ 🖺 38
	806 Alarm delay	→ 🖺 39
	941 Diagnostic behavior	→ 🖺 40
	941 Diagnostic behavior	→ 🖺 40

	952 Diagnostic behavior	→ 🖹 49
	952 Diagnostic behavior	→ 🖹 49
	952 Diagnostic behavior	→ 🖹 49
	952 Diagnostic behavior	→ 🖹 49
	952 Event category	→ 🖹 49
	952 Event category	→ 🖹 49
	952 Event category	→ 🖹 49
	952 Event category	→ 🖹 49

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

---

* Visibility depends on order options or device settings

942 Event category	🔒

Navigation	❶❷ 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	❶❷ 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	❶❷ 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 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	Currently measured level
User interface	−99 999.9 to 200 000.0 %
Factory setting	0.0 %

Output current

Navigation	⊞▤ Application → Measured values → Output curr.
Description	Shows 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 lower edge of device flange to product surface.
User interface	Signed floating-point number
Factory setting	0 mm

Unfiltered distance

Navigation	⊠⊟ Application → Measured values → Unfiltered dist.
User interface	Signed floating-point number
Factory setting	0 mm

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 ℃

Sensor temperature

Navigation	◉⊟ Application → Measured values → Sensor temp.
Description	Displays the current temperature of the sensor electronics.
User interface	−150 to 200 ℃
Factory setting	−150 ℃

3.3.2   Measuring units

Navigation   ◉⊟ Application → Measuring Units

Level unit   🔒

Navigation	◉⊟ Application → Measuring Units → Level unit
Description	Used to display the level.

Selection	*SI units*	*US units*
	• %	• ft
	• m	• in
	• mm	

Factory setting   %

Distance unit   🔒

Navigation	◉⊟ Application → Measuring Units → Distance unit
Description	Used for the basic calibration (Empty / Full).

Selection	*SI units*	*US units*
	• mm	• ft
	• m	• in

Factory setting   mm

Temperature unit	🔒

Navigation	🖩🖵 Application → Measuring Units → Temperature unit
Description	Used to display the electronics temperature.
Selection	*SI units* *US units*
	• ℃ ℉
	• K
Factory setting	℃

3.3.3   Sensor

Navigation   🖩🖵 Application → Measuring Units

Basic settings

Navigation   🖩🖵 Application → Sensor → Basic settings

Tank type	🔒

Navigation	🖩🖵 Application → Sensor → Basic settings → Tank type
Description	Optimizes the signal filters for the respective tank type.
	Note:
	'Workbench test' deactivates all filters. This option should exclusively be used for tests.
Selection	• Process vessel standard
	• Process vessel with agitator
	• Storage vessel
	• Sphere
	• Open channel
	• Stilling well
	• Workbench test [*]
Factory setting	Process vessel standard

---

*   Visibility depends on order options or device settings

Bin type	⌂

Navigation	⊠⊟ Application → Sensor → Basic settings → Bin type

Description	Optimizes the signal filters for the respective bin type.
	Note: 'Workbench test' deactivates all filters. This option should exclusively be used for tests.

Selection	• Silo • Buffer silo (fast) * • Bin / Pile * • Crusher / belt * • Workbench test *

Factory setting	Silo

Empty calibration	⌂

Navigation	⊠⊟ Application → Sensor → Basic settings → Empty calibr.

Description	Distance between process connection and minimum level (0%).

User entry	0 to 125 000 mm

Factory setting	20 000 mm

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	20 000 mm

---

* Visibility depends on order options or device settings

Max. draining speed solid	ⓐ

Navigation	ⓘⓔ Application → Sensor → Basic settings → 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	• Very slow < 0.5m (1.6ft) /h • Slow < 1m (3.3ft) /h • Standard < 2m (6,5ft) /h • Medium < 4m (13ft) /h • Fast < 8m (26ft) /h • Very fast > 8m (26ft) /h • No filter / test
Factory setting	No filter / test

Max. filling speed solid	ⓐ

Navigation	ⓘⓔ Application → Sensor → Basic settings → 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	• Very slow < 0.5m (1.6ft) /h • Slow < 1m (3.3ft) /h • Standard < 2m (6,5ft) /h • Medium < 4m (13ft) /h • Fast < 8m (26ft) /h • Very fast > 8m (26ft) /h • No filter / test
Factory setting	No filter / test

Max. draining speed liquid   🔒

Navigation	🔘🔲 Application → Sensor → Basic settings → 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	• Slow < 1cm (0.4in) /min • Medium < 10cm (4in) /min • Standard < 1m (40in) /min • Fast < 2m (80in) /min • Very fast > 2m (80in) /min • No filter / test
Factory setting	Standard < 1m (40in) /min

Max. filling speed liquid   🔒

Navigation	🔘🔲 Application → Sensor → Basic settings → 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	• Slow < 1cm (0.4in) /min • Medium < 10cm (4in) /min • Standard < 1m (40in) /min • Fast < 2m (80in) /min • Very fast > 2m (80in) /min • No filter / test
Factory setting	Standard < 1m (40in) /min

Tank/silo height	🔒

Navigation	🖲🗔 Application → Sensor → Basic settings → Tank/silo height
Description	If the parametrized measuring range (Empty calibration) differs significantly from the tank or silo height, it is recommended to enter the tank or silo height in this parameter. Example: Continuous level monitoring in the upper third of a tank or silo. Note: For tanks with conical outlet, this parameter should not be changed as in this type of applications 'Empty calibration' is usually not << the tank or silo height.
User entry	0 to 125 000 mm
Factory setting	20 000 mm

Damping output	🔒

Navigation	🖲🗔 Application → Sensor → Basic settings → Damping out.
Description	Reaction time of the output signal on fluctuation in the measured value.
User entry	0.0 to 1 200.0 s
Factory setting	0.0 s

Distance	

Navigation	🖲🗔 Application → Sensor → Basic settings → Distance
Description	Distance from lower edge of device flange to product surface.
User interface	Signed floating-point number
Factory setting	0 mm

Confirm distance	🔒

Navigation	🔘🖥 Application → Sensor → Basic settings → Confirm distance
Description	Specify, whether the measured distance matches the real distance. Depending on the selection the device automatically sets the range of mapping.
	Note:
	If the teaching procedure with 'Distance too small' or 'Distance too big' is quit before the distance has been confirmed, a map is not recorded and the teaching procedure is reset after 60 s.
Selection	• Manual map
	• Distance ok
	• Distance unknown
	• Tank empty
Factory setting	Distance unknown

Mapping start point	🔒

Navigation	🔘🖥 Application → Sensor → Basic settings → Map. start point
User entry	−999 900 to 999 900 mm
Factory setting	−250 mm

Mapping end point	🔒

Navigation	🔘🖥 Application → Sensor → Basic settings → 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	100 mm

Map gap	🔒

Navigation	🔘🖥 Application → Sensor → Basic settings → Map gap
User entry	0 to 100 000 mm
Factory setting	235 mm

Mapping overlay time 🔒

Navigation	🖷🖵 Application → Sensor → Basic settings → Map overlay time
User entry	0 to 1 200 s
Factory setting	5 s

End of mapping 🔒

Navigation	🖷🖵 Application → Sensor → Basic settings → End of mapping
Description	Defines the behavior of the mapping curve in the tank bottom area.
Selection	• Adjustable • Last map value
Factory setting	Adjustable

End map. ampl. 🔒

Navigation	🖷🖵 Application → Sensor → Basic settings → End map. ampl.
Description	Amplitude of the mapping curve in the tank bottom area.
User entry	–99 999.0 to 99 999.0 dB
Factory setting	–100 dB

Record map 🔒

Navigation	🖷🖵 Application → Sensor → Basic settings → Record map
Selection	• No • Overlay map • Delete cust map
Factory setting	No

MappingRecordingStatus

Navigation	😊⬚ Application → Sensor → Basic settings → MapRecordingStat

User interface
- Not active
- In progress
- Not ok
- Ok
- Not changed
- Recording customer map
- Recording factory map
- Store
- Ready for recalculation
- Distances Recalculated

Factory setting   Not active

MappingRecordedCtrl (MappingStatus)

Navigation	😊⬚ Application → Sensor → Basic settings → MapRecordedCtrl

User interface
- Invalid range
- Valid range
- Not active
- Passed
- Executing
- Store
- Not ok
- Ok

Factory setting   Not active

Active map   🔒

Navigation	😊⬚ Application → Sensor → Basic settings → 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   No map

MappingSelectionStatus

| Navigation | ◉▣ Application → Sensor → Basic settings → MapSelectionStat |

| User interface | • Factory map
• Customer Map
• No map
• Factory map
• Customer Map
• No map |

| Factory setting | No map |

Additional settings

| *Navigation* | ◉▣ Application → Sensor → Add. settings |

Medium type   🔒

| Navigation | ◉▣ Application → Sensor → Add. settings → Medium type |

| Selection | • Liquid
• Solid |

| Factory setting | Liquid |

Medium group   🔒

| Navigation | ◉▣ Application → Sensor → Add. settings → Medium group |

| Description | Rough specification of the dielectric constant (DC). |

This parameter presets the 'Medium property' parameter as follows:

'Others'
->'Medium property' = 'Unknown'

'Water based (DC >= 4)'
-> 'Medium property' = 'DC 4 ... 7'

Note:
If 'Medium property' is changed afterwards, 'Medium group' retains its value. Only 'Medium property' is relevant for the signal evaluation.

Note:
The measuring range may be reduced for small dielectric constants. For details refer to the Technical Information (TI) of the respective device.

Selection	• Others
	• Water based (DC >= 4)

Factory setting	Others

Medium property

Navigation	🔢🖵 Application → Sensor → Add. settings → Medium property

Description	Specify the dielectric costant (DC) of the medium.
	Note:
	For multiple-phase systems this value refers to the upper medium.

Selection	• Unknown
	• DC 1.2 ... 1.6
	• DC 1.6 ... 1.9
	• DC 1.9 ... 2.5
	• DC 2.5 ... 4
	• DC 4 ... 7
	• DC 7 ... 15
	• DC > 15

Factory setting	DC 1.9 ... 2.5

Upper blank out

Navigation	🔢🖵 Application → Sensor → Add. settings → Upper blank out

Description	This parameter describes a line segment between reference point and close to maximum level (100%). The value is calculated by the device to blanket potentially disturbing signals coming from this space. The value can be adapted manually.

User entry	0 to 125 000 mm

Factory setting	50 mm

Upper blank out evaluation mode

Navigation	🔢🖵 Application → Sensor → Add. settings → UBO eval. mode

Selection	• No measurement in upper blank out
	• Measurement in upper blank out

Factory setting	Measurement in upper blank out

Output mode	🔒

Navigation	🔘🖳 Application → Sensor → Add. settings → Output mode
Description	Select output mode between: Ullage = The remaining space in the tank or silo is indicated. or Level linearized = The level is indicated (more precisely: the linearized value if a linearization has been activated).
Selection	• Ullage • Level linearized
Factory setting	Level linearized

L max. drain speed	🔒

Navigation	🔘🖳 Application → Sensor → Add. settings → L max draining
User entry	0.0 to 50 000.0 %/min
Factory setting	0.0 %/min

L max. fill speed	🔒

Navigation	🔘🖳 Application → Sensor → Add. settings → L max.fill speed
User entry	0.0 to 50 000.0 %/min
Factory setting	0.0 %/min

Level limit mode	🔒

Navigation	🔘🖳 Application → Sensor → Add. settings → 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 → Add. settings → 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 → Add. settings → 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 → Add. settings → Level correction
Description	The measured level is corrected by this value 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 % |

Echo evaluation

Navigation   ▣▣   Application → Sensor → Add. settings → Echo evaluation

Navigation   ▣▣   Application → Sensor → Basic settings

Echo curve statistic

Navigation	▣▣	Application → Sensor → Add. settings → Echo evaluation → Ec. curve stat.

Selection
• Off
• On

Factory setting   On

Echo curve statistics up

Navigation	▣▣	Application → Sensor → Add. settings → Echo evaluation → EC. stat. up

User entry   0 to 30

Factory setting   3

Echo curve statistic down

Navigation	▣▣	Application → Sensor → Add. settings → Echo evaluation → ECS in down

User entry   0 to 30

Factory setting   5

Echo curve smoothing mode

Navigation	▣▣	Application → Sensor → Add. settings → Echo evaluation → EC. smooth.mode

Selection
• Off
• SG smoothing
• Symmetric smoothing
• Asymmetric smoothing

Factory setting   Symmetric smoothing

Echo curve smoothing	🔒

Navigation	🔘🖳 Application → Sensor → Add. settings → Echo evaluation → EC. smoothing
User entry	0 to 9 900 mm
Factory setting	0 mm

FAC offset	🔒

Navigation	🔘🖳 Application → Sensor → Add. settings → Echo evaluation → FAC offset
User entry	–9 999.0 to 9 999.0 dB
Factory setting	12 dB

FAC window size	🔒

Navigation	🔘🖳 Application → Sensor → Add. settings → Echo evaluation → FAC window size
User entry	0 to 9 900 mm
Factory setting	1 600 mm

Max Value EWC	🔒

Navigation	🔘🖳 Application → Sensor → Add. settings → Echo evaluation → Max Value EWC
User entry	–9 999.0 to 9 999.0 dB
Factory setting	100 dB

First echo factor	🔒

Navigation	🔘🖳 Application → Sensor → Add. settings → Echo evaluation → First echo fact.
User entry	0.0 to 100.0 dB
Factory setting	10 dB

Parabolic fit window size

Navigation	◉▣ Application → Sensor → Add. settings → Echo evaluation → Parab fit window
User entry	0 to 9 900 mm
Factory setting	120 mm

Tank bottom range

Navigation	◉▣ Application → Sensor → Add. settings → Echo evaluation → TB range
Description	Defines the range in which the tank bottom echo is searched for. The Tank bottom range extends downward and starts at level 0% (Empty calibration). It ends at the entered value.
	Note: If the level 0% (Empty calibration) is far above the tank or silo bottom, the Tank bottom range starts at the entered Tank/silo height.
User entry	0 to 312 500 mm
Factory setting	15 000 mm

Min. amplitude TBD

Navigation	◉▣ Application → Sensor → Add. settings → Echo evaluation → Min. ampl. TBD
User entry	0 to 9 999.0 dB
Factory setting	3 dB

Lower level area

Navigation	◉▣ Application → Sensor → Add. settings → Echo evaluation → Lower level area
User entry	0 to 125 000 mm
Factory setting	1 000 mm

Evaluation mode	🔒

Navigation	🔊🖳 Application → Sensor → Add. settings → 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

Reset evaluation	🔒

Navigation	🔊🖳 Application → Sensor → Add. settings → Echo evaluation → Reset evaluation
Description	Restarts level determination.
Selection	• Reset done • Yes
Factory setting	Reset done

Window size tracking	🔒

Navigation	🔊🖳 Application → Sensor → Add. settings → Echo evaluation → Wind.size track.
User entry	0 to 20 500 mm
Factory setting	500 mm

Maximal track counter	🔒

Navigation	🔊🖳 Application → Sensor → Add. settings → Echo evaluation → Max track count
User entry	0 to 100
Factory setting	2

Distance	
Navigation	⧉⧄ Application → Sensor → Basic settings → Distance
Description	Distance from lower edge of device flange to product surface.
User interface	Signed floating-point number
Factory setting	0 mm

Debug block index	🔒
Navigation	⧉⧄ Application → Sensor → Add. settings → Echo evaluation → Debug block indx
Selection	
Factory setting	System control block

Debug parameter index	🔒
Navigation	⧉⧄ Application → Sensor → Add. settings → Echo evaluation → Debug parm. idx
User entry	0 to 65 535
Factory setting	2

Debug array index	🔒
Navigation	⧉⧄ Application → Sensor → Add. settings → Echo evaluation → Debug array indx
User entry	0 to 255
Factory setting	0

Status	🔒
Navigation	⧉⧄ Application → Sensor → Add. settings → Echo evaluation → Status
User entry	0 to 255
Factory setting	0

Debug value integer32

Navigation	🎛️🖥️ Application → Sensor → Add. settings → Echo evaluation → Debug val. int32
User interface	Positive integer
Factory setting	0

Debug value

Navigation	🎛️🖥️ Application → Sensor → Add. settings → Echo evaluation → Debug value
User interface	Signed floating-point number
Factory setting	4.0

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 • cm³ • dm³ • m³ • hl • l • % • mm • m *Custom-specific units* Free text	*US units* • lb • UsGal • ft³ • ft • in	*Imperial units* impGal

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 to 125 000 mm
Factory setting	20 000 mm

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.
	'Manual' The level and the associated linearized value are entered manually for each linearization point.
	'Semiautomatic' The level is measured by the device for each linearization point. The associated linearized value is entered manually.
	'Clear table' Deletes the existing linearization table.
	'Sort table' Rearranges the linerization points into an ascending order.
	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

Table number	🔒

Navigation	🞊🖳 Application → Sensor → Linearization → Table number
Description	Table point you are going to enter or change.
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 %

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 monotonously increasing or monotonously decreasing function

Selection   • Disable
                        • Enable

Factory setting   Disable

Signal information

Navigation   ▣▣   Application → Sensor → Signal inform.

Signal quality

Navigation	▣▣ Application → Sensor → Signal inform. → Signal quality
Description	Shows the quality of the evaluated level signal.
User interface	▪ Strong ▪ Medium ▪ Weak ▪ No signal ▪ (Strong) ▪ (Medium) ▪ (Weak)
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	−999 999.9 to 999 999.9 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	−999 999.9 to 999 999.9 dB
Factory setting	0.0 dB

Sensor cycle time	

Navigation	🖩🖵 Application → Sensor → Signal inform. → Sens. cycle time
User interface	0 to 65 535 ms
Factory setting	0 ms

Actual IF gain	

Navigation	🖩🖵 Application → Sensor → Signal inform. → Actual IF gain
User interface	0 to 1 000
Factory setting	0

Antenna zero distance	🔒

Navigation	🖩🖵 Application → Sensor → Signal inform. → Ant. zero dist.
User entry	0 to 10 000 mm
Factory setting	230 mm

PLL configuration selector	🔒

Navigation	🖩🖵 Application → Sensor → Signal inform. → PLLconf.select.
Selection	• PLL Configuration 01
	• PLL Configuration 02
	• PLL Configuration 03
	• PLL Configuration 04
	• PLL Configuration 05
	• PLL Configuration 06
	• PLL Configuration 07
	• PLL Configuration 08
	• PLL Configuration 09
	• PLL Configuration 10
Factory setting	PLL Configuration 02

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 → Meas.mode outp
Description	Select curve of current output.
Selection	• Standard • Inverse
Factory setting	Standard

Current range output	⋒

Navigation	⊞⊟ Application → Curr.output → Cur.range outp
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 of which variable has been selected as PV, define the related lower and upper range values. Assignment PV value to 4 mA and 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 of which variable has been selected as PV, define the related lower and upper range values. Assignment PV value to 4 mA and 20 mA.
User entry	Signed floating-point number
Factory setting	100.0 %

Failure behavior current output	🔒

Navigation	🔘🔳 Application → Curr.output → Fail.behav.out
Description	Defines which current the output assumes in the case of an error. Min: < 3.6 mA Max: >21.5 mA
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	Shows 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
User entry	3 to 5 mA
Factory setting	4 mA

---

20 mA trim value

Navigation	⊚▣ Application → Curr.output → 20 mA trim value
User entry	18 to 22 mA
Factory setting	20 mA

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	5xB/6xB

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 • Build-up index * • Build-up 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 • Build-up index * • Build-up 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
- Build-up index [*]
- Build-up 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 1   🔓

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 1	🔒

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
- Build-up index *
- Build-up 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 • Build-up index * • Build-up 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 • Build-up index * • Build-up 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
- Build-up index *
- Build-up 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
- Build-up index *
- Build-up 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
- Build-up index *
- Build-up 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 • Build-up index * • Build-up 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 • Build-up index * • Build-up 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	Shows the device type with which the measuring device is registered with the HART Communication Foundation
User interface	0 to 65 535
Factory setting	4 545

Device revision	

Navigation	🎛🖳 Application → HART output → Information → Device revision
Description	Shows the device revision with which the device is registered with the HART Communication Foundation

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
User interface	5 to 7
Factory setting	7

HART descriptor

Navigation	Application → HART output → Information → HART descriptor
Description	Enter description for the measuring point
User entry	Character string comprising numbers, letters and special characters (16)
Factory setting	5xB/6xB

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   5xB/6xB

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	5xB/6xB

Locking status

Navigation	⊞⊟　System → Device manag. → Locking status
Description	Indicates the type of locking.
	'Hardware locked' (HW) The device is locked by the 'WP' switch on the main electronics module. To unlock, set the switch into the OFF position.
	'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	▪ Hardware locked ▪ 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 9999

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. → Conf. new passw.
Description	Enter the new password again to confirm.
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	

Reset password	

Navigation	🖳 System → User manag. → Reset password
Description	Enter a code to reset the current 'Maintenance' password. The code is deliverd by your local support.
User entry	Character string comprising numbers, letters and special characters (16)
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) *
                      • العَرَبية (Arabic) *
                      • Bahasa Indonesia *

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*   Visibility depends on order options or device settings

- ภาษาไทย (Thai) [*]
- tiếng Việt (Vietnamese) [*]
- 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 • 1 bargraph + 1 value • 2 values
Factory setting	1 value, max. size

Number format   ⊞

Navigation	⧉⧉ System → Display → Number format
Description	Choose number format for the display.
Selection	• Decimal • ft-in-1/16"
Factory setting	Decimal

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 • Build-up index [*] • Foam index [*] • Terminal voltage

---

*   Visibility depends on order options or device settings

- 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 • Current output • Build-up index * • Foam index * • Terminal voltage • Electronics temperature • Sensor temperature
Factory setting	None

---

* Visibility depends on order options or device settings

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.xx

Value 3 display	🔒

Navigation	🔘🖥 System → Display → Value 3 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 • Current output • Build-up index * • Foam index * • Terminal voltage • Electronics temperature • Sensor temperature

Factory setting	None

Decimal places 3	🔒

Navigation	🔘🖥 System → Display → Decimal places 3

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

Selection	• x • x.x • x.xx • x.xxx • x.xxxx

---

* Visibility depends on order options or device settings

Factory setting   x.xx

Value 4 display   🔒

Navigation   ⓘⓘ System → Display → Value 4 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
                          • Current output
                          • Build-up index *
                          • Foam index *
                          • Terminal voltage
                          • Electronics temperature
                          • Sensor temperature

Factory setting   None

Decimal places 4   🔒

Navigation   ⓘⓘ System → Display → Decimal places 4

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

Contrast display

Navigation   ⓘⓘ System → Display → Contrast display

Description   Adjust local display contrast setting to ambient conditions (e.g. lighting or reading angle)

User entry   20 to 80 %

---

* Visibility depends on order options or device settings

Factory setting   30 %

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	5xB/6xB

Manufacturer

Navigation	▣▣ System → Information → 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	1 118

Information

Navigation	🖥🖥	Application → HART output → Information
Navigation	🖥	System → Information → 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	Shows the device type with which the measuring device is registered with the HART Communication Foundation

User interface	0 to 65 535

Factory setting	4 545

Device revision

Navigation	⊞⊟ Application → HART output → Information → Device revision

Description	Shows the device revision with which the device is registered with the HART Communication Foundation

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

User interface	5 to 7

Factory setting	7

HART descriptor   🔒

Navigation	⊞⊟ Application → HART output → Information → HART descriptor

Description	Enter description for the measuring point

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

Factory setting	5xB/6xB

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	5xB/6xB

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

3.4.7   Additional information

Navigation   ⊞⊟   System → Bluetooth conf.

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 -

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

Stored CRC device configuration

Navigation	ⓘⓛ System → Softw. config. → Stored CRC conf.
Description	Stored CRC after the last safety lock. Factory delivery is 65535 means that the device has not yet been safety locked.
User interface	0 to 65 535
Factory setting	65 535

Timestamp stored CRC device config.

Navigation	System → Softw. config. → TS stored CRC
Description	Gives the time stamp when the CRC was last stored following completion of the safety lock wizard.
User interface	Character string comprising numbers, letters and special characters
Factory setting	

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	• SIL • WHG • Heartbeat Verification • Heartbeat Monitoring

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