Special Documentation
Micropilot FMR60B, FMR62B, FMR63B, FMR66B, FMR67B HART

Application package
Heartbeat Verification + Monitoring

HART
COMMUNICATION PROTOCOL

Heartbeat
Technology

Endress+Hauser

People for Process Automation

1 About this document

1.1 Document function

This manual is a Special Documentation and does not replace the Operating Instructions included in the scope of supply. It is a part of the Operating Instructions and serves as a reference for using the Heartbeat Technology function integrated in the measuring device.

1.2 Content and scope

This document contains descriptions of the additional parameters and technical data of the application package and detailed explanations regarding:

- Application-specific parameters
- Advanced technical specifications

1.3 Symbols

1.3.1 Safety symbols

⚠ CAUTION

This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.

⚠ DANGER

This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.

NOTICE

This symbol contains information on procedures and other facts which do not result in personal injury.

⚠ WARNING

This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.

1.3.2 Symbols for certain types of information and graphics

🛈 Tip
Indicates additional information

1. , **2.** , **3.** Series of steps

1, 2, 3, ...
Item numbers

❋ Bluetooth
Wireless data transmission between devices over a short distance.

1.4   Documentation

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

1.5   Registered trademarks

HART®
Registered trademark of the FieldComm Group, Austin, Texas, USA

2   Product features and availability

2.1   Product features

The Heartbeat Verification + Monitoring application package 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 devices in the application.

The test scope achieved using these diagnostic and verification tests is expressed as the **total test coverage** (TTC). The TTC is calculated using the following formula for random errors (calculation based on FMEDA as per IEC 61508):

$TTC = (\lambda_{TOT} - \lambda_{du}) / \lambda_{TOT}$

λ_{TOT}:	Rate of all theoretically possible failures
λ_{du}:	Rate of undetected dangerous failures

The undetected dangerous failures are not diagnosed by the device diagnostics. If these failures occur, they can falsify the measured value that is displayed or interrupt the output of measured values.

Heartbeat Technology confirms that the device is functioning within the specified measuring tolerance with a defined TTC.

The TTC is at least:
- 98 % for the current output
- 95 % for HART communication

The current value for the TTC depends on the configuration and integration of the measuring device. It is determined under the following basic conditions:
- Integration of the measuring device for the output of measured values via the 4 to 20 mA HART output
- **Simulation** parameter **Off** option
- **Failure behavior current output** parameter set to **Min.** option or **Max.** option and evaluation unit detects both alarms
- Settings for diagnostic behavior correspond to factory settings

2.2   Availability

The Heartbeat Verification + Monitoring application package can be ordered with the device or enabled subsequently with an activation code. Detailed information on the order code is available on the website www.endress.com or from your Endress+Hauser sales organization.

The availability of the application package can be checked as follows:
- Order code with breakdown of the device features on the delivery note
- On the web using the Device Viewer: enter the serial number from the nameplate and check whether the order code is displayed
- In the operating menu: here you can see if the application package is enabled. Navigation: System → Software configuration → Software option overview

2.2.1   Activation code

If ordered subsequently, a retrofit kit is supplied. This kit includes a wired-on tag plate with modified device data and an activation code.

Enter the activation code in:
System → Software configuration → Activate SW option

2.2.2   Access

Heartbeat Technology is compatible with all the system integration options. Interfaces with digital communication are required to access the data saved in the device. The speed of data transmission depends on the type of communication interface used.
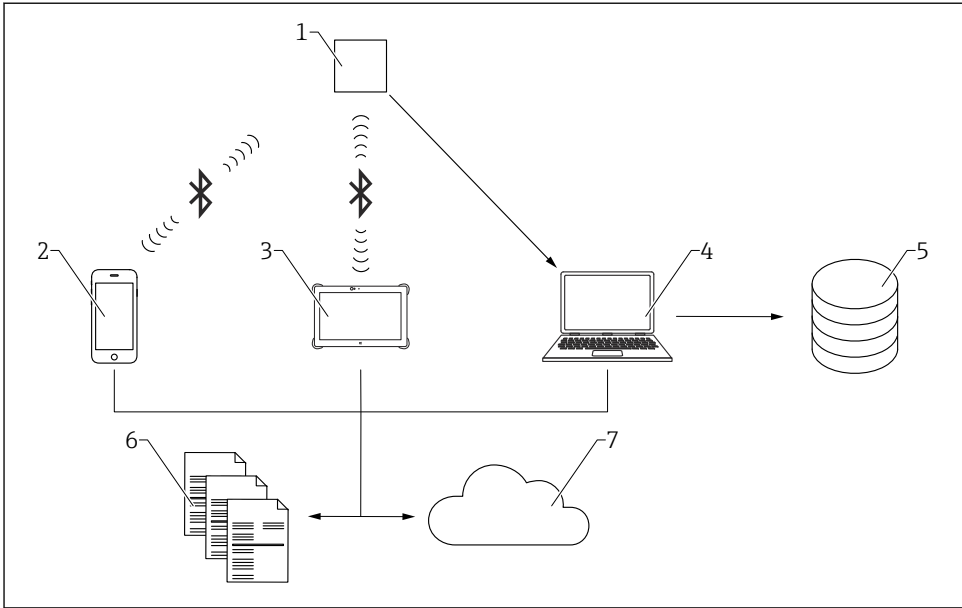
3   System integration

The functions of Heartbeat Technology are available via the digital interfaces. They can be used both via an asset management system and via the automation infrastructure (e.g. PLC).
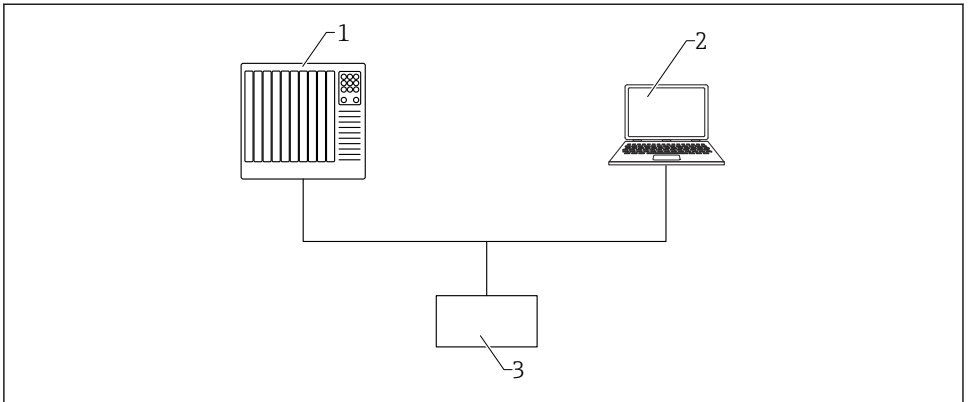
A0040019

1　PLC
2　Asset management system
3　Measuring device

A0047321

1   Device with local display
2   Mobile terminals with SmartBlue app
3   FieldXpert
4   DTM-based tools, e.g. FieldCare, DeviceCare ...
5   Data archive
6   Verification report
7   Netilion Library

Run Heartbeat Verification via one of the following interfaces:
- System integration interface of a higher-level system
- Service interface (CDI = Endress+Hauser Common Data Interface)
- Local display (optional)
- Bluetooth (optional)

The device must be accessed externally from a higher-level system via the system integration interface in order to start a verification and signal the verification result (**Passed** option or **Failed** option). It is not possible to start the verification via an external status signal and relay the results to a higher-level system via the status output.

The detailed results of the verification are saved in the device and provided in the form of a verification report. The last result is saved in the device.

Verification reports can be created using the plant asset management software FieldCare, DeviceCare or the SmartBlue app and FieldXpert.

3.1 Data exchange performed by the user (asset management system)

Heartbeat Verification
- Start of verification
- Upload, archive and document the verification results including detailed results

Heartbeat Monitoring
- Configuration of the monitoring function: specify which monitoring parameters are output continuously via the system integration interface.
- The user can read the monitoring measured variables in the operating menu.

3.2 Data management

The result of a verification is saved as a non-volatile parameter set in the measuring device memory. Older data is successively overwritten by new Verification results on a "First In – First Out" basis (FIFO).

3.2.1 Verification report

Verification report must be pressed

The Verification report is output in PDF format.

Prerequisite: A verification has already been performed.

3.2.2 File management

Netilion Library

Heartbeat verification reports can be saved in Netilion with the Netilion Library (www.netilion.endress.com). They can be uploaded by notebook, smartphone or a Field Xpert tablet.

The verification reports are then:
- online
- automatically assigned to their digital twin
- easier to find
- always readily available

4 Heartbeat Verification

Heartbeat Verification is performed on demand and complements the self-monitoring function, which is performed constantly, with additional checks. During verification, the system checks whether the device components comply with the factory specifications. Both the sensor and the electronics modules are included in the tests.

Heartbeat Verification confirms on demand that the device is functioning within the specified measuring tolerance with a total test coverage TTC (Total Test Coverage) specified as a percentage.

Heartbeat Verification meets the requirements for measurement traceability in accordance with ISO 9001 (ISO9001:2015 Section 7.1.5.2).

The verification result is Passed or Failed. The verification data is saved in the device on a "First In, First Out" basis (FIFO) and optionally saved on a PC with the FieldCare asset management software or in the Netilion Library. Based on this data, a verification report is generated automatically to ensure the traceable documentation of the verification results.

It is possible to manually record reference data relating to the operator and the location. These reference data appear on the verification report.

4.1   Device behavior and interpretation

- Result: Passed
  All test results are within the specification.
- Result: Failed
  One or more test results are "Out of specification (S)".

Verification result Failed

If the result of a verification is **"Failed" option**, repeat the verification.

Consider the following measures when doing so:

1. Establish defined and stable process conditions in order to rule out process-specific influences as much as possible.
2. Compare current process conditions with those of the previous verification to identify possible deviations.
3. Take remedial measures based on the diagnostic information of the device.

The cause of the error can be narrowed down by identifying the test group with a "Failed" verification.

🛈 Operation continues during the entire Heartbeat Verification.

4.2   Verification

Performing verification

1. Navigation: Guidance → Heartbeat Technology → Heartbeat Verification → Heartbeat Verification
2. Select the **Start verification** option.

Displaying the status

▶ Navigation: Diagnostics → Heartbeat Technology → Heartbeat Verification → Status

Displaying the result

▶ Navigation: Diagnostics → Heartbeat Technology → Heartbeat Verification → Overall result

4.3   Verification results

Access to the verification results via:
- SmartBlue app
- DTM-based tools (e.g. FieldCare or DeviceCare)
- FieldXpert

4.3.1   Classification of results

Individual result:
- ☒ **Failed**
  At least one individual test in the test group was **Out of specification (S)**.
- ☑ **Passed**
  All individual tests in the test group complied with the specifications.
  The result is **Passed** even if the result of an individual test is **Not done** and the result of all other tests is **Passed**.
- ◻ **Not done**
  No test has been performed for this test group. For example, because this parameter is not available or activated in the current device configuration.

Overall result:
- ☒ **Failed**
  At least one test group has **Failed**.
- ☑ **Passed**
  All verified test groups were within the specification.
  The overall result is **Passed** even if the result of individual test groups is **Not done** and the result of all other tests is **Passed**.

ℹ️ Heartbeat Verification confirms on demand that the device is functioning within the specified measuring tolerance with a total test coverage (TTC) specified as a percentage.

4.4   Verification report

The results of the verification can be documented via DTM-based tools, the SmartBlue app or FieldXpert in a Verification report . As the Verification results are automatically and uniquely identified with the Operating time, they are suitable for the traceable documentation of the verification of devices.

The following information for the clear identification of the device is indicated on each report page/section:
- Serial number
- Device tag
- Operating time (Verification)

4.4.1   Verification report, section 1

Measuring point identification, presentation of the overall verification result and confirmation of completion:

- **Device information**
  (Information on the place of operation, Device tag, Device name, Order code, Firmware version, Hardware version)
- **Calibration / Configuration**
  (Information on the device configuration such as Empty calibration, Full calibration, Medium type, Media group, CRC device configuration)
- **Verification information**
  (Operating time (Verification) for the clear allocation of the Verification results for the purpose of traceable documentation of the verification)
- **Verification result**
  (Overall result of the verification is **Passed** if all individual results are **Passed**)

4.4.2   Verification report, section 2

Details on the individual results of the following test groups:
- Verification pre-condition
- Mainboard module
- Sensor module

4.4.3   Verification report, section 3

Details with values for the individual tests from section 2.

4.4.4   Verification report, section 4

Additional data and information that can influence the assessment of the measurement results or the appraisal of the process conditions:
- Process condition (at the time of verification)
- Device history
- Sensor history

4.5   Test criteria for the test objects

4.5.1   Verification pre-condition

System status
Checks active measurement device errors at diagnostical behavior 'alarm'. If an active error is detected, then verification will be performed but the overall result will always be 'Failed'.

4.5.2   Mainboard module

Terminal voltage
Checks whether the voltage at the supply terminals is within the specified limits. Exceeding the maximum terminal voltage can damage the device. If the supply voltage is permanently in the maximum range, the useful life of the device can be reduced. If the terminal voltage falls below the minimum, the device can fail.

Terminal voltage value

The Terminal voltage that is currently present is measured and compared with the limit values (Minimum terminal voltage and Maximum terminal voltage).
Limit values: 10.5 to 35 V

Output current

The Output current is read back continuously and compared with the set current according to the measured value.

"Current deviation" parameter
Checks whether read-back current at the output matches the current set by the device.
Limit values: −0.5 to +0.5 mA

Software integrity

Checks whether the function blocks of the software are executed in the correct order. Checks whether certain events are currently active, e.g. in the mainboard, the device checks the incrementation of the sequence counter with each new measured value in the sensor module. If this is not the case, Failed is output.

RAM check

Checks the correct function of the RAM (Random Access Memory). If a RAM cell is defective, this is detected by the read-back value of the RAM cell and Failed is output.

ROM check

Checks the correct function of the ROM memory (Read-Only-Memory). If the checksum of the checked program code area does not match, Failed is output.

Loop diagnostics

Only visible if the Heartbeat Monitoring functionality Loop diagnostics has been enabled via the wizard.

Checks whether the voltage/current values are within range or the voltage/current baseline defined with wizard. "Failed" can indicate faulty power supply or grounding / wiring.
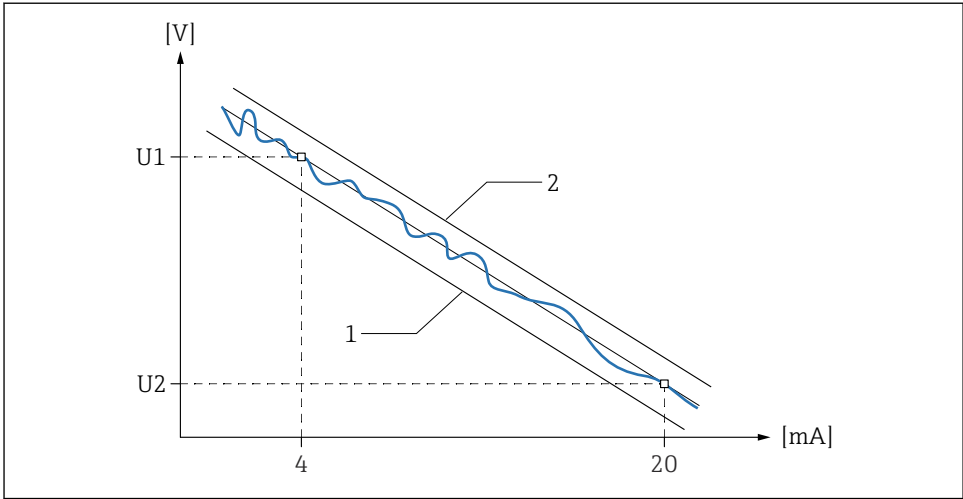
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☒ *1   Current/voltage baseline*

1   Clamping voltage lower threshold
2   Clamping voltage upper threshold

"Terminal voltage 1" parameter
Shows the current terminal voltage that is applied at the output
A check is run continuously to determine whether the voltage is within the range defined by
the **Clamping voltage lower threshold** parameter and **Clamping voltage upper threshold**
parameter.

"Timestamp Baseline" parameter
Displays the operating time counter reading when the baseline was created.
At this time, the upper Terminal voltage (U1) was determined at 4 mA and the lower
Terminal voltage (U2) was determined at 20 mA.

"Resistance Baseline" parameter
Resistance value of the baseline (slope of current/voltage baseline).

"Supply voltage Baseline" parameter
Support point of the baseline; voltage at the point where the current/voltage baseline is
formed.

"Timestamp previous Baseline" parameter
Displays the operating time counter reading when the previous baseline was created.

"Resistance previous Baseline" parameter
Resistance value of the previous baseline (slope of previous current/voltage baseline).

"Supply voltage previous Baseline" parameter
Support point of the previous baseline; voltage at the point where the previous current/
voltage baseline was formed.

4.5.3   Sensor module

Signal quality

The Relative echo amplitude is used for evaluation purposes.

"Signal quality" parameter
Shows the quality of the evaluated level signal.
- Strong (>10 dB)
- Medium (≤10 dB)
- Weak (≤5 dB)
- No signal (0 dB)

"Relative echo amplitude" parameter
Shows the relative amplitude (i.e. the distance to the evaluation curve) of the evaluated level
signal.

Radar Accuracy Index (RAI)

The Radar Accuracy Index (RAI) evaluates the Micropilot reference accuracy. The test method
to determine the RAI is based on the generation of a test signal via the high-frequency
oscillator and the measurement of the signal using the sample oscillator.

"Radar Accuracy Index (RAI)" parameter
The Radar Accuracy Index (RAI) [ppm] is output as the relative deviation between two RAI
measurements:
- Traceable measurement which was performed during production as part of device
  calibration
- Measurement which is performed in the application as part of Heartbeat Verification

Failed option is output if the relative RAI deviation exceeds or drops below the limit values.

Limit values: −200 to +200 ppm

Clock and analog path

To ensure correct measurement, a test signal is generated and evaluated via the normal
measuring path (frequency and amplitude).

"Reference echo frequency" parameter
The frequency of the test signal is evaluated and compared with the limit values
Limit values: 990 000 to 1 010 000 Hz

"Reference echo amplitude" parameter
The amplitude of the test signal is evaluated and compared with the limit values
Limit values: device-specific

IF signal

The check of the intermediate frequency signal (IF signal) ensures the sensor electronics and
the associated signal path are functioning correctly. The permitted range is defined by limit
values for the amplitude and amplitude swing.

"Maximum value IF amplitude" parameter
Measured maximum value of the IF amplitude
Limit values: max. 65 525 digits

"Minimum value IF amplitude" parameter
Measured minimum value of the IF amplitude
Limit values: min. 10 digits

"IF amplitude span" parameter
Amplitude swing; difference between the maximum value for the IF amplitude and the
minimum value for the IF amplitude
Limit values: min. 10 digits

Sensor integrity

Checks the function of the sensor (no event active).

Energy boundaries

Checks whether the energy states are within the limits.

Energy Monitoring

Checks the energy balance on the sensor.

"Energy storage capacity" parameter
Checks whether measuring capacitors are in the valid range.
Limit value: 1 000 to 3 000 μF

"Radar signal input strength" parameter
Checks the input power in the sensor module
Limit value: >8 mW

"Energy consumption of measurement" parameter
Checks whether the energy consumption of the sensor module is in the valid range
Limit value: 1 to 20 mWs

Sensor module voltage

Checks the supply voltages.

"Value for power supply 1.8 V" parameter
Supply voltage for the logic part of the sensor module (processor, memory)
Limit value: 1.71 to 1.95 V

"Value for DCS power supply" parameter
Supply voltage transmitted by the mainboard to the sensor module
Limit value: 6 to 20 V

RAM check

Checks the correct function of the RAM (Random Access Memory). If a RAM cell is defective,
this is detected by the read-back value of the RAM cell and Failed is output.

ROM check

Checks the correct function of the ROM memory (Read-Only-Memory). If the checksum of the
checked program code area does not match, Failed is output.

Build-up detection

Prerequisite: The Heartbeat Monitoring buildup detection function has been activated beforehand via the wizard. Checks whether there is buildup on the antenna.

"Build-up index" parameter

Build-up index 0% means: no build-up. Build-up index 100% means: maximum detectable build-up.
Limit value: customer-specific setting

Foam detection

Prerequisite: The Heartbeat Monitoring foam detection function has been activated beforehand via the wizard. Checks whether there is foam on the liquid medium.

"Foam index" parameter

Foam index 0% means: no foam. Foam index 100% means: maximum detectable foam.
Limit value: customer-specific setting

4.6   Other Verification information

ℹ️ Additional data and information that can influence the assessment of the measurement results or the appraisal of the process conditions.

The following parameters are information values only. No evaluation on a Passed / Failed basis takes place.

4.6.1   Process conditions at the time of verification

"Signal quality" parameter

Possible reasons for poor signal quality include EMC interference, a defective device on the same bus, bad contacts, wrong resistor size
EMC interference

"Electronics temperature" parameter

Current Electronics temperature and permitted Minimum/maximum values

"Sensor temperature" parameter

Current Sensor temperature and permitted Minimum/maximum values

"Level linearized" parameter

Displays the linearized level

"Absolute echo amplitude" parameter

Shows the absolute amplitude of the evaluated level signal.

"Relative echo amplitude" parameter

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

4.6.2   Device history

Terminal voltage value

Shows the current terminal voltage that is applied at the output. Including the Minimum/maximum values reached since the last reset.

Electronics temperature
Displays the current temperature of the main electronics. Including the Minimum/maximum values reached since the last reset.

4.6.3 Sensor history

"Sensor temperature" parameter
Displays the current temperature of the sensor electronics. Including the Minimum/maximum values reached since the last reset.

"Time min. sensor temperature" parameter
Time of the operating time counter when the Minimum sensor temperature was reached

"Time max. sensor temperature" parameter
Time of the operating time counter when the Maximum sensor temperature was reached

"Max. filling speed" parameter
Displays the maximum Filling speed reached since the last reset; is used to detect possible measured value peaks

"Max. draining speed" parameter
Displays the maximum Draining speed reached since the last reset; is used to detect possible measured value peaks

"Level linearized" parameter
Displays the linearized level. Including the Minimum/maximum values reached since the last reset.

"Time min. level" parameter
Time of the operating time counter when the Min. level value was reached. Helps assign the recorded measured value peak to the course of the process

"Time max. level" parameter
Time of the operating time counter when the Max. level value was reached. Helps assign the recorded measured value peak to the course of the process

"Counter underfilling" parameter
Number of underfills - level less than 0%

"Counter overfilling" parameter
Number of overfills - level greater than 100%

"Power-up cycles" parameters
Number of power-up cycles of the device

4.7   Heartbeat Technology in safety instrumented systems

Verification (Heartbeat Verification) enables the documentation of the current device diagnostic or device status as a proof of testing.
- This supports the documentation of proof tests in accordance with IEC 61511-1, Section 16.3.3, "Documentation of proof tests and inspection".
- The verification is based on automatically executed device-specific test sequences. From a safety point of view, verification cannot replace the proof-testing of a sensor, since random errors are usually not detected.
- Nevertheless, verification can be usefully applied as a step in a proof-test scenario as per NA 106 as a flexible proof-testing strategy.
- The verification report should be regarded as a supplement to the proof-test report.

5   Heartbeat Monitoring

Loop diagnostics wizard, **Foam detection** wizard and **Build-up detection** wizard are available. In addition, other monitoring parameters can be output for use in predictive maintenance or application optimization.

5.1   Monitoring parameters

The following monitoring parameters can be assigned to the various outputs of the device for continuous transmission to a Condition Monitoring system.
- **Level linearized**
  Displays the linearized level.
- **Distance**
  Distance from the process connection to the product surface
- **Terminal voltage 1**
  Shows the current terminal voltage that is applied at the output
- **Electronics temperature**
  Temperature measured in the main electronics
- **Sensor temperature**
  Temperature measured in the sensor electronics
- **Absolute echo amplitude**
  Shows the absolute amplitude of the evaluated level signal.
- **Relative echo amplitude**
  Shows the relative amplitude (i.e. the distance to the evaluation curve) of the evaluated level signal.
- **Area of incoupling**
  Ringing integral within the detection area. Shows the area under the echo curve in the range up to 1 m (3.28 ft) to determine the amount of build-up on the antenna.
- **Build-up index**
  Visibility depends on order options or device settings
  Build-up index 0% means: no build-up. Build-up index 100% means: maximum detectable build-up.

- **168 Build-up detected**
  Visibility depends on order options or device settings. Indicates whether the customer-specific threshold for build-up detection is exceeded.
- **Foam index**
  Visibility depends on order options or device settings
  Foam index 0% means: no foam. Foam index 100% means: maximum detectable foam.
- **952 Foam detected**
  Visibility depends on order options or device settings
  Indicates whether the customer-specific threshold for foam detection is exceeded.
- **Percentage**
  Measured variable of the first dynamic variable (PV) as a percentage.
- **Loop current**
  The loop current is the current at the output that is set by the evaluated level signal.
- **Terminal current**
  The terminal current is the current read back at the terminal block.

Defining monitoring parameters as HART SV/TV/QV:

1. Navigation: Application → HART output → HART output
2. Select SV/TV/QV assignment.
3. Select monitoring parameters.

Selecting the measured value that is shown on the local display:

1. Navigation: System → Display
2. Select the measured value.

5.2 "Loop diagnostics" wizard

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

5.2.1 Areas of application

- Detection of changes in the measuring circuit resistance due to anomalies
  Examples: Contact resistance or leakage currents in wiring, terminals or grounding due to corrosion and/or moisture
- Detection of faulty power supply

5.2.2 Initialization of Loop diagnostics

 Activate loop diagnostics during device commissioning.

Guidance → Heartbeat Technology → Loop diagnostics → Loop diagnostics

**Programming the current/voltage characteristic (baseline)**

Typically, the voltage at the terminal changes in a linear manner as a function of the analog output current. After initial installation, the current/voltage baseline characteristic is recorded by the measuring circuit via an active current simulation of 4 or 20 mA.

> ⚠ **CAUTION**
>
> **The current output is simulated. Alarms can be triggered by mistake. The behavior in the control loop can change.**
> ▶ Take appropriate measures.
> ▶ Bridge the PLC if necessary.
> ▶ The baseline cannot be programmed on a write-protected device.

The bandwidth around this characteristic (Factory settings 1.5 V) determines when an event is reported.
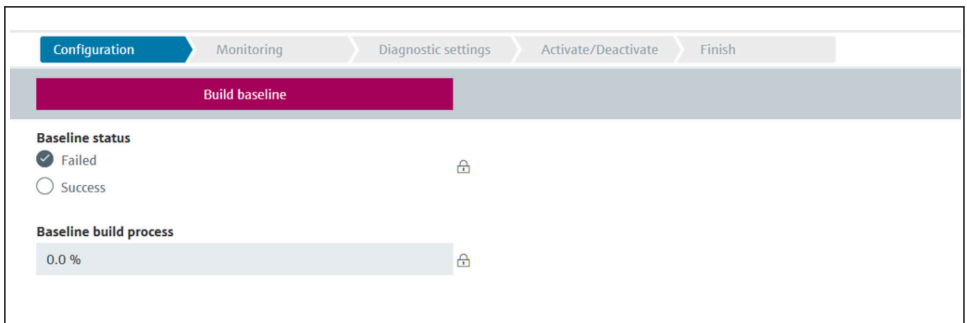
⊞ *2   Screenshot - values and entries are examples only*

| Configuration | Monitoring | Diagnostic settings | Activate/Deactivate |

Actual baseline

Timestamp Baseline

0d05h02m15s

Resistance Baseline (62)

250 Ohm

Supply voltage Baseline (63)

24.0 V

Previous baseline

Timestamp previous Baseline

0d00h00m00s

Resistance previous Baseline

0 Ohm

Supply voltage previous Baseline

0.0 V

Cancel   Previous   Next

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🖾 *3   Screenshot - values and entries are examples only*

| Configuration | Monitoring | Diagnostic settings | Activate/Deactivate |

Tolerated deviation +/- (64)

1.5 V

Cancel   Previous   Next

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🖾 *4   Screenshot - values and entries are examples only*

The current and last baseline of the current/voltage characteristic are saved in the device.
Program the baseline again if changes have been carried out in the measuring circuit.
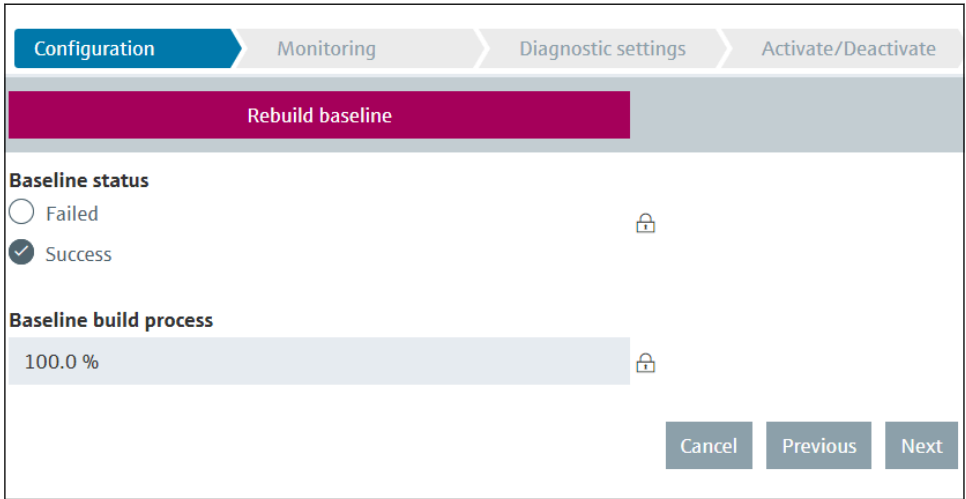
☒ *5*   *Screenshot - values and entries are examples only*

Alarm delay

Time during which the status triggering the Alarm must be present before an event message is displayed. Required to rule out short-term signal interferences. Factory settings: 1 s

Diagnostic behavior

☒ *6 Screenshot - values and entries are examples only*

Diagnostic behavior

Defines how the recognized **Loop diagnostics** diagnostic message event should be communicated:

- **Logbook entry only** option: No digital or analog transmission of the message
- **Warning** option: Current output remains unchanged; message is output digitally (Factory settings)

If the permitted conditions are reached again, the warning is no longer available in the device.

Disable / Enable

☒ *7 Screenshot - values and entries are examples only*

Specify whether the Loop diagnostics function should be activated. If the **Disable** option option is selected, no analysis and therefore no event reporting take place.

In some cases, changes in the measuring circuit resistance can only be detected at high output currents. By rebuilding the baseline, characteristic values can be compared and changes detected.

5.3   "Foam detection" wizard

This wizard configures the automatic foam detection.

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

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

5.3.1   Areas of application

- Measurement in liquids
- Reliable detection of foam on the medium

5.3.2   Initialization of Foam detection

The **Foam detection** wizard is only available if Medium type= Liquid.

Guidance → Heartbeat Technology → Heartbeat Verification → Foam detection

Foam detection initialization should only be performed with little or no foam.

⊞ 8   *Screenshot - values and entries are examples only*

⊞ 9   *Screenshot - values and entries are examples only*

⊡ *10   Screenshot - values and entries are examples only*

952 Diagnostic behavior
Defines how the recognized Foam detection event should be communicated:
- **Logbook entry only** option: No digital or analog transmission of the message
- **Warning** option: Current output remains unchanged; message is output digitally (Factory settings)
- **Alarm** option: The current output adopts the configured alarm current

11 *Screenshot - values and entries are examples only*

5.4   "Build-up detection" wizard

This wizard configures the build-up detection.

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

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

5.4.1   Areas of application

- Reliable measurement in liquids and solids
- Detection of buildup on the antenna, enables optimization of maintenance cycles

5.4.2   Initialization of Build-up detection

Guidance → Heartbeat Technology → Heartbeat Verification → Build-up detection

Build-up detection initialization should only be performed with little or no buildup.

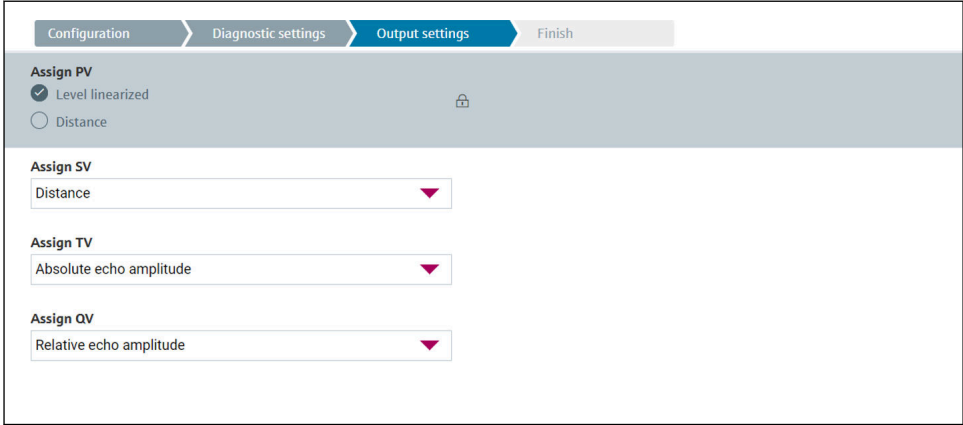*12   Screenshot - values and entries are examples only*

13   Screenshot - values and entries are examples only

168 Diagnostic behavior

Defines how the recognized Build-up detection event should be communicated:

- **Logbook entry only** option: No digital or analog transmission of the message
- **Warning** option: Current output remains unchanged; message is output digitally (Factory settings)
- **Alarm** option: The current output adopts the configured alarm current

14   Screenshot - values and entries are examples only

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