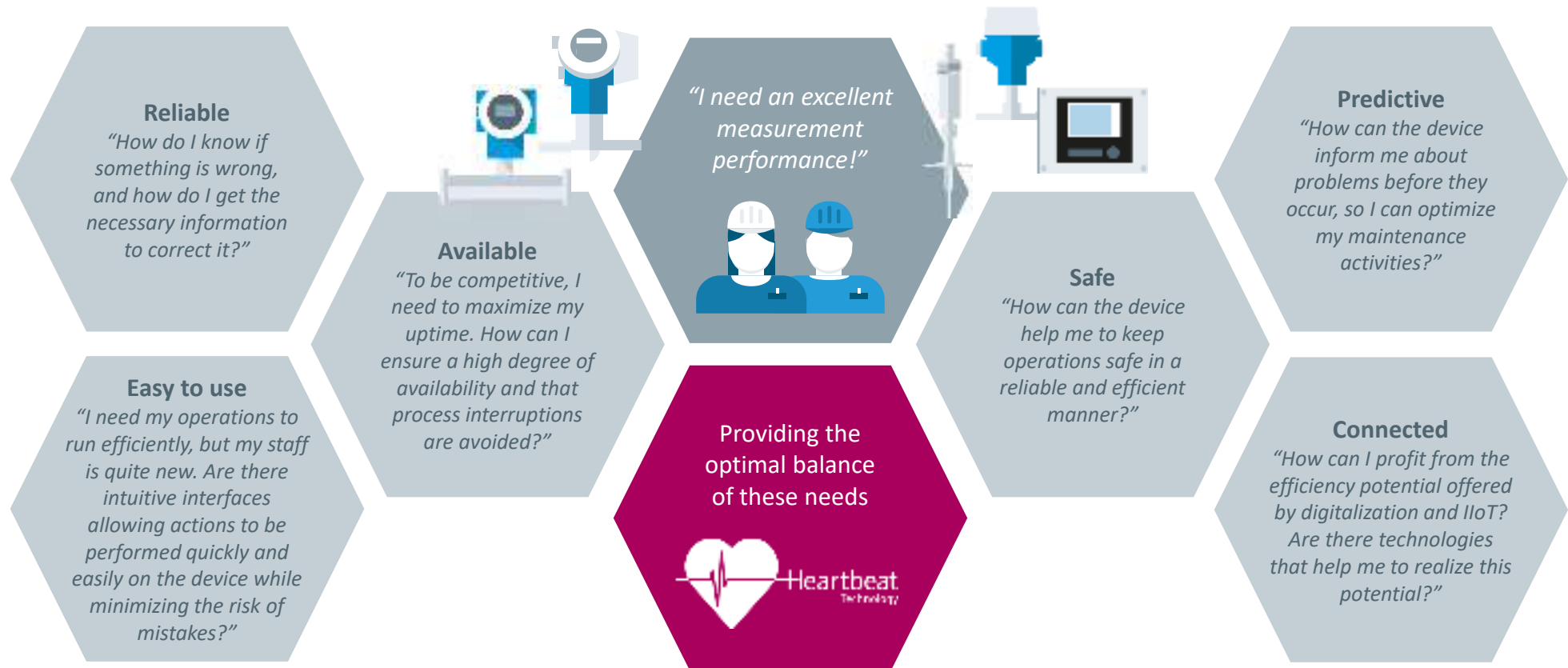


Heartbeat Technology – Taking the pulse of your measurement

Improve your plant performance while reducing operative expenses



Heartbeat Technology addresses these needs



What Heartbeat Technology can do for you

Increase your plant performance and ...

- ... boost reliability as well as safety levels
- ... reduce your verification efforts
- ... improve your process insights

Heartbeat Technology

- for diagnostics**

Permanent process and device diagnostics
- for verification**

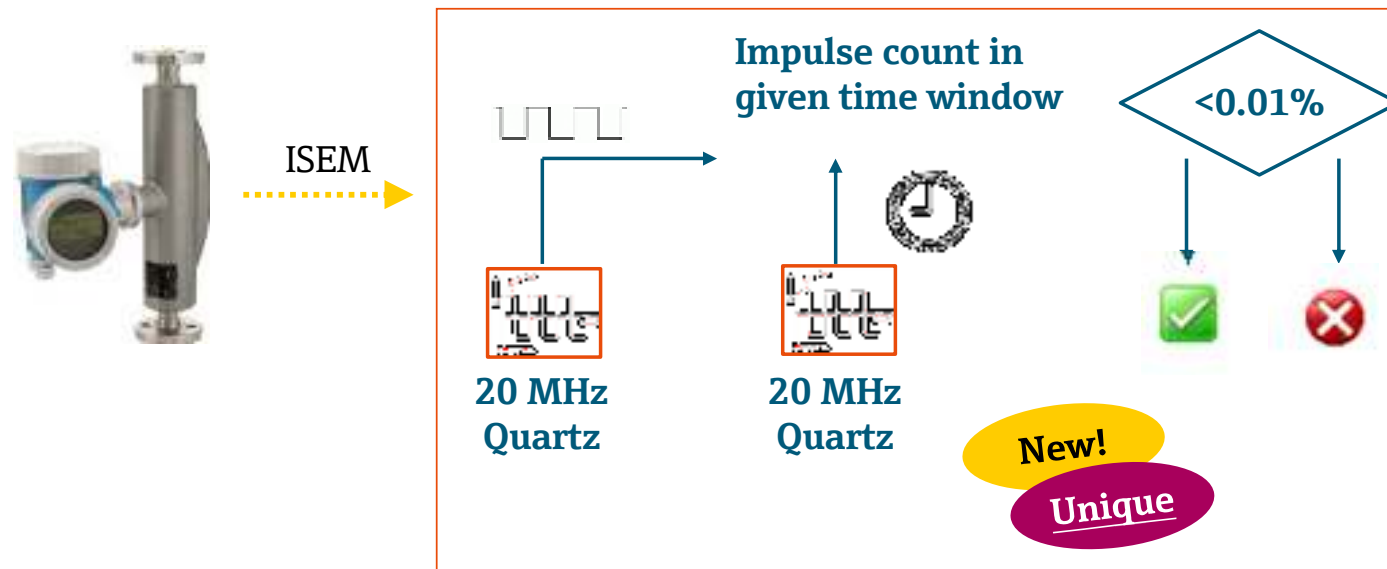
Documented device functionality without process interruption
- for monitoring**

Information for process optimization and predictive maintenance






Traceable internal references for measurement + testing

High-precision frequency generators

- Continuous **synchronous-run test** in the device reliably detects ambient and process influences potentially causing drift in the electronics
- Traceable test of each module against accredited reference standard prior to **traceable factory calibration** of the entire device



Heartbeat Technology is available for a wide variety of measurement technologies

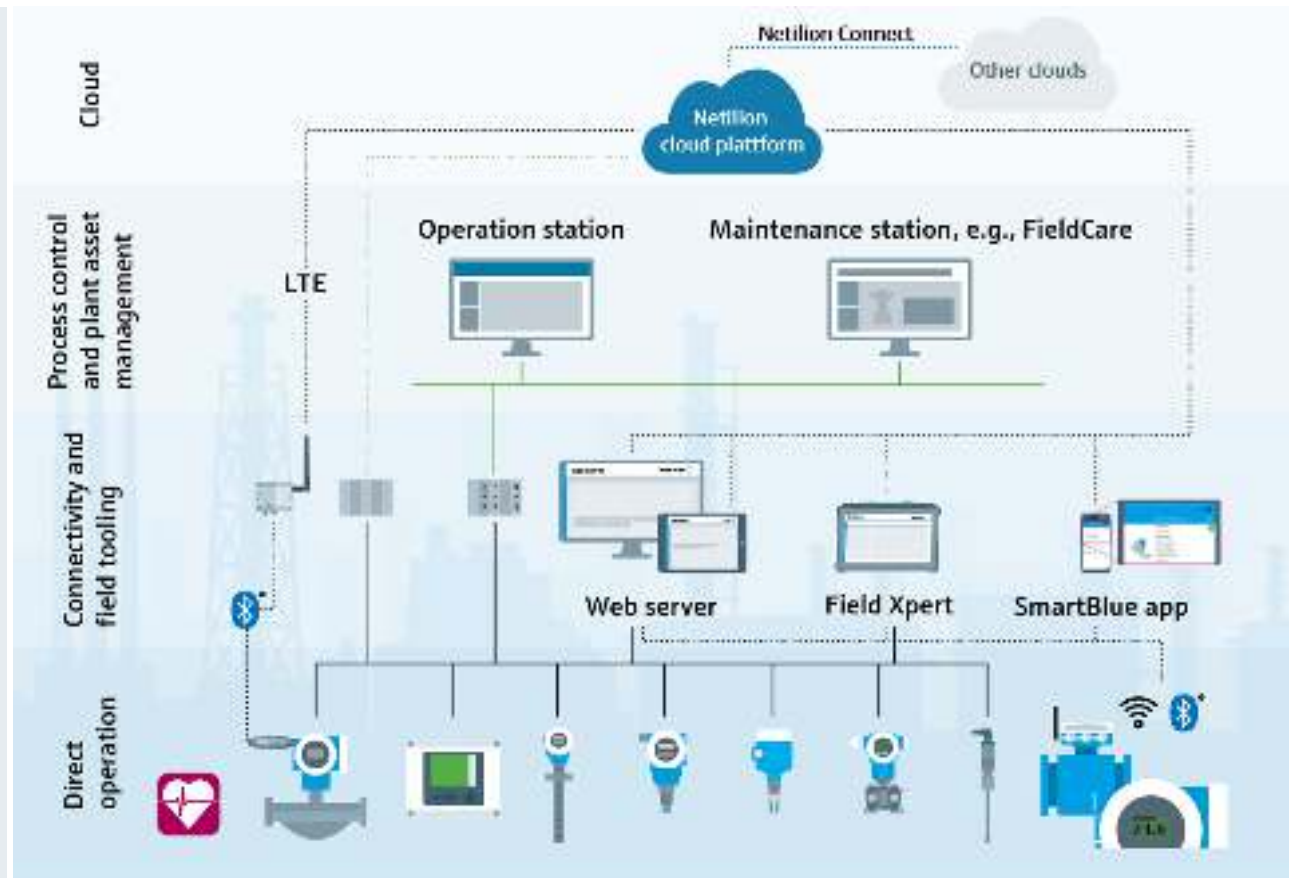
Heartbeat Technology device portfolio				
Flow	Level	Pressure	Temperature	Analysis
 <p>Mass flow:</p> <ul style="list-style-type: none"> Coriolis Thermal <p>Volume flow:</p> <ul style="list-style-type: none"> Electromagnetic Ultrasonic Vortex 	 <p>Point level:</p> <ul style="list-style-type: none"> Vibronic Radiometric <p>Continuous level:</p> <ul style="list-style-type: none"> Free space radar Guided wave radar Radiometric 	 <p>Pressure:</p> <ul style="list-style-type: none"> Metal membrane Ceramic membrane <p>Differential pressure:</p> <ul style="list-style-type: none"> Metal membrane 	 <p>Temperature:</p> <ul style="list-style-type: none"> Self-calibrating 	 <p>Liquid:</p> <ul style="list-style-type: none"> pH and ORP Dissolved oxygen Disinfection Turbidity Photometry Conductivity Samplers <p>Gas:</p> <ul style="list-style-type: none"> Concentration (TDLAS)

Take the next step

Release the potential given by connectivity to optimize your processes and operations

- **Connect** – Optimize your processes by integrating Heartbeat Technology functionalities into your infrastructure
- **Create value** – Exploit the full saving and efficiency potential of digitalization and IIoT by connecting your Heartbeat Technology field devices to the cloud
- **Expand the scope** – Obtain insights, not only on the individual device, but also on the overall health condition of all your installed devices via digital services
- **Increase efficiency** – Save time, reduce personnel exposure in the field and minimize risk of mistakes by accessing device specific information from anywhere
- **Stay secure** – Keep your information protected with our digital offering, which is designed in compliance with the highest industrial automation security standards

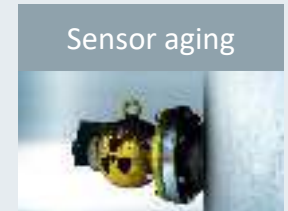
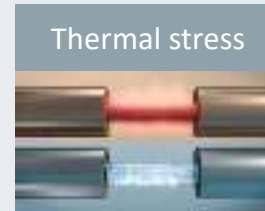
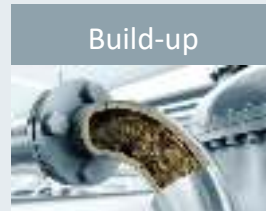
Use Heartbeat Technology in a connected environment and turn data into knowledge



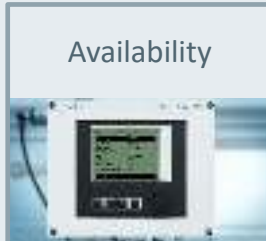
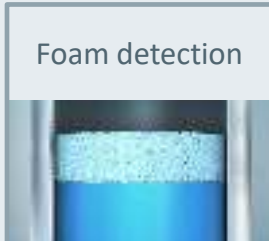
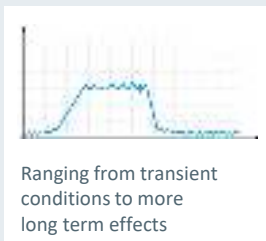
Use cases – Device and asset condition monitoring and process optimization

Click/tab to navigate

Condition monitoring enabling predictive maintenance by identifying process conditions that may negatively affect device or asset integrity or process performance



Supporting **process optimization** by identifying process anomalies (not critical to the device integrity, but might affect its performance) and monitoring of the device's **installation condition** to increase the reliability of the measuring point (or identify any need for corrective actions)



Build-up – Flow – Electromagnetic

1. Device is clean



2. Build-up develops

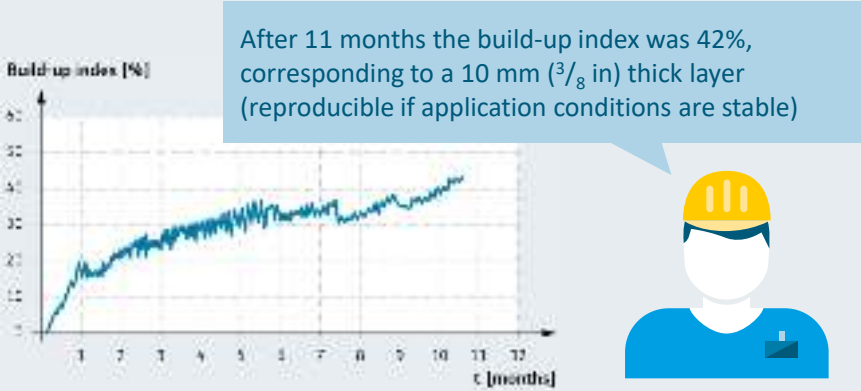


3. Check build-up thickness regularly




4. Write down the values



Month	Build-up thickness	Build-up index
Month 2	3 mm	20%
Month 4	5 mm	30%
Month 6	7 mm	37%
Month 11	10 mm	42%




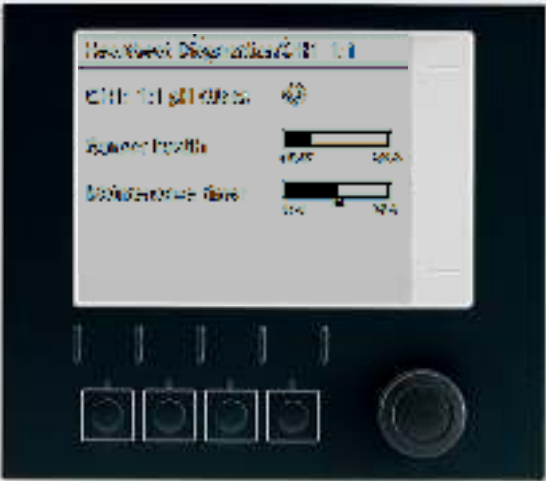
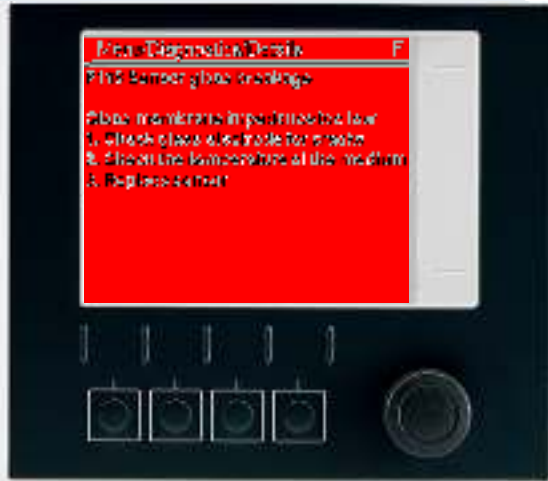
After 11 months the build-up index was 42%, corresponding to a 10 mm ($\frac{3}{8}$ in) thick layer (reproducible if application conditions are stable)

5. Clean the device

When the build-up is removed, the build-up index returns to its low initial value

! The build-up index correlates to the build-up thickness, but needs to be determined per application

		
<ul style="list-style-type: none">■ Overview screen shows the status of each connected sensor at a glance■ Heartbeat permanently calculates the sensor health during its operation	<ul style="list-style-type: none">■ Detailed screen per channel■ Information about current sensor health and remaining time to next maintenance	<ul style="list-style-type: none">■ Standardized classification of all status messages (NE107)■ Clear remedy recommendations allow to quickly take the right action

Verification 3/3

- **Pass or Fail report**
- Layout is separated to
 - Device information
 - Mainboard module
 - I/O Module
 - Sensor module
 to assist with failure identification and spare part management



Mainboard module

Check set and measured current	✓ Passed
Logical program run control	✓ Passed
Check sum RAM	✓ Passed
Status signal	✓ Passed

I/O module

Check sum RAM	✓ Passed
Temperature check	✓ Passed

Sensor

Result self check	✓ Passed
Result device check	✓ Passed
Check sum RAM	✓ Passed
HF path verification	✓ Passed

Thank you for your interest in Heartbeat Technology

