

Renewable natural gas (RNG)

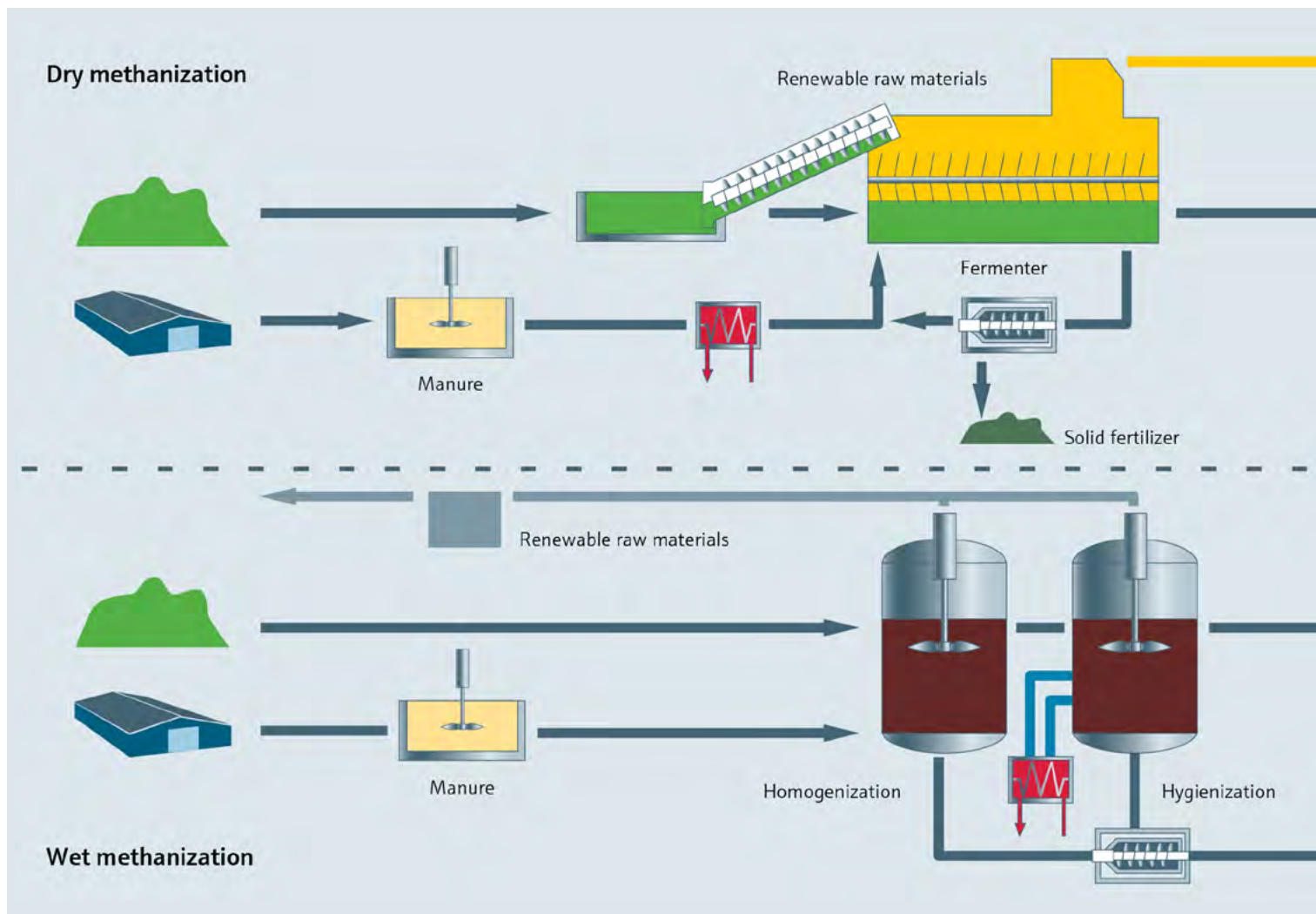
Measurement solutions for secure and reliable biogas and renewable natural gas production

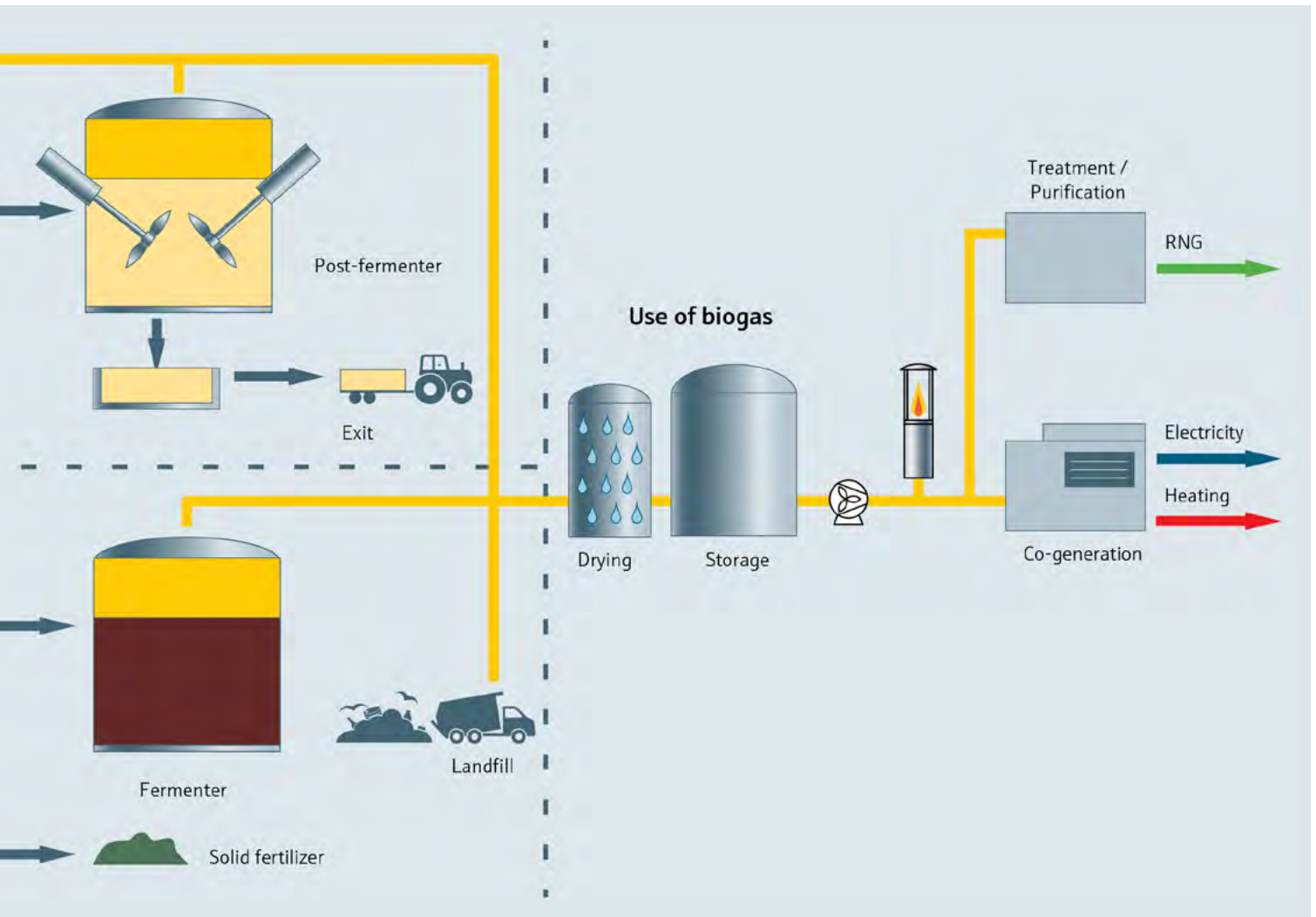


At the heart of energy recovery

Anaerobic digestion makes it possible to produce biogas from the fermentation of manure, crop by-products and residues, green waste, bio-waste and more, or naturally from solid waste and landfills.

After different stages (drying, compression, purification, etc.), this gas can be used to produce energy in the form of RNG, electricity, heat or even biofuel. With expertise and experience of more than 70 years in industrial instrumentation, at Endress+Hauser, we help you optimize your biogas and RNG production.





Unique and complete offering

The entire biogas production process must be monitored and controlled within critical parameters.

The main measurements are:

- Flow
- Level
- Pressure
- Temperature
- Liquid analysis
- Gas analysis

We have reliable, precise and resistant sensors that allow you to address the various constraints encountered in your process. The table below lists the most used measures and technologies according to the equipment installed in your processes.

Biogas and RNG production process – most used measurements and technologies

		Liquid (manure silage)	Delivery	Pre-treatment
Continuous level measurement with non-contact radar	Radar			
	Ultrasound			
Continuous level measurement	Hydrostatic			
Level detection	Capacitance			
	Vibronic point level			
Temperature measurement	Pt100			
	Thermocouple			
Pressure measurement	Pressure			
	Differential pressure			
Liquid flow measurement	Electromagnetic			
	Ultrasonic			
Biogas/RNG flow measurement	Thermal, Coriolis, Ultrasonic, Vortex			
Liquid analysis	pH measurement			
	Total suspended solids measurement			
	Dissolved oxygen measurement			

Flow

Flow measurement is a critical parameter in the management of a methanization installation.

Whether measuring charged inputs, wet or dry biogas or biomethane, we have technologies to meet your needs. The full-bore Promag electromagnetic flowmeter is ideal for demanding liquids. On wet biogas, the Prosonic Flow B/G ultrasonic flowmeter, which includes the measurement of the methane level (CH₄), allows monitoring of production at the digester outlet but also allows you to be informed quickly in the event of a deterioration in the methane

content and act accordingly. On biogas, after drying, the t-mass thermal mass flowmeter holds strong without pressure losses and is easy to install.

Ultrasonic is a technology that can reliably measure the flow of wet biogas. We developed the Prosonic Flow B/G for applications at the outlet of a methanizer and in the purification process.

Key product offering



Proline Promass Q 300 Coriolis flowmeter

- Optimized performance for liquids with entrained gas – Multi-Frequency Technology (MFT)
- Full access to process and diagnostic information – numerous, freely combinable I/Os and Ethernet
- Integrated verification, monitoring and diagnostics with Heartbeat Technology



Proline Prosonic Flow G 300

- Flexible device with user-definable gas mixtures for demanding measuring tasks
- Maximum reliability even with humid or wet gas – sensor design insensitive to condensate
- Integrated verification, monitoring and diagnostics with Heartbeat Technology



Proline Promag W 10 electromagnetic flowmeter

- Reliable measurement at constant accuracy with 0 x DN inlet run without pressure loss
- Flexible engineering – sensor with fixed or lap-joint process connections
- Integrated verification, monitoring and diagnostics with Heartbeat Technology



Proline Prowirl F 200 vortex flowmeter

- Easy energy management – integrated temperature and pressure measurement for steam and gases
- Same accuracy down to Re 10 000 – most linear vortex meter body
- Integrated verification, monitoring and diagnostics with Heartbeat Technology



Proline Prosonic Flow B 200 ultrasonic flowmeter

- Integrated real-time methane fraction measurement
- No additional pressure loss – full bore design
- Integrated verification, monitoring and diagnostics with Heartbeat Technology



Proline t-mass I 300 thermal mass flowmeter

- Reliable monitoring – detection of process disturbances and reverse flow
- Full access to process and diagnostic information – numerous, freely combinable I/Os and fieldbuses
- Integrated verification, monitoring and diagnostics with Heartbeat Technology

Level

Whatever level of measurement or detection is required in your process, we have a broad portfolio of technologies to meet your application needs.

For non-contact level measurement, free space radar is a reliable choice that is easy to install and commission. Compact or cable hydrostatic pressure measurement is an excellent choice for applications with challenging installation conditions. The capacitance probe is a robust /

reliable technology for either continuous or point level applications. It is especially useful for foam detection. Liquiphant vibronic technology can be utilized for either maximum or minimum level detection, pump protection and a variety of other applications.

Key product offering



Micropilot FMR60B 80 GHz radar sensor

- Easy handling through intuitive operation and wizards, for commissioning and verification
- Reduction of systematic errors through guided SIL-locking, verification and proof testing
- Increased productivity because of process monitoring, verification and diagnostics in the running process with Heartbeat Technology



Point level switch Liquiphant FTL51B

- Universal measuring principle for limit detection – proven vibronic technology
- Heartbeat Technology allows safe, continuous diagnostics and a simple verification, without process interruption
- Second line of defense to protect the environment



Capacitance point level detection Liquicap FTI51

- Cost savings because of easy and fast commissioning as calibration takes place at the press of a button
- Reliable and safe measurement due to active build-up compensation
- Reliable and universal application due to a wide range of certificates and approvals



Hydrostatic level measurement Waterpilot FMX21

- Highest level accuracy using temperature compensated density correction
- Flexible scaling of 4 to 20mA with superimposed HART 6.0 output
- Simultaneous measurement of level and temperature with optionally integrated Pt100 temperature sensor

Pressure

For pressure measurement, whether absolute, relative or differential, fixed or configurable range, we have a solution to meet your application needs.

Key product offering



Absolute and gauge pressure Cerabar PMP21

- High reference accuracy of 0.3% combined with high long-term stability and repeatability ensures high quality process monitoring
- Enhanced process availability is strengthened by the stringent use of 316L material and the possibility of a submersible version with IP68 ingress protection rating



Differential pressure Deltabar PMD55

- Instrument-led/error-free commissioning via local display – HART communication or Bluetooth
- Easily adapts to high-pressure/low-pressure changes in impulse lines via electric switch on the main electronics
- Compact design and modular concept for easy replacement of display or electronics



Cerabar PMC51B

- Eliminates the need for multiple interface devices – commission and troubleshoot the device with a smartphone or tablet
- Reduce systematic failures – error free SIL commissioning and instrument guided proof testing
- Reduce on-site accidents and protect resources when instruments are in difficult to reach areas

Temperature

A wide choice is available for temperature measurement, from the simple Pt100 probe to a probe with a transmitter and thermowell.

Key product offering



TH13 modular RTD thermometer

- High flexibility due to modular assembly with standard terminal heads and customized immersion length
- World-class transmitter with integrated sensor offering for heavy process industry applications
- Long-term stability ≤ 0.05 % per year



iTHERM ModuLine TH11

- User-friendly and reliable from product selection to maintenance
- Full traceability and consistent high product quality for reliable measured values

Liquid analysis

Real-time measurements of contaminants like water (H₂O), carbon dioxide (CO₂) and hydrogen sulfide (H₂S) are essential in your process. Accurate analysis ensures compliance with industry standards, prevents corrosion and optimizes combustion in generators.

Key product offering



Digital pH sensor Memosens CPS11E

- Extended storage of calibration and process data, enabling better trend identification and providing a future-proof basis for predictive maintenance and enhanced IIoT services
- Lab calibration and quick sensor exchange in the process result in minimized process downtime and longer sensor lifetime
- Process glass is suitable for the full pH range and pressure-stable up to 17 bar (246.5 psi) absolute



Suspended solids sensor Turbimax CUS51D

- Optimum adaption to all measuring tasks – sensor fits all measuring ranges due to numerous integrated analytical models
- Enables unattended plant operation – intelligent design enables sophisticated self-cleaning capabilities and minimizes maintenance
- Fast and easy commissioning – sensor arrives precalibrated and preconfigured



Channel transmitter Liquiline CM442

- Universal modules for all parameters minimize spare part stock and allow for easy extension to up to eight channels at any time
- Heartbeat Technology enables status-oriented maintenance and easy verification of the entire measuring point and helps to carry out optimization measures
- Intuitive user interface, automatic sensor recognition, plug-and-play with pre-calibrated Memosens sensors

At Endress+Hauser, our turnkey solution includes third-party devices carefully selected for their performance and compliance.

The advantages of our analysis system are:

- Compliance with local regulations
- Easy to install
- Proven technologies
- Minimal maintenance requirements and no consumables
- Easy validation of the analyzer in the field, making periodic checks simple and quick



Digital oxygen sensor Memosens COS22E

- Modular sensor design enables fast exchange of membrane cap and electrolyte
- Suitable for application in hazardous areas
- High accuracy of the measuring principle enables precise measurement resulting in best product quality

Gas analysis

Gas analyzers continuously monitor gas composition, including methane (CH_4), carbon dioxide (CO_2), hydrogen sulfide (H_2S) and oxygen (O_2). Accurate measurements optimize processes like anaerobic digestion and biogas upgrading, ensuring consistent RNG quality and safety.

Key product offering



J22 TDLAS H₂O analyzer

- Accurate and real-time H₂O gas analyzer in biomethane
- Provides highly accurate reading of H₂O in gas
- Provides H₂O concentration prior to sending to its final destination or natural gas distribution



SS2100 gas analyzer

- Accurate, real-time measurements
- Available for the following measurements: H₂O, CO₂, H₂S, NH₃, C₂H₂
- Low cost of ownership, no consumables and virtually maintenance-free and reliable in harsh environments



JT33 TDLAS H₂S analyzer

- Accurate and real-time H₂S gas analyzer in biomethane
- Provides highly accurate reading of H₂S in gas
- Provides H₂S concentration prior to sending to its final destination or natural gas distribution



OXY5500 oxygen analyzer

- Small optical sensor with no membrane or consumable chemicals
- Optical measurement with fast, continuous response
- Not affected by H₂S

Process safety and digitalization

At Endress+Hauser, safety takes center stage. Our process safety solutions not only ensure compliance but also safeguard personnel and the environment.

Our innovative designs incorporate Safety Integrity Level (SIL) certified field instrumentation. These instruments provide robust safety measures across diverse processes. Anticipating potential incidents, we implement risk control measures to prevent challenges and maintain operational integrity.

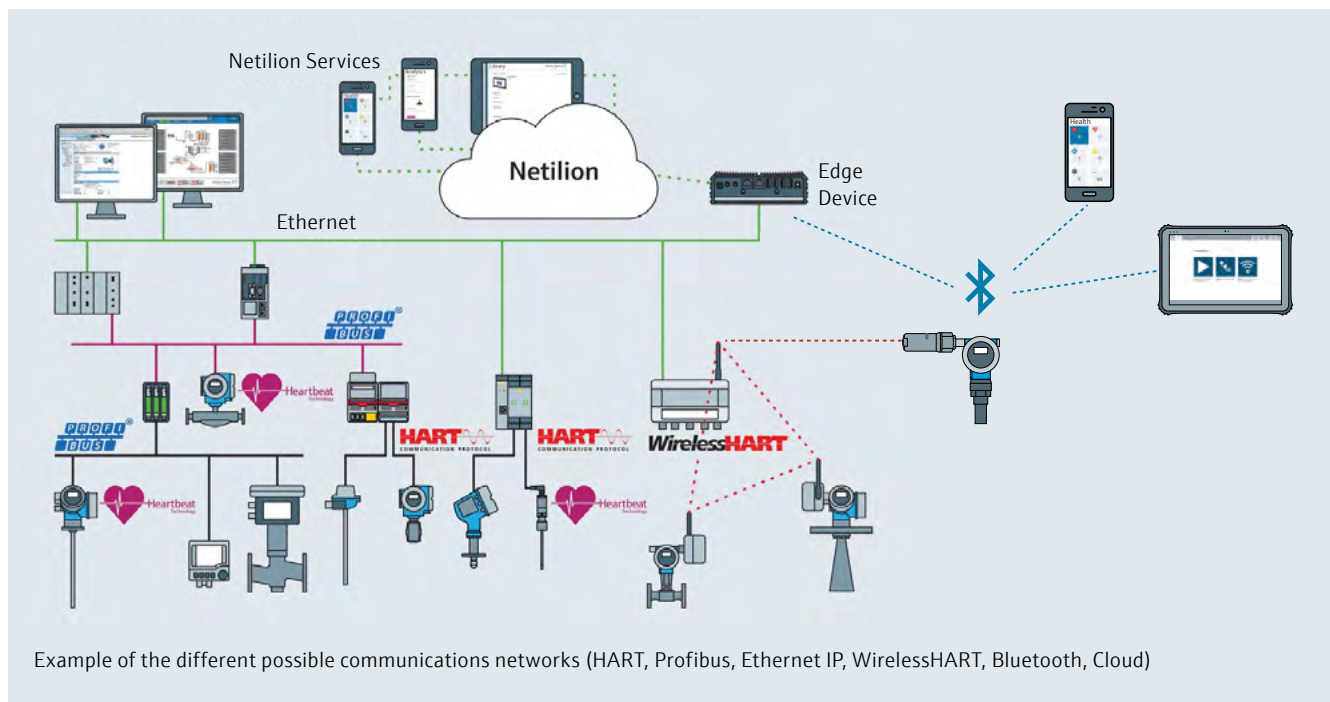
The Industrial Internet of Things (IIoT) is our ally. It unlocks knowledge, helping us fulfill regulations, meet quality obligations and enhance overall efficiency.

Whether managing water and wastewater or optimizing biogas yield, our process solutions are tailored to specific industries. Leverage digitalization to meet safety and

quality requirements. Monitor critical parameters during waste-to-energy conversion, ensuring environmental compliance.

Our experts accompany your journey. Applying digitalization, we unlock enhancements specific to your processes. Data becomes your compass, guiding continuous improvement.

Waste need not be wasted. Our commitment to circular economy principles transforms waste into valuable resources. Meanwhile, we can help minimize energy consumption without compromising process safety. Efficiency and sustainability walk hand-in-hand.



Optimization and compliance

Endress+Hauser's Heartbeat Technology – an innovative diagnostic and verification concept – helps ensure cost-effective and safe operation throughout the installation's lifecycle.

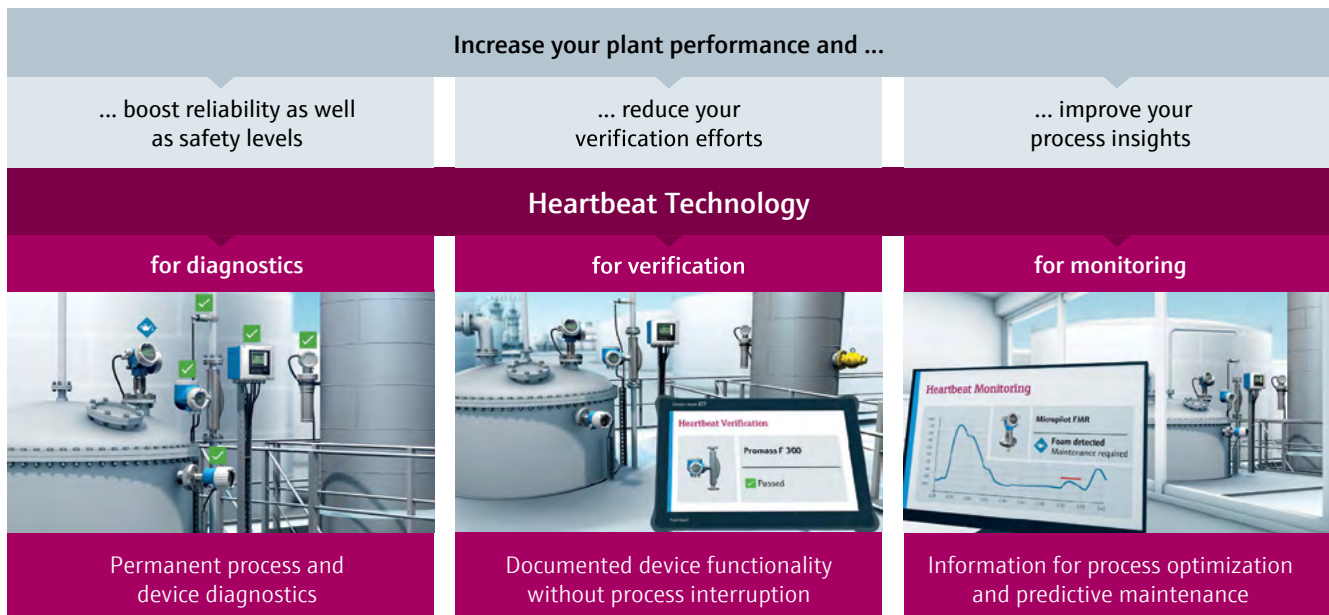
Endress+Hauser's Heartbeat Technology – an innovative diagnostic and verification concept – helps ensure cost-effective and safe operation throughout the installation's lifecycle. Diagnostic, verification and monitoring functions provide confidence in system performance.

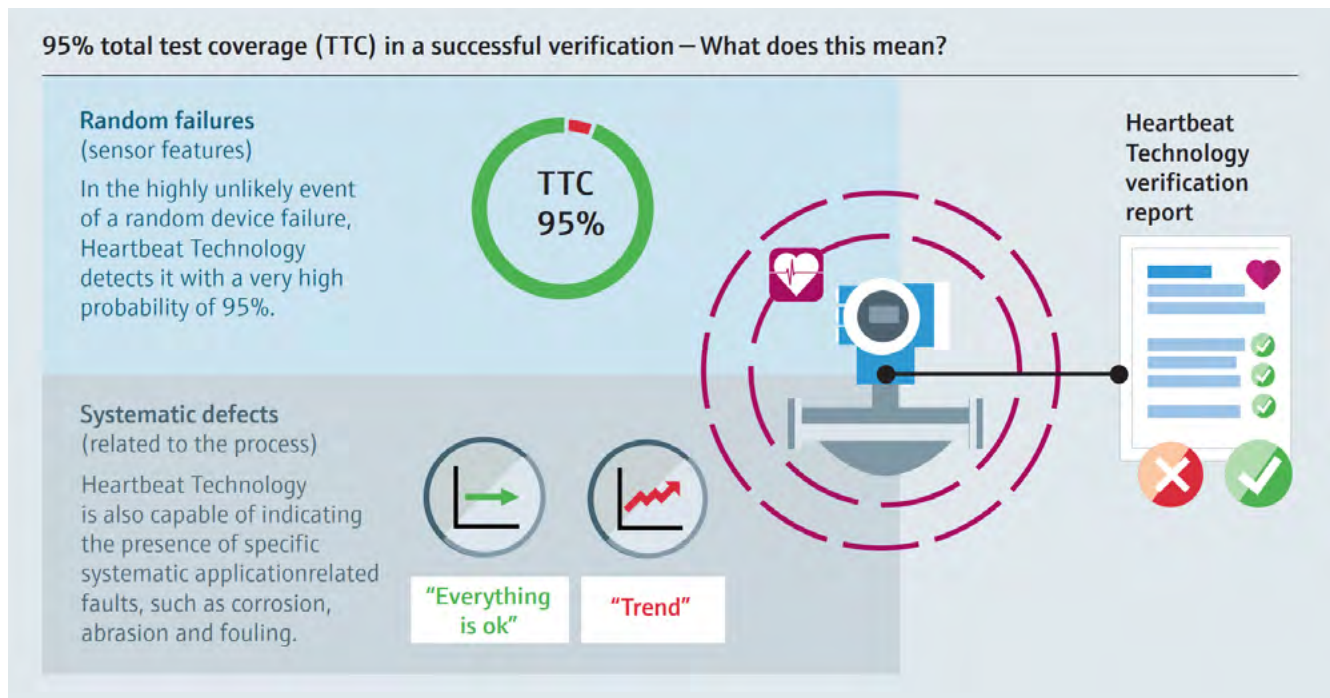
Instead of relying on traditional manual processes, digital reporting streamlines safety loop validation. Partial proof testing ensures that safety loops are functioning correctly without interrupting ongoing operations.

Assessing measuring device functionality directly on-site is crucial for efficiency. Heartbeat Technology allows you to

evaluate devices without the need for external tools. By doing so, you can promptly detect systematic faults (such as corrosion or abrasion) that may impact performance.

But Heartbeat Technology goes beyond mere diagnostics. It interprets events occurring within the process – whether it's foam in tanks or other anomalies. By bridging process knowledge with device insights, you gain actionable information. This understanding enhances overall operational efficiency and safety.





Optimize your maintenance, improve your processes

Do you want to increase the availability of your installation and reduce your costs?

With Heartbeat Technology, Endress+Hauser offers the broadest range of devices with an innovative diagnostic and verification concept for this purpose.

Heartbeat Technology enables cost-effective and safe plant operation throughout its lifecycle by quickly combining diagnostic, verification and monitoring functions.

Compliance with measuring points

The performance and compliance of your installations and measurement points require a rigorous and systematic approach to monitoring the critical instrumentation fleet. Call us during your technical shutdowns or other maintenance activities.

How can you be sure that your installation starts on time? Commissioning for operational instruments:

- 50% increase in timesaving
- Technicians with solid know-how in instrumentation and application
- Functionality and performance of the devices, from day one
- Warranty extension to manage unforeseen events and thus reduce costs
- Transfer of knowledge to your staff



Service contracts

Scalable service contracts drive optimization with your instrumentation installed base without risk of additional costs.

Setting up a contract gives you additional peace of mind:

- Be sure that maintenance services are carried out on time
- Receive regular visits from a technician who can provide you with maintenance advice
- Contracts can also include equipment from third-party manufacturers

Remote support:

- We connect to your devices and provide remote assistance

A reliable partner

Our products have a complete network of sales and service representatives to support products wherever they're installed.

New features transform us.endress.com into a powerful and intelligent cooperation platform that directly connects customers to us and our extensive network of sales representatives. Personalized space allows customers to perform operations within minutes. Manage transactions,

purchase products, order spare parts, download documentation and access contacts – whether at the office, in the field or while on the move – simply with **My Endress+Hauser**.



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 Find the representative partner closest to you



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