

Highlights 2026

Products, solutions and services

Highlights 2026



18,000+

employees worldwide

125

countries with their own
sales organizations and service centers
plus local representatives

36

production locations in 11 countries
on four continents

1,200

product families with millions of
configuration variants

Partner for
Process
Improvement



Dear Sir or Madam,

In the process industry, functioning processes decide on far more than efficiency alone. They determine how safely plants are operated, how consistently quality is ensured and how economically resources can be used. Certainly in times of growing complexity and transformative background conditions, partners are called upon not only to understand the processes, but also to continuously develop them further in collaboration with the plant operators. This way, a stable foundation is established for sustainable industrial value creation.

In our Highlights 2026, it is precisely these processes that are under focus. As a Partner for Process Improvement, Endress+Hauser supports plant operators with end-to-end solutions, digital expertise and hands-on services – with the clear goal of optimizing organizational workflows sustainably and effectively.

At the center are technologies in real-world industrial use where they perform at their full effect under actual process conditions. Processes differ in the respective media, requirements and objectives. Value is added when the engineered solution is made to measure and enables reliable data, safe workflows and informed decisions in plant operation.

This is the basis on which we provide ongoing support to our customers as a technology and know-how partner. Our solutions create transparency across processes and deliver reliable insights with which plant operators can improve availability, safety and cost-effectiveness in targeted ways. As a result, added value becomes measurable during operation.

For us, partnership means sharing responsibility and making industrial processes better together, today and in the future.

Discover practical insights and see how Endress+Hauser advances industrial processes.

Kind regards,

Markus Schmid
Director Sales Marketing

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Improvement



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Partner for Process Improvement –



The balance between routine and change decides how industry will remain future-ready. Those who rigorously reappraise processes and pursue further development collectively create the basis for stability, efficiency and lasting progress.

Making processes better together

Industry moves in the tension between routine and change. Many once familiar background conditions are now uncertain: supply chains are experiencing instability, energy prices are in flux and geopolitical developments hit deep into everyday production. At the same time, there is increasing pressure to modernize processes, digitalize them and make them more efficient without putting ongoing operation at risk.

In this context, future readiness is seen above all in terms of the ability of an operator's own workflows to perform. Financial success is achieved today not through products alone, but through frictionless, transparent and resilient processes. Companies are therefore looking for partners who think holistically, recognize interdependencies and can implement improvements both realistically and sustainably. Endress+Hauser sees itself acting in exactly this role: not only as an instrumentation specialist, but also as a long-term partner who knows the processes, understands business realities and develops solutions jointly with its customers.

When the know-how of plant operators converges with the industry expertise of Endress+Hauser, the foundations for effective improvements are laid.

Process improvement is teamwork

Good processes emerge through sharing. They need persons who examine, scrutinize and make decisions together. In order for this cooperation to be effective for years to come, stable framework conditions and long-term perspectives are needed.

As a family-owned company, we invest purposefully in structures that enable collaboration, development and innovation at production locations worldwide. These include new production buildings in Asia, regional logistics hubs in China and India, and comprehensive investment programs at central locations in Europe. In total, the company is currently actioning investment projects of over 550 million euros, the largest of which is at our production site in Maulburg, southern Germany. We are also developing, on average, a new industrial solution every business day and have amassed an intellectual property portfolio of over 9,000 patents. This makes it possible to anchor process improvement in the operations of our customers in a structured and purposeful way.

We rigorously question: Where are our customers losing time, money or quality and how can our products, services or digital tools make a targeted contribution to reducing these pain points? Which process steps are still unclear despite existing solutions and how can we make them transparent in future? And how can we design user operation, integration, service and life cycle management to enable reduced effort for our customers and make results more quickly available?

From these questions, we derive a clear idea of the process work: decisions in the business must be based on reliable data, acquired where processes are actually taking place. It is only when system states, process deviations and cause-and-effect relationships are transparent that measures can be evaluated with certainty and improvements implemented in a targeted way. Without this understanding, optimization remains a guessing game – with associated risks for safety, quality and availability.

Engineering only works with experience

When the know-how of plant operators converges with the industry expertise of Endress+Hauser, the foundations for effective improvements are laid. This is the basis for targeted engineering application.

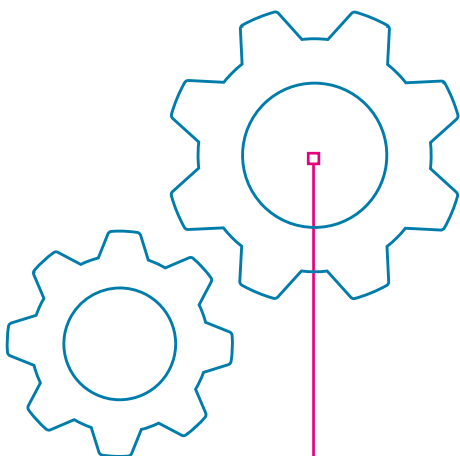
With a broad portfolio of measurement and sensor technologies and over seventy years of practical experience, we know exactly where processes react sensitively and which measuring points are truly critical. This sees the emergence of solutions that endure day in, day out: from reliable temperature monitoring in the food industry to high-precision measurement technology in energy and LNG applications.

Engineering alone, however, does not solve any problems. Only the right application, positioning and integration makes data usable. Just as crucial are clever calibration concepts and functions for self-monitoring. These make sure that measured values remain reliable for a long time to come, deviations are identified early on and targeted maintenance measures can be planned in advance. This reduces unplanned interventions, increases plant availability and makes an immediate contribution to operational safety.

Process optimization creates sustainability

If something is measurable, stable and fully managed, it can also be controlled sustainably. Sustainability, therefore, is not a target quantity accompanying the process, but its result.

In everyday industrial operations, it decides where processes meet their limits: under load changes, deviations, maintenance interventions or aging of components. Those who fully manage these situations reduce energy losses, material use and emissions not just there and then, but permanently.



* The figures were published as part of the results media conference 2025.

Process optimization acts here as an organizing principle. It helps to ensure that interventions remain plannable, operating states are comparable and plants can be run stably throughout their entire life cycle. Sustainability develops not as an extra task, but as the result of robust operations management.

New industrial applications, such as the use of hydrogen or Carbon Capture, Usage and Storage (CCUS), push these boundaries further. They demand processes that remain controlled even under changed conditions. Those who factor in these requirements early on can integrate new technologies gradually and anchor sustainability in operations from the beginning.

Future readiness is an operational issue

Good processes rarely stand out. They don't make any noise and are rarely in the limelight. And yet they decide whether an operation stays stable under pressure, whether changes succeed or whether there is room for maneuver. This strength stems from rigorous decisions, which involve looking more closely, taking data seriously and not letting improvements slide.

Companies that understand their processes can react faster, make more informed decisions and actively shape the changes. Endress+Hauser provides support with technical competency, a deep understanding of the industry and an attitude geared towards long-term collaboration. This results in processes that not only work, but sustain – today and in the future.

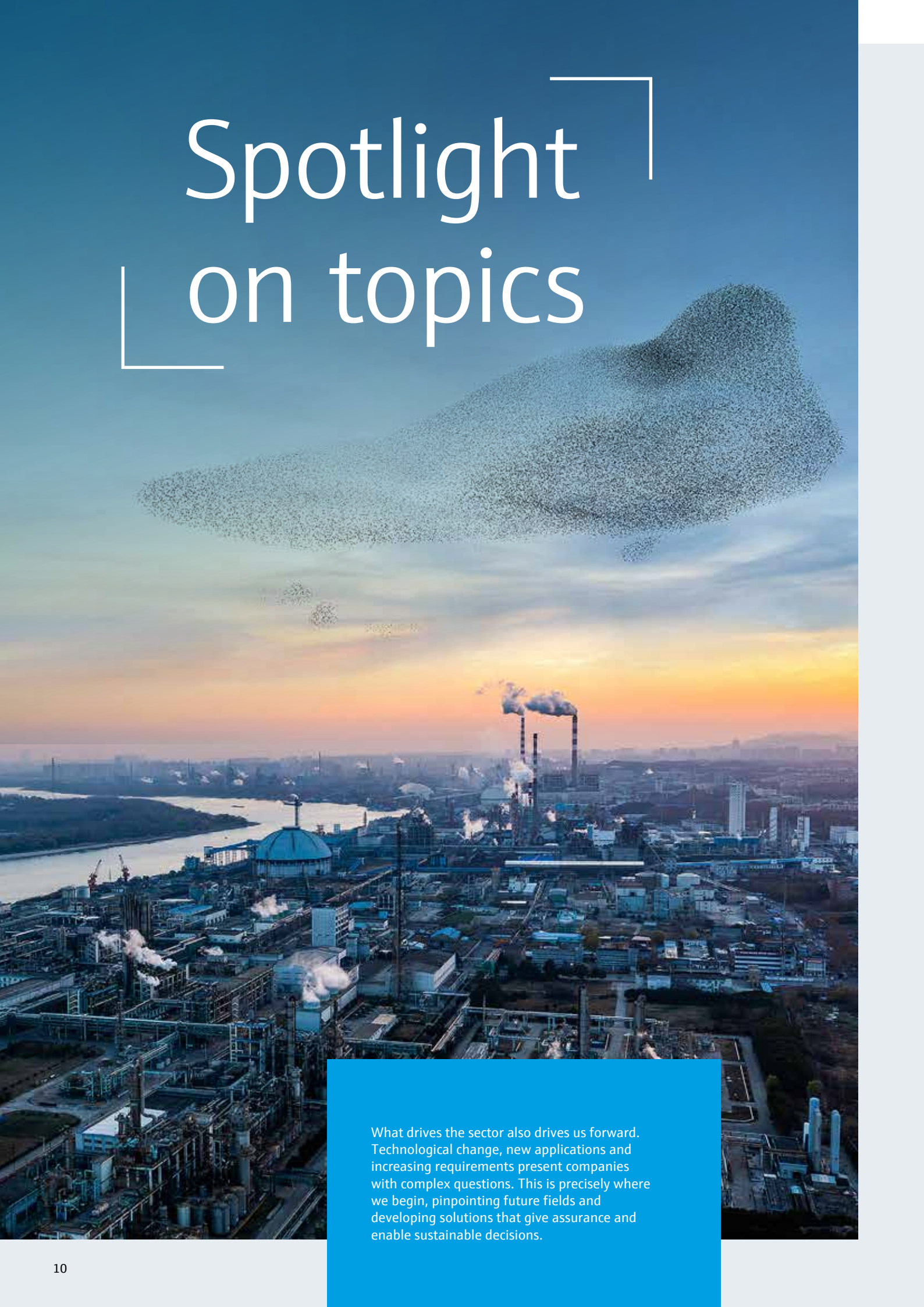
In 2024, Endress+Hauser spent 275 million euros worldwide for research and development. This equates to 7.4 percent of total turnover and is leading on average to a new invention every business day.*

Our intellectual property portfolio consists more than

9,000 patents



Spotlight on topics



What drives the sector also drives us forward. Technological change, new applications and increasing requirements present companies with complex questions. This is precisely where we begin, pinpointing future fields and developing solutions that give assurance and enable sustainable decisions.

Data centers under continuous load: temperature monitoring as a safety factor

Data centers are the backbone of the digital world. Cloud computing, data-driven business models and the rapid uptake of artificial intelligence are driving a steep increase in demand for processing power worldwide. Particularly high-performance graphics processors (GPU chips), which are indispensable to AI applications, consume far more electricity than traditional processor architectures (CPUs). With the increasing processing density and performance, not only is the energy requirement on the up, so is, inevitably, the thermal load of the infrastructure.

Why cooling becomes a question of efficiency

This rising heat load has direct consequences for energy consumption. In many data centers, cooling now accounts for up to 40 percent of the total electricity demand. Any mistuning in temperature management has immediate repercussions on efficiency and costs. Precise temperature measurement turns from being solely a safety factor to being the central control instrument for protecting the valuable processors and optimizing energy use at the same time.

The step towards liquid cooling

To make higher power densities manageable, operators are increasingly opting for liquid cooling. It enables a more targeted heat dissipation than traditional air cooling, but it does place new requirements on the operation. Fluctuations in flow, changing heat loads and complex pipe networks call for a continuous data basis. Without consistent real-time data, inefficient states remain hidden often for long times before performance losses or disturbances become noticeable. Even short temperature deviations can have considerable financial consequences because, on average, the downtimes incur costs in the high six-figure range per second.

Measurement technology becomes part of the infrastructure

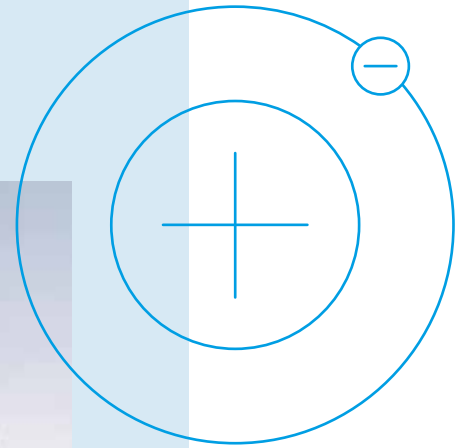
Measurement technology is therefore becoming a central component of modern liquid cooling systems in data centers – not only for operational, but also for regulatory reasons. Energy efficiency legislation demands transparent acquisition of energy flows and a provisioning of the generated heat. The basis for this is the combined measurement of flow and of supply and return temperatures, from which the dissipated thermal power can be reliably calculated by means of an energy computer. This energy acquisition creates clarity with respect to cooling performance and energy consumption and lays the foundation for efficient operation. Custody transfer measuring instruments enable the legally compliant handover of thermal power, e.g. through connection to local communal and district heating networks.

Existing plants can be expanded even during live operation: clamp-on solutions for temperature and ultrasonic flow measurements allow a retrofit without intervention in the pipe system and without interrupting data center operations.

At the same time, measurement technology makes a decisive contribution to operational safety. The monitoring of the coolant for pH value, conductivity and turbidity makes it possible to identify changes in media quality early on and to initiate counter-measures promptly before sensitive and cost-intensive components like expensive high-performance graphics processors (GPU chips) suffer damage.



Hydrogen and CCUS as key technologies of industrial decarbonization



Hydrogen and CCUS (Carbon Capture, Utilization and Storage) are the cornerstones of the industrial energy transition. They make an instrumental contribution to achieving the targets of the German climate strategy, reaching net zero by 2045 and offsetting unavoidable residual emissions. Industry and energy suppliers are primarily concerned here with the actual implementation and how to deal with technical and regulatory requirements. Reliable measurement technology is crucial to the success of both technologies.

Decarbonization of industry

With its Carbon Dioxide Storage and Transport Act (KSpTG), the German government has created the foundation for the use of CCUS at industrial scale. In this way, CO₂ is regarded for the first time not only as an emission, but as a material flow that has to be safely managed over longer distances and time frames.

It all starts with capture from industrial processes. Here, the continuous acquisition of quantities and qualities decides whether the captured CO₂ is suitable for reuse or storage. These requirements continue in its processing and transport. Impurities such as water, hydrogen sulfide or oxygen could cause corrosion, condensation or ice formation and

endanger the transport infrastructure. Precise measurement technology creates the necessary transparency of CO₂ purity and enables safe operation. At the same time, the particular physical properties of CO₂ place high requirements on the flow measurement, especially during dense-phase transport. For permanent storage, an unbroken monitoring of the relevant process parameters is essential to ensure the stability of the storage facilities and to identify risks early on.

As a member of the German Carbon Management Initiative, Endress+Hauser is involved not only in technical solutions for CCUS, but also in the further development of legal and strategic framework conditions. This includes bringing forward a national carbon management strategy and giving companies guidance for practical implementation.

Hydrogen as energy carrier of the future

Meanwhile, hydrogen is becoming increasingly important as a central energy carrier. Green hydrogen offers great potential for decarbonization. It has so far been produced in comparatively low amounts, which is why it is contingent on the ramping up of electrolysis technologies. In both alkaline and PEM electrolysis, precise measurement technology is required in order to control

processes safely and enable the transition to continuous industrial operation. Directly attached to its generation are requirements for quality assurance as well as for storage and transport. The continuous monitoring of purity, moisture, pressure and temperature is a prerequisite to a safe supply chain.

As a nationwide pipeline infrastructure has not existed until now, transport represents a particular challenge. To address this, a consortium consisting of Endress+Hauser, Hexagon Purus and Infraser Höchst has developed the MEGC container. The project, promoted by the Federal Ministry for Economic Affairs, sets new standards for the safe, efficient and flexible transport of hydrogen. Integrated sensors enable real-time monitoring of relevant parameters and help to ensure transparency, safety and efficiency along the entire supply chain. After all, the ability to measure and control complex processes reliably is decisive when it comes to the successful implementation of both technologies.



<https://eh.digital/46JodCQ>

Battery recycling as key to strategic raw material securement

Industry companies are pursuing the goal of recovering valuable raw materials contained in batteries and reducing their dependence on imports. In Europe, meanwhile, an extraordinary market situation is appearing: existing recycling capacities currently exceed actual demand. A major reason for this is the persisting low availability of used batteries from electric vehicles and of production wastes while the scaling out of new recycling plants is already well under way.

With the steep rise in new electric cars, it takes around ten years before used batteries become available. Today's capacity expansion is therefore seen as an investment in the future. Short-term overcapacities contrast with the long-term central importance of battery recycling for added value and security of supply. To be able to retain raw materials, technologies and markets in the global competition, it is necessary to weather the current market situation and simultaneously pursue a long-term strategy. Battery recycling is therefore becoming a key issue of industrial policy.

Hydrometallurgy as standard practice

Hydrometallurgy is establishing itself in Europe as the standard practice in battery recycling. It makes it possible to meticulously recover metals such as lithium, nickel, cobalt and manganese from the black mass with a high degree of purity. Working in an aqueous solution, it consumes less energy than pyrometallurgy. At the same time, the procedure is complex and requires numerous chemical process steps and a precise control of pH value, temperature and flow as even small deviations could affect yield and product quality. As such, hydrometallurgy is resource-sparing but heavily dependent on reliable measurement technology.

Measurement technology as a key to process stability

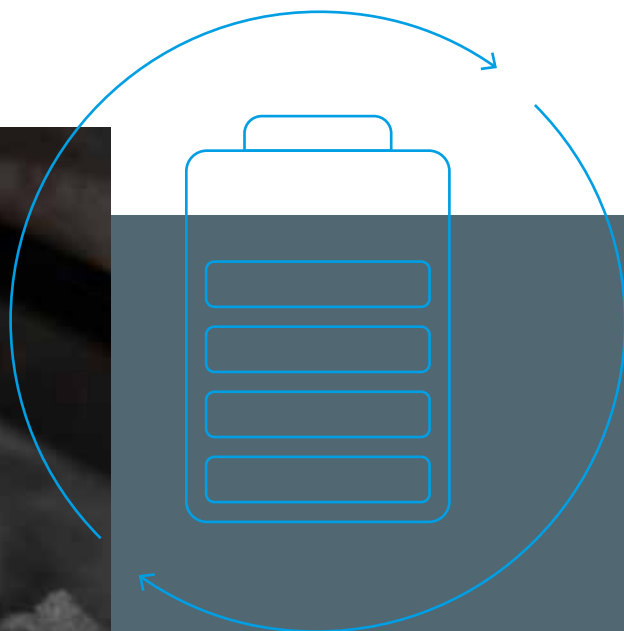
Modern sensor concepts are decisive in the success of hydrometallurgical processes during operation. Inline pH measurements secure the desired product quality, flow measurements control the precise addition of chemicals, and temperature measurements ensure stable

reaction conditions. It is only through the exact acquisition and control of these parameters that high purity levels can be achieved and chemicals, energy and water can be used efficiently. In addition, continuous data logging is required to meet regulatory requirements, such as the EU battery regulation, and ensure the traceability of material flows.

Endress+Hauser is already supporting companies today exactly in this regard. We offer robust and reliable measuring solutions, which work dependably even in aggressive media, and digital interfaces that make measurement and process data available in real time.



<https://eh.digital/4tIXjVD>





At a glance

Why Endress+Hauser for mining, minerals & metals?

- Because Endress+Hauser boosts resource efficiency with precise measurement technology and supports sustainable processes.
- Because certified SIL-compliant devices and intelligent self-diagnostics increase the safety of people, plants and the environment.
- Because digital, connected technologies and end-to-end customer focus deliver efficiency and a future-proof foundation.



Mining, minerals & metals

On a direct route to efficient and sustainable processes

In the mining, minerals & metals segment, geopolitical dependencies meet strict environmental requirements due to the exploding demand for scarce resources linked to the energy transition. Sustainability and security of supply need to be rethought.

Improving your eco balance

Circularity and resource efficiency are becoming the success factor for the sector. This is backed by our spectrometry solutions, which tap into the new usage opportunities for by-products and reduce waste. Measuring instruments that deliver precise, user-friendly data for emissions monitoring create transparency for ESG reporting and net zero targets. Robust water solutions – including cloud-based technologies – increase metrological traceability and transparency in the monitoring of water quality and for emission reports and compliance.

Strengthening safety for workers and the public

Our certified experts for functional safety act as dependable and guiding partners. The SIL-compliant devices are developed to IEC standards and certified by TÜV, among other test bodies. Thanks to sensor self-diagnostics with Heartbeat Technology, Endress+Hauser products deliver precise safety data. Field instruments are therefore easy to verify and reporting on safety standards can be simplified significantly.

Boosting efficiency through cross-sector innovation

Backed by cross-sector expertise, we have developed a broad portfolio of measuring instruments to deliver the right data at the right time and as efficiently as possible. We enable future-proof solutions for both established and new markets of the energy transition as well as for battery production and recycling. Intelligent sensors with wireless connectivity, self-diagnostics and open API can be seamlessly integrated into existing plants. And, all the while, our measurement technology continues to meet the increased requirements for the quality and purity of new minerals and metals for the energy industry.

Customer focus for a seamless customer journey

Putting customers first, we develop our offerings with the user in mind at every stage – with a comprehensive portfolio, a digital selection tool and online shop for easy product selection, integration, purchasing and commissioning. After purchase, field and cloud experts provide support for our products during operation, which are long-lasting and low-maintenance. Flexible solutions and services enabling swift adaptation to changing requirements across the entire life cycle complete our customer focus credentials.

Driving the green transformation

Dillinger and Saarstahl now run on hydrogen

O

On 21 August 2020, Dillinger together with Saarstahl put into operation the first plant in Germany for hydrogen-based steel production via the blast furnace route. The aim is to lower CO₂ emissions significantly and gradually integrate green hydrogen into the industrial practice. The project marks an important milestone on the pathway to climate-friendly steelmaking.

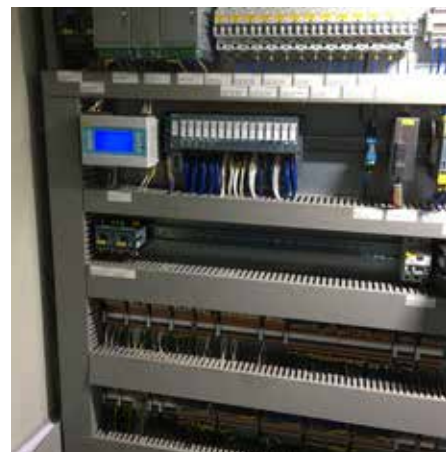
↑ The new coke oven gas plant is expected to help save 120,000 to 150,000 metric tons of CO₂ per year – instrumentation with Cerabar S pressure meters

The challenges

The German steel industry is under strong pressure to reduce its CO₂ emissions significantly while remaining competitive at the same time. The aim is to produce ideally CO₂-free “green” steel. A central approach is the use of hydrogen-rich process gases in the blast furnace to partly reduce carbon and thereby lower CO₂ emissions. The practical implementation of this technology represents a first in Germany and calls for superior process reliability, dependable measured values and a precise control of gas flows. At the same time, regulatory requirements, particularly those of EU climate law, must be fulfilled.



↑ Hydrogen measurement at the blast furnace with Prowirl vortex flowmeter plus Cerabar S pressure meters



↑ RMC621 universal flow computer for determining standards-compliant flow

Our solution

In the project for hydrogen-based steel production at Dillinger and Saarstahl, a coke oven gas injection system developed by plant supplier Paul Wurth was implemented. This system makes it possible to use coke oven gas in the blast furnace as a metallurgical process gas and thereby partly replace pulverized coal and coke. As a result, the carbon intensity of iron production is reduced.

The safe and efficient operation of this plant is monitored by the measurement technology of Endress+Hauser. Cerabar S pressure measuring cells, Prowirl flowmeters (vortex principle) and RMC621 universal flow computers deliver precise measured values. They form the basis for stable process control and support the gradual reduction of CO₂ emissions.

Result

Back in 2019, Dillinger and Saarstahl adopted a common strategy under the motto "proactive, carbon-free, efficient". Defined in it were concrete steps for the transformation to "green steel". The project for the hydrogen-based blast furnace route is a key component of this strategy.

For the next steps, dependable political framework conditions are required, including a fair foreign trade framework, support during the industrial transformation and sufficiently available green energy at competitive prices. The ambitious climate goals of the national government underscore the importance of such projects.

Solution components

- 200 Cerabar S pressure measuring cells
- 10 Prowirl flowmeters (vortex principle)
- 6 RMC621 universal flow computers



<https://eh.digital/40ZD5tu>

DILLINGER[®]

The Dillinger Group offers its customers superlative quality and the best services in heavy plate manufacturing. This includes the activities of an integrated smelting works, coke and pig iron production via the subsidiaries jointly owned with Saarstahl AG, and the manufacturing of liquid steel and intermediates. The heavy plate production takes place at two locations, one being Dillinger Hütte in Dillingen, the other Dillinger France in Dunkirk.



Micropilot FMR10B, FMR20B and FMR30B



NEW



Level



www.endress.com/Micropilot-FMR10B-20B-30B

The easier, the better: our compact 80 GHz radar sensors for level measurement



Highlights

- Non-contact radar level measurement with 80 GHz technology
- Heartbeat Technology enables on-demand guided verification and diagnostics without process interruption
- Quick commissioning and user operation thanks to control wizards
- Bluetooth® connection enables easy, reliable and encrypted remote access
- Device identification for Bluetooth® connection with "It's me function" and status indication by color LED/display
- Weatherproof design
- Easy device selection thanks to clear segmentation and universal suitability for liquids and solids

Application

Micropilot FMR10B, FMR20B and FMR30B compact 80 GHz radar sensors enable a reliable and efficient level measurement wherever free-flowing materials are stored, conveyed or mixed. Even with highly variable grain, rough surfaces, dust formation or changing weather conditions, they deliver precise measurement results. Control wizards support commissioning in a few minutes and provide step-by-step assistance in functionality verification. Operation takes place conveniently by smartphone or tablet via Bluetooth® or directly at the device. The current device condition is indicated by a color touchscreen display on the FMR30B, and by clearly visible status LEDs on the FMR10B and FMR20B. Heartbeat Technology enables diagnostics and verification without process interruption, increasing plant availability. Thanks to the standardized platform, wide-ranging accessories and 1:1 interchangeability with predecessor models, selection, installation and spare parts management are simplified considerably – for maximum efficiency in daily operation.



Quality marks and standards



Smart pressure transmitter with condition verification and uninterrupted operation



Highlights

- In-process condition verification thanks to Heartbeat Technology
- Wireless device operation in the field using the SmartBlue app via Bluetooth®
- Clear status indication with color switching from green to red when there are error messages
- Reduction of systematic failures thanks to error-free SIL commissioning and guided proof tests

Application

This pressure transmitter belongs to the new Cerabar generation. The measuring instrument is robust and suitable for demanding process applications. Operation takes place easily using the SmartBlue app via secure Bluetooth® connection. Intuitive wizards assist with commissioning, proof testing and device verification. Heartbeat Technology offers verification and monitoring functions for detecting unwanted anomalies, such as dips in the supply voltage.

Quality marks and standards



Cerabar PMP71B



Pressure



www.endress.com/PMP71B

Smart electromagnetic flowmeter



Highlights

- Quick, secure configuration via encrypted Bluetooth® connection
- Combined flow, conductivity and temperature measurement in one device
- Space-saving design for compact plants and skids
- Easy operation and device access via the SmartBlue app
- Flexible plug and play integration into common fieldbus systems including IO-Link

Application

Picomag Inline electromagnetic measuring instrument is ideal for conductive liquids in auxiliary and secondary processes. Its compact inline design enables use even in confined spaces. The bidirectional measuring principle delivers stable measured values regardless of pressure, temperature or viscosity. Additional conductivity and temperature measurements support reliable process monitoring. Commissioning takes place quickly and securely via the SmartBlue app.

Quality marks and standards



Picomag Inline



Flow



www.endress.com/dma

Proline Promag P 300



 Flow



www.endress.com/5p3b

Electromagnetic flowmeter



Highlights

- No pressure loss due to cross section constriction even with no inlet and outlet runs
- Maintenance-free (no moving parts)
- Full access to process and diagnostic information – numerous, freely combinable IOs and Ethernet
- Reduced complexity and variance – freely configurable IO functionality
- Built-in verification – Heartbeat Technology

Application

Proline Promag P 300 is an electromagnetic flowmeter for demanding process applications involving high temperatures and aggressive media. The bidirectional measuring principle delivers stable measurement results regardless of pressure, density, temperature or viscosity. The compact transmitter enables flexible system integration, convenient operation and easy connection. Heartbeat Technology supports continuous monitoring for high process reliability and plant availability.

Quality marks and standards



Proline Promass Q 300



 Flow



www.endress.com/8q3b

Innovative specialist for demanding applications



Highlights

- Maximized measurement accuracy for mass flow, volume flow and density
- Reliable measurement with entrained gas thanks to MFT
- Space-saving installation with no inlet/outlet runs
- Comprehensive access to process and diagnostic information with integrated Heartbeat Technology

Application

Proline Promass Q 300 offers maximized measurement accuracy for mass flow, volume flow and density. Thanks to MFT, the measuring instrument delivers excellent performance even for liquids with entrained gas bubbles. The intuitive operation, e.g. via WLAN, enables secure and quick commissioning. Numerous analog and digital interfaces help to ensure flexible and universal system integration. With its integrated Heartbeat Technology, a permanently safe and reliable plant operation is also guaranteed.

Quality marks and standards



Water hardness analyzer for low measuring ranges



Highlights

- Multi-channel operation with analyzer for up to six sampling points or flows
- Flexible timing and prioritization of the measurement channels
- Upgradeable to complete measuring point with up to 4 Memosens sensors
- Reduced maintenance effort thanks to toolfree servicing
- Predictive maintenance supported by advanced diagnostic functions

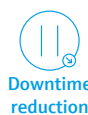
Application

Liquiline System CA82HA enables the colorimetric online analysis of very low water hardnesses to a detection limit of 0.02 mg/l. The continuous water hardness measurement ensures, among other factors, the quality of coolant in hot rolling processes, of process water for battery active materials and of pure water for use in capital-intensive installations, such as turbines and heat pumps. In this way, monitoring contributes decisively to plant availability and product quality.

Quality marks and standards



Connectivity solution for the Liquiline platform



Highlights

- Continuous data transmission to the Netilion IIoT ecosystem
- Off-site access to measuring points and device condition
- Easy plug and play integration with no fieldbus dependency
- Strong cybersecurity for protection of process and data
- Flexible use as new device option or upgrade to existing systems

Application

Liquiline Edge Module CYY7 enables the secure transmission of measurement and condition data to the Netilion IIoT ecosystem – even from remote or hard-to-reach measuring points. Process circuits and auxiliary circuits can therefore be monitored and analyzed off site. The added transparency simplifies maintenance, increases plant availability and supports data-based optimizations. Its plug-in design and fieldbus-independent communication make the module easy to integrate.

Quality marks and standards



Liquiline System CA82HA



NEW



Liquid analysis



<https://eh.digital/4jYNhv5>

Liquiline Edge Module CYY7



NEW



Liquid analysis



www.endress.com/cyy7

FlexView FMA90



NEW



Level



www.endress.com/FMA90

Seamless integration with support for up to two sensors



Plant
availability



Process
efficiency



Robustness

Highlights

- Flexible use with up to two level sensors covering different measurement technologies
- Strong cybersecurity due to integrated software functions
- Remote access to hard-to-reach measuring points thanks to WLAN connectivity
- Intuitive operation using a 3.5" color touchscreen display, even when gloves are worn
- Quick commissioning thanks to control wizards and automatic sensor recognition

Application

FlexView FMA90 is a control unit for radar, ultrasound, hydrostatic and universal 4–20 mA level sensors. It enables the simultaneous connection of up to two sensors and, with eight digital switched outputs, comprehensive control and monitoring functions. Thanks to its robust design and intuitive touch control, even with gloves, it is ideal for applications in the bulk solids sector.

Quality marks and standards



Micropilot FWR30



Level



www.endress.com/fwr30

Cloud-based level sensor



Plant
availability



Downtime
reduction



Process
efficiency

Highlights

- Simplified solution from procurement through to operation
- Full transparency in storage and transportation of liquids and solids
- Secure data transmission combined with a flexible, digital service portfolio
- Information access from anywhere at any time

Application

Micropilot FWR30 is an intelligent, wireless and battery-powered 80 GHz IIoT radar sensor for the reliable level measurement and inventory monitoring of liquids and solids. In combination with Netilion and SupplyCare, it enables secure remote access to inventory data – at any time and from any location. Easy commissioning and low-maintenance measurement technology provide enduring optimization of inventory management, replenishment planning and logistics processes.

Quality marks and standards



High-performance mercury measurement in flue gases



Plant
availability



Process
efficiency



Robustness

Highlights

- Reliable and unambiguous measuring of the concentration of elemental and chemically bonded mercury in gases
- Low maintenance
- High long-term stability with no human effort thanks to gas analyzer with self-adjustment
- Convenient, quick access for easy servicing and user-friendly remote diagnostics
- No misinterpretations of mercury caused by cross sensitivities (Zeeman atomic absorption spectroscopy)
- For use in plants complying with 13th, 17th, 27th and 44th BImSchV (German Ordinance on the Implementation of the Federal Immission Control Act)

Application

The innovative MERCEM300Z mercury gas analyzer provides reliable measurements even in places where other measuring systems would have to admit defeat. This extractive mercury gas analyzer monitors Hg emissions in flue gases with high reliability down to very small measuring ranges. Thanks to a range of housing variants, the MERCEM300Z is suitable for use in both climate-controlled analysis containers and outdoors under demanding ambient conditions. The complete extractive system is designed to meet national and international official requirements.

Quality marks and standards



EtherNet/IP



MERCEM300Z gas analyzer



Optical analysis



[www.endress.com/
MERCEM300Z](http://www.endress.com/MERCEM300Z)

Metric RTD/TC thermometer with welded thermowell



Vibration
resistance



Plant
availability



Downtime
reduction



Explosion
protection

Highlights

- Universal range of application
- Vibration-resistant primary sensor technology up to > 60 g
- Fastest response times with thermowell t90 from < 10 s, depending on the configuration
- Option of a secondary containment feature ensures reliable plant availability
- Easy, intuitive operation, including in Ex zones, with Bluetooth®

Application

iTHERM ModuLine TM131 modular industrial thermometer is available in RTD or TC design with its own thermowell or for use with existing thermowells. An optionally integratable head transmitter supports all common communication protocols. High-vibration-resistant, fast-response sensor elements in combination with robust iTHERM StrongSens and QuickSens thermowell technology plus comprehensive Ex approvals ensure superlative measurement accuracy, reliability and immediate operational readiness.

Quality marks and standards



iTHERM ModuLine TM131



Temperature



www.endress.com/tm131



At a glance

Why Endress+Hauser for the chemical and oil industry?

- Because safe and efficient processes smooth the way to a sustainable future.
- Because effective maintenance and better cost control increase competitiveness.
- Because digital integration and precise analysis capability enable process efficiency and maximum productivity.



Chemical & oil

Optimizing resources, maximizing performance

High energy costs, a weak global economy and considerable regulatory obstacles – the chemical and oil industry is mired in structural crisis and is simultaneously having to cope with the transformation to climate neutrality. This requires investment in infrastructure and digitalization in order not only to control emissions in the long term, but also to recover them for use as a raw material elsewhere.

Operating plants with ESG compliance and circularity

The correct process instrumentation is crucial if the emissions from plants are to be reduced and environmental regulations are to be observed. Our comprehensive portfolio of devices has been developed for hazardous areas in accordance with international standard IEC 61508 for the safety of your teams. Numerous measuring instruments of Endress+Hauser have the design concept Heartbeat Technology built in. Its unique diagnostic, verification and monitoring functions continuously support you with optimizing your plant's performance. Our products have been developed on the "Safety by Design" principle, which means that not only are they robust, they also reduce costs for the long term. Plus, our obligation towards transparent supply chains makes us your trusted partner for achieving ESG objectives.

Achieving high plant performance and reducing operating costs

A scalable service offering and digital support via a secure IIoT ecosystem enable maintenance of our reliable installed base. A "Smart Support" system guarantees on-demand access to experts so that all assets are managed effectively throughout the entire life cycle. The user-friendly Endress+Hauser measuring instruments also make day-to-day handling easier. Personnel can make quick decisions based on efficiently acquired operating data, which contributes to cost control over the long term.

Strengthening process efficiency from procurement to production

The more integrated we work with customers, the more they benefit from our expertise – and that applies right from the start: We support companies with the automation of their procurement process. The electronic linking of purchaser and supplier makes the purchase of even complex products like measuring instruments faster, more transparent and more data-driven. In production, we are on hand as experts for optical analysis: The real-time insights into composition, process progress and end points of chemical reactions enable precise control of production parameters and maximize productivity.

Precise measurement technology for innovative plastic recycling

enespa ag collaborates with Endress+Hauser for safe, efficient and sustainable pyrolysis processes

P

Plastic wastes are worldwide among the greatest ecological challenges of our time. Technologies that recover new useful materials from previously unrecyclable plastics are a cornerstone for a functioning circular economy. This is exactly where enespa comes into play: With innovative pyrolysis plants, the company creates the foundation for a sustainable recycling of plastics. Supported by the measurement technology of Endress+Hauser, processes are developed that combine economical efficiency with ecological responsibility.

The challenges

enespa ag develops solutions for the chemical recycling of polyolefin plastic wastes by pyrolysis. In a thermochemical process, certain plastics are transformed into pyrolysis oil, which can then be used again for plastic production in the petrochemical industry. This closes the circular economy of plastic products, which would otherwise go unused, and prevents unnecessary greenhouse gas emissions. A central challenge is the heterogeneous composition of the raw material. Different polymers, additives and impurities lead to varying melting and decomposition points, which hampers process management and makes the plant prone to trouble. In order for the pyrolysis oil to be used industrially, it must meet certain specifications. For consistent product quality and safe plant operation, therefore, precise control of the process parameters is necessary.

“Here in our process, we sometimes have extreme process conditions. This means that we have extreme requirements for our process components.

The measurement technology of Endress+Hauser has allowed us to achieve a very high degree of automation. We have now reached the point at which the plant can, in principle, be operated autonomously.”

Julian Herrmann, Project Manager enespa ag

Our solution

With Endress+Hauser, enespa has a partner with sector experience by its side. The reliable and exact measurement technology enables stable monitoring and continuous optimization of the entire pyrolysis process. Endress+Hauser delivers high-precision sensors for acquiring the process parameters – even under demanding conditions, such as temperatures up to 400 °C. The sensors are suitable for flush-mounting and are characterized by their long operating time, which helps to prevent curing of the raw material. The real-time acquisition and further processing of the measured data enables automated process control, which optimizes efficiency and guarantees a safe, trouble-free and scalable operation of the pyrolysis plants.

Result

- Maximum plant availability thanks to few disturbances and reduced downtime
- Unbroken process monitoring in real time with tracking of all critical parameters
- End product permanently fulfills the required quality standards

Solution components

- Cerabar PMP71B: Precise monitoring even under extreme process pressures, vital for safety and plant stability
- iTHERM TM131: Stable measured values at high temperatures, crucial for process management
- Liquiphant FTL51B: Reliable measurement of point levels in tanks and reactors
- Proline Prowirl F 200: Exact measurement of material flows for process control and optimization



www.endress.com/enespa-pyrolyse

Safe measurement thanks to wireless control with the Cerabar PMP71B ↓



enespa ag is a Swiss technology company based in Appenzell, which specializes in sustainable recycling solutions. With subsidiaries in Germany, Liechtenstein and the USA, enespa develops and operates plants worldwide for the chemical recycling of plastic wastes and implements technologies for tire pyrolysis and the refinement of used oil. With over 50 employees and more than 3,000 shareholders, enespa is contributing to a future-ready circular economy.



Raman spectroscopy: From lab to field

Scalable PAT solution with
Endress+Hauser for more efficiency,
safety and quality

E

Evonik, partnered by Endress+Hauser, has successfully integrated Raman spectroscopy as a powerful process analytical technology (PAT) from the laboratory and pilot plants through to production. The technology delivers real-time data, boosts efficiency, lowers costs and improves product quality. Its flexibility, scalability and safety make it the key to unlocking new savings potential in chemical process development. Customers benefit directly from the know-how gained to be able to optimize their own development and production process sustainably.

↑ Even in the harsh environment of process plants and under consideration of ATEX requirements, Raman spectroscopy systems hold their own

The challenges

Back in 2016, Evonik initiated the company-wide strategy "Lab to Process" with the goal of anchoring PAT technologies early on in process development. Evonik looked for a process analytical technology that would efficiently accompany the entire development and optimization process and contribute to cost reduction at the same time. The aim was to find a solution that would not only deliver precise real-time data, but also be flexible enough to be used in an extremely wide range of process environments – from the lab to production.

The technology should

- be for universal use with a whole range of chemicals, states of matter and process conditions
- be flexible and scalable, from laboratory to production, from the R&D lab to the large industrial production plant
- be quick to integrate in order to shorten development times and reduce time to market
- improve product quality thanks to continuous inline measurements
- function reliably even under demanding conditions such as ATEX zones

“With Raman spectra, we are often fortunate to be able to assign isolated peaks to individual substances in the mixture. This reduces calibration effort considerably and quickly leads to quantitative results. By contrast, NIR spectra sometimes do not allow a distinction to be made between substrate and product in the reaction mixture with the naked eye.”

Dr. Andreas Ohligschläger, Evonik PAT engineer

Our solution

- Tailor-made solution based on Raman spectroscopy, fulfilling all process and safety-related requirements
- High modularity and flexibility thanks to optical fibers and various probe types for different installation situations
- Integration even in narrow pipelines (e.g. 6 mm) – ideal for pilot and development plants
- Up to four independent channels for simultaneous monitoring of multiple measuring points in complex processes
- Chemometric evaluation in real time directly on the spectrometer
- Inline acquisition of qualitative and quantitative process data without manual sampling
- ATEX-compliant system thanks to certified components; additional use of the Liquiphant level switch for safeguarding potentially explosive atmospheres

Result

- Inline measurements at one-minute intervals replace time-consuming NMR samples
- Continuous, precise process monitoring with unchanged system composition
- Increased process reliability, especially in pilot plants with low volumes
- Reduced time and cost expenditure and greater safety for personnel and plant
- Increase in efficiency and product quality in process development
- Successful technology transfer from the lab to production
- International rollout of Raman technology in production plants, supported by the global expertise of Endress+Hauser

Solution components

- 16 Raman Rxn2 analyzers
- More than 50 measuring points with Raman probes (different probe types, suitable for modular use)
- Optical fibers for flexible integration
- Liquiphant vibronic level switch for ATEX safety



<https://eh.digital/4sBwEbT>



Evonik Industries AG is a worldwide leading specialty chemicals company based in Essen. With the power of innovation and technological excellence, the company goes beyond conventional chemicals to create sustainable solutions for industry and society. Evonik operates production locations in 27 countries on six continents.



Raman spectroscopy systems



Optical analysis



www.endress.com/process-analytical-chemistry



www.endress.com/raman-spectroscopic-systems

Robust real-time analyses for maximum efficiency and precise chemical processes



Real-time transparency



Increased process safety



Consistent product quality



Cost and raw material efficiency

Highlights

- Raman spectroscopy enables continuous inline analysis of chemical processes in real time
- Comprehensive range of laboratory and process probes for any installation environment
- The robust Raman Rxn2/4 analyzers are designed for reliable in situ measurements in 24/7 production or laboratory operation
- The Raman Rxn-40 probe allows flexible in situ analyses directly in the reactor, in pipelines or partial flows
- Quick measurement results enable reaction end point determination and active control of reaction kinetics
- The Raman data library software supports the real-time visualization and analysis of spectral data – including peak trending, modeling and secure data management

Application

Raman spectroscopy is a powerful process analytical technology for the automated monitoring and optimization of chemical processes.

The Rxn4 and Rxn2 analyzers, comprehensive probe portfolio and Raman data library software offer an integrated solution for quantitative and qualitative inline and real-time measurements.

The Raman Rxn4 analyzer enables robust in situ measurements around the clock and is ideal for production and process environments. In combination with the Raman Rxn-40 probe, reactions can be monitored directly in the reactor, in pipelines or partial flows – for quick and precise analyses in batch and continuous processes.

The Raman data library software supports visualization, analysis and management of spectral data.

This complete solution increases efficiency and product quality, shortens batch times and enables easy scalability from the lab to the process.



Quality marks and standards



Precise and reliable pressure monitoring in liquids and gases



Faster scaling



Consistent product quality



Cost and raw material efficiency

Highlights

- Device development to IEC 61508
- Quick and easy commissioning thanks to a control wizard
- Flexible write protection via hardware and/or security mode wizard
- Pressure- and leak-tested pre-installed valves for faster installation

Application

Cerabar PMP50 and Deltabar PMD50 are a pressure transmitter and differential pressure transmitter with metallic membrane for pressure monitoring in liquids and gases for a pressure measuring range up to 400 bar (6,000 psi) and process temperatures up to 400 °C (752 °F) with diaphragm seal. Both devices are optimized for standard applications and offer intuitive and safe control functions. Accuracy is to $\pm 0.055\%$.

Quality marks and standards



Coriolis flow measurement redefined – top performance up to DN 250



Increased process safety



Consistent product quality



Maximum plant availability



Easy device integration

Highlights

- Superlative accuracy for flow (0.05% rdg) and density (0.2 g/l)
- Multi-Frequency Technology (MFT) for active compensation of homogeneous gas bubbles in liquids
- Approved for custody transfer gas measurements according to MI-002
- Built-in verification with Heartbeat Technology
- Space-saving installation, no inlet/outlet runs

Application

Promass Q makes it possible to measure the most problematic media, such as highly viscous media with entrained gas. It provides superlative accuracy and reliability in the case of challenging measuring points, up to a nominal diameter of DN 250. The high density accuracy means that it can be used in quality-relevant applications. Get full access to process and diagnostic information thanks to Heartbeat Technology and Ethernet-APL.

Quality marks and standards



Cerabar PMP50, Deltabar PMD50



NEW



Pressure



www.endress.com/PMP50



www.endress.com/PMD50

Promass Q 300/500



Flow



www.endress.com/promass-q300



www.endress.com/promass-q500

Proline Promag P 300



 Flow



[www.endress.com/
promag-p300](http://www.endress.com/promag-p300)

High-temperature flowmeter with compact, access-optimized transmitter



Real-time
transparency



Increased
process safety



Maximum
plant availability



Easy device
integration

Highlights

- Energy-saving flow measurement; no pressure loss due to cross section constriction
- Maintenance-free, no moving parts
- Full access to process and diagnostic information thanks to numerous, freely combinable IOs and Ethernet-APL
- Ungrounded measuring enables a stable and cost-effective measurement without ground disks

Application

Promag P 300 is designed for corrosive liquids and high fluid temperatures. The compact transmitter enables flexible user operation and easy system integration with access from one side, remote display and extended connection options. The ungrounded, bidirectional measuring principle works virtually independently of pressure, density, temperature and viscosity. Heartbeat Technology ensures compliance and process reliability at all times.

Quality marks and standards



Liquiline CM42B



NEW



Liquid analysis



www.endress.com/cm42b

Memosens technology for reliable, digital data transmission and high availability



Faster
scaling



Consistent
product quality



Maximum
plant availability

Highlights

- Reliable, digital data transmission and high availability of the measured values
- Plug and play of the pre-calibrated sensors reduces idle times
- Certified HART communication and safe integration into your process control system
- Bluetooth® connection with unique security concept, which prevents unauthorized intrusion and enables a sophisticated role management of the operating personnel

Application

Liquiline CM42B offers precise and reliable measurement of pH, redox, conductivity or oxygen in demanding applications. Take advantage of the intuitive operation and configuration and use the secure Bluetooth® interface for a detailed overview on your mobile device. Thanks to international Ex approvals, such as IECEx, ATEX, C/US IS Cl. I div 1 and CHN-Ex, the device is suitable for use in potentially explosive atmospheres.

Quality marks and standards



The new generation of pioneering sensor technology



Faster
scaling



Consistent
product quality



Maximum
plant availability

Highlights

- Reliable signal transmission: no moisture or EMC problems thanks to inductive, digital signal transmission
- Intelligent safety: active indication of a dropout between the sensor and transmitter
- Field calibration no longer necessary: easy, safe calibration in the laboratory possible thanks to storage of relevant data in the sensor head
- Cross-parameter plug and play thanks to pre-calibrated sensors
- IIoT-ready: trend detection as future-proof basis for predictive maintenance and IIoT services

Application

Memosens technology digitalizes the measured value directly in the sensor and transfers it contactlessly to the transmitter. Memosens 2.0 sensors store, for example, the calibration history and load matrices and thereby smooth the way for predictive maintenance and sophisticated IIoT services. Memosens 2.0 sensors are backward compatible and offer full flexibility in potentially explosive atmospheres.

Quality marks and standards

MEMOSENS



Memosens 2.0



Liquid analysis



www.endress.com/memosens

Digital, safe and easy to use



Increased
process safety



Maximum
plant availability



Reliable
operation



Easy device
integration

Highlights

- Vibronics: established and universal measuring principle for use in all liquids
- Developed to IEC 61508 for direct use in SIL2/3 applications
- Superlative safety thanks to permanent self-monitoring and Heartbeat Technology
- Digital interfaces, such as Ethernet-APL and HART, deliver real-time data directly from the process
- Second line of defense to protect the environment

Application

Liquiphant FTL51B was developed according to IEC 61508 and is suitable for direct use in SIL2 and SIL3 applications. A reliable measurement result is achieved regardless of changing media properties, flows, turbulences, gas bubbles, foam, vibrations or deposits. As a limit switch, the device is easy to operate. Having digital interfaces, it delivers real-time data directly from the process.

Quality marks and standards



Liquiphant FTL51B



NEW



Level



<https://www.endress.com/FTL51B>

Micropilot FMR62B – 80 GHz radar sensor



NEW



Level



www.endress.com/fmr62b

Easy, safe and even smarter



Highlights

- Increased productivity thanks to process monitoring, verification and diagnostics with Heartbeat Technology during operation
- Safety by Design: Device development to IEC 61508 for SIL2 and SIL3 applications (e.g. with homogeneous redundancy)
- Reduction of systematic failures thanks to guided SIL locking, verification and proof testing
- Easy to use thanks to intuitive operation and wizards for commissioning and verifications

Application

Micropilot FMR62B is a 80 GHz radar sensor for non-contact level measurement in demanding applications. The device measures reliably under extreme temperatures and pressure as well as with changing media. Guided SIL locking, Heartbeat Technology and international Ex approvals increase process reliability and plant availability. Ethernet-APL, in addition to the PROFIBUS® PA and HART interfaces, helps to ensure easy device integration.

Quality marks and standards



MCS300P process gas analyzer



Optical analysis



www.endress.com/mcs300p

Simultaneous process monitoring of up to six measuring components



Highlights

- Automatic adjustment without expensive test gases
- Integration into existing networks
- Integration of external parameters, such as temperature and pressure
- Suitable for potentially explosive atmospheres
- Easy installation and maintenance thanks to clear, compact design

Application

MCS300P is an extractive process photometer for measuring in gaseous and liquid media. It detects IR- and VIS-active components across variable measuring ranges from ppm concentrations to high volume percents. Special process cuvettes with integrated protection functions, such as double seals and purge gas chambers on both sides, enable safe use even in toxic or flammable mixtures.

Quality marks and standards



Universal high-performance tablet PC for device configuration



Highlights

- Efficient handling of field devices saves time during maintenance and operation
- Mobile commissioning of any kind of field device
- Easier collaboration and increased productivity thanks to integrated access to the Netilion IIoT ecosystem
- Support for all protocols, including wireless technology

Application

Field Xpert SMT70B enables mobile plant asset management, even in potentially explosive atmospheres. It supports in the configuration and management of Endress+Hauser and third-party devices with digital interface and assists in documenting work progress. As a complete solution coming with a pre-installed driver library and Bluetooth® interface, Field Xpert allows device management throughout the entire life cycle.

Quality marks and standards



Service interfaces

Non-invasive thermometer with high measuring performance for demanding applications



Highlights

- Measurement accuracy and response time comparable to invasive measurements
- No process opening necessary, no risk of leakage
- International certifications: explosion protection to ATEX, IECEx, CSA and NEPSI; functional safety (SIL)
- Reduced outlays for installation, certification and inspections, and elimination of costs for thermowell, fitting and flange, weld inspections and pipe extensions

Application

The non-invasive thermometer is optimally suited to high flow velocities, high process pressures, viscous or corrosive media and abrasion. A specially designed thermal coupling element provides ideal thermal conductivity to the sensor and reduces ambient influences. The iTEMP temperature transmitter is equipped with all standard communication protocols and optional Bluetooth® connectivity.

Quality marks and standards



Field Xpert SMT70B



NEW

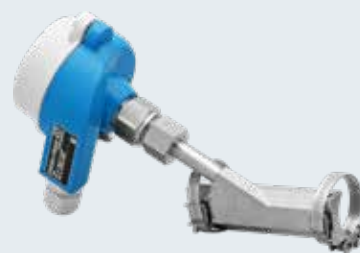


System product



www.endress.com/smt70b

iTherm SurfaceLine TM611



NEW



Temperature



www.endress.com/tm611



At a glance

Why Endress+Hauser for power, energy & gas?

- Because Endress+Hauser is a reliable partner for the energy and heating transition today and tomorrow.
- Because Endress+Hauser increases plant safety and operating efficiency at the same time.
- Because Endress+Hauser simplifies business processes for the long term.

Power, energy & gas

Smart solutions for the energy and heating transition

The energy sector is facing profound change: Decarbonization, rising electricity demand and the scaling-out of renewable energies and storage have to be reconciled with security of supply, grid stability and cost-effectiveness. A successful digital transformation is essential for efficient processes.

Supporting the energy and heating transition

Whether it's carbon capture, usage and storage, renewable energies or innovative transport and storage solutions involving hydrogen or synthetic fuels (e-fuels) – as a solution provider, we give ongoing support for energy suppliers, network operators, plant engineers and data centers along the pathway to digital transformation and decentralized energy generation. Our precise measurement technology meets the high requirements for the use of hydrogen in low-emission power and heat generation and makes the entire H₂ value chain safer and more reliable. Equally, we support the requirements of safety, quality and process stability in the use of low-carbon fuels like biogas, bioethanol and green ammonia, but also of more conventional fuels, such as natural gas, liquefied petroleum gas (LPG), CNG, LNG, when they use technologies like carbon capture or originate from sustainable sources.

Increasing plant safety and operating efficiency

Our measuring instruments acquire multiple process variables simultaneously. This saves space, reduces installation effort and delivers valuable insights into plant operation. Solutions for monitoring steam and water quality maximize availability and offer transparency throughout the entire life cycle, including IIoT connectivity and in situ verification with our Heartbeat Technology. Thanks to rigorous compliance with Ex, SIL and cybersecurity standards, we minimize risks and idle times for the efficient operation of electricity and heat generation plants.

Simplifying business processes

Experienced sector experts, structured process visualizations and comprehensive application and training resources enable the optimum selection of measuring instruments. Knowledge transfer, engineering and e-procurement run on an online central engineering platform. Not least, our customers benefit from us packaging our broad portfolio of products, services and solutions under a strong brand backed by local presence and a high-performing global network.

Optimizing time and project management

We supervise projects throughout the entire life cycle – from engineering to start-up to commissioning. Our experts and tools, such as Applicator, shape the design and technical implementation efficiently and consistently. We deliver project-specific documentation, tests and certificates and offer on-site services. In addition, integration into tracking systems ensures easy traceability.

Modular hydrogen electrolyzer made in Baden-Württemberg

Pioneering work in the Center for Solar Energy and Hydrogen Research Baden-Württemberg (ZSW) in collaboration with Endress+Hauser

T

The CE-certified system demonstrator is based on an alkaline pressure electrolysis technology researched, developed and optimized by the ZSW (up to 30 bar). Thanks to its modular construction, the plant is easy to scale in double-digit megawatt power classes. Over 40 measuring instruments from Endress+Hauser ensure the safety and high efficiency of the process.

↑ Scalable, production-ready system demonstrator for alkaline pressure electrolysis with an output of 1 MWel

The challenges

Green hydrogen is a cornerstone for the decarbonization of industry, mobility and energy supply. To cover the future steep increase in demand, however, the electrolysis technology must be rapidly transferred from the test and demonstration stage to industrial operation at production scale. Small- and medium-sized companies in particular are faced with the challenge of developing electrolysis systems that are not only competitive and scalable, but also safe. Efficiency, operational safety and optimum use of renewable energies play a decisive role here. At the same time, operating alkaline pressure electrolyzers requires a precise monitoring and control of central process parameters, such as liquid analysis and flow, temperature, pressure and level. Without reliable measurement and automation, neither the desired efficiency nor a long service life for the plants can be ensured. For these reasons, the objective of the "Electrolysis made in Baden-Württemberg" project was to realize a modular production-ready electrolyzer in the shortest possible time and thereby decisively accelerate the market ramp-up of this hydrogen technology.

→ Endress+Hauser sensors measure temperature highly accurately and reliably for high efficiency and process reliability



← Level measurement with Levelflex FMP51 guided wave radar in combination with the Liquiphant FTL51B



Our solution

In the development of the modular alkaline pressure electrolyzer, the ZSW purposefully relied on the collaboration with Endress+Hauser as its strategic partner. With its comprehensive expertise in measurement and automation, Endress+Hauser supported the precise acquisition and control of all relevant process variables. Modern measuring instruments and automation solutions enabled exact control of current density, temperature and pressure up to 30 bar. As a result, the electrolysis process could be optimally tuned to the fluctuating feed-ins from renewable energies. Meanwhile, the solutions of Endress+Hauser contributed to reducing material loads, ensuring safe operation of the system and creating the basis for modular scaling up to double-digit megawatt power classes. And with Heartbeat Technology, permanent diagnostics and verification of the measuring points are possible, thereby increasing plant availability.

Result

In just two years, a CE-certified system demonstrator emerged with an electric output of one megawatt, a production capacity of around 20 kilograms hydrogen per hour and an efficiency of around 70 percent. The electrolyzer has been in use at the ZSW since mid-2023 and has made the successful transition from test operation to continuous operation. Thanks to the precise measurement and automation engineering of Endress+Hauser, it was possible to boost energy efficiency considerably and achieve a sustainable increase in operational safety. The modular build allows flexible scaling for industrial applications. Based on this demonstrator, system integrator Ecoclean has now developed an internationally competitive series product. Endress+Hauser is therefore making a crucial contribution to the industrialization of hydrogen technology and to the successful decarbonization of the industry.

Solution components

Among others:

- Levelflex FMP51 radar level transmitter in combination with Liquiphant FTL51B vibronic point level measurement for reliable monitoring of the gas separators and the safe separation of hydrogen and oxygen
- Proline Promag P electromagnetic flowmeters, designed for use in aggressive and corrosive media, such as electrolytes



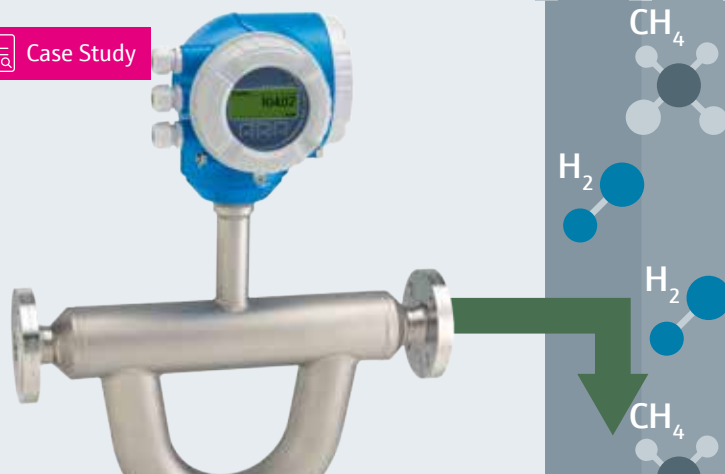
<https://eh.digital/3NkkdSN>

The ZSW has developed a scalable, production-ready alkaline pressure electrolyzer in just two years ↓



The Center for Solar Energy and Hydrogen Research Baden-Württemberg (ZSW) based in Stuttgart is one of the leading European energy research institutes. Here, technologies for the sustainable and climate-friendly production of electricity, heat and regenerative fuels are researched and developed into market-ready products, particularly in the field of hydrogen technology.





Hydrogen blending for natural gas turbines



↑ The Raman-Rxn5 process analyzer of Endress+Hauser delivers quantitative measurements of the gas mixture's chemical composition and, together with the Promass Q Coriolis flowmeter, determines the fuel quality (Wobbe index)

Long Ridge Energy demonstrates the successful use of clean hydrogen energy

W

With the help of process measurement technology solutions from Endress+Hauser, a new Long Ridge Energy (LRE) power plant successfully showcases the viability of clean hydrogen in the global energy and power industry.

The challenges

The global energy transition calls for solutions that unite security of supply, climate protection and cost-effectiveness. While wind and solar energy strongly fluctuate, hydrogen from renewable sources is gaining increasingly in importance as a storable energy carrier. LRE operates a gas power plant in Hannibal, Ohio, the turbine of which was originally designed exclusively for natural gas. The objective was to blend in hydrogen as a clean energy carrier and thereby phase down CO₂ emissions. The blending of hydrogen, however, does bring considerable challenges: increased explosion risks, more demanding firefighting, implications for the existing infrastructure and stricter regulatory requirements. LRE had to ensure that the hydrogen concentration is controlled, validated and documented exactly at all times. At the same time, the system was to be scalable to enable much higher hydrogen concentrations down the line – along with maximized safety, maximum efficiency and minimum interventions in the existing plant.

“At Long Ridge, we have realized a world first by mixing hydrogen into the fuel. In collaboration with Endress+Hauser, we are in this way championing sustainable energy generation.”

Mark Barry, Program Manager, Long Ridge Energy

Our solution

Together with Endress+Hauser, LRE realized a precise, safe and future-ready hydrogen blending system. The core of the solution is a high-accuracy multi-variable flow measurement based on Coriolis technology. At the feed-in point, a Proline Promass Q regulates the hydrogen supply with an accuracy of ± 0.25 percent with no costly inlet or outlet runs. A further Proline Promass F monitors the gas flow in the main line. For additional validation of the gas mixture, a RamanRxn5 analyzer with RamanRxn30 probe has been integrated. This solution analyzes the chemical composition of the gas mixture virtually in real time and enables the Wobbe index to be calculated – a crucial characteristic quantity for safe turbine operation. The combination of flow measurement and real-time gas analysis ensures maximum safety, regulatory conformity and optimum process control.

Result

LRE was successfully able to realize a hydrogen blend initially of 5 percent and thereby smooth the way to the partial decarbonization of its electricity generation. The precise measurement and analysis technology of Endress+Hauser minimizes safety risks, prevents hydrogen overdosing and protects the turbine from damage. At the same time, the system is flexible to scale and already prepared for future blends of 20 percent and more. Besides reducing emissions, the project also had positive economic effects: The new power plant helped to revitalize the local economy and created numerous jobs. The lessons learned reveal that many existing gas turbines worldwide can be made hydrogen-compatible with manageable modifications.

Solution components

- Coriolis flow measurement (Proline Promass Q & F)
- Raman gas analysis (RamanRxn5 with RamanRxn30 probe)
- Scalable, future-proof system architecture: Flexible expandability of measurement and analysis solutions for higher hydrogen concentrations without comprehensive conversions to the existing infrastructure



<https://eh.digital/45iwM78>

LONG RIDGE Energy & Power

Long Ridge Energy based in Hannibal in the Appalachian region of Ohio, USA, developed the first combined cycle power plant in the world purpose-built for the use of hydrogen. The 485 MW natural gas plant is currently feeding hydrogen into the natural gas that it burns, proving the viability of carbon-free renewable hydrogen for cleaner power generation.



FLOWSIC610



NEW

Flow



<https://eh.digital/4sxlXXQ>

Custody transfer ultrasonic gas meter for hydrogen transport



MID approval
for hydrogen



No
pressure loss



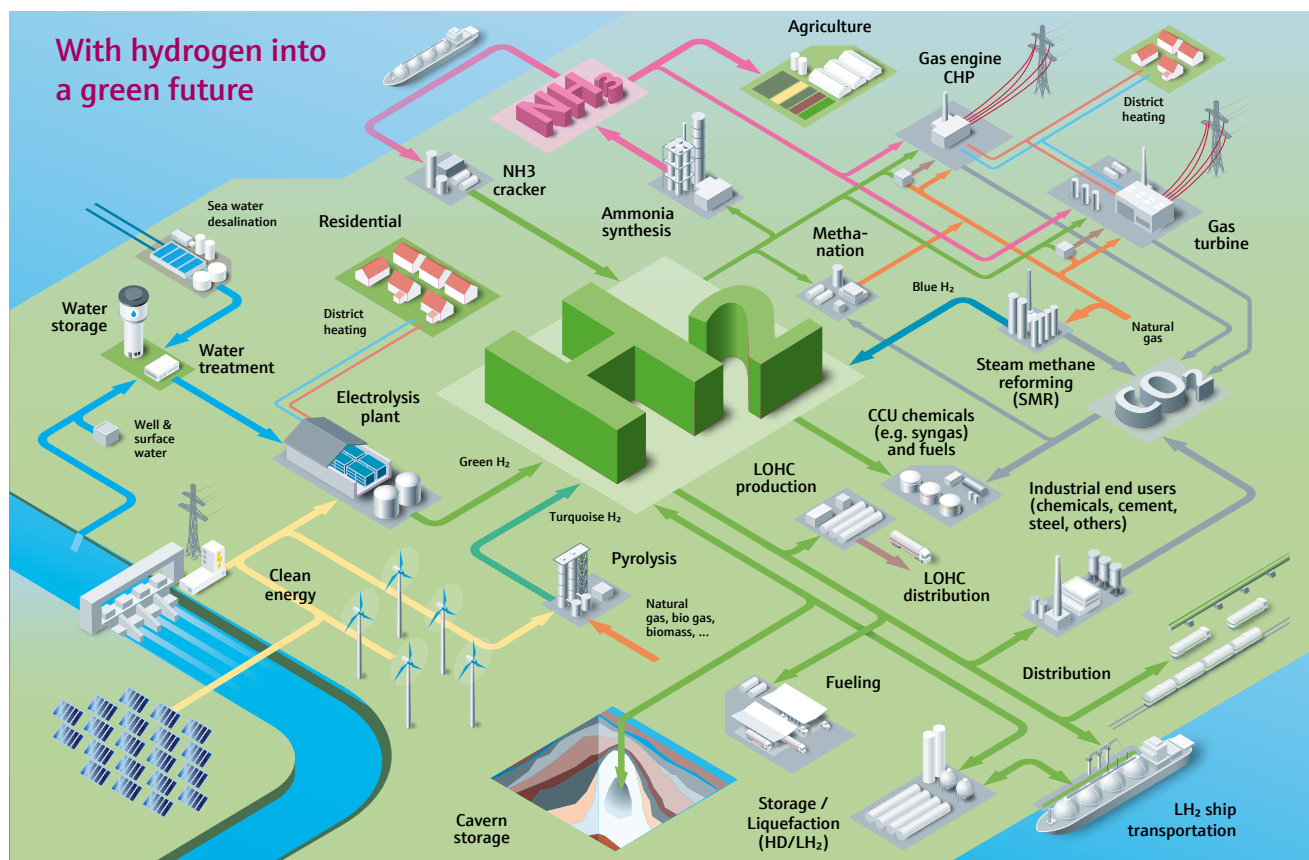
Usable up to 60 m/s
gas velocity

Highlights

- MID approval (accuracy class 1) for hydrogen
- Available in nominal diameters DN50 to DN400
- Ready for energy-equivalent flow – performing up to 60 m/s
- Measuring span up to 1:160
- Minimum operating costs as virtually maintenance-free
- No pressure loss
- Easy commissioning and data readout via FLOWgate™
- Hydrogen purity indicator (optional) – real-time values for process monitoring

Application

Compact, precise and ready for the future of clean energy. Based on years of experience in the custody transfer flow measurement of natural gas, the FLOWSIC610 is an MID-approved ultrasonic gas meter for the custody transfer metering of hydrogen: a robust and reliable solution, developed for the demanding operating conditions in hydrogen transport. The FLOWSIC610 is available for nominal diameters of DN50 to DN400 with accuracy class 1 for billing purposes. The “purity indicator” enables immediate monitoring of hydrogen purity based on speed of sound.

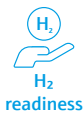


Quality marks and standards



MID

Smart pressure transmitter with condition verification and uninterrupted operation



Highlights

- In-process condition verification thanks to Heartbeat Technology
- Clear status indication with color switching from green to red when there are error messages
- Reduction of systematic failures thanks to error-free SIL commissioning and guided proof tests
- Wireless device operation in the field using the SmartBlue app via Bluetooth®

Application

The pressure transmitter of the new Cerabar generation is suitable for demanding process applications. It measures pressures up to 700 bar and is designed for process temperatures up to 400 °C in conjunction with diaphragm seals. Operation takes place easily using the SmartBlue app via secure Bluetooth® connection. Intuitive wizards assist with commissioning, proof testing and device verification. Heartbeat Technology enables condition monitoring and detects anomalies during operation early on.

Quality marks and standards



Cerabar PMP71B

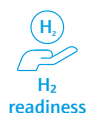


Pressure



www.endress.com/PMP71B

Robust measuring system for liquids, gases and steam



Highlights

- Easy energy management – integrated temperature and pressure measurement for easy conversion to mass and standard volume
- Reliable, safe measurement technology – compliance with vortex standard ISO 12764
- Wide operable flow range thanks to vortex meter body with unique linearity
- Convenient device wiring – separate connection compartment, various Ethernet options
- Built-in verification – Heartbeat Technology

Application

Prowirl F is a multi-variable inline measuring instrument for precise wet steam measurement. PremiumCal calibration ensures excellent measurement results and high plant availability, even with low flow rates of gas, steam and liquids. Thanks to genuine loop-powered technology, the Prowirl F 200 is cost-effective to integrate into existing infrastructure and offers superlative operational safety, even in the Ex zone. Heartbeat Technology helps to ensure process and diagnostics safety at all times.

Quality marks and standards



Proline Prowirl F 200



Flow



www.endress.com/7f2c

NEW

Proline Promass Q 300



 Flow



www.endress.com/8q3b

Innovative specialist for demanding applications with access-optimized transmitter



Reliable operation



Integration capability



Plant availability



Multi-gas capability

Highlights

- Optimized performance for liquids with entrained gas – MFT (Multi-Frequency Technology)
- Space-saving installation – no inlet/outlet runs
- Full access to process and diagnostic information – numerous, freely combinable IOs and Ethernet
- Reduced complexity and variance – freely configurable IO functionality
- Built-in verification – Heartbeat Technology

Application

Promass Q 300 offers superlative measuring performance for mass flow, volume flow and density and is the first choice for billing-related applications, including custody transfer. The measuring principle works independently of viscosity and density and is ideal for demanding processes and liquids with entrained gas. The compact transmitter enables flexible system integration with access from one side, remote display and modern connection options. Heartbeat Technology helps to ensure continuous process reliability and operational safety.

Quality marks and standards



Liquiline System CA82HA



NEW



Liquid analysis



<https://eh.digital/3YI9GTM>

Water hardness analyzer for low measuring ranges



Reliable operation



Integration capability



Plant availability

Highlights

- Multi-channel analysis: up to six sample channels with one analyzer
- Flexible measuring strategy: Freely programmable channel prioritization
- Space and cost saving: Integration of up to four Memosens sensors
- Low maintenance: Toolfree maintenance and predictive diagnostics
- Automatic cleaning and calibration at customizable intervals

Application

Liquiline System CA82HA enables the colorimetric online analysis of very low water hardness concentrations with a detection limit of only 0.02 mg/l. Thanks to continuous monitoring, the analyzer contributes to plant efficiency because deposits on heat exchangers can be reduced and damage to capital-intensive installations, such as turbines, can be prevented. It is ideal for monitoring boiler feedwater and condensate and for pure and ultrapure water applications, and it supports quality assurance in industrial processes.

Quality marks and standards



80 GHz radar sensor: easy, safe and even smarter



Highlights

- Increased productivity thanks to process monitoring, verification and diagnostics with Heartbeat Technology during operation
- Safety by Design: device development to IEC 61508 for SIL2 and SIL3 applications (e.g. with homogeneous redundancy)
- Reduction of systematic failures thanks to guided SIL locking, verification and proof testing
- Easy to use thanks to intuitive operation and wizards for commissioning and verifications
- Easier troubleshooting thanks to recommended actions on the display

Application

Micropilot FMR62B is a 80 GHz radar sensor of the newest generation for continuous, non-contact level measurement in demanding liquid applications. It measures reliably in extreme temperatures from -196 to +450 °C and pressures of up to 160 bar. The strong beam focusing enables precise measurements to 80 m, even with many internal fittings. Guided SIL functions and Heartbeat Technology increase safety and plant availability.

Quality marks and standards



Micropilot FMR62B



www.endress.com/FMR62B

Proven measurement technology for flue gas monitoring



Highlights

- Measuring instrument tested for suitability in accordance with EN 15267
- Low-maintenance and effective thanks to wear-free gas delivery
- Condition monitoring included

Application

MCS200HW is an analytical system for continuous monitoring of up to 10 IR components plus oxygen and TOC in flue gases. All wetted parts are heated above the dew point and therefore protected against corrosion. The internal reference point check allows the measured values to be checked quickly without test gases. The web display and the predefined task wizards make operation very easy. MCS200HW Ex offers reliable emissions measurement even in potentially explosive atmospheres.

MCS200HW gas analyzer



NEW



Optical analysis



www.endress.com/mcs200hw

JT33 TDLAS gas analyzer/ J22 TDLAS gas analyzer



Optical analysis

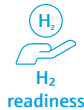


www.endress.com/jt33



www.endress.com/j22

High-precision TDLAS trace measurement of H₂S and H₂O for maximum gas quality



H₂
readiness



Reliable
operation



Integration
capability



Plant
availability

Highlights

- Exact TDLAS differential spectroscopy for high-precision real-time measurement in the ppm range
- Minimum maintenance and maximum-reliability monitoring of critical trace gases to avoid corrosion, hydrate formation and unplanned process disturbances
- Excellent plant availability thanks to robust build with modules maintainable on-site
- Heartbeat Technology for automatic diagnostics, validation and fully comprehensive test reports

Application

TDLAS gas analyzers JT33 and J22 enable precise real-time monitoring of H₂S and H₂O along the entire gas value chain, support plant operators in complying with gas quality specifications and help to avoid corrosion and hydrate formation. Optical measurement with long-term stability, robust differential technology and Heartbeat Technology ensure high measurement stability, minimum maintenance and maximum plant availability.

Quality marks and standards



Engycal RH33/RS33



System product



www.endress.com/RH33



www.endress.com/RS33

Energy calculator for steam, water and other liquids



Integration
capability



Plant
availability



Calibration law
conformity

Highlights

- Standards-compliant calculation to IAPWS-IF97 and EN 1434
- Billing-compatible and custody transfer-ready for transparent energy costs
- High measurement accuracy thanks to electronic sensor-transmitter matching
- Comprehensive data transparency with remote access over Ethernet and fieldbuses

Application

The energy computers EngyCal RS33 and RH33 enable the standards-compliant acquisition and billing of steam, heat and cooling quantities in industry, power plants and building automation. Based on measured flow, temperature and pressure values, they calculate energy and mass flows in accordance with international standards. Electronic sensor matching, detailed data storage and remote reading help to ensure superlative measurement accuracy, transparency and efficient energy management.

Quality marks and standards



Groundbreaking, highly modular and intrinsically safe temperature sensor



Highlights

- Universal range of application
- Option of a secondary containment feature ensures reliable plant availability
- Easy, intuitive operation, including in Ex zones, with Bluetooth®

Application

The RTD or TC thermometer is suitable for universal use in demanding industrial applications and is available with its own thermowell or for existing thermowells. Optionally integrated head transmitters with common communication protocols and Bluetooth® enable easy operation and recalibration. Functions such as an option for iTHERM QuickNeck secondary containment and vibration-resistant sensor elements ensure high measurement accuracy, fast response times, reliable operation up to 1,100 °C and high process pressures.

Quality marks and standards



iTHERM ModuLine TM131

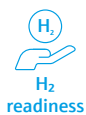


Temperature



www.endress.com/tm131

Non-invasive RTD/TC thermometer with high measuring performance



Highlights

- No process opening necessary, no risk of leakage
- Measurement accuracy and response time comparable to invasive measurements
- iTEMP temperature transmitter with all standard communication protocols and optional Bluetooth® connectivity

Application

Non-invasive RTD/TC thermometer with high measuring performance for demanding applications. Perfect for retrofitting for temperature measurements in existing plants. This makes them ideal for demanding process conditions such as high flow velocities, high process pressures, viscous or corrosive media and abrasion.

Quality marks and standards



iTHERM SurfaceLine TM611



Temperature



www.endress.com/tm611

NEW



At a glance

Why Endress+Hauser for the food and beverage industry?

- Because a fast market needs quickly adaptable processes.
- Because food safety is not negotiable, but existential.
- Because maximum productivity and minimal failures are crucial success factors.



Food & beverage

Innovation without quality compromises

Consumer trends change very quickly in the food and beverage industry. Greater health consciousness and lifestyle matters are driving the market and increasing competitive pressure. Food and beverage manufacturers must – against consistently high safety standards – always innovate swiftly and be able to depend on efficient and smart process solutions.

Securing your production capability

At production locations, dependable data are absolutely key to securing the ability to supply and maintain product quality despite changing recipes and fluctuating raw materials. Our approach to real-time data acquisition here not only enables quick adaptations, but it means that even overall plant effectiveness can be improved when downtime is reduced thanks to process optimization.

Complying with food safety standards

A smart hygiene concept helps to avoid contaminations, comply with national and international regulations and pass quality audits successfully. Endress+Hauser measurement technology supports you with a certified hygiene design. Foodborne dangers are reduced, while consumers and brand reputation are protected.

Enabling high production capacity

A high production capacity is based on minimal plant downtime with predictive and preventive maintenance. Our innovative measurement technology plays a central role here as manufacturing processes can be optimized in a targeted way based on the data. Off-spec products are avoided and plants add more value. Standardized instrumentation solutions also boost efficiency, and cybersecurity requirements are met by a trustworthy partner.

Advancing sustainability initiatives

For all production processes, our measurement technology always delivers the data necessary to be able to make sustainable decisions. In collaboration with food and beverage manufacturers, we class ourselves as a responsibility-aware partner who keeps in mind the sustainability objectives of its customers at the same time as improving operational efficiency.

Increasing competitive advantage

Smart instrumentation and standardized devices quicken the pace and increase competitive advantage: New production lines can be planned and implemented faster and real-time data enable optimum monitoring, which shortens reaction times to market requirements.

Driving sustainable progress with innovative measurement technology

Flensburger combines tradition with modern process precision

F

For brewery Flensburger Brauerei, sustainability is not a side issue, but a central goal of the company. To produce in a resource-efficient way while ensuring maximum beer quality, the brewery relies on innovative technologies.



↑ Experts in conversation: product specialist and sales representative of Endress+Hauser together with brewmaster Enes Erisgen

The challenges

For Flensburger Brauerei to achieve its sustainability objectives, it is necessary to take into consideration the whole brewing process – not only the brewhouse and the fermentation room, but also the process periphery. The aims are reduced drinking water consumption, lower wastewater effluent and the ability to use wastewater as an energy carrier and for resource conservation. This takes measurement technology.

Critical points in the fermentation process:

- Restricted data basis: Only one laboratory sample per day prevented precise control and reproducibility
- Limited ability to plan: Without continuous measurement, the optimum racking point was difficult to foresee
- High product loss: Each sample caused 20–30 liters of loss – around 1,000 hl per year
- High cleaning outlay: More beer loss means more frequent cleaning and higher water, energy and chemicals consumption

Water and wastewater management are decisive too: Less drinking water and targeted handling of wastewater conserve resources. Depending on its content, wastewater can be recycled or used for methane recovery.

“Transparency is created when something can be measured. Our objective: to brew sustainably and resource-efficiently – while preserving the unique character and soul of Flensburger beer.”

Michael Seip, Managing Director (Engineering) of Flensburger Brauerei

Our solution

A tailor-made optimization for the fermentation room was jointly developed. At the heart is Fermentation Monitor QWX43, which acquires extract values and fermentation parameters in the tank inline and comprehensively. As a result, manual sampling is no longer required, product losses are reduced and the fermentation processes are visualized in real time – for better plannability and more efficient control. Precise measurement technology is also crucial for wastewater processing and reuse: Memosens Wave CAS80E continuously measures the COD content and makes it possible to distinguish reliably between lightly and heavily polluted wastewater streams and to take the correct procedural steps. This saves money, conserves resources and supports the sustainability objectives of the brewery.

Result

With Fermentation Monitor QWX43, Flensburger Brauerei can now monitor its fermentation processes consistently and raw materials, energy and water can be used more efficiently. The data acquired improve the ability to plan and help to optimize control of tank occupancy.

Solution components

- Monitoring of the fermentation process with Fermentation Monitor QWX43 for continuous, non-contact acquisition of all relevant fermentation parameters in the tank
- Wastewater monitoring with Memosens Wave CAS80E for real-time monitoring and targeted control of differently polluted water streams



<https://eh.digital/3LIVCMG>



Flensburger Brauerei was founded in 1888 and is today an independent family firm based in the far north of Germany. Known for the signature “Plop!” of its swing-top bottle, the “Flens” brand stands for superlative quality, regional affiliation and a living brewing tradition. With around 210 employees, the brewery produces traditional beers, alcohol-free variants, sodas and mineral water.



Cheers! Optimized disinfection in bottle cleaning

Disinfection measurement and dosing in bottle cleaning made easy

B

Bottle deposit receipt – and then? A refundable deposit bottle is generally cleaned, disinfected and refilled around thirty to fifty times. A bottle cleaning facility of this kind is also operational at Maisel's Brauhaus in Bayreuth. The disinfection panel installed there not only delivers precise measured values, but also controls the optimum dosing of the disinfectant.

↑ Brauerei Gebr. Maisel and Endress+Hauser:
joining forces to achieve our goal

The challenges

The cleaning process begins with the bottles being fully emptied, presoaked and sprayed out. Then they are put through base and water baths, disinfected with chlorine dioxide and subsequently rinsed. Crucial to the process is a dosing that still ensures safe disinfection on the one hand and, on the other, remains low enough to minimize costs and yet protect the plant from corrosion. Here's exactly where the challenging part comes in: Temperature fluctuations, changeable flow velocities and irregular downtime make a stable chlorine dioxide measurement difficult. Then there are temporary pressure peaks, which could damage the membrane cap of the sensor, and heavy contaminant load in the medium – such as label residues, which foul the membrane and falsify measured values. As these values form the basis for dosing, every inaccuracy leads directly to over- or underdosing of chlorine dioxide – with consequences for costs, safety and the reliable protection of the plant.

“Thanks to the stable measurement, we were able to reduce target concentrations and save a total of 35 percent in chlorine dioxide.”

Sven Müller, acting Head of Batching at Brauerei Gebr. Maisel

Our solution

The core component is a compact, pre-assembled measuring panel for the bypass measurement, which combines measurement, control and cleaning. An amperometric sensor precisely detects the chlorine dioxide content. For stable values under harsh conditions, multiple components are at work: A filter traps particles such as label residues and is regularly backflushed; a pressure regulator protects against line pressure fluctuations. The unit comprising CYA27 assembly and CCS50E sensor is automatically flushed, while a flow sensor ensures constant flow. In control of everything is Liquiline CM44, which evaluates the data, starts cleaning cycles and adapts the dosing. During downtime the system reduces chlorine dioxide addition automatically – for plant protection, chemical savings and consistent disinfection effectiveness.

Result

- Stable measurement: Reliable values despite contaminant load and idle times – basis for correct dosing
- Less maintenance: The filter traps particles and is automatically backflushed to avoid blockages and keep the sensor technology permanently clean
- High robustness: Even after six months of continuous operation, no readjustment was necessary – evidence of an effective cleaning concept
- Easy operation: The intuitive Liquiline interface makes it possible to view all parameters and adapt the cleaning cycles without specialist knowledge; reduced training needs and error rates

Solution components

- Memosens CCS50E: Digital chlorine dioxide sensor for precise measured values – even with pressure fluctuations and contamination
- Liquiline CM44: Transmitter controls cleaning cycles and regulates chlorine dioxide dosing on demand
- Flowfit CYA27: Flow assembly for constant flow and protected sensor fit – ensures reliable measuring conditions



<https://eh.digital/45booWX>



Brauerei Gebr. Maisel, a fourth-generation family brewery in Bayreuth, brews premium beers including the specialty wheat beer Maisel's Weisse. With the Beer Experience World, the brewery creatively combines traditional brewing techniques with modern innovations.



Compact Line



NEW



Pressure



Level



[www.endress.com/
compact-line](http://www.endress.com/compact-line)

Particularly compact, extraordinarily powerful



Hygienic
design



High measurement
accuracy



Scalability



Compact
design

Highlights

- Developed for the strictest hygiene requirements – perfect for processes in the food, beverage and pharmaceutical industries
- Compact design – flexible to use in confined spaces and in large tanks
- Scalable – from pilot plant to large-scale process
- Intuitive operation – touch functionality and Bluetooth® connectivity for maximum user-friendliness
- Certified hygiene design – not only of the parts in contact with the process, but the entire housing
- Material conformity and unbroken traceability guaranteed
- Maximum productivity – with integrated Heartbeat Technology for permanent diagnostics and verification
- Uniform user interface – for easy standardization and quick commissioning

Application

The measuring instruments of the Compact Line have been specially developed for applications with high hygiene requirements and they increase the productivity, safety and efficiency of processes in the food industry. In the manufacturing of drinks, dairy products, oils and other sensitive media, low operating costs and stable product quality are a decisive competitive advantage. At the same time, food safety has top priority – every process step must be reliably monitored and controlled. Modern measurement technology provides crucial support here: It enables precise level and pressure measurement, reduces downtimes, simplifies cleaning processes and helps to ensure reproducible results. The Compact Line offers robust, hygiene-compliant and scalable solutions, which can be integrated seamlessly into existing plants and meet all relevant industry standards. In this way, food manufacturers benefit from reliable, economical and future-proof production processes.



Quality marks and standards



Precise pressure measurement even in the presence of condensation and moisture



Hygienic design



High measurement accuracy



Process reliability



CIP/SIP capability

Highlights

- Reliable and highly accurate level and pressure measurement thanks to optional Contite Measuring Cell for moisture and TempC Membrane for minimized temperature errors
- Device verification during operation and identification of process anomalies by means of Heartbeat Technology
- Easy commissioning
- Flexible system integration – via PROFINET-Ethernet-APL, PROFIBUS PA and HART
- High safety – SIL 2/3-compliant to IEC 61508

Application

Ideal for pressure measurement in pipelines and hydrostatic level measurement in tanks under cold process conditions. The pressure transmitters are resistant to CIP and SIP cycles and associated temperature shocks and they meet the hygiene requirements of the food industry.

Quality marks and standards



Cerabar PMP63B and Deltabar PMD63B



NEW



Pressure



www.endress.com/PMP63B

www.endress.com/PMD63B

Using innovation to maximize flexibility and reduce costs – even in hygienic applications



Hygienic design



High measurement accuracy



Process reliability



CIP/SIP capability

Highlights

- Maximum measuring performance without inlet/outlet runs, without constriction and without pressure loss for reliability regardless of flow profile and installation location (0 x DN Full Bore option)
- Outstanding hygiene readiness for food and life sciences applications thanks to suitable device design that meets 3-A and EDHG standards
- Optionally available with IO-Link, Ethernet/IP and PROFINET for digital communication

Application

Proline Promag H with the innovative 0 x DN Full Bore option can easily be installed, even in the most straight compact skids without losing the proven properties of this electromagnetic measuring instrument for hygienic applications.

Proline Promag H with 0 x DN Full Bore option



NEW



Flow



www.endress.com/5h3b

www.endress.com/5hbb

Quality marks and standards



Proline Promass Q 300/500



 Flow



www.endress.com/8q3b

www.endress.com/8q5b

The benchmark for accuracy in the beverage and milk industry



Hygienic
design



High measurement
accuracy



Process
reliability



CIP/SIP
capability

Highlights

- Superlative accuracy for flow (0.05% rdg) and density (0.2 g/l) enables raw material saving
- Multi-Frequency Technology (MFT) for active compensation of homogeneous gas bubbles in liquids, ideal for measuring foamed products
- Support for regulations and HACCP concepts thanks to Heartbeat Verification

Application

Whether it's dairy, brewery or soft drinks production: Exact concentration determination and stable measured values are guaranteed even with gassy, foamed or viscous media. Safe milk reception, precise quality control, pinpoint hot wort and Kräusen measurement, and highly accurate syrup dosing help to reduce spoils, optimize processes and maximize profitability.

Quality marks and standards



CCS5xE with Memosens 2.0 and Flowfit CYA27



 Liquid analysis



<https://eh.digital/3NImRHI>

Digital sensors for precise disinfection monitoring in the flow assembly



High measurement
accuracy



Low
operating costs



Process
reliability

Highlights

- Complete sensor portfolio for disinfection
- Plug and play: Low installation effort thanks to pre-calibrated Memosens sensors
- Memosens 2.0 enables predictive maintenance and extended IIoT services

Application

CCS5xE sensors are designed for continuous and precise measurements of disinfectants in water processes. Thanks to amperometric technology, they deliver measured values in real time and enable interruption-free monitoring and control, e.g. of chlorine values. By comparison with colorimetric techniques, they help to ensure more efficient dosing, stable processes and support safe compliance with legal requirements.

Quality marks and standards



Processing and reuse of wastewater



High measurement accuracy



Easy device integration



Low operating costs



Process reliability

Highlights

- Real-time monitoring in the process: Interruption-free measurements directly in the medium for maximum process reliability
- Reliable data thanks to Memosens technology: Digital, trouble-free communication for stable and precise measurement results
- Versatile parameter analysis: Detects turbidity, suspended solids, CSBeq, BSBeq, TOCeq, SAK254, nitrate, APHA-Hazen color and more
- Quick integration and low maintenance effort

Application

Memosens Wave CAS80E optimizes wastewater monitoring in the food industry by measuring the COD content continuously and precisely. This means that differently polluted water streams can be detected with certainty, purposefully processed and fed to the correct process stages. This reduces resource consumption, lowers costs and supports businesses effectively in achieving their sustainability objectives.

Quality marks and standards



Memosens Wave CAS80E spectrometer



NEW



Liquid analysis



www.endress.com/cas80e

Hygienic CIP cleaning and data-based CIP process optimization – now as a package



Hygienic design



High measurement accuracy



Process reliability

Highlights

- Reliable measured values – even after CIP/SIP
- Hygienic, autoclavable design
- Inline measurement without process interruption
- Easy integration into existing plants

Application

The CIP measurement package combines conductivity and turbidity measurement for reliable, automated monitoring of the cleaning process. The conductivity measurement ensures correct cleaning agent concentrations in acid and base tanks and detects precise phase changes in the CIP return. The turbidity measurement with absorption sensor OUSBT66 enables rapid inline detection of phases and undissolved solids. In this way, product losses are minimized, media are cleanly separated and CIP processes are shortened based on data.

CIP optimization with conductivity and turbidity measurement



NEW



Liquid analysis



<https://eh.digital/3LSJ9QI>

Quality marks and standards



Teqwave H



NEW



Liquid analysis



www.endress.com/teqwave-h-d9hc

Maximum quality control thanks to easy operation, inline measurement and time-saving analysis



Hygienic design



High measurement accuracy



Process reliability



CIP/SIP capability

Highlights

- Installation in the process line from DN 50 or in the tank with different process connections (Varivent N, Tri-Clamp 2", DIN11851, external thread ISO 228 1")
- Reliable, accurate and robust inline quality control with easy user operation and adaptation to customer needs without time-consuming sampling
- SIP cleaning thanks to increased maximum process temperature
- New transmitter housing in stainless steel (IP66)

Application

Teqwave H enables the inline quality control of liquids in different applications: sugar concentration of juices, soft drinks and syrup, monitoring of cleaning and disinfection in the food sector. Product-specific recipes and real-time measurement help to ensure superlative accuracy and process stability.

Quality marks and standards



Fermentation Monitor QWX43



Liquid analysis



www.endress.com/qwx43

Live transmission of the fermentation process



Hygienic design



Process reliability



High measurement accuracy

Highlights

- Replaces manual spindle method and time-intensive laboratory analyses
- Continuous process monitoring – minute-by-minute updating of all relevant parameters, retrievable at any time and from anywhere
- Process optimization through data analysis – historical batch comparisons enable informed improvements
- Batches and measured values are automatically created, stored and made available for download
- Hygienic design – easy in-tank cleaning in accordance with EHEDG and 3-A guidelines

Application

Fermentation Monitor QWX43 is installed directly in the tank. It measures density, temperature and speed of sound and uses these values to calculate all relevant parameters for the fermentation process, such as degree of fermentation, apparent extract, alcohol content, the sugar types of the wort or fermentation rate. This multi-sensor device enables lab-accurate and repeatable measurements in real time, transmits them to the controller or Netilion ecosystem and thereby creates the basis for remote process monitoring.

Quality marks and standards



The easier, the better



Scalability



Compact design



Easy device integration

Highlights

- Newest 80 GHz radar measurement with intelligent signal processing
- Universal measurement technology for all applications – the measuring range is identical for liquids and bulk solids
- Intuitive operation thanks to status LED, touchscreen display and Bluetooth®
- Quick commissioning without specialist knowledge thanks to control wizards
- Heartbeat Technology enables on-demand verification and diagnostics without process interruption

Application

Micropilot FMR10B, FMR20B and FMR30B radar measuring instruments are suitable for many level applications in the food and beverage industry – from basic storage tanks to dumps and silos to IBCs. Their compact build allows use in confined spaces and the 80 GHz radar technology enables highly accurate measurement regardless of operating conditions, particularly in auxiliary circuits.

Quality marks and standards



Measurement certainty with automated self-calibration at 39 °C (CIP) and 118 °C (SIP)



Hygienic design



High measurement accuracy



Process reliability



CIP/SIP capability

Highlights

- iTHERM TrustSens revolutionized SIP applications with precise self-calibration at 118 °C during steam sterilization. Now the alternative calibration point at 39 °C is opening up new possibilities in processes without the use of steam.
- Fully automatic in situ self-calibration without plant shutdown
- Reference sensor with physical fixed point for maximized measurement certainty
- Audit-proof, automated certificate creation and GMP-compliant documentation
- Process reliability thanks to Heartbeat Technology

Application

iTHERM TrustSens TM371 has been specially developed for applications in the pharmaceutical, food and beverage industries. Thanks to the fully automatic in situ self-calibration before each batch, it ensures end-to-end compliance with GMP requirements and eliminates the risk of undetected non-conformities. The integrated reference sensor with physical fixed point, combined with Heartbeat Technology, helps to ensure superlative measurement accuracy, constant product quality and maximum plant availability with minimum outlay.

Quality marks and standards



Micropilot FMR10B, FMR20B and FMR30B



NEW



Level



www.endress.com/Micropilot-FMR10B-20B-30B

iTHERM TrustSens TM371



NEW



Temperature



www.endress.com/trustsens



At a glance

Why Endress+Hauser for life sciences?

- Because process excellence is non-negotiable.
- Because process reliability guarantees competitive advantage.
- Because a tech-driven sector needs innovative experts by its side.



Life sciences

Swiftly and safely from lab to production

The life sciences industry is facing a variety of structural, technological and regulatory challenges. Strict, ever-changing regulatory requirements are increasing costs and delaying time to market, while high competitive pressure is forcing ever faster innovation cycles. Efficiency from the laboratory to production is therefore becoming a non-negotiable success factor.

Accelerating product launches

From GMP-compliant single- and multi-use solutions to the easy integration into existing systems: The device portfolio developed by Endress+Hauser for the life sciences industry has been purposefully designed for safe and efficient processes. Sector experts support projects from the beginning, help with early standardization of the measurement technology and thereby ensure high plant availability. Risk-based calibration concepts lessen effort and reduce idle times. Overall, this leads to a faster project implementation and an optimized time to market.

Boosting productivity and minimizing risks

As a global partner, we can sustainably increase and globally ensure efficiency, plant availability and process reliability. Thanks to installed base and obsolescence management, data-driven maintenance and Heartbeat Technology, risks can be identified early on and reduce downtimes. Risk-based calibration concepts support the monitoring and optimization of processes that are particularly important in the life sciences – for maximum reliability with minimum effort.

Ready for Batch – process reliability for every batch

The “Ready for Batch” approach based on our Heartbeat Technology has been specially designed to meet the high requirements of GMP-regulated production: Before the start of a production batch, a verification of the relevant measuring instruments is carried out automatically so that the batch can always be started under defined and error-free conditions. Particularly in regulated, risk-laden processes, this means that safe production can be ensured in reproducible quality and with unbroken traceability.

Cross-manufacturer calibration expertise

Process reliability at WuXi Biologics

T

Thanks to the engineering services of Endress+Hauser, it was possible to successfully ensure compliance with the quality and statutory requirements in pharmaceuticals production even before first production, thereby guaranteeing patient safety and giving revenue assurance to the customers of WuXi Biologics.

↑ Self-modified calibration trolley for flow measurement in the clean room

The challenges

Hardly any sector is as strictly regulated as the life sciences. That's because safety is paramount here, and the top priority is always the patient. To guarantee this, the quality of the products in the pharmaceutical industry is documented end-to-end at every single stage of the manufacturing process. Likewise, trust in the measurement technology used is a fundamental prerequisite. Another decisive factor is the process efficiency on the side of manufacturers. Even a measurement accuracy improvement of a single decimal place can bring considerable cost savings for customers, such as in the dosing or batching of extremely expensive pharmaceutical agents with a value of several million euros per kilogram. An investment in the optimum calibration of the plant therefore offers both short- and long-term benefits.

“So far, our inquiries have always been responded to promptly and handled with great flexibility, allowing all our requests to be fully accommodated.”

Dr. Christian Rämsch, Head of Engineering WuXi Biologics Germany

Our solution

WuXi Biologics and Endress+Hauser managed in five weeks to ensure the quality of the produced biologicals and the statutory requirements in the manufacturing of pharmaceuticals – and that was even before the start of the first production batch. In the project phase, an extremely wide range of critical parameters were calibrated in conformity with GMP. One particular challenge came in the calibration of approximately 250 measuring points, the measuring instruments of which originated from different manufacturers.

Result

The collaboration of WuXi Biologics and Endress+Hauser enables the team on site to address the particular needs of their customers even more efficiently and comply with all quality demands to the last detail. Maximized process reliability is ensured as a result. At the critical measuring points, tailored calibration solutions matched perfectly to the process requirements are now in use. The custom-made calibration tools are designed for ease of use, which saves valuable time. Another benefit is the simplified knowledge transfer, which is enabling WuXi Biologics to carry the specialist knowledge over to its own SOPs. Flexible and rapid service deliveries by the technicians of Endress+Hauser make sure that the customer is optimally supported at any time.

Solution components

- Cross-manufacturer calibration of various process parameters at a total of approximately 250 measuring points
- Flow calibration tools tailored to the individual needs of the customer
- On-site calibration by technicians of Endress+Hauser



<https://eh.digital/4pYcNHi>

Thanks to cross-manufacturer calibration, WuXi Biologics is getting calibration expertise from a single source ↓

WuXi Biologics
Global Solution Provider

WuXi Biologics is a worldwide leading contract research, development and manufacturing company (CRDMO) offering integrated end-to-end solutions. These enable partners to discover, develop and manufacture biological pharmaceuticals for the well-being of patients worldwide – from the first idea to development to market introduction.



Raman monitoring for biosimilars in UF/DF processes

Alvotech's testing of the protein purification process during ultrafiltration/diafiltration (UF/DF)

T

The increasing complexity of biopharmaceutical downstream processes places high requirements on analysis and monitoring technologies. With ultrafiltration and diafiltration processes (UF/DF) in particular, quick, precise and real-time measurements are crucial to ensuring product quality, process efficiency and regulatory requirements compliance. Alvotech is therefore collaborating with instrumentation specialist Endress+Hauser to establish inline Raman spectroscopy as an innovative PAT solution in the downstream.

↑ Inline Rxn-10 probe connected to a Raman flow assembly monitoring protein purification during UF/DF

The challenges

Downstream processes are characterized by rapid changes in composition, small volumes and short cycle times. Conventional, usually extractive, analytical methods deliver results after a delay, are prone to anomalies and require work-intensive offline analyses. This makes efficient process control difficult. In addition, intensified upstream processes lead to more complex cleaning steps in the downstream. During UF/DF, there is the risk of protein aggregation, which can negatively affect product quality, effectiveness and patient safety. The absence of real-time data entails manual interventions, extended process times, product losses and uncertainties over batch consistency and regulatory compliance.

“Downstream processes are often fragmented by long waiting times for offline results. This puts the brakes on scheduling in development. Implementation of the inline Raman flow cell into operations promises a more efficient approach, effectively changing downstream development dynamics.”

Julia Karitas, Helgadottir DSP Scientist at Alvotech

Our solution

- Inline Raman for low flow rates: Raman-Rxn2 analyzer, Rxn-10 inline probe and Raman flow assembly
- Micro flow bench couples the optic to the micro flow cell without product contact (sterilizable; reusable or single-use)
- Improved signal-to-noise ratio supports chemometric and predictive models
- Inline monitoring of monomers/aggregates and buffer ingredients across all UF/DF phases

Result

- Cost saving through less offline analytics, reduced buffer consumption and more efficient use of personnel
- Shorter processing time thanks to real-time adaptation; HPSEC waiting times eliminated/reduced
- Proactive process optimization, higher yield and more stable development dynamics
- Fewer manual interventions and consistently high product quality across batches

Solution components

- Raman-Rxn2 analyzer
- Rxn-10 inline Raman probe
- Raman flow assembly:
 - Micro flow bench (optics without product contact)
 - Micro flow cell (sterilizable; single-use/reusable)



<https://eh.digital/4sTCRB6>



Headquartered in Reykjavik, Iceland, Alvotech is an integrated biopharmaceutical company dedicated to the development and production of high-quality biosimilar medicines on a global scale. Their mission is to enhance the health and quality of life for patients worldwide, striving to broaden access to proven treatments for various diseases.



Compact Line FMR43, PMP43 and FTL43



FMR43 PMP43 FTL43

NEW



Pressure



Level



[www.endress.com/
compact-line](http://www.endress.com/compact-line)

Particularly compact, extraordinarily powerful



Hygienic
design



CIP/SIP
capability



cGMP-
Compliance



Process
reliability

Highlights

- Compact design – flexible to use in confined plants and in large tanks
- Intuitive operation – touch interface and Bluetooth® for easy handling
- Hygienic design & material conformity – certified and fully traceable
- Standardization from lab to production – easy scale-up and scale-down
- Heartbeat Technology – quick, documented verification without process interruption
- Precise measurement – reliable with turbulent media, foam and the smallest tanks
- CIP-/SIP-compatible – problem-free cleaning and sterilization
- Cost-optimized – less maintenance thanks to condition-based and predictive diagnostics

Application

Compact Line combines superlative measurement performance with a compact, hygienic design. The portfolio comprises the Micropilot FMR43 for non-contact level measurement (80 or 180 GHz), the Liquiphant FTL43 point level sensor and the Cerabar PMP43 for pressure and hydrostatic measurements. From the laboratory to large-scale production, the Compact Line enables continuous standardization for efficient processes, lower costs and easy maintenance. Heartbeat Technology allows ISO 9001-compliant verification in under three minutes – without process interruption. Hygienic design to EHEDG, 3-A and ASME-BPE, CIP-/SIP-compatible and full material conformity to FDA, EC1935/2004 and cGMP. Intuitive touch operation using the display and SmartBlue app helps to ensure quick commissioning.



Quality marks and standards



Precise pressure measurement even in the presence of condensation and moisture



Hygienic design



CIP/SIP capability



Process reliability



cGMP-Compliance

Highlights

- Reliable and highly accurate level and pressure measurement thanks to optional Contite Measuring Cell for moisture and TempC Membrane for minimized temperature errors
- Device verification during operation and identification of process anomalies by means of Heartbeat Technology
- Easy commissioning
- Flexible system integration – via PROFINET-Ethernet-APL, PROFIBUS PA and HART
- High safety – SIL 2/3-compliant to IEC 61508

Application

Ideal for pressure measurement in pipelines and hydrostatic level measurement in tanks under cold process conditions. The pressure transmitters are resistant to CIP and SIP cycles and associated temperature shocks and they meet the hygiene requirements of life sciences.

Cerabar PMP63B and Deltabar PMD63B



NEW



Pressure



www.endress.com/PMP63B



www.endress.com/PMD63B

Quality marks and standards



Using innovation to maximize flexibility and reduce costs – even in hygienic applications



Hygienic design



CIP/SIP capability



cGMP-Compliance



Digital connectivity

Highlights

- Maximum measuring performance without inlet/outlet runs, without constriction and without pressure loss for reliability regardless of flow profile and installation location (0 x DN Full Bore option)
- Outstanding hygiene readiness thanks to suitable device design that meets 3-A standards and is CIP-/SIP-compatible
- Optionally available with IO-Link, Ethernet/IP and PROFINET for digital communication

Application

Proline Promag H with the innovative 0 x DN Full Bore option can easily be installed, even in the most compact skids without losing the proven properties of this electromagnetic measuring instrument for hygienic applications.

Proline Promag H with 0 x DN Full Bore option



NEW



Flow



www.de.endress.com/5h3b

Quality marks and standards



Proline Promass U 500



NEW

Flow



www.endress.com/8u5b

Single-use Coriolis with superlative accuracy and traceable calibration



Traceability



cGMP-
Compliance



Process
reliability



Hygienic
design

Highlights

- Superlative measurement accuracy for single-use applications
- Pre-calibrated measuring tubes, shipped from the factory
- Heartbeat Technology enables the pre-calibrated sensor to be verified in the field
- Compact design for single-use applications in the process, laboratory and on skids

Application

The new Promass U 500 Coriolis measuring instrument offers superlative accuracy and repeatability for flow measurements in the field of single-use technology. It enables a multi-variable measurement in full compliance with cGMP requirements including all documentation (CoC) for biopharmaceutical applications. The integrated Heartbeat Technology automatically verifies the validity of the factory calibration during installation in the field. In addition, all available sizes (DN04 – DN25) can be used in one device.

Quality marks and standards



Micropilot FMR63B



NEW

Level



www.endress.com/FMR63B

80 GHz radar sensor for hygienic applications



Hygienic
design



CIP/SIP
capability



cGMP-
Compliance



Digital
connectivity

Highlights

- Maximum compliance – meets the strictest regulatory requirements
- Intuitive operation – easy commissioning and verification guided by wizards
- Process reliability and productivity – Heartbeat Technology for continuous monitoring, verification and diagnostics during operation
- Digital integration – seamless assimilation into asset management systems

Application

Its fully hygienic design and certifications to EHEDG, 3-A and ASME BPE guarantee maximum process reliability and product safety. Control wizards and Heartbeat Technology enable easy commissioning, reliable verification and precise measurements even in tanks with internal fittings – across measuring ranges up to 80 m with ± 1 mm accuracy.

Quality marks and standards



Measurement certainty with automated self-calibration at 39 °C (CIP) and 118 °C (SIP)



Traceability



cGMP-Compliance



Process reliability



Validation- & audit-compliant documentation

Highlights

- iTHERM TrustSens revolutionized SIP applications with precise self-calibration at 118 °C during steam sterilization. Now the alternative calibration point at 39 °C is opening up brand new possibilities in processes without the use of steam.
- Fully automatic in situ self-calibration without plant shutdown, traceable
- Reference sensor with physical fixed point for maximized measurement certainty
- Audit-proof, automated certificate creation and GMP-compliant documentation
- Maximum process reliability and plant availability thanks to Heartbeat Technology

Application

iTHERM TrustSens TM371 has been specially developed for applications in the life sciences. Thanks to the fully automatic in situ self-calibration before each batch, it ensures end-to-end compliance with GMP requirements and eliminates the risk of undetected non-conformities. The integrated reference sensor with physical fixed point, combined with Heartbeat Technology, helps to ensure superlative measurement accuracy, constant product quality and maximum plant availability with minimum outlay.

Quality marks and standards



Temperature transmitter for safe and connected temperature measurement



Process reliability



Digital connectivity

Highlights

- Digital communication to the field level, even in potentially explosive atmospheres
- Simple and standardized system integration via PROFINET® Profile 4
- Ease of commissioning and maintenance thanks to integrated web server
- High measuring point accuracy thanks to sensor-transmitter matching
- Reliable measuring operation thanks to sensor monitoring and device hardware fault detection

Application

iTEMP TMT86 is a future-proof two-channel temperature transmitter for precise measurements in demanding industrial and life sciences applications. It supports Ethernet-APL and PROFINET® and is suitable for use in the Ex zone. Two independent universal inputs enable a flexible sensor connection. Advanced diagnostic functions and corrosion monitoring of the sensor lines increase plant availability.

Quality marks and standards



iTHERM TrustSens TM371



NEW



Temperature



www.endress.com/trustsens-technology

iTEMP TMT86



NEW



Temperature



www.endress.com/tmt86

Liquid analysis



Liquiline CM42B

NEW



Liquid analysis



<https://eh.digital/3YJGrjr>



www.endress.com/CM42B

Our offering for all parameters in liquid analysis



cGMP-
Compliance



Process
reliability



Validation- & audit-
compliant documentation



Digital
connectivity

Highlights

- Constant product quality thanks to continuous and reliable liquid analysis
- Maximum process reliability thanks to digital, interference-free signal transmission
- Easy integration into existing control systems thanks to modular platforms
- Time and cost saving thanks to pre-calibrated sensors and plug and play
- Future-proof thanks to digital sensor technology and advanced data storage

Application

To maintain product quality in pharmaceutical processes constantly at a high level, a continuous analysis of liquids is essential. Parameters such as pH value, oxygen content or conductivity deliver crucial information for process monitoring, optimization and compliance with safety and environmental regulations. Modern, digital analytical instrumentation replaces error-prone manual measurements and simplifies operation, documentation and maintenance considerably. The Endress+Hauser analytical instrumentation with Memosens 2.0 technology enables a reliable, economical and GMP-compliant operation of measuring points – from the individual application to the connected multi-channel platform.



Memosens 2.0 sensor technology – simple, reliable and connected

With Memosens 2.0, a new chapter in digital sensor technology begins. The future-ready further development builds on all the known benefits of Memosens technology and upgrades them in terms of digitalization and intelligent sensor concepts. In addition to measured values, now calibration and process data are also stored directly in the sensor head. This means that modern calibration and maintenance concepts, particularly for applications in the life sciences, can be efficiently implemented. Of course, the new Memosens generation is fully backward compatible: Existing measuring points and transmitters can continue to be used, while new sensors work together with existing systems without limitations. The digital, inductive signal transmission helps to ensure a reliable and trouble-free data transmission immune to moisture and EMC interference. At the same time, process reliability is increased by the active monitoring of the sensor connection. Pre-calibrated sensors also enable cross-parameter plug and play and simplify commissioning, operation and calibration concepts considerably.

Typical product composition of a liquid analysis measuring point

Sensors (pH):

- CPS61E
- CPS77E

Measuring cable:

- CYK10

Transmitter:

- CM42B (new product, Liquiline platform)

Assemblies:

- CPA842
- CPA875



Quality marks and standards



ASME BPE



Raman spectroscopy for reliable and scalable biopharmaceutical processes



Highlights

- Real-time reaction monitoring in complex processes thanks to inline analysis with no sampling enable higher product quality, yields and process reliability
- Fast analysis times of a few minutes instead of several hours or days
- Faster product and process development (time to market) thanks to short analysis times, scalable data and end-to-end systems
- Closed-loop control systems enable advanced process control (APC)
- Comprehensive laboratory and process probes enable flexible integration inline, online or atline
- Standard communication protocols (e.g. PEAXACT, SIMCA®, GRAMS IQ™, Unscrambler) and the Raman data library (cGxP option) support end-to-end data integrity
- Self-monitoring, diagnostic and self-calibration capabilities guarantee the validity of each measurement

Application

The Raman spectroscopy of Endress+Hauser enables precise inline and real-time measurements in all phases of biopharmaceutical processes. The Raman-Rxn2 analyzer is designed for laboratory and pilot plants and supports sample-taking, R&D projects and early process development. In addition, the Rxn-46 probe helps to ensure seamless integration into Ambr®, BioPAT® Spectro and Biostat STR® single-use bioreactors. The optical Raman system for single-use bioreactors combines a reusable, non-contact optic with a sterile disposable sleeve and delivers reliable spectra without cleaning effort. For benchtop systems, bio multi optics and bio sleeves are available to ensure high sterility and stable signal quality. The Raman flow bench with flow cell enables accurate monitoring of DSPs even with low volume flows. The Raman data library offers real-time visualization, audit trails and a cGxP option.

Raman spectroscopy



Optical analysis



www.endress.com/raman-spectroscopic-systems



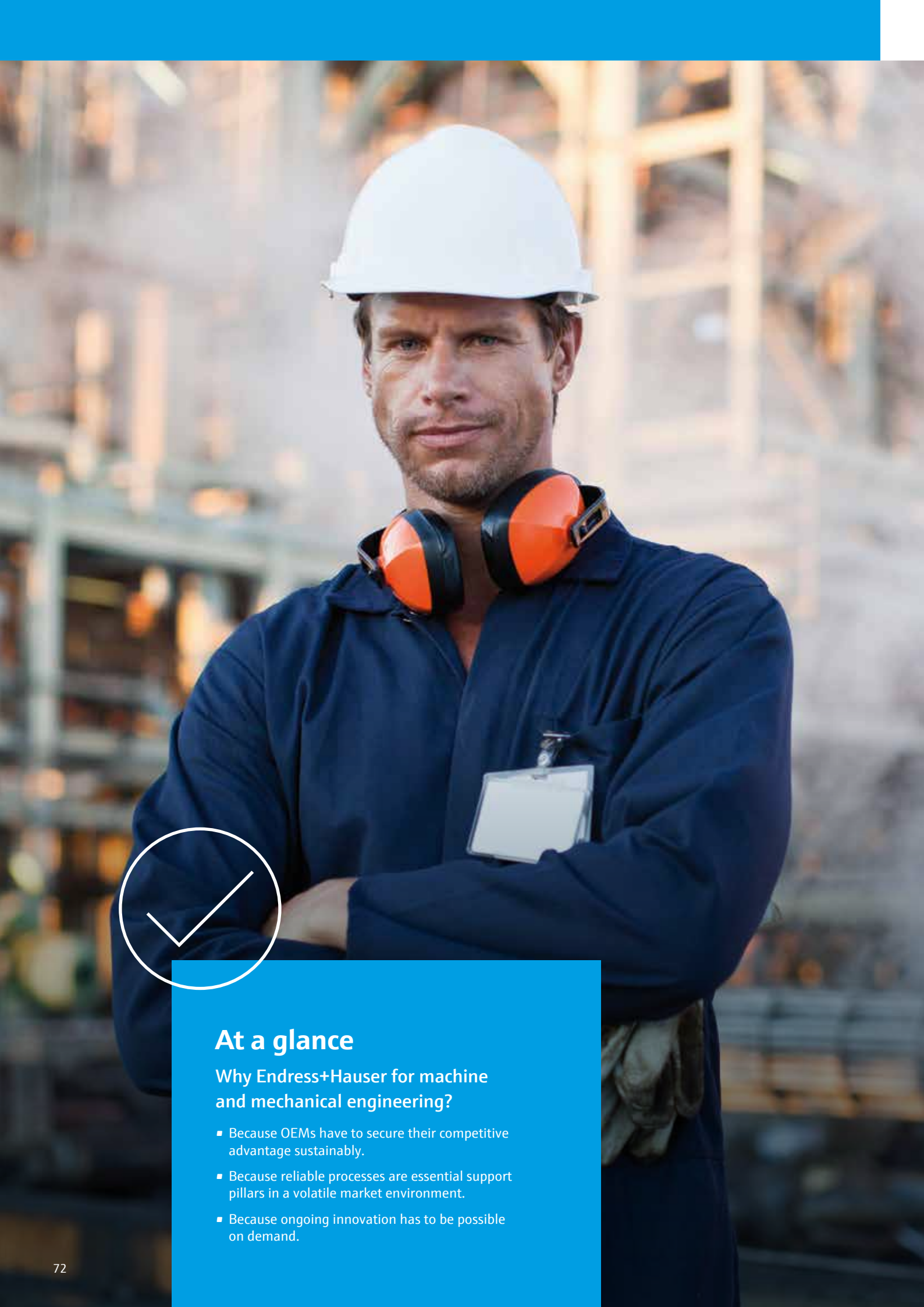
Raman spectroscopy – from the lab to cGMP production

Raman spectroscopy is an established key technology for the biopharmaceutical industry. It enables the non-destructive analysis of a medium's molecular composition – without sampling and without processing. Complex upstream and downstream processes can therefore be monitored in real time and controlled in a targeted way. The scalable Raman solutions of Endress+Hauser support a safe, data-based transfer from the R&D laboratory to process-engineering plants and accelerate development and scale-up phases considerably. Manufacturers benefit from stable, reproducible measurements that significantly increase quality, yield and process understanding. Short analysis times mean that critical reaction progressions can be identified early on and process times reduced considerably. The technology is flexible to use in upstream and downstream processes and supports continuous process management. In this way, Raman provides a central basis for modern PAT and QbD strategies in biopharmaceutical production.



Quality marks and standards





At a glance

Why Endress+Hauser for machine and mechanical engineering?

- Because OEMs have to secure their competitive advantage sustainably.
- Because reliable processes are essential support pillars in a volatile market environment.
- Because ongoing innovation has to be possible on demand.

Machine and mechanical engineering

Future readiness with reliably innovative solutions

The complex mix of Industry 4.0 and AI-assisted production paired with rising costs and global competition poses challenges for machine and plant manufacturers. Traditional business models are having to be transformed to set the planning, construction and operation of plants on a sustainable footing. Innovation and efficiency capacity are in demand more than ever.

Reducing complexity

With our simplified by design “Fundamental Selection” portfolio of measurement technology solutions for machine and plant manufacturers, we deliver devices of uncompromisingly high quality for flow, temperature, pressure and level combined with low manufacturing costs. IO-Link communication also enables savings and improvements in process efficiency and machine availability.

Guaranteeing reliability throughout the entire plant life cycle

We stand for stable partnerships, ability to supply worldwide and local support. Measuring instruments have been engineered for longevity, replacement parts and services remain available for decades to come, including backward compatibility. For OEMs, this means planning certainty, minimized downtime risks and maximum reliability, even for plants with run times of 20 years or more.

Enabling technology leadership

Innovative measurement technology and integrated diagnostic functions support modern, data-based system concepts. Preconfigured devices are quick to select, install and put into operation. Digital data are available early on, enable “plug & produce”, make predictive maintenance easier and help to counteract the skilled worker shortage through ease of handling and reduced complexity.

Operating sustainably

A precise measurement technology makes an active contribution to reducing energy, media and raw material consumption. Long-lasting products, transparent life cycle data and environmental key performance indicators support machine and plant manufacturers in meeting ESG objectives and regulatory requirements. In this way, sustainability, cost-effectiveness and future-proofing can be combined throughout the entire plant life cycle.

Micropilot FMR10B, FMR20B and FMR30B



NEW



Level



[www.de.endress.com/
Micropilot-FMR10B-20B-
30B](http://www.de.endress.com/Micropilot-FMR10B-20B-30B)

The easier, the better



Low
engineering effort



One sensor for many
applications



Low-
maintenance



Easy
standardization

Highlights

- Increases the standardization potential of machines thanks to a uniform sensor platform
- Shortens project lifetimes by way of minimal configuration and integration effort
- Supports modular machine concepts and scalable plant layouts
- Lowers servicing costs thanks to condition-based maintenance instead of reactive interventions
- Enables quick commissioning and servicing even without specialist personnel
- Increases plant availability throughout the entire machine life cycle
- Simplifies replacement part logistics thanks to clear product structure and interchangeability
- Future-proof measurement technology for modern, digitalized plants and machinery

Application

Micropilot FMR10B, FMR20B and FMR30B compact 80 GHz radar sensors offer machine manufacturers a reliable and efficient solution for level measurement in an extremely wide variety of applications. Thanks to clear product segmentation, easy device selection and universal suitability for liquids and solids, the sensors are flexible to integrate into plant and machinery concepts. In addition, control wizards enable quick commissioning in under three minutes – either using a color touchscreen display or via remote access from a smartphone or tablet. This reduces engineering effort and accelerates commissioning at the end customer.

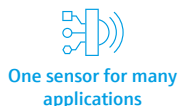
The 1:1 interchangeability with predecessor models and application-specific accessories also simplify installation in retrofit projects. With Heartbeat Technology, verification and diagnostics can proceed without process interruption. The certified, ISO 9001-compliant practice increases plant availability and supports machine manufacturers in the implementation of low-maintenance, future-proof solutions.



Quality marks and standards



Pressure transmitter with metallic membrane for precise pressure monitoring in liquids and gases



Highlights

- Robust and economical pressure transmitter for standard applications
- Quick and easy commissioning thanks to a control wizard
- Device development to IEC 61508
- Flexible write protection via hardware and/or security mode wizard
- Pressure- and leak-tested pre-installed valves for faster installation

Application

Cerabar PMP50 is a reliable pressure transmitter with metallic membrane for monitoring liquids and gases. Designed for robust standard applications, it impresses with its easy and safe user operation. Measuring ranges up to 400 bar, process temperatures up to 400 °C (with diaphragm seal) and an accuracy up to $\pm 0.055\%$ help to ensure precise and stable measurement results.

Quality marks and standards



Cerabar PMP50



NEW



Pressure



www.endress.com/PMP50

Economical pressure transmitter with ceramic measuring cell for measurement in gases or liquids



Highlights

- Easy and time-saving installation and commissioning in the plant thanks to compact design and customizable measuring ranges
- Reference accuracy of 0.3% together with high long-term stability and reproducibility ensure the high quality of process monitoring
- High process availability, even in demanding process environments
- Robust, oil-free ceramic measuring cell
- IO-Link communication

Application

Cerabar PMC21 is an economical and highly compact pressure transmitter. It offers a capacitive, oil-free ceramic measuring cell that can measure absolute and gage pressure from 100 mbar to 40 bar. PMC21 was developed to withstand the harsh conditions of the process industry thanks to its degree of protection up to IP68, the high abrasion resistance of the Ceraphire membrane, high-grade materials and the 316L housing.

Quality marks and standards



Cerabar PMC21



Pressure



www.endress.com/PMC21

Compact Line



NEW



Pressure



Level



[www.endress.com/
compact-line](http://www.endress.com/compact-line)

Particularly compact, extraordinarily powerful



Reliable
measurement



One sensor for many
applications



Compact
to integrate



Easy
standardization

Highlights

- Compact and hygienic design – flexible use in both confined spaces and large tanks
- Outstanding user-friendliness thanks to touch operation and Bluetooth® connectivity
- Material conformity and traceability

Application

Compact Line is easy to set up and operate without specialist knowledge. Color display, intuitive touch function and control wizards minimize errors and training needs. It is operated using the SmartBlue app via Bluetooth®. Hygienic design enables CIP/SIP and meets EHEDG, 3-A and ASME-BPE standards. Heartbeat Technology allows documented verification to ISO 9001 in under three minutes – without process interruption.

Quality marks and standards



Dosimag and Dosimass



NEW



Flow



www.endress.com/d8ab

Precise filling with optimum standard deviation, cGMP conformity and IO-Link



Reliable
measurement



Compact
to integrate



High plant
availability



Easy
standardization

Highlights

- Dosimag – new fully welded and more compact design with integrated electronics and optional temperature measurement
- Dosimass – new transmitter and more compact sensor with the highest compliance standards, also up to DN 40
- Intelligent pulse output with IO-Link – easy commissioning and documentation, real-time availability of process data, optimization of fill conditions and predictive maintenance
- Version with integrated batching function and dynamic drip correction over Modbus RTU for advanced filling control

Application

The new generation offers particular advantages for dosing and filling applications: integrated batching function, intelligent pulse output, Modbus and IO-Link connectivity. This not only increases user-friendliness, but also opens the door to digitalization right through to the filling machine.

Quality marks and standards



Flowmeter for minimal total operating costs with simple user operation concept



Low
engineering effort



Reliable
measurement



One sensor for many
applications



High plant
availability

Highlights

- IO-Link enables easy integration into existing plants and offers a cost-efficient solution for basic applications in process and hygiene environments in accordance with 3-A, cGMP and EHEDG
- The multi-variable measurement of flow, density and temperature reduces the quantity of measuring points and saves space
- It is intuitive to operate by touchscreen (HART, Modbus RS485) or using the SmartBlue app on a mobile device
- Integrated Heartbeat Technology enables continuous verification and increases plant availability

Application

Promass K is the economical Coriolis solution for mass flow measuring tasks and offers reliable measurements in basic applications with liquids and gases. With its hardware and software design, Promass K 10 simplifies every stage of the life cycle from engineering through to maintenance with customary Endress+Hauser quality. Heartbeat Technology enables measurement reliability and extends recalibration cycle intervals.

Quality marks and standards



Smart electromagnetic flowmeter



Low
engineering effort



One sensor for many
applications



Compact
to integrate



Easy
standardization

Highlights

- The quick and easy configuration takes place securely over an encrypted Bluetooth® connection and intuitively from the SmartBlue app
- The simultaneous measurement of flow, conductivity and temperature considerably reduces the quantity of measuring points needed
- The compact all-in-one design with sensor and transmitter in a single housing is ideal for applications with limited space
- IO-Link enables flexible integration and makes it easy to access throughout its entire operating life

Application

The economical and versatile Picomag Inline electromagnetic measuring instrument is used across all industries for conductive liquids in auxiliary circuits. Machine manufacturers appreciate the space-saving Picomag Inline for its flexible range of applications. In addition, the future-oriented, convenient operation via SmartBlue app enables quick and safe commissioning on any Bluetooth®-compatible smartphone or tablet.

Quality marks and standards



Proline Promass K 10



Flow



www.endress.com/8kbb

Picomag Inline



Flow



www.endress.com/dma

Liquiline Compact CM72



Liquid analysis



www.endress.com/cm72

Single-parameter field device for Ex and non-Ex applications



Low
engineering effort



Compact
to integrate



Easy
standardization

Highlights

- This space-saving 2-wire device can be integrated directly into an assembly and does not require a separate power supply
- Thanks to the fixed configuration, the CM72 is immediately ready for use and enables a particularly quick commissioning
- Memosens technology ensures reliable data transmission, high availability of measured values and ease of use
- A red/green LED enables clear on-site diagnostics and indicates the status of the transmitter and sensor at all times

Application

Liquiline Compact CM72 is a compact transmitter for Memosens sensors and is ideal for applications with limited installation space not requiring a multi-parameter device. Together with the sensor, it can be integrated into most assemblies and is particularly easy to install. Measuring parameters and range are determined at the time of order, which makes the CM72 ready for immediate use and offers the assurance of no user error.

Quality marks and standards



Liquiphant FTL31



Level



www.endress.com/FTL31

Level switch for liquids in compact design with stainless steel housing



Low
engineering effort



One sensor for many
applications



Compact
to integrate



Low-
maintenance

Highlights

- Integrated self-monitoring helps to ensure reliable and safe switching – even in the event of voltage drop
- A defined switch point is permanently maintained regardless of changing media properties
- The sensor is immediately ready for use and has no need for calibration, special tools or specialist knowledge
- The robust, maintenance-free stainless steel housing in 316L guarantees high environmental resistance and a long operating life
- The modular design enables flexible adaptation to an extremely wide variety of applications and process conditions

Application

Liquiphant FTL31 is a compact level switch for the safe detection of liquids in industrial applications. It is ideal for use as an overfill protection system or pump safeguard, e.g. in cleaning, filtration, cooling and lubrication systems. Thanks to continuous self-monitoring, it switches reliably regardless of medium properties. Plug and play, no calibration, and IO-Link enable easy commissioning and flexible configuration.

Quality marks and standards



IO-Link temperature head transmitter with an RTD sensor input



Low
engineering effort



High plant
availability



Easy
standardization

Highlights

- Push-in terminals for quick, toolfree wiring during installation and maintenance
- Easy configuration using free software tools (requires SFP20)
- Sensor-transmitter matching with Callendar-van-Dusen linearization for critical measuring points
- Improved RTD measurement accuracy to 0.15 K and long-term stability
- IO-Link communication

Application

iTEMP TMT36 is a reliable, long-lasting, single-channel IO-Link temperature transmitter with a form B terminal head. The tailored sensor-transmitter matching based on Callendar-van-Dusen linearization further improves the temperature measurement accuracy of RTD sensors. The IO-Link-enabled temperature transmitter can be used in all Endress+Hauser modular thermometers in order to digitalize a large quantity of applications with special requirements using IO-Link communication.

Quality marks and standards

IO-Link

iTEMP TMT36



Temperature



www.endress.com/TMT36

Compact RTD thermometer for precise process temperature measurement



Low
engineering effort



One sensor for many
applications



Compact
to integrate



Easy
standardization

Highlights

- The compact stainless steel design with M12 connection (IP69) enables quick installation and easy commissioning
- Flexible signal options such as Pt100 4-wire, 4 to 20 mA or IO-Link and a preset measuring range simplify integration
- Innovative sensor technology helps to ensure extremely short response times and high measurement accuracy, even with short immersion lengths
- Comprehensive approvals, standards-compliant diagnostic function and a hygienic 3-A design guarantee safe and conforming operation

Application

The compact thermometer detects process temperature precisely using a Pt100 RTD sensor element (class A, 4-wire). An optionally integrated transmitter converts the signal and automatically detects IO-Link or 4 to 20 mA. Developed for hygienic and aseptic applications, it enables easy standardization. With measuring ranges from -50 to +200 °C, pressure resistance up to 50 bar and IP69 degree of protection, it is suitable for demanding process conditions.

Quality marks and standards

IO-Link



iTHERM CompactLine TM311



Temperature



www.endress.com/tm311



At a glance

Why Endress+Hauser for water, wastewater & waste?

- Because supply security is a must, even with scarcer resources.
- Because a future-ready water infrastructure needs innovative digital solutions.
- Because there is no way around sustainable operating processes.

Water, wastewater & waste

Achieving the right balance between legal conformity and efficiency

In Germany, the water infrastructure is in considerable need of renewal: Studies commissioned by the Association of Local Public Utilities (VKU) forecast a capital expenditure of around 800 billion euros in the (waste-) water industry by 2045. Outdated plants, rising costs and climate change are increasingly putting security of supply and water quality at risk. At the same time, the EU's new Urban Wastewater Treatment Directive (UWWTD) is tightening requirements with stricter limit values for nitrogen and phosphorus, the obligation to upgrade to the fourth purification stage, and stipulations for energy efficiency. Waste products, including sludge treatment and resource recovery, are also gaining increasing importance. Process modernization and increased efficiency are therefore indispensable.

Optimizing processes

Precise measurement technology and digital solutions form the basis for stable and legally compliant workflows. They enable the remote monitoring of plants and deliver highly accurate data. In this way, for example, primary water losses can be reduced with precise flow and pressure measurement or energy consumption in the aeration process can be driven down. Especially in the context of UWWTD, continuous, high-precision measured data create the foundation for on-demand chemical dosing, stable processes and the safe compliance with tightened limit values. Based on the acquired data, it is also possible to optimize maintenance and maximize plant performance – a crucial benefit when budgets are tight and optimum resource utilization is necessary.

All from one source

As a main supplier able to cover all critical water and wastewater parameters as well as processes in energy generation, we make it easier to select and procure the right measurement technology. Instead of having to coordinate multiple vendors, you benefit from a central point of contact, a comprehensive portfolio and technologies that are optimally matched to your applications. At the same time, we see ourselves not solely as a supplier, but as a partner who will reliably support you in complying with legal requirements. Our experienced specialists will help you find the best possible solution whatever the measuring task – for simplest possible complete solutions that fulfill all your tasks and are cost-effective to install.

Wastewater treatment under control

Energy saving thanks to optimum aeration in the aeration basin

T

To reduce energy consumption in the biological stage of the wastewater treatment plant, the town of Velen went for two measures: the purchase of new energy-efficient blowers and the introduction of Liquiline Control aeration technology from Endress+Hauser in order to optimize nitrogen reduction.

↑ Energy saving thanks to optimum aeration in the aeration basin

The challenges

The ever stricter requirements for the purification of wastewater call for continuous optimizations and capital expenditure in wastewater treatment plants. In the past, the wastewater treatment plant in Velen controlled the switching on and off of the aeration blowers using redox potential regulation. This method functioned well for many years. Nevertheless, in connection with the renewal of the blowers, the town saw the opportunity to save energy and improve nitrogen elimination with a modern and process-oriented aeration control system. The town opted to introduce the Liquiline Control aeration controller from Endress+Hauser. This control technique is based on measured ammonium and oxygen values and on influent load and enables precise determination of the timing, duration and intensity of the aeration.



↑ Stefan Bertels, wastewater treatment plant manager

Our solution

Liquiline Control is an automation platform for wastewater purification processes. In the Velen wastewater treatment plant, it regulates the intermittent aeration for nitrogen elimination in two aeration basins. The control logic is based on the upper and lower ammonium limit values and on fixed minimum and maximum times for nitrification and denitrification phases.

Central functions:

- Dynamic O₂ target value: During blower pauses (denitrification), the target value for the next nitrification is determined – dependent on ammonium concentration and rate of change, within defined min./max. limits
- Stable aeration phases: The calculated O₂ target value remains constant for the duration of each aeration phase
- Continuous O₂ measurement: During aeration, the deviation from the target value is detected and handed over to the blower controller as a correcting variable

Result

- Reduction in the plant's annual electricity consumption by 100,000 kWh within four years thanks to new blowers and the Endress+Hauser Liquiline Control aeration regulation technology
- Stable and energy-optimized process with proven wastewater measurement technology
- Quick and flexible integration of the Endress+Hauser regulation technology into the existing control system
- Easy operation via remote access

Solution components

- Liquiline Control CDC81 with CPU unit (PLC - programmable logic controller) and touch display
- Two CAS40D ion-selective sensors (one per aeration basin) for continuous measurement of ammonium and nitrate
- Two COS61D optical oxygen sensors (one per aeration basin)
- Liquiline CM444 transmitter



<https://eh.digital/4r1D8Ai>



The Velen wastewater treatment plant has been operating since 1989. Since then, it has been cleaning all sanitary wastewater from private households and the local industry. To operate the Velen wastewater treatment plant, it runs 11 pump stations, 13 km of sanitary sewerage, 48 km of storm sewerage, 40 km of combined sewerage and 18 special-purpose structures. The annual sanitary wastewater volume amounts to approximately 1,250,000 m³.





Reliable compliance with limits

On-demand dosing saves up to 40 percent precipitant

V

Veolia Wasser Deutschland GmbH together with Endress+Hauser has realized a solution for the on-demand and automated precipitant dosing in the aeration basins of the wastewater treatment plant in Colditz.

↑ Thanks to continuous measurement, the precipitant can be dosed on demand

The challenges

Compliance with the legal limit values for orthophosphate posed several challenges for the wastewater treatment plant in Colditz. Until now, dosing of the precipitant took place based on weekly laboratory analyses – however, these provided results only at specific time points and could not detect fluctuations in daily or weekly time frames. This was complicated further by the fact that the measurement had to take place in two aeration basins with different levels and reaction cycles. To keep pace with increasing requirements on a permanent basis, a continuous and more precise monitoring of the phosphate content was required.

“Endress+Hauser helped us to get the values in virtually real time and so avoid precipitant overdosing or underdosing.”

Martin Moisel, Head of Operations/Technical Manager Veolia Wasser Deutschland GmbH

Our solution

In close collaboration with Veolia, Endress+Hauser developed a tailor-made solution for continuous phosphate monitoring. Phosphate analyzer CA80PH was the chosen solution. This was installed in a weather-protected measuring cabinet and reliably measures the phosphate concentration in the aeration basins. As a result, the precipitant can now be dosed on demand – which not only ensures compliance with limit values, but also lowers operating costs. The measured data are transmitted in real time to the Netilion Cloud. This means that any required maintenance can be identified immediately and notified on a smartphone. Thanks to remote access, it is possible for the service team of Endress+Hauser to access the analyzer directly. In this way, initial diagnoses can be made and potential disturbances swiftly rectified.

Result

- Reliable compliance with legal limit values for orthophosphate
- On-demand and precise dosing of the precipitant
- Operating costs reduced
- Increased operational safety thanks to remote access
- Fast reaction times in the event of malfunctions
- More efficient workflows and processes

Solution components

- Liquiline System CA80PH orthophosphate analyzer
- System integration: Control and analysis concept for two aeration basins
- Digital solution: Netilion Cloud for data transmission and maintenance notification
- Service: Smart Support and remote monitoring
- Protection: Installation in a customer-specific measuring cabinet



↑ The enclosure protects the analyzer from external influences



<https://eh.digital/49Ax1vu>



On behalf of the Grimma-Geithain Supply Association, Veolia Wasser Deutschland GmbH operates the wastewater treatment plant in Colditz designed for around 5,500 population equivalents (PE). As a service provider, Veolia operates in the supply of potable water and wastewater treatment.



Proline Teqwave MW 300/500



NEW



Liquid analysis



[www.de.endress.com/
teqwave-mw300](http://www.de.endress.com/teqwave-mw300)

Inline measuring instrument for solids content measurement in sewage sludge



Maximum
process stability



Early warning/
deviations



Lower
operating costs



Quick
commissioning

Highlights

- Reliable measuring performance in real time – permanent inline measurement with outstanding repeatability
- Lower maintenance effort – polished measuring tube reduces deposit formation and extends cleaning intervals
- Easy calibration – in-process comparison with laboratory sample without device removal
- Reduced effort in programming – integrated load calculation possible in combination with a flowmeter
- Additional process information from multi-variable measurement (solids content, temperature, conductivity)
- Easy installation and operation – innovative sensor construction and cutting-edge technology with web server (optional WLAN)
- Full access to process and diagnostic information – numerous, freely combinable IOs available
- Built-in verification – Heartbeat Technology enables documented device functionality without process interruption

Application

Teqwave MW 300/500 inline measuring instrument optimizes sludge treatment in wastewater treatment plants by measuring solids content in real time using microwave transmission. This enables a faster, more efficient process optimization and fewer laboratory measurements. The continuous availability of measured data improves separation into solid and liquid constituents, increases operational safety and enables a rapid response to process changes. Typical applications in sludge treatment include primary clarification, digestion and dewatering.

The transmitters of the Proline 300/500 line are engineered for a high degree of flexibility and meet the different requirements for user operation and system integration. For easy operation and to provide additional process and device information, the transmitter features an integrated web server and optional WLAN. Menu guidance by wizards simplifies comparison with the laboratory value.



Quality marks and standards



Maximize productivity and reduce costs with innovations



Highlights

- World's first electromagnetic flowmeter without inlet and outlet runs and without constriction (0 x DN full bore)
- Heartbeat Technology – enables, for example, the detection of deposits or magnetic field interference
- Factory-calibrated conductivity measurement – reliable and traceable
- Ungrounded measuring – enables a stable and cost-effective measurement without ground disks

Application

In water and wastewater applications, Proline Promag helps to ensure reliable measured values in all conductive media – from raw water detection and treatment processes to wastewater treatment plants and sludge lines. The innovative sensor and transmitter functions increase measurement certainty, support predictive maintenance planning and enable process optimizations without the need to interrupt operation.

Quality marks and standards



Proline Promag



www.endress.com/promag-innovationen

Non-invasive flow measurement with ultrasonic clamp-on



Highlights

- Innovative FlowDC function enables short inlet runs (max. 2 x DN) without any loss of measurement accuracy
- Easy and reliable installation thanks to integrated installation testing, status display and operation with maintenance-free coupling pads

Application

The ultrasonic clamp-on device enables a safe, non-invasive and maintenance-free flow measurement in water and wastewater processes. Thanks to FlowDC, measurement accuracy is retained even with disrupted flow profiles and short inlet runs. Maintenance-free coupling pads and Heartbeat Technology help to ensure high operational safety, transparent diagnostics and early detection of deposits.

Quality marks and standards



Proline Prosonic Flow W 400



NEW



www.endress.com/9w4b

Customer-specific complete solutions for liquid analysis



Liquid analysis



www.endress.com/en/solutions-lowering-costs/ims

From the analysis panel to the measuring container



Maximum process stability



Lower operating costs



Robust measuring performance



Legally compliant documentation

Highlights

- Modular analysis panels for water monitoring
- Fully equipped measuring containers for water, wastewater or water monitoring
- Delivered with customer-specific configuration and ready for connection

Application

Whether in drinking water, process water, coolant, wastewater or water vapor circuits, the combination of the Liquiline multi-channel transmitter and digital Memosens sensor on the same analysis panel offers an optimum solution for measuring points with multiple analysis parameters. The modular design of the panel enables the flexible replacement or addition of individual modules. For larger measuring points, enclosures through to fully air-conditioned measuring containers in individual sizes are also available.

Quality marks and standards



Analysis of chlorine dioxide, free chlorine, total chlorine, free bromine and ozone



Liquid analysis



<https://eh.digital/4qWfwwz>

Digital disinfection sensors CCS5xE with Memosens 2.0



Maximum process stability



Lower operating costs



Predictive Maintenance



Quick commissioning

Highlights

- Complete sensor portfolio for disinfection
- Plug and play: Low installation effort thanks to pre-calibrated Memosens sensors
- Memosens 2.0 enables predictive maintenance and extended IIoT services

Application

In recent years, the disinfection portfolio has undergone purposeful further development and modernization. The new sensor concept combines up-to-date measurement technology with high performance and enables the use of amperometric sensors across a very wide measuring range. As a result, disinfection can be monitored reliably in an extremely wide range of applications: in drinking water to ensure conforming and stable disinfection, and in any situation where disinfectant should be dosed efficiently, in a resource-sparing way and with minimum effort.

Quality marks and standards



Spectrometer probe for monitoring multiple water quality parameters



Highlights

- Uncomplicated use in applications such as humic substances and DOC in drinking water, wastewater treatment plant effluent and elimination of trace substances in wastewater
- Monitoring of new limit values
- Individual application customization for special applications such as different industrial wastewaters

Application

Memosens Wave CAS80E spectrometer allows the parallel determination of different water quality parameters, such as COD, DOC, TOC, nitrate, turbidity, SAC and color, in the UV range as well as in the VIS range. The wavelength range from 200 to 800 nm covers the entire relevant analysis range for applications in water/wastewater. The new, low-maintenance technology results in excellent stability and availability.

Quality marks and standards



Memosens Wave CAS80E

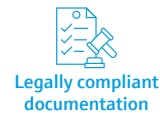


Liquid analysis



www.endress.com/cas80e

Liquiline system platform CA80 for applications in water pollution control



Highlights

- Colorimetric analyzers for precise monitoring even in very low concentration ranges
- Part of the Liquiline Memosens platform: same operating concept and easy connectivity to the Netilion IIoT ecosystem thanks to integrated edge module
- Available parameters: phosphorus, orthophosphate, ammonium, CSB, TOC, nitrite, iron, chromium, hardness, aluminum

Application

The CA80 online analyzers make it possible to monitor, control and regulate processes reliably. In municipal and industrial wastewater treatment plants, they enable precise and legally compliant analyses at all relevant control points. Even heavily polluted industrial wastewaters are reliably covered. In the treatment of process, drinking and ultrapure water, the analyzers are also used for the continuous quality control of raw water.

Quality marks and standards



Water and wastewater monitoring with analyzers



Liquid analysis



<https://eh.digital/4r0d34A>

Micropilot FMR10B, FMR20B and FMR30B



NEW



Level



www.endress.com/Micropilot-FMR10B-20B-30B

The easier, the better



Maximum
process stability



Quick
commissioning



Universal measurement
technology

Highlights

- Newest 80 GHz radar measurement with intelligent signal processing
- Universal measurement technology for all applications – the measuring range is identical for liquids and bulk solids
- Intuitive operation thanks to status LED, touchscreen display and Bluetooth®
- Quick commissioning without specialist knowledge thanks to control wizards
- Heartbeat Technology enables on-demand verification and diagnostics without process interruption

Application

Micropilot FMR10B, FMR20B and FMR30B measuring instruments are suitable for a variety of applications – from open channels to pumping stations and elevators to IBCs and storage tanks. The compact design allows use even in confined spaces. Regardless of environmental influences, the radar sensors measure reliably at all times. Integrated flow curves enable flow to be calculated directly in the sensor. The 80 GHz radar technology guarantees highly accurate measurements, even with foam formation or turbulent surfaces.

Quality marks and standards



FlexView FMA90



NEW



Level



www.endress.com/FMA90

Universal control unit for level and flow measurements



Maximum
process stability



Lower
operating costs



Robust measuring
performance



Quick
commissioning

Highlights

- Flexible use with integration of up to two level sensors (radar, ultrasound, hydrostatic and universal 4 to 20 mA sensors)
- With the FMA90, sensors can be conveniently commissioned remotely
- Intuitive operation using a 3.5" color touchscreen display and web server
- Quick commissioning thanks to control wizards, tutorials and automatic sensor identification
- Pre-defined applications for the water and wastewater industry

Application

FlexView FMA90 is a universal control unit for level sensors. It enables the simultaneous connection of up to two sensors and, with eight switched outputs, comprehensive control and monitoring functions. Available in the form of field housing, DIN rail device or control panel variant, the unit offers flexibility of use. Thanks to pre-defined applications, the commissioning of flowmeters, rake and pump controllers takes only a few minutes.

Quality marks and standards



Modular gas analyzers for optimum plant control and monitoring



Highlights

- Innovative product family for extractive gas measurement, which can measure up to 60 different individual components
- Continuous measurement of CO₂, O₂ and relevant greenhouse gases for optimizing biological clarification processes
- GMS800 as the base unit supplemented by the FIDOR variant for FID measurements, PowerCEMS as the complete emissions monitoring system and S700 for special installation situations
- Turnkey system solutions for the non-Ex and Ex zone

Application

GMS800 gas analyzer in combination with FIDOR or S700 enables the continuous monitoring of N₂O, CH₄, CO₂, O₂, C-org and a further 60 gas components in wastewater treatment plants. It supports the optimization of biological purification processes, emission measurement to EN 15267/EN 14181 and the monitoring of raw and treated gas flows. A modular design and robust housing, including for the Ex zone, simplify the integration into water and wastewater applications.

Quality marks and standards



GMS800 gas analyzer



Optical analysis



www.endress.com/gms800

The low-maintenance complete solution for intelligent monitoring of water, wastewater and disposal networks



Highlights

- Efficiency gain thanks to off-site data acquisition
- Full transparency for the active control of energy efficiency and costs
- Optimized water availability through analysis of consumption trends
- Legally compliant acquisition for reliable assignment and billing
- High operational safety thanks to cloud-based flow verification

Application

Netilion Water is a certified, cloud-based and cross-manufacturer solution for the intelligent monitoring of water, wastewater and disposal networks. It converges measured data from across locations and offers 24/7 transparency of quantities, pressure, level, pH value or turbidity. In the use cases of water withdrawal, water distribution and wastewater discharge, Netilion Water enables the safe monitoring of critical measuring points, early detection of deviations and the reliable compliance with legal requirements – for efficient and sustainable operation.

Netilion Water



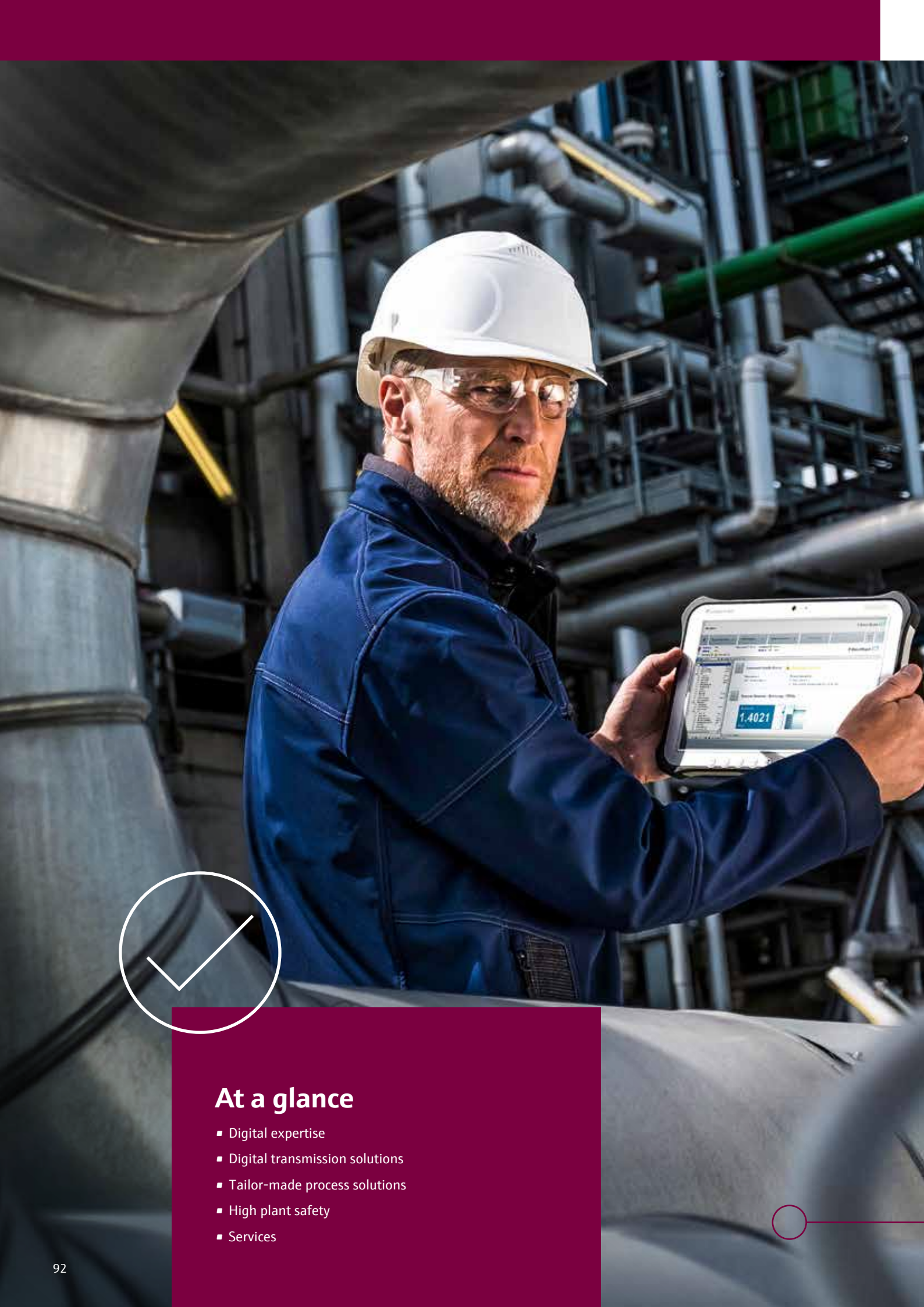
NEW



Digital solution

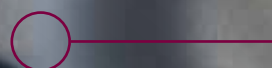


www.endress.com/netilion-water



At a glance

- Digital expertise
- Digital transmission solutions
- Tailor-made process solutions
- High plant safety
- Services



ServicePlus

Holistic expertise for modern process plants

Endress+Hauser stands for solutions that make processes measurably better. In this section, we converge selected fields of expertise by combining measurement technology, digitalization and after-sales service to form end-to-end solutions.

Digitally supported – from device to application

Digital solutions make information centrally available and simplify workflows. They assist with the management of devices, data and services, make it easier to access relevant information and create a reliable basis for daily operations – off site and always up to date.

Connected processes with reliable communication

A stable and secure data transmission forms the basis of modern process management. End-to-end communication solutions help to ensure that measured values and condition and diagnostics data are transmitted reliably. This provides transparency of plant condition and creates the foundation for an efficient, future-ready process control.

Integrated process solutions

We study applications holistically. Solutions are matched perfectly to processes and combine engineering, application knowledge and services to form a functioning total system. The aim is to optimize workflows and keep processes permanently stable.

Plant safety

Safety is a central component of every process plant. We provide support in standards-compliant plant planning, ensuring safe operation and identifying risks early on. Solutions and services for plant safety contribute to the protection of persons, environment and plant, and they simultaneously guarantee reliable and legally compliant operation.

Service as an integral component

Services are a fixed component of every solution. They provide support from commissioning and operation to the continuous optimization of the plant. Digital and in-person services intertwine and help to ensure safety, reliability and long-term performance.



Digital expertise

Connected. Transparent. Future-proof.

Integrated digital solutions

Digital expertise is an essential component of our solutions portfolio. Measurement technology, connectivity and digital services intertwine seamlessly and form an end-to-end total concept for industrial plant operation. The aim is to make data usable in a targeted way and to support processes efficiently and safely.

Central platforms for everyday work life

With "My Endress+Hauser", you have a central platform that digitally supports a multitude of processes all to do with products and services. The combination of comprehensive product information and direct request and purchase options makes the procurement process easier and more efficient than ever before.

From data to usable knowledge

Only the interplay of technology, data and analysis leads to true added value. Digital services and packaged solutions assist in the targeted evaluation of measured data and plant data and in transferring them to robust knowledge. From the smart sensor to connectivity and extensive cloud applications for data analysis as well as corresponding interfaces to existing systems (such as SAP), all components are optimally matched to each other. As a reliable partner, we will support you before, during and after your digitalization project – in strict compliance with the latest IT and data security standards, of course.

The comprehensive information and procurement platform on endress.com

My Endress+Hauser

Application

Discover the new possibilities afforded by efficient information retrieval and electronic transaction management with the "My Endress+Hauser" account. In your personal account on endress.com, you have access to an overview of the key functions as well as your quotes and order history at all times. You will also find the contact details of your dedicated Endress+Hauser sales contact in your account. This means that you always have maximum flexibility between online and offline support.

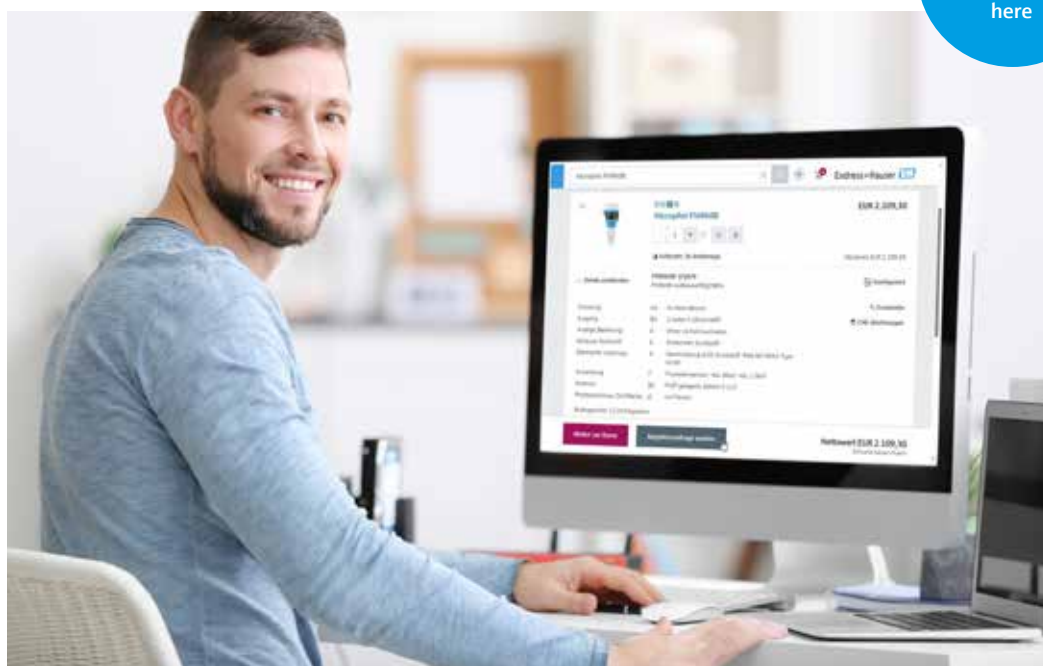
Our technical support is also available online for assistance. It is easy to access "Support & Service" directly under "My Endress+Hauser".



www.endress.com/my-endress-hauser

Highlights

- Compile and download product documents as a package for desired devices from offerings and purchase orders
- Request quotes or create quotes yourself and download them directly
- Access to CAD drawings, spare parts and technical documentation
- Comprehensive information on our entire product portfolio, prices and delivery times
- Status information on quotes, orders and delivery tracking
- Transparent overview of all business transactions, including order documents



Maximum efficiency through automation of procurement processes



B2B integration with Endress+Hauser

Application

For companies with a large quantity of transactions and standardized processes, it's worth digitalizing the procurement process with B2B integration.

Endress+Hauser offers a broad range of digital solutions that can be adapted to the customer's procurement process. From electronic catalogs to basket interfaces, such as OCI or punchout catalog, and different kinds of ERP integration, our customers receive a tailor-made solution that exactly meets their needs and requirements. Depending on the desired type of solution, this can be implemented between the customer and supplier directly or indirectly via an electronic marketplace, e.g. SAP Business Network (Ariba) or Coupa.

All transactions – from order placement, order confirmation and confirmation of dispatch to electronic invoicing – are transported and processed automatically between systems. In this way, manual input errors are reduced and cost savings in procurement are achieved. The entire procurement process becomes significantly faster and more reliable – a win for customer and supplier.

Highlights

- Optimization of the operational procurement process thanks to electronic exchange of business data
- Time and cost savings and improved data quality thanks to automated processes
- Integrated solutions tailored to your specifications and processes

→ Benefits

- Increased data quality and speed in the procurement process
- No manual recordkeeping in goods receiving or invoicing
- With a basket interface, you can transfer products or quotes to your system with a single click
- Professional implementation of integration solutions thanks to years of experience



www.endress.com/B2B-Integration

Added value



Reduce process costs



Optimize process throughput times



Increase process quality



Managing all engineering applications in one central location

My Endress+Hauser – Projects

Application

Improve project collaboration over the entire project life cycle, from planning to operation. Endress+Hauser's Projects brings together all of the applications you require on one platform and enables easy project development of products, increasing your efficiency and reducing workload as you have to enter data only once. It is reliable, cohesive and available at any time. In addition, Projects provides the best possible support in creating and configuring multiple projects in your day-to-day work.

Highlights

- Design and configure measuring points on a single platform
- Option for importing from external engineering software via Excel
- Optional storage of an operating standard

→ Benefits

- Simple selection, design and configuration of products
- Quick to download technical documents in one go
- Easy access to your prices
- Rapid re-engineering of products



www.endress.com/my-endress-hauser

Using application data to find the right measuring instrument quickly and easily

My Endress+Hauser – Product Guide

Application

The Applicator has been helping users to select and design measuring instruments for more than 20 years. With Product Guide, Endress+Hauser is now taking the next step in providing optimum support for product selection and design. All-new integrated user guidance makes it considerably easier to select, design and configure the measuring point and has been optimally matched to the individual needs of the fields of application. What makes it even more efficient is that you are taken from the application data straight to the finished measuring instrument. Particularly for complex measuring points that consist of multiple devices, the Product Guide offers new possibilities for creating complete measuring points. For an analysis measuring point, this means that not only the sensor is fully designed and configured, but so are the assembly, cable and transmitter.

Highlights

- Select and design measuring instruments in a single step
- Simultaneously calculate and size all devices that can be used
- Design complete measuring points using process data

→ Benefits

- Quick and easy design and configuration of measuring instruments
- Recommendation of the optimal measuring instrument based on the process data
- Avoidance of errors in complete measuring points



cx.endress.com/productguide_en



Digital transmission solutions

How our customers can benefit from our digital expertise

Data flow as the basis for digital processes

Reliable and comprehensible data streams enable digital applications in the industrial environment. Digital transmission solutions make sure that measured, condition and diagnostic data from field level get to higher-level systems, where they can be used in a targeted way. Endress+Hauser combines intelligent field devices, modern communications technologies and digital platforms to make end-to-end solutions for the Industrial Internet of Things (IIoT).

Netilion – the IIoT ecosystem

The cloud-based Netilion IIoT ecosystem represents the central layer for the acquisition, analysis and use of plant data. It merges the physical plant with the digital world and enables off-site access to relevant information. Scalable digital offerings can be adapted flexibly to different applications and support informed, data-based decisions.

Intelligent sensors with Heartbeat Technology

Heartbeat Technology is directly integrated into the sensors and delivers continuous information on device and process condition. Functions for diagnostics, verification and monitoring enable deeper insights into plant operation – without process interruption. This supports stable operation and creates the basis for predictive optimization.

Ethernet-APL – the next step in field communication

Ethernet-APL combines high data performance with the requirements of the process industry and enables end-to-end and reliable communication all the way to the field. As the preferred technology for the future, Ethernet-APL provides the basis for fully connected process plants. At the same time, we also support established technologies such as HART and IO-Link – for maximum flexibility in the design of your plant.

Industrial Internet of Things – turning data into knowledge

The cloud-based Netilion IIoT ecosystem

Application

Netilion is a cloud-based industrial IoT ecosystem that is compatible across manufacturers and designed for processes in industrial process engineering. It connects the physical and digital worlds. With Netilion, we are embracing digitalization to make knowledge accessible to our customers, to optimize processes and to enable quick decisions based on facts – anytime, anywhere. With its scalable approach and various digital offerings, Netilion provides options that are precisely tailored to customer requirements.

Customized solution packages

Endress+Hauser's digital solutions are provided in application-based packages. From the smart sensor to connectivity and extensive cloud applications for data analysis as well as corresponding interfaces to existing systems, all components are optimally matched to each other. As a reliable partner, we will support you before, during and after your digitalization project – in strict compliance with the latest IT and data security standards, of course.

Highlights

- Intelligent process sensors with extensive diagnostic functions
- Connectivity through edge devices, adapters and field gates
- Support for all established communication technologies
- Netilion cloud ecosystem for data acquisition
- Fulfillment of the strictest security standards (ISO 27001, IEC and many more)
- Numerous interfaces to ERP, MES and SCADA systems



www.endress.com/netilion

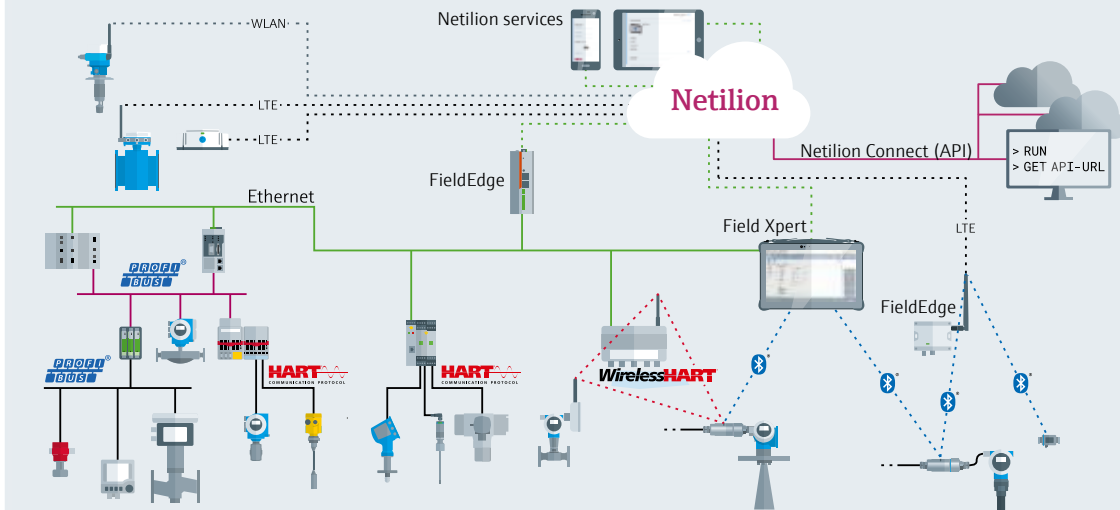
Connectivity is created with an adapter and edge device

Application

In the latest generation of process plants, Industry 4.0 concepts are relatively easy to implement. In the digitalization of existing or brownfield plants, however, the challenge is to ensure connectivity of data from the field devices. This is because, for the successful digitalization of plants, the connectivity of the data suppliers is the key element. The solution: transmission of additional digital data from the field level in parallel to the measured data via a second communication channel. [L→](#)

Highlights

- Digitalization of existing and brownfield systems
- Connection without interfering with existing system architectures
- Data transmission via second communication channel
- Simple transmission of analog signals thanks to adapter solution
- Immediate access to measurement and diagnostic parameters via mobile devices



Quality marks and standards



Simultaneous data transmission

Our measuring instruments already have numerous digital interfaces, e.g. 4 to 20 mA HART, PROFIBUS and PROFINET. Many sensors are also available with Bluetooth® and WLAN interfaces. With the new FieldPort SWA50 adapter, existing 4 to 20 mA sensors can be connected in accordance with the "Namur Open Architecture" (NOA) concept without placing any strain on existing communication channels or interfering in the system architecture. Our portfolio is supplemented with edge devices and gateways.

Simple adapter solution

The new NOA-compliant FieldPort SWA50 adapter brings existing metrology equipment in analog networks quickly and cost-effectively into the cloud via gateways and edge devices. The wireless adapter connects existing 4 to 20 mA HART field devices to digital services easily by converting all HART signals into wireless signals. Either via Bluetooth® or WirelessHART, all HART signals from field devices can be transmitted to the cloud in parallel to the measured value – even those from third-party manufacturers.



developer.netilion.endress.com

Monitoring the pulse of your measurements for comprehensive insights

Heartbeat Technology gives you the answer



Application

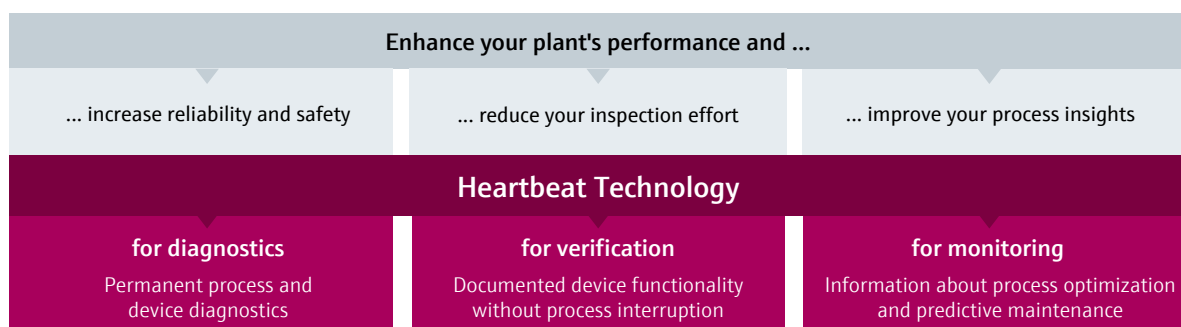
To help plant operators achieve their goals, Endress+Hausser has integrated Heartbeat Technology into many of its measuring instruments. Their unique diagnostics, verification and monitoring functions support you in your daily efforts to increase plant performance.

Maximum reliability and productivity

Outstanding diagnostic capabilities thanks to development to IEC61508, standardized and understandable diagnostic messages, traceable device verification and monitoring of process conditions.



www.endress.com/heartbeat



The next evolutionary stage in digital field instrumentation with Profinet-APL

Ethernet-APL: easy, quick, digital

Application

During planning and operation, process plant operators strive for efficient engineering and reliable production quality, rapid start-up and fast commissioning. Working with plant equipment, especially field instrumentation, built around older technologies like HART or PROFIBUS is often a complex issue. There is increasing demand for higher data performance but also for driving down costs for devices and system integration.

Existing technologies

With digitalization, the commonly used fieldbus technology PROFIBUS has been pushed to its limit for some years now – low bandwidth, lack of speed and complicated protocol conversions. This is similarly the case with the even more dated analog 4 to 20 mA measurement technology with HART protocol. HART, however, is dogged by even greater performance losses as soon as the equipment is expected to produce high data rates for automation tasks. The newly introduced APL (advanced physical layer) for industrial Ethernet protocols, such as PROFINET or even EtherNet/IP, has seen a kind of paradigm shift.

With APL (Advanced Physical Layer), it is now possible to use field instrumentation with industrial Ethernet-based protocols, e.g. Profinet, even directly in the harsh environment (e.g. Ex zone) of process automation. APL is an advanced physical layer for Ethernet.

Highlights

- Energy and data via two-wire cable
- Ethernet speed of 10 Mbit/s full-duplex
- Explosion protection with intrinsic safety for all zones and divisions
- Polarity-independent connection terminals, quick and easy to install
- Open to any type of industrial Ethernet protocol
- Easy to device replacement
- Easy integration of device diagnostics into controllers and process control systems
- Quick and easy access to all device parameters via web server
- NAMUR Open Architecture (NOA) via a second channel

The technology fulfills all requirements of process plants and effectively brings Ethernet and its benefits into the field of process automation. Ethernet-APL enables complete digitalization in the process industry and in all life cycle phases.

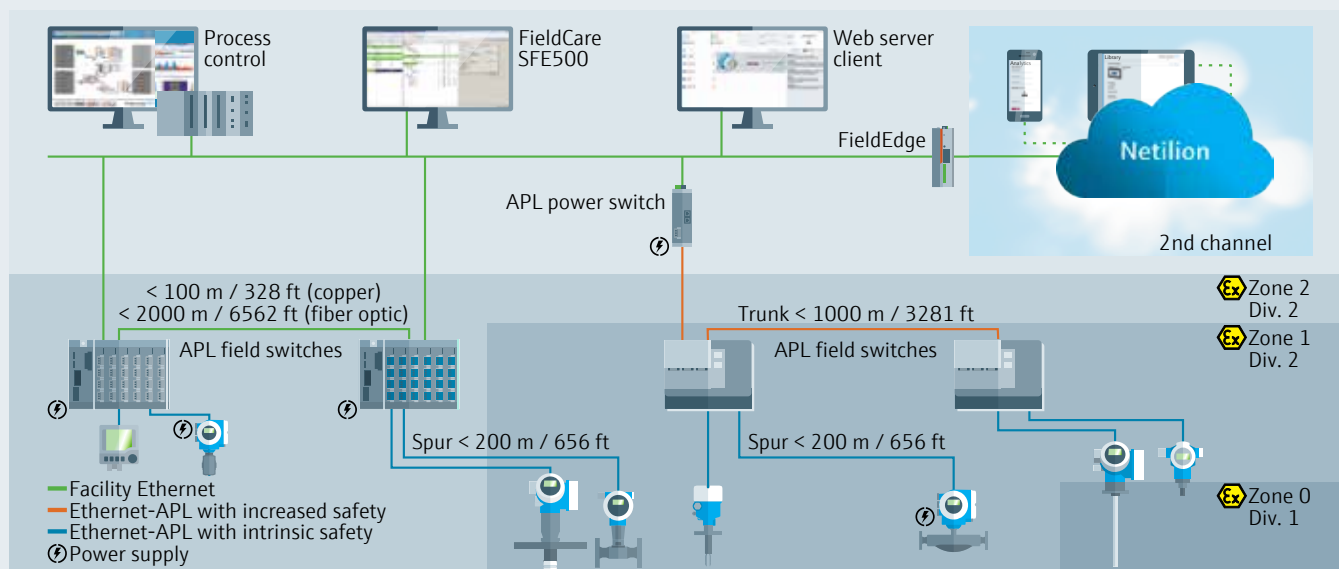


www.endress.com/apl



ethernet-apl.org

Ethernet-APL topologies





Tailor-made process solutions

Solutions tailored to your processes

Holistically conceived – starting from the application

Endress+Hauser develops process solutions that are purposefully tailored to the requirements of your plant. The starting point is always the process itself and its organizational framework conditions. On this basis, solutions are realized that combine engineering, application knowledge and services to form a functioning total system. The aim is to achieve plant operation that functions safely, efficiently and in conformity with regulations.

Integrated plant-wide solutions

Tailor-made process solutions don't apply only to individual measuring points, but to the entire process. From detection and monitoring to control and data integration through to the link to higher-level systems, all components are matched to each other. This is how plant-wide solutions evolve that can be integrated seamlessly into existing process landscapes.

Engineering, implementation and operation from a single source

On this basis, we provide ongoing support for projects across all phases: from consultancy and dimensioning to design and engineering through to commissioning,

documentation and continuing aftercare. Even complex applications are holistically implemented, including automation, safety-related analysis and system integration. A central point of contact helps to ensure clear workflows and efficient coordination.

In order for planning and engineering to take effect during operation, a clean implementation is crucial. Dimensioning, mechanics and installation must interact in a purposeful way. Measuring instruments, mechanical components and associated assemblies are prepared and functionally matched for the specific application – as pre-assembled and tested units or through installation and commissioning directly on site. As a result, interfaces can be reduced, installation effort minimized and reproducible implementation ensured under real operating conditions.

Optimization throughout the entire life cycle

Once the plant has been consistently implemented, its long-term operation moves into focus. In addition to the process solutions, matched optimization services assist in securing measurement quality, stabilizing workflows and managing processes efficiently. In this way, it is possible to avoid downtime, plan maintenance needs better and be fully in control of operating states at all times.

From successful terminal management through to individual tank storage systems

Custody transfer tank gaging and flow measurement



Application

High-accuracy measuring systems and sensors are required wherever the storage and acceptance of raw materials in the process industry must be monitored and controlled. Endress+Hauser provides customized solutions with system approval characterized by convenient maintenance and extraordinary operational safety. The measuring systems that we offer also meet all requirements of European legislation that must be fulfilled for custody transfer. In addition to the sensor technologies, Endress+Hauser also offers complete packaged solutions comprising all the necessary components such as dosing control, pipework and inventory management software. Thanks to our many years of experience and extensive industry expertise, Endress+Hauser solutions for transfer, storage and marine applications enable significant optimization of complex processes.

Highlights

- Solutions for liquids such as fuels and oils, chemical products, food and alcohols, as well as gases and liquefied gases
- For fuel depots or individual tanks, loading facilities for drums, IBCs, trucks, BKG and ship and pipeline measuring systems
- Marine applications for tank level and consumption solutions, as well as bunkering solutions
- Simple and secure integration into existing process landscapes

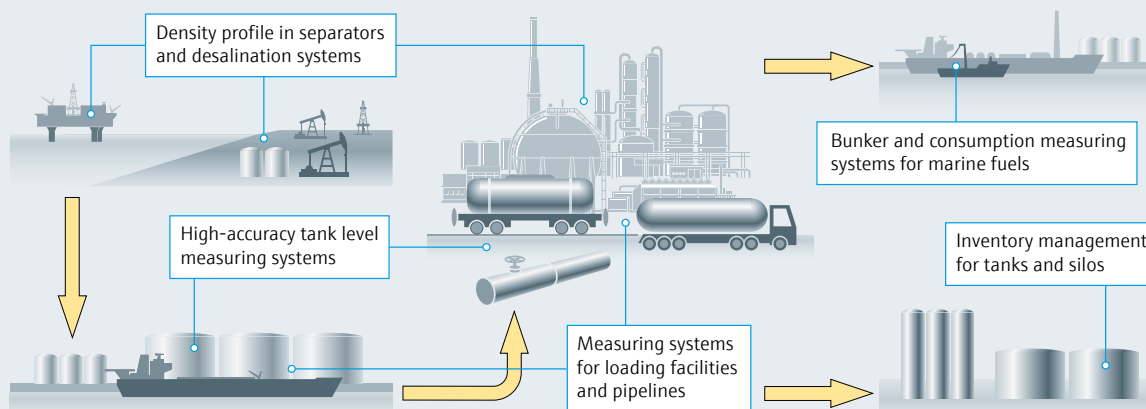
→ Benefits

- Superlative accuracy thanks to market leadership in tank level and flow measurement technology
- From engineering to custody transfer approval – everything from a single source offers time and cost savings
- Safe marketing of all measuring solutions through certification in accordance with PTB, NMI, OIML R85 and R117 with system approval for MID MI-005, among others
- Endress+Hauser's own calibration reference for liquids other than water MID MI-005 Class 0.5 loading facilities



<https://eh.digital/4pTeT6g>

The journey of crude oil – an example of transfer, storage and marine solutions from Endress+Hauser



From the measuring point to connecting to the ERP system: everything from a single source



Automated extraction solutions for process plants

Application

Extraction covers separation processes in which one or more components are extracted from a substance mixture by adding a solvent. Usually the extract is further concentrated by means of an evaporation system. Endress+Hauser can take on the entire project management for you. In addition to hardware planning, designing components and creating circuit plans, Endress+Hauser can also provide software engineering, the automatization concept and the SIL and Exi calculations. In addition, you will also be assigned a central contact partner for your next EI&C project to ensure expert implementation from the outset.

Highlights

- Process automation of extraction, evaporation and CIP systems
- Complete planning and delivery, from measurement technology through to commissioning and documentation
- Efficient recipe management of mixing and dosing systems

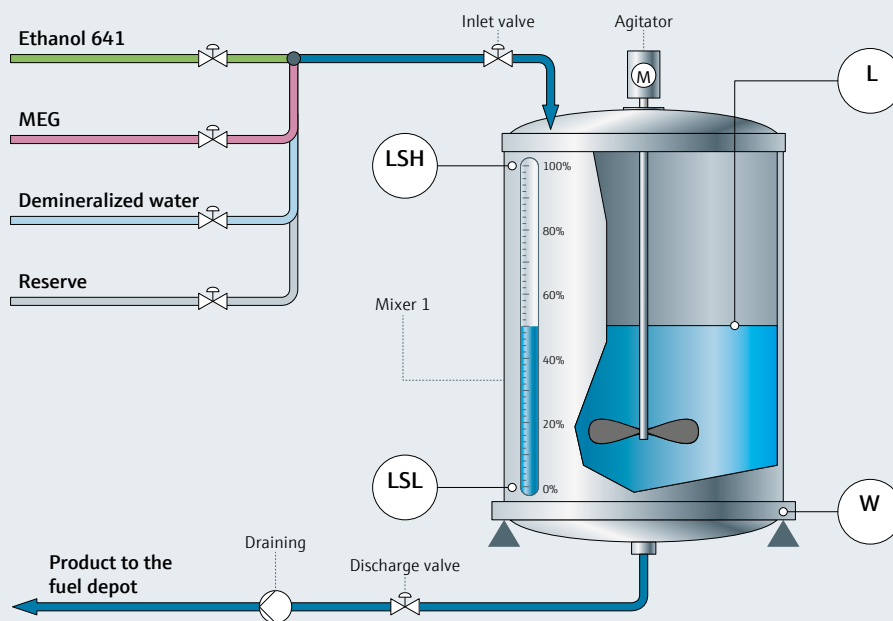
→ Benefits

- Highly flexible recipe management (up to 1,000 different raw materials)
- High scalability and reproducibility
- Holistic planning and delivery of EI&C technology
- Onboarding and training for plant personnel



<https://eh.digital/4pTeT6g>

Extraction solution



Mixer 1/recipe management



Complete mechanical solutions for field instrumentation

Pre-assembled solutions with exactly matched devices and components and possibility for assembly directly on site

Simplicity in operation

As a complete provider in measurement technology, Endress+Hauser has gained comprehensive experience in the implementation of complex instrumentation projects. All-in-one mechanical solutions combine measuring instruments, mechanical components and accessories into functionally matched units, which are either tested and prepared before installation or installed and tested on site. As a result, interface and installation effort can be minimized and sources of error in the project minimized.

Easing the burden on operators and project teams

This intentionally eases the burden on operators and project teams. Resources can be focused on essential tasks in the plant project, while the selection, sizing and engineering of the metrological solutions including mechanical components can be carried over in a structured way. Our range of pre-assembled solutions and the complete installation of measuring instruments on site supports efficient commissioning and helps to ensure reproducible quality across all measuring points.

Highlights

- Reduction in interfaces
- Delivery of pre-assembled and tested complete measuring points
- Device-adjacent assembly and commissioning of the supplied components
- Matched components from qualified suppliers ensure optimum commissioning and permanently smooth operation
- Project management for the overall project, monitoring of the on-site installation and commissioning work and coordination of the supplied components
- Compilation of all device documentation in full

Structured implementation and complete documentation

In addition, all required documents are consistently compiled and presented. Complete and auditable documentation supports commissioning and subsequent operation, and it forms the basis for maintenance, testing and adaptations throughout the entire life cycle of the plant.



<https://eh.digital/3O5PQzw>



<https://eh.digital/3M5eobu>





Plant safety

Safety reliably implemented

Protection of people, environment and plant

Plant safety is an essential component for stable and legally compliant plant operation. It protects people and the environment, safeguards processes and supports compliance with legal requirements. Endress+Hauser considers safety in its entirety and combines measurement technology, application knowledge and services to create end-to-end safety solutions.

Functional safety throughout the entire life cycle

Functional safety requires a systematic procedure throughout the entire life cycle of safety-related installations. Endress+Hauser supports operators

with matched SIL services – from dimensioning and commissioning to computer-aided proofs through to periodic testing and complete documentation. In this way, the protection function is reliably ensured and safe operation is permanently supported.

This systematic safeguarding also forms the basis for the fulfillment of further statutory requirements in the field of environmental and plant protection. An essential component in Germany is compliance with the Federal Water Act. As a recognized specialist in this regard, Endress+Hauser provides ongoing support for the dimensioning, commissioning and testing of overfill protection systems and supports operators in meeting statutory requirements including presenting the required proofs.

Quality marks and standards

ZVEI:



CE

VDI¹

VDE

DIN

Safeguard protection function and optimum operation in safety devices

SIL services for process plant operators

Our SIL services

To reduce the risk of potential hazards to personnel, the environment and the plants themselves to a tolerable level, it is necessary to implement the appropriate protective measures. SIL devices in SIL applications meet this need. As an SIL device alone is not sufficient given that optimum operation must also be guaranteed for maximum functionality and safety, Endress+Hauser offers a range of SIL services: from computerized SIL records to commissioning and recurring inspections. In this way, it is possible to avoid systematic errors, uncover any dangerous and undetected errors and ensure the optimum operation of safety functions.



Highlights

- Services for guaranteeing the protection function of safety instrumented systems
- Uncover systematic errors early on and reveal dangerous random errors
- Documentation for audits and as evidential record

→ Benefits

- Undertaken by experienced and specially trained SIL service technicians
- Complete documentation to IEC 61511 for each SIL device for audits
- Comprehensive service portfolio supplementary to a broad SIL device portfolio
- Many years of experience with functional safety as manufacturer of SIL measuring instruments to SIL 2/3 (IEC/DIN EN 61508)

Ensuring compliance with legal requirements as a specialist certified according to the WHG

Solutions and services for compliance with the Federal Water Act (WHG), including periodic inspection

Our solutions and services for WHG

The Federal Water Act (WHG) is one of the most significant German laws for protection of the environment and safety in operation. Under the WHG, containers for water-polluting liquids must be protected against overfilling. Endress+Hauser, as an accredited and certified specialist in WHG-compliance, can help you meet the requirements. Our services include consulting, dimensioning of new overfill protection systems, WHG commissioning operations and recurring inspections in accordance with the WHG, including comprehensive documentation for audits.



Highlights

- Customized device solutions tailored to your needs
- Services and documentation for ensuring statutory requirements
- Expert knowledge in design and recurrent inspections in accordance with the WHG

→ Benefits

- WHG specialist for over 25 years – certification of Endress+Hauser by TÜV every two years
- Annual training of our WHG service technicians ensures superlative service quality
- Everything from a single source – from WHG services and measurement technology for overfill protection through to the complete WHG solution



Services

Reliable support throughout the entire plant life cycle

Service as an integral component

At Endress+Hauser, services are a fixed component. They make sure that measuring instruments are used optimally from the start and their performance is maintained throughout the entire life cycle. The aim is safe, efficient and legally compliant operation – from planning to ongoing optimization.

Support from commissioning to operation

As early as the project development and commissioning phase, our service experts provide ongoing support with tailored services and hands-on assistance. Concepts such as Smart Start-Up enable efficient commissioning and help to ensure that measuring instruments are put into operation quickly and correctly. During operation, structured service packages provide support during maintenance, calibration and repair.

Quick help when it's needed

With Smart Support, a productive support concept is available that offers fast response times, direct access to expert knowledge and modern remote assistance. Disruptions can be efficiently rectified and unplanned idle times avoided.

Transparency for sustainable decisions

Dynamic Installed Base Analysis (DIBA) creates transparency across the installed measurement technology base. It forms the basis for informed decisions on maintenance, standardization and modernization and supports predictive, strategic servicing.

Remote commissioning with live video assistance

Smart Start-Up

Smart Start-Up

offers rapid remote support for commissioning. Ensure that your measuring instruments are operating optimally from the outset and benefit from the device expertise of our specialists without having to undertake long-term planning. By talking to the technician, users can become familiar with the new measuring instruments and ask individual questions about the device in the application.

Highlights

- Rapid remote support for commissioning in the chosen time slot
- Assurance of the optimal measuring performance in accordance with the specific requirements
- Access to the expertise of product and application specialists

Priority support with rapid remote assistance and 24/7 access to expert knowledge

Smart Support

Smart Support

offers you the advantages of a comprehensive support agreement exactly according to your needs. In an emergency, you can rely on the rapid assistance of our experts. Use Visual Support to allow experts to look over your shoulder during commissioning. This reduces the time and costs required for diagnostics and troubleshooting.

Highlights

- Prioritization of support queries for a faster response time
- Visual Support for rapid and efficient support from experts
- Your My Endress+Hauser account is straightforward to use for support queries, to view support cases and to have 24/7 access to expert knowledge

Optimization services for calibration processes – reducing cost and increasing safety and quality



Calibration optimization

Endress+Hauser is your partner for calibration optimization. You will be advised and supported by our calibration and maintenance experts with metrology, calibration and measurement technology expertise.

Measuring performance analysis: for confidence in your calibration results

Thanks to the measuring performance analysis carried out by one of our calibration consultants, users receive a transparent management overview of all calibration activities. The service includes a detailed analysis of the metrological status of the installed base for all instruments in the analysis.

Criticality/MPE evaluation

Criticality and the maximum permissible error (MPE) form the foundation for high-quality and cost-effective calibration. The offering enables users to lay the necessary foundations for realizing initial potential for improvements, such as reducing "out of tolerance" calibrations. Furthermore, using ISO 31010-compliant documented methods, project managers will be in a position to justify decisions to auditors. In addition, it is possible to take up further optimization services, such as optimization of calibration intervals.

Highlights

- Knowledge transfer of metrology and calibration expertise into the company as well as audit-proof documentation

Calibration interval optimization

Endress+Hauser helps users to determine the correct time frame in which calibration should be carried out. Proven scientific models are used for this purpose. These models take into account historical data from previous calibration results to make predictions about future behavior. In this way, sound decisions can be made about the calibration interval to be used. Depending on operational conditions – such as planned plant shutdowns – intervals are then adjusted to create an optimized schedule for carrying out calibration. Ultimately, users and plant operators benefit from an optimal balance between cost and risk.



<https://eh.digital/3Z3TdcE>



<https://eh.digital/4k3kRQL>

Optimization of calibration processes			
Standardization of processes	Creation of transparency	Definition of principles	Cost/risk balance
Optimization of the calibration process	Measuring performance analysis	Criticality/MPE evaluation	Calibration interval optimization
Together, we develop the optimum workflow and tool landscape to reduce unnecessary activities and achieve maximum return on investments – adapted for your asset management strategy.	We analyze calibration results, help you to identify process measuring risks and provide recommendations for necessary preventative or corrective measures.	We offer best-practice methods for determining device criticalities and MPE. Our experts will provide you with support for practical implementation of theoretical calculations.	We use a mix of innovative algorithms and expertise in metrology to ensure that your devices are not calibrated any more or less than necessary.

Legal compliance combined with minimum possible process interruption

Accredited calibration service and calibration testing

As one of the leading manufacturers of measuring instruments for the process industry, we possess the expertise gained from carrying out well over one million calibrations. From creating a calibration specification to implementing a complete calibration management solution, we support you throughout the entire process.

Calibration directly on site or in the laboratory

In Endress+Hauser's accredited calibration laboratory, we reliably calibrate every measured variable in the process industry, such as flow, pressure and temperature – irrespective of the manufacturer. In addition to high-precision calibration to ISO/IEC 17025 in the laboratory, it is often advisable to carry out calibration while operation is in progress, e.g. in the case of test benches and stationary measuring equipment. In this way, the sensor can be tested under real operating conditions directly at the installation location. With extensive experience in metrology, measurement technology and calibration, our certified calibration technicians and traceable documentation, we maximize the potential of on-site calibration without compromising safety or compliance.

Calibration testing

In addition to calibration, Endress+Hauser also offers calibration testing of stationary measuring systems. The use of Coriolis mass flowmeters as a permissible working standard enables more efficient calibration testing. By looping in the compact working standard in series to the DUT, time and costs can be saved when calibrating for products such as gasoline, diesel, vegetable oil, AdBlue, beer, milk or alcohol.



Highlights

- Manufacturer-independent calibration of all process parameters
- Calibration during operation and in situ or in the laboratory
- DAKS-accredited on-site calibration service for the parameters of flow, pressure and temperature – in accordance with ISO/IEC 17025
- High-accuracy production calibration rig for flow with minimal measurement uncertainty of < 0.015%

→ Benefits

- Minimize your auditing effort with an accredited and completely traceable calibration
- Increase in plant availability thanks to innovative inline calibration process
- Reduced coordination effort as only one partner is needed for all device models and makes



<https://eh.digital/4q1OWBq>



Training and continuing professional development

Qualify employees and onboard efficiently



Our training programs support you in efficiently onboarding new employees and upskilling experienced personnel through continuous professional development. From device training to process instrumentation and from plant safety to communications technologies – we impart practical hands-on knowledge for the optimum use of our process instrumentation.

Highlights

- Qualified and experienced trainers and advisors help to ensure an efficient and optimum training delivery
- Use of professional training equipment enables optimum knowledge transfer
- Certificates for the acquired qualifications serve as proof for the continuing professional development of your employees
- Practical presentation and training documents assist you with transferring the lessons learned into your operations
- In addition to knowledge transfer, you also benefit from the sharing of experience with colleagues and subject experts and expand your professional network

Device training compact

- Duration: 3 – 4 days
- Basics training on multiple measuring principles
- Theory and demonstrations
- Training content: commissioning and configuration, troubleshooting and remediation

Device training

- Duration: 1 day
- Basics training on one measuring principle
- Theory and demonstrations
- Training content: commissioning and configuration, troubleshooting and remediation

Practical device training

- Duration: 2 – 3 days
- Intensive training on one measuring principle
- Theory and practical exercises
- Training content: commissioning and configuration, troubleshooting and remediation, maintenance

Specialist training

- Duration: 1 – 2 days
- Training on plant safety (ATEX, WHG, SIL)
- Training content: principles, legal and normative requirements, practical implementation

Communications technology training

- Duration: 1 – 4 days
- Communications technology (PROFINET, Ethernet, Modbus, HART)
- Training content: principles, demonstrations and practical exercises

Industry process training

- Duration: 1 – 2 days
- Sector- and application-specific know-how
- Training content: correct selection for efficient use of measuring instruments and solutions

DIBA: Increasing plant performance while reducing maintenance costs

Dynamic Installed Base Analysis (DIBA)



Create transparency and manage complexity

Dynamic Installed Base Analysis (DIBA) is a strategic service delivery developed by Endress+Hauser to enable operators of industrial plants to have a full and up-to-date overview of their installed measuring instruments. In many plants, there is an absence of transparency over which devices are installed, how old they are and which risks or optimization potential are present. DIBA closes this gap by systematically capturing, digitalizing and continuously evaluating the installed base. This creates a robust foundation for informed decisions in maintenance and life cycle management.

Structured analysis with expert know-how

As part of DIBA, all relevant asset information – such as device type, manufacturer, age, condition and criticality – are centrally converged and analyzed. Our experts evaluate these data in the context of the respective application and operational requirements. Examined factors include obsolescence risks, maintainability and the importance of individual measuring points to plant operation. On this basis, practical recommendations materialize in relation to, for example, the optimization of maintenance strategies or the prioritization of modernization measures. The analysis is regularly updated so that changes in the plant can be considered at any time.

Highlights

- Transparency across the measuring instruments installed in the plant – cross-manufacturer and up to date
- Expert recommendations as informed decision-making basis for maintenance, modernization and standardization
- Risks and unplanned idle times reduced thanks to criticality-based analyses
- Digital processing of asset data as the basis for sustainable performance optimization

More safety, efficiency and future readiness

This dynamic evaluation of the installed base enables our customers to transition from a reactive maintenance strategy to a proactive one. Risks for plant availability and compliance can be identified early on and minimized in a targeted way. At the same time, effort for maintenance and replacement part logistics is reduced because measures are prioritized and can be planned better. The digitally processed installed base also forms an important foundation for standardization, automation and further steps in the digital transformation. DIBA therefore makes a decisive contribution to sustainably increasing the performance capability of plants and securing it for the long term.



www.endress.com/diba



Glossary

Quality marks and standards



Marking for measuring instruments that meet the hygiene requirements of the 3-A Sanitary Standards and are suitable for use in the food, beverage and pharmaceutical industries.

ASME BPE

Hygiene standard of the ASME for the biopharmaceutical industry defining the design, materials and surfaces of process and measuring instruments for the highest cleanliness and hygiene requirements.



Bluetooth® is an industry standard developed in the 1990s by the Bluetooth® Special Interest Group for wireless data transmission between devices over a short distance.



With the CE mark, the manufacturer declares conformity with the directives in force in Europe.

CSA

North American certification for electrical devices in potentially explosive atmospheres, which confirms that construction and testing conform to applicable safety requirements for explosion protection.



The CSA Group (formerly Canadian Standard Association) is an independent standards organization and accredited certifier for the North American and global market.



Deutscher Institut für Normung e. V. (DIN) is the independent platform for industrial and national standardization in Germany.



The EN 15267 standard relates to the certification of automatic measuring systems (AMS) for monitoring air quality and emissions from stationary sources.



The EN 14181 standard specifies quality assurance procedures for automatic measuring systems (AMS) used to monitor emissions from stationary sources.



Ethernet Advanced Physical Layer describes a physical layer for Ethernet communication, based to some extent on single-pair Ethernet and developed specifically for the requirements of the process industry.

EtherNet/IP

EtherNet/IP is a real-time Ethernet used mainly in automation engineering.



Explosion protection falls under safety engineering and is intended to prevent physical harm and material damage.



European Hygienic Engineering and Design Group is an association of food production equipment suppliers, food processing companies, research institutes and public health institutions as a foundation. It was founded in 1989 with the aim of supporting hygiene measures during the production and packaging of food.



The Food and Drug Administration is a US authority that issues approvals for food, active ingredients, cosmetics and pharmaceutical products. It also issues recommendations for the use of materials in plants in the food and pharmaceutical industries.



Foundation Fieldbus is a fully digital, serial and bidirectional communication system used as the basic network in an automation environment.



The HART protocol is a digital communication protocol for field devices.



Heartbeat Technology of Endress+Hauser is a technology for device-internal diagnostics, verification and monitoring.



The International Electrotechnical Commission is a global standards organization that develops standards for electrical engineering and electronics.



IECEx is the IEC system for certifying devices for use in potentially explosive atmospheres around the world.



IO-Link is a communication system for connecting intelligent sensors and actuators to an automation system in standard IEC 61131-9.



Memosens is a watertight and safe pluggable system for liquid analysis.

MID

MID stands for "Measurement Instruments Directive", a European directive that specifies requirements for the accuracy and reliability of measuring instruments.



Marking for companies that are a member of the Modbus Organization and actively support the Modbus open industry standard for cross-manufacturer communication in automation engineering.



Interoperability standard for the safe and reliable exchange of data in industrial automation.



NAMUR is an international association of users of automation engineering and digitalization in the process industry.



OIML is an international organization for the regulation of metrological matters in legal metrology.



PROFIBUS is a protocol standard for fieldbus communication in automation engineering.



PROFINET is a communication standard based on Industrial Ethernet.



Safety integrity level is a term associated with the area of functional safety and is defined in international standards IEC 61508/IEC 61511.



Originally founded in 1893, the VDE (Verband der Elektrotechnik Elektronik Informationstechnik e. V.) is the German association for electrical, electronic and information technologies.



The Verein Deutscher Ingenieure e. V. is a non-profit engineers' association founded in Germany in 1856.



The Federal Water Act (WHG) forms the main part of German water law.



WLAN: Marking for measuring instruments with integrated wireless communication for cable-free user operation, configuration or diagnostics.



ZVEI e. V. (Verband der Elektro- und Digitalindustrie) represents the economical, technological and environmental policy interests of the German electrical, electronics and digital industry.

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