# Portfolio
## Chemical


Endress+Hauser
People for Process Automation

# Ensuring your success is our mission

Dear reader,

The chemical industry is essential to producing a myriad of manufactured goods, impacting virtually every aspect of modern life. Over the past couple of decades, the industry has been the object of profound transformation due to ever-increasing economic, environmental and regulatory demands. Although much has been achieved, these challenges continue to be in effect:

1. Globalization of markets and companies
2. Growing competition, leading to added quality demands and significant cost pressure
3. Stronger safety requirements, reflecting more stringent regulations and tighter laws and directives
4. Increased scrutiny on the sustainability of operations, as determined by environmental, social and governance (ESG) considerations

While the cost of raw materials and energy are rising steadily and the technical solutions are becoming more complex, the number of staff managing the systems continues to decline. This shifting landscape has forced the operators to improve systems' efficiency, availability and safety, using as few resources as possible.

Endress+Hauser is keenly aware that your success can only be achieved with the support of reliable partners. This brochure presents our chemical industry portfolio, selected from our vast instrumentation, software and solutions offerings. If you want to know more about our complete portfolio for the chemical industry, visit our page at www.endress.com/chemical

Want to know more about chemical?
www.endress.com/chemical

## 6 All from one source

A reliably designed portfolio to support you to control your plant and reduce operating costs without compromising safety, quality or delivery time.

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Use digitalization to ensure the right chemistry with your assets.

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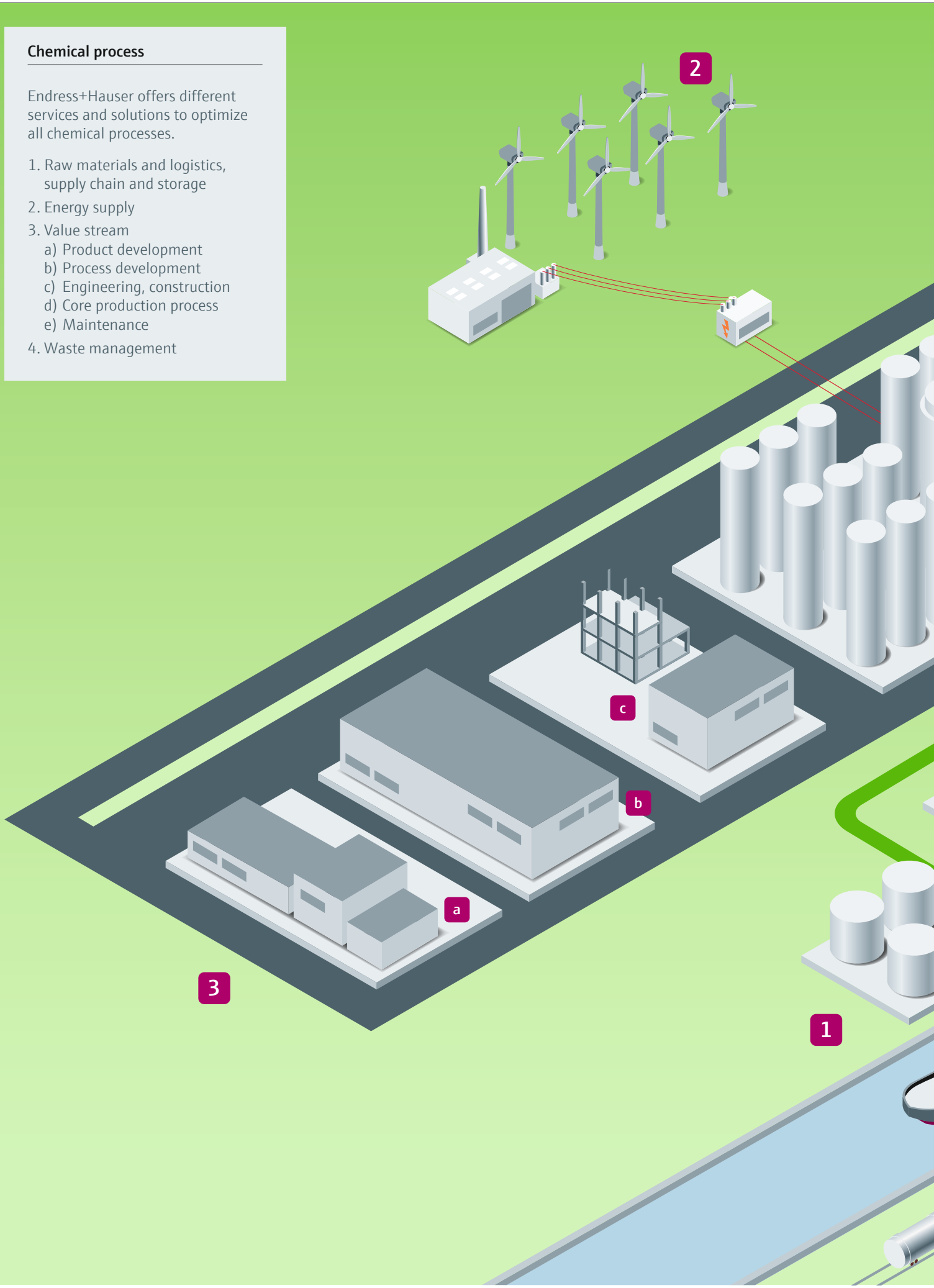
## Chemical process

Endress+Hauser offers different services and solutions to optimize all chemical processes.

1. Raw materials and logistics, supply chain and storage
2. Energy supply
3. Value stream
   a) Product development
   b) Process development
   c) Engineering, construction
   d) Core production process
   e) Maintenance
4. Waste management

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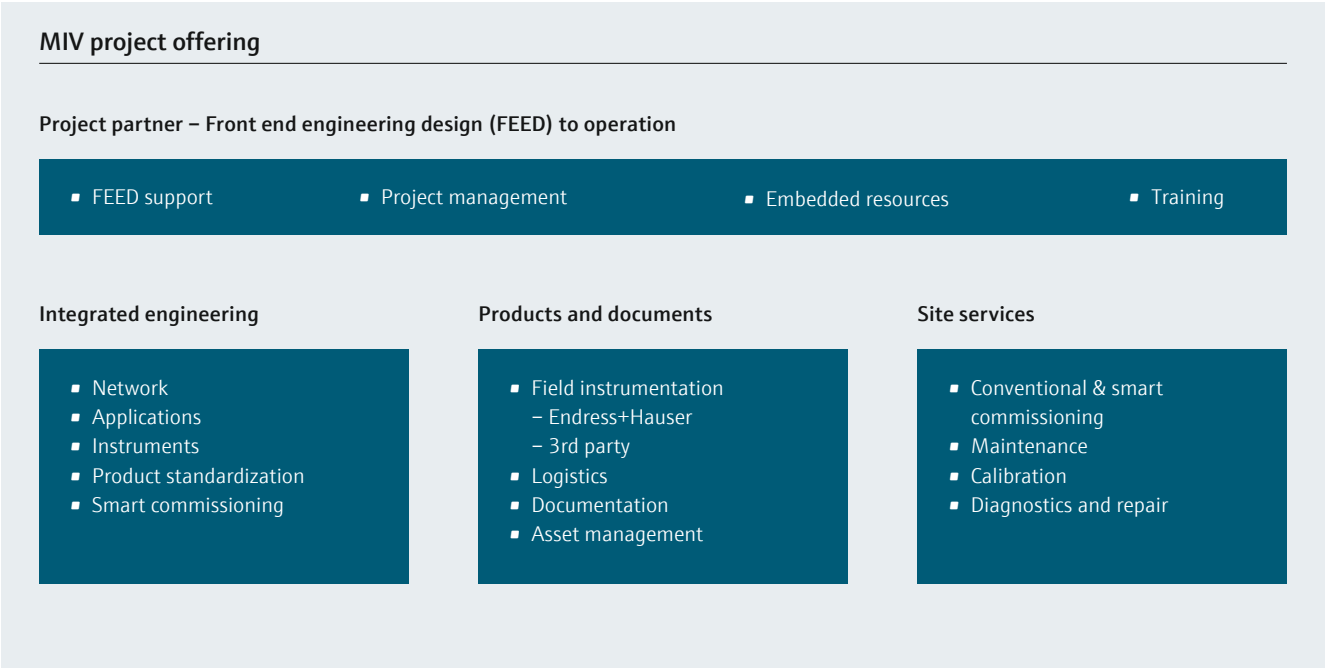
# All from one source

## A reliably designed portfolio to support you to control your plant and reduce operating costs without compromising safety, quality or delivery time.

Now more than ever, the chemical industry must deal with ever-increasing financial pressures and uncertainty. The impact is further amplified by growing environmental, regulatory and corporate citizenship expectations. To meet your goals, you need a partner that enables you to reduce the complexity of operations, control operating costs and optimize plant performance. Someone like Endress+Hauser, who has a portfolio carefully designed to help you translate business goals into reality.

Endress+Hauser's portfolio contributes to cost and time savings while improving operational processes. A comprehensive and interlocking product basket is key to increasing efficiency and productivity, be it at the production, supply chain or maintenance level. This starts with selecting a product or service from our offering. The ordering process is backed by a comprehensive support concept that allows you to efficiently place an order without any issues. A growing software tooling landscape enables 24/7 accessibility to your engineering, ordering and delivery information. Of course, personal contact remains of the utmost importance, and you will always find someone available at each step of the life cycle.

When thinking about commissioning, having instruments from only one supplier results in a smoother overall process. But, just to be sure, our experienced service technicians can install and commission instruments from a wide range of suppliers. After your plant or application is up and running, you can still benefit from relying on a main instrumentation vendor (MIV) such as Endress+Hauser. Thanks to our modular instrumentation platform, you can reduce the number of different spare parts you need to keep in stock. And services like maintenance, verification and calibration are easier to manage if you get it all from one source.




Your partner and main instrument vendor (MIV) ensures staying on time and schedule from FEED to operation

## The right technology for your application

At Endress+Hauser, we are keenly aware that each application comes with its specific set of challenges. Selecting the right measurement technology becomes crucial to obtaining data that ensures the optimal performance of your plant. That is why we take a closer look at your requirements to find out what type of technology is best suited. Whatever your application is, our technicians can support you in defining the right technology for your case.

# Business process

## To boost plant safety and performance: our promise to our customers

To be better in tune with our customers, Endress+Hauser's chemical team thinks in terms of business processes. Each process is measured to provide key performance indicators that reflect your business targets. Our offering for the chemical industry is designed to support you in reaching these targets and continuously improving each process.

### Reliable process control instrumentation for your core value chain processes

Right along the core value chain, we have considered the horizontal processes that matter the most to your production facility. Key activities include not only feedstock and energy supply but also inbound logistics production, outbound logistics, waste management and final delivery. For each of them, you have comprehensive support to help you reach your goals and advance your operation. For Endress+Hauser, this translates into offering reliable process control instrumentation, increasing the intelligence of sensors and making available the data from smart sensors.

The mission of our process analytic portfolio is to increase the measurement speed of at- and in-line lab parameters, which are critical to improve productivity. Further, we enable data-based decisions by allowing you to "see" directly into your chemical processes in real time. This way, you can precisely and accurately determine

1. the purity of the feed streams
2. the progress of the reaction
3. the endpoint of the reaction
4. the quality of the end products.

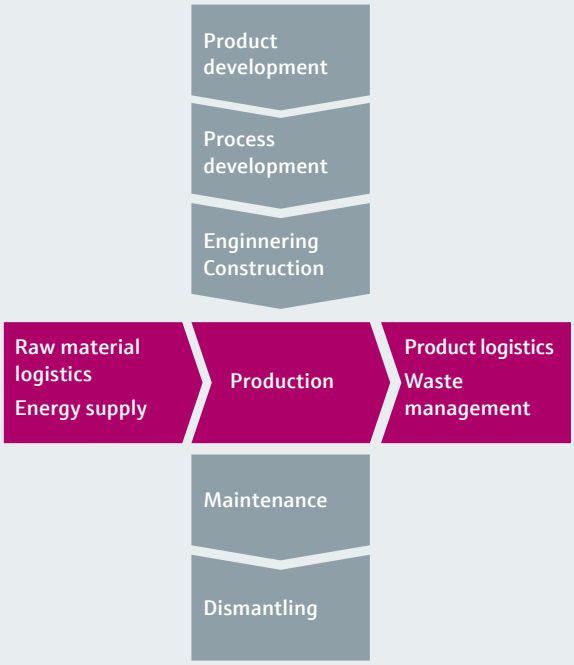
### Learn, understand and optimize

On par with process analytical parameters, digitalization plays a significant role in improving the efficiency of your operations. Take, for example, supply chain challenges, such as operating in a volatile market, reduced net working capital and production continuity. All these challenges may be overcome with SupplyCare, our cloud-based supply chain solution. The solution was built by combining data from the stock and transfer of various gas, liquid and solid applications, with existing knowledge of supply chain exercises. This creates the required transparency for the reduction of supply chain costs for handling, complexity and logistics.

Vertical business processes include the life cycle of your products and development, as well as the engineering to revamp or build new production, and essential maintenance processes. As in the horizontal processes, the speed at which the measurement is done by the analytical equipment is crucial. Designing from the start how to scale up, from lab to pilot plant, and from there to full-fledged production, paves the way to decrease the time to market and to have a more efficient scalability.
Endress+Hauser's chemical team has created hand-in-hand processes for basic and detailed engineering through to delivery and commissioning. The use of a fully digital process enables you to react to changes almost immediately while reducing potential errors made during engineering. Along the life cycle, we always provide you with the latest information for our portfolio anywhere and everywhere. Whether you are in your office or on the top of a distillation column servicing an instrument, you will find the information you need with Netilion, our cloud-based service.

We are ready to boost your plant safety and performance. Or, in other words, to enable you to save money and time without compromising on safety!

**Business process of a chemical company**

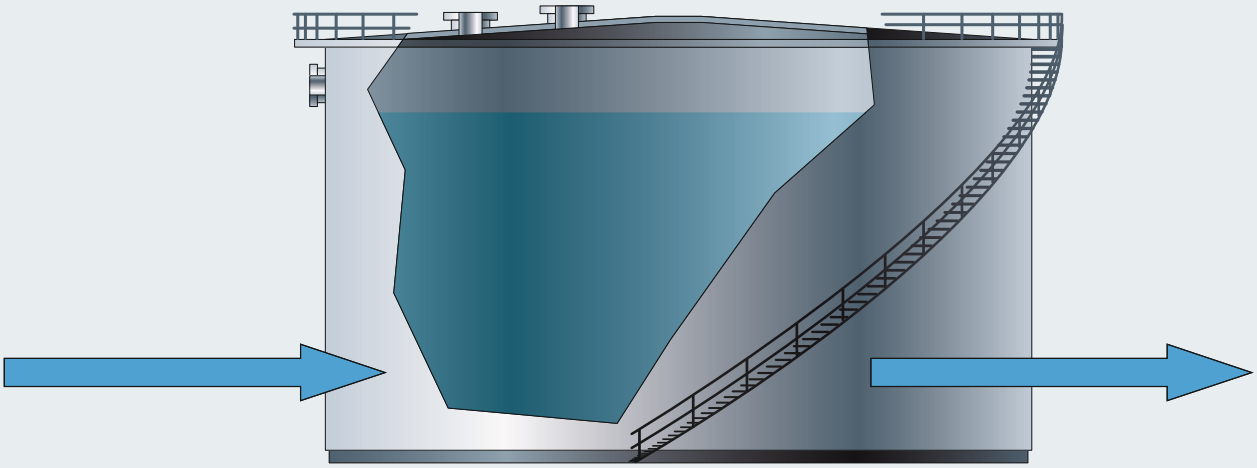


# Supply chain and storage

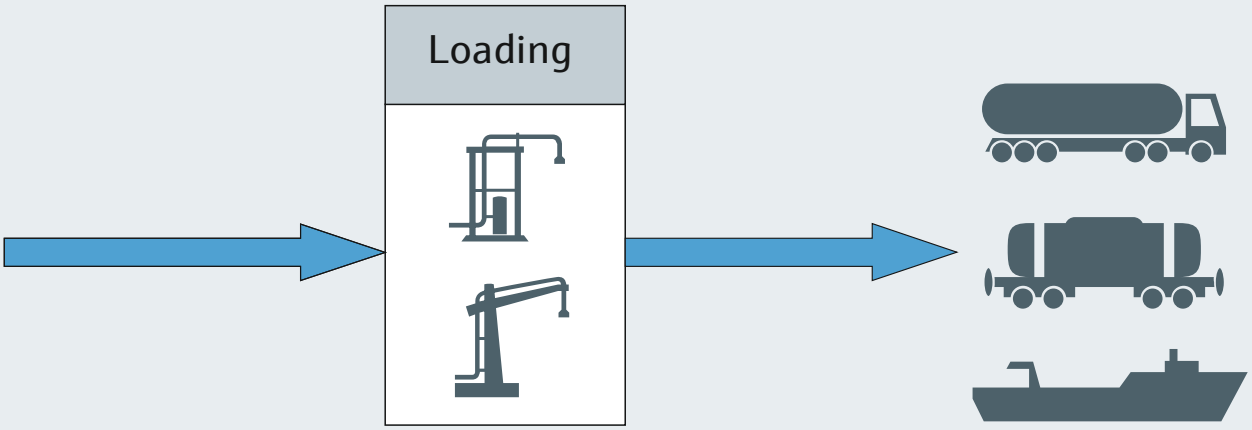
## Storage and transport of chemicals, safely and efficiently

Storage and transport of chemicals and other hazardous materials can inevitably carry potential risks. Mitigating risks through rigorous safety management while simultaneously ensuring efficiency and availability is a major challenge for today's worldwide chemical industry.

A Storage of chemicals

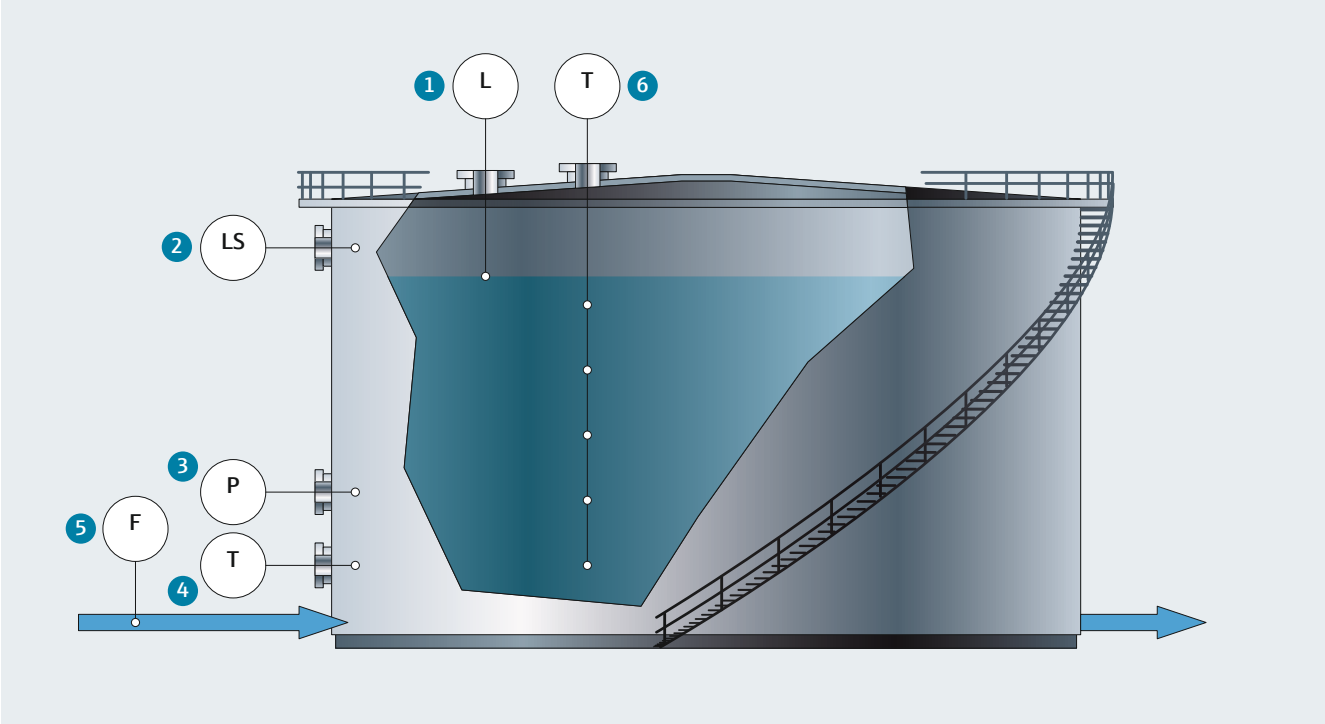


B Loading and unloading



# Storage of chemicals

## Storage of chemicals, safely and efficiently




### 1 – Micropilot NMR81

Non-contact 80 GHz radar device for custody transfer and inventory control applications

- Accuracy of up to ±0.5 mm and NMi/PTB approvals
- Time-saving commissioning due to easy connection to major DCS systems via open protocols
- Process safety – hardware and software developed according to IEC 61508 up to SIL3
- Drip-off antenna design eliminates measurement error due to condensation build-up

FLEX

www.endress.com/NMR81

### 2 – Liquiphant FTL81

Vibronic point level device with extension tube for liquids for FailSafe overfill prevention

- Real plug & play sensor without any need for adjustment even in changing media
- Guaranteed function due to permanent monitoring of fork for damage, corrosion and mechanical blocking
- Functional safety up to SIL3 according to IEC 61508/IEC 61511-1 and DIN EN ISO 13849
- Proof-testing interval up to 12 years, secondary devices tested at the press of a button

FLEX

www.endress.com/FTL81


### 3 – Cerabar PMP71B

Piezoresistive pressure transmitter for highly accurate measurements and full range of certifications

- Developed according to IEC 61508 for use in SIL2/3; calibration traceable to ISO/IEC 17025
- Easy-to-use wizards for commissioning, SIL locking and proof-testing; backlit display
- TempC diaphragm seal improves measurement performance and allows use of smaller flanges
- Bluetooth® connectivity and SmartBlue app for intuitive and remote operation

F L **E** X

www.endress.com/pmp71b

### 4 – iTHERM TM131

Intrinsically safe temperature sensor for applications in hazardous areas

- iTHERM QuickSens: fastest response times 1.5 s for optimum process control
- iTHERM StrongSens: unsurpassed vibration resistance (>60 g) for ultimate plant safety
- iTHERM QuickNeck: cost and time savings thanks to simple, tool-free recalibration
- International certification: explosion protection according to ATEX, IECEx, CSA C/US and NEPSI

F L **E** X

www.endress.com/TM131


### 5 – Proline Promass F 300

Robust Coriolis flowmeter with premium accuracy and a compact, easily accessible transmitter

- Highest process safety – pressure-rated sensor housing, purge connections and rupture disks
- Space-saving installation – no inlet/outlet run required
- Reliable data – developed as per IEC 61508 (SIL), with NAMUR NE 107 clear text diagnostics
- Process safety at all times thanks to implemented Heartbeat Technology

F L **E** X

www.endress.com/Proline-Promass-F300

### 6 – Prothermo NMT81

Precise average temperature and water bottom measurement

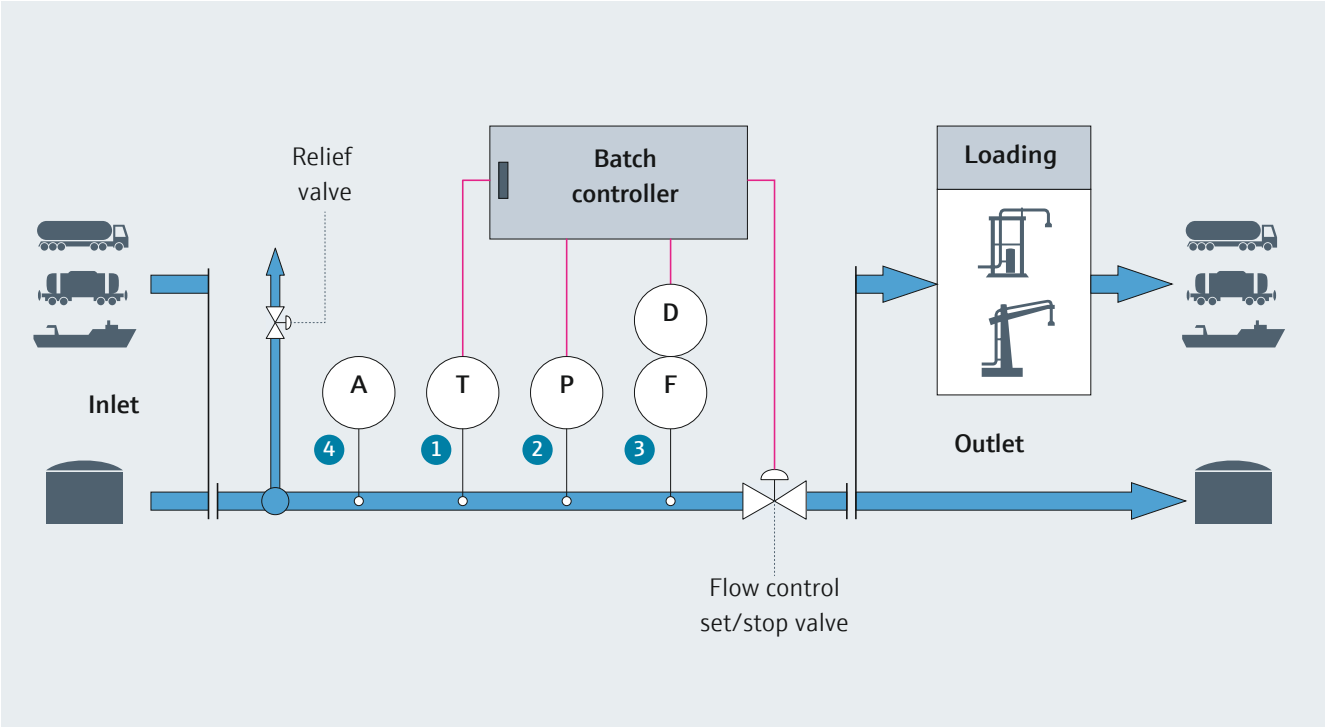
- Precise asset management thanks to up to 24 RTDs
- Corrosion-resistant process parts
- Waterproof and dust-proof housing
- Reduced downtime thanks to redundant RTDs processed by a software algorithm

F L E **X**

www.endress.com/nmt81

# Loading and unloading

## Reception and delivery of chemicals through safe, reliable and efficient methods

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F L E X

www.endress.com/TM131


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- TempC diaphragm seal improves measurement performance and allows use of smaller flanges
- Bluetooth® connectivity and SmartBlue app for intuitive and remote operation

F L E X

www.endress.com/pmp71b

### 3 – Proline Promass Q 300

Innovative and highly precise Coriolis flowmeter for challenging applications

- Optimized measuring performance for liquids with entrained gas thanks to MFT (Multi-Frequency Technology)
- Highest accuracy and repeatability for optimum mass balancing in plants
- Determination of product composition through precise density measurement

F L E **X**

www.endress.com/promass-q300

### 4 –w process photometer

Precise inline color measurement for product recognition and quality control

- Accurate color monitoring according to standard color scales
- Fast inline measurement for reduced operating costs and fewer product losses
- Low maintenance with long service life and stable operations
- High process safety thanks to international approvals for hazardous areas

F L **E** X

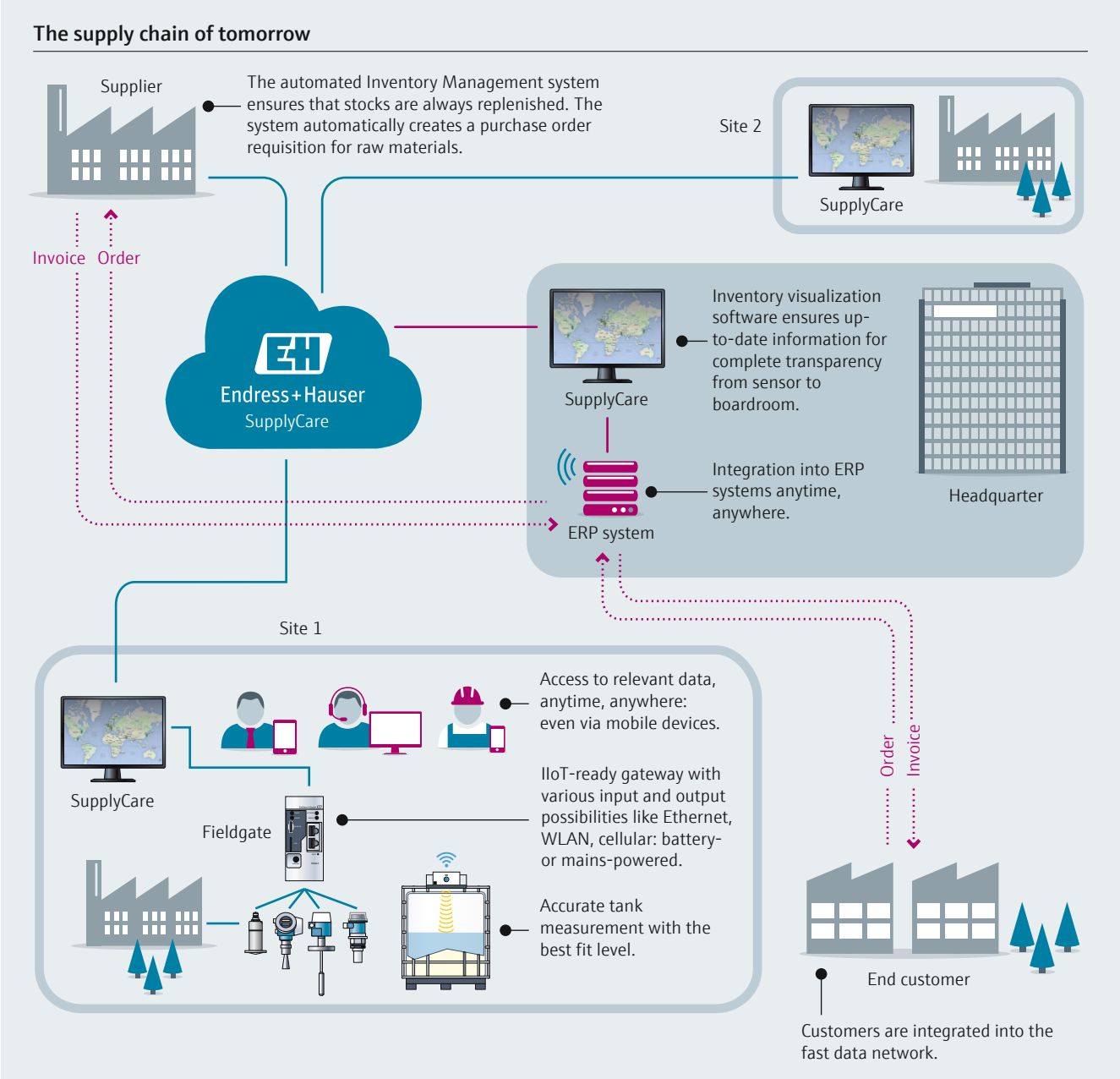
www.endress.com/OUSAF22

# Chemical process solutions

## Maximized plant performance and productivity with safety and quality assurance

In Endress+Hauser, you have an experienced partner for successful chemical plant modernization projects. With innovative, high-quality products, as well as expert consultation and support throughout the asset life cycle, we provide chemical process solutions to boost performance, reduce losses, minimize interruptions and increase safety. Together, we can work on realizing your company productivity and profitability objectives while protecting sustainability goals and industry safety obligations.

- Zero Loss: A quantitative approach will unlock efficiencies in your supply chain and plant mass balance while minimizing operational risk.
- Quality & Compliance: Ensure that the delivered products and output are compliant with quality standards while enhancing both throughput and safety of assets and personnel.
- Operational [Digital] Enhancements: Extract maximal operational performance from your chemical plant assets with optimized maintenance and ongoing expert support into your digital future.



# Applications:

## Chemical loading and unloading skids for trucks and railcars

Handling and transport of chemicals and other hazardous liquids can carry risks to people, assets and the environment, particularly when loading and offloading. From front-end engineering design to operations and maintenance, our chemical metering skid and process safety experts across the world are available to assist throughout the asset life cycle. Profit from our experience in over 5,000 applications in the chemical industry over the past 10 years.

## Inventory monitoring for the chemical industry

The chemical industry is characterized by highly complex supply chain processes. Managing raw material stocks optimally and safely, stored in silos of varying types, often geographically distant, requires ready access to data and analytics. Many chemical companies are turning from manual inventory data to new digital tools, powered by IIoT. Reduce stock planning efforts up to 60% with Endress+Hauser and optimize your inventory, storage planning and costs for lean, efficient operations.

## Monitoring of utilities (water, wastewater and steam monitoring)


Safety of the plant, employees and the environment is a top priority in the chemical industry. As a scarce resource, water must be reliably monitored to ensure its quality and to potentially reuse it in the process. Endress+Hauser's panel solutions help you make the right decisions in the following use cases:

- The water is used during extraction, filtration or centrifugation.
- The wastewater is generated in production and the surface water is collected in your plant.
- Steam is the safest way to generate heat in the chemical industry, most frequently in pass-through reactors. SWAS Compact saves up to 70% of water consumption compared to conventional SWAS systems.

## Moisture detection in feed gas

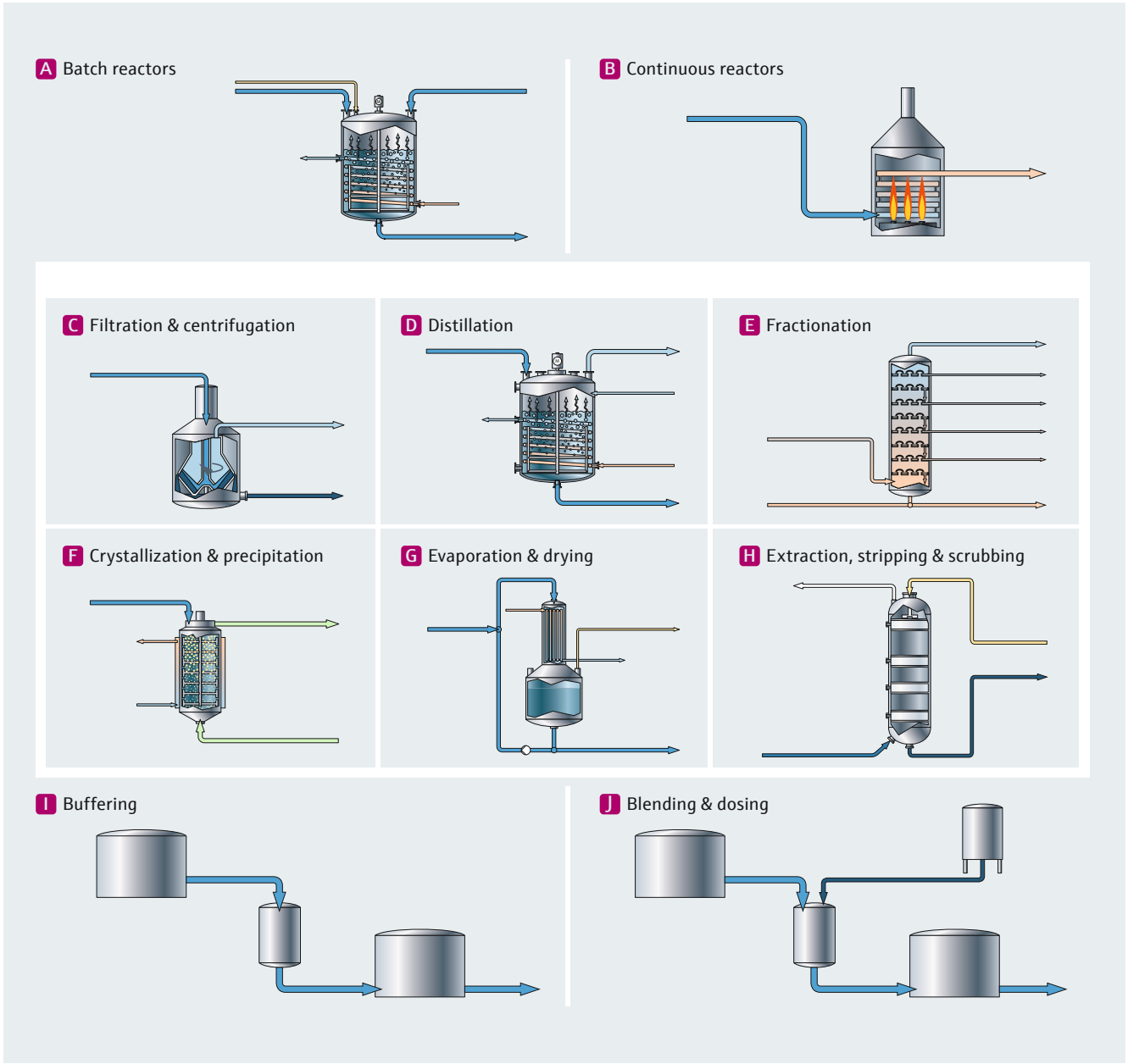
In the chemical industry, moisture is a disruptive factor not only for the installation but also for certain sensitive products. The reliability and accuracy of standard water analyzers can be affected by various contaminants. Endress+Hauser TDLAS analyzer solutions provide fast, precise and reliable water monitoring and control, with lower OpEx, minimal maintenance, no field calibration and no consumables. We combine turnkey solutions with expert project management to partner with you to deploy the optimum provision for your specific process needs.

www.eh.digital/chemical-solutions

# Core process units

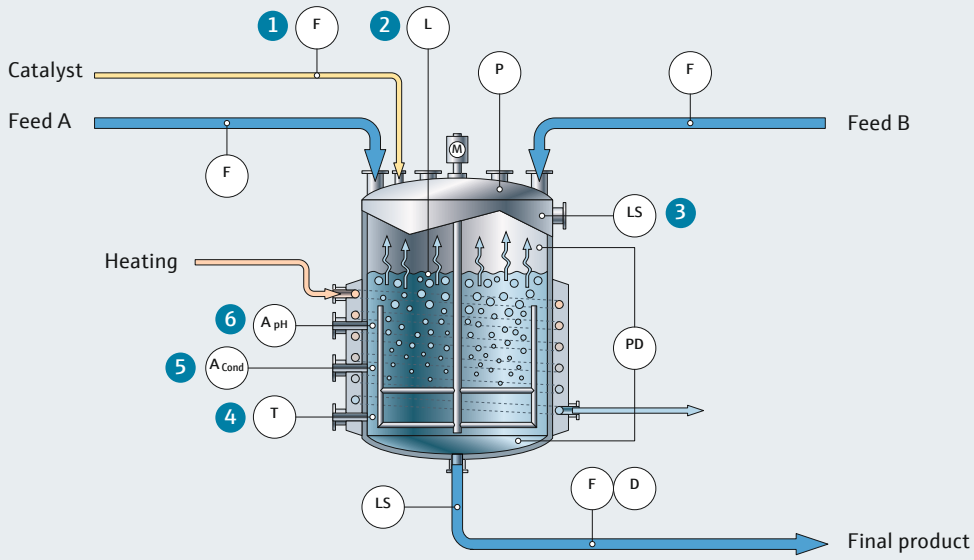
## From reactors to separation

Chemical manufacturing processes can be divided to two major groups: continuous and batch processes. Historically, in the early stage of chemical production, many chemical products were made through batch processes. Today, often larger volume (bulk) chemicals are produced through continuous processes for efficiency purposes. A continuous operation requires a constant raw material feed to the process vessel as well as continuous removal of the reaction product to ensure process safety.



# Batch reactors

## Being efficient for producing small quantities designed to meet customer-specific demands, batch processes are often used for specialty and fine chemicals




### 1 – Proline Promass A 300

Single-tube Coriolis flowmeter for smallest flow rates

- Highest process safety – fully welded process connections for pressures up to 430.9 bar (6250 psi)
- Single-tube design ideally suited for slurry catalysts - prevents blocked tubes
- Verified dosing quantity to control dosing pumps

F L E X

www.endress.com/Promass-A-300-8A3C

### 2 – Micropilot FMR62B

Non-contact radar measurement not affected by changing media, temperature changes, gas blankets or vapors

- Heartbeat Technology for cost-effective and safe plant operation during the entire life cycle
- Hardware and software developed according to IEC 61508 up to SIL3 incl. SIL proof test
- Seamless integration into control or asset management systems
- Bluetooth® connectivity and SmartBlue app for intuitive and remote operation

F L E X

www.endress.com/FMR62B

### 3 – Liquiphant FTL51B

Vibronic point level switch with optional extension tube for liquid applications in hazardous areas

- Time-saving commissioning without any adjustment for various media – no calibration required
- Developed according to IEC 61508 for usage in SIL2/SIL3 applications
- Functional testing by means of test button on electronic insert, via Testmagnet, remote via Nivotester FTL325N/P or SmartBlue app
- Real-time knowledge on device and process data with Heartbeat Technology without process interruption

F L **E** X

www.endress.com/liquiphant

### 4 – iTHERM TM131

Intrinsically safe temperature sensor for applications in hazardous areas

- iTHERM QuickSens: fastest response times 1.5 s for optimum process control
- iTHERM StrongSens: unsurpassed vibration resistance (>60 g) for ultimate plant safety
- iTHERM QuickNeck: cost and time savings thanks to simple, tool-free recalibration
- International certification: explosion protection according to ATEX, IECEx, CSA C/US and NEPSI

F L **E** X

www.endress.com/TM131

### 5 – Memosens CLS50D

Robust inductive conductivity sensor

- High durability and chemical resistance even in harsh processes such as sulfuric acid production
- Insensitive to soiling thanks to dirt-repellent materials and large sensor opening
- Digital Memosens technology for increased process safety and predictive maintenance

F L **E** X

www.endress.com/CLS50D

### 6 – Memosens CPS11E

Most flexible selection of pH glass sensors tailored to different batch conditions

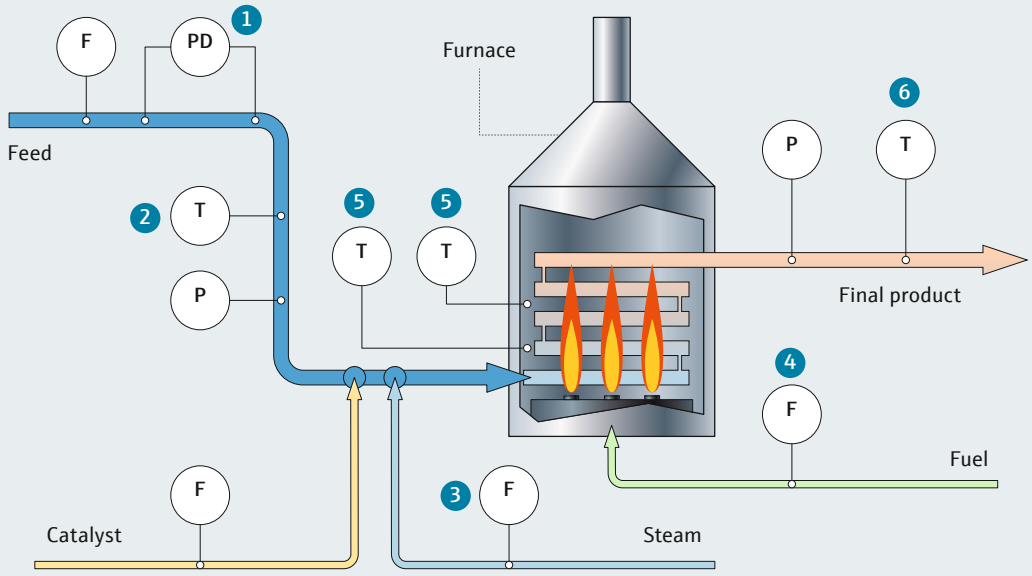
- High flexibility in processes thanks to various sensor versions: CPS11E for high alkaline load or hydrofluoric acid contents, CPS71E for poisoning media, CPS41E for fast-changing media
- Increased process safety and predictive maintenance thanks to digital, non-contact Memosens technology
- All international approvals for hazardous areas

F L **E** X

www.endress.com/CPS11E

# Continuous reactors

## Reactants are continuously fed into the reactor and emerge as a continuous stream of product




### 1 – Deltabar PMD75B

Smart differential pressure transmitter with full range of certifications and Heartbeat Technology

- Developed according to IEC 61508 up to SIL2/3; calibration traceable to ISO/IEC 17025
- Easy-to-use wizards for commissioning, SIL locking and proof-testing
- Heartbeat Monitoring wizards to detect anomalies like clogged impulse lines
- Bluetooth® connectivity and SmartBlue app for intuitive and remote operation

F L **E** X

www.endress.com/PMD75B

### 2 – iTHERM TM131

Intrinsically safe temperature sensor for applications in hazardous areas

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- iTHERM StrongSens: unsurpassed vibration resistance (>60 g) for ultimate plant safety
- iTHERM QuickNeck: cost and time savings thanks to simple, tool-free recalibration
- International certification: explosion protection according to ATEX, IECEx, CSA C/US and NEPSI

F L **E** X

www.endress.com/TM131

### 3 – Proline Prowirl F 200

Vortex flowmeter with mass flow output, available as compact or remote version

- Optimal availability – robust and resistant to vibrations, temperature shocks and water hammer
- Accurate values in critical applications due to dualsens version enabling redundant measurement
- Process safety at all times thanks to implemented Heartbeat Technology

F L **E** X

www.endress.com/prowirl-f200

### 4 – Proline Prosonic Flow G 300

Rugged inline flowmeter for demanding fuel gas measurement, including wet gas

- Ideally suited for fuel gas measurement and energy content calculation due to integrated advanced gas analysis functions
- Improved process control – output signals highly immune to fluctuations in process conditions or gas properties
- Best-in-class diagnostics coverage developed according to IEC 61508 (SIL by design)

F L **E** X

www.endress.com/prosonic-flow-g300

### 5 – Thermocouple TAF16

High-temperature TC thermometer

- Long lifetime by usage of innovative thermowell materials with increased wear and chemical resistance
- Long-term stable measurement due to sensor protection with non-porous materials
- Flexible product selection by modular design
- Optimized life cycle costs by means of replaceable spare parts

www.endress.com/TAF16

### 6 – TC13 Modular TC thermometer

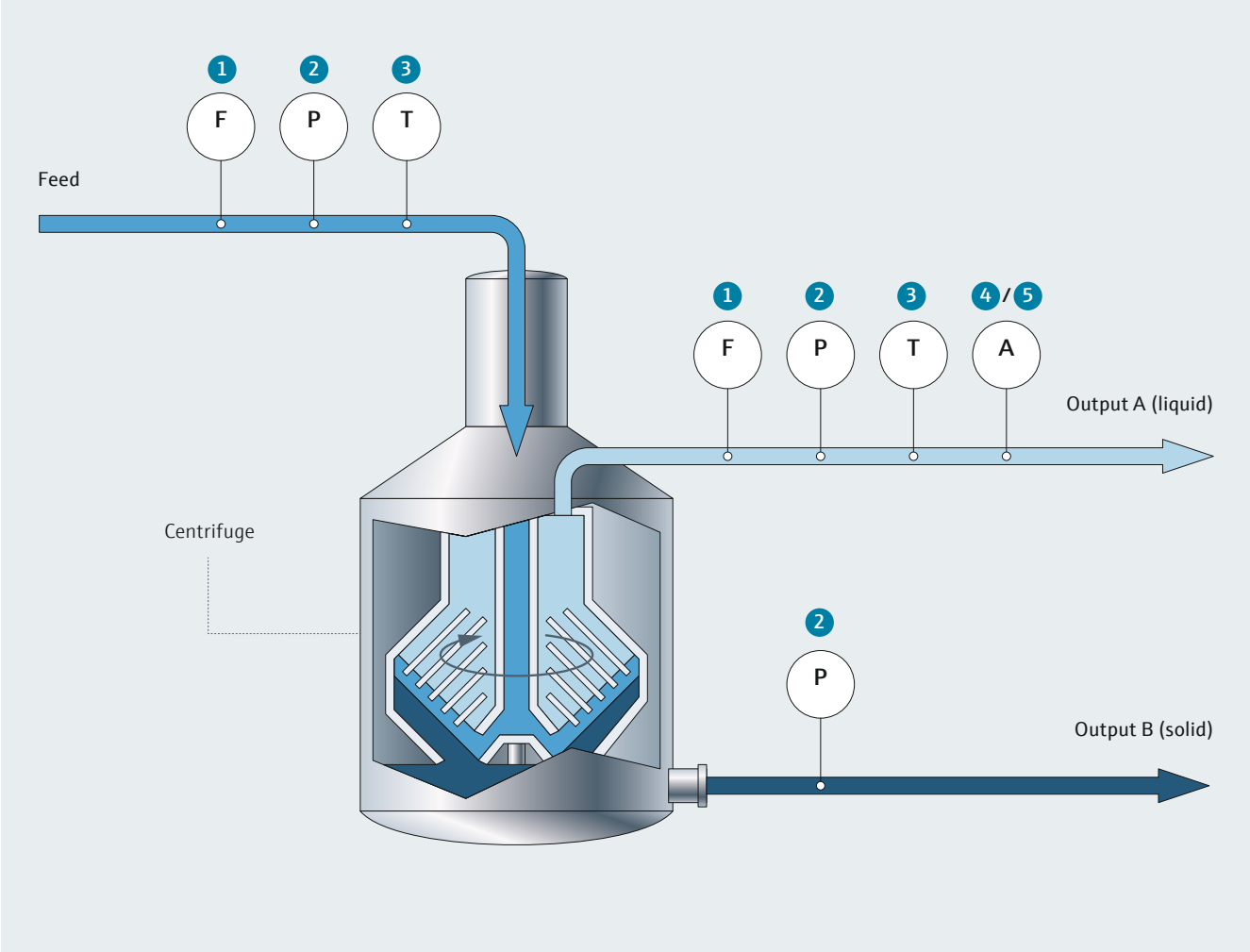
Precise average temperature and water bottom measurement

- High degree of flexibility thanks to modular design with standard terminal heads as per DIN EN 50446 and customer-specific immersion lengths
- High degree of insert compatibility and design as per DIN 43772
- Extension neck to protect the head transmitter from overheating
- Fast response time with reduced/tapered tip form

www.endress.com/TC13

# Filtration and centrifugation

## Separation of solids from liquids





**1 – Proline Promag P 300**
Proven electromagnetic flowmeter for feed or inlet control to the centrifuge

- Cost-efficient and robust measuring system as per IEC 61508 (SIL)
- Energy-saving due to full-bore design with minimal pressure loss
- High process reliability thanks to Heartbeat Technology for diagnostics, verification and monitoring
- Integrated conductivity measurement for optimum product quality

F L E X

www.endress.com/5P3B


## 2 – Cerabar PMC71B

Smart pressure transmitter with dry ceramic cell, a full range of certifications and Heartbeat Technology

- Easy-to-use wizards for commissioning, SIL locking and proof-testing
- Backlit display for easy readability and identification in the field
- Heartbeat Technology for cost-effective and safe plant operation during the entire life cycle
- Bluetooth® connectivity and SmartBlue app for intuitive and remote operation

F L E X

www.endress.com/PMC71B

## 3 – iTHERM TM131

Intrinsically safe temperature sensor for applications in hazardous areas

- iTHERM QuickSens: fastest response times 1.5 s for optimum process control
- iTHERM StrongSens: unsurpassed vibration resistance (>60 g) for ultimate plant safety
- iTHERM QuickNeck: cost and time savings thanks to simple, tool-free recalibration
- International certification: explosion protection according to ATEX, IECEx, CSA C/US and NEPSI

F L E X

www.endress.com/TM131

## 4 – OUSAF12 process photometer

Suspended solids measurement by light absorption in the NIR/VIS range

- Process and product safety due to inline detection of significant turbidity/ solids changes
- Reliable measured values thanks to easy and traceable liquid-free calibration
- Cost savings thanks to timely detection of solids in the clarified product
- Reliable digital communication with HART, Modbus TCP, EtherNet/IP and Profibus DP with Liquiline transmitter

F L E X

www.endress.com/OUSAF12

## 5 – OUSTF10 process photometer

Turbidity and suspended solids measurement by light scattering and absorbance

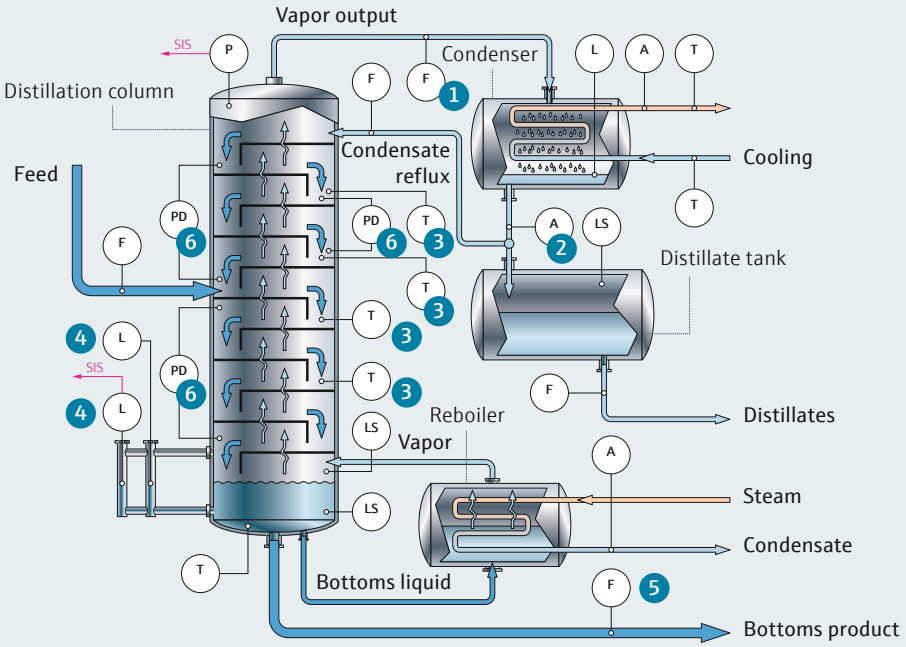
- Process and product safety due to inline detection of significant turbidity/ solids changes
- Cost savings thanks to timely detection of filter breakthrough and permanent quality control of the filtrate
- Reliable digital communication with HART, Modbus TCP, EtherNet/IP and Profibus DP with Liquiline transmitter

F L E X

www.endress.com/OUSTF10

# Distillation

## Separation of a liquid from a liquid




### 1 – Proline Promass F 300

Robust Coriolis flowmeter for accurate gas output measurement

- Reliable data – developed as per IEC 61508 (SIL), with NAMUR NE 107 clear text diagnostics
- Implemented Heartbeat Technology for in situ device verification without process interruption
- Robust, proven-in-use mass flowmeter for process temperatures up to +240 °C (option: +350 °C)

F L **E** X

www.endress.com/Proline-Promass-F300

### 2 – OUSAF22 process photometer

Optical sensor combined with the OUA260 flow assembly for the measurement of color concentrations

- Measures the slightest color changes and impurities ensuring high condensate and product quality
- Fast inline measurement for reduced operating costs and optimum efficiency of the distillation
- Stable measured values; ATEX and FM approval when using an ex barrier
- Cost savings thanks to unique combination of OUSAF22 and Memosens sensors with one transmitter

F L **E** X

www.endress.com/OUSAF22

### 3 – iTHERM MultiSens Linear TMS11

Modular TC and RTD multipoint thermometer for oil & gas and petrochemical applications

- Increased safety due to continuous monitoring of the integrity of the thermowell with a pressure port
- Linear sensors distribution layouts suitable for any process monitoring configuration
- Possibility to individually replace inserts, even in operating conditions
- Easy mounting thanks to a modular and integrated junction box support system
- Inserts according to standard IEC 60584, ASTM E230 and IEC 60751

F L E **X**

www.endress.com/TMS11

### 4 – Levelflex FMP51

Standard guided wave radar device for level applications in liquids

- Reliable measurement even for changing product and process conditions
- HistoROM data management concept for fast commissioning
- Hardware and software developed according to IEC 61508 up to SIL3 incl. SIL proof test
- Heartbeat Technology for cost-effective and safe plant operation during the entire life cycle
- Seamless integration into control or asset management systems

F L **E** X

www.endress.com/FMP51

### 5 – Proline Promass Q 300

Innovative Coriolis flowmeter for challenging applications

- MFT (Multi-Frequency Technology) for optimized measuring performance in liquids with entrained gas
- Improved plant mass balancing due to superior accuracy and repeatability
- Reliable determination of product composition through highly precise density measurement

F L E **X**

www.endress.com/promass-q300

### 6 – Deltabar FMD72

Accurate electronic dp level measurement even for boiling surfaces

- Safety built in – system unaffected by environmental conditions
- Safety risks are minimized with the electronic differential pressure system architecture and design
- The technology to lead – high reproducibility and long-term stability

F L **E** X

www.endress.com/FMD72

# Use digitalization to ensure the right chemistry with your assets

Emerging trends like the circular economy, environmental sustainability and new technologies are amplifying the need for a new way of thinking. Changing mindsets and behavior shape an increased demand for enhanced digital offerings. Digital data delivers valuable insights into the chemical production process. Increased control over the installed base enables operators to reduce costs, improve availability and efficiency and mitigate risks in the engineering, procurement, operations and maintenance phase.

Just imagine you could ensure the ongoing optimization of your productivity? What if you could increase your performance? And what if you could better keep on schedule, mitigate and manage risks efficiently and stay on budget? With our safety-by-design instruments, deep application know-how and reliable and accurate data, we can support chemical production facilities to run at an optimum level. An easy-to-use IIoT ecosystem can facilitate and support these processes and deliver a return on investment with respect to maintenance and operations, safety and compliance. One important dimension of process optimization is a transparent overview of the plant and equipment. High supplier mix or communication protocol variants can lead to inefficient operations and unnecessary effort – and thus results in high costs for maintaining, purchasing and managing the installed base.

Regardless of the type of equipment – instrumentation, pumps, valves, etc. – failures of critical apparatus can cause complete production shutdown in the worst case. Key equipment data can become a crucial lever for increasing reliability. At this point, it is revealing to know that 90 percent of Endress+Hauser field devices are already digital. The key is to connect the installed base to unlock the potential and intelligence of our devices, translate data into information and multiply the added value of our offering.

This is where Endress+Hauser's field connectivity and the Netilion IIoT ecosystem come into play. Our technology is capable of accessing crucial equipment data, such as obsolescence status, instrument documentation or self-diagnostics. And this empowers the customer to reduce the risk and costs for stock and operations

Get all the insights with Netilion Value

Making the information and files digitally available in a safe way increases control over the processes. Quick responses in case of emergencies, as well as strategic operational activities, can be based on precise data and perfectly managed documents. This is how an IIoT ecosystem creates opportunities to increase performance.

A digitalized factory opens the door to multiple optimization opportunities, even in industries that can already look back on a history of continuous improvement. End-to-end digital transformation is top of mind, from raw material and energy, production, operations and maintenance to final products and waste management. Major digital trends reshaping the operating models of chemical companies are massive advancements in technology, rapidly changing customer requirements and increasing pressure on cost and productivity. Our IIoT ecosystem enables scalable, secure and connected products and services that match these requirements.

Endress+Hauser is a trustworthy partner in implementing digital services. The development process of the products has been certified group-wide according to IEC 62443-4-1. Our IIoT ecosystem Netilion fulfills the requirements of ISO 27017. Furthermore, Endress+Hauser Digital Solutions complies with ISO 27001. And Netilion is easy to implement. The standard offering comprises various digital services. The Netilion Connect API module can be utilized for data integration projects or development of individual applications. There are several ways to ensure field connectivity in order to unlock the data. With a partner like Endress+Hauser, whose expertise covers the hardware automation level and IIoT, you are in a position to take a major step toward the future of manufacturing.

Looking for more details on Netilion?
www.netilion.endress.com

## Netilion Services

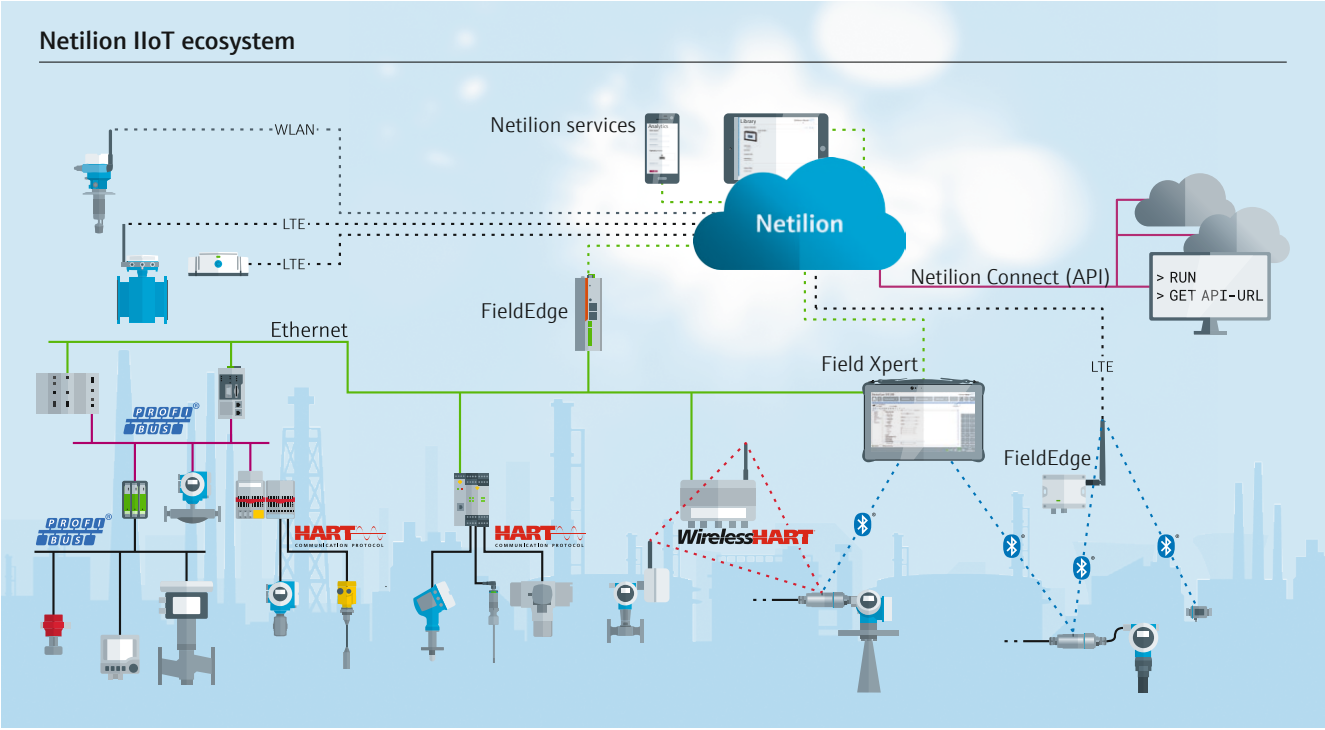
**Netilion Analytics** is a digital service that lets you manage all the devices in your plant. Use their data to eliminate obsolescence by optimizing and standardizing your equipment. This is the first step to keeping productivity smooth and continuous.

**Netilion Library** is a file management service designed to organize documents related to your plant's instrumentation. The digital availability of these files will increase your team's performance, thanks to automated administration and simple information sharing.

**Netilion Health** is a digital asset-health management service that puts your maintenance team a step ahead of problems. Diagnostics and cause and remedies anytime and anywhere.

**Netilion Value** is a digital monitoring service that connects you to your measurements wherever you are, letting you see what's happening in your facility at any time. With digital access to this information, you can manage operational quality accurately and precisely – even from a distance. And you can document your compliance.

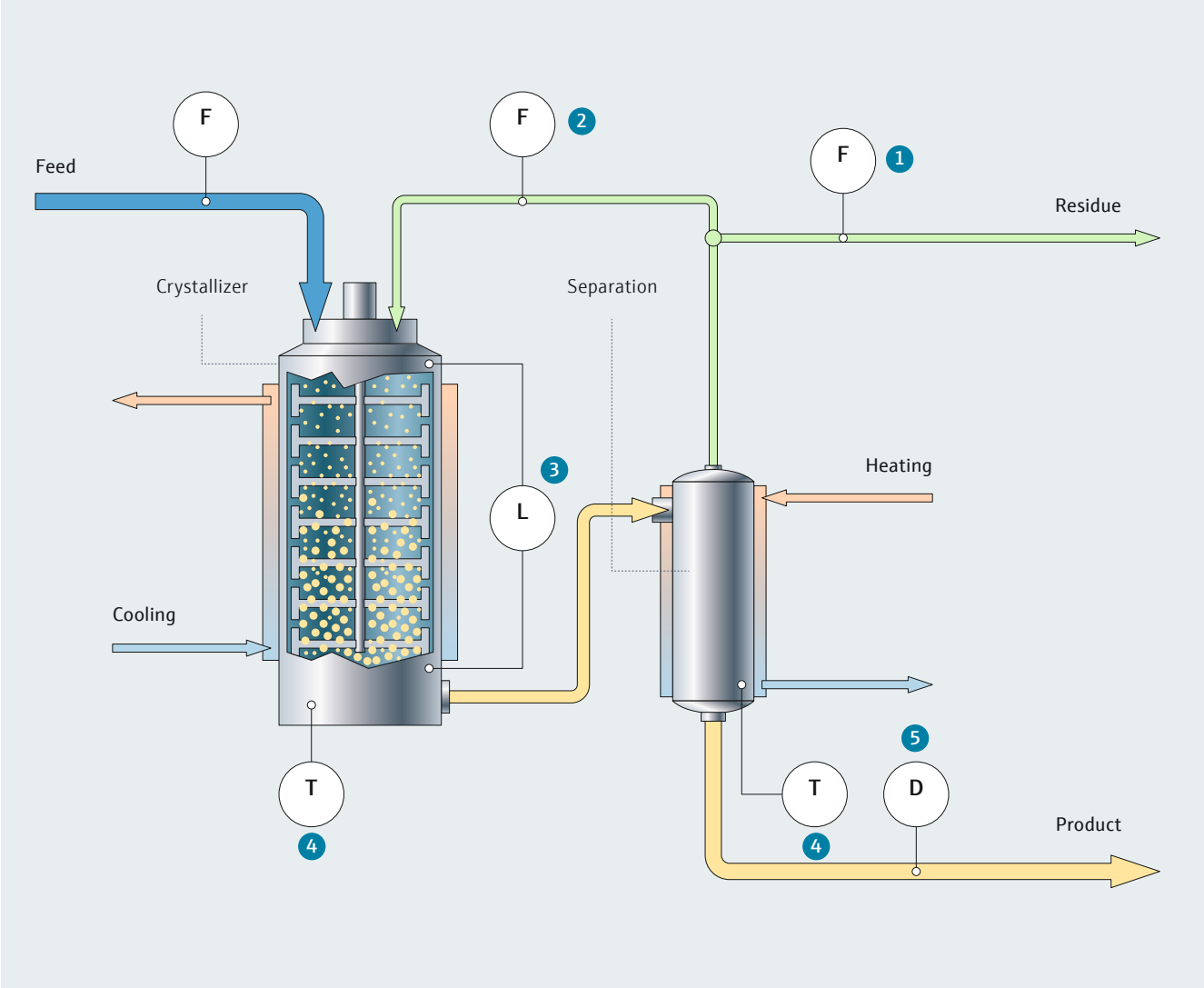
**Netilion Inventory** is a digital service for inventory management that allows you to control your supplies. No matter where you are, you can monitor your containers and tanks. Having exact data about how much you have is the best way to optimize storage and logistics.




Typical industrial network topology with Netilion connectivity

# Crystallization and precipitation

## Separation by solubility change




### 1 – Proline Promass F 200

Genuine loop-powered, robust and proven Coriolis flowmeter for residue measurement

- Lower costs for electrical installation through two-wire technology. No need for a separate power circuit
- Safe operation – simplified access and maintenance in hazardous areas due to intrinsically safe design
- Direct in situ density measurement and temperature-compensated concentration determination

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www.endress.com/8F2B


## 2 – Proline Promag P 300

Robust electromagnetic flowmeter for reflux monitoring

- High process reliability thanks to Heartbeat Technology for diagnostics, verification and monitoring
- Integrated conductivity measurement for optimum product quality
- Broad application range due to wide variety of corrosion-resistant materials (wetted parts)

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www.endress.com/5P3B

## 3 – Deltabar FMD71

Electronic dp measurement with robust ceramic membrane technology

- System unaffected by environmental conditions
- Safety risks are minimized with the electronic differential pressure system architecture and design
- Robust and reliable ceramic membrane with high reproducibility and long-term stability

F L **E** X

www.endress.com/fmd71

## 4 – iTHERM TM131

Intrinsically safe temperature sensor for applications in hazardous areas

- iTHERM QuickSens: fastest response times 1.5 s for optimum process control
- iTHERM StrongSens: unsurpassed vibration resistance (>60 g) for ultimate plant safety
- iTHERM QuickNeck: cost and time savings thanks to simple, tool-free recalibration
- International certification: explosion protection according to ATEX, IECEx, CSA C/US and NEPSI

F L **E** X

www.endress.com/TM131

## 5 – Liquiphant FTL51B

Vibronic point level switch with optional extension tube for liquid applications in hazardous areas

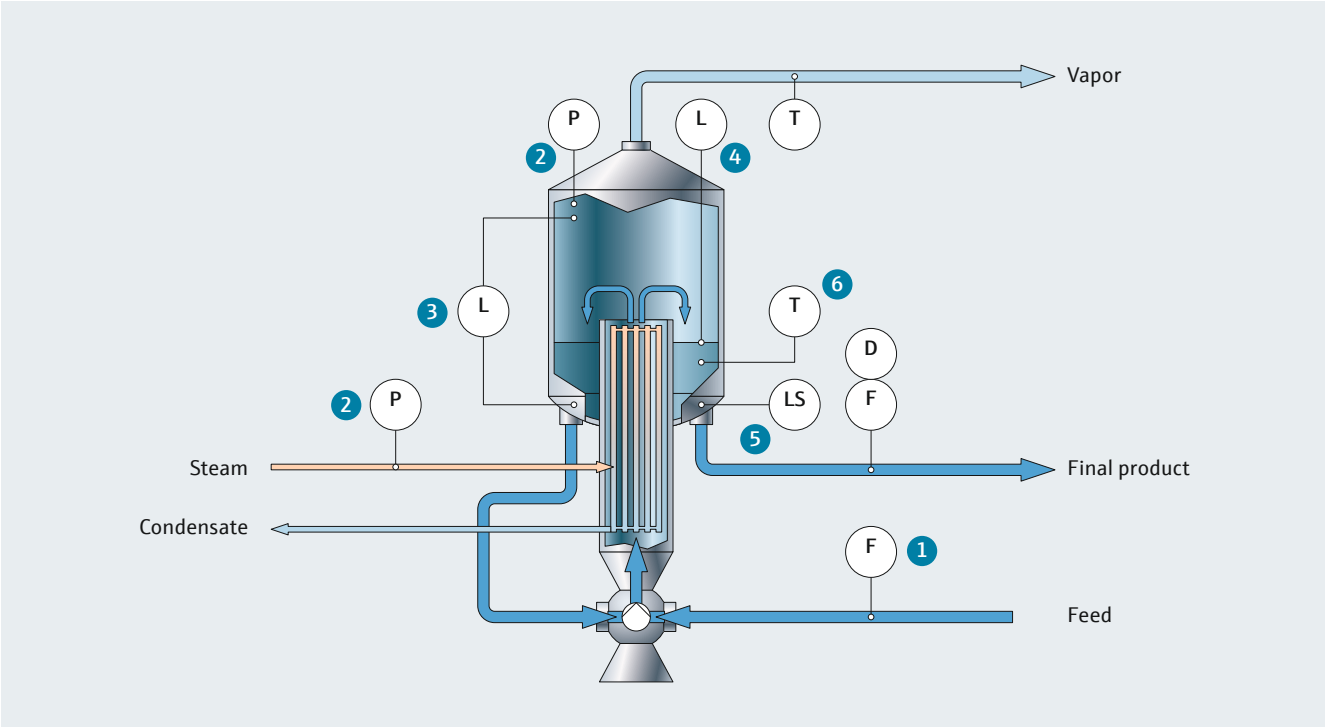
- Time-saving commissioning without any adjustment for various media – no calibration required
- Developed according to IEC 61508 for usage in SIL2/SIL3 applications
- Functional testing by means of test button on electronic insert, via Testmagnet, remote via Nivotester FTL325N/P or SmartBlue app
- Real-time knowledge on device and process data with Heartbeat Technology without process interruption

F L **E** X

www.endress.com/liquiphant-FTL51B

# Evaporation and drying

## Separation by concentration and solubility change




### 1 – Proline Promag P 200

Robust electromagnetic flowmeter with genuine loop-powered technology

- Maintenance-free measuring system without moving parts for long-term operation
- Fast and simple connectivity thanks to genuine two-wire technology
- Broad application range due to a wide variety of corrosion-resistant materials (wetted parts), e.g. PFA liners and various electrode materials
- Safe operation – simplified access and maintenance in hazardous areas due to intrinsically safe design

F L **E** X

www.endress.com/Promag-P-200


### 2 – Cerabar PMP71B

Smart piezoresistive pressure transmitter with full range of certifications and Heartbeat Technology

- Developed according to IEC 61508 up to SIL2/3; calibration traceable to ISO/IEC 17025
- Easy-to-use wizards for commissioning, SIL locking and proof-testing
- Detect dynamic pressure peaks via Heartbeat Monitoring
- Bluetooth® connectivity and SmartBlue app for intuitive and remote operation

F L **E** X

www.endress.com/PMP71B

### 3 – Deltabar FMD72

Maximize stock quality with the innovative specialist in electronic dp measurement

- Safety built in – system unaffected by environmental conditions
- Safety risks are minimized with the electronic differential pressure system architecture and design
- The technology to lead – high reproducibility and long-term stability

F L E X

www.endress.com/FMD72

### 4 – Micropilot FMR51

Non-contact radar device for advanced level applications in liquids

- HistoROM data management concept for fast and easy commissioning
- Bluetooth® connectivity and SmartBlue app for intuitive and remote operation
- Hardware and software developed according to IEC 61508 up to SIL3 incl. SIL proof test
- Heartbeat Technology for cost-effective and safe plant operation during the entire life cycle

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www.endress.com/FMR51

### 5 – Liquiphant FTL62

Vibronic point level device with extension tube for liquids with highly corrosion-resistant coating

- Resistant and reliable sensor with different coatings for aggressive media
- Time-saving commissioning without any adjustment for various media – no calibration required
- Developed according to IEC 61508 for usage in SIL2/SIL3 applications
- Guaranteed function due to permanent monitoring of fork
- Real-time knowledge on device and process data with Heartbeat Technology without process interruption

F L E X

www.endress.com/liquiphant-FTL62

### 6 – iTHERM TM111

Explosion-proof temperature sensor designed for a wide range of industrial applications and hazardous areas

- iTHERM QuickSens: fastest response times 1.5 s for optimum process control
- iTHERM StrongSens: unsurpassed vibration resistance (> 60 g) for ultimate plant safety
- User-friendly and reliable from product selection to maintenance
- International certification: explosion protection according to ATEX, IECEx, CSA C US and NEPSI

F L E X

www.endress.com/TM111

# Service by your side

## Our service portfolio was developed to enable you to achieve a higher performance with lower operational costs without compromising safety

By your side, with total commitment, today and into the future, Endress+Hauser will help you to meet and surpass the specific challenges of your operation. It is what drives us; it is what defines us. As the global 24/7 economy in which you compete brings unprecedented margin pressures, we help you to deliver incremental OpEx reductions and plant availability gains that make a difference.

As new regulations to protect people and the environment are introduced, the industry is being forced to rethink its processes. We will help you comply with the strictest of requirements while remaining competitive. Moreover, we are here to ensure that relentless technological progress does not become a threat but an opportunity. With Endress+Hauser Services, you give yourself every chance of success.


## Dynamic IBA

The Dynamic Installed Base Analysis manages all instrument-related information to enable asset, process and maintenance optimization. It takes you data to a level beyond collection and analysis. Our service consultants deliver accurate asset information management with expert recommendations.

- Gain transparency with reliable, accurate, comprehen-sive and clearly visualized instrument information
- Improve plant availability and get standardization insights with reliable analysis
- Enhance maintenance strategies with expert analysis and recommendations
- Find the ideal balance between asset criticality and obsolescence management to minimize risk and optimize plant availability
- Stay fully informed and compliant with traceable documentation

## Maintenance and calibration optimization

How can you find the right balance between costs and maintenance activities without compromising safety? A review and redesign of the maintenance processes in a plant can help maintenance and plant managers to decide how to reach their asset management goals. On one hand, Endress+Hauser consultants analyze calibration data with in-depth metrological expertise to help customers to find their optimal calibration intervals. On the other hand, they provide detailed insights on the health of your installed base to optimize current maintenance processes and assist in reducing operational costs. By making the data obtained from processes and instruments (Endress+Hauser and third parties) available in a quick and safe manner, we can tailor the best services offer with added value for our clients.

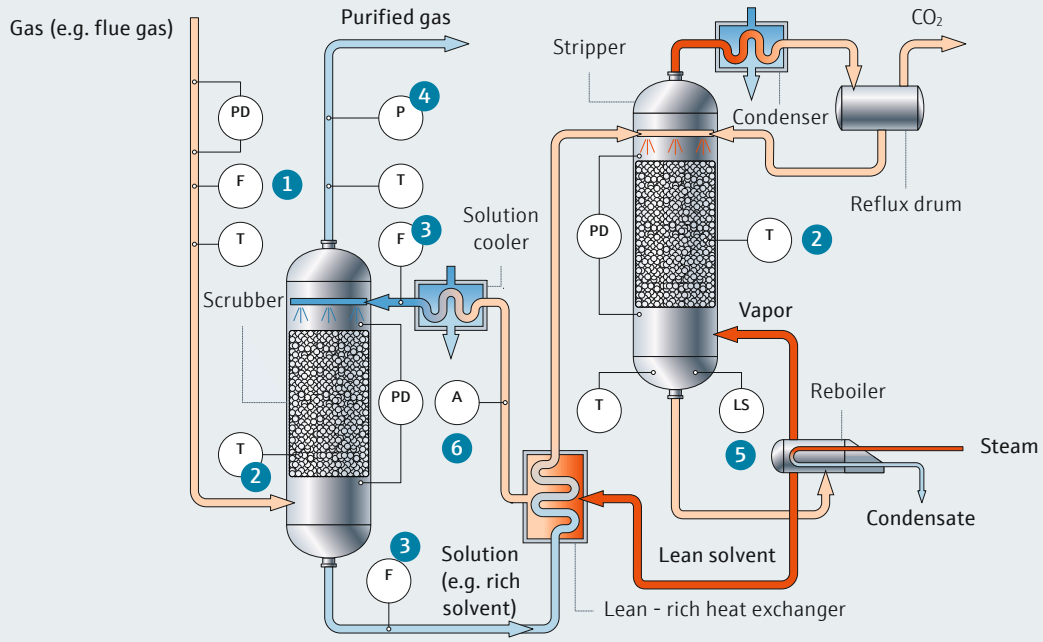
## Remote asset monitoring with Smart Support Connect

Smart Support Connect increases responsiveness to service incidents thanks to automated support notifications with diagnostics and related remedies. Enhance diagnostics and maintenance workflows to increase uptime and plant availability. Our Smart Support Connect for diagnostics and maintenance of your process-critical Endress+Hauser equipment ensures measurement confidence and reduced cost of ownership throughout its life cycle.

- Flexible service agreement levels with guaranteed response times
- 24/7 access to our technical knowledge base
- Proactive support with audio-visual connection to our instrumentation and process experts
- Remote asset monitoring and proactive notifications with cause and remedy information for our CA80 analyzers

# Stripping and scrubbing

## Separation by extraction




### 1 – Proline Prowirl F 200

Vortex flowmeter with mass flow output

- Optimal availability – robust and resistant to vibrations, temperature shocks and water hammer
- Reliable data – developed as per IEC 61508, with NAMUR NE 107 clear text diagnostics
- Safe operation – simplified access and maintenance in hazardous areas due to intrinsically safe design
- Process safety at all times thanks to implemented Heartbeat Technology

F L **E** X

www.endress.com/prowirl-f200

### 2 – iTHERM MultiSens Linear TMS11

Modular TC and RTD multipoint thermometer for oil & gas and petrochemical applications

- Increased safety due to continuous monitoring of the integrity of the thermowell with a pressure port
- Linear sensors distribution layouts suitable for any process monitoring configuration
- Possibility to individually replace inserts, even in operating conditions
- Easy mounting thanks to a modular and integrated junction box support system
- Inserts according to standard IEC 60584, ASTM E230 and IEC 60751

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www.endress.com/TMS11

### 3 – Proline Promass F 300

Robust Coriolis flowmeter with premium accuracy

- With Gas Fraction Handler for a special signal processing ensuring a more stable reading during two-phase flow
- Optimal process safety – dedicated wetted parts for chemical and process applications
- Developed as per IEC 61508, with NAMUR NE 107 clear text diagnostics

F L **E** X

www.endress.com/Proline-Promass-F300


### 4 – Cerabar PMP71B

Smart piezoresistive pressure transmitter with full range of certifications and Heartbeat Technology

- Developed according to IEC 61508 with highest diagnostic coverage
- Easy-to-use wizards for commissioning, SIL locking and proof-testing
- Heartbeat Technology with cost-effective verification
- Bluetooth® connectivity and SmartBlue app for intuitive and remote operation

F L **E** X

www.endress.com/pmp71b

### 5 – Liquiphant FTL51B

Vibronic point level switch with optional extension tube for liquid applications in hazardous areas

- Time-saving commissioning without any adjustment for various media – no calibration required
- Developed according to IEC 61508 for usage in SIL2/SIL3 applications
- Functional testing by means of test button on electronic insert, via Testmagnet, remote via Nivotester FTL325N/P or SmartBlue app
- Real time knowledge on device and process data with Heartbeat Technology without process interruption

F L **E** X

www.endress.com/liquiphant

### 6 – Memosens CPS11E

Robust and reliable pH glass sensor for make-up water control

- Low-maintenance and robust thanks to large PTFE ring junction
- Increased process safety and predictive maintenance thanks to non-contact, digital Memosens technology
- Cost savings thanks to flexible installations with multi-channel, multi-parameter transmitters
- Reliable digital communication with HART, Modbus TCP, EtherNet/IP and Profibus DP possible

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www.endress.com/CPS11E

# Optical analysis

## Trusted Raman analyzer and probe technology

For over 30 years, Endress+Hauser has harnessed the powerful analytical information of Raman spectroscopy to help companies attain operational excellence. Endress+Hauser Raman analyzer systems are proven and reliable process measurement tools for a wide range of upstream and downstream chemical applications. We offer real-world expertise that comes from having Raman analyzers successfully installed at multiple chemical plants around the globe.

Endress+Hauser Raman analyzer systems are prized for their ability to perform chemical compositional analyses on gas, liquid, and solid samples with unparalleled accuracy and precision. Featuring highly intuitive Raman RunTime embedded control software, our Raman analyzers work in conjunction with a range of versatile Raman sampling probes optimized for the chemical industry. Accessed via a user-friendly touchscreen or remote interface, Raman RunTime integrates the spectrometer functions into the analyzer electronics, avoiding the need to run proprietary software.

### Benefits of Raman measurement

Our Raman-based instrumentation is easy and economical to install, operate and maintain. Up to four Raman probes can be inserted directly into multiple process streams, each one remotely connected to a single analyzer that can be located hundreds of meters away from a potentially hazardous process. As a result, one compact Raman analyzer can effectively replace four gas chromatographs (GCs), along with their sample handling systems. Companies can dramatically reduce CapEx by saving shelter space and lower OpEx by eliminating the maintenance typically required on a GC and sample handling system with wearing parts.

### Our proven Raman technology

Endress+Hauser's industry-proven Raman technology truly shines in its ability to provide real-time, *in situ* measurement at the speed of light—far faster than other off-line techniques—with greater accuracy and reproducibility. In essence, our Raman analyzer systems empower you to "see" directly into your chemical processes in real time, so you can precisely and accurately:

- Measure the purity of the feed streams
- Monitor the reaction progress in continuous batch reactors
- Detect the endpoint of the reaction
- Determine the quality of the end products

With such tight process monitoring and control, Endress+Hauser Raman products help to improve your processes so you can boost plant safety and performance, as well as save time and money across your entire organization.

# Endress+Hauser's Raman spectroscopic portfolio

## For in-line, real-time process measurement 24/7

### Raman Rxn2 analyzer

Designed for use in analytical laboratories with model transfer capabilities

- Reliable, real-time, *in situ* measurements
- Unified internal construction for easy model transfer
- Intuitive, fully embedded Raman RunTime control software with built-in multivariate predictors
- Configurable with up to four probes with installation via benchtop or mobile wheeled cart

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www.endress.com/RXN2B

### Raman Rxn4 analyzer

Designed for analysis in process and manufacturing settings

- Continuous in-line, on-line, or at-line process measurement
- Intuitive, fully embedded Raman RunTime control software via touchscreen or remote interface
- Scale-up, scale-out and pilot-plant compatible
- Designed for rack installation (NEMA 4X enclosure available) and certified for output into hazardous area/classified environments

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www.endress.com/RXN4B

## Raman Rxn5 analyzer

Turnkey, laser-based, gas-phase process analysis

- Fast, accurate, non-destructive gas-phase measurement
- Compact with no sample transport, no consumables and minimal utility requirements
- Minimal analyzer technician time with maximum technician safety
- Flexible installation options and hazardous area certification: ATEX, CSA, IECEx

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www.endress.com/RXN5B

## Raman Rxn-30 probe

Robust, reliable gas-phase probe for process analysis

- Reliable, quantitative, in situ gas-phase measurements with no transfer lines or fast loops required
- Can be directly inserted into processes with temperatures up to 150 °C and pressures up to 68.9 Barg at sample
- Industry standard installation options and sampling flexibility (direct insertion, side insertion, or sample loop)
- Hazardous area certified: ATEX, CSA, IECEx

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www.endress.com/R30

## Raman Rxn-40 probe

Compact, sealed immersion probe for liquid analysis in laboratory or process plant settings

- Fast, simple and customizable installation with a range of process connections
- In situ/no transfer lines or fast loops required
- Supports a range of chemical processes and corrosivity requirements
- Meets regulatory requirements and hazardous area certified: ATEX, CSA, IECEx

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www.endress.com/R40

## Raman Rxn-41 probe

Rugged, direct process insertion probe for liquid analysis

- Constructed to individual site requirements
- Sealed probe design and integrated “laser on” indicator
- Meets Category 1 pressure equipment safety standards
- Hazardous area certified: ATEX, CSA, IECEx

F L **E** X

www.endress.com/R41

www.addresses.endress.com

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Endress+Hauser

People for Process Automation