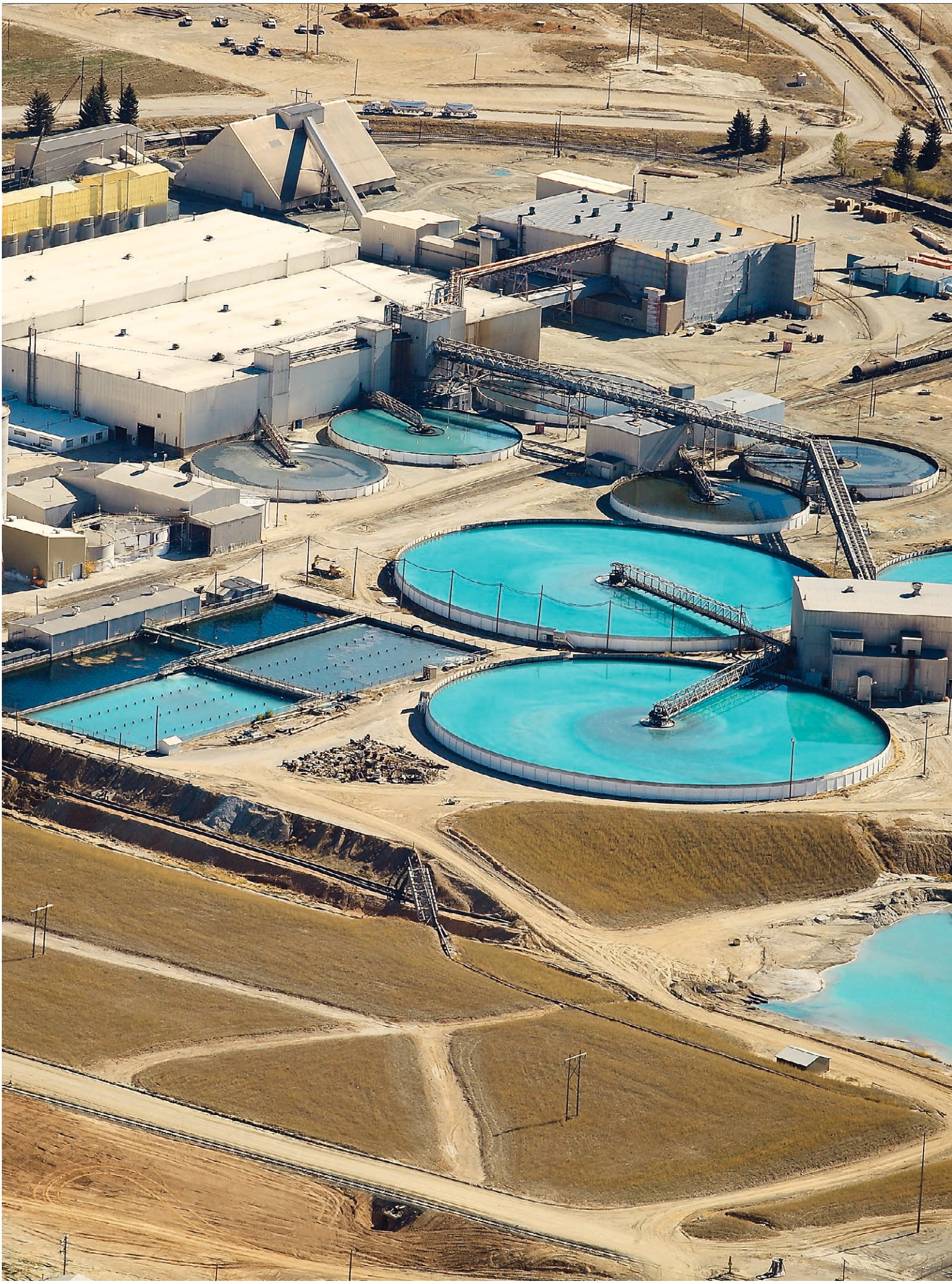
Portfolio
Mining

Endress+Hauser
People for Process Automation



Dear reader,

For many thousands of years, humans have been extracting metals and minerals from the earth for different uses. According to archeologists, the oldest mine site is more than 40,000 years old. But as societies evolved, so too have the tools and techniques used to mine and process these natural resources.

In modern times, mining processes have become highly advanced and complex, and are continuously developed to ensure they are increasingly efficient, compliant and safe. In addition, the needs of society have progressed.

While fossil fuels have long been extracted to power our industrialized world, the advent of climate change, resource depletion and environmental concern has triggered the transition to alternative energy sources.

New metals are also in demand to enable the technological revolution, like lithium, cobalt and nickel for batteries, to power everything from smartphones to electric vehicles.

The mining industry is therefore simultaneously transforming to extracting a much broader spectrum of resources, requiring constant innovation.

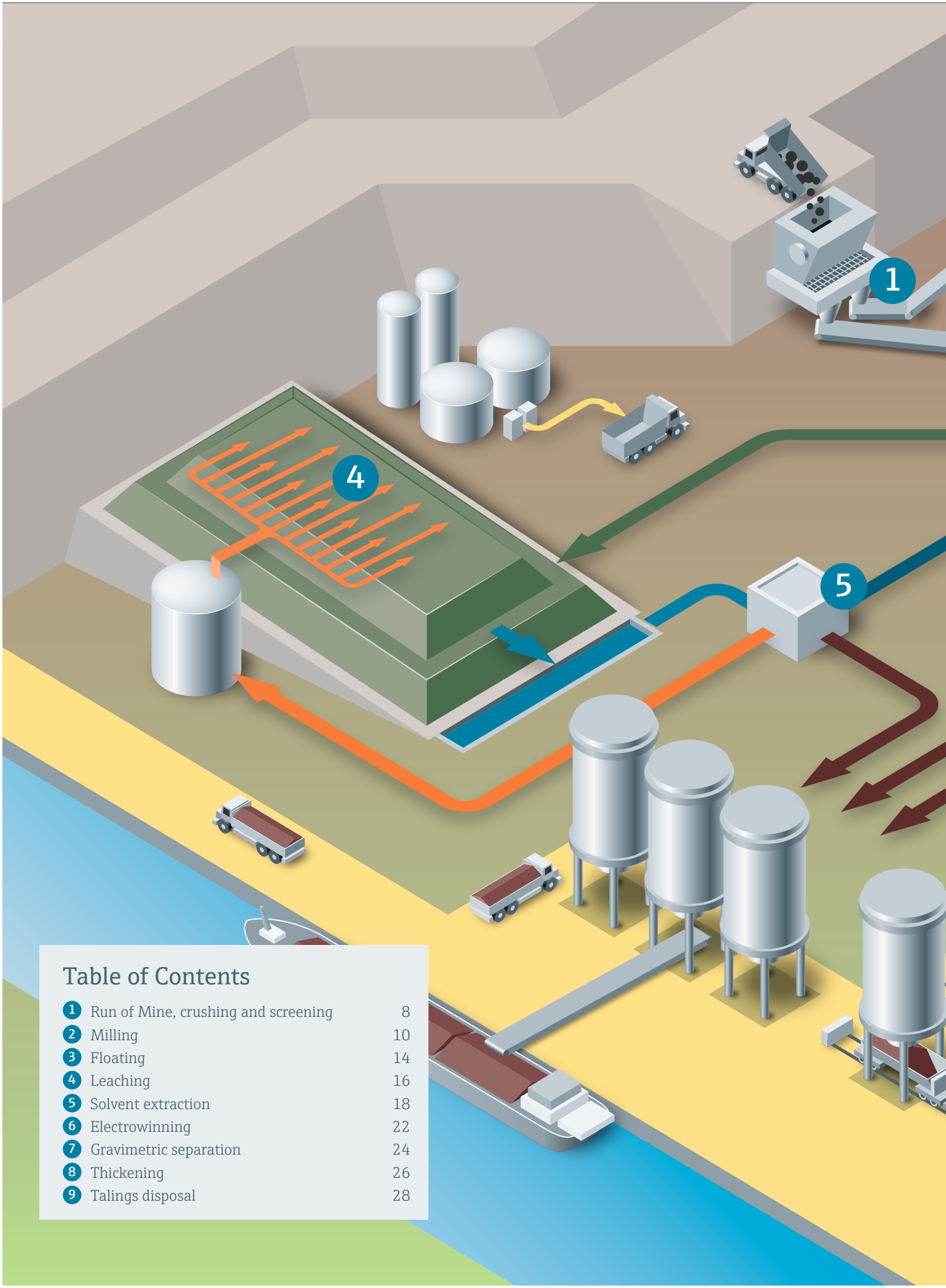
It also faces different challenges when contrasted to other industries; abrasion, corrosion, durability and reliability are all important in mineral processing. The breadth of separation processes also calls for a diverse range of sensors to closely monitor and optimize processes.

Endress+Hauser has a comprehensive portfolio that covers the most important measuring points and offers a wide range of industry-leading measurement technologies. As a multinational, multi-industry provider, we are able to apply an exceptional breadth and depth of cross-industry application knowledge.

With several decades of mining industry experience, we offer strong capabilities in supporting our customers beyond instrumentation - helping you to address current challenges and anticipate future ones. We're the right partner for process improvement.

To learn more about Endress+Hauser, including our full portfolio offering, visit us at Endress.com and find your local representative.

Learn more about our mining offering:
www.endress.com/en/industry-expertise/mining-minerals-metals



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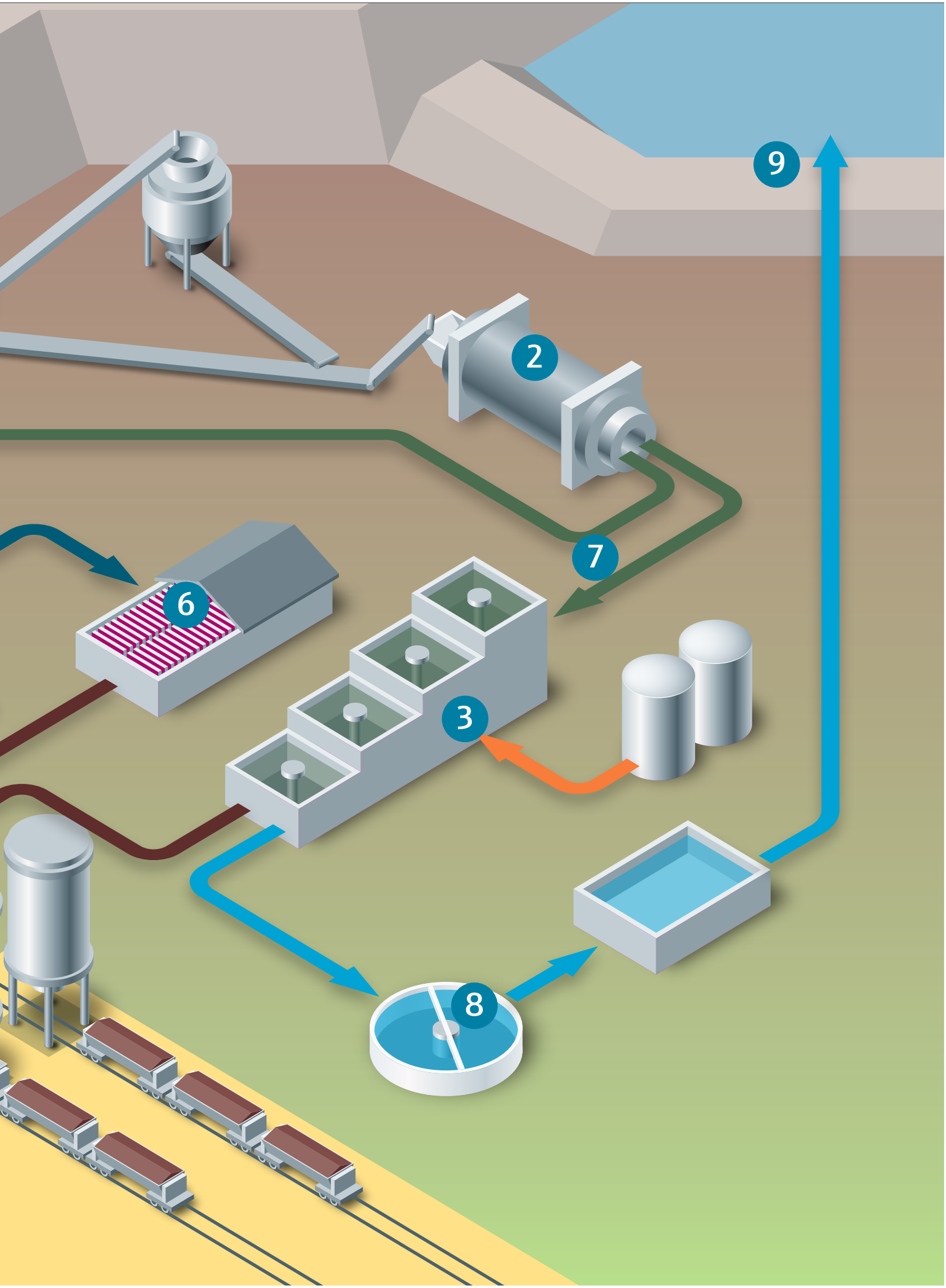
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All from one source

Partner with Endress+Hauser to harness the benefits of a main instrument vendor with an extensive offering of products, solutions and services

The mining industry is changing. On top of concerns like market conditions, commodity prices and safety, new challenges have emerged in recent years. Environmental, social and governance topics (ESG) are increasingly weighing on mining customers, with new reporting requirements, practices and social responsibility considerations evolving all the time.

To rise to all of these challenges, mining operations need reliable insights into their processes to make them efficient, safe and transparent. But process control measuring points are diverse, and multiple parameters need to be considered with each application. And, with often harsh conditions in mining, instrumentation needs to be durable and reliable.

Our portfolio has been developed with the challenges and demands of the mining industry in mind. With the right data at the right time and place, our safe-by-design instruments enable accurate measuring and monitoring as well as pre-emptive maintenance. This allows you to protect and evolve your plant's productivity and safety, while improving efficiency in line with your sustainability goals.

It starts with the selection and ordering process; with just one point of contact right from the start, the ordering process is also backed by a comprehensive support concept. In addition, we not only offer multiple parameters for your measuring tasks, but also multiple technologies. This way, our experienced experts can recommend the optimal solution for your applications.

After your plant or application is up and running, you can still benefit from reliance on a main instrumentation vendor like 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 also easier to manage when you get it all from one source.

MIV project offering

Project partner – Front end engineering design (FEED) to operation

- FEED support
- Project management
- Embedded resources
- Training

Integrated engineering

- Network
- Applications
- Instruments
- Product standardization
- Smart commissioning

Products and documents

- Field instrumentation
  - Endress+Hauser
  - 3rd party
- Logistics
- Documentation
- Asset management

Site services

- Conventional & smart commissioning
- Maintenance
- Calibration
- Diagnostics and repair

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

Project Management
Our project management process is based on PMI® (Project Management Institute) framework (PMBOK® Guide) and our PMP® certified project managers serve you as main point of contact. With our standardized project process we assure you an agreed common discipline of planning, doing, checking and acting to achieve the predefined project goals and objectives. This leads to a faster and proper management, support and handling of your projects.

FLEX Selections – Flexible answers to individual needs

Simplify your product selection with our FLEX portfolio structure

Xpert Selection	Master your most challenging applications	▪ Specialized products ▪ Designed for demanding applications	F L E **X**
Extended Selection	Optimize your processes with innovative technologies	▪ High-end products ▪ Highly functional and convenient	F L **E** X
Lean Selection	Handle your core processes easily	▪ Standard products ▪ Reliable, robust and low-maintenance	F **L** E X
Fundamental Selection	Meet your basic measurement needs	▪ Simple products ▪ Easy to select, install and operate	**F** L E X

Selecting the right products for your application can be a challenge for several reasons:
1) The instrument must be suitable for the process
2) Sensors with unnecessary functions should be avoided
3) Time is usually of the essence

In line with our brand motto, our goal is to provide you the best possible support. With these things in mind, we are introducing our new FLEX structure, which separates our extensive portfolio into four distinct segments based on your needs.

Benefits

- Easy to understand
- Logical structure based on user needs
- Filter function on the website

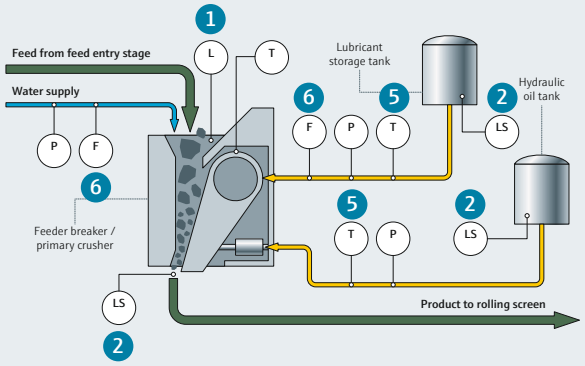
How to make the best use of FLEX Selections

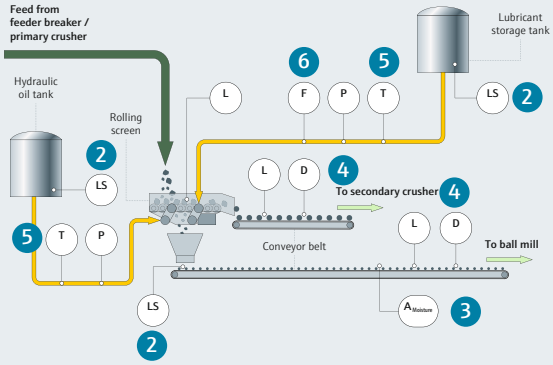
Apart from this brochure, the FLEX structure is also used in the product section of our website. Products can be filtered according to four selections, or the filters can be combined for easy comparison of the selections. All products now have a FLEX indicator that shows to which selection they belong, all according to the key features of the product.

For more information, visit:
www.eh.digital/flex-mining

Run of Mine, crushing and screening

The initial stage of the mining process must be monitored to prevent damage to the equipment and safely maximize throughput





1 – Micropilot FMR67B

Non-contact 80 GHz radar device for advanced level applications with long measuring ranges in bulk solids

- Time-saving and easy commissioning thanks to intuitive wizards
- Reduced measurement errors and minimized plant shut-downs due to state-of-the-art diagnostic, verification and monitoring functionality of Heartbeat Technology
- Increased safety through smart safety concept – SIL2/3 certified according to IEC 61508 and guided prooftest wizards
- Time savings – overview on the data via mobile device or LED status indication

F L **E** X

www.endress.com/fmr67b

2 – Soliwave FQR57

Transmitter for non-contact point level detection and bulk flow monitoring

- Measuring principle is independent of the process properties like vibrations
- Easy operation via the Nivotester FTR525 with graphical display
- Robust construction and maintenance free
- Increased safety of the point level monitoring by optional integrated bulk flow monitoring

F L **E** X

www.endress.com/fqr57

3 – Solitrend MMP40

Moisture measurement for continuous and batch processes in conductive bulk solids

- Easy commissioning even in challenging processes
- Wide moisture range from 0-100 % possible
- Integrated transmitter for simple plant integration
- No recalibration needed thanks to unique wear performance

F L **E** X

www.endress.com/mmp40

4 – Gammapilot FMG50

Compact 2-wire loop powered radiometric transmitter

- Reduced measurement errors and minimized plant shut-downs due to state-of-the-art diagnostic, verification and monitoring functionality of Heartbeat Technology
- SIL 2/3 approved according to EN 61508
- Highest sensitivity and accuracy at lowest dose rates
- Seamless integration – 4...20 mA HART communication directly to DCS/PLC with power supply

F L E **X**

www.endress.com/fmg50

5 – Easytemp TMR31

Compact, fast and precise for the measurement of process temperatures in common industries

- Small, compact design made entirely of stainless steel
- Extremely short response times
- Highly accurate even with short insertion lengths
- 4-wire, Pt100 or PC-programmable transmitter with 4 to 20 mA output

F L E X

www.endress.com/tmr31

6 – Proline Promag W 10

Highly cost-effective electromagnetic flowmeter for controlling water used on dust suppression

- Long product life cycle – robust sensor for challenging environments
- Flexible engineering – space-saving due to sensor option without in-/outlet runs at constant accuracy
- Easy operation and commissioning – intuitive access and handling via SmartBlue app and touch screen
- Maximum safety – traceable verification during operation due to integrated Heartbeat Technology

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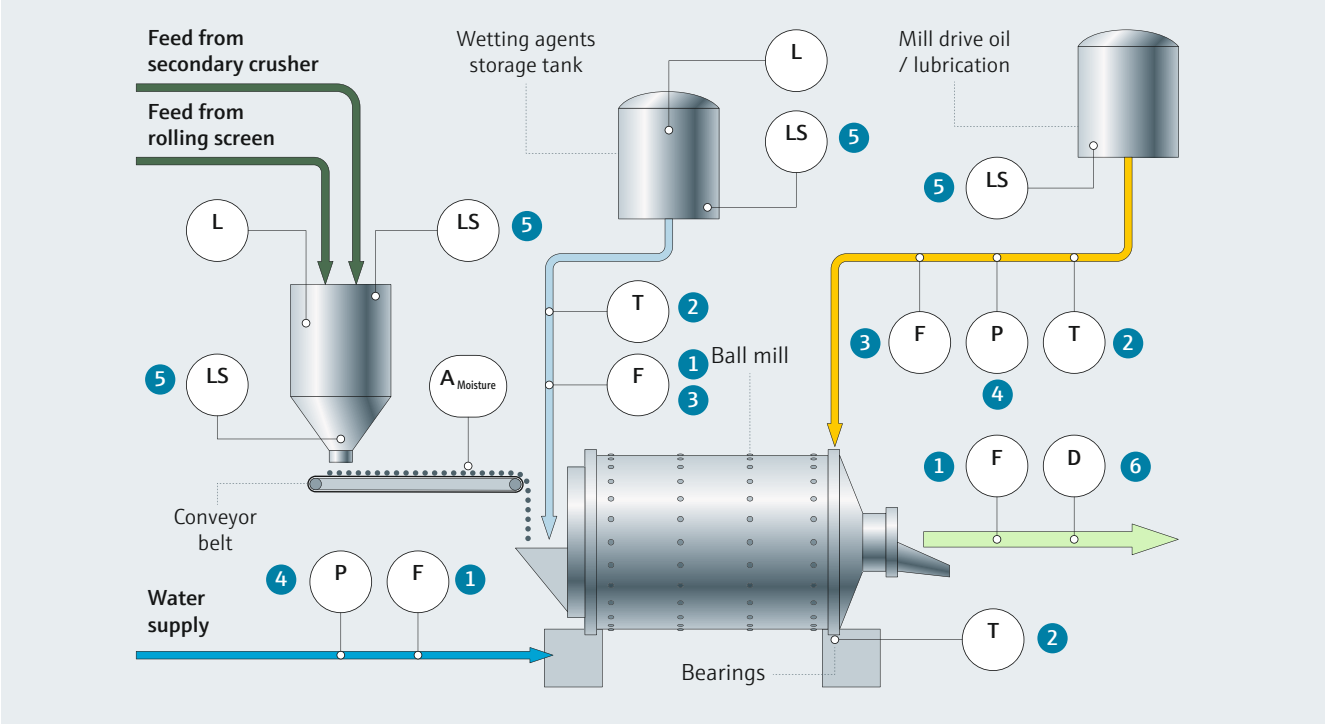
www.endress.com/5wbb

Milling

Final particle size and distribution are important in the milling process to optimize further downstream classification processes



1 – Promag 55S

High-performance electromagnetic flowmeter with outstanding robustness and integrated calculation of solids content

- Long product life cycle – robust sensor for challenging environments
- Excellent signal stability – permanent abrasion-resistant liners and measuring electrodes
- Minimum costs for maintenance and repair – designed without moving parts
- Meeting all relevant safety regulations – fully industry-compliant transmitter (IEC, EN, NAMUR)

F L E X

www.endress.com/55s

2 – RTD Thermometer TR10

Trend-setting, highly modular and intrinsically safe RTD thermomenter

- 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
- Head transmitter with easy selection: Analog output 4 to 20 mA, HART®, PROFIBUS® PA or FOUNDATION Fieldbus™

www.endress.com/tr10

3 – Promass E 300

Coriolis flowmeter with minimized total cost of ownership that monitors the flow of wetting agents

- Long product life cycle – robust sensor for challenging environments
- Space-saving installation – compact sensor design
- Increased plant accessibility – flexible, quick commissioning & servicing due to web server and WLAN
- Maximum safety – traceable verification during operation due to integrated Heartbeat Technology

F L **E** X

www.endress.com/6f3b

4 – Cerabar PMC71B

Smart pressure transmitter with self-monitoring ceramic membrane

- Easy and fast device setup with guided commissing wizard via Bluetooth®
- Increased safety with smart safety concept – SIL2/3 certified according to IEC 61508 and a guided prooftest wizard
- Seamless integration into all leading process control systems

F L **E** X

www.endress.com/pmc71b

5 – Liquiphant FTL51B

Vibronic point level switch with optional slurry and chemical density measurement with the FML621, suited for hazardous areas

- Proof test wizard with automatically generated documentation
- Time-saving commissioning – no calibration required, easy to start up
- Mechanical safety – second line of defense to protect people and environment
- Safety by design, SIL2/3 according to IEC 61508

F L **E** X

www.endress.com/ftl51b

6 – Gammapilot FMG50

Compact 2-wire loop powered radiometric transmitter

- Reduced measurement errors and minimized plant shut-downs due to state-of-the-art diagnostic, verification and monitoring functionality of Heartbeat Technology
- SIL 2/3 approved according to EN 61508
- Highest sensitivity and accuracy at lowest dose rates
- Seamless integration – 4...20 mA HART communication directly to DCS/PLC with power supply

F L E **X**

www.endress.com/fmg50

Service by your side

Our service portfolio was developed to enable you to increase yield and efficiency, to ensure safe operations and to stay environmentally compliant

By your side, with total commitment, today and into the future, Endress+Hauser will help you both meet and surpass your specific industry challenges. 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 deliver the incremental OPEX reductions and plant availability gains to make the difference.

As new regulations to protect people and the environment force industry to rethink its processes, we help you comply 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.

Project and commissioning services

Ensure faster completion and increase the efficiency of your projects
With cutting edge engineering tools, our engineering services team provides expertise to ensure complete planning and design of the application and a tailored selection of products and system components. We ensure a fast installation and commissioning of the chosen offering and care for an efficient execution of your tasks. Our commitment is to support you to achieve completion of your project on time and on budget.

- Ease planning and engineering: our industrial engineering services are designed to cost-effectively keep your project on schedule and ensure timely delivery on budget.
- Save time, effort, and costs: our project experience and our streamlined communication help manage the projects efficiently.
- Ensure compliance: our commissioning process strictly adheres to health, safety, environmental and quality standards. Device conformity, functionality and performance are documented throughout for total traceability.

Support and education services

Increase asset uptime and build your technical skills with the optimum access to experts
With extensive instrumentation and application knowledge, our technical support team is dedicated to helping you solve issues and improve uptime. Our experts also contribute to developing the knowledge and skillset of your team.

- Increase plant availability: we support you in rapidly resolving any disruption that you might experience with your Endress+Hauser process instruments, software, or solutions, to maximize operation uptime.
- Minimize costs of repairs: solve your process issues remotely and save valuable time and costs of on-site visits or device returns.
- Build skills and ease your maintenance work: increase your technical knowledge on Endress+Hauser instruments, software or solutions with our educational packages. Leverage our support platform to resolve issues autonomously.

Maintenance services

Keep your applications reliable and compliant
Our instrumentation maintenance experts will partner with you to maintain your assets according to your process requirements, continuously ensuring the long-term reliability of your installed base. Together with our calibration specialists you can maximize your plant performance while maintaining your product quality and process safety according to your industry standards.

- Increase plant availability: With their extensive instrumentation knowledge and industry know-how, our service experts ensure that your devices remain in top condition to enable a smooth and efficient plant operation.
- Mitigate risk: corrective maintenance with documentation including identified root causes and planned maintenance, executed by certified technicians using approved SOPs and qualified tools, is always carried out reliably and in line with your requirements.
- Reduce operational costs: streamline your service tasks via access to skilled and experienced specialists with fundamental measurement knowledge, and additionally save on training costs and expensive service tools.

Performance optimization services

Sustainably improve your maintenance and calibration processes
Endress+Hauser process experts will partner with you to manage all activities across your installed base and optimize your maintenance process - the ideal collaboration to improve your Operational Equipment Efficiency.

- Improve process efficiency: our process experts bring in-depth analysis and recommendations to optimize your maintenance processes and long-term asset management strategy.
- Save costs and mitigate risk: global expertise and sensor data deliver insights to identify options to help reduce operational costs and ensure compliance with defined requirements.
- Focus on your core competence: Endress+Hauser takes over the day-to-day management of your maintenance business process. We continuously strive for improvements to optimize your productivity and efficiency.

Preventive maintenance

Our instrumentation maintenance experts support you to maintain your field devices according to your process requirements and to ensure the long-term reliability of your installed base while keeping your plant operating safely, consistently and economically.

Remote asset monitoring with Smart Support Connect

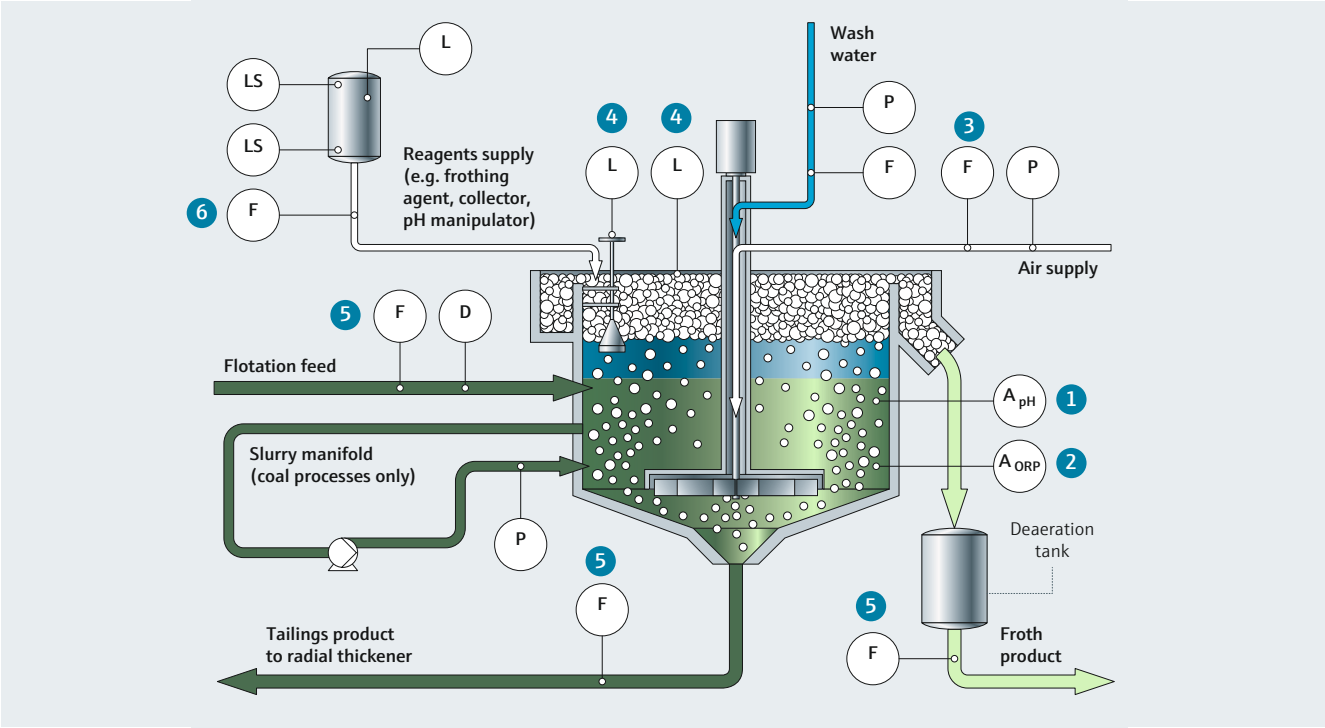
Smart Support Connect increases responsiveness to service incidents thanks to automated support notifications with diagnostics and related remedies. Enhance diagnostics and maintenance workflows to increase uptime and plant availability.

Dynamic Installed Base Analysis

Do you have full control on the lifecycle of your instrumentation installed base? Endress+Hauser provides you the full transparency of your installed base and advice to increase productivity of your maintenance team, minimize downtime, reduce costs, and mitigate your safety risks.

Flotation

Froth flotation is commonly used in many different mineral processing plants and good control is critical for maximising yield



1 – Memosens CPS91E

pH monitoring of the flotation cell

- Fast response time ensures better process control
- Open aperture including ion trap for use in contaminated media
- Low maintenance thanks to gel filling, long service life thanks to new, stabilized bridging electrolyte gel
- Cost savings thanks to flexible multichannel installations and sensor datahandling with Memosens

F L **E** X

www.endress.com/cps91e

2 – Memosens CPS92E

ORP monitoring of the flotation cell

- Fast response time ensures better process control
- Open aperture including ion trap for use in contaminated media
- Low maintenance thanks to gel filling, long service life thanks to new, stabilized bridging electrolyte gel
- Cost savings thanks to flexible multichannel installations and sensor datahandling with Memosens

F L **E** X

www.endress.com/cps92e

3 – Proline t-mass F 300

High-performing, intelligent inline flowmeter monitoring air flow rate

- Application-specific process control – high measurement accuracy
- Process monitoring – alerts to common process disturbances, e.g. droplets or pulsating flow
- Cost-saving – negligible pressure loss; low mainteance due to drift-free, easily removable sensor
- Device verification without removal or process interruption – integrated Heartbeat Technology

F L **E** X

www.endress.com/6f3b

4 – Prosonic S FDU91

Ultrasonic level sensor for installation with separate transmitter

- Integrated temperature sensor for correction of level drift due to temperature changes
- Time-saving commissioning – integrated automatic sensor detection for transmitters FMU90/ FMU95
- Separate installation of the transmitter for rough ambient conditions

F L **E** X

www.endress.com/fdu91

5 – Promag 55S

High-performance electromagnetic flowmeter with outstanding robustness and integrated calculation of solids content

- Excellent signal stability – permanent abrasion-resistant liners and measuring electrodes
- Energy-saving flow measurement – no pressure loss
- Fewer downtimes – integrated electrode cleaning function
- Easy commissioning – quick setup with guided menus

F L E **X**

www.endress.com/55s

6 – Proline Promass E 300

Coriolis flowmeter with minimized total cost of ownership that monitors the flow of reagents

- Long product life cycle – robust sensor for challenging environments
- Space-saving installation – compact sensor design
- Increased plant accessibility – flexible, quick commissioning & servicing due to web server and WLAN
- Maximum safety – traceable verification during operation due to integrated Heartbeat Technology

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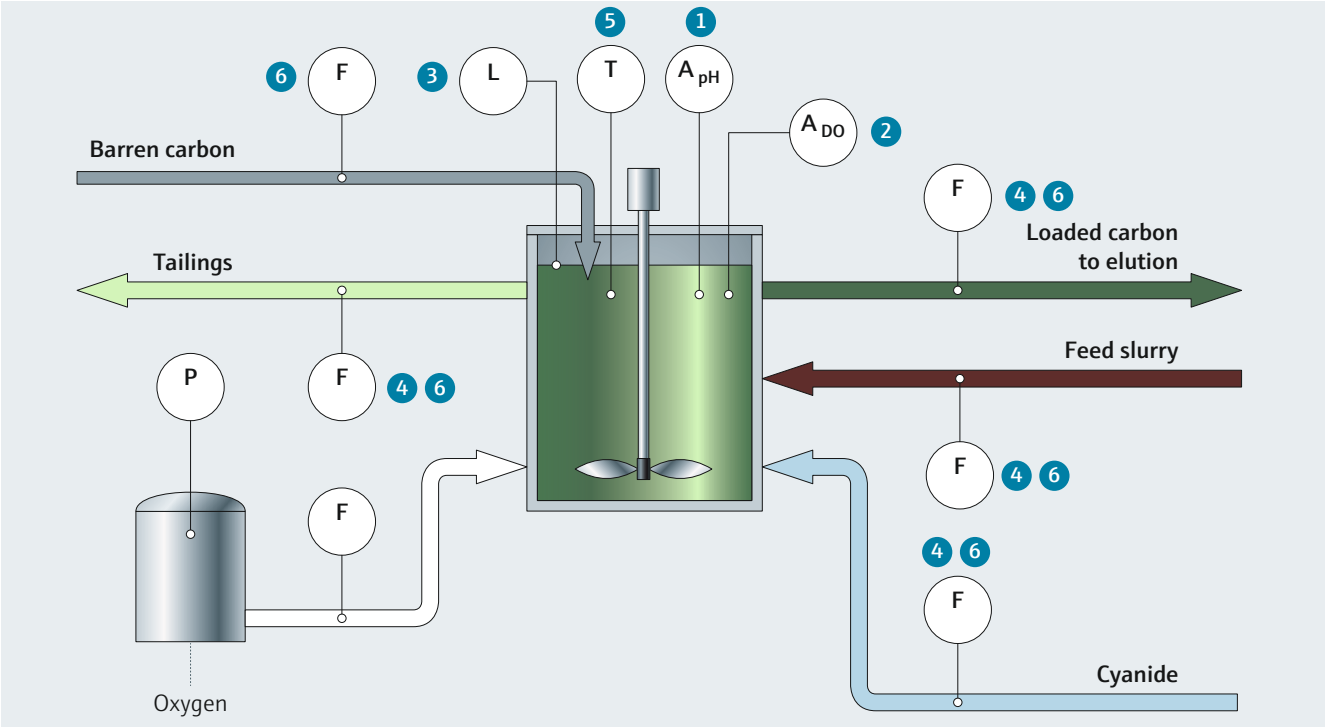
www.endress.com/8e3b

Leaching

Leaching presents a challange for instrumentation as it often requires pH adjustment, aggressive chemicals and even high temperature and pressures for some processes



1 – Memosens CPF81E

Double reference combined pH electrode with plastic body

- Patented KNO3 bridge electrolyte, better protection against poisioning by S2- / CN- ions
- Optionally available with flat membrane for improved wear resistance
- Threaded connection NPT ¾" top and bottom for easy installation at user end
- Increased process safety and cost saving thanks to contactless Memosens technology

F L E X

www.endress.com/cpf81e

2 – Memosens COS81E

Optical oxygen sensor for aqueous solutions

- Compact desing allows for retrofit in existing 12mm/ PG13.5 installations lowering OPEX
- Cost savings due to reduced maintenance effort
- Cost savings thanks to flexible installations with multi-channel, multi-parameter transmitters
- Increased plant availibility and process safety thanks to digital Memosens sensor with Liquiline

F L E X

www.endress.com/cos81e

3 – Micropilot FMR62B

Non-contact 80 GHz radar device for aggressive liquids

- Process safety – hardware and software developed according to IEC 61508 up to SIL3 incl. SIL proof test
- Reduced measurement errors and minimized plant shut-downs due to state-of-the-art diagnostic, verification and monitoring functionality of Heartbeat Technology
- Reliable measurement with radar technology and an accuaracy of up to ±1mm

F L **E** X

www.endress.com/fmr62b

4 – Proline Promag P 300

Electromagnetic flowmeter with highest accuracy for cyanide injection

- High-performance wetted materials – corrosion-resistant PTFE or PFA liners available
- Minimum costs for maintenance and repair – designed without moving parts
- Increased plant accessibility – flexible, quick commissioning & servicing due to web server and WLAN
- Maximum safety – traceable verification during operation due to integrated Heartbeat Technology

F L **E** X

www.endress.com/5p3b

5 – iTHERM TM131

Trend-setting, highly modular RTD thermomenter

- 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
- Protection tube with chemical resistance
- Head transmitter with easy selection: Analog output 4 to 20 mA, HART®, PROFIBUS® PA or FOUNDATION Fieldbus™

F L **E** X

www.endress.com/tm131

6 – Promag 55S

High-performance (electromagnetic) flowmeter with outstanding robustness and integrated calculation of solids content

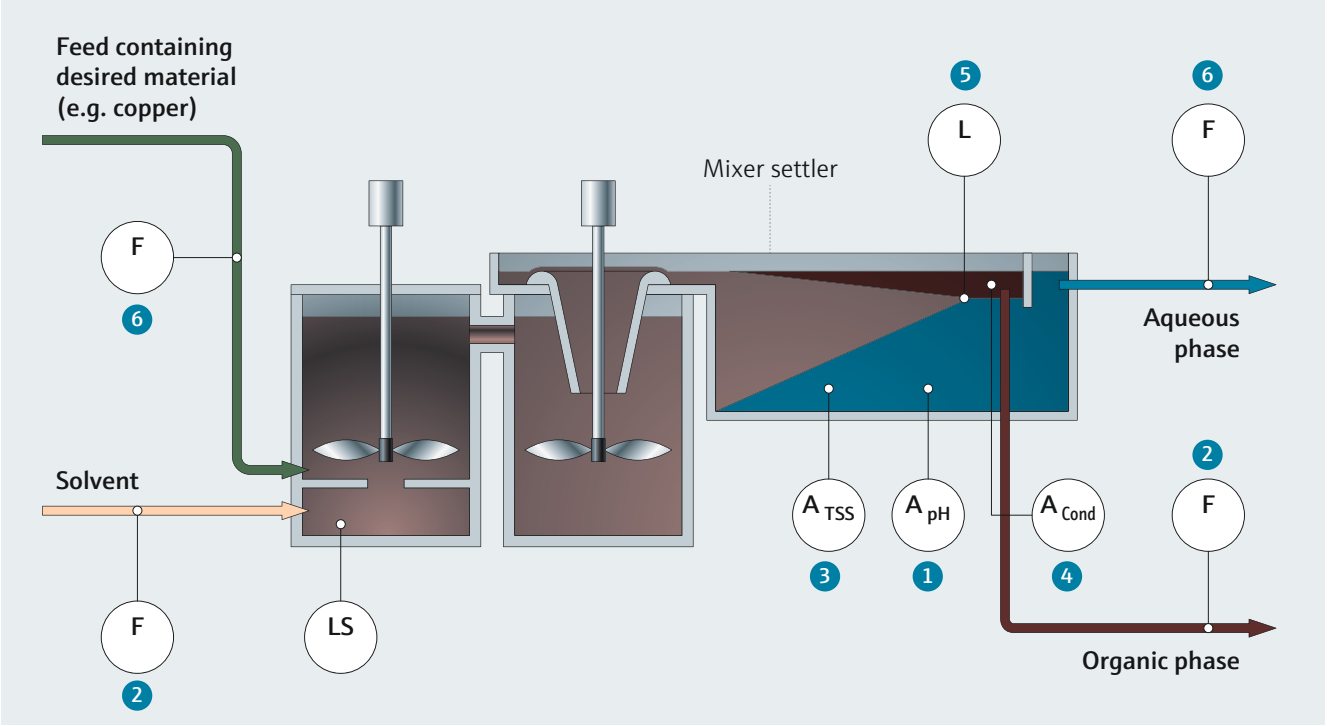
- Minimum costs for maintenance and repair – designed without moving parts
- Energy-saving flow measurement – no pressure loss
- Fewer downtimes – integrated electrode cleaning function
- Easy commissioning – quick setup with guided menus

F L E **X**

www.endress.com/55s

Solvent Extraction

Using organic solvents after heap leaching can create hazardous areas, but these challenges are easily overcome with our extensive portfolio



1 – Memosens CPS11E

Proven pH glass electrode for applications in industrial processes with dirt-repellent PTFE diaphragm

- Low-maintenance and robust thanks to large PTFE ring diaphragm
- Poison resistant reference system with ion trap
- Use in hazardous areas thanks to ATEX, IECEx, FM, CSA approval
- Increased process safety and cost saving thanks to contactless Memosens technology

F L **E** X

www.endress.com/cps11e

2 – Proline Promass E 300

Coriolis flowmeter with minimized total cost of ownership that measures injection flow of solvent

- Process reliability – immune to external piping forces thanks to balanced measuring tube system
- Fewer measuring points – simultaneous, multi-variable measurement of mass flow, density, temperature
- System integration compatibility – automatic restoration of the original firmware in service cases
- Increased plant accessibility – flexible, quick commissioning and servicing due to web server and WLAN

F L **E** X

www.endress.com/8e3b

3 – Turbimax CUS51D
Sensor for turbidity and solids content

- Four-beam pulsed light technology allows optimal adaption to the measurement task
- Sensor factory-calibrated with formazin and kaolin for quick and easy commissioning
- Customer-specific calibrations to ensure individual process adaption
- Increased process safety and cost saving thanks to digital Memosens technology

F L **E** X

www.endress.com/cus51d

4 – Indumax CLS50D
Inductive conductivity sensor for Ex applications

- Use in hazardous areas thanks to ATEX, IECEx. FM, CSA, TIIS and NEPSI approval
- High chemical resistance and dirt-repellent thanks to PFA coating
- Large measuring range from 2 µS/cm to 2000 mS/cm and Pt1000 temperature sensor
- Increased process safety and cost saving thanks to digital Memosens technology

F L **E** X

www.endress.com/cls50d

5 – Levelflex FMP55
Guided radar and capacitance measurement device for level and interface applications

- Reliable sensor due to Multi-Echo Tracking evaluation
- Hardware and software developed according to IEC 61508 up to SIL3 incl. SIL proof test
- Reduced measurement errors and minimized plant shut-downs due to state-of-the-art diagnostic, verification and monitoring functionality of Heartbeat Technology
- Seamless integration into control or asset management systems

F L E **X**

www.endress.com/fmp55

6 – Proline Promag P 300
Magmeter with highest accuracy providing details on the organic phase

- High-performance wetted materials – corrosion-resistant PTFE or PFA liners available
- Long product life cycle – robust sensor for challenging environments
- Energy-saving flow measurement – no pressure loss
- Maximum safety – traceable verification during operation due to integrated Heartbeat Technology

F L **E** X

www.endress.com/5p3b

Finding the right solution

Combining our broad portfolio of instruments with our services offering we can add even more value to the processes of our customers with our solutions

A surging demand for minerals and metals means that your industry faces its own challenges to increase output, increase yield, cut costs and deal with a reduced workforce all while maintaining its own net zero ambitions and environmental impact. This presents plants with opportunities to adopt alternative refining processes, leverage digital operations, adopt clean energy sources like hydrogen and ammonia, as well as reduce their carbon footprint through carbon capture.

In this new competitive arena of the mining industry, small margins can make a big difference. But sometimes a singular measurement sensor just isn't enough to give you adequate process insights. You need more than that – you need a holistic solution. With the specific challenges of the mining industry in mind, we developed process solutions that are easily integrated into your operations. Based on a requirement analysis and our expert consulting, we have combined our portfolio and technologies with designing and engineering capabilities.

Our process solutions bring clarity and precision to your metering, inventory and product throughput measurement, helping you to avoid errors and ensure continuity of production.

Strong innovation and attention to detail means our solutions are ready to support you in your rapidly changing industry; for example, the increased focus on environmental compliance and shifting to greener consumables in your production process.

Metering and Inventory control

To ensure continuous production, operators must make sure that they don't run out of certain production inputs like fuel, chemicals or lubricants. Likewise, the construction industry requires an uninterrupted supply of cement and plaster to the construction site. The waiting times for replenishments can be rather long and costly, especially if operations or construction sites are located in remote areas. Also, most of these materials need to be handled in safe way to not endanger either human life or the environment. Combining our measurement sensors, gateways, visualization software and ERP integration enables metering of fuels and gases and monitoring of individual tanks and bulk containers, mobile or fixed. Whether you are looking to replace or migrate your existing metering and inventory management systems, you can rely on our support for optimal project engineering and management.

Tailings and water management

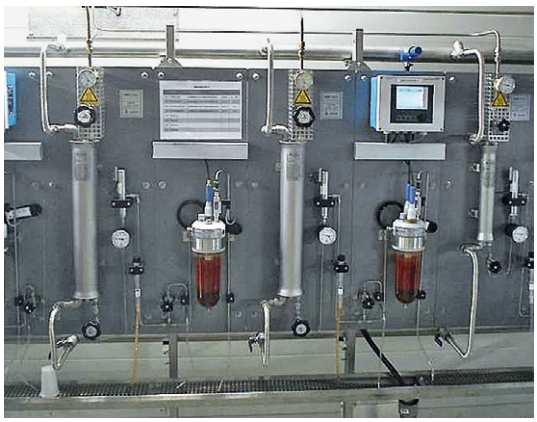
Process water is often sourced from boreholes, lakes or desalination. These water sources require careful management and clear insights to ensure an uninterrupted water supply while meeting environmental obligations. Mismanagement and non-compliant reporting of water sources can lead to water shortages, environmental damage and costly penalties.

Likewise, by-products from mining and metals processes are often stored in temporary containment or dams that can be as large as lakes. The stored waste is often toxic. Should a dam or waste storage facility break, the impact on the environment and surrounding community can be devastating. Proper monitoring of wastewater parameters and storage integrity is crucial.

We offer not only measurement instrumentation for the most important parameters like flow, level, pressure and analytics, but also a dedicated system for remote monitoring and reporting of your water network. Our Netilion Network Insights solution was developed to continuously monitor quantitative and qualitative parameters throughout your whole water network. The data is comprehensively displayed in a customizable visualization and embeds additional E+H functionality, like our Heartbeat verification.

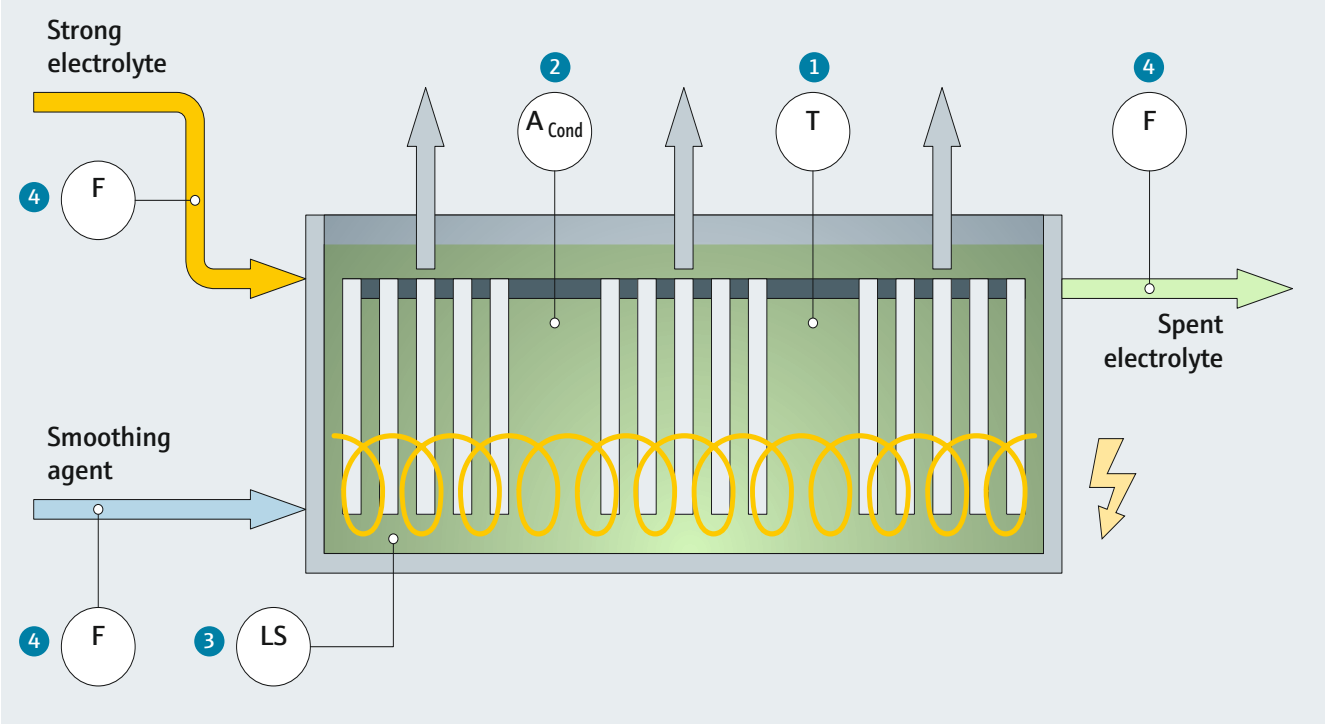
Analytical panels and water quality measurement

Water is a crucial element in mining, metals and mineral extraction processes. To achieve a high production standard for your product, the parameters of the process water must be monitored closely. For example, pH is one of the most important parameters for thickening and flotation. And to control the success of the separation, you need to measure turbidity to determine the suspended solids. Sizing, selection and installation of multiple measurement points can be a tedious and time-consuming task. Using our industry knowledge and instrument expertise, we combine all your measurement requirements into one easy-to-install panel.



Electrowinning

Electrolysis is used to separate desired metal ions from solution is widely used in industry for non-ferrous metals



1 – Easytemp TMR31

Compact, quick and precise thermometer for the measurement of process temperatures

- Small, compact design made entirely of stainless steel
- Extremely short response times
- Highly accurate even with short insertion lengths
- 4-wire, Pt100 or PC-programmable transmitter with 4 to 20 mA output

F L E X

www.endress.com/tmr31

2 – Indumax CLS50D

Inductive conductivity sensor for Ex applications

- Use in hazardous areas thanks to ATEX, IECEx. FM, CSA, TIIS and NEPSI approval
- High chemical resistance and dirt-repellent thanks to PFA coating
- Large measuring range from 2 µS/cm to 2000 mS/cm and Pt1000 temperature sensor
- Increased process safety and cost saving thanks to digital Memosens technology

F L E X

www.endress.com/cls50d

3 – Liquiphant FTL62

Vibronic point level switch with optional slurry and chemical density measurement with the FML621, suited for hazardous areas

- Reliable sensor – plug & play sensor offered without any need for adjustment even in changing media
- Recommended for safety systems requiring functional safety to SIL2/ SIL3 as per IEC 61508/ IEC 61511
- Real time knowledge on device and process data with Heartbeat Technology via Bluetooth
- Proof test wizard with automatically generated documentationReal-time knowledge on device and process data with Heartbeat Technology without process interruption

F L **E** X

www.endress.com/ftl62

4 – Proline Promag P 300

Electromagnetic flowmeter with highest accuracy measuring flow of electrolytes and smoothing agents

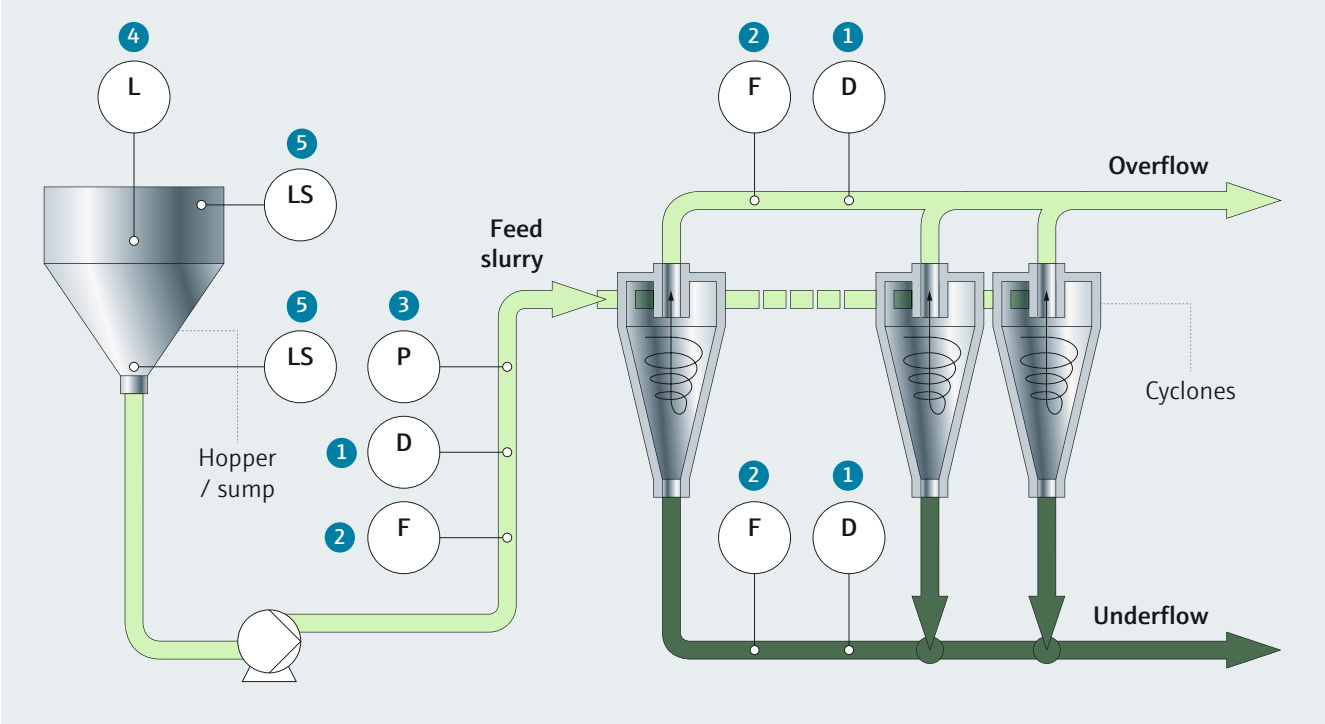
- Long product life cycle – robust sensor for challenging environments
- Increased plant accessibility – flexible, quick commissioning & servicing due to web server and WLAN
- Energy-saving flow measurement – no pressure loss
- Minimum costs for maintenance and repair – designed without moving parts

F L **E** X

www.endress.com/5p3b

Gravimetric separation

Gravimetric separation processes are commonly used in mineral processing, including the use of cyclones for classification and separation of minerals



1 – Gamapilot FMG50

Compact 2-wire loop powered radiometric transmitter

- Reduced measurement errors and minimized plant shut-downs due to state-of-the-art diagnostic, verification and monitoring functionality of Heartbeat Technology
- SIL 2/3 approved according to EN 61508
- Highest sensitivity and accuracy at lowest dose rates
- Seamless integration – 4...20 mA HART communication directly to DCS/PLC with power supply

F L E X

www.endress.com/fmg50

2 – Promag 55S

High-performance electromagnetic flowmeter with outstanding robustness and integrated calculation of solids content

- Long product life cycle – robust sensor for challenging environments
- Minimum costs for maintenance and repair – designed without moving parts
- Fewer downtimes – integrated electrode cleaning function
- Meeting all relevant safety regulations – fully industry-compliant transmitter (IEC, EN, NAMUR)

F L E X

www.endress.com/55s

3 – Cerabar PMC71B

Smart pressure transmitter with self-monitoring ceramic membrane

- Ceramic membrane able to measure slurries and resistant abrasive particles
- Easy and fast device setup with guided commissing wizard via Bluetooth®
- Increased safety with smart safety concept – SIL2/3 certified according to IEC 61508 and a guided prooftest wizard
- Seamless integration into all leading process control systems

F L **E** X

www.endress.com/pmc71b

4 – Micropilot FMR60B

Non-contact 80 GHz radar device for basic level applications in liquids

- Time-saving commissioning – HistoROM data management concept for fast and easy commissioning
- Reduced measurement errors and minimized plant shut-downs due to state-of-the-art diagnostic, verification and monitoring functionality of Heartbeat Technology
- Increased safety with smart safety concept – SIL2/3 certified according to IEC 61508 and a guided prooftest wizards
- Overview on the data via mobile device or LED bright status indication

F L **E** X

www.endress.com/fmr60b

5 – Liquiphant FTL51B

Vibronic point level switch with optional slurry and chemical density measurement with the FML621, suited for hazardous areas

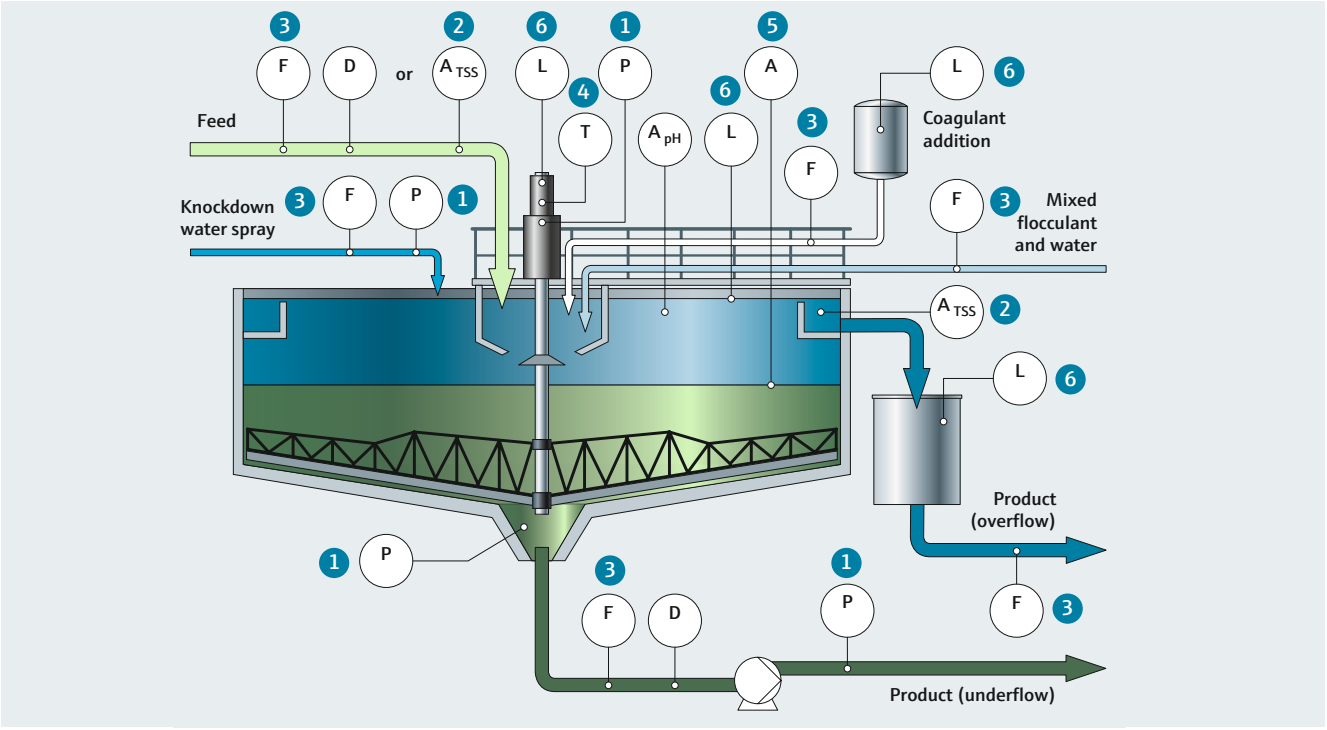
- Reliable sensor – plug & play sensor offered without any need for adjustment even in changing media
- Recommended for safety systems requiring functional safety to SIL2/ SIL3 as per IEC 61508/ IEC 61511
- Real time knowledge on device and process data with Heartbeat Technology via Bluetooth
- Proof test wizard with automatically generated documentation

F L **E** X

www.endress.com/ftl51b

Thickening

Thickening is an important dewatering process for both tailings and concentrate applications



1 – Cerabar PMC51B

Smart pressure transmitter with robust self-monitoring ceramic membrane

- Ceramic membrane able to measure slurries and resistant to abrasive particles
- Easy and fast device setup with guided commissing wizard via Bluetooth®
- Increased safety with smart safety concept – SIL2/3 certified according to IEC 61508 and a guided prooftest wizard
- Remote housing version up to 15 m (600 inch) available

F L E X

www.endress.com/pmc51b

2 – Turbimax CUS51D

Sensor for turbidity and solids content

- Absorption light technology allows optimal adaption to the measurement task
- Sensor factory-calibrated with formazin and kaolin for quick and easy commissioning
- Customer-specific calibrations to ensure individual process adaption
- Increased process safety and cost saving thanks to digital Memosens technology

F L E X

www.endress.com/cus51d

3 – Promag 55S

High-performance electromagnetic flowmeter with outstanding robustness and integrated calculation of solids content

- Excellent signal stability – permanent abrasion-resistant liners and measuring electrodes
- Minimum costs for maintenance and repair – designed without moving parts
- Energy-saving flow measurement – no pressure loss
- Meeting all relevant safety regulations – fully industry-compliant transmitter (IEC, EN, NAMUR)

F L E **X**

www.endress.com/55s

4 – Easytemp TMR31

Compact, quick and precise thermometer for the measurement of process temperatures

- Small, compact design made entirely of stainless steel
- Extremely short response times
- Highly accurate even with short insertion lengths
- 4-wire, Pt100 or PC-programmable transmitter with 4 to 20 mA output

F L E X

www.endress.com/tmr31

5 – Turbimax CUS71D

Immersion ultrasonic bed level sensor

- Two different sensor models with and without wiper allow optimal adaption to the measurement task
- Simple commissioning thanks to predefined calculation models
- Intelligent sensor – all characteristics and calibration values are stored in the sensor
- Increased process safety and cost saving thanks to digital Memosens technology

F L **E** X

www.endress.com/cus71d

6 – Prosonic S FDU91

Ultrasonic level sensor for installation with separate transmitter

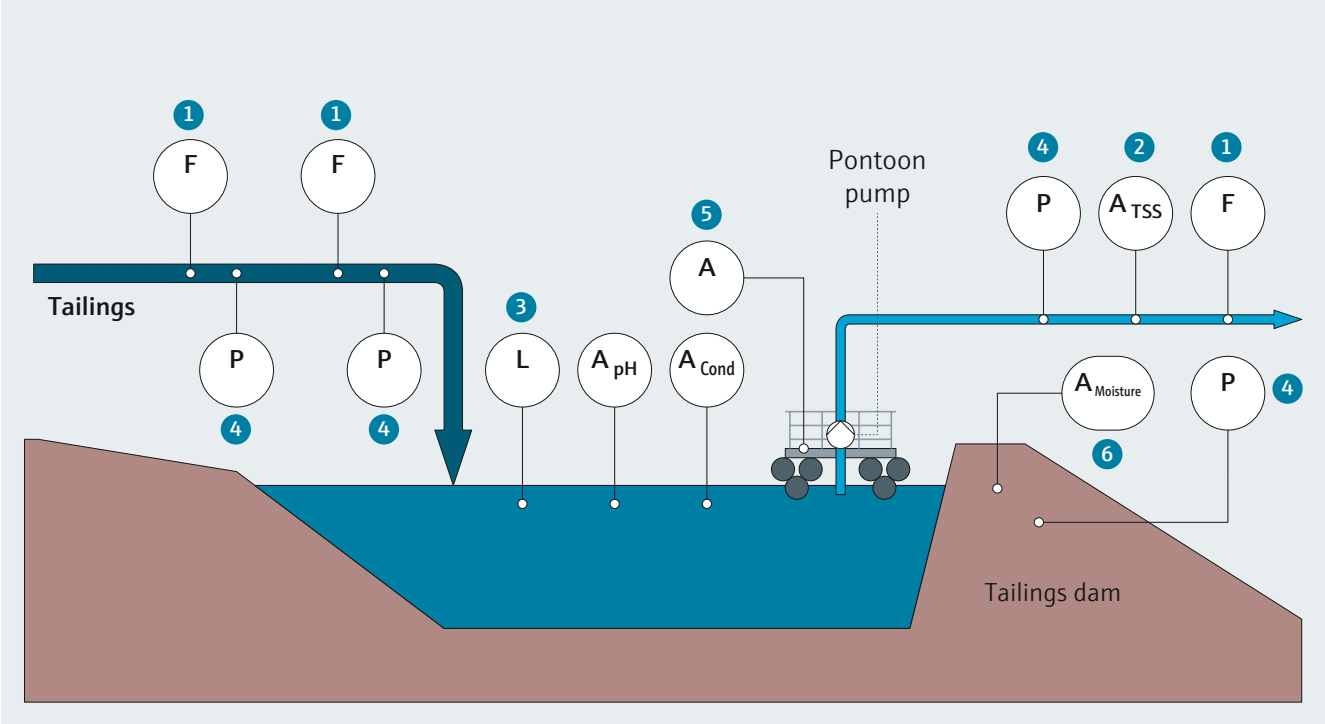
- Integrated temperature sensor for correction of level drift due to temperature changes
- Time-saving commissioning – integrated automatic sensor detection for transmitters FMU90/ FMU95
- Process safety – for rough ambient conditions separate installation of the transmitter

F L **E** X

www.endress.com/fdu91

Talings dam surface management

Tailing dams often have dangerous levels of toxic materials (e.g. cyanide), so accurate monitoring is critical for safety



1 – Promag 55S

High-performance electromagnetic flowmeter with outstanding robustness and integrated calculation of solids content

- Long product life cycle – robust sensor for challenging environments
- Excellent signal stability – permanent abrasion-resistant liners and measuring electrodes
- Easy commissioning – quick setup with guided menus
- Meeting all relevant safety regulations – fully industry-compliant transmitter (IEC, EN, NAMUR)

F L E **X**

www.endress.com/55s

2 – Turbimax CUS51D

Sensor for turbidity and solids content

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- Increased process safety and cost saving thanks to digital Memosens technology

F L **E** X

www.endress.com/cus51d

3 – Micropilot FMR20

High-performance compact radar for level measurement up to 20 m in liquids

- Easy setup with three main parameters suitable for most applications
- Bluetooth® commissioning, operation and maintenance app
- Sealed wiring and fully potted electronics

F **L** E X

www.endress.com/fmr20

4 – Cerabar PMC71B

Smart pressure transmitter with self-monitoring ceramic membrane

- Ceramic membrane able to measure slurries and resistant to abrasive particles
- Easy and fast device setup with guided commissing wizard via Bluetooth®
- Increased safety with smart safety concept – SIL2/3 certified according to IEC 61508 and a guided prooftest wizard
- Resistant to corrosive/hazardous material

F L **E** X

www.endress.com/pmc71b

5 – Memosens CPS11E

Proven pH glass electrode for applications in industrial processes with dirt-repellent PTFE diaphragm

- Low-maintenance and robust thanks to large PTFE ring diaphragm
- Poison resistant reference system with ion trap
- Increased process safety and cost saving thanks to contactless Memosens technology

F L **E** X

www.endress.com/cps11e

6 – Solitrend MMP20

Flexible mobile moisture measurement

- Battery powered handheld device
- Wide moisture range from 0-100 % possible
- Surface and capillary moisture measurement

F L E X

www.endress.com/mmp20

Success stories

Process automation worth its weight in gold

Customer challenge:
The Agnico Eagle mine in Kittilä, northern Finland, is the largest primary gold producer in Europe. The ore at the Kittilä mine goes through a treatment process of grinding, flotation, pressure oxidation and treatment in carbon-in-leach circuits. Agnico Eagle was not fully satisfied with the functionality and reliability of the instruments in use at the time. Inaccuracies in pH measurements resulted in diminished safety and process efficiency. Also, the calibration of instruments was taking up a considerable amount of time and resources.

Our solution:
Our Memosens and Liquiline platforms are used to address the challenges associated with pH measurements. The Liquiline digital transmitters and the Memosens sensors are the perfect solution for demanding liquid analysis. The Memosens sensors perform reliable measurements even in extreme conditions and in demanding applications. The non-contact digital signal between the sensor and the transmitter is very reliable and is not affected by any external factors, such as moisture. Thanks to the Memosens technology calibration is easier than ever before, and no longer needs to be carried out in difficult and hazardous field conditions.

Customer benefit:

- 90% of reduction in time spent on maintenance and calibration
- Improved safety as maintenance no longer has to be carried out under difficult conditions
- 50% reduction in consumed chemicals thanks to more accurate pH measurement

… and how can we help to improve your processes?
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