

# From metering and monitoring to advanced steam boiler management

## Integrated right-tech steam solutions



# Steam

As a sustainable, efficient and ecological utility

**Access to global know-how** in steam generation, distribution and consumption. Peace of mind for boiler house and utility management, and operations staff thanks to Endress+Hauser expertise and know-how.

**By partnering with us**, package boiler manufacturers, system integrators and boiler operators are guaranteed class-leading quality, reliability with direct access to expertise, and shared industry know-how.

**Our range of integrated steam solutions** is designed to deliver cost-effective and reliable measurement solutions from a single source that comply with international regulatory standards across all industries and boiler technologies.

**We understand your requirements** for safe design and reliable construction and have built a comprehensive portfolio of measurement instrumentation, services and solutions.

**Additionally we are able to share our expertise** with unrivalled confidence. We provide accessible global technical support throughout the entire life of your Endress+Hauser products and solutions.







# The universal value of a sustainable utility

Meeting the growing demands of steam generation, supply and distribution



At Endress+Hauser we recognize the intrinsic value of steam and the growing interest in steam as a sustainable, efficient and ecological utility for a diverse group of industries.

Steam is the preferred medium for process heating because it is clean, efficient and easy to use: temperature is controlled by controlling pressure.

## Integrated solutions for today's steam needs

Interest in steam as an utility is rapidly evolving while steam is being recognized by a diverse group of industries as a safe and readily available utility suitable for a broad range of industrial applications.

With an extensive range of metering, monitoring and steam management products and services, Endress+Hauser is able to unlock the true value of steam applications and offer a partnership for integrated steam boiler management solutions.

*A sustainable, efficient and ecological utility for a diverse group of industries.*



# When safety, availability & efficiency count

A deep understanding of your business and industry requirements lies at the heart of our product and service offering.

## Improved boiler house and plant safety through optimal design and operation

Our product portfolio ensures boiler safety and supports robust systems with high availability.

Our measuring solutions fulfil a number of industry regulatory/safety compliance and environmental protection standards that include:

- EN 12952/12953, BS 2486 – Recommendations for treatment of water for steam boilers and water heaters
- ASME Boiler Water – ASME Guidelines for water quality in modern industrial boilers PED 97/23/EC, IEC 61508.



## Uncompromising supply and availability

Your customers expect continuous steam availability. Our product portfolio ensures an uninterrupted supply.

We are committed to providing worldwide access to our field expertise of steam and are proud of our ability to react and respond to the ongoing needs of our customers and partners.



## Efficiency through fulfilment and cost/unit consumption

Measuring solutions help to improve boiler efficiency through advanced monitoring of critical parameters such as flow, level, pressure and temperature, through 3-element control.

The ability to analyze and react accordingly provides an opportunity to optimize CAPEX and OPEX whilst generating and delivering steam.



# Feedwater preparation

At Endress+Hauser we are committed to providing our customers with greater control through access to reliable process data and cutting edge knowledge.

**Feedwater preparation** is integral to the safety, efficiency and lifespan of a boiler unit. The feedwater component of the steam loop provides multiple access points to extract key metering and monitoring information.

**The quality and supply of make-up and return water** have a direct impact on the functional safety of boilers. Accounting for up to 90% of the total expenditures, consumables are the main cost drivers associated with the daily operation of boiler unit. This is a compelling argument for boiler operators and managers to investigate process monitoring solutions that reduce the operating costs related to consumables.

The re-use of condensate makes sense from an energy stand-point: typically 10 to 15% of the energy added in the boiler is still contained in the condensate. It is good practice in several applications to monitor the quality of this return water in order to check e.g. for leaks in plate heat exchangers.

## **Delivering cost savings and maintaining efficiency gains**

Using steam as a heat-transfer medium has several major advantages. It is non-toxic and non-flammable. The equipment needed for its generation is relatively inexpensive and requires little maintenance. Using steam also has its disadvantages, however. Among the typical problems associated with the use of steam are safety issues, early equipment failures, poor steam system efficiency, frequent boiler shutdowns, damaged steam pipes and valves due to water hammer, corrosion, reduced capacity of steam systems and failed steam traps.





**Ensuring the highest quality of feedwater** is an essential step in the steam generation process. Maintaining optimal production and supply of steam generation and distribution can be enhanced through better management of feedwater preparation. Taking advantage of solutions to maximize the quality and supply of feedwater has a direct impact on the overall boiler lifespan and the amount of water preparation consumables required.

*...the quality and supply of feedwater preparation directly impacts the overall boiler lifespan.*



#### Maximizing feedwater quality will:

- Increase boiler lifespan – Improving boiler lifespan and efficiency is a very achievable goal with the solutions now readily available for measuring and monitoring feedwater preparation.
- Reduce blowdown costs – Optimizing the overall quality of feedwater dramatically reduces the need for manual and unscheduled blowdowns of accumulated salt, sediments and corrosive particles and results in significant improvements in energy loss and time.
- Reduce costs for chemicals by dosing correctly - Optimal proportional dosing of chemicals into the boiler minimizes internal boiler corrosion as well as excess chemical consumption and costly blowdowns.
- Improve safety by preventing overflow and lack of feedwater - Preventing the overflow of condensate within the hotwell by including level switches provides an intervention that alerts the operator to suboptimal feedwater levels due to the condensate flowing back into the steam boiler.



# You need to measure it to know

## Using real-time data to drive decision-making in feedwater preparation

**Flow** – Boiler feedwater flow is measured to determine blowdown losses and boiler efficiency. A feedwater meter can also be used for proportional dosing of chemicals into the boiler in order to minimize corrosion and the need for excessive blowdown, both of which lead to energy losses. In performing 3-element control using a feedwater meter, a long lifetime of the boiler can be assured. Not only may the use of a freshwater meter be a legal requirement, its addition to a feedwater system is useful in determining the amount of condensate.

Endress+Hauser provide a range of solutions for feedwater levels, steam measurement and fresh water measurement using measuring principles that are virtually independent of pressure, density, temperature and viscosity and that minimize boiler corrosion and deposition.

**Level** – Level switches are important to make sure that enough feedwater is in the hotwell or in the deaerator. Additionally, the overflow of these containers can be avoided using these switches. Improved control can be achieved by continuous level measurement.

**Temperature** – Monitoring feedwater temperature is important for avoiding thermal shock and crack formation in the pressure vessel. Temperature and pressure also define density and enthalpy of the steam.

*...properly adjusted water levels represent safety and preventive maintenance that can support years of reliable operation.*

**Analysis** – Boiler feedwater requires specific conditioning to reduce levels of dissolved oxygen and mineral salts. Through proper conditioning, the pH value of feedwater can be adjusted to acceptable levels for inhibiting corrosion and sedimentation. Dissolved oxygen in boiler feedwater, in particular, will cause serious corrosion damage in steam systems by attaching to the walls of metal piping and other metallic equipment and forming oxides. Dissolved carbon dioxide combines with water to form carbonic acid that causes further corrosion.

A number of international standards provide guidance on water chemistry requirements for optimal operation. Included among these are BS 2486 (Recommendations for treatment of water for steam boilers and water heaters) and ASME (Consensus Operating Practices for Control of Feedwater/Boiler Water Chemistry in Modern Industrial Boilers).

Controlled and proportional dosing of chemicals into the boiler – reducing under- or over-dosing – contributes to minimizing internal boiler corrosion as well as excess chemical consumption and costly blowdowns.

Minimizing sedimentation improves the heat exchange rate, which is directly linked to lower fuel expenditure and a reduced need for expensive boiler blowdowns.









## Fuel combustion & exhaust

Advances in combustion technology continue to challenge current standards and the daily operation of many steam production facilities. At Endress+Hauser, we meet our customers' changing needs with right-tech solutions engineered to provide safe, efficient and accessible metering and monitoring of fuel combustion and exhaust management within the steam production loop.

*...proven and tested solutions that accurately measure how effectively the heat content of a fuel is transformed into usable energy.*

Boiler efficiency remains a high priority. If the boiler is burning fuel suboptimally or heat is lost through the surrounding system, the end result is excessive waste and potential violations of emission standards.

In terms of fuel combustion and exhaust, boiler efficiency can mean different things to different people. Commonly, however, it refers to the "thermal" or "fuel-to-steam" efficiency. Most often, the term is used to describe combustion efficiency. The stack temperature and flue gas oxygen (or carbon dioxide) concentrations are regarded as primary indicators of combustion efficiency.

Whether your focus is on combustion efficiency, thermal efficiency or fuel-to-steam efficiency, we have a range of proven and tested solutions that accurately measure how effectively the heat content of a fuel is transformed into usable energy. Our range of monitoring solutions complies with ASME Performance Test Codes (PTC 4-1998) and regulatory standards.



## Control what is measured

**Flow** – Choosing the right instrumentation to meet government-based emission requirements for fuel and exhaust flow measurement and their multiple process variables is a challenge.

When measuring flow maximum accuracy is crucial, along with the ability to measure multiple process variables such as mass flow, volume flow, density and temperature simultaneously.

**Pressure** – Pressure is an important control parameter for both liquid and gaseous fuels. Too low pressure and the boiler doesn't receive enough natural gas. In liquids, low pressure may lead to cavitation.

**Incoming combustion air temperature** – This temperature is used for the calculation of the boiler's indirect efficiency. Increasing this temperature helps improving the boiler efficiency.

**Exhaust temperature** – A boiler's exhaust temperature is a function of the boiler design, firing rate and fluid temperature. If the exhaust temperature rises independently of these factors it indicates a deterioration in the heat transfer inside the boiler. 'Long-term stable' is an essential temperature measurement that provides trend analysis.

A rapid increase in exhaust temperature indicates a burner-side problem. A slow increase indicates scale formation on the waterside, which can result in expensive repairs or, in extreme cases, a catastrophic failure.

Exhaust temperature is also used in the calculation of indirect efficiencies. A 20°C change in exhaust temperature approximates to a 1% change in the indirect efficiency of the boiler.



# Steam Generation

## Optimized steam production is of utmost importance due to changing process and consumption needs

The boiler is the heart of every steam system.

### The main targets of steam boilers are

- A readily available supply of steam at the desired pressure and temperature
- An efficient performance at the lowest possible costs
- A safe operation at all times of use
- A continual compliance with relevant norms and regulations

If there is an inefficient supply of steam, or the steam is not supplied at the correct temperature, a plant cannot operate correctly. If steam is not supplied efficiently, costs may explode leading to a poor competitive position. If steam is not produced safely, the health and safety of the boiler operators are potentially at risk. If the boiler is not complying with national regulations and international norms, authorities may close down the boiler house leading to a loss of production.

In order to achieve these targets, appropriate boiler controls are required. Continuous measurement of flow during steam generation is a standard requirement. This can be effectively addressed by techniques based on the vortex principle. The vortex principle is well known for its robustness and reliability and is a tried and tested

### If you don't measure it, you can't control it

- Reduce costs by controlled dosing of chemicals into the feedwater preparation
- Improve boiler lifespan, efficiency and availability through three-element control: measuring level, steam and feedwater flow
- Access to temperature and enthalpy information
- Provide real-time conductivity information
- Provide high repeatability and temperature output at an attractive price
- Use IAPWS-IF97 standard for all Endress+Hauser flow measurement

technology for liquid and gas flow measurement. At Endress+Hauser, we strive to bring new developments and innovations to the market. A leading example is our new Prowirl 200 vortex flowmeter. The Prowirl 200 exemplifies our commitment to right-tech solutions and engineering innovation by taking the tried-and-tested vortex principles of measurement one step further with the ability to detect wet steam or even measure the dryness fraction!

### Unrivalled quality and a sound reputation

Our flow metering and monitoring product and solution range for boiler systems is engineered to improve overall efficiency by monitoring direct boiler efficiency and reducing blowdown losses to deliver the following benefits:

**Flow** – Today, modern flow technologies such as vortex, ultrasonic and Coriolis, offer a reliable alternative to traditional flow technologies like positive displacement (PD), turbine, variable area (VA) and differential pressure (DP) – once the best-fit or only solution for some applications.

When a plant's process needs improvement, replacing existing flow technology with something more accurate and reliable can be key to minimizing process downtime for flow meter maintenance, calibration or replacement.

By measuring flow within the boiler unit, acquired data can be used directly to enhance the overall efficiency of the boiler. Monitoring direct boiler heat conversion and efficiency results in fewer expensive and unscheduled blowdowns. By applying flow instrumentation strategies to optimize the dosing of chemicals into feedwater, the lifespan, efficiency and availability of the boiler can be directly improved, while also reducing costs. Our range of flow measurement instrumentation includes solutions that can detect wet steam and measure its dryness fraction, this being one of the most important parameters for helping to increase safety and improve overall steam production efficiency.

**Level** – Significant damage to boiler equipment can result from long-term level problems that have not been addressed. We provide a range of monitoring solutions configured to customer needs according to the safety level required. Improved level monitoring and control increases safety and availability by reducing the risk of boiler shutdowns. Endress+Hauser provides both switches and continuous level measurement devices developed according to IEC 61508 (SIL).





**Pressure** – Accurate and reliable measurement of boiler feedwater pressure as well as the boiler’s steam according to the safety level required is a priority. We are dedicated to enhancing pressure measurement by increasing boiler lifespan. We do this by avoiding short-cycling, increasing the boiler’s overall safety and accuracy by correctly compensating for mass and energy changes.

**Temperature** – Pressure and temperature compensation are the two factors that lead to effective savings. Availability of a Safety Integrity Level (SIL) transmitter for thermometers ensures compliance with safety regulations. Temperature thermometers with Endress+Hauser technology, such as the StrongSens vibration and water hammer resistant sensor, ensure long-term stable temperature measurement.

StrongSens technology is an example of temperature measurement instrumentation that provides direct cost savings as the frequency of sensor replacement can be reduced, therefore reducing overall downtime resulting from unscheduled maintenance and replacement.

**Analysis** – Boilers need to be free of turbidity and sediments and require specific conditioning to reduce dissolved oxygen and concentration and adjustment to the pH value. Dissolved oxygen causes serious corrosion in steam systems by attaching to the walls of metal

pipings and other metallic equipment and forming oxides. Dissolved carbon dioxide combines with water to form carbonic acid that causes further corrosion.

A number of international standards have been established providing guidance on water chemistry requirements for optimal operation including the British Standard: Recommended Water Characteristics for Shell Fire-tube boilers (BS 2486) and the ASME: Boiler Water Chemistry in Industrial Boilers.

Internal boiler corrosion can be reduced through proportional chemical dosing. This avoids under- or over-dosing, reduces excess chemical consumption and associated costly blowdowns. Reducing sedimentation improves the heat exchange rate which leads directly to lower fuel expenditure and fewer blowdowns.

**Components** – Calculating steam quantity Endress+Hauser offers a broad range of components that are useful in the boiler house. Flow computers help to convert volume flow information into compensated mass or energy flow. Digital recorders help to track important information like level, fuel flow or the boiler efficiency over time. Surge arresters help to protect the equipment from power surges. Power supplies power the instruments in a safe way.

# Steam solutions available

Endress+Hauser – A full spectrum of measurement & monitoring solutions for safe, efficient and available steam

## Flow



**Vortex**

Vortex meters are extremely robust. These versatile devices have long been in use for measuring liquids, gases and steam in all industries. They are optionally available as multivariable devices with integrated flow computer for energy and heat metering.



**Prowirl**



**Differential pressure**

Thanks to the large wealth of experience, differential-pressure flow metering has been accepted and widely used for over 100 years throughout the world. Some primary elements, e.g. orifices, can be replaced or calibrated at any time under operating conditions, even in pipes with nominal diameters larger than 2 meters.



**Deltatop**



**Thermal**

The principle of thermal mass flow measurement has become widely accepted by industry in recent years and is used successfully in many applications involving gases and liquids, this principle the measurement e.g. of natural gas or combustion air at very low rates and process pressures with high accuracy.



**t-mass**

### Steam generation

- High long-term stability and repeatability
- Lifetime calibration factor
- Mass and energy measurement of wet and super-heated steam by an optionally integrated flow computer and temperature sensor
- Reading in external measured values (e.g. pressure, second temperature value)
- Increased safety and efficiency thanks to wet steam detection or measurement
- Advanced verification using Heartbeat technology

 [www.endress.com/prowirlf200](http://www.endress.com/prowirlf200)

### Steam generation

- Worldwide standards
- Long tradition in metrology, widely accepted
- Robust and application-specific designs (orifice, nozzle, Venturi, Pitot)
- Pitot tube for reduced pressure loss
- Combinable with flow computers for mass, energy and volume measurement of liquids, gases and steam; and for increased turndown (split range)
- High temperature and pressure solutions

 [www.endress.com/Deltatop-DO62C](http://www.endress.com/Deltatop-DO62C)

### Fuel combustion & exhaust

- Simultaneous measurement and output of mass flow and fluid temperature (multivariable sensor)
- Negligible pressure loss (<2 mbar)
- Large operable flow range up to 100:1
- Devices certified for hazardous areas are optionally available

 [www.endress.com/t-mass-65f](http://www.endress.com/t-mass-65f)



## Flow



Coriolis

Maximum accuracy is the outstanding feature of this measuring principle for liquids and gases. Another feature is the ability to measure multiple process variables simultaneously: mass flow, volume flow, density, viscosity and temperature. This opens up new perspectives for optimizing and monitoring utilities (e.g. burner control).



Promass

Fuel combustion & exhaust

- Multivariable measurement: several process parameters are simultaneously measured
- High measuring accuracy
- Independent of the fluid's properties
- No inlet/outlet runs necessary
- Approvals for custody transfer (optimal)
- Combinable with flow computers for gas and liquid energy metering
- Verification using Heartbeat technology



[www.endress.com/promass\\_e](http://www.endress.com/promass_e)



Electromagnetic

Electromagnetic meters are used for measuring the fresh water added and in some application also for the feedwater. They offer the advantage of no pressure drop. Short inlet runs and strong measuring dynamics.



Promag

Feedwater preparation

- High degree of measuring reliability and repeatability
- Good long-term stability
- Over 2 million installed devices
- Free pipe cross-section, no pressure loss
- Very high operable flow range



[www.endress.com/Promag-10L](http://www.endress.com/Promag-10L)



Ultrasonic

Loop-powered in-line ultrasonic flowmeter with innovative minimum inlet run parallel path design. For homogeneous conductive and non-conductive liquids.



Prosonic Flow

Feedwater preparation

- Safe design
- Energy-saving – full bore design ensures minimal pressure loss
- Easy installation and reduced installation costs – loop-powered transmitter
- Maintenance-free – no moving parts
- Safe operation – simplified access & maintenance
- Reliable and accurate data - clear text diagnostic information



[www.endress.com/Prosonic-Flow-92F](http://www.endress.com/Prosonic-Flow-92F)

# Steam solutions available

Endress+Hauser – A full spectrum of measurement & monitoring solutions for safe, efficient and available steam

## Level



**Guided wave radar**

Guided wave radars are used for continuous measurement when it comes to high safety requirements. These devices are not filled by foam which is a potential danger for other level measurement technologies. Best practice is to install these devices in a bypass.



**Levelflex**



**Vibronic**

Point level switches using the vibronic principle are used in applications with high process temperatures up to 280°C and can be used for Safety Instrumented Systems up to SIL2, in homogeneous redundancy up to SIL3. Reliable measurement values, not affected by: changing media properties, flow, turbulences, gas bubbles, foam, vibrations or build-up.



**Liquiphant**

## Pressure



**Pressure**

Digital pressure transmitter with capacitive, oil-free ceramic measuring cell is typically used in process applications for pressure measurement in liquids and gases. Quick Setup with adjustable measuring range allows simple commissioning, reduces costs and saves time.



**Cerabar PMC**

Values at a glance

### Steam generation

- Certification according EN 12952/3
- Developed per IEC 61508 SIL2/3
- Increase safety by reducing the risk of boiler shut-downs
- Increase availability by improved level control (Levelflex Bypass: no clogging impulse piping, measurement not fooled like capacitance probes in the boiler)
- End of probe measurement
- Gas phase compensation above 20bar (increased accuracy)

 [www.endress.com/Levelflex-FMP54](http://www.endress.com/Levelflex-FMP54)

### Steam generation

- With welded gas tight feedthrough maximum safety in the event of damaged sensor
- Large number of process connections to choose from: universal usage
- No calibration: quick, low-cost start-up
- No mechanically moving parts: no maintenance, no wear, long operating life.
- Monitoring of fork for damage: guaranteed function

 [www.endress.com/Liquiphant-FTL70](http://www.endress.com/Liquiphant-FTL70)

### Feedwater preparation, steam generation, fuel combustion & exhaust

- Best fit for vacuum during shut-down
- Process safety through membrane breakage detection
- Condensation resistant
- Easy menu-guided commissioning via local display, 4 to 20mA with HART, PROFIBUS PA, FOUNDATION Fieldbus
- Process pressure up to SIL2, certified to IEC 61508 and IEC 61511
- Modular concept for easy replacement of display or electronics

 [www.endress.com/Cerabar-PMC51](http://www.endress.com/Cerabar-PMC51)



## Temperature/Recorders/Components



### Temperature

Temperature is an important parameter in boiler feedwater at the steam outlet and in the exhaust of the boiler. The temperature thermometer with StrongSens vibration and water hammer resistant sensor will ensure a longterm stable temperature measurement.



**Omnigrad**

### Recorders/Components

The Advanced Data Manager is a flexible and powerful system for organizing process values. Thanks to its intuitive operation adapts quickly and easily to every application. The measured process values are clearly presented on the display and logged safely, limits are monitored and analyzed.



**Recorder Memograph**

Steam generation,  
fuel combustion & exhaust

- Comply with regulations by continuous checking indirect efficiency
- Increase safety (SIL StrongSens)
- Availability of SIL transmitter for thermometers ensures compliance of safety regulations
- Cost saving for the customer as frequency of sensor replacement and downtime can be reduced



Steam generation

- Memograph M offers additional functions like math channels for calculation of key figures and efficiency, data recording and storage
- Integrated Web server: remote access to device operation and visualization for lower maintenance costs
- Highly improved accuracy compared to compensation in customer's PLC (use of IAPWS-IF97, DP standards, as opposed to use of ideal gas equation)
- Boiler efficiency can be calculated and visualized

Calculate amount of recovered heat/delta heat with EngyCal RS33



# Steam solutions available

To avoid serious corrosion in steam systems, boiler feedwater requires specific conditioning using different liquid analysis parameters.



## Liquid Analysis



**pH**

Feedwater preparation

- Robust electrode with long poison diffusion path, requires low maintenance due to large, dirt-repellent PTFE ring diaphragm
- Optional salt ring for low conductivity applications such as boiler feed water and water for injection
- Maximum process safety through non-contact, inductive signal transmission
- Enables predictive maintenance due to storage of sensor and process-specific data
- Reduced operating costs thanks to minimized process downtime and extended sensor lifetime



**Conductivity**

Feedwater preparation

- Reliable and accurate measuring values at medium to high conductivities
- Robust design for long durability and low maintenance
- High thermal and mechanical stability
- Logging of sensor-specific data for easy traceability and predictive maintenance
- Maximum process safety via non-contact inductive signal transmission

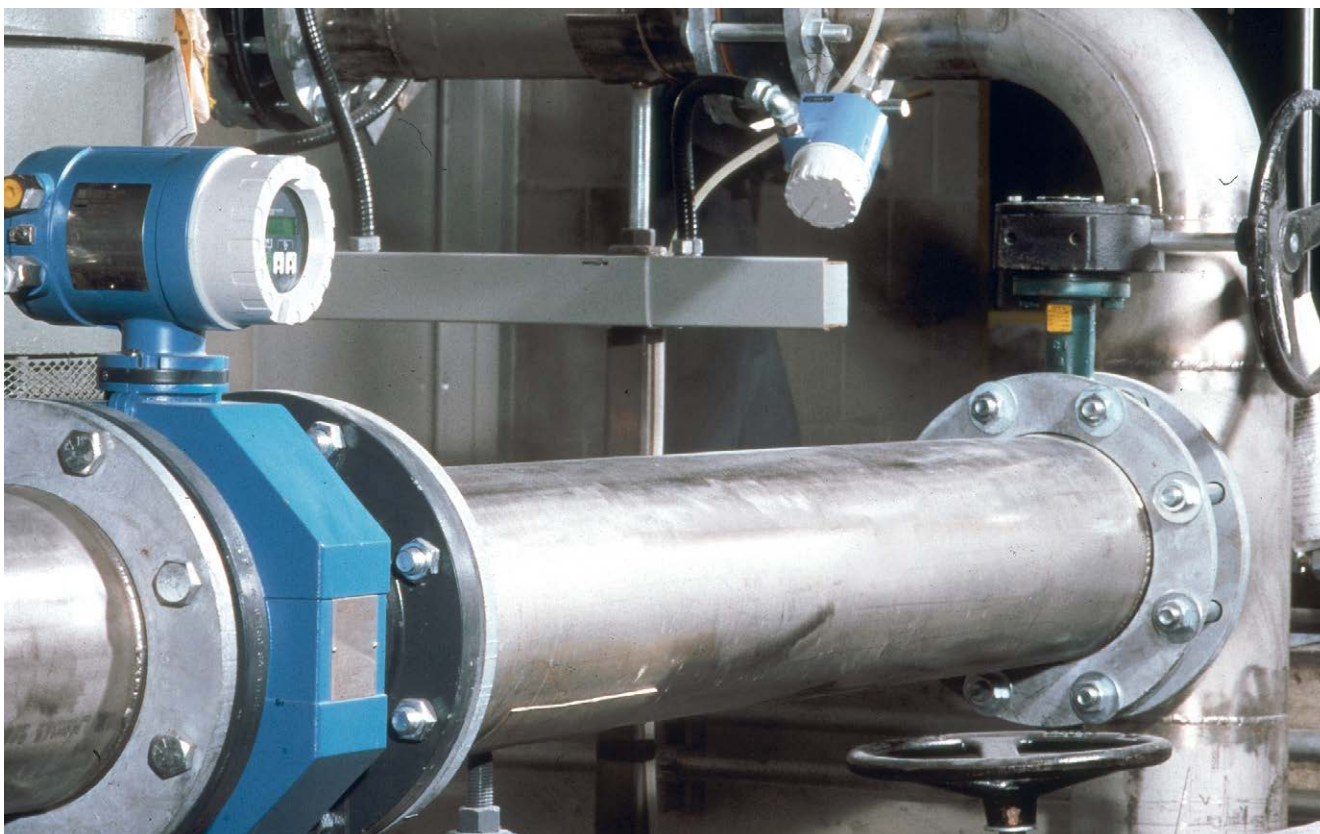


**Dissolved Oxygen**

Feedwater preparation

- Reliable, long-term stability and linear measurement
- Low-maintenance design
- Maximum process safety via non-contact inductive signal transmission
- Sensor with long-term stability to measure traces of dissolved oxygen





## Liquid Analysis



### Turbidity

#### Feedwater preparation

- Measuring results like in the lab: Highly accurate and reliable monitoring of your water quality – even at the lowest turbidity
- Smart verification and calibration: Absolutely safe, liquid-free, without Formazin
- Great flexibility, simple handling: One sensor for all measuring points and all installation environments (inline or immersion)
- Improved process control: Individually adaptable sensor response time
- Fast commissioning: Factory calibration and Memosens technology allow plug & play integration into your process



[www.endress.com/CUS52D](http://www.endress.com/CUS52D)

## Memosens

The first connection that you can truly rely on. The mechanically safe, non-contact connection between the sensor and the cable enables the technology to function safely, even under water. As all sensor-related data are stored directly in the sensor head, it is possible to perform predictive maintenance. This has been proven to reduce maintenance costs significantly and to increase sensor operating time. At the same time, process safety is increased and system downtime reduced to a minimum. And as if that wasn't enough, Memosens saves hard cash when it comes to capital costs.



### Main benefits

- Non-contact, digital measured value transmission
- EMC safety guaranteed
- Easy calibration in a laboratory
- Industry leading data management
- No more incorrect values
- Memory included

# A global commitment to total quality steam generation, distribution & consumption

All devices manufactured by Endress+Hauser guarantee high measuring accuracy and operational safety 24/7 throughout the entire life cycle of the steam boiler plant.

We have sales and customer service centers in over 45 countries. So, whether you are based in Europe, America, Asia, Africa or Australia, we are there for you!

The extensive network of sales and production is coordinated by Endress+Hauser Management AG. The company with headquarters in Reinach, Switzerland, is the receiving point for the management reports from each company and the point from which the cross-departmental tasks and processes are standardized and coordinated. Various support centers enable the Group companies to fulfill their tasks. Endress+Hauser InfoServe in Weil am Rhein, Germany, plays a special role. InfoServe, the Group's IT specialist, runs our data processing center and concentrates unique expertise for software and computer-assisted services and solutions.



## We support you by

- Providing first-class field measurement technology for all process variables (flow, analysis, level, pressure, temperature etc.)
- Planning and delivering all common control, visualization and process control systems
- Planning and advising with consultants, engineers and expert technicians on site
- Consulting, designing and engineering
- Managing national and international projects
- Installing, commissioning and configuring
- Inspecting and maintaining (maintenance contracts)
- On site calibrating of factory, controlling measurement
- Repairing services, spare parts
- Individual maintenance concepts (installed base audit)
- Training courses and qualifications
- Worldwide service







# Information at your fingertips for improved steam boiler plant design, maintenance and operational productivity

Rely on a knowledgeable partner to support you for improved steam boiler plant design, maintenance and operational productivity

## W@M Life Cycle Management

W@M Life Cycle Management enhances your processes with easy access to device information. Up-to-date data allows you to shorten engineering time, increase plant uptime and optimize maintenance.

### Improved productivity with information at your fingertips

W@M Life Cycle Management is an open and flexible information platform with online and on-site tools. Instant access to current in-depth data shortens your plant's engineering time, speeds up procurement processes and increases plant uptime. Combined with the right services, W@M Life Cycle Management boosts productivity in every phase, from planning and initial design, engineering, procurement, installation and commissioning, to plant operation, maintenance and servicing.



More information about W@M

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



## W@M Operations - data to optimize maintenance

Optimal maintenance is driven by information. Transfer your device data easily into the operation phase and enrich it with up-to-date asset information to manage your installed base.

Endress+Hauser Operations app allows easy access to up-to-date information on your equipment e.g. order code, availability, spare parts, successor products for old devices and general product information - wherever you are, whenever you need it. Simply enter the serial number or scan the data matrix code on the device to download the information.

Download the free mobile app today. The app is available for iPhone, iPad and Android. Scan the QR Code to download the Operations app from the App Store or Google Play.



## Select and size the best-fit products step by step

Plant engineering holds many challenges. You must keep track of things during the planning process and harmonize application and instrumentation to arrive at safe decisions. Applicator is a comfortable selection and design tool to determine and select the suitable product for the measuring task. During the planning process, enter specific application parameters to obtain a selection of suitable products and solutions.



Learn more on how to select and size product

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

Applicator provides clear process guidance and a straightforward module structure:

- Selection – determine the measuring system for the application. Product areas include level, flow, density, pressure, analysis, temperature, registration and system components
- Sizing – choose the correct dimensioning for the measuring device
- Free access to the online tool or download and install the tool locally including project module.

## System Integration – from individual sensors to complete solutions

With the introduction of communication technologies such as HART®, PROFIBUS and FOUNDATION fieldbus™, the barriers between field instrumentation and the systems level began to disappear. Instruments became more intelligent and were integrated into the automation architecture. Having recognized this development early on, Endress+Hauser has been actively involved in standardization committees and user organizations from the introduction of fieldbus technology onwards to ensure that our customers stay abreast of new trends.

A fieldbus output is both an interface to the field instrument and a carrier of additional information from the field. Instrument status, maintenance and diagnostics information from the process to the control room increases plant availability.

Endress+Hauser ensures the integration of this information into the system environment.

# Engineering with full traceability

Save time and money through automatically generated 3D models and 2D drawings !

Whether you are engaged in detailed engineering, creating isometric drawings or writing a bill of material, you can rely on Endress+Hauser's device data. Using our online tools, you can select and size the best-fit instrument and configure it according to your application. A product definition is generated and based upon order code, device CAD models and drawings are made available which can be used for planning and documentation.

On our website we provide 2D drawings and 3D models free of charge, offering different native and specific output formats fitting to your preferred engineering environment, based on the specific order code of the best-fit product. The deliverables are automatically generated in real time, available 24/7, out of centrally stored and quality insured master data that is kept up-to-date based on Product Center specifications.

## Increased data consistency & data quality

- Through databases providing all life cycle information around our products
- Always up-to-date product information including e.g. CAD, documentation, product status, spare parts

## Reduced time & cost

- Reduced plant start up time through faster engineering
- Reduce error rate
- Up to date information 24/7

## Purchasing made easy

Endress+Hauser offers you comprehensive tools for your procurement process. From the first piece of information to the delivery status – the entire procurement chain is available online via your browser, offline on your computer or as an integrated solution adapted to suit your procurement process.

## Online Shop

Available around the clock, the Online Shop gives you the opportunity to order standard products, services, consumables and spare parts in accordance with your conditions. You access the shop's homepage through a personalized portal. With its clear layout, it shows at a glance all current quotations and purchase orders.


## Integrated Solutions

Working in line with your strategic orientation and in business processes, we assist you with individual solutions for integration into your procurement process. This means that you get the ideal solution for your requirements – electronic catalogs, defined shopping cart interfaces such as OCI, and ERP to ERP connections.

## A worldwide network

Serving comes before earning: the company founder's principle has shaped our company to this day. That's why we are always close to our customers with a worldwide network of sales and production centers.

Our sales centers, over 45 in number, are national companies in charge of sales, marketing and service in their particular country. In places and locations where we are not directly present, selected distribution partners complete this close network. Our production centers with headquarters in Germany and Switzerland focus on knowhow in production, product management and R&D as well as logistics. At these sites we also manufacture core components for our worldwide production. Plants in Brazil, China, France, India, Italy, Japan, South Africa, the UK and the United States assemble, test and calibrate instruments and devices, mainly for regional markets. This helps us to serve our customers quickly, flexibly and individually anywhere in the world.

 **Endress+Hauser** works closely with local and global organizations, foundations and institutes such as First Point Assessment Limited (FPAL) for cost reduction and performance improvement. Our instruments are designed and manufactured according to globally standardized certifications including API, ISO, SIL and IP. Global approvals and certificates include:

Approvals for hazardous areas (Ex certificates)

- ATEX ▪ FM ▪ CSA ▪ TIIS ▪ IECEx ▪ NEPSI

Further approvals

- CE ▪ FCC ▪ R&TT



TIIS





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CP012-30/29/EN/01.16