Sensors, transmitters, compact devices and assemblies

Experts in Liquid Analysis

Endress+Hauser
People for Process Automation

Endress+Hauser – Your partner

Endress+Hauser is a global leader in measurement instrumentation, services and solutions for industrial process engineering.

Endress+Hauser supports customers around the globe with a wide range of instruments, services and automation solutions for industrial process engineering. Around half of the 13,000 „People for Process Automation“ work in sales. They help customers throughout the world to make their processes safe, economical and environmentally friendly. With sales centers in over 40 countries, Endress+Hauser is always near its customers. In places and locations where Endress+Hauser is not directly present, representatives complete this global network allowing Endress+Hauser to serve its customers quickly, flexibly and individually.

Concentrated expertise
The headquarters of our production centers focus on production, product management, research and development, as well as logistics. At sites in Germany and Switzerland, we produce core components for our worldwide production. Plants in Brazil, China, the Czech Republic, France, India, Italy, Japan, South Africa, the UK and the United States assemble, test and calibrate instruments and devices mainly for regional markets.

Sustained growth
For us, profit is not the goal but the result of good economic activities. The Group focuses on sustained growth on its own strength. The basis for this endeavor is a sound equity ratio of 68 percent. Profits are predominantly returned to the company – this also ensures the success and independence of the Group. Endress+Hauser was founded by Swiss native Georg H. Endress and German native Ludwig Hauser in 1953. Over the years, the company thrived and is now a global enterprise - wholly owned by the Endress family since 1975.

Expertise in liquid analysis

Within the globally active Endress+Hauser Group, Endress+Hauser Conducta counts among the leading international manufacturers of sensors, transmitters, assemblies, analyzers, samplers and complete solutions for liquid analysis. As a center of excellence, we have worked hard over the last 40 years to achieve a top-ranking position on the international market. Endress+Hauser Conducta has five production plants: in Gerlingen (Germany), Waldheim (Germany), Groß-Umstadt (Germany), Anaheim (USA) and Suzhou (China).


Gerlingen, Germany


Waldheim, Germany


Groß-Umstadt, Germany


Anaheim, USA


Suzhou, China

Precise liquid analysis

Environmental protection, consistent product quality, process optimization and safety – these are just a few reasons why liquid analysis is becoming increasingly essential.

Liquids such as water, beverages, dairy products, chemicals and pharmaceuticals have to be analyzed day in and day out. We support you in fulfilling all these measuring tasks with application know-how and cutting-edge technologies. Our comprehensive portfolio always offers the product best suited to your process needs.

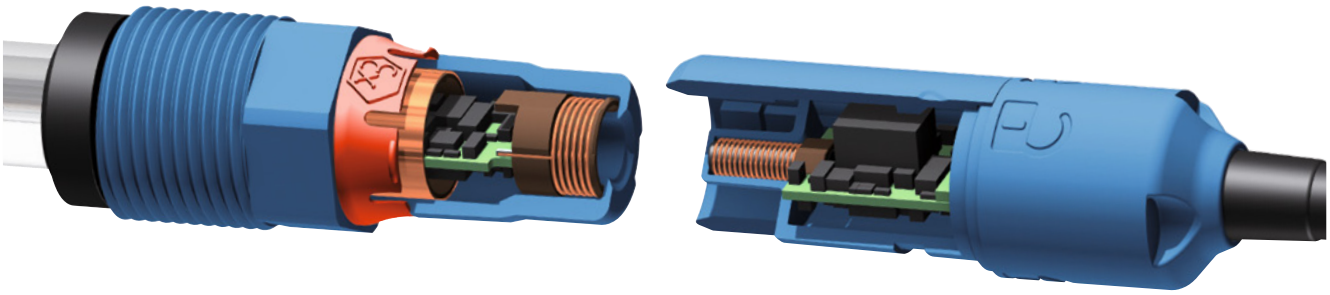
- From standard sensors to complete measuring stations – we provide cutting-edge technology for every liquid analysis parameter.
- Our high-precision instruments help you to increase product yield, improve product quality and ensure process safety.
- State-of-the-art communication interfaces and protocols enable you to seamlessly integrate our devices into your production and business processes and your plant asset management.
- Whether process lab, process or utilities – use our know-how and expertise to optimize your application.
- As leading supplier of analytical measuring technology, we support you during the entire product life cycle - everywhere in the world.

Content

Memosens technology

Liquid analysis makes great demands not only on the sensor element but also on the transmission of the measured value from the sensor to the transmitter. When measuring pH, low currents and very high sensor internal resistances additionally require a high-impedance connection to the transmitter. Moisture in the connection can change the measured value and may even result in measurement failure.

The Memosens technology revolutionizes the safety of data transfer by digitalizing the measured value in the sensor and transferring it to the transmitter without a contacting, and thus moisture-sensitive, connection.
The jump in technology to a new generation of sensors has additional advantages and eliminates general limitations of the technology in place to date.



Memosens makes the sensors digital with integrated data storage
Sensors with Memosens technology save the current calibration data and other information which can be used for look-ahead maintenance, such as hours of operation, maximum and minimum measured values and maximum and minimum temperature. When the sensor is mounted, the calibration data are automatically transferred to the transmitter and used to calculate the current value.

The result:
- Measuring point maintenance is no longer based on individual issues identified but rather all relevant sensor data are used.
- The current application of the sensors can be made to depend on the previous history.

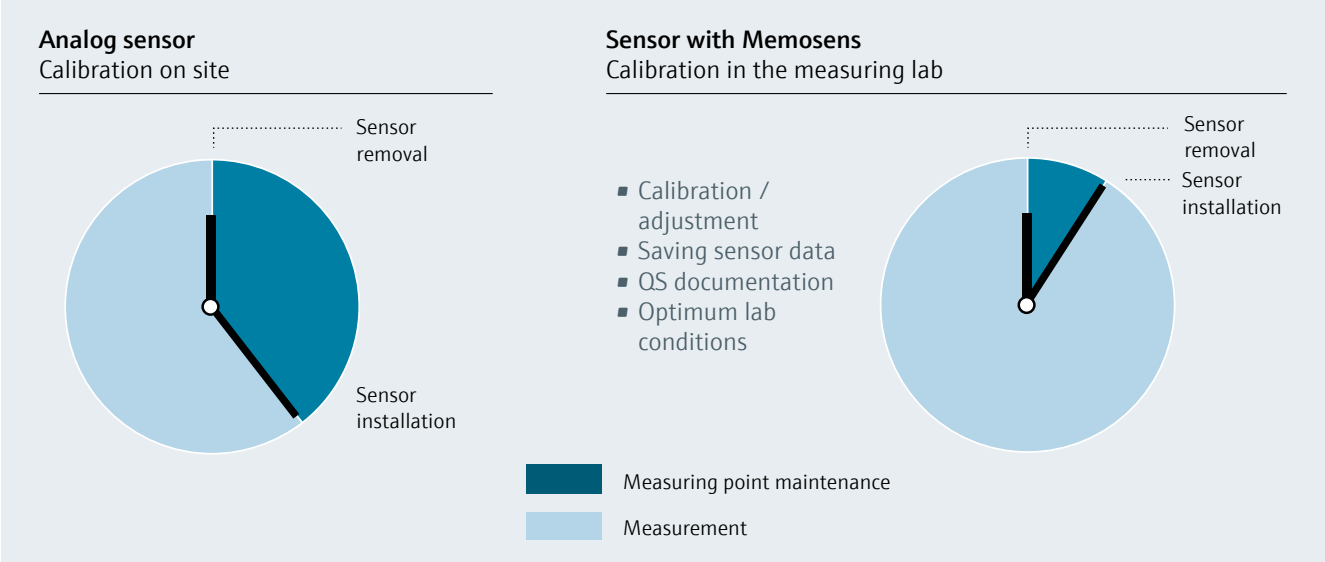
An unestablished connection between the sensor and transmitter is actively displayed – the first really definite connection
Digital measured value transmission automatically results in an error message if the signal flow is interrupted. And this regardless of whether the sensor or measuring cable is no longer working properly.

The result:
- The availability of the measuring point is dramatically increased and ensured.
- Automatic sensor detection allows for unproblematic sensor replacement.

Benefits

- Safe digital data transmission: inductvie, corrosion-free, 100% reliable
- Easy-to-handle sensor connection
- Sensor head stores measurement data and sensor information for predictive maintenance
- Fast plug & play with pre-calibrated sensors
- International standard

Video about Memosens technology



Sensors with Memosens technology are the first sensors to allow calibration/adjustment away from the measuring point in the measuring lab.

The result:
- The availability of the measuring point is dramatically increased by the quick, easy replacement of calibrated sensors.
- Measuring point down-time is reduced to the time between detecting and replacing the sensor.
- The calibration/adjustment itself takes place under optimum external conditions in the measuring lab.

The first non-contact measured value transmission from the sensor to the transmitter
Sensors with integrated Memosens technology transmit the measured value contactlessly from the plug-in head of the sensor to the cable coupling.

The result:
- Always free from corrosion
- A coupling system that can even be connected under water
- Free from leaks and measured value distortion due to moisture

EMC safety through galvanic decoupling of medium from transmitter
Highly integrated electronics in the sensor convert the analog signal of the sensor to digital information which is then transferred via the cable coupling to the transmitter contactlessly and free from interference potential.

The result:
No more need to ask about “symetrically high-impedance” or “unsymmetrical” or an impedance converter for pH measurement.

Memosens sensor and measuring point management

Qualification and servicing of measuring points with Memosens technology

Reliable measurements are a prerequisite for high process safety. With the Memocheck tools you can always be sure that measured value transmission is error-free, since these tools simulate measured values for qualification of digital data transmission.

- Comprehensive checks: from cable coupling to process control system
- Flexible application: for all transmitters with Memosens technology, available for hazardous or non-hazardous areas
- Always precise: Requalification with quality certificate possible

Memocheck Sim is the tool to check all parameters. It simulates freely configurable measured values, value ramps, errors and calibration values and supports you during installation, commissioning or troubleshooting of various measuring points.

Memocheck supports service personnel during fast online-checks of a measuring point. The double plug-in head simulates two predefined sensor status.

Measure, calibrate and document with Memobase Plus

Memobase Plus enables easy and accurate calibration of Memosens sensors and at the same time, documentation of the entire sensor life cycle offering full traceability with a minimum of paperwork. It can also be used as laboratory measuring device in combination with a standard PC.

Better process safety with sensor traceability
Memobase Plus offers complete lifetime history of all Memosens sensors used.

- Beneficial for GLP, GMP, Audit Trail, enables you to operate in accordance with FDA 21CFR Part 11 and comply with the standards of the life sciences industry.
- Documents as-found/as-left values, to identify and store changes in the sensor characteristics during the batch.
- Offers network functionality to store all values in a central database: even local calibrations with a laptop are synchronized as soon as the computer re-connects to the network.

Improved process reliability with sensor diagnostics Memobase Plus stores sensor performance data for true sensor diagnostics.

- Programmable value limits for sensor exposure to elevated conditions ensures optimum sensor performance.
- Timely senor cleaning and regeneration prolongs the sensor lifetime.

Increased efficiency with simple sensor maintenance: With plug and play technology, Memosens sensors can be exchanged in the process for convenient maintenance and calibration in the laboratory or workshop.

Versatile measuring station High-performance instrument for use with up to four Memosens sensors simultaneously.

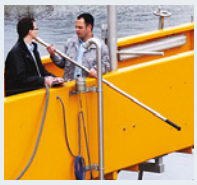
- Storage and export of measurement data enable fast and easy creation of high quality reports.
- Use of an identical sensor in the lab as in the process minimizes the risk of incongruences between laboratory results and online values.
- Real multipoint sensor adjustments and calibrations provide highest accuracy for your measurements.

Easy buffer management With a scanner you import the lot number, the expiry date, etc. of our buffers into Memobase Plus. This allows you to easily trace which sensor has been calibrated with which buffer.

Benefits

- Reliable measurements guaranteed
- Full traceability
- Better comparability of process and and laboratory

Measuring parameter overview

	Description	Applications
pH/ORP	**Description** pH value monitoring guarantees optimized production output in all areas of industry. Furthermore, the pH value is a critical controlled variable that affects plant efficiency. Endress+Hauser's reliable products help protect people and the environment, and guarantee the quality of high-grade products.	Applications  ▪ Process control in the chemical industry ▪ Municipal and industrial wastewater treatment plants ▪ Control in the food industry
Conductivity	**Description** Monitoring electrolytic conductivity is important for monitoring wastewater treatment and controlling cleaning processes (CIP) in the food and pharmaceutical industry. In the chemical industry, conductivity is used to determine the concentration of acids and bases.	Applications  ▪ Monitoring of WFI water in the pharmaceutical industry ▪ Monitoring of cleaning processes ▪ Monitoring of boiler feedwater ▪ Control of water treatment
Turbidity	**Description** In drinking water, the turbidity value is an important measure of quality. In the field of wastewater treatment, turbidity is measured to control wastewater treatment processes for primary sludge, sludge dewatering and in the aeration basin and outlet.	Applications  ▪ Drinking water measurement in the fine turbidity range ▪ Monitoring of residual water in the concrete industry ▪ Monitoring of the sewage treatment plant outlet
Dissolved oxygen	**Description** Dissolved oxygen is a key water quality indicator when monitoring surface water or in water treatment systems. It is also a critical factor in ensuring a highly effective aeration basin system and in guaranteeing optimum conditions for fish farming.	Applications  ▪ Controlling in the aeration basin ▪ Monitoring of boiler feedwater ▪ Control of fermenters ▪ Measurement in inertization and beverage bottling
Disinfection	**Description** The measurement of chlorine and chlorine dioxide is needed in all areas of disinfection to ensure safe and effective water treatment.	Applications  ▪ Flexible disinfection system in swimming pools ▪ Process water and cooling circuits ▪ Lasting disinfection in drinking water

Analyzers

- Samplers
- Nutrients
- Carbons
- Industrial parameters
- Container

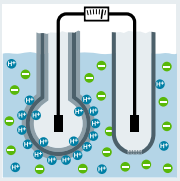
Samplers .....Page 34

For the automatic sampling, defined distribution and preservation of liquid samples
- CSF48 stationary samplers
- CSP44 portable samplers

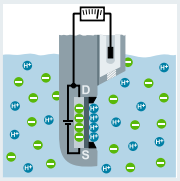
Nutrients .....Page 34

Online systems for measuring nutrient parameters
- Ammonium
- Nitrate and nitrite
- Phosphate and total phosphate

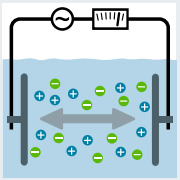
Measuring principle



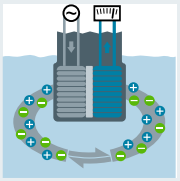
Based on a pH-sensitive glass membrane on which hydrogen ions accumulate, thereby causing electrical potential to build up.



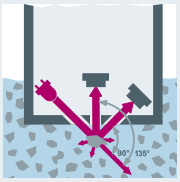
The ISFET is a simple transistor which is isolated from the gate by an isolator. Hydrogen ions can accumulate on this gate.



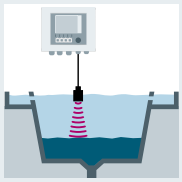
An alternating voltage is applied to two electrodes located in the medium. The conductance value is calculated according to Ohm's law.



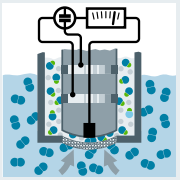
Based on an alternating magnetic field that induces an electrical current in the medium which generates a magnetic field in the secondary coil.



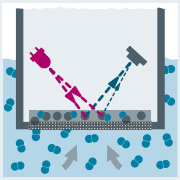
A beam of light is directed through the medium and scattered by elements with a greater optical density.



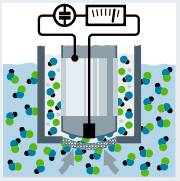
A piezoelectric crystal generates an ultrasonic signal that reaches solid particles and comes back to the receiver.



Oxygen reaches the working electrode via a membrane and is converted to an electric current. A counter electrode keeps the system running.



Marker molecules are excited by a green light and respond with a red fluorescent light. Oxygen molecules adapt and reduce the fluorescent light.



Chlorine is reduced at the gold electrode. The electron acceptance is proportional to the concentration of chlorine.

Systems for determining organic load of water
- SAC (spectral absorption coefficient)
- BOD (biological oxygen demand)
- COD (chemical oxygen demand)
- TOC (total organic carbon)

Different water quality requirements depending on the branch of industry
- Softened for rinsing and washing water
- Without calcium, Mg for industrial water
- Without dyes, iron or manganese for paper

Fully climate-controlled, individually sized containers with all necessary measuring devices
- Support in project planning
- Application advice
- Commissioning

Experts in pH measuring technology

Experienced, skilled, reliable
Endress+Hauser pH measuring systems are in operation anywhere priority is given to reliable measured values, a high degree of availability and long operating times. With an annual production rate of over 300,000 process sensors, the company is an international market leader.

With its accredited calibration laboratory, Endress+Hauser sets another standard when it comes to ensuring correct measurement results. For our customers, this means they can rely completely on our pH quality buffers.

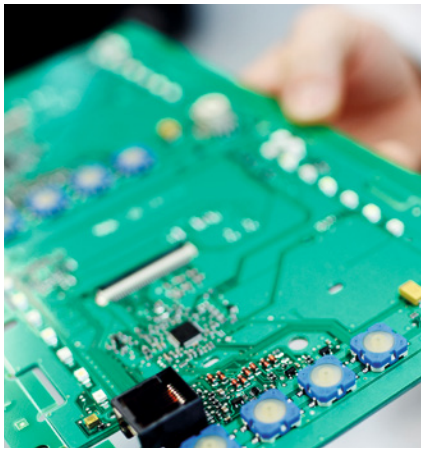
Research and development pay
Ranging from non-glass pH sensors to fully automated measuring points, R&D certainly pays off and means we can offer excellent price/performance ratios to our customers. Our sensors with their twin-chamber reference system or ion traps and gel compositions for tough, chemical applications offer maximum protection against contamination and a wider measuring range.

They boast a service life many times that of conventional pH/ORP sensors, which translates to a significant reduction in operating costs for pH measuring points. Sensors for fermenter applications with a pressurized reference system, or sensors for overhead installation are further examples of successful developments in sensor technology.

Benefits

- Long electrode operating times reduce operating costs
- Consistently high product quality
- Outstanding price/performance ratio
- Excellent vertical range of manufacture guarantees high product availability

Video on pH measuring principles



The pH sensor portfolio covers the complete range of applications:

- Water and wastewater treatment and long-term monitoring: Standard sensors with A-glass for fast response times and PTFE diaphragms for durability (CPS11D).
- Applications with fast-changing medium compositions or low conductivity in chemical or life sciences industries: Sensors with chemically highly resistant B-glass, liquid reference and ceramic diaphram to guarantee fast responses also in these applications (CPS41D).
- Hygienic applications in the food and life sciences industries: Sensors with highly resistant B-glass and ion trap protecting from poisoning, autoclavable and suitable for CIP and SIP to 140 °C (CPS71D).
- Applications with high fiber or particle content in the pulp & paper or power & energy industries: Sensors with open aperture and durable B-glass that do not block easily (CPS91D).
- Applications that do not tolerate glass breakage, for example in the food industry or that imply high contents of organic solvents: Unbreakable ISFET sensors with a chip that is insensitive to organic solvents (CPS441D, 471D, 491D) or long-life, CIP- and SIP-suitable enamel sensors (CPS341D)
- Highly sensitive applications that require extremely accurate monitoring: Combined pH/ORP sensors with various reference systems (CPS16D, CPS76D, CPS96D).

All Endress+Hauser sensors are approved for hazardous areas according to ATEX/FM/CSA, NEPSI and TIIS .

Benefits

- Complete portfolio for all kinds of applications
- All relevant approvals
- Accredited calibration laboratory

Memosens - a strong partner in pH measuring technology

The advantages of the Memosens technology are particularly evident in pH measuring technology. Problems with moisture are a thing of the past. In addition to excellent transmission reliability, for the first time ever a system is available that can detect a cable break or other interruptions in the measuring signal. This, in turn, significantly reduces process downtime.

Safe transmission of measured values

To ensure safe transmission of measured values from contacting plug-in systems, double-shielded measuring cables are required to prevent electromagnetic interference impulses. With Memosens technology, values and data are digitized directly in the sensor and transmitted with a standard bus cable of low impedance.

Fexible measuring point concepts for all needs

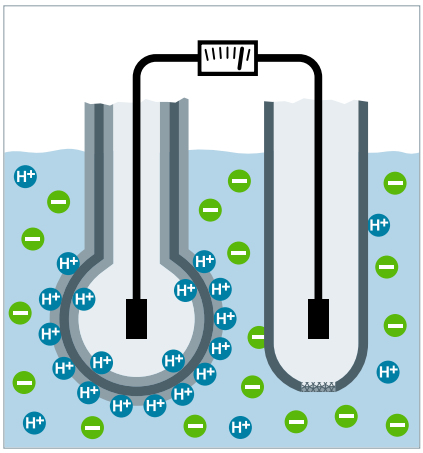
Endress+Hauser not only offers a complete sensor portfolio but also a wide range of transmitters and assemblies. Transmitters range from basic one-channel transmitters to multi-channel and multi-parameter transmitters for up to 8 sensors. There is a unique range of assemblies and retractable assemblies to choose from with so many different process connections for every installation position and a wide range of materials ranging from PVC to stainless steel and Hastelloy. All sensor types fit into the same assemblies. As a result, it is easy to convert to another sensor type even in difficult applications. If it's a case of upgrading a manual measuring point to a fully automated pH system, you will find the ideal solution in Liquiline Control CDC90.

pH electrodes using the potentiometric method

The method of pH measurement using glass electrodes is a potentiometric measurement method. Since glass is an electric insulator, transmitters for analog pH measurement must have an extremely high input impedance. In the case of Memosens electrodes, signals are transmitted digitally without interference. The measuring effect is based on a pH-sensitive glass membrane whose surface reacts to the acid content of the solution with a specific voltage. This voltage is then measured relative to a reference element made of silver/silver chloride (Ag/AgCl).

Nowadays, the most modern pH glasses display high selectivity (low cross-sensitivity to ions other than H^+) over a wide temperature range. A pH sensor achieves the outstanding performance of the linear measurement of a material component over a concentration range of 14 (!) exponents. pH glass electrodes have become a standard worldwide.
Glass has the advantage of being very chemically inert and very stable when working with hot acids and alkalis. This means that pH glass electrodes can be used universally in a multitude of applications.

Combined pH/ORP sensors enable simultaneous measurement of pH value and ORP potential. Those values can be used to calculate the rH value which is a measure for the oxidizing or reducing effect of a medium.



Potential buildup during pH measurement with glass electrodes

Benefits

- Universal use (pH 0-14)
- High chemical resistance
- Lead-free shaft glass
- Temperatures up to 140 °C

1 All-round sensor Orbisint CPS11D/11
Long-term monitoring in the chemical, pure and potable water and wastewater industry; dirt-repellent PTFE ring diaphragm; reliable measurement (pH 0-14) up to 16 bar; salt ring for pure water; easy-to-use system

2 Water sensor Memosens CPS31D
Pool water, potable water, pH compensation in disinfection processes; 3 ceramic diaphragms for reliable measurement at low conductivity; low drift due to minimal ion depletion in electrolyte; optional salt ring for long operating life

3 Liquid-filled sensor Ceraliquid CPS41D/41
For all applications in chemical industry, pharmaceutical industry, pure water (low conductivity); for high accuracy and speed; reliable measurement (pH 0-14) in fast-changing medium compositions

4 High-performance sensor Ceragel CPS71D/71
Chemical industry, chemical processes in all industries; gel type sensor with ceramic diaphragm for fast responding; poisoning resistant by ion trap with pressurized reference system of TP version; upside-down installation realized by TU version

5 Hygienic sensor Memosens CPS171D
Bioreactors and fermenters in the biotech industry; specialized glass membrane and gel for long-term stability; precise after many CIP/SIP and autoclaving cycles (up to 140°C); certified biocompatibility with regard to bioreactivity; pressurized reference

6 Contamination abrasion-resistant sensor Orbipac CPF81D/81
Primaries, water, wastewater, paper industry, power stations; integrated assembly; flat membrane; double-chamber reference; large dirt-repellent PTFE diaphragm; fixed cable available

7 Blocking-resistant sensor Orbipore CPS91D/91
Pigment production, paper industry, dye/paint production; for precipitation reactions, suspensions, emulsions; rapid response, high-stability gel

ORP electrodes using the potentiometric method

The ORP value is an indicator of the oxidizing or reducing properties of a process medium and is measured in mV. In aqueous media, the measuring range is between -1 500 mV and +1 500 mV. A precious metal electrode (silver, gold or platinum) acts as the measuring electrode. As is the case with pH measurement, the electrochemical potential is measured against a silver/silver chloride reference (Ag/AgCl) and indicated in mV.

All ORP pairs in a process make up the oxidation reduction potential. As such, in contrast to pH measurement, the ORP value is a sum parameter that cannot be assigned quantitatively to the individual ORP pairs.

Even though only one sum parameter is measured, ORP measurement is an effective and low-cost method which can be used for chromate detoxification, cyanide detoxification or to measure the metering of oxidants for disinfection purposes.

The ORP value can also be indicated as a percentage. Here, two characteristic mV values are assigned to a 20 % and an 80 % value, making it possible to detect activities pertaining to chemical reactions and also of reaction endpoints.

Benefits

- Cost-effective measurement method
- Universal use
- Gold electrodes for oxidizing media
- Platinum electrodes for reducing media

Gold pin or platinum cap as measuring electrode

1 Memosens CPS16D combined pH/ORP sensor
Standard sensor for long-term monitoring in water treatment or the chemical industry; dirt-repellent Teflon ring diaphragm; poison-resistant ion trap

2 Memosens CPS76D combined pH/ORP sensor
Hygienic sensor for food, pharmaceutical industries; CIP-, SIP- and autoclavable; certified biocompatibility; pressurized reference for fermenters

3 Memosens CPS96D combined pH/ORP sensor
Robust sensor for chemical processes, pulp and paper industry; open aperture diaphragm for very contaminated media and suspended solids; fast response time

4 Standard sensor Orbisint CPS12D/12
Long-term monitoring in water treatment, detoxification, or the chemical industry; platinum cap or gold pin; measuring range: -1500 to +1500 mV; dirt-repellent Teflon ring diaphragm

5 High-performance sensor Ceraliquid CPS42D/42
Chemical industry, detoxification, water treatment, power stations; for media that tend to form buildup, and fast-changing medium compositions; platinum cap

6 Hygienic sensor Ceragel CPS72D/72
Food industry, fermenter, biotechnology with rapidly changing oxidation reduction potential; platinum cap; acrylamide-free, ion trap, excellent resistance to temperature and pressure changes

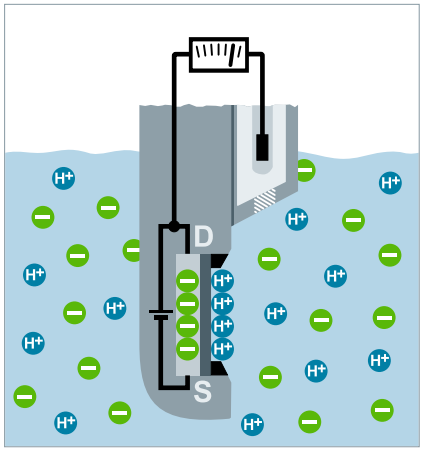
7 Sensor for suspensions Orbipore CPS92D/92
Paper and pulp industry; open aperture diaphragm for contaminated media such as emulsions, precipitation reactions, dispersions; platinum cap for rapid response

Non-glass pH electrodes using the ion-selective method

The pH value can also be measured with an ion-selective field effect transistor (ISFET). It is, in effect, a simple transistor with a source and drain that are separated from the base gate by a semiconductor. Hydrogen ions from the medium may accumulate here. The resulting positive charge on the outside is „mirrored“ on the inside of the base where a negative charge occurs. This makes the semiconductor channel conductive. The lower the pH value of the liquid, the more H+ ions accumulate on the base and the more current can measurably flow between the source and drain.

The accumulation of protons is a purely electrostatic effect. As a result, the sensor material does not change and the need for recalibration is by no means as frequent as with glass electrodes. Since there is no gel-like layer, ISFET electrodes are also suitable for pH measurement in media with a low proportion of water.

Modern gate materials are highly selective and follow the Nernst law in close tolerance limits. The particularly robust nature of the sensors is a result of the ISFET chip being embedded in a stable and unbreakable PEEK body (polyetheretherketone; polymer thermoplastic with excellent mechanical and chemical resistance properties that are retained at high temperatures). ISFET-based pH electrodes are primarily used in applications where unbreakability is required, as is the case in the food and pharmaceutical industry, since fragile glass electrodes could cause problems if broken.



The current between source and drain of the semiconductor element depends on the charge at the base and thus directly on the pH value

Benefits

- Non-glass, break-proof electrode
- Reliable measurement even with low water content
- Fast response
- Precise also at low temperatures
- Improved CIP stability

1 High-performance sensor Memosens CPS47D
For high levels of organic solvents and clogging media; liquid KCl reference, ceramic diaphragm, FDA, EHEDG, 3-A certified; USP87, USP88 class VI, USP381, USP661; perfluorelastomer seal with all hygiene certificates; overhead installation possible

2 Hygienic sensor Memosens CPS77D
For hygienic and sterile applications; bacteria-tight thanks to gel-filled reeference and micro-porous ceramic diaphragm; 6 times higher CIP stability, sterilizable, autoclavable; FDA, EHEDG, 3-A certified; USP87, USP88 class VI, USP381, USP661; perfluorelastomer seal with all hygiene certificates

3 Sensor for suspensions Memosens CPS97D
For contaminated media n the chemical and paper industries; for low temperatures and high particle content; open aperture diaphragm, reference system with stabilized gel; best cleanability thanks to sensor head design and larger measuring surface

4 Sensor with pH-sensitive enamel Ceramax CPS341D
Pharmaceutical industry, food&beverages; CIP/SIP capabilities; no aging, extremely corrosion resistant

Accredited pH laboratory

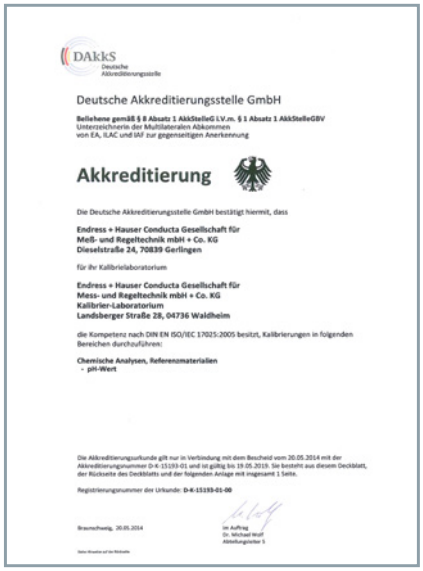
Correct results you can rely on
Our permanent calibration laboratory for pH quality buffers meets highest customer requirements. Endress+Hauser has successfully passed the tough accreditation process of the German Calibration Service (DKD) in accordance with the specifications of DIN EN ISO/IEC 17025:2005. This accreditation guarantees our customers even greater reliability when it comes to pH measurement.

The accuracy of a pH measuring point is rooted in achieving the right calibration with pH buffer solutions. Endress+Hauser produce pH buffer solutions for the most stringent requirements, which are specified with the actual value and an accuracy rating of ±0.02 pH. On May 5 2009, the accreditation body granted a calibration license with the DAR registration number DKD-K-52701 to the permanent laboratory in Waldheim. This accreditation confirms that the actual values and deviations of the buffer solutions produced are determined correctly.

Furthermore, the quality buffers meet the strict requirements of the pharmaceutical industry and contain only FDA-listed preservative agents. Users in the chemical, food and water/wastewater industries also benefit from the reliability of the calibration solutions.

Benefits

- In-house DKD calibration laboratory
- Maximum measured error ±0,02 pH
- Traceable calibration values


DAkkS
Deutsche Akkreditierungsstelle

Deutsche Akkreditierungsstelle GmbH

Akkreditierung

Die Deutsche Akkreditierungsstelle GmbH bestätigt hiermit, dass

Endress + Hauser Conducta Gesellschaft für
Meß- und Regeltechnik mbH + Co. KG
Dieselstraße 24, 70839 Gerlingen

für ihr Kalibrierlaboratorium

Endress + Hauser Conducta Gesellschaft für
Mess- und Regeltechnik mbH + Co. KG
Kalibrier-Laboratorium
Landsberger Straße 28, 04736 Waldheim

die Kompetenz nach DIN EN ISO/IEC 17025:2005 besitzt, Kalibrierungen in folgenden Bereichen durchzuführen:

Chemische Analysen, Referenzmaterialien
- pH-Wert

Fully automated measurement, cleaning and calibration

Continuous maintenance of the sensor guarantees a high degree of accuracy and the highest degree of availability of a pH measuring point. However, this causes a hike in operating and maintenance costs, particularly in applications with strict requirements, such as in the chemical, food and pharmaceutical industry or with measuring points with aggressive process conditions. Endress+Hauser offers fully automatic measuring, cleaning and calibration systems for up to two Memosens pH sensors to keep these costs to a minimum. With Factory Acceptance Tests (FAT) and Site Acceptance Tests (SAT), we make sure that the systems meet your requirements.

Liquiline Control CDC90
Liquiline Control CDC90 provides for high sensor availability and maximum reproducibility of calibrations, ensuring reliable measurement results and a long sensor lifetime particularly in aggressive and highly contaminated media. Thanks to its web-based technology, Liquiline Control CDC90 supports remote access from anywhere at any time. Access is possible via process control systems or any mobile device such as tablets, smartphones or notebooks.

When do I use Liquiline Control CDC90?

- The pH sensor must be cleaned and calibrated frequently.
- The pH measuring point is difficult to access.
- The process demands reproducible precise pH measurements.
- Appropriate maintenance of the pH measuring points is difficult due to lack of resources.
- The pH sensor must be calibrated frequently between batch processes or even during a batch process.

High product safety and product yield

- Optimized cleaning and calibration cycles ensure reliable measured values.
- Automated calibration and adjustment guarantee maximum reproducibility.

Maximized occupational safety

- Reduction in plant personnel visits to potentially dangerous sites.
- Elimination of the need for manual cleaning and calibration.
- The status of difficult-to-access measuring points can be checked and controlled remotely.

Reduced operating and maintenance costs

- Process integration is easy and seamless thanks to a number of fieldbus protocols and interfaces.
- Preset cleaning and calibration programs enable fast adaptation to the process.
- Unnecessary maintenance checks are eliminated because Liquiline Control CDC90 actively reports potential errors to the process control system.
- Even event-triggered cleaning or calibration can be controlled remotely.
- Maintenance work is limited to planned exchanges of the pH electrodes, buffers and cleaning solution.

1 CDC90 control unit
2 Pneumatic control unit
3 Double-membrane pumps
4 Cleaner and buffer canisters

Experts in conductivity measurement

Experienced, skilled, reliable
Over 40 years ago, Endress+Hauser began using the measurement of electrolytic conductivity not only to monitor water treatment, but also to control cleaning processes in the food industry (CIP = Cleaning in Place). We are is a leader in this field today. Since then, the range of applications for conductivity measurement has been constantly expanded, with new products introduced for the chemical and pharmaceutical industries, making Endress+Hauser a supplier for all sectors of industry today.

High-tech production
Cutting-edge plastic injection molding and connection techniques are key processes in the production of sensors. Before being packed for distribution, each individual sensor is inspected and its cell constant measured. The electronic components are produced on state-of-the-art pick-and-place machines and assembly stands. Each assembly is tested individually. The production subsystems are centrally controlled and allow a high degree of flexibility teamed with excellent production safety. This ensures the consistent high quality of our products.

Developing solutions for customers
In addition to the clear segmentation of the product portfolio for individual industries, Endress+Hauser also provides support in planning and implementing customized solutions. Qualified experts are at hand to provide our customers with professional application advice. Furthermore, Endress+Hauser also offers services to ensure the long-term reliability and availability of the measuring systems.

Benefits

- EHEDG-certified sensors for ultrapure water
- Injection molding technology for particularly smooth surfaces
- Consistently high product quality
- Excellent vertical range of manufacture guarantees high product availability

Video on conductivity measuring principles

Conductivity sensors using the conductive method

The electrical conductivity of liquids is determined using a measuring arrangement incorporating two electrodes located opposite from one another - as is the case in a capacitor.

The electrical resistance R, or its reciprocal value - the conductance value G - are measured following Ohm's law. From this, the specific conductivity (Greek; kappa) is calculated using the cell constant k, which describes the geometry of the individual electrode arrangement:

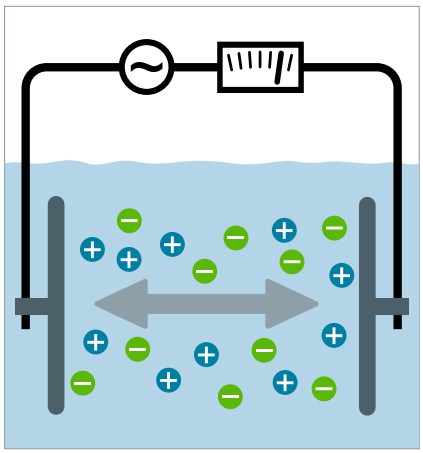
$\kappa = k \cdot G = k / R$

The cell constant k usually has the unit cm^{-1} and is specified by the manufacturer for each sensor. With an ideal plate capacitor, the cell constant is:

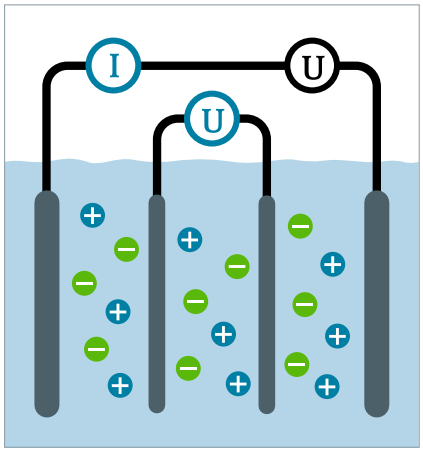
k = electrode spacing / electrode surface

The choice of sensor with a specific cell constant depends on the desired measuring range: the lower the conductivity, the smaller the cell constant selected. The size of the cell constant affects the optimum arrangement of the electrodes. For example, for ultrapure water the preference is for a concentric arrangement of cylindrical electrodes.

Four-electrode method
The four-electrode method is particularly suited for applications which cover a wide measuring range. The sensor has two additional electrodes to compensate for polarization effects that occur with two-electrode sensors at higher conductivities. The two additional electrodes measure the voltage drop in the medium which depends on the medium's conductivity. The connected transmitter calculates the conductance from the measured voltage and the given current.



Two electrodes are located opposite from one another – as in a capacitor



Two additional inner electrodes compensate the polarizaton effect.

Benefits

- High sensitivity
- Can be used over a wide range
- Simple design

1 High-temperature sensor Condumax CLS12/13
Industrial and power plant applications (boiler feedwater); measurement of low conductivity values at high pressures (up to 40 bar) and high temperatures; Ex approval

2 Pure and ultrapure water sensor Condumax CLS15D/CLS15
Monitoring of ion exchangers, reverse osmosis, distillation and chip cleaning; electropolished electrode surfaces; Ex approval

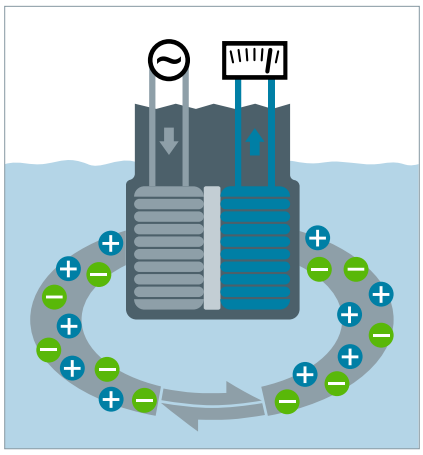
3 Hygienic sensor Condumax CLS16D/16
Pharmaceutical industry, WFI (Water for Injection); monitoring of ion exchangers, reverse osmosis, distillation, FDA, EHEDG and 3A certificates; Ex approval

4 Drinking water and wastewater sensor Condumax CLS21D/21
Medium separation; potable water treatment, wastewater treatment; measuring range up to 20 mS/cm; Ex approval

5 4-electrode sensor Memosens CLS82D
Life sciences; monitoring of phase separation, fermentation or chromatography; FDA-listed, EHEDG, 3-A certificates, complies with USP Class VI; suitable for CIP, SIP, autoclaving; wide measuring range 1 µS/cm - 500 mS/cm

Conductivity sensors using the inductive method

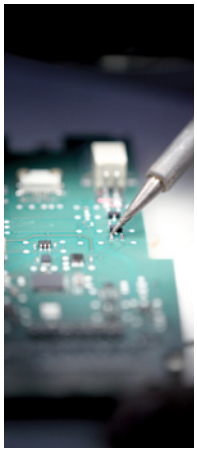
In the case of inductive conductivity measurement, a transmitter coil generates a magnetic alternating field that induces an electrical voltage in the medium. This sets the positively or negatively charged ions in the liquid in motion and an electrical alternating current flows through the liquid. This current produces a magnetic alternating field in the receiver coil. The induction current produced in the coil in this way is evaluated by the electronics system and used to calculate the conductivity.



A magnetic alternating field induces an electrical voltage in the medium

Benefits

- No restrictions in the case of high conductivity values due to polarization effects
- No galvanic contact with the medium
- Not sensitive to contamination



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1 Robust sensor Indumax CLS50D/ CLS50
Concentration measurements for acids, bases and salts, product monitoring, wastewater treatment; excellent chemical resistance properties thanks to PEEK or PFA; up to 125 or 180°C; Ex approval

2 Hygienic sensor Indumax CLS54D/ CLS54, Smartec CLD134 measuring system
Food and life sciences industries; ideally suited for control of CIP processes and detection of phase separation certified, hygienic design: FDA, EHEDG, 3-A, USP <87> and <88> class VI

3 Cost-effective, hygienic measuring system Smartec CLD18
Food & beverage industry; ideally suited for control of CIP processes and detection of phase separation; certified hygienic design: FDA, 3-A , EHEDG

Experts in turbidity and sludge level measurement

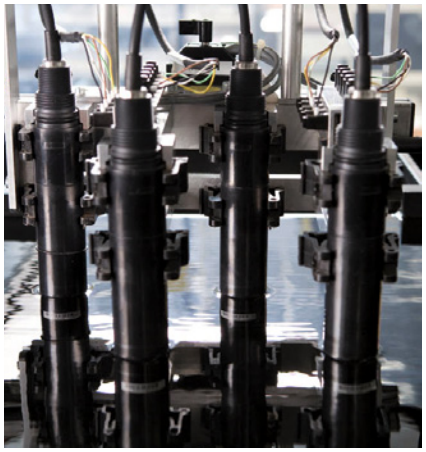
Focus on water and wastewater
In the area of turbidity and sludge level measurement, the focus is on providing solutions for the water and wastewater industries. Regardless of whether you're measuring turbidity downstream of a sand filter in waterworks in the limit range of optical metrology, or the solid contents of sewage sludge so concentrated it can barely be pumped – Endress+Hauser's sensors cover a wide range of applications. With the 90-degree scattered light measurement system that complies with DIN/ISO specifications, we provide a universal sensor system that can be used for most common applications. Our product portfolio is complemented by absorption sensors that measure the transmitted light and sensors that are based on the 4-beam alternating light method and, depending on the particular measuring range, use scattered light, forward scattered light or backscattered light. These optical sensors are also used in sludge level measurement. Ultrasonics provides an alternative method of determining the level of sediment in a basin or container by measuring the "time-of-flight" of the acoustic signal.

Flexible installation
Turbidity sensors from Endress+Hauser are suitable for installation in pipes or containers and for immersion applications in basins or channels. A wide range of assemblies safely positions the sensor in the process, including the CYA112 immersion assembly, the CYA251, CUA252, CUA262 flow assemblies, and the CUA451 ball valve retractable assembly.

Benefits

- Cost-saving solutions for control, monitoring and quality assurance
- Compact devices and sensors
- Factory calibration offering long-term stability
- Versatile applications

Video on turbidity measuring principles

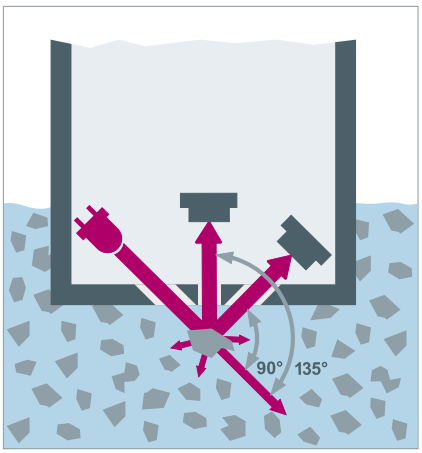


Turbidity sensors using established scattered light methods, 4-beam alternating light method and attenuation measurement

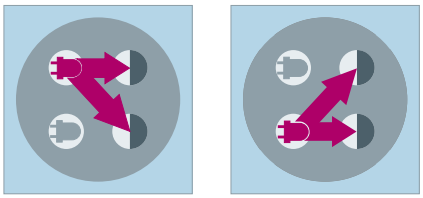
Scattered light methods
The 90-degree scattered light method in accordance with ISO 7027 / EN 27027 measures turbidity values under standardized, comparable conditions mainly in the low turbidity range. The 135-degree scattered light method is optimized for the measurement of high turbidities. With both methods, the solid particles in the medium cause the incident light to scatter. The scattered light thus generated is measured using scattered light receivers. The turbidity of the medium is calculated from the amount of scattered light.

4-beam alternating light method
The method is based on two lights and four detectors. Long-life light emitting diodes are employed as monochromatic light sources. These light emitting diodes are pulsed at a frequency of several kHz so as to eliminate any effects of extraneous light. With each light signal, two measuring signals are detected at the four detectors. Eight measuring signals in total are processed in the sensor and converted to solid concentrations. The 4-beam alternating light method allows users to compensate for any fouling and aging of optical components.

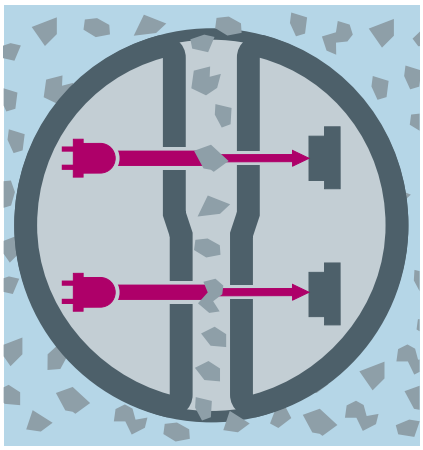
Attenuation measurement
Attenuation measurement is also performed in accordance with ISO 7027. A light source radiates a light beam through the medium. The detector is positioned in one line with the light source and detects the transmitted light. This measuring method is suitable for medium to high turbidities.



Scattered light methods: The scattered light generated by solid particles is measured at 90° and 135°



The 4-beam alternating light method compensates fouling and aging



Attenuation measurement: The transmitted light is measured.

1 Online turbidimeter Turbimax CUE21
Drinking water and treated process water; with infrared light measurement according to EN ISO 7027 / DIN 27027 or white light measurement in accordance with US EPA 180.1; measuring range: 0-1000 NTU/FNU; ultrasonic cleaning, simple calibration.

2 Potable and process water sensor Turbimax CUS52D
Fine turbidity range with a resolution of 0.0015 FNU; scattered light measurement according to ISO 7027; easy calibration and verification with solid state reference; hygienic version for direct inline mounting

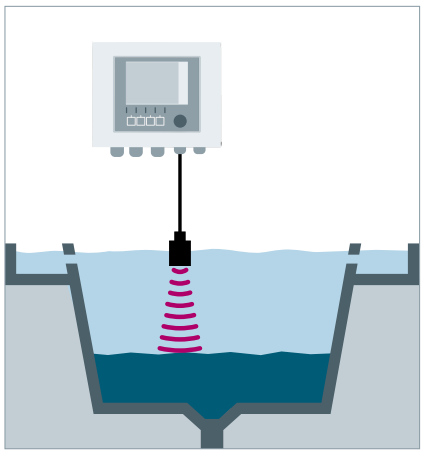
3 Wastewater sensor Turbimax CUS51D
All wastewater applications; 4-beam alternating light methods; excellent long-term stability; cleaning only - no maintenance; automatic air cleaning, if required

4 Absorption sensor Turbimax CUS50D
For industrial wastewater and process applications; light attenuation according to ISO 7027; high level of measurement accuracy and repeatability; robust materials for application in aggressive media or seawater; optional automatic air cleaning

Benefits

- Standardized measurement method
- Reliable measurements
- Excellent long-term stability
- Portfolio suits all applications

Sludge level measurement using the optoelectronic or ultrasonic method



Ultrasonic method
In the ultrasonic method, a piezoelectric crystal is encased in a flat cylindrical plastic body. When the crystal is excited with voltage it generates a sonar signal. In the process, ultrasonic waves are emitted to scan the separation zones. The measured variable is the time the emitted ultrasonic signal needs to reach the solid particles in the separation zone and return again to the receiver.

Benefits

- Easy configuration
- Simple calibration
- Quick and easy installation

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1 Ultrasonic system CUS71D/CM44
Water, wastewater, mining, chemical industry; in preclarification, secondary clarification and thickeners; multichannel design for parallel measuring, no moving parts, quick and easy to install

Experts in dissolved oxygen measurement

A solution for every industry
The range of dissolved oxygen measurement from Endress+Hauser spans from controlling the aeration of activated sludge basins in wastewater treatment and residual oxygen measurement in power station boiler feedwater, to controlling fermentation in biotechnology and food processes and assessing color and taste in the production of red wine.

Established and new sensor technologies
Two types of technology are deployed in sensory measuring technology: the well-known and tried-and-tested amperometry - here oxygen concentrations are converted to electric currents - and the optical method of fluorescence quenching. Here, the fluorescing light of an oxygen-sensitive molecule is used to determine the concentration. In the transmitter, the signals are processed further for the desired reading.

Flexible measuring point concept
Channels, pipes, tanks – not a problem. With the flexible measuring point concept, every task is mastered. Oxygen sensors from Endress+Hauser are designed both for use in channels and basins as well as for installation in pipes and tanks. The wide range of assemblies on offer safely positions this sensor at the place of application - these assemblies include the CYA112 immersion assembly, the COA250 flow assembly or the COA451 retractable assembly. This strategy of flexibility is completed by the Liquiline platform whose transparent operating concept impresses every user.

Superb product quality
Sensor production is highly automated. Testing is also performed in a fully automated test stand. Here, the zero point, slope and constancy of the sensors are checked, and the results are documented. This guarantees the consistent high quality of our products.

Benefits

- A wide range for all applications
- Technologies for different measuring requirements
- Flexible installation
- High-quality products guaranteed

Video on the dissolved oxygen measuring principles

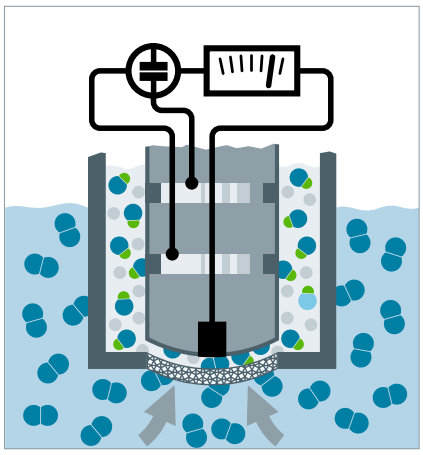
Oxygen sensors using the amperometric principle

When performing measurements according to the amperometric principle, the sensor comprises a working electrode and a counterelectrode in the simplest version of the two-electrode system. Both are surrounded by an electrolytic liquid in a common chamber.
A membrane provides the link to the medium or process: oxygen permeates from the medium into the electrolyte through the membrane and is converted to a current at the working electrode. The counterelectrode keeps the system running by means of a chemical equivalence reaction. The resulting current response is in direct proportion to the oxygen partial pressure.
The current is converted in the downstream transmitter and displayed to the user in the familiar units of oxygen saturation, concentration (in mg/l or ppm) and oxygen partial pressure.

In more complex three-electrode systems, an extra electrode is used (the reference electrode) to accurately control and regulate the internal condition of the sensor. This sensor demonstrates a high level of long-term stability.

Benefits

- Proven technology
- Highly accurate
- Excellent long-term stability
- With a three-electrode system



Oxygen permeates into the electrolyte through the membrane and is converted to a current

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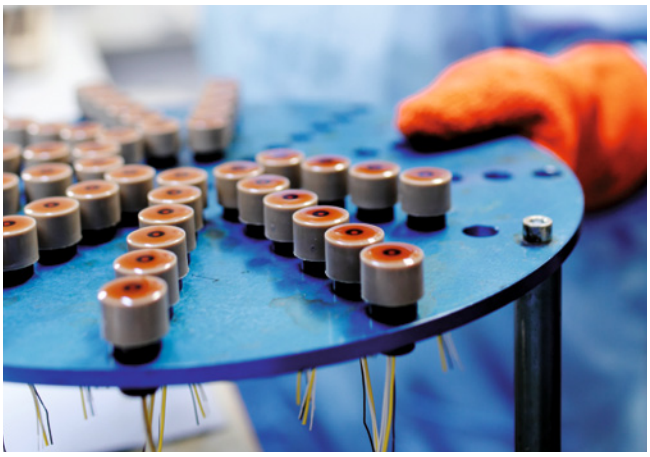


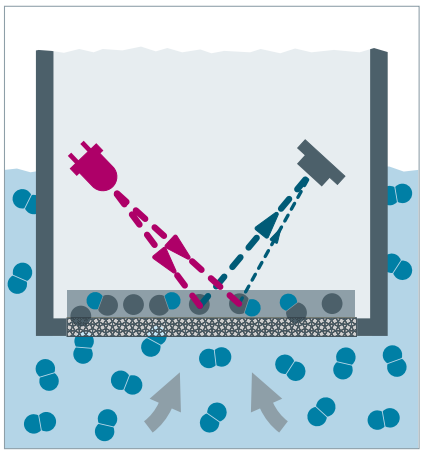
1 Hygienic sensor Oxymax COS22D
Digital sensor for food, pharmaceuticals, energy, chemicals, inertization; very wide measuring range: 0.001-10mg/l trace sensor; 0.01-60mg/l standard; 12mm stainless steel design, CIP and SIP compatible; approvals for hazardous area applications approvals

2 Water sensor Oxymax COS41
Analog sensor for water treatment; tried-and-tested 40mm design; two-electrode system; measuring range: 0.0-20mg/l

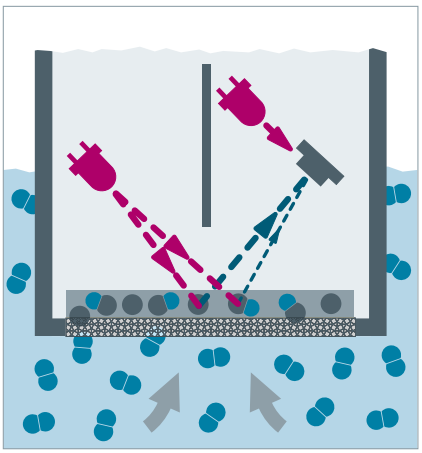
3 All-round sensor Oxymax COS51D
Digital sensor for water and wastewater; very wide measuring range: 0.05-100mg/l; 40mm design, 3-electrode system; long-term stability

Oxygen measurement using the principle of fluorescence quenching

With the fluorescence quenching method, a layer that is permeable to oxygen also forms the junction with the process. This layer contains just as many oxygen molecules as the medium (the partial pressure of the oxygen is just as high in the medium as in the layer). It is separated from the optics at the sensor by means of a substrate that is permeable to light. The layer contains marker molecules that are optically excited with a green light and respond with a red fluorescence light.
Oxygen molecules adapt to these marker molecules and decrease (quench) the fluorescence light emitted. The reduction in fluorescence light is connected to the oxygen partial pressure, both in terms of the amplitude and the duration. The light signal is converted in the downstream transmitter and made available to the user in the familiar units of oxygen saturation, concentration (in mg/l or ppm) and oxygen partial pressure.
In applications that involve higher temperatures, e.g. during sterilization or cleaning, sensors with reference LEDs are used. This LED compensates for the aging of the measurement LED and delivers reliable results even in demanding applications.



Oxygen molecules adapt to the marker molecules and decrease the fluorescence light emitted



The reference LED compensates for the aging of the measurement LED.

Benefits

- Purely optical system
- Short response times
- Low maintenance
- Excellent availability

1 Hygienic sensor Memosens COS81D
Digital sensor for life sciences, food & beverage; wide measuring range: 0.004 - 30mg/l; long-term stable measurement; certified hygienic design: EHEDG, FDA, USP Class VI, suitable for CIP and SIP; hazardous-area approvals

2 Optical sensor Oxymax COS61
Water, wastewater, fish farming; digital signal processing in the sensor; measuring range: 0.05-20 mg/l; long-term measurement stability; long maintenance intervals; intelligent self-monitoring

3 Memosens sensor Oxymax COS61D
Water, wastewater, fish farming, digital signal processing in the sensor; measuring range: 0.05-20 mg/l; long-term measurement stability; long service intervals; intelligent self-monitoring

Experts in chlorine and chlorine dioxide measurement

Disinfection solutions for all applications
Disinfection solutions play a particularly important role in applications such as drinking water, industrial water treatment and swimming pools. In these applications, the focus is on safe and cost-effective water treatment and disinfection as a means of protecting people and systems. An appropriate disinfectant is added to the process in a waterworks, swimming pool, cooling tower or bottle cleaning facility. Due to their powerful disinfectant properties, chlorine and chlorine dioxide have established themselves as the best solution currently available worldwide.

Complete measuring points
The sensory mechanism uses the amperometric principle, i.e. the chlorine concentrations are converted to electric currents in the sensor, which are then processed in the transmitter to provide the required reading. To do this, the medium (mostly water) is supplied to the sensor via a flow assembly. The discharged medium is either returned under pressure or directed into the drain. This is referred to as a lost sample, a method commonly used in the field of drinking water for the prevention of all possible contamination. The measuring points are often fully mounted on a panel; once the water supply and operating voltage have been connected, measurement can begin without delay.

Wide range of high-quality products
Endress+Hauser offers a wide range of sensors. Besides the sensor for free available chlorine, sensors for chlorine dioxide and total chlorine are also available. The highly automated production process guarantees consistently high quality.

Testing is also performed on a fully automated testbed, where the sensors are tested for zero point, slope and constancy and the results are documented.

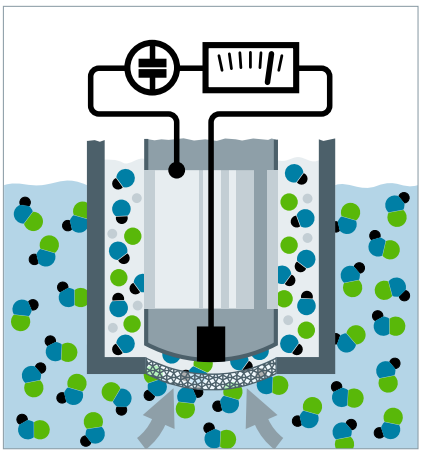
Benefits

- Sensors for all forms of chlorine: free available chlorine, chlorine dioxide and total chlorine
- Easy installation thanks to complete measuring panels with flow assembly
- Simultaneous measurement of pH and ORP values possible
- High-quality products guaranteed

Sensors for disinfection using the amperometric principle

The sensors work in accordance with the amperometric principle in a membrane-covered cell.
How they work can be described using the example of chlorine dioxide measurement:
The sensor features a metallic cathode, which is separated from the medium by a thin membrane. Chlorine dioxide coming from the medium diffuses through this membrane and is reduced at the gold cathode. The circuit is completed by means of the silver anode and the electrolyte. The electron reduction at the cathode is proportional to the concentration of chlorine dioxide in the medium. The transmitter converts this current to the appropriate display value.

With chlorine dioxide, this process works in a wide pH and temperature range. The situation with free available chlorine is somewhat different. Here, hypochlorous acid diffuses through the membrane and produces a reaction. The presence of hypochlorous acid in the medium depends on the pH value.
This dependency is compensated by means of pH measurement in the flow assembly and balancing in the transmitter.
Total chlorine measurement is more complicated. In addition to hypochlorous acid, chloramines also play a part in a complex system of reactions.



Chlorine dioxide diffuses through the membrane and is reduced at the gold cathode

1 Sensors for free available chlorine Memosens CCS51D and CCS51
Drinking water, pool water, industrial and process water; measuring ranges: 0 to 200 mg/l at a flow over 5 l/h (CCA151 without pH compensation); convex, dirt-repellent membrane and ultrasonic welding for long-term stable measurement; fast response time for precise dosing

2 Sensors for chlorine dioxide Memosens CCS50D and CCS50
Drinking water, industrial and process water; measuring ranges: 0 to 200 mg/l at a flow over 5 l/h (CCA151); convex, dirt-repellent membrane and ultrasonic welding for long-term stable measurement; fast response time for precise dosing

3 Sensors for total chlorine Memosens CCS120D and CCS120
Drinking water, pool water, industrial water and wastewater; measuring range: 0.1 to 10 mg/l including chloramines; wide pH range 5.5 to 9.5; for flow and immersion operation

Benefits

- Long-term stable thanks to dirt-repellent, ultrasonically welded membrane
- Efficient due to fast response time
- No zero point calibration
- Virtually independent of flow
- Low maintenance

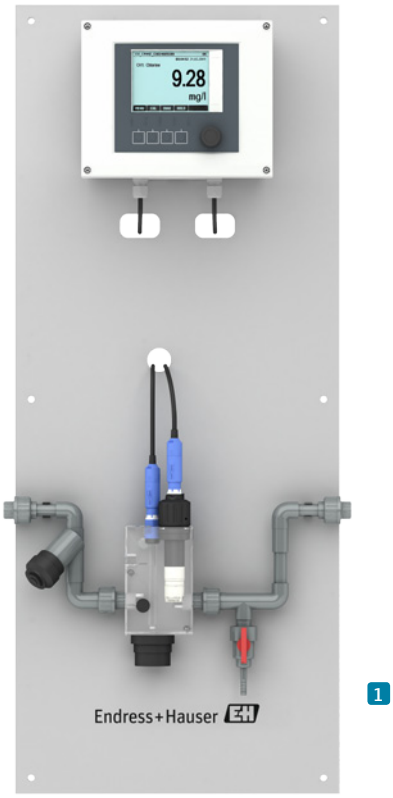
Montoring panels for disinfection - practical complete solutions

The monitoring panels for disinfection are fully mounted, tested and delivered complete, including medium-conducting components and connections. All the customers have to do is connect them to the media pipe. The media line includes a filter for sample preparation, check valve and sampling tap. This facilitates easy sampling for DPD comparison measurements used for calibration.

Panels for free chlorine are the standard solution for:
- Drinking water: to monitor, control and optimize disinfection processes
- Swimming pools: to monitor the water quality
- Utilities of all industries

Chlorine dioxide panels are particulary suited for monitoring of
- Cooling water systems to prevent formation of pathogens and biofilms
- Wash water for packaged vegetable and salad to ensure a high food quality
- Drinking water to ensure sufficient disinfection
- Beverage plants to secure the absence of chlorine dioxide

In co-operation with our partners Brenntag GmbH and a.p.f. Aqua System AG, we offer the Clorious2 automation solution. This continuous chlorine dioxide generator enables production of chlorine dioxide on-site as and when it is needed thanks to its unique patented process.



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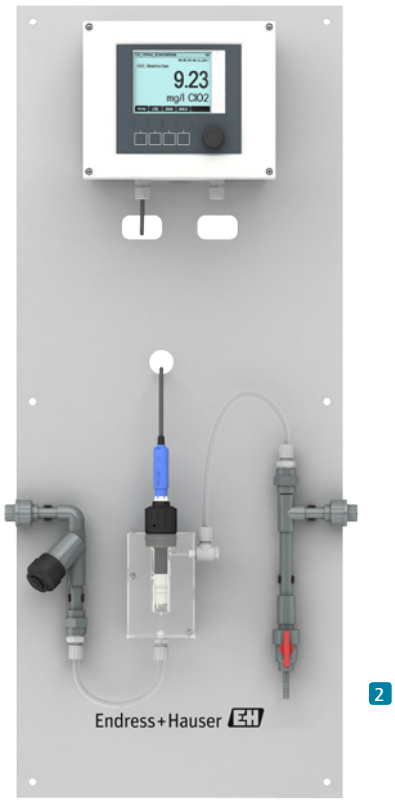

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Benefits

- System is ready to connect
- Easy to access from the front
- Easy to calibrate
- Easy to maintain

1 Monitoring panel for free chlorine
Drinking water, industrial water, swimming pools; chlorine dosage for water treatment; based on Liquiline CM44 transmitter, Memosens CCS51D for free available chlorine, pH and temperature measurement and CCA250 flow assembly

2 Monitoring panel for chlorine dioxide
Cooling water, washwater, beverage plants; chlorine dioxide measurement to avoid pathogen and biofilm formation as well as overdosing; based on Liquiline CM44, Memosens CCS50D sensor and CCA151 flow assembly


People for
Process
Automation

Assemblies open a window onto the process

No assembly, no measurement!
For almost every measurement, whether in the food or chemical industries or in environmental applications, an assembly is required which must be optimally designed to suit the sensor and the application. In the chemical industry in particular, monitoring, accuracy and plausibility (for example of the pH value), guarantee optimum productivity and the highest quality. The accuracy of the measured value depends on sensor maintenance, cleaning and calibration. Endress+Hauser offers a range of retractable, flow and installation assemblies, which are used to move the sensor in the process boiler, pipe or fermenter to the desired position in the medium and to remove it while the process is running.

What is unique is the range of materials and process connections available to provide the right assembly solution for all possible installation positions and applications.

The new Cleanfit CPA871 assembly generation, for example, comprises immersion chamber versions for application in sticky media. Its modular design makes it possible to switch between stainless steel and PEEK, PVDF, Hastelloy C-22 or titanium. The hygienic Cleanfit CPA875 assembly offers every feature, from double service chamber to dynamic sealing, to meet the highest demands of hygienic processes.

Benefits

- Process-compliant assembly family
- High degree of modularity for individual adaption
- Flexible range of materials, from plastic to Alloy for any kind of application
- Internal research and development and high-tech manufacturing

Assemblies		Advantages and benefits
Retractable assemblies Cleanfit Only a retractable assembly allows you to achieve continuous availability of the sensor. When the tank is full and in the event of process pressure, you can remove the sensor and replace it, or clean it and calibrate it.		▪ Safety for people and processes thanks to patented sealing concept or the use of a ball valve as a process seal ▪ Easy to operate with safety functions ▪ High level of sensor availability ▪ Sensors can be replaced and checked while process is running ▪ Integrated rinse chamber means that maintenance, including calibration, is contamination free. Video on the functional principle of CPA875
Installation assemblies Unifit CPA842/CPA640 Simple and cost-effective assemblies may be used if the sensor does not require replacement or cleaning online/ under pressure and the application permits it!		▪ Easy fixed mounting, EHEDG-certified design ▪ Integrated basket protector protects against electrode breakage ▪ Versatile PVDF (CPA640) or stainless steel 1.4435 (CPA842) for the food and pharmaceutical industries ▪ Low-cost pipe and boiler mounting ▪ Cost-effective solution
Immersion assemblies Dipfit These assemblies are used mainly in wastewater treatment plants or in the chemical industry. They are also a good choice for top-mounting in tanks or containers.		▪ Installation in open basins, tall containers and rubberized boilers ▪ Sensor holder with bayonet lock facilitates dismantling and prevents twisting of the cable ▪ Sensor removal following removal of complete assembly ▪ Range of materials facilitates wide range of uses ▪ Installation of up to three electrodes possible
Flow assemblies Flowfit Flow assemblies are often found in waterworks, in the food and chemical industries and on analysis panels in power stations.		▪ Cost effective ▪ High level of sensor availability due to bypass installation ▪ For 12- and 40-mm sensors ▪ Resistant plastic housing ▪ Spray cleaning possible ▪ Integrated flow display and adjustment for CCA250 ▪ Flexible mounting options with CCA151
Holder and assembly for immersion operation Flexdip CYH112/CYA112 Flexdip holder and assemblies for immersion applications allow for modular and flexible insertion of sensors in the medium.		▪ For open basins, channels and tanks ▪ Easy, cost-effective and flexible ▪ Existing structures can be used ▪ Easy to install and service, with rapid fastening for quick installation and sensor replacement ▪ Assembly version in stainless steel V4A or PVC with a wide range of connection threads for all applications ▪ Floating versions for varying levels

Transmitters display the measured value

Transmitters make the measuring point complete!
They process the measured value of the sensor and display it or make it available for further processing. They also make it possible to adapt the measuring point exactly to the operating and process conditions and to take over control tasks.

The transmitter concept of Endress+Hauser comprises the Liquisys transmitters and the Liquiline platform. The latter ranges from the cost-efficient one-parameter device Liquiline CM14 over the high-performance Liquiline CM42 with two-wire technology through to the multiparameter and multichannel controller Liquiline CM44. Up to 8 sensors with Memosens technology can be connected to the controller simultaneously in any desired parameter combination.

The outstanding feature of the devices is their easy and uniform operator guidance. The Liquiline multiparameter transmitter, in particular, offers one-of-a-kind convenience. It features an integrated web server that allows the operator to remotely access device parameters via any web browser. It also offers the digital fieldbus protocols HART, PROFIBUS, EtherNet/IP or Modbus for seamless integration into process control systems.

The platform is rounded off by Liquiline Compact, the smallest transmitter for sensors with Memosens plug-in head. It is particularly suitable for limited mounting spaces and can be operated by any Smartphone or tablet via a secure bluetooth connection.
The modular design of the Liquiline platform makes it very simple to expand the functionality. Its hardware and software are integrated into the Liquistation CSF48 and Liquiport 2010 CSP44 samplers and the new Liquiline System CA80 analyzer generation. All this saves you storage costs and makes your everyday work easier.

Benefits

- Transmitters for every application
- Reliable thanks to easy operation
- Modular design saves time and costs
- Flexible due to standardization
- Heartbeat Technology

Transmitters		Advantages and benefits

Liquiline CM44/CM44R
The multiparameter and multichannel controller is suitable for all Memosens sensors and digital sensors with Memosens technology. The transmitter is available as field device and DIN-rail version for mounting in cabinets and on DIN rails.
Heartbeat Technology
		▪ Easy operation with uniform and easy-to-understand menu guidance for all parameters and each sensor combination
		▪ Simple commissioning and integration into process control systems due to HART, PROFIBUS DP, EtherNet/IP and Modbus communication
		▪ Comfortable configuration and check of the device with any browser
		▪ Saves time thanks to preconfigured software and easy sensor replacement with precalibrated sensors with Memosens technology
		▪ Modular and standardized components reduce maintenance and storage costs
		▪ Heartbeat Technology offers easy and better control of the measuring points:
		  ▪ Extended proof test cycles and standardized diagnostic messages for efficient maintenance;
		  ▪ Verification of the measuring point without process interruption reduces the verification effort;
		  ▪ Monitoring data for trend recognition facilitate predictive maintenance and targeted process optimization.

Liquiline CM42 The high-performance 2-wire transmitter can be used in hazardous and non-hazardous locations.		▪ Version for pH/ORP, conductivity, dissolved oxygen – easy switch of Memosens sensors by plug & play ▪ Intuitive operation with plain-text display and online help ▪ Easy integration into process control systems due to HART, PROFIBUS PA and FOUNDATION Fieldbus ▪ Predictive maintenance possible with sensors with Memosens technology ▪ Available with stainless steel housing in hygienic design
Liquiline CM14 The compact 4-wire transmitter is suitable for Memosens sensors.		▪ Low-priced, reliable one-channel controller for one of the parameters pH/ORP, oxygen or conductivity ▪ Very easy operation and handling ▪ Time saving and comfortable: Plug&play due to pre-calibrated Memosens sensors ▪ Safe and resistant to interferences due to digital signal transmission ▪ Compact housing fits into standard control panels
Liquiline To Go CYM290, CYM291 The multiparameter handhelds support Memosens pH/ORP, conductivity and oxygen sensors. Liquiline To Go CYM291 is suitable for application in hazardous areas.		▪ Real plug & play thanks to Memosens technology ▪ Easy operation with direct and uniform menu guidance for all parameters ▪ Reliable measurement thanks to digital, non-contact data transmission ▪ Suitable for demanding environments thanks to water-proof housing (IP66/67) ▪ Identical measuring technologies in the laboratory and the process to achieve full consistency of lab and process measurements
Liquiline Compact CM72/CM82 The smallest transmitter for sensors with Memosens plug-in head can be used in hazardous and non-hazardous areas. Links to download the SmartBlue app: Apple iOS Android		▪ Easy commissioning and operation via existing tablets or smartphones and the SmartBlue app (CM82) ▪ Fast and reliable: A secure bluetooth connection allows to check measuring points that are dangerous or diffficult to access from a safe distance (CM82) ▪ Reliable measurement thanks to digital, non-contact data transmission ▪ Space-saving installation: The 2-wire device fits inside an assembly
Liquisys The 4-wire transmitter is available with a field or panel-mounted housing.		▪ Version for pH/ORP, conductivity, dissolved oxygen and chlorine ▪ Easy-to-understand menu structure makes configuration easier ▪ Large two-line display enables simultaneous display of measured value and temperature ▪ 4 to 20 mA, HART or PROFIBUS PA/DP outputs for connection to the process control system available ▪ Optional relay functions, e.g. for neutralization processes ▪ Extended diagnostic functions

Experts in analyzers, sample conditioning, containers, solutions

Analyzers and samplers

Whether you need an analyzer for certain parameters or for complex mixtures – Our analyzers need few consumables and are so simple that they can be easily operated by operating personnel. The modular design of the new Liquiline System CA80 analyzers simplifies inventory management and allows easy upgrade to a complete measuring station. Simply connect Memosens sensors, measure all analytics-relevant parameters with just one device and reduce your installation effort.

Many applications require sample conditioning for reliable and accurate results. Endress+Hauser sample conditioning units are optimally matched to your process conditions and easy to install and maintain.

Benefits

- Wide variety of measuring principles
- Easy operation and maintenance
- Low reagent consumption
- In-situ and cabinet devices for all industries and installation situations

If your process requires verification of the measuring reasults in the laboratory, you can apply stationary and portable samplers for automatic sampling, defined distribution and preservation of your liquid samples.

Turnkey solutions for Liquid Analysis

Depending on the measuring task in question, we develop customer-specific analytical solutions such as monitoring panels, cabinets or stations as well as automation systems. We will support you from the concept development stage to implementation and commissioning.

Monitoring

Our monitoring stations are supplied in turnkey condition and contain all of the components required from sample preparation right through to the transfer of data to higher-level systems. This guarantees easy installation, operation and calibration. These monitoring solutions are individually adapted to the customer‘s specific ambient conditions as well as communication and service requirements.

Automation

Our automation solutions support you in optimizing your processes, be this aeration control or phosphate dosing in a wastewater treatment plant or the automatic cleaning and calibration of pH measuring stations in the chemical or life sciences industries.

Parameter		Advantages and benefits
Samplers The new samplers from Endress+Hauser can be easily equipped with sensors for online measurement of various parameters and integrated into the control system.		▪ Liquistation CSF48 Stationary sampler for automatic sampling, defined distribution and preservation of liquid samples taken using the vacuum or peristaltic system or the CSA420 assembly ▪ Liquistation 2010 CSP44 Portable sampler for automatic sampling and defined distribution of liquid samples using a peristaltic pump, easy and user-friendly, compact design with integrated grips
Nutrients In addition to decomposing carbon, today's wastewater treatment plants also reduce nitrogen and phosphate. For this purpose, online measurement of nutrient parameters plays an important role.		**Nitrate** ▪ Viomax CAS51D* ▪ ISEmax CAS40D* **Nitrite** ▪ Liquiline System CA80NO **Ammonium** ▪ ISEmax CAS40D* ▪ Liquiline System CA80AM **Phosphate** ▪ Liquiline System CA80PH ▪ Liquiline System CA80TP (total phosphorus) * in combination with Liquiline multichannel controller
Sum parameters To evaluate the organic load of water and wastewater, the primary parameters measured are TOC, SAC and COD. Endress+Hauser offers various measurement methods for these parameters.		**TOC** ▪ TOCII CA72TOC **SAC** ▪ Viomax CAS51D (SAK)* **COD** ▪ Liquiline System CA80COD ▪ TOCII CA72TOC ▪ Viomax CAS51D* * in combination with multichannel controller Liquiline
Metals and other parameters of water treatment The requirements differ depending on the branch of industry. However, most process water is softened and virtually all manufacturing processes require corrosion-free water that is likewise free of turbidity, color, iron and manganese.		▪ Liquiline System CA80CR Chromate ▪ Liquiline System CA80FE Iron ▪ Liquiline System CA80AL Aluminum ▪ Liquiline System CA80HA Hardness ▪ CA76NA Sodium
Analytical solutions Endress+Hauser supports the development of customer-specific solutions from application consulting and basic engineering via mechanical design and software integration right through to commissioning and maintenance.		▪ Monitoring stations with all necessary components from sample preparation up to data transfer to higher-level The stations range from panels over cabinets to fully climate-controlled, individually sized containers. ▪ Automation solutions for the optimization of processes such as aeration control or phosphate dosing and automatic cleaning and calibration of pH measuring points.

Water is our life

Water quality, discharges, regulations, the environment … just rely on a trusted partner.

As budgets shrink and legislative demands soar, we bring expertise to challenging needs. Safe potable water, discharges, environmental penalties, water infrastructure for developing countries, energy monitoring, the rising quantities of sludge from wastewater treatment and the opportunities they create for biogas – we make sense of it all with experienced thinking supported by process technology solutions for your every need.

Working with water in over 100 countries, Endress+Hauser offers a refreshing alternative:

- Improve plant safety and availability
- Optimize costs in your internal water processes
- Support your risk and failure management

Product highlights

Liquiline CM44
Fexible multichannel and multiparameter transmitter for 12 different parameters and up to eight sensors. Fast commissioning thanks to plug and play. Easy operation due to intuitive menu guidance. Seamless integration into process control systems via digital fieldbuses. Comfortable remote access via any web browser.

Oxymax COS61D
Optical oxygen sensor with Memosens technology for fast, drift-free measurements in the biological stage of wastewater treatment plants or reliable monitoring of surface water and drinking water quality. Low maintenance thanks to optical technology and stable fluorescence layer.

Turbimax CUS52D/CUS51D
Turbidity sensors with Memosens technology. CUS52D for safe measurements in the low turbidity range and in drinking water. Reduces installation effort and avoids product losses. CUS51D for reliable measurements in a wide application range thanks to integrated application models. Very low maintenance due to self-cleaning design.

Memosens CCS51D
Digital sensor with Memosens technology for measurement of free chlorine in drinking water, pool water or process water. Reliable values even with fluctuating flow rates and conductivities. Long maintenance and calibration intervals thanks to membrane-covered sensor head.

Liquistation CSF48
Stationary sampler for water and wastewater treatment. Safe samples thanks to insulated, cooled sample compartment. Fast cleaning and maintenance due to easy removal of medium-transporting parts. Flexible adaptation to application needs via a variety of sampling methods and sampling programs.

Liquiline System CA80
Analyzer for precise online measurement of e.g. ammonium in all critical control points of wastewater treatment plants: inlet, aeration basin, outlet. Low maintenance thanks to automatic calibration and cleaning. Low reagent consumption. Connection of up to four Memosens sensors. Advanced diagnostics for higher process safety and improved process documentation.

Safe water
The cost-effective supply of clean water is one of the main challenges - today and in future. Comprehensive monitoring of water quality requires a portfolio that covers all relevant parameters. Liquiline CM44 enables you to measure up to eight of the water quality parameters simultaneously - simply by connecting the corresponding sensors via plug and play. You achieve:

- Reliable, accurate measured values
- High plant availability thanks to low-maintenance operation and calibration in the laboratory
- Easy installation, commissioning and operation for cost-optimized plant operation
- Seamless integration into your process control system via diverse digital fieldbuses
- Documentation of sensor life cycles and process traceability using sensor and measuring point management tools such as Memobase Plus

Comply with limit values - reduce fees
The primary focus in wastewater treatment plants is to protect downstream waters. This is why the limit values are becoming stricter every year. To keep discharge fees at reasonable levels and to avoid penalties, managers of wastewater treatment plants need nutrient monitoring they can rely on. Liquiline System CA80 analyzers use standardized measuring methods for full consistency with laboratory results. In addition, the analyzers feature the logbooks to provide continuous documentation of the measured values to the water authorities.

Nourishing your productivity

Your global partner for accurate measurements and expert support in food and beverage automation.

From hygiene regulations and food safety to the basic demands of reliability and uptime, high-quality food and beverage producers profit from our experience in more than 100 countries. Get it right the first time and make your safe choice:

- Constant food quality and compliance
- Resources savings
- An expert partner

Product highlights

Smartec CLD18/CLD134
Compact, inductive conductivity systems for beverage plants. Hygienic design prevents product contamination. Fast detection of phase separation minimizes product losses and organic load of wastewater. Suitable for cleaning in place (CIP). CLD18 is suitable for small pipe diameters.

Liquiline CM44
Fexible multichannel and multiparameter transmitter for 12 different parameters and up to eight sensors. Fast commissioning thanks to plug and play. Easy operation due to intuitive menu guidance. Seamless integration into process control systems via digital fieldbuses. Comfortable remote access via any web browser.

Indumax CLS54D
Inductive conductivity sensor with Memosens technology for highest hygienic and sterile demands. Food-grade virgin PEEK body without joints or crevices. With all required hygienic certificates. Suitable for cleaning in place (CIP) and sterilization in place (SIP). Available with all common hygienic process connections.

Memosens CPS77D and Ceramax CPS341D
Glass-free pH sensors with Memosens technology for hygienic applications. Unbreakable for highest product safety. Low maintenance. CPS77D provides reliable measurements and fast response times even at low temperatures and features contanimation-resistant gel. Sterilizable and autoclavable. CPS341D is long-term stable over many years. Suitable for cleaning in place (CIP) and sterilization in place (SIP). High mechanical stability thanks to pH-sensitive enamel on a steel carrier.

OUSAF11
Glass-free NIR/VIS absorption sensor for phase detection and suspended solids. Unbreakable for highest product safety. Fast response time for minimized product losses. Suitable for cleaning in place (CIP) and sterilization in place (SIP). Flexible installation: insertion in pipes or immersion in basins. Low maintenance thanks to stable lamp and dirt-repellent FEP sensor head. FDA and 3-A certificates.

Cleaning in Place (CIP)
Cleaning in place is a key application in every food or beverage process. The concentration of the cleansing agents is a decisive factor to ensure the hygienic operation of a production facility. This concentration is controlled by conductivity measurement using the Smartec compact devices or Liquiline CM44 and Indumax CLS54D. These inline measurements deliver fast measured values for optimized control of the cleaning process and precise dosing of the cleansing agents.

Phase separation
Cost efficiency plays a decisive role in the food industry. Cost savings can be achieved by avoiding product losses and reducing the organic load of the wastewater. To achieve these aims, fast detection of the product/water phase separation is indispensible.
In processes where media with different conductivities are used, the Smartec compact devices or Indumax CLS54D with Liquiline CM44 guarantee a reliable detection of phase separation. In dairies, Liquiline CM44P and the glass-free OUSAF11 process photometer are the ideal solution.

No glass breakage in foodstuff
Food applications do not tolerate glass breakage – that's why glass-free sensors are used in these applications for maximum product safety.

Global chemicals, competitive and safe

Get the extra project skill and know-how you need to boost your plant's safe performance.

You gain concrete benefits from a partner who has first-hand knowledge of your sector's issues around the globe: on increased safety, on environmental protection, on over-supply leading to cost pressure and on finding engineering support and service when required. You can rely on our help to become more competitive in your line of business.

With a long history of industry firsts we have grown with the sector by listening, acting and innovating to better serve you with:

- Safety, built-in
- The technology to lead
- Best-fit project management

Product highlights

Liquiline CM42
Robust transmitter for demanding applications and hazardous areas. Intuitive operating concept for easy commissioning, operation and maintenance. Seamless system integration via HART, PROFIBUS PA, FOUNDATION Fieldbus. International approvals for hazardous areas.

Ceragel CPS71D
Digital pH sensor with Memosens technology for fast-changing media compositions. Resistant to poisoning thanks to pressurized reference system or ion trap. Fast response time due to ceramic diaphragm. International approvals for hazardous areas.

Orbisint CPS11D
Digital pH sensor with Memosens technology for long-term monitoring of stable processes. Long poison diffusion path and dirt-repellent PTFE diaphragm. Process glass for highly alkaline media available. Pressure-stable up to 16 bar. International approvals for hazardous areas.

Indumax CLS50D
Inductive conductivity sensor with Memosens technology for concentration measurement of acids, bases, brine and chemical products. High chemical stability and temperature-stable up to 125°C thanks to PFA or PEEK coating. Large sensor opening avoids soiling. International approvals for hazardous areas.

OUSTF10
Scattered light turditiy sensor for undissolved solids, emulsions and immiscible media. Highly sensitive inline measurement for quality control of product purity, fast detection of filter blocking or filter ruptures and leakage detection in heat exchangers. Temperature-stable up to 90°C. Approved for hazardous area use (ATEX, FM).

Cleanfit CPA871/CPA472D
Retractable assembly for sensor cleaning and calibration without process interruption. Intelligent safety functions prevent unintended moving of the sensor into or out of the process. Suitable wetted materials for corrosive processes. Manual versions are pressure-stable up to 8 bar (CPA871) or 4 bar (CPA472D), pneumatic versions up to 16 bar (CPA871) or 10 bar (CPA472D).

Safety for people and environment
Handling combustible, toxic substances is still a critical challenge for the chemical industry and a potential risk for the safety of people and environment. When developing our devices, we take all relevant factors for a safe plant operation into account. Our instruments comply with international safety standards/ recommendations and are approved for application in explosion-hazardous areas.

Process safety for sensors
Chemical processes often involve aggressive media, which makes regular sensor cleaning a must. Retractable assemblies such as Cleanfit CPA871 enable sensor cleaning and calibration without process interruption and are perfectly suited for the chemical industry.

- Robust thanks to wetted materials such as PEEK, PVDF, etc. for corrosive processes
- Mechanically stable thanks to metallic support housing
- Intelligent safety functions prevent unintended movement of the sensor into or out of the process.

Technologies for efficiency and quality
In the chemical industry, production efficiency, product quality and operating costs are key factors of production. They are, however, interdependent which makes optimization a rather complex task. It is not easy to find the right balance. To achieve top performance of production processes, a great number of reliable and precise data and key performance indicators are necessary. Innovative technologies and services for liquid analysis support the generation and analysis of these data. They enable:

- Reduced maintenance by providing accurate process data
- Precise key performance indicators of the measuring points for highest reliability
- Higher availability of the measuring points thanks to Memosens
- Lower operating costs and higher occupational safety thanks to calibration in the laboratory

The pulse of life sciences

Trust a reliable partner who puts quality, compliance and cost control at the heart of life sciences.

It is a daily task to meet stringent GxP regulations and productivity goals throughout your product lifecycle. You can count not only on our world-class instruments, designed to ASME-BPE standards, but also on our highly qualified engineering input and experienced service teams.

We partner with you to generate process optimization, higher plant availability and continuous improvement. Our experience, gained at the heart of the sector, will help you to:

- Streamline your projects
- Attain operational excellence
- Make the right decisions

Product highlights

Liquiline CM44P
Flexible multichannel and multiparameter transmitter. Combines up to four Memosens sensors and two process photometers for the monitoring of process quality in the life sciences industry. Fast commissioning and seamless integration into process control systems thanks to digital fieldbuses. Comfortable remote access via any web browser.

Memosens CPS171D
Robust digital pH sensor for fermentation processes in bioreactors. Suitable for SIP, CIP and autoclaving. Certified biocompatibility with regard to biological reactivity acc. to USP Class VI, FDA compliant, no zytotoxicity, free from animal-based materials. Optional pharma certificate of compliance.

Memosens CLS82D
Digital 4-electrode conductivity sensor for reliable measurements over a wide measuring range. Certified aseptic design according to EHEDG and 3-A. Sterilizable and autoclavable. Unique electrode connection surveillance for maximum safety. Compact design for small pipe diameters.

OUSAF44
UV absorption sensor for reliable monitoring of product concentrations. Excellent accuracy for maximum linearity and full consistency with laboratory results. Suitable for sterilization in place (SIP) and cleaning in place (CIP). Liquid-free online calibration traceable to NIST.

Cleanfit CPA875
Sterilizable retractable assembly for sterile applications. Patented, dynamic sealing concept for highest product safety. Certified sterile design according to EHEDG and ASME BPE. FDA and USP Class VI compliant seals. Flexible adaptation to process requirements thanks to a large number of available process connections.

Memobase Plus CYZ71D
Multichannel and multiparameter tool for measurement, calibration and documentation. Higher process safety thanks to sensor traceability: full history of all applied Memosens sensors. Supports GLP, GMP, Audit Trails. Enables operation according to FDA 21CFR Part 11. Minimizes the risk of discrepancies between laboratory results and process values.

Memosens technology
Product quality, measuring accuracy and reproducibility are all critical in the highly regulated life sciences industry. Memosens digital technology enables you to achieve consistent measured values from the laboratory over pilot plants through to the process. With Memosens, you can perform calibration under optimum ambient conditions to improve measuring accuracy. Furthermore, it offers advanced diagnostic functions that provide an excellent database to decide whether a sensor is still ready for the next batch or needs to be cleaned and regenerated - a very important benefit for biotech processes.

Memobase Plus for full traceability
Memobase Plus stores the complete lifetime history of all Memosens sensors used. It is beneficial for GLP, GMP, Audit Trail and enables you to operate in accordance with FDA 21CFR Part 11. With as-found/as-left documented values, changes in the sensor characteristics during the batch can be identified, printed and stored. Memobase Plus turns your computer into a space-saving, high-performance workstation with up to four channels. It minimizes the risk of discrepancies between laboratory results of grab samples and online values. The same type of sensors with identical signal communication can be used in the laboratory as in the process – essential for product quality improvement as well as production efficiency.

Power up your plant

Power plants play a vital role. We help minimize downtime while delivering safety and productivity.

Your plant needs a multi-skilled, versatile partner. You need reliable solutions that meet your application requirements and industry quality standards. And you may need to upgrade ageing plants with proven and state-of-the-art technologies, to keep output consistently high.

As the industry shifts towards natural gas, renewables and the new market dynamics driven by shale gas, our mission is to provide the all-round support and experience you need. This includes elevated standards of safety for your staff – and the ability to meet even-higher environmental demands in flue gas cleaning processes such as SCR catalysts for nitrogen oxide reduction, electrostatic precipitators (ESPs) for particle separation and limestone scrubbing processes for desulphurization.

When you choose us, you:

- Boost the efficiency of your plant
- Heighten safety
- Maintain expertise

Product highlights

Liquiline CM44
Fexible multichannel and multiparameter transmitter for 12 different parameters and up to eight sensors. Fast commissioning thanks to plug and play. Easy operation due to intuitive menu guidance. Seamless integration into process control systems via digital fieldbuses. Integrated VGB calculation models.

Condumax CLS15D
Digital conductive conductivity sensor with Memosens technology for pure and ultra-pure water. Reliable measurement of lowest conductivities and determination of differential conductivity for the calculation of pH values enable safe determination of corrosion, impurities and conditioning of the water. Low maintenance thanks to polished measuring surfaces.

Orbisint CPS11D
Digital pH sensor with Memosens technology. Long poison diffusion path and dirt-repellent PTFE diaphragm. Salt ring for accurate measurements at low conductivity in steam production. International approvals for hazardous areas.

Oxymax COS22D
Digital amperometric oxygen sensor with Memosens technology for trace measurement. Optional gold cathode for compensation of cross-sensitivities. Reliable measured values for safe detection of possible pipe corrosion. Long-term stable with international approvals for hazardous areas.

Liquiline System CA80
Analyzers for precise online measurement. Accurate silicate values for the monitoring of ion exchanger quality during feedwater preparation. Reliable iron values for safe detection of potential corrosion of heat exchangers. Low maintenance thanks to automatic calibration and cleaning. Low reagent consumption. Connection of up to four Memosens sensors to Liquiline System CA80.

SWAS panel
Panel containing the complete measuring technology for online monitoring of water and steam quality, including temperature and pressure reduction. Seamless integration into process control systems. Tamper-proof documentation of the measured values. Tailored to individual customer requirements.

Highest safety thanks to reliable trace measurement
In power plants, the quality of the water is a key factor in keeping the water/steam cycle free from contamination. Turbines, boilers and pipes can become corroded and encrusted if the water is not pure enough, leading to expensive repairs or even complete unit replacement. The high temperatures and pressures in the water/steam cycle and the low measuring ranges demand smart solutions.

- Conductivity, pH and oxygen sensors that have been designed for trace measurement ensure that even minute impurities in the demineralized feedwater are detected.
- SWAS panels (Steam/Water Analysis System) comprise all the measuring technology that is needed to monitor a water/steam cycle. The measurements are performed online, i.e. a sample of the feedwater comes directly from the cycle, passes through a temperature and pressure reduction system (sample preparation) and is then sent to the sensors and analyzers that are mounted on the panel. The sample is discarded after the measurement.

Extracting more from less

In a world of lower grades, skills gaps and excavation challenges, we can help you hit your targets.

We've seen how lower grades are driving an acute need for ever-better automation and controls. You are also facing an emerging skills gap, requiring better-informed industry partners. At the same time, energy costs are only going one way, and the legislative environment is becoming increasingly stringent. Tough challenges call for experienced heads who can:

- Reduce your metal and mineral production costs
- Keep your plant safe
- Boost compliance and responsibility

Product highlights

Liquiline CM44

Fexible multichannel and multiparameter transmitter for 12 different parameters and up to eight sensors. Fast commissioning thanks to plug and play. Easy operation due to intuitive menu guidance. Seamless integration into process control systems via digital fieldbuses. Comfortable remote access via any web browser. Chemoclean function for automated sensor cleaning.

Orbipac CPF81D

Digital pH sensor with Memosens technology. Robust polymer housing protects against mechanical damage. Flat pH membrane for application in abrasive media. Second electrolyte bridge for better protection against electrode poisioning ions (S^{2-}, CN^{-}).

Turbimax CUS71D

Digital ultrasonic sensor for interface measurement in e.g. thickeners. Quick, continuous interface information ensures precise control of valves and separators. Fast commissioning thanks to predefined calculation models. Low maintenance due to wiper function.

Flexdip CYH112/CYA112

Modular holder for the installation of sensors and assemblies in open basins or tanks. Flexibly adaptable to any installation situation: ground, wall or rail mounting with chain retainer, fixed or pendulum holder.

Cleanfit CPA871/CPA472D

Retractable assembly for sensor cleaning and calibration without process interruption. Guarantees longer sensor lifetime even in harsh environments. Intelligent safety functions prevent unintended moving of the sensor into or out of the process. Suitable wetted materials for corrosive processes. Manual versions are pressure-stable up to 8 bar (CPA871) or 4 bar (CPA472D), pneumatic versions up to 16 bar (CPA871) or 10 bar (CPA472D).

Cleanfit Control CYC25

Cleaning unit for retractable assemblies. Combined with Liquiline CM44 and Chemoclean Plus, it provides automated, regular sensor cleaning. Enables interval measurement in aggressive and abrasive media. Extends sensor lifetime even in harsh environments.

Measuring reliably even under toughest conditions

Processes in the primaries and metals industries are extremely demanding for sensors because they often involve abrasive solids. The sensor design must be very robust or the sensors must to be cleaned regularly to withstand these conditions.

- Orbipac CPF81D pH sensor features a flat membrane that offers little contact surface for abrasive media.
- Cleanfit CPA871 assembly offers an optional immersion chamber that provides additional protection for the sensors.
- Cleanfit Control CYC25 in combination with Liquiline CM44 provides automated regular cleaning of the sensors thus contributing to reliable measurements.

Memosens technology makes daily life easier for plant personnel

The primaries and metal industries are not only demanding for measuring technology but also for the people who work in these industries. Thanks to Memosens digital technology, they only have to spend little time in the plant to exchange the sensors. Cleaning, regeneration and calibration can be done in the safe and comfortable environment of the laboratory.

Fuel for thought

With vast experience in the oil & gas sector, we help you to perform, comply and thrive.

From exploration to refinery, from storage to distribution – from plant upgrades to new projects, we have the application expertise to help you succeed. At a time when the sector faces skills shortages and tightening of regulations, our organization is here across the full life cycle of your project always keeping your deadlines in mind.

While complexity of facilities and processes are ever increasing, and downtime must be reduced, your competitiveness is enhanced with reliable, accurate and traceable asset information. In short, you need to do more with less, benefiting from a stable partner who is here for the long haul and ready across the globe, offering:

- Assured plant safety
- Optimized return on investment
- Best-fit products, solutions and services

Product highlights

Liquiline CM42
Robust transmitter for demanding applications and hazardous areas. Intuitive operating concept for easy commissioning, operation and maintenance. Seamless system integration via HART, PROFIBUS PA, FOUNDATION Fieldbus. International approvals for hazardous areas.

Orbisint CPS11D
Digital pH sensor with Memosens technology. Long poison diffusion path and dirt-repellent PTFE diaphragm. Salt ring for accurate measurements at low conductivity in steam production. International approvals for hazardous areas.

Indumax CLS50D
Inductive conductivity sensor with Memosens technology for high-temperature applications and hazardous areas. High chemical stability thanks robust materials (PFA, PEEK). Large sensor opening avoids soiling. International approvals for hazardous areas.

Cleanfit CPA871
Retractable assembly for sensor cleaning and calibration without process interruption. Guarantees longer sensor lifetime even in harsh environments. Intelligent safety functions prevent unintended moving of the sensor into or out of the process. Suitable wetted materials for corrosive processes. Manual versions are pressure-stable up to 8 bar (CPA871) or 4 bar (CPA472D), pneumatic versions up to 16 bar (CPA871) or 10 bar (CPA472D).

Memobase Plus CYZ71D
Multichannel and multiparameter tool for measurement, calibration and documentation. Higher process safety thanks to sensor traceability: full history of all applied Memosens sensors. Minimizes the risk of discrepancies between laboratory results and process values. More safety for plant personnel: they only spend minimal time in the plant to exchange the sensors. Cleaning, regeneration and calibration is done in the safe and comfortable environment of the laboratory.

Water preparation and treatment in oil production and refining

Production and refining of mineral oil requires large amounts of water and steam that need to be prepared for the refining process and treated after the process. Our portfolio provides complete monitoring of the water quality:

- Steam monitoring is performed by pH and conductivity sensors for accurate measured values in low measuring ranges. They help to avoid corrosion and deposits in the steam pipes and to prevent leakages.
- During process water preparation, digital pH sensors with salt ring provide precise monitoring of the boiler feedwater while turbidity sensors control the preparation process.
- Wastewater treatment and water reuse are becoming more and more important due to increasing water scarcity. Here, oxygen, turbidity, conductivity and ammonium measurements support the refineries in optimizing the wastewater treatment, increasing their water reuse and reducing discharge fees.

Saving energy and costs – together

Generating and distributing air, steam, gas, cooling or heating water requires a considerable amount of cost and energy. We help you to run these utilities as efficiently as possible.

Are you the maintenance technician, engineer or plant manager whose job it is to maintain competent support for the gas, steam or water utilities of your company? Are you the process or finance manager who has to balance the 'trade-off' between increasing plant efficiency and reducing operating overheads and energy costs? Do you find that the dictates of quality audits, standard operating procedures and environmental protection require ever-stricter process monitoring?

Yes? Then you can fully count on Endress+Hauser in regard to energy and cost savings. We can offer the all-inclusive solutions package you need:

- Customized solutions for your energy applications
- Competent planning, commissioning and maintenance
- Engineering, project management of simple solutions, for example, for boiler houses all the way to complete system solutions
- Professional support from specialists in all sectors

Product highlights

Liquiline CM44
Fexible transmitter for 12 different parameters and up to eight sensors. Fast commissioning thanks to plug and play. Easy operation due to intuitive menu guidance. Seamless integration into process control systems via digital fieldbuses. Comfortable remote access via any web browser.

Condumax CLS15D
Digital conductive conductivity sensor with Memosens technology for pure and ultra-pure water. Reliable measurement of lowest conductivities for safe determination of corrosion, impurities and conditioning of the water. Low maintenance thanks to polished measuring surfaces.

Memosens CPS16D
Combined pH/ORP sensor with Memosens technology. Provides simultaneous pH and ORP measurement for better process control. Delivers information on the acid load and oxidizing effect of the water in filtration systems, for example.

Oxymax COS22D
Digital amperometric oxygen sensor with Memosens technology for trace measurement. Optional gold cathode for compensation of cross-sensitivities. Reliable measured values for safe detection of possible pipe corrosion. Long-term stable with international approvals for hazardous areas.

Liquiline System CA80
Analyzers for precise online measurement. Accurate silicate values for the monitoring ion exchanger quality during feed water preparation. Reliable iron values for safe detection of potential corrosion of the heat exchanger. Low maintenance thanks to automatic calibration and cleaning. Low reagent consumption. Connection of up to 4 Memosens sensors to Liquiline System CA80.

Memosens CCS51D
Digital sensor with Memosens technology for measurement of free chlorine in drinking water, pool water or process water. Reliable values even with fluctuating flow rates and conductivities. Long maintenance and calibration intervals thanks to membrane-covered sensor head.

No contamination of feed water
High quality of boiler feedwater is a key factor to avoid corrosion or build-up of deposits in boilers or pipes. They might lead to expensive repairs or even complete unit replacement. Conductivity, pH and oxygen sensors, specially designed for trace measurement, ensure that even minute impurities in the demineralized feed water are detected. Plant operators can react fast and take necessary measures.

Safe cooling water cycles
Cooling water cycles must run stably and must not interfere with the product. Contaminated cooling medium can cause corrosion or build-up of deposits and thus leakage in the cooling water cycle that leads to mixing of product and cooling medium. Conductivity, pH, chlorine and SAC sensors ensure that contamination is detected before problems can occur.
Cooling water must be of such quality that no micro organisms can settle in the system. They form a biofilm on the pipes that impedes the heat transfer and thus limits the cooling performance. Reliable chlorine measurement enables precise chlorine dosing leading to bacteria-free water.

Seamless system integration

Greater transparency through added information: only digital field buses enable device and process data to be transmitted simultaneously. That is why our devices are available with all state-of-the-art fieldbus technologies.

Intelligent devices with digital communication offer users a vast number of benefits for plant operation. In addition to seamless integration into automation systems and the ability to monitor functional capability, digital communication also allows you access to what's happening in the process. This offers significant benefits:

- Comfortable device configuration and optimization of your processes.
- Optimum plant availability and reliability thanks to state-of-the-art diagnostics and predictive maintenance.
- High flexibility: main device variables and parameters are available.
- Full transparency due to access to all parameters and diagnostics of the devices and process environment.
- Cost-efficient, fast system integration without additional network components or gateways.

Endress+Hauser's fieldbus laboratory in Reinach (CH)

Fieldbus technology from Endress+Hauser

Endress+Hauser only uses internationally-recognized open standards for the digital communication of its field devices. This ensures seamless intergraton into plants and guaranteed investment protection. Various communication systems that Endress+Hauser also supports have become established in the area of process automation:

- HART
- PROFIBUS DP/PA
- FOUNDATION Fieldbus
- Modbus
- EtherNet/IP

Endress+Hauser is one of the pioneers of fieldbus technology. The company plays a leading role in the implementation of HART, PROFIBUS DP/PA and FOUNDATION Fieldbus technology. Endress+Hauser operates its own fieldbus laboratory in Reinach, Switzerland:

- Accredited PROFIBUS competence center
- Engineering of fieldbus networks
- System integration testing
- Training courses and seminars
- Customer-specific application development
- Troubleshooting

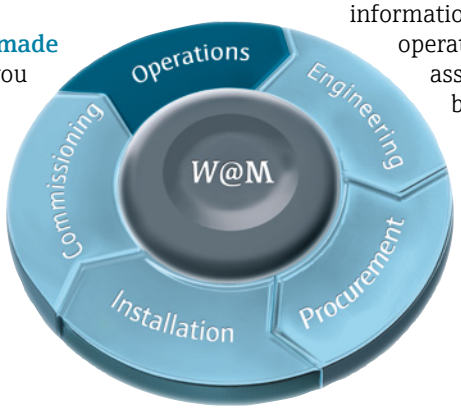
W@M life cycle management

Improved productivity with information at your fingertips

Data relevant to a plant and its components is generated from the first stages of planning and during the asset's complete life cycle. 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. Coupled with the right services, W@M Life Cycle Management boosts productivity in every phase.

W@M engineering – reliable planning and traceability A variety of online tools and updated data simplify your daily engineering tasks. Throughout your project all data is documented and securely stored for all subsequent processes.

W@M procurement – purchasing made easy Electronic purchasing allows you to optimize your processes. It simplifies the procurement, reduces purchasing costs and strengthens your competitive position.



W@M installation – prepare fast device setup Efficient 'first-time' installation of your equipment is now possible with easy downloading of related and updated technical information and device drivers for smooth device configuration.

W@M installation, commissioning, operation – full document history Simplify commissioning with access to all relevant measuring device and field network information and ensure smooth handover of all documentation for site acceptance tests, checks, operation and maintenance.

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.

Tools for selection and operation

Applicator

Our Applicator software is a convenient selection and sizing tool for planning processes. Using the entered application parameters, e.g. from measuring point specifications, Applicator determines a selection of suitable products and solutions. Applicator Industry Applications uses graphics or tree structures to guide you to the right product selection. With additional sizing functions and the Applicator Project module for project management, it makes your day-to-day engineering tasks easier.

www.endress.com/applicator

Operations app

The app offers mobile access to up-to-date product information and device details such as order code, availability, documentation, 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.

Available on the App Store

ANDROID APP ON Google play

Experts in services

As a manufacturer of measuring equipment for plant engineering, Endress+Hauser has been active in the market for over sixty years now. We work together constantly with our customers, providing support in every situation. Whether you need troubleshooting, fast delivery of spare parts, calibration or on-target advice - our entire business structure is oriented towards helping you achieve your business goals at all times. Your job is to manufacture optimum product quality safely, reliably and profitably - our job is to support you with our services so that you can reach this goal with maximum plant safety and optimum effort.

Benefits

- Services for the entire life cycle
- Worldwide service network
- Cooperation as partners

Our contribution to your return on investment
Our entire organization is oriented towards helping you in your tasks in the procurement, installation, commissioning and operation phases. This starts with continuously optimizing our measuring equipment for plant engineering to your branch of industry, in conjunction with developing special solutions for your specific needs, and continues with our range of innovative tools and services. Whether your facility just recently came online or has been running for twenty years - our customer service consultants can help you optimize maintenance schedules, improve your return on capital and avoid costs incurred by unnecessary downtime.

Comprehensive service offering
Endress+Hauser offers a wide range of services focused on industrial measurement and process automation. These range from application advice to commissioning and calibration and even complete maintenance packages. With our service support, we offer you everything you need over the life cycle of your facility.

Calibration
Accurate liquid analysis is of great importance in many manufacturing processes. We calibrate your conductivity measuring point onsite according to USP recommendations and ASTM standards. We offer the same service for pH measuring points calibrated with our DKD (German Calibration Service) accredited buffer solutions. If a turbidity, disinfection, oxygen or nitrate sensor should ever leave its ideal line, we restore its accuracy with a factory calibration.

Application advice and commissioning
The demands on your employees are increasing continuously. They have to maintain the existing facilities while simultaneously planning and commissioning new ones with state-of-the-art technology. Endress+Hauser can help you with these tasks. Our contact persons provide comprehensive application advice, draft concepts and work with you to develop the ideal solution. If you like, we can study your wastewater as a snapshot. We analyze your sample using recognized reference methods and according to the measuring point requirements and recommend how to proceed. We commission the measuring points along with you, provide support for the integration into the facility-wide process control and asset management system and run a series of tests to ensure that your measuring point works correctly.

Maintenance concepts
Our maintenance concepts provide the right safeguard for quality and safety-related measuring points. We work closely together with our customers and, in consultation with you, determine the amount of maintenance required for your devices. From Service Level 1, in which we carry out all required maintenance tasks and generate documented reports about compliance with quality procedures, to Service Level 4, with which you can select the service components you need individually, we offer professional support, both for Endress+Hauser devices and those from other manufacturers.

Benefits

- Calibration to international standards
- Expert application advice
- Flexible maintenance concepts for every need

www.addresses.endress.com

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Endress+Hauser

People for Process Automation