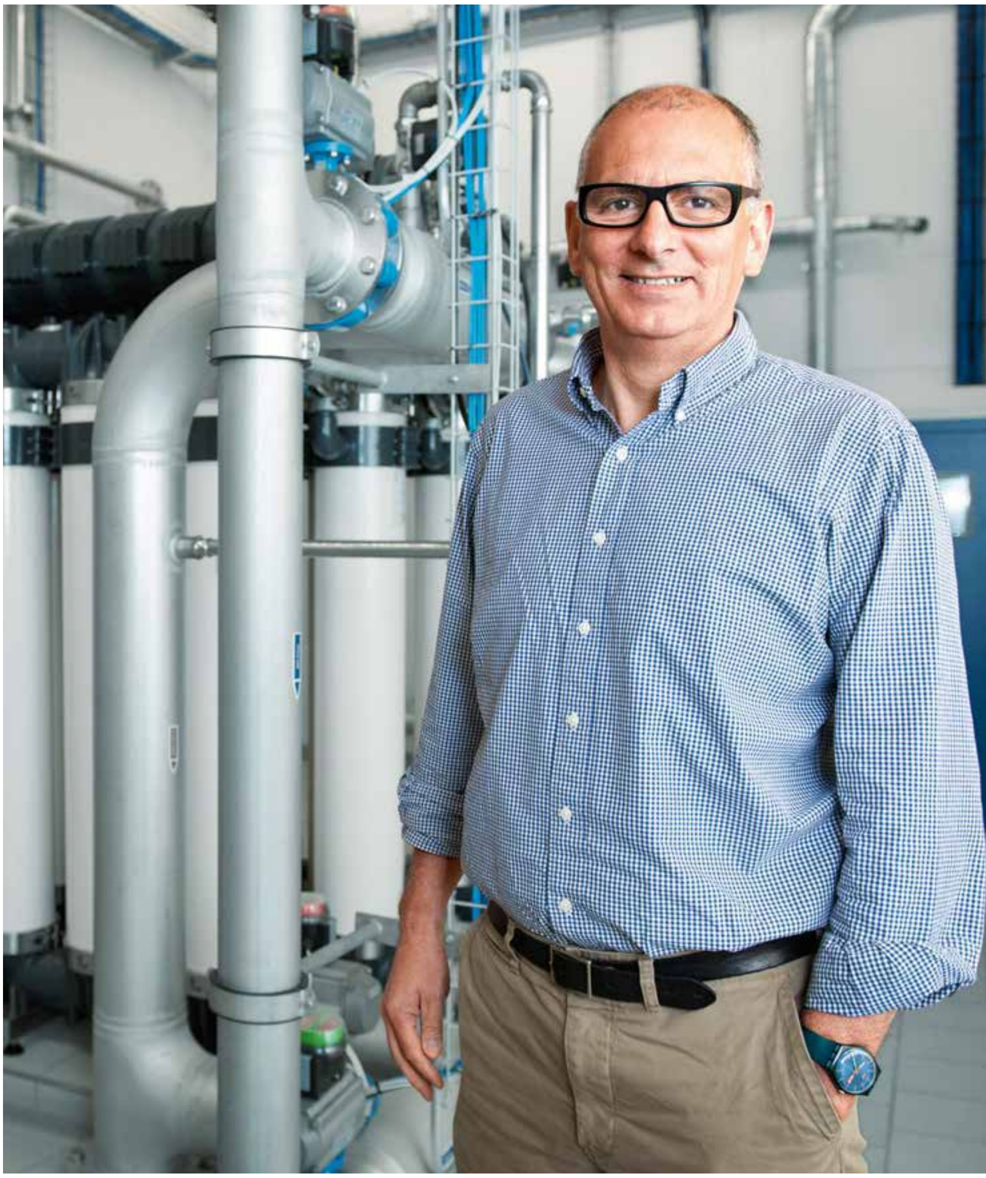
Liquid Analysis

For the love of quality water

Fresh ideas for waterworks, distribution networks, surface waters and industrial plants



Whether fresh or salty, we have the best ingredients for operating and maintaining your water treatment system

Optimum instrumentation:
Specialized analytical devices make your work easier, ensure the reliability of your processes and help to reduce costs.

Plant maintenance with added value:
Enjoy the convenience of servicing your sensors in the laboratory and increase your measured value quality.

On your mark, get set, measure!
Mount our turnkey monitoring solutions for all of your measuring points and critical control points to the wall and off you go.

Dive into your plant:
We help you to make the correct adjustments to improve efficiency when working with water.

Strong partner:
With measuring technology, consulting and service available from a single source, the operation and maintenance of your plant is straightforward and future-proof.

Endress+Hauser
People for Process Automation

What is considered high quality water?

Even the ancient Romans were aware of the interrelation between wastewater and fresh water. They built viaducts to make fresh water sources located outside of the city available to the city. However, they also built the "Cloaca Maxima", a canal in the heart of Rome, which transported wastewater from the Forum Romanum into the River Tiber.

At that time, the Romans were already ahead of Europe in the middle ages when drinking water and wastewater were not strictly separated. A safe drinking water supply was built from the middle of the 19th century following major cholera epidemics in London (The Great Stink), Hamburg and other cities.

This meant that it was necessary to define what is an acceptable drinking water quality. The World Health Organization (WHO) established criteria stipulating that good-quality, safe drinking water should be clean, colorless, cool and it should taste good. The WHO also defined initial limit values for the quality of the drinking water supply to the population in emergency situations. These values should apply, for example, in the event of a natural disaster. This then ultimately led to the development of what are termed Critical Control Points (CCPs). For each of these points, waterworks define what to do if a measured value exceeds specific limits. A reliable drinking water supply should thus be guaranteed even in the event of a fault.

Drinking water treatment has become a complex task in the meantime. The extraction of untreated water is often spread among various sources, from deep wells to rivers or the sea. Depending on the source, the composition of the water can vary significantly: Each source of untreated water has different contents of minerals, salts, trace substances, nitrate etc. and must therefore be processed in a specific way. The aim is to achieve a uniform, constant quality of drinking water at the outlet of the water facility at all times and irrespective of the quality of the untreated water.

Operators of waterworks and their staff face increasing challenges to meet this objective. For example, they are subject to legislation such as the European Water Framework Directive (WFD) which tightens limit values and demands an increasing number of quality measurements and water analyses. Add to this the difficulties encountered in daily operations such as troubleshooting faults in the middle of the night (as part of on-call duty). There is also the emergence of megatrends, such as the increasing scarcity of drinking water brought about in part by the rapidly increasing global population. This calls for even stricter limit values for outflow water and creates an even greater need to operate wastewater treatment processes in a manner that is safe and trouble-free.

On the following pages, you can take a look at Memosens and Liquiline devices specially developed for the water treatment sector. Not only do they make your work at the water facility easier, they also ensure the reliability of your processes and outlet values and help to save costs. And if you want even more, take a look at our monitoring solutions. They offer you all the measurements you need within a minimum of space to produce drinking water of a high quality. This makes sure that your customers enjoy clean and good-tasting water.

"Endress+Hauser analytical panels deliver measurements that are accurate, reliable and safe. They are also easy to operate and feature a clean and tidy design. I can recommend them highly to other waterworks."

Benoit Daval
Technical Manager, Belfort waterworks (France)

Memosens and Liquiline – the dynamic duo for your water facility

The Liquiline platform is the basis for our transmitters and analyzers. With these devices, you can monitor, control and regulate your entire water treatment process. Benefits include the convenient, standardized operation of all devices throughout your entire plant and distribution network and the protection of your processes against operating errors. And since we use the same standardized hardware in all of the devices, you also benefit from a straightforward, cost-effective spare parts inventory. Furthermore, you can easily upgrade our Liquiline products to include relays, sensor inputs or fieldbuses, for example, ensuring flexibility for years to come.

A core component of the Liquiline platform is digital Memosens technology. Sensors equipped with Memosens technology store a wide range of data directly in the sensor head. This includes information such as sensor type, serial number, calibration results (e.g. slope and zero point) and much more. Liquiline devices can therefore automatically detect any sensor within seconds and adopt the saved data for use in operation. This is true plug and play functionality that makes your work easier and minimizes interruptions to measurement during sensor maintenance.

The cutting-edge sensor technology

Memosens digitizes the measured value in the sensor and sends it to the transmitter via a non-contact, disturbance-free connection. Since its introduction, it has become the leading global standard in liquid analysis. A broad portfolio of Memosens products has been helping to improve the safety, efficiency, transparency and quality of processes in all industries ever since.

- 100% reliable: digital data transmission via inductive, corrosion-free bayonet lock
- Sensors easily connected
- Sensor head stores calibration and sensor information and thereby facilitates more precise process management and optimized maintenance strategy
- Plug and play with precalibrated sensors increases process and measurement availability
- Memosens 2.0 is leading Memosens technology into the future. The extended sensor electronics offer the perfect basis for IIoT connectivity and for predictive maintenance. The digital data can be transferred directly to the Netilion cloud and used for IIoT applications such Netilion Value, see page 19

Overview of Liquiline platform

- Hardware components and operating concepts are standardized across all transmitters, analyzers and samplers in the Liquiline series
- Ability to connect up to 8 sensors for different parameters
- Automatic sensor detection saves time during commissioning and when replacing worn sensors
- Controller functions, e.g., dosing of flocculants, oxygenation in manganese and iron removal, chlorine/chlorine dioxide dosing (disinfection) in the outlet
- Seamless integration into any process control system (PCS) via 0/4 to 20 mA, HART, PROFIBUS DP, Modbus RS485, Modbus TCP, Profinet, EtherNet/IP
- Seamless integration into Netilion (Endress+Hauser IIoT ecosystem)
- Integrated web server enables remote access from any location, also via tablets and smartphones
- Easily extensible thanks to standardized hardware

Turning untreated water into pure water

The quality of the untreated water is different from plant to plant and depends on local conditions. The quality the pure water must reach is generally regulated by law.

The untreated water typically undergoes a quality check to analyze an entire range of parameters from the pH value to the oxygen content. The same occurs to the pure water before it is fed into the distribution network. A comparison of the quality of the untreated water and pure water allows you to evaluate how well critical components were broken down during water treatment and how much energy was used for this process.

Untreated water from wells and deep wells
This refers to groundwater which is tapped from a well. Before it is extracted, it sometimes remains there for days with little or no movement. As a result, well water contains high levels of minerals. On the other hand, the oxygen content, turbidity and microbial load are low.

Untreated water from surface waters
This includes water from lakes, rivers, dams and the sea. Surface waters typically have a high microbiological concentration, large amounts of organic material and sediments. The turbidity can also be correspondingly high. The mineral content on the other hand is relatively low as surface water has only a limited contact area with the ground. The oxygen content again is rather high as air is diffused into the water through the large surface. While surface water from fresh water reserves usually requires filtration or flocculation and disinfection to turn it into drinking water, the high salt content in sea water must be eliminated.

Untreated water from saltwater
Saltwater contains approximately 35 g of salt per kg of water. There is also brackish water, which is a mixture of fresh and saltwater. One method of treating saltwater or brackish water is thermal separation whereby the water is heated until it evaporates and condenses. Components such as salt and microbes remain behind. Relatively pure water is produced if this process is carried out multiple times (cascading).

Another method which is very common nowadays is filtering via reverse osmosis (RO): In an RO system pressure forces water through a membrane which does not allow salts, minerals and other components to pass through. What remains is the “brine”, a solution with a strong salt and mineral content which is fed back into the sea.

You can use our transmitters and sensors to monitor your untreated and pure water reliably. Many waterworks order the measuring instrumentation preassembled on instrument panels. The measuring points can thus be easily installed, operated and maintained in one place.

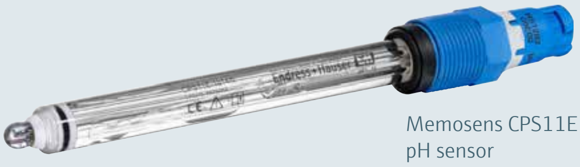
"We have had a great experience with Memosens sensors: They measure accurately, are very easy to handle and maintenance requirements are low. The easy integration of the Liquiline transmitters into our control system was also great."

Krzysztof Zembko, Deputy Manager,
Water Production Division Pietrasze, Bialystok (Poland)

Using different flocculants in your plant

The pH value of the untreated water strongly influences how effective a flocculant is. If the pH value shifts due to changes in the quality of the untreated water, an additional flocculant will need to be used to achieve the best flocculation results.

It is possible to use different flocculants in a system without difficulty: Install a pH measurement upstream of the flocculation chamber, e.g. using the pH sensor Memosens CPS11E and switch between different flocculants based on the measured value. You can also build a closed-control loop which uses the measured value to dose the optimum flocculant automatically into the flocculation chamber.



Memosens CPS11E
pH sensor

Reliable processing of untreated water
The pH value and conductivity are often measured after the untreated water is extracted. This helps to detect impurities quickly as each change in these values indicates a change in the quality of the untreated water.

The untreated water is usually fed into a fast filter where coarse components are removed. If suspended particles are still present following this process, flocculants such as aluminum salts or iron salts are added to the untreated water. These agents should be adapted to the pH value of the water and cause flocculation of the suspended particles. Once the flakes are sufficiently large and heavy, they sink to the bottom in a sedimentation tank.

An aluminum or iron measurement makes sense following sedimentation: If the dosage is too high, the salt content increases the number of ions in the water, shifts the pH value and can ultimately lead to corrosion of the plant. Not to mention the fact that the often very expensive flocculants are wasted in the event of overdosage.

The water is then fed through a slow sand filter where the microbial load is reduced and other constituents biologically broken down. The result is often water that is already drinkable.

It may sound simple but only to an extent as the composition of the water can change constantly. For example, imagine a heavy rain event that washes small particles from the area surrounding the water source and thus raises the turbidity value of the untreated water. In agricultural regions, the groundwater often contains excessive nitrate levels. In coastal areas, saltwater from the sea can enter the fresh water stores causing the conductivity value to rise.

You can monitor surface waters in order to record these effects - for example, using practical measuring containers (see pages 16/17).

When extracting untreated water, it is important to detect changes in the water quality early to be able to react quickly. The panels described on pages 14/15 will help you to do this.

Reliable operation of unstaffed plants

A current trend is the use of satellite plants to track the water supply. This involves unoccupied water treatment plants operating independently but monitored and controlled from a central location. Those working in this central location plan all the tasks and maintenance measures and regularly travel to the satellite plants to do this.

Unplanned maintenance work will quickly become expensive if staff are required to travel to the site specifically for this purpose. It is therefore worthwhile to know how serious the error message of a measuring device is. With the broadest range of different communication options available on the market, Liquiline devices help you to do this. This not only makes for easy integration in your process control system, it also provides you with convenient remote access to the devices via the various fieldbuses and the integrated web server. You can monitor all of the analytical measuring points at all times – from the control room as well as from outside the plant, e.g., during emergency standby service.

Should a problem occur in the process, you can evaluate its urgency remotely. Does the problem need to be resolved immediately on site? Or can you wait until tomorrow to go on site? If you were to change a few parameters remotely, e.g. manipulated variables, would that eliminate the need for a site visit? You are therefore much less dependent on weather conditions and can avoid call-outs in the middle of the night and in extreme weather.

Plant maintenance with added value

Time is often in short supply when it comes to the day-to-day running of a plant. This applies even more to unmanned plants where staff visit the site only occasionally to carry out maintenance. From pH to solids, all sensors with Memosens technology can be precalibrated or preadjusted in the lab or factory. Since all of the important data including calibration information are stored in the sensor, there is no need to carry out maintenance on site. Instead, simply connect your own ready-to-use sensors.

In this way, plant maintenance and sensor calibration can be physically separated and performed at different times. This improves the quality and reliability of your process enormously and makes for more efficient maintenance.

Quality leap in sensor maintenance
The ambient conditions of the surrounding area are relevant when carrying out conventional sensor maintenance work directly at the measuring point. This can not only prove inconvenient in a cold, wet basement, but can also affect the quality of the maintenance and thus the quality of the sensor's measured value. If, for example, the metallic contacts of an analog pH sensor become damp, the sensor does not measure correctly. The same applies to oxygen sensors; if their contacts become wet, their measured values are incorrect. Incidentally sensors with Memosens technology manage entirely without metal contacts giving moisture no chance.

Performing maintenance in your lab or factory allows you to create constant conditions – without any external influences. This increases the quality of the calibration and therefore the accuracy of your sensors. And it also happens to be more convenient for you.

Maintenance you can schedule
Sensors prepared in this way can then be put into use at a time that suits you, e.g., during a scheduled planned maintenance activity. You simply take the sensors you replaced with you and prepare them at the next opportunity in your factory so that they can be used the next time a replacement is required. This type of maintenance strategy enables you to avoid measuring point failures, reduce unplanned call-outs in the field and therefore save considerable time and money. In the unlikely event of a failure, simply use a prepared sensor to get the measurement back up and running again. Since replacing a sensor connected to a Liquiline device is extremely easy, it can be done by staff members without any knowledge of analytics.

Reliable sensor cleaning
You can extend Memosens sensors that are specifically geared towards drinking water with automatic cleaning options. A nozzle is attached to each sensor that sprays compressed air or water on the sensor head. You can also keep the sensitive surface of turbidity sensors free of air bubbles and deposits with an air bubble trap and ultrasonic cleaning. This ensures that your sensors are clean for long-term, fault-free operation. It also eliminates the need for moving parts, such as wipers, in your process.

The cleaning process is controlled by your Liquiline transmitter. You can specify fixed time intervals and also stipulate that cleaning be performed in between times should the sensor become soiled. In this case, the transmitter receives a signal from the sensor that triggers the cleaning function.

Automated operation
The available control loops, automatic sensor cleaning and planned maintenance work provide you with every opportunity to automate your water treatment process extensively. You can even adjust the level of automation to suit your precise needs. Automatic dosing of the flocculant is just as possible as setting up an unstaffed plant.

Air cleaning system of the Turbimax CUS52D turbidity sensor

Our Memosens sensors and Liquiline transmitters, analyzers and samplers actively support you in your daily work. It has never been easier, more convenient and safer to produce water efficiently and thus to comply with limit values.

Why not give it a try?

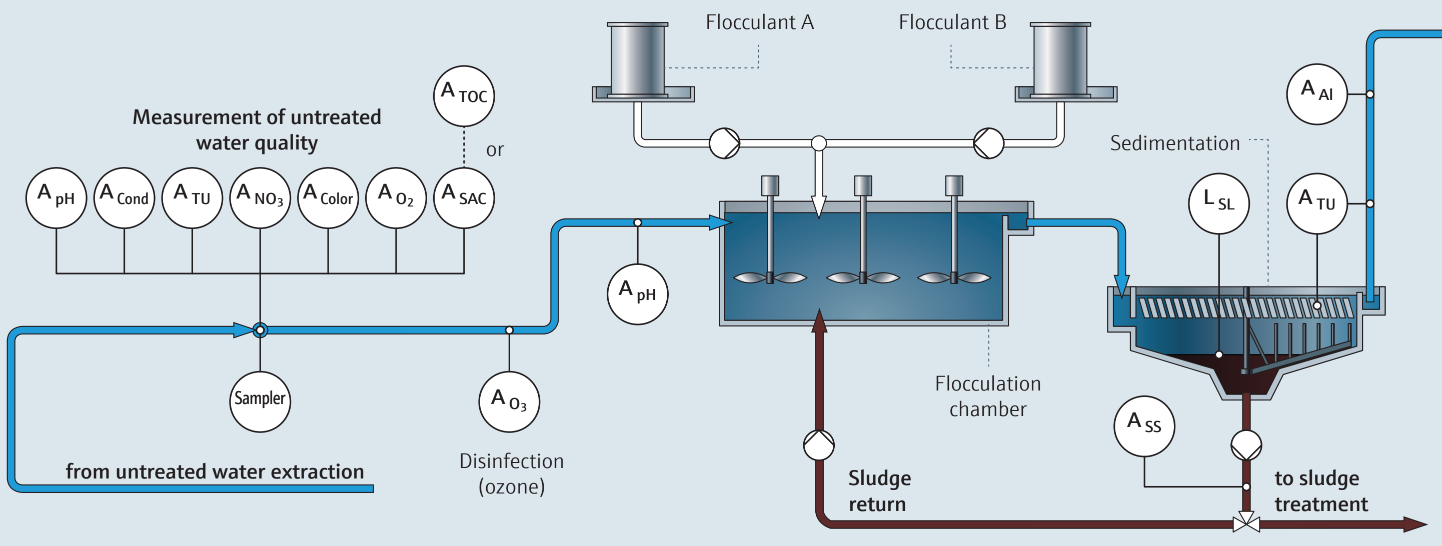
Products and solutions for all analytical measuring points in water treatment plants

Influent	Instrument	Information
pH	CPS11E	Robust sensor for all measuring points
Conductivity (Cond)	CLS50D CLS21E	Particularly dirt-resistant sensor Sensor for standard applications
TOC	CA72TOC CAS51D CAS80E	High-temperature TOC analyzer Optical TOC_{eq} sensor for trend identification Spectrometer for a wide range of parameters
SAC	CAS51D CAS80E	Optical SAC sensor Spectrometer for a wide range of parameters
Nitrate (NO_3)	CAS51D CAS80E	Optical NO_3 sensor Spectrometer for a wide range of parameters
Color	OUSAF21 CAS80E	Absorption sensor for minor colorations Spectrometer for the APHA-Hazen color
Turbidity (TU)	CUS52D CAS80E	Sensor for low ranges Spectrometer for a wide range of parameters
Disinfection (O_3)	CCS58E	Amperometric sensor for ozone (O_3)
Sampler	CSF28 CSF48	Automatic sampler Fully automatic, extendible sampler

Sedimentation and flocculation	Instrument	Information
pH	CPS11E	Robust sensor for all measuring points
pH / ORP	CPS16E	Combined pH/ORP sensor
Sludge level (SL)	CUS71D	Sensor for determining sludge deposit zone
Suspended solids (SS)	CUS51D	Low-maintenance, dirt-resistant sensor
Turbidity (TU)	CUS52D CAS80E	Sensor for low measuring ranges Spectrometer for a wide range of parameters
Aluminum (Al)	CA80AL	Colorimetric aluminum analyzer

Manganese- and iron removal	Instrument	Information
Oxygen (O_2)	COS61D COS81E	Optical sensor for standard applications Optical sensor for hygienic applications
Nitrite (NO_2)	CA80NO	Colorimetric nitrite analyzer

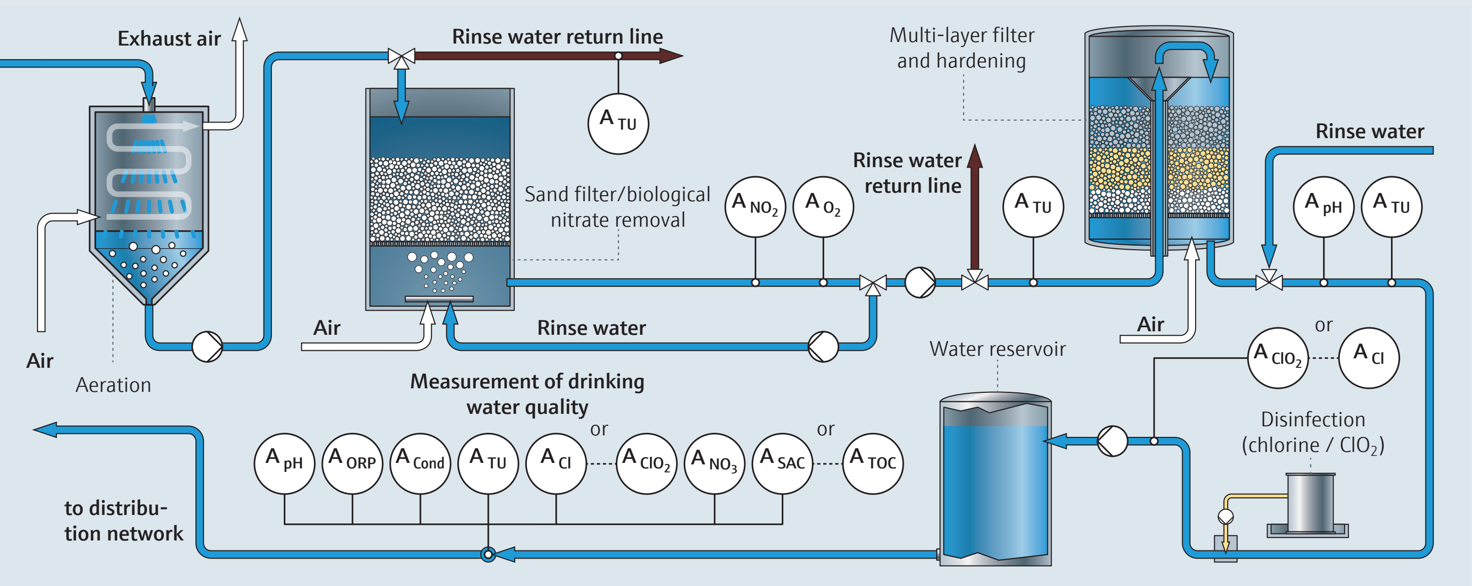
Examples of analytical measuring points in a water utility



Filtration/hardening	Instrument	Information
pH	CPS11E	Robust sensor for all measuring points
Turbidity (TU)	CUS52D CAS80E	Sensor for low measuring ranges Spectrometer for a wide range of parameters

Outlet	Instrument	Information
pH	CPS31E	For pH compensation in disinfection processes
ORP	CPS12E CPS16E	ORP sensor Combined pH/ORP sensor
Turbidity (TU)	CUS52D CAS80E	Sensor for low measuring ranges Spectrometer for a wide range of parameters
TOC	CA72TOC CAS51D CAS80E	High-temperature TOC analyzer Optical TOC_{eq} sensor for trend identification Spectrometer for a wide range of parameters
SAC	CAS51D CAS80E	Optical SAC sensor Spectrometer for a wide range of parameters
Nitrate (NO_3)	CAS51D CAS80E	Optical NO_3 sensor Spectrometer for a wide range of parameters
Conductivity (Cond)	CLS21E CLS82E	Sensor for standard applications Sensor for hygienic applications
Disinfection	CCS50E CCS51E CCS53E	Amperometric sensor for chlorine dioxide (ClO_2) Amperometric sensor for free available chlorine (Cl) Amperometric sensor for total chlorine

Solutions and accessories	Instrument	Information
Measuring cabinet, measuring container	As per customer specification	Turnkey solutions for all measuring tasks
Monitoring solutions (panels)	As per customer spec.	Monitoring, e.g., turbidity, disinfection, SAC
Transmitter	Liquiline CM44	Multiparameter device with up to eight channels
Portable handheld	CML18	For pH, ORP, conductivity, oxygen, temperature
Sample conditioning	CAT820/CAT860	Filter systems for analyzers of CA80 series
Measured value simulator	Memocheck Sim CYP03D	For quick and easy commissioning
Standards and buffers	CPY20 / CPY3 COY8 CLY11	pH buffers / ORP buffers Gel for oxygen zero-point calibration Conductivity calibration solution



From the waterworks to your tap - every single drop delivered reliably

How is drinking water transported to ensure that it comes out of your tap tasting good, looking good and safe from bacteria? Ultimately the water cannot carry potentially pathogenic germs or permit these germs to spread. There are essentially two approaches to prevent this: firstly, the water is kept low in carbon so that critical microorganisms are left without nutrients. The second approach is that disinfectant is added to the drinking water prior to distribution. Free chlorine, chlorine dioxide or chloramine (total chlorine) are used for this purpose as these substances have an antibacterial effect and can form a residual. The antibacterial effect is maintained for a long time due to the residual with the result that no dangerous biofilms can grow en route from the waterworks to the consumer's tap.

If it is not disinfected, approximately 100,000 bacteria live in every milliliter of drinking water – whereby this should only entail harmless bacteria. This considerable number can enter the water in the most diverse ways. Bacteria can potentially enter the drinking water pipes through every screw connection. This is particularly critical in the case of pipe breaks as bacteria have considerable room to enter.

The topology of the distribution network also plays an important role. A certain flushing action continues as long as everything is in flow. As soon as no more water is removed in one part of the network, it remains stagnant there for an indefinite period. This occurs, for example, in areas used on a seasonal basis such as holiday resorts. These pipes are often known as "dead ends" as the age and quality of the water are virtually impossible to monitor. Many network operators therefore regularly flush out their pipes.

You can also monitor the water quality in your distribution network online. Many distribution network operators opt for a panel solution as it simplifies the measuring task. You can combine our panels with other physical parameters (flow rate, pressure and temperature). This allows you to identify if a pipe is burst (pressure measurement is used for this purpose), whether there are subsections with non-flowing water (flow measurement) and whether the balance is correct (does the amount I am supplying to the customer match the amount I am feeding in?).

The measuring technology for Critical Control Points (CCPs) is often installed on a panel. A protective enclosure is also sometimes used to protect the measuring technology. Our service engineers will be happy to help you install and maintain your CCPs.

Critical Control Points (CCPs)
The World Health Organization defined a concept for what are termed Critical Control Points (CCPs): measuring points that monitor different measuring parameters are installed at particularly important points in the waterworks and in the distribution network. For each of these parameters a procedure is defined on what to do if the limit value or alarm value is exceeded. The action to be taken is laid down in standardized procedures (Standard Operation Procedures/SOPs). In this case, critical utility services are not simply switched off but continue to operate in order to guarantee a reliable supply.

Analytical parameters are vital for Critical Control Points as they are used to determine the drinking water quality. Values such as pH, conductivity, color, carbon content (SAC), nitrate, turbidity and various disinfection parameters (such as free available chlorine or chlorine dioxide) are often monitored at these points.

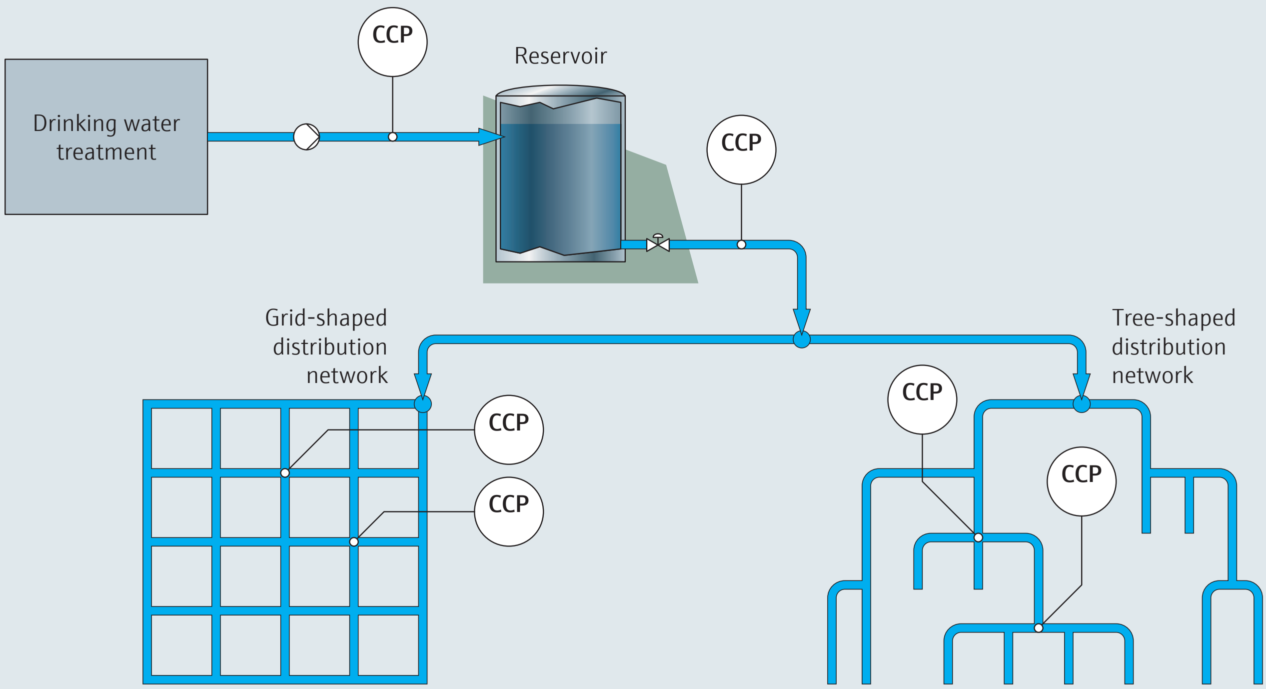
Tips on how to interpret Critical Control Points correctly

- An excessively high **turbidity value** indicates corrosion or even a pipe break. Furthermore, the level of bacteria could also be high as bacteria like to attach themselves to particles.
- If the **carbon content** is high, bacteria find adequate nutrients thus increasing the probability of a bacterial load in the water.
- If the values for the **disinfection parameters** are lower than expected, the disinfectant was probably used up by the bacteria.
- An increase in the **conductivity value** can be caused, for example, by saltwater entering.
- If the **color value** of the water increases, it is possible that an upstream filter or manganese/iron removal is defective.

Critical Control Points in water distribution

The CCPs are installed at the outlet of the waterworks and/or reservoir as well as at problematic spots in the distribution network. They signal an alarm when the water quality goes off course and they help you to troubleshoot problems. They also allow you to decide to take affected sections of the network out of operation.

Distribution networks typically have a tree-like or grid structure or a combination of both. The location of the problematic spots is specific to each system and depends on the local conditions. We will be happy to help you identify your CCPs and to fit them with all the necessary measuring devices.



Clever and smart: Monitoring water quality with panels

Make life easier for yourself!
Determining the quality of water is a science unto itself. On the one hand, a large number of parameters must be measured and monitored, which incidentally can be different for each measuring point. On the other hand, each individual parameter has its own particular characteristics which must be taken into account. For example, a turbidity measurement often requires a significantly higher process pressure than the measurement of disinfection parameters such as chlorine dioxide. Nobody grasps this better than we do! We have developed panels specifically for the production and distribution of drinking water to satisfy every measuring parameter. The panels consist of modules that we put together based on your needs. All you are required to do is mount them to a wall and connect them to electricity and water.

Do you have space to give away?
You most likely have very little free floor space in your premises. Yet you are required to accommodate all of the required measurements somewhere. This is why we placed particular emphasis on a compact design when developing our panels, which means they fit on most walls. In cases where they do not, the panel modules can be distributed in such a way that you are sure to be able to house all measurements logically.

Safe. And future-proof.
Do you know now if your water treatment process will run with the same precision in years to come as it does now? Or if the relevant legislation may change? In such a case, you would possibly need to monitor other or additional measuring parameters. The modular structure of our panels ensures that you remain flexible: You can replace individual modules at any time or add modules.

What is a panel?

A panel (sometimes referred to as an instrument panel) is a plate made of either plastic or stainless steel on which one or more complete measuring points are preassembled. You secure the plate either onto a wall or a frame/rack. Then you can manage virtually every measuring task, from turbidity to the organic load to the disinfectant concentration. Everything you need – the sensors, assemblies, transmitters, valves, piping etc. – is fully installed, connected and wired.

How will I benefit from using a panel?

- Select a flexible installation site which is adapted to your premises, your operations etc.
- You no longer need to worry about the specific characteristics of each individual measuring parameter. All measurements are perfectly built and provide precise and reliable measured values from the start.
- The installation and commissioning of measuring points could not be simpler: Screw the panels onto the wall, connect them to electricity and water and off you go.

Monitoring panels for water facilities and distribution networks

We have developed panels especially for water facilities and distribution networks that provide a precise and reliable solution to specific measuring tasks. These panels are preconfigured on delivery, have been tried and tested time and time again, are very compact and particularly easy to handle. Whenever your process has specific requirements – be it high process pressure, special measuring parameters or the identification of cable bundles – our engineers build panels to match your specifications.

"I can summarize my experience of the panel in three words: "Fault-free, maintenance-free, perfect."

Rolf Bügler, Water Supervisor, Frasnacht waterworks (Switzerland)

Standard panels, optimized for measuring points in the production and distribution of drinking water as well as for industrial water. In addition to turbidity, you can monitor up to 4 other parameters with these panels. Users can choose from pH, ORP, conductivity, oxygen and disinfection. A temperature measurement is integrated as standard.

Standard panels for monitoring disinfection parameters, such as free available chlorine or chlorine dioxide. You can regulate and optimize dosage of the disinfectant using this panel. The modular design of the assembly enables the installation of a total of six variables. Therefore, you are able to additionally measure e.g. pH, ORP, conductivity or oxygen.

Example of a panel for monitoring process water in order to measure parameters such as turbidity, pH, conductivity or oxygen. It is perfectly suited to all demanding applications in untreated and industrial water. Long measuring cycles are possible thanks to ultrasonic cleaning, a gas bubble trap and high flow velocities: Sediment particles, biofilms and air bubbles are reliably and automatically removed.

In this example three panel modules were combined with stainless steel piping (left: turbidity, center: conductivity and pH, right: SAC). The modular arrangement allows you to adapt perfectly to your specific circumstances as each measuring parameter can be configured and maintained individually without affecting the other measurements.

Safe and practical: Monitoring surface waters with measuring containers

Clean drinking water from lakes, rivers and dams
Surface waters are a major source of our drinking water. Water that is flowing through lakes, rivers and dams today can pour out of our tap tomorrow. If it is polluted or contaminated, water facilities are required to put a great deal of effort into treating it.

Usually pH, conductivity, turbidity, nitrate, oxygen, ammonium and the organic load are constantly measured and analyzed. If necessary, the measured values help to decide if a facility must process its untreated water in another way.

Measuring cabinets and containers for surface waters
The measuring points that are used to monitor rivers, lakes and dams are often scattered in the countryside and can only be reached following a long journey. We enclose the measuring technology in protective housing to guard it from rain, the cold, heat, dust or unauthorized access. This ensures that your measurements remain safe and available.

The spectrum ranges from small enclosures to walk-in measuring containers incorporating entire workstations. This means that you and your staff are protected from the elements while carrying out lab analyses and maintaining the measuring technology.

If you choose a measuring cabinet or container, you will receive a package tailored to your needs, containing everything you require for your measuring activity and its documentation.

Space for everything that needs protection

- All of your measurements are located in one place and are protected against heat, cold, rain, snow, dust, unauthorized access and vandalism.
- From a small measuring cabinet to a walk-in measuring container with a fully equipped lab, anything is possible.
- Reliable operation in the field thanks to customized data management and secure remote access to data and devices.
- Optional air conditioning ensures optimum conditions for the measuring technology, whatever the weather.
- Our project team will provide you with expert advice throughout the entire project and will find the best solution for your individual circumstances.

How industrial plants save money when dealing with water

Practically every industrial company requires water in their production and taps running waters, municipal water supplies or their own wells for this purpose. Furthermore, water is often used for cooling - power stations and chemical plants, in particular, require large quantities of water.

Together, we can dive deep into your plant and processes and make adjustments to help you increase the operating life and efficiency of your plant.

What adjustments can be made to extend the operating life of my plant?
Measurements of the oxygen and pH values, as well as the water temperature help to prevent long-term damage to the plant. Corrosion can occur, for example, if the oxygen content is too high or the pH value too low. A high temperature accelerates this process. As a rule of thumb, the effect doubles per temperature increase of 10 degrees Celsius.

Monitoring conductivity is also important. The higher the value, the greater the number of ions in the water. This in turn increases the probability of deposits and corrosion in the piping.

What adjustments can I make to save costs and increase plant efficiency?
Nowadays, water consumption is more expensive than ever. On the one hand, buying fresh water requires hard cash. On the other hand, wastewater increases the monthly bills. In addition, the wastewater may still be carrying energy, e.g., in the form of heat or in the form of oxidizable carbon compounds.

It can be worthwhile to do a simple calculation here: Consider at what point is it worthwhile to treat the wastewater and to reuse it as process water (known as "water reuse"). Are the investment and operating costs of a water treatment plant lower than the costs associated with buying fresh water and paying wastewater charges? Add to this the potential returns of using the energy contained in the wastewater. The process water must of course only be treated to the level necessary for your process.

Please call us if you are unsure where in your plant the correct adjustments can be made and how best to make them. We will be delighted to help you!

Intelligent ideas for the water management of tomorrow

Industry 4.0 helping you to make decisions faster
No doubt you have asked yourself if the Internet of Things can lighten your work load. The answer is yes. But how? Your sensors are the basis for this change as they continue to deliver measured values as always. Would it not be of benefit to have an overview of all of these measured values at once – irrespective of where you are? And would it not be practical to be automatically notified if a limit value is exceeded so that you can intervene in an instant?

Netilion, our IIoT solution (IIoT = Industrial Internet of Things) links physical infrastructure with the digital world, transforming data from the field into valuable information in an automated way and visualizing it directly on your smartphone, tablet or other device. So you know what's happening in your processes at any time and from anywhere. This allows you to make decisions faster and act if required to ensure that your processes are up and running as quickly as possible.

5. Data fusion and analysis
Algorithms for early anomaly detection,
verification, forecasts, etc.

↑

4. Data management and visualization
Monitoring of networks and decentralized infrastructure

↑

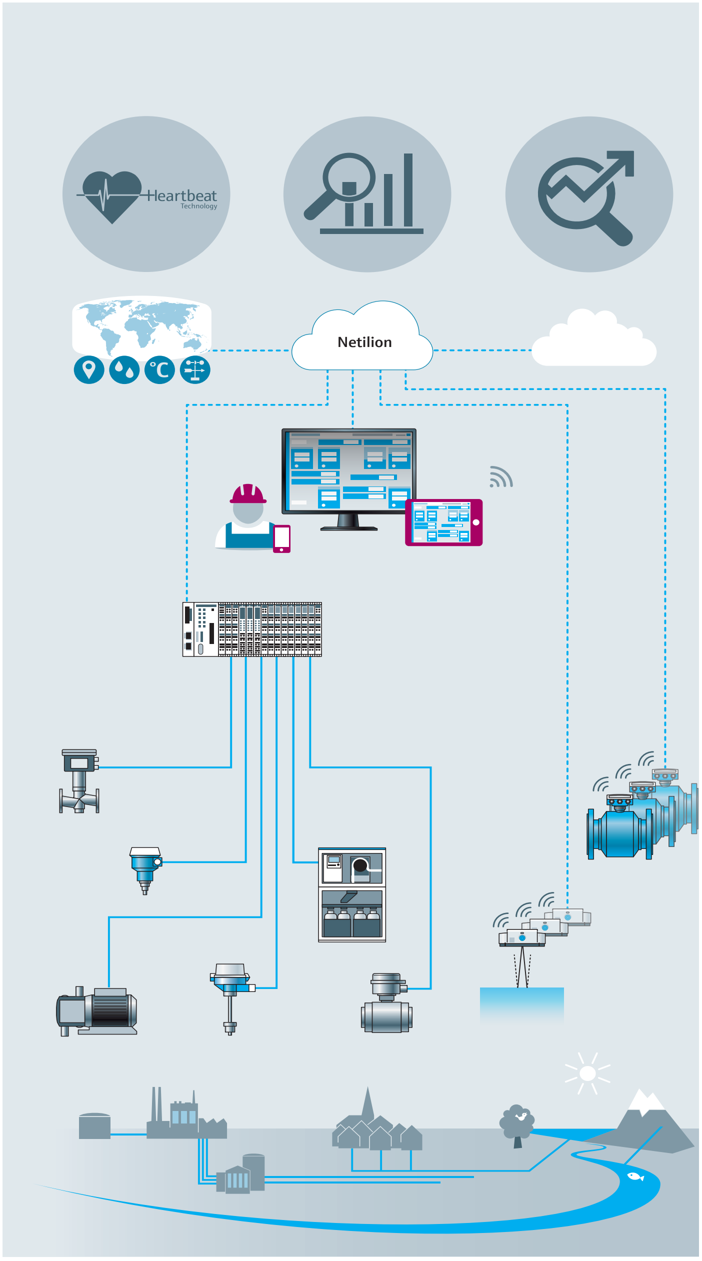
3. Data collection and transmission
Flexible edge connectivity solutions

↑

2. Data collection and control
Smart field devices and sensors

↑

1. Physical world
Infrastructure (pipes, pumps, valves, etc.)



Netilion, the cloud-based IIoT ecosystem from Endress+Hauser

Mastering the challenges of water management digitally
Digitalization has big potential to tackle and meet the current and upcoming challenges of the water industry, for example the effects of climate change. Netilion makes these opportunities tangible: With Netilion Services you can trace and use all kinds of data from the field. Better data access provides deeper knowledge of your plant, helps you to overcome challenges, and makes your daily work easier.

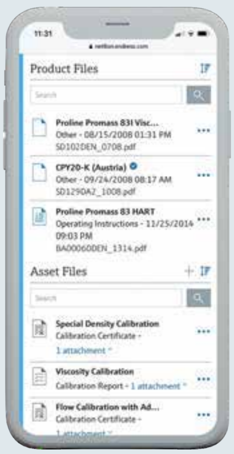
There are plenty of possibilities that can be aligned with your needs. In Oberzent (Germany), for example, Netilion enabled time saving through reduction of daily routine tours: "Our water masters can now spend more time on their core tasks and less time making trips out to plants. This is key because these specialists are currently in short supply on the job market," says mayor Christian Kehrer.

Netilion Value

Measuring devices work around the clock. But you don't have to. With Netilion Value you can access your data whenever you want. This digital service collects data from the field and visualizes it on your PC or smartphone. This allows you to check the data at any time, even for remote locations (for example, in the case of large watersheds). It also sends threshold alerts, so you can avoid problems before they start. In addition, the service offers further possibilities to apply algorithms and to generate forecasts.

Netilion Health

In order to meet water management regulations, you need accurate measurements. This means your instrumentation needs to stay in good shape. Netilion Health is a digital service for monitoring asset health, so you can track the condition of your instruments and react faster and better. Staying ahead on maintenance keeps your plant running and reliable. McKinsey sees between 20% and 40% savings potential in maintenance costs by predictive maintenance activities - and up to 50% less downtime.



Netilion Library

In addition to documenting your water values, you may also need to document information on measuring devices. Netilion Library is like a virtual store, containing the digital twins of all your instruments. So whenever you need to send calibration protocols or view configuration reports, you know that you have it in Netilion Library. This service saves your time and helps you ensuring compliance.

"Endress+Hauser measuring devices are an excellent choice. I can rely on the measured values 100% and know what the quality of the water is at each process step. Our contact is also always available any time we have a question. I am more than satisfied!"

Zbigniew Wasiluk, Deputy Manager,
Water Production Division Jurowce, Bialystok (Poland)

For all of the information available on our sensors, transmitters, analyzers and samplers, see:
www.endress.com/analysis

For further information on water quality monitoring systems for drinking and process water, see:
www.eh.digital/panels-drinkingwater
www.eh.digital/panels-process-water

For an overview of our water expertise, see:
www.endress.com/water

For further information on our IIoT services, see:
www.netilion.endress.com

www.addresses.endress.com

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Endress+Hauser
People for Process Automation