



SENSORS AUTOMATION

Issue 1/2022



“To think about the end in everything you do, that is sustainability.”

Eric Schweitzer

What is truly sustainable?

Products and solutions
“made by JUMO”!





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To improve readability the masculine form is used for personal designations and personal nouns. These terms shall generally apply to all genders in order to be non-discriminatory. This abbreviated language is only used for editorial purposes and is not intended to suggest value judgment.



Dear Reader,

Sustainability is the key theme of the cover story in this issue of our JUMO customer magazine. It was also the driving force behind the decision by JUMO General Partners Bernhard and Michael Juchheim to restructure the management team to ensure that the company has a sustainable foundation from which to grow. With this in mind, this editorial foreword is coming from a new duo. Alongside Dimitrios Charisiadis, who has been Chief Executive Officer of JUMO since 2020, Steffen Hoßfeld became the new Chief Operating Officer on May 1, 2022. He has worked at JUMO since 2017 and was previously in charge of Finance, Purchasing, and IT. As Chief Operating Officer, he will be responsible for steering and organizing all of the company's operational processes.

As Chief Executive Officer, Dimitrios Charisiadis is responsible for managing market-oriented areas such as Development and Sales. Both share responsibility for the strategic orientation of the corporate group. Bernhard and Michael Juchheim have assumed a supervisory role as active General Partners. Sustainability has also shaped many other applications involving JUMO's products and solutions. The following pages will take you on an exciting journey to greenhouses in the Netherlands, water works in India, and perfectly air conditioned trains. But what does all of this have to do with JUMO? In many applications measurement, control, and automation technology plays a key role in saving energy and conserving resources. This makes JUMO's portfolio a kind of "sustainability toolkit" for a whole host of industries ranging from industrial furnace construction to water technology and renewable energy. Are you looking to make your plant or process more sustainable? Our team around the globe will be glad to help you make the world a better place.

Steffen Hoßfeld
Chief Operating Officer

Dimitrios Charisiadis
Chief Executive Officer

We all leave behind an ecological footprint.

The footprint is a complex sustainability indicator that describes how much space a person needs to satisfy their need for resources.

What is truly sustainable?

Products and solutions “made by JUMO”!



Sustainability is a complex topic. To break it down into something everyone can understand, it is a good idea to look at the 17 Sustainable Development Goals from the United Nations (UN), which aim to ensure sustainable development from an economic, social, and ecological perspective all over the world. The goals came into effect on January 1, 2016 and run for 15 years.

A quick glance already reveals that it defines sustainability in much wider terms than merely the ecological impact. It covers topics such as fighting poverty and hunger, improving health systems, and expanding the education sector worldwide. The United Nations believes that sustainability can only truly be achieved when all 17 of these goals are given equal priority. →

Cover story



What does that mean for a medium-sized industrial company? As a manufacturer of innovative measurement, control, and automation technology, what can we do to drive sustainability forward? Here, too, the 17 goals can help, as JUMO touches on several of them with its products and solutions.

digiLine

Goal 6: Clean water and sanitation

At JUMO, the field of analytical measurement technology has enjoyed continuous growth in recent years. The treatment of drinking water and wastewater plays a crucial role in this trend. JUMO now has an extensive product portfolio covering the entire groundwater treatment chain from the water well all the way through to storage. Water projects in India is one area in which this technology is being used.

Another pressing problem is water shortages, which affects more and more regions of the world. Even valuable supplies of fossil groundwater are increasingly running out. One solution is to use seawater desalination plants to produce drinking water using reverse osmosis. JUMO technology is also used here to measure measurands like temperature, pressure, or conductivity.

“Whether you need to monitor the generator temperature in wind turbines or the conductivity of the water in geothermal plants – JUMO has the solution you’re looking for.”

Dr. Thomas Reus
Market Segment Manager for
Renewable Energy

thomas.reus@jumo.net

Goal 7: Affordable and clean energy

Electrical power is required to run reverse osmosis plants. To reduce the environmental impact, these plants are increasingly being run with green electricity generated from solar or wind power plants. This is where JUMO can serve the next Sustainability Goal. Whether it is wind, hydropower, geothermal energy, or solar power – they all need comprehensive measurement and control technology.

Goal 12: Responsible consumption and production

“You are not sovereign when you have a lot, but when you need only little.” This quote from Niko Paech neatly sums up JUMO’s mindset when it comes to consumption and production. If you need an example here, just think of how robust and durable JUMO’s technology is. It is so durable that we repeatedly see images with products that have been reliably working away for decades. Even products that are no longer manufactured can be repaired by JUMO’s Service team for up to 15 years after they have been discontinued. That might not necessarily make much commercial sense, but it is certainly sustainable.

Another trend when it comes to sustainable production is retrofits. Why should entire machines and plants be replaced if individual components are still very much in perfect working order? One way JUMO rose to this challenge was with the JUMO dicoTEMP 100 smart tube. This solution allows users to continue using any devices that are already part of the process at the same measuring point and, at the same time, extend them functionally with electrical temperature measurement.

Goal 13: Climate action

Achieving CO₂ neutrality by 2050 is one of the most important global climate goals. As a provider of measurement and control technology, JUMO is helping to achieve them. In the industrial sector, for example, more than 60 % of the energy is used for process heat. So far, most of it still comes from fossil fuels. However, most energy processes can be made CO₂-neutral by combining electric heating elements and power controllers with green electricity.

Goal 14: Life below water

Around a third of global fish stocks are considered to be overfished. At the same time, the increase in the world’s population has resulted in a greater demand for food from our oceans. Aquacultures can help to solve this problem. Aquaponics systems go one step further, as they additionally use the process water from aquacultures to supply nutrients to plants. Consequently, aquaponics combines the rearing of fish with the hydroponic cultivation of agricultural plants in a single production system. Key to the success of this process is accurate monitoring of the water quality – and this is where JUMO comes into play. The smart sensor network for liquid analysis, JUMO digiLine, enables worry-free operation of such complex systems. ■

Sustainability is the sum of many parts



You do not always first have to draw up a big, detailed sustainability strategy within the company that can be referenced in colorful brochures and flashy videos. What is more important is what you actually do – and JUMO plays a key role in many aspects of sustainability, to make the world a better place for future generations.

JUMO innovations

3 products that make the world a little better

1 JUMO NESOS with SIL

Using the name JSP (JUMO Safety Performance), JUMO has been bundling the company's expertise in the SIL (Safety Integrity Level) and PL (Performance Level) fields. Now the JSP portfolio is being expanded to include another important measurand which will enable the reliable detection and measurement of process-critical point levels as well as filling levels for liquids. This is a system solution based on the products of the JUMO NESOS series that is available in various expansion stages. Flexible options are available including the SIL-qualified sensor with all required safety-related characteristic values, SIL-certified sensors, and the certified measuring point.

The JSP complete solution in the "filling level" field can also reliably detect line faults such as short circuits and cable breaks, ranging from the sensor to the actuator. Solutions can also be implemented in combination with applications in explosion-protected areas (intrinsically safe [Ex i] and flameproof enclosure [Ex d]) as well as in shipbuilding. As a result, possible applications include the field of liquid gas and hydrogen, steam boilers, bio-reactors, or solvent purification plants.



2 JUMO hydroTRANS

Precise humidity and temperature monitoring is the basic requirement for accurate control of indoor and process air. As a result, users from the HVAC field (heating, ventilation, and air-conditioning) can reduce costs and minimize maintenance effort.

Devices of the JUMO hydroTRANS series are reliable humidity and temperature transmitters with an optional CO₂ module, which operate according to the capacitive measurement method. The device series is available with various interfaces. It is characterized by easy installation, robustness, and reliable sensor technology. The JUMO hydroTRANS is available in 4 variants: wall-mounted, duct, rod, or indoor.



3 JUMO SIRAS

The JUMO SIRAS P21 AR/DP programmable pressure transmitter is approved for use in safety-related plants with Safety Integrity Level (SIL) according to DIN EN 61508 as well as Performance Level (PL) according to DIN EN 13849. As a result, it is perfectly suited for safety measuring chains in the process industry.

In combination with the JUMO safety temperature limiter/safety temperature monitor and a JUMO transmitter power supply unit, it can be used as an immediately operational safety chain for SIL 2 or SIL 3. JUMO provides the required certificates and all safety-related system properties in a clearly arranged manner, so that the safety assessment effort for the user is significantly reduced.

JUMO SIRAS P21 AR/DP can be used in a variety of applications so that it reliably and precisely measures the relative, absolute, or differential pressure of liquids, steam, and gases. The pressure transmitter is an extension of the JSP portfolio (JUMO Safety Performance) which can be used in combination with the JUMO safetyM STB/STW and the transmitter power supply unit as an immediately operational safety chain (according to the PED 2014/68/EU).

The default measuring ranges for the JUMO SIRAS P lie between 0 and 100 bar relative pressure and between 0 and 100 bar absolute pressure. JUMO SIRAS P21 AR/DP is particularly impressive due to its high degree of precision. Long-term stability is less than 0.1 % per year, while the linearity is 0.05 %.



Fresh vegetables every day

Automated climatic chambers



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Heating, cooling, humidifying, and drying with PLC technology.

More than 15 000 liters of water are required to produce a kilogram of beef, but a kilogram of tomatoes requires only 110 liters. Vegetables, therefore, are clearly the more sustainable choice. That might also be one of the reasons why vegetable consumption in Germany has increased by 14 % to 109 kilograms per person in the last 10 years.

Our Dutch neighbors might only consume half as many vegetables per person, but when it comes to tomatoes, carrots, and onions, the country is one of the top 3 vegetable producers in Europe. JUMO's Dutch subsidiary has been supporting the Dutch vegetable industry for years with its products and expertise in optimizing technical plants and processes.

As a result, the Dutch seed cultivation industry is also constantly improving its processes, so as to maximize crop growth and the harvest. Local company Bejo Zaden is located in Warmenhuizen and has branch offices in more than 30 countries. It is a leader in the cultivation, production, and sale of vegetable seeds.

Research in climatic chambers

Seed cultivation requires a lot of research. One of the ways Bejo does so is by using test climate chambers. They enable the company to examine the effect of temperature, moisture, and light on seed growth. Frost Klimaattechniek located in Stompeteren is responsible for delivering and installing these climatic chambers. The company has teamed up with JUMO specifically to meet Bejo's requirements. One of the aforementioned climatic chambers is the so-called 9-compartment chamber, which Bejo needed to replace. It therefore contacted Frost to see if they could help.

Ready for the future

The control system of the new test climatic chamber with 9 compartments had to meet some special requirements. The existing chamber measured both temperature and relative humidity, and its replacement had to do the same. The new chamber also had to be equipped with expansion options to allow for additional applications. One particular requirement was the ability to decrease the requested lower temperature limit. To be able to turn the seeds, each compartment is equipped with rollers. Bejo wanted to use a central control system with an intuitive HMI. For the lighting, Bejo requested LED modules instead of standard bulbs in the various compartments.



JUMO PLC technology

PLC technology in combination with control technology requires special expertise and skills. Thanks to our many years of experience in this field, Frost commissioned JUMO with the control system for Bejo's new 9-compartment chamber. The JUMO mTRON T automation system was chosen for the new solution so that temperature, moisture, and lighting can be controlled for each compartment. Each of these measurands can be controlled individually per compartment to prevent condensation problems. In addition to the drying process of the new 9-compartment chamber, the JUMO mTRON T also controls the ventilation speed, the rollers, and the light intensity for each compartment.

Summary

The collaboration between Frost and JUMO resulted in a technical plant for Bejo that meets all relevant refrigeration-related and electrical requirements. The design and the development work ensure the highest levels of reliability for the system and demonstrate a pioneering approach. For example, the chamber is prepared for the installation of a twin compressor. Safety, accuracy, and ease of use are cornerstones of this solution. The research work conducted in this chamber helps to ensure as well as increase the yield and improve the quality of the seeds.

JUMO supports drinking water model project in Solapur

Smart measurement technology for Indian metropolis



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The complete system functions as a model and can be applied to other cities and regions.



Member of
German Water Partnership

The State Agency for Environmental Technology and Resource Efficiency Baden-Württemberg (*Landesagentur für Umwelttechnik und Ressourceneffizienz Baden-Württemberg*) and the Fraunhofer Institute for Interfacial Engineering and Biotechnology IGB have worked hand in hand with JUMO and other industry partners in Solapur to implement a showcase project for simple monitoring of water quality.

In India, more than 500 million people have no, or only difficult, access to drinking water. The government is aiming to provide a country-wide water supply by 2024. To achieve this goal, 100 cities have been named “Smart Cities” in which methods to establish an effective supply of drinking water are to be tested.

The aim of the project in the “Smart City” of Solapur was to digitally monitor the water treatment system in the city’s biggest water works and to train the operators on-site to build up a pool of experts for the long term. The ability to monitor the drinking water online is a crucial aspect for Solapur because the Ujani reservoir, the city’s main source of water, is located more than 100 kilometers away. The quality of the water is heavily impacted by discharges of wastewater from settlements above and below the reservoir.

Improving the supply of drinking water

The data acquired from the online monitoring is used to identify further measures for improving the drinking water supply. The technical implementation of the project was carried out by the JUMO Engineering department in Fulda with JUMO’s Indian subsidiary managing construction management on-site. In addition to digital JUMO sensors for analyzing the drinking water, the new JUMO Cloud and the new JUMO automation system JUMO variTRON 300 were also used.

Important drinking water parameters such as flow, conductivity, acidity, and turbidity are measured using sensors from the JUMO digiLine range. JUMO digiLine is a bus-compatible connection system for digital sensors that gives users the ability to establish intelligent sensor networks. As a result, all important measurement parameters for liquid analysis can be measured with a single system. Only a single digital signal line then still leads to an evaluation unit or controller.



This enables more efficient and faster cabling of plants in which several parameters are measured simultaneously at various locations.

Evaluation and further processing

The JUMO variTRON 300 automation system is used to evaluate the data and process it further. This system provides users with an intelligent solution for simple automation applications.

JUMO variTRON 300 is based on a powerful CPU with an 800 MHz single-core processor. The software has a modular structure based on a Linux platform and uses the CODESYS V3.5 programming environment SP16. Another special feature is a customer-specific configuration and process data editor. In addition, individual applications can be created using the modern programming environment Node-RED.

The central processing unit has a USB host, 2 Ethernet interfaces, and a RS485 port as connection options. Up to 32 wireless JUMO Wtrans sensors can be connected via a wireless gateway for various purposes including measuring temperature or pressure. All data is collected and analyzed in the JUMO Cloud. The Fraunhofer IGB analyzes the data in detail every three months and draws up recommendations for how to proceed.

The possibilities of the JUMO Cloud

As an IoT platform for process visualization as well as for data acquisition, evaluation, and archiving, JUMO Cloud enables worldwide access to measurement data using common web browsers. It is characterized by a high degree of security as well as valuable visualization, alarm, and planning functions. Customers can use the JUMO Cloud to monitor several plants that are scattered, processes, or sites in one dashboard, which, in turn, increases process reliability. The possibilities provided by the JUMO Cloud span from simple alarm messages through to condition monitoring and complete plant controls.

The complete system can, in principle, be transmitted all over the globe. ■



Goal

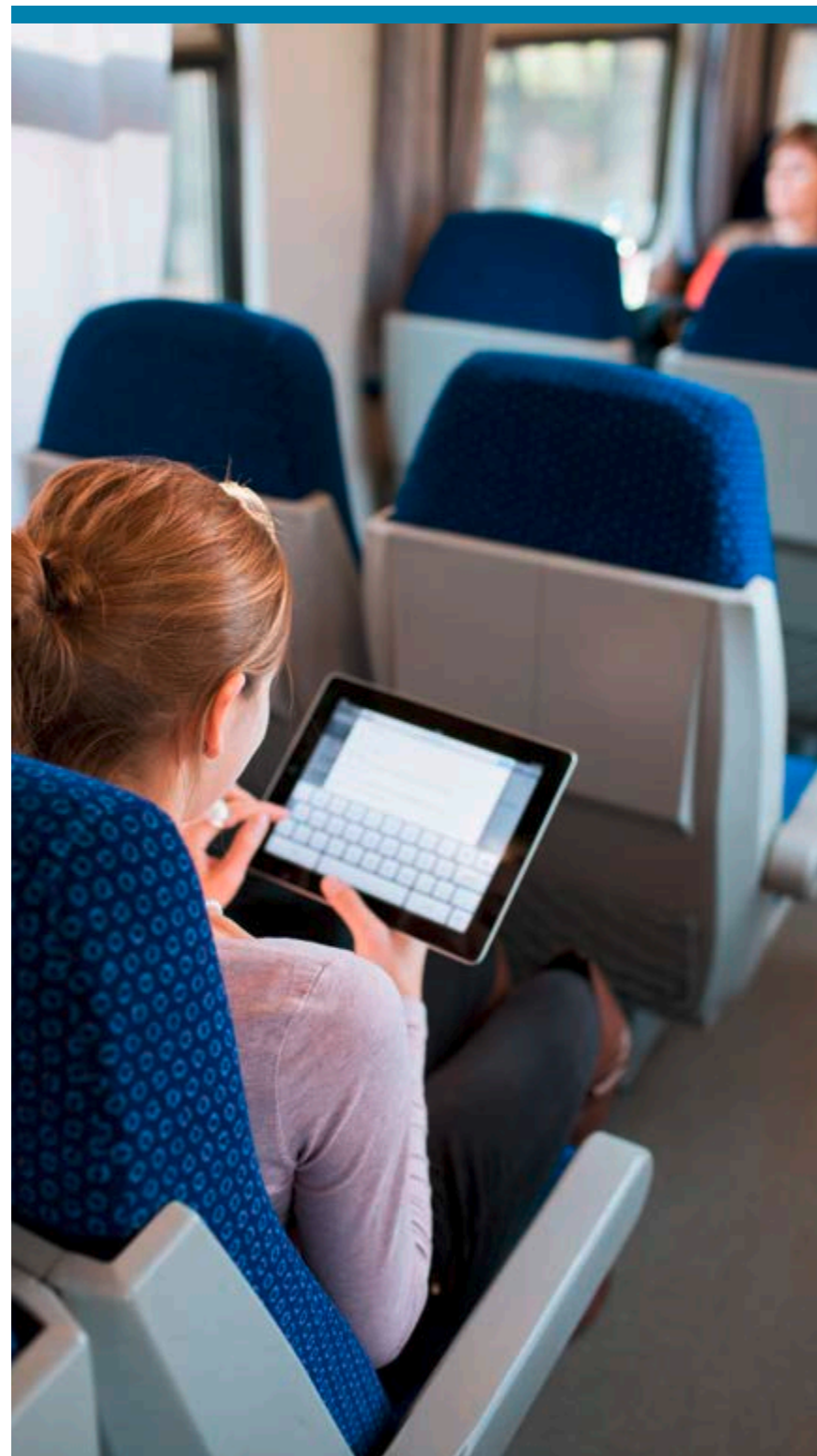
The partners involved in the project got to know one another as part of the India network of the German Water Partnership e. V. (GWP) and quickly joined forces. GWP e. V. includes around 350 specialist companies, universities, and research institutions from the water and wastewater sectors. Their aim is to solve global problems relating to water and wastewater by applying German and European expertise.



JUMO employee Jayant Varade starting up the feed line measuring point in Solapur

How to ensure an optimal climate on the move

Reliable temperature control for railway technology



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The railway industry leads the way when it comes to protecting the environment. JUMO ensures a perfect climate to keep passengers comfortable in the trains.

Traveling by train emits only a tenth of the emissions per passenger compared with taking a domestic flight. Passenger cars also perform poorly in this respect as they carry only 1.5 people on average. On trains, capacity utilization is an average of 56 %.

An extensive portfolio of measurement and control technology from JUMO is used in railway applications. Other than temperature measurement on the chassis and in water supplies, temperature control also plays a key role – after all, nobody wants to sit in an intercity train without a working air conditioning system in the summer heat. Mechanical thermostats are usually used for this purpose.

However, electronic thermostats provide a simpler as well as more efficient way to reliably control and monitor air conditioning systems.

One example is the JUMO eTRON T100. This electronic thermostat for DIN-rail mounting was especially designed for temperature control and monitoring. RTD temperature probes, thermocouples, current signals, and special temperature probes from the railway technology field can be connected to the measurement input.

Thermostat, timer, and data logger in one device

The JUMO eTRON T100 sets itself apart with its compact size and large functional range, including – among other things – an integrated timer, data logger, service and operating hours counter, PhotoMOS® output for additional limit value signaling, and digital input.



Digital control signals can be used to create logical connections (AND, OR, XOR), which are processed internally.

The device has UL approval and also meets standard EN 50155 for the railway industry. Relevant measurement inputs for railway temperature probes have been integrated to meet the specific requirements of this industry.

The JUMO eTRON T100 has a user-configurable dot-matrix display on which process values, parameters, switching statuses, and the electric connection diagram can be viewed.

A clearly-structured operating concept supported by additional texts (4 languages are already available in the device) as well as practical and quick wiring via vibration-proof PUSH IN terminals enable a quick and easy startup. So, when in the summer train passengers step out of the train completely relaxed, that might well have something to do with the JUMO eTRON T100. ■



Its compact design type allows the JUMO eTRON T100 to be integrated with ease into control cabinets and sub-distribution units

Tip

Visit JUMO at InnoTrans in Berlin from **September 20 to 23, 2022**, Hall A, CityCube, Booth # 270. Find out more about our trade fair highlights at: <http://innotrans-en.jumo.info>



E-learning course

JUMO digiLine CR/Ci with analog outputs
and switching outputs

Hydrogen from a container

Tailor-made power-to-gas plants



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Power-to-X is becoming increasingly important as a suitable technology.

The energy transition is in full swing. By 2050, the aim is for Germany to obtain the energy it needs primarily from renewable energy sources such as wind, hydro power, solar power, geothermal energy, and sustainable raw materials. However, a major problem with this project to date has been the inadequate energy storage facilities. That is why Power-to-X – the process of converting excess power into fuel or raw material – is becoming increasingly important as a suitable technology.

Energy management is relatively straightforward for conventional power plants. If more power is needed in winter or at night then one simply has to increase the plant's output slightly. But that's not so easy anymore, especially with renewable energy. What should be done on a sunny, windy summer's day, when thousands of photovoltaic systems are running at full capacity and the wind turbine installations in the North Sea and Baltic Sea are generating a huge amount of energy? What can be done with all this energy from Mother Nature?

Using Power-to-X processes, excess power can be converted into valuable fuel and raw materials. In PTG (Power-to-Gas) plants, for example, power is converted into hydrogen using electrolysis. This hydrogen can then be stored in existing gas infrastructure, transported, and provided in line with demand.

Environmentally friendly creation of hydrogen

Kyros Hydrogen Solutions GmbH is located in Föritz in Thuringia, Germany from where it supplies tailor-made hydrogen generation systems for all types of mobility solutions and industry. A specialist in proton-exchange membrane technology (PEM), Kyros Hydrogen Solutions GmbH is an innovative company that provides an eco-friendly way to generate hydrogen for trains, passenger cars, trucks, and even industrial uses. The company is collaborating closely with JUMO for its measurement technology.



The PEM system needs power and water. It has a semi-permeable membrane on the inside, made from an ion-conducting material that only allows hydrogen ions (H+) to pass through. When power is supplied, the water molecules at the interface of the membrane are split. This produces a flow through the system, and oxygen is emitted. The hydrogen ions pass through the membrane and join with the electrons to form hydrogen as fuel.

In a nutshell

So-called PEM electrolyzers split water into its chemical components of hydrogen and oxygen using an electrical current. Once split, the hydrogen is available for compression in a hydrogen compressor and subsequent storage.

Special features

The entire PEM system is housed in a single container and is supplied as a turnkey solution. There are proton-exchange membrane stacks in each electrolyzer container to generate hydrogen gas. All you need on-site are a power source and source of water. The size of the container can vary depending on how much hydrogen is required and the corresponding system size. The entire system is controlled by a PLC.

Ultra-pure water as the key raw material

The key raw material used for this technology is demineralized water – in other words ultra-pure water. The water is purified in several stages ranging from pre-filtration, to desalination, and the process water feed system. Conductivity is the main measurand used to determine the quality of ultra-pure water.

JUMO sensors have been used for many years to reliably measure the conductivity of ultra-pure water. The digital variants JUMO digiLine CR/Ci are new additions to the range. The CR sensor that operates in measuring ranges from 0.05 $\mu\text{S}/\text{cm}$ to 600 mS/cm is suitable for use in reverse osmosis plants, ion exchange plants, applications involving ultra-pure water, and pharmaceutical applications.

Solving problematic installation situations

JUMO digiLine CR/Ci sensors are available with integrated electronic components or detached electronic head and cable connection. The detached version can easily master problematic installation situations (heat emission, vibrations).

Since the electrolytic conductivity is highly dependent on temperature, the temperature must be taken into account during the evaluation. For this purpose, a Pt1000 sensor is integrated in the JUMO digiLine CR conductivity sensor. During the measurement process,

the sensor acquires the medium temperature, which is then compensated accordingly in downstream measuring amplifiers.

The parts of the sensor which come into contact with the medium are manufactured out of stainless steel (316L) to electropolished quality ($R_a < 0.8 \mu\text{m}$). For these, acceptance test certificates according to DIN EN 10204,

3.1, as well as roughness certificates (according to Ph. Eur or ASTM International), can be provided. Seals and plastics used by JUMO meet the requirements of the FDA and are physiologically harmless. ■



The entire PEM system (proton-exchange membrane technology) is housed in a compact container

Treatment of pharmaceutical water

Quality right from the start



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The right measurement technology for a demanding project.

Water for pharmaceutical use is subject to particularly strict quality criteria. Selecting the ideal measurement technology for conductivity, temperature, and pressure is crucial in order to satisfy the stringent demands placed on parameters such as total bacteria count, TOC, conductivity, and nitrate or heavy metal content. EnviroFALK PharmaWaterSystems uses JUMO technology to comply with these standards.

E-learning course
Practical information for measuring conductivity in ultra-pure water

EnviroFALK PharmaWaterSystems is a specialist in the treatment, storage, and distribution of pharmaceutical water, process water, and ultra-pure steam. It supplies and starts up turnkey plants meeting the highest quality standards all over the world. The focus is on protecting the patient, ensuring reliable, energy-saving plant operation, and providing high-quality technology in a hygienic design.

Its customers include companies from the following industries: packaging, production of active pharmaceutical ingredients, production of vaccines, and health and life science products. However, premium cosmetics lines are also upgrading their production lines. Pharmaceutical water plays a key role here as a product medium and for cleaning.

Quality of pharmaceutical water

Pharmaceutical water is distinguished into purified water, highly-purified water, and water for injection. The quality of pharmaceutical water is governed in various standards including the European Pharmacopoeia (Ph. Eur.) and the US Pharmacopoeia (USP). Methods such as distillation, reverse osmosis, and ultra-filtration are used as part of the production process.

The standards prescribe the use of reliable quality control procedures. Conductivity measurement has proven to be the most reliable method. The measurement in pharmaceutical water is performed with conductivity sensors that work according to the two-electrode method. As the electrolytic conductivity of a liquid is highly dependent on the temperature, the measured value is usually based on the internationally recognized reference temperature of 25 °C (temperature-compensated).



Application of four-pole measuring technology

The JUMO BlackLine CR 4P conductive conductivity sensor, for example, can be used for applications involving pharmaceutical water. It comes with an integrated temperature probe and can be used for measuring relatively high and low conductivities. A wide measuring range up to 300 mS/cm is covered through the use of four-pole measuring technology. This technique also offers additional advantages such as reduced sensitivity to pollutants. Furthermore, no interfering polarization effects, which falsify the measured value, take place. The measuring electrodes of the JUMO BlackLine CR 4P are made of special graphite which is abrasion resistant and robust enough to withstand chemicals. →

The JUMO ecoTRANS Lf 03 transmitter can be used for signal evaluation. It measures the conductivity or the resistance of liquids in conjunction with conductive conductivity measuring cells. In addition to applications involving pharmaceutical water, typical application areas also include plants for fresh water monitoring and water treatment or reverse osmosis plants.

Current water analyses

A customer-specific project involving purified water with a generation capacity of 500 liters per hour and 2 storage and distribution systems was recently successfully implemented by EnviroFALK PharmaWaterSystems. As a basic prerequisite, all necessary pre-treatment steps had to be designed based on current water analyses. A hot water sanitation system in accordance with the latest GMP (Good Manufacturing Practice) requirements was also required. Moreover, the plant had to have a recirculation system to prevent bacterial growth during standstill and separate sanitation. The entire system also had to be connected to a higher-level control system, needed self-explanatory menu guidance, and had to be easy to use. ■



Summary

JUMO supplied the ideal measurement technology for this challenging project. Other than conductivity measurement, JUMO sensor technology was also used to measure the pressure and temperature, ensuring the greatest possible product safety during production. The quality standards were also optimized further.



A pharmaceutical water plant from EnviroFALK PharmaWaterSystems

When it's all about the sausage

Process technology “made by JUMO”



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*A user-friendly
complete solution
for a variety of
industries.*

JUMO is expanding its comprehensive automation portfolio to include a complete solution for process technology workflows. The application has been designed to be very easy to use and is suitable for a variety of industries.

Tip!
Online event
Hybrid industry day: industrial furnace construction
October 20, 2022
<http://furnace.jumo.info>

More than **sensors + automation**



One area in which process technology applications from JUMO are traditionally used is the meat processing industry. A number of different steps are involved here: cooking, boiling, smoking, maturing, and storing. They all have to be perfectly coordinated with one another to guarantee the best product quality and safety. The process technology solution is therefore also used in smoke generators as well as cooking and baking equipment in this industry. One particularly convenient feature is the self-explanatory user interface, which enables end users to adjust the process directly on the devices without needing expertise in programming or PLCs.

At the heart of the solution lies the JUMO variTRON automation system, for which a special application was developed, and the graphical editor JUMO smartWARE Program. As a result, an end-to-end solution ranging from the sensor to the cloud can be provided in combination with other JUMO smartWARE applications.

A focus on 3 user groups

Manufacturers

of process technology plants can define individual process steps and plant types using JUMO smartWARE Setup.

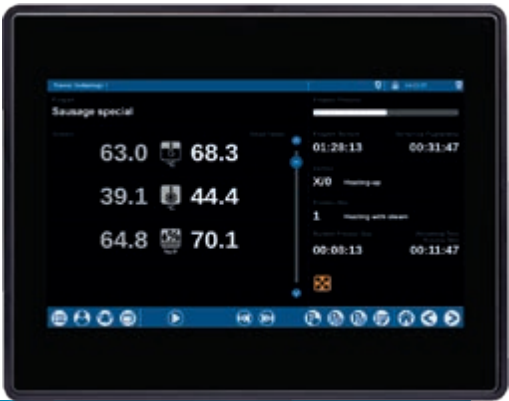
Plant operators

can intuitively create and edit process technology programs as well as recipes with a graphical editor thanks to the new JUMO smartWARE Program. This browser-based application can be used on a PC as well as a laptop or tablet.

End users

can visualize and manage the program sequence in the browser using a display on a web panel or a tablet. The user interface can be customized as required, has a consistent design, and is intuitive to use.

Other JUMO applications such as JUMO smartWARE SCADA, the JUMO Cloud, or JUMO smartWARE Evaluation can also be used for monitoring, batch recording, and the creation of individual reports.



Summary

In many industries, perfectly coordinated processes can play an important part in ensuring energy-efficient, sustainable production. The JUMO process technology application plays a key role here, as it enables sustainable processes to be established in a variety of different industries.

Guaranteed plant availability

JUMO maintenance contracts



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Maintenance contracts ensure the maximum productivity of a plant over a long period of time.

Modern industrial production processes are like a finely tuned clock. The failure of just one plant can cause the entire factory to come to a standstill.

According to Total Productive Management (TPM), plant failures are among the 8 major types of loss that can make the overall production equipment less efficient.

These losses arise due to sporadic or chronic faults in production equipment and result in a lower output (because the machine is stopped and cannot produce anything) and/or more quality problems. The objective must be to have zero plant failures.

Survey in the USA

A survey of the 500 largest American companies revealed that 94 % consider the risk of a critical plant failure to be a major problem.

43 % of respondents stated that the risks of plant failures had risen in the last 5 years. They are not just worried about a loss of turnover – they also view damage to the brand, critical inspections by investors, or even the risk of downsizing as potential consequences.

Flexible maintenance contracts for JUMO customers

Nowadays, preventive maintenance based on time or usage statistics is one of the most common ways to maintain industrial operations. The maintenance work is performed at regular intervals to reduce the probability of a plant failure. Predictive maintenance goes one step further – this type of maintenance uses machine learning, artificial intelligence, and cloud technology.

JUMO supports its customers across the globe by providing flexible maintenance contracts for effective predictive maintenance. With this collaborative approach, users' skills and resources are taken into account and assistance is provided when customers reach their limits.

The first step is to draw up a tailor-made maintenance plan setting out which performance data needs to be checked at which interval. A maintenance contract may also include any necessary calibration work on the measurement technology being used, along with the relevant certificates.

The contracts run for 3 or 5 years and reminders of scheduled maintenance dates are sent automatically. It goes without saying that any necessary service work is carried out by qualified JUMO specialists, who can also replace wearing parts directly on-site. A detailed maintenance report is a mandatory part of the service. JUMO can also archive the data.

This way, maintenance contracts ensure the maximum productivity of a plant over a long period of time. Production risks are minimized and planning reliability is optimized.

JUMO service portal

Apart from the aforementioned services, the JUMO service portfolio includes an express repair service, an expert technical telephone support team, and a configuration service. At JUMO, spare parts are available on a long-term basis – in some cases for up to 15 years. Our extensive stock ensures a particularly fast spare parts service. Urgent orders can be processed within 24 hours. ■

Good to know

In keeping with the slogan:

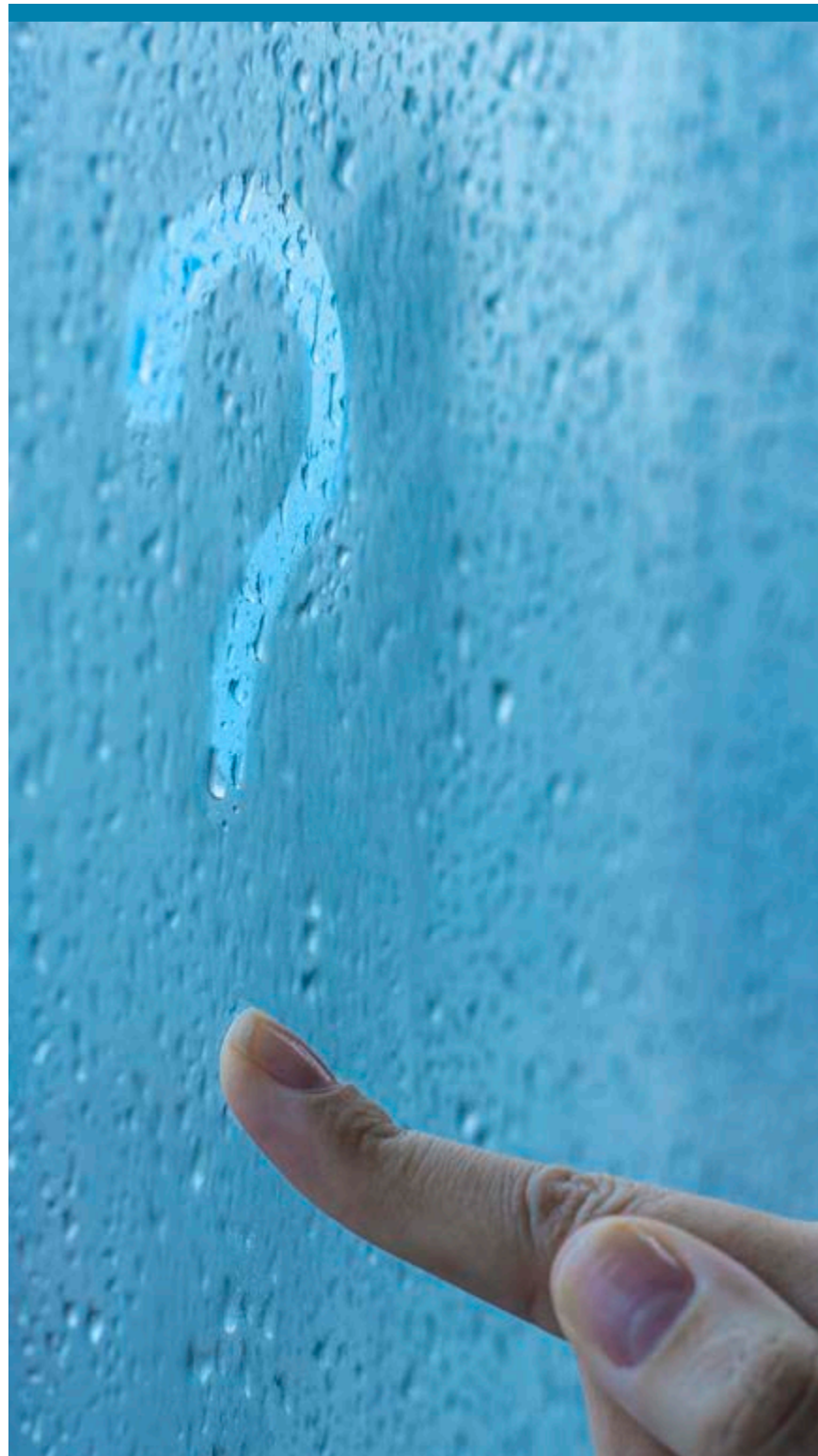
“More than sensors + automation”

JUMO always focuses on the application as a whole and would be pleased to advise customers on ways to ensure sustainable production.

**Webinar recording**Introduction to humidity measurement –
basic principles and measurement methods

Relative and absolute

Practical knowledge about humidity measurement



”

*Many processes
are only successful
if a defined humidity
is maintained.*

Many processes require humidity measurements. For example, the determination takes place in drying processes, in paint shops, or even in the indoor air.

Along with temperature, humidity is an important process variable. For example, the relative humidity of an environment has a major effect on our sense of well-being and state of health. Also, a correctly adjusted humidity level can contribute to considerable savings in energy consumption. The list of applications in which air humidity measurements are important could go on forever. Continuous monitoring of the air humidity is highly relevant wherever chemical, physical, or biological processes are caused or affected by the content of water vapor in the air.

The composition of the air

In addition to small amounts of neon, helium, krypton, and xenon, clean, dry air is made up of the following:
**78.10 % vol. nitrogen, 20.93 % vol. oxygen,
0.93 % vol. argon, 0.03 % vol. carbon dioxide, and
0.01 % vol. hydrogen.**

Other than these components, the ambient and outside air also contains a number of gaseous and solid substances as well as a certain amount of moisture in the form of water vapor. The air is, therefore, a homogenous mixture of different gases and water vapor.

Relative humidity and the most important derived variables

Relative humidity

The air's ability to absorb humidity increases as the temperature rises. The humidity level is always determined by measuring the relative humidity, which describes the ratio of the humidity present in the air relative to the maximum possible humidity. All other measurands are derived from the relative humidity and the temperature by the measuring probe.

Dew point temperature

A very low humidity content is expressed by the dew point temperature. This is the temperature at which condensation would form in the air.

Absolute humidity

Absolute humidity describes the number of grams of water contained in one cubic meter of air. It is influenced by changes to the process pressure.

Mixing ratio

For this reason the mixing ratio is calculated in drying processes. It is independent of the temperature as well as pressure and describes the mass of water vapor relative to the mass of the dry gas. In addition to the temperature, the humidity measuring probes must also have the information about the process pressure.

The measurement methods

Capacitive humidity measurement method

See also product picture 1

In most cases, capacitive humidity measurement methods are used to measure the level of humidity. The sensor technology essentially comprises a capacitor, whose dielectric takes in or gives off humidity depending on the humidity of the ambient air. The humidity content influences the dielectric constant of the polymer material and thereby the capacitance of the capacitor. The downstream electronics use this measured capacitance to calculate the relative humidity with a high level of accuracy. This principle works well for most applications. However, only special devices can be used in areas with high humidity. In these devices, the area underneath the sensor cap is heated up, reducing the relative humidity and enabling a reliable measurement. In contaminated media, the ingress of dirt particles is counteracted by the use of sinter filters, which protect the sensitive sensor technology.

Hygrometric humidity measurement method

See also product picture 2

In areas of high humidity or if the air is contaminated, the hygrometric humidity measurement method can provide the right solution. The method involves a fiber whose length is influenced by the level of humidity. A special transfer system transmits the change in the length to an indicator or potentiometer. →

The systems only calculate the relative humidity and no derived variables. The measurement technology does not require a voltage supply and is suitable for cost-effective mounting of hygrometers. The use case is restricted to a temperature range of -40 to +80 °C and a humidity range of 35 to 100 % RH.

Psychrometric humidity measurement method

See also product picture 3

In contaminated or aggressive air, the measurement can be taken in a temperature range of 5 to 95 °C using the psychrometric humidity measurement method. In

the psychrometer, a thermometer is directly exposed to the ambient air and measures the so-called dry-bulb temperature. A second thermometer is enclosed by a suction wick soaked in water, which measures the wet-bulb temperature. At the humidity probe, heat is extracted due to evaporation and a lower equilibrium temperature occurs. The difference between the 2 temperatures is called the psychrometric difference – the drier the air, the larger the difference. The 2 RTD temperature probes are connected to an evaluation unit, which calculates the relative humidity based on the dry-bulb temperature and the

psychrometric difference. This measurement technology is extremely robust and provides good measuring accuracy in the low to medium measuring ranges. However, it is inaccurate in the high humidity range, where hardly any cooling occurs. The installation work is relatively complex as a fan is often required on account of the defined air flow. Additionally, the system needs to be maintained. For example the water level needs to be monitored and the suction wick replaced.

“Humidification and dehumidification always require a lot of energy. Effective and efficient measurement technology can help to save energy.”

Manfred Schleicher

Trainer

Sensor and automation technology



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1 Capacitive humidity measuring probe for calculating the relative humidity and derived variables using intelligent replaceable probes

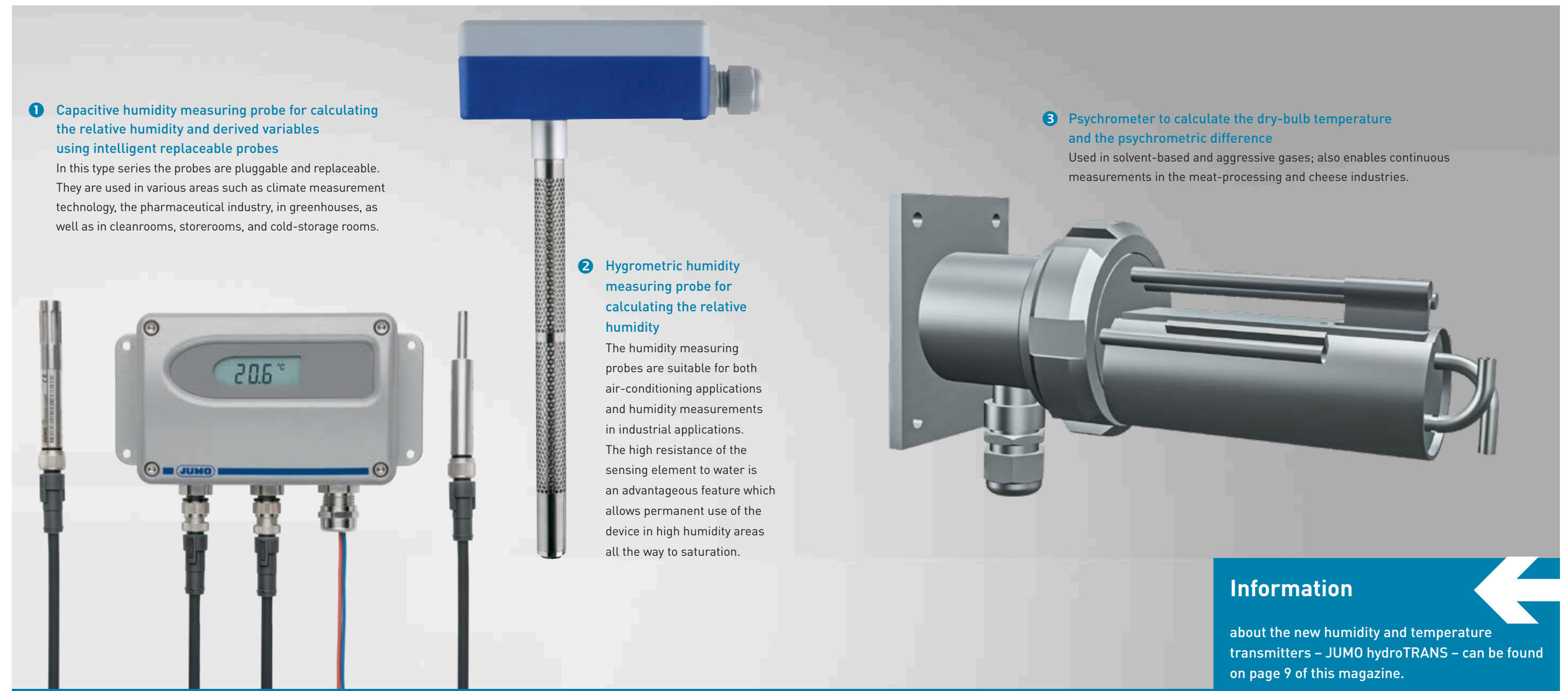
In this type series the probes are pluggable and replaceable. They are used in various areas such as climate measurement technology, the pharmaceutical industry, in greenhouses, as well as in cleanrooms, storerooms, and cold-storage rooms.

2 Hygrometric humidity measuring probe for calculating the relative humidity

The humidity measuring probes are suitable for both air-conditioning applications and humidity measurements in industrial applications. The high resistance of the sensing element to water is an advantageous feature which allows permanent use of the device in high humidity areas all the way to saturation.

3 Psychrometer to calculate the dry-bulb temperature and the psychrometric difference

Used in solvent-based and aggressive gases; also enables continuous measurements in the meat-processing and cheese industries.



Information

about the new humidity and temperature transmitters – JUMO hydroTRANS – can be found on page 9 of this magazine.

JUMO is taking action –

With its products and solutions, JUMO helps to drive forward sustainability in many industries across the globe. However, its own sustainability credentials as a company are also repeatedly put to the test and analyzed. For example, it is subject to an annual energy report which compiles the results of the company's internal energy management system. The good news is that JUMO's production processes do not use a lot of energy – in fact, energy costs as a proportion of turnover only amount to around 1 %. In energy-intensive industries, this figure can be more than 10 %.

For some time now, JUMO has been pursuing the strategic goal of cutting CO₂ emissions in its production processes and related areas, and has successfully managed to reduce them on a sustained basis over the past few years. Whereas the CO₂ emissions at the company's headquarters in Fulda were around 6000 metric tons in 2013, by 2020 they had fallen by over 30 %, to just under 4000 metric tons. Firstly, this is due to the fact that investments in the Production department have looked closely at the energy consumption of the new machines and plants. Secondly, a major factor has been the company's purchase of green electricity from the regional energy supplier. This reduction in CO₂ emissions, teamed with an increase in production units, has resulted in CO₂ savings of around 14 % for 2020 alone.

Alternative energies

Another way in which the company is reducing its CO₂ footprint is to use alternative energy generated by JUMO itself. A photovoltaic power plant was started up on the building roof in Fulda as early as 2014. 416 collectors covering a total area of 677 square meters collect the sun's energy and convert it into power for the company to use. Its power output of 100 kW is sufficient to power 25 single-family homes. Furthermore, 2 combined heat and power plants with a total power output of 90 kWel contribute to a sustainable energy supply.

Establishing a “greener” company, step by step

These measures all form part of JUMO's overarching strategy, intended to target and counteract the massive increase in energy costs while simultaneously helping to ensure sustainable development. This starts with the replacement of conventional light bulbs with modern LED technology and does not end with reviewing the energy performance of the air conditioning and room ventilation technology. The company's plans to build a new, additional production hall at its headquarters in Fulda are also heavily influenced by the need to ensure sustainable construction and reduce CO₂ emissions.

focusing on our own CO₂ footprint

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Editorial comment:

For JUMO, a key part of sustainability is conserving resources wherever possible. This mindset applies to everything we do as a company. We have therefore decided that our "Sensors + Automation" customer magazine will now be published digitally for the most part, starting with this issue. Only a small number of printed copies will be retained for use at trade fairs and similar events.

The aim is to actively reduce our CO₂ footprint.

If you would like to receive a printed copy, simply send an email to:

pressestelle@jumo.net.

If you would prefer to read our magazine online from now on, simply register at

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