2/2025

SYSTEMS + SOLUTIONS

SENSILO – THE HEART OF PRECISION

↗ THE FUTURE BEGINS HERE:
High-tech sensor production at the new JUMO plant – focus on production expertise, quality, and sustainability

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COMPANY I SERVICES

To improve readability, gender-neutral language has been used throughout this text. 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,

Energy moves us – both in the tangible and figurative sense. Without energy, literally nothing functions in our modern world. Machines stop, production halts, and progress comes to a standstill. Today we face the challenge of ensuring that energy is not only available, but also sustainable and efficient.

With over 75 years of experience in sensor and automation technology, we know that innovation is key for the future – as is responsibility. That's why we are rethinking energy. It is not only our technological solutions that are at the heart of our approach, but, above all, our holistic understanding of efficiency, climate protection, and economic efficiency.

In addition to our new EMAS certification, our new SENSILO plant at our Fulda site is a particularly visible sign of this focus. It is not only a milestone in our production, but also a clear expression of our approach: energy-efficient, digital, and sustainable. State-of-the-art building technology, networked production, and resource-efficient processes demonstrate how sustainable industrial production can be achieved today.

In this edition of our customer magazine, we would like to take you on a journey through the world of JUMO solutions to ensure an energy-efficient future. You will find out how our systems help to make energy flows transparent, minimize losses, and control processes more intelligently in a wide variety of industries. We're committed to shaping the energy transition across industries – from food and beverage to water and energy production – by working closely with our partners and customers to deliver intelligent, sustainable solutions that stand the test of time. After all, real energy is only created when people and technology are in motion.

We hope you enjoy the latest edition of our customer magazine.

Dimitrios Charisiadis

Dimitrios Charisiadis
Chief Executive Officer

Steffen Hoßfeld

Dr. Steffen Hoßfeld
Chief Operating Officer

JUMO is expanding its market position with its state-of-the-art SENSILO plant

The grand opening of the new JUMO plant in the Fulda-West industrial plant took place in May 2025. This project, backed by an investment of approximately 50 million euro, is the largest in the history of the JUMO corporate group. With more than 75 years of experience in measurement and control technology, JUMO, as a system and solution provider for sensor and automation technology, is focused on a long-term growth strategy.

The innovative energy management system is geared toward sustainable building technology while also playing a role in reducing energy costs and protecting the environment. JUMO has completely stopped using fossil fuels at the new site in the Fulda-West Technology Park by using geothermal energy and photovoltaic energy instead. Driving forces behind this energy management system for technology include in-house JUMO systems and solutions as well as the automation and digitization specialists from JUMO Engineering. The quality and long life cycle of JUMO solutions offer decisive added value for many companies.

Top quality – "Made by JUMO" for over 75 years!

After more than a year of in-depth planning and a construction period of over a year and a half, the first machines and plants were brought from the head office in Moritz-Juchheim-Straße in Fulda to the state-of-the-art SENSILO plant and connected in November 2024. This move marked an important milestone in ensuring the quality promise "Made in Germany, made by JUMO". Production of pressure and temperature sensors is made even more efficient in the new plant. The first complex, interlinked production line for pressure sensors was moved last November and also given a capacity upgrade to meet the increasing market requirements.

Precise planning for a seamless process

Moving the machines was a highly complex undertaking. Each detail – from the plants' climatic conditions to parallel production – was planned in precise detail. Pre-production

and downtimes were carefully coordinated to ensure delivery capability.

The seamless transition of employees to the new plant was also ensured. Quality assurance is a top priority, as it is a key part of the entire moving process to ensure top production standards.

At the same time, additional measures have also been taken in the SENSILO plant, including constructing a cleanroom and the final installation of trendsetting building technology. Efficient production relies on effective and sustainable framework conditions.

The successful start of the move is proof of the outstanding collaboration between the JUMO team and all its partners. *"The new plant lays the foundation for state-of-the-art and flexible production to secure future growth and expand JUMO's market position,"* states Stefan Reith, who was responsible for the entire construction process as project manager.

The entire project, from the groundbreaking in March 2023 to completion, was on schedule and within the budget. This is primarily due to the "integrated project delivery" model, in which the contractors are involved in the project right from the start of the planning phase and are judged by the collective success of the project.

Reith states that the project method developed has been able to fully utilize its advantages. *"Our model had the major advantage that the company representatives had already known each other for 12 months before they entered the construction site,"* he adds. The construction and trade companies also had a huge amount of technical knowledge and years of experience. Reith stresses that these are 2 further reasons that construction progressed quickly.

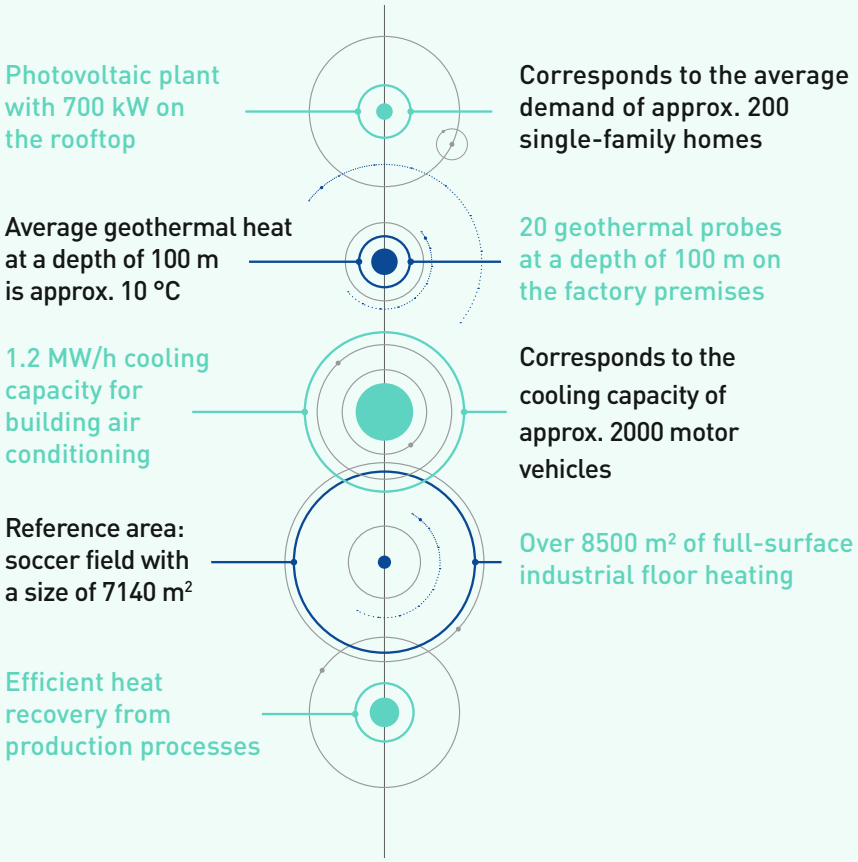
Sustainable energy supply as a model for the future

Heat pumps are now an established technology that is predestined for the requirements of a sensor plant. A heat pump is the core component of the heat and cooling supply in the new production facility.

This system has been supplemented with a generously sized energy storage unit thanks to optimum construction and operation planning. Specifically, this is the sprinkler tank (which was required anyway) with a volume of 1.25 million liters – this corresponds to a capacity of over 8300 bathtubs or half an Olympic-sized swimming pool. Excess process heat or cold air from outdoors can be stored in the sprinkler tank as required. ➜

In summer, the cool night air is used and in winter the heat from production processes is utilized to significantly increase energy efficiency. During production downtimes, energy compensation can be carried out with a geothermal plant. *"This sustainable solution enables optimum energy efficiency and underscores the strong technological focus of the new building,"* states Stefan Steinbeck, plant manager at SENSILO.

An outstanding energy concept sets standards:



This versatile energy concept is achieved through the elimination of fossil fuels. In doing so, JUMO not only significantly reduces its own CO_2 footprint, but also helps its customers to lower costs and emissions through its products and solutions.

Intelligent energy management

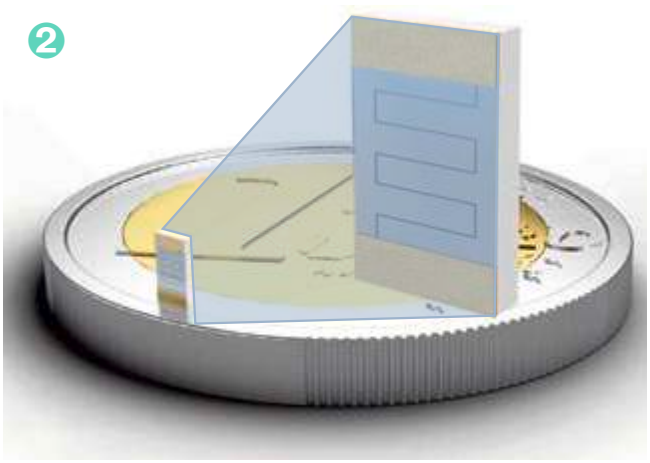
Automation of the cutting-edge energy management system is based on the JUMO variTRON 500 platform. The system can be optimized using artificial intelligence. This advanced solution was developed in close collaboration between the architects, the operator, and the JUMO Engineering team. From the outset, the focus was on maximizing automation and digitization. The JUMO variTRON 500 platform system can be easily expanded and features more than 400 state-of-the-art digital sensors from the JUMO product portfolio. Acquired data is transferred to the JUMO smartWARE SCADA in encrypted form and can be called up anywhere in the world.

Thanks to the convenient data access via common web browsers, the SCADA software offers functions for process visualization as well as evaluation and archiving of acquired data. In addition, the SCADA software also supports manufacturing and work processes with valuable monitoring, alarm, and planning functions. Furthermore, the energy distribution system can be optimized independently through AI-supported analyses. The responsible parties receive access to the prepared data at any time and can tackle predictive optimization even more effectively.

Highly precise production in a cleanroom

A high-tech cleanroom has been set up in the new production hall – a building within a building. Integrating state-of-the-art cleanroom technology was particularly challenging. Extremely small temperatures sensors with dimensions of just 1 × 2 mm and highly precise pressure sensors are produced here. The sensors have to be produced under extremely controlled conditions to reduce temperature deviation to a minimum.

SENSILO is a milestone in the future of JUMO. The plant combines innovative technologies with sustainable energy efficiency while creating the perfect conditions for further growth and a stronger market position. ■



Numbers | Data | Facts

Production in the plant:	temperature and pressure sensors
Total area of the building:	approx. 13 000 m²
Production and logistics area:	approx. 10 000 m²
Building dimensions:	approx. 135 × 650 × 8 m
Plot size:	approx. 100 000 m²

❶ + ❷ *Intricate temperature and pressure sensors are manufactured in the new SENSILO plant. This requires the highest precision and quality.*

❸ + ❹ *Numerous JUMO products and solutions are installed in the SENSILO plant: among others, JUMO hydroTRANS and JUMO variTRON 500 contribute to energy efficiency and safety.*

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SENSILO opening: multi-million investment in the sustainability of the JUMO Group

JUMO opened its new SENSILO plant in the Fulda-West Technology Park in Rodges, Germany, at the end of May 2025. In addition to the Juchheim family, representatives from politics, business, and public administration as well as numerous customers, partners, honored guests, and employees gathered for the ceremonial opening.

"The opening of the SENSILO plant marks more than just the completion of a construction project. We are making a statement – for our continued development, for securing our location, and for our corporate future. SENSILO stands for what defines JUMO: the drive to move things forward, the ability to bring generations together, and the ambition not just to serve markets with our technology, but to create solutions that truly make a difference," said JUMO General Partner Bernhard Juchheim.

Production and logistics area of around 10 000 m²

The new SENSILO plant for the production of temperature and pressure sensors has a production and logistics area of approximately 10 000 m². JUMO sees great potential here in the coming years. At a cost of approximately 50 million euro, the new facility is the largest investment in JUMO's history. In addition, investments of approximately 21 million euro will be made in machinery and plants by 2027.

"The plant is a multi-million investment in the future of the corporate group as well as a commitment to the Fulda economic region and, above all, to our customers," emphasized Chief Executive Officer Dr. Steffen Hoßfeld. He expressly thanked the city of Fulda as well as the district of Fulda.

"The cooperation with the authorities was consistently solution-oriented, unbureaucratic, and cooperative. That was a great help and played a key role in enabling us to complete this project so quickly," said Hoßfeld.

Fulda's mayor, Dr. Heiko Wingenfeld, echoed the sentiment and added: *"This investment by JUMO – as a company with a long tradition from the Fulda area – is a clear commitment to Fulda as a business location and to the Fulda-West Technology Park. This entire region benefits from such strong medium-sized companies. The new facility allows the company to lay a solid foundation for future growth, as measurement and control technology is a key driver of tomorrow's innovations."*

Integrated project management as the basis for success

Project Manager Stefan Reith attributed the success of completing the new facility entirely within the planned time and budget to the integrated project management approach. With this method, all parties involved – including construction and trade contractors – are brought on board early in the planning process. The focus is firmly on the team mindset.

Reith thanked architect Marco Schlothauer (Erfurt) as well as JUMO's general partners, JUMO management, the JUMO workers' council, and all employees for their support. By appointing Stefan Steinbeck as the new SENSILO plant manager, the company has secured an experienced production specialist who is set to lead the plant with strategic focus into a successful future. ■

JUMO General Partner Bernhard Juchheim during his welcoming speech

❶ *With the traditional ribbon cutting by Stefan Reith, Dr. Steffen Hoßfeld, Dr. Heiko Wingenfeld, Bernhard Juchheim, Brigitte Juchheim, Bernd Woide, Dimitrios Charisiadis and Stefan Steinbeck (from left to right) the new SENSILO plant was officially opened.*

❷ *Pressure and temperature sensors are manufactured in the SENSILO plant.*

❸ *There is still a demand for qualified professionals to support the projects in SENSILO.*

Measurement and control technology is a central future technology

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Precise control of diverse measurands: JUMO diraTRON DR100

An important tool in process control

The universal JUMO diraTRON DR100 DIN rail controller enables precise control of various measurands.

This device can be adapted to different process requirements with configurable measurement inputs and control options as a two-point, three-point, modulating, or continuous controller.
An analog output for controller, actual value, or setpoint output as well as 2 digital control signals for such uses as implementing simple logic functions or delayed switching on and off ensure a wide range of application possibilities. The integrated RS485 interface enables seamless communication with other systems and ensures easy integration into existing networks.
All relevant information is clearly displayed on the text display. The rear panel bus enables quick and easy installation of up to 10 devices while at the same time reducing the amount of cabling required.
In summary, the JUMO diraTRON DR100 stands out due to its versatility and user-friendliness, which makes it attractive for a wide range of industries and applications.

The JUMO diraTRON DR100 in the control cabinet

"The customer benefits from 2 key advantages. The first is that integration into existing systems is easy. The second is that the JUMO diraTRON DR100 is compatible with numerous other systems," explains Klaus Otto, product manager at JUMO. ■

A display with plain text ensures clear operation and makes the JUMO diraTRON DR100 an important tool in process control.

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Tailored solutions for modern thermal processes: JUMO TYA series

JUMO thyristor controllers with comprehensive certifications

JUMO presents its new, innovative series of thyristor controllers: JUMO TYA HL301, JUMO TYA HL302, and JUMO TYA HL303. These powerful devices set new standards in the control of modern thermal processes while offering a wide range of functions for maximum efficiency and process reliability. This new series covers a current range from 300 to 800 A.

The JUMO TYA series is designed for different mains voltages up to 690 V and features well-thought-out top-bottom wiring, which ensures easy installation and a high degree of operational safety. An optional, intelligent load management system effectively reduces current peaks and, as a result, lowers operating costs. The integrated load current monitoring contributes significantly to process reliability and dependably detects defective heating elements.

JUMO TYA HL301 is a 1-phase thyristor controller that has been specifically developed for non-linear loads. *"The integrated data logging function and an oscilloscope for visualizing the output voltage greatly simplify configuration as well as startup and provide valuable insights into the process,"* emphasizes product manager Andreas Kraus.

JUMO TYA HL302 is a 3-phase thyristor controller in economy circuit and the ideal solution for demanding thermal processes.

The 3-phase **JUMO TYA HL303** completes the series. Its compact design and efficient wiring make it the ideal choice for use in thermoprocess technology and renewable energy fields.

A significant advantage of the JUMO TYA series is its comprehensive certification. Devices up to 700 A are certified according to cUL 508 while 800 A types are certified according to UL, which allows them to be used in the important American market. *"These certifications underscore our commitment to the highest quality standards and open up important growth opportunities in our focus industries,"* explains Andreas Kraus. JUMO is taking another important step towards sustainable and efficient solutions for industrial applications with this new product series. ■

The JUMO TYA HL301 (left) and JUMO TYA HL302 (right) from the 3 series are innovative thyristor controllers that are easy to install and offer a high level of process reliability.

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Effective preventative measures against power outages

Electric current is a fundamental element for prosperity, security, and quality of life

Electric current creates warmth and light, enables communication, and provides mobility. It is vital in areas where human lives depend on a reliable power supply. Measures are therefore taken in certain industries to keep the risk of outages as low as possible. These include both rotating and static uninterruptible power supply (UPS) systems, which are used to bridge power outages. Piller Group GmbH, a renowned supplier of UPS systems, has experienced steadily growing demand, with over 7000 installed kinetic energy storage systems and more than 6000 rotary UPS units in operation.

Task

Piller Group GmbH owns 7 chamber furnaces at the Osterode site, which had already been in use for several years so that it required modernization. The control cabinets and their components were to be replaced and equipped with a new control system capable of operating both as a program controller and a controller in continuous mode. In addition, frequency converters, safety temperature limiters, and control cabinets had to be replaced. In the wake of modernization, the operation was to be centralized and clearly arranged at the same time.

Solution approach

After a detailed analysis by JUMO Engineering, an individual solution was developed and implemented in close cooperation between Piller Group, JUMO, and MAGG Elektroanlagen GmbH (a JUMO system partner). Plant control and automation is provided by the powerful JUMO variTRON 500, which is used to ensure plant self-sufficiency for a system of 2 furnaces. A total of 4 systems were implemented. The JUMO smartWARE Evaluation software handles the recording and visualization of data.
A JUMO safety temperature limiter was also installed for each furnace to increase plant safety.

MAGG Elektroanlagen GmbH was responsible for the schematic design, the planning, and the construction of the new control cabinet. It took care of installing the frequency converters, the JUMO variTRON 500 with all inputs and outputs, the operating panel, and the safety technology in the form of safety temperature limiters. Similarly, MAGG Elektroanlagen GmbH was the contact for the delivery, setup, and cabling of the plant.
This way, any malfunctions that occur can be detected at an early stage so that adequate countermeasures can be taken. These include shutting down parts of the plant or alerting technical personnel. ■

The new complete plant

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Successful digitization in the boiler house:

How ICCT is shaping the hospital of tomorrow with JUMO

The Texas Health Harris Methodist hospital in Fort Worth, Texas.

In an age in which automation, energy efficiency, and digitization are becoming increasingly important factors for industrial processes, innovative companies are showing how existing plants can be made sustainable. An outstanding example of this is provided by the Texan company Intelligent Combustion Control Technology (ICCT), which specializes in the maintenance, modernization, and automation of industrial boiler plants – with a strong partner by its side: JUMO.

A family company with vision

Jörg Bollgen, founder and owner of ICCT, has had a career in measurement and control technology spanning several decades – starting in Germany near Weishaupt, he is now a successful entrepreneur in the USA. His aim is ambitious: to completely digitize boiler houses so that they can be operated not only more efficiently, but also more safely and with lower maintenance.

"Our vision is a modular, scalable complete solution for the boiler house," explains Bollgen. *"From pump sequencing and level control to burner sequencing – everything from a single source. That's why we need a system that is flexible, reliable, and open for expansions."*

First project: Automated pump sequencing in a Texas hospital

This collaboration with JUMO started with a hospital project in Fort Worth, Texas. Here, manual control of a feed water tank was replaced by an automated system. *"Previously, a technician had to manually replace the pumps, which was inefficient and prone to errors,"* Bollgen recalls.

JUMO variTRON 500 touch was used – a modular automation node which not only controls the pump sequencing, but also regulates the level via differential pressure measurement. The system is designed to balance the pump runtimes and activate additional pumps as required – completely automatically.

Efficiency and reliability – even during emergency operation

Fail-safe operation is essential in a hospital environment in particular. *"The system automatically detects when demand is increased – for example during increased steam consumption in the emergency department – and activates additional pumps,"* states Bollgen. Constant pressure and temperature conditions are ensured thanks to intelligent control around the clock.

What's the feedback from customers? *"Excitement,"* as Bollgen puts it. *"They no longer have to take care of anything. The system runs reliably, relieves the workload on staff, and saves energy in the long term."*

Second project: Scaling to an entire boiler house

The successful prototype was followed by a larger order for controlling a total of 4 tanks (feed water and condensate) including pump speed, based on the current pressure. JUMO variTRON takes on all control functions here, with flow and temperature measurements also being integrated. The next steps are already being planned – including the implementation of burner sequencing. ➜

Digitization for extremely high safety demands

One particularly exciting customer is the US Department of Veterans Affairs, which operates over 300 hospitals in the USA. Its requirements are extremely high and include complete control, detailed data acquisition (e.g. gas, water, and steam flow) as well as integration in a secure SCADA system.

"This is where the JUMO range of products really comes into its own," stresses Bollgen. *"From the sensor and control system to the cloud – everything from a single source."* The option of visualizing, analyzing, and centrally storing data with JUMO smartWARE SCADA and JUMO Cloud creates added value for applications such as predictive maintenance or energy controlling.

Challenge: Boosting recognition in the USA

While JUMO products impress on a technical level, Bollgen identifies a persistent gap yet to be addressed: "*The JUMO brand is still relatively unknown in the USA.*" Many plants already contain JUMO components such as safety thermostats, yet barely anyone knows the name behind them. The aim is therefore to make the company more visible with successful reference projects.

A strong team across continents

The partnership between staff is also another reason for the success of the collaboration. *"I am not a programmer, but I have an amazing team of JUMO technicians in Syracuse, NY, and Fulda that supports me,"* states Bollgen. Even though there were minor obstacles in the initial phase, the company is on the best path to a scalable modular system.

Outlook: sustainable solutions for all markets

What started as an individual project has grown to be a scalable solution for various sectors – from hospitals and universities to industrial applications. *"The combination of automation, remote maintenance, SCADA integration, and cloud services makes the system extremely attractive – even for the European market,"* explains Bollgen.

One thing is clear to him: *"If I were to plan a new boiler house today, JUMO would be involved in the project right from the start."*

At the hospital, manual control of a feed water tank was replaced by an automated system.

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Green hydrogen 4.0:

How JUMO sensors with IO-Link play a role in the energy transition

The hydrogen project in Hünfeld-Michelsrombach consists of an electrolyzer, refueling station, and trailer filling station.

In the age of accelerating climate change and the urgent need to transition away from fossil fuels, green hydrogen is gaining more and more importance. As a versatile energy source which is produced exclusively using renewable energies such as wind or solar power, green hydrogen offers a ray of hope when it comes to decarbonizing core sectors such as industry, heavy-duty transport, and energy supply.

Future sustainability

A pioneering hydrogen project consisting of an electrolyzer, a hydrogen refueling station, and a trailer filling station was recently implemented just 10.5 km away from the corporate headquarters of JUMO GmbH & Co. KG in Fulda.

Electrolyzers from FEST – "Made in Germany"

While local renewable energy plants supply green power and the hydrogen refueling station enables emission-free refueling, an electrolyzer takes on a key role: splitting water into hydrogen and oxygen.
As a specialist in innovative electrolyzer technologies, FEST GmbH from Goslar supplies the state-of-the-art PEM electrolyzers (PEM = polymer electrolyte membrane), which are at the heart of hydrogen production. The containerized FEST plants are designed to provide maximum efficiency, safety, and flexibility. Thanks to their modular design, they can be optimally adapted to the site's requirements and enable scalable production – from the pilot application to a large-scale hydrogen hub. FEST not only provides peak "Made in Germany" technological performance, but also offers extensive experience in planning, implementation, and support of complex hydrogen projects. Its expertise enables FEST GmbH to ensure that green hydrogen is produced reliably and cost effectively from renewable power – and therefore lays the foundation for the success of the entire project. ➜

Precise measurement as the basis for efficient hydrogen production

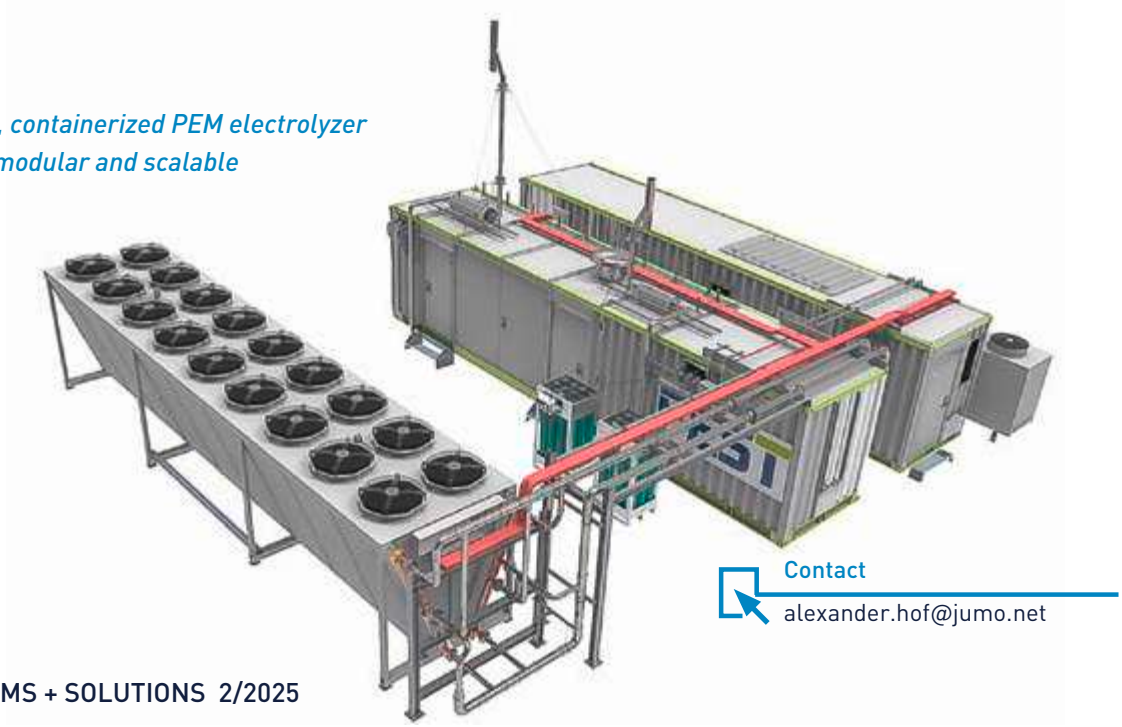
During hydrogen production (electrolysis), water is broken down into hydrogen and oxygen using current – a highly sensitive process during which various process variables need to be monitored precisely. Even extremely small deviations can impair the efficiency of hydrogen production or result in unwanted secondary reactions. For example, a precise measurement ensures that the electrolysis cells always work in an optimum temperature range and are protected against overheating as well as power losses. Continuous checking of conductivity is therefore essential for ensuring the quality of electrolytes and detecting deposits or malfunctions at an early stage. Error-free and stable measured values are therefore essential for making the PEM electrolysis process safe, cost-effective, and sustainable.

IO-Link: smart sensors for maximum process reliability

The advantages of the IO-Link technology become apparent even during the early phases of the project – long before the electrolyzer even produces hydrogen for the first time. When planning and starting up the plant, the digital interface not only saves time, but also reduces complexity. The reasons is that a standardized cable with M12 plug connectors, which transmit both current and digital measured values, is used instead of complex wiring with separate lines for energy and sensor data. This reduces the effort required for wiring by up to 50 % depending on the plant. The startup phase has also been improved as sensors can be parametrized centrally while configurations can be saved and transmitted quickly to other devices as required. This saves time, enables seamless integration in the control environment, and increases flexibility when modifying or expanding the plant.

IO-Link shows its full potential in ongoing operation. The sensors not only deliver precise measured values, but also provide comprehensive diagnosis data in real time. For example, signs of wear or deviations can be identified at an early stage and rectified effectively – a key benefit for process reliability and plant availability. If a sensor needs to be replaced, the system automatically detects the new sensor and adopts the saved parameters so that replacement can be carried out more quickly and with fewer errors. Remote diagnosis and remote maintenance are also made easier thanks to IO-Link: operators and service technicians can access sensor information at any time, without having to be on-site.

The successful history of IO-Link demonstrates that the technology has long become standard in industrial automation. It offers enormous future potential, as IO-Link is becoming a key technology for Industry 4.0 due to its increasing digitization and networking of production facilities. In hydrogen production, IO-Link offers a whole new level of transparency, efficiency, and process reliability – and makes projects such as the electrolyzer in Hünfeld-Michelsrombach ready to meet the challenges of tomorrow. ■



Standardized, containerized PEM electrolyzer from FEST – modular and scalable

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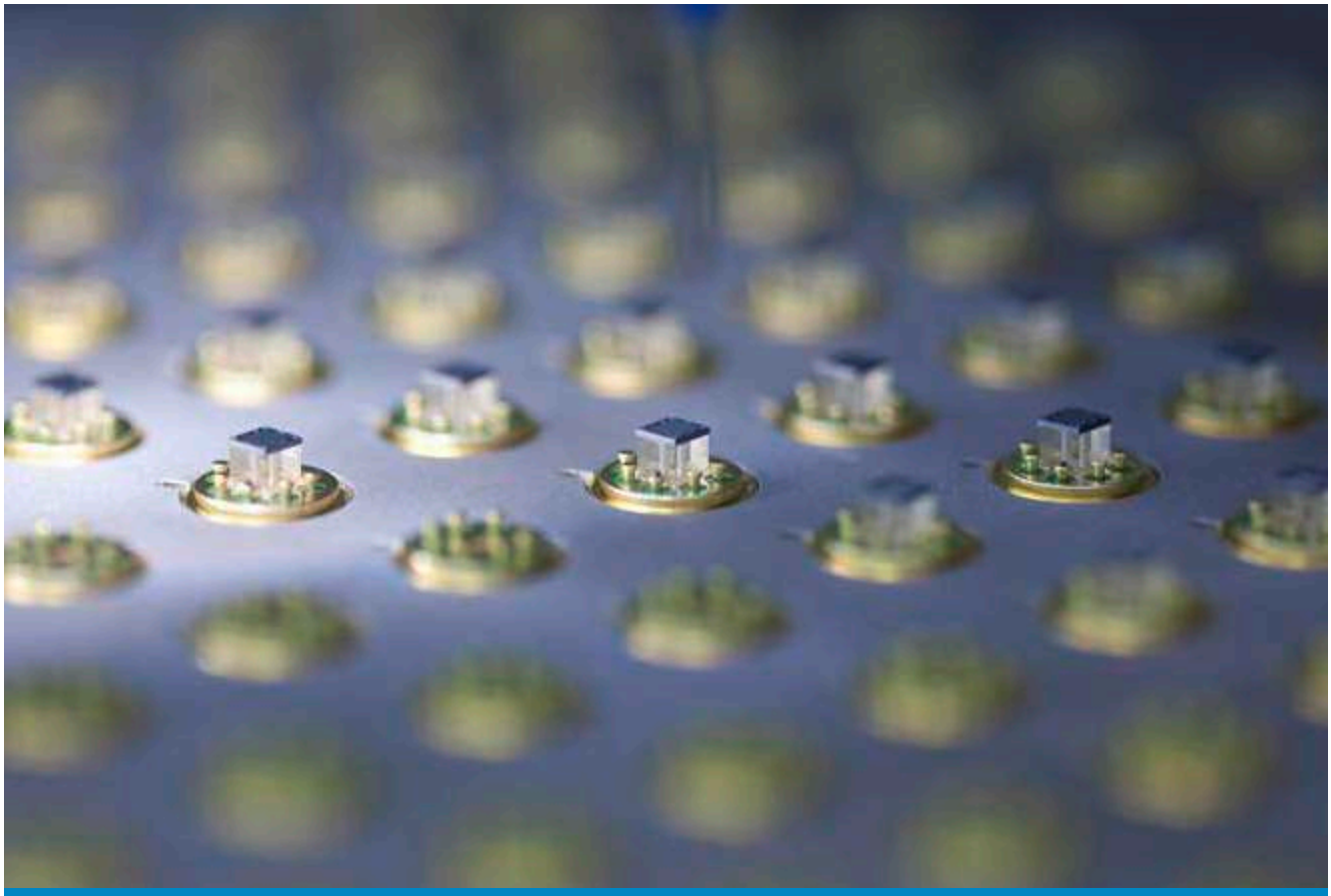
Intelligent pressure sensor technology in water meters

Efficient prevention of water loss and proactive maintenance

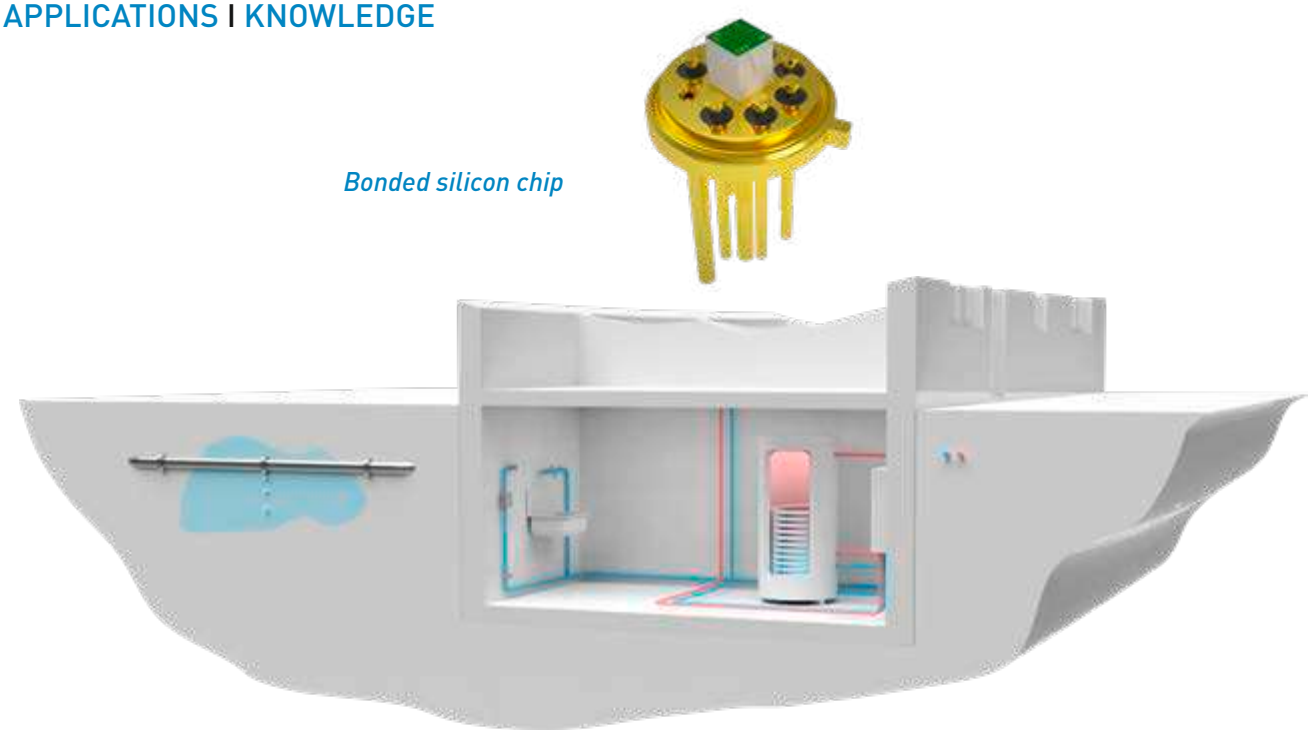


The application of pressure sensor technology in water meters is a central issue for JUMO in the heat meter (metering) focus industry. Extremely delicate technology is required for this purpose.

Drinking water is a valuable resource: around the world, suppliers are struggling with so-called "non-revenue water" – water that is produced but neither consumed nor billed. The causes are leaks, pipe bursts, or inaccurate measurements.

The scale of non-revenue water is alarming, with global losses amounting to around 39 billion USD annually according to expert estimates. Every day, around 346 million liters of drinking water are lost on the way to the consumer, which corresponds to an annual amount of around 126 billion liters. These losses are not just a technical problem, but also result in significant financial losses and waste valuable resources. The proportion of water lost varies significantly depending on the region and condition of the infrastructure – up to 50 % of the water fed in is lost in some areas. The Infrastructure Leakage Index (ILI) is an internationally recognized indicator for evaluating water losses in supply networks, with a high ILI value indicating a need for optimization.

Germany is also affected, with around 92 million m^3 of drinking water being lost annually in Bavaria – around 10 % of the volume supplied. A reason for this is the outdated infrastructure. Many pipes are from the 1960s to 1980s and have exceeded their operating life. The recommended replacement rate from the *Deutsche Verein des Gas- und Wasserfaches* (German Technical and Scientific Association for Gas and Water – DVGW) of 1 to 1.5 % is not being achieved in many places. ➜



Bonded silicon chip

State-of-the-art technologies are therefore crucial. Water meters, which are often already equipped with communication technology, offer new possibilities. The condition of the network and potential leaks can be detected in real time using the integrated pressure sensor technology. This is a clear benefit for suppliers.
In contrast to acoustic leak detection (ALD) – which often has a range under 5 m in the case of PE pipes – pressure sensor technology does not depend on the pipe material. Since polyethylene (PE) is now standard for new installations, pressure measurement offers key benefits here.

The JUMO solution: Pressure measuring cells for smart meters

The JUMO CEROS series allows JUMO to offer robust, digital pressure measuring cells for battery-powered applications. One aspect that is particularly relevant here is that the JUMO CEROS S02 M is made from stainless steel. It is compact, energy-efficient (operation < 1 mA, sleep mode < 50 nA), temperature-compensated, and calibrated. Its vibration and shock resistance as well as digital signature for traceability make it ideal for modern water meters.

Predictive maintenance through precise pressure data

Weak points can be detected before pipes burst by analyzing pressure data using AI. This predictive maintenance saves money, improves planning, and helps to ensure money is invested where it is most needed.

Benefits for suppliers and end customers at a glance:

- **Early leak detection and reduced water losses**
- **Savings thanks to optimized pump control and extended infrastructure operating life**
- **Optimized maintenance thanks to predictive analysis**
- **Increased customer satisfaction thanks to stable supply**
- **Contribution to sustainability by conserving resources**

The application of pressure sensor technology in water meters is a central issue for JUMO. JUMO offers solutions that not only boost efficiency, but also help to operate networks sustainably. ■

Conclusion

Intelligent pressure sensors like the JUMO CEROS S02 M enable water meters to actively contribute to network monitoring and optimization. They enable predictive maintenance, save money, and secure the water supply – both now and in the future.

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Cooler than Superman

How JUMO protects the IT heroes of the future

In a world in which data is the new gold and digital processes are the backbone of the economy, data centers are invisible heroes working in the background. They ensure that companies, authorities, and private individuals can access their information anywhere and at any time. But these heroes are vulnerable – heat is their biggest enemy. Even very small temperature fluctuations or excessively high humidity can result in failures, which are not only expensive, but also put their existence at risk. This is where JUMO comes into play – with innovative solutions that are much more than just technology. They are a shield that safeguards the IT infrastructure of the future.

Climate control and monitoring of data centers: On the safe side with JUMO

The requirements placed on the climate control of data centers have increased significantly over the last few years. State-of-the-art servers operate with ever higher power densities, which results in significant heat development. The demands in terms of energy efficiency and sustainability are also increasing. JUMO is confronting these challenges with a clear industry focus and a wide range of highly precise measurement and control technology. The solutions not only enable safe, but also environmentally friendly and cost-efficient data center operation. *"They act like a superhero's cape, which protects the IT infrastructure against overheating and also enables energy conservation,"* states Nico Müller, Product Manager for Software Products at JUMO. ➜

Tailored solutions for maximum safety and efficiency

JUMO takes a holistic approach: from precise monitoring of the room temperature and humidity and inspection of the cooling water circuits to safeguarding of the water quality – all relevant parameters are continuously acquired, evaluated, and regulated. This means that the fail-safe quality of the servers is not only maximized, but the energy consumption also reduced to a minimum. The close interplay of industry knowledge and innovative technology makes JUMO the ideal partner for cooling and monitoring data centers.

An overview of the most important JUMO products for data center cooling

❶ JUMO TAROS S47 P and ❷ JUMO DELOS S02 – Precise pressure monitoring for maximum operational safety

The JUMO TAROS S47 P and JUMO DELOS S02 pressure transmitters are indispensable parts of any modern cooling system. They reliably monitor the condition and performance of the pump in the cooling circuits. Therefore they ensure the system remains in an optimum working range to keep the operating costs low. Thanks to their high measuring accuracy and robustness, they can also be used in difficult conditions. Additionally, the quick zero point correction facilitates a simpler startup. The devices have various output signals and state-of-the-art interfaces such as SPE (Single Pair Ethernet) so that they can be integrated seamlessly into existing automation systems. A particular highlight is the high long-term stability, which significantly reduces the maintenance requirements and operating costs.

❸ JUMO dTRANS T100 and T1000 – Temperature probe with transmitter for precise cooling control

The temperature probes with integrated JUMO dTRANS T100 and T1000 transmitters enable continuous acquisition of the flow and return temperature in the cooling water system. They are characterized by extraordinary precision and reliability. The devices are available in various design types and can be easily modified to meet the relevant requirements. In addition, fast integration via various interfaces is a major advantage. Precise temperature acquisition enables optimum control of the cooling output, which not only increases server safety, but also minimizes energy consumption.

❹ JUMO hydroTRANS S30 – Humidity and temperature measurement for the perfect indoor climate

The JUMO hydroTRANS is an innovative humidity and temperature transmitter which was developed especially for indoor climate monitoring in sensitive areas such as data centers. It not only measures the relative humidity, but also the temperature extremely accurately. Critical conditions such as condensation or static charge in connection with a PLC can therefore be detected early so that they can be prevented. Easy integration into existing systems and the high level of reliability make the JUMO hydroTRANS the first choice for monitoring indoor climate.

❺ JUMO AQUIS touch S – Intelligent monitoring of water quality

Liquid, non-conductive cooling media are used – whether in a cooling tower or in the event of direct contact or immersion cooling of the server components. Important quality parameters in these media are electrolytic conductivity, pH value, turbidity, and the chlorine or bromine measurement. One ideal solution is a multichannel measurement, control, and recorder device such as the JUMO AQUIS touch S. Matching sensors for seamless operation are also available. All the important parameters can be measured, controlled, and recorded. The addition of biocides to prevent algae formation in the water, the replenishment of fresh water, as well as the regulation of pH and chlorine or bromine levels can all be centrally controlled with this device. The system can be expanded and offers an intuitive user interface, which enables easy configuration and monitoring.

❻ JUMO variTRON – At the heart of automation

The JUMO variTRON automation system is the key interface for controlling and monitoring all measurands in the data center. It enables all sensors and actuators to be integrated and, in conjunction with additional

software, ensures seamless documentation and alerting. The modular architecture enables the system to be customized to meet the relevant requirements and ensures maximum flexibility. JUMO variTRON can be used to implement complex control strategies that improve operational safety and optimize energy efficiency.

Holistic solutions for sustainable success

JUMO not only views itself as a supplier of individual components, but also as a system partner that develops tailored solutions together with its customers. The close collaboration with operators and planners of data centers gives rise to concepts which are precisely tailored to the respective requirements. *"The primary goal is always to maximize operational safety, increase energy efficiency, and minimize environmental impact,"* stresses Michael Wiener, Strategic Product Manager for PLC Systems at JUMO. ■

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Safe operation of biomass plants

An essential component of renewable energy

Particular details must be taken into consideration when storing biomass. Companies should not underestimate risks such as fire hazard.

Biomass, which consists of wood, plant residues, and waste, is an important component of renewable energy and helps to reduce the use of fossil fuels. However, its storage poses a major fire protection risk. Ultimately, biochemical processes can lead to dangerous temperature increases and spontaneous combustion. To ensure the safety of biomass plants and prevent fires, an early detection system for the heating of biofuels is therefore advisable. This is exactly what a large district heating plant in southern Sweden has implemented using innovative JUMO technologies.

Keeping the entire plant's safety in mind

The greatest heat buildup occurs at the core of the biomass due to oxygen supply, biological decomposition, and moisture. That is why early detection of excessive heat buildup is particularly important at that point. Since commercially available thermal imaging cameras are usually limited to acquiring surface temperatures, they often reach their limits when objects are heated in deeper layers. Consequently, an alternative monitoring system is required that alerts the plant user at an early stage in the event of an emergency. That way, countermeasures such as restacking the material with a wheel loader can be implemented. This helps to prevent dangerous spontaneous combustion and ensures the safety of the entire plant.

Comprehensive fire protection solution

This fire protection system for biomass plants was implemented by the JUMO Wtrans B, which is a head transmitter with wireless data transmission. It is available in different standard lengths to suit the size of the biomass stack. The sensor, which can be used either as a lance or in a screw-in version, can be easily inserted

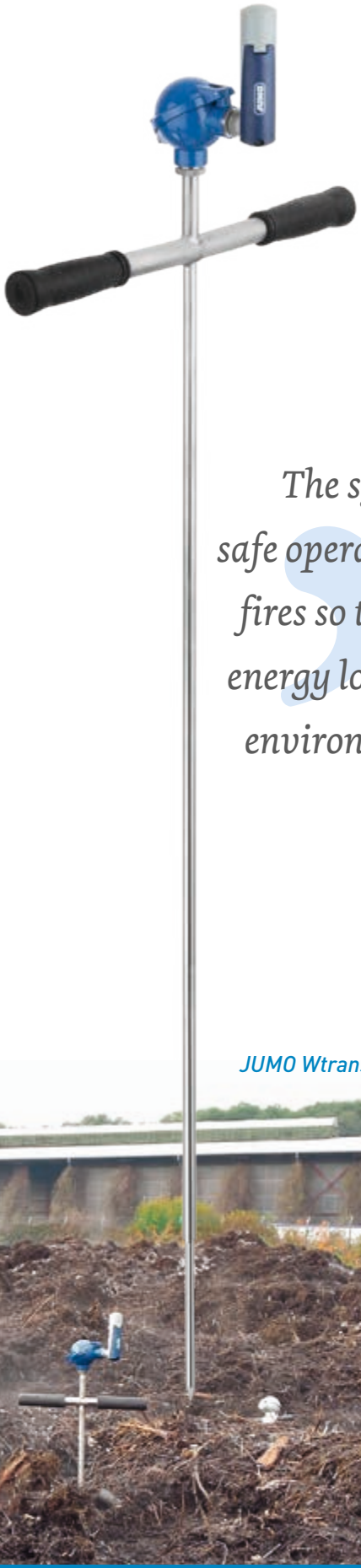
into the core of the stack using its sturdy handle. It is made of stainless steel so that it is resistant to cellulose acids and high temperatures. This feature ensures a long operating life and a high degree of reliability. Customized lengths are available upon request for special requirements.

The signal from the fire protection sensor is transmitted wirelessly and almost interference-free at a radio frequency of 868.4 MHz to the JUMO Wtrans receiver T01, which supports up to 16 sensors. A range of over 2 km can be achieved due to the optimal placement of the antenna and antenna amplifier. Low battery levels are indicated by the receiver at an early stage, so that functional reliability in the monitoring system is always ensured.

Centralized monitoring and evaluation

For large plants that require more than 16 sensors, the receiver can be replaced by the JUMO variTRON 300 modular PLC. It enables the operation of up to 32 sensors and can also be expanded.

The measured values can be transferred directly to the JUMO Cloud or JUMO smartWARE SCADA, thus enabling quick and easy browser-based access to all process data. Even larger biomass plants with numerous stacks can be easily monitored from a central location in a single dashboard. ➜



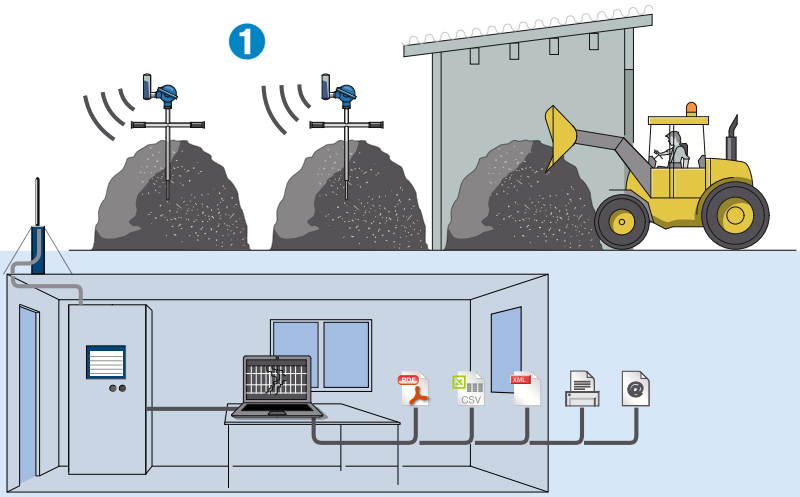
The system ensures safe operation and prevents fires so that it minimizes energy losses and negative environmental impacts.

JUMO Wtrans B in operation

Only through consistently traceable documentation of the indirect process inspection can the produced composts be considered hygienically safe.

Early detection of overheating

The new fire protection system guarantees early detection of overheating in all biomass stacks. These include biofuels (such as wood chips, pellets, and sawdust), agricultural products (such as straw, hay, grain, and peat), and waste from waste centers. The JUMO system ensures safe operation, prevents fires, and thereby minimizes energy losses and negative environmental impacts. Continuous monitoring is made possible by reliable wireless transmission and flexible sensor integration, which supports the sustainable and efficient use of biomass. ■



❶ *A solution was designed for the district heating plant in Sweden in which various systems interact.*
❷ *The measured values can be transferred directly to the JUMO Cloud or JUMO smartWARE SCADA, thus enabling quick and easy browser-based access to all process data.*
❸ *JUMO Wtrans receiver: universal receiver for JUMO wireless measuring probe*
❹ *JUMO Wtrans B: head transmitter with wireless data transmission*
❺ *JUMO PROCESStemp: RTD temperature probe for process technology with Ex approval*
❻ *JUMO Wtrans B transmitter*
❼ *Biomass, which consists of wood, plant residues, and waste, is an important component of renewable energy and helps to reduce the use of fossil fuels.*

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Smart phosphorus recovery:

Smart JUMO technology in use at SF-Soepenberg

Various sensors, which ensure additional safety and accuracy, are installed along the entire recovery process in SF-Soepenberg's plant. Andree Flach (right), Project Manager at SF-Soepenberg GmbH, and Björn Seling, JUMO Sales Representative, are shown in the picture.

The recovery of vital raw materials is becoming a growing priority, not just for environmental reasons, but also due to statutory regulations. A recent example here is the new mobile phosphorous recovery plant from SF-Soepenberg GmbH in Hünxe, Germany. The company makes use of the iPHOS chemical process developed in-house to dissolve iron phosphates from sludge – supported by precise and robust measurement technology from JUMO. The project impressively demonstrates how sustainable environmental technology and modern sensor technology go hand in hand.

Why phosphorous is so valuable

Phosphorous is an essential nutrient for plant growth and therefore a cornerstone of global food production. Since natural phosphorous deposits are limited and also unevenly distributed in geopolitical terms, phosphorous recovery is gaining in importance. Germany's complete reliance on imports creates dependencies. The German Federal Government has responded with a clear demand: the revised *Klärschlammverordnung* (German Sewage Sludge Ordinance) obligates operators of larger sewage treatment plants to recover phosphorous from 2029 onwards, if the sludge's dry substrate contains more than 2 % phosphorous. The aim is to close nutrient loops, relieve the burden on the environment, and safeguard supply in the long term. ➜

The process – mobile, modular, and resource-efficient

The mobile phosphorus recovery plant from SF-Soepenberg is based on an innovative process, which is used on site at the sewage treatment plant – without costly transport or energy-intensive incineration. Thanks to targeted chemical reactions, the phosphorous contained in the sludge is released from poorly soluble iron phosphates and recovered for further use.

Systematic recovery – sustainable and efficient

The process can be broken down into several process steps:

- **Sludge removal:** excess sludge is removed directly from the secondary clarification phase or the digester.
- **Addition of acids:** sulfurous reducing agents lower the pH value, thereby dissolving phosphorous.
- **Reduction phase:** the phosphorous is mobilized into the liquid phase in a mixer or reaction line.
- **Reaction phase:** adding sodium sulfite increases the pH value again. Flocculants then support separation of solids and liquid.
- **Solid/liquid separation:** a belt thickener separates the phosphate-rich filtrate from the solids content.
- **Phosphate precipitation:** in the last step, the dissolved phosphorous is specifically precipitated as struvite or calcium phosphate.

The entire process has been designed so that up to 90 % of the phosphorous contained in sludge can be recovered. This process therefore not only provides environmental benefits, but also significantly reduces disposal costs compared to thermal mono-incineration. At the same time it reduces the carbon footprint thanks to shorter transport routes and lower energy use.

JUMO – measurement technology that makes processes possible

This type of precise chemical process requires reliable and intelligent sensor technology. As a system and solution provider, JUMO not only supplies individual measuring devices, but also offers a holistic concept for process monitoring that is integrated into the process control system of 1 of the 2 truck trailers. Various sensors to ensure additional safety and accuracy, including 2 new products, are installed along the entire recovery process in SF-Soepenberg's plant.

1 JUMO DELOS S02 – the new pressure transmitter

This high-performance pressure transmitter reliably measures the pressure at critical points in the process such as at pumps or in reaction vessels.
The JUMO DELOS S02 impresses with its extremely high measuring accuracy, excellent long-term stability, and intuitive operation via Bluetooth. Its rotating display enables flexible orientation – ideal for confined spaces or varying installation positions. A direct connection to cloud systems is also possible, which helps with easy integration into modern Industry 4.0 environments. The device is therefore perfect for use in challenging conditions and offers maximum process reliability together with a high degree of user-friendliness.

2 JUMO ZELOS C01 LS – the new level switch

Its capacitive measurement method allows the compact JUMO ZELOS C01 LS to reliably detect levels of liquids or other media. It offers a high degree of chemical resistance, flexible installation positions, and modern IO-Link technology for easy integration into digital processes. Parts in contact with the medium are made of PEEK, which ensures excellent resistance to aggressive media. The additional equipment includes a unique auto-calibration function, short-circuit and reverse-polarity protection, as well as a 360° status display according to NE107 as standard features. Communication takes place via IO-Link or PNP, NPN, and push-pull. The sensor is designed for medium temperatures from -40 to +200 °C, depending on the respective version.
Other implemented JUMO components include pH and

As a system and solution provider, JUMO not only supplies individual measuring devices, but also offers a holistic concept for process monitoring that is integrated into the process control system of 1 of the 2 truck trailers.

redox sensors for monitoring the chemical reactions, temperature probes, level sensors, and transmitters for converting signals. As a result, JUMO supplies the key sensor technology for stable and efficient plant operation – coordinated to the individual requirements of the mobile recovery solution. ■

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Conclusion

The innovative phosphorous recovery plant from SF-Soepenberg GmbH demonstrates how a technically demanding challenge can be transformed into an environmentally and economically convincing concept. As a system supplier of precise sensor technology, JUMO paves the way for a safe, modular, and sustainable solution that is aligned with the principles of a sustainable circular economy. The combination of innovative process technology and intelligent sensor technology from JUMO shows what modern environmental technology looks like today – flexible, efficient, digital, and ready for the challenges of tomorrow.

Application of thyristor power controllers

Metallic heating elements in 1-phase operation using the example of the JUMO TYA 201

Thyristor power controllers are used in plants heated with electrical energy. They control the electrical power emitted to heating elements in proportion to the control signal from a temperature controller. The electrical energy is converted into heat in the heating elements.

Thyristor power controllers ❶ work similarly to thyristor switches ❷ by establishing or interrupting the voltage supply to consumers. 2 thyristors are used in both cases. Since the semiconductors can only switch alternating voltage, use is limited to alternating voltage systems. Smaller consumers are generally operated via a single phase, with the actuators usually switching a voltage of AC 230 V at 50 Hz.

Operating modes

For example, thyristor power controllers regulate the power within the range of 0 to 100 %; this is carried out in 2 operating modes. If possible, the actuators should be used in **burst-firing operation**. In this mode, they switch a portion of the mains voltage cycles to the heating elements, while the rest are blocked. If, for example, power of 60 % is required, the power controller switches 3 of 5 mains voltage cycles to the load. ❸

In most cases, metal is used as a heating material in the heating elements. Burst-firing operation is generally very well suited for these elements.

However, there are also heating elements made from ceramic materials, and these are used for temperatures well above 1000 °C. Some of these elements have an extremely low resistance in a cold state, something which necessitates current limiting. To limit the current, the mains voltage has to be switched in every half cycle – this is designated **phase-angle operation**. ❹

In phase-angle operation, the voltage supply is only connected from the control angle α. The power can be controlled by varying this angle (smaller angle = higher power, larger angle = lower power). The load current can only be limited in this operating mode. However, this operating mode generates electromagnetic interference (EMC) and reactive power, which may have to be suppressed through relevant countermeasures. Phase-angle operation is therefore only used where it is actually needed.

Thyristor power controllers face demanding applications in dimensioning and configuration. This especially applies to applications like high-temperature heating elements that are operated via a transformer. However, the process is relatively simple for the metal elements generally used. As an example, this is shown for a 1-phase heating element with a nominal voltage of AC 230 V and a nominal power of 10 kW below. The heating element is operated in a low-voltage network of 3/N/400/AC 230 V.

Dimensioning

The power controllers must be designed for the mains voltage with which they are supplied. This is generally also the nominal voltage of the heating elements. The example load has a nominal voltage of AC 230 V and is operated between the phase and N-conductor via the power controller. This phase voltage is also used for the control electronics which means that the power controller therefore also has to be designed for AC 230 V. ❺

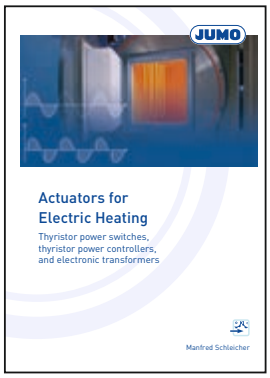
The thyristors have to be able to switch the current flowing through the load. In the example, the load current is 42.73 A (10 000 W/230 V). A power controller with a load current of 50 A is used.

The tables show the available mains voltages and load currents for the power controller series JUMO TYA 201 with the following selection as an example:

Mains voltage	
024	AC 24 V
042	AC 42 V
115	AC 115 V
230	AC 230 V
265	AC 265 V
400	AC 400 V
460	AC 460 V
500	AC 500 V

Load current	
020	AC 20 V
032	AC 32 V
050	AC 50 V
100	AC 100 V
150	AC 150 V
200	AC 200 V
250	AC 250 V

The technical literature "Actuators for Electric Heating" provides practical, helpful tips



Configuration

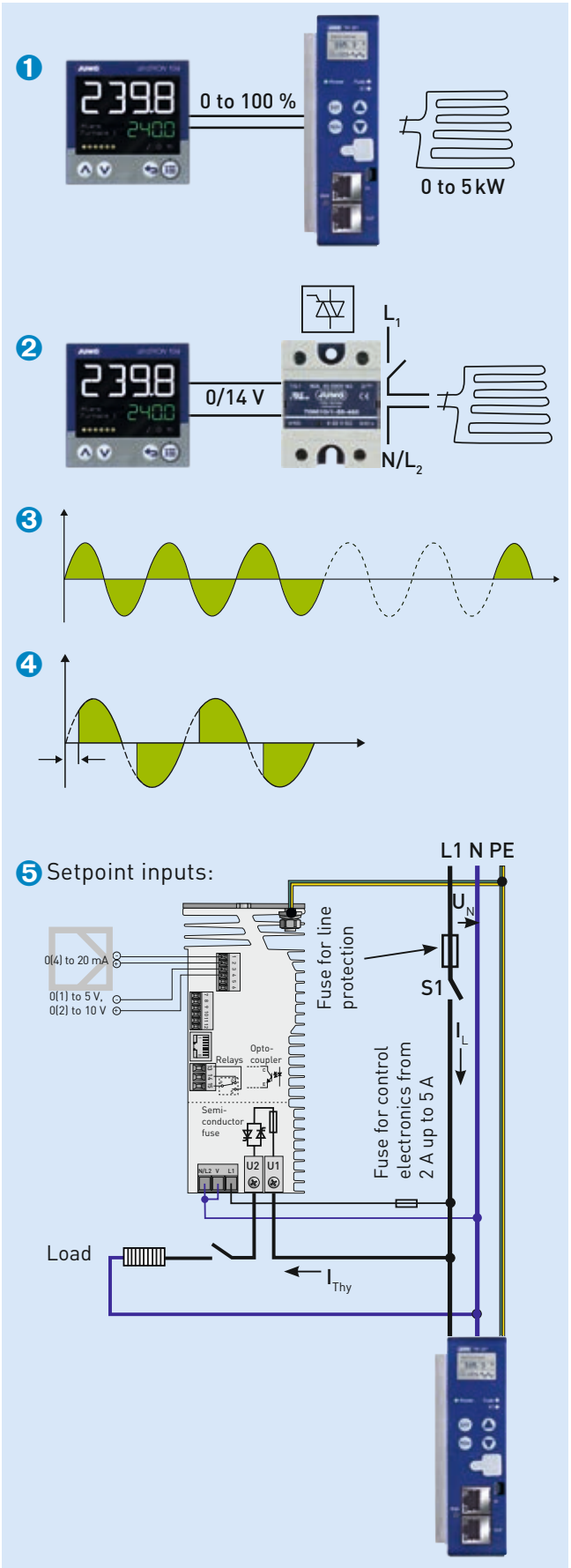
The configuration of the thyristors can be modified via the device front or a configuration program. However, the default settings are generally ideally suited for the metallic heating elements: the power controllers operate in burst-firing operation by default and the subordinate control loop is U_2. They expect a signal of 0 to 20 mA as a setpoint value. A load voltage of AC 230 V is output at an input signal of 20 mA.

Notes on the default settings

The resistance of the metallic heating elements is relatively high in a cold state, but increases slightly as the temperature increases. This means that no current limiting is required and **burst-firing operation** is sufficient. Per default, the thyristors regulate the square of the load voltage proportionally to the input signal. The electric power is the square of the load voltage (U_2) divided by the load resistance. If the load resistance remains the same, the power is proportional to the square of the load voltage and therefore also to the input signal 0 to 20 mA. At an input signal of 20 mA, the **load voltage is AC 230 V** and the mains voltage is permanently connected.

Input signal 0 to 20 mA

As a rule, it makes sense to switch the scaling of the input signal to 4 to 20 mA so that a line break can be detected. The following functionalities may be useful for the use of metallic heating elements:
If a power is requested starting from 0, the thyristors increase the power using an adjustable **soft-start** time when using a soft-start – until the required power is reached.
The thyristors offer the option of partial load break monitoring for parallel-connected heating elements. The thyristor detects a broken heating element and signals an error.
If there are multiple thyristors in a plant, the energy management system ensures that the actuators are not connected at the same time if the power consumption is not too high. This reduces current peaks.
The thyristors also have many configuration options for operating the aforementioned high-temperature elements. Settings can also be made for vibratory drives. ■



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JUMO white paper on thermoprocess technology illustrates current trends

Thermoprocess technology is changing: the new JUMO white paper addresses current trends and demonstrates how innovative technologies, digitization, and sustainable solutions are revolutionizing the industry. Find out how modern industrial furnaces and heat treatment processes are becoming more efficient, environmentally friendly, and digitally networked – and how companies benefit from these advancements.

Click here to request the white paper:
https://jmo.to/whitepaper-us

Want to find out more? Then take a look at our webinar recording with Jörg Bollgen in the JUMO media library at
https://jmo.to/webinar-boiler-room

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A particular highlight is the newly organized **YouTube playlist** on the JUMO variTRON 500 – you can find it at

https://jmo.to/yt

Among other things it includes the video series "Startup of a JUMO variTRON system", which takes you through each step needed to set up the control system – from an introduction to the system, through configuration using JUMO smartWARE Setup and the extension with PLC functionalities via CODESYS, to the recording, evaluation, and provision of process variables in the JUMO Cloud.

Subscribe to the JUMO channel to ensure you won't miss any new videos

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