JUMO

SENSORS + AUTOMATION

Issue 2021

Ultrafast with ultrasonic!

New flowmeters from JUMO

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Dear Reader,

The former CEO of BMW, Eberhard von Kuenheim, made the decisive point that in today's economy, it is no longer large businesses that outcompete small ones, but the fast that beat the slow. Nowadays, there is another aspect to consider as well: businesses which take advantage of digitization overtake those which do not. Digitization has become a driver of innovation, process optimization, and new business models.

The amount of data generated worldwide is currently increasing by around 30 percent per year. A significant proportion of this data consists of measured values that are acquired by sensors and evaluated by superordinate systems. This reality has been at the core of JUMO's business model for decades. We develop high-quality measurement technology for different physical measurands. We also produce the required control and automation technology for processing sensor data.

However, even JUMO has to ensure that this business model is fit for digitization. We achieve this in a number of ways. For example, we are expanding our products' connectivity with wireless technology (JUMO flowTRANS US W, JUMO variTRON 300), developing apps (JUMO meroTRON), and providing software that can intuitively evaluate and visualize process data (JUMO smartWARE Evaluation). By leveraging all these technologies, JUMO Engineering creates solutions for a wide variety of industries.

It is this "complete package" that enables JUMO to remain a reliable partner for customers all over the world as we start this digital age.

You can expect exciting developments from us!

Bernhard Juchheim *Michael Juchheim*
Chief Executive Officers and General Partners

Dimitrios Charisiadis
Chief Executive Officer

Take a look https://bit.ly/3vUvY5a
Seminar
Flow measurement technology
June 07, 2022

Dolphins have evolved to have a highly sophisticated communication system that uses ultrasound.
They communicate with each other to pass on important information and even to tell one another about objects that they have found.

Ultrafast with ultrasonic!

New flowmeters from JUMO

The “flow” measurand is part of the standard values in modern measurement and control technology. As a result, many processes can be implemented depending on the applied measurement medium, the required accuracy, and the process conditions. Traditional methods include using floating bodies, paddlewheels, or turbine meters. Measuring using differential pressure is also a method which has been proven for many years. New developments in this field include ultrasonic, Coriolis, and calorimetric measurement methods.

JUMO already offers devices for flow measurement that operate using differential pressure as well as with the aid of a calorimetric measurement method. Devices for flow measurement that work according to the electromagnetic measurement principle are also offered. All these methods have advantages and disadvantages. For example, given the simple design of the measuring devices, differential pressure is often used for low-viscosity media as well as for gases and steam. However, due to the quadratic correlation between flow and dynamic pressure or measured differential pressure, the measuring dynamics are not as high as in other systems. →

Electromagnetic flowmeters are characterized by very high measuring dynamics and a high measuring accuracy. Further advantages are the extremely low loss of pressure and the absence of mechanically moving parts in the volume flow. As a result, these devices have relatively low wear and low maintenance. However, the medium to be measured requires a minimum conductivity level. Insufficient conductivity may reduce accuracy.

The new flowmeters from JUMO

The new flowmeters from the JUMO flowTRANS US series use ultrasound as a measuring principle. The first ultrasonic flowmeter was invented in 1959 by the Japanese physicist Shigeo Satomura. Ultrasonic flowmeters use sound waves to measure the speed of a flowing medium (e.g. gas or liquid). Essentially, this method differentiates between the Doppler and transit-time principles. JUMO devices work according to the latter.

The operating principle

The transit-time ultrasonic flow measurement is based on the principle that acoustic energy passes both upstream and downstream through a liquid or gas in a pipe, during which time difference is proportionally influenced by the totalized flow rate. Therefore, this method measures the time difference between sending an ultrasonic signal from the first sensor and receiving it at the second, at which point a comparison between the upstream and downstream measurements takes place.

If no medium is flowing, the transit time in each direction will be the same. If medium is flowing, the sound moves more quickly if it moves in the direction of the flow, and more slowly if it moves against it. The difference between the upstream and downstream measurements is used to calculate the flow through the pipe.

The two sensors are permanently installed in a measuring pipe. They become the ultrasonic flow sensor. This results in a compact flowmeter together with the integrated electronic components. These devices prove their worth with high accuracy and a fast response behavior. Another major advantage is that ultrasonic flowmeters require practically no maintenance.

The JUMO flowTRANS US W01

JUMO flowTRANS US W01 also measures precisely in conductive as well as non-conductive media. The device is absolutely wear-free and maintenance-free. The accuracy is ±2 percent of the measured value. Its metal-free housing and the applied plastic pipe in nominal widths ranging from DN 15 to DN 32 allow it to be used in a flexible manner – even when dealing with corrosive media and corrosive environmental influences. The nominal pressures can be up to PN 16, the medium temperature up to 80 °C. With lower accuracy, even measurements at temperatures of up to 95 °C are possible. The flowmeter can be easily integrated into existing plants. The IP65 protection type makes the device a flexible partner for a wide variety of processes.

The JUMO flowTRANS US W02

Other variants of the JUMO flowTRANS US offer a significantly extended functional range. Other than the basic features, they have a display and a Bluetooth interface. The accuracy is ±1 percent of the measured value. In addition, a temperature measurement is always permanently installed in the higher-quality version and the devices can be optionally upgraded with a pressure measurement. What's more, an app for JUMO sensor technology is now in use for the first time. It is also used for other products such as the new controllers from the JUMO meroTRON series.

One variant is available with an IO-Link interface, which also provides standard interfaces. Another version enables the JUMO flowTRANS US W02 to be used together with the JUMO digiLine system, which is a smart sensor network for liquid analysis. ■

"The application options are diverse. They range from water and environmental engineering to the dosing of chemicals."

Dirk Losert

Product Manager for Flow

dirk.losert@jumo.net

Application areas

The application area ranges from small and medium-sized water treatment plants to galvanic plants or pump construction.
Furthermore, the JUMO flowTRANS US W01 is suitable for applications in the field of heating, ventilation, and air-conditioning (e.g. for cooling water circuits or cooling tower technology).

JUMO innovations

5 products for happy practitioners

1 Intuitive evaluation and visualization of process data

JUMO smartWARE Evaluation

JUMO smartWARE Evaluation is a license-based software solution that is now available for the JUMO variTRON automation system, enabling browser-based process data analysis via customizable dashboards. Manipulation detection based on digital certificates ensures a high degree of data security. JUMO smartWARE Evaluation is installed centrally on desktops, local servers, or in the cloud using Docker technology. Once set up, JUMO smartWARE Evaluation enables an unlimited number of users to analyze and visualize up to 1500 signals in a scalable manner.

2 Smart solution for simple automation applications

JUMO variTRON 300

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. Up to 32 wireless JUMO Wtrans sensors can be connected via a wireless gateway for various purposes including measuring temperature or pressure.

3 Modular one-channel/ two-channel controller with PLC function

JUMO meroTRON

The JUMO meroTRON controller takes the concept of the successful JUMO dTRON series into the future with a completely new product. The multifunctional controller impresses with the individual design of its user interface and flexible hardware equipment. This way, analog as well as digital inputs and outputs, counting inputs, and interfaces can be added as required. The controller masters even complex applications with a second control channel, math and logic functions, and the implementation of control functions via ST code. When it comes to communication, the JUMO meroTRON is optimally prepared for future challenges with PROFINET, Ethernet, and RS485 as well as Bluetooth, USB host and device.

4 Electronic transformer for special requirements

JUMO IPC 300

The JUMO IPC 300 is an electronic transformer with amplitude control in the performance range up to 40 kW. Due to the integrated amplitude control, the mains current and the mains voltage of the JUMO IPC 300 are proportional to the required power of the heating element. The acquisition of additional compensation systems is therefore no longer necessary. In addition, the device reduces malfunctions such as flicker or harmonics so that it contributes to higher plant availability. Consistent energy requirements decreases reactive power and current peaks are reduced. This way, the JUMO IPC 300 lowers energy costs.

5 Pressure measurement – now for low-energy applications

JUMO CEROS S02 M and C02 M

The new JUMO pressure measuring cells are active components with integrated signal conditioning that already provide a temperature-compensated and calibrated digital output signal for pressure and temperature values from the moment they leave the factory. They are particularly suitable for low-energy applications. Both a piezoresistive (JUMO CEROS S02 M) and a ceramic thick-film variant (JUMO CEROS C02 M) are available. The very low current consumption and the low energy consumption make them ideal partners for applications with low energy requirements, such as hand-held battery-powered devices. ■

For a clean future

Precise temperature monitoring in fuel cells

Take a look https://bit.ly/3vUvY5a

Seminar
Electrical temperature measurement for practitioners
March 08, 2022 + September 13, 2022

Hydrogen is a key element for the climate-neutral future. JUMO VIBROtemp temperature sensors are used to monitor the temperature in fuel cells.

With over 20 years' experience, Proton Motor Fuel Cell GmbH – an international company based in Puchheim, near Munich – is a recognized expert in cleantech-based energy solutions. With a current workforce of just under 100, the company produces environmentally friendly hydrogen fuel cells and fuel cell hybrid systems for automotive, maritime, and stationary plants as well as for rail services.

Operating principle of fuel cells

Fuel cells can best be compared to the way batteries work. Energy is produced in a chemical reaction between the anode and the cathode. The substances that react together in the fuel cell are hydrogen and oxygen. PEM (polymer electrolyte membrane) technology uses gaseous hydrogen (H_2) as fuel and converts it with oxygen (O_2) from the air to pure water. Electricity and heat are produced by the reaction in the cell.

In contrast to traditional internal combustion engines, coal-fired power plants, and nuclear power plants no poisonous, radioactive, or environmentally harmful by-products are produced or emitted. The only waste product is water. To achieve this, however, only renewable energy must be used to produce the required hydrogen.

The open-circuit voltage of the electrical circuit in the fuel cell is 1.23 V. To produce higher voltages, fuel cells are positioned one behind another, like the batteries in a pocket flashlight, and then "stacked" on top of one another.

Temperature measurement in PEM fuel cell technology

Three temperature probes are required for each fuel cell stack. They are fitted in the so-called media adapter plates. These plates are installed on the PEM fuel cell stacks for media distribution and monitoring. The individual subassemblies are then combined into stack modules.

JUMO measurement technology is in demand when it comes to fuel cell technology

Fuel cell stack module from Proton Motor Fuel Cell GmbH

Two temperature probes are required to indirectly monitor the cooling section. They are responsible for acquiring the temperature of the coolant circuit (forward and reverse flow).

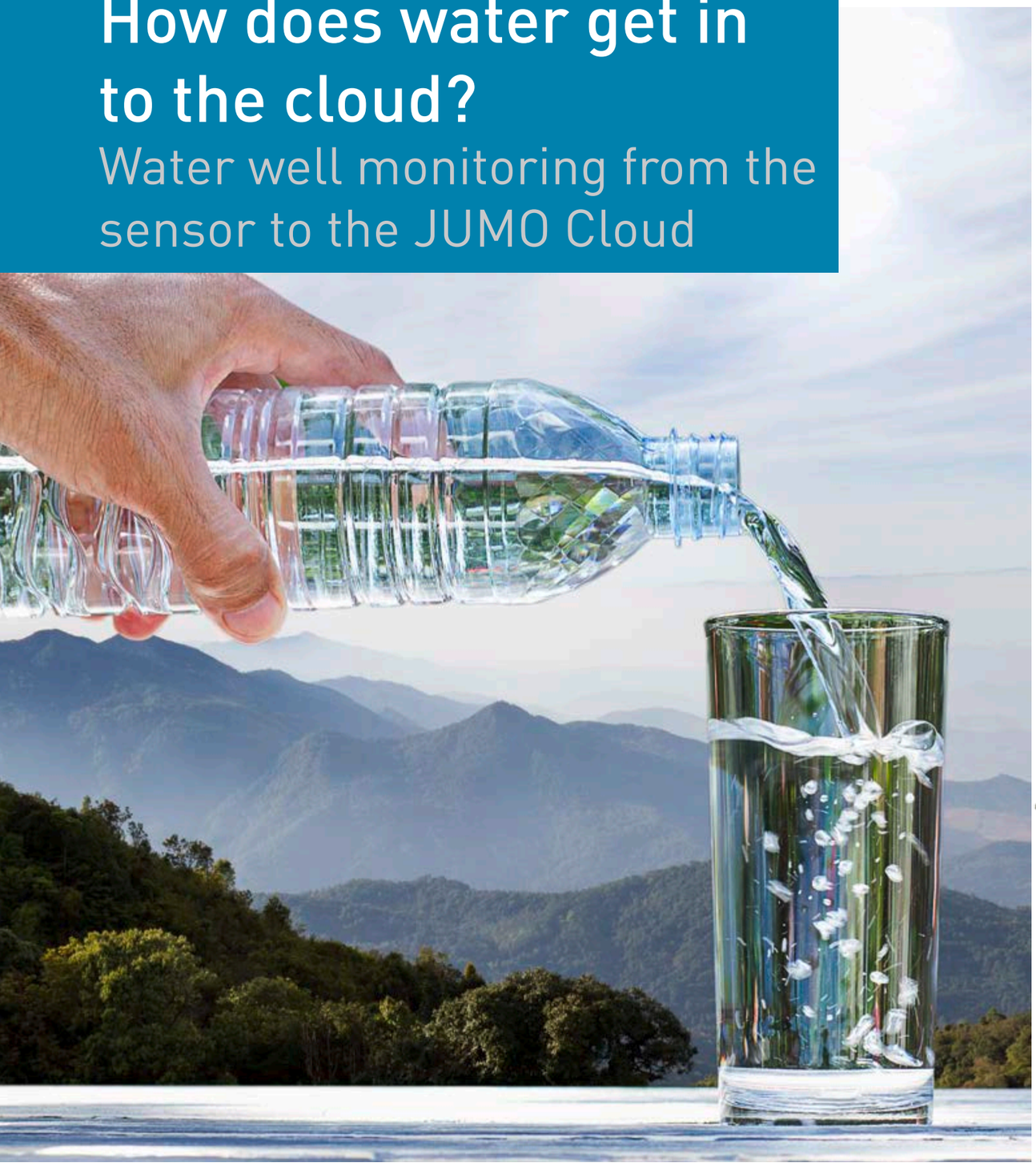
Another JUMO sensor fulfills a safety role. It is positioned in the outlet stream of the stack module's air gap. At that location the sensor acquires the temperature of the reaction air and indicates a stopped coolant flow in the event of overheating.

JUMO VIBROtemp temperature probes are used in the fuel cells from the company Proton Motor Fuel Cell GmbH. These screw-in RTD temperature probes enable temperature measurements in commercial vehicles, construction machinery, agricultural machinery, motors, compressors, and in railway technology. The vibration-resistant structure achieves excellent long-term stability even in tough operating conditions.

In the example application described, the temperature probes reliably monitor temperatures up to 150 °C. ■

How does water get in to the cloud?

Water well monitoring from the sensor to the JUMO Cloud



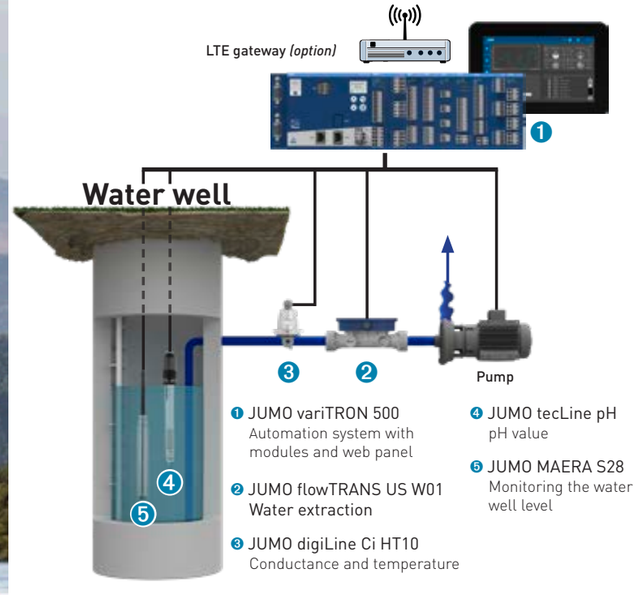
Take a look https://bit.ly/3vUvY5a

Webinar
JUMO Cloud – establish connection and visualize first values
June 29, 2022 + October 06, 2022

Mineral water is drawn from water wells. Similarly, breweries also draw their water from deep wells that must be monitored. Results are documented and reports are regularly sent to the respective authorities. Many of these operators run several water wells, which are usually far away from each other, so that personnel requirements are very high. The inline acquisition of the measured values from the individual water wells, along with their depiction in the JUMO Cloud, presents a solution that significantly reduces the workload and that can also be automated if required.

Monitoring

The temperature, water well level, conductance, pH value, and flow must be monitored. JUMO offers the right sensor technology for all these measurands. For example, the amount of water extracted can be determined with the JUMO flowTRANS US W01 ultrasonic flowmeter. The new flowmeter proves its worth with high accuracy (±2 percent of the measured value) and a fast response behavior. Its metal-free housing and the applied plastic pipe in nominal widths ranging from DN 15 to DN 32 allow the JUMO flowTRANS US W01 to be integrated into existing plants in a simple, flexible manner.



Overview of water well monitoring with visualization in the cloud

The JUMO tecLine pH combination electrode is ideal for determining the pH value. It is characterized by a very robust mechanical design and has an integrated temperature sensor. The conductivity can be determined with the JUMO digiLine Ci sensor. JUMO digiLine is a bus-compatible connection system for digital sensors in liquid analysis with which extensive sensor networks can be built.

The water well level can be monitored with the JUMO MAERA S28 level probe. It is especially designed for use in the open air. Alongside the advantages of excellent long-term stability (provided by the piezoresistive measuring cell) and maximum process reliability (through an integrated lightning protection system), this level probe also enables the level and temperature to be measured simultaneously.

Automation and visualization

All measuring devices can be connected to the JUMO variTRON 500 automation system. The on-site touchscreen displays all determined values. The outputs can be used, for example, to switch off pumps when water levels fall below a certain point. Furthermore, the system acts as a gateway to the JUMO Cloud with a secure MQTTS connection.

All measurement data comes together in the JUMO Cloud. This way, all water wells and values can be visualized and evaluated via individual dashboards. The creation of reports is also very simple. If values are exceeded or fall short, alarms can be predefined and then sent by email, text message, or another chosen option.

Up to the cloud

As an IoT platform for process visualization and 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, processes, or sites in one dashboard, which, in turn, increases process reliability. ■

Safe drinking water with innovative technology

Corrosion-resistant measurement technology in a desalination system

Take a look https://bit.ly/3vUvY5a

Seminar
Analytical measurement technology for practitioners
May 17, 2022 + November 15, 2022

The Dutch subsidiary of JUMO has assisted a customer in developing an innovative desalination system. A key concern was the required corrosion resistance.

The company Rainmaker Holland B.V. specializes in the decentralized development and production of water technologies to provide safe drinking water to remote areas worldwide. Rainmaker has developed two product lines for this purpose: Air-to-Water and Water-to-Water.

The challenge

Fresh water is distributed very unevenly on the planet. Currently, an estimated 800 million people around the world live without access to a safe source of drinking water. These shortages are most serious in North Africa, the Middle East, India, Mexico, and much of South America. Rainmaker uses innovative techniques precisely where access to drinking water is difficult.

The "Air-to-Water solution"

Rainmaker's two decentralized and renewable-energy-powered technologies called Air-To-Water and Water-to-Water produce safe drinking water at low prices. The Air-to-Water system uses a turbine to push air through a heat exchanger. The air in the heat exchanger is cooled, which produces condensation. The optimized cooling/heating cycle enables efficient energy consumption to produce greater amounts of water. The collected water is purified and sterilized to guarantee the best possible standard of drinking water. Although this technology is designed to be operated with renewable energy, it can also run on traditional energy sources. Depending on the ambient temperature and humidity, a single Air-to-Water unit can produce up to 5000 liters of water per day. Moreover, it can easily be adjusted to suit the required water quantities. To guarantee efficient water production, Rainmaker has developed an adaptive control system that maximizes water production depending on the environmental conditions at the operating location.

The "Water-to-Water solution"

The Water-to-Water technology is based on a new type of membrane distillation technology. It is a seawater desalination system in which water is vaporized at low pressure via a heat pump condensation process. The steam produced in this heating process diffuses through a microporous hydrophobic membrane, which filters out all the impurities. This technology is based on the physical principle of the partial pressure difference (temperature difference) between the two sides of the membrane pores.

The Water-to-Water System can be powered efficiently by the wind, sun, the power grid, a generator, or a combination of the above

JUMO industrial sensors

Rainmaker needed suitable sensors for an EU-backed Water-to-Water project on Gran Canaria. Several sensors were used to monitor the sustainability of the system and guarantee its safety. Since this is a desalination system, corrosion protection had to be ensured. JUMO offers the right selection of sensors and automation devices for water treatment.

The Rainmaker project made use of conductivity sensors from the JUMO BlackLine series and transmitters from the JUMO ecoTRANS series. These devices are used for accurate measurement of conductivity, which guarantees the quality of clean drinking water. To measure conductivity for wastewater, Rainmaker chose the JUMO CTI-500. It is ideal for high conductivity values as it uses an inductive measurement. JUMO's MIDAS C18 SW sensor is used to monitor the pressure of the wastewater. It is a titanium sensor that is very well-suited to water with high salinity. ■

Placing the level on the scale

Weight calculation of raw materials in storage tanks

Take a look https://bit.ly/3vUvY5a

Seminar
Pressure and level measurement technology
September 28, 2022

Calculating weight using a level measurement

Epple Druckfarben AG in Neusäß, near Augsburg, is world-renowned in the graphics industry for its high-quality printing results, extensive technical knowledge, precise processes, and custom solutions. Manufacturing sheet-fed offset printing colors requires mineral or vegetable oils that are stored in tanks with a storage capacity of up to 13 000 kilograms. The exact weight of the tanks must be determined: not only for the order process, but also to check the invoicing during deliveries. To do this, the JUMO Engineering team has developed and created an application for calculating the weight of mineral oils in the tanks.

Strict customs requirements

The weight is calculated using a level measurement, which is then converted. The ultrasonic method that Epple Druckfarben AG used up to now was not accurate enough and it was not able to meet the strict customs requirements.

Therefore, it was clear what was required of JUMO Engineering: the weight of the contents in ten outdoor tanks needed to be acquired in kilograms, using level measurement and subsequent conversion. Each tank is seven meters tall. Protection against explosion was not required here, but the temperature still needed to be acquired.

The JUMO Engineering team created a solution based on the JUMO mTRON T measurement, control, and automation system. In the case of Epple Druckfarben AG, the weight of the material in each tank is determined using JUMO MAERA level probes, which also have the required temperature sensor. Two level probes are used to calculate the weight of the stored products. They are positioned at a defined distance from one another. The determined pressure delta between the level probes is used to determine the specific material density. The specific density plus the dimension figures for the tank (volume) are then used to calculate the weight. This calculation is carried out by the JUMO mTRON T system using the integrated PLC based on CODESYS.

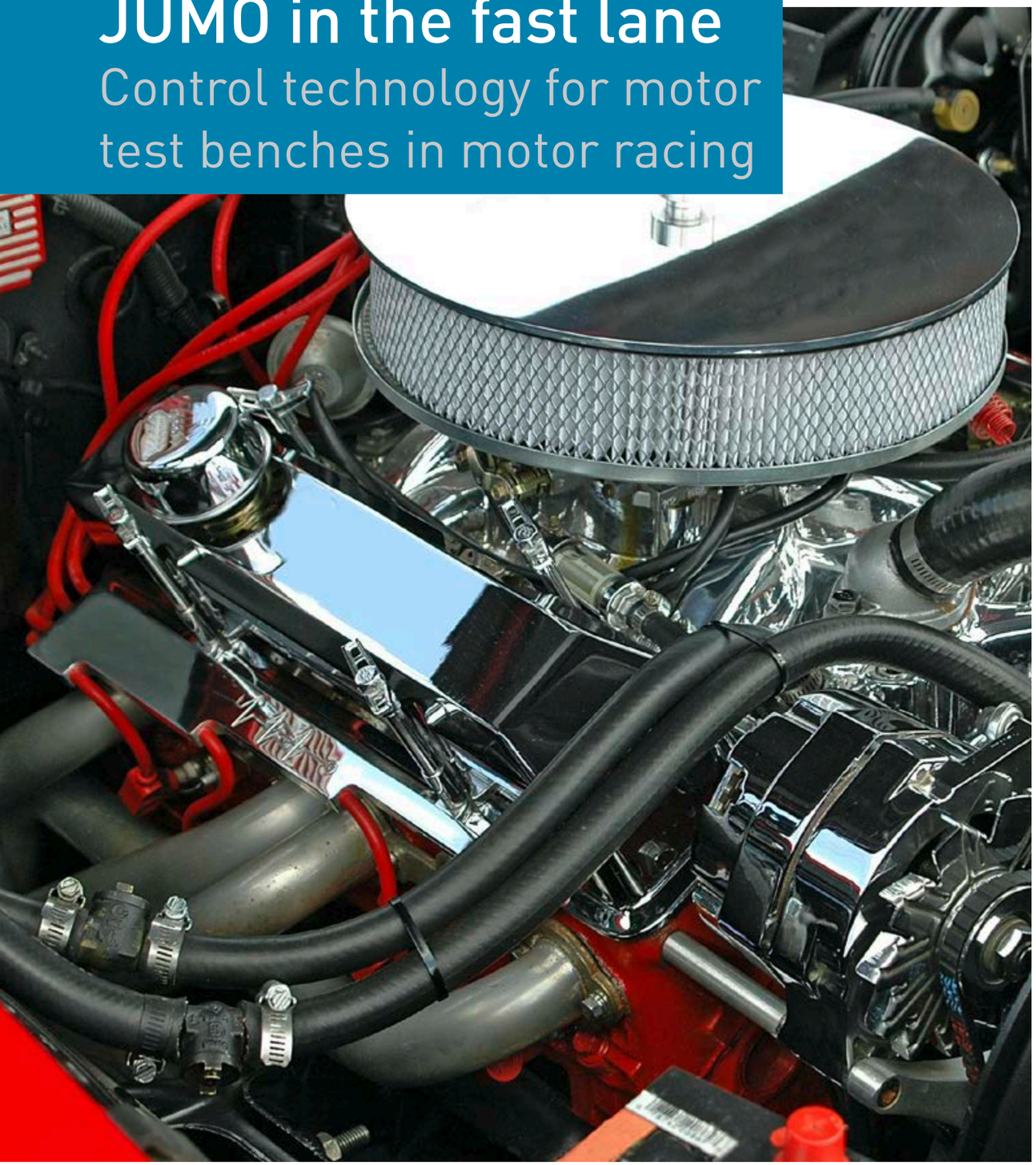
Level probes and automation system

Furthermore, a multifunction panel is used for operation, which is placed in the immediate vicinity of the tank connection for the truck, which thereby enables on-site monitoring and control of alarm messages. Both standard screens and custom process screens are used.

The system can be connected to a superordinate control system via PROFIBUS. However, all process values can also be transmitted via a web application, so that they are available to Epple Druckfarben AG's purchasing department for material control. The enormous amount of time saved, combined with the simple startup and operation, were decisive features that helped make JUMO Engineering the best option for this project. ■

JUMO in the fast lane

Control technology for motor test benches in motor racing



Take a look https://bit.ly/3vUvY5a

For motors with power outputs of up to 1200 hp

For over 30 years, Herrmann Motorenentwicklung GmbH, located in Salzgitter, Germany has provided neutral and independent inspection, startup, and development services for internal combustion engines as well as electric and hybrid vehicles. The service concept also includes renting out test bench capacities and the related service of motor tuning. On behalf of the business, JUMO Engineering took care of the design and implementation work involved in developing sophisticated control technology on a motor test bench.

The company's test benches are used by specialists to test the performance and functional capability of motors under laboratory conditions. Cooling these systems is a particular challenge. For three test benches designed for motorsport engines with a power output of up to 870 kW (1200 hp), JUMO Engineering developed a control system that uses temperature control to guarantee a cooling power of 600 kW at an outside temperature of 20 °C.

Highly-precise control technology

For this purpose, four main and eight subordinate control loops must be controlled, and anticipatory control must be implemented. As the motors tested represent very precise technology, only minimal control deviations are permitted when maximum load changes occur.

JUMO used the JUMO mTRON T automation system to meet these requirements. The modular system offers the user a multifunctional overall solution through components that are completely tailored to one another. By using many input and output modules, JUMO mTRON T enables simultaneous operation of up to 120 control loops, which also makes it suitable for demanding control processes.

The individual modules of the automation system were structured in such a way that temperature monitoring of all relevant areas could be implemented. An individual control strategy was implemented for each sub-area, according to the customer's specification. Also, a user administration function was integrated.

A JUMO multifunction panel (HMI) acts as the system's control center. For the application described the multifunction panel was planned in such a way that after the system starts up, a general screen appears showing all of the system's sub-areas with the associated key information. In this project, the sub-area designation is provided with an indicator denoting its status.

Information concerning operating statuses

In the detailed views, all the drives and 3/2-way valves are displayed in a color animation if information about operating and malfunction conditions is available. When a malfunction is displayed, a malfunction text is also shown in the header of the operating panel. The JUMO mTRON T system controls the heating in the swirl pot, the pump, the bypass pump, and the angle seat valve. Both pumps are also monitored for malfunctions. ■

Conclusion

In this application, JUMO's precise anticipatory control technology enables dynamic and economical cooling technology, a precise export of recording data, and efficient communication with the control center.

Global access to measurement data

Implementation of a SCADA solution for monitoring industrial furnaces

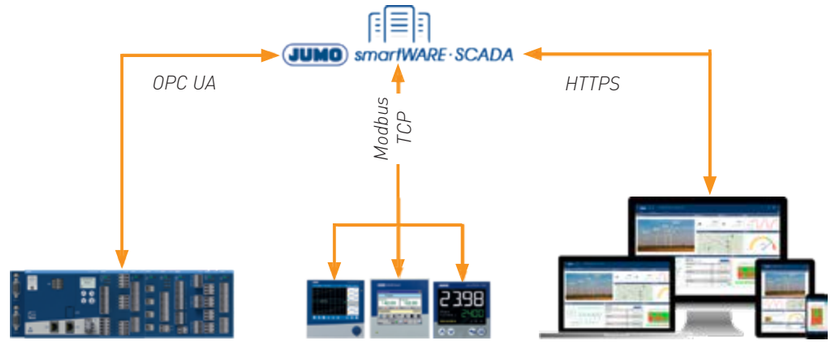
Take a look https://bit.ly/3vUvY5a

Seminar
Determining measurement uncertainty during electrical temperature measurements
September 14, 2022

Keeping a close eye on complex processes

Precise monitoring of the temperature in industrial furnaces is a complex task. Even the smallest deviations can have a major impact on the entire production process. The company Lapport Schleiftechnik GmbH uses a SCADA solution in conjunction with a JUMO automation system for these tasks. JUMO Engineering handled the implementation of the application.

Lapport has been offering its customers tailored solutions for demanding grinding tasks since it was founded in 1873. In 2009, the business was taken over by the company Günter Effgen GmbH, and has since been part of the Effgen Group. A variety of different furnaces are used to manufacture conventional grinding tools. For some time now these furnaces have been controlled using the JUMO mTRON T automation system. To bring the overall system up to date, a SCADA (Supervisory Control and Data Acquisition) system needed to be introduced to visualize the process values and monitor the alarms.



JUMO variTRON automation system | *Modbus TCP capable devices* | *Visualization and operation via web browser*

Modern SCADA solution

The new JUMO smartWARE SCADA system was used for this purpose. This product is a highly scalable and powerful digitization platform that supports manufacturing and work processes with efficient visualization, alarm, and planning functions. A modern web interface makes client access possible without installation. Here, the number of users is not limited. Security is guaranteed by end-to-end encryption with possible two-factor authentication.

A solution was developed for Lapport Schleiftechnik GmbH that graphically displays and stores the analog measured values of the furnaces. The SCADA interface can be called up from any web browser. User names, passwords, individual operators, and their corresponding access rights are set during installation and startup.

To visualize the data, a tailored dashboard was developed showing the setpoint values, actual values, malfunctions, and alarms from the JUMO mTRON automation system. All values are displayed in a live graph. The user can access the history via a separate tab and extract the process values via a selected line area.

An alarm plan can also be set up through the dashboard. Here, the user can define a timeframe (days, weeks, months) within which an email should be sent if a malfunction occurs. Furthermore, all malfunctions and alarms that arise are archived in a message archive.

Efficient process monitoring

This way, JUMO smartWARE SCADA supports Lapport Schleiftechnik GmbH's working processes by providing helpful monitoring and alarm functions. All systems can now be monitored at a glance. Error messages and malfunctions can be recorded using remote monitoring, which prevents production downtime and ensures a high-quality combustion process. ■

The JUMO Engineering team

The JUMO Engineering team with its many years of expertise is available to assist in the implementation of industry as well as project-specific cloud and SCADA applications. The team's capabilities range from running feasibility analyses and workshops to drawing up product requirements specifications and specification sheets as well as the configuration, programming, and validation of automation solutions.

CQI-9 – the gold standard in heat treatment

JUMO as a qualified service provider

Take a look https://bit.ly/3vUvY5a

Seminar
Creation of the individual measurement uncertainty budget for a temperature measuring point
Available upon request

Many important properties of metals, such as hardness or toughness, are only obtained through targeted and sophisticated heat treatment. To guarantee these properties, automotive manufacturers have collectively drawn up corresponding regulations for their suppliers. Today, suppliers and service providers are also members of the industry associations so that these regulations also apply to them.

The Continuous Quality Improvement (CQI) guideline is the automotive industry's absolute standard

CQI-9 governs matters relating to heat treatment. It is subdivided into different sections that describe, for example, the process for evaluating heat treatment systems, the required instrumentation as well as the SAT (System Accuracy Test) and TUS (Temperature Uniformity Survey).

Fourth Edition of the CQI-9

When the fourth edition of the CQI-9 was published in June 2020, many additions had been made. One of the biggest changes in the new revision is that external service providers now have to be accredited according to the national standard to be permitted to perform the instrumentation test and SAT measurement. JUMO meets this requirement, making it the ideal calibration partner for all heat treatment processes according to CQI-9.

JUMO thermoCOR measuring system

In addition, JUMO offers an easy-to-use compact solution for calibration according to CQI-9 with the thermoCOR measuring system. JUMO was able to draw on its many years of experience in the development of the measuring system. As early as 1992 a certified DKD (German calibration service) was opened at the company headquarters in Fulda. This was then certified by the new German National Accreditation Body (DAkkS) in 2011.

As part of a DAkkS calibration, a temperature probe is checked at different temperatures. Using the measurement data, characteristic parameters are calculated and a certificate is issued on the measurements that are carried out. At JUMO, DAkkS calibration certificates for RTD temperature probes, thermocouples, measuring chains, data loggers, and temperature block calibrators in the measuring range between -80 and +1100 °C can be issued.

Calibration of the temperature probe

The calibration of the temperature probe alone is not enough in many cases because other components are still involved in the temperature acquisition and the display that influence the measurement result. These components include transmitter cables for the temperature probe, the measuring point switch, and evaluation electronics such as controllers, recorders, or indicators. Only an on-site calibration can evaluate all influential factors correctly and include them in the calibration result. For this reason, JUMO has the important DAkkS accreditation for the on-site calibration of temperature sensors at its disposal. ■

"CQI-9 heat treatment is a MUST in many industries. JUMO is the right partner for this demanding set of regulations."

Sascha Römer
Head of JUMO Service

sascha.roemer@jumo.net

Take a look https://bit.ly/3vUvY5a
Seminar
Flow measurement technology
June 07, 2022

More than sensors + automation

Flow measurement based on ultrasound

Measuring principles in JUMO's flow sensor technology

JUMO's sensor technology for flow measurement works according to different measuring principles. This article explains how ultrasound can be used to measure flow in the newly developed sensor technology field.

Manfred Schleicher
Trainer for Sensor and Automation Technology
manfred.schleicher@jumo.net

What is ultrasound?

Sound is the spreading of pressure and density fluctuations in a medium. Ultrasound occurs in a frequency spectrum of > 20 000 Hz, which is inaudible to humans.

The Doppler effect ❶

The Doppler effect is an example of a method that can be used to measure flow. You can observe this effect in day-to-day life.

For example, the noise made by an approaching vehicle (e.g. by a siren) sounds louder to a stationary observer than the noise made by a vehicle that is moving away. This is because the sound waves correspond to a sine wave with a corresponding wavelength. The wavelength of the sound produced by the approaching vehicle is reduced along the distance that the vehicle travels within a sine full wave. As a result, the frequency increases and the noise sounds louder. For the observer, the sound of a departing vehicle arrives at a correspondingly lower frequency, and the wavelength increases.

In flowmeters that work using the Doppler effect, sound is projected against the flow direction onto reflective objects in the measurement medium, whereby the frequency of the reflected sound is measured. The frequency of the reflected sound wave increases with the flow velocity. The measurement can only be conducted in liquids containing particles or gas bubbles.

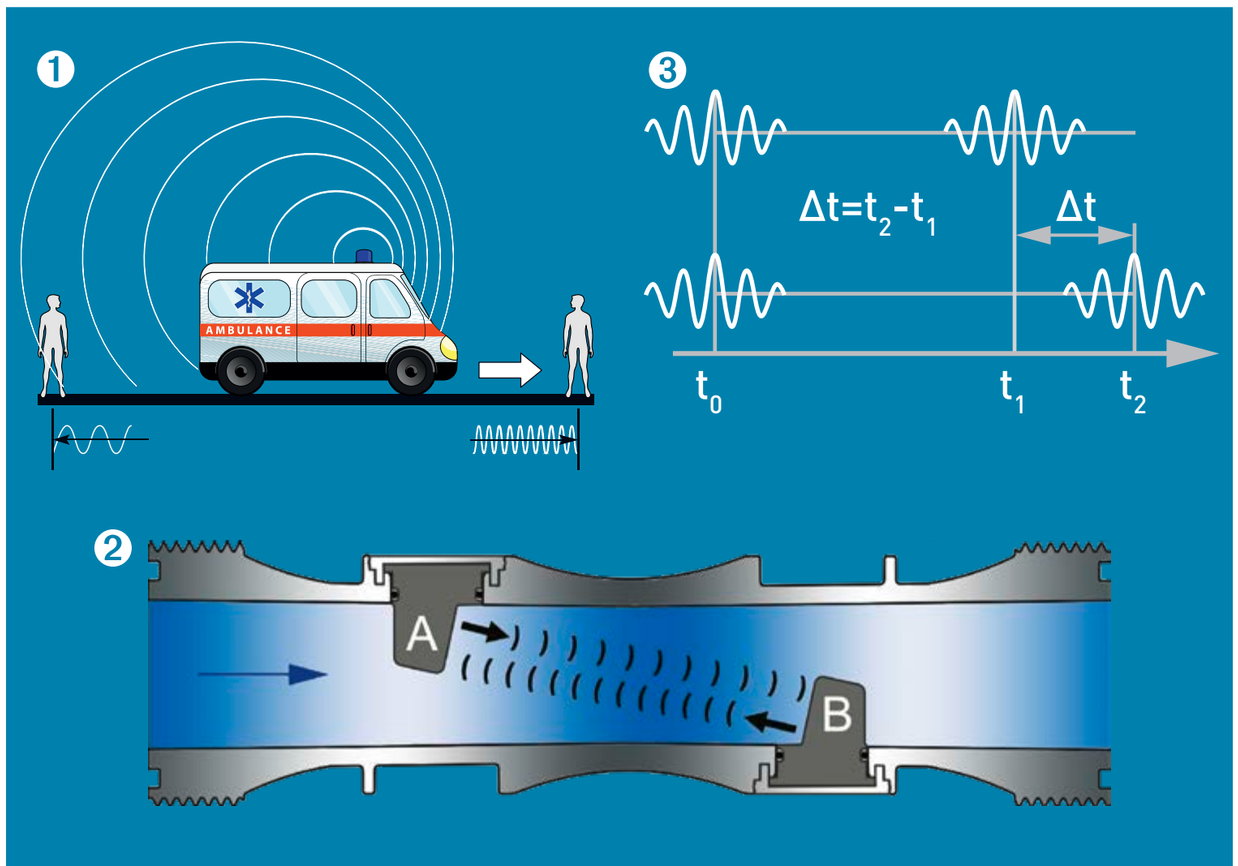
The new JUMO flowTRANS US W01 and W02 devices ***(see pages 4 to 8)*** work according to the transit-time principle. Here, too, we can use an example from everyday life: imagine a person moving at a set speed on a moving walkway (such as the ones used at airports). If they walk in the walkway's direction of travel, the person will reach the end of the walkway faster than if they walked against its direction of travel. If the person moves at a set speed, the speed of the walkway can be determined from the difference between the two times.

JUMO continues to use the following measuring principles:

Paddlewheel
Rotation speed evaluation of a paddlewheel in a liquid
Cost-effective – does not tolerate solids

Magnetic-inductive
Generation of a magnetic field and measurement of the voltage induced through the moving liquid
Requires the medium to have a minimum conductivity

Difference/differential pressure method
Measurement of the difference in pressure before and after a tapering of the cross section
Measurement in gaseous media, especially steam; complex structure



Flow measurement according to the transit-time method ❷

The application of the principle in the new flowmeters is as follows: **two transducers (A and B)** work according to the piezoelectric effect, alternately sending and receiving ultrasonic waves. In this process, a crystal converts electrical energy into mechanical energy, and vice versa. Sound waves that spread in the measurement medium's flow direction do so faster than when they spread in the opposite direction. The difference in the transit time is calculated. The greater the difference, the higher the flow velocity of the medium.

Determining the transit-time difference ❸

Traveling in the flow direction, the sound reaches transducer B after time t_1. Time t_2 passes until the sound reaches transducer A against the flow direction. The time difference is a unit for measuring the flow velocity.

The sound waves travel through the entire conductor cross section. However, even with this method, inlet and outlet sections before and after bends, pipe extensions, pipe reductions, etc. must be considered.

The measuring principle does not require much from the measurement medium: the proportion of solids must not be too high (⩽ 5 % vol.) and the proportion of gas bubbles permitted is limited (⩽ 1 % vol.). No minimum conductivity is required for the measurement medium, so the flow of highly-purified water can also be determined.

The measuring principle can be used for liquid and gaseous media. The JUMO flowTRANS US W01 and W02 series only measure the flow of liquids. ■

Awards for JUMO

“The best” for apprenticeships, events, and ideas management

FOCUS
“The best companies for apprenticeships in Germany”

FOCUS magazine, along with the Institute for Management and Economy Research, investigated the quality of apprenticeships in the 20 000 companies in Germany with the largest number of employees.

JUMO GmbH & Co. KG was awarded an excellent second place in the “Measurement technology” industry, and was one of 800 companies to be recognized as one of “Germany's best companies for apprenticeships”.

To put together the ranking, factors such as structural business data, the apprenticeship ratio, the success of the apprenticeships, and the apprenticeship pay were investigated. The overall score was calculated on a scale from 1 to 100. JUMO achieved an above-average score of 96.1.

Stevie Award for JUMO Xperience Days

The Stevie Awards are among the most respected business awards in the world.

This year, JUMO received a gold trophy for its virtual trade fair “JUMO Xperience Days”. The award was given for the category “Best Brand Engagement Event” of the year. This category honored events that promote customer commitment to a brand, build up great relationships with customers, and maintain a strong impact after the event.

The Xperience Days revolved around a professional livestream featuring 15 presentations and an interview on JUMO highlights, example applications, and current topics. For this purpose, JUMO worked with a renowned film production company which transmitted the livestream from its studio. Furthermore, visitors to the Xperience Days were able to discover current product innovations and industry solutions live at 12 virtual booths and talk directly to JUMO specialists via chat or video function.

German Ideas Management Award Awarded twice

The “German Ideas Management Award” recognizes companies and individuals who have acted as role models in the field of ideas management.

The nationwide competition is the highest honor in ideas management in Germany. It is awarded by an independent jury of specialists from scientific and practical fields. This year, JUMO's ideas management was honored with awards in two categories at the highly respected competition.

In the “Best idea in production and technology” category, second place went to two employees who developed a method for achieving a 20 percent efficiency increase in machines for selecting temperature sensors.

In the category “Best apprentice idea”, JUMO won first prize for an idea from a business apprentice, which saved time and material in the printing processes while also reducing paper waste. ■

Virtual JUMO Industry Days 2021

Online events with a real live feeling

January 2021 saw the first virtual JUMO trade fair take place, which was swiftly recognized with a gold Stevie Award for “Best Brand Engagement Event”. More events are now set to take place on the “JUMO Xperience” platform in fall 2021.

Review of industry day: Industrial furnace construction

The industrial furnace construction industry day was held at the beginning of October 2021, welcoming furnace manufacturers, furnace operators, hardening plants, and suppliers to the automotive and aerospace industries. The recordings of all of the livestreams can be found on the JUMO Xperience platform. An interview with outside experts explains how heating processes can become carbon neutral. In addition, you can find a number of presentations and example applications concerning automation and IoT solutions focusing on climate protection and digitization in furnace construction.

More information at: http://furnace.jumo.info

Review of industry day: HVAC and heat/cold meters

Our first industry day on HVAC and heat/cold meters was held at the beginning of November. It was aimed at planners, planning offices, plant engineers, and specialist wholesalers in the heating and air-conditioning industry as well as heat meter manufacturers, public utility works, and utility companies.

Participants could experience the launch and practical live demonstration of our new system solution for the HVAC market. With the JUMO variTRON 500 – now with BACnet interface – JUMO will provide the most precise control solution, all from a single source! As a special highlight, on the day of the event all active participants had a chance to win a JUMO variTRON 500 starter set with BACnet including controller module, software, and startup.

Further topics included which approvals apply to which country, information on the impact of Brexit, and how the length of a thermowell affects the measurement result.

More information at: http://hcm.jumo.info

Industry day: Pharmaceuticals on December 01, 2021

December 01 will see the launch of the first pharmaceutical industry day, with many practical use cases. The event is aimed at decision-makers in the areas of production, equipment, and organization in the pharmaceuticals and biotechnology industries as well as the food and water industries. Examples of topics include “Cleaning in Place (CIP) in vaccine production”, “Ion exchanger plants and reverse osmosis in medical water treatment”, and “Self-monitoring digital sensors for water treatment in the pharmaceutical industry”. ■

JUMO news:

You can always find an overview of all our industry events here:
http://industry.jumo.info

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