01/2017

sensors + automation

The Customer Magazine from JUMO

JUMO

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JUMO Engineering guides you on your path!

More than sensors + automation

JUMO Engineering

We bundle expertise as well as industry experience in one team and develop customized solutions that are consistently based on your specific requirements.
The personal support and consulting from the initial point of contact to series production for the implementation of the most diverse industry applications provides you with optimal benefit.

**Place your trust in decades of experience,
a high level of commitment,
and outstanding industry expertise.**

Welcome to JUMO.

http://engineering.jumo-en.info

Dear Reader,

The rapid technological change over recent years has repeatedly resulted in the creation of new business models. Companies such as Uber or Airbnb, for example, plain and simply would not have been imaginable without the enormous growth of the mobile Internet. Companies like Tesla are using the energy transition to redefine the future of mobility.

Even supposedly "classical" industries can reinvent themselves over and over again. One example of this is the Engineering department at the JUMO corporate group. This department arose as the logical consequence of the increasingly demanding automation solutions in the industries that are relevant to us. The fundamental idea is to not just be able to offer individual components, but rather complete solutions for a variety of applications. Our customers profit, on the one hand, from the wide variety of JUMO products for high-quality measurement and control technology and, on the other, from our comprehensive expertise in process technology for a variety of different industries. Here it is irrelevant whether the project scope involves a minor automation solution for the food industry or the complete monitoring and control of industrial melting furnaces.

In this edition of the customer magazine, we present the "success story" of the new business model and also describe various application examples from which the whole spectrum of engineering services can be seen. In addition, you will again find application reports, product innovations, news from the corporate group, as well as trade fair and seminar dates.

We hope you enjoy reading this issue.

Your Managing Partners,

Bernhard Juchheim *Michael Juchheim*

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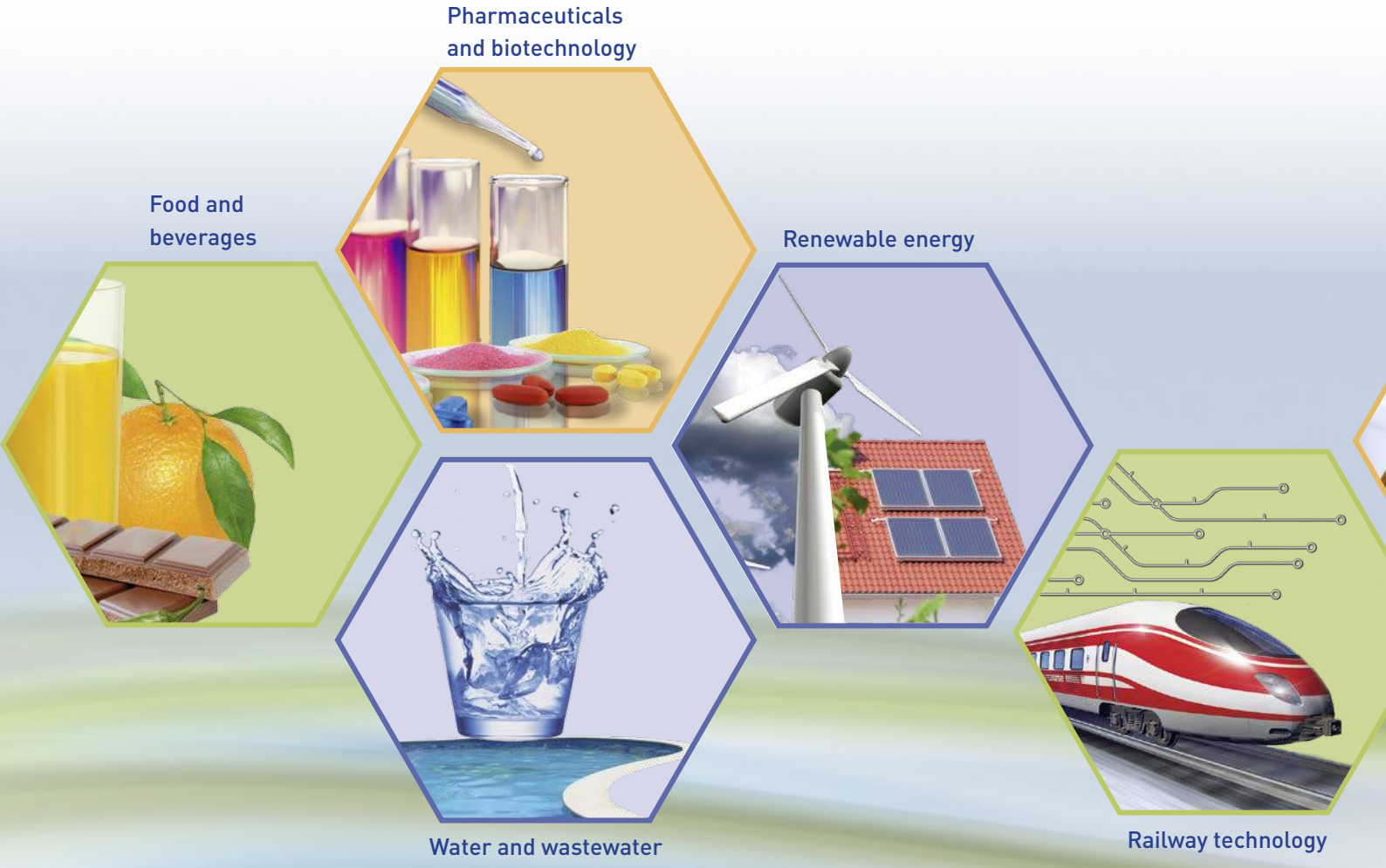
JUMO Engineering

The easy path to a system solution

"It is unfortunate that we try to solve the simplest questions cleverly, and therefore make them unusually complicated. We should seek a simple solution." No, this quote is not from Werner von Siemens or Steve Jobs – the Russian author Anton Chekhov made this simple yet profound assertion over 100 years ago. Today it is truer and more important than ever and could also be interpreted as the foundation of JUMO Engineering.

Industrial measurement and control technology has gone through a rapid change over recent decades. Not so long ago, it was still possible to monitor the temperature in baking ovens using simple dial thermometers. Today in industrial bakeries, a variety of production steps need to be coordinated, permanently monitored, and documented in a tamper-proof manner. JUMO met the needs of this development with the introduction of the modular measurement, control, and automation system mTRON T in 2011. Since this time, customers have not only received measurement and control technology, but also the necessary automation solution to implement complex processes. Yet this was only the first step on the way to becoming a system supplier. It became clear very quickly that customers often also require extensive programming services to implement their automation solutions. The JUMO Engineering department was brought into being to meet these needs and simultaneously open up new industries. This team bundles the decades of company experience in industrial measurement/control/automation technology, supports customers throughout the entire project management, and develops customized applications for a variety of industries. The Engineering team has an extensive portfolio. The versatile services include running basic feasibility studies and providing workshops, drawing up



requirement and system specifications, and end-to-end project management. The team has extensive experience in PLC programming, visualization, and network technology.

Customer applications are developed and created based on JUMO products. This is because JUMO's product range already covers the entire solution chain from sensor technology for temperature, pressure, liquid analysis, flow, level, and humidity through to the right devices for recording, controlling, and automation. The range also includes all the necessary actuators such as solid state relays (SSRs) and thyristor power controllers. This means that efficient solutions which are optimally aligned with each other can be created – and all from one service provider. The applications are commissioned on-site. Customers receive complete project documentation as well as a customized operating manual. The Services and Support section as well as specific training courses complete the package. Customers can choose between individual elements or the implementation of entire projects. JUMO Engineering works nationally as well as internationally. A look at several successfully implemented projects indicates the great range of industries for which JUMO Engineering is finding solutions. For example, an application was developed for wireless temperature monitoring in municipal composting plants. This development is now attracting interest throughout Germany. A cooling system for more than 70 tanks was created for a winery that can be used to precisely control the fermentation process. Temperature control in industrial glass melting tanks was a particular challenge. Here, 64 measuring points need to be monitored and then transmitted to a higher-level control system using the JUMO automation system. However, JUMO Engineering does not only provide particularly large and complex solutions. For example, the owner of a milk processing company in the Allgäu region can monitor the cheese ripening chambers in various alpine dairies from the company headquarters and thereby significantly improve the quality of the final product. That's just one great example of how a simple solution can make a lot of people very happy.

For each industry a solution.

Further information

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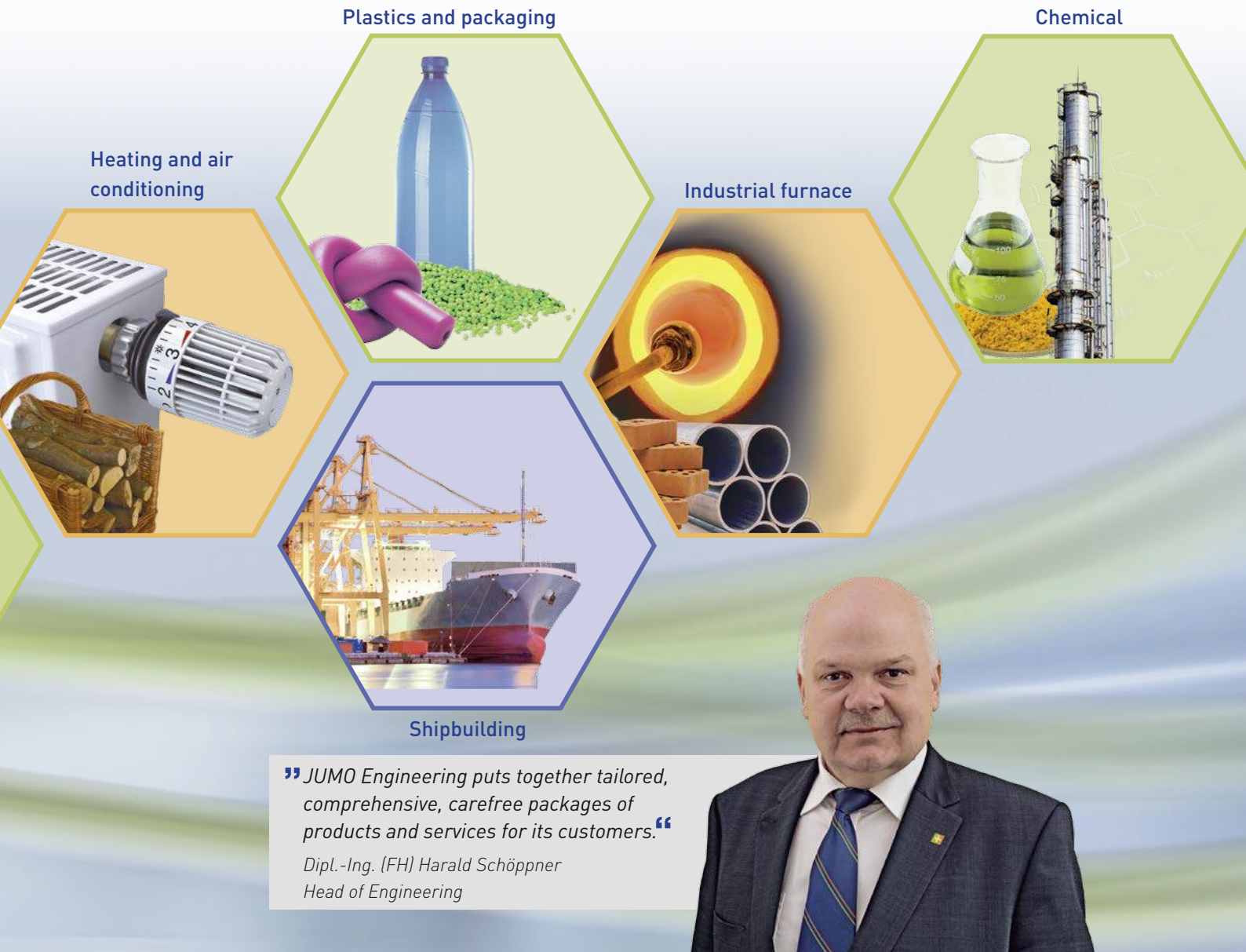

"JUMO Engineering puts together tailored, comprehensive, carefree packages of products and services for its customers."

Dipl.-Ing. (FH) Harald Schöppner
Head of Engineering

IO-Link sensors for bottling plants

Clean – secure – reliable

As an internationally operating manufacturer of filling and packaging systems for the beverage, food, and non-food industry, KHS GmbH takes up a leading position in the industry. KHS develops and manufactures its whole portfolio of filling and packaging machines at five German sites. The range includes high-performance systems, but also solutions for smaller output capacities. In KHS' bottling plants, for example, more than 80,000 PET bottles or 2,000 kegs can be processed per hour.

KHS has been using JUMO products to record the pressure measurement for a long time. The first IO-Link sensors from JUMO are now in use.

The system offers clear benefits: a three-wire connection with an M12 plug connection enables simple integration into established fieldbus systems and, therefore, communication to the lowest field level. Sensors can be replaced much more easily and machines as well as plants can be started up more quickly. The cabling work is also significantly reduced.

These advantages also convinced those responsible at KHS GmbH. The temperatures and pressure need to be reliably and precisely measured in the valve clusters of filling plants for bottles or kegs. These values are acquired and processed in a higher-level control system.

The new JUMO dTRANS p35 is used as the IO-Link pressure sensor. It covers a measuring range from –1 to +600 bar. Its accuracy at an ambient temperature of 20 °C is 0.5 % of the measuring span and its long-term stability is less than 0.2 %. Another temperature sensor in use is the JUMO dTRANS T1000 sensor with IO-Link which works with a tried-and-tested Pt1000 sensor from JUMO. The measuring range is between –50 and +260 °C. Both sensors can be configured using identical software and have different switching functions such as switching point, adjustable hysteresis, switching delay, or window function. Hygienically safe connection technology is particularly important for use in bottling plants. Here, JUMO managed to make an impression with its own PEKA process connection adapter system. The modular adapter system can be used for a variety of measuring devices and offers a wide range of process connection adapters. The respective measuring device can be mounted and dismounted as often as required. Easier mounting, cleaning, and repair processes lower the plant downtime as well as the consequential costs to a minimum. Parts in contact with the media made out of stainless steel as well as a cavity-free system prevent microbial contamination and therefore guarantee maximum process reliability. The combination of IO-Link sensors and the PEKA adapter system guarantees the highest degree of safety and flexibility for KHS GmbH.

IO-Link

JUMO dTRANS p35
Pressure sensor
Type 402058

JUMO dTRANS T1000
Temperature sensor
Type 902915

Good to know:

IO-Link is a pioneering communication system for connecting intelligent sensors and actuators to automation systems. This standardization covers the electrical connection data and a digital communication protocol which is used by the sensors and actuators to exchange data with an automation system.

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JUMO innovations

JUMO platinum-chip temperature sensor

New, especially robust platinum temperature sensor

Type 906121

Platinum chip temperature sensors from JUMO have been proven millions of times for temperature measurement in many different industries. The new model with the EC extra code is particularly resistant to environmental influences thanks to its gold-plated nickel connection wires.
The sensor is suitable for all common processing methods and is available for temperature ranges from -70 to +500 °C.

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JUMO AQUIS touch P

Modular multichannel measuring device now with PROFINET and DNV GL approval

Type 202580

JUMO AQUIS touch P is a modularly structured, compact multichannel measuring device for liquid analysis. One single device covers the "measuring, controlling, recording, and displaying" tasks. The device is now available with a PROFINET interface. In addition, the device now has the required DNV GL approval for the shipbuilding industry.

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JUMO tecLine Br

Sensors for measuring bromine online

Type 202637

The new JUMO tecLine Br sensors are used for measuring the bromine concentration and are available with analog or digital (to connect to the JUMO digiLine system) interfaces.
The new sensors distinguish themselves through their easy calibration, integrated temperature compensation, and a proven measuring system.

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JUMO PINOS L01

New fittings and nominal widths for flow sensors

Type 406040

Flow sensors are required in a range of industries and applications. The PINOS L01 gives JUMO a variant for use in water and aqueous media which is based on the calorimetric measuring principle. JUMO PINOS L01 is available for nominal widths from DN 20 to DN 50. A number of different fittings made of stainless steel and plastic are available for process-reliable installation.

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JUMO TYA power controller series

Now with additional interfaces

Types 709061/62/63

The EtherCAT protocol is now also available for the JUMO power controller from the TYA series. The user has access to all of the power controller's data via the real-time-capable fieldbus protocol. Furthermore, the configuration can be adopted using the TwinCAT software. Additional configuration through a setup software is no longer necessary.

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JUMO dTRANS T07

Two-channel transmitter with HART® communication

Type 707080

The new JUMO dTRANS T07 device series is a two-channel temperature transmitter with HART® communication which is available in B-head or in DIN rail housing version. The versions with Ex and SIL approval (IEC 61508:2010) for SIL 2/3 (hardware/software) enable secure use in demanding process applications.

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It's all about the sausage!

Wireless temperature measurement in a meat production plant

Hygiene is the highest precept in all process steps when it comes to manufacturing meat and sausage products to eliminate any risks to the consumer. Franz Ablinger & Co Fleischhauereibetrieb GmbH, with its headquarters in Austrian Oberndorf near Salzburg, uses JUMO technology to control and monitor its heating processes.

Producing a safe food product, in the sense of guaranteed stability and edibility up to the end of the use-by date, is the top priority in the food industry. In this respect, the microbiology and the associated prevention of premature spoilage are crucial factors in the production of meat and sausage products. A HACCP concept (Hazard Analysis and Critical Control Points) is created to both define and control the dangers. This allows all critical control points to be defined and measures to be taken to achieve and guarantee optimum product safety.
Heating is an example of a critical control point in the production of sausages and boiled ham. During the heating process, the product is treated not just to make it edible, but also so that it is microbiologically stable and lasting. This means that spoilage-promoting and harmful bacteria as well as microorganisms are killed in a controlled and monitored heating process. As a result, the "heating" control point is an immensely important parameter in the production of sausages and boiled ham.

Documented product quality

The documentation of the temperature development and progression of time is also very important during the heating process. It is, for example, used to determine whether the required heating values and therefore the microbiological safety were reached. This step also serves as proof that the heating requirements for the production of sausages and boiled ham were met and monitored. The company Ablinger has been producing meat and sausage products since 1932. Customers in both catering and trade are supplied with a full range of over 300 specialities in around 1,200 different packaging forms. The production area contains 15 smoking chambers, each with one to four sections. Around 50 JUMO Wtrans T RTD temperature probes with wireless data transmission are used in total for monitoring the heating process. A wired solution would cause significant time delays when filling and unloading the smoking chambers. The JUMO Wtrans series is a system for wireless acquisi-

tion of measured values. The acquired values are first transmitted wirelessly to the receiver of the Wtrans system and from there to measurement and control equipment such as controllers, automation systems, indicators, or recorders for further processing.

The JUMO Wtrans T01 receiver is used in conjunction with appropriate wireless measuring probes for mobile or stationary measurement of the temperature. One receiver can process up to 16 wireless signals. Assigning unique IP addresses means that the signals can be processed together by one receiver. The supplied lambda/four-antenna can be directly screwed on or mounted externally. If the antenna wall holder is used with the 3 m antenna cable, the maximum open air range is up to 300 m. The insertion variant from the JUMO Wtrans series is particularly well-suited for recording the core temperature when cooking or smoking meat and sausage products.

Barcodes ensure security

At Ablinger, each transmitter has a barcode and can therefore be easily traced. A barcode is also generated for each order. This barcode includes information about the corresponding product and the order number. The individual carriages are then moved into the smoking chambers and the barcodes are scanned.

The result is that the right smoking process for the respective product starts automatically. Each product has a fixed limit value (which is monitored) with a hold time. Once this limit value is reached and the hold time has expired, the completion of the process is indicated via external displays. The product name, the current temperature value, the maximum value, the limit value, and the hold time are also displayed on these indicating devices. A daily protocol is automatically generated to provide continuous documentation of the process. This provides an overview of all probes used and batches processed either issued as a PDF file or sent via email. The whole process was visualized using the JUMO SVS3000 software which supports the user with extensive protocol functions for batch-related protocol evaluation and data archiving for an adjustable period. This overall package of measurement technology and software ensures the maximum degree of flexibility in the production and security for the documentation.

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Controlled cheese maturation

Optimal quality due to automation

Germany is a cheese country. Almost 25 kilograms of cheese are consumed annually per person and 1.1 million tonnes are exported. From the North Sea to the Allgäu region in the very south of Germany, large and small dairies offer around 150 regional and national cheese specialities. Cheese production is a traditional trade that has not changed for centuries. However, even though the principles have not changed, more modern technology always finds its way into cheese production. One dairy in the Allgäu region is using a JUMO automation system to ensure controlled cheese maturation.

The journey from milk to cheese is always the same. Fresh or pasteurized milk is skimmed and then adjusted to a defined fat content using cream. The milk mixture is pre-matured using lactic acid bacteria and then coagulated using rennet so that the curd is made. The remaining whey is separated from the curd by draining and pressing. The curd is then left to rest. It is during this phase, which can take weeks or months, that the cheese acquires its very special character. Gebr. Baldauf GmbH & Co. KG has been producing cheese specialities from hay milk in the Allgäu region for over 150 years and runs several small alpine dairies. The task was to further optimize the cheese quality at two of these locations using heat treatment chambers. To do so, the company wanted to use thermophilic cheese cultures during the maturation process to provide a milder, less acidic flavor. While conventional, mesophilic cultures work optimally in temperatures as of 25 °C, their thermophilic counterparts require significantly higher temperatures. However, the process can be controlled very precisely based on the pH value, thereby ensuring a consistently high product quality.

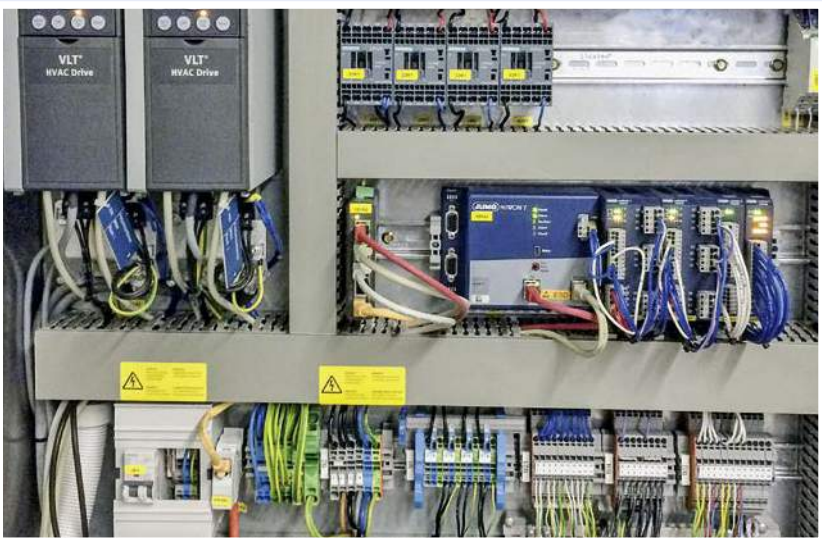
JUMO Engineering as a partner

The company relied on engineering solutions by JUMO GmbH & Co. KG to implement this project. The JUMO Engineering team bundles decades of experience in industrial measurement, control, and automation technology. This team supports customers throughout the entire project handling and develops customized applications for a variety of industries.

The task in this case was to control two heat treatment chambers at each of the two locations using a temperature profile. In addition, the pH value of the products needed to be continuously measured as it is the termination criterion for the heat treatment process. The process data needs to be acquired and remote access must be possible via the Internet.

All these requirements were implemented using the JUMO mTRON T automation system, the JUMO AQUIS touch P multi-channel measuring device, as well as JUMO temperature and pH sensors. The JUMO mTRON T system has a modular

JUMO mTRON T and JUMO AQUIS touch P



Installation situation of the JUMO mTRON T

Ripening chamber with JUMO mTRON T panel and JUMO AQUIS touch P

design. Different measurands such as temperature, pressure, or humidity can therefore be precisely acquired and digitalized using the same hardware. In addition to flexibility, future security and expansion options also played an important role in the deployment of the automation solution. For example, JUMO mTRON T enables simultaneous operation of up to 120 control loops. Furthermore, the inputs and outputs of each controller module can be individually expanded and adjusted via expansion slots. Another advantage is the clear display of all the acquired values. In addition to enabling visualization, the multifunction panel also enables easy-to-use operation of the controllers and program generators. User-dependent access to parameter and configuration data for the overall system is also supported. The recording functions of a fully-fledged paperless recorder, including a web server, are also implemented as a special feature in the JUMO system. Proven PC programs are available for extracting and evaluating recorded data.

Complete solution with web connection

The solution for the dairy in the Allgäu region involved the panel being operated entirely using custom process screens. The screens enable program selection, program start, and entries in a batch field. The pH value in the cheese is measured with a JUMO AQUIS touch P using an insertion electrode and the temperature is measured using an insertion probe. The JUMO AQUIS touch P is a modular multichannel measuring device for liquid analysis with an integrated controller and paperless recorder. Regardless of whether the measuring task involves the pH value, redox value, electrolytic conductivity, resistance of high-purity water, temperatures, or disinfection measurands (such as free chlorine, total chlorine, chlorine dioxide, ozone, hydrogen peroxide, or peracetic acid), the JUMO AQUIS touch P provides a central platform for displaying and processing the corresponding sensor signals. The heating chambers in both alpine dairies are linked to the company's head office. The batch data from the plants are extracted on the server at the headquarters and relevant form printouts are stored on the server as PDF documents. Additionally, the form indicates which alpine dairy the batch comes from so that the file is also printed on the network printer of the respective dairy.

The quick and easy implementation of the required application was important to Gebr. Baldauf GmbH & Co. KG. A cost-effective overall solution was possible thanks to JUMO Engineering's system concept.

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Process screen: chamber overview

JUMO mTRON T
Scalable measurement, control, and automation system
Type 705060

JUMO AQUIS touch P
Modular multichannel measuring device for liquid analysis with integrated controller and paperless recorder
Type 202580

Flow measurement in liquid concrete

Measurement technology for the harshest conditions

The company BTD Bohrtechnik AG operates in the field of special civil engineering and in the geothermal sector. Their core expertise lies in manufacturing and developing drilling machines, drilling tools, and backfilling materials. Liquid concrete is used for this technology to strip the drill holes. A reliable flow measurement is absolutely required here to deliver optimum results. That is why BTD Bohrtechnik AG uses electromagnetic flowmeters from JUMO.

Geothermal energy counts as renewable energy and is defined as thermal energy stored below the surface of the earth. This so-called geothermal energy is a source of energy for heat production that is constantly available. A distinction is fundamentally made between near-surface (up to 400 m) and deep geothermal energy (greater than 400 m up to several thousand meters). In Central Europe, the average temperature increases by about 3 degrees Celsius per every 100 m of depth. As of a depth of 10 m below the surface of the earth, the temperature remains practically constant throughout the entire year.

The first work step in using geothermal energy is to drill a hole using a mobile drilling unit. The geothermal probe is then installed in the drilled hole. After that the hollow space is compactly filled, which thereby ensures the thermal transfer of the probe. Brine is almost always used as the heat transfer medium. It is a mixture of water and antifreeze fluid. This mixture is continuously pumped through the probe into the deep. There it heats up and is transported back to the surface of the earth.

The JUMO flowTRANS MAG S01 electromagnetic flowmeter is used in this application to determine the exact volume flow of the liquid concrete. This is aligned with the calculated and previously planned volume. Process information regarding possible air pockets can thereby be evaluated. Electromagnetic flowmeters often present the only option for these applications to ensure high abrasiveness

Questions for BTD Bohrtechnik AG:

"What role does geothermal energy play in the energy transition?"

Its CO_2 neutrality, almost unlimited availability, and non-hazardous nature places geothermal energy among the energy forms that make the most sense in the long-run. As constant ground energy can be gained from geothermal energy, it represents a real alternative to the current generated at nuclear, coal-fired, and gas power plants. This form of energy is therefore an important, additional pillar in the energy transition.

"What are the particular challenges of the measurement technology used in geothermal energy?"

The challenge here is finding the right materials that meet the high requirements at constructions sites, have a low weight, and deliver operability as easily as possible.

"How does JUMO support you with your applications?"

JUMO manufactures components for us as requested and in the quality we need.

and solid-laden liquids in the required measuring performance.

Easy cleaning, long operating life

For many years the magnetic-inductive measurement method has been tried and tested in mining industry applications for quantity measurement. One major advantage of this measurement method is the free pipe cross section of the measured value transducer. This means that no additional pressure losses occur and that the measuring pipe can be cleaned very easily. Special materials need to be selected for the pipe coating and the measuring electrodes due to the highly abrasive features of the medium that is to be measured. These materials are the perfect answer to the raw process conditions. This means that service lives can be extended compared to standard coatings and that long-term stability is ensured in the process.

At BTD Bohrtechnik AG, JUMO technology is also used in further process steps such as the final pressure check that is part of the system's leakage test. As the water needs to have a specific temperature in this test, the temperature is controlled using push-in RTD temperature probes. A JUMO paperless recorder is used for acquiring and evaluating data for these process parameters.

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JUMO flowTRANS MAG S
For the process industry

Furnace control and data archiving

With the JUMO mTRON T automation system

Over the course of more than 90 years, Vacuumschmelze GmbH & Co. KG, with its headquarters in Hanau, Germany has evolved into one of the world's leading companies for magnetic and metallic special materials and products refined from these materials. Today, the company employs over 4,000 individuals and owns more than 800 patents. Excellent products for almost all industries and markets are produced every year in the business units semi-finished products, parts, cores, components, and permanent magnets.

Extremely precise, reliable, and reproducible temperature control is needed to manufacture and refine these materials. The various furnaces work at temperatures above 1,000 °C for their application. The scalable JUMO mTRON T measurement, control, and automation system is used at VAC in Hanau, Germany. The universally deployable system stands out mainly with its simple, application-oriented, and user-friendly configuration concept. At its heart is a central processing unit with a process map for up to 30 input/output modules. The CPU has superordinate communication interfaces including a web server. For individual control applications, the system has a PLC (CODESYS V3), program generator and limit value monitoring functions as well as math and logic modules. In addition to enabling visualization of all processes, the convenient multifunction panel enables easy to operate controllers and program generators. The use of predefined screen masks that come as a standard feature considerably reduces startup times. All acquired data is then analyzed and archived using the PCA3000 software.

Overall solutions from products and services

Vacuumschmelze GmbH & Co. KG also used the Engineering services from JUMO to commission the JUMO mTRON T. JUMO's many years of experience with highly precise control technology was a big advantage here. The Engineering department was particularly deployed for the optimization of the furnace systems, leading to noticeable improvements in the results and energy efficiency. The extensive JUMO product portfolio which on top of automation solutions also includes thermocouples, controllers, thyristor power controllers, recording devices, and safety temperature limiters was once again used to construct the furnaces. Manufacturers who produce plants for the aerospace and automobile industry can also get JUMO devices with the required certificates according to AMS 2750E or CQI-9.

JUMO AMS 2750E JUMO CQI-9

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Pictures of the application

Bell furnace after removal of the heating mantle to start the cooling phase

JUMO mTRON T in the control cabinet for temperature control in the tower furnace

Process screen: control system signals

Process screen: furnace control

A hot affair

Measurement and control technology for glass furnaces

Glassware production places extremely tough requirements on all process components. This naturally also applies to the measurement and control technology that is used. A producer in Spain chose a holistic solution by JUMO for building a new glass furnace.

The company is a globally leading supplier of glass packaging for beverage and food products. Every year, approximately 15 billion bottles are manufactured. At five sites in Spain, the company manufacturers bottles for sparkling wine, spirits, beer, soft drinks, and mineral water as well as for the food industry. In addition, at another location innovative packaging solutions are developed.

Industrial manufacturing of glassware is a challenging procedure. Production starts with a melting process inside special furnaces. The raw materials out of glass are continuously fed to the furnace and melted. Then, the liquid glass is sent to processing machines capable of producing up to several hundred bottles per minute. The plant design and the entire process flow require that the plant operates around the clock.

To ensure a consistently high quality for the end product, the temperature of the liquid glass must be permanently monitored and controlled. In the case of the new plant in Spain, the requirement was to develop a package solution capable of measuring and controlling the measurands temperature, pressure, humidity, oxygen, and glass filling level.

Over 100 sensors in use

JUMO was not only able to provide the required technology, but also handled the complete installation of the sensors along with the planning and installation of the control cabinets for the required measurement and control technology. More than 100 JUMO thermocouples were deployed to constantly monitor the temperature throughout the entire process. Among other devices, the JUMO dTRANS p20 DELTA differential pressure transmitter and the JUMO DELOS SI precision pressure transmitter with switching contacts and a display are used to measure the pressure in the air, gas, and fuel lines. In addition to the PLC controls, the control cabinets house many other JUMO components, such as the JUMO dTRANS T02 and dTRANS T05 transmitters as well as redundant dTRON series controllers for controlling the supply of air and heat. In the furnace itself, not only the process pressure is controlled with the JUMO IMAGO 500 multichannel process and program controller, but also the flow of various media and the temperature.

Additionally, the JUMO mTRON T measuring, control, and automation system is used to control the filling level of the glass melt.

Further information

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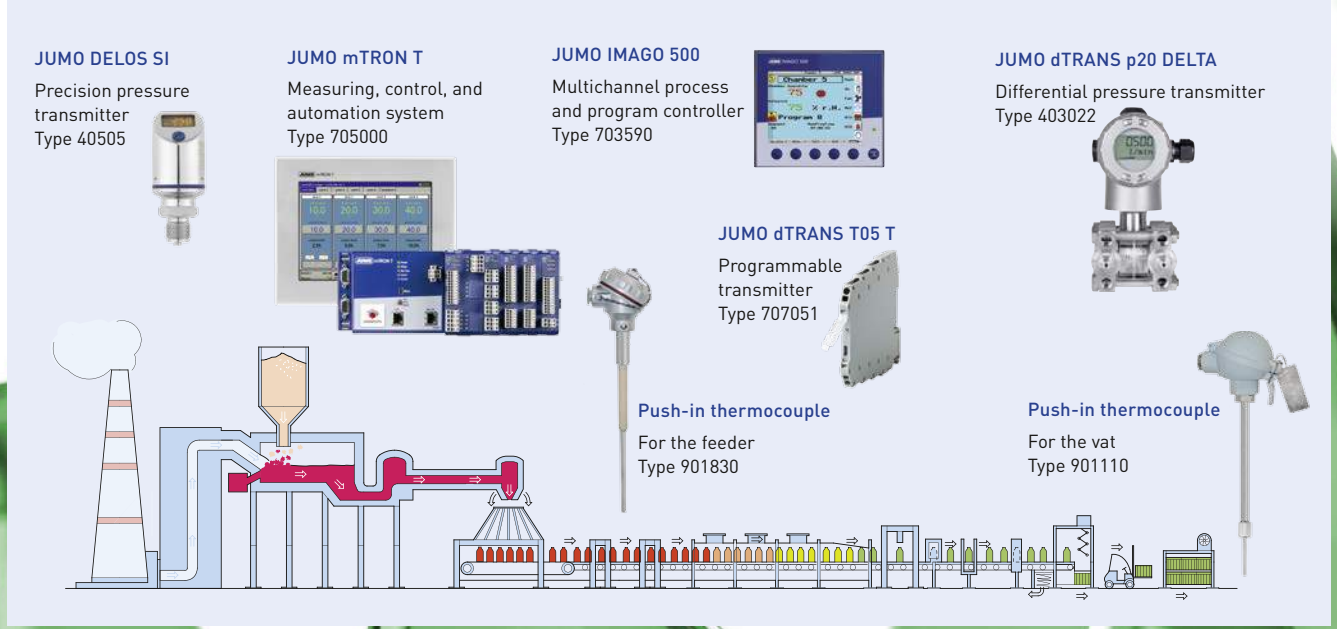
Container glass manufacturing with JUMO components



Systematic exhaust air decontamination

JUMO provides clean air

Washing processes for treating exhaust air are used successfully in many sectors of industry. These processes can be applied to decontaminate single-component and multiple-component exhaust gas compositions that are harmful to human health as well as exhaust gas flows that are both harmful to the environment and odorous. terra-care Umwelttechnik GmbH in Recklinghausen, Germany does not only use components from JUMO in the area of measurement and control technology, but also relies on its the engineering services.

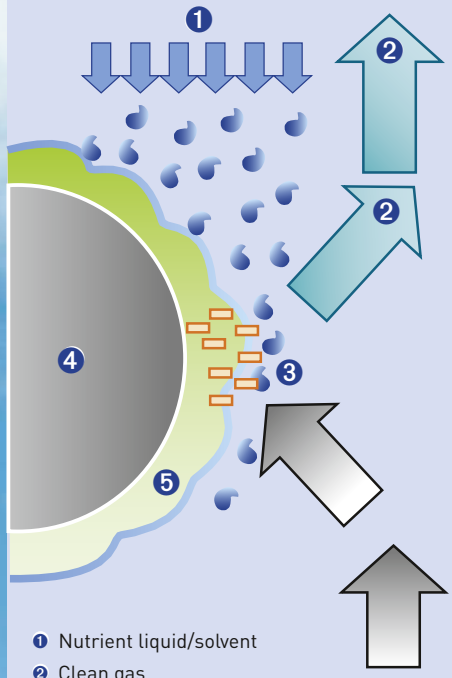
terra-care Umwelttechnik GmbH prefers to use multistage systems with absorption agents and biological treatment stages to safely and effectively comply with the legally stipulated pollutant limits. The process relies on the mass transition of soluble raw gas components and the sorbent on the one hand, and the biodegradability of many exhaust air components on the other. The high deposition rate of the washing systems means the emission limit values stipulated in the German Federal Ministry's "TA Luft" (Technical Instructions on Air Quality Control) for the protection of the environment, nature, and reactor safety or BimSchV (Germany's Federal Emissions Protection Act) can be reliably complied with and guaranteed. The raw gas is fed to the washer system and guided through the column.

Complex, multistage process

The aerosols that are carried along are removed from the treated exhaust gas stream by a demister before being routed into the next cleaning stage. To minimize operating material costs, the solvent is recycled, continually checked with measurement technology, and, if necessary, chemically balanced. The process engineering in the biological cleaning stage can be viewed as an equivalent. However, here, the biodegradable materials are reduced using microbacterial implementation mechanisms.

The safe functionality of the plant depends to a large extent on the controllable operating parameters of the installation

The principle of exhaust air purification



❶ Nutrient liquid/solvent
❷ Clean gas
❸ Microbacterial metabolic process
❹ Filler
❺ Biofilm

The entire plant at a glance

parts and the water quality. For this reason, the entire system is exclusively monitored and controlled using JUMO's measurement and control technology components. The setup of the control system was developed in coordination between the engineers from terra-care Umwelttechnik and the JUMO Engineering department. In this process, the JUMO Engineering team collaborated with the customer to develop product requirements specifications and a specification sheet based on a feasibility analysis. This resulted in an individual system solution that allowed the use of the extensive JUMO product portfolio in measurement and control technology.
At the terra-care Umwelttechnik plants, the conductivity, water temperature, oxygen content, pH value, level, differential pressure, and supply air temperature are measured in the individual cleaning stages and evaluated by the JUMO AQUIS touch. The multichannel measuring device forms the central platform for displaying and processing the corresponding sensor signals. A process schematic and a tabular list of all the measurement parameters support the operator in the form of a chart on the screen of the JUMO AQUIS touch. Depending on the displayed measured values the water quality is ensured along with a response initiated by the control system in case of high load. Similarly, the circulation pump and fan outputs are controlled so that the whole system works independently and without any operator involvement. The important data is also evaluated through automated processes.

A network of digital sensors

Furthermore, the innovative JUMO digiLine system is used to measure the oxygen content. JUMO digiLine is a bus-compatible connection system for digital sensors in liquid analysis that gives users the ability to build intelligent sensor networks. Only a single digital signal line is then routed to the evaluation unit or controller. This enables more efficient and faster cabling of plants in which several parameters need to be measured simultaneously at various locations.

Further information

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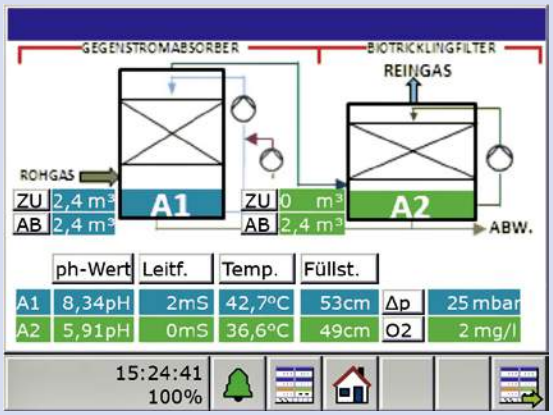
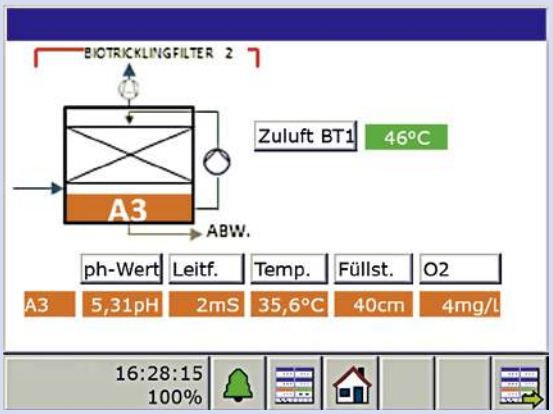
JUMO AQUIS touch S in use



Process screen: overview of stage 1 and 2



Process screen: overview of stage 3

JUMO – a prized partner

Awards as an innovator, employer, and global leader

The JUMO corporate group has again won some impressive awards in recent months. For example, in November the company was awarded the *Deutschlandtest* seal for "Top career opportunities" from the *FOCUS Money* magazine.

JUMO is in second place in the "measurement technology" industry. This study examined the 2,000 companies in Germany with the largest number of employees with respect to career and development opportunities. The foundation for this was almost 10-million statements in online media, forums, blogs, and evaluation platforms.

There are around 3.6 million family businesses in Germany. Over half of the people working in the private sector work in these businesses. The proportion of family businesses of the German gross domestic product is approximately 45 %. According to a ranking by the platform "Die deutsche Wirtschaft", JUMO belongs to the 1,000 largest German family businesses. JUMO was once again included in FOCUS magazine's list of Germany's best employers. 1,000 companies with at least 500 employees from 22 different industries were examined for this. JUMO was ranked in place 117 out of 1,000 companies in the overall standings. JUMO achieved ninth place in the "Electronics, electrical engineering, and medical appliances" industry and managed third place among medium-sized companies with up to 2,000 employees.

Innovation

Furthermore, the magazine *Wirtschaftswoche* analyzed the innovative power of 3,500 medium-sized German companies. JUMO achieved 25th place in the overall ranking.

In this investigation, it was important for the respective company to excel through constant innovations, to be seen by competitors as innovative, and to be a pacesetter for innovations – not just a copycat. Economical indicators such as turnover and profit growth were also included in the evaluation.

Global market leader

The global market leader index for the DACH region of the *HBM Unternehmerschule* at the University of St. Gallen is completely new. JUMO is represented in this index with its industrial temperature probes for heat meters. Award-winning companies need to be active on three continents with their own export/production/distribution companies, generate an annual turnover of at least 50 million euro, have an export share of at least 50 %, and be the number one or the number two in the relevant market segment.

JUMO fulfills all of these criteria.

JUMO Campus: experiencing knowledge

Keep your professional knowledge fresh

Training courses for customers and employees about JUMO products and the organization of conferences and events – all this has been taking place at JUMO for two years under the management of "JUMO Campus".

For a number of years now, JUMO has offered an extensive training program to help customers keep their professional knowledge and skills base up to date and make the most of all their products. The training and materials being offered range from e-learning and technical literature to seminars and exclusive training. "JUMO webinars" have also been part of the offer since last year.

Webinars complete the offer

Webinars should not be considered a replacement for local training courses on-site – they do, however, provide an important supplement to the known seminars. They offer customers a first glimpse into a selected topic for about an hour. Over the past year, JUMO Campus has already offered 14 German customer webinars that were very well received. For this reason, the offer has been doubled for 2017. In the future the webinars will be available in German and English.

However, the additional offer from JUMO Campus is also constantly growing: the number of training courses that have taken place has increased by 43 % since 2011 and the number of participants has also grown significantly by 30 %. The average rating the training courses received from our participants was 1.3. (an "A" grade).

Exclusive training courses

In addition to the training courses, all the seminars are also offered as an individual exclusive training course on-site – in English if requested. This means that each training course can be individually tailored to specific needs and requirements.

The introduction of a modern "learning management system" is the next big Campus project.

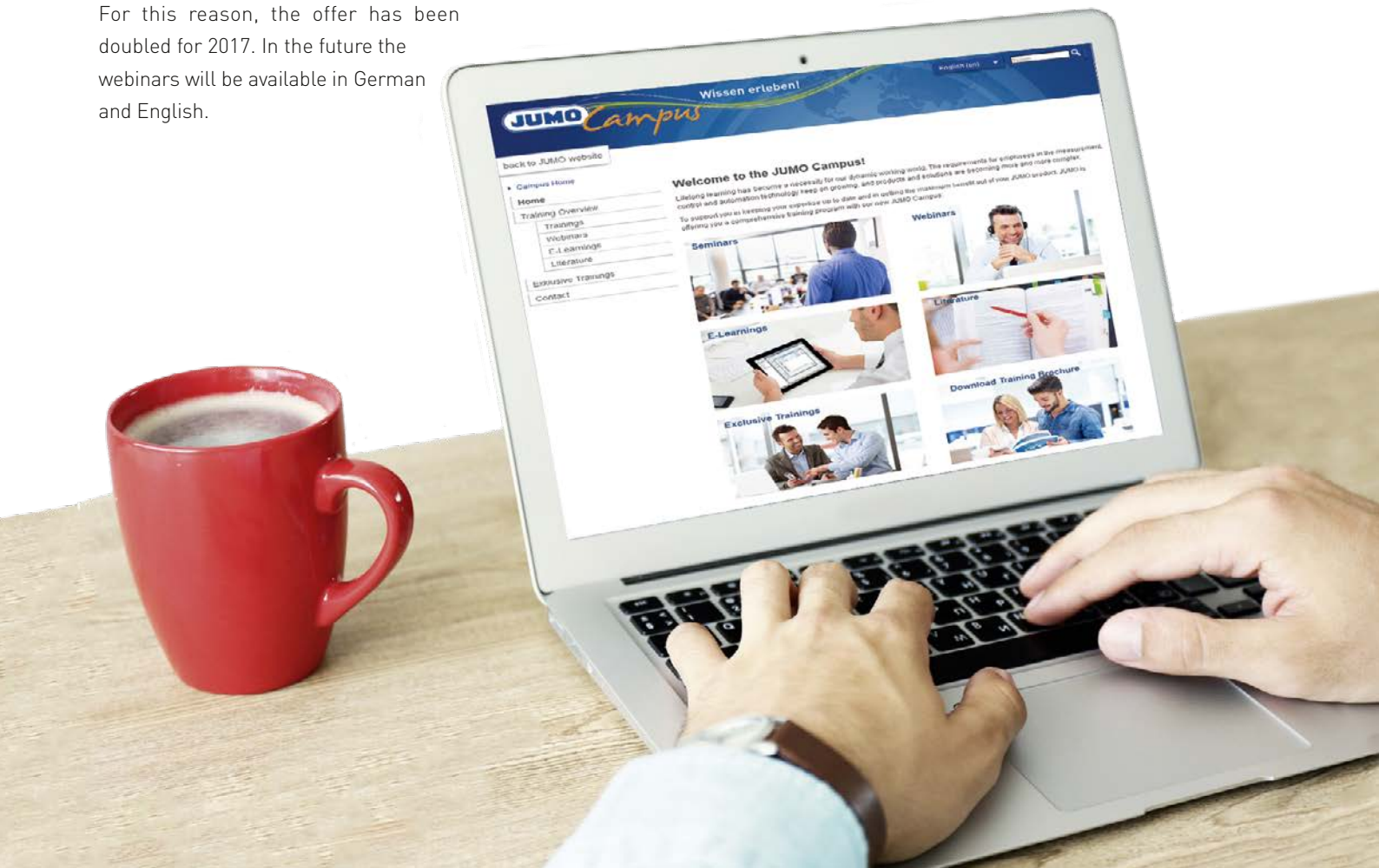
In November 2016, as the first big step, the "JUMO Campus Portal for Customers" went online.

New customer portal

The portal contains a clear summary of our complete range of further training courses and materials: from seminars and webinars to technical literature and e-learning. Webinar recordings will soon be added. The advantage for you: thanks to various filter and search functions you can now easily find relevant training courses for your product or subject area.

Visit us online and take a look for yourself.

Our webinars
http://campus.jumo-en.info



Challenges in calibration

The solution for complex challenges

Temperature block calibrators are often used to check thermocouples directly on-site at the production facility. The advantage of using block calibrators is that they are very compact. The result is that they can be used very flexibly and cover a very large temperature range (–100 to 1300 °C). They can be calibrated for DAkkS (Germany's National Accreditation Body) in line with directive DKD-R 5.4 "Calibration of temperature block calibrators" of the German calibration service.

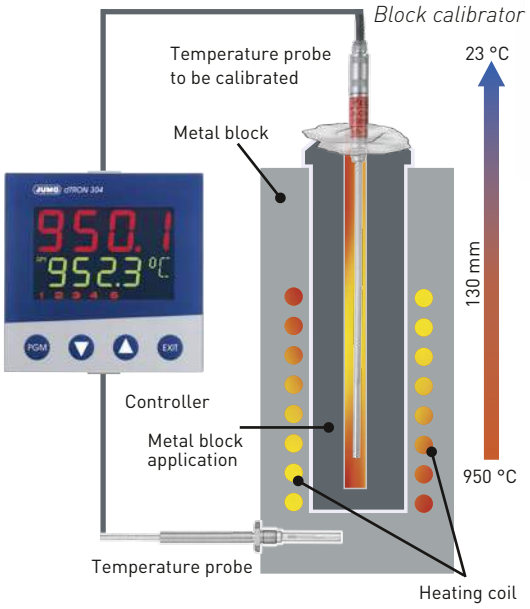
This involves the installed temperature sensor being calibrated, including the display unit. In addition, the temporal temperature stability, the hysteresis, the "loading effect", and the temperature homogeneity are also determined. Users can now estimate their measurement uncertainty and evaluate their measuring results using this data. Comparative measurements between accredited laboratories showed that the results are very easily reproducible in the temperature range up to 600 °C.

What about temperatures greater than 600 °C?

For high temperatures, the preferred compact design of the block calibrator becomes a disadvantage: large temperature gradient along the short immersion depth (frequently max. 110 to 130 mm). Consequently, as the temperature rises, the axial temperature homogeneity along the drilled hole significantly increases in importance and has an ever greater influence on the measuring result. Even with comparative measurements at the maximum immersion depth the result can be measuring values that vary by several Kelvin.

Even when the thermocouples are very similar in outward appearance (same insertion length, same protection tube diameter), they do not necessarily display the same measuring result.

The following two X-ray images show two thermocouples with a protection tube diameter of 3 mm.



X-ray images

Figure 1 *Figure 2*

Figure 1 shows firstly that the welding bead is hanging in the "air" and secondly that it is at a distance of 4.75 mm to the base. In *Figure 2,* you can see a good heat connection and a distance of 2.83 mm between the welding bead and the base.

The problem becomes visible if you try to determine the influence of the axial temperature distribution. You can use different methods to do so:

1. Two thermocouples

One thermocouple is fixed in position on the base of the drilled hole.

The second thermocouple is pulled out step-by-step.

2. Profile thermocouple

A special designed thermocouple.Thermoelectric voltage is tapped in various positions.

3. Special metal block insert

A metal block insert is especially produced for this test. The insert features drilled holes with various depths.

Depending on the method and the thermometer that is used, completely different results that vary by up to several Kelvin will occur.

But which result is the right one?

The significant influence of the axial temperature distribution on the measuring result was the trigger for raising the smallest measurement uncertainties for accredited calibration laboratories in Germany.

Temperature range	New, smallest measurement uncertainties for block calibrators
600 to 800 °C	2.5 K
800 to 1000 °C	4.0 K
1000 to 1100 °C	5.0 K

Smaller measurement uncertainties cannot be achieved with block calibrators. If measuring uncertainties of 1 K are specified in the calibration certificates, you should questions these results.

Further information

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Wireless level measurement in fermentation and storage tanks

Promising test in a pilot system

Brewing masters all over the world have been brewing their beer with plants from ZIEMANN HOLVRIEKA for more than 160 years. To this end, ZIEMANN HOLVRIEKA plans, builds, and installs all the plants required for the brewing process – from the brewery to the pressure tank cellar. When installing the necessary measurement technology in these plants, tank heights of up to 30 m must be observed. Similarly, the number of tanks, which can be many more than 100 per brewery (depending on the application), must also be observed. As a result, the necessary cabling is complicated here.

For over two years, ZIEMANN HOLVRIEKA has therefore been testing the wireless level measurement in a fermentation and storage tank in its own pilot brewery using the JUMO Wtrans p. It is used in conjunction with a Wtrans receiver for stationary or mobile recording of the pressure in liquid or gaseous media. The measured values are transmitted wirelessly. The measured values are displayed on the receiver and are available at the RS485 interface in digital form as well as in electrical standard signals at the analog outputs.

The device was installed in this application with the JUMO PEKA process connection adapter system. Thanks to its cavity-free mounting and the hygienic design, the EHEDG-certified system is easy to clean and specifically geared to the requirements of the food industry.

The level measurement is performed in closed beverage tanks by means of the differential pressure measurement. Two measuring devices are required for this task. One is installed on the base of the tank and the other on the top of the tank. The practicability of JUMO's "wireless technology" is tested in ZIEMANN HOLVRIEKA's pilot brewery. Among other things, a decisive factor was the operating life of the battery because frequent changing would mean additional maintenance overheads.

In the pilot application, the pressure transmitters achieved an operating life of over two years with a transmission interval of 30 seconds. However, this involved ideal test conditions with relatively low distances. The initial experiences that ZIEMANN HOLVRIEKA had with JUMO's wireless pressure measurement were, however, promising.

The next step involves transmitting the results for realistic brewery sizes. Tests need to be performed to see whether the transmission can also be reliably ensured for tanks that are further apart. The maximum distance between the transmitter and the receiver also still needs to be subjected to further tests. In the event that these tests and an overall evaluation of the system turn out to be positive, ZIEMANN HOLVRIEKA will test out the wireless level measurement at its brewery plants.

Further information

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JUMO Campus: highlights in 2017

Keep your technical knowledge fresh – with our JUMO seminars and webinars:

TEMPERATURE

Basic course:
Electrical temperature measurement
September 27, 2017
Webinar:
Industrial heat treatment according to AMS 2750E and CQI-9
May 17, 2017

LIQUID ANALYSIS

Basic course:
Analytical measurement technology for the practitioner
May 16, 2017 and November 21, 2017
Webinar:
Connection of JUMO digiLine sensor technology to a JUMO AQUIS touch S/P
May 9, 2017

PRESSURE AND LEVEL

Basic course:
Pressure and level measurement technology
May 17, 2017

FLOW

Basic course:
Flow measurement technology
March 23, 2017 and September 20, 2017
Webinar:
Flow measurement with the JUMO flowTRANS MAG
March 21, 2017 and September 28, 2017

HUMIDITY

Webinar:
Introduction to humidity measurement
May 04, 2017

CONTROL

Basic courses:
Control technology for practitioners
June 19-22, 2017 and November 20–23, 2017
Measurement, control, and recording technology
September 19-21, 2017
Control parameters and optimization of controllers
September 26, 2017

RECORDING

Basic course:
Data recording and evaluation with JUMO paperless recorders
September 28, 2017
Webinar:
JUMO LOGOSCREEN 600: Startup, wiring, configuration, data transmission, and evaluation
May 24, 2017

AUTOMATION

Webinar:
Applying the JUMO mTRON T: Establishing a fixed-setpoint controller and a recording
June 20, 2017
System courses:
Measuring, controlling, and automation system JUMO mTRON T
March 21-22, 2017 and September 12–13, 2017
PLC programming software CODESYS V3.5 and JUMO mTRON T
March 23, 2017 and September 14, 2017

MONITORING

Webinar:
Using the JUMO safetyM STB/STW
June 27, 2017

GENERAL TOPICS

Basic courses:
Explosion protection in Europe according to ATEX
May 18, 2017 and November 23, 2017
Functional safety in Europe according to SIL and PL
September 29, 2017
Webinar:
Explosion protection basics (ATEX)
September 07, 2017

Our webinars
http://campus.jumo-en.info

JUMO at trade fairs in 2017

Experience our new products and innovations live

AUSTRIA
SMART Automation Linz
Trade fair for industrial automation
May 16-18, 2017 in Linz

AZERBAIJAN
Caspian Oil & Gas
Trade fair for oil and gas production
May 31-June 3, 2017 in Baku

CHINA
ISH China & CIHE
International trade fair for heating, ventilation, air-conditioning, sanitation, and home comfort systems
May 18-20, 2017 in Beijing
P-MEC, InnoPack & LABWorld China
Trade fair for pharma machinery, equipment, and technology
June 20-22, 2017 in Shanghai

DENMARK
HI Industri
Technology and industry trade fair
October 3-5, 2017 in Herning

FRANCE
Mesures Solutions Expo
Trade fair for the process industry
May 31-June 1, 2017 in Lyon
International Paris Air Show
Largest international event for the aerospace industry
June 19-25, 2017 in Paris

GERMANY
HANNOVER MESSE
The world's largest industrial trade fair
April 24-28, 2017 in Hanover
SENSOR + TEST
The measurement trade fair
May 30-June 1, 2017 in Nuremberg
drinktec
World's leading trade fair for beverages and the liquid food industry
September 11–15, 2017 in Munich

INDIA
AUTOMATION
Leading trade fair for process automation
August 9-12, 2017 in Mumbai

ITALY
SPS IPC Drives Italia
Trade fair for electronic automation, systems, and components
May 23-25, 2017 in Parma

KAZAKHSTAN
KIOGE
International conference and trade fair for oil and gas
October 4-6, 2017 in Almaty

NETHERLANDS
AQUATECH Amsterdam
Leading trade fair for process water, drinking water, and wastewater
October 31-November 3, 2017 in Amsterdam

NORWAY
NOR-SHIPPING
Trade fair for the maritime industry
May 30-June 2, 2017 in Oslo
AQUA NOR
World's largest aquaculture technology trade fair
August 15-18, 2017 in Trondheim

POLAND
WOD-KAN
International trade fair for machines and facilities for water supply and sewage systems
May 16-18, 2017 in Bydgoszcz
ENERGETAB
International power industry trade fair
September 12-14, 2017 in Bielsko-Biala

RUSSIA
Metallurgy Litmash, Tube Russia, Aluminium/Non Ferrous
Trade fair for foundry, metallurgy, non-ferrous metal, metalworking, and welding engineering
June 5-8, 2017 in Moscow

SWEDEN
ELFACK
Trade fair for the electricity industry
May 9-12, 2017 in Gothenburg

SPAIN
Expoquimia
International chemistry event
October 2-6, 2017 in Barcelona

United Kingdom
Sensors & Instrumentation
Trade fair for test, measurement, and control
September 26-27, 2017 in Birmingham

USA
Sensors Expo
Industry event focused on sensors as well as sensor-integrated systems and control
June 28-29, 2017 in San Jose, California

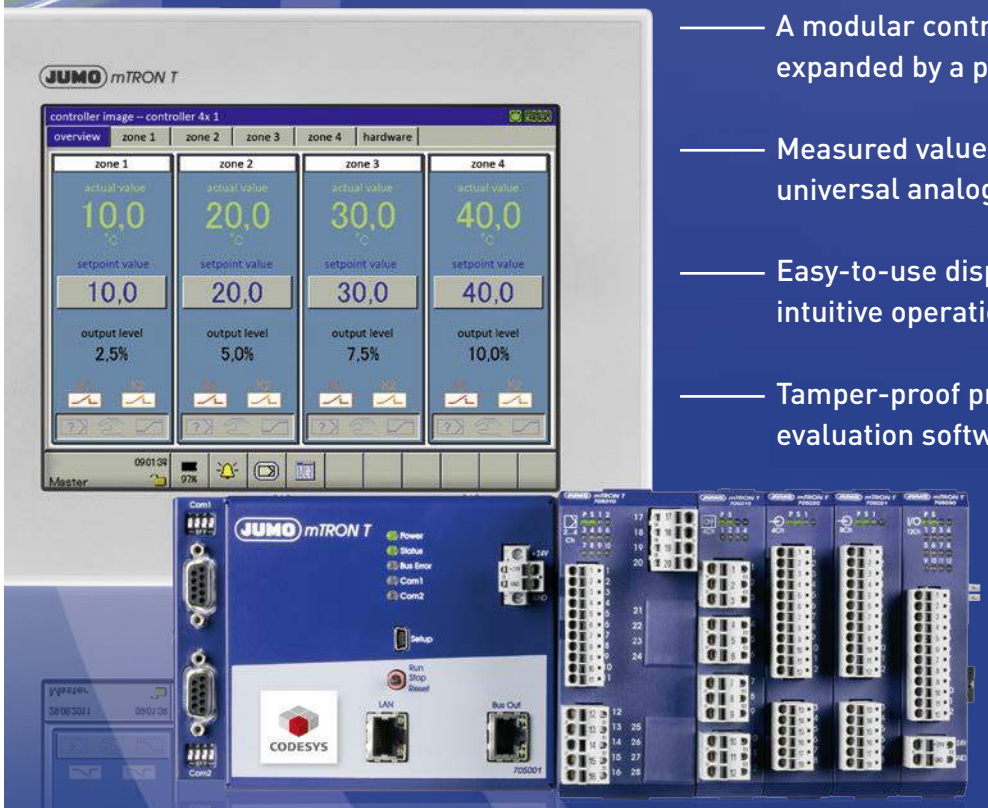
UZBEKISTAN
OGU
Trade fair for oil and gas
May 17-19, 2017 in Tashkent

Other scheduled trade fairs:
http://fairs-international.jumo.info

www.jumo.net

Noticeably perfect.

Measuring, control, and automation system JUMO mTRON T



- A modular control system that is easy to configure, expanded by a powerful PLC (CODESYS V3)
- Measured value recording through high-quality, universal analog inputs
- Easy-to-use display and simple, intuitive operation
- Tamper-proof process data recording with extensive evaluation software

JUMO. More than sensors + automation.