SENSORS + AUTOMATION

Issue 1/2024

JUMO is a leading system and solution provider

Efficient orchestration with SPE, IO-Link, and sensor-to-cloud

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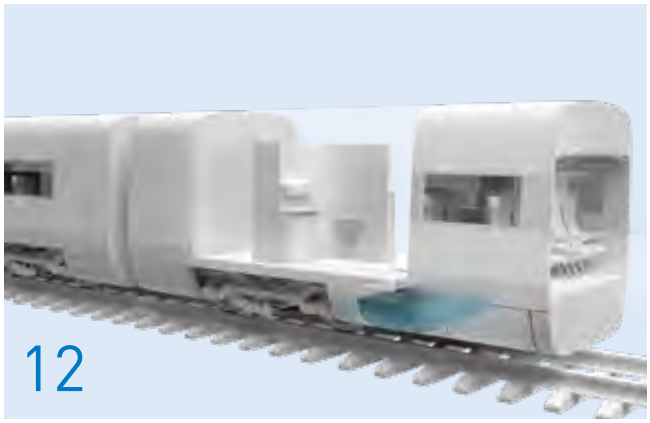
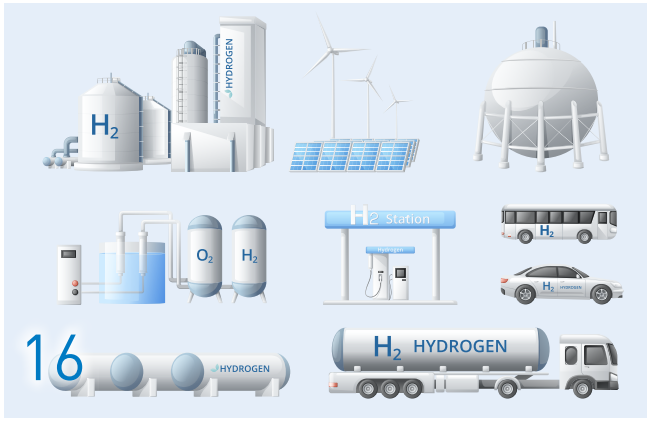




JUMO

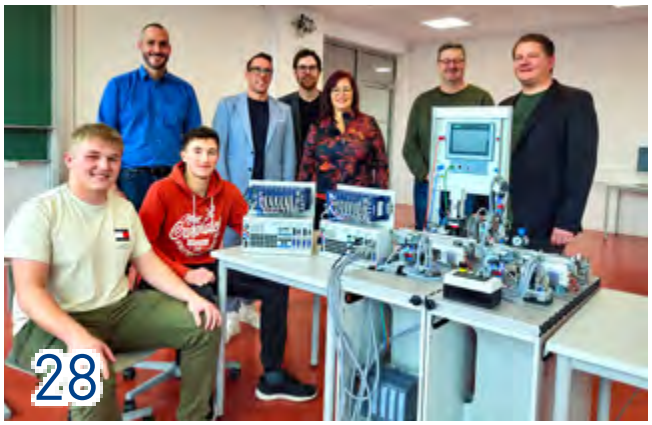
MORE THAN SENSORS AND AUTOMATION

APPLICATIONS + KNOWLEDGE

TECHNOLOGY + PRODUCTS

COMPANY + SERVICES

DISPLAY



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

EDITORIAL

Dear Reader,

"More than sensors and automation". That's our brand mission here at JUMO. But what do we mean by "more" exactly? Apart from our products, what additional benefits do we offer customers around the world? It's our decades of expertise that enable JUMO to develop individual sensors and automation products, such as controllers and control systems, into tailored systems for a wide array of industries. Regardless of whether the task at hand involves high-precision temperature and humidity control in large furnaces or accurate water analysis in ultra-pure water applications (e.g. in hydrogen production), JUMO systems can tackle these challenges with ease. In doing so, we cover almost every level of the automation pyramid – from the sensor to the cloud.

And yet, "more" goes even further than this. We create customer-specific solutions based on our systems through supplementary services. These services include extensive engineering expertise for complex automation applications as well as after sales services or calibration options. As a result, we are able to create efficient complete packages that always focus on our customers' individual needs.

Our unique combination of products, systems, and individual solutions enables us to master your current challenges and also offer you new business models, such as cloud services. The next few pages contain examples of our problem-solving expertise. Though, of course, they only provide a small insight into the world of JUMO. Set us a challenge – we would be happy to show you exactly what "more" could mean for your company.

We hope you find some inspiration over the next few pages.

Dimitrios Charisiadis

Dimitrios Charisiadis
Chief Executive Officer

Steffen Hoßfeld

Dr. Steffen Hoßfeld
Chief Operating Officer

JUMO is a leading system and solution provider

Efficient orchestration with SPE, IO-Link, and sensor-to-cloud

Single Pair Ethernet

JUMO is on a dynamic development path towards becoming a leading system and solution provider for industrial sensor and automation technology. This change is clearly demonstrated by the networking and integration of modern technologies such as Single Pair Ethernet (SPE), IO-Link, and sensor-to-cloud communication in the JUMO system world.

IO-Link

Further information
www.jumo.net

These technologies have enormous potential for JUMO if one looks at the numerous industries that JUMO supplies in the field of automation.

SPE is a pioneering development in the world of industrial communication technologies. Originally developed in the automotive industry, SPE offers considerable advantages for industrial automation. It uses only a single wire pair for data transmission, which enables a leaner, cheaper, and simpler infrastructure while maintaining high data transmission rates. The advantages of SPE include space and weight reduction, easier installation, lower costs, longer range, faster data transmission, and integrated power supply via Power over Data Line (PoDL).

IO-Link is important for the implementation of smart manufacturing

IO-Link is a communication technology that has been part of JUMO's product portfolio for many years. It ensures seamless communication between sensors, actuators, and the control system. As the first standardized IO technology for communication with sensors and actuators, IO-Link enables digital point-to-point industrial network logging.

The key features of IO-Link include bidirectional communication, device parameterization, comprehensive diagnostic capabilities, and flexibility to support a wide range of devices. IO-Link also plays a central role in the implementation of smart manufacturing and the fourth ➜

industrial revolution by providing an intelligent solution for optimizing production processes and improving production efficiency as well as occupational safety.

Machine-to-machine (M2M) communication is also a key element of Industry 4.0. It refers to the automated exchange of data between machines, plants, and devices, often via a network, without human intervention. This communication enables machines to exchange information, coordinate tasks, and make decisions based on real-time data.

M2M communication refers to the direct exchange of data between devices, machines, sensors, and control systems such as the JUMO variTRON 500. This communication usually takes place via wireless or wired networks and is a central component of automation as well as monitoring systems in various industries.

The concept is closely linked to the Internet of Things (IoT), where the focus is on the interaction of machines. SPE and IO-Link play a decisive role in M2M communication. SPE enables the fast and efficient transmission of large amounts of data via a single wire pair, which can be a great benefit in complex automation environments. By integrating SPE, machines and sensors can communicate over greater distances and transmit data more efficiently. IO-Link technology impresses by providing a robust and flexible platform for the exchange of sensor data and control signals. JUMO has recognized these advantages and successfully integrated both technologies into its product portfolio.

The focus is on the interaction between machines

At JUMO, sensor-to-cloud refers to the connection of smart sensors in industrial environments directly to the JUMO Cloud. This connection allows data from production processes to be acquired efficiently and converted into usable information. Smart sensors play a key role here, as they can send data directly to the cloud without the need for additional components. This direct data flow enables production data to be used quickly and efficiently, which increases productivity and reduces costs.

Summary

It is clear that JUMO is taking a significant step toward becoming a comprehensive system and solution provider by introducing innovative technologies such as Single Pair Ethernet (SPE), IO-Link, and sensor-to-cloud communication. This benefits many industries – and therefore also JUMO customers.

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Single Pair Ethernet (SPE)

JUMO sensors make the SPE ecosystem more efficient

Data with SPE technology from the sensor directly to the JUMO Cloud • "Intelligent" probing • Standstills are avoided

The SPE-capable product portfolio presented at JUMO's 75th anniversary press conference in February 2023 has gone into series production. The innovative SPE technology has been integrated into 3 new JUMO sensor products:

❶ JUMO hydroTRANS S20 (Temperature, humidity, CO_2 transmitter)
❷ JUMO flowTRANS MAG H20 (Flowmeter)
❸ JUMO DELOS S02 (Pressure transmitter)

"SPE is interesting for all automation applications – and thereby for all industries. Many operational processes that need to ensure a high level of availability can benefit from end-to-end Ethernet networking thanks to SPE technology," explains Manfred Walter, product manager and SPE expert at JUMO.

As a result, the use of SPE can avoid standstills and enable even greater efficiency – which in turn enables long-term cost savings – in many application scenarios.

JUMO sensors make the SPE ecosystem more efficient. *"Intelligent probing is possible,"* as Walter points out. Important measurands such as temperature, air humidity, CO_2, flow, and pressure are forwarded with high accuracy and speed to such destinations as the JUMO Cloud. For the first time, this enables continuous Ethernet networking of the sensors based on the familiar automation pyramid right down to field level without a media break in Ethernet communication.

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Important additional diagnostic information can be easily and quickly supplied by an intelligent sensor for condition monitoring or predictive maintenance directly via the two-wire Ethernet interface – independently of the control system.

"Process control continues while the necessary maintenance data is extracted and processed independently in the background by the systems set up for this purpose," explains Justin Heinrici, product manager at JUMO.

Each of the 3 sensors is supplied via Power over Data Line (PoDL). Cable distances of up to 1000 m can be achieved when mounting and cabling the sensors. The connection is established using a SPE connector with the high protection type IP67 in M12 design. ■

Single Pair Ethernet

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Further information
product-highlights-en.jumo.info

Highly-scalable paperless recorder
JUMO LOGOSCREEN 700

Simple and intuitive to use • ICON-based operation and visualization concept

A high level of scalability level allows the paperless recorder to be flexibly adapted to various customer needs: from a device version without a measurement input through to device versions with up to 18 universal measurement inputs, 3 analog outputs, 18 digital inputs, 24 individually switchable digital inputs/outputs, and 7 relay outputs.

What's more, the JUMO LOGOSCREEN 700 is characterized by its high level of connectivity. In addition to standard Ethernet, USB, mini USB, and RS232/RS485 interfaces, the recorder comes with the optional extra of a PROFINET interface. Thanks to this high level of connectivity, the JUMO LOGOSCREEN 700 is a high-performance all-rounder that can record a total of 60 channels in analog and digital form, thus enabling up to 120 external analog and digital inputs to be visualized.

In heat treatment processes used in thermoprocess technology, the JUMO LOGOSCREEN 700 meets the requirements of standards AMS2750 and CQI-9, which means that it can be used as a mobile field testing device. In addition to its high-precision thermocouple connection terminal developed especially for this purpose, the paperless recorder impresses with an intuitive browser-based TUS test. Once the test has been completed, a fully automated PDF report saves the user a huge amount of time and allows for complete documentation where proof is required.

As backing up process-relevant data is becoming increasingly important as we evolve into the age of digital technology, reliable and complete documentation is the goal of any plant operator.

The JUMO LOGOSCREEN 700 offers the highest degree of security during data acquisition through manipulation detection based on the latest hash algorithms. It allows batch reports to be created for up to 5 plants simultaneously. The batch control function also offers individual and flexible usage options here, be it by touchscreen, control signal, or interface (Modbus or PROFINET).

The Windows-based software package PCA3000/PCC allows the recorded process data to be evaluated quickly and securely with the optional extra of having reports drawn up automatically.

Customer benefits – in a nutshell

- Intuitive, easy operation thanks to ICON-based menu navigation and user-friendly setup program
- Highest degree of security during data acquisition through manipulation detection based on the latest hash algorithms with digital certificate
- Data recording compliant with FDA 21 CFR Part 11, AMS2750, and CQI-9
- Individual creation of proprietary applications thanks to the ST code option and 10 customer-specific process screens
- Flexible system connection through a multitude of different interfaces and protocols

JUMO AMS2750

JUMO CQI-9, 11, 12, 29

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The ”all-rounder“ for complex applications

JUMO meroVIEW

Multifunctional digital display with PLC function • Planning reliability through modularity • High degree of interface connectivity • Suitable for numerous industries

The flexible adaptation, the customizable device menu, the text-supported operation, the parameterization, and the configuration in 4 languages as well as the quick wiring in PUSH-IN terminal technology make a fast startup and versatile use of the JUMO meroVIEW in different industries possible. *"This saves the customer time and money,"* says product manager Klaus Otto.

The new series is available in the typical formats for display devices:

❶ 96 × 48 mm landscape format with 5-digit display
❷ 48 × 48 mm
❸ 48 × 96 mm
❹ 96 × 96 mm

Up to 5 universal measuring inputs allow the connection of RTD temperature probes, thermocouples, resistance transmitters, resistance potentiometers, and standard signals 0(4) to 20 mA or 0(2) to 10 V. Customer-specific linearization with 40 value pairs or a mathematical 4th order polynomial allow individual adaptation to a wide range of sensor signals. Thanks to fast pulse inputs, machine speeds or totalized flow rates (or counting pulses) can also be acquired and displayed.

The modular device concept offers flexible expansion with a wide variety of options. These include digital and analog inputs, outputs, and interfaces as well as a voltage supply for two-wire transmitters.

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A high degree of connectivity is achieved through the available interfaces, RS485 (Modbus RTU master/slave), Ethernet (Modbus TCP master/slave), and PROFINET device as well as USB host and USB device.

With standard functions such as min/max value, measured value hold, or a taring function for weighing applications, math and logic functions can be used to link analog and digital values, or to implement additional control functions via ST code (structured text).

The setup program provides an ST editor and a debug function for ST code programming. ■

PROFINET®

Modbus

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Full steam ahead!

Safe drinking water on board at all times

Measurement and control technology is essential for treating drinking water, service water, cooling water, boiler water, and wastewater on large ships. Measuring and control devices for use in offshore and maritime applications are subject to more stringent technical requirements than their land-based counterparts. After all, it would be a disaster if the supply of drinking water on a cruise ship were to fail. While measuring devices with maritime approvals (e.g. DNV or Bureau Veritas) have been available for the engine room and its critical applications for some time, more and more such devices are being added in the field of liquid analysis.

Ever since humans have sailed the oceans they have had to think about their supplies on board. In the early years of shipping, a considerable part of the hold was used to bunker drinking water and food for the crew and passengers. If the trip took longer due to lack of wind or the water quality in the containers dropped, the lives of the passengers and crew would soon be in jeopardy.

The demand for drinking water is particularly high on cruise ships. Megaships with over 2000 passengers are the largest group and make up 2/3 of the global fleet. The largest cruise ship offers space for almost 7000 passengers, has 19 swimming pools, and an additional 500 000 liter Aqua Theater. Reverse osmosis plants are used here to ensure that the drinking water tanks are always sufficiently filled. Large ships have a range of different water circuits that all need a reliable supply.

A distinction is made between freshwater and seawater. Freshwater is categorized into drinking water and service water (usually drinking water from other areas that has been used once) which can be used to flush the toilets.

The manufacturing and monitoring of the respective water quality requires robust as well as proven measurement and control technology. By monitoring important parameters such as pH value, chlorine content (alternatively ozone, etc.), redox potential (pools), electrolytic conductivity, pressure, flow, level, and temperature in the water treatment plants, a high level of water availability and the highest quality can be ensured.

JUMO is well represented on the market here with the JUMO AQUIS touch P, JUMO variTRON 300, JUMO NESOS R40 LSH, JUMO ZELOS C01 LS, and JUMO Ex-i isolating switch amplifier.

Devices and sensors which have been approved according to DNV have undergone an additional technical inspection and are subject to extra tests designed specifically for maritime applications. As such, these approvals are not just another bureaucratic piece of paper. Instead they verify that the components concerned meet special maritime requirements for robustness in practice. In addition to the technical requirements for their land-based counterparts, measuring and control devices intended for maritime applications need to undergo more stringent load tests. For example, the devices must not be disrupted by maritime radio communications. Likewise, they themselves must not disrupt the international emergency frequencies for maritime transport (156 to 165 MHz band). ■

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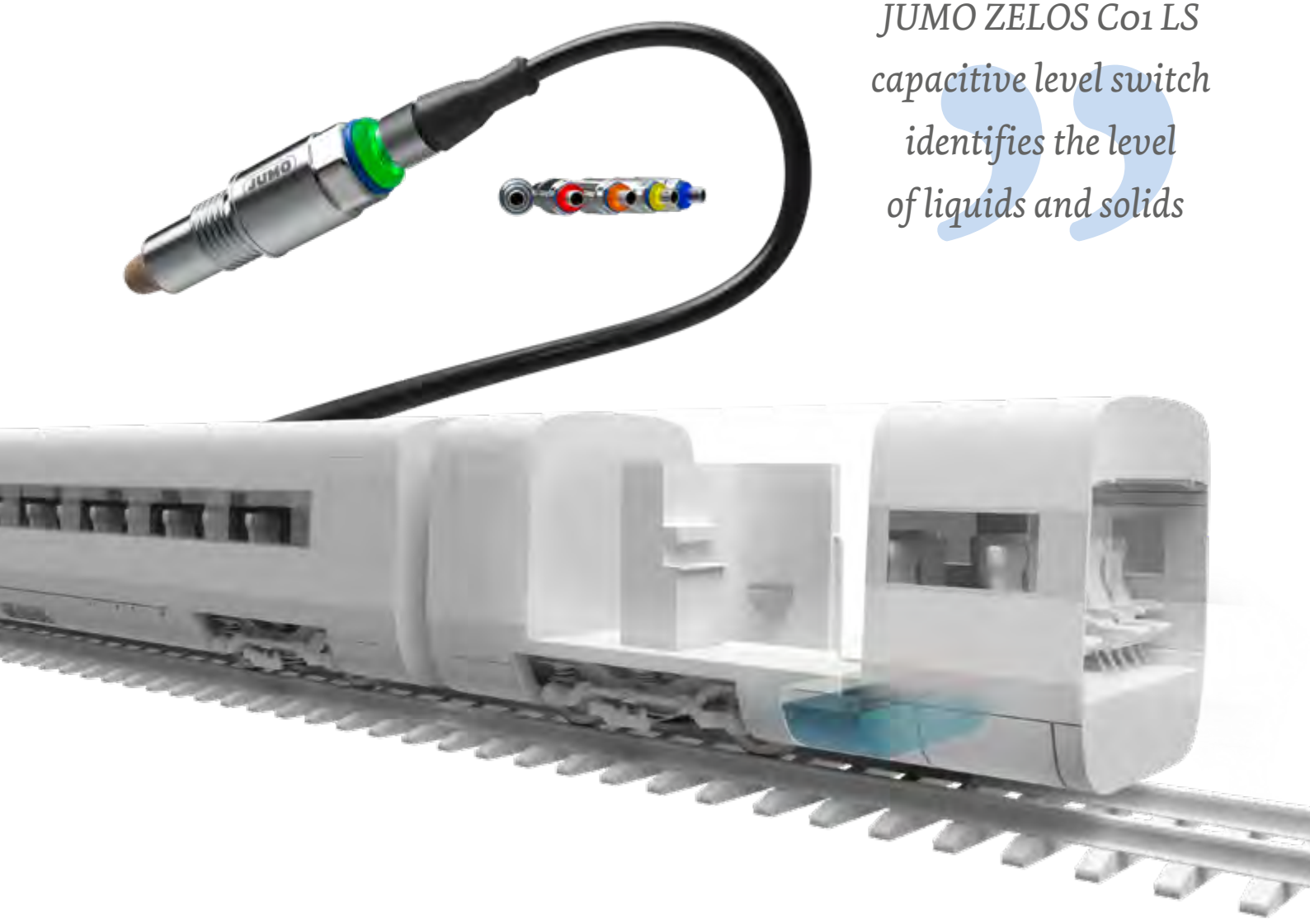
Capacitive level switches in rail vehicles

A revolutionary solution with the JUMO ZELOS C01 LS

The JUMO ZELOS C01 LS capacitive level switch identifies the level of liquids and solids



In the railway transport sector, the precise monitoring of the fill level of liquids and bulk goods is exceptionally important for ensuring smooth and safe operations. Over recent years, capacitive level switches have established themselves as an innovative solution for meeting these requirements.

Monitoring the filling level in rail vehicles is essential for various areas of use such as fuel or coolant tanks, brake and hydraulic systems, and wastewater and sewage tanks.

Accurate level measurement not only guarantees optimum system operations, but also ensures the safety and efficiency of rail transport.

Capacitive level switches use the principle of the change in capacitance between a probe and the surrounding medium to measure filling levels. Electrical capacitance occurs when an electrical field forms between the probe and the medium. This capacitance changes depending on the filling level as the medium's dielectric constant changes. This change is acquired by the level switch and converted into an electrical signal.

Short-circuit and reverse polarity protection provides additional safety for the JUMO ZELOS C01 LS. An antivalent electrical circuit enables the detection of line faults such as a cable break. A firmware update profile allows the sensor to be updated while installed so that plant downtime is minimized. PNP, NPN, push-pull, and IO-Link are available as output signals.

A 360° illuminated status display enables easy recognition of the sensor status according to NAMUR and VDI/VDE.

Benefits of using capacitive level switches in rail vehicles

- Versatility: capacitive level switches such as the JUMO ZELOS C01 LS can be used for both liquids and solids. This enables them to be used in a wide array of applications in various tanks and containers.
- Precision: capacitive measurement offers a high level of accuracy and reliability in level measurement, regardless of the medium's physical features.
- Compact design: capacitive level switches are available in compact design types, which enables them to be easily integrated in the restricted installation conditions in railway vehicles.
- Robustness: the level switches are resistant to vibrations, impacts, and temperature fluctuations, making them ideal for use in railway vehicles.

The JUMO ZELOS C01 LS capacitive level switch identifies the level of liquids and solids. This device can also be used in pressurized tanks or in pipes. During use, it showcases its advantages in applications with requirements for overflow and dry-run protection or for media detection.

JUMO ZELOS C01 LS can be used in liquids or bulk solids with temperatures between -40 and +200 °C. Thanks to the auto-calibration function, point level measurement offers both reliability and long-term stability. In addition, after configuration, the 2 switching outputs can automatically distinguish reliably between 2 measured media. Even adhesions do not present a problem for the reliable sensor. The product design contributes to miniaturization in sensor technology so that compact systems can be implemented. Mounting is easily achieved with a standard torque wrench. Since the seal to the medium goes through the sensor tip, no separate seal is required, thereby eliminating the possibility of a mix-up.

Conclusion

The use of capacitive level switches, such as the JUMO ZELOS C01 LS, has significantly advanced the area of level measurement in railway vehicles. With their versatility, precision, robustness, and user-friendliness, level switches offer a reliable solution for monitoring liquids and solids. The JUMO ZELOS C01 LS is a prime example of this technology and allows for optimum integration into railway vehicles to ensure reliable and efficient operations.

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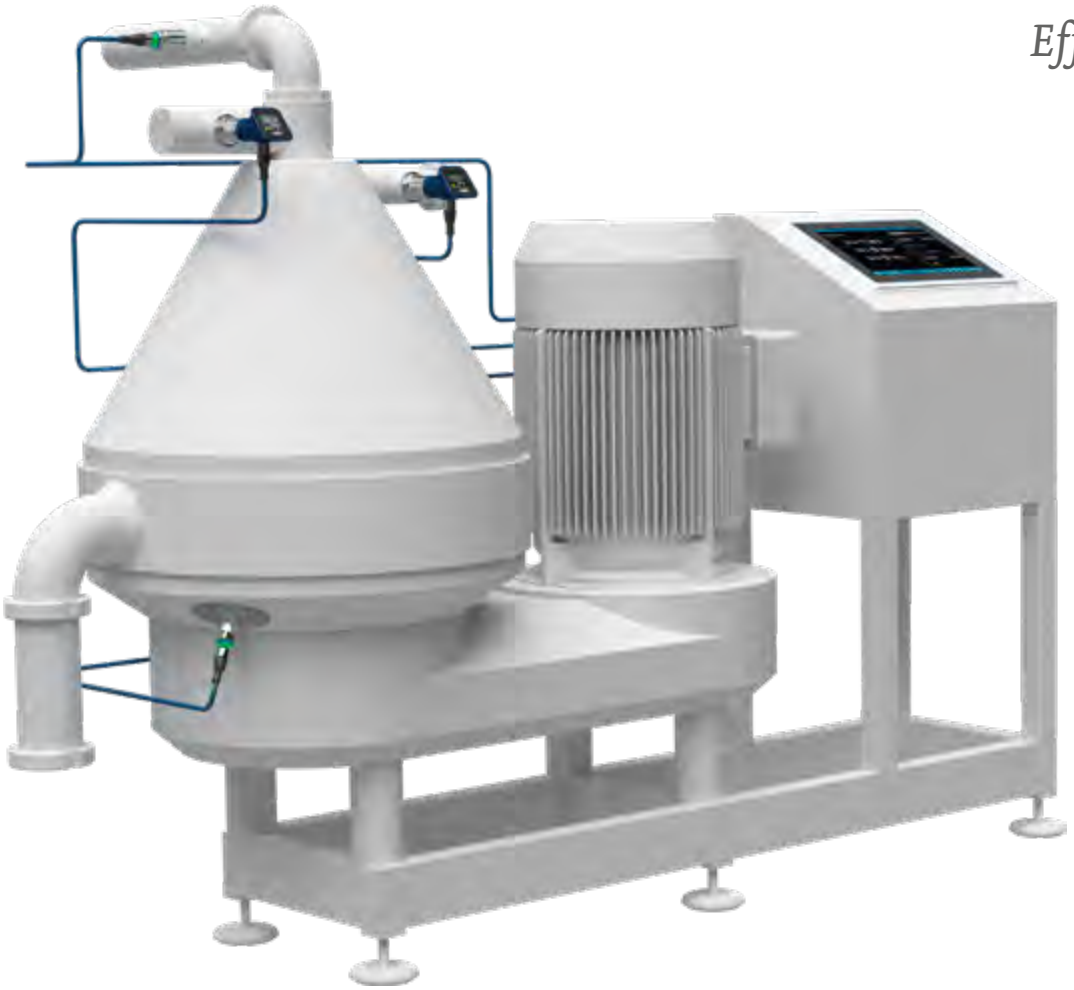
Monitoring the separation

through precise acquisition and control of process parameters



Efficient monitoring of measurands such as flow and pressure

Separators play a significant role in the milk processing industry as they allow milk to be separated into different components. In the brewing industry, separators are used to separate yeast or set up the requisite turbidity value. The efficient monitoring of measurands, such as flow or pressure, and the use of level switches are exceptionally important for ensuring an optimum performance and consistent product quality.

The precise measurement of flow in separator plants is critical for efficiently separating milk components and setting particular fat content levels throughout the entire batch process. Cutting-edge flow sensors allow for real time monitoring and control, which helps to ensure a consistent product quality. Optimum flow measurement minimizes energy consumption and maximizes plant efficiency.

The OPTIFLUX 6000 is an electromagnetic flowmeter (EMF) for hygienic applications in the food sector. The 3A

and EHEDG certified flowmeter has industry-specific insertion lengths to meet the stringent requirements of the food and beverage industry.

Pressure monitoring at the separator's inlet and outlet is key when it comes to avoiding plant downtimes and, in turn, ensuring a consistent and reproducible product quality.

As a result, it is possible to monitor operating conditions on a continuous basis. Deviations from the optimum pressure can alert the operator to problems that require immediate rectification to avoid production downtime.

This is where the JUMO DELOS S02 shows its strength. The pressure transmitter is a small, reliable "powerhouse". It is easy to configure and offers a high degree of process reliability, accuracy, and long-term stability. In addition, the pressure transmitter is also available as an Ethernet-capable version and can be used in many industries outside of the food sector. It is used to acquire relative and absolute pressures in liquid and gaseous media. Measuring ranges are from 0.1 to 100 bar relative or 0.4 to 60 bar absolute.

The successor for the current JUMO DELOS SI can be configured via Bluetooth and app or IO-Link. Thanks to the Ethernet-capable version (Single Pair Ethernet/SPE) and the cloud connection, it can be used in a wide range of industries.

The plant user is also able to view pressure values on the display on-site. When using the IO-Link variant, the sensor can be replaced quickly. The pressure transmitter does not need to be reconfigured using the setup program, which reduces possible downtimes.

Other key players in the process are level switches such as the JUMO ZELOS C01 LS. Monitoring of the inlet and outlet as well as a solids detection function are essential for interruption-free, efficient operations.

The JUMO ZELOS C01 LS capacitive level switch identifies the level of liquids and solids. It can also be used in pressurized tanks or in pipes. Typically, level switches are used in industrial environments for applications with requirements for overflow and dry-run protection or for media detection (such as yeast in separation processes).

Integration of measurands into higher-level control systems

The JUMO variTRON 500 touch is based on the JUMO JUPITER modular platform. The central processing unit, in combination with the proven input and output modules from JUMO, forms an overall system with integrated PLC (CODESYS V3.5) and enables visualization via touch panel.

Modbus or OPC UA can be used for integration into higher-level process control systems. The software JUMO smartWARE Evaluation can be used to record all data and verify it for optimization processes. ■

Conclusion

Integration of measurand monitoring into separators plays a key role in optimizing the separation process, both at dairies and in breweries. The precise measurement of flow and pressure as well as the use of level switches for product and phase detection enable operating costs to be reduced, while at the same time improving product quality and increasing overall efficiency. Investment-driven plant upgrades promise long-term benefits in relation to economic efficiency and competitiveness in the dairy and brewing industries.

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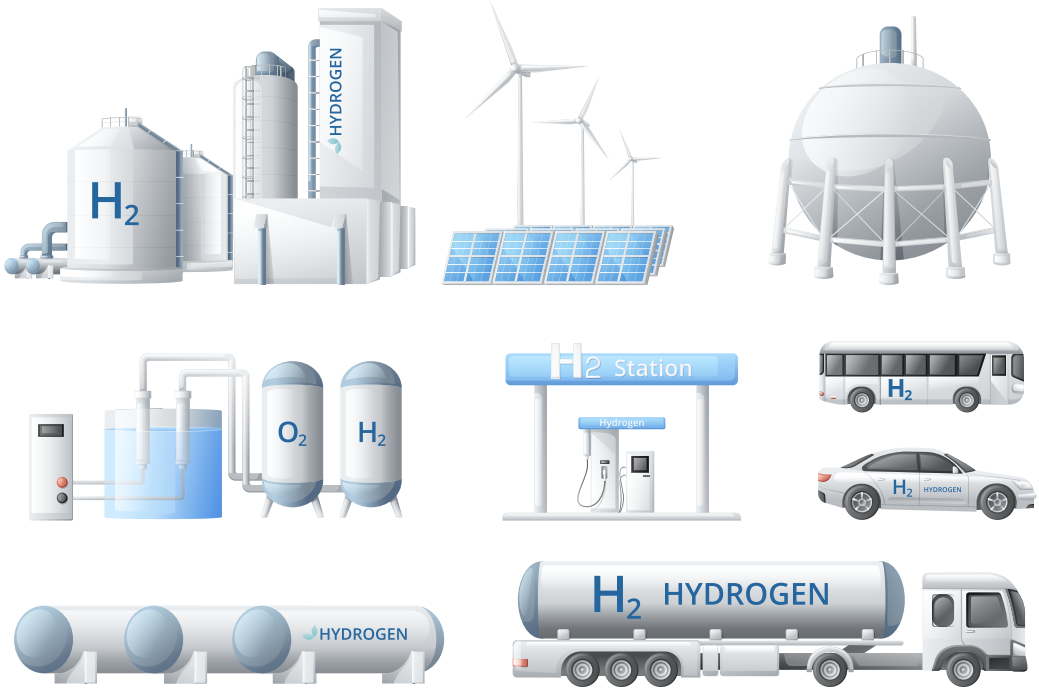
Promising hydrogen economy continues to gain momentum in 2024

JUMO offers efficient solutions as a development partner



JUMO sees hydrogen as a promising technology for the future and wants to participate in its dynamic development

The gaining momentum of the global hydrogen economy as an important component of the energy transition is in full swing. JUMO wants to participate in this development, focuses on the requirements of the hydrogen economy as a system and solution provider, and consistently aligns its product portfolio accordingly.

Areas of application for clean hydrogen

Hydrogen plays a crucial role in the energy transition for several reasons: it is a versatile energy carrier that can be produced cleanly and leaves only water as a by-product when burned or used in fuel cells. This makes it an attractive alternative to fossil fuels and helps reduce greenhouse gas emissions.

Another reason for the importance of hydrogen is its storage capacity. It can serve as long-term energy storage,

ideally for surplus current from renewable energy sources. Electrolysis is used to split water into hydrogen and oxygen, whereby the hydrogen produced can be stored and later converted back into current or heat as required.

In addition, hydrogen offers the opportunity to decarbonize sectors that are difficult to electrify. Examples include heavy goods traffic, shipping, aviation, and steel production. By using hydrogen as an energy source, these industries can drastically reduce their emissions and support the goal of climate neutrality.

Success factors for the hydrogen economy are further advances in technology, competitive costs, an improved infrastructure for the manufacturing, storage, and distribution of hydrogen as well as increased cooperation between governments, companies, and research institutions.

Technical requirements at a glance

The use of hydrogen as an energy source entails specific material requirements that play a key role in the safety, efficiency, and long life cycle of the systems. As hydrogen is handled at high pressure and in some cases at high temperatures, materials that can withstand these conditions are required.

JUMO is experiencing a significant boost in business and sees enormous growth opportunities in the hydrogen sector. The company adapts its products for use in hydrogen and certifies them where necessary. The existing production facilities were only slightly modified while the necessary increases in quantities can often be achieved from the production reserve.

Handling hydrogen requires extensive safety precautions and measurement technology expertise – be it in the manufacturing of ultra-pure water for feeding the electrolyzer or in monitoring electrolytic conductivity. Digital pressure and temperature sensors from JUMO ensure the monitoring of thermodynamic processes and offer safe as well as reliable technology that is also explosion-proof.

JUMO's customers include numerous DAX-listed flagships of German industry, which in turn install these systems in their plants.

The JUMO portfolio for hydrogen applications includes the conductive conductivity sensors JUMO tecLine CR and JUMO digiLine CR so that a reliable solution for this measuring task can be found. As a development partner for sensor and automation solutions, JUMO often also offers individual solutions for customer-specific electrolyzer concepts.

The JUMO safetyM safety temperature limiter/monitor is used to implement complete safety measuring chains (e.g. for monitoring the temperature of hydrogen in hydrogen refueling stations). This reduces potential hazards to a technical minimum.

The JUMO SIRAS P21 pressure transmitter measures reliably and precisely in hydrogen and other liquids, steam, and gases. It has been developed for use in safety-related plants with Safety Integrity Level (SIL). Furthermore, it has the necessary approvals for the process industry and mechanical engineering. ■

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CQI-9 and heat treatment

Suppliers must guarantee quality

Comprehensive carefree package available – everything from a single source

Some time ago, a recall campaign was carried out in the USA for various models of the Kia car brand. Incorrect heat treatment of the piston rings could lead to engine damage in around 170 000 cars. However, recalls of this kind remain the absolute exception.

This is because the leading manufacturers know that metals only acquire many of their important properties, such as hardness or tensile strength, through targeted and sophisticated heat treatment. To guarantee these properties, automotive manufacturers have collectively drawn up corresponding regulations for their suppliers. Nevertheless, uncertainty often prevails in the industry as to how these regulations can be implemented and how the process can be set up efficiently and cost-effectively.

The person responsible for carrying out the heat treatment process and who is under contractual obligation must demonstrably comply with these regulations. The Continuous Quality Improvement (CQI) directive is the automotive industry's absolute standard. CQI-9 governs

matters relating to heat treatment and is mandatory for all suppliers in this industry. The current 4th edition is a collaborative effort between OEMs, tier 1 suppliers, heat treatment suppliers, and calibration companies that provide services to the heat treatment industry. As a result, it is considered the gold standard in the industry, holds suppliers accountable, and ensures overall quality.

If the CQI-9 directive is aimed at heat treatment, the CQI-11 directive focuses on electroplating, the CQI-12 on surface coating, and the CQI-29 on brazing processes. Specifically, these CQI directives, on the one hand, formulate the requirements of the automotive industry for the installed systems and, on the other hand, the procedure for conducting process audits in the individual special processes.

Directives mean additional work and costs for suppliers

Based on its many years of practical experience and numerous discussions with company representatives, JUMO is aware of the uncertainty in the industry about how to implement CQI-9, CQI-11, CQI-12, and CQI-29 in practice. JUMO supports compliance with these guidelines through its expertise.

Companies need to take the following initial steps to take stock and evaluate:

1. Process audit carried out by a neutral specialist auditor / heat treatment expert to eliminate operational blindness and uncover the actual potential for improvement
2. Transfer of the identified potential for improvement into an action plan
3. Implementation of all defined measures (creation of work instructions, process instructions, parameter blocks, general operational documents, etc.)
4. Sensitization of all process participants for the correct handling of the established process management system
5. Sensitization to become a CQI-9/CQI-11/CQI-12/CQI-29 process auditor
6. Raising the awareness of maintenance staff / process participants regarding correct inspection of heat treatment systems / process lines (thermocouples, instruments, instrumentation inspection, SAT system accuracy test, TUS temperature uniformity survey)
7. Practical exercises on internal heat treatment systems / process lines (instrumentation testing, SAT, TUS)
8. Combination of process audit and raising employee sensitization as well as strict inspection of the heat treatment system or process line
9. Modification of the measurement and control technology on the heat treatment system or in the process line (controller, recorder, thermocouples, calibrator, data recorder, automation system, etc.)
10. Creation and maintenance of a thermocouple management system
11. Optimization of the process or parameter blocks
12. Maintenance of the process management system
13. Comprehensive carefree package available – everything from a single source – from the initial audit to the directive-compliant process management system!

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New JUMO products in ETIM BMEcat

Search quickly with one click

The standardization of product data leads to a consistent appearance

JUMO employs the ETIM classification standard and the BMEcat exchange format for managing and sharing product data. It is committed to the enhancement and standardization of this classification model. JUMO's new ETIM BMEcat catalog offers a number of new products that are suitable for distributors and a wide range of applications.

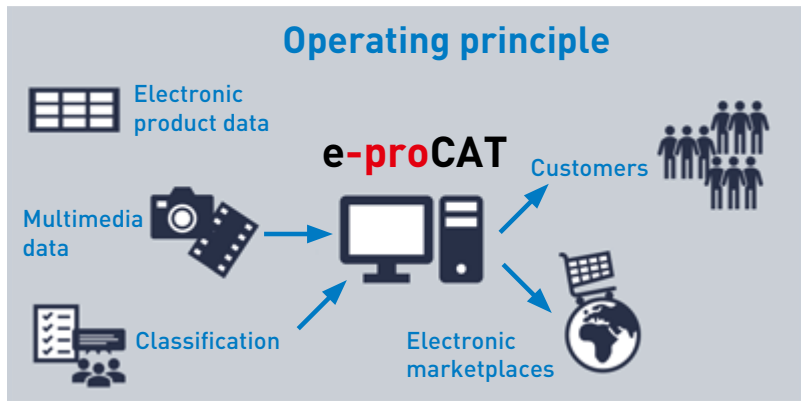
Automatic product information processing saves costs

The world of digital product catalogs has advanced a great deal over recent years. With the introduction of ETIM BMEcat – a standard classification and standard format for acquiring product data – companies are now able to automate their catalogs and make them more effective. The idea behind ETIM BMEcat is simple:

Further information
data-exchange-en.jumo.info

uniform standards and automated product information processing to cut costs, save time, and minimize errors.

The ETIM classification model was developed by ETIM Deutschland e. V. ETIM also expanded the BMEcat standard to include relevant fields for the distribution industry. This relates to a product catalog based on XML that enables all product and multimedia data to be acquired, processed, and distributed. The system supports a number of languages and currencies while giving companies a quick and simple way to share their product data.



Navigation is easier – as are product comparisons

ETIM BMEcat offers a number of advantages. First and foremost, the standardization of product data has led to a uniform appearance for catalogs, which makes them easier to navigate and simplifies product comparisons. This is crucial to the area of e-commerce in particular, where consumers on the hunt for certain products often find themselves confronted with a whole host of information and options.

Another benefit of this transport medium is the automation of processes. By using standardized formats, companies are able to automatically update and sync their product data. This reduces the amount of manual work required and saves time. What is more, standardizing product data allows for its seamless integration into other systems such as ERP or CRM systems.

In addition to the automation of processes and standardization of product data, another benefit offered by ETIM BMEcat is product classification. This enables companies to organize their products into various classes and allows for effective search queries. ETIM classification is a particularly practical option for companies as it is based on a standardized classification system that is suitable for a large number of industries.

ETIM BMEcat at JUMO

ETIM BMEcat plays a central role in the digitization of business processes at JUMO as well. The BMEcat catalog currently contains approx. 1000 stock items from all of the company's production areas. These include products for measuring temperature, liquid analysis, pressure, filling levels, flow, and humidity as well as products for recording, monitoring, and controlling. As such, the BMEcat is becoming a resource for a number of different products for a huge array of applications and industries.

JUMO is also actively involved in the relevant classification committee and is committed to the enhancement and standardization of the ETIM standard. The company not only uses ETIM BMEcat to share product data with its customers and suppliers, but also to maintain its own database. As a result, information on products can be updated and published quickly and easily. ■

Conclusion

Use of the classification model has led to the procurement, management, and sharing of product data at JUMO becoming more efficient and more transparent. The uniform structure enables data to be processed automatically and integrated into different systems. This saves time and reduces sources of error, both for JUMO and its customers.

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Sustainable building technology reduces energy costs

CO_2 footprint in the production process

The aim is to reduce the CO_2 footprint to a minimum

Energy management is one of the most important tools in today's industry for increasing the efficiency of industrial processes and optimizing energy consumption at the same time. JUMO uses its own energy management system, is currently building a new plant in the Fulda West Technology Park, and is focusing on sustainable building technology at this location.

The description of energy in the 19th century was strongly influenced by the scientific, technological, and industrial developments of the time. During this period, humankind experienced a significant transition from the use of predominantly mechanical energy to chemical and electrical energy sources. Mechanical energy started and drove the industrial revolution.

The energy from the movement of machines, driven by wind and water power, was often described as "mechanical work". The use of fuels (chemical energy) such as wood, coal, and later oil as well as natural gas led to the most revolutionary development of the time – steam engines, which converted thermal energy into mechanical work or electricity.

However, it should be noted that the storage of CO_2 in plants through photosynthesis as well as the thermal release of CO_2 through combustion is ultimately a recurring, sluggish, and lengthy carbon cycle. In view of the excessive demands placed on the carbon cycle by the massive combustion of CO_2 and the sluggish storage of CO_2, only a significant reduction in CO_2 can lead to a noticeable trend reversal in the CO_2 content of the atmosphere. Initially, it was thought that fuels were avail-

Further information
sensilo-en.jumo.info

able in infinite supply and at low cost. However, economic growth, competitiveness, and subsequent cost-cutting measures have revealed that energy expenses are now a major component of industrial operating costs.

Implementation of energy management technology leads to innovations

Energy management has become one of the most important tools in today's industry for increasing the efficiency of industrial processes and optimizing energy consumption at the same time. The implementation of energy management technologies promotes and often leads to technological innovations as they know where and how the energy flows. Companies that continuously invest in energy-efficient technologies not only improve their energy balance, but also become more competitive globally.

More and more customers expect industries to provide CO_2 proof that the products they buy are produced more and more sustainably from year to year.

Many countries have also introduced laws and regulations that oblige industries to monitor and reduce their energy consumption.

An energy management system helps to meet the increasingly demanding legal requirements. By reducing its energy consumption, JUMO will further minimize the environmental impact of its production processes and contribute to a more sustainable development without compromising its productivity and quality.

For example, JUMO has developed and installed its own energy management system for the chillers at the main plant in Fulda ❶.

Important components of this JUMO energy management system are:

- Energy management software (e.g. JUMO Cloud)
- Energy management system (e.g. JUMO smartWARE SCADA)
- Regulation (e.g. influencing a heating system on the basis of a target/actual comparison)
- Control (e.g. influencing a heating valve to influence the room temperature)
- Sensors (e.g. for temperature, pressure, performance)

However, existing older industrial buildings repeatedly push ecological footprint reduction measures to their limits. One result from this is the largest investment in JUMO's history – a new building in the Fulda-West Technology Park. JUMO is successfully setting the course for a sustainable future with around 50 million euro.

After all, around 13 000 m² (approximately the size of 2 soccer fields) will be available for the modern production of temperature and pressure sensors.

There's a wind of change when it comes to innovation, digitization, and sustainability in the new plant. Here, the current plans aim to completely eliminate fossil fuels in the future. A geothermal plant is to be used for heating support. This will cover the peak load. The base load will be covered entirely by heat recovery from the production processes.

Energy requirements for the production facilities will be largely covered by the company's own current. The new plant's cooling and ventilation systems will be predominantly operated using the company's own photovoltaic system. Overall, all energy-related processes are geared towards the goal of reducing the company's CO_2 footprint to a minimum and making full use of the available energy. ■

❶

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Risk reduction in Ex environments

Reliable pump monitoring protects lives

Monitoring pumps in industrial processes is far more than just a protective measure for the pump unit. In addition to preventive maintenance and the acquisition of operating data, ignition source monitoring has become much more important in recent years – especially in Ex environments. A precise risk assessment is crucial to prevent explosions. Because only reliable pump monitoring ensures smooth processes and thereby efficiency in the company.

Safety experts from TÜV (the German Technical Inspection Association) know the scenario: pumps without sufficient stability can quickly overheat. This heat can lead to an explosion with devastating damage to production. The company may have to pay a portion of the damage if the liability insurance company can prove negligence. In other words, pump units that are not secured represent a high economic risk. Furthermore, responsible management is committing a criminal offense if it does not comply with the legal requirements. Or in a nutshell:

reliable pump monitoring saves the management from legal action!

Confusing jungle of standards and regulations

Only a few manufacturers cover the entire safety chain for measurement and control technology with their products and solutions.

However, safety in the production process is a top priority for companies. This is why numerous standards and regulations that need to be interlinked are in place. They all require consistent application, such as the Industrial Safety Regulation and TRGS 725 (Technical Guideline for Hazardous Substances).

What sounds simple and logical at first glance becomes complex as soon as you enter the jungle of standards, directives, regulations, technical rules, and manufacturer recommendations that must be observed when monitoring ignition sources.

The relevant standards for this topic are IEC/EN 60079-xx on explosion protection, DIN EN 50495 (Safety devices required for the safe functioning of equipment with respect to explosion risks), and DIN EN 14597 (Temperature control devices and temperature limiters for heat generating systems). Standard DIN EN 14597 always includes a complete measuring, control, and limiter system consisting of sensor, logic, and actuators. For example, the following tests are certified for the individual components:

- Response behavior of the sensor technology
- Reactions (modes of operation) of the evaluation electronics
- Reliability / operating life of the actuators

Additionally, the IEC/EN 61508, EN/ISO 13849, EN/IEC 62061, EN/IEC 61511, TRGS 725, and possibly other product-specific standards apply in the area of functional safety.

In the past, electrical explosion protection traditionally played a major role in safety precautions, but in recent years the focus has increasingly shifted to mechanical components as a potential source of ignition. Users need to understand this background, assess it carefully, and incorporate it into their decision-making processes. The correct application of the Ex identification marking as well as the evaluation of SIL (Safety Integrity Level) and PL (Performance Level) pose particular challenges here.

Security yes – headaches no

Machine and system designers who have already come into contact with the topic of "functional safety" will already have realized the complexity and diversity of the subject.

The responsibility for the risk of damage borne by operators and planners of protective equipment is immense. They have to acquire safe components and are faced with a huge mountain of figures and formulas. In the end, they still do not know whether everything has been calculated correctly.

JUMO Safety Performance shows that this process can be easier. All JUMO products and services relating to SIL and PL can be found under this brand name. JUMO Safety Performance has been offering a certified compact system for functional safety according to SIL and PL for years.

JUMO guarantees ...

... standard and legally compliant safety. In short: a complete safety system is offered. It consists of sensor, logic, and relay output for operating the actuator from a single source.

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Sensor technology for measuring conductivity

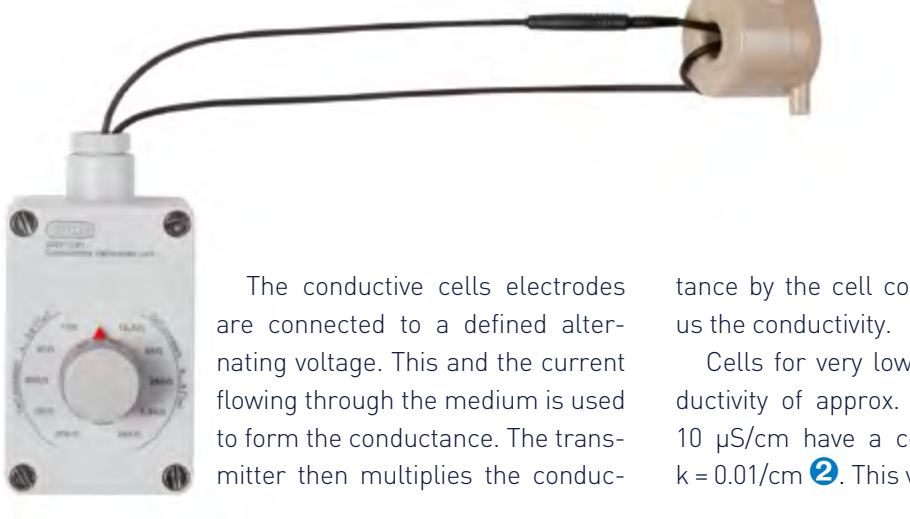
in aqueous solutions

Conductivity is a measure of the concentration of dissolved salts in aqueous solutions and must be measured in many processes. This variable is calculated for a wide range of reasons, such as determining the quality of ultra-pure water or finding the concentration of lyes and acids.

Conductive measuring cells are used for low levels of conductivity. Depending on their geometric structure, they measure conductivity from approx. 0.05 µS/cm to 15 mS/cm.

Conductive cells for higher levels of conductivity have a measuring range of approx. 10 µS/cm to 15 mS/cm. In this case, very small graphite plates are used as electrodes. ❶

In these cells, the ratio of the distance to the plate surface is 1 cm/ 1cm² = 1/cm – this is the cell constant k.



The conductive cells electrodes are connected to a defined alternating voltage. This and the current flowing through the medium is used to form the conductance. The transmitter then multiplies the conductance by the cell constants to give us the conductivity.

Cells for very low levels of conductivity of approx. 0.05 µS/cm to 10 µS/cm have a cell constant of k = 0.01/cm ❷. This very small ratio

of distance to surface area is only possible with a concentric design. The sensors consist of one inner electrode (rod) and one outer electrode (open cylinder).

Cells for a medium measuring range of approx. 1 µS/cm to 1000 µS/cm (cell constant 0.1/cm) also feature a concentric design, but may also be equipped with rods.

It is possible for the effective cell constant to deviate from the nominal cell constant by up to +/-10 %, though the transmitter can compensate for this following calibration. During the calibration process, the sensor is placed in a test solution where the conductivity is already known and this conductivity is entered into the transmitter. The result of the calibration is the relative cell constant. For example, if the nominal cell constant is k = 1/cm and the effective cell constant is just 0.93/cm, the transmitter calculates the relative cell constant at 93 %. After being calibrated, it multiplies the measured conductance by 0.93/cm (93 % x 1/cm) instead of 1/cm. The relative cell constants must be calibrated during startup. Conductivity sensors that are soiled detect lower conductivity, which is why they must be kept clean. The relative cell constant has to be recalibrated after each clean.

Conductive measuring cells are forced to bow out for conductivity >15 mS/cm. Inductive conductivity sensors must be used in this case. They are made up of 2 coils and use the transformer principle: the primary coil is supplied with alternating voltage and the voltage is measured at the secondary coil. The coupling between the coils varies as a result of the measurement medium's conductivity. The major advantage of this system is that any coatings on the measuring system have virtually zero influence on the measuring result, which means that the sensor technology can be regarded as maintenance-free in most cases. In contaminated media, it therefore makes to use the sensor at conductivity levels <15 mS/cm. The sensor technology requires minimum conductivity of approx. 200 µS/cm. If "head transmitters" are chosen as the sensor, they are ready for use straight away.

In remote systems, a basic calibration process often has to be performed. This is achieved by inputting different loop resistance values and, as such, different conductivities.

The existing conductivity is known as the uncompensated conductivity. In drinking water, for example, this increases at approx. 2.4 %/K (or °C). At conductivity levels >10 µS/cm, temperature response can be regarded as linear.

If the measurement takes place at different temperatures, it becomes difficult to compare conductivity. For instance, as standard, transmitters use the uncompensated conductivity and the temperature to determine the conductivity of the measurement medium at 25 °C – this is known as the compensated conductivity. Per default, the transmitters require a linear response, meaning that linear temperature compensation is activated. To allow the compensated conductivity to be calculated correctly, the measurement medium's temperature coefficient must be input into the transmitter. For this calculation, the uncompensated conductivity is determined at 25 °C and at the typical operating temperature. Both value pairs are then used to calculate the temperature coefficient.

When measuring conductivity <10 µS/cm, conductivity does not increase in a linear manner with the temperature. For these applications (pure or ultra-pure water), formulae are stored in the transmitters and simply have to be activated. For example, if the temperature compensation "ASTM 1125" is activated, the compensated conductivity at extremely low conductivity levels is determined. ■

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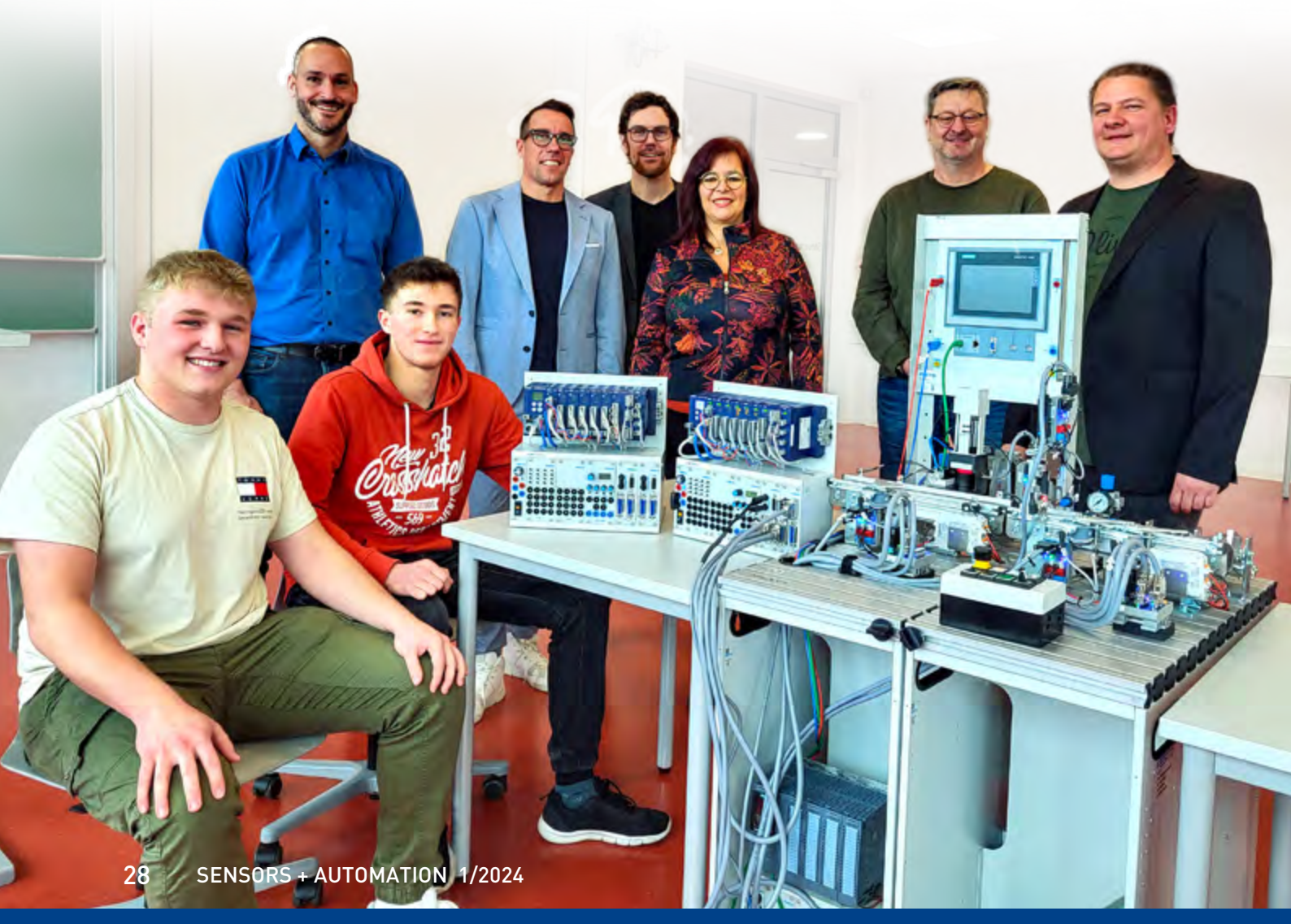
JUMO supports school with automation systems

JUMO variTRON devices prepared by JUMO apprentices for use at the Ferdinand-Braun-School in Fulda

Win-win situation for the entire region

JUMO Chief Executive Officer Dr. Steffen Hossfeld (second from the left, back row) and JUMO sales manager Ralf Kappmeyer (third from left, back row) are delighted with the handover to the Ferdinand-Braun-School, as are principal Ulrike Vogler (center of picture), her colleagues, and students



In the future, students at the Ferdinand-Braun-School in Fulda will use high-tech devices from JUMO in their studies. JUMO supplied a total of 14 variTRON automation systems to the commercial and technical vocational training center in the Baroque city of Fulda.

The JUMO automation system enables machines and plants to be controlled and monitored efficiently. In January, JUMO apprentices and their trainers prepared the JUMO variTRON devices ready for use at the JUMO training center.

This resulted in a real win-win situation as emphasized by JUMO's Chief Executive Officer Dr. Steffen Hossfeld. *"Thanks to our technology, the students are ideally prepared for their future careers. And JUMO is underlining its expertise as a leading system and solution provider,"* explains Hossfeld.

Steffen Hossfeld and Ralf Kappmeyer, sales representative on the JUMO field sales team, handed over 14 units to Steffen Mehler, teacher and head of technical training at the Ferdinand-Braun-School.

"JUMO covers the entire automation pyramid. We transfer data from the sensor all the way to the cloud and offer fully connected control centers. We are delighted that young people have the chance to use our high-tech devices to train for a future-proof career", emphasizes Ralf Kappmeyer, who played a key role in driving this project.

"And it is not just the Ferdinand-Braun-School that has benefited, but the region as a whole. In JUMO, we have both a partner we can rely on, and a supplier of cutting-edge systems," says Mehler. ■

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Maximum expertise – minimum effort

Update your skills by attending our free webinars

JUMO has designed a variety of training courses with a particular emphasis on the current topics of our focus industries, which also offer real added value in day-to-day business.

As a leading system and solution provider for industrial sensor and automation technology, JUMO places great importance on contributing to optimized process control, increased efficiency, and integrated systems through practice-oriented webinars and innovative learning formats.

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In our premium streamed webinars, you can access our experts' deep pool of expertise. You can also benefit from active dialog with other customers.

To be fond of learning is to be near to knowledge.

Confucius

From theory to practice – IO-Link and SPE in the JUMO brewing plant

November 6, 2024,
10:00 to 11:00 a.m.
(German version)
3:00 to 4:00 p.m.
(English version)

Registration and further information:
digitalsensors.jumo.info

In this practical-based webinar, our speakers Alexander Hof, Martin Eppinger, and Manfred Walter will use the JUMO brewing plant to explain how digital sensors are used in beverage technology and the industry as well as what benefits they can bring.

Thermoprocess technology: "Make a wish"
November 19, 2024,

1:00 to 2:00 p.m.
(German version)
3:00 to 4:00 p.m.
(English version)

Registration and requests:
thermoprocess.jumo.info

Unlike conventional webinars, we give you the opportunity to submit topics and questions – in advance – that are of particular interest or a challenge to you. Your input determines the agenda and makes this webinar a customized event that is tailored directly to your needs and interests. Take advantage of this unique opportunity to promote the issue of your choice!

Dangerous ignition sources and explosion protection

December 5, 2024,
10:00 to 11:00 a.m.
(only in German)

Registration and further information:
safety.jumo.info

In industries where every second counts and safety is paramount, adherence to functional safety is not only a legal requirement, but also a principle of responsibility. Non-compliance can have severe consequences under civil and criminal law, resulting in far-reaching effects for your company and personal career. To boost your specialist expertise in this sensitive field, we would like to invite you to our webinar "Dangerous sources of ignition and explosion protection". During the session, you will find out how you can effectively monitor plants and potential sources of ignition as well as how to mitigate risks to people, the environment, and equipment.

That's why you should definitely take part:

- A speaker with many years of experience in the area of functional safety
- Maximum expertise in just one hour
- Top ratings from former participants
- Certificate to provide proof of training

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