01/2018

sensors + automation

The Customer Magazine from JUMO

JUMO

JUMO Safety Performance

The new brand for increased safety when it comes to SIL and PL

| Page 4 |

JUMO Safety Performance (JSP)

Functional Safety – Hassle-Free!

- Certified measuring chain protection up to SIL 3/PL e possible
- The highest degree of flexibility when selecting SIL components due to the comprehensive delivery program
- SIL no longer needs to be calculated by the user when the JUMO safetyM is used in combination with JUMO temperature probes
- Suitable for different measurands such as temperature, pressure, level, and flow
- Individual assessment of the safety chain and advice provided by the experienced JUMO Safety Performance team of experts

JUMO SAFETY PERFORMANCE SIL PL

Welcome to JUMO.

http://jsp-en.jumo.info

Dear Reader,

"If you want something, you find a solution.
If you don't, you look for excuses."

It is precisely this search for solutions that has been JUMO's driving force for 70 years now. Together with our customers, we work towards making the world a little bit better every day. This could be products that provide cleaner water, or technology that helps to preserve valuable resources or energy. From the humble beginnings of the company's founder Moritz Kurt Juchheim, we have become an international corporate group offering a wide product portfolio for many different industries. Join us in taking a look back at our company history in this issue of the JUMO customer magazine.
At the same time, the search for simple solutions is getting increasingly complex. A good example is the topic of SIL (Safety Integrity Level) and PL (Performance Level). Only a combination of the right products, customized solutions, and the necessary expertise will make users successful in this field. JUMO is the right partner for all these factors. This is why we have combined our SIL and PL expertise in our JSP brand (JUMO Safety Performance). This way we can make the lives of our customers easier. At the same time, we are taking a further step towards becoming a solution-focused component and system partner rather than just an equipment provider.
You can read all about our new JSP brand as well as lots of other innovations and application reports on the following pages.

We hope you enjoy reading our latest customer magazine.
Your Managing Partners,

Bernhard Juchheim

Michael Juchheim

| Page 10 |

| Page 12 |

| Page 17 |

LEGAL NOTICE

Publisher:

JUMO GmbH & Co. KG
36035 Fulda, Germany
Phone: +49 661 6003-0
Fax: +49 661 6003-500
Email: mail@jumo.net
Internet: www.jumo.net
Project management (responsible for content): Michael Brosig
Layout: Manfred Seibert
Printing: Hoehl-Druck Medien + Service GmbH, Bad Hersfeld, Germany

JUMO Safety Performance

The new brand for increased safety when it comes to SIL and PL

The topics of SIL (Safety Integrity Level) and PL (Performance Level) are consistently gaining importance in the processing industry as well as in mechanical and plant engineering. However, finding the right solution for a particular application among the "jungle of standards" is often a complex challenge for users. JUMO has therefore combined its product and solution expertise in these topics to create a new brand – JSP (JUMO Safety Performance).

The difficulty with SIL and PL lies in the detail. With a device that has an Ex identification marking (explosion protection), users know exactly where and how they are permitted to use the device. But when a user sees an SIL identification marking on a sensor, they cannot draw any conclusions about the degree of risk reduction that can be achieved when it is used in a system. This is because for the SIL and PL the entire measuring chain always needs to be evaluated and calculated together with all components. This generally requires a significant amount of time. Concurrently, the user needs a huge amount of technical knowledge.
JUMO Safety Performance shows that this process can be easier. In the future, all JUMO products and services relating to SIL and PL will be found under this brand name. Along with having its own logo, it will be possible to recognize JSP products by the identification marking with a yellow signal color.

Clever temperature compact solution

The primary focus of SIL is on the evaluation of the safety chain. This safety chain typically consists of the sensor, the control, and the actuator. In principle, safety-focused variants can be implemented using two approaches. This way, users can opt for a safety programmable logic controller which requires complex programming applications and for which the inputs as well as outputs are coupled with card types and multichannel features. In addition, each application needs to be calculated and evaluated separately according to SIL.
As an alternative, JUMO offers a compact, single-channel safety controller for the temperature measurand with selectable redundant input signals for standard signals and temperature sensors. This can achieve SIL 3 or PL e. When combining the JUMO safetyM safety temperature limiter/safety temperature monitor and calculated JUMO sensor technology, the entire SIL measuring chain – consisting of a sensor, controller, and actuator – is

already calculated and delivered with the appropriate manufacturer's declaration. As this does not require the use of a complex controller, no programming knowledge is needed for startup. There are clear advantages for the user. They do not need to carry out complicated calculations and save documentation and engineering costs.

The JUMO safetyM STB/STW Ex is also suitable for ATEX/IECEx/EAC applications and meets the requirements of the Pressure Equipment and Machinery Directive. Another special highlight is that this solution can be achieved with almost all JUMO temperature probe variants.

Wide product portfolio

JUMO also offers SIL and PL solutions suitable for other measurands such as pressure, level, or flow. Customers receive all safety-related characteristic values and they can use these to carry out the necessary calculations. This means, for example, that a convenient solution can be achieved for pressure monitoring in tank systems, which is primarily used in the chemical industry on a frequent basis. The control of pumps, switch-off for overfilling, or monitoring extruders is also possible.

Other JUMO products that will be offered from now on in the JSP variant with yellow signal color include the JUMO dTRANS T07 two-channel temperature transmitter, the Ex-i repeater power supply/input isolating amplifier, the JUMO exTHERM-AT explosion-protected surface-mounted thermostat, and the JUMO dTRANS T06 four-wire transmitter.

Optimum guidance

Along with products and solution developments, the high level of consulting expertise is at the forefront for JUMO Safety Performance. JUMO employees have been trained to be experts in JSP products thanks to our internal training concept. These employees have in-depth knowledge in the application of JUMO safetyM, in temperature/pressure/flow measurement technology, in explosion protection, and, of course, in functional safety (SIL and PL). The JSP expert team is available to offer transnational help with its comprehensive expertise.

You can find more information at
http://jsp.jumo.info

Further information

+49 661 6003-2583
matthias.garbsch@jumo.net

The manufacturer's declaration issued by JUMO establishes a certified SIL 3/PL e compact solution

Your benefits in a nutshell

- Certified measuring chain protection up to SIL 3/PL e possible
- SIL no longer needs to be calculated by the user
- The highest degree of flexibility when selecting SIL components thanks to the comprehensive delivery program
- Safe monitoring and shutoff of systems
- Selectable security features (e.g. limiter or monitor function according to DIN EN 14597)
- For different measurands such as temperature, pressure, level, and flow
- Certified measuring chain individually adaptable to the process requirement
- By combining the JUMO safetyM and JUMO temperature sensors, also available as an explosion-protected compact solution according to ATEX directive in different ignition protection types (such as [Ex i]/]/[Ex e])
- Individual consulting for component selection of the safety chain by the experienced JSP team of experts

" The combination of high-quality products, intelligent solutions, and comprehensive expert knowledge turns JUMO Safety Performance into a comprehensive carefree package. "

Dipl.-Ing. Matthias Garbsch
Product Manager Explosion Protection & Functional Safety

Safety-related shutdown up to SIL 3

Certified compact system for temperature

Temperature

JUMO thermocouples/
RTD temperature probes

JUMO safetyM STB/STW
Type 701150

Manufacturer's declaration

Compact system for temperature

Temperature

JUMO thermocouples/
RTD temperature probes

JUMO dTRANS T07
Type 707081

**Repeater power supply/
input isolating amplifier**
Type 707530

JUMO safetyM STB/STW
Type 701150

Compact system for pressure*

Pressure

JUMO dTRANS p20
Type 403025

JUMO safetyM STB/STW
Type 701150

Compact system for pressure

Pressure

JUMO dTRANS p20
Type 403025

**Repeater power supply/
input isolating amplifier**
Type 707530

JUMO safetyM STB/STW
Type 701150

Compact system for flow*

Flow

JUMO flowTRANS MAG S01
Type 406012

JUMO safetyM STB/STW
Type 701150

General comment about the displayed safety-related compact solutions:

- The JUMO safetyM STB/STW has an output signal to control the downstreamed safety actuator systems.
- Additional output signal suitable for downstreamed visualization, controlling, and documentation.

* Auxiliary energy for power supply is required separately.

JUMO presents the first plastoSENS T temperature probes

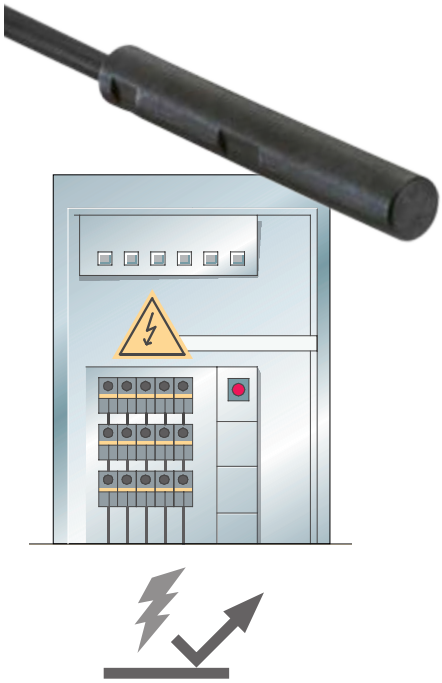
Innovative temperature measurement technology in a unique plastic design

JUMO plastoSENS is a completely new process for manufacturing high-quality measurement technology. The sensors are coated with plastic in an injection molding process. The first temperature probes are now demonstrating this revolutionary technology's wide variety of applications.

JUMO plastoSENS T01

Voltage-resistant plastic temperature probe

JUMO plastoSENS T01 temperature probes made of high-temperature plastics are both electrically insulating and thermally conductive. This makes them easy to use in environments with very high currents and voltages such as in transformers, generators, or combined heat and power plants. JUMO plastoSENS T01 is a standardized, voltage-resistant probe with an insulation resistance of up to 10 kV and which can be used at a continuous service temperature of -50 to +200 °C. Conventional temperature probes can withstand a maximum of 2.5 kV.

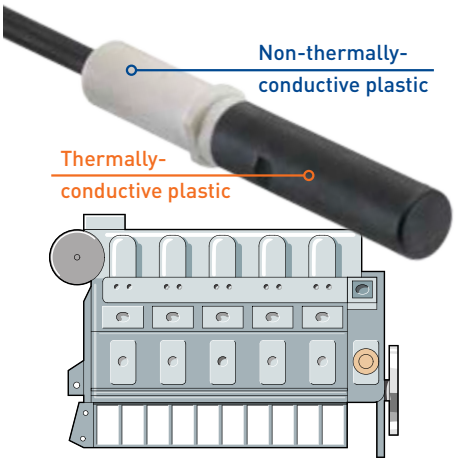


Insulation resistance up to 10 kV

JUMO plastoSENS T02

Vibration-resistant plastic temperature probe

Vibration represents a major problem for measurement technology in engines of vehicles or machines. Placing the temperature sensor in the probe tube so that it is truly in a secure position is very complex with conventional probes. However, in the case of JUMO plastoSENS T02, the sensor is completely coated in plastic. JUMO has therefore developed a vibration-resistant and shock-resistant push-in probe that can easily withstand forces of up to 20 g and can be used in almost all liquids in a temperature range of -40 to +180 °C. JUMO plastoSENS T02 is also characterized by being highly fail-safe and having a low natural frequency in the event of vibrations.

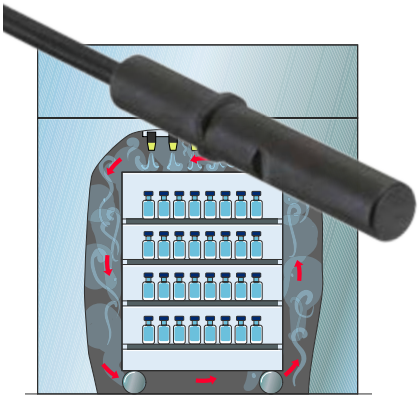


Vibration and shock resistance

JUMO plastoSENS T03

Steam-tight plastic temperature probe

In sterilization or CIP cleaning applications sensors are exposed to a particularly stressful combination of high temperatures, moisture, and pressure. With the JUMO plastoSENS T03 probe for sterilization applications, the applied high-temperature plastics form a substance-to-substance bond during the injection molding process and thereby guarantee steam and water tightness. This is an invaluable advantage, particularly for the cable outlet from the probe, which is a critical point. The FDA compliant probe can be used in a temperature range of -50 to +150 °C.



Steamtight and watertight

Further information
guenter.grommes@jumo.net

JUMO NESOS series

Float switch and level transmitter

With the JUMO NESOS product series, JUMO is introducing devices for limit level measuring using a float and reed contact onto the market for the first time. JUMO is also doing so for level measurement using a float and reed chain. JUMO has been producing the core piece – the float – for about 40 years. The high quality has been verified by different customers. As a result, JUMO is changing from a component supplier to a system supplier for its customers. The tried-and-tested measurement method excels due to the robust technology, cost-saving installation and assembly, low maintenance requirements, and a very good price-performance ratio. The measurement can take place in liquid media irrespective of foam formation, conductivity, permittivity, or pressure ratios. JUMO NESOS devices for limit level measurements can be used in a wide temperature range from -52 to +240 °C. The option of installing a temperature switch or temperature sensor is also available. The products for level measurements stand out due to a high level of accuracy and can be supplied in numerous versions. In each case, approvals for shipbuilding, explosion-protected areas, and a certificate for the Pressure Equipment Directive (PED) are available.

Further information
+49 661 6003-9144
rene.krug@jumo.net

Types 408301, 408302, 408303, 408320

JUMO digiLine CR and JUMO digiLine Ci

Digital conductivity transmitter with IO-Link

JUMO digiLine offers digital sensor technology including data management for the most important parameters in liquid analysis. The program has been further improved through the introduction of the digiLine sensors for conductive (JUMO digiLine CR) and inductive conductivity measurement (JUMO digiLine Ci). The application area is universal. Versions are available for all water qualities ranging from ultrapure water in pharmaceutical/for injection quality with conductance values as of 0.05 µS/cm up to measurements in highly concentrated liquids up to 2,000 mS/cm. JUMO digiLine Cr/Ci sensors are available with integrated electronic components or detached electronic head and cable connection. The detached version can easily master problematic installation situations.
The digiLine interface functions as the RS485 interface with extended Modbus protocol. The sensors can also be integrated in standard Modbus network RTU. The Modbus version will be made available at the same time as a digital version with IO-Link interface. This is the first electrolytic conductivity measurement anywhere in the automation industry that can be integrated in machines and plants with IO-Link infrastructure.

IO-Link

digiLine

Further information
+49 661 6003-493
reinhard.manns@jumo.net

Types 202706, 202707, 202708, 202709

JUMO heatTHERM P300

New 3-phase panel-mounted thermostat

JUMO heatTHERM P300 further enhances the JUMO portfolio for panel-mounted thermostats. The device has a maximum switching capacity of 30 A/480 V and can be supplied with a variety of connection options such as tab connectors, screw terminals, or push-in terminals. JUMO heatTHERM P300 has a trip-free function for additional safety, which is a unique feature for this price segment. For example, the new thermostat can be used in electronic screw-in heaters or in the catering sector (deep fryers and hobs).

Further information
+49 661 6003-326
rainer.staaf@jumo.net
Type 602090

JUMO dTRANS T08/S08

Versatile series of temperature transmitters and signal converters/supply isolators

The JUMO dTRANS T08 series and the S08 series comprise an extensive portfolio of nine temperature transmitters and 13 signal/isolating converters. All products are characterized by a high level of accuracy and very efficient galvanic isolation with a high degree of insulation resistance in a particularly slim housing format. Furthermore, they impress users with an excellent price-performance ratio. Another special feature is the fast on-site startup. DIP switches can be used to select over 1,000 different measuring ranges for the temperature transmitters or the requested signal characteristics for the signal converters.

Further information
+49 661 6003-498
manfred.walter@jumo.net
Types 707101, 707209

JUMO CEROS S01 M

Digital pressure measuring cell with integrated signal processing

In contrast to standard pressure measuring cells, this is an active component that supplies a temperature-compensated and calibrated digital/analog output signal (pressure and temperature values). High level of accuracy, compact design, and the possibility for setup configuration reduces subsequent production steps to a minimum.

JUMO CEROS S01 M is available in measuring ranges from 100 mbar to 100 bar relative or 1 to 100 bar absolute.

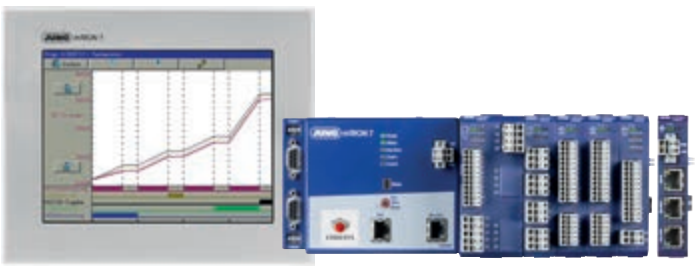
The operating temperature lies between -40 and +125 °C. Customer-specific measuring ranges, compensation temperatures, and design types are also possible.

Further information
+49 661 6003-2375
hubert.jakob@jumo.net
Type 405101

JUMO mTRON T – measuring, control, and automation system

System version 05

In the new system version 05, numerous enhancements have been combined to create the scalable JUMO mTRON T measurement, control, and automation system. For example, an option to preview the program directly in the system's multifunction panel has been recently added. In the new version, personalized user registration can now be performed via an interface. One such example is a RFID chip card. In addition, the process contacts in the process steps have been expanded from 16 to 64. Additional variants of the JUMO mTRON T operating panels can be connected by updating the CODESYS runtime system.



Further information
+49 661 6003-2922
thomas.diel@jumo.net
Type 705060

Universal assistants for maritime applications

More stringent requirements for measurement technology on ships

The water requirements on modern container ships, cargo ships, tankers, or cruise liners are so large that it is now impossible to store all the water required for the whole trip. The world's largest cruise liner (according to current rankings) can carry up to 6,800 passengers and has 23 swimming pools. Ships like this are therefore often equipped with water treatment technology like those in onshore plants.

Evaporation technology was initially only used to produce boiler water, but is now in widespread use. Seawater is drawn in and evaporated using a negative-pressure process. The negative pressure enables the water to be evaporated at just 40 to 50 °C and the heat energy required for this process can be recovered from the waste heat of the engines. The water vapor is then condensed again and the distillate is available as purified water. Before it can be used as drinking water,

JUMO AQUIS touch P
Modular multichannel measuring device for liquid analysis
Type 202580/202581

TYPE APPROVED PRODUCT
DNV·GL
DNVGL.COM/AF

the water hardness is increased and the water is sterilized using chlorination, ozonization, UV irradiation, and activated carbon filters.

Large demand for certified measurement technology

The process of producing and monitoring the water quality requires robust, tried-and-tested measurement and control technology. By monitoring key parameters, such as the pH value, chlorine content (alternatively ozone, etc.), redox potential, electrolytic conductivity, pressure, flow, level, and temperature, a high level of water availability and the highest quality standards can be ensured at all times in the water treatment plants. When designing the technical plants and measurement technology on ships, it helps the planners and process engineers if maritime approval has been granted for the plant components. The DNV GL test seal is an important internationally recognized standard.

Devices and sensors which have been approved by the DNV GL have undergone an additional technical inspection and are subject to extra tests designed specifically for maritime applications. 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).

The devices are subject to significantly tougher climate tests when it comes to permitted air humidity and ambient temperature. Whereas a conventional control cabinet device for use on land is usually only designed and tested up to 50 °C, the maritime certification rules require deviations up to 65 °C or 70 °C. The devices' mechanical design is also subject to more stringent vibration and shock tests.

From pool control systems to the engine room

For the first time, a modular multichannel measuring and control device designed for water quality parameters such as pH value, redox potential, conductivity, and chlorine (as well as other disinfection variables) has now been granted this important certification.

The JUMO AQUIS touch P measuring, control, recording, and indicating device is now available with the DNV GL test seal. This means that it is ideally suited for use in the demanding water treatment plants on ships and in other maritime applications.

Typical application areas include all measuring and control points for water parameters – from seawater desalination plants to pool control systems and cooling water monitoring systems, and even boiler water measurements and ballast water disinfection systems. JUMO can also supply the high-quality sensors required for this purpose so that the entire measuring chain, including the sensor technology, is available from a single source.

Another example of a JUMO device with a DNV GL certificate is the JUMO MAERA S29 level probe. It can be used to effectively monitor the level regardless of the water quality – even in seawater thanks to its titanium housing.

Tried-and-tested RTD temperature probes of type 903564, single and double surface-mounted thermostats of type 605060, or precision pressure switches of type 405071 with "Bureau Veritas" maritime approvals are available to perform measurements in the particularly sensitive engine room.

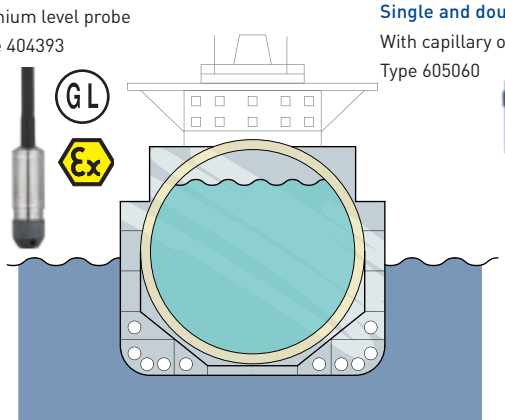
JUMO pressure and differential pressure transmitters as well as JUMO temperature probes with DNV GL and ATEX approval are used in potentially explosive areas of gas and oil tanks. Safety temperature limiters with SIL approval complete the range. JUMO therefore has a wide range of sensors, controllers, and measuring devices to offer for use in the maritime sector.

Further information

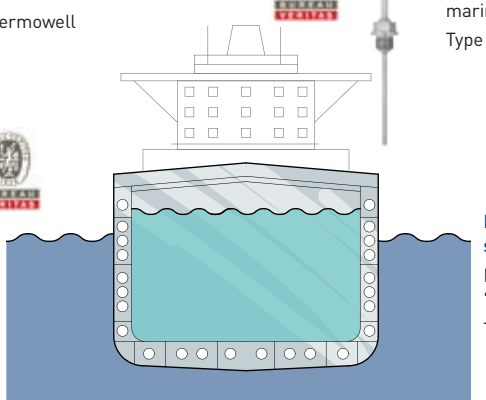
+49 661 6003-402
matthias.kremer@jumo.net

JUMO dTRANS p20
Process pressure transmitter with display
Type 403025

JUMO MAERA S29 SW
Titanium level probe
Type 404393



Single and double surface-mounted thermostat
With capillary or rigid thermowell
Type 605060



RTD temperature probe
With BV (Bureau Veritas) marine certification
Type 903564

High precision pressure switch
HNSPX-Ex-1 – HNSPX-Ex-2
"i" and "t" series
Type 405071

A clean system

JUMO products and solutions for a Spanish seawater aquarium

The aquarium in the Basque city of San Sebastián is one of most advanced oceanariums in Europe and features 30 tanks where jellyfish, seahorses, and various fish species can swim about, as well as an impressive 360º tunnel where you can see a shark up close. When it comes to acquiring measurement and control technology, the operators rely on technology and solutions from JUMO.

The San Sebastián aquarium was established over 100 years ago. Today, visitors can see more than 40 different fish species in their natural environment. 30 tanks hold a total of 1.5 million liters of water, the quality of which needs to be constantly monitored. JUMO provides the necessary measurement technology to monitor the pH value, the oxygen content, the conductivity, and the temperature. pH and conductivity sensors from the JUMO ecoLine and JUMO BlackLine series, the JUMO ecoLine O-DO optical sensor for oxygen, and the mineral-insulated RTD temperature probe with terminal head form B are used in the aquarium. All these values are measured in 30 different locations in the tanks. 30 JUMO AQUIS touch S multichannel measuring devices for liquid analysis are available to process the large quantity of measurement data.

JUMO AQUIS touch S
Modular multichannel measuring device for liquid analysis
Type 202580/202581

The installation situation

Multichannel measuring device as the core element

The JUMO AQUIS touch S provides a central platform to display and further process the pH value or redox voltage, electrolytic conductivity, high-purity water resistance, temperature, disinfection-related measurands, or the flow rate. The device can measure and manage up to 19 parameters simultaneously. Alongside countless simple alarm, limit value, or time-controlled switching functions, up to four higher-order control loops can be defined in the JUMO AQUIS touch S at the same time.

A paperless recorder is also incorporated to record data. Up to eight analog measurands and six binary signals are registered. Their chronological sequence is displayed on the screen. A 5.5" color screen with touch function can be used to display all parameters as well as to operate and setup the device. The plain text operation philosophy virtually eliminates the need for a manual.

Engineering provides a complete solution

The aquarium operators also benefit from JUMO's engineering expertise. 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 extensive portfolio ranges from running basic feasibility analyses and workshops through to drawing up product requirements specifications and specification sheets as well as configuring, programming, and auditing automation solutions. In addition to startup and project documentation, tailor-made training courses are also offered.

In the case of the San Sebastián aquarium, a solution was required which could clearly display all measured values with a web application in a standard browser. When you click on an individual tank, you are given a detailed view of the corresponding JUMO AQUIS touch S. The measured values of all 30 tanks are updated on the central overview page every ten seconds. Error messages are also displayed here.

The complete system has been commissioned and maintained on site by the Spanish JUMO subsidiary. This complete solution consisting of high-quality measuring technology and innovative engineering services offered added value to the aquarium operators and helped to reduce the engineering costs for the development of the web application.

Further information
+49 661 6003-371
bernhard.mueller@jumo.net

The JUMO sensors

JUMO ecoLine O-DO
Optical sensor for dissolved oxygen (DO)
Type 202613

JUMO ecoLine/JUMO BlackLine
pH/redox combination electrodes
Type 201005

JUMO BlackLine CR-GT/-EC/-GS
Conductive two-electrode conductivity sensor
Type 202922

Mineral-insulated RTD temperature probe
With terminal head form B according to DIN EN 60751
Type 902210

70 years of "Technology with passion"

A look back at JUMO's history

In January 1948, a new constitution came into force in Italy, the Indian freedom fighter Mahatma Gandhi was assassinated, and in Fulda, Moritz Kurt Juchheim set out to establish a small factory for producing glass thermometers. 70 years later, the JUMO corporate group has grown into an international company with around 2,300 employees – but we have not forgotten our humble beginnings. On the occasion of this significant anniversary, the son and grandson of the company founder take a look back at the company's past and contemplate its future. Today, Bernhard and Michael Juchheim are responsible for determining the destiny of the company as its managing partners.

Every beginning is hard, but also rewarding!

It all started in this building. Everything happened under one roof – production and management. There was even employee accommodation.

Bernhard Juchheim: "Whenever I take a walk through the company today and see how far JUMO has come in the last 70 years, I can't help feeling a little bit of awe. Because things were far from easy for my father when he started the company. He came to Fulda from the Soviet-occupied zone because the supply situation was better here. He actually expected that he would soon return to his home in Ilmenau."

Michael Juchheim: "Looking back at the history of the company shows that the decision to set up in Fulda was the right choice. And it's clear that what started out in 1948 with six employees on a site of 350 square meters has turned into a real success story. My grandfather focused on quality and service from the very beginning. This is why his glass and glass contact thermometers already proved to be such a success at the HANNOVER MESSE in 1949."

Growth during the "Wirtschaftswunder" (economic miracle)

Bernhard Juchheim: "My father was never satisfied with what he had already achieved. As early as the 1950s, he started establishing a national sales network. The production range was also expanded during this period to include dial thermometers and heating thermostats. Three years after the company had been founded, "M. K. JUCHHEIM", which was the name of the company back then, already had over 100 employees."

Michael Juchheim: "And the number of employees continued to grow. In 1960, there were already 750 employees working in a manufacturing area of 12,000 square meters. The first JUMO branch offices started appearing in the 1960s. There was also a constant stream of technological advances. Electronic measuring and control devices, RTD temperature probes, and thermocouples – all of these products were added to the portfolio between 1960 and 1970."

A heart for sensors and the first steps into Europe

Bernhard Juchheim: "There was another milestone in 1966. JUMO started manufacturing platinum glass sensors. This groundbreaking decision has shaped the company we have today. The successors to these sensors – the platinum thin-film sensors – are still a central pillar of our success today. Only a few companies around the world can produce this key element of temperature measurement themselves."

Michael Juchheim: "In the 1970s, our main focus was international expansion. In 1971, the first subsidiaries were founded in Belgium and Switzerland – today there are 25 around the globe. This is also a specific feature of JUMO. We have achieved continuous growth based on our own resources. In 2015, we purchased our first additional company. But the purchase was more due to a technological innovation. We hope that the new JUMO plastic sensor technology will provide decisive growth impulses for the future. Which JUMO technology are you particularly proud of?"

Booth from the 1960s

New technologies and industries – wired and wireless

Bernhard Juchheim: "It's hard to say – there are so many. For example, in 1978 when we incorporated microprocessor technology into JUMO devices. Back then we were one of the first companies to put an emphasis on processors in control technology. And in 1997 with the JUMO mTRON, we introduced our own automation system onto the market, and that was another particularly special moment. The successor, JUMO mTRON T, is still a successful model today. "

Michael Juchheim: "I also think that it's remarkable how more and more new measurands have been incorporated into the JUMO portfolio over the decades. As early as the 1950s, we were already implementing pressure measurement technology, and in the 1980s we included the field of liquid analysis and successful recording devices, which have continually evolved over the years from paper recorders to modern paperless recorders. Then there's the field of wireless measuring technology, which we have been focusing on since 2007, and which is becoming increasingly important in this age of digitization."

Prepared for the future

Bernhard Juchheim: "Exactly, that's a tribute to my father: he was always on the lookout for new ideas and solutions as well as ways to further develop the JUMO brand. I think that it must be in our genes as we are still leading the company according to the "Technology with passion" principle."

The main JUMO building in 1985

Michael Juchheim: "I am sure that our curiosity in technology will continue to be the recipe for success in the future. At the same time, establishing ourselves as a system and solution provider will play an increasingly important role for JUMO. I'm thinking about our engineering department, apps, or cloud solutions in particular."

Bernhard Juchheim:
"So, we are feeling very optimistic about the start of another 70 years."

Flow measurement for plate heat exchangers

Advantages of the calorimetric measuring principle

Plate heat exchangers are a special type of heat exchanger. They consist of wavy profiled plates, which are assembled in such a way that in each case the warming medium flows into the successive spaces, followed by the heat-emitting medium. Due to their special design, plate heat exchangers can be expanded easily and are very flexible.

A typical application example is the hot water supply in heating, air-conditioning, and ventilation technology. Using the fresh water modules, the drinking water is heated as needed according to the operating principle of a flow heater. The advantage compared to a conventional boiler is that warm water does not have to be stored for hours or days at a time.

Speed control is particularly important when operating fresh water modules. The JUMO PINOS L02 flow sensor that operates according to the calorimetric measuring principle can be used to ensure this. The calorimetric measurement method uses the physical effect of a flowing medium dissipating heat energy. To put it simply, the faster the liquid flows, the more the heating element in the sensor is cooled. As a result, the flow velocity of the liquid can be determined using a simple temperature measurement.

Due to the measuring method, no moving parts susceptible to wear are incorporated. This is a significant advantage over measuring devices with paddle wheels, for example, because the sensor can also be used in liquids that are polluted with smaller solid particles. Due to the stable design, the devices can also be used under a high operating pressure of up to 75 bar. The JUMO PINOS L02 has another special feature: the developers have managed to construct the device in such a way that allows installation in any direction.

When using the JUMO PINOS L02 in fresh water modules, it detects any change in the flow velocity due to such factors as water being removed. The pump runs permanently at a low speed to supply the fresh water module with warm water. When water is removed, the flow sensor detects a change in the flow. The pump speed is automatically increased. At the same time, a mixing valve is actuated, which is used to regulate the exact ratio of cold water to warm water and therefore regulates the temperature. The result means that the heat exchanger is highly efficient and has a high level of process reliability at all times. Another benefit is that energy is saved by regulating the heat supply to the fresh water module.

Further information
+49 661 6003-2475
stefan.buechner@jumo.net

JUMO PINOS L02
Calorimetric flow sensor
Type 406041

The plate heat exchanger

Recertification of SIL devices

Challenges and opportunities

There is another new driving force within the ranks of JUMO safety measuring technology: the JUMO dTRANS p20 pressure transmitter family with HART® protocol. The device series has now been recertified by TÜV Nord according to the latest standard DIN EN 61508/-1/-2: 2011 path 2H. It is now classified as an operationally tested, SIL-capable device for safety equipment.

But what exactly does "recertified" mean?

Does a standard SIL device not need to be developed from the start based on IEC 61508?

Quite the opposite – for recertification, all relevant components and parts are subjected to extensive testing and supporting documentation is required.

Specifications and architecture

As an initial step, an error analysis must be created according to DIN EN 61508-2 table A1 with a corresponding diagnostic coverage for SIL 2 (type B). The next step is to evaluate and assess the electronics as well as the software of the entire pressure transmitter architecture.

Return statistics

In addition, corresponding error analyses must also be performed based on the quantities sold and repairs. All possible errors identified in these analyses need to be categorized. Additionally, each individual status requires corresponding suggestions for improvement and adequate implementation of improvements.

Validation of production

All work instructions for production must be indicated with corresponding specifications of the manufacturing process. For the series release, the individual process steps within the production must also be accurately defined in additional, specific documents.

Systematic suitability of production

The production must also be audited for functional safety on top of the already-existing monitoring facilities/audits such as for ATEX, ISO 9001 quality management, maritime approvals, and Eurasian approvals.

Safety was already included

JUMO already focused on safety and reliability during the development stage of the JUMO dTRANS p20 series. The process transmitters had therefore implemented internal diagnostic algorithms from the start.

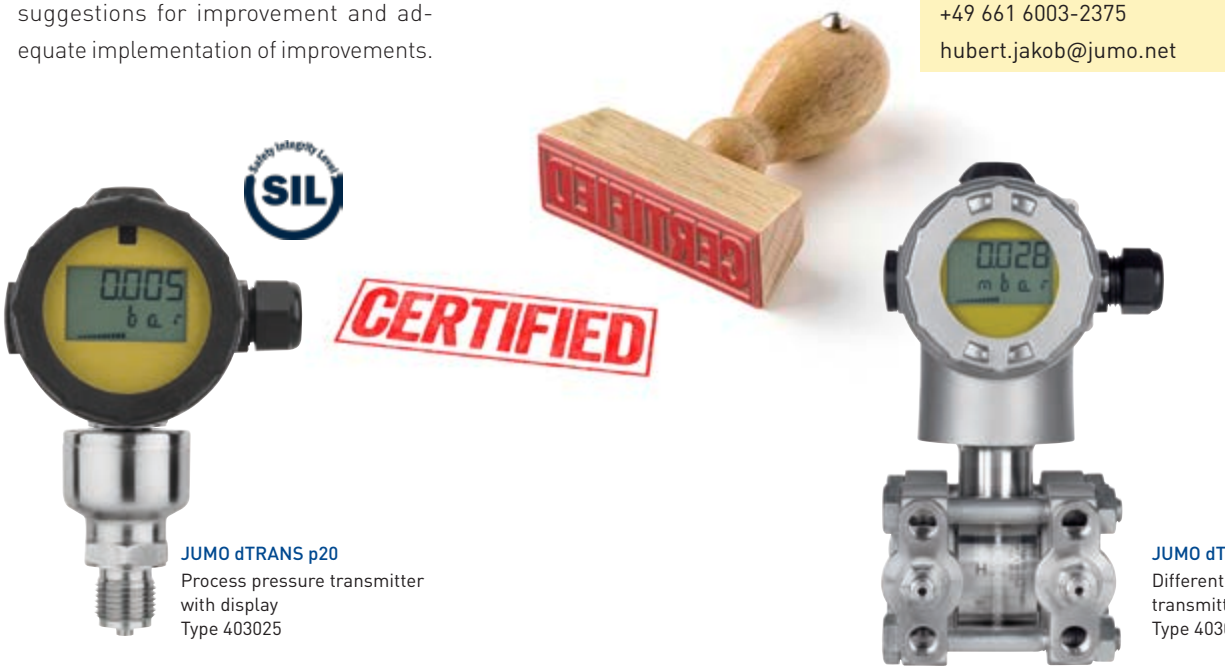
Every JUMO dTRANS p20 and every JUMO dTRANS p20 DELTA device receives a calibration certificate after a successful manufacturing and calibration process.

Summary

Even this short description has made it clear that recertification of an established and tried-and-tested device is in no way inferior to a new device that has been developed according to SIL requirements. The user receives a reliable device with a guarantee for demanding applications in safety-critical systems.

Further information

+49 661 6003-2375
hubert.jakob@jumo.net



JUMO dTRANS p20
Process pressure transmitter with display
Type 403025

JUMO dTRANS p20 DELTA
Differential pressure transmitter with display
Type 403022

Calculating SIL safety switch-offs*

Tips and tricks from JUMO Campus

With the JUMO safetyM STB/STW safety temperature limiter/safety temperature monitor, it is possible to achieve safety switch-offs in line with SIL classification. The required SIL calculation is possible with standardized methods.

Among other factors, the achievable Safety Integrity Level is determined by the "average probability of dangerous failures of a safety function on demand (PFD_{avg})". The following table considers the "Low Demand Function", i.e. the demand rate placed on the safety-related system is on average once a year:

SIL level	PFD_{avg}	Max. tolerable risk for Low Demand Function
SIL 4	$\geq 10^{-5}$ to $< 10^{-4}$	1 failure in 10,000 years
SIL 3	$\geq 10^{-4}$ to $< 10^{-3}$	1 failure in 1,000 years
SIL 2	$\geq 10^{-3}$ to $< 10^{-2}$	1 failure in 100 years
SIL 1	$\geq 10^{-2}$ to $< 10^{-1}$	1 failure in 10 years

Relationship between Safety Integrity Level + PFD_{avg} value

According to the table, systems with SIL 4 have the lowest probability of failure (highest level of safety). The probability of a failure is a maximum of 10^{-4} per demand case. Statistically, one demand per year results in one failure every 10,000 years.
Accordingly, systems with SIL 1 offer the least security. Statistically, this results in a failure after 10 years at the earliest.

The PFD_{avg} value of the overall system is the sum of the PFD_{avg} values of the individual components. The failure probability of the entire system is the result from the addition of all the individual failure probabilities:

$PFD_{avg\_sensor\ technology\ (35\ \%)}$
+ $PFD_{avg\_converter\ (15\ \%)}$
+ $PFD_{avg\_actuator\ (50\ \%)}$
= $PFD_{avg\_total\ (100\ \%)}$

The chain from the sensor to the relay of the safety temperature monitor/safety temperature limiter (converter/logic) may have a maximum PFD_{avg} value of 50 % of 10^{-3} in a complete system with SIL 3. JUMO supplies this part of the measuring chain with a manufacturer's declaration regarding the probability of failure and the SIL classification. It is possible to provide a manufacturer's declaration for a combination of selected temperature sensors and the safety temperature monitor/safety temperature limiter. Only the actuator needs to be included in the analysis. With JUMO safetyM STB/STW, SIL 3 can be achieved when using two sensors.

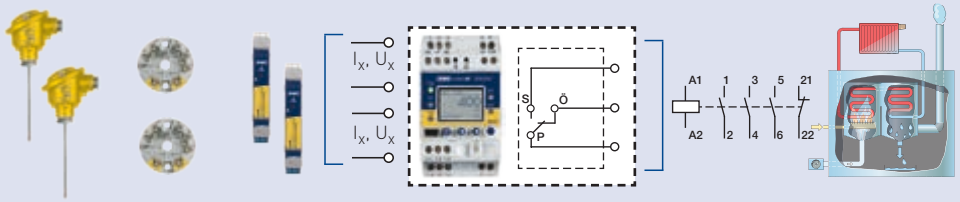
If a measuring chain is used that does not have a manufacturer's declaration regarding SIL classification, each individual component must be considered separately. As previously indicated, a PFD_{avg} value of max. $0.15 \times 10^{-3} = 1.5 \times 10^{-4}$ is admissible in an overall system for SIL 3 for the safety temperature monitor/safety temperature limiter (converter/logic). It is apparent from the operating manual of the safety temperature limiter/safety temperature monitor that the PFD_{avg} value of the safety temperature limiter/safety temperature monitor remains below the required value when using two sensors/signals. Considerations also need to be made for the other components accordingly. Derived from the model for "35 % for the sensor technology", the PFD_{avg} value for the sensor technology can be broken down further as per ***Fig. 1***:

$PFD_{avg\_sensor\ (21\ \%)}$
+ $PFD_{avg\_head\ transmitter\ (7\ \%)}$
+ $PFD_{avg\_transmitter\ power\ supply\ unit\ (7\ \%)}$
+ $PFD_{avg\_converter/logic\ (15\ \%)}$
+ $PFD_{avg\_actuator\ (50\ \%)}$
= $PFD_{avg\_total\ (100\ \%)}$

After this consideration, 21 % (0.21×10^{-3}) is assigned to the sensor; the head transmitter and transmitter power supply unit have a result of 7 % each (0.07×10^{-3}). So, for example, sensors with a maximum PFD value of $0.21 \times 10^{-3} = 2.1 \times 10^{-4}$ need to be used. The safety relevant information must be available and documented.

JUMO supports users in their search for the optimal SIL solution with reliable products and extensive consultation (page 4-7).

Breakdown of PFD, according to SIL



Sensor 21 % × 10^{-3} | Head transmitter 7 % × 10^{-3} | Transmitter power supply unit 7 % × 10^{-3} | Converter/logic 15 % × 10^{-3} | Actuator 50 % × 10^{-3}

Consideration of overall system with special conditions

$PFD_{sensor} + PFD_{signal\ paths} + PFD_{logic} + PFD_{actuator} <=$ ... SIL classification ($=10^{-3}$)

Fig. 1: *System for safety temperature limitation*

* Safety Integrity Level

JUMO at trade fairs 2018

Experience our new products and innovations live

GERMANY

ACHEMA
International leading trade fair for the process industry
June 11–15, 2018 *Frankfurt am Main*

SENSOR + TEST
The measurement fair
June 26–28, 2018 *Nuremberg*

SMM
The world's leading trade fair for the maritime industry
Sep. 04–07, 2018 *Hamburg*

InnoTrans
International trade fair for transport technology
Sep. 18–21, 2018 *Berlin*

HeatTreatment Congress
Specialist conference for heat treatment
Oct. 16–18, 2018 *Cologne*

BrauBeviale
European trade fair for the beverage industry
Nov. 13–15, 2018 *Nuremberg*

SPS IPC Drives
International trade fair and congress for electrical automation, systems, and components
Nov. 27–29, 2018 *Nuremberg*

BELGIUM

AQUARAMA
Trade fair for water technology
Oct. 25, 2018 *Brabanthal Leuven*

DENMARK

AUTOMATIK
Trade fair for automation technology
Sept. 11-13, 2018 *Brøndby*

FRANCE

POLLUTEC
Trade show for environmental equipment technologies and services
Nov. 27-30, 2018 *Lyon*

INDIA

AUTOMATION
Leading trade fair for process automation
Aug. 29-Sept. 01, 2018 *Mumbai*

NETHERLANDS

WOTS
World of Technology & Science
Oct. 02-05, 2018 *Utrecht*

NORWAY

NOR-FISHING
Exhibition for the fisheries industry
Aug. 21-24, 2018 *Trondheim*

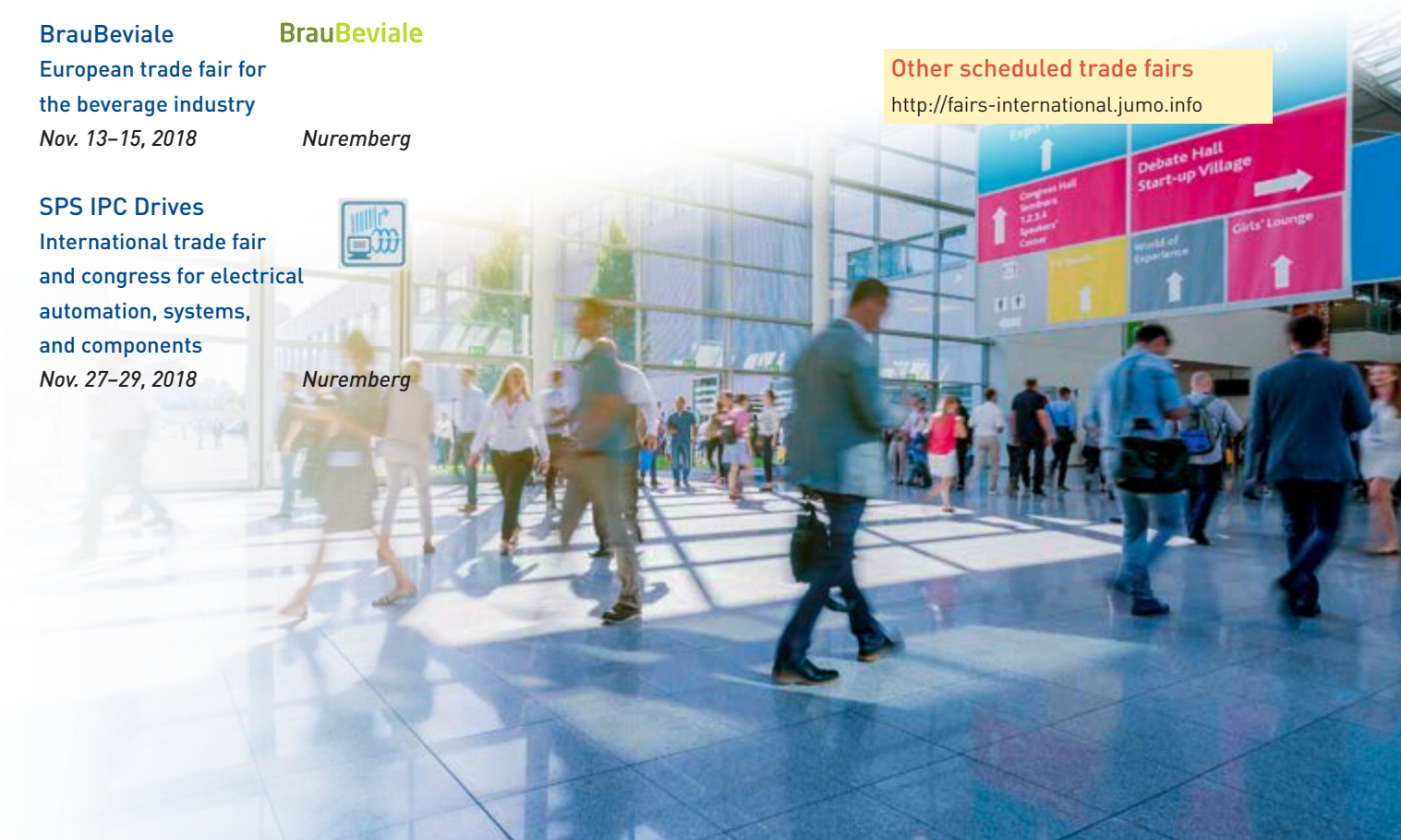
RUSSIA

ECWATECH
International trade fair for water technology
Sept. 25-27, 2018 *Moscow*

SWEDEN

VA-MÄSSAN
Trade fair for water and wastewater
Sept. 25-27, 2018 *Jönköping*

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



JUMO webinar highlights in 2018

Keep your technical knowledge fresh

TEMPERATURE
Practical basics of electrical temperature measurement
Sep. 05, 2018

LIQUID ANALYSIS
Basic principles for pH measurement and use of measurement technology
Sep. 18, 2018

PRESSURE AND LEVEL
Hydrostatic level measurement – basic principles and startup
Sep. 13, 2018

FLOW
Industrial flow measurement technology – basic principles and measurement methods
Nov. 06, 2018

HUMIDITY
Introduction to humidity measurement – basic physical principles and overview of measurement methods
Sept. 12, 2018

CONTROL
Using cascade control
Nov. 13, 2018

AUTOMATION
JUMO thyristor power controller of the TYA series – functions and controls for three-phase operation
June 19, 2018

MONITORING
Application of JUMO safetyM STB/STW safety temperature limiters and monitors
June 27, 2018

IO-Link GENERAL TOPICS
Connection of JUMO sensors with IO-Link
Sep. 19, 2018

Basic principles of explosion protection (ATEX) and the use of JUMO equipment with the protection type intrinsically safe
Oct. 17, 2018

We are continually expanding the number of webinars we offer – make sure to check out our JUMO Campus portal for the next webinar dates:
http://webinars.jumo-en.info

Here you will also find a wide range of free e-learning courses, webinar recordings, and technical reference books.

We look forward to your visit at:
http://campus.jumo-en.info