02 / 2015

sensors + automation

The Customer Magazine from JUMO

JUMO

JUMO digiLine: smart sensors for Industry 4.0

Intelligent, bus-capable connection system for digital sensors

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Everything flows!

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Sweet temptation

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JUMO is expanding

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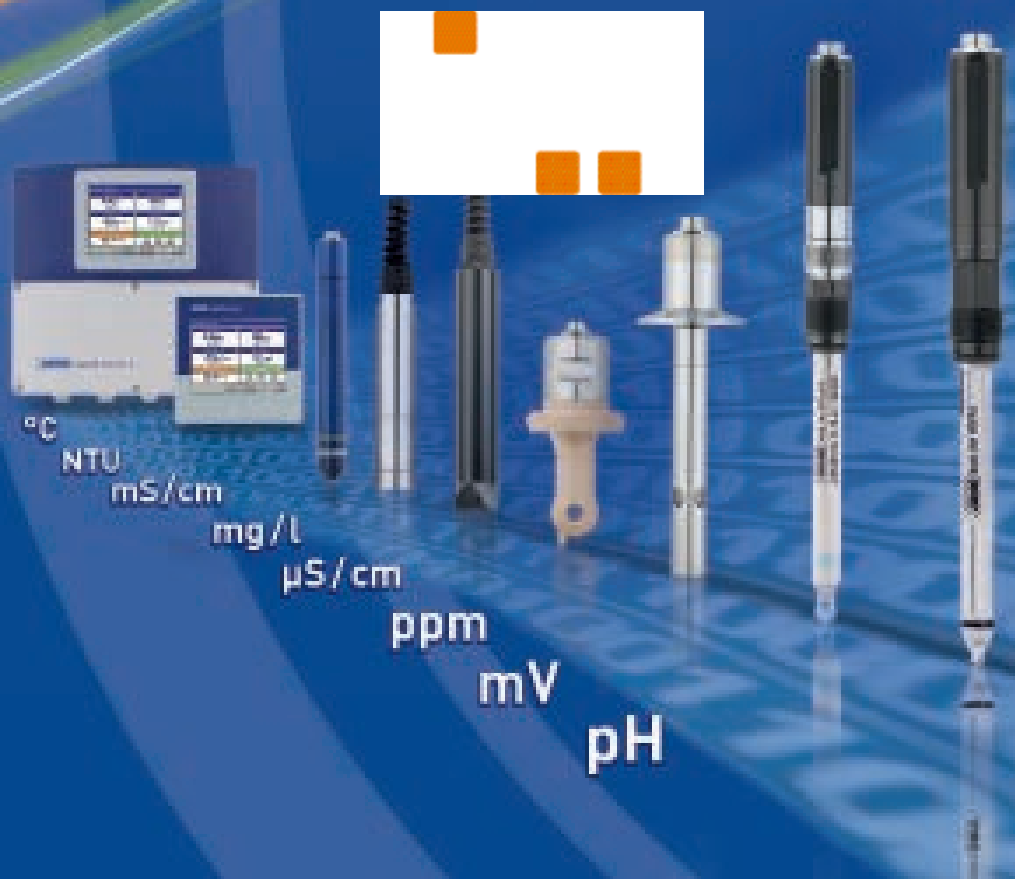


JUMO digiLine

Intelligent, bus-capable connection system for digital sensors in liquid analysis with integrated sensor management

Measure various measurands of liquid analysis with just one system

- Measurands:
  pH value, temperature, ORP, conductivity, oxygen concentration, turbidity, and those related to disinfection
- For industrial applications in the processing, food, pharmaceutical, and water industry
- Fail-safe digital data transfer for optimal process monitoring
- Modular system: for both individual measuring points and for establishing sensor networks
- Plug and Play function when connected to transmitters from the JUMO AQUIS touch series: facilitates the replacement of used up sensors or the brief exchange of sensors for calibration purposes
- Sensors can also be connected to the JUMO mTRON T automation system
- When combined with the JUMO digiLine interface, the sensor can be disconnected and replaced with a new sensor once it has become worn
- Safe and simple calibration of sensors as well as comprehensive measuring point management: convenient on a PC with JUMO DSM (Digital Sensor Management)

Welcome to JUMO.

www.digiline-en.jumo.info

Dear Reader,

"The future is digital" – this common phrase has suddenly taken on a completely new meaning in the course of Industry 4.0. Terms such as wireless transfer technology, clouds, and mobile apps were previously only found in the private sector. And now, companies increasingly need to grapple with these developments as they progress toward digital engineering and the Internet of Things.

With our products, we form a part of Industry 4.0. JUMO measurement and control technology opens up a wide range of networking opportunities at the control and production level, in particular in the area of vertical integration. With the new sensors from the digiLine series, which we are introducing in this issue of our customer magazine, we also make a significant contribution to "Big Data". A range of completely new possibilities is now opening up for recording data throughout the entire product lifecycle of our sensors.

However, the "classic" analog measurement technology will of course continue to play a key role for JUMO. The new electromagnetic flowmeters in the JUMO flowTRANS series are the best example. With these products we are expanding our portfolio for the long term and taking another step forward in our evolution from a component supplier to a solutions provider.

Alongside these key topics, in the new issue of the magazine you will also find interesting reports on applications, product presentations, and news from the JUMO corporate group.

We hope you enjoy reading our magazine.

Your Managing Partners,

Bernhard Juchheim

Michael Juchheim

JUMO digiLine pH
pH combination electrode
Type 201021
digiLine electronic
Type 202705

JUMO digiLine Rd
Redox combination electrode
Type 201026
digiLine electronic
Type 202705

JUMO tecLine Cl2
Sensor for disinfection measurands
Type 202630

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

JUMO ecoLine NTU
Optical sensor for turbidity measurements
Type 202670

JUMO digiLine Ci
Inductive conductivity and temperature sensor
Type 202707

JUMO digiLine CR
Conductive two-electrode conductivity sensor
Type 202706

JUMO digiLine: smart sensors for Industry 4.0

Intelligent, bus-capable connection system for digital sensors in liquid analysis with integrated sensor management

mg/l

With digiLine, JUMO presents the first bus-capable connection system for digital liquid analysis sensors with Plug and Play functionality. The system enables the simple setup of sensor networks.

The world is analog – our senses, as well as all natural, physical, and chemical processes, function according to this principle. Why then do we try to make everything digital?

mV

For the technical world, the digitization of measurement signals represented an important step forward. Finally, it was possible to process measured values from the sensors in display units, controllers, or recorders without any loss, and to mathematically connect these with other signals.

The major trend in recent years has years has been not to first digitize the sensor signals in a measuring or control device, but instead to bring these as close as possible to the analog sensor element. This enables any signal changes or malfunctions on the way from the sensor to the downstream measuring device to be further minimized or prevented altogether.

pH

Through the integration of microprocessors in the sensors, analog measuring sensors became so-called "smart sensors", which carry their specifications with them at all times.

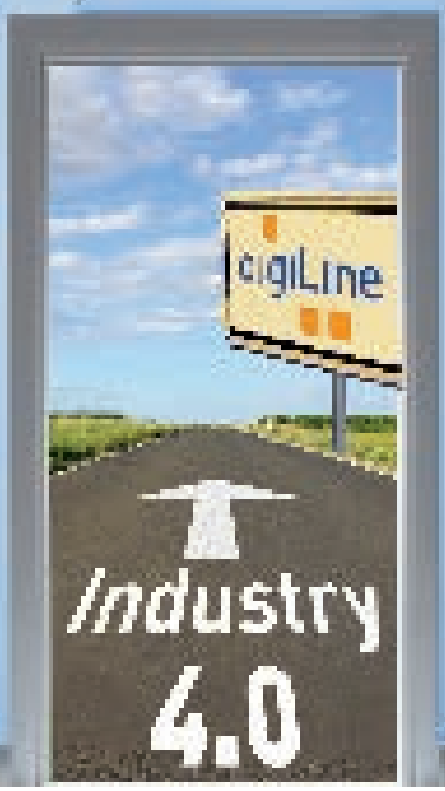
From a technical point of view, this now simplifies startups, calibration processes, and parameter settings. The sensor has everything on board to automatically provide the peripheral equipment with the option to retrieve measurement signals and further data. The often mentioned "Plug and Play" from the consumer sector has now finally found its practical use in the industrial and technical world.

In addition to the digital transfer of sensor signals, the smart sensors also enable the setup of sensor networks. An example of this type of intelligent network is the JUMO digiLine. A diverse range of sensors can be connected to each other in a star network or in series. Only a single digital signal cable then connects to the next evaluating unit or to the control. This enables more efficient and faster cable installation in plants in which several parameters need to be monitored simultaneously at a diverse range of locations.

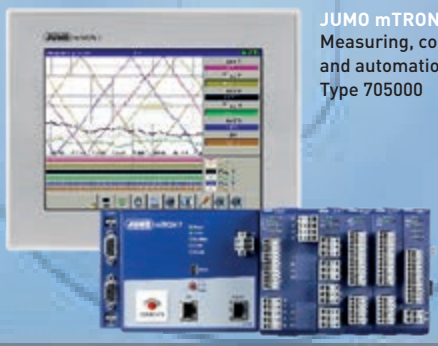
A variety of liquid analysis parameters can now be measured using just one system. For the market launch, a digiLine component was developed for pH, redox, and temperature measurement.

Furthermore, it is possible to connect with tried-and-tested JUMO products

ms/cm



JUMO AQUIS touch S / P
Modular multichannel measuring devices for liquid analysis with integrated controller and paperless recorder
Types 202580 / 202581



JUMO mTRON T
Measuring, control, and automation system
Type 705000

for turbidity and oxygen measurement. Digital versions of the conductivity and amperometric sensors for disinfection (free chlorine, total chlorine, ozone, hydrogen peroxide, etc.) are also in preparation. The major benefit: the simple connection of various sensors to a bus opens up a range of new possibilities for industrial applications in the processing, food, pharmaceutical, and water industry.

The JUMO digiLine sensor network also increases the number of sensors that can be connected to the JUMO AQUIS touch multichannel measuring and control devices. Furthermore, JUMO digiLine sensors can be integrated with the JUMO mTRON T automation system. This means that there is no need for an additional transmitter between the control and the digital sensor.

Here, JUMO is bridging the gap between sensor technology and Industry 4.0

Alongside the Modbus-based digiLine protocol, most digiLine sensors are also available with an analog output of 4 to 20 mA. This allows the smart sensors to be integrated even in older systems.

JUMO digiLine pH and redox sensors come as a single unit consisting of the sensor with the electronic system screwed onto it. Once the pH redox component has become completely worn, the screw connection is separated and electronic components can continue to be used with a new sensor.

The system software is also completely new. The necessary parameterization and calibration of the pH or redox sensor can be carried out conveniently in the laboratory using a PC or laptop, a USB interface converter, and the JUMO digiLine software. Calibration data and the sensor status evaluation are stored directly in the sensor and enable seamless documentation over the entire sensor life cycle.

With this new technology, JUMO is bridging the gap between the world of sensor technology and Industry 4.0.

Prepare to be amazed by the wide range of possibilities offered by the JUMO digiLine sensor network.

ppm

°C

NTU

µs/cm

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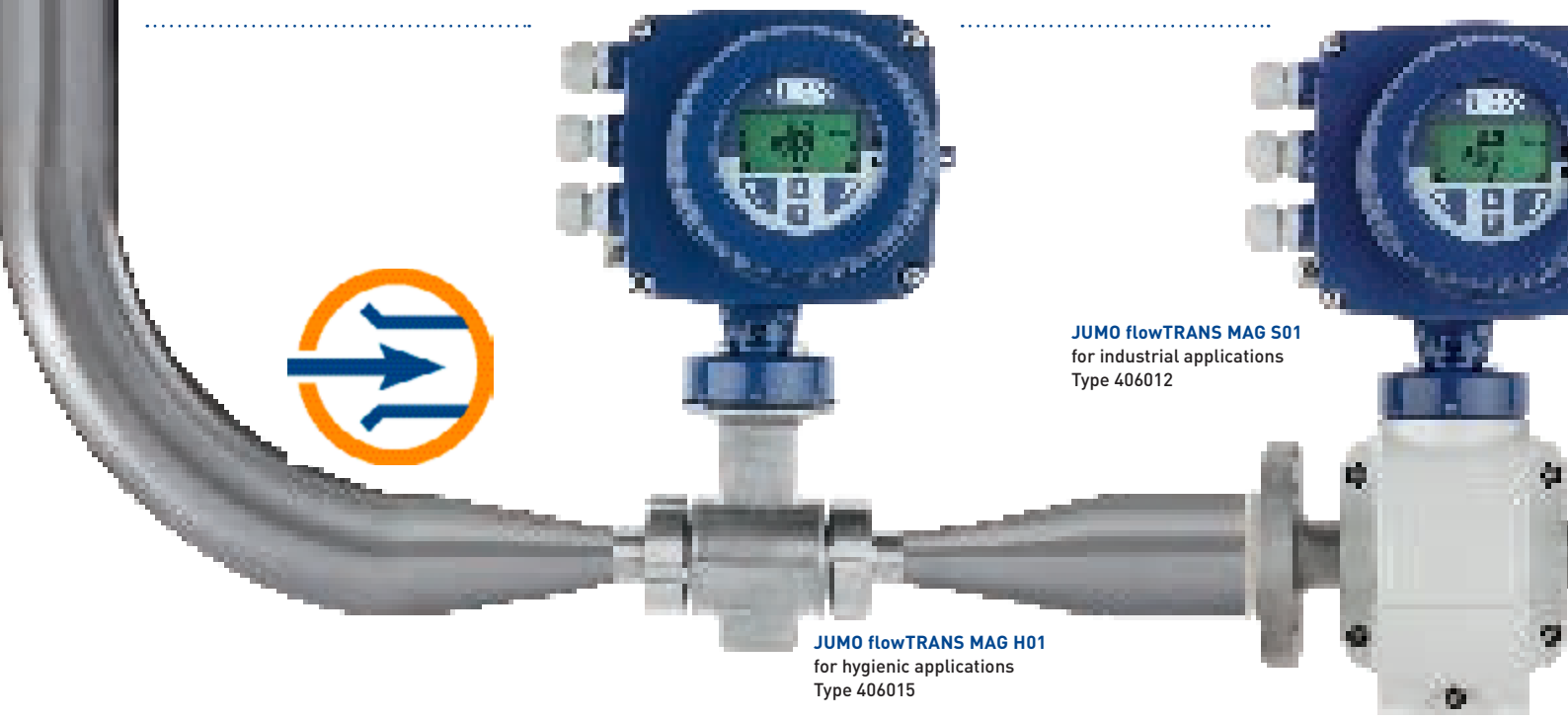
“With digiLine, JUMO presents the first bus-capable connection system for digital liquid analysis sensors with Plug and Play functionality.”
Dipl. -Ing. (FH) Reinhard Manns
Product Manager, Sensors



JUMO flowTRANS MAG S01
for industrial applications
Type 406012

JUMO flowTRANS MAG H01
for hygienic applications
Type 406015

Everything flows!

Electromagnetic flowmeters complete the JUMO portfolio

The aphorism "Panta rhei" (everything flows) is said to come from the Greek philosopher Heraclitus. Admittedly, he probably wasn't thinking of measurement technology when he spoke these words. And yet today, "flow" is one of the most important physical measurands. As a result, many processes can be implemented, depending on the measurement medium used, the required accuracy, and the environmental conditions.

Traditional methods for determining the flow rate include paddle wheel and turbine meters. Measuring the differential pressure is one of the oldest and most commonly used measurements. New developments include the electromagnetic, ultrasound, Corriolis, Vortex, and thermal measuring principles.

Until now, JUMO has relied on differential pressure when it comes to flow measurement. Due to the simple construction, this method is often used for low-viscosity liquids as well as for gases and steam. Because of the quadratic correlation between flow and dynamic pressure or measured differential pressure, the measuring range is not as large as in other systems.

For this reason, customers have been continually asking for alternative methods. JUMO satisfies these customer expectations with the new electromagnetic flowmeters from the JUMO flowTRANS MAG series. With a market share of around 25 percent, electromagnetic flow measurement is one of the most widely used methods around the world. The measuring principle is based on the induction of a voltage in a conductor when it moves within a magnetic field. The measured voltage is proportional to the strength of the magnetic field and the flow velocity. Electromagnetic flowmeters are characterized by a very high measuring dynamic and a high measuring accuracy. Further advantages are the extremely low loss of pressure and the absence of mechanically moving parts in the volume flow. As a result the flowmeters are relatively low-wear and low-maintenance.

These features make the devices in the JUMO flowTRANS MAG series suitable for a variety of application areas. You can measure the flow of acids, lyes, liquid food, water, wastewater, and many other liquids.

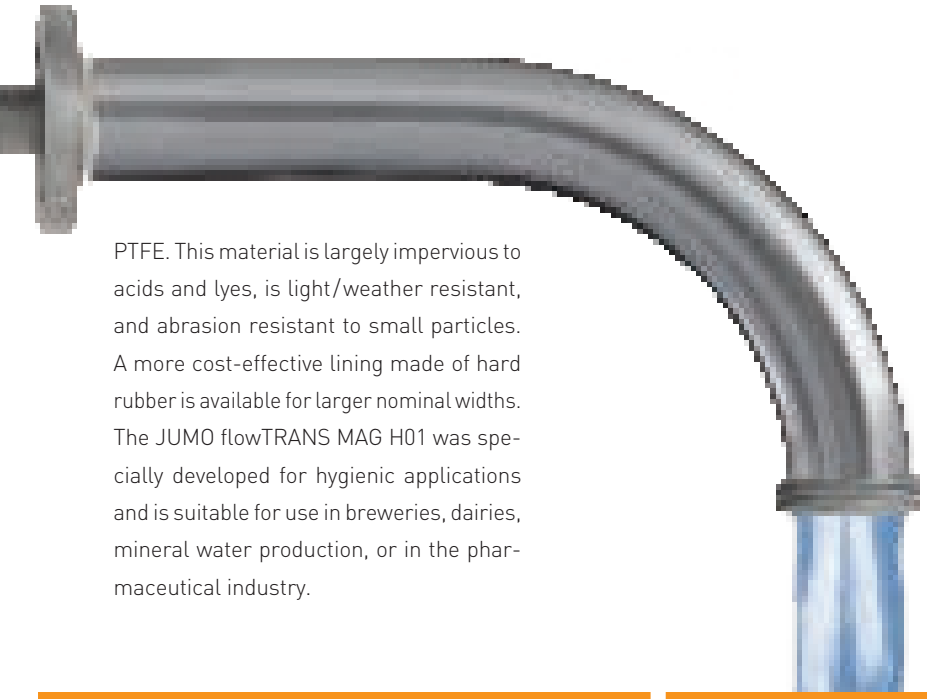
The JUMO flowTRANS MAG S01 is the standard version of the new series. Potential application areas exist in water and wastewater engineering, paper and pulp production, the metal industry, mechanical engineering, and the chemical and energy industries. It is available for nominal widths ranging from DN 10 to DN 300. The mi-

nimum conductivity of the measurement medium must be greater than 5 µS/cm; the maximum temperature limit is +130 °C. Further versions can be purchased upon request. The flowmeter is available either as a compact device with protection type IP67 or with a separate transmitter (IP68). DIN versions or ASME versions are available as a flange.

As standard, the flowmeters are lined with PTFE. This material is largely impervious to acids and lyes, is light/weather resistant, and abrasion resistant to small particles. A more cost-effective lining made of hard rubber is available for larger nominal widths. The JUMO flowTRANS MAG H01 was specially developed for hygienic applications and is suitable for use in breweries, dairies, mineral water production, or in the pharmaceutical industry.

It is available for nominal widths ranging from DN 3 to DN 100 and also designed in protection type IP67 or IP68. The following variable process connections can be selected: welded socket, screw connection, Tri-Clamp, or connection flange. A special welding aid facilitates and ensures correct installation of the welded sockets.

As standard, the flowmeters are lined with PFA. This material is suitable for particularly high temperatures, is vacuum proof, and features particularly good chemical resistance. Both of these flowmeters are simple and convenient to configure, either on the device itself or using PC software. The transmitter automatically detects the sensor and the data from the SensorMemory is automatically loaded after switching on the auxiliary power. The device is operated via a configurable backlit display. The transmitter electronics and the sensors can be checked for proper function and the operating conditions can be monitored through integrated diagnostic functions.



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JUMO flowTRANS MAG S01 (406012) for industrial applications

Compact

Remote

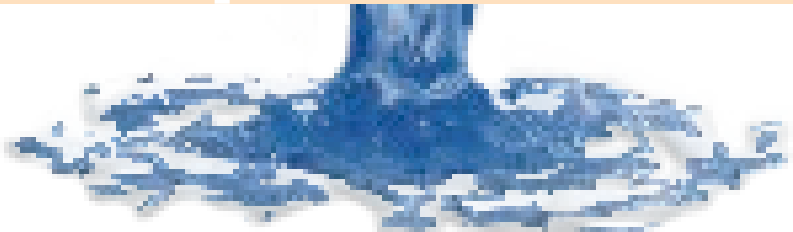
Sensor Transmitter

JUMO flowTRANS MAG H01 (406015) for hygienic applications

Compact

Remote

Sensor Transmitter



JUMO LOGOSCREEN 600
Paperless recorder
Type 706520

Touching the future of recording

The new JUMO LOGOSCREEN 600

The new JUMO LOGOSCREEN 600 combines JUMO's long-standing experience of paperless recorders with a new control and visualization concept. With the ICON-based system, in most cases only a maximum of three "touch movements" are required to display the desired process data.

Multiple versions of the JUMO LOGOSCREEN 600 are available for process data recording. The basic model is a device version with no measuring input. With this version, up to 24 analog and digital process values are received from external systems in slave or master operating mode via Ethernet interface with Modbus TCP or RS485 interface with Modbus RTU. The top-of-the-line models are variants with three or six universal analog inputs, two analog outputs, 12 digital inputs, and 12 individually switchable digital inputs/outputs.

The measurement signals are stored in the internal memory according to groups with a configurable memory cycle time from 125 milliseconds up to 32,000 seconds. The data can be read out using a USB flash drive or via an Ethernet interface.

In the JUMO LOGOSCREEN 600, the connected process signals can be displayed with the default visualizations, such as line graphs (vertical or horizontal), bar graphs, text images (numerical), or digital diagrams. In addition, users can use the setup program to create up to six separate process screens according to their individual requirements.

With the flexibly adjustable batch recording, important production data is safely stored and archived for subsequent backtracking of production processes. The powerful PCA3000 PC program is available for the evaluation of data, and the PCC communication software is available for automatic data retrieval. With the convenient setup program, this extremely compact paperless recorder (mounting depth 119 mm) is easily and reliably configured to enable a quick startup. When connected to an Ethernet network, the installed web server enables remote requests via Internet browser. The device can also be read out via the new JUMODevice app.

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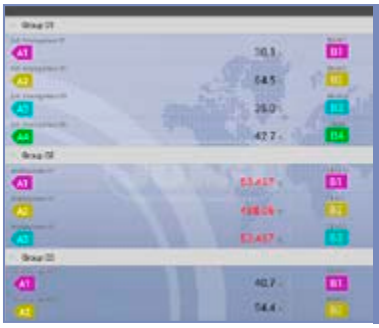
JUMODevice: new app for smartphones and tablets

Mobile communication is becoming more important with Industry 4.0. With the free JUMODevice app, both Android and Apple smartphones as well as tablets can now be connected to various JUMO devices, such as the JUMO mTRON T automation system. The intuitive user concept is based on the design of the new JUMO LOGOSCREEN 600 paperless recorder. The app can scan for devices in the company network and displays the discovered devices in a clear list. If a JUMO device is selected via the app, the device tells the app which data it can provide. This data could, for example, include event or alarm lists.



INNOVATION

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JUMO SCR power controller: successful through communication

Yesterday was analog – the future is digital. JUMO has therefore equipped the TYA power controller series with a new Ethernet-based communication protocol. The new interface provides more data in a shorter time. This also enables the constant transfer of process data such as load current, load voltage, and impedance. However, data on energy consumption and diagnosis functions such as mains voltage fluctuations, partial load failure, and excess temperature are also evaluated. The real-time capability of the interface enables several power controllers to be synchronized in combination with the JUMO mTRON T automation system, and also enables the management of load currents.

Type 709061

INNOVATION

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JUMO TYA-203: expansion of the successful SCR power controller series

The TYA-200 power controller series from JUMO is growing. The series now includes the new TYA-203, a fully-fledged three-phase power controller. This enables the actuation of three-phase loads in three-phase networks with all operating modes and the simultaneous detection of partial load failures. The new power controller is typically used in furnace construction, where temperatures of +1400 °C and higher need to be reached. A further benefit is the teach-in function, which is used to automatically set the alarm limits for partial load failure detection. The cyclical calibration ensures permanent and precise detection of partial load failure, even if the specifications of the heating element are changed. The series is available in currents from 20 to 250 A and mains voltages of up to 500 V.

Type 709063

INNOVATION

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Hygienic thermowells for temperature probes used in the food and pharmaceutical industry

The function of hygienic thermowells is to safely close sensitive processes in the food and pharmaceutical industry. At the same time, the processes must no longer be opened for maintenance work and calibrations. As a result, this reduces both the time and costs for installation and dismantling work, as well as for plant cleaning cycles. The new hygienic thermowells from JUMO can be manufactured with all process connections commonly found in the industry. They are made of 316 L stainless steel with a standard surface roughness of Ra ⩽ 0.8 µm and can also be manufactured with a surface finish of Ra ⩽ 0.4 µm. The probe tip of the thermowell has been reduced from 6 to 3.5 mm, which considerably improves the response time.

Type 902810/12

INNOVATION

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System monitoring ...

... with the JUMO mTRON T system

With headquarters in Laupheim, Germany, Rentschler Biotechnologie GmbH is an internationally active service provider for the production of biopharmaceuticals. With 600 employees, it is Europe's third largest company in this product segment.

The JUMO mTRON T measuring, control, and automation system is used to monitor production plants in Laupheim. Designed to be modular, JUMO mTRON T uses an Ethernet-based system bus and an integrated PLC – also for decentralized automation tasks. The system, which can be used universally, also impressed Rentschler Biotechnologie GmbH with its simple, application-oriented, and user-friendly configuration concept.

The heart of JUMO mTRON T is the central processing unit with a process map for up to 30 input/output modules. The CPU contains superior communication interfaces, including a web server. For individual control applications, the system has a PLC (CODESYS V3), program generator and limit value monitoring functions, as well as math and logic modules.

The system in Laupheim is used for recording measured values, as well as for the visualization, recording, and monitoring of temperatures in the production process. The galvanically isolated recording of measured values of the temperature sensors used in the plants takes place via the four-channel analog input module. The pre-alarms are defined directly at the corresponding analog input and masked if necessary. The main alarms are generated in the recording function of the multifunction panel and then also flow into the PC evaluation. The measured values are visualized using curve, text, bar graph, and process screens.

The JUMO SVS3000 plant visualization software also enables visualization, recording, and password-protected operation of the plant from a superior control room. A remote alarm function is also possible here. The alarms are recorded in the JUMO SVS3000 in event lists. An SMS alarm function has been implemented via a GSM modem.

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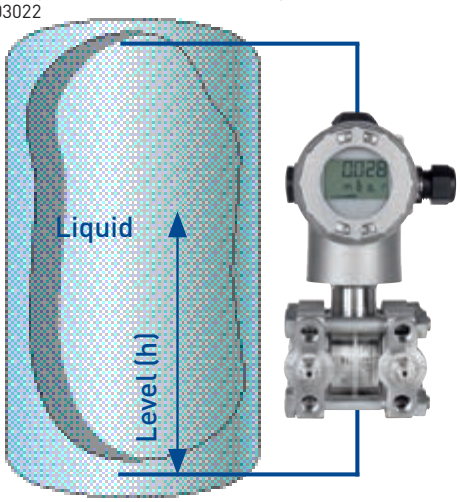
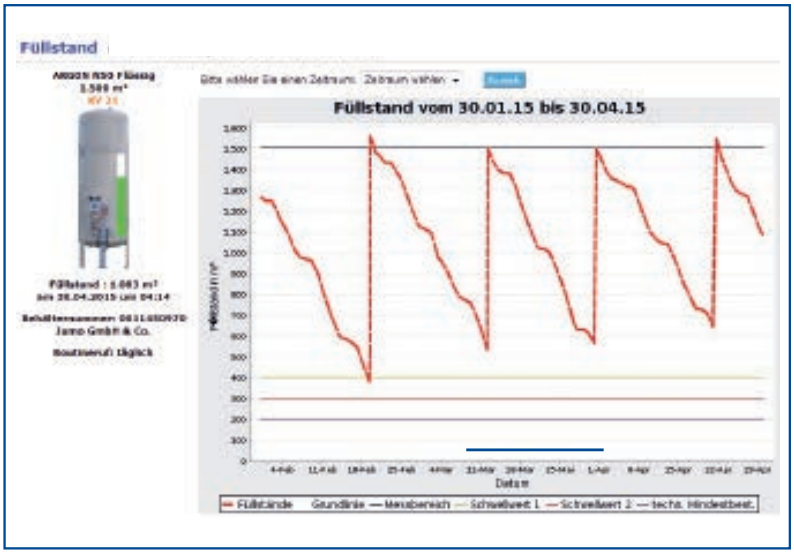
JUMO dTRANS p20 DELTA
Differential pressure transmitter with display
Type 403022



The automated level monitoring process screen



Half full or half empty?

Level monitoring with an automation system

Pressure transmitters or level probes are used for hydrostatic level measurement in vented tanks or for determining the level, for example, in drinking water wells. The measuring principle in this process is based on the hydrostatic pressure in a liquid or gas.

Differential pressure transmitters such as the JUMO dTRANS p20 DELTA can be used to achieve the most accurate measurement of the level in closed tanks. For this, one differential pressure transmitter with two pressure separators is used in each tank. During installation, the measuring device is connected to the floor and the cover of the container using pipelines.

If this measurement technology is then combined with an automation system, it opens up a number of additional possibilities. Thanks to the JUMO dTRANS p20 DELTA and JUMO mTRON T automation system, several nitrogen tanks are monitored at the JUMO premises in Fulda, Germany.

Because the automation system includes an integrated web server, users can conveniently and reliably access the process values. This can be performed either using a PC or also remotely using a smartphone or tablet. Messages – such as alarm messages – can also be sent via SMS text message or email.

Furthermore, automated level monitoring can be implemented using this functionality. To this end, a limit value is defined in the JUMO mTRON T. If values fall below this limit value, an order process is triggered automatically via email at the supplier's end. Thanks to proven measurement technology and modern automation solutions, this implements an application that successfully opens the door to Industry 4.0.

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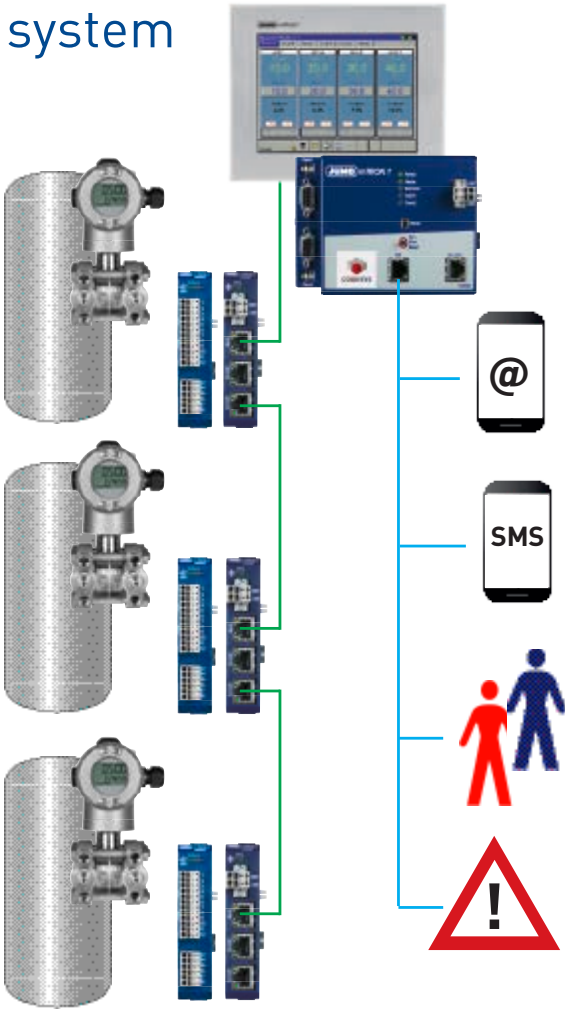

Schematic display of level monitoring with the JUMO mTRON T automation system

JUMO tecLine HD pH
pH combination electrode
in glass shaft design
Type 201021

JUMO dTRANS pH 02
Compact multichannel transmitter/
controller for pH, redox, ammonia,
standard signals, and temperature
Type 202551

Sweet temptation

Special sensors for measuring the pH value in sugar production

When producing sugar from cane sugar, the pH value plays a crucial role in the quality of the final product. However, the used measurement technology is subjected to extreme stresses in this process. Consequently, JUMO has developed special pH electrodes that are being used successfully in a sugar plant in Ecuador.

The world is not only round, it is also sweet. At least when per capita consumption of sugar is considered. The front-runner is Cuba, with approx. 70 kg per resident a year, followed by Brazil with 64 kg. By contrast, German per capita consumption is "only" 32 kg annually, but this is still the equivalent of 10,000 sugar cubes. While household sugar is extracted primarily from sugar beets in Europe, cane sugar is usually the raw product in South America, Asia, and Africa.

After pressing or extraction, cane sugar is brown, sticky, and is referred to as raw sugar. It does not keep well and it has no nutritional advantages over refined sugar. Sugar therefore needs to be chemically treated.

Sulfitation (addition of sulfur dioxide) contributes to the white color of the final sugar. The measurement and inspection of the pH value during the process provides information about the amount of sulfur dioxide that needs to be added to the cane sugar. For the liming step, hydrated lime is added to the syrup to neutralize the pH value. This stops the decomposition of sucrose into glucose as well as fructose and results in precipitation of calcium sulfite, through which impurities are removed.

For the required measurement, the sugar mass has a temperature of up to 100 °C. This high temperature not only reduces the operating life of typical pH electrodes, but during cooling the crystallizing sugar can stick to the diaphragm in the electrode. Coatings on the pH sensitive membrane glass can significantly interfere with the pH measurement or even make it impossible. Since electrode poisons are present in the measurement medium itself, the measurement technology must be extremely durable and reliable. These poisons – in this case the sulfite from the used sulfur dioxide – can reach the conducting element of the electrode through the porous diaphragm and the reference electrolytes. There they destroy the silver/silver chloride reference electrode. This results initially in drifting measured values and ultimately failure of the measuring chain.

It is for this reason that JUMO has developed a heavy-duty pH and redox combination electrode for use in extreme conditions.

A section of the complete system

The JUMO tecLine HD pH and the JUMO tecLine HD Redox are particularly robust and can even be used in difficult processes for temperatures of up to +135 °C and a maximum pressure of 13 bar.

A newly developed and extensive PTFE ring diaphragm with improved structure enables a quick response time while simultaneously being largely impervious to greater pollution loads or oily/fatty process water and wastewater. The double-chamber architecture is a standard feature; its extended diffusion path prevents electrode failure in the event of penetrating electrode poisons. A large salt reserve in the reference system enables measurements with long-term stability.

Additionally, the sugar producer in Ecuador wanted to compare the online pH value measurement with the pH value measurement in the laboratory at 25 °C for quality purposes. Therefore temperature compensation was necessary. The measurement signal required for this task is provided by the temperature probe that is integrated in the pH electrode.

Another increase in process reliability was achieved through the use of an automatic cleaning system with a pneumatic retractable holder. This enabled the pH electrode to be removed from the process without complication. In addition, crystallized deposits could be cleaned from the pH electrode in the rinsing chamber of the retractable holder outside of the process. The associated control unit includes a cleaning program that has been proven in practical application and which could be easily adapted to the process requirements.

All of these measures not only significantly increase the quality of the final product, they also considerably reduce maintenance efforts due to regular automatic cleaning. It was possible to virtually double the operation time of the electrodes compared to the electrodes that were used previously.

Further information

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Pneumatic retractable holder
for all commercial sensors
with 225 mm length
Type 202823

JUMO tecLine HD Redox
Redox combination electrode
in glass shaft design
Type 201026

An aquaculture with the various tanks in which fish are bred

Digital measuring systems: ready for use in aquaculture plants

Simple measurement of oxygen and turbidity with optical digital sensors

Aquacultures are used for the controlled breeding of fish and shellfish. The continuous inspection of parameters that determine quality, such as temperature, salt content, pH value, oxygen, and turbidity, is a vital necessity here. The current trend is toward fully automated circuit systems. These should be as simple as possible to operate, robust, and low-maintenance.

The digital systems from JUMO meet all of these requirements. These are used, among others, by the Dutch company Trintech. The plant engineer is a specialist in automation solutions that are used in fish breeding, greenhouses, and agriculture. At Trintech, the JUMO ecoLine O-DO oxygen sensor and associated JUMO AQUIS 500 RS display/controller are used.

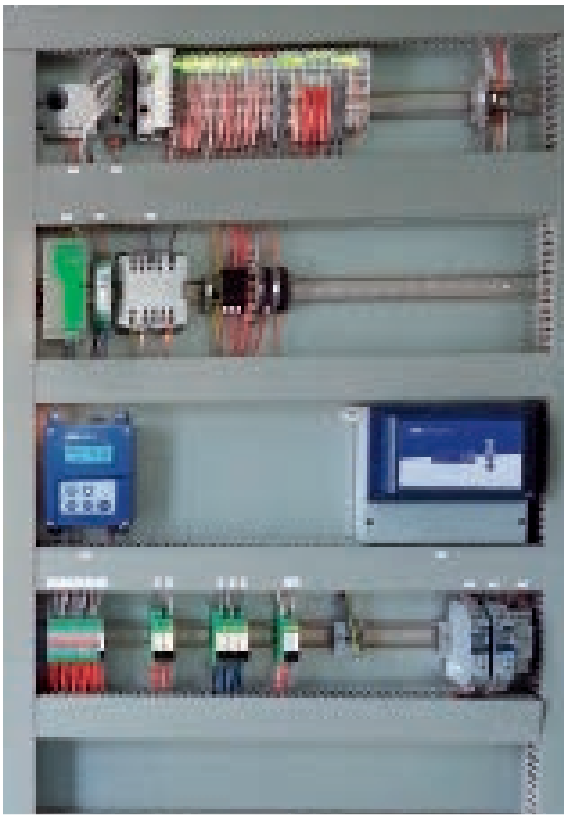
It is possible to connect an additional digital sensor to the same display unit – the JUMO ecoLine NTU turbidity sensor. Both sensors function according to optical methods with digital signal processing. The measured value recording and compensation for the necessary influencing factors is performed by the electronics in the sensor head. The data from the previous 10 successful calibrations is also stored here. The advantage of this technology is that the sensors no longer need to be calibrated on-site. Instead, this can be carried out in advance (e.g. in the laboratory).

Optical oxygen measurement JUMO ecoLine O-DO

The measuring principle of the JUMO ecoLine O-DO is based on the luminescence method. This involves a purely physical time measurement. Unlike with amperometric sensors, optical measurement does not consume any oxygen in a chemical process. A minimum inflow of the sensor is therefore not necessary. Furthermore, the sensor does not have any electrodes that can be negatively

JUMO AQUIS 500 RS in use as a display unit / controller

The JUMO ecoLine O-DO prior to use in the plant



Clearly arranged control box

affected by electrode poisons. This is why optical oxygen sensors exhibit a lower drift behavior and do not need to be calibrated so often. The robust sensor housed in a stainless steel case operates across a measuring range from 0 to 20 mg/l and can be used in a temperature range from 0 to +60 °C.

Visual turbidity measurement JUMO ecoLine NTU

The measuring principle of the JUMO ecoLine NTU sensor is based on an infrared light measurement. The sensor is designed for operation in a measuring range from 0 to 4000 NTU. It is therefore suitable for use in water with a low to medium turbidity. The sensor case of the JUMO ecoLine NTU is made from PVC and has a slim and robust design. It can be used in media temperatures of up to +50 °C. Immersion and flow fittings are available as accessories for both the JUMO ecoLine O-DO and the JUMO ecoLine NTU.

JUMO AQUIS 500 RS controller

The JUMO AQUIS 500 RS has been specially developed for connecting digital sensors to the Modbus RTU interface. A special feature is the automatic sensor detection of the transmitter. The transmitter is designed as a field device with protection type IP67 for use on-site. However, it can also be mounted in a control cabinet if required.

The monitoring of two limit values for the oxygen content in aquacultures has proved itself in practice. As soon as the value for the dissolved oxygen falls below a set limit value, the JUMO AQUIS 500 RS opens a valve with the first relay contact, allowing oxygenated water to be fed into the breeding tank. However, if the oxygen content falls below a critical safety limit in an emergency situation, the second relay contact switches on a replacement pump that supplies the tank with additional oxygen. The measured value for the dissolved oxygen and the temperature are forwarded to a superior system via the two current outputs, thus enabling documentation of the water quality.

JUMO AQUIS 500 RS
Display unit / controller for digital sensors with Modbus protocol
Type 202569

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

JUMO ecoLine NTU
Optical sensor for turbidity measurements
Type 202670

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Recording temperature in a glass furnace

JUMO Engineering takes care of project for Ardagh Glass GmbH

The industrial manufacturing of glassware is an impressive process. At Ardagh Glass GmbH in Germersheim, Germany, around 1.6 million beer, wine, and sparkling wine bottles are produced every day. The company uses JUMO products to monitor the temperature inside the glass furnaces and also turned to the services of JUMO Engineering for implementation.

At the beginning of the production process is a melting process inside a special furnace. The glass raw materials are continuously added to the furnace and melted. The liquid glass is then sent to processing machines capable of producing up to 600 bottles per minute.

Melting furnaces are made from fire-resistant materials consisting of alumina and other ceramic materials. To save energy, the combustion air is preheated in the regenerative system. The flue gases are directed through a latticework made of stones, which are heated. After this heating-up period, usually lasting 30 minutes, the flue gas flow is reversed and fresh air flows through the chamber and is thus heated up. The flue gases from the combustion escape to the other chamber.

In large industrial plants, the entire process often lasts several days, meaning that the glass furnace needs to be operated around the clock. The furnaces can have a capacity of over 2,000 tonnes, with temperatures reaching up to +1,300 °C.

To ensure a consistently high quality of the end product, the temperature of the liquid glass in the furnace must be permanently monitored. For this task, Ardagh Glass GmbH relies on temperature sensors and an automation system from JUMO. The project planning and startup of the plant was carried out by the JUMO Engineering team.

As a specialist in industrial measurement, control, and automation technology, JUMO has several decades of project experience in all kinds of industries. By pooling these skills in its "JUMO Engineering" range of services, the company is taking another step forward in its evolution from a component supplier to a provider of integrated solutions.

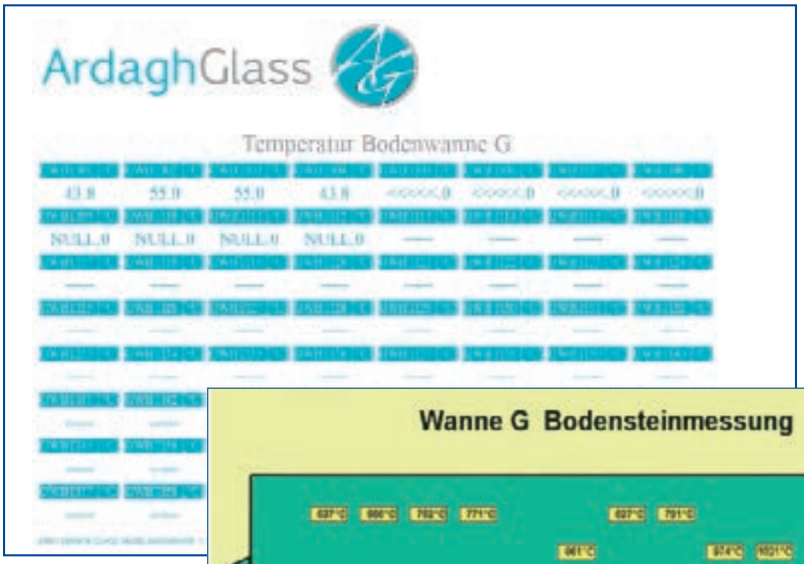
The Engineering team develops tailored

applications for a range of industries. These include food, water and wastewater engineering, pharmaceutical, heating and air conditioning, chemical, and the rapidly expanding area of renewable energy.

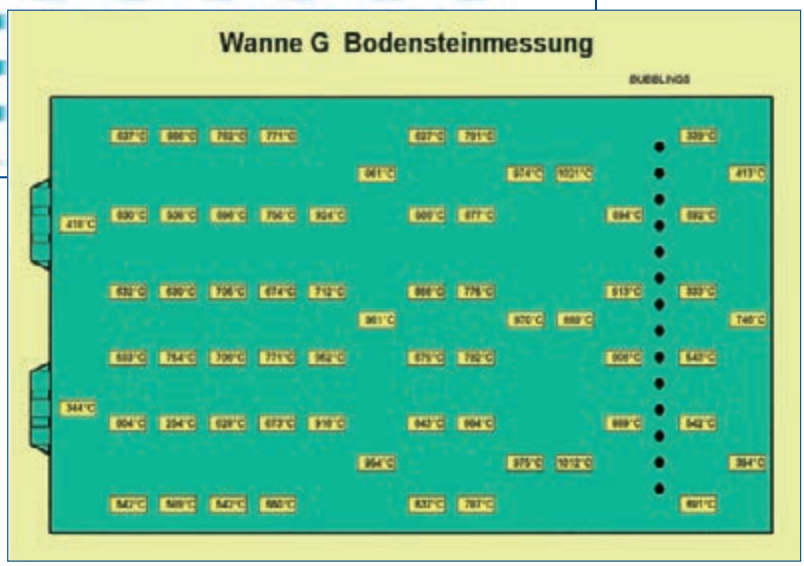
The portfolio is extensive. It ranges from running basic feasibility studies and workshops through to drawing up requirement and system specifications and end-to-end project management. The team boasts extensive experience in PLC programming, visualization, and network technology. This means that efficient solutions that are optimally aligned with each other can be created – and all from one service provider.

The task at Ardagh Glass GmbH was to record the temperature of a glass furnace with 64 measuring points. JUMO thermocouples are used as the sensors. The JUMO mTRON T is used to monitor the modular measuring, control, and automation system. The sensors are connected using a total of 16 four-channel analog input modules. The recorded temperature distribution of all 64 measuring points is transferred to a superior control system via a PROFIBUS interface card. This ensures that the measured values are constantly available. The superior control system then presents a visualization of the melting furnace with the individual temperatures.

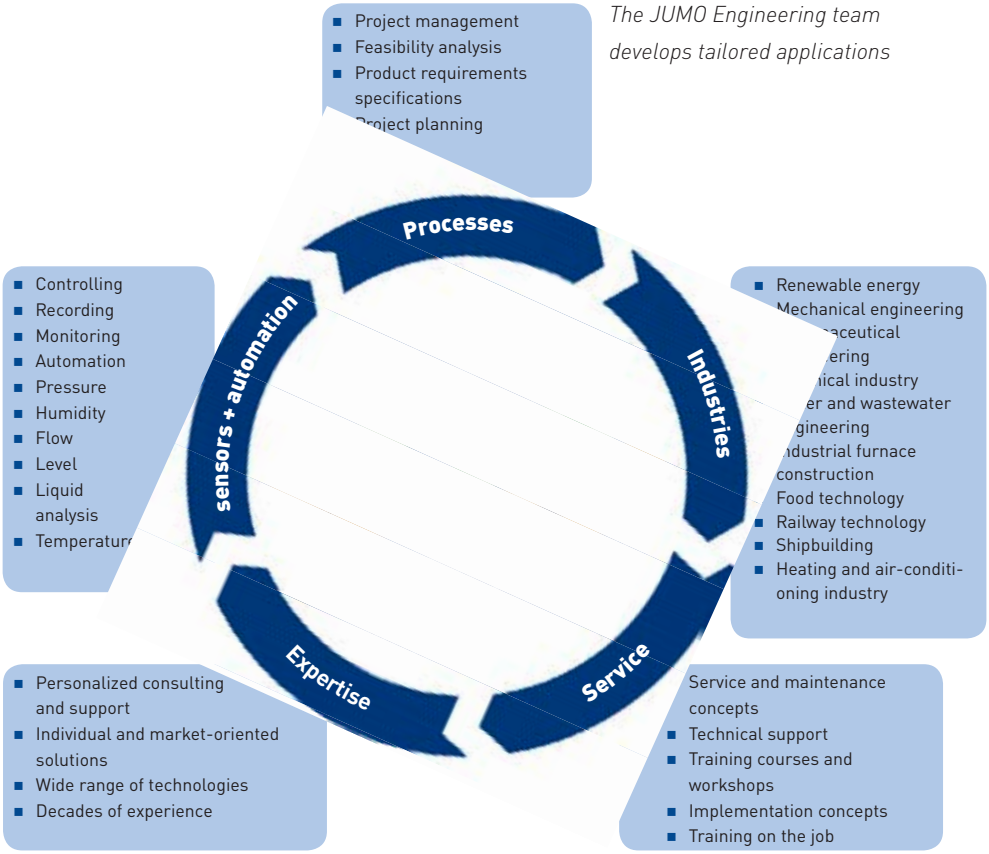
Furthermore, users can use the web server function of the JUMO mTRON T to display the current measured values of the temperatures in table form in a web browser and monitor these. This web server can be accessed not only from standard PCs, but also via mobile end devices.



Text display of the measured value



Visualization of the 64 temperature measuring points



The JUMO Engineering team develops tailored applications

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The new building in Belgium

Interior view of the new subsidiary in Italy

JUMO is expanding – new buildings in Italy and Belgium

With its 24 subsidiaries, the JUMO corporate group is represented all over the world. Growth in international markets is becoming increasingly important, with the export share at over 50 percent.

At the Eupen site in Belgium, 35 employees produce high-quality temperature sensors for industrial use. The above-average growth in recent years has seen the company reach its capacity limits. The production area has now doubled to 630 m² thanks to a building extension, and there is also space for a new test laboratory. With the machines and plants used in the new building, the production capacity at the site has risen by 30 percent.

The Italian subsidiary has also enjoyed strong growth in recent years. Founded in 1975, there are currently around 20 employees working there. The move to a new company building has allowed customers from industries such as industrial furnace construction, the food and beverage industry, and water and wastewater engineering to be taken care of more efficiently.

New managing directors in Austria and Switzerland

Dr. Klaus Hense

René Schlittler

Since May 1, 2015 Dr. Klaus Hense has been Managing Director of our subsidiary in Vienna. After training to become a mechatronics engineer, he studied technical physics and completed a PhD at TU Wien. After entering the private sector, he was head of technology development in the consumer electronics area, head of development, and a member of the management team in the laboratory and process measurement technology field. He was most recently area manager in the railway industry with a Europe-wide team of 40 employees.

Also since May 1, 2015, René Schlittler has been Managing Director of the Swiss JUMO subsidiary. His career at JUMO began on November 1, 1997 working as a technical salesman within the sales department. Beginning in 2001 he worked as a sales representative responsible for the regional area and for sales. Thanks to his many years of work at the company, he was able to develop extensive and specialized process knowledge of all JUMO product areas. He shared substantial responsibility for obtaining the approvals for the manufacture of ATEX/IECEx, rail, and SIL temperature probes at JUMO's own production site in Stäfa, Switzerland.

JUMO SCR power controllers

Technology that impresses

The JUMO power controller series consists of three independent device versions: type TYA-201 for single-phase operation and type TYA-202 for three-phase operation in a three-phase economy circuit. The new addition is the TYA-203, which is also a fully-fledged three-phase power controller (see page 9).

The configuration can be carried out easily and quickly on the device thanks to the standard LCD with plain text display. The clear and easy-to-read menu structure offers the user reliable handling in the shortest time, therefore reducing startup times. The innovative device structure has enabled a slim design size, which is available in current ranges from 20 to 250 A.

A simple pre-configuration can be carried out via the mini USB connector on the front. Here it is not necessary to connect the device to an auxiliary voltage supply; the supply is taken from the available USB port on the PC or laptop.

The teach-in function is used to automatically set the limits for partial load failure detection. The cyclical calibration ensures permanent and precise detection of partial load failure, even if the specifications of the heating element are changed.

The standard dual energy management enables an equal distribution of energy in the mains voltage, therefore saving energy costs.

The new "R Control" function is used for molybdenum disilicide heating elements (MoSi2). This function can limit the output and therefore the surface temperature of the heating elements, which are extremely sensitive in the upper temperature ranges. This increases the operating life and reduces operating costs.

A variety of intelligent safety systems ensure a simple and convenient startup. These systems include the standard rotating field detection and the detection of wiring errors, which are signaled via the display. Mains voltage fluctuations can be quickly adjusted via the subordinate U, U², I, I², and P control loops. This guarantees a high level of process reliability.

The energy efficiency is permanently monitored during the process. The freely configurable analog output and optional Modbus RTU 485 and PROFIBUS-DP are available for this.

All important process values, messages, and limit values can be adapted simply, quickly, and individually to each application, and can be forwarded to a superior control system. The proven JUMO setup program is available for this to guarantee consistent startup management.

The wide variety of voltage types means that there is no need for an additional power supply. The new device series is available in versions from AC 24 to AC 500 V –20/+15 %.

JUMO TYA-201
Single-phase SCR power controller for control of ohmic-inductive loads
Type 709061

JUMO TYA-202
SCR power controller for actuating ohmic-inductive loads in three-phase economy circuits
Type 709062

JUMO TYA-203
SCR power controller for actuating ohmic-inductive loads in three-phase economy circuits
Type 709063

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Support is our passion

Comprehensive service for all JUMO products

Customers all around the world trust in the quality and reliability of JUMO products. True to our slogan of "More than sensors + automation", we ensure that users can enjoy our measurement and control technology for as long as possible after the purchase has been made.

Our service department provides a quick and simple repair service if this should ever be necessary. Express repairs are also possible, if required. For devices that cannot be dismantled and sent to us due to technical reasons, there is the option of an on-site repair. Customer-specific configuration data is of course kept secure. The range of services also includes the retrofit of device-specific options and upgrades or updates of hardware and software.

We ensure the long-term availability of spare parts for our high-quality, long-lasting JUMO products – in some cases for up to 15 years. Our extensive stock ensures a particularly fast spare parts service. Urgent orders can be processed within 24 hours. However, that's not all: the JUMO configuration service offers a comprehensive range of services related to the modernization of plants. We help customers to define requirements and select products.

Users also have a expert contact in JUMO when it comes to calibration. Beginning as early as 1992, we have had our own DAkkS laboratory for the measurand temperature. JUMO is also accredited by the DAkkS (Deutsche Akkreditierungsstelle GmbH – Germany's National Accreditation Body) for on-site calibration of temperature sensors. The accredited temperature range is between –80 and +1100 °C in-house, and between –40 and +700 °C on-site. The smallest measurement uncertainty assigned lies between 0.25 and 2.5 K, depending on the calibration range. Along-side RTD temperature probes and thermocouples, thermometers with transmitters can also be calibrated.

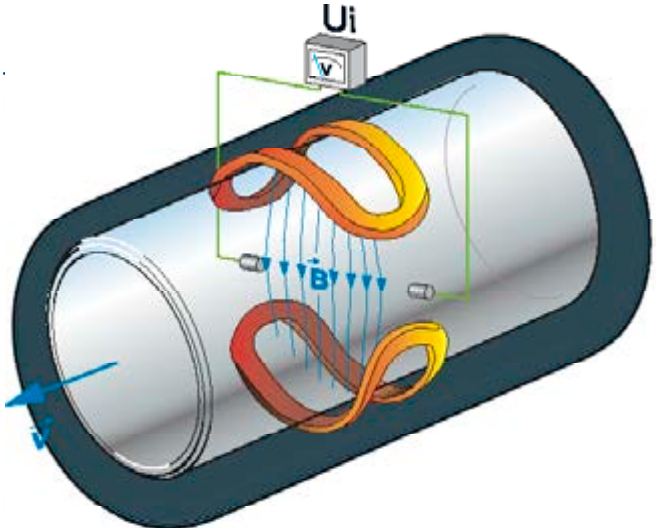
If users wish to play it safe, a maintenance concept should be implemented, including for safety-focused compact solutions and certified safety chains up to SIL 3. This involves compiling maintenance reports with quality-related protocols, monitoring calibration deadlines, and replacing worn parts in a timely manner. This ensures optimal availability of the devices in between maintenance intervals.

Service hotline

+49 661 6003-9135

service@jumo.net

Contact us for assistance with the operation and optimization of our devices.



practical

Electromagnetic flow measurement

The road to successful flow measurement can entail a number of questions and challenges. The measurements are taken in closed pipe systems and are more difficult to monitor than other measurands, meaning that reference measurements involve greater costs. The description "liquid medium" is relatively broad, as are the resulting demands on the various measuring principles – and the number of these. These range from simple mechanical counters right up to ultrasound technology. The accuracy varies just as much as the handling or maintenance costs.

With its new flowTRANS MAG series of flowmeters (see page 6), JUMO has used the magnetic inductive flow sensor method. The magnetic inductive measuring principle is widely used in a number of industries. The application options are universal and restricted by just a few parameters.

An important feature is the hygienically flawless design of the magnetic inductive flow sensor. It does not need moving parts or inconvenient contours. On the contrary, the measuring section is a straight pipe, which has the same cross section as the rest of the pipe system. There is no pressure loss, and therefore no additional energy costs.

The physical foundations of the law of induction make this type of measurement possible. According to these, a voltage is induced in a wire when it moves through a magnetic field. With the magnetic inductive flow sensor, a constant magnetic field is generated in the measuring pipe. The flowing liquid acts as the moved conductor. The induced voltage is tapped across two electrodes and is proportional to the flow. This therefore indicates that the liquid to be measured must be conductive. The minimum conductivity is defined as 5 µS/cm. By comparison, tap water has a conductivity of around 300 µS/cm.

Another advantage of the magnetic inductive flow sensor is the short inlet and outlet sections. In some processes, a straight pipeline with a length that is 50 times the nominal pipe diameter (DN) may need to stabilize the flow after it has been swirled through bends, valves, or cross section changes, or has been subjected to turbulence. For the magnetic inductive flow sensor, an inlet of 3 x DN and an outlet of 2 x DN are sufficient.

The process connection can range from a standard flange in the standard versions of the devices to hygienic process connections made from stainless steel, designed as a welded socket, screw connection, Tri-Clamp, or connection flange. Setting up the devices on-site is just as easy as the installation. Due to the highly dynamic measuring range, the primary focus when selecting a device is its installation size – that is to say the diameter of the pipeline used in the process. An on-site calibration is not necessary. Only the ends of the measuring range need to be defined. It couldn't be simpler.

Is the medium abrasive, chemically aggressive, or does it contain sediment? JUMO offers a solution for almost every challenge. A variety of measuring pipe linings and an array of electrode materials guarantee permanently precise measurements. This ensures an accuracy of approx. 0.4 % deviation from the measured value as standard. An optional three-point calibration then reduces this to just 0.2 %.

The measured value can be output as a current signal or pulse frequency. The devices have a HART interface as standard, as well as binary inputs and outputs that can be individually configured for control purposes. PROFIBUS-PA is an available option

In addition to the step-by-step startup, the user has an extensive range of further functions to choose from. These include empty pipe detection, editable counters, upstream and downstream measurements, diagnosis functions in accordance with NAMUR recommendations, plus many more. The magnetic inductive flow sensor device is operated using capacitive keys on a glass panel, behind which is an illuminated display. To summarize, the magnetic inductive flow sensor offers an outstanding cost-benefit ratio, and these benefits speak for themselves: measuring quality, user friendliness, effectively no maintenance and wear, as well as no additional energy costs due to pressure drops.

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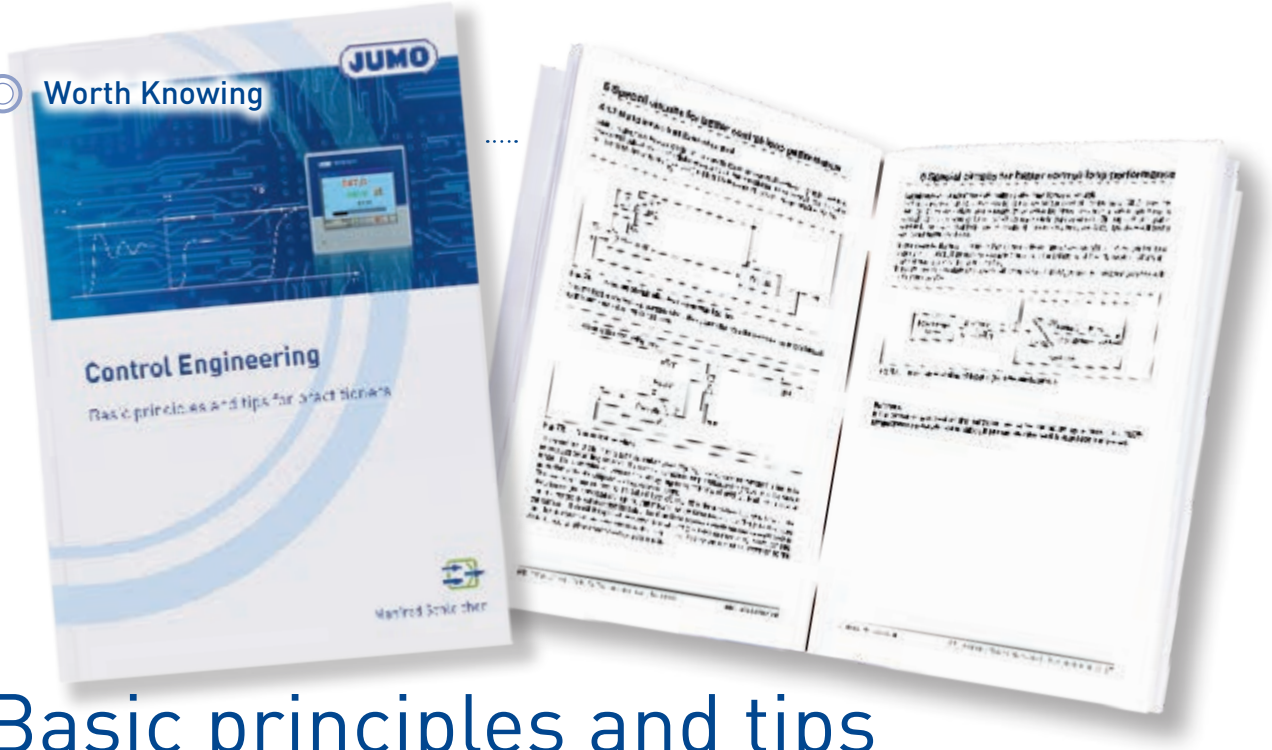

Basic principles and tips for practitioners

New issue of the JUMO technical handbook on control technology

Optimized control loops are the basic prerequisite for consistent product quality and the efficient operation of plants.

Control technology is therefore a key component in modern automation technology and is a central pillar of Industry 4.0. However, it is often considered to be highly theoretical and based on math. The JUMO handbook "Control Engineering" therefore has a very strong focus on practical aspects of control technology. For years it has been extremely popular with users from a range of industries as well as those studying this field. This new issue has been extensively revised and provides a comprehensive insight into the entire subject.

The handbook is not intended as a scientific book. With over 100 pages, it has deliberately avoided unnecessary theoretical explanations and approaches each topic from the user's perspective to explain how control paths can be defined, control parameters determined, and controllers optimized. This handbook is based on the author's experience as a lecturer in measurement and control technology, which spans more than 20 years. Numerous practical tips and tricks from concrete startup scenarios have also been included.

The basic principles of control technology are explained in the first chapter. Following important information on closed control loops and control responses, different equipment is introduced. A later chapter introduces and provides information on control paths and how these may be characterized. The various parameters of a PID controller (X_P, T_n, and T_v) are then covered. After this, optimization methods are presented and the controller structures relevant to various control variables are specified. Furthermore, the reader will find extensive information on the working methods and configuration of two-state, three-state, modulating, and position controllers. Special controller circuits, such as the cascade control, are also explained. JUMO-specific controller functions, such as autotuning or program controller functions, are explained in the last chapter.

The handbook is universally valid and calls upon the many years of JUMO experience in the development and production of devices used in control technology. The extensive product range stretches from single-channel controllers right through to complete automation solutions. The company's devices can be found in a multitude of applications right across the globe.

The handbook is available free of charge as a PDF-file.

You can find more information on this topic using the following link:
JUMO literature:
www.literature.jumo.info

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JUMO at trade fairs 2016

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November 22-24 *Nuremberg, Germany*

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www.fairs-international.jumo.info

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