Pure Fun in the Water

Smart sensors in swimming pool technology

Whether in a swimming pool, spa center, or medicinal spa – people of all ages love to swim and bathe. Germany alone has around 6,700 public indoor and outdoor pools. To make sure visitors can enjoy the water at its purest, pool operators require an extensive range of measurement and control technology.

Chlorine content, turbidity, temperature, flow, and filling level have to be examined carefully at every stage of the pool water treatment process, starting with flocculation and filtration through to disinfection and pH regulation. This can quickly amount to an overwhelming number of sensors, particularly when you have to look after more than one pool.

In the past, this always involved a great deal of work when it came to laying the cables and commissioning the system. A special coaxial cable with a particular type of insulation has to connect every single sensor to a transmitter, which tends to be digital these days. In general, this is used as a display and control device for chemical dosages or to convert the sensor signal (mV) into an industrial standard signal (for example, 0(4) to 20 mA).

This is then sent to further devices such as recorders or control consoles/PLCs. Transmitters are used for a number of reasons, including to conduct regular, mandatory calibrations at the measuring location.

On the road to Industry 4.0, these classic forms of liquid measurement also have to be put under the microscope. The digitalization and parameter storage of a sensor in a transmitter that is located a few meters away can still be

optimized. Moving part of the digitalization electronics closer to the sensor enables easier connection to the data network and the sensor/actuator.

The major trend in recent 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 path from the sensor to the downstream measuring device to be further minimized or prevented altogether. Through the integration of microprocessors in the sensors, analog measuring sensors became so-called "smart sensors", which carry their most important specifications with them at all times.

A poor solution would be to "cram" the wearing part (i.e. the pH electrode electrode or redox electrode) full with electronics. In principle, this should not present any problems nowadays and these types of solutions are also offered by several manufacturers. If a sensor's performance fails over a period of weeks or months or the sensor breaks before any of these times then the valuable transmitter electronics also have to be disposed. This is unacceptable from an economical and environmental perspective.

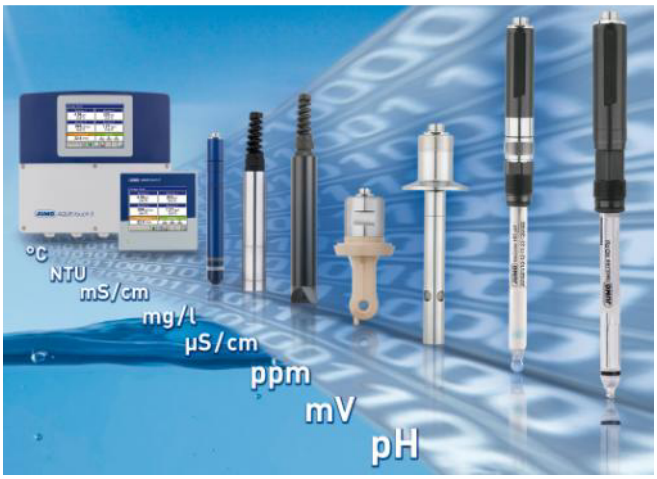

Figure 1: JUMO digiLine is an intelligent, bus-capable connection system for digital sensors in liquid analysis with integrated sensor management.

The measurement and control technology manufacturer JUMO has therefore developed the JUMO digiLine. It is a system that enhances conventional electrodes by adding a small, removable, and reusable electronics attachment. The system is currently available for pH and redox measurement. In addition, proven JUMO products can be integrated for turbidity and oxygen measurements. Solutions for the measurands free chlorine, total chlorine, ozone, and other disinfection measurand are due to follow shortly.

But the JUMO digiLine can do even more than that. It also allows users to create intelligent sensor networks. All important measurement parameters for

liquid analysis can be measured with a single system. With the JUMO digiLine, you can connect a wide array of sensors in various bus topologies such as line or star structures. The central evaluation unit or controller then receives just one single digital signal line. This enables more efficient and faster cabling of plants in which several parameters need to be measured simultaneously at various locations. This makes the system ideal for use in swimming pools.

The individual sensor is also bus-capable thanks to the digiLine sensor system. Up to six sensors can be connected to a digital interface in a serial or star configuration. Thanks to the system's intelligence, the sensors are detected and log on to downstream electronics almost automatically.

The system's DSM software (Digital Sensor Management) is also brand new. The necessary parameterization and calibration of the pH or redox probe 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 evaluation of the sensor status are stored directly in the sensor and enable seamless documentation over the entire lifecycle. Precalibrated sensors can be installed quickly thanks to the Plug and Play design.

If one sensor in the bus fails the others carry on working. Greater plant availability is therefore also guaranteed. Thanks to the digitalized sensor signals, a transfer of measured values that is highly immune to malfunctions is ensured. JUMO digiLine sensors can also be supplied with a 4 to 20 mA output signal for integration into existing installations.

Fig. 2: Opening the door to sensors for liquid analysis – the JUMO digiLine sensor bus system

Furthermore, JUMO digiLine sensors can be integrated directly into the JUMO mTRON T automation system. The number of sensors which in theory can be connected then increases to up to 62 (31 per interface). JUMO mTRON T also includes a software PLC with which even relatively complex plants and procedures for water, process water, and wastewater technology can be achieved.

Fig. 3: The scalable JUMO mTRON T measurement, control, and automation system

Fig. 4: Current multichannel measurement, control, and recorder device JUMO AQUIS touch S with option to connect up to six digiLine sensors

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