

Smart cubes for smarter water networks



Maintaining clean water quality is extremely important for both consumers collecting it from the tap and for manufacturers that rely on it as a key constituent part of a process. Efficient measuring and monitoring of parameters such as pH, iron content and turbidity, is a constant challenge for many water utilities and food & beverage producers. Now there is a flexible, modular system that uses smart cube technology to save space, time and money.

Traditionally, clean water analysis equipment has been bulky and time-consuming to install, not to mention the resource required to monitor and calibrate it regularly. Due to the importance of quality standards and compliance with statutory regulations that are applied for the safety of the general public, these shortcomings have been unavoidable - until now.

Experts in flow control technology at Bürkert have been applying some innovation in this field and as a result the company's Type 8905 Online Analysis System is setting new standards in terms of flexibility, ease of use, installation time and reduced operating costs. As a compact, modular system it is far easier to integrate into an existing control infrastructure than typically in-line alternatives and can be adapted almost instantly for individual applications.

Smart cubes

The secret to its success is plug-and-play sensor cubes that are capable of measuring pH, reduction potential (ORP), conductivity, free chlorine, chlorine dioxide, iron, and turbidity. Each cube, irrespective of its capabilities, has the same dimensions and connections and can be plugged in, or removed, from the unit while it is operational, thus providing a 'hot swap' facility.

Each cube holds all the calibration data and mapping data that is required for it to operate without additional input from the operator. This onboard 'intelligence' means that any cube can be installed in a base unit and it will automatically configure itself and make its presence known to the rest of the system.

This benefit is enhanced when it comes to ongoing calibration because now a process that was rather drawn out and time-consuming, can be completed in a matter of seconds. All cubes can be calibrated in a cleaner environment using a laptop and the associated calibration equipment. The 'hot-swap' function of the cubes means that an operational cube can be replaced with a recently calibrated cube from another sampling station. This allows a spare cube to be rotated across any number of sampling stations, all the time carrying its calibration with it.

Looking at the individual sensor cubes and their calibration processes in detail it is possible to gain a better understanding of the advantages they have over more traditional monitoring systems. Bürkert's sensors, which operate with much smaller volumes of sample fluid than traditional equipment can offer more accurate data and greater operating life.

Turbidity

Traditionally, turbidity sensors are calibrated using formazine, or verified with a verification block and probe. Both have their downsides, formazine is a carcinogen, so in most cases the probe is sent back to the manufacturer to be tested and cleaned. The verification block and the probe equipment on the other hand is difficult to store and use in the field while maintaining accuracy.

Bürkert has done away with both of these less than ideal methods in favour of repeatable, accurate test processes using a dedicated plug-in calibration tool.

The added difficulty with turbidity calibration is that any bubbles, however small, will interfere with the result. Bürkert's in-field calibration tool takes account of this and ensures continued accuracy without the need to send sensors back to the manufacturer.

pH

Traditional pH probes should not be allowed to dry out, either during storage or operation, and they have a defined shelf life of approximately one year. With the Bürkert solution, there is no glass component within the cube, so it can be stored indefinitely, and the calibration process is straightforward and quick.

The calibration process for pH, ORP and conductivity cubes uses a hand-held module that connects into the bus network or via a laptop, with the onscreen guide providing step-by-step instructions. The calibration module contains a standard fluid, for example at pH 5 or pH 7, which is drawn into the analysis cube. By following the steps any offset between the standard and the cube reading is addressed, and the process is complete.

Chlorine

The amperometric chlorine MEMS sensor chip used by Bürkert is not affected by chloramines, providing true chlorine analysis. Other major benefits are the fact that the sensor cubes are not reagent-based, they do not use an electrolyte or a membrane cap as traditional probes do, neither is there a need to maintain a gold electrode with abrasive paper, so the maintenance requirement for this system is greatly reduced.

The calibration process involves taking a reading from the display in parts per million (ppm), and a sample of the water at the same time and using a DPD1 photometer reference test for free chlorine. This is a universal test for chlorine that is used all over the world to quickly establish the offset and recalibrate the cube.

Connectivity

Each of these cubes can be arranged as required, depending on the application. Multiple sample lines can be added to one central analysis station, or several remote stations can be connected using any of the common industrial networking communication protocols.

Depending on the needs of the system, the analysis cubes can be connected directly to a PLC, which can perform the datalogging function as well as using the analysis data to make changes in the process. Used in either a compact system or a panel-built system, there is a direct connection between the cube and the output card.

Therefore, if the display or the datalogger fails for any reason, the cube continues to operate and transmit its data to the control network. Each sensor cube has its own output card, so if one fails, all the other cubes continue to operate, while the failed card issues a warning message to allow a repair to be made.

Compact solutions

This simple solution offers many advantages to the water industry as well as the food and beverage sector. Downtime for calibration is kept to an absolute minimum, site operatives' safety is assured and the costs for calibration are also minimised. Integration with existing process control systems is relatively straightforward, however Bürkert can provide on-site support ranging from specification advice to a full turnkey installation and commissioning service.

The combination of modular cubes, simple calibration, operational flexibility, reliability and a very compact footprint means that Bürkert's Type 8905 Online Analysis System is setting the standard for clean water quality analysis.

Image Captions:

Image 1: The Type 8905 Online Analysis System from Bürkert is setting new standards in terms of flexibility, ease of use, installation time and reduced operating costs.

Image 2: The plug-and-play smart sensor cubes are capable of measuring pH, reduction potential (ORP), conductivity, free chlorine, chlorine dioxide, iron, and turbidity.

Image 3: As a compact, modular system it is far easier to integrate into an existing control infrastructure than typically in-line alternatives.

About BURKERT

Burkert Fluid Control Systems is one of the leading manufacturers of control and measuring systems for fluids and gases. The products have a wide variety of applications and are used by breweries and laboratories as well as in medical engineering and space technology. The company employs over 2,500 people and has a comprehensive network of branches in 36 countries world-wide.

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Editor Contact

DMA Europa Ltd. : Brittany Kennan

Tel: +44 (0)1562 751436

Fax: +44 (0)1562 748315

Web: www.dmaeuropa.com

Email: brittany@dmaeuropa.com

Company Contact

Bürkert Fluid Control Systems : Kirsty Anderson

Tel: +44 (0)1285 648761

Fax: +44 (0)1285 648721

Web: www.burkert.co.uk

Email: kirsty.anderson@burkert.com