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Dear Reader,

Winter is coming! Fortunately not yet, but summer is definitely over. What should be a time to relax and take a breath for everybody this year was a time of constant news and changes going on. On of them Brexit, that should have been executed by now is still hovering and what it really will bring is still unsure. Writing this at the end of August, with only 2 months to go, it is not even sure if the timing of the "event" won't change again.



What is sure and can be counted as a positive, is that we were active for you collecting news and trends to bring it to you. For example a measurement and monitoring system that takes care of a substantial and important ingredient for food: water. Details about it you will find on page 6. In the cover story of the issue (page 12), we present to you an Italian company that focuses on the special needs of customers handling ingredients in the Pharmaceutical industry and other areas where accuracy of bulks and solids handling is one of the keys to success.

About a year ago, Jumo in Fulda, Germany decided to launch JSP, a brand for their SIL approved part of the portfolio, to make decisions for customers easier. How a SIL approved solution for auxiliary heating in potentially explosive surroundings looks like will be described in the editorial on page 26.

I hope you will have an interesting read with this issue and as usual: Please contact me if you have a feedback for us or an idea for a story to share with our readers.

*Kay Petermann*

Editor of PCN Europe

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## Elemica Receives Major Investment

Elemica, the cloud based Digital Supply Network for the global Process Industries, announces its acquisition by Eurazeo, a leading global investment company listed in France. This new partnership with Eurazeo will support Elemica's continued global growth and product line development, allowing the company to extend into new industry verticals with its expanding software product portfolio. "Elemica is the leading provider of digital transformation solutions for the Process Manufacturers. This major new investment from Eurazeo will support our strategy of continuing to expand our reach into adjacent markets segments, while also allowing the company to broaden its product portfolio," said Rich Katz, President of Elemica. "We will continue to invest in next-generation technologies, as we have seen how this focus ultimately benefits our clients, allowing them to quickly realize improvements to their bottom line results as they deploy our solutions." John Blyzinskyj, CEO of Elemica added, "With Eurazeo's partnership, we will be able to globally develop Elemica's nearly 20-year vision of connecting the world's leading process manufacturers to their direct material suppliers, logistics service providers, and customers. Our transatlantic operations and global ambitions make Elemica and Eurazeo very complementary partners and we look forward to executing on our growth strategy together."



## Opening of New Test Center

BHS invested 3.8 million Euros in building the new test center and will perform production-scale tests at the center on all machines and processes offered by the company in the fields of mixing, crushing, recycling, and filtration technologies. "BHS-Sonthofen considers itself first and foremost a specialist that develops optimal process engineering solutions in collaboration with its customers," notes Dennis Kemmann, Managing Director at BHS-Sonthofen. "This is where we set new industry standards with the test center. The center allows us to map various processes and chain individual machines into systems on a much larger scale than before, as well as enabling us to set up more units overall." For all BHS-divisions in the fields of mixing, crushing, recycling, and filtration technology tests with the



customers' material at the new test center will be performed. Compared to the old test center, the equipment was significantly expanded and modernized in all areas. The company has extensive facilities for mixing, crushing, and recycling as well as ultra-modern separation technology for the separation of various materials.

## Agreement for Sale of Bosch Packaging Technology

CVC Capital Partners selected for its growth strategy and broad industrial expertise. Packaging Technology and its Pharma and Food units to remain intact.

Bosch plans to sell its packaging machinery business, based in Waiblingen, to a newly incorporated entity managed by CVC Capital Partners (CVC). CVC is a leading private equity and investment advisory firm with 24 offices in Europe, Asia, and the United States. It currently manages more than US\$75 billion of assets.

The parties signed an agreement on July 11, 2019 effecting the transfer of the entire packaging technology business and its 6,100 associates in 15 countries. It has been agreed that the purchase price and other details of the purchase agreement will not be disclosed. Completion of the sale is subject to the approval of various bodies, including antitrust authorities, and is expected to close at the turn of the year.

Positive prospects for the Packaging Technology business  
Dr. Alexander Dibelius, Managing Partner of CVC, said: "Bosch Packaging Technology is a strong company in an attractive market with long-term growth prospects. Packaging Technology has an excellent reputation for quality and innovation, a broad product range, a global footprint, and experienced associates. Together with the management team, we will work to take the business forward in the years ahead, and to make it even more competitive."



## Continental Expands Industrial Hose Business



Continental has reached an agreement with Merlett Group, based in Daverio, Italy, on the purchase of its flexible hose business. With this acquisition, Continental is expanding its material expertise beyond rubber, particularly with regard to high-performance thermoplastics technologies and solutions. At the same time Continental is diversifying its product portfolio and broadening its regional presence, especially in Europe. The agreement includes the purchase all of Merlett Group's activities, including three manufacturing plants in Italy and Switzerland as well as a comprehensive network of sales offices in twelve European countries with nearly 500 employees. Merlett Group was founded in 1952 by the Tamborini family and is now one of the leading European manufacturers of flexible plastics hoses. It designs, manufactures and distributes hoses for the agriculture, industrial, construction, transport and food industries. The company operates two well-equipped production sites in Italy (Daverio, Varano Borghi) and one in Rancate, Switzerland.



# Maintaining the Quality of an Essential Ingredient

Fast, convenient water quality monitoring could hold the key in processes

Water is used in so many ways throughout the food and beverage industry, even as the final product, which means the quality of that water needs to be carefully monitored. With such an influence on the finished product, precise water quality monitoring can provide the key to consistent quality output, so is it time to look at the next generation of compact continuous analysis solutions?

Greg Wainhouse, UK Water Segment Manager for Bürkert, looks at water usage within the food and beverage sector, and the best practical method of continuous monitoring for various aspects of water quality as it enters the process.

Water is an essential element in the manufacture of food and drink, from washing

produce to being the main ingredient, each application has different water quality requirements. Having access to reliable, up-to-date data on water quality parameters is an important step in improving productivity as well as the quality of the final food products.

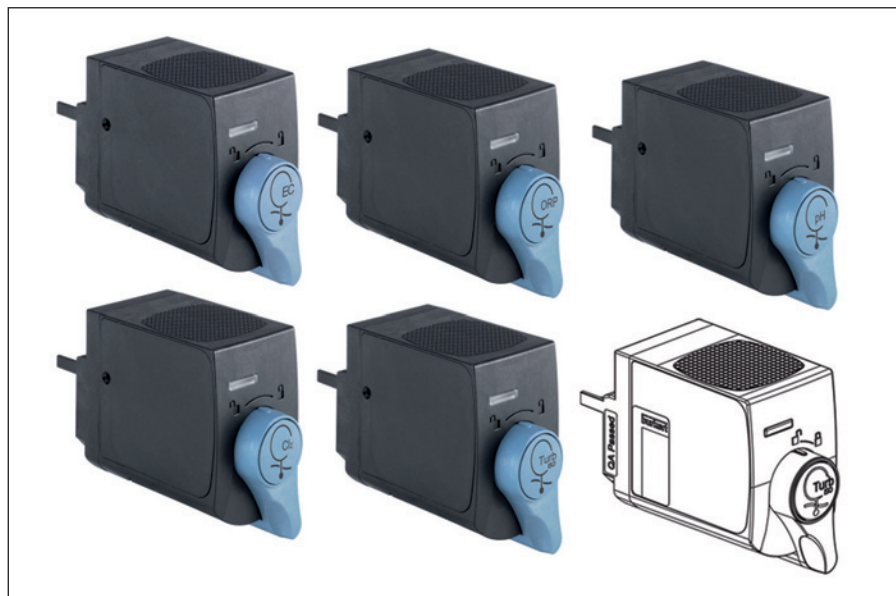
## SOURCE MONITORING

In most cases, water will be supplied by the local water authority, which has the responsibility to provide a service within certain parameters. However, demands on the treatment plants, seasonal changes and the age of the network can have a big influence, and this means variability in the quality of mains-supplied water.

It is possible for the local authority to be

unaware of an 'out-of-consent' incident until it is reported by consumers, but for some industrial customers, this notification will have come far too late. Furthermore, water authorities are required to add sufficient levels of chlorine to reach the furthest points of the network. This means that those closest to the water treatment works may receive some free chlorine, which can damage sensitive equipment such as reverse osmosis membranes for example.

The alternative is a bore hole, usually on or near the manufacturing site, but this source can be affected by temperature, rainfall and local agricultural activities, which means it needs to be tested for quality at least every month, preferably more frequently. On-site treatment should be looking to remove sediment, dissolved iron, nitrates and bacteria.



Ensuring a minimal footprint, the innovative sensor design means that sensor cubes can be installed or removed without affecting any others in the system.

## FILTRATION SYSTEMS

Whichever source is used, manufacturers will employ a range of water treatment processes, depending on their application. Carbon filters can remove chlorine, biological contaminants and flavours, while a sand filter will remove iron. Ion-exchange processes are used to soften the water and both pH and conductivity monitoring can take place at this point.

Finally, filtration is used to remove unwanted particles, organic matter and bacteria. Depending on the quality of water required, manufacturers may use ultra-filtration, nano-filtration or reverse osmosis and each process can be equipped with sensors for turbidity, chlorine and pH to provide feedback on water quality.

Many businesses will use third party water





*Having access to reliable, up-to-date data on water quality parameters is an important step in improving productivity as well as the quality of the final food products.*

the sensors is an important step that may require a certain amount of downtime and additional expense.

Of course, even reliable data is of little use unless the process control system can use it effectively. This requires common communication protocols and these may vary between manufacturers.

#### MODULAR, FLEXIBLE SOLUTIONS

There is an opportunity for food and beverage manufacturers to use the latest in sensing technology that has a proven track-record in accuracy and simplicity. As a compact and modular design, Bürkert's Type 8905 Online Analysis System, offers a range of benefits that make it cost-effective and reliable for this purpose.

The Type 8905 offers a multi-channel, multi-function unit capable of measuring pH, ORP, conductivity, free chlorine and turbidity, chlorine dioxide and iron. Several of the measurements are conducted by compact plug-in sensor cubes, offering ease of use and convenience. The introduction of a chlorine monitor is an important addition due to its popularity in the disinfection process as an effective microbicide, disinfectant and sanitiser.

Bürkert has also developed an auto-cleaning process for the sensor cubes that uses a solution of clean, filtered water and mild citric acid, primarily to flush the turbidity sensor cube. The accuracy of the water analysis equipment can be maintained using a handheld cleaning and calibration module that connects to the Type 8905. This enables operators to follow simple step-by-step maintenance instructions and procedures for using calibration fluids. All the while, the base unit is constantly monitoring the process and recording the necessary data.

#### SIMPLE INSTALLATION

The compact design of the Type 8905 ensures a minimal footprint and the innovative sensor design means that sensor cubes can be installed or removed without affecting any others in the system. When a new sensor cube is plugged into a free slot, it logs in with the system and makes its features available to all of the other modules present in the system. Each sensor cube contains all the required data for operating the menus, configurations and its specific functions.

This enables operators to start with an initial set of parameters under analysis that can be added to at any point without affecting the existing system. For applications where multiple water flows need to be analysed, it is already possible to link two or more of the type 8905 units together and combine their operational controls to a single touch-screen display.

Of course, investment in water quality monitoring equipment needs to be carefully assessed and often supporting evidence is required to obtain the capital expenditure. With this in mind, Bürkert offers short-term rental solutions for the Type 8905, enabling end users to build a water quality profile while also creating a case to support a capital submission process.

For every business that needs to maintain high water quality standards and ensure the integrity of on-site water treatment facilities, taking advantage of the latest in analysis systems can deliver significant benefits. Saving time and reducing maintenance requirements, the Bürkert Online Analysis System is just one way to provide simple, accurate 'live' results to enhance long-term quality and productivity.

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services companies to monitor the water quality and address any issues on a regular basis. The problem with this approach is the frequency of the interventions and the reporting. In many cases, a monthly visit is deemed appropriate, so an issue could reasonably go undetected for over three weeks, which could affect a significant volume of products.

#### CAPTURING VITAL DATA

To resolve this situation, manufacturers need an accurate but flexible system that can be built around their application and connect directly into their control infrastructure. Some will only need pH and turbidity, while others require a more comprehensive solution that includes iron, chlorine, conductivity and oxidation reduction potential (ORP).

However, capturing the data is just the first step, validating it for accuracy and using the data for positive process control also need to be considered. To this end, calibration of



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# Make Your Steam Supply System Intelligent

**Integration of an intelligent water analysis and efficiency system into a boiler helps saving money and reducing emissions**

Octapharma, a company specialising in human proteins made from blood plasma and human cell lines, has modernised the energy supply area at its site in Vienna. This upgrade was preceded by an Energy Quick Check, carried out by Bosch Industriekessel, to help identify potential for increased efficiency on the basis of the customer's existing situation. New Bosch technologies now supplement the existing steam boiler system from 2007. The modernisation process included the integration of the digital efficiency assistant MEC Optimize as well as automation equipment for water analysis. In future, the systems will create transparency in steam supply: The smart data analysis improves production processes and energy efficiency, while recommendations for action are also generated with the aid of artificial intelligence.

## **DIGITALLY ASSISTED MAINTENANCE SCHEDULES**

The MEC Optimize efficiency assistant analyses and interprets the

boiler system data and informs the operating personnel in advance about unfavourable operating conditions as well as opportunities to increase efficiency. If, for example, the fuel consumption increases due to excessively high desalting rates, MEC Optimize reports possible causes. Another key element is predictive maintenance. The digital assistant makes predictions regarding the remaining service life of all important components and provides assistance with regard to maintenance scheduling. The benefits are obvious for Octapharma: "We can monitor system values more easily, detect unfavourable operating conditions early on and have in-depth monitoring in place without having to be on site," reports Orestis Almpanis-Lekkas, Head of Utilities at the Vienna site. By connecting to the MEC Remote access system, the operator can also securely retrieve the data collected by MEC Optimize remotely and view the operating information on a mobile device such as a notebook or tablet.

## **AUTOMATIC DIGITAL LOGS**

In addition, the retrofitted water analysis device from Bosch delivers all the relevant data from the fully automatic water analyses to the control system or to MEC Optimize. The water characteristics for steam boiler systems are subject to strict regulations and are crucial for long-lasting and reliable boiler operation. At Octapharma, the boiler log book has now been implemented digitally, with water values recorded in a fully automatic way. The digital efficiency assistant interprets these measured values to provide recommended actions or warnings, and in some cases even the water treatment will be automatically modified. Octapharma benefits from a reliable plant protection system and a fault-free process. This results in significant financial savings.

## **SUSTANTIAL REDUCTION OF EMISSIONS**

Additional modernisation measures included the conversion of the control system to the latest generation of the boiler and system controls from Bosch. The new control system allows for convenient operation while also increasing the degree of automation. Furthermore, the Vienna-based company is achieving the highest levels of energy efficiency as a result of additional heat recovery modules: The recovery of thermal energy from exhaust vapours (deaeration



*New technologies now supplement the existing steam boiler system, including a digital efficiency assistant and automation equipment for water analysis*





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*An Energy Quick Check helps to identify potential for increased efficiency on the basis of the customer's existing situation*

process) and desalting water is saving more than EUR 20,000 per year. There are environmental benefits as well, with around 150 tonnes fewer CO<sub>2</sub> emissions each year. This is equivalent to the CO<sub>2</sub> emissions produced by around 90 cars. New silencer hoods also ensure that the burner sounds in the boiler house are very quiet. All components from Bosch are designed to be easily retrofitted, meaning that the modernisation went smoothly without any issues or interruption to the steam supply. Orestis Almpanis-Lekkas from Octapharma describes the collaboration with Bosch as being flexible and solution-oriented, adding: "With MEC Optimize, we will be able to identify areas of action and potential for improvement much quicker in future, and implement this directly." The digital assistant consequently allows for increased system efficiency and more cost-efficient boiler operation through reduced energy costs.

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## mesago

Messe Frankfurt Group

## STAINLESS-STEEL PRESSURE REGULATOR

Consistent pressure with one turn



The new robust stainless steel pressure regulator from **Eisele** is designed for applications in aggressive environments and industries with stringent cleaning requirements. It is a completely new design made of stainless steel 1.4301. The

screw-in fitting from the Eisele INOXLINE has a control pressure range from 2 to 8 bar and is designed for very fine adjustment with low fluctuation. In addition, the flow-optimised pressure regulator reduces the vibration behaviour of the control system, and it is also designed for quiet operation. The choice of high-quality materials facilitates cleaning. The Eisele pressure regulator is mounted with 1/8-inch threads and can be used for water and air applications.

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## EXPANSION OF FEEDER SERIES

Volumetric and gravimetric standard designs available



After the introduction of this innovative new type of feeder in 2018, the FEEDOS range has now grown into a complete family of feeders for hygienic and basic applications in the chemical, food and pharmaceutical industry. The

modular design combines minimum dead zones with good accessibility for cleaning and maintenance. With **GERICKE's** Easyclean even the most stringent requirements in hygienic applications or frequent product changes can be fulfilled. The swing-hinged feeding chamber option allows even better access to the feeding chamber and intromitter. The design has gained quick acceptance in the market and is used in various demanding applications, such as infant nutrition, baking ingredients or pharmaceutical formulation.

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## HANDHELD RFID-READER

Fast and reliable UHF tag detection



The **Balluff** UHF Handheld Reader BIS U-890 is an ideal tool for modern data collection. It offers flexibility for RFID close range or in long-range applications. The reader is equipped with a powerful 1 GHz ARM processor and a 4.3" color touch screen. Together with Microsoft Windows Embedded Compact 7 it is designed especially for fast, reliable reading of UHF tags. The integrated UHF module with 1 W of

power and the adaptive cross-dipole antenna are designed for fast detection of large populations of UHF tags (>200 tags/sec.). The required RFID software is already pre-installed and offers the user a maximum degree of flexibility.

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## SMART ULTRASONIC SENSORS

Operation from -25 to +70 °C with up to 1.3 m range



**microsonic** has equipped the new lpc+ sensor family with two output stages. The sensors in the M18 threaded sleeve are available with 2 push-pull switching outputs with IO-Link interface or with a push-pull switching output plus an analogue output 0-10 V or 4-20 mA

with IO-Link interface. With four detection ranges between 150 and 1,000 mm the new ultrasonic sensors cover a measuring range from 20 mm to 1.3 m. The sensor accuracy is  $\pm 1\%$ , the temperature drift is internally compensated. The operating range is between -25 and +70 °C. Thanks to the IO-Link interface, the lpc+ sensors can be easily and reliably parameterized by the machine controller even during operation. On-site adjustment is not required, but is possible with LinkControl.

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## VARIABLE AREA FLOWMETER

Options for low flow measurement available



**KROHNE** introduces new options for low flow measurement with variable area flowmeters: the H250 M40 with its extensive range of features and options is now available for very low flow rates, and the purgemeters DK32, DK34 and DK37/M8M

have been re-assessed as SIL2 compliant. The new H250 M40 low flow option combines the small measuring cones of the purgometer DK37 with the extensive range of process connections, communication options and Ex-approvals of H250 M40. The new option is suitable for liquid flows starting at 0.16 l/h / 0.04 GPH and gas flows starting at 1.6 l/h / 0.06 SCFH. Optional mechanical flow controllers or flange adapters are included in the SIL compliance.

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## LED LINEAR LUMINAIRES

Non-metallic, hazardous area luminaires



Emerson is introducing updated **Appleton** ATX FELED non-metallic, hazardous area linear luminaires. These luminaires bring significantly higher energy

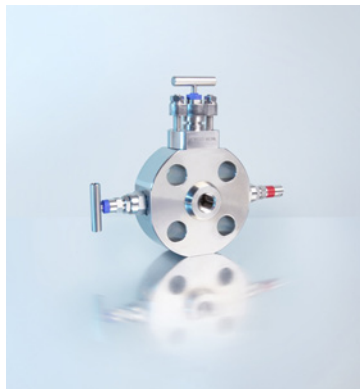
efficiency, lower maintenance costs, and a longer service life to harsh, punishing environments unsuitable for standard lighting fixtures, especially where ingress protection from dust and moisture is required. The ATX FELED is rated for IECEx/ATEX Zone 1 and 21 locations in petrochemical plants, oil and exploration, wastewater treatment and other areas where ignitable concentrations of flammable gases or vapors are likely to exist under normal operating conditions. It uses the Appleton universal voltage LED driver with 120-277 Vac and 170-300 Vdc voltage ranges, and 6kV of built-in surge protection.

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## MONOFLANGE IN NEW DESIGN

Prevention of fugitive emissions with special seals



The new **WIK**A model IVM monoflange for connecting pressure measuring instruments to the process is particularly suitable for applications involving critical liquids, gases and vapours. Special seals also prevent fugitive emissions in accordance with TA-Luft (VDI 2440) and ISO 15848-1. The monoflange is manufactured and tested to comply with

various common standards such as ASME BPVC. It is designed for a long service life, even under difficult conditions. The valves work durably, smoothly and precisely, even at high pressures. The metal seat of the non-rotating spindle tip is tested for bubble tightness. To avoid seizure and leaks, the threaded mounting of the bonnets is not in contact with the medium. In a version with OS&Y bonnet, firesafe tested to API 607 and ISO 10497/BS 6755-2, the IVM can also be mounted directly to the process without additional first isolation. For the combination of the monoflange (or other protective devices) with a pressure measuring instrument, WIK A offers professional assembly. Customers receive an application-specific, complete solution, ready for installation and leak-tested.

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## VALVE ACTUATOR MONITORING SYSTEM

For operation on lengths up to 20 km without repeaters



Suitable for use in all industries, the new generation of the **Rotork** Master Station is capable of operating up to 240 actuators across three separate field

networks allowing the optimum network to be used in different plant areas. It now supports Modbus RTU protocol with third party device integration and Pakscan Classic, Rotork's standard two-wire loop system. The Master Station has many features to enable the management of the assets connected to it. Whether the interest is in condition based monitoring or predictive maintenance, it is all possible. A large touch screen interface and web pages share the same intuitive menu structure focused on providing quick device set up, interrogation and issue resolution. Multiple host connectivity is included and the presence of multiple databases enables the Master Station to maximise data transfer efficiency. Network communications are secured with fault tolerance, allowing for plant operation to continue, even if a fault occurs. Installation is low cost and simple through the use of a single twisted pair cable instead of expensive multicore cabling. The wired control loops can operate on long loop lengths up to 20 km without external repeaters, further reducing labour, installation and commissioning costs. The Master Station is available with either 19" rack or panel mounting options and all wiring is easily accessible from the front panels.

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## COMPACT MIXER SERIES

Performance for open and sealed tank applications



The Compact Series mixers are ideal for open tank applications (e.g. municipal, industrial water or wastewater, and mining & minerals slurry processes) as well as for sealed tank applications (e.g. chemical process applications requiring a mechanical seal). This new series offers many of the features offered on other mixers in the Lightnin range including a choice of high efficiency

impellers and a gearbox designed by **SPX FLOW** specifically for reliability in mixing applications while keeping simplicity of design. The new range also includes the Lightnin True Dry Well which is integrally cast into the gearbox. Critical for drinking water and other applications, the dry well protects against lubricants seeping past shaft seals, which can contaminate process fluids. The Compact Series offers users a highly competitive, straight forward mixing solution which provides the reliability, strength and efficiency associated with Lightnin mixers. The leading Lightnin impellers are designed to optimize mixing performance by maximizing flow generation and minimizing drive loads. The range covers powers of 0.75 - 55 kW (1HP to 75HP) with speeds of 13-155 rpm, is available with OSHA, CE and ATEX certification and availability of premium efficiency for safe area motors.

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- Simple zero point correction with a magnet
- Maximum operational safety – due to high IP69 protection type

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JUMO TAROS S46 H

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## Ergonomics, Handling and new Design

### Fulfilling Customer Needs in Pharmaceutical Processing and Beyond

The experience of over 30 years of activity, developing a deep know-how in the various pharmaceutical processes, makes CO.RA. a supplier specialized in connection systems and interface between machine A and machine B, which ensure the customer a high solution quality and specific assistance based on needs. The thirty-year tradition in pharmaceutical solid handling allows CO.RA. to guarantee products according to the most stringent regulatory standards (FDA, ATEX, CE). The design, development and construction are completely Made in Italy.

Also this year, the company from Altopascio (LU) took part in the 59th AFI Symposium, which was held in Rimini from 5 to 7 June 2019. This edition entitled "Innovation and globalization strategies for the pharmaceutical industry" was an important meeting and discussion point for the various exponents of the pharmaceutical sector, who were able to discuss the news in progress and strategies to cope with the changes. The strategies to be adopted with a view to innovation and globalization were the leitmotif of the 17 scientific sessions, designed to offer an up-to-date overview of the main areas of activity carried out by those who work in research, development, production, control and distribution of medicines and medical devices.

There is also the DUK model equipped with specific load cells that constantly detect and monitor the weight of the container during the spill, allowing constant monitoring of the quantity of product discharged and remotely modulating the residual quantity of product in the tank to be sent to the machine by filling.

#### A BAG BREAKER HOPPER FOR CRUSHING DUST

By refining the experience in the sector and experimenting with a deeper knowledge in

#### DEVICES FOR WEIGHING AND HANDLING

With the focus on the customer needs for an economical, light and manageable system, CO.RA. has developed the MINI DUK mobile or fixed for lifting/moving small loads. This machine is able to lift and move loads such as drums, pharmaceutical bins or process machines (pneumatic transport) with a maximum weight of 70 kg.

It is manually operated and has no source of energy other than human, both for the lifting phase and for movement to various areas, simply by pushing it. It has also been built in compliance with the precautions necessary for use in pharmaceutical and food environments.

Even the already known CO.RA. DUK has a new design, with a fixed base and a slimmer, more ergonomic structure to be more easily placed in the room with less impact in terms of space.



*DUK system allows the complete discharge of the product.*



*Mini Duk is handling system for small loads.*





*Bag breaker hopper for crushing dust. Full unit and details with HR Crusher used inside*

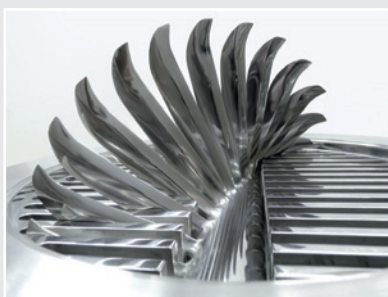


*New stationary DUK design.*

## HIGH-EFFICIENCY CRUSHER

The HR Crusher system allows to break up agglomerated powders that have formed during the production and/or storage phase and is the ideal solution for breaking hygroscopic or packing products. The system is composed of a tree equipped with knives that break the lump passing through a fixed comb.

HR Crusher is designed so that it can be positioned inside product loading or unloading pipes for emptying drums, hoppers, bins, etc. It is built with materials suitable for contact with chemical/pharmaceutical and nutraceutical/food products: AISI 316L, PTFE or PEK (compliant with the FDA standard). The parts that do not come into contact with the product such as the casing of the electric motor or the control panel are made of AISI 304. The surface finishes are generally polished inside and external satin finish, but they can vary according to customers' requests. It is implemented by a variable speed electric motor for versatile use. It can also be installed in ATEX environments with 0/20 classification.



close contact with the operators who daily interact with the process equipment, CO.RA. seeks to improve their systems, components and applications, to make them increasingly suitable for use in the field.

Among the new applications introduced on the market in the last two years we describe a bag breaker hopper system, made for the first crushing of agglomerated powders previously collected in bags.

The system is also composed of an HR Crusher positioned on the hopper discharge mouth and which has the function of further crushing and shredding the product lumps that can be transported in the next phase of the production process through a pneumatic conveying system. These systems are all equipped with safety devices that block the operation of the machine.

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## Cryogenic Valves for Safe Transport of Liquefied Natural Gas

Quality and safety are the two critical considerations when choosing a valve for extreme conditions

Cryogenic valves and other media are susceptible to extreme temperatures. Leakage is dangerous, threatening worker and plant safety. It is also expensive, considering the high cost of converting gases into cryogenics. Standard valves expand and contract at varying rates when exposed to extreme temperatures. This expansion and contraction cause breaks in the seal. The result of these breaks is undesired leakage. AS-Schneider offers the solution to this problem: cryogenic valves. These valves remain functional in temperatures as low as -320°F (-196°C)

The manufacturer has to produce cryogenic valves using the right materials. Few materials can cope with cryogenic temperatures. These

chosen materials can withstand the pressure at these temperatures, especially when it comes to the parts of the valve that are in direct contact with the fluid and the temperature.

### WHERE ARE CRYOGENIC VALVES USED?

Operators use cryogenic valves in the production of liquefied gases. They also use the valves for the transport and storage of these gases. The gases include liquid nitrogen, argon, oxygen, hydrogen, natural gas, and helium. In the liquefied condition, the gases are a lot easier to handle.

### LNG APPLICATION

One big part in the use spectrum for cryogenic valves is the LNG application. Transport ships use natural gas for fuel. They prefer LNG because space is rarely available on ships. The operators had to reduce the volume to keep the natural gas tanks as small as possible. They did this by liquefying natural gas (LNG, Liquefied Natural Gas).

### WHAT ARE THE CHALLENGES OF USING CRYOGENIC VALVES?

In some cases, the gas is highly flammable, like natural gas or oxygen. The valve has to perform well in the case of a fire. There is an accumulation of pressure in the routine handling of cryogenics. This pressure is due to heat gain from the environment and consequent vapor formation. There needs to be a special consideration in designing the valve/piping system to allow for pressure build-up. Extreme temperature variations can compromise the safety of the worker and the plant. Each component of the cryogenic valve expands and contracts at different rates. These

variances are due to the different material compositions. They also occur as a result of the length of their exposure to the cryogen.

Another big problem when dealing with cryogenics is heat gains from the surroundings. These heat gains are the reason why manufacturers insulate valve and piping.

The valve also has to cope with a considerable amount of challenges. For example, the temperatures of liquefied gases go down to -270°C for liquefied helium.

Valve function becomes very challenging if the temperature plunges to absolute zero. A cryogenic valve connects the pipeline with the liquid gas to the environment. It does so at ambient temperature. The result can be a temperature difference of up to 300°C between the pipeline and the environment. The temperature difference generates a heat flow from the warm to the cold area. It impairs the correct functioning of the valve. It also decreases the efficiency of the system under extreme circumstances. This situation is of particular concern if ice forms at the warm end.

In cryogenic application, there is deliberate use of this process of passive heating. Manufacturers use this process in sealing the valve stem. They use plastics to seal the stem of conventional valves. These materials cannot withstand the low temperature. The alternative would be a high-performance metallic sealing of two parts, which are in near constant motion, in opposite directions. Metallic sealing would be very expensive and close to impossible. There is a straightforward solution to this problem. The plastics for sealing of the stem can be brought to an area with average temperatures. That means the sealant of the stem has to be far from the fluid. The bonnet





*The Testing of cryogenic valves down to -196°Celsius.*

The use of cryogenic valves made of stainless-steel material is recommended. This material copes well with the temperature gradient during operation with liquefied gases. The cryogenic valves should have the right sealing materials, for a high tightness up to 100 bars. Also, extended bonnet is an essential feature. It determines the tightness of the stem sealant.

#### TESTING OF CRYOGENIC VALVES

Keep in mind that suppliers test cryogenic valves down to -196°Celsius. These tests are in keeping with specific international standards. AS-Schneider tests its cryogenic valves in liquid nitrogen with helium as the test medium.

#### WHAT SHOULD ENGINEERS PAY ATTENTION TO DURING ASSEMBLY OF CRYOGENIC VALVES?

The cleanliness of the valve is essential in the cryogenic application. Grease or lubricants get very hard at low temperatures. For example, if they get between the ball and the seats of a ball valve, there is no flat contact and sealant gets leaky. Thus, the manufacturer has to clean and degrease the valve before use.

The buyers also have a responsibility for the cleanliness of the valve. They have to ensure that the installers assemble the valve with clean tools. All connections and piping parts should also be free of pollution of any kind. AS-Schneider manufactures robust cryogenic valves for use in extreme conditions in the chemical and petrochemical industries. Their high performance ensures the safety of plants and workers.

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is like a pipe. If the fluid is rising, this pipe gets warmed from the outside temperature. When the fluid reaches the stem sealant, it is at ambient temperature and gaseous. The bonnet also prevents the handle from freezing and preventing actuation.

#### SELECTING A VALVE FOR CRYOGENIC SERVICE

Choosing valves for cryogenic applications can be quite complicated. Buyers have to consider the conditions aboard ships and in plants. Also, the specific nature of low-temperature cryogenic fluids demands specific valve performance. Proper selection ensures plant reliability, protection of equipment, and operational safety. The global LNG market uses two main valve designs:

#### TRIPLE OFFSET ROTARY TIGHT ISOLATION VALVES

These offsets allow the valve to operate open and closed, with minimal rubbing and friction in their operation. It also uses stem torque to make the valve more sealable.

Trapped cavities are one of the challenges of LNG storage. In these cavities, the liquid can expand over 600 times explosively. The triple rotary tight isolation valve eliminates this challenge.

#### SINGLE AND DUAL FLAPPER CHECK VALVES

These valves are critical components in liquefaction plants. They prevent damage from flow reversal. Material and sizing are essential considerations because cryogenic valves are expensive. The results of an incorrect valve can be detrimental.

#### HOW CAN ENGINEERS ENSURE THE TIGHTNESS OF CRYOGENIC VALVES?

When one contemplates the cost of making a gas into a cryogen in the first place, leakage is costly. It is also dangerous.

One big problem with cryogenics is the potential for seat leakage. Buyers often underestimate the radial and linear growth of the stem as it relates to the body. If buyers select the correct valve, they can avoid the problems mentioned above.



## INDUSTRIAL CABINET FOR CLEANROOMS

Parameter monitoring with pre-configured enclosure



The new **Vaisala CAB100** Industrial Cabinet for Continuous Monitoring System (CMS) is ideal for data collection specifically in cleanrooms, and in other demanding industrial environments. It integrates Vaisala's data loggers, analog signal data

collection and differential pressure transmitters in a single enclosure with a high IP-rating and easy-to-use design. The CAB100 is an add-on part of the viewLinc Continuous Monitoring System. The monitoring system integrates data loggers, transmitters and monitoring software to monitor several parameters, and provides real-time and historical measurement data, customizable reporting, and reliable alarming to email, SMS, and local or PC display. The Vaisala viewLinc Continuous Monitoring System is used globally in pharmaceutical and biotechnical companies to fulfill their Good Manufacturing Practice, also known as the GMP-requirements. The CAB100 cabinets are configurable according to the application requirements, with various options for measurement inputs and safety barriers to instrumentation used in hazardous areas. The powering options include integrated power supply for mains powering or Power over Ethernet (PoE). The CAB100 Industrial Cabinet for CMS will be available in two sizes.

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## RADAR LEVEL TRANSMITTER CONFIGURATION

Easy and safe maintenance of devices in the field



**Emerson** has added the Radar Master app for the AMS Trex Device Communicator, making it easier for field technicians to safely and efficiently configure Rosemount radar level transmitters, that are critical to help deliver

accurate, reliable measurements on both liquid and solid materials. The Device Communicator solves problems of bringing heavy equipment to the field by enabling technicians to carry a handheld communicator that is capable of both configuring and powering radar devices via the Radar Master app. Dynamic graphics and an intuitive touchscreen interface in the Radar Master app help ensure that users can more quickly configure tank measurement devices with the correct settings. Tank geometry is drawn to match the physical parameters of the actual tank, allowing technicians to more easily tune measurement settings to prevent false echoes from static objects in the tank such as ladder rungs, agitator blades, and baffles, which can delay the process of obtaining accurate measurements. Users can track, view, and trend tank level and alert information to identify issues and aid troubleshooting by using the new built-in historian. Every configuration change made in the field is automatically recorded and time-stamped, providing an automated audit trail.

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## WIRELESS ULTRASONIC-SENSOR-KIT

Fill Level Management in the Internet of Things



The industrial Internet of Things connects the virtual world of information technology with the real world of machine and plant engineering and opens up new possibilities for process automation. With

the help of radio sensors that transmit their data to the Internet, it is also possible to control assets that are either widely distributed or seem impossible to connect due to their mobility. With the **WILSEN.sonic.level**, **Pepperl+Fuchs** presents an ultrasonic wireless sensor for monitoring fill levels in mobile containers, tanks, and silos. In addition, the battery-operated device determines the geolocation of the container and transmits the collected data via a GSM or LoRaWAN connection to a defined collection point on the Internet. The **WILSEN.service** not only ensures the secure exchange of data, but also allows centralized management of all IoT sensors in the field. In turn, software systems and data platforms for business data processing can be connected to the service. Pepperl+Fuchs has compiled an entry-level starter kit that includes all of the components required to form a working IoT system. This time-limited, fixed-cost package allows interested parties to get started with the Internet of Things even without prior knowledge, so that they can gather experience in their own process environment as quickly as possible.

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## ATEX HUMIDITY AND TEMPERATURE SENSOR

Intrinsically safe unit for gas explosion hazard areas



The new intrinsically safe sensor unit from **E+E Elektronik** is certified according to the European ATEX directive 2014/34/EU and the international IECEx standards for use in gas explosion hazard areas up to zone 1. The EE100Ex complies with

temperature class T4 for intrinsically safe equipment and can be mounted directly in hazardous area. Due to the robust IP65 aluminum enclosure and the wide choice of filter caps, the sensor is suitable for various applications such as utility tunnels, hazardous storage rooms or in the pharmaceutical industry. The sensor enables highly accurate measurement of relative humidity [RH] and temperature [T] in the range 0...100 % RH and -40...60 °C (-40...140 °F). The combination of robust sensing head, proprietary E+E sensor coating and encapsulated measurement electronics inside the probe ensures excellent measuring performance and long-term stability in harsh and corrosive environment. The EE100Ex features two galvanically isolated, configurable 4...20 mA, 2-wire outputs. Besides RH and T, the sensor also calculates the dew point [Td] and frost point temperature [Tf]. The device can be powered by any appropriate intrinsically safe power source or via Zener barriers. An error indication at the analogue outputs according to the NAMUR standard facilitates troubleshooting in case of a malfunction.

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# Decentralizing Controls

## Tough outdoor enclosures simplify advanced remote I/O plant control architectures

Intertec is launching a range of tough field enclosures for housing remote I/O and other control and instrumentation electronics, featuring compact passive cooling to dramatically reduce costs of ownership. The new enclosures help EPCs and processing plant engineers to eliminate the need for large and costly plant buildings such as satellite instrument houses or remote instrument enclosures - which often need to be air conditioned and blast- and fire-resistant.

Fabricated from GRP (glass fibre reinforced polyester) materials, the enclosures provide rugged dust- and water-proof environments

to protect remote control equipment located deep inside processing areas. Developed at the request of clients, the enclosure concept simplifies the roll-out of more versatile distributed control architectures containing field equipment such as software-configured I/O, IIoT networking and PLCs. The advance can allow field control equipment enclosures to be assembled and sealed in the factory - an efficient and cost-effective process - avoiding the need for opening and exposure to dangerous local conditions at the site during installation and operation.

The ability of Intertec GRP enclosures to

be fabricated with embedded insulation (a monolithic sandwich with layers of GRP sheet enclosing insulation) is a major virtue. Insulation is commonly required because modern remote I/O applications use sensitive electronic devices, with lifetimes and reliabilities that are drastically reduced by overheating. Efficient insulation helps protect against temperature extremes. This is one reason why the simple steel cabinets widely used for cabling-related field junction boxes are not adequate for some of the more sophisticated remote I/O applications now being deployed.

Because of the electronic devices used, some form of cooling may also be required. If power is available at site, this can be in the form of conventional fan cooling. However, the temperature stability of highly insulated GRP boxes also makes it possible to efficiently exploit passive cooling techniques which require no electricity and have no moving parts - also making them suitable for deployment in hazardous areas. A tank of water plus a heat exchanger utilise the coolness of the night to moderate interior temperature during the day. As many advanced remote I/O applications will - by their nature - be compact and small, Intertec has designed new passive cooling systems for smaller-sized cabinets and enclosures. These include a passive cooling system with a heat exchanger that doubles as a sunshade. The performance of the passive cooler can also be boosted by a small active element - such as a water cooler. Intertec can fabricate passively cooled field protection systems like this in enclosure and box sizes down to around 40 litres in volume.



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# Choosing the Right Cobot Gripper for Cosmetics Handling

**Versatile vacuum gripper can easily handle different shapes and packaging types.**

For the cosmetics industry, placing products into packages aimed at a wide variety of different channel partners is a particular challenge. Today this task is often fulfilled by an armada of workers hand picking and placing each item into each specific box. The opportunity for automation seems obvious but is also challenging, as it demands an extremely high degree of flexibility to make an investment economically worthwhile.

## QUICK AND EASY IMPLEMENTATION

The UR Plus certified Kenos KCS gripper from Piab, addresses this issue for customers from the cosmetics industry who need a solution to provide many small items combined in various ways for different store types. Universal Robots, a pioneer and innovator in the development of cobots for the manufacturing industry, is a specialist when it comes to providing automation solutions that solve tasks collaboratively with the human workforce. While easy to use and fast to deploy, flexibility often depends on the gripper technology.

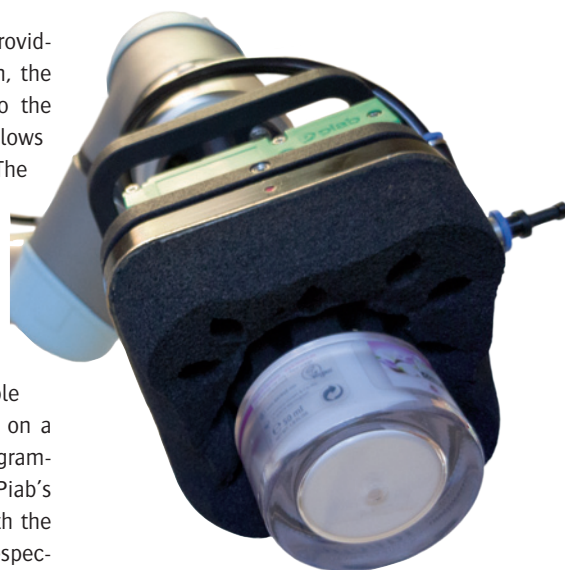


To support Universal Robots vision of providing an “out-of-the-box” usable solution, the gripper must seamlessly integrate into the UR Plus plug and play platform, which allows easy installation and implementations. The start-up phase of grippers certified for the UR Plus program is tremendously reduced by the requirement of Universal Robots that the gripper manufacturer provides so called UR Caps. These are small pieces of software similar to mobile phone apps and enable the user to commission a new gripper on a Universal Cobot without detailed programming know-how within a few minutes. Piab’s Kenos KCS gripper is now equipped with the respective UR Cap and listed on the respective UR Plus Solutions website. Any gripper used in cosmetics distribution needs to offer the flexibility of being able to handle all kinds of products in every shape and packaging type, be it cartons, bags, tubes or glass containers.

Particularly in the cosmetics industry with its high mix of many different small products, customers depend on flexible automation solutions that can handle whatever comes in front of them to make the investment worthwhile. With the flexibility of the Kenos KCS gripper from Piab, customers in the cosmetics industry are able to pick and place products with any shape or surface making it easy for them to handle multiple different parts with just one end-of-arm-tool.

## FDA APPROVED EQUIPMENT

Piab’s Kenos KCS gripper consists of a separate pump unit that integrates modular vacuum generation in the smallest of spaces and of a



gripper unit. Both are connected by a quick-change system. The main gripper consists of a technical foam, which can adapt to a wide variety of contours and can thus accommodate different parts flexibly. This eliminates in many cases the need for accurate identification of a workpiece as well as the gripping surfaces. Accordingly, in many applications, a change of the gripper when changing the parts to be handled is not necessary. The cobot is therefore ready for immediate use for different processes. In addition to the greatest possible flexibility in the field of application, time and cost savings are achieved through shorter downtimes and time needed for retooling. This is also contributed to by the fact that when the foam layer is worn, it can simply be exchanged, without replacing the entire gripper. For direct handling of food, the gripper can also be equipped with a special FDA-approved technical foam. For special ap-



plications, such as the handling of plastic bags of concentrates or granulates, PIAB has developed another gripper unit, which can be swiftly exchanged via the quick-change system.

Flexibility in terms of forms and surfaces that can be handled, as well as in the placement of products to be handled, are a plus for the cosmetics industry. For the Kenos KCS gripper it does not matter if a product is placed exactly in a specifically planned location – it can pick it up as long as its surfaces gets a hold of in on most of the product. The gripper units are characterized by their edgeless design. Due to the rounded sides and the surface of technical foam, possible injury hazards were largely eliminated. This makes the gripper units particularly safe to use on cobots, which cooperate freely with humans.



#### HIGH PERFORMANCE WITH LOW PRESSURES

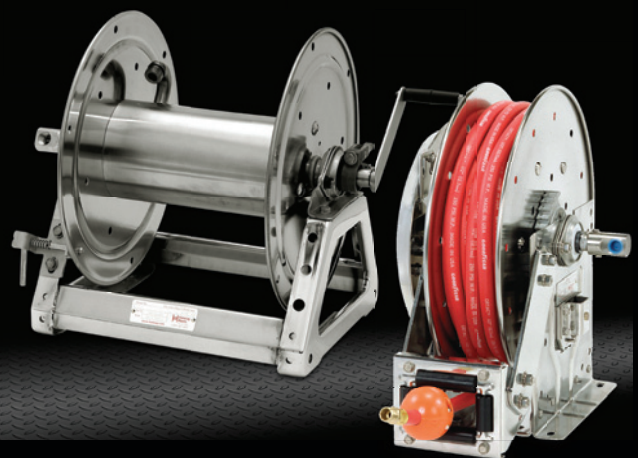
The pump unit is equipped with PIAB's powerful new generation COAX SX vacuum technology. The lightweight piCHIP unit is a small, integration-optimized vacuum pump and was selected because of its almost silent operation, making it ideal for use directly next to the operator. Because COAX ejectors are up to twice as fast as other ejectors and deliver three

times more flow than a conventional ejector with identical air consumption, the piCHIP unit can deliver high performance even with low or fluctuating supply pressure. Independent comparison tests at the Fraunhofer Institute for Machine Tools and Forming Technology IWU in Dresden have shown that the PIAB ejectors require significantly lower compressed air to achieve the same output compared to ejectors from other manufacturers. This makes them particularly energy efficient. Accordingly, their use reduces the cost of providing compressed air and thus the total cost of production. This is another important factor in increasingly competitive industries, especially as the handling and placement of a product is not itself a value-adding factor in production.

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## FLEXIBLE HIGH-PRESSURE PARALLEL REACTOR

Available in stainless steel and alternative materials



**Asynt** announce the launch of the Multicell PLUS - a high pressure parallel reactor system with a wide choice of configurations for optimised screening of chemical reactions.

Constructed as standard from durable 316 stainless steel - the Multicell PLUS is an affordable, compact device that, depending on the configuration chosen, can be used to screen 4, 6, 8 or 10 parallel reactions. A choice

of cell size allows the user to perform reactions in parallel with volumes ranging from 30 to 100ml, at pressures of up to 100 bar and temperatures of 300 °C. The Multicell PLUS can be used simply with a hotplate stirrer, for heating only, or can be upgraded to allow for individual heating of every reactor cell. The key feature of the Multicell PLUS is that, despite the small footprint, each reactor cell is supplied with multiple inlet/outlet ports to allow for individual optimisation of the reactor configuration. Asynt can also supply their versatile high-pressure parallel reactor from alternative materials including Hastelloy, Inconel, Titanium and alloy steels, allowing for greater heat capacity and use with particularly corrosive or caustic chemicals.

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## CONTINUOUS FLOW REACTOR

Delivering uniform high purity substances



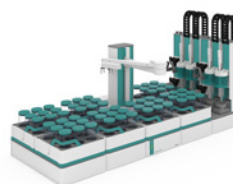
The LCTR-Series of Laminar Continuous Flow Chemical Reactors from **Analytik** set a new standard for high yield synthesis of high purity, uniform substances based upon the Taylor fluid flow principle. These patented design

chemical reactors use a jacketed cylindrical vessel with a central, rotating agitation bar to produce Taylor flow mixing along the length of the vessel resulting in 3-times faster mass flow transfer compared to tank type reactors. Reagents are pumped at a controlled rate into the vessel and the reaction efficiency is optimised through specific turbulent mixing before the products are collected at the end of the vessel. With the uniform Taylor fluid flow without dead-zones, a scale-up from 0.02 L to 1000 L can be routinely achieved to produce products with enhanced properties (purity, density, particle distribution, degree of crystallization etc.) and at higher yields compared to traditional reactors. Combining powerful agitation with uniform Taylor fluid flow allows reaction times to be significantly reduced and productivity enhanced. Precise temperature control is achieved using a small diameter pipe design to facilitate thermal transfer and to maintain control and stability using a dual jacket. Each system includes a real-time monitoring system enabling you to follow the progress in real time, and if a problem occurs, you can stop the process automatically.

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## UNIVERSAL PLATFORM FOR WET ANALYSIS

High-end titration system offers integrated approach



OMNIS from **Metrohm** gives laboratories the flexibility to respond to new challenges as they arise. Hence, the platform can be expanded at any time to provide additional capacity for new applications and/or higher sample throughput. This is done

by adding the required hardware, e.g. another titration module, another work station, or even a robotic autosampler to the existing platform. Efficiency can be boosted with the possibility to perform several tasks in parallel. Here is an example: While a titration is performed in a sample on one workstation of the OMNIS Sample Robot, the next sample is already being prepared on another workstation. A third and fourth workstation may be used to further integrate the same application or to perform different ones - simultaneously. The modularity includes the possibility to increase sample throughput by automation. Hence, throughput can be pushed in increments from 50 to 175 samples based on the x-y-z system of the Sample Robot. Peak performance is defined by four titrations performed simultaneously at 4 workstations to analyze 175 samples completely unattended. Basically, the system provides a construction kit of discrete functional steps, which can be freely combined and used over and over again. Thus, customized operating procedures can be easily built block by block.

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## CHILLING/HEATING DRY BATH

Tempering of samples from -10°C to 110°C



**Torrey Pines Scientific** announces its EchoTherm Model IC20XR Compact Peltier driven, Chilling/Heating Dry Bath. It can freeze, chill or heat samples from -10°C to 110°C at your work station. It can be supplied

with the broadest variety of precision-made aluminum sample blocks available anywhere. The Model IC20XR can be used with assay plates of all types, centrifuge tubes of all sizes, vials, test tubes, and most any other sample container. It is particularly well suited to the molecular biology lab for doing hybridizations, sample prep for PCR, ligations, enzyme reactions and much more. The Model IC20XR has digital display and control of temperature to 1°C. It comes with a count-down timer in days, hours, minutes and seconds to 30 days, data logger, and RS232 I/O port to control the unit by computer or to record data. The logger records data points in 1 sec, 1 min or 5 minute intervals and can collect 8110 data points. The compact unit measures 165 x 222 x 89 mm (w x h x d). It comes complete with chiller/heater module, universal power supply, AC line cord, and instructions. Custom sample blocks can be made in three weeks. The IC20XR is UL, CSA, and CE certified.

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# Automated Liquid Handler

Powerful and affordable unit enhances hands-free throughput and reproducibility

Hamilton introduces the compact Microlab Prep automated liquid handler as an ideal entry-level solution for those transitioning away from manual pipetting in 96- and 384-well microplates and other sample vessels. In addition to the standard configuration consisting of two independent pipetting channels, the Microlab Prep is available with a high-speed multi-probe head, as well as a configuration containing both pipetting technology types for the utmost in flexibility and speed. Each allows hands-free operation to enhance laboratory productivity and elim-

inate repetitive use injuries, and it easily fits on a lab bench or in many biological safety cabinets for further assay flexibility.

As with Hamilton's larger automated systems, the Microlab Prep uses air displacement pipetting technology, which eliminates the risk of liquid induced contamination and reduces maintenance frequency compared to liquid displacement pipettors. High pipetting accuracy, precision, and consistency are ensured throughout the dynamic pipetting range of 0.5–1000  $\mu$ L, without the potential for errors and variability that occur during



manual pipetting. When used with Hamilton's wide range of pipette tips, patented Compressed O-Ring Expansion (CO-RE) technology creates a tight seal for superior measurement accuracy and precision without tip distortion or aerosol generation during tip pick-up and ejection.

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## PORTABLE ISOLATORS

Providing high visual clarity and solvent resistance



The Purair® FLEX from **Air Science** is a containment product that redefines when and where glove bags can be used. Designed as a flexible, highly portable film isolator, it permits easy set up and

delivers superior containment capability. The Purair FLEX is constructed of ArmorFlex film which offers complete visual clarity and excellent solvent resistance across a range of chemicals as confirmed by independent product testing. ArmorFlex film complies with FDA 21CFR and 2002/72/EC standards for minimal outgassing, solvent and biological reactivity and static resistance. The product is anti-static and ESD2 safe and meets European ATEX Directive. At 30" (762 mm) wide and an internal volume of 3 cu.ft. (85 L) the Purair FLEX provides a large work area with a 12.5" (317 mm) gas tight zippered access with a 6" (152 mm) diameter opening. A nitrogen gas barb is a standard feature to permit creation of an oxygen-free workspace. The semi-rigid support rods simplify set up and increased stability even if the bag is not inflated to full pressure. Closed HEPA filtration, bag-in/bag-out port, and Nitrogen purge inlet connections enhance safety to meet specific needs. The film material used contains no BADGE, BFDGE, or NOGE materials and no phthalates, latex, or silicone were used. Stored Flex units have a shelf life of five-year.

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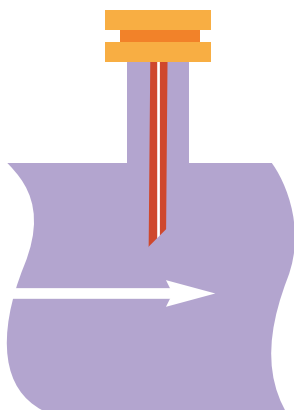
# When and Why to Use a Probe in Analytical Sampling

In analytical sampling systems, using a probe to extract process samples can be advantageous and advisable for several reasons—but not always. By Randy Rieken, Market Manager for Chemical and Refining, Swagelok Company

Process temperature and pressure, the physical makeup of the fluid, dew and bubble points, and solids present in the stream are system conditions that should be evaluated to help make the right decision. This article explains how a probe can be beneficial, what to consider when using one, and when not to use a probe.

## PROBES AND THEIR BENEFITS

A probe is typically made of metal, glass, or ceramic, and is usually inserted into a nozzle at the process tap location to extract samples for analysis. The probe extends into the process fluid where sample fluid enters the proboscis, allowing the probe to withdraw a continuous flow for analysis. A nozzle can also be used by itself – without a probe – to deliver samples to the analyzer. For most systems, though, probe sample de-



A probe extends into the process fluid and withdraws a continuous flow for analysis. All images © 2013 "Industrial Sampling Systems"

livery offers advantages including inherent filtering, faster analyses, and better samples.

## FILTERING

First, a probe acts as a filter, excluding around 85% of dust, pipe scale, and entrained liquid drops from the extracted sample. Depending on operating conditions and the number of particles in the process stream, the probe's filtering capabilities can lead to significant savings stemming from extended filter life. A probe's filtering properties are a result of particle momentum shows how inertia keeps the particles in a process stream moving downstream, instead of making a sharp turn into the proboscis. The separation is most effective when particles are heavy, or denser than the process fluid.

The direction and speed of particles contribute to the probe's filtering properties. Low fluid velocity in laminar flow can allow more particles to enter the probe, while a turbulent, high-velocity flow can enhance filtration. In the turbulent flow, fluid moves faster, and any slower molecules are bumped into this flow and then accelerated to the higher speed. Although turbulence randomly kicks particles sideways across a pipe, their average downstream velocity in turbulent flow is higher than in laminar flow, minimizing their potential to be captured by the probe.

Even without momentum-based filtration, probes extract cleaner samples than nozzle-only systems. Solid debris tends to collect near pipe walls, where flow energy is low. In gas streams, any entrained liquid drops will also wet the walls and cling to them. In either case, that contamination may flow directly into a nozzle that doesn't use a probe.

## FASTER RESPONSE

Probes help deliver faster analysis responses compared to systems relying solely on a nozzle. The probe samples system media from the center of a process stream where the velocity is highest. Sampling this faster-moving flow ensures more process fluid reaches the analyzer quicker, which results in a faster analysis.

Probes also reduce purge time for sample analysis by eliminating nozzle volume. With a probe, purge volume is limited to the small bore of the probe.

Without a probe, the entire nozzle volume requires purging. Nozzle volume is also a mixing volume, which must be purged at least three times its volume to ensure the sample is representative.

## SAMPLE ACCURACY

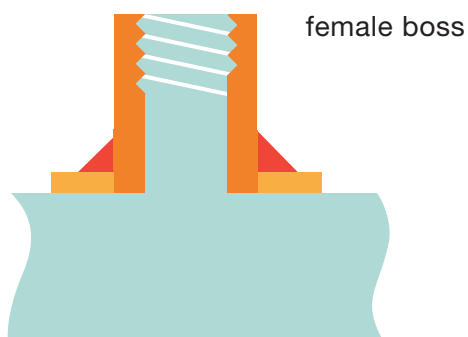
Finally, a probe can extract more representative samples than a nozzle connection because it pulls samples from the center of the process stream where they are fully mixed. It is important to note, though, that probes will omit some solids or liquids from samples. In certain applications, these omissions can alter the sample's composition and may skew results.

## WHEN NOT TO USE A PROBE

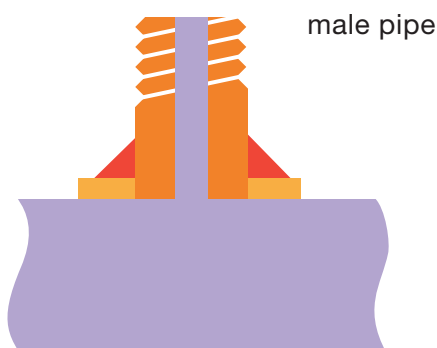
Though they can deliver many benefits, probes are not always necessary. Here are some scenarios when using a probe is not useful:

**In streams without solids or entrained liquids.** If the process stream does not contain solid particles or entrained liquids, the probe's only advantage is a fast response. If





female boss



male pipe

A nozzle—with either a female threaded boss (top) or male threaded pipe nipple (bottom)—can be used by itself without a probe to deliver samples to the analyzer.

When a large nozzle is already in place, a probe can help reduce lag for triple purging the mixing volume. However, if a new tap is being added, installing a short  $\frac{3}{4}$ -inch pipe nozzle and running enough sample flow could make for easier and more cost-effective purging than a probe.

**In very small pipelines.** Probes can obstruct process flow on very small pipelines. For that reason, some project specifications discourage probes on pipelines smaller than 80-mm (3-inch) nominal bore. Typically, though, this is a judgment call on the technician's part, based on the potential for solid or liquid entrainment in the line.

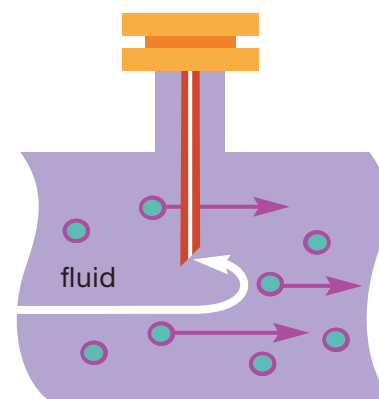
**When the cost is prohibitive.** The initial installation of a probe and nozzle comes at a higher upfront cost than a simple  $\frac{3}{4}$ -inch pipe nozzle. Additionally, some cost is associated with ongoing maintenance of the

probe. If the fluid is very clean and the line is free of contaminating debris, a probe is not usually worth the cost to install and maintain, though there will be slower analyses. When weighing the economics, remember that omitting probes from lines carrying a wet gas or dirty fluid is not worth the upfront cost savings. Any fluid that may contain solids or entrained liquid drops requires a probe. Without one, analyzer results will be less reliable.

**If the pipeline is subject to pigging.** A pig is used to clean pipelines or to separate one conveyed product from another. It will damage any probe that juts into its path. Therefore, probes should not be used in lines that are frequently cleaned this way. In large gas pipelines, though, mechanisms are available to retract the probe on command while pigging takes place, helping to avoid damage.

#### TO PROBE OR NOT TO PROBE?

In general, consider using a probe in most applications. However, they are not applicable for every circumstance. Without a probe, samples will contain more solid particles,



*Inertia keeps the particles in a process stream moving downstream instead of flowing into the probe, allowing the probe to act as an effective filter.*

leading to more frequent maintenance time for replacing filtration elements. These contaminating solids, or liquids in a gas sample, can also reduce analysis accuracy or even damage the analyzer.

Base the decision on process conditions, filtration needs, response times, sample representativeness, and total ownership costs. With these factors in mind, it is easy to make the right decision.

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# Optical Gas Imaging in Compliance with Quad OA

Efficient and cost-effective inspection of natural gas compressors

In June 2017, new regulations from the Environmental Protection Agency about the monitoring of natural gas compressor stations went into effect. The rules require quarterly checks for methane leaks at any compressor station that has been newly constructed or modified since September 2015. While the EPA's main concern is reducing emissions of methane, a potent greenhouse gas, experience is starting to demonstrate that regular testing using infrared (IR) cameras can save companies money and improve worker safety as well. The new rule is "Oil and Natural Gas Sector: Emission Standards for New, Reconstructed, and Modified Sources," which EPA labels as Subpart OOOOa to 40 CFR Part 60, and which is widely referred to as Quad OA. Under the regulation, compressor stations have options for how to

perform the required monitoring. One option is Method 21, an older technology that uses a "sniffer" to detect the presence of hydrocarbon gases and report it in parts per million. The more modern option, and the one designated by the EPA as the "best system of emission reduction," is optical gas imaging, which uses an IR camera to see plumes of gas leaking from pipes and equipment. Optical gas imaging uses spectral filtering to target the infrared wavelengths absorbed by the gas, letting the user visualize otherwise invisible gas.

## A BETTER TECHNIQUE

Optical gas imaging has some advantages over Method 21. Most importantly, it allows inspectors to actually see where the gas is coming from, to localize the leak to, say, a valve or a



Recognizing leaks is the first step to reduce emissions to environment and save money

pipe joint, making it easier to find and repair. Method 21 only reports the concentration of methane in the air at the spot where the test is performed, but cannot provide any information about the rate or direction in which the gas is flowing, making it challenging to find the source of the leak. The other advantage of optical gas imaging is that, because it's a visual method, it allows the inspector to survey a whole scene from a particular vantage point. The camera does not provide a quantitative measurement of the leak, although the size of a gas plume provides some idea of the volume of gas. An experienced camera operator can provide a qualitative evaluation of the leak size (small, medium, large, very large) or even an estimated leak rate, providing an additional layer of information to prioritize leak repairs. But if a station operator wants to put a number on it, they can use the sniffer at the source of the leak identified by the camera, getting a parts per million reading without having spent as much time searching for leaks.



Localizing a potential gas leak at a thief hatch







*FLIR GF320 camera with a spectrally filtered indium antimonide detector and resolution of 320 by 240 pixels*

annual saving of gas worth \$1,609 per year, and the average lifetime of a repair is two years. Applying net present value with a 10 percent discount - a method of comparing the present value of money spent to the value it would have in the future if it were invested - to the value of the gas saved yields a benefit of \$1,122 per survey.

Over all the facilities, a total of more than \$360,000 worth of gas was saved annually, for a net present value of more than \$251,000. Companies would have to comply with the regulatory requirements whether they realized a savings or not, so that quarter-million dollars might be considered a bonus.

#### HIGHER SAFETY, LOWER EMISSIONS

Monetary returns are not the only benefit of monitoring. Another is improved safety. Of all the leaks found, 22 were identified as potential safety hazards. Seven of those were high hazards, and three were considered extreme. Leaks are considered dangerous when they lead to high concentrations of gas that start to approach the lower explosive limit, the concentration at which the gas can combust. High concentrations can pose a risk of fires or explosions hazard, so discovering such leaks before they cause such a problem is extremely valuable.

The leaks can also pose a hazard to personnel. Approximately 60 percent of those leaks were found in areas where facility operators or maintenance staff were working. The facilities were unaware of those leaks, despite having gas detection equipment in their buildings. Finally, there's the emissions benefit. The EPA wants to discover leaks in order to reduce the amount of methane released into the atmosphere. The total amount of methane discovered during these inspections was the equivalent of 59,000 metric tonnes of carbon dioxide per year. To continue reading visit: [pcne.eu/bingo/57587](http://pcne.eu/bingo/57587)

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#### A CASE STUDY

To measure the effect of implementing these new regulations, Target Emission Services, a contractor that performs inspections for leak detection and repair at compressor plants, collected data from several inspections. Based on what it found, optical gas imaging surveys not only allowed companies to comply with EPA rules, they also showed economic benefits for the companies.

During the four quarters of 2017 and the first quarter of 2018, Target performed a total of 224 inspections at 104 facilities in nine different states owned by five compressor companies. There were an average of 2.4 compressors per facility. Each monitoring event was carried out by a technician with at least 1,000 hours of experience in optical gas imaging. They used a FLIR GF320 camera with a spectrally filtered indium antimonide detector and resolution of 320 by 240 pixels. The camera was used in high-sensitivity mode for enhanced leak detection.

#### LEAKS FROM SMALL TO LARGE

The severity of a leak is characterized by the gas flow rate. Gas flow is not measured by the camera, but by a Hi-flow Sampler. A rate of less than 0.1 cubic feet per minute (cfm) is

considered low severity, from 0.1 to 0.5 cfm is medium, and greater than 0.5 cfm is high severity. Inspectors discovered a total of 1,977 leaks. Of those, 65 percent, or 1,291 leaks, were low severity. Another 32 percent, or 630, were medium severity. And 3 percent, or 56 leaks, were high severity leaks. The smallest leak discovered measured only cfm, while the largest was 7.85 cfm.

Every cfm of escaped gas represents a cost of roughly \$1,600 per year, so that 7.85 cfm means a loss of more than \$12,500 worth of gas in a year.

While numbers like that suggest that the greatest return comes from finding and repairing the largest leaks, it's important to note that by volume, the large number of small leaks roughly equaled the lesser number of large leaks, each accounting for about 27 percent of the gas lost, while the medium leaks made up the other 45 percent.

The inspections turned up an average of 19 leaks per facility, nine leaks per survey. The average total leak rate per facility was 2.4 cfm.

#### NOTABLE SAVINGS

The economic benefits were clear. The average monitoring cost per survey was \$1,220, and repair costs were \$450. That leads to an



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# When the Going Gets Tough

## SIL solutions for auxiliary heating in potentially explosive surroundings

These days, auxiliary heating is needed to maintain or increase temperatures, particularly in chemical processes or process engineering, to optimize the increasingly complex processes in modern industrial facilities. Flexible electrical heaters are not restricted to individual industries or special applications. Instead, they can be used universally.

Through the basic physical property of resistance heating, it is possible to use electrical heaters in precisely the places where they are needed and also only when auxiliary heating is necessary. Even existing plants or process sequences can be easily retrofitted with little technical effort using a flexible electrical heater.

The Winkler company, based in Heidelberg, Germany has been designing and building flexible electrical heaters for 40 years. In addition to many standard solutions, Winkler has created special, customer-specific heating solutions in recent years, especially

when it comes to explosion-proof heater systems. This product range, which is primarily influenced by directives, regulations, and standards, has grown tremendously in recent years. In this case, the products have a system certification.

With this certification, the operator is no longer required to perform additional acceptance of the delivered heaters for a potentially explosive plant, as the manufacturer (Winkler) has already certified the device in advance. Informative documentation is also part of the delivery scope. This documentation is an important part of the explosion-protection document that must be maintained by the operator according to §6 of the German Ordinance on Hazardous Substances "Information Transfer and Hazard Assessment".

As part of a compliance evaluation process according to the directive 2014 / 34 / EU and an ignition hazard assessment, the installed explosion-relevant components have also

been subjected to a special selection process. That is why Winkler has always installed certified Pt100 RTD temperature probes by JUMO with EC-type examination certificates in its flexible explosive-proof heaters.

The Pt100 RTD temperature probes are an important safety component in the heaters, since the installed resistance heating conductor would exceed the maximum admissible temperature without appropriate controllers and limiters. Exceeding the maximum temperature would not only damage the heater itself, but would also become a hazardous source of ignition.

According to EN 60079-14 section 13 "Electrical heating systems" Appendix F "Installation of Electrical Trace Heating Systems", safety equipment such as sensors that record temperature for controllers and limiters is to be provided to prevent high temperatures that could potentially become ignition sources. This is known as monitored design (Appendix F 4.3), which requires temperature control equipment to be used to limit the surface temperature. This temperature limit must work independently of the temperature control to switch the heating system off permanently before the maximum admissible surface temperature (on the heater conductor) is exceeded. The system cannot be switched back on until the system operator is certain of the reason why the safety equipment was activated and is sure that the corresponding maximum temperature of the Ex-area is no longer exceeded.

The temperature sensor must be positioned at the hottest point in the process. This hot spot could be, for example, on a heating hose between the heating conductor and the object

*Positioning of the sensor at the "hotspot" of an Ex-analyzer line*





The JUMO safetyM STB/STW safety temperature monitor/limiter with SIL-certified temperature probes.

to be heated, which is the base hose (Picture 1). When resistance-heating the heating conductor by applying voltage, the Pt100 RTD temperature probe responds by changing the resistance according to an evaluation from the corresponding control and monitoring equipment (that is operated inside or outside the Ex-area) and then initiating corresponding measures depending on the construction and programming. This way, not only operating temperatures of the process can be con-

trolled, but also ignition sources that come about in the heater due to uncontrolled excess temperatures can be avoided. In addition to proper installation and correct positioning of the RTD temperature probes in the flexible heater, corresponding process stability is also decisive here. This process stability depends primarily on the utilized evaluation unit. The JUMO safetyM STB/STW safety limiter/monitor is particularly well-suited for this task. It enables a compact single-channel

safety control with selectable redundant input signals for standard signals and temperature sensors. This solution is ideal for smaller functional applications such as special machines and individual applications with a low density and number of signals. The JUMO safetyM STB/STW also has ATEX approval.

JUMO exTHERM DR two-state controller with Ex II approval is also designed for use in electrical heaters. The intrinsically safe Ex (ia) measurement input for RTD temperature probes, thermocouples, or current standard signals allow corresponding type-tested sensors to be connected directly. As a result, barriers are no longer required. In addition to the "controller" relay output, the device has a second relay output for limit value monitoring.

The following graphic shows an example of an electrical heater using an explosion-proof heating sleeve. The corresponding processes can be carried out in the heater with integrated Pt100 RTD temperature probes. One probe is for temperature control (1 x sensor) and the other for the limiter with redundant design (2 x sensors).

In addition to low investment costs, the advantages here include low parameterizing effort for each application. Three different analog and binary functional outputs are available. In connection with special JUMO temperature probes, which are also available in ATEX variants, the whole SIL safety chain has already been evaluated and corresponding certificates up to SIL 3 can be issued by JUMO.



Heater solutions for barrels or gas cylinders

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# Mobile Multi-gas Detectors Ensure Worker Safety in Hazardous Environments

Perimeter monitoring with wireless units ensures safety of teams where fixed system is not suitable

Al Masood Oil & Gas, which following its formation in 1971, became one of the first oil and gas suppliers and contractors in the United Arab Emirates (UAE). Al Masood has supplied around 800 BM25 portable gas detectors into a host of onshore and offshore projects, including 200 of the latest-generation wireless models.

The company acquires the units directly from Oldham-Simtronics.

"We selected the BM25 because we can trust and depend on its performance in the harsh environments in which we operate" states Ammar Maarouf, Department Manager, Airloop & H2S Safety Services at Al Masood Oil & Gas.

"The BM25's robust construction and intelligent design make it one of the best detectors to be deployed in applications where area monitoring is a critical part of the safety system." The BM25 was designed for team protection or area surveillance, and is ideally suited to perimeter monitoring, rig overhauls, and mobile or short-term work where fixed detection systems are not practical.

Providing the capability to monitor one-to-five gases simultaneously, the BM25 packs the benefits of a fixed area monitor into a rugged, user-friendly and transportable instrument; a factor that has long-appealed to Al Masood. With over 900 employees, the Abu Dhabi-based company provides advanced energy services into upstream and downstream operations.

Its Air Loop & H2S Safety business unit also supplies, calibrates and services various application-specific products across the UAE, including portable gas monitors, for both sales-based and rental-based projects.

## DETECTION OF UP TO 5 DIFFERENT GASES

"Provide us with a challenge and we'll find the right solution," says Mr Maarouf. "Portable gas detection and area monitoring has been a key competency for many years, and here we rely on various solutions from 3M Gas & Flame Detection, including the PS200 multi-gas detector, as well as the BM25." Up to five gases can be monitored simultaneously using the BM25; interchangeable sensors are available for AsH<sub>3</sub>, CO, CO<sub>2</sub>, H<sub>2</sub>, HCL, HCN, NO<sub>2</sub>, NH<sub>3</sub>, O<sub>2</sub>, PH<sub>3</sub>, SiH<sub>4</sub> and SO<sub>2</sub>. When the BM25 detects a hazardous level of gas, the top-mounted beacon sends a flashing, bright signal in all directions while emitting a powerful, 103dB siren alarm. "The standard BM25 can send alarms via alarm transfer cables, however, the latest-generation BM25 Wireless sends alarms, faults and readings using a 2.4GHz wireless signal," explains Mr Maarouf. "This setup can create a safety perimeter around a detected atmospheric hazard, or transmit a manually initiated emergency signal over a wide area." Powered by a NiMH battery pack, the BM25 multi-gas monitor offers up to 170 hours of continuous run time. Other standard features include STEL (short-term exposure limit) and TWA (time-weighted average) values, as well as a data-logging capacity of more than four months.

## EASY INTEGRATION IN MESH NETWORKS

The BM25 Wireless provides networking and communication to the Oldham-Simtronics MX40 controller,

which centralises the data and can display up to 32 measurements in real time. When a BM25 signals an alarm, the MX40 also goes into alarm mode and can, for example, control internal relays and order other monitors to transmit the alarm as well. The control





offer them. Our customers love the simplicity and the speed in which they can be deployed to keep workers safe." The Oldham-Simtronics BM25 Wireless can be used as a stand-alone monitor or linked into a mesh network to provide gas detection over a large area.

The mesh network allows peer-to-peer connection with all other units in the network to send, receive and relay data. As a result, detectors can communicate around obstructions and alter communication paths should a monitor be removed for recharging or servicing. A total of 30 BM25 Wireless units may be meshed together in a single network, while up to 16 independent networks can co-exist without interference.

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panel displays real-time gas concentrations, field device status, battery levels, network RF signal quality and fault diagnostic conditions.

"To date we've supplied around 200 BM25 Wireless gas detectors," says Mr Maarouf. "In fact, I think we were the first in our region to

## ANALYTICAL TRANSMITTER

Measures conductivity and pH in for harsh environments



**ABB** has taken an innovative approach to transmitter design with its new AWT210 single-channel two-wire transmitter for measurement and control of pH, redox (ORP) and conductivity in hazardous and non-hazardous industrial applications. The modular design reduces process downtime and overall operations expenditure while improving

safety and boosting performance by optimizing plant control and availability. The low power high-performance transmitter is built around single sensor interchangeable modular plug-and-play technology. The AWT210 pH and conductivity systems ensure optimal safe performance in the harshest of applications. This combined with greater user flexibility and environmental compliance make them ideal for the oil and gas, pulp and paper, metals and mining and chemical and petrochemical industries. The highly flexible transmitter design enables the same unit to be used with pH, redox (ORP) and ion-selective sensors as well as two- and four-electrode and toroidal conductivity sensors. Factory-calibrated modules for the different sensor types can be quickly fitted and exchanged when required via the transmitter's hinged door, enabling fast and easy upgrading and maintenance in the field.

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verification without removing the instrument or interrupting the process. This allows cost-effective and safe system operation during the entire life cycle. The monitoring function enables trend detection for predictive maintenance. Instruments equipped with Heartbeat Technology significantly extend test cycles and supply standardized diagnostic notifications for cost-effective maintenance. Instruments with Heartbeat Technology offer permanent process and instrument diagnostics while supplying standardized and unambiguous NAMUR 107-compliant diagnostic notifications and symbols with clear instructions. The technology thus permits cost-effective, status-oriented maintenance. The result is higher system availability without additional effort for the user. The permanent self-diagnosis furthermore makes a significant contribution to a safer process. The Heartbeat verification function carries out a managed test without interrupting the process and without removing the instrument and enables clearly documented test results. The automatically generated test protocol provides verification compliant with regulations, laws and norms. This increases system availability and reduces test effort.

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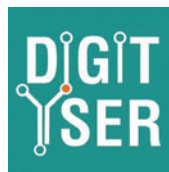
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