PROCESS TECHNOLOGY

AUTOMATION + CONTROL + INSTRUMENTATION

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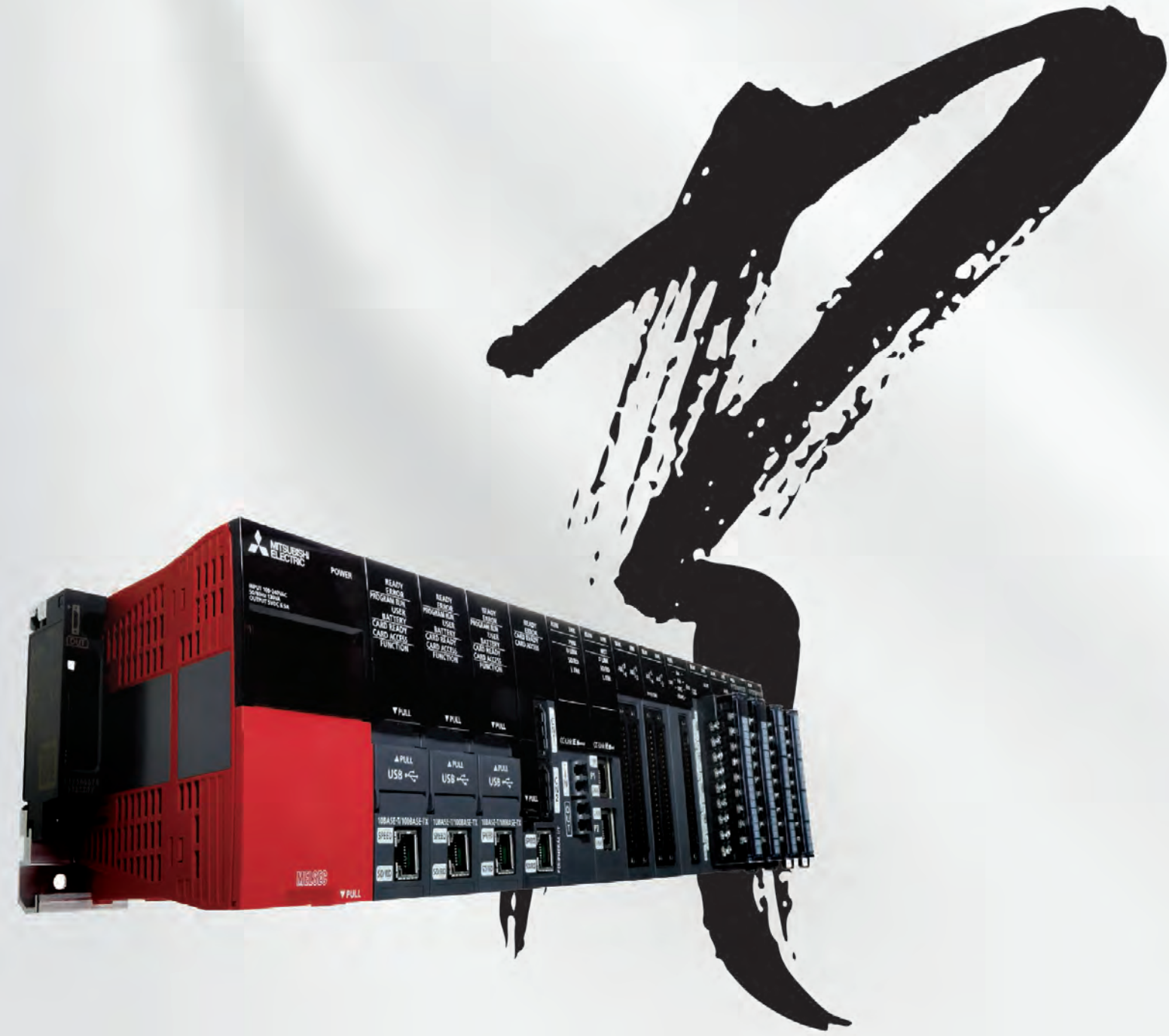

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People for Process Automation

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PROCESS TECHNOLOGY
FEBRUARY 2018

CONTENTS

ON THE COVER

Mitsubishi Electric has introduced MELSEC iQ-R, a revolutionary, next-generation controller, building a new era in automation. As the core of a next-generation automation environment, the MELSEC iQ-R automation controller provides added value while reducing total cost of ownership (TCO).

To succeed in highly competitive markets, it is important to build automation systems that ensure high productivity and consistent product quality. The MELSEC iQ-R Series has been developed from the ground up based on common problems faced by customers and rationalising them into seven key areas: productivity, engineering, maintenance, quality, connectivity, security and compatibility. Mitsubishi Electric is taking a three-point approach to solving these problems: reducing TCO, increasing reliability and re-use of existing assets. As a bridge to the next generation in automation, the MELSEC iQ-R Series is a driving force behind revolutionary progress in the future of manufacturing.

Mitsubishi's iQ platform brings together a full automation suite, also including the GOT2000 range of HMIs, the powerful compact automation controller iQ-F series, the high-performance FR-A800 range of inverters as well as the high-function MR-J4 servo systems — all developed to provide a next-generation automation environment focused on adding value while reducing TCO.

Mitsubishi Electric is one of the world's leading names in the manufacture and sales of electrical and electronic products and systems, used in a broad range of fields and applications. As a global company, it is applying its technologies to contribute to society and daily life around the world.

Mitsubishi Electric Australia
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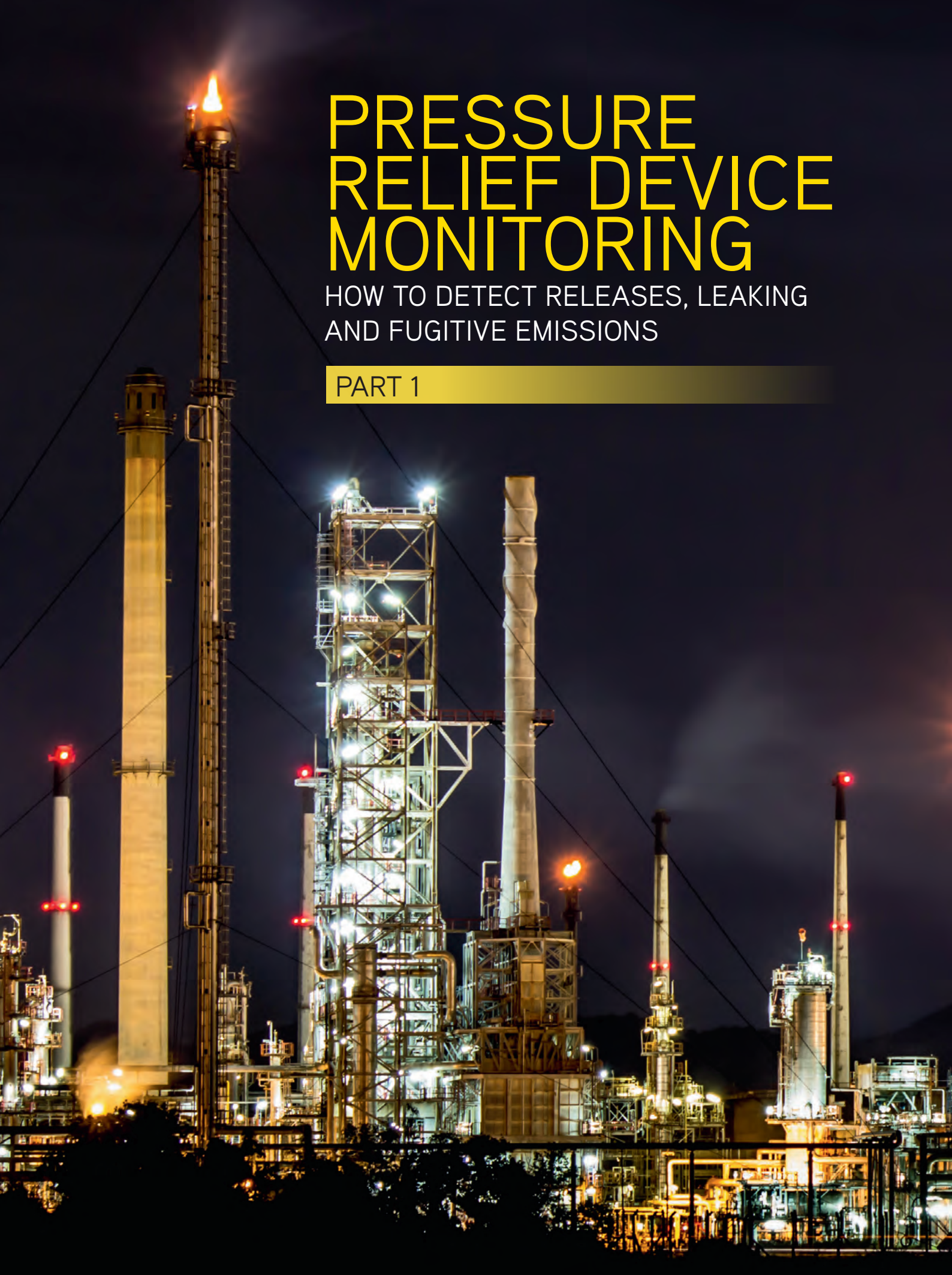
MITSUBISHI ELECTRIC
Changes for the Better

PRESSURE RELIEF DEVICE MONITORING

HOW TO DETECT RELEASES, LEAKING AND FUGITIVE EMISSIONS

PART 1



This article outlines how to comply with environmental regulations and detect PRD malfunctions while minimising costs and cutting operating expenses.

Every country has regulations and engineering specifications to protect industrial plants and facilities against overpressure in various processes and operations. Insurance companies and government agencies rely on the observance of these regulations and specifications to determine if designs are correct, and if operations are being conducted correctly.

Enforcement is done by local environmental and occupational safety regulatory agencies that were created to protect health and the environment by writing and enforcing regulations. New fugitive emissions regulations worldwide are growing more stringent, requiring rigorous monitoring of pressure relief devices (PRDs) and bypass valves. They also require better control of flares and air concentration monitoring at the plant fenceline.

Pressure relief devices

The purpose of a process plant control system is to keep process variables at the desired operating point and within safety limits. However, control systems may not be able to handle all process upsets, so operator intervention, safety instrumented systems and PRDs become the last lines of defence. One of the main safety concerns is to keep process pressure within the limits tolerated by vessels, pipes and valves.

PRDs can be pressure relief valves (PRVs), pressure safety valves (PSVs) or rupture discs (RD). They activate when the pressure gets too close to the maximum allowable working pressure (MAWP) of the vessel or process component. As per regulations, all PRDs must be mechanically powered by the process itself, so they do not require external power or intervention to function.

Traditionally, PRDs have a simple mechanical design to ensure reliability under all foreseeable conditions. Excessive pressure in a pressurised system is relieved by blowing process fluid (gas or liquid) to the environment, or to a closed recovery system.

Ideally, hazardous materials being relieved by a PRD should be routed to an enclosed recovery system to be treated and properly disposed of, or neutralised through combustion in a flare system. However, this is not always the case, with many PRDs releasing process fluid directly into the environment. Regardless of whether the PRD releases to an enclosed recovery system or to the environment, or is handling hazardous area pollutants (HAP) like H_2S or more benign fluids such as steam, it is important to identify the source, time and magnitude of the release. PRDs releasing to the atmosphere can create explosive and toxic emergencies.

Flare systems are the most commonly used method of neutralising hazardous discharges, but are not perfect. Fast transients caused by sudden fluid composition and volume changes can still cause releases of unburned hazardous material. Additionally, in a closed recovery system it can be difficult to locate the source in order to take corrective action.

In addition to potential environmental and safety concerns, process upsets causing overpressures can affect production and uptime, negatively impacting profitability. A PRD is sometimes the only indicator of process upsets, so the sooner a PRD event can be detected, the sooner operators can respond to the root cause.

As previously stated, there are three main types of PRDs: pressure relief valves, pressure safety valves and rupture discs. The term

PRV or relief valve (RV) is generically used for both PRVs and PSVs; however, these two devices have different working principles.

PRV basic operating principles

PRVs are safety devices protecting a vessel against overpressure. Figure 1 shows a typical spring-loaded PRV. The disc between the process side (inlet piping) and the discharge side (discharge piping) is pushed against the seat by a compression spring. The spring force determines the PRV set pressure and it is adjusted by the compression nut during calibration and certification.

When the spring force exceeds the force resulting from the process pressure and the pressure in the discharge side (backpressure), the disc blocks the flow from the process side to the discharge. When the process pressure exceeds the valve set pressure, the disc pushes the spring, opening the valve and forcing the process fluid to the discharge pipe. The valve will remain open until the process pressure drops approximately below 95% of set pressure. The 5% deadband, also known as 'valve blow down', prevents the valve from chattering when the process pressure varies close to the valve setpoint.

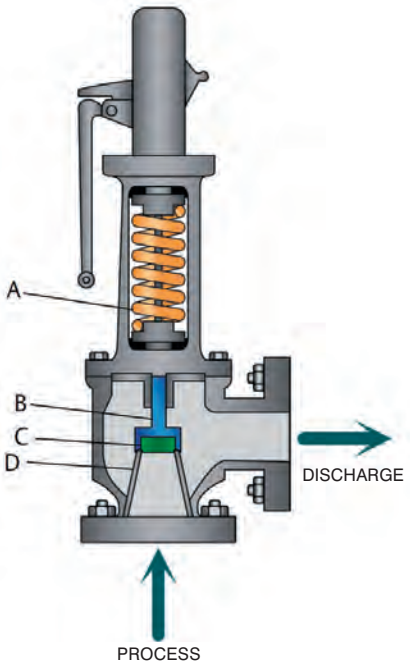
Unaccounted discharges also occur when the valve chatters. This happens when the vessel pressure oscillates around the PRV setpoint with an amplitude larger than the deadband. Chattering occurs when the valve is not specified correctly or the piping was not designed properly.

The valve opens proportionally to the excess pressure, and returns to the closed position when the process pressure returns to normal. There are more sophisticated types of PRVs, but the basic working principle is the same. In the relief valve calculation, it is necessary to take into account the pressure on the discharge side. In enclosed recovery systems, sometimes there is a back pressure build-up caused by relief of other PRDs in the discharge header.

When things don't work as expected

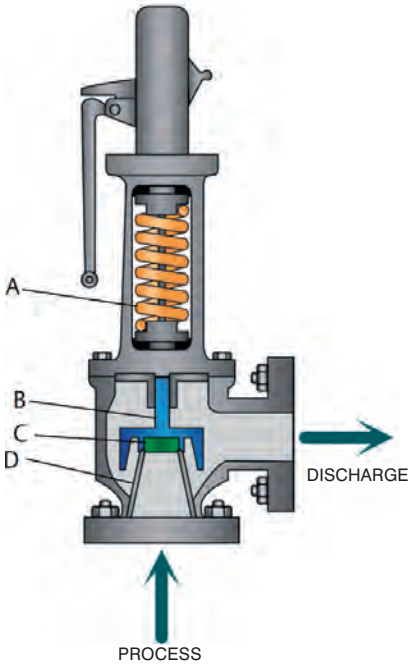
Sometimes, when the process pressure returns to normal conditions, the PRV does not close completely. There are several reasons for this:

- Pressure increase on the discharge side
- Valve seat damaged after repeated actuations
- Deposition or formation of solids between the disc and the seat
- Altered process fluid
- Corrosion
- Mechanical malfunction



A. Spring
B. Disc/seat holder
C. Disc seat
D. Nozzle

Figure 1: Pressure relief valve.



A. Spring
B. Disc/seat holder
C. Disc seat
D. Nozzle

Figure 2: Pressure safety valve.

Gas type	Gas per metric ton (USD)[1]	Process pressure (psig)[2]	Leakage yearly losses (USD)
Ethylene	1,044	250 @ 100°C	740,000
Ammonia	500	250 @ –33°C	335,000
Steam	22	250 @ 200°C	7,800

1. July, 2015 Platts Global Petrochemical Prices.
2. Relief valve set pressure – 300 psig and ASME orifice type "G".

Table 1: Example of petrochemical leakage loss costs.

Even a small leakage (0.1% from the PRV flow area) can cause losses of tens of thousands of dollars per year. Additionally, the leakage can cause significant emissions violations, resulting in expensive fines and even required shutdowns.

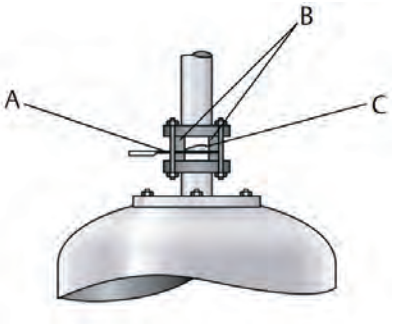
Pressure safety valves

This device is commonly known as a 'pop valve' because it opens completely and rapidly when the pressure exceeds the setpoint. The valve will remain open until the process pressure drops to approximately 95% of set pressure. These valves are mostly used for gas and steam.

PSVs are slightly different than PRVs. The disc blocking the nozzle has a smaller area and is contained in a larger diameter chamber. When the pressure exceeds the setpoint, the stem starts to lift, allowing the process fluid to flow to the chamber.

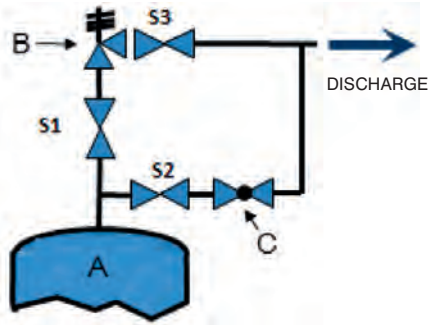
As the chamber area is much larger than the one exposed by the disc, the uplifting force is much larger than the spring force and the valve opens completely, as compared with a PRV in which the amount of opening is proportional to the pressure differential. With the discharge, the pressure reduces in the chamber and the valve closes. If the process pressure is still above the setpoint, the valve keeps popping open until the pressure returns to normal levels.

When the process pressure fluctuates around the PSV setpoint value, the blocking disc will lift to allow the chamber to fill and lift the stem. The process fluid vents to the discharge pipe, reducing the pressure but not opening the valve completely. This process is called simmering and occurs frequently. Simmering can also cause material build-up on the disc seating



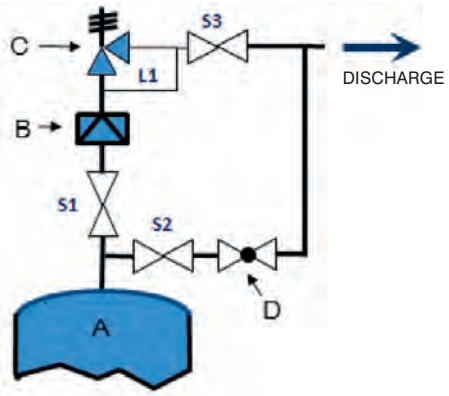
A. Rupture disc
C. Disc seat
B. Diaphragm sensor

Figure 3: Rupture disc.



S1, S2, S3. Shutoff valves
A. Protected vessel
B. Pressure relief valve
C. Bypass valve

Figure 4: Pressure relief valve bypass.



S1, S2, S3. Shutoff valves
L1. Ventline
A. Protected vessel
B. Rupture disc
C. Relief valve
D. Bypass valve

Figure 5: Typical installation for an RV with rupture disc.

and stem misalignment, which prevents the valve from closing completely. The discharge caused by simmering and its side effects are not usually detectable by conventional methods.

PSVs (Figure 2) are commonly equipped with a lever so an operator can initiate a manual release. This is useful to test the valve, clean possible scale or solids deposited on the seat surface, and deal with special process conditions during startup or during shutdowns.

Rupture discs

Rupture discs (Figure 3) are safety devices for one-time use. They consist of a membrane that bursts when the differential pressure between its two sides exceeds a set value. These devices are used alone or in combination with a PRV, providing a physical isolation layer between the process and the relief valve, especially on processes containing highly corrosive fluid. Some models are equipped with a sensor that indicates when the diaphragm is broken.

Rupture discs are very simple devices, with no moving parts. Unlike pressure relief or safety valves, the rupture disc will remain open until the ruptured diaphragm is replaced. Diaphragms are less susceptible to causing fugitive emissions, but there is always the possibility of pitting corrosion which creates pinholes, leading to undetectable leakage.

PRD bypass

Safety relief devices require shutoff valves and a bypass valve as shown in Figure 4. These valves are used for device maintenance and special process conditions. If a rupture disc diaphragm has to be replaced, for example, the device has to be isolated using these valves. In some cases such as during startup, shutdowns, tests or load changes, it may be necessary to bypass the PRD.

It is not uncommon for plant personnel to forget and leave these valves in the open position or not close them properly, causing process fluid losses and emissions that can go undetected for a long time. Monitoring bypass valve position enables quick response to human error or defective equipment.

RV with rupture disc

In some applications, it is necessary to use a rupture disc installed upstream from the RV (Figure 5). The main reasons for this are:

- The rupture disc can prevent fugitive emissions through the RV.
- The rupture disc protects the RV against corrosive process fluids. The RV may not be available with materials required for long-term resistance to the process fluids, or it may be too expensive to provide one that is resistant. The rupture disc diaphragm works as a shield between the process and the relief valve.
- The rupture disc protects the RV against solid particles. These particles can damage or prevent the RV from working properly, failing to open or remaining open after a release.
- The rupture disc protects the RV against frozen vapours, material polymerisation, hydrate formation or other problems that may prevent it from working properly.

It is important to note that if the rupture disc diaphragm has a pinhole leak caused by corrosion or other adverse conditions, the pressure between the rupture disc and the RV will be equal to the process pressure. Therefore, the pressure differential on the rupture disc will be always zero — it will never blow, even if the process pressure exceeds its limit. Therefore, the leakage caused by the pinhole goes to the discharge line and can go undetected for a long period of time.

To avoid this problem, a vent line is often installed (L1 in Figure 5) to keep the pressure between the disc and the valve equal to the discharge line pressure.

In Part 2

In Part 2 of this article, we will examine the most effective ways to monitor relief devices for releases, fugitive emissions and failures.

Emerson Automation Solutions
www.emersonprocess.com.au

Subsea variable speed drive successfully tested underwater

The first full-scale prototype of a subsea variable speed drive has been successfully tested in a sheltered harbour in Vaasa, Finland, taking the vision of an all-electric subsea processing facility one step closer to reality. A variable speed drive is needed to boost the productivity of processes, improve energy efficiency and cut maintenance costs of electrical gear.

The test is the latest in a five-year Joint Industry Project (JIP), started in 2013, between Statoil, Total, Chevron and ABB. The JIP aims to develop transmission, distribution and power conversion systems for subsea pumps and gas compressors, operating at depths of 3000 m and over vast distances. By providing the large power needs closer to the reservoir, production improves due to the increased flow and pressure of the stream.

The subsea variable speed drive, designed for subsea gas compression, was operated over three weeks in November 2017 in a back-to-back configuration directly with the grid, without motor loads. This so-called 'power in the loop' test means that only a few hundred kilowatts of losses need to be supplied from the grid.

"The water test was carried out successfully and achieved all the set targets," said ABB CTO Bazmi Husain. "We have demonstrated the successful and reliable operation in a number of high-stress conditions. This achievement underlines our ability to push technology to its limits."

The subsea VSD features a pressure-compensated design, whereby all of its power components are cooled by being submerged in oil. The water test proved that the electronic and power components can meet the thermal performance demand. Prior to the test, the main drive subassemblies and components were pressure tested at 300 bars in Statoil's R&D facility in Trondheim — this test was performed to demonstrate that the drive can tolerate a pressurised environment.

"This is a major milestone in solving such a grand challenge. It takes technology from the laboratory to the field in a structured qualification and pragmatic process, via prototypes and multiple demonstrations," said Husain.

Taking power distribution from onshore to the seabed, with up to 100 MW of capacity being transmitted some 600 km, frees up the limited space on topside installations. Costs are reduced by having one cable that is distributed to many subsea loads. Furthermore, operational costs are greatly reduced and energy and CO_2 emissions are lowered, while marine pollution is cut and decommissioning simplified.

A highly complex system in such an extreme environment must be reliable and designed for long life with minimum, if any, intervention for maintenance or repair. "We have to prove to our customers that the entire installation is going to be ultrareliable, because pulling up equipment from 3000 m costs a lot of money," explained Per Erik Holsten, managing director of ABB's Oil, Gas and Chemicals business.

The team is pushing the boundaries of traditional product development, specifically to attain the highest possible reliability. In addition, to ensure a cost-competitive subsea processing facility, the installation needs to be low weight and small to enable simplified logistics.

Following the success of the test, the JIP is now preparing for a 3000 h shallow water test of a subsea power system with two variable speed drives in parallel, combined with subsea switchgear and controls, targeted to start in late 2018. The first installations of the new subsea power systems in offshore production sites are expected to begin in 2020.

"While these technology developments and the project progress relies heavily on experience, know-how and an ability to deliver, the critical element is the collaboration between all joint industry project members. It is enhanced by regular and deep partner involvement which operates at multiple levels," explained Holsten.

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SERVOMOTOR COUPLINGS

The ServoClass coupling Model 55 from Zero-Max is available in both single- and double-flex models. Providing high torsional stiffness with low inertia, the ServoClass couplings are designed to handle high-speed reversing loads and precise positioning requirements in demanding servomotor applications.

The Model 55 in single- and double-disc models handles bore diameters from 10 to 30 mm. They are lightweight and are designed with 304 stainless steel disc packs and high-strength aluminium hubs and centre members. All models and sizes feature clamp-style hubs with corrosion-resistant socket head cap screws. All materials are RoHS compliant.

Claimed to be a better choice than bellows and beam-style couplings, the ServoClass couplings perform in 24/7 servomotor applications. When the application cycle becomes faster they are said to outperform beam couplings, which are subject to wind up, and bellows couplings, which have a fragile design.

Fourteen sizes of standard off-the-shelf ServoClass couplings are now available in both inch and metric sizes. The couplings are suitable for applications in automation, packaging, semiconductor assembly and laboratory automation, as well as for most products that use ball screws and servomotors.

Naismith Engineering & Manufacturing Co Pty Ltd
www.naismith.com.au

POWER SUPPLY BUFFER MODULE

The maintenance-free Quint CAP buffer module from Phoenix Contact bridges cyclical failures lasting up to 30 s. It combines an electronic switch-over unit and maintenance-free, capacitor-based energy storage in the same housing. The lockable USB interface for connection to higher-level controllers makes it convenient to shut down the supported system. The buffer module with double-layer capacitors offers a long buffer time due to high memory capacity. Around 5–10 A can be buffered for 30 s.

Due to their compact design, the modules save space in the control cabinet. Furthermore, with an expected lifetime of over 20 years at 20°C and more than 500,000 charge/discharge cycles, they have a long service life. The soft start means that the buffer modules can also be used in combination with power supplies in the low power range. With comprehensive signalling options and a wide operating temperature range from -40 to +60°C, they support flexible use.

Phoenix Contact Pty Ltd
www.phoenixcontact.com.au

CONTROLLER FOR RENEWABLE POWER OPERATIONS

Emerson has launched automation technology for utilities and independent power producers that rely more and more on diverse renewable energy sources and that serve the fast-growing microgrid market. The modular Ovation OCC100 controller extends Emerson's Ovation control technology by managing the flow of energy from various sources to ensure continuous generation for these emerging industries. This small-footprint, scalable technology is also suitable for critical water and wastewater applications.

With renewable electricity capacity expected to expand by over 920 GW worldwide through 2022, the controller is particularly attractive to power generators with growing and diverse renewable generation portfolios (including hydro, solar and wind) and microgrids that rely on a variety of distributed energy resources.

The product offers remote monitoring and control capabilities for wind farms spread out over a wide geographic area and the ability to operate in the higher ambient temperatures associated with solar facilities. For microgrids, it provides a single point of control for performance optimisation. It can also be used to efficiently monitor and control remote pump stations critical to collecting, treating, storing and distributing water to homes and businesses.

In addition to operating independently, the controller can be natively merged into a larger, Ovation distributed control system offering greater visibility into plant-wide operations. The controller also features integrated wide-area technologies that allow it to control geographically dispersed equipment using cell or other wireless technology.

Emerson Automation Solutions
www.emersonprocess.com.au

DRIVE FOR WATER INDUSTRY APPLICATIONS

The ABB580 drive is designed for water and wastewater applications. This robust compact drive can be wall mounted or cabinet built and features built-in pump application functionality. This includes sensorless flow calculation, multipump control, level control, soft pipe fill, dry run protection, quick ramps and a solution for keeping the impeller of the pump clean.

The ABB580 offers a power range of 0.75 to 250 kW and an optional IP55 enclosure for wall or cabinet installation, and there is also a built-in energy calculator to visualise energy savings. A TÜV-certified safe torque off function will help to save on energy costs and an intuitive hand-off-auto control panel and PC tool drive composer is available for easy usability.

Control Logic Pty Ltd

www.control-logic.com.au

CLOUD-BASED HISTORIAN

Honeywell Process Solutions has launched its Honeywell Connected Plant Uniformance Cloud Historian, a software-as-a-service cloud hosting solution for enterprise-wide visualisation and analysis, which is designed to help improve asset availability and increase plant uptime.

Uniformance Cloud Historian fuses the real-time process data analysis of a traditional enterprise historian with a data lake, enabling the integration of production, ERP and other business data coupled with analytics tools to provide business intelligence. This allows enterprise data to be analysed instantly on a larger scale than previously. Such a solution makes it possible to leverage insights found at one plant across all plants, allowing smarter, more strategic decisions to be made.

It collects, stores and enables replay of historical and continuous plant and production site process data and makes it visible in the cloud in near real time. The historian combines a time series data store, which empowers plant and enterprise staff to execute and make decisions, with a big data lake, which enables data scientists to uncover previously unknown correlations between process data and other business data in the enterprise.

The scale and performance delivered through native cloud technology can reduce enterprise information technology costs by up to 25%. Because Uniformance Cloud Historian is built on the Honeywell Sentience Internet of Things Platform, future value may be delivered in the form of additional applications and services.

Honeywell Process Solutions Ltd

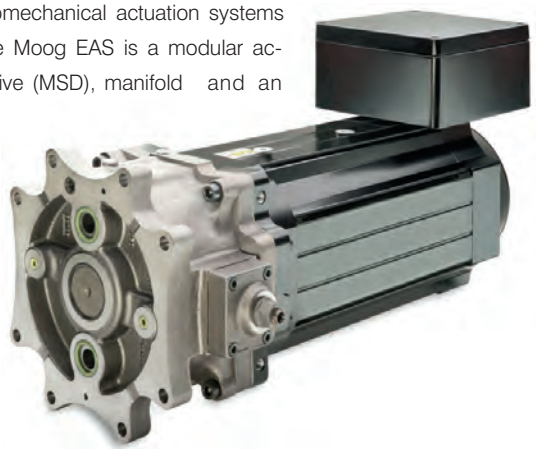
www.honeywell.com.au

ELECTROHYDROSTATIC PUMP

Moog has enlarged its product range of electrohydrostatic pump units with the EPU size 80 cc in order to help users address a wider range of applications.

The product line now includes the sizes 19, 32 and 80 cc. The EPU size 80 cc is suitable for machine builders and operators seeking cleaner and more energy-efficient options that meet the requirements for high force actuation. The Moog EPU enables the deployment of a decentralised drive system and eliminates the need for a hydraulic power unit and complex piping, thereby reducing the overall machine footprint. The compact product design features an interface that enables direct mounting onto a cylinder, minimising the requirement of additional space on each axis.

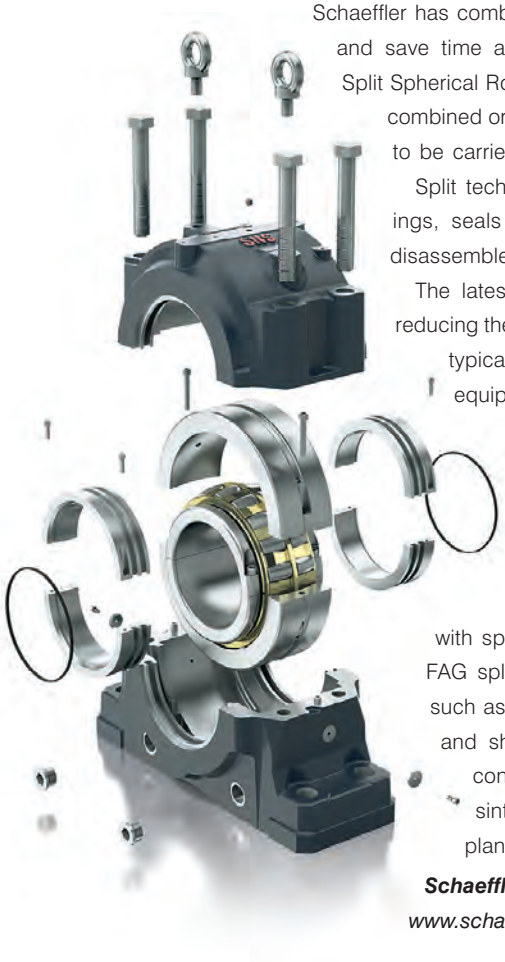
The EPU is part of Moog's Electrohydrostatic Actuation Systems (EAS), which is a compact alternative to traditional electrohydraulic or electromechanical actuation systems for applications with high force requirements. The Moog EAS is a modular actuation system comprised of the EPU, a servo drive (MSD), manifold and an optional cylinder.



The Moog EPU has been developed to meet the needs of OEMs, system integrators and end users for a large variety of industries such as metal forming and heavy industry, plastic machinery, gas and steam turbines and wind turbine pitch control.

Moog Australia Pty Ltd
www.moog.com

SPLIT BEARING TECHNOLOGIES FOR LOWER TCO



Schaeffler has combined three of its split technologies to reduce TCO and save time and machinery downtime. Its Split SNS Housing, Split Spherical Roller Bearing and NTSG Split Labyrinth Seal can be combined or used individually to allow repairs and maintenance to be carried out easily and efficiently.

Split technologies (as opposed to standard non-split bearings, seals and plummer blocks) mean machinery can be disassembled swiftly for parts maintenance or replacement.

The latest FAG split technologies also increase safety by reducing the amount of heavy disassembly and assembly tasks typical of maintenance on machinery such as conveying equipment, materials processing plant, ventilation plant, rolling and milling equipment, energy and water utility machinery and primary processing plant including timber, paper and agribusiness machinery.

Complex additional tasks — such as removing gears and clutches, dismounting drives and dismantling shaft lines — are no longer necessary with split components.

FAG split technologies are typically applied to machinery such as bucket wheel excavators and reclaimers, winches and sheaves, worm conveyors, bucket conveyors, belt conveyors, mixing and stirring plant, mills and crushers, sintering plant, fans and ventilators, dust extraction plant, and drive and transmission shafts.

Schaeffler Australia Pty Ltd
www.schaeffler.com.au

PANEL PC

Interworld Electronics has released the ViPAC-915 15″ panel PC with support for Intel 6th/7th Generation Core i3/i5/i7 processors.

The ViPAC-915 features a (4:3) aspect ratio 1024 x 768 LCD display with 420 nits brightness. A sunlight-readable 1000 nits display with auto-dimming control is also available. Touch screen options include projected capacitive, resistive touch or no-touch anti-reflection glass.

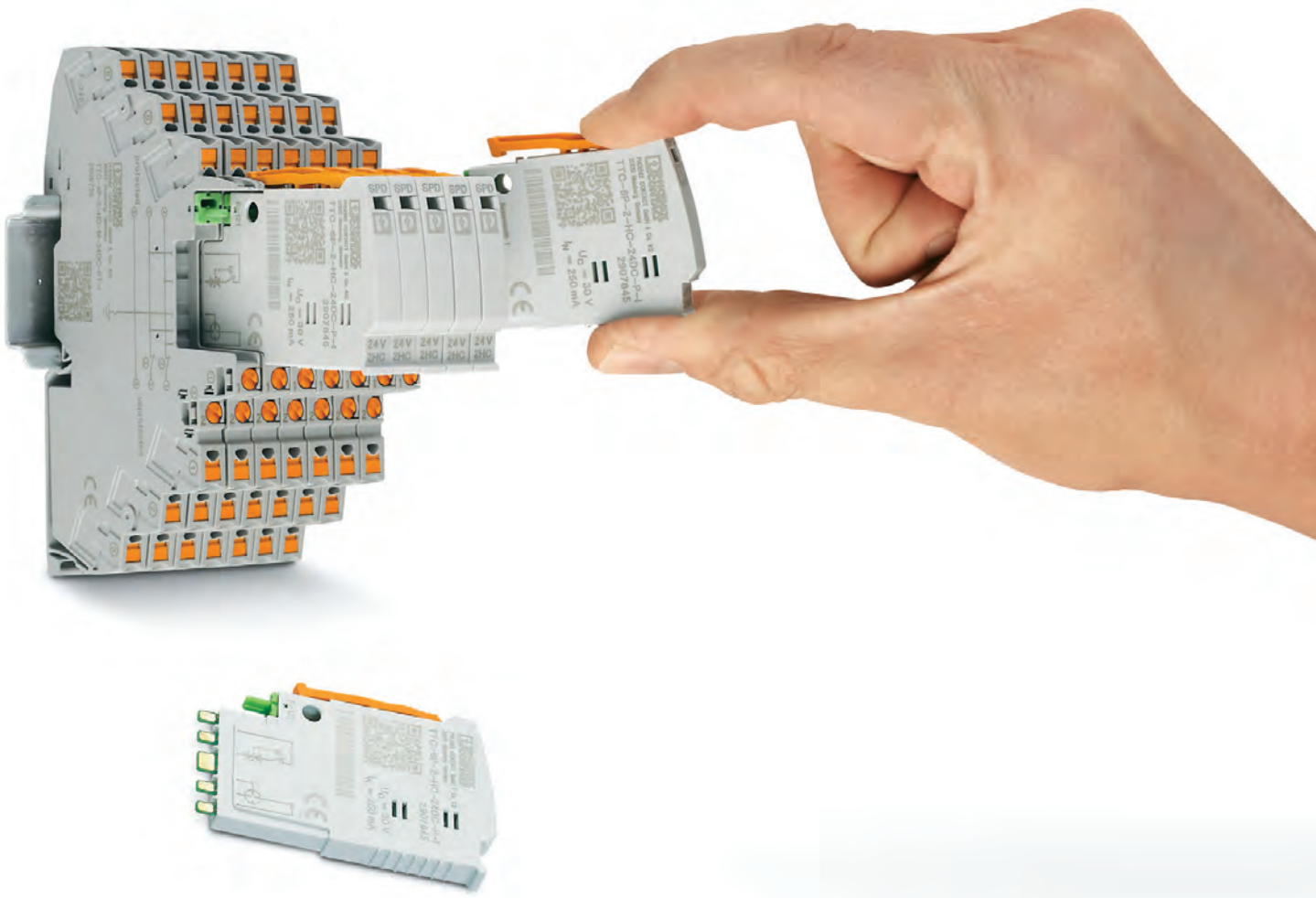
The ViPAC-915 is housed in a full metal chassis with IP66 aluminium front panel. Optional SUS304/316 stainless steel front bezels are also available. Two memory slots support up to 64 GB of DDR4 SDRAM. Two 2.5″ hard drives can be mounted for the operating system and data storage. I/O ports include three COM ports, four USB 3.0 ports, HDMI and VGA video, and two LAN ports on the base models. Optional I/O includes front panel USB and RFID and rear panel four USB 2.0 ports, two COM ports and 8-bit GPIO.

Expansion capability includes one full-size Mini-PCIe slot, one half-size Mini-PCIe slot and one SIM slot for 3G/4G/LTE, Wi-Fi/Bluetooth and GPS modules. Two PCIe expansion slots supporting one PCIe x1 and one PCIe x16 card are provided for dedicated applications.

The ViPAC Series provides a wide range 9–36 VDC power input with selectable AT/ATX mode power control.

With support for Windows operating systems including Windows Embedded 7/8.1 and Windows 10 IoT 2016, the ViPAC series provides the performance needed for industrial applications that require intelligent automation.

Interworld Electronics and Computer Industries
www.ieci.com.au



Pluggable surge protection at 6 mm with remote signaling

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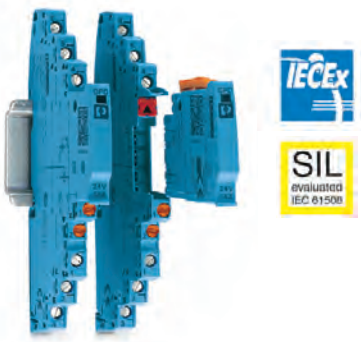
REMOTE MONITORING WITH
INFRARED STATUS INDICATOR



SAFE FOR POTENTIALLY
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TESTABLE
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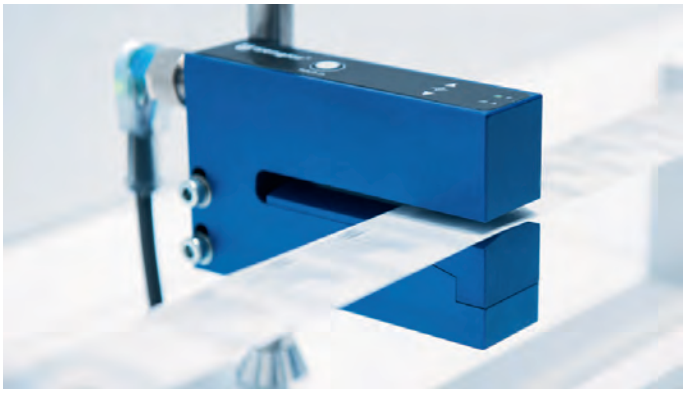
INSPIRING INNOVATIONS

ULTRASONIC FORK SENSOR



As packaging errors are perceived as a product defect, perfect product labelling plays an important role in packaging processes. The ultrasonic fork sensors from Wenglor are designed to reliably monitor the presence of dark, transparent or printed labels on role holders, before they're applied to packages by label dispensers. This assures the highest possible quality standards and, at the same time, reduces costs resulting from scrap due to incorrectly labelled products.

Whether paper or plastic, printed or transparent, ultrasonic fork sensors detect labels on any base material regardless of colour, degree of transparency and surface characteristics. They are also designed to reliably detect transparent labels on transparent base materials at high process speeds. This is due to varying ultrasound attenuation resulting from different material thicknesses, because the label on the base material attenuates the ultrasound to a greater extent than the bare base material between two labels. A small gap of 2 mm is enough to detect labels at a switching frequency of up to 400 Hz.

The emitter and the receiver in ultrasonic fork sensors are set up as a light barrier in a single housing. This simplifies installation because there's no need for sensor alignment. Easy sensor set-up by pressing the teach-in key provides for optimum convenience and user-friendliness.

Treotham Automation Pty Ltd
www.treotham.com.au

MAGNETOSTRICTIVE SENSORS WITH SSI OUTPUT

MTS Sensors has announced that the output range of the Temposonics T-Series has been extended by adding an SSI output. The sensors now also conform to the NEC standards 500, 505 and 506, as well as CEC, ATEX, IECEx.

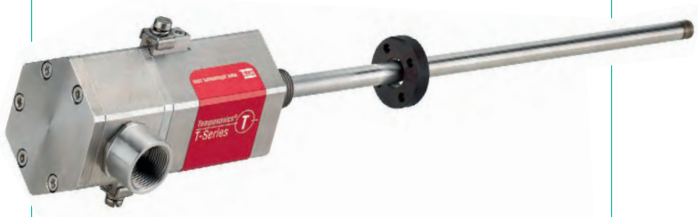
The SSI output allows for greater functionality. It has the advantage that in addition to position data down to 0.5 μm accuracy, digital information can be transmitted that provides status information during operation and, in case of a failure, comprehensive diagnosis data.

The magnetostrictive linear position sensors of the T-Series have been developed for use in hazardous working environments, such as those that expose the sensor to flames or corrosive substances. The growing demand for sensor solutions which meet the requirements for explosion protection and functional safety are typically sought after by engineers in the power generation, oil processing and chemical processing industries.

Due to their certifications, the T-Series sensors can be applied in the safety-relevant areas of Classes I, II, III; Divisions 1, 2; Groups A, B, C, D, E, F, G, as well as in the Zones 0/1, 21 and 22.

The Temposonics technology developed by MTS provides an accurate non-contact method for measuring position. Based on this technology, Temposonics sensors are highly resilient to vibrations, shock and extreme pressure. Since these sensors are not reliant on moving parts, they have prolonged operational lifespans, with little or no maintenance required, and they can be mounted within even the most space-constrained surroundings.

Thermo Fisher Scientific
www.thermofisher.com.au



FLAT-PACK INDUCTIVE PROXIMITY SENSORS

The Allen-Bradley Bulletin 871FM miniature, metal, flat-pack, inductive proximity sensors from Rockwell Automation are rugged, smart sensors built for harsh environments. Enabled with IO-Link technology, the sensors deliver comprehensive diagnostic and parameter data to the controller over EtherNet/IP from the IO-Link master module.

Unlike traditional, tubular proximity sensors, the fully shielded Bulletin 871FM sensors' 8 mm and 14 mm stainless steel rectangular housings can be installed in low-profile, space-critical applications. The compact design and all stainless steel construction of the proximity sensors is intended for sensing small parts in demanding environments.

The sensors are also available in welding models with sensing ranges up to 10 mm and Factor-1 equal sensing for different ferrous and nonferrous metals. Weld-immune models are equipped with an Allen-Bradley ToughCoat Finish coating to help prevent weld-slag build-up, making them suitable for environments such as automotive welding applications. They are also suitable for food and beverage processing plants, stamping, material handling and a wide variety of other sensing applications.

The metal, flat-pack sensors feature highly visible, bicolour status LEDs, margin indication for optimal set-up and auto detect NPN/PNP, and complementary NO and NC outputs. The sensors are available with either a 2 m cable or 0.2 m pigtail cable, with integral M12 Micro Quick Disconnect connectivity.

Rockwell Automation Australia
www.rockwellautomation.com.au

PRESSURE & TEMPERATURE INDICATORS

The Status Instruments DM670 series of pressure and temperature indicators offer advanced features including logging, relay outputs and user-configurable text display messages.

The DM670PM pressure indicator is available in ranges to 100 bar while the DM670TM temperature indicator will accept RTD and thermocouple probe inputs with standard and custom probes available. Both are available in surface, panel and direct mounting versions.

Other features include stainless steel IP65 housing, long-life lithium battery (user replaceable), max/min recall, 5000 reading data logger and USB configuration. The two independent relays can be configured as high/low/deviation with adjustable hysteresis and latched or non-latched operation.

Logged data can be retrieved via the USB interface or via the NFC android interface in conjunction with a downloadable app. All logged data is timestamped by the internal real-time clock and the NFC interface is also capable of starting a new log with different log modes. Applications include the food, beverage and brewing industries.

W&B Instruments Pty Ltd
www.wandbinstruments.com.au

QUALITY MONITORING IN MILK PROCESSING

PART 1

In modern dairy production, in which food safety and quality are paramount, accurate and fast control of each step of the process requires appropriate instrumentation for measuring flow, mass, temperature and pressure.

The milk of various animals has been used a source of human nutrition for thousands of years; however, it has only been in the last 200 years that techniques have evolved to produce milk for sale in high volumes. With the discovery of pasteurisation in the 19th century, it became possible to produce milk for human consumption on an even larger scale while ensuring it was bacterially safe.

Modern dairy production is now a highly automated and complex process involving many stages of processing to produce not only whole milk of standardised quality, but also secondary products such as skim milk, cream, butter, cheese and yoghurt, along with a broad range of processed food products.

This article describes the general processes and instrumentation required in the production of whole milk, and describes the three main processes of raw milk receiving and storage, standardisation of fat content, and heat treatment for food safety. Accurate and fast control of each step of the process requires appropriate instrumentation for measuring flow, mass, temperature and pressure — instrumentation that is fast, accurate, resistant to CIP washdown, and suitable for food and beverage applications.

Milk receiving and storage

The process of milk receiving at a dairy involves the emptying of the milk delivery trucks to raw milk storage tanks to await processing. The delivery necessarily requires measuring and recording the quantity of raw milk delivered, which is challenged by the fact that the transportation will have caused some frothing of the milk. Therefore, there will be entrained air in the milk (bubbles), making accurate measurement difficult. The milk reception process therefore needs to be designed well to minimise bubbles.

An air eliminator is used prior to measurement to ensure that the majority of the large coalescent foaming bubbles are removed. The larger the buffer size, the greater the pressure available to collapse bubbles. This also has the advantage of a longer holding time, allowing the maximum number of bubbles to escape the process before passing through the meter.

Milk receiving and storage measurements

The reception and storage of raw milk requires the elimination — as far as possible — of entrained air in the form of bubbles, and finding an accurate mass flow reading of the milk quantity, compensating for the small bubbles that remain after the air elimination stage.

Accurate mass balance and volume measurements throughout the diary process are critical for understanding such things as:

- the mass of cream or fat taken into the process, as compared with after standardisation
- accounting for the consumption and use of the raw milk through subsequent processing
- control of product losses at all following steps in the process.

As for all aspects of milk processing, temperature control is critical and so the accurate monitoring of delivered and stored milk

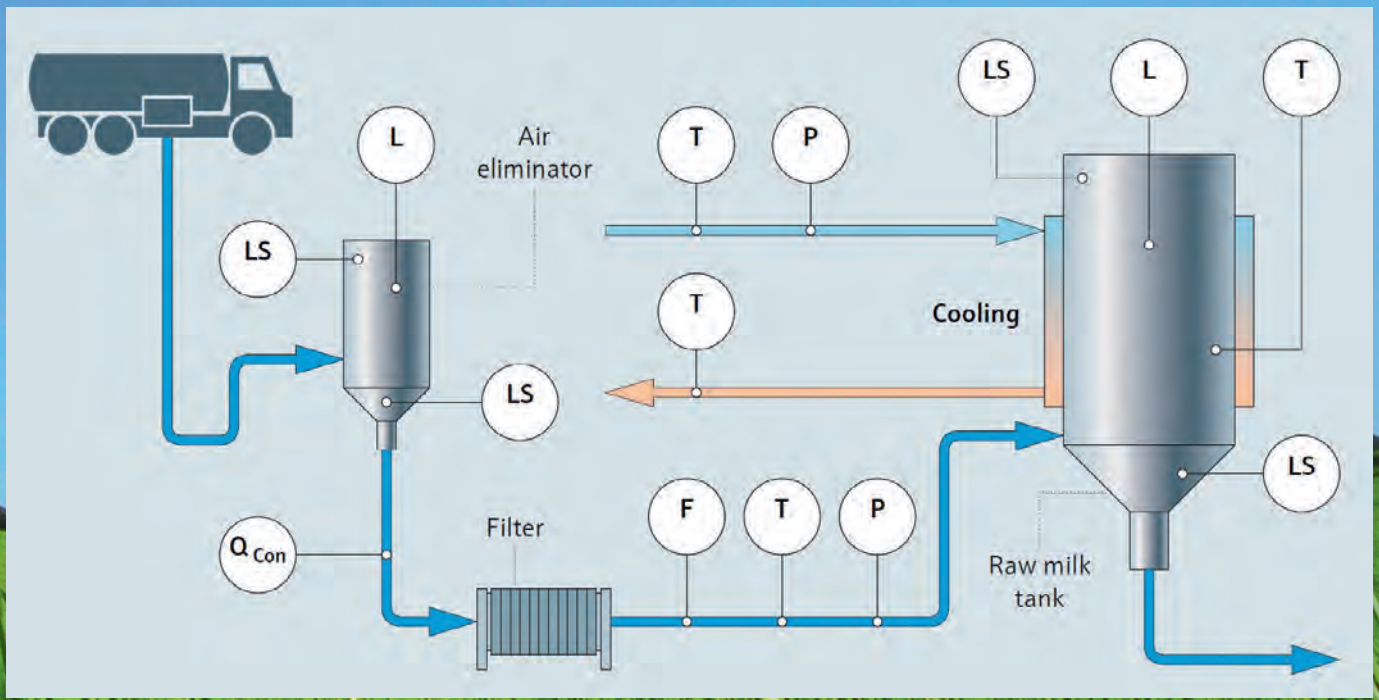


Figure 1: The milk receiving and storage process.

Figure 2: Typical Coriolis flow meter for sanitary applications.

Figure 3: A hydrostatic pressure instrument.

Figure 4: A retractable sterile assembly for pH electrode extraction and insertion.

Figure 5: A glass-free NIR/VIS optical sensor suitable for interface detection between process steps.

temperature needs to be carried out. The storage silo will also require high/overfill level detection and low-level detection when emptying, to find a balance between wasting milk and allowing air to be pumped into processing lines.

Measurement of milk pH at the receiving stage also ensures that milk that has been spoiled in transit is not introduced into the process.

In storing the milk in the storage tank, it should be remembered that the temperature of the milk will probably have risen above 4˚C and will need to be chilled and maintained at 4˚C while in storage. The milk must also be gently agitated to prevent cream separation and so it is important that the agitator is only operated when the milk level is higher than the agitator blades.

Instruments for monitoring flow

As mentioned previously, the largest challenge in accurately measuring received milk quantity is the presence of bubbles. While a well-designed milk receiving process should eliminate most of the bubbles, it is also advantageous to choose a measurement technology that can compensate for the remaining entrained air.

In the case of measuring delivered milk quantity, the best type of instrument is a Coriolis flow meter, because it is capable of measuring the milk as a mass quantity and also measuring its density, which is directly related to its fat content (see below). Such a meter can therefore provide qualitative as well as quantitative information. Recently, dual-frequency Coriolis meters have been developed that are capable of greater accuracy by being able to compensate for bubbles.

Instruments for monitoring level

There are two places in the milk receiving and storage process where level measurement is necessary. The first is in the air eliminator and the second is the raw milk tank itself.

The air eliminator, being essentially a smaller short-term storage vessel, is best equipped with a capacitance level probe instrument, since fast changes in temperature and pressure will not affect its accuracy and it offers a fast response time.

In the (often very large) milk storage tanks, a hydrostatic pressure instrument (Figure 3) provides best performance with high accuracy and stability. The instrument needs to be hermetically sealed and resistant to CIP washdown chemicals. An instrument available with remote electronics also helps alleviate issues with access to hard-to-reach areas.

The final — and most important — type of level measurement is point level sensing, which has a number of applications, including:

- overspill protection in air eliminators
- overspill protection and filling pump control for storage tanks
- minimum level in air eliminators
- minimum level in storage tanks for pump regulation and agitator control.

Detecting spoilage

While the conditions under which the milk is stored and processed at a dairy can be well controlled, what happens to the milk at the farm and in transport to the dairy is not within the dairy's control, and there are potential opportunities for the milk to begin to spoil before it reaches the dairy.

It is known that the spoilage of milk causes its pH to change.[1] The pH of unspoiled milk is approximately 6.7, and as the milk spoils it becomes more acidic as lactic acid is formed. In most dairies the measurement of the pH is a manual step that is labour-intensive and time-consuming, but automation of the process can be achieved with a suitable instrument.

> THE MAJORITY OF MILK LOSSES IN A DAIRY OCCUR DURING THE TRANSFER OF PRODUCT FROM ONE PRODUCTION STEP TO THE NEXT.

Instruments for monitoring pH

One of the problems with pH monitoring is the need to clean the pH electrode, so the ideal choice in this instance is an automated self-cleaning pH system utilising an ISFET glass-free pH electrode that can be installed in the receiving line to monitor and record the pH of every batch of milk.

Technologies are also readily available to allow for the automation of the cleaning of the pH electrode. In order to access the electrode, a retractable sterile assembly must be used, which seals the hygienic process from the outside world as the electrode is extracted and inserted. Such assemblies can be manually operated or pneumatically driven for full automatic control. When used in conjunction with an automatic electrode cleaning system, such an assembly reduces the time and labour needed to maintain the pH measurement system.

Minimising product loss

Due to the complexities of the dairy process, with the various processing steps (to be described below) and the many pumping and storage steps along the way, there is always the chance of product loss due to various changes and malfunctions that can occur in the system. The majority of milk losses in a dairy occur during the transfer of product from one production step to the next. For example, built-in safeguards designed to prevent pumps running dry can cause pumps to stop operating and milk to be dumped to a drain. As a result, interface measurements (milk/air or milk/water) are usually performed in the pipework between processing steps. These measurements are traditionally performed by timers that are triggered by a low limit switch — a method that is not precise and is subject to process issues.

Instruments for minimising product loss

Minimising product loss can be achieved by using instruments that incorporate a robust, hygienic and fast sensor that can quickly detect changes in the composition of the sample. For this application, the most suitable sensor is an optical sensor, since the measurement is instantaneous and therefore provides for real-time monitoring of what is flowing through the pipe. Ideally the sensor is located in the line as close as possible to the tank or process vessel that it is feeding into or before the transfer pump to protect against the pump running dry. As soon as an interface is detected, the sensor can send a signal to the control system.

Optical sensors typically suitable for this purpose utilise near-infrared or visible light to detect the product interfaces or suspended solids. A sensor with a glass-free hygienic design that can withstand high temperatures during CIP processes or in heat treatment phases is most appropriate, and needs to be coupled with a matching multiparameter process transmitter.

Milk standardisation and heat treatment

Milk is mainly a suspension of various constituents in water. The relative amount of the natural constituents is variable due to the natural origin of the raw product and its dependence on natural biological variation between animals, as well as both seasonal and locational variation. The process of milk standardisation is intended to produce whole milk for retail sale that has a standardised minimum fat content, while also producing the cream (fat) by-product that can be used for secondary products such as butter, cream, yoghurt and cheese.

In its natural form, milk can also contain a range of pathogenic organisms that are harmful to humans, as well as other micro-organisms that cause the milk to spoil and shorten its shelf life. Heat treatment is used to eliminate the harmful bacteria, and also to maximise shelf life of the final milk product.

In Part 2

The standardisation of milk and its heat treatment are the more complex areas of milk quality management and will be discussed in Part 2 of this article.

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1. Lu M et al 2013, 'Milk Spoilage: Methods and Practices of Detecting Milk Quality', *Food and Nutrition Sciences*, vol. 4, no. 7A, pp. 113-123.

Endress+Hauser Australia Pty Ltd
www.au.endress.com

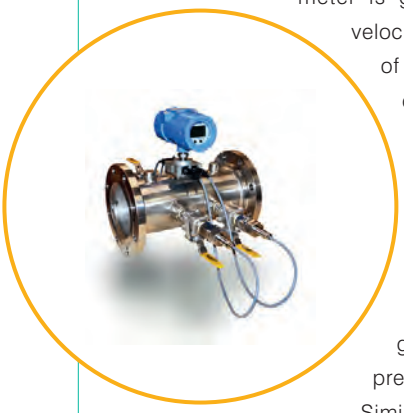
ULTRASONIC GAS FLOW METER

Lauris Technologies (LaurisTech) has announced the addition of a molecular weight and mass flow measurement capability to the FC1223 ultrasonic gas flow meter.

The meter is built on a transit-phase method which allows volume flow measurement of highly turbulent gas flows. The method is fundamentally insensitive to the speed of sound in the moving fluid. This advantage, consequently, turns into a challenge for determining the molecular weight or mass flow for this type of meter.

LaurisTech overcame this challenge by developing a molecular weight and mass flow measurement technique in which the meter uses gas velocity to provide the mass flow measurement.

The mass flow of flare gas can alternatively be measured by thermal mass flow meters. However, this type of flow measurement is not suitable for flare gas metering because the output of thermal mass meter is governed by the gas velocity and the composition of gas. The known gas composition actually removes the need for mass flow measurement, as the density can be calculated from the chemical composition of the gas at the operating pressure.



Similarly, Coriolis flow meters also provide direct measurement of mass flow independent of gas composition, but flow obstruction and limited pipe size make them impractical for flare gas measurement.

The mass flow measurement capability will be offered in LaurisTech's model FC1223-M ultrasonic gas flow meters.

AMS Instrumentation & Calibration Pty Ltd
www.ams-ic.com.au

POWER QUALITY LOGGER

The compact Fluke 1740 Series power quality loggers are used for studying and monitoring utility power quality and demand to industry standards. They offer advanced data aggregation and analysis that saves time, reduces manpower and eliminates errors associated with traditional data collection and reporting.

The 1740 series loggers are fully compliant with the international power quality standard IEC 61000-4-30 (and AS/NZ 61000-4-30.2012 standards) and meet Class A requirements. They are capable of simultaneously logging more than 500 parameters for each averaging period, allowing technicians to analyse power quality in detail and to correlate intermittent events with detailed waveform data to identify the root cause of disturbances.

The included software makes it quick and easy to set up the logger, and automates the complex task of analysing and reporting the data.

An optimised user interface, flexible current probes and an intelligent measurement verification function that lets technicians digitally verify and correct connections makes set-up easy and reduces measurement uncertainty. Connection errors are automatically indicated via an amber light on the unit's power button which turns green once corrected. Because measurement and logged data can be viewed using a wireless Wi-Fi connection, the 1740 Series minimises technicians' time in potentially hazardous environments and reduces the hassle of suiting up in personal protective equipment.

The loggers are rated AS/NZ 61010 600 V CAT IV/1000 V CAT III for use at the service entrance and downstream.

Fluke Australia Pty Ltd
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WIRELESS GAS MONITOR

The Rosemount 928 wireless gas monitor is a fully integrated WirelessHART toxic gas monitoring solution. It is designed to significantly improve safety in areas and applications that were previously considered to be too expensive and difficult to monitor due to remote or difficult-to-access locations, challenging topology and other issues.

Workers approaching sites like wellheads and remote tank batteries for maintenance are constantly in danger of exposure to unplanned releases of toxic gas such as hydrogen sulfide. Monitoring these sites with conventional wired gas detection systems is often cost-prohibitive or logistically impossible. The installation, wiring and commissioning costs for each additional wired device can add tens of thousands of dollars to the instrument's total installed cost.

The Rosemount 928 gas monitor integrates into a WirelessHART network, eliminating wiring and dramatically reducing installation, commissioning and maintenance costs. Once integrated into the wireless network, personnel simply check the status of the remote monitoring system to know if a maintenance trip is safe.

In addition, the Rosemount 928 gas monitor includes a power module and the Rosemount 628 toxic gas sensor module that are both intrinsically safe and can be replaced in the field in minutes without the need for tools. The Rosemount 628 is a 'smart' sensor module, meaning that calibration information is stored within the sensor not the transmitter. This allows users to calibrate the sensor in a non-hazardous location and carry it into the field for quick exchanges with installed sensors.

Emerson Automation Solutions
www.emersonprocess.com.au

ULTRASONIC FLOWMETERS FOR HIGH PRESSURE AND TEMPERATURES

The OPTISONIC 4400 is an inline 2-path ultrasonic flowmeter for flow measurement at elevated process temperature and pressure. It is available in two versions: high temperature (HT) and high pressure (HP).

With a full bore, unobstructed sensor tube and large dynamic range, both OPTISONIC 4400 versions feature high long-term stability and perform with minimum operational and maintenance costs. The dual parallel path design provides information about the flow profile and can also compensate for varying flow profiles. Wet calibration is standard for both versions. Options include redundant designs for safety applications with complete separation of electronics. In addition to 4–20 mA outputs, OPTISONIC 4400 flowmeters feature HART 7, Profibus PA and DP, Modbus RS485 and Foundation Fieldbus communication (NAMUR NE 107 compliant).

The OPTISONIC 4400 HT has an operating temperature range of -45 to 600°C and is aimed at flow applications such as molten salt or synthetic thermal oil/HTF in concentrated solar power plants (CSP), hot liquid hydrocarbons in oil refineries or feed water measurement in coal-fired thermal power plants. It features an accuracy of ±0.5% and ±5 mm/s in a measurement range of 0.5 to 20 m/s.

With a pressure range up to 490 bar, the OPTISONIC 4400 HP aims at high-pressure applications, such as water/chemical well injection or transportation networks in the oil and gas industry or for usage in petrochemical/refinery units or chemical plants. It features an accuracy of ±1% and ±10 mm/s.

KROHNE Australia Pty Ltd
www.krohne.com.au

HART TEMPERATURE TRANSMITTER WITH IS CONNECTIONS

Moore Industries has expanded its Associated Intrinsically Safe (AIS) range of products with the release of the THZ³ compact dual input smart HART temperature transmitter in DIN rail mount housing with AIS sensor connections. The intrinsically safe AIS option allows direct connection of sensors located in hazardous areas since it includes an internal intrinsically safe barrier in the front end of the THZ³.

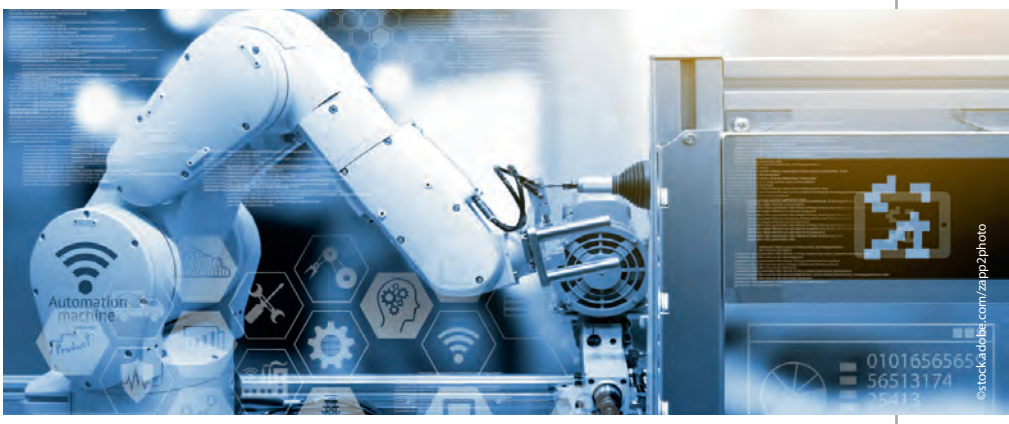
The THZ³-DIN with the -AIS option is an associated apparatus suitable for mounting in non-hazardous or Class I, Division 2/Zone 2 hazardous locations with sensor input terminals connected to equipment or sensors located in Class I, II, III, Division 1/Zone 0/1 hazardous locations. Installation costs are reduced since the intrinsically safe barrier is embedded in the receiving device. There is no need for the additional cost of the IS barrier, cabinet space, high-integrity clean ground connection, separate power supply or custom vendor backplanes. This drastically reduces the cost of purchasing, installation and maintenance versus more traditional approaches requiring a separate Zener or isolating barrier. Blue connectors on the THZ³-DIN with -AIS option provide a visual way to recognise the AIS capability.

The dual-input THZ³-DIN with the -AIS option offers HART 7 compliance, 20-bit resolution, sensor failover and backup capability, device intelligence including sensor drift and corrosion detection, and an input simulation capability. It is HART configurable via any HART handheld configurator or HART compatible host. Users can also program or monitor with any FDT compliant host or program, such as PACTware, utilising Moore's DTM.

Moore Industries Pacific Inc
www.miinet.com

OPINION

REALISING SMART INDUSTRY GOALS



The industrial world is transforming with the rise of Smart Industry. Modern production machines and handling equipment have become highly integrated mechatronic systems with a considerable portion of embedded software.

The growing abundance of data is a key driver for Smart Industry. Power plants, production machines, electric and hydraulic drives, and vision sensors all gather an increasing amount of measured data during production operation. This data can be turned into business value by developing predictive models and algorithms. For instance, machine learning can train a model to understand historical sensor data, so that the model can be used to create systems to predict future equipment failures and prevent production downtimes.

But one major design question in implementing such systems is: where should the model be deployed? Should it run on the machine itself, so that decisions can be made in real time on the attached PLC or industrial PC? Or should it be in business IT systems, possibly located on off-site servers, or in the cloud, where computational power is readily available and models can be easily updated? Each approach has its positives and negatives, and the answer depends on several elements.

Quite often, one of the first locations considered for predictive models is business IT systems. Model maintenance is straightforward and, should a better model be discovered, it is an easier task to update a model in this system than it is to update models in embedded systems. As a result, models can be continuously researched and improved as more data becomes available.

To integrate predictive models with such systems, you need tools for integrating with a range of programming languages and APIs. Programming languages such as Java, .NET, C++ and Visual Basic are often used to implement business systems. Common data transfer methods include RESTful APIs and JSON. The generated predictive models must be able to integrate into these environments to avoid the costly and inefficient process of recoding models.

Software components are also increasingly providing a significant part of the entire added value of machine or production plants. Embedded software running on PLCs, industrial PCs or field-programmable gate arrays (FPGAs) involves closed-loop control functionality, ensuring product quality and predictive maintenance algorithms for increased uptime without service intervention. In addition, supervisory logic for state machine handling and automatic generation of optimised movement trajectories are implemented in embedded software.

Response times are faster when implementing predictive models in embedded systems, as data does not have to be transmitted over a network and back, and they are deterministic, running on a real-time system. In controls applications, where the result of the predictive model is used to calculate the next actions taken by the machine, this is especially important.

Implementing predictive models on equipment is part of a bigger trend toward raising the complexity and size of the code base on production machinery. However, many machine builders are mechanically focused and must maintain experience with workflows and toolchains for mechanical construction. With regard to software design, machine builders rely on traditional methods for programming and testing on hardware. This tends to be time-consuming and error-prone with the increasing complexity of the algorithms used in machinery. Manually implemented functions that have already been verified through simulations do not always behave the way they were intended to, may contain errors and can cause missed deadlines and problems that are only noticed on-site.

The design productivity and system reliability of such an approach can be improved by using model-based design tools. Such tools facilitate modular development of automation components, hardware-independent testing and automatic code generation, which can implement algorithms for specific-hardware platforms with ease. Real-time functionality is directly generated from simulation models using automatic code generation — thus avoiding sources of errors. The tested algorithm is directly translated into real-time code, saving time. Model-based design with automatic code generation lets engineers fully leverage their expertise in construction to build a machine or plant, minus the concerns about programming language details.

In the future, engineers will need new methods and tools to overcome an ever-increasing amount of data and the growing complexity of software. In the meantime, industrial companies who can move their focus towards interdisciplinary design thinking (instead of production thinking) will rise out of the transformation with new business models for their market and as true innovative leaders.

As Industry Manager for the industrial automation and machinery field at MathWorks, Philipp Wallner is responsible for driving the business development of this industry segment that comprises energy production, automation components and production machines. Prior to joining MathWorks, Philipp worked in the machine builder industry, where he held different engineering and management positions.

PANEL PC

The PPC-3150S is a 15″ industrial-grade panel PC for compact applications for machine builders in a fanless design with a low-power Intel Celeron N2930 1.83 GHz processor. With a high-durability design, the PPC-3150S is equipped with a flat touchscreen with IP65 front panel protection and a die-cast aluminium alloy enclosure. It supports two serial ports, three USB ports and two Gb Ethernet ports to satisfy various industrial applications. It also supports the most popular operating systems, such as Microsoft Windows 7, WES7, Windows 8.1, Windows 10, Linux and Android.

The PPC-3150S's true flat display has no bezel, which makes it easier to read, and incorporates a durable industrial 5-wire resistive touch screen that works well in industrial environments and is more resistant to scratches.

The Intel Celeron Quad Core processor supports turbo boost from 1.83 to 2.16 GHz, and a low power consumption of 7.5 W. It also features up to 8 GB DDR3L SDRAM memory, dual GbE LAN for redundancy, two serial ports and three USB ports to make it easier to satisfy various simple industrial applications. With a wide range of DC power input support, the PPC-3150S will work stably between 12–24 VDC and has been FCC class B certified. It is compliant with the EMC immunity and emission standards EN55011, 61000-6-2 and 61000-6-4.

Advantech Australia Pty Ltd
www.advantech.net.au

PROCESS CALIBRATOR

The Fluke 726 is a precision multifunction process calibrator, designed specifically for the process industries with broad workload coverage and calibration power in mind. The calibrator measures and sources almost all process parameters and can calibrate almost anything. It is available to rent from TechRentals.

The product has two separate channels that enable operators to measure, source and view process signals simultaneously. It measures and sources, voltage, current, RTDs, thermocouples, frequency and resistance to test sensors and transmitters. It also has a frequency totaliser as well as a frequency pulse train source mode for enhanced flowmeter testing.

It features an accuracy of 0.01%, with a transmitter error percentage calculation, and has auto-stepping and auto-ramping functions. Up to eight calibration results can be stored for later analysis.

TechRentals
www.techrentals.com.au

NEW EVENTS TO FEATURE AT AOG 2018

The annual Australasian Oil & Gas Exhibition & Conference (AOG) will showcase the oil and gas industry over three days with an exhibition, a free conference program and industry networking opportunities.

- **What:** Australasian Oil & Gas Exhibition and Conference (AOG)
- **When:** 14–16 March 2018
- **Where:** Perth Convention and Exhibition Centre

There has been a noticeable upturn in the oil and gas sector and, as a result, a list of new and innovative activities that will be part of a very full week at the Australasian Oil & Gas Exhibition & Conference (AOG 2018) in March.

While AOG is more than three decades old, the event's organisers have continued to ensure that it remains fresh and relevant at a time when the oil and gas sector is going through a time of major change. Significantly, a number of the innovative new events to be staged at AOG 2018 are being driven by the event's sponsors and key partners such as Woodside and National Energy Resources Australia (NERA).

NERA has been instrumental in developing the NERA Technology and Skills Hub and the NERA SME ConnectER. The NERA Technology and Skills Hub will provide a dynamic, interactive forum featuring technology demonstrations, skills insights and presentations from thought leaders and practitioners, while the SME ConnectER will be a facilitated process to connect established SMEs that have innovative products or services and a genuine value proposition to champions from LNG operators and contractors.

Western Australian Premier Mark McGowan MLA will headline an impressive list of industry and government speakers when the much-anticipated AOG 2018 Collaboration Forum kicks off on 14 March. The inaugural AOG Collaboration Forum was a critical success in 2017, and this year's version is set to maintain that reputation for high-quality content with some of the biggest names in the local oil and gas industry to provide presentations. Those presenters include:

- Mary Hackett, Baker Hughes' Vice President Australia, New Zealand & Papua New Guinea
- David Bird, Shell Australia's Vice President responsible for the groundbreaking Prelude FLNG project
- Collette Cohen, CEO of the Oil & Gas Technology Centre in the UK
- Miranda Taylor, CEO of National Energy Resource Australia (NERA)
- Derrick O'Keeffe, Head of Division, Safety & Integrity with Australian oil and gas industry regulator NOPSEMA.

The Collaboration Forum will cover a range of topics that are currently at the forefront of industry discussions, including the journey to reliable and competitive operations; extending the life of brownfield operations through continuous improvement; perspectives on decommissioning; new markets and new energies; and the workforce of the future.

Another new addition for 2018 is the Asset Integrity Zone, which will be located on the exhibition floor, supported by the Australian Institute for Non-Destructive Testing (AINDT). With the Australian oil and gas industry moving into a lengthy period of large-scale project management, this is certain to be a popular addition to the AOG program.

Other new additions to AOG 2018 include the AOG Festival, a networking and entertainment event featuring pop-up food vendors, bars and entertainment that will provide the ideal place for attendees, presenters and exhibitors to wind down after a full day of activities throughout AOG 2018.

For more information on AOG 2018 or to register, please go to: *www.aogexpo.com.au.*

CALIBRATOR AND COMMUNICATOR FOR HAZARDOUS AREAS

If users want to take a normal, non-Ex calibrator into a hazardous area, they will need a hot-work permit — this takes time, effort and bureaucracy. A risk analysis will also be needed, as well as additional safety equipment such as gas analysers. Using an Ex certified intrinsically safe calibrator in an Ex area is a safer and easier choice.

The Beamex MC6-Ex is a hazardous area approved high-accuracy documenting calibrator and communicator that offers calibration capabilities for pressure, temperature and various electrical signals. It also contains a field communicator for HART, FOUNDATION Fieldbus and Profibus PA instruments.

The Beamex MC6-Ex is an IEC and ATEX certified calibrator and can be used in any Ex Zone/Division, including Zone 0/Division 1. The certification classification is Ex II 1 G and Ex ia IIC T4 Ga.

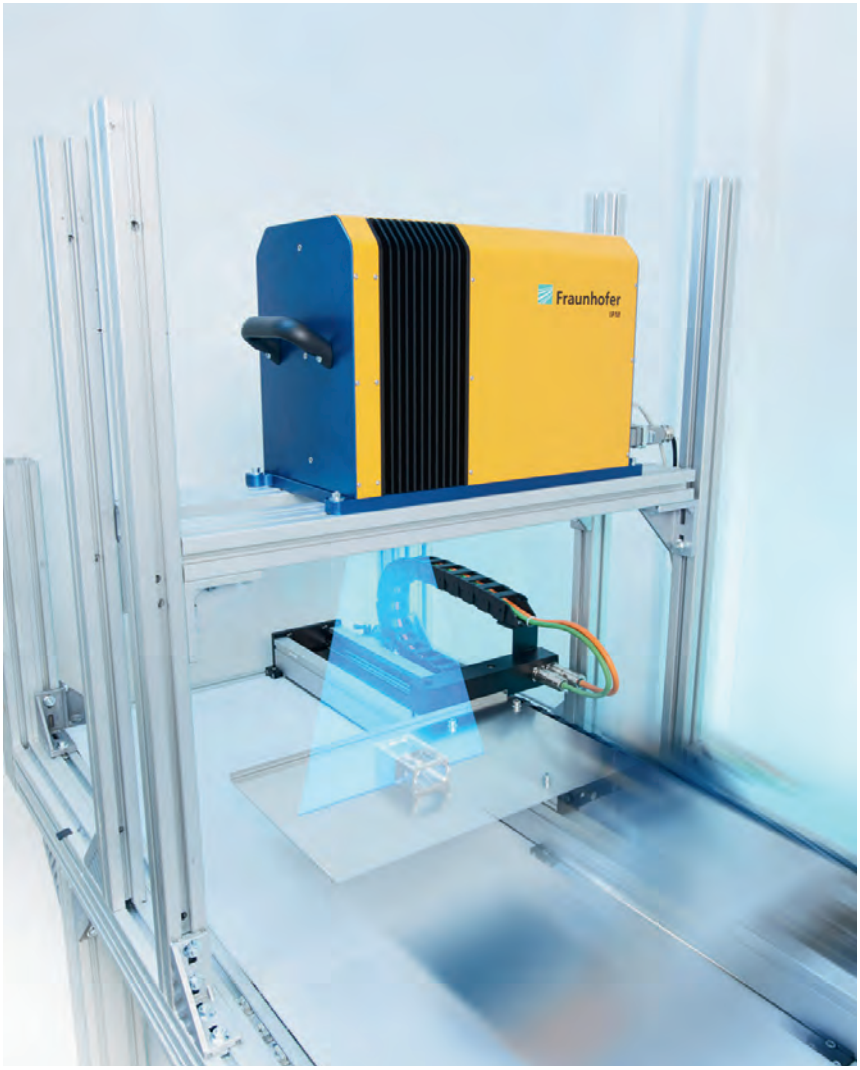
The robust, IP65-rated dust and waterproof casing, ergonomic design and ease of use make the MC6-Ex a suitable device for all types of field use. It communicates with Beamex calibration management software, enabling fully automated and paperless calibration and documentation. The MC6-Ex can also be part of the paperless integration to the customer's own ERP system.

Other features include internal loop supply, up to three internal pressure measurement modules and external modules, large 5.7″ backlit colour display with touchscreen and multilingual user interface, smart field-replaceable battery pack, built-in field communicator, documenting capability and a data logger functionality. Also, communication with pressure and temperature controllers is possible in a safe area.

AMS Instrumentation & Calibration Pty Ltd

www.ams-ic.com.au

Detecting impurities on 3D components



Impurities adhering to the surface of components can cause problems in later stages of the production process — or even make the entire component useless. A new fluorescence scanner developed by the Fraunhofer Institute for Physical Measurement Techniques IPM allows specialists to inspect metallic parts for residues of grease, machining chips and cleaning agents — for every single item in production cycle.

The smallest of details can have huge consequences — for instance, tiny particles of dirt clinging to the surface of components during the production process. The oil pan in vehicle engines is a typical example: if the process lubricant contains impurities that stick to the areas where the sealant will be applied, the seal will not be tight and the oil pan is likely to leak at this vulnerable point. Until now, it has not been technically possible to examine every single component for residual contaminants. The only solution was to test random samples, which is not only time-intensive but also fails to identify the exact spot on the component contaminated by foreign substances.

In future, manufacturers won't need to worry about such questions of contamination. The answer lies in the inline fluorescence scanner developed by researchers at the Fraunhofer Institute in Freiburg.

"This scanner not only enables us to perform inline measurements on every single metallic component — during the production process and without requiring additional time — but also enables us to pinpoint the exact location of the dirt particles," explained Andreas Hofmann, business development manager at Fraunhofer IPM. "The outstanding spatial resolution of this system enables us to identify even the slightest deposits or films of less than 10 mg/m^2."

The system works as follows: while the oil pan travels from point A to B on the conveyor belt, a point-source UV laser scans a specific area of the component. If traces of grease, remains of organic cleaning fluids or fibres are detected on the surface, they reflect light in the visible fluorescence spectrum as a response to the laser's UV light. The sensitive detector that captures these light frequencies ignores all other wavelengths, and is thus able to interpret the fluorescence signals as signs of contamination.

The metallic component itself does not reflect fluorescent light. A scanner ensures that the laser focus passes over the surface at high speed, creating a point-by-point grid. The laser beam scans the object at a rate of approximately 200 times per second. As a result, the quality controller receives an image showing precisely where any dirt particles or oil films have been detected. The fluorescence scanner is even capable of detecting metallic chips that adhered to the test object in previous machining steps, even though they are not fluorescent.

"The preprocessed components are cleaned using water or compressed air. Any remaining chips are contaminated with oil or other fluorescent substances," said Hofmann.

The researchers can adapt the system's spatial resolution and processing speed to the needs of the production process. The fluorescence scanner is also not restricted to applications involving metallic components, although further studies will be needed to adapt it to other materials.

Fraunhofer Institute for Physical Measurement Techniques IPM
www.ipm.fraunhofer.de/en.html

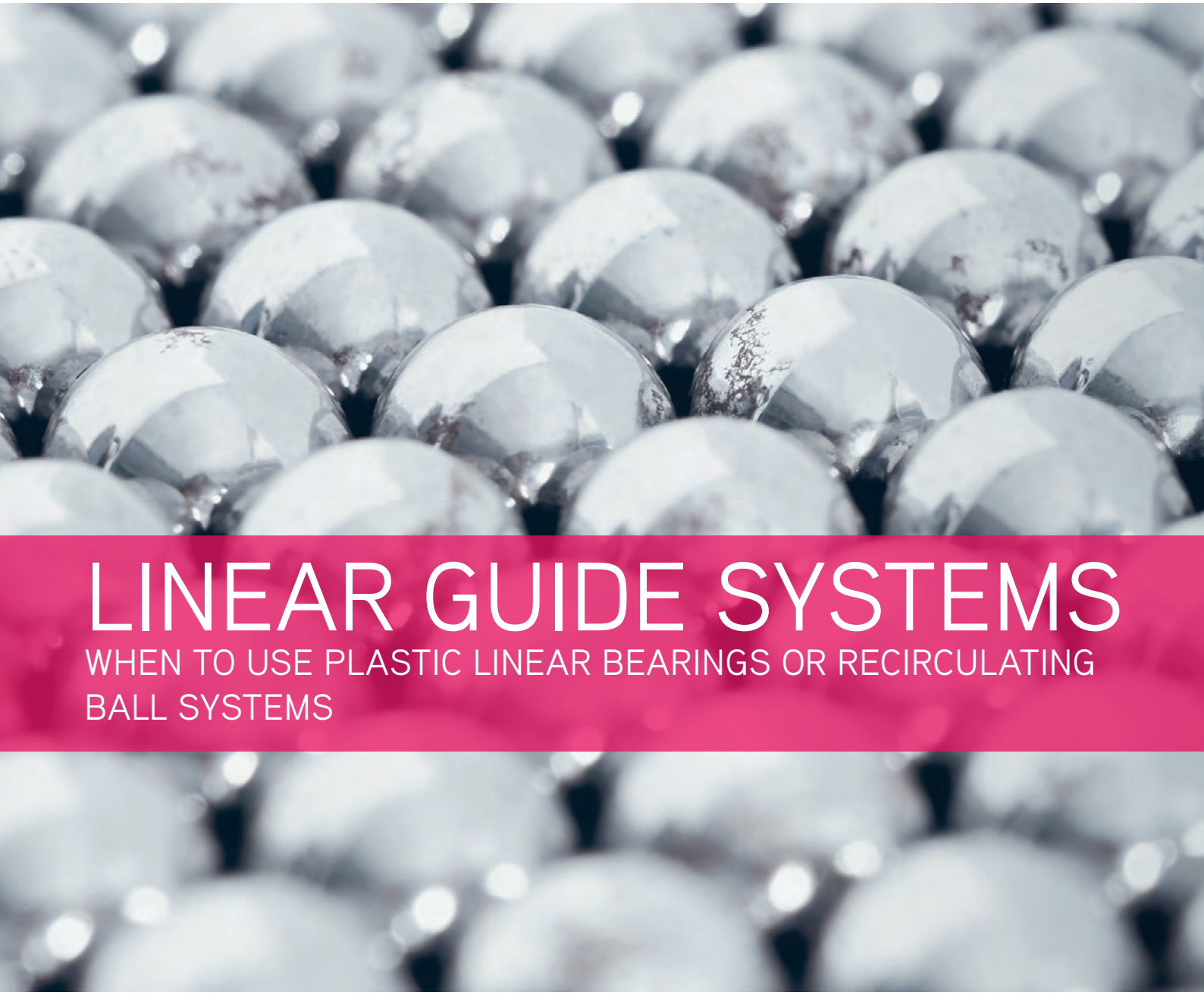
HIGH-SPEED PROFINET CABLES

The Lapp ETHERLINE PN Cat.7 Profinet cables are primarily intended for use in machines, systems and network infrastructure, especially in cases where large amounts of data are transferred at high speed, such as in systems with a large number of sensors or with high-resolution cameras.

The ETHERLINE cables are capable of delivering 10 GBps according to the Cat.7 standard. Although Cat.6A cables achieve comparable speeds, Cat.7 cables feature larger reserves in terms of performance and transmission security as they can be used at a higher transmission frequency of 600 MHz. As a result, the cables still achieve maximum performance even if they age or are damaged over the course of time. The cables are thin, with outer diameters ranging from 8.1 mm for fixed cables to 8.7 mm for flexible cables.

There are five variants of the ETHERLINE PN Cat.7 cables. For fixed installation there is a flame-retardant version with a PVC sheath, a halogen-free and flame-retardant version with an FRNC sheath, and a version with a PUR sheath meaning it is halogen-free, flame-retardant and more mechanically robust. There are also two variants for flexible installation — with a flame-retardant PVC sheath or with a halogen-free and flame-retardant FRNC sheath.

Treotham Automation Pty Ltd
www.treotham.com.au



LINEAR GUIDE SYSTEMS

WHEN TO USE PLASTIC LINEAR BEARINGS OR RECIRCULATING BALL SYSTEMS

Linear guide systems can be divided into open and closed guides (according to the shape of the guide and the direction of the transferable forces) and into plain bearing or rolling bearing (according to the type of friction). In principle, a linear guide consists of two components: a leading and a guided part. The leading element is a profile rail or a round shaft. Guide carriages and round bushings are guided. The difference is in the type of bearing, rolling or sliding translation. Both linear guide types are available individually, as a unit as well as in combination with linear drives as a complete assembly.

Rolling bearing guides

Most rolling bearings operate according to the principle of a recirculating ball bearing system and are therefore also called recirculating ball bearing guides or recirculating ball bearings. Small steel balls are used as rolling elements, which move axially in a ball channel. There are two types: circular guides with ball bushings and rail-rail units with intermediate flat ball cages.

In the case of the profile rail guide, the rolling movement takes place by means of a rail and a ball guide carriage running on it. The carriage guides the recirculating steel balls, which are stressed in the direction of movement via the inner ball guide row, deflected and guided back within the carriage into the raceway in a load-free manner against the axial movement. This recirculation principle ensures that all balls are evenly loaded. The small contact surface of the rolling elements with the elements of the guidance leads to very low friction. Due to the point of contact and the associated high pressures on bearings and shafts, only hardened rails and shafts made of steel or stainless steel can be used. The ball rail guides can be provided with two-, four- or six-row orbits (for very high loads). The balls usually consist of steel, or ceramics when high speeds are also required. The runner blocks can be made of steel or aluminium.

In the case of round ball bearing guides, the rolling movement takes place by means of recirculating rows of balls in a bushing on a round shaft. This form is the most widely used linear guide.

Plain bearing guides

The concept of linear plain bearings differs from that of recirculating ball bearing systems in the nature of movement: plain bearings do not roll, they slide. This gives a larger contact surface resulting in lower surface pressure. Due to the large surface load distribution in comparison with ball bearing systems, low-cost, soft shaft materials

such as aluminium and non-metallic components can also be used as a running partner (shaft) in addition to hardened stainless steel or hard-chromium-plated steel. In order to reduce friction, plastics optimised for friction and wear are applied on the sliding surfaces. These high-performance plastics consist of a thermoplastic base material which ensures good wear resistance. In order to increase the mechanical load-bearing capacity, fibres and fillers are added to the matrix.

By selecting the suitable material pairing of sliding surface and shaft or rail, the coefficients of friction of the plain bearings can be controlled and their service life extended. The polymer component can be fitted to the guide, the guide carriage or as a liner between the components. There are also sliding bushes made of solid material, and the entire bearing wall thickness acts as a wear zone.

Comparing linear guides

As a result of the different technical principles and materials, both rolling guides and linear plain bearings have their strengths and weaknesses.

Lubrication versus dry operation

A significant difference between linear plain bearings and rolling guides is the use of lubricants. In order to reduce friction as well as corrosion, the contact of the steel rolling elements in rolling bearings requires a permanent lubrication with grease or oil. The recirculating ball bearing system ensures that the amount of lubricant is evenly distributed; however, a linear bearing that has to be lubricated requires maintenance: approximately every three to six months the guide carriage must be relubricated via an adapter or a grease nipple. 38.5% of all rolling bearing damage is caused by a lack of, or incorrect, lubrication.

Lubricated rolling bearings are also sensitive to dust and dirt. Higher quality rolling bearings are therefore equipped with scrapers or guards for environments with gross dirt and chips. Longitudinal or end seals as well as cover strips can also prevent the penetration of contaminants into the interior of the ball carriage; however, the sealing elements increase friction and are very sensitive. If the lubrication is not sufficient, the sealing elements become brittle and crack, allowing dust to penetrate the housing.

The self-lubrication effect

Linear plain bearings made of plastic operate dry because micro-fine solid lubricants are embedded in minute chambers in the matrix of the polymer. As soon as the linear guide moves, homogeneously distributed solid lubricant particles are released by micro-abrasion, which settle in the microscopic troughs of the shaft surface and lubricate the guidance itself. Due to the self-lubrication effect, plastic plain bearings do not have to be serviced, and linear plain bearings can also be used openly in adverse environmental conditions. Dirt or dust particles cannot stick to lubricants or are pushed forward from the bearing during the next movement. Furthermore, liners with specific geometries act as dirt channels which push any foreign bodies from the guide track without hindering the operation of the bearing.

Dry operating linear bearing systems are extremely clean and hygienic, so that numerous polymer plain bearings are certified for cleanroom compatibility. Lubrication-free linear plain bearings are also suitable for use in the food industry, since they cannot lead to contamination of foodstuffs and the plastics are resistant to harsh disinfectants.

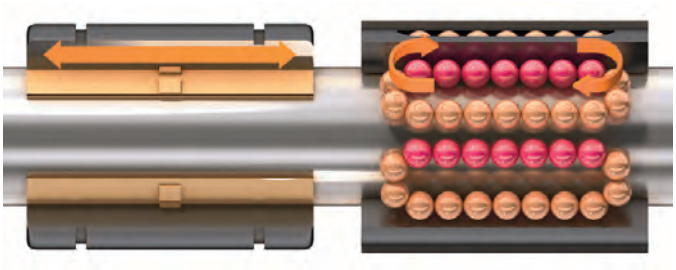


Figure 1: Plain linear polymer bearing compared with a recirculating ball bearing system (round shaft).

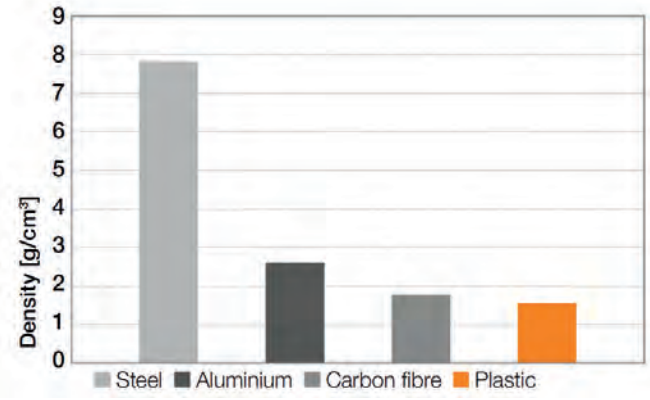


Figure 2: Relative densities for different bearing guide materials.

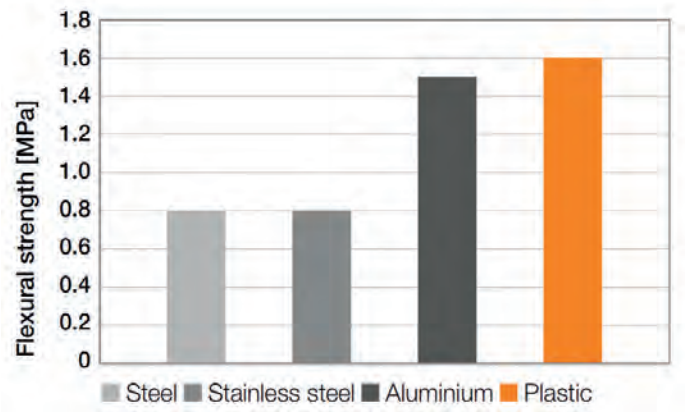


Figure 3: Flexural strength of bearings constructed from materials.

Precision

The special strength of the rolling guide is its high precision. The bearing clearance, which is achieved by precise manufacture and the applied pre-load, is about 0.001 mm to 0.01 mm for linear rolling guides.

Since linear plain bearings must always have a minimum clearance in order to counteract a braking effect, polymer plain bearings achieve a maximum bearing clearance of 0.02 to 0.15 mm. For this reason, their use in machine tool manufacturing, CNC machining or electronics production is not recommended.

Weight

Low weight is beneficial in designs where every gram counts. It is also useful when it comes to dynamic applications and the increase in the number of cycles, as in handling or automation tasks, since it increases acceleration. Heavy metals such as non-alloyed steel also have a very high weight due to their high density. In this regard, linear guide systems made of plastic perform better, since they are roughly five times lighter than steel and still display good toughness. The less mass you have to accelerate, the less energy you use.

Plain bearing guide systems are more flexible when compared with rolling bearings in the choice of materials for their guide partners. They can run on soft and non-metallic shaft or axis materials. Aluminium is lighter than steel, and a linear guide that slides on non-metallic shafts — for example, on carbon fibre-reinforced or glass fibre-reinforced plastic — is 40% lighter again than aluminium guides and 60% lighter than a steel rail. The flexible use of plastic solutions is also useful wherever physical loads are reduced or transport costs have to be reduced.

Corrosion protection

The corrosive process in steels can seriously affect the operation of a component. For this reason, many rolling guides use stainless steels, which have significantly better corrosion resistance than low-alloy and unalloyed steels. To some extent they also withstand aggressive media and do not require additional surface protection.

Polymer plain bearings, on the other hand, are corrosion-free. Due to their organic nature, they are resistant to inorganic media as well as mineral acids, alkalis and salt solutions. A guide with a shaft made of high-alloyed steel in combination with a plain bearing made of high-performance polymer is suitable for cleaning-intensive industries such as filling technology, chemical and electroplating industry or in situations involving seawater.

Speed

Linear bearings must be able to withstand high speeds and accelerations. Due to the inertia of the rolling elements the maximum speed of rolling bearings is 5–10 m/s. Plain bearings, on the other hand, reach up to 30 m/s and also perform better in terms of acceleration provided only small masses up to a maximum of 10 kg have to be moved, otherwise the friction heat caused by the higher contact pressure during the sliding movement will interfere. When using hard-coated aluminium as a guide, the operating temperature in the bearing point can be reduced by the high thermal conductivity of aluminium, allowing significantly higher loads and speeds.

Loads and impacts

Plain bearings made of thermoplastic polymers can handle loads with surface pressures of up to 150 N/mm². The fibre matrix of thermoplastic compounds does not yield even with radial pressures, and the dampening properties of the plastic also make them relatively insensitive to impacts, vibrations and shocks. In comparison, the soft and thin gliding layer of the metal bearings can be easily pushed away under high loads, edge pressures or vibrations.

Stroke lengths

In order to achieve greater stroke lengths, guide rails are lined up in a row. In the case of linear plain bearings, the rails are slightly chamfered at their ends and placed one behind the other. The grooves

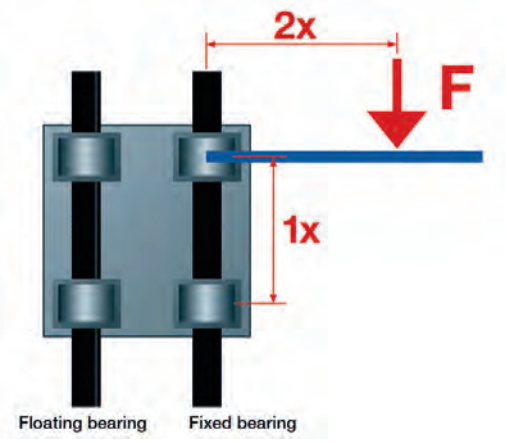


Figure 4: The 2:1 design rule for the distance of the driving force for linear plain bearings.

produced by the joints can be easily passed over by the sliding elements. Rolling guides, on the other hand, are mortised, measured and aligned in order to make the crossovers precise and to avoid damage to the shield and the balls.

Ball guides require a minimum stroke length so that all balls can be inserted and the lubricant can be recirculated. For very small strokes, the same balls are always in contact with the shaft in rolling bearings. As a result, they are stressed on one side, which impairs service life. Over short distances linear plain bearings are therefore more suitable because they operate independently of the stroke length, even as short as 2 mm.

Coefficient of friction

Rolling friction is 10 times lower than sliding friction. Since the coefficient of friction of the linear plain bearings is higher than that of the rolling guides, the required drive force is consequently also higher. This fact must be taken into account, especially in manually operated applications.

In order to avoid the possibility of an uneven movement sequence or blockage of the system, the position of the drive must be precisely planned for linear plain bearings. The greater the distance between the drive and fixed bearing, the higher the degree of wear and required drive force. Therefore, the 2:1 design rule should be applied: if the distance of the driving force to the fixed bearing is more than twice the bearing spacing (2:1 rule), the guidance will theoretically get stuck at an adhesion friction coefficient of 0.25. Thereby this principle applies regardless of the value of the load or drive force. On the other hand, rolling bearing guides are more flexible in application because of their lower coefficient of friction.

Costs

The production of polymer sliding elements using an injection moulding process as well as completely injection-moulded plastic bearings is economical, since plastic production is more energy efficient than metal production. In addition, there are restrictions with regard to the casting moulds, whereas more complicated mouldings can also be produced from thermoplastics with relatively little effort. Even extruded, coated aluminium rails are more cost effective to manufacture than the multipressed, ground and finally hardened profile rails made of steel or stainless steel used in rolling bearings.

By dispensing with external lubrication in plain bearings, the costs for lubricants can be saved. Production costs can also be reduced, since the maintenance-free, dry-operating linear plain bearings significantly reduce machine downtime. Overall, plastic plain bearings can reduce the costs of metal solutions by up to 40%.

Conclusion

Certain industrial requirements need different linear guides. If machine elements have to work with millimetre accuracy, or high precision and low friction are indispensable, then rolling bearings should be used. In the interior of machine tools, machining centres or even in the assembly of printed circuit boards in electronics manufacturing, rolling guides cannot be replaced because of their very high precision and stiffness. However, if accuracy plays a minor role and factors such as dirt resistance, corrosion resistance or jerk-free movements are required, a linear plain bearing made of high-performance plastic is the first choice.

Treotham Automation Pty Ltd
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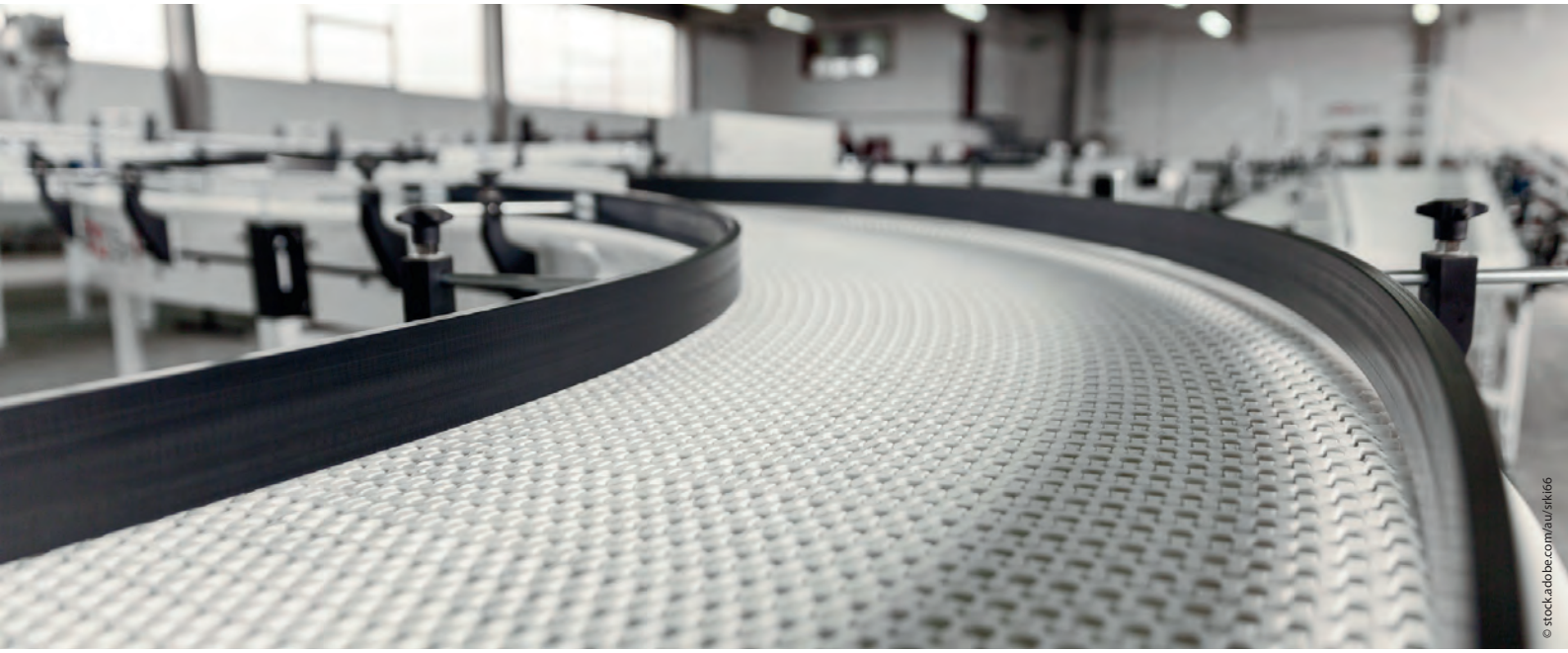
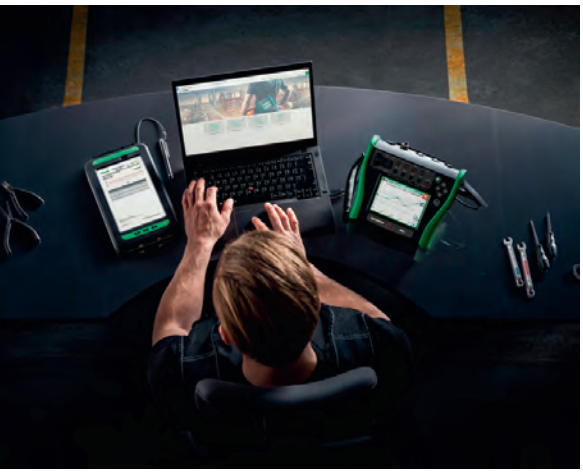


CLOUD-BASED CALIBRATION CERTIFICATE GENERATION

Beamex has introduced a free, cloud-based calibration certificate generation software called LOGiCAL. It was developed to offer an easy-to-use, modern system for documenting calibration results.

In the process industry, most calibrations need to be documented in a calibration certificate. Many sites manually document calibrations using paper and pen, making it an inefficient process that is prone to error.



LOGiCAL reads the calibration results from Beamex documenting calibrators, such as the Beamex MC6 or Beamex MC4, and hence does not store any critical data in the cloud. When the user performs calibrations using these calibrators, they automatically store the calibration results in their memory. LOGiCAL software can read these results and convert them into a PDF calibration certificate that users can either store or print.

The LOGiCAL cloud communicates with the calibrators using a web service, meaning that the calibration certificate can be generated using any device connected to the internet and a web browser, given that the calibrator is connected to the computer and running LOGiCAL. It is compatible with most browsers, such as Chrome, Internet Explorer or Safari.

Users will need to have a Beamex MC6 or Beamex MC4 calibrator with the Documenting Calibrator option to utilise LOGiCAL.

The initial use of LOGiCAL will be available at no cost while further capabilities will become available as chargeable options. Beamex is committed to developing additional functionality in LOGiCAL based on user feedback and market requirements.

AMS Instrumentation & Calibration Pty Ltd
www.ams-ic.com.au

ROUTER WITH UPDATED SECURITY FUNCTIONALITY

The FL Mguard RS4000 TX/TX-P security router from Phoenix Contact offers an extended temperature range as well as ATEX and IECEx approval.

As of firmware 8.5, several security functions are activated by default, and custom firewall rules can now also be stored inside and outside of the VPN tunnel. These include deep package inspection modules for OPC Classic and Modbus/TCP, enabling the relevant communication to be protected with fine granularity, and the firewall redundancy functions with and without VPN. In addition, the 250 VPN licence is activated, making it possible to communicate with up to 250 peers simultaneously, and CIFS Integrity Monitoring is available to protect systems that cannot be patched.

It is no longer necessary to order individual mGuard licence certificates. The security router can be incorporated into a defence-in-depth architecture according to ISA-99 and IEC 62443 and protects small and large production networks.

Phoenix Contact Pty Ltd
www.phoenixcontact.com.au

AI CONTROLLER MODULE

Creating diagnostic analytics solutions in industrial operations has long required expert data scientists with a deep understanding of the specific application to be analysed. Those experts then require weeks, months or even years to understand and model the system.

Rockwell Automation has announced its Project Sherlock artificial intelligence (AI) module, in which a data-driven analytics algorithm is provided that fits directly into a controller chassis. Once installed, Project Sherlock AI leverages physics-based modelling to 'learn' the application that the controller manages. The solution scours controller tags to identify the application or allows users to choose what they would like modelled by selecting inputs and outputs via an add-on-instruction (AOI). Project Sherlock AI will then quickly learn from the stream of data passing through the controller to build a model.

Once the model is built, the Project Sherlock solution continuously watches the operation looking for anomalies against its derived, principled understanding. If it spots a problem, it can trigger an alarm on a HMI screen or dashboard. Future iterations will go beyond diagnostics to direct users on how to remedy the issue or to automatically adjust system parameters to fix the problem without human intervention.

Project Sherlock diagnostics are expected to offer reduced false-positive alarms due to the physics-based modelling and a foundation in industrial applications. For example, Project Sherlock AI can tell if a boiler temperature shift is related to a benign change in upstream operations or an abnormality that requires correction.

Rockwell Automation Australia
www.rockwellautomation.com.au

REMOTE ACCESS APP

eWON eCatcher is the software that eWON users utilise to establish a remote connection via an eWON router to their machine. HMS Industrial Networks has now launched a mobile version called eWON eCatcher Mobile, available for both iOS and Android.

By connecting an eWON Cosy or Flexy router to a machine, it is possible to access and control the machine via the cloud service eWON Talk2M. eWON users can then access Talk2M in an easy and secure way from a computer using the eCatcher software.

Today, many HMI and PLC manufacturers offer apps to connect to their devices. eCatcher Mobile is designed to complement these apps. It opens a secure tunnel to the remote machinery through the Talk2M cloud, enabling users to run any device manufacturers' app and connect, just as if they were on-site.

After logging in to their eCatcher account, users validate themselves using Touch ID (or a PIN code), similar to most mobile banking applications. Just as in the desktop version, users will see all eWON routers connected to their Talk2M account. After clicking on the eWON they want to access, they are securely connected. When the eCatcher Mobile app is connected, it is possible to start native HMI apps from automation vendors. Examples include Sm@rtClient Lite from Siemens, Vijeo Design'Air from Schneider Electric and Remote HMI from Pro-face. eCatcher Mobile can also be used with VNC client apps.

Global Automation Asia-Pacific
www.globalautomation.com.au

PoE INJECTORS

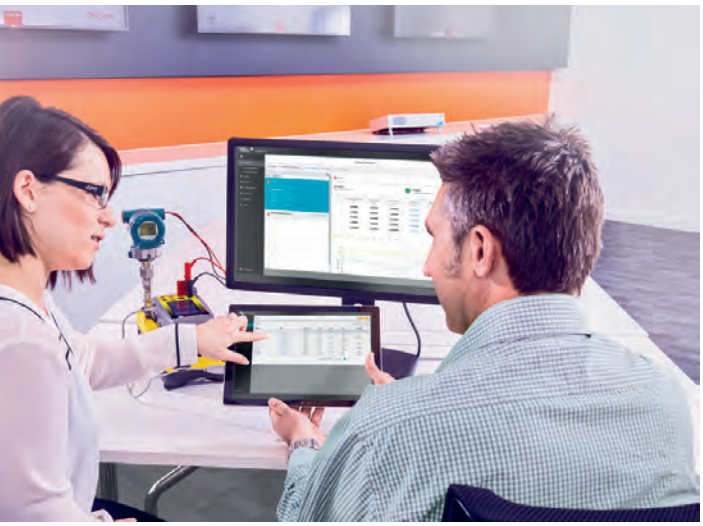
Hirschmann's PoE/PoE+ injectors are designed to support the growing demand for high-voltage Power over Ethernet.

Suitable for industrial operations such as transportation and physical security, as well as process production and automation, the injectors provide increased port density and maximum power without load sharing. Each provides a stable, ruggedised housing specially designed for use in industrial environments and is easy to use, with plug-and-play capability, automatic device detection and standard DIN rail mounting.

All variants support up to 240 W across up to eight ports without load sharing, with each port able to provide the maximum per-port output power of 30 W. The built-in power supply version provides an all-in-one-solution, offering an efficiency of >95% to ensure minimal energy waste.

Depending on an application's needs, two different injectors are available — active (with an integrated power supply) or passive (using an existing external power source). Both are designed with ease of installation and space saving in mind. These midspan devices can be used to connect non-PoE switches with PoE devices, providing systems with the additional power their devices need without affecting data.

Belden Australia Pty Ltd
www.belden.com



CALIBRATION AND ASSET MANAGEMENT SOFTWARE

4Sight2 calibration and asset management software from Baker Hughes, a GE company, is designed to make calibration management easy to use, cost effective and scalable. Equally effective for single-site use or global multi-site operations, this software is designed to empower organisations to operate simply and securely, connecting people to instruments, data and enhanced analytics.

Purpose-built with custom installation support available, 4Sight2 is designed to deliver actionable intelligence and transformative insights. Developed in-house, the software package enhances the visibility of assets and data, helping organisations to plan resource allocation in such a way as to positively impact effective maintenance, process efficiency and regulatory compliance. 4Sight2 allows significantly lower investment costs and minimal IT requirement costs in terms of server support, upgrade management and data backup. Users can log in to the application software from a browser, with location and PC compatibility. Alternatively, 4Sight2 may be installed directly on a company server. 4Sight2 gives simple control over calibration and maintenance workflow and data, along with automated worksheets and insights into performance management, ensuring compliant, audit-ready data.

Thermo Fisher Scientific
www.thermofisher.com.au

VIBRATION TESTER

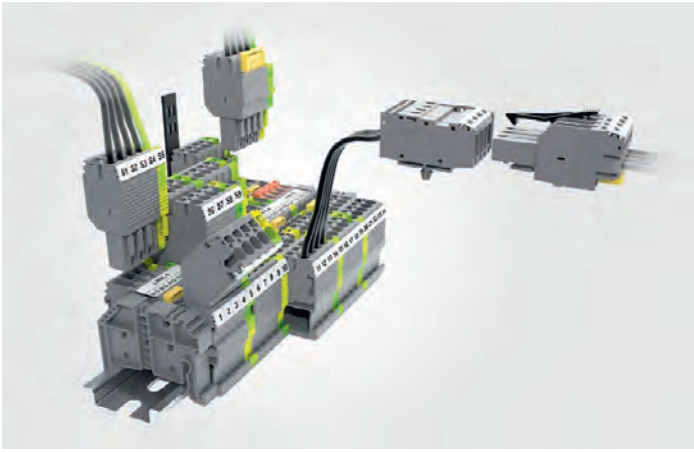
The Fluke 810 vibration tester offers diagnostic technology to assist technicians in quickly identifying and locating mechanical problems. It uses a simple step-by-step process to report on machine faults the first time measurements are taken, without prior measurement history. It is available to rent from TechRentals.

The product identifies and locates common mechanical faults, including bearing faults, misalignment, unbalance and looseness. A fault severity scale enables technicians to prioritise maintenance work into four severity levels, which helps to address critical problems first. Detailed diagnostic reports and spectral diagrams help confirm data quality and narrow down the root cause of failures. In addition to its diagnostic capabilities, the vibration tester also recommends corrective action to resolve identified faults.

The device can be used to test rotating machinery to determine the status of gearing wear, troubleshoot equipment to understand the cause of failure or commission new equipment. The overall vibration level allows technicians to quickly assess overall machine heath directly from the diagnosis screen. The product enables technicians to better control unplanned downtime, prevent recurring problems and improve repair management.

TechRentals

www.techrentals.com.au



TERMINAL BLOCKS

The StoP (Spring-to-Pin) plug-in terminal blocks by Klemsan are designed to make it easier to build signal or power circuits with plugs and sockets. The StoP series can couple terminals without any DIN rail fixing to intervene in energy breakdowns quickly, making tests faster and safer.

Airborne connection terminals can be used on DIN rails as well as other rail terminals with different sized structures as well as for making quick and safe connections inside the panels or installation ducts. Dual cross-connections and same cross-connectors can be utilised for terminals and sockets respectively and can be optionally locked to prevent excessive circuit vibration. Removing sockets from terminals is achieved by pushing the clip upwards, with easy access to wires using a screwdriver to open the spring cage. Its pin lock mechanism prevents misconnection through matching the right plugs and sockets that can be used to make customised sets. Proper marking of the terminal block set is done utilising strip labels or marking tags.

Control Logic Pty Ltd

www.control-logic.com.au

LAPP LAUNCHES IN AUSTRALIA
TO BOOST FUTURE-FOCUSSED INDUSTRIES

One of the world's leading providers of branded cable and connector systems and integrated electrical and automation engineering solutions, Lapp, is establishing a fully-fledged subsidiary in Australia.

Lapp Australia — headquartered in new 3100 m^2 premises at Eastern Creek, Sydney — will meet demand nationally for technologies used in future-focussed areas of industry, such as automation, robotics, energy management, data distribution and intelligent manufacturing, buildings, infrastructure and process engineering.

Lapp Australia General Manager Simon Pullinger says the new facility — to open on 1 February — will bring new levels of service and choice to the Australian market, offering a strong inventory of over 1,000 product lines onshore as well as direct access to more than 40,000 standard items from Lapp's global ranges.

"We are offering a one-stop shop for highly integrated, efficient and reliable systems which comply with the leading Australian, European and American compliance and quality standards, which are among the most demanding in the world. In addition to major Lapp brands of product — such as ÖLFLEX, UNITRONIC, HITRONIC, SKINTOP, SILVYN, EPIC, FLEXIMARK, and ETHERLINE — Lapp Australia will focus strongly on world-class total solutions incorporating highly compatible components from the one source. This integrated approach will save customers time and money when assembling optimum solutions to their particular needs, while ensuring proven reliability in service," said Pullinger.

"With Lapp's 18 manufacturing locations on four continents and our industry partnerships, Lapp Australia will deliver outstanding access to internationally respected technology and innovation," continued Pullinger. "The family-owned Lapp organisation is renowned globally for its levels of quality, innovation and for its commitment to ethical values and service, qualities which it will bring to key Australian markets, including:

- Manufacturing and plant engineering, including automation and robotics and process engineering systems
- Electrical engineering systems and energy systems, including wind and solar green energy
- Machine building and machine tools
- Food and beverage
- Automotive, rail and mobility systems
- Intelligent buildings and infrastructure
- The resources industry, including mining and oil and gas process engineering

Lapp Australia will work in close co-operation with its established key local Lapp distribution partner in Australia, Treotham Automation, which brings market-leading local expertise to its specialised markets. Lapp Australia will also extend its strong association with ECS New Zealand, a family-owned business, like Lapp, which has been a Lapp distributor for more than 30 years.

ECS Investments is a 50% shareholder in the new Lapp Australia business, with the other 50% owned by Lapp Holding Asia. The existing online Lapp Express website, meanwhile, will continue to expand in both countries, complementing the new strengths delivered by Lapp Australia.

Pullinger says Lapp's investment in a new full subsidiary in Australia is a strong vote of confidence in local industry as it increasingly moves into the global industrial automation market, which is forecast to grow to an annual worth of US$350 billion (A$460 billion) by 2024.[1]

"Lapp has delivered its resources, expertise and German top-quality standards to Australia at a time in the country's industrial development when such support is most needed to prepare diverse industries for a future in which they will use technology to compete cost-efficiently.

"Lapp's integrated approach to high technology solutions is also highly appropriate to Australian customers seeking the assurance of top quality products and systems that meet global compliance standards and are fully traceable back to the point of manufacture.

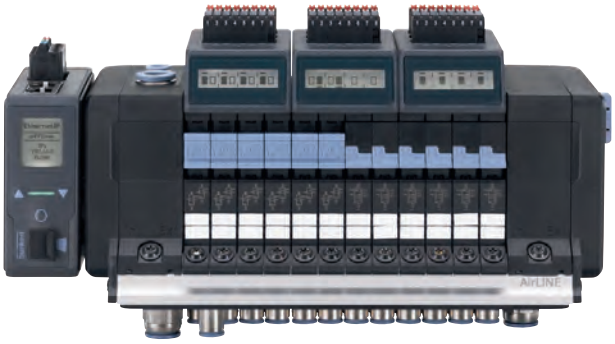
"Lapp's commitments to the markets it enters are always in-depth, long-term and backed by an uncompromising customer focus and dedication to client service. These values of Lapp globally have remained constant since its establishment by Oskar Lapp in 1959 and through its evolution into a global family of companies bound together with the same strong principles."

Pullinger says the new Eastern Creek facility provides a strong base for engineering, technical and product support staff, operating in a technology and distribution environment modelled on Lapp's global facilities supplying more than 100 countries worldwide. These facilities provide fully tailored solutions, service and product backup that are easily accessible to engineers, designers and specifiers. Lapp Australia's locally available stock, compatible products and systems and quick order turnaround times are designed to streamline the specifier's job and to deliver optimum on-time results with outstanding ongoing reliability.

1. Transparency Market Research, September 2017

LAPP Australia

www.lappaustralia.com.au



VALVE ISLAND

The Bürkert AirLINE Type 8652 valve island has been designed for applications in the pharmaceutical, cosmetics, food and beverage industries as well as for water treatment applications. It offers users adjustable monitoring and diagnostic functions that improve system availability while at the same time enabling preventive maintenance, according to the company. An integrated display shows detailed on-site information such as the current switching status of the pilot and process valves, issues a message if preset pressure limit values are exceeded and displays errors such as cable breaks in plain text.

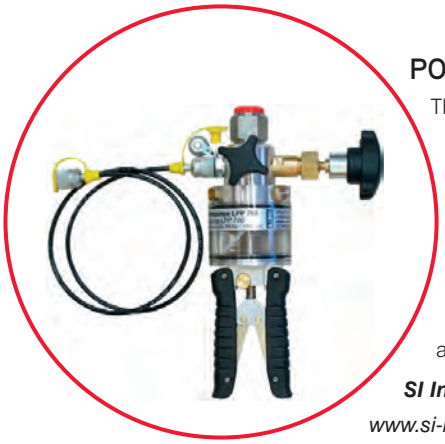
The 8652 valve island is significantly smaller than its predecessor and therefore fits more easily into compact control cabinets that can be placed close to the process valves.

The valve island communicates via common industrial Ethernet protocols or Profibus DP. In sealed ring topologies and Profinet I/O communication, the Media Redundancy Protocol (MRP) for highly available networks ensures that even switch or cable break can be compensated for.

Every single valve is hot-swap capable, which means it can be replaced during live operation without shutting down the system. As an additional safety function, check valves are used in the exhaust channel. These prevent the unwanted activation of valves by pressure peaks and the resulting mixing of media.

With the valve island, Bürkert is systematically expanding its Efficient Device Integration Platform (EDIP), which the company is using to equip its products for Industry 4.0. The EDIP device platform includes numerous functions and adapted HMI devices that facilitate the integration of new devices.

Burkert Fluid Control Systems
www.burkert.com.au



PORTABLE CALIBRATION TEST PUMP

The LR Cal LPP-700 portable calibration test pump has been designed to be easy to use with calibration equipment in the field for testing pressure gauges, pressure switches and pressure transmitters. 700 bar or 10,000 psi can be reached in a simple way using the prime-high pressure selector. Reference instruments such as electronic pressure calibrators as well as precision reference pressure gauges can be mounted directly on top of the LPP-700.

Due to its high-quality construction there is no leakage expected. It is supplied with a 1 m test hose with ¼″ BSP connection.

SI Instruments
www.si-instruments.com

CURRENT INDICATOR TERMINAL BLOCK

Phoenix Contact has released a current indicator terminal block with Push-in connection technology. The PTTB 2,5-ILA 100 current indicator terminal block simplifies the connection process, with its Push-in connection technology allowing low insertion forces — enabling the conductors to be inserted easily and directly, and tool-free.

The current indicator terminal block detects interruptions or line breaks during operation — voltage drop is evaluated at a Zener diode in the reverse direction and is indicated by an LED so that the technician can see the operating status of the system. The device also features a printed circuit diagram for clear identification to help minimise faulty wiring and ensure performance.

The compact system helps users save on space with its slim design, while providing flexibility when it comes to configuration. Shock and vibration resistant, the device is robust and safe to use and operate.

The unit is suitable for use in a range of industries including systems manufacturing and machine building, process technology and process engineering, chemical and petrochemical, rail and shipbuilding, as well as in energy technology.

Phoenix Contact Pty Ltd
www.phoenixcontact.com.au

MOBILE SCREENER-CONVEYOR

The BEV-CON mobile flexible screw conveyor with round vibratory screener removes oversize particles and reduces soft agglomerates before conveying on-size bulk materials. The system is suitable for materials from powders and large pellets that flow freely to non-free-flowing products that pack, cake, seize or smear due to compression or frictional heat.

Ready to plug in and run, the castor-mounted system can be rolled into position, locked in place with jacking footpads and connected to an upstream material source in several minutes.

A rugged flexible screw, with geometry optimised for difficult-to-move products, is the only moving part contacting material. It is driven above the point at which material exits the conveyor, preventing material contact with seals and associated bearing failure and product contamination. As the screw rotates it self-centres within the conveyor tube, providing clearance between the screw and tube wall, eliminating or minimising product degradation.

Aside from the smooth polymer conveyor tube, all material contact surfaces are of stainless steel, finished to food, pharmaceutical or industrial standards. A lower clean-out cap can be removed to flush the smooth interior surfaces with steam, water or cleaning solutions, or to fully remove the flexible screw for cleaning and inspection.

Flexicon Corporation (Aust) Pty Ltd

www.flexicon.com.au

ACOUSTIC ARRAY FOR SOUND IMAGING

The ACAM 100 acoustic array from Signal Interface Group allows users to create an acoustic image overlaid on an optical image to visualise sound sources at different frequencies. It consists of an array of 40 digital MEMS microphones on a 40 x 40 cm plate that are sampled simultaneously, each with a 24-bit resolution, providing phase information for digital signal processing algorithms. An acoustic membrane protects each microphone from dust and moisture.

A 5 MP optical camera is located in the centre of the array, allowing an optical image to be overlaid onto the acoustic image to visualise sound sources.

The array has two isolated digital inputs and two isolated digital outputs. These can be used for synchronisation with data acquisition systems, and one of the inputs can be used for a tachometer.

It enables users to lock onto and target specific sound sources, program the sample rate (50, 40, 25, 20, 12.5 or 10k) and employs digital low-pass filters to allow anti-aliasing. The maximum sound pressure is 112 dB and it holds an onboard buffer memory of 256 MB.

The product requires just one USB cable for microphones, optical camera, digital I/O and power. It is available either bundled with beamforming software as a complete system for end users or unbundled, with an API providing access to all of the array's capabilities: an open platform for developers, system integrators and researchers.

SciTech Pty Ltd

www.scitech.com.au

HMI RANGE

The Red Lion CR1000 and CR3000 HMIs employ Crimson 3.1 software to provide more engaging interfaces with advanced design capabilities including protocol conversion, data logging and a web server for remote monitoring and control.

Both the CR1000 and CR3000 are available in a broad range of sizes from 4.3″ up to 15″ and feature a wide array of connectivity options to address the real-world challenges of today's multivendor manufacturing environments, offering a built-in and expanding library of more than 300 industrial protocols. Updated and expanded symbol libraries and primitives with anti-aliased rendering, including support for 16 million colours, help designers create interfaces that deliver greater visual effectiveness with a more natural appearance.

Crimson 3.1 software incorporates updated features and shortcuts that make the development process simpler, such as the ability to rearrange the order of primitives within libraries or the ability to create a custom favourites list. With a built-in web server, the CR3000 allows users to securely monitor and control their application via PCs, tablets or smartphones. SMS and email alerts provide early warning of process issues and the CR3000 provides data logging.

Both models are housed in a rugged polycarbonate enclosure and operate in temperatures between -10 and +50°C. With high shock and vibration tolerance and an IP66 rating, they are suitable for a number of industries, including manufacturing, packaging, food and beverage, and plastics.

Control Logic Pty Ltd
www.control-logic.com.au

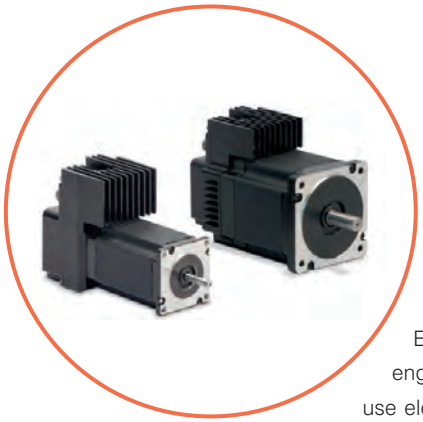
REMOTE MONITORING SYSTEM FOR THERMAL PROCESSES

Honeywell has announced Honeywell Connected Plant Thermal IQ, a cloud-based remote monitoring system designed to monitor and manage critical thermal process data.

Thermal IQ is a remote monitoring solution for industrial and commercial thermal applications. It securely connects combustion equipment to the cloud, making critical thermal process data available in real time on any smart device. Maintenance engineers and plant managers can more effectively monitor and manage their thermal process equipment, according to the company.

Thermal IQ is part of the Honeywell Connected Plant range, which is designed to turn data into insight, from edge to enterprise, to help users improve their bottom line.

Honeywell Process Solutions Ltd
www.honeywell.com.au



INTEGRATED SERVO MOTOR

The Tolomatic ACSI integrated servo/motor/controller is now available with the Profinet industrial Ethernet protocol, allowing engineers to design easy-to-use electric actuator solutions for single-axis applications. The integrated package is suitable for replacing pneumatic cylinders and automating any simple axis of motion with Profinet-enabled PLCs.

With built-in configurations for Tolomatic electric actuators, the integrated controller automatically configures the motor, actuator, safety limits and other key settings inside the controller for quick and seamless integration. The Profinet protocol is in addition to Tolomatic's existing EtherNet/IP and Modbus TCP options for the ACSI.

As an integrated servo motor and drive, the product creates a space-saving design. The integrated package does not require space in a control cabinet, making it suitable for machine retrofits and also for displacing pneumatic cylinder applications. Available in both linear and rotary set-up, the device is easily configured to the desired user units.

Available in two sizes (NEMA 23 and 34), with peak torques up to 1.35 Nm, the product features standard M12 connectors, an IP65 rating, dual Ethernet ports with LED indicators for easy troubleshooting and a USB microprogramming port. All models come equipped with 24 VDC digital I/O (four in and two out) and 0–10 VDC or 4–20 mA analog I/O for distributed sensors and logic to expand the network. The dual Ethernet ports with integrated managed switch allow many axes of ACSI to be daisy-chained without affecting network performance.

Pneumatic Products
www.pneumatics.com.au

GRAPHIC TERMINALS

The Allen-Bradley PanelView 5310 family of graphic terminals are designed to help machine builders increase productivity through tighter integration between controller and HMI.

The PanelView 5310 graphic terminals are an alternative to the PanelView 5500 terminals for smaller applications of up to 50 HMI screens, delivering the same usability benefits and enhanced integration with Logix 5000 controllers. The terminals are available in 7″, 9″ and 12″ display sizes, with a 6″ option forthcoming.

Companies can also use the enhanced integration to create high-speed jog buttons in place of cumbersome hardwired buttons. These auto-diagnosing buttons can interact with the controller at I/O speeds to help reduce downtime and improve productivity.

The Rockwell Software Studio 5000 design environment allows users to create re-usable faceplates, screens and custom graphics to help reduce development time. These objects seamlessly integrate with Logix add-on instructions and different user-defined data types.

Emulation capabilities allow engineers to test run projects in the development environment. This can help them make changes without using the PanelView 5000 hardware or disrupting production.

VNC connectivity allows operators to remotely monitor operations via a smartphone, tablet or personal computer. Historical-trending and data-logging features also allow operators to easily troubleshoot issues directly on the panel.

Engineers can load projects onto the graphic terminals directly from removable media to more quickly recover information and make project updates without needing to use the Studio 5000 View Designer application.

Rockwell Automation Australia
www.rockwellautomation.com.au

ULTRASONIC LEAK TESTER

The Ultraprobe 3000 is a handheld digital ultrasonic instrument from UE Systems that is designed for leak detection and steam trap inspection in gas, electrical, fluid and mechanical systems. It is available to rent from Tech-Rentals. It is designed to help cut costly energy waste in common industrial set-ups, such as compressed air systems. Ensuring systems run efficiently saves money while simultaneously reducing environmental impact.

The Ultraprobe 3000 features data download via a USB interface, a calibrated decibel readout with 16-segment bar graph, 400 memory locations for test data and spin-and-click technology for simplifying sophisticated inspection processes.

TechRentals
www.techrentals.com.au

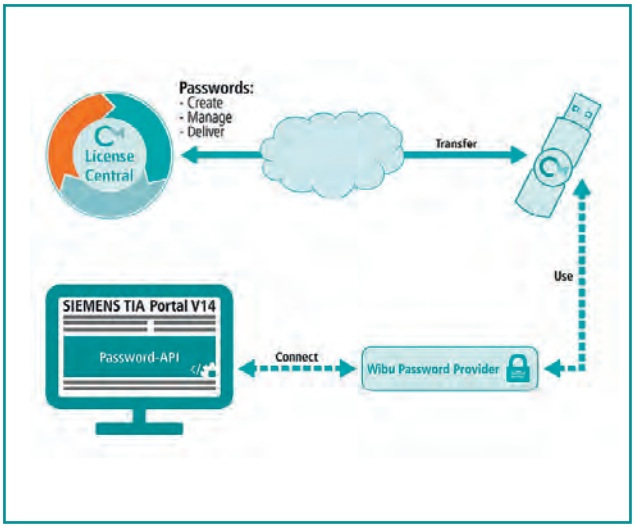
INTEGRATED STEPPER MOTORS

The latest generation of integrated stepper motors from JVL, ServoStep, advances previous designs, incorporating users' feedback.

Each unit includes the motor, drive electronics, encoder, motion controller and an easily programmed embedded PLC with eight I/O points onboard. The motors can operate as standalone units or be controlled from a master PLC or PC. The eight I/O points can be individually configured as digital inputs, digital outputs or analog inputs.

Popular options include absolute multiturn encoders, CANopen, double shafts, hollow shafts, electromechanical brakes (front or rear mounted), IP protection class up to IP65, customised connectors and safe torque off (STO) input. Wireless options are also available for Bluetooth, Zigbee and WLAN, making them suitable for AGVs and other battery-powered applications.

Motion Technologies Pty Ltd
www.motiontech.com.au



SECURE PASSWORD MANAGEMENT FOR SIEMENS TIA PORTAL

German company Wibu-Systems has developed a password provider for the Siemens Totally Integrated Automation (TIA) Portal V14 SP1 or higher based on its Password API.

The engineering data that is stored in the TIA Portal is often very sensitive in nature. While online teamwork is highly effective, logical access controls are paramount to make sure that only entitled users can view and edit only those projects they have full rights to.

With Siemens' Password API, Wibu-Systems created a password provider that streamlines know-how and write protection and, in turn, increases the access control and engineering data protection measures. Rather than being susceptible to disclosure, passwords can now be safely stored in Wibu-Systems' CmDongles, hardware secure repositories that come in several form factors, including USB sticks (with optional flash memory), memory cards (SD, microSD, CF, and CFast type) and ASICs. Access controls by timer or unit counter govern the ability to access or edit the engineering data.

CmDongles are operated with CodeMeter, Wibu-Systems' technology incorporating proprietary encryption methods based on public symmetric and asymmetric standards, like AES 256-bit, RSA 2048-bit and ECC. Its password management tool is flexible enough to allow the creation and administration of passwords in accordance with the customers' requirements and secure enough to safeguard the digital identity of the TIA Portal's users. Passwords are transferred online or offline, conferring additional versatility to the solution.

Wibu-Systems has also worked with other major automation vendors, including B&R and Rockwell Automation, to provide security solutions for their development systems.

Wibu-Systems AG
www.wibu.com

EMBEDDED COMPUTER

Crystal Group has introduced the RE1112 rugged embedded computer, designed for applications where high performance is needed in demanding environmental conditions.

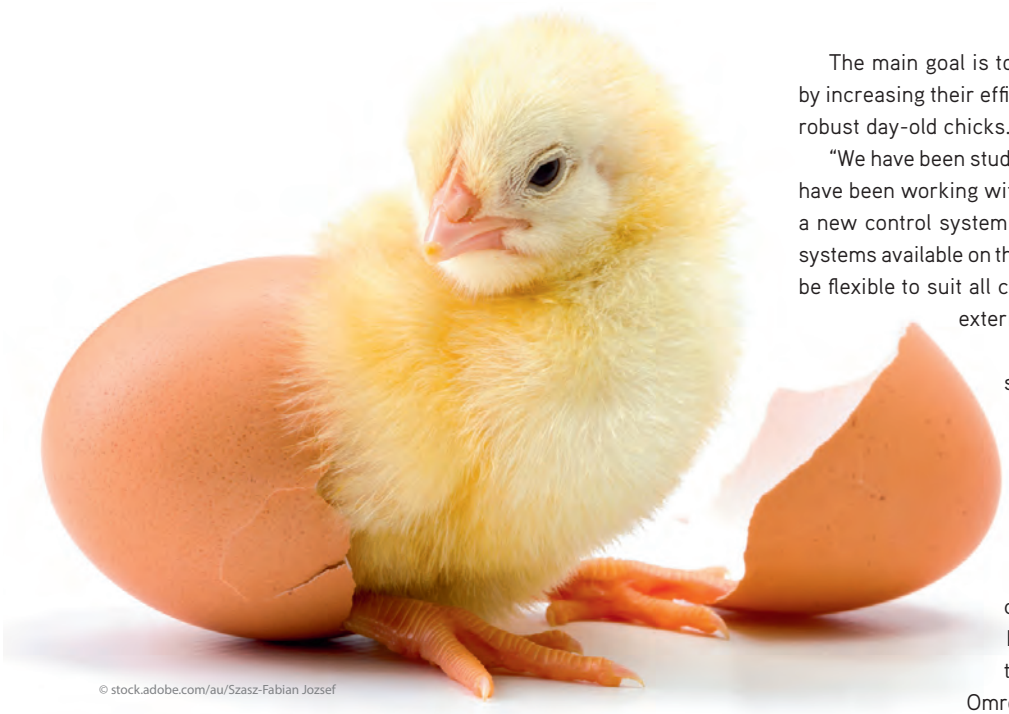
This computer's efficient heat-dissipating, solid-state design makes it suitable for harsh environment automation applications such as those typically found in oil and gas production, municipal utilities, mining operations and military systems. It provides a stable automation platform with minimum maintenance.

The computer is designed for fanless operation over an extended temperature range from -40 to +60°C, and its special aluminium housing with cooling fins serves as a heat sink for conductive cooling of the internal electronics. The chassis is built to withstand harsh environments for storage operations from -45 to +85°C. The unit mounts with multiple DIN rail options and operates from a wide voltage range of 18–36 VDC.

The embedded computer is powered by an Intel Core i7 processor, is equipped with up to 16 GB of RAM and features one PCIe X16 low-profile expansion card and onboard SATA2 and SATA3. The computer has two non-removable 2.5″ SSD hard drives and supports Linux, VMWare and Windows software.

Metromatics Pty Ltd
www.metromatics.com.au

Sydney automation firm hatches innovative plan to boost poultry production



Poultry producers have been using incubators to hatch eggs for more than a century, in a method that dates to the early Egyptians. A modern incubator is a device that aims to not just simulate but to exceed the results of natural avian incubation. It creates the perfect environment and conditions for an egg to incubate because it is able to allow all factors, both internal and external to the incubator, to be monitored and work together to achieve high quality and hatchability.

Now, a Sydney-based engineering company has taken this process a giant leap further with the development of a groundbreaking new control system.

Automated Control Solutions (ACS) is a company that specialises in automation and control for the manufacturing and food and beverage industries. Established in Western Sydney over nine years ago, ACS has turned its focus to the food industry to assist poultry producers to increase their productivity.

"Our company has been doing research and development into incubator control systems for the poultry industry for many years," said ACS founder and CEO Adam Francica. "We have been trialling our latest system at the plant of a leading poultry producer on the outskirts of Sydney.

"The results have not only shown an increase in number and quality of hatchings, but also a huge increase in efficiency.

"After using the new technology, the producer has seen an increase of 3–5% in hatch results and a reduction in energy costs of more than 30%, which easily provides a quick return on investment."

The main goal is to increase the productivity of poultry producers by increasing their efficiency and producing large numbers of uniform, robust day-old chicks.

"We have been studying the hatching process over several years and have been working with hatchery managers to develop, trial and prove a new control system that achieves better hatch results than current systems available on the market," added Francica. "And the system must be flexible to suit all conditions, both internal to the incubator and the external environment."

ACS developed the first prototype of the control system three years ago and has been continuously developing and improving with the latest system in trial for the past six months. The system is still in the developmental stages, but the early signs are most promising.

The success of the system can be largely attributed to the reliability and accuracy of its components. Nearly all the hardware was supplied by Omron, a global manufacturer of automation technology and specialising in control systems. Omron supplied the control hardware: the PLC, touch-screen HMI and various control components.

"We have had a longstanding relationship with Omron," said Francica. "Our company is an authorised Omron systems integrator.

"Omron is a reputable company — they always provide good support and they are local. We have a strong relationship with them."

Omron helped to implement the new system and is providing ongoing support.

ACS aims to expand the control system into the poultry industry both nationally and then globally, as companies overseas have already expressed interest in the system.

"There is one key point of difference [compared with existing systems]: customisation of the system provides more control and flexibility," said Francica.

"Our system can be custom-designed to individual applications and our unique knowledge gained from research and consultation with industry leaders has enabled the development of a control system that is versatile and more flexible than other systems. We can locally support our control system due to in-house design and development, and this gives us a great advantage in the marketplace."

The control system uses the latest in valve technology to enable optimum temperature control and efficiency, while the PLC incorporates custom algorithms with an easy-to-use touch screen for operators.

"With the new system, we have been able to control the environment far more efficiently," said Francica.

Omron Electronics Pty Ltd
www.omron.com.au

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AS I SEE IT

TOP ENGINEERING AND TECHNOLOGY TRENDS FOR 2018: YOU NEED TO STEEM FORWARD VIGOROUSLY

At a recent function for would-be students of our engineering college on the need for more of a STEM focus, I was sharply corrected by a good colleague who remarked that we should think rather of STEEM: science, technology, engineering, *entrepreneurship* and mathematics. And he is so absolutely right.

My take on the industrial automation industry in Australia is that we do not have enough entrepreneurial activity with a global focus. With the huge downsizing in employment at the large Australian mining and manufacturing companies, we need other entrepreneurial ventures to take up the employment slack in the engineering industries. For example, an inspirational Australian entrepreneurial company in the industrial automation sphere that I once worked for embraced this and went onto huge success globally: Citect (now part of Schneider Electric) created world-class SCADA software that took the world by storm.

The evidence of a rapidly changing jobs market is plain for everyone to see. We have known for the past two decades that there are no longer 'jobs for life'. Now we are increasingly seeing that automation has hollowed out the number of people required in any industrial facility. Technologies that once were buzzwords are now being successfully implemented and providing huge opportunities for would-be entrepreneurs: machine learning, artificial intelligence, robotics, Internet of Things, cybersecurity, cloud computing and virtual reality.

It is thus vital that everyone jumps on board this train of entrepreneurship. We need to encourage everyone from the time they enter school to think as entrepreneurs, with a strong focus on creativity and business outcomes — and also tolerance of failure. This doesn't necessarily mean that you should set up a business, but that you should always think of yourself as an entrepreneur — even when working for a large mining company.

Without a shadow of doubt, engineering professionals are brilliant problem-solvers; however, you need to go well beyond this to be successful as an entrepreneur with an appetite for risk-taking. Engineers often mistakenly believe that creation of the technology is the hard bit and taking the product to market is the easy part. Everyone is fixated on 'cool ideas and technology'. However, this is a very small part of the story: commercial viability is absolutely critical, and trying to understand what the market wants is key to success.

The old adage 'Build a better mousetrap, and the world will beat a path to your door' is sadly not true. Powerful selling and marketing are key elements in making a product successful. Elements such as product functionality can only be gauged by engaging with the market.

The financial side of the business is also critical. Pricing the product just right is essential. The business model has to stack up and you need to have a clear idea of who your ultimate customers are and what their needs are.

With the world economy bouncing back (and mining back in vogue again), technology change accelerating and the internet reducing the barriers to entry, now is the time for Australian would-be entrepreneurs — especially in the industrial automation space — to satisfy this huge raft of new demands out there.

All the best for a barnstorming 2018. Focus on hard objectives now to ensure it exceeds all your expectations. Above all, stay healthy and stay happily personally connected.

Steve Mackay PhD has worked across the world for the past 40 years in the design and construction of iron ore plants, oil and gas platforms and power stations, as well as plant maintenance. He believes university engineering programs need to be strongly focused on industry. He has been the author or editor of over 30 engineering textbooks, and he is currently leading the first fully online accredited engineering college with over 1500 students from over 140 countries.

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