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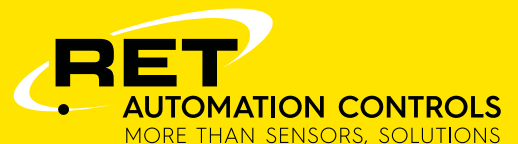
Real-time distance measurement for faster setup and troubleshooting

Reduce downtime due to broken sensors with an IP69K-rated, FDA-grade stainless steel housing

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I have been visiting a number of universities around the country recently – in major centres as well as in more far out regions. The focus of the interactions has been around engineering – various disciplines, and in various states of delivery.

What inspires me is the fact that in this country there seem to be many youngsters interested in a career in engineering.

I am fully aware of the discussions around preparedness of students – and there are real problems. However, youngsters in South Africa, in general, are NOT scared of Science, Technology, Engineering and Mathematics (STEM).

A cynic may argue that it is because we make it too easy! But the fact of the matter remains – as a nation we are winning the hearts and minds of the youngsters in the STEM space.

As an indication, I am aware of an institution that received well over 17 000 applications for about 1 000 places in engineering programmes. Look at the opportunity we may be missing.

More importantly, the case that we need to make is that engineering, as a profession, is like a big room with multiple doorways. Only one of those is via the Bachelors degree in Engineering.

It is important to review the pyramid of skills, and emphasise that the base of the pyramid is increasingly being made up of unskilled and semi-skilled labour. Above that band we have the artisan band – again this will include semi-skilled and skilled people.

It is at the base of the pyramid that we need to build capacity and that requires a massive rebuilding of skills. It is clear that, in many current major projects, we are importing artisans. This makes no sense at all.

The challenge is to prepare the skills in advance of the projects; this is frankly something we are poor at getting right.

Our Technical and Vocational Education and Training (TVET) Colleges need to be driving these initiatives, with the support of industry.

Then we have the technicians, technologists and engineers. Again, we need to recognise that we need more technicians than technologists and engineers.

Why do I emphasise this? Well, one reason is that every youngster seems to be driven to be an engineer. I worry that of the 16 000 who are NOT successful in getting a place in a Bachelors degree in engineering (and this is at only one institution) may not consider entering the room via one of the other doors.

What is even worse, they may opt for something else – like law or accounting.

We need these technical skills, and we need to nurture them at all levels.

It is critical that each one of us in the profession makes it our business to engage schools, engage teachers, even if only at our own children's schools (or, dare I say it, our grandchildren) to assist in describing the progression and the doorways that we can see them enter.

I am completely convinced that we need to develop these skills well ahead of the growth that is surely to come. Further, as a principle, we should understand that it is not possible to over-produce technical skills in any nation.

On the entire African continent, I have been advised that only one country is actually producing enough engineers for its economy. It is not a southern African country!



Ian Jandrell

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BSc (Eng) GDE PhD,  
FSAIEE SMIEEE

*Ian*



# ZEST

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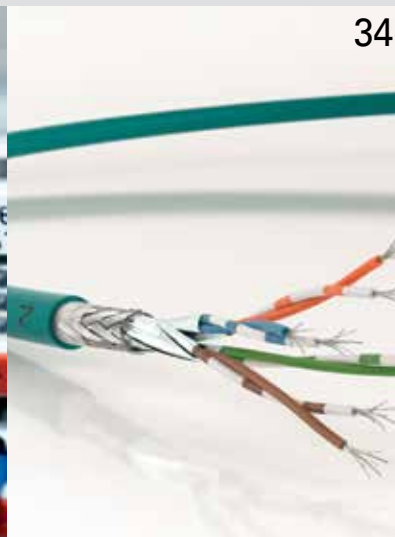




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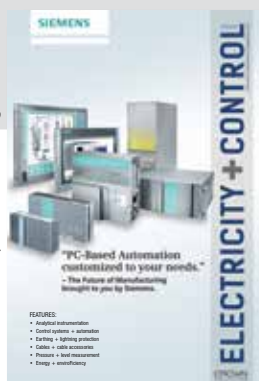
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**Siemens** SIMATIC IPCs offer flexible options for compact designs with greater performance and functionality. *Read more on page 25.*

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# Tools for measuring modern radars

By D Miles, Tektronix

*There are significant challenges in designing modern electronic warfare and radar systems.*

**S**olutions must be developed with the flexibility and adaptability required for next-generation threat detection and avoidance. To succeed, you need capable tools for the generation and analysis of extremely complex pulse patterns and you need to validate designs with advanced scanning methodologies – tools that can handle complex radar baseband, IF and RF signals as well as identify multi-system interference. With today's rapid advances in radar technology, developing and manufacturing highly specialised and innovative electronic products to detect radar signals takes leading-edge technology and tools.

Tektronix innovative test equipment reduces testing uncertainty during the design process and delivers confidence in the integrity of increasingly complex designs. Tektronix Arbitrary Waveform Generators, Real-time Spectrum Analysers and High-Bandwidth Oscilloscopes offer the capabilities you need to manage the requirements of modern radar applications.

Real-time visibility of advanced pulse compression systems and the generation and analysis of all digital dynamic signal types help you create highly reliable, cost-effective system designs for defence and commercial electronic systems. The analysis tools described represents a scalable architecture that can protect investments and speed design development.

## **Pulse generation equipment selection**

The AWG5000 Series arbitrary waveform generator has up to 14 bits per sample, giving the highest dynamic range within a single waveform. The AWG7000 Series has up to a 24 GS/s clock rate which provides the highest effective output frequency (up to 9,6 GHz). The AFG3000 Series arbitrary function generator has the capability of directly selecting the waveform parameters for generating baseband pulses.

*Considerations for determining equipment are the parameters needing measurement and the range of values expected for these results.*

- It takes leading technology, tools and products to develop radar detection signals.
- The test equipment described reduces testing uncertainty during the design process.
- The analysis tools described represent scalable architecture that can protect investments and speed up design development.

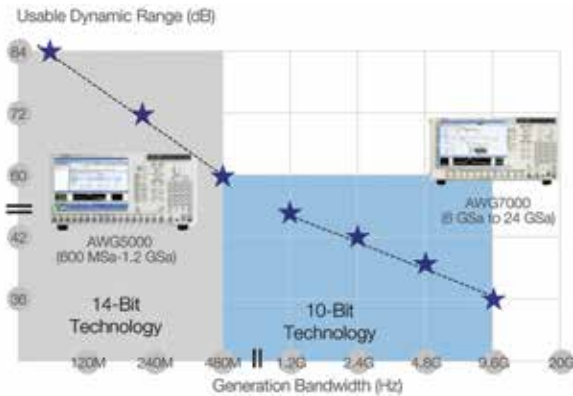


Table 1: Signal-generation equipment overview.

Table 1 indicates the choice of test equipment based on the characteristics of the signal needed for the required test. The selection of the optimum equipment for measuring radar pulses depends on the nature of the pulses and the differences in capabilities between the available types of test equipment.

### Important pulse parameters

Considerations for determining equipment are the parameters needing measurement and the range of values expected for these results. Pulse RF carrier frequency is basic. If the available equipment does not cover the frequencies involved, then a frequency conversion device will be required in addition to the fundamental tester. Such a converter may introduce phase and flatness impairments or other distortion. Corrections for these must be an integral part of the measurement system. Pulse bandwidth is the next consideration. Modern radars are using wider bandwidth pulses, such as faster rise times and wider modulation bandwidths. Many measurements can only properly be measured if the entire bandwidth is captured at once.

The third consideration is modulation. What varied modulations need measurement and what properties of the modulation are critical? Some types of chirped pulses only require that the carrier frequency sweeps over the specified range. But many others require that the carrier sweep meets a linearity specification. These pulse parameters impact the linearity and dynamic range requirements placed on the test equipment, as well as the phase and frequency flatness of the instrument measurement bandwidth.

Measurements of small signals in the presence of high-power ones, or high-accuracy phase measurements over long time intervals may require a high dynamic range or bit depth of digitisation. Complex modulation schemes may require built-in specialised demodulation processes.

### Equipment capabilities

This section examines several types of available equipment, including oscilloscopes, spectrum analysers, and the automated software that can be used on each, respectively.

A/D	– Analogue to Digital
ACPR	– Adjacent Channel Power Ratio
CCDF	– Complementary Cumulative Distribution Function
DPO	– Data Phase Optimisation
DSA	– Digital Signal Algorithm
ENOB	– Effective Number of Bits
FFT	– Fast Fourier Transform
IF	– Intermediate Frequency
MSO	– Multiple System Operator
OBW	– Occupied Bandwidth
PRF	– Pulse Repetition Frequency
RBW	– Resolution Bandwidth
RF	– Radio Frequency
RSA	– Real-time Spectrum Analysers
SFDR	– Spurious-free Dynamic Range
VBW	– Video Bandwidth
VSA	– Vector Signal Analysers

### Abbreviations/Acronyms

### Traditional oscilloscope measurements

The oscilloscope is the fundamental tool for examining varying voltage versus time. It is very well-suited for displaying the shape of baseband pulses.

The origin of oscilloscope performance parameters traces back to characterisations of early radar pulses. Today's real-time oscilloscopes have bandwidth up to 33 GHz, and are designed to capture and display either repetitive or one-shot signals.

The equivalent-time or sampling oscilloscope is not discussed here, as it requires repetitive pulses and cannot measure one pulse by itself. The traditional oscilloscope does well displaying baseband pulses. Pulses with very fast transition times or very short duration (sub-nanosecond or shorter) can be accurately seen on a 33 GHz bandwidth oscilloscope.

Oscilloscope triggering systems are very highly developed. Since most oscilloscopes have 8-bit digitisers, this requires careful consideration of dynamic range and the effective number of bits (ENOB) if there is a need to measure small and large signals together.

### Oscilloscope Pulse waveforms and DPX acquisition technology

The FastAcq feature of the oscilloscope operates on live time-domain data using DPX acquisition technology. All frequency domain measurements are made on the time-sampled acquisitions of stored data. The FastAcq display on the oscilloscope can discover baseband pulse time-domain transient errors. Figure 2 shows just one single pulse that has a narrower pulse width than hundreds of thousands of correct pulses.

The blue colour on the temperature scale representation of signal persistency represents the least frequent occurrence, while the red areas are the parts of the signal that are the same every time. The FastAcq capability on the DPO, DSA, and MSO Series provides a time-domain display with a high waveform capture rate. The DPX acquisition technology processor operates directly on the digital samples live from the A/D converter.

It discovers rapid variations or one-shot events in the time-domain display. For wideband measurements using an oscilloscope, FastAcq can be used to see even momentary transient events using the voltage versus time display.

Figure 3 shows a one-time transient in blue. For this display, blue represents very low-occurrence transients, while red represents parts of the waveform that are constantly recurring.

## Oscilloscope triggering

One of the most highly developed capabilities of the oscilloscope is triggering. Recent advances in oscilloscope trigger have enabled methods of triggering an acquisition or measurement based on the voltages and voltage changes in one or more channels. These range in complexity from simple edge or voltage-level triggering to complex logic and timing comparisons for combinations of all of the input channels available. Pattern recognition, both parallel and serial, triggering on 'runt' or 'glitch' signals and even triggering based on commercial digital communications standards are all available in oscilloscopes. The DPO/MSO5000, DPO7000 and DPO/MSO/DSA70000 Series oscilloscopes allow the user to specify two discrete trigger events as a condition for acquisition. This is known as a trigger sequence, or Pinpoint triggering. The main or 'A'-trigger responds to a set of qualifications that may range from a simple edge transition to a complex logic combination on multiple inputs. Then an edge-driven 'B Delayed' trigger can be specified to occur after a delay expressed in time or events.

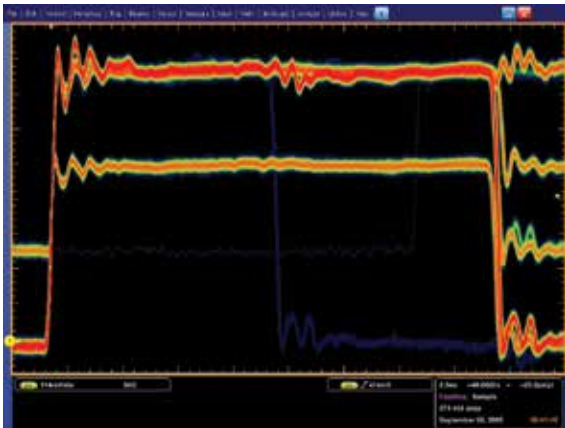


Figure 2: FastAcq shows a single too-narrow pulse out of many tens of thousands.

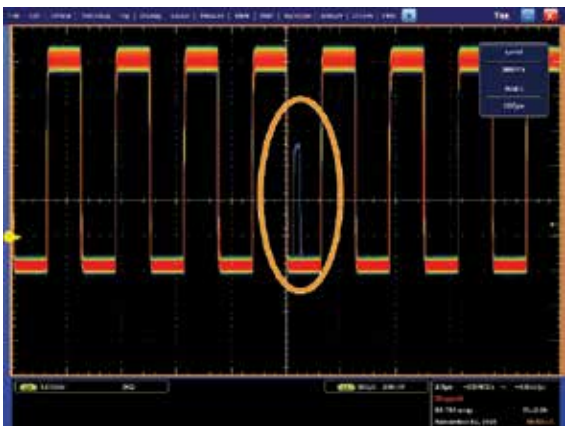


Figure 3: Discovery of a single transient glitch in a train of pulses.

The B-trigger is not limited to edge triggering. Instead, the oscilloscope allows the B-trigger to look, after its delay period, for a condition chosen from the same broad list of trigger types used in the A-trigger. A designer can now use the B-trigger to look for a suspected transient, for example, occurring hundreds of nanoseconds

after an A-trigger has defined the beginning of an operational cycle. Because the B-trigger offers the full range of triggering choices, the engineer can specify, for instance, the pulse width of the transient they needed. Over 1 400 possible trigger combinations can be qualified with Pinpoint triggering. Sequences can also include a separate horizontal delay after the A-trigger event to position the acquisition window in time. The Reset Trigger function makes B-triggering even more efficient. If the B-event fails to occur, the oscilloscope, rather than waiting endlessly, resets the trigger after a specified time or number of cycles. In so doing it re-arms the A-trigger to look for a new A-event, sparing the user the need to monitor and manually reset the instrument. The system can detect transient glitches less than 200 ps wide. Advanced trigger types, such as pulse width trigger, can be used to capture and examine specific RF pulses in a series of pulses that vary in time or in amplitude. Trigger jitter – a crucial factor in achieving repeatable measurements – is less than 1 trillionth of a second (1 ps) rms.

For baseband pulses, the triggers based on edges, levels, pulse width, and transition times are of the most interest. If triggering based on events related to different frequencies is needed, then the RSA Series spectrum analyser is required.

## Manual timing methods

Traditional measurements of pulses were once made by visual examination of the display on an oscilloscope. This is accomplished by viewing the shape of a baseband pulse. The measurements available using this method were timing and voltage amplitude. These measurements were sufficient, as pulses were generally very simple. The baseband pulses were used to modulate the power output of the radar transmitter. If it was necessary to measure the RF-modulated pulses from the transmitter, then a simple diode detector was used to rectify the RF signal and provide a reproduction of its baseband timing and amplitude for the oscilloscope to display. Generally, the oscilloscope did not have sufficient bandwidth to be able to directly display the RF-modulated pulses, and if it did, the pulses were difficult to clearly see, and was even more difficult to reliably generate a trigger.

For these baseband pulse measurements, the measurement technique first used was to visually note the position on-screen of the important portions of the pulse and count the number of on-screen divisions between one part of the pulse and another. This is a totally manual procedure performed by the oscilloscope operator and as such was subject to errors.

## Automated oscilloscope timing measurements

With the advent of A/D converters, the process of finding the position on-screen became one of directly measuring the time and voltage at various portions of the pulse. Now there are fully automated baseband pulse timing measurements available in modern oscilloscopes. Single button selection of rise time, fall time, pulse width, and others are common. However, most of these measurements do not focus on the measurement envelopes of modulated radar signals. When used on pulse-modulated carriers, these measurements are of limited utility, because they are presented with the carrier of the signal instead of



the detected pulse. This results in pulse width measurements that are made on a single carrier cycle, and rise times of the carrier instead of the modulated pulse. Detectors may be used on the input of the oscilloscope to remove the carrier and overcome this.

A traditional Swept Spectrum Analyser is a simple RF detector that is effectively swept across a selected span of RF frequencies. This produces a display of the combined RF spectrum of all signals within the selected span of frequencies. Measurements of carrier frequency, pulse width and pulse duration can be made by manually observing the lines within the spectrum display, aided by on-screen marker readouts. The carrier is at the centre of the pulse spectra that are shown in *Figure 4*. The carrier is marked there with the letter 'A.'

The spectrum analyser does particularly well at displaying the spectrum of a pulse-modulated RF carrier, provided that the signal is repetitive, stable, and the Resolution Bandwidth (RBW) and Video Bandwidth (VBW) controls are correctly set. Spectrum analysers are usually optimised for the high dynamic range needed to see very small signals in the presence of very large ones. Fast Fourier Transform or FFT-based Vector Signal Analysers (VSA) use internal digitisers to sample an acquisition bandwidth at a fixed frequency may have as much as 75 to 85 dB SFDR (Spurious-Free Dynamic Range).

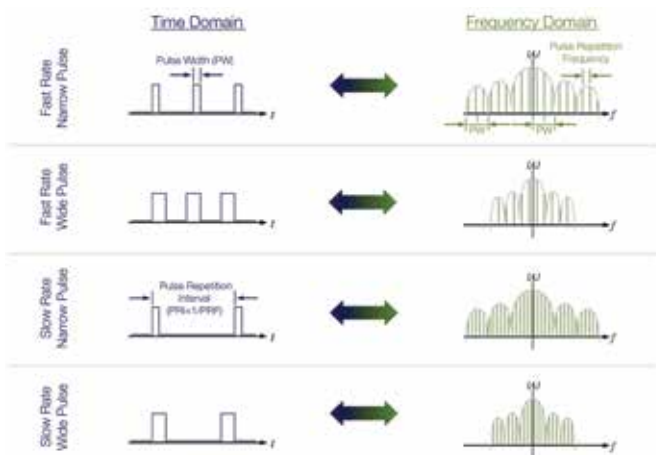


Figure 4: Spectrum plot measurements of pulse width and repetition rate.

Because of the inverse relationship between frequency and time, it is possible to determine basic pulse timing parameters using the spectrum analyser frequency domain display. The pulse repetition time (pulse period) is the inverse of the frequency spacing between the finely-spaced lines within the larger spectrum envelope. The pulse width is the inverse of the frequency spacing between the nulls in the spectrum envelope.

Using a swept spectrum analyser, there can be an alias between the sweep time and the pulse rate. The analyser will provide a vertical deflection only at the exact time the pulse is ON, and produce no deflection during the pulse off-time. This may appear to be the Pulse Repetition Frequency (PRF) lines, but the apparent frequency spacing will change as the sweep rate of the analyser is varied. This manual change of sweep time is necessary to determine if the lines seen are PRF or are the sweep-time alias. FFT-based VSA analysers do not exhibit this alias. Swept spectrum analysers also have a zero-span mode where the operator selects an RF frequency, and the instru-

ment is stopped at this frequency without sweeping its frequency converter. The detector is now responding to all signals within the IF bandwidth (otherwise known as Resolution Bandwidth – RBW) of the analyser. The pulse is displayed versus time on the instrument display. The result is a display of RF power versus time just like an oscilloscope, but with the increased dynamic range of the spectrum analyser available.

In the zero-span mode, RF pulses are detected and shown as baseband pulses. The rise time capability of the zero-span mode is limited by the widest resolution filter available in the analyser's IF system. In the case of either a VSA or a Real-time Spectrum Analyser (RSA) which can digitise and store a wide frequency band in one capture, signal amplitude-versus-time can be displayed.

This can show pulse rise time as fast as the full capture bandwidth allows, and the spectrum display does not have the lines. For rise times faster than this bandwidth will support, an oscilloscope is recommended for accurately measuring rise times of the pulses.

## Conclusion

There are RF spectrum measurements that can be made manually with markers on a spectrum display, but are commonly found as automated routines in most instruments since these can be quite tedious if done manually. The basic software of the RSA5000 and RSA6000 Series, or an oscilloscope with the SignalVu vector signal analysis software, includes many commonly automated measurements such as Occupied Bandwidth (OBW), Complementary Cumulative Distribution Function (CCDF) and Adjacent Channel Power Ratio (ACPR) (also known as Spectral Re-growth). Occupied Bandwidth is the most relevant for pulsed radar. Most radars have to meet a specified bandwidth to avoid interfering with RF systems operating on nearby frequencies. This measurement examines the RF spectrum of the signal and locates the highest amplitude value. Then an integration of the power across the spectrum is performed to find the bandwidth occupied by the specified percent of the total power. The default setting reports the 99% power bandwidth, but the user can enter other values.

The Real-time Spectrum Analyser (RSA) has an RF conversion section similar to a swept spectrum analyser. The RSA5000 Series digitises up to a 110 MHz bandwidth with up to 78 dB of spurious-free dynamic range. The digitised samples are directly processed by hardware DSP, and can be simultaneously saved in memory or on a hard disk. This hardware processor performs discrete time transforms into RF spectrum information. This provides real-time triggering on selected frequency events, or a DPX Live RF spectrum display that can discover RF transients and display same-frequency time-sharing RF signals.



Dean Miles is a senior technical marketing manager at Tektronix responsible for Tektronix High Performance Product Portfolio. Dean has held various positions at Tektronix during his more than 20 years with the company, including global business development manager for Tektronix RF Technologies and business development manager for Tektronix Optical Business Unit. Enquiries: Comtest on 010 595 1821 or sales@comtest.co.za

## Hard-faced thermowell for erosive environments

When working in the metal industry, we constantly deal with extremely harsh and erosive environments. This causes damage to instruments more often temperature probes. **Endress+Hauser South Africa** decided to take this challenge and develop a solution to improve the thermowell, which ensures that the instruments lasts up to 10 times longer than usual.

Temperature measurement proves to be a challenge in the steel making process, not only due to high temperatures of between 400 - 450°C, but also the harsh and very abrasive applications involved in the process of making good quality steel. During the process of producing the steel, it is of extreme importance that the molten metal is at the correct temperature before pouring it into the mould, if not, the final product might have a defect and it also compromises the strength. Temperature measurement can be used in an application where arc furnaces are used to channel information to the power input controller via the temperature of metal which can help considerably in saving energy consumption and time.

If you are using or need temperature measurement in applications like roof-top furnaces and rotary kilns etc. where abrasion is a challenge due to high-velocity thermal wind, Endress+Hauser offers a thermowell that can withstand such applications.

This solution was offered to one of our key customers where the application was to measure molten ferrous metal where the thermowell had to be exchanged every two weeks due to damage. Once the innovative solution was installed, the lifespan of the thermowell was immediately increased to over two months.

**Application:** Temperature measurement – roof-top furnace

**Medium:** Molten Ferrous Metal

Temp range: 400 – 450°C

**Solution:** Endress+Hauser -Type "K" Thermocouple c/w Hard-faced thermowell

*Enquiries: Benjamin Mlangeni. Tel. 011 262 8012  
or email [info@za.endress.com](mailto:info@za.endress.com)*

## 10<sup>th</sup> Anniversary and 57+ years in the sensing industry

**LumaSense Technologies, Inc.** officially celebrated its 10<sup>th</sup> anniversary in August, but its legacy in the sensing industry dates back to 1958 with the founding of Impac Infrared, which LumaSense acquired in 2007. "We're a young company with extensive experience in the sensing industry," said LumaSense chief executive officer, Steve Abely.

Through a series of strategic acquisitions starting in 2005, LumaSense set out to build a world-class temperature and gas sensing company to help energy and industrial companies improve the efficiency and safety of their operations. Since its founding ten years ago, LumaSense Technologies has evolved into a leading producer of infrared imagers, thermometers, and gas analysers. With global headquarters in Santa Clara, California and factories in the US and Europe, LumaSense continues to supply a growing and diverse customer base spanning more than 85 countries.

LumaSense started to build its temperature and gas sensing portfolio with the Luxtron Corporation in 2005. Luxtron, founded in 1978, provided fibre optic sensing probes and systems that are commonly found in electrical transformers used to propel energy through the grid. Innova was also founded in 1978 and became LumaSense's line of photoacoustic gas analysers in 2006. These instruments are used in a variety of research and industry applications.

In 2007, LumaSense acquired Andros, Mikron and Impac. Andros, founded in 1969, uses non-dispersive infrared gas detection technology for a variety of automotive, medical, and utility applications. Mikron also founded in 1969, brought LumaSense's well-established line of thermal imagers and blackbody calibration sources, which have long been the industry gold standard. Impac, founded in 1958, is a pioneer in infrared thermometry (pyrometers). Known for their precision and durability, Impac pyrometers are a favourite among manufacturers handling molten metals or glass.

By leveraging its technologies and engaging in rigorous research and development, LumaSense provides a string of solutions for a variety of leading industries. For example, LumaSense fibre optic probes and systems help utilities transmit electricity safely and reliably. Its pyrometers help to improve the crystal growth processes common in making semiconductors, LEDs, and glass for smart devices. LumaSense's solutions are also common in the oil and gas, petrochemical, metals, glass, automotive, and medical industries.

*Enquiries: Sujeet Karna. Email [s.karna@lumasenseinc.com](mailto:s.karna@lumasenseinc.com)*



## 40 000 Spectrometers

**SPECTRO** Analytical Instruments has announced the shipment of its 40 000<sup>th</sup> spectrometer.

The milestone instrument, a SPECTRO ARCOS state-of-the-art optical emission spectrometer with inductively coupled plasma (ICP-OES), was delivered to SGS Germany GmbH.

SGS is a long-time SPECTRO customer with dozens of SPECTRO instruments in operation worldwide performing various applications in elemental analysis. The milestone ARCOS spectrometer was delivered to SGS's operations in Speyer, Germany.

SPECTRO managing director Manfred Bergsch said that in 1998, SPECTRO shipped its 10 000<sup>th</sup> instrument – 19 years after the founding of the company. "In the following 17 years, we delivered another 30 000 spectrometers. Our track record demonstrates SPECTRO's unique success story as well as our strength, innovative capability and customer orientation".

The SPECTRO ARCOS analyser represents a pinnacle of productivity and performance for ICP-OES spectrometers. Its robust and durable semiconductor generator is considered to be one of the strongest on the market. Together with the instrument's outstanding optics, analytical tasks previously thought to be impossible can be resolved at the highest plasma load. Even highly volatile organic samples, like gasoline, are analysable at room temperature without cooling. Moreover, the ARCOS operates without the need of an expensive and high-maintenance external cooling system – and instead features an innovative, patented air cooling. As a result, the ARCOS excels in industrial and academic applications for the most advanced elemental analysis of metals, chemicals, petrochemicals, and other materials.

*Enquiries: Email: [spectro.info@ametec.com](mailto:spectro.info@ametec.com)*



# Reliable Temperature Measurement



Endress+Hauser offers a complete range of accurate temperature measurement instrumentation designed to meet diverse requirements. More than that, our dedicated pre-sales team ensures customers select the correct instrument for the right application, guaranteeing optimised, reliable plant performance. Let us assist you with all your temperature solutions.

#### Local manufacturing facility

- Flexible manufacture (customer specific)
- Reduced delivery period
- Cost-effective temperature probe and solutions
- High performing SANAS accredited calibration laboratory
- New innovation (StrongSens – Robus RTD sensor for high vibration applications)

#### Temperature transmitters

- Universal input, 2-wire loop powered
- 4 - 20mA output with HART option
- Galvanic isolation (2KV DC)
- Slim line version (12.6mm thick) – panel space saver

## USB interface takes multi-functional counter to next level

Ease of use has been taken to another level with Hengstler multifunctional counters which are now available with a USB interface. This allows the user to program the versatile counter via PC or tablet using the company's free downloadable programming assistant. It not only provides a clear, user friendly display but will also recognise and alert the user should conflicting entries be attempted.

The program settings can be printed or saved as a file for record keeping purposes and programming is done via a USB interface cable or USB flash drive connection.

The USB interface on the Hengstler Tico 773 allows both the import and export of numerous values and settings including count value, presets, subtotals, totaliser and batch counter. It also facilitates output monitoring with a notification of any changes in the outputs.

The Hengstler Tico 773 offers reliable and accurate operation in a wide range of applications including position indication, rotation speed controlling, time controlling and batch counting. The easy to read display with large digits (9,3 mm x 7,2 mm) make it simple to use, while the installation of the device is easy due to plug and play style terminals.

**Countpulse Controls** is the official southern Africa distributor of the full range of Hengstler counters and the company offers a technical advisory and support service to assist users with both the appropriate purchasing decision as well as troubleshooting should this be necessary.

**Enquiries: Gerry Bryant.**  
Tel. 011 615 7556 or email  
bryant@countpulse.co.za



## Micronutrient analysis

The ability to conduct at-line micronutrient analysis using ED-XRF spectroscopy at the point of production is detailed in a new application brief from **SPECTRO Analytical Instruments**, available to download at <http://xrf.spectro.com/micronutrient>. The brief, At-Line Micronutrient Analysis Using ED-XRF Spectroscopy at the Point of Production, details the significant advantages of At-line elemental analysis for product quality control and consistency in micronutrient analysis — while maximising production throughput. Both the recent use of inductively coupled plasma-optical emission spectrometry (ICP-OES) and alternate colorimetric methods for manufacturing quality control purposes present drawbacks for producers, according to the paper. These include the need to transport samples from the production line to a laboratory for analysis, and the lengthy time that is required for extensive sample preparation.

In contrast, the advantages of At-line elemental analysis are many. The foremost benefit, according to the brief, is that with a new-generation portable ED-XRF spectrometer, elemental analysis can be performed directly on a sample and usually with little preparation — at the production line or anywhere in the plant. In addition, the use of a new, carefully-selected ED-XRF instrument in performing at-line elemental analysis can deliver the level of accuracy previously found only in the laboratory. Moreover, the paper notes, employing At-line elemental analysis can help boost production throughput, reduce costs, and provide the manufacturing process with far more flexibility than ever before. As a guide, the brief also provides a series of critical factors for readers to consider when specifying and comparing various at-line ED-XRF spectrometers for micronutrient analysis.

**Enquiries: Email [spectro.info@ametec.com](mailto:spectro.info@ametec.com)**



## Electromagnetic flow meter

The Promag 400 electromagnetic flow meter meets absolute accuracy, approvals, remote operation and data security. Whether potable water, industrial water or wastewater, whether in urban or rural areas, water has become a scarce resource due to worldwide population growth and the associated urbanisation.

As South Africa is a semi-arid country we must have a sustainable water management system which includes increasing the population's access to potable water and sanitation. Due to the high cost of purification and distribution of this limited resource, losses should be minimised and every drop accounted for. Currently South Africa's non-revenue water is at 36,8%.

At the heart of this is leaks, un-billed (not measured), water theft as well as the agreed free water quota. Without accurate and reliable water flow measurement, this figure cannot be improved on. The new Promag 400 and Promag 800 from **Endress+Hauser** offers excellent advantages precisely in such applications ensuring cost and time saving operation.

The Promag 400 electromagnetic flow meter is based on over 35 years of industry experience. Important requirements for the water management industry such as accuracy, approvals, remote operation and data security are met by Promag without any compromise. The fields of application are:

- Volumetric flow measurement of drinking water, industrial water, irrigation water or wastewater
- Applications in small plant engineering or in large-scale projects
- Measurement in distribution networks, pump systems or in pits
- Monitoring, regulation, billing and leak detection

**Enquiries: Hennie Pretorius. Tel. 011 262 8068 or email [hennie.pretorius@za.endress.com](mailto:hennie.pretorius@za.endress.com)**

## Sensor management for Memosens sensors

Measuring technology specialist Knick now offers an enhanced version of their sensor management software for Memosens technology: MemoSuite Advanced allows for the calibration of up to ten sensors at once. The intuitive-to-operate PC software enables users to easily pre-calibrate sensors for pH, ORP, oxygen, conductivity and temperature measurement under optimal conditions in the lab, i.e. completely dispenses with complicated on-site calibrations in adverse environmental conditions. Sensors can be connected to a PC via USB using the interface converter MemoLink included in supply.

In addition to the calibration function, MemoSuite Advanced completely records all calibration data and logs operational times (across all or under extreme process conditions) allowing for documentation according

to legal requirements such as FDA 21 CFR Part 11. 1. The software also displays current



measuring values, sensor data and the latest adjustments and supports a multitude of established calibration methods. For pH sensors, a comprehensive buffer catalogue with various buffer sets for individual compilation is available as well. If needed, customers can implement their own buffer sets. Calibration reports – the software includes several templates – or MS Excel data records can be generated. The MemoSuite database enables users to implement a predictive maintenance strategy. Lifetime sensor data records also facilitate long-term planning of replacement cycles and optimised maintenance strategies. Sensor data tables can be freely configured and database entries can be sorted, filtered or grouped and compared. In addition, the software supports visualisations of statistical findings and sensor histories, and provides an export function for detailed reports.

**Mecosa** is the sole agent for Knick Elektronische Messgeräte in Southern Africa.

**Enquiries: Tel. 011 257 6100 or email [measure@mecosa.co.za](mailto:measure@mecosa.co.za)**

## Control system order for Brazil's largest biomass power plant

Yokogawa Electric Corporation's subsidiary, Yokogawa America do Sul, has received an order from AREVA Renewables Brazil, a subsidiary of the French firm AREVA SA, to deliver a control system for a biomass power plant that will be the largest facility of its type in Brazil. The plant is being constructed by Bolt Energias in São Desidério, Bahia, in the North Eastern part of the country. This biomass plant will have three power units with a total capacity of 150 MW, and will burn eucalyptus as its fuel. For this facility, Yokogawa will deliver the CENTUM VP integrated production control system, ProSafe-RS safety instrumentation system, and other products. Yokogawa will also be responsible for engineering, and for providing installation support and commissioning for these products. The plant will be connected to the power grid in mid-2017. Although Brazil and many other countries in South America have relied largely on hydroelectric power, this power source has been less reliable in recent years because of severe water shortages. Thus, there is an urgent need in such countries for the construction of power plants that utilise alternate energy sources. As Brazil is the world's largest producer of eucalyptus pulp and sugar cane, biomass power plants that can utilise this energy source are a promising solution.

**Enquiries: Tel. 011 831 6300 or email [Christie.cronje@za.yokogawa.com](mailto:Christie.cronje@za.yokogawa.com)**

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## Mixed-signal oscilloscopes in-vehicle serial bus options

Trigger and analysis options have been added to **Yokogawa's** DLM2000 (4-channel) and DLM4000 (8-channel) mixed-signal oscilloscopes (MSOs) for testing the latest generation of in-vehicle serial buses. The new options are specifically designed to address the measurement challenges posed by the CAN FD (CAN with Flexible Data Rate) and SENT (Single Edge Nibble Transmission) bus systems.

CAN FD is a higher-speed version (up to 8 Mbit/s) of the original CAN Bus designed to provide a faster, more reliable and cost-effective solution to the challenge of the increased amount of data traffic in automotive applications such as firmware updating for ECUs (electronic control units).

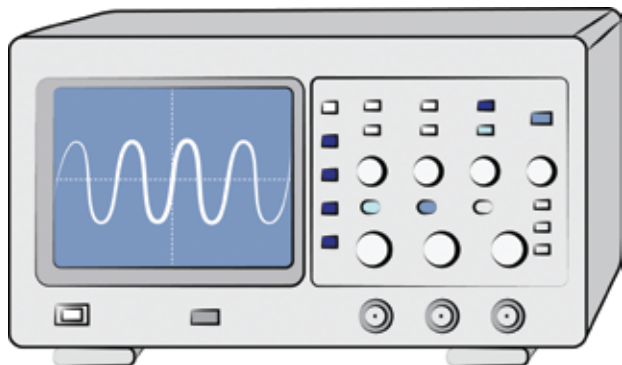
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## Simultaneous ICP-OES Elemental Analysis for Cost-Effective Condition Monitoring

Spectrometer-based elemental analysis has become a fundamental technique for condition monitoring (CM) in most service laboratories. A new white paper, Cost-Effective Condition Monitoring, details why a simultaneous ICP-OES instrument is a serious economic alternative to sequential ICP and atomic absorption spectrometry for elemental analysis in condition monitoring.

The paper includes a complete explanation of basic ICP-OES principles and processes — from sample preparation to plasma generator to the optical system and detectors through to the software developed to interpret measurement data. Using the SPECTRO GENESIS simultaneous ICP-OES spectrometer as a test instrument, the paper references the typical limits of detection for related elements in condition monitoring. The paper also describes advantages of the SPECTRO GENESIS' suitability for elemental analysis in condition monitoring and details its cost advantages versus sequential ICP and AAS analysers.



**Enquiries:** Download <http://goo.gl/8JlvFR>

## New precision pressure calibrators

**Fluke's** new 721 precision pressure calibrator with dual isolated sensors for gas custody transfer applications for pressure calibration and temperature measurement, allows for simultaneous static and differential pressure measurements within a single tool. The Fluke 700G31 precision pressure gauge calibrator - a rugged, high-quality pressure gauge calibrator - delivers fast and accurate test results. Its easy-to-use and reliable construction allows for precision pressure measurement from 15 psi/ 1 bar to 10 000 psi/690 bar with an impressive 0,05% accuracy. It is compatible with most hydraulic and pneumatic test pumps and can be combined with one of the Fluke test pump kits (700PTPK or 700HTPK) for a complete pressure testing and calibration solution. The 700G/TRACK Software allows for the upload over 8 000 pressure measurements which are logged in the field to a table or PC. The **Comtest Group** is Fluke's authorised Test and Measurement Distributor for South and southern Africa.

**Enquiries:** Tel: 010 595 1821  
email: [sales@comtest.co.za](mailto:sales@comtest.co.za)



## Flexible relative humidity instruments for industrial users

Michell Instruments, represented in South Africa by **Instrotech** – a **Comtest Group** company – has released its latest range of relative humidity transmitters for industrial applications. As well as being flexible, for use in a wide range of processes, the HygroSmart 280/290 series includes an interchangeable sensor that allows for routine maintenance to be made in just 30 seconds for most models.

At the heart of each instrument is the new HygroSmart I7000XP. This sensor is fully replaceable, and, because all the calibration data is incorporated, makes routine maintenance and recalibration as easy as changing a light bulb. The I7000XP uses Michell's latest polymer capacitive sensing technology, the H8000 tile to provide reliable accuracy of 1% RH.

The HygroSmart 280/290 series features a number of configurations designed to suit different applications. This includes duct- and wall-mounted as well as remote sensor versions, each with optional displays for easy interrogation and configuration. New software also allows for easy access to all configuration settings and data collection from a control room. The units are configurable to suit specific needs including outputs, units and alarms. Michell Instruments is a provider of field measurement solutions of humidity and temperature.

*Enquiries: Tel. 010 595 1831 or email sales@instrotech.co.za*



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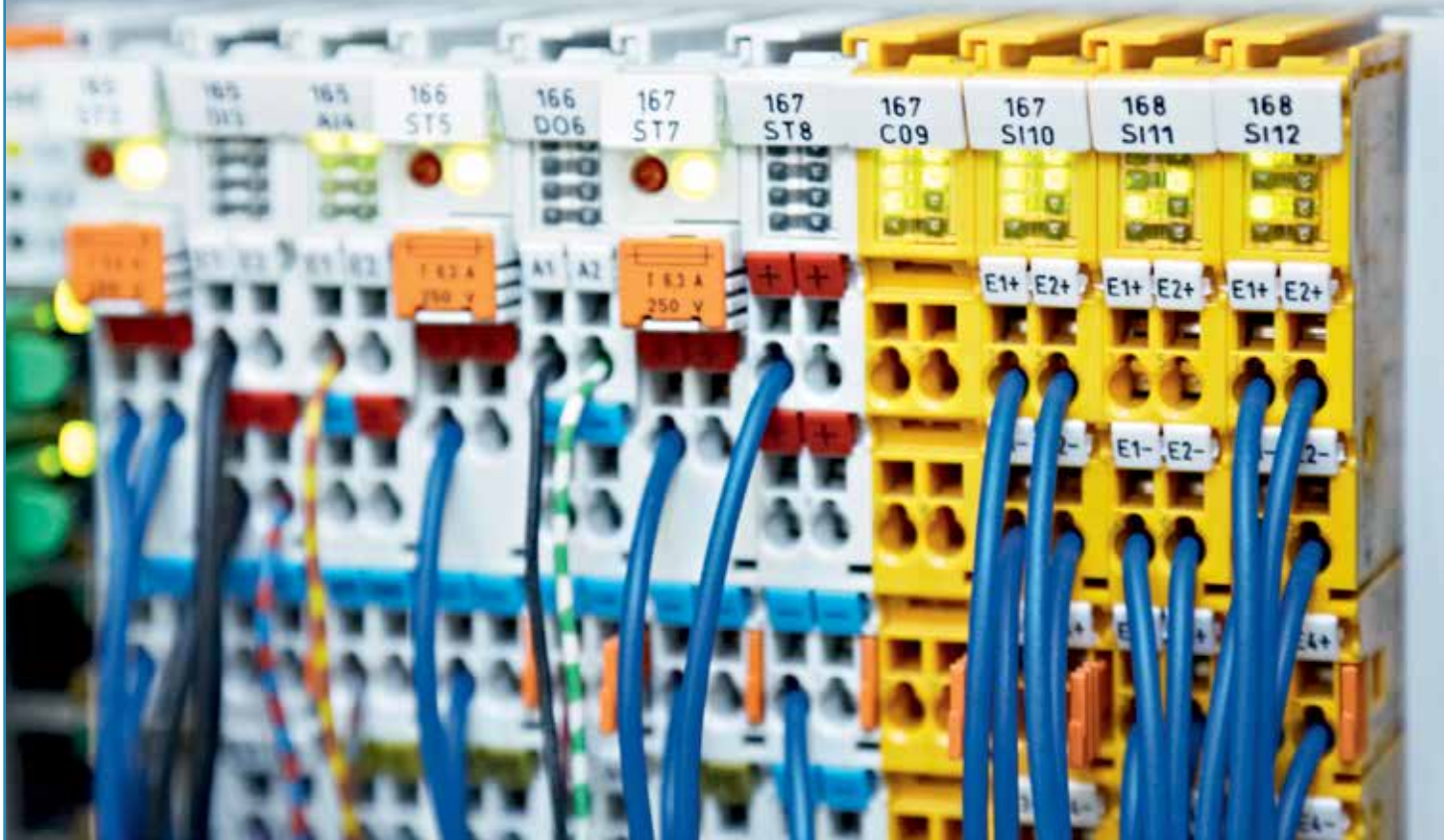
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# Best practices for control, safety and measuring technology

By S Ziegler, Beckhoff

*At a highly automated facility in Oelde, Germany, high end appliance manufacturer, Miele produces around 300 000 electric ovens and cookers per year, all of which are comprehensively tested before delivery. To this end, the corresponding manufacturing cells are equipped with semi- and fully-automatic testing stations. These stations benefit from integrated engineering and the close interaction of standard control, safety, and measurement technology, all powered by this company's automation software suite.*

The high quality Miele ovens and cookers are designed for the European and North American markets. Export share at Miele is over 70%, which is reflected in seven country-specific voltage versions and corresponding appliance tests. Originally, the appliances were produced in an assembly line with several integrated and consecutive testing stations. With the goal of 'production cycles based on customer demand', the system was converted to production in U-shaped assembly cells, resulting in an extended variety of tasks for all staff, including appliance testing, and improved productivity overall.

With the previous three synchronised assembly lines, the cycle time of the conveyor belts was between one and three minutes, depending on the line and device type, which corresponded to the working cycle of a worker for each appliance. Now, the work com-

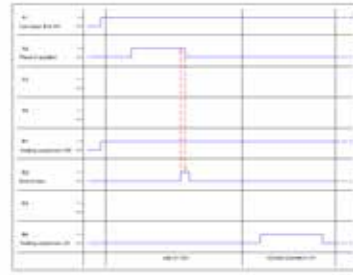
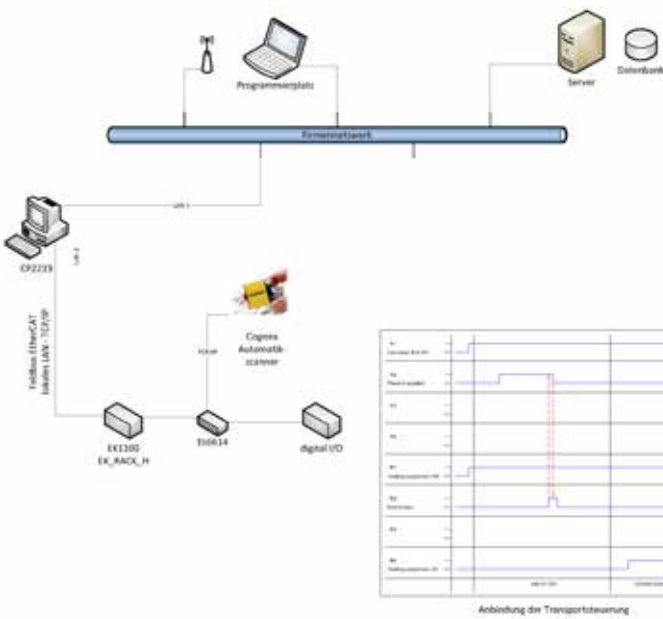
prises the complete assembly and testing of an appliance, which takes around 30 minutes and enhances job satisfaction for the workers. In addition, the changeover effort was quite high in the past, with associated cycle time losses and fluctuating staffing requirements, owing to the high number of appliance variants (around 800) and the large variety of lot sizes between one and ten. With the new concept that offers a total of seven assembly cells, we were able to

*Owing to its high degree of flexibility, PC-based control can be extended to cover new testing requirements.*



- ERP – Enterprise Resource Planning
- I/O – Input/ Output
- MPA – Miele Testing and Workstation
- PC – Personal Computer
- PLC – Programmable Logic Controller
- TCP/IP – Transmission Control Protocol/Internet Protocol

## Abbreviations/Acronyms



- With the goal of 'production cycles based on customer demand', this appliance manufacturer needed to improve its method of appliance testing before delivery.
- The system was converted to production in U-shaped assembly cells equipped with semi and fully automatic testing stations.
- Volume and variant flexibility has increased with reduced lead times and satisfied workers.

take note

increase the volume and variant flexibility while reducing lead times. This means that any device can be manufactured any day, basically without the need to plan ahead, which enables us to respond much better to rapidly changing customer demand and short-term orders.

### Assembly cells with fully and semi-automatic testing stations

Depending on the intended production capacity, each of the seven production cells has one or more semi-automatic testing stations – 17 in total. In addition, there are nine automatic stations in the conveying segments of the assembly cells, which monitor the tests and the presence of 'test content', forward the appliances to the central packing area and generate delivery notes, or divert them for repair if faults are found.

The actual functional testing, i.e. the statutory safety inspections, protective conductor measurements and high voltage tests, as well as numerous function tests, are carried out by a worker in the semi-automatic testing stations, based on a guided test sequence. Depending on the design of the around 1 000 appliances produced each day, the tests take between two and three minutes. Thanks to the underlying automation technology, all values can be logged in a central database.



### Flexible and open control technology required

In order to integrate the test stations in the respective production environment, flexible and open control technology is required, just like in the previous production line environment. From the outset, they benefitted from company's Bus Terminal system, which enables them to implement a uniform and compact I/O architecture. An additional benefit is the openness regarding the different bus systems, so that it was also quite easy to operate the test stations in a CANopen or PROFIBUS environment.

By leveraging the modular Bus Terminal technology, it is easy to log the numerous test signals and integrate them into the system. A key factor for efficient individual testing stations, particularly in the new assembly cells with their extended task requirements, is an error-free and comfortable dialogue with the tester. It therefore made sense to use not only the I/Os, but also PC-based control technology from this company.

These system benefits enable uniform, well-structured control hardware. Due to its high degree of flexibility, PC-based control can be extended easily to cover new testing requirements. EtherCAT offers particular advantages as a communication system that is not only extremely powerful, but also offers the choice of bus topology based on the individual requirements. This is complemented by excellent diagnostic capabilities, which facilitate working from the development environment right into the fieldbus or I/O level.

### Integrated and consistent software

With the transition to the new manufacturing and testing station concept, the new TwinCAT 3 software generation was introduced as the automation suite. The biggest advantages of the platform include integration into the Visual Studio engineering environment and integrated TwinSAFE safety functionality.

The given software structure of a testing station comprises the internally developed 'Miele testing and workstation' (MPA), which provides visualisation and data exchange with the ERP level. Ad-

ditionally, the system reads the device-specific test sequences from the central production database, for example.

As a subordinate system, which is linked to the MPA via ADS communication, TwinCAT 3 deals with traditional control tasks and I/O data processing. Work can now take place consistently in a single development environment. This makes project development much easier. In the past, a large number of tools had to be used - for different PLC generations, robot and safety controllers, as well as special real-time operating systems - which weren't even able to run on the same computer in some cases. An additional benefit was the straightforward and efficient nature of porting the existing TwinCAT 2 projects to TwinCAT 3.

The seamless integration of safety technology is another important aspect relating to the use of TwinCAT. The semi-automatic testing stations include a light curtain, emergency stop, and a door contact switch as safety elements. In addition, they had to meet the safety requirements of the Low-Voltage Directive, to ensure safe switching of the test voltages. All this can be configured in a unified engineering environment with the TwinSAFE Editor.

TwinSAFE also results in a significant reduction in hardware requirements, because the previously required special safety systems, and the corresponding cabling and communication efforts are a thing of the past now that Safety over EtherCAT is used, the TwinSAFE EL6900 logic terminal and the TwinSAFE I/O terminals.

### Control technology with advanced measurement functionality

The project design is further simplified with the direct integration of measurement technology into the control technology. The EL3403 three-phase power measurement terminals (up to 500 Vac) and EL3413 (up to 690 Vac) are used to check the function of the heating elements installed in the ovens as well as compliance with the power limit values. They are also used for high voltage tests. The EL3413 power measurement terminals, which are designed for up to 690 Vac, are also used to test the pin assignment of the 16-pin connector for the hob and the correct allocation of the energy regulators.

### Conclusion

The openness of PC-based control technology has additional benefits. Other measuring devices and sensors required for the appliance tests can also be integrated with little effort. To avoid the need for additional interfaces or communication modules, TCP/IP-capable devices are used - a high voltage meter and a hand-held scanner for the testing station and a bar code scanner for the automatic workstation. These can be integrated via the EL6614 Ethernet switch port terminal and supplied with the current parameter set via TCP/IP.



Stefan Ziegler is in marketing communications at Beckhoff, Germany.

Enquiries: Kenneth McPherson. Beckhoff Automation.  
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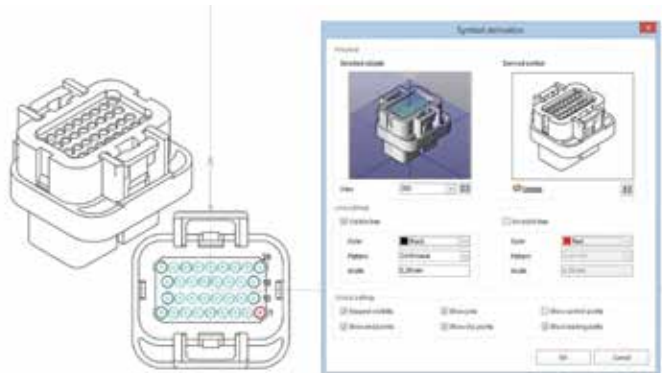
## Eplan Harness proD 2.5

Version 2.5 of **Eplan Harness proD** is just become available. Development has focused on optimising user workflows and a major new highlight is the coupling of the 3D wire harness engineering system to the Eplan Platform's central parts management. This represents a milestone in integrated data management. Users then have only one central parts management system which they are able to access over the entire course of a project. This significantly reduces the effort in maintaining master databases and enables continuous workflows from schematics through to production documentation. Master data workflows have been further optimised through the derivation of 2D symbols – required for nail board drawing – from existing 3D data. This is particularly efficient because 3D component data is already required. Existing data therefore gets reused – manual creation of component symbols is unnecessary.

Simple component positioning in 3D: Eplan Harness proD aims to provide a user-friendly 3D system for wire harness design. Electrical engineers generally have limited experience in operating complex MCAD systems and therefore benefit from a user-friendly approach. For example, by positioning a component, such as a connector, within the 3D space enables the selection of reference point, edges

and areas. This simplifies the positioning process. A preview function helps users to achieve correct positioning at the first attempt avoiding the need for subsequent adjustment. Users who use AutoCAD symbols can look forward to a much improved import function. Imported DWG and DXF drawings can be edited in Version 2.5 with all the relevant content being extracted.

**Enquiries: EPLAN Software & Service. Johan Reyneke. Tel. 011 609 8294 or email Reyneke.J@eplan-software.co.za**



## World's first Premset manufacturing partnership agreement

**Schneider Electric** has entered into a production partnership agreement with Steelcor Power, a South African manufacturer of electrical products, to produce its next generation of smart grid-ready, medium voltage (MV) switchgear, Premset. Built using a Shielded Solid Insulation System (2SIS), Premset lets MV network operators



increase safety and efficiency while simultaneously minimising downtime and meeting the needs of the smart grid. 2SIS is a technical breakthrough that protects all the switchgear's live parts with earth-screened solid insulation, reducing the risk of internal arcing and facilitating top performance in practically any environment. To prepare for production, Steelcor Power has added 900 square metres to its factory in Boksburg, an area that has been enhanced with a three-ton gantry crane, a new test bay with a partial discharge faraday cage, and specialised equipment to manufacture Premset. The first unit is expected to roll off the line for inspection by Schneider Electric France at the end of October 2015. A further 14 units are planned for this year, and production for 2016 will scale up to 200 units with an annual increase of 20%.

**Enquiries: Ntombi Mhangwani. Tel. 011 254 6400 or email ntombi.mhangwani@schneider-electric.com**

*John Farren, chief executive officer at Steelcor Power and Eric Leger, country president for Southern Africa at Schneider Electric, at the signing of the licence agreement.*

## Make renewable and EFW plants more efficient

Energy from Waste (EFW) plants around the world rely on automated systems from **Mitsubishi Electric** to optimise performance and ensure the maximum levels of efficiency while also achieving rigorous environmental standards for emissions.

Interest in EFW has never been higher. It is estimated that in the UK 17% of the nation's demand for electricity could be met from EFW generation plants and that this would massively reduce the need for waste disposal in landfill sites. Further it would make a major contribution to recycling targets.

As well as traditional power plants Mitsubishi Electric has supported Energy from Waste, biomass and other new and emerging solutions. Within its experience are biogas based generation at waste water facilities, electricity generation from steam turbines and district heating.

Mitsubishi Electric is launching several innovative new solutions for the EFW industry, including the PMSXmicro, a control system developed specifically for smaller plants, and the Virtual Power Plant which uses cutting edge control technologies to create a stable energy network by automatically managing multiple renewable power plants to work together and meet real-time energy needs. PMSXmicro is designed specifically for smaller scale applications. It runs on a single industrial computer and delivers proven control technology in an inexpensive and easily engineered package. Its integrated alarm and event system allows rapid responses to unexpected events and also records events and messages securely in sequence, allowing process flows to be traced in the event of problems or changes to the plant.

**Enquiries: Email philip@dmaeuropa.com**

## Siemens hands over Northriding manufacturing cell

On 15 September, **Siemens** hosted over 50 people, which included representatives from the Department of Trade and Industry and Eskom to celebrate the official handover of the new lean manufacturing cell to Fearless Technical Contracts and Services at their Siemens North Riding Manufacturing Facility, an incubator for Small Enterprises.

The Fearless organisation started out as temporary workers that were contracted to a labour broker. Due to Siemens' decision to stop the use of labour brokers, Tshepo Mokoena, founder of Fearless and his team were given the opportunity by Siemens to register his business as a small enterprise and to continue rendering their services as a supplier to Siemens. Fearless is a completely black owned company and today comprises 15 employees, men and women.

As part of Siemens' culture of continuous improvement, their manufacturing process was improved by isolating certain pre-assemblies and a lean manufacturing cell was established to produce these sub-assemblies. Taking into account Fearless' excellent service delivery and commitment, they have now been appointed as the main suppliers in charge of the new lean manufacturing cell to produce certain sub assemblies for the Eskom Kusile project.

Rita Nkuhlu, Siemens Executive Director stated, "At Siemens, we believe that helping to develop small and medium sized enterprises can ignite an economic upturn in our country."

With Enterprise Development forming the core of the country's economic sustainability, the company has invested over R100 M towards supporting strategic black partners in their quest for economic sustainability, by enabling them to hold 100% black share ownership in businesses which continue to have access to market share and thrive as stand-alone enterprises.

In February this year, Siemens launched the Supplier Development Programme, which marked the start of a process whereby a select number of suppliers were chosen to partner with Siemens in order to develop their business ambitions.

Fearless is one of the 50 companies that have been selected from their 3 500 supplier base. Each of these suppliers is part of a tailored development programme to meet their specific requirements. The program includes a combination of mentoring, coaching and internal and external training in both technical and soft skills.

**Enquiries: Kalai Pillay. Tel. 011 652 2285 or email [kalai.pillay@siemens.com](mailto:kalai.pillay@siemens.com)**



*Representatives from the Department of Trade and Industry, Eskom, Fearless Technical and Siemens at the official Launch of the Lean Manufacturing Cell to Fearless.*

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## Engineering students develop future technology

Engineering students at the University of Witwatersrand (WITS) are aiming to revolutionise the food and beverage industry by developing new concepts and innovative designs as part of their participation in the 2015 **PneuDrive** Challenge, sponsored by **SEW-EURODRIVE**. The annual PneuDrive Challenge aims to provide mechanical, electrical and mechatronic students with the opportunity to combine theory with the latest drive engineering technology.

They are expected to come up with a concept design and business case, which involves cost analyses and the feasibility of companies using their designs.

Three teams at WITS are working hard to win top prize – a ten-day all expenses paid trip to Germany, where the winners will present their design to the head office of the sponsor company. The competition sees universities receiving state of the art equipment for their laboratories from the sponsor as part of their prize.

### **Autonomous robotic cleaner**

The first team consists of Vuledzani Madala, Portia Sibambo, Tisetso Ramolobe and Nkosinathi Shongwe. They are designing a robotic floor cleaner for hazardous environments.

The team came up with the concept of the robot after visiting a brewery in Pretoria and identifying the need for this design.

The robot uses a mechanical broom and mop which extends to the floor and absorbs liquid, while pushing solid waste inside its storage bin. The autonomous cleaner is able to separate liquid waste from solid waste without assistance.

Their design is focused on assisting industrial companies to avoid the costs of paying external cleaners, however, they must also support their business case by including cost comparisons between using their robot, and employing cleaners.

Sibambo, who is the leader of the group, focused on the pneumatic system while the others split the drawing, design and research among themselves.

### **Turning waste into energy**

The second team consists of Craig Daniel, Micha Dedekind and Richard Grieves. Their project is based on waste reduction, by converting organic waste to methane through anaerobic digestion.

They aim to cut costs for businesses by giving them the opportunity to use renewable energy. Daniel indicates that they are focusing

on the elements that need to be controlled in order to get the pH right within the tanks and to ensure that they do not over-pressurise.

For their business case, Daniel's team claims that their design will help companies to not only get rid of their waste in-house, but to convert that waste into a bio gas that can be used for other purposes such as heating. Although they admit that it would be costly to set up, they insist that the long-term cost benefits outweigh the set-up costs.

### **Depalletiser for bottle recycling**

The third team consists of Muhammed Mangera, Markus Janse van Rensburg and Mikhail Villet, who are designing an overhead arm that picks up plastic sheets and removes them from empty bottles inside pallets. Janse van Rensburg explains that the main focus of the design is the recycling of bottles. "We would like to target companies that do depalletising manually, as our design eliminates the process of having to unpack, clean, refill and thereafter recycle."

"Our design is compact, high-performance and requires minimal maintenance. As a result, we believe we can improve productivity, resulting in time and cost savings," Janse van Rensburg adds.

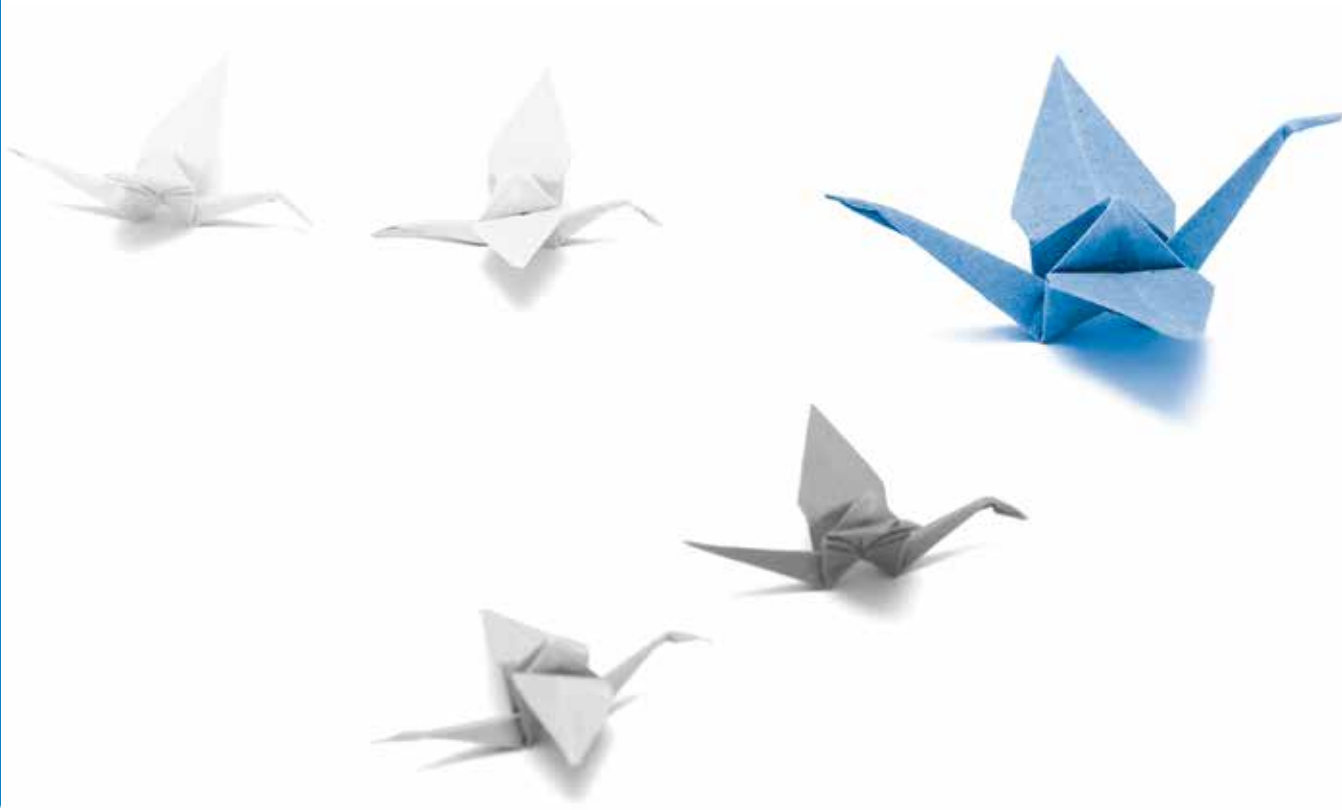
All three teams from WITS will send through their designs for judging by 8 October 2015, along with teams from other universities nationwide. The winning team is due to be announced in December 2015.

**SMC Pneumatics South Africa** has announced that they will be the pneumatic partner for the competition going forward.

**Enquiries: Visit [www.pneudrive.co.za](http://www.pneudrive.co.za)**



Vuledzani Madala, Portia Sibambo, Tisetso Ramolobe and Nkosinathi Shongwe, Craig Daniel, Richard Grieves, Muhammed Mangera, Markus Janse van Rensburg, Mikhail Villet and Micha Dedekind.



## Streamline your production with SMC's advanced technology in pneumatics and automation

The evolution from basic pneumatics to the more sophisticated automation solution, has granted SMC a global market share of 32%, and 60% in the Japanese market.

### Did you know?

- Despite SMC offering more than 12,000 basic products in over 700,000 variations, the company is able to provide a rapid response to meet its customers' demands which operate across diverse automation industries.
- Thanks to its extensive customer focused infrastructure, SMC has the hands on expertise and bespoke technical facilities to provide solutions – however big or small the idea, issue or need its customers face.

Contact us for a free consultation on +27 11 568 2407 or [sales@smcpneumatics.co.za](mailto:sales@smcpneumatics.co.za)

## Advanced embedded control in grinding mills

**ABB**, the power and automation technology group, is launching an advanced control solution embedded within a variable-speed drive. Called SmartMill, it utilises real-time data for continuous control of individual grinding mills, thereby removing the onus on the operator's experience and judgment.

Traditionally, operators face limited flexibility in optimising grinding operations, an example is adding balls to the mill load and waiting for load reduction when the mill is overloaded. These adjustments are usually performed with only rudimentary control automation, or none at all. ABB's SmartMill optimises the process by adapting the actual mill speed and feed rate to current conditions in real time. The speed is varied according to an advanced control concept that keeps the mill's solid feed as high as possible, while monitoring signals such as power consumption, motor torque and bearing pressure and mill speed. This automatic selection of optimal set points means that operators can focus on more important tasks.

Having full control of a mill helps improve the process control strategy. ABB offers advanced process control (APC), which increases grinding efficiency, decreases energy consumption and extends equipment lifetime throughout the entire grinding circuit.

SmartMill is a standalone solution for individual mills and incorporates a variable-speed drive system as standard, while accessing all mill operation and maintenance features, such as automatic positioning, creeping speed and the frozen charge protection and remover function. For inputs, SmartMill uses power, torque and load, which the controller uses to predict

future mill behaviours. The outputs can take into account several mill variables, such as feed rate, mill rotation speed, ore hardness and purity, total load and water addition rate. SmartMill provides full stability to individual mills, without the need for additional controllers or sensors. This leads to increased grinding efficiency, reduced energy consumption, higher throughput, better influence over particle size, fewer shift-to-shift variations and extended liner lifetime.

"Normally, there is a trade-off between particle size, throughput, and recovery," says Marcelo Perrucci, global product manager, ABB. "SmartMill allows flexible adjustments so that the sweet spot, which will vary from mine to mine, can be readily identified."

**Enquiries:** Email [emmanuel.chabut@ch.abb.com](mailto:emmanuel.chabut@ch.abb.com)



# OMRON

## New FQ2 Vision Sensor

The Vision Sensor that has it all



Omron's new FQ2-series vision sensor sets a new standard, providing the most comprehensive image inspection and code verification on the market.

With over 100 camera options, the FQ2 provides users with the ultimate flexibility to solve applications, whether you need high resolution, code reading, integrated lighting, or a cost effective solution to solve a simple application, there is an FQ2 which fits your needs.

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# Current Automation

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## POWERING SOUTHERN AFRICA WITH INDEPENDENT AND INTELLIGENT SOLAR ENERGY

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# Sunny Tripower

**SUNNY TRIPOWER 5000TL - 25000TL**  
**THE THREE-PHASE INVERTER – NOT ONLY FOR YOUR HOME...**  
**...but also perfectly suited to the design of the traditional residential PV system up to the higher power outage range.**

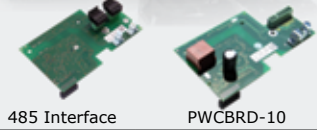


## Economical

- \* Maximum efficiency of 98%
- \* Shade management with OptiTrac Global Peak
- \* Active temperature management with OptiCool

## Flexible

- \* DC input voltage of up to 1,000 V
- \* Integrated grid management functions
- \* Reactive power supply
- \* Module-tailored system design with Optiflex



485 Interface

PWCBRD-10

Technical Data	STP 5000TL	STP 6000TL	STP 7000TL	STP 8000TL
<b>Input (DC)</b>				
Max. DC power (@ cos φ = 1)	5100W	6125W	7175 W	8200W
Max. input voltage	1000 V			
MPP voltage range / rated input voltage	245 V ... 800 V/580 V	295 V ... 800 V/580 V	290 V ... 800 V / 580 V	330 V ... 800 V / 580 V
Number of independent MPP inputs / strings per MPP input	2 / A:2; B:2	2 / A:2; B:2	2 / A:2; B:2	2 / A:2; B:2
<b>Output (AC)</b>				
Rated power (@ 230 V, 50 Hz)	5000W	6000W	7000W	8000W
Max. AC apparent power	5000 VA	6000 VA	7000 VA	8000 VA
Interface: RS485, Bluetooth, Speedwire / Webconnect	o / • / •	o / • / •	o / • / •	o / • / •

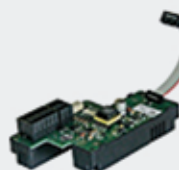
Technical Data	STP 9000TL	STP 10000TL	STP 12000TL
<b>Input (DC)</b>			
Max. DC power (@ cos φ = 1)	9225W	10250W	12275 W
Max. input voltage	1000 V		
MPP voltage range / rated input voltage	370 V ... 800 V / 580 V	370 V ... 800 V / 580 V	440 V ... 800 V / 580 V
Number of independent MPP inputs / strings per MPP input	2 / A:2; B:2	2 / A:2; B:2	2 / A:2; B:2
<b>Output (AC)</b>			
Rated power (@ 230 V, 50 Hz)	9000W	10000W	12000 W
Max. AC apparent power	9000 VA	10000 VA	12000 VA
Interface: RS485, Bluetooth, Speedwire / Webconnect	o / • / •	o / • / •	o / • / •

**ACCESSORIES**    • Standard feature   o Optional feature   – Not available

Technical Data	STP 15000TL	STP 20000TL	STP 25000TL
<b>Input (DC)</b>			
Max. DC power (@ cos φ = 1)	15,340 W / 15,340 W	20440W / 20440W	17,410 W / 17,410 W
Max. input voltage	1000 V		
MPP voltage range / rated input voltage	360 V to 800 V/600 V	320V to 800V/600V	400 V to 800 V/600 V
Number of independent MPP inputs / strings per MPP input	2 / A:5; B:1	2 / A:3; B:3	2 / A:5; B:1
<b>Output (AC)</b>			
Rated power (@ 230 V, 50 Hz)	15000W	20000W	12000 W
Max. AC apparent power	15000 VA	20000 VA	12000 VA
Interface: RS485, Bluetooth, Speedwire / Webconnect	o / • / o	o / • /	o / • /



Data module with RS485 interface



SMA Power Control Module



Multifunctional Relay

## ACCESSORIES

# Sunny Boy

NOW COMES STANDARD WITH WEBCONNECT  
FOR FREE ONLINE MONITORING

The Sunny Boy is the ideal solution, especially for demanding PV arrays and partially shaded systems. Enjoy proven technology combined with intelligent ideas. Cutting-edge technology that sets the standard. Concepts you can count on. Details that are simply superior.



Data module with RS485 interface



## Economical

- Maximum efficiency of 97 %
- Multi-string technology in all power classes
- Cost saving due to fewer parallel strings
- Shade management with OptiTrac Global Peak

## Flexible

- Maximum DC input voltage of 750 V
- Integrated grid management functions and reactive power provision

Technical Data	SB 3000TL	SB 3600TL	SB 4000TL	SB 5000TL
<b>Input (DC)</b>				
Max. DC power (@ cos φ = 1)	3200W	3880W	4200W	5250W
Max. input voltage	750 V			
MPP voltage range / rated input voltage	175 V ... 500 V / 400 V	175 V ... 500 V / 400 V	175 V ... 500 V / 400 V	175 V ... 500 V / 400 V
Number of independent MPP inputs / strings per MPP input	2 / A:2; B:2	2 / A:2; B:2	2 / A:2; B:2	2 / A:2; B:2
<b>Output (AC)</b>				
Rated power (@ 230 V, 50 Hz)	3000W	3880W	4000W	5000W
Max. AC apparent power	3000 VA	3680VA	4000 VA	5000 VA
Interface: RS485, Bluetooth, Speedwire / Webconnect	o / • / o	o / • / o	o / • / o	o / • / o

## ACCESSORIES • Standard feature o Optional feature — Not available

Technical Data	Sunny Boy 1.5	Sunny Boy 2.5
<b>Input (DC)</b>		
Max. DC power (@ cos φ = 1)	1600W	2650W
Max. input voltage	600 V	
MPP voltage range / rated input voltage	160 V to 500 V	260 V to 500 V
Number of independent MPP inputs / strings per MPP input	1 / 1	1 / 1
<b>Output (AC)</b>		
Rated power (@ 230 V, 50 Hz)	1500W	2650W
Max. AC apparent power	1500 VA	2650VA
Interface: RS485, Bluetooth, Speedwire / Webconnect / WLAN	- / - / • / •	- / - / • / •

# Sunny Island

The custom-fit solution for on-grid and off-grid

## Flexible

- \* For self-consumption systems, battery backup systems and off-grid systems
- \* For single- and three-phase systems from 2 to 13 kW
- \* All lead-acid batteries and many lithium-ion batteries can be used



Speedwire data module Modbus TCP



Load-shedding protection



Technical Data	Sunny Island 3.0M	Sunny Island 4.4M	Sunny Island 6.0H	Sunny Island 8.0H
<b>Input (DC)</b>				
Rated input voltage / AC input voltage range	230 V / 172.5 V ... 264.5 V	230 V / 172.5 V ... 264.5 V	230 V / 172.5 V to 264.5 V	230 V / 172.5 V to 264.5 V
Rated input frequency / permitted input frequency range	50 Hz / 40...Hz ... 70 Hz			
Maximum AC input current	50 A	50 A	50 A	50 A
Maximum AC input power	11,500 W			
<b>Stand-alone or emergency power operation</b>				
Rated grid voltage / AC voltage range	230 V / 202 V ... 253 V			
Rated power (for Unom / fnom / 25°C / cos φ = 1)	2,300 W	3,300 W	4,60W	6,000 W
<b>Battery DC input</b>				
Maximum battery charging current / rated DC charging current / DC discharging current	51 A / 45 A / 51 A	75 A / 63 A / 75 A	110 A / 90 A / 103 A	140 A / 115 A / 130 A
Sunny Home Manager / SMA Energy Meter	o / o	o / o	o / o	o / o

# Flex PRO

Three-phase inverters for small to medium-sized PV systems



**NEW**

Topology: Transformerless  
Max. DC voltage: 1000 V  
Nominal apparent power: 15000 VA / 17000 VA

Technical Data	FLX Pro 15	FLX Pro 17
<b>Alternating Voltage (AC)</b>		
Nominal apparent power	15 kVA	17 kVA
Nominal active power	15 kW	17 kW
Reactive power range	0 to 9.0 kVAr	0 to 10.2 kVAr
<b>Direct Current (DC)</b>		
Max. PV power per MPPT	8 kW	8 kW
Active MPPT voltage range / MPPT voltage range during rated operation	220/430 to 800V	220/485 to 800V
<b>Efficiency</b>		
Max. efficiency	98.0 %	98.0 %

## Monitoring Control

Our products for system monitoring offer you the widest range of possibilities: wireless or internet based, compact or complex, concise or elaborate. Regardless whether you want to monitor the yield of a home roof system or of an open-field solar power station.

### SUNNY HOME MANAGER



Every residential PV system can be conveniently and seamlessly monitored with the Sunny Home Manager. After a simple commissioning procedure using the installation wizard, all basic functions are available via Sunny Portal.

### SUNNY PORTAL



Whether for residential systems or commercial PV plants, centralized management and system monitoring saves time and money. Plant operators and installers have access to key data at any time.

### SMA ENERGY METER



The powerful measurement solution for intelligent energy management within the SMA Smart Home: The SMA Energy Meter takes phase-exact and balanced electrical measured values as a grid feed-in and purchased electricity meter and communicates these values via Speedwire.

### SUNNY WEBBOX



The Sunny WebBox is the ideal monitoring solution for medium-sized PV plants. It receives and stores current measured values and transmits data via RS485. This means you can stay updated on the status of your plant around the clock.

### SUNNY WEBBOX with Bluetooth



Monitoring, remote diagnosis, data storage, configuration and visualization from anywhere in the world – the Sunny WebBox.

### SUNNY VIEW



With Sunny View, you have an overview of all of your plant data – even live and in color: Plant operators can use the large, easy-to-read five-inch color touchscreen to display all key PV data at home, as well as to receive news and meteorological data.

### POWER REDUCER BOX



With the Power Reducer Box, SMA delivers a solution for PV plants that take part in feed-in management. It allows the grid operator to remotely control the plant performance in cases when the grid is overloaded.

### SUNNY SENSORBOX



The Sunny SensorBox is installed directly onto the modules and measures solar irradiation and module temperature, optionally, wind speed and ambient temperatures.

### WEBCONNECT



Ideally suited for online monitoring of small PV systems with up to four inverters, Webconnect provides free access to Sunny Portal and Sunny Places, the community portal. It's simple to use, requiring only Internet access and a DSL router.

## Contact us:

JHB: Tel: 010 591-1713, Fax: 011 462-4310  
Capetown: Tel: 021 200-5754 / 021 200-8248  
Mbombela (Nelspruit): Tel: +27 (0) 13 004-0012 / Fax: +27 (0) 13 004-0011

KZN (Durban): Tel: 031 569-2854, Fax: 031 569-2864  
Bloemfontein: Tel: 051 011 0158, Fax: 051 444-1996

## New version of the UPS-CONF UPS software

The free UPS-CONF software enables the Qunit UPS-IQ and Trio UPS UPS systems to be monitored and configured conveniently and clearly. The new version 2.2.7.0 features improvements and enhancements.

New warning messages signal, for example, whether the UPS remote control is activated or whether a communication error has occurred between the UPS and the batteries. The new COM trigger mode can be useful if several PCs need to be shut down in a controlled manner in the event of a mains failure; here the signal contacts of the UPS initiate a shutdown of the PC via the COM port, which means that

no permanent data cable connections are required, regardless of the Windows version being used. DC UPS devices with 5, 10, 20, and 40 A from revision 06 can now switch off loads in a staggered sequence. When the UPS buffers a mains failure, two separate timers start, whereby previously defined consumers cease to be supplied by the battery after a set time.

The software automatically detects the connected power storage, for example a lead battery with 12 Ah. All relevant operating parameters are displayed graphically and important messages appear in the foreground. The behaviour of the UPS

modules can be changed via the software to suit individual requirements.

**Enquiries: Tony Rayner.**  
Email [tonyr@phoenixcontact.co.za](mailto:tonyr@phoenixcontact.co.za)



## Safety is paramount

**Schneider Electric**, a global specialist in energy management and automation, has released its Tricon CX compact system for safety and critical control applications in the oil and gas, power, refining, chemicals, pharmaceutical and biotech industries, where safe operations are critical and reliable operation is paramount. A certified ISA Secure system, the high-integrity and highly available Tricon CX ensures operational integrity, protecting against inherent risk and hazards, as well as external threats such as cyber-attack.

The latest addition to Schneider Electric's Triconex line of safety-instrumented systems, the Tricon CX is smaller, faster, lighter and more powerful than previous safety solutions. Its advanced functionality enables online upgrades without operational interruption. Additionally, the compact design allows for a number of new features including:

- Reduced form factor by 50%
- 67%t reduction in weight
- Lower power consumption
- Advanced monitoring and control capabilities, including:
  - o Supervised DI/DO with advanced line-performance diagnostics
  - o Fast analogue inputs with integrated HART

- o 1ms SOE digital input
- o Choice of direct termination or external termination panel
- 300% increase in controller tag capacity
- Five times increase in peer-to-peer performance
- ISA Secure EDSA level 1
- New automated test and verification of safety logic

**Enquiries: Visit <http://bit.ly/TriconCX>**



## Ethernet media converters for basic requirements

The new class 1000 Ethernet media converters from **Phoenix Contact** are designed for industrial applications with basic requirements. They offer a simple and cost-effective entry into optical transmission technology. Data transmission via fibre optics optimises Ethernet applications in terms of performance and transmission reliability. In addition to a higher range, the benefits of electrical isolation are also reaped. The compact units in robust metal housings bridge distances of up to 9,6 km. Multi-mode glass-fibres are used, option-

ally with SC duplex or B-FOC (ST) plugs. Start-up is simplified by auto negotiation and auto crossing. In addition, data rates of 10 and 100 Mbps can be firmly set. Besides numerous diagnostics LEDs, the media converters are equipped with LFP function (Link Fault Pass-through). This ensures permanent and continuous monitoring of the connection. In the event of a connection loss, redundancy mechanisms can take over operation immediately.

**Enquiries: Sean Hadley.**  
Email [seanh@phoenixcontact.co.za](mailto:seanh@phoenixcontact.co.za)



## Complete integrated solution for data and power transfer

The new Ha-VIS eCon Ethernet Switches offer the complete integrated solution for data and power transfer in one device, while reducing cabling effort and costs at the same time.

Besides stable data communications with a high bandwidth, industrial devices need a reliable supply of power. The new Ha-VIS eCon Ethernet switches from **HARTING** therefore offer high performance Power over Ethernet Plus for the supply of power to industrial devices. With a data transfer rate of 1 000 Mbit/s simultaneously on all ports and with the support of PoE+, the Ha-VIS eCon series offers functions enabling the efficient and future-proof design of equipment, systems and plants.

Over and beyond the PoE/PoE+ standard, we are offering the new switches with an integrated dc/dc voltage converter. In this case the switches can be supplied with 24 V instead of the 48/54 V usually required. This provides users with more flexibility in the connection of end devices and the expansion of the network, saves on components such as power supplies and reduces assembly time and space.

Thanks to their compact dimensions, the switches of the Ha-VIS

eCon family fit in anywhere. With over 200 switch models, users can select exactly the combination of performance characteristics and port combinations that fit the particular application perfectly.

*Enquiries: Email [Michael.Klose@HARTING.com](mailto:Michael.Klose@HARTING.com)*



## Components for 10 GigaBit Ethernet

Recently, the demand for reliable data transmission between the harsh industrial environment and the office communication network has been increasing. ESCHA supplied by **RET Automation Controls** offers the appropriate connectivity components for this interface solution. These components include M12x1 round connectors, flanges, and built-in plugs with X-coding for the harsh environments experienced at the field level as well as RJ45-connectors for IT-wiring.

### Connectors for the field level

The four-pair M12x1 round connectors for the field level are based on the 360° shielding concept developed by ESCHA. Thereby, the shield connection is effected through a reliable crimping with the shield housing and not through a crimped plug-connection on the cable. Therefore they meet the IP67, IP68, and IP69K protection class requirements and moreover guarantee a safe and reliable 10 Gbit/s data-transmission speed according to Cat6A. In addition to the manufactured connection and junction cables, ESCHA has added a field-wireable connector to the product line. The portfolio also includes housing feed-through receptacles for front and back wall installation and an M12x1-flange with angled contacts for direct mounting onto boards. Moreover, a reflow-capable built-in socket for device installation is available and can be adapted to custom-specific housings. The shielding concept has been consistently implemented with these products as well.

### Connectors for the office level

At the office level the sealing requirements are lower than those at the industry level. For this application area, various RJ45-solutions are available that meet protection class IP20. The 4-pole and 8-pole connection and junction cables of the RJ45-connector provide for data transmission according to Cat6 and are also available in an overmolded as well as a field-wireable version. All variants are multiport capable through their compact housing style.

### Applications with high data-transmission speeds

Given the ever-increasing higher data-transmission speeds, ESCHA is quite confident that they will be able to meet their customer's current and future requirements with its comprehensive product program for Industrial Ethernet applications.

According to ESCHA, there are three main industrial areas that require high data-transmission speeds. These are building wide management systems being installed in industrial facilities, device installation on the production line and the area of vision and scanner systems for production monitoring and real-time data evaluation. In addition to the industrial application areas, there are more application environments. For example, rail and security applications. In particular, entertainment-systems on trains that provide passengers with a reliable seat-internet connection and monitoring cameras which place similarly high requirements on data transmission and the robustness of the connector. Apart from high transmission speeds, the trend will also continue to move towards quality. It is only when misinformation during data transmission is avoided, that the available high transmission speeds can also be used. In new applications with higher data volumes, inferior cables cause transmission errors. That means, data packages have to be resent which in turn leads to higher network traffic and longer protocol-processing periods. Particularly sensitive systems may even experience a bus crash. At this point, ESCHA has high-grade M8x1 and M12x1 Industrial Ethernet components for all common Ethernet protocols (sercos, EtherCAT, ProfiNet, Powerlink and EtherNet/IP). The connector and housing manufacturer has launched connectivity products that provide for measurable high data-transmission speeds. All products guarantee a reliable, fast and safe futureproof data transmission through increased signal reserves.

### Comprehensive portfolio for IE-applications

Besides the M12x1 connectors with X-coding and the new RJ45-products, ESCHA continue to offer its proven M12x1-portfolio with D-coding designed for Industrial Ethernet applications with a data-transmission speed of Cat5e. This comprehensive 4-pole product range is also based on the proven 360° shielding concept and guarantees better network traffic through high signal reserves.

*Enquiries: [Brandon Topham](mailto:Brandon.Topham@retautomation.com)  
Email [brandon.topham@retautomation.com](mailto:brandon.topham@retautomation.com)*



# SIEMENS SIMATIC IPC

## The more industrial PC



To implement tasks of increasing complexity - at less risk and with less outlay - you require hardware and software that is both innovative and guaranteed to remain available over the long term. For over two decades, Siemens has offered reliable industrial PCs for this purpose assembled in their own factories in Germany with mainboards developed in house – standardised, flexible and scalable. This benefits machine and plant builders, system integrators and end customers alike. SIMATIC IPCs offer you flexible options for compact designs with greater performance and functionality.

### 'The More Industrial PC'

#### Advantages of 'the more industrial PC':

- Reliable industrial PCs with main-boards developed in house
- Assembly in Germany to the highest standards of quality to ensure high system availability and greater productivity
- Compact, innovative design in various construction types with higher performance and greater functionality
- Uniform front panels with widescreen displays for harmonized design of machines and plants
- Ready-to-use bundles and software packages
- Customised automation for individual products, systems, turnkey and industry-specific solutions

### 'Made in Germany'

In 1983, Siemens was the first supplier to offer standard PC technology with industrial characteristics. More milestones since then:

- 2006 – The first industrial PC family with Intel Core2 Duo processors
- 2009 – The first and, until now, only supplier of a software controller with safety functions that has been certified by the German Technical Inspectorate (TÜV)
- 2010 – The first manufacturer of an integrated, high-end industrial PC family with new-generation i7/i5/i3 Intel Core processors
- 2011 – The first manufacturer of an embedded industrial PC family with new-generation Intel Atom processors (presented with the iF product design award in 2011 and 2012)
- 2012 – The first supplier of HMI/IPC devices with widescreen fronts (presented with the iF product design award in 2012)

Siemens has more than doubled the number of PC based systems in the field over the past nine years to over a million devices. Siemens is the global market leader in industrial PCs and therefore the leading systems supplier of PC-based automation.

### SIMATIC S7-1500 Software Controller

The SIMATIC S7-1500 Software Controller offers the advantages of the SIMATIC S7-1500 standard controller on industrial PCs. As a result, you will benefit from maximum user friendliness and scalability in performance as well as efficient engineering due to the Totally Integrated Automation (TIA) Portal.

As with all SIMATIC controllers, messages pertaining to system diagnostics can be called up via a click. Easy-to-use motion functions are already integrated.

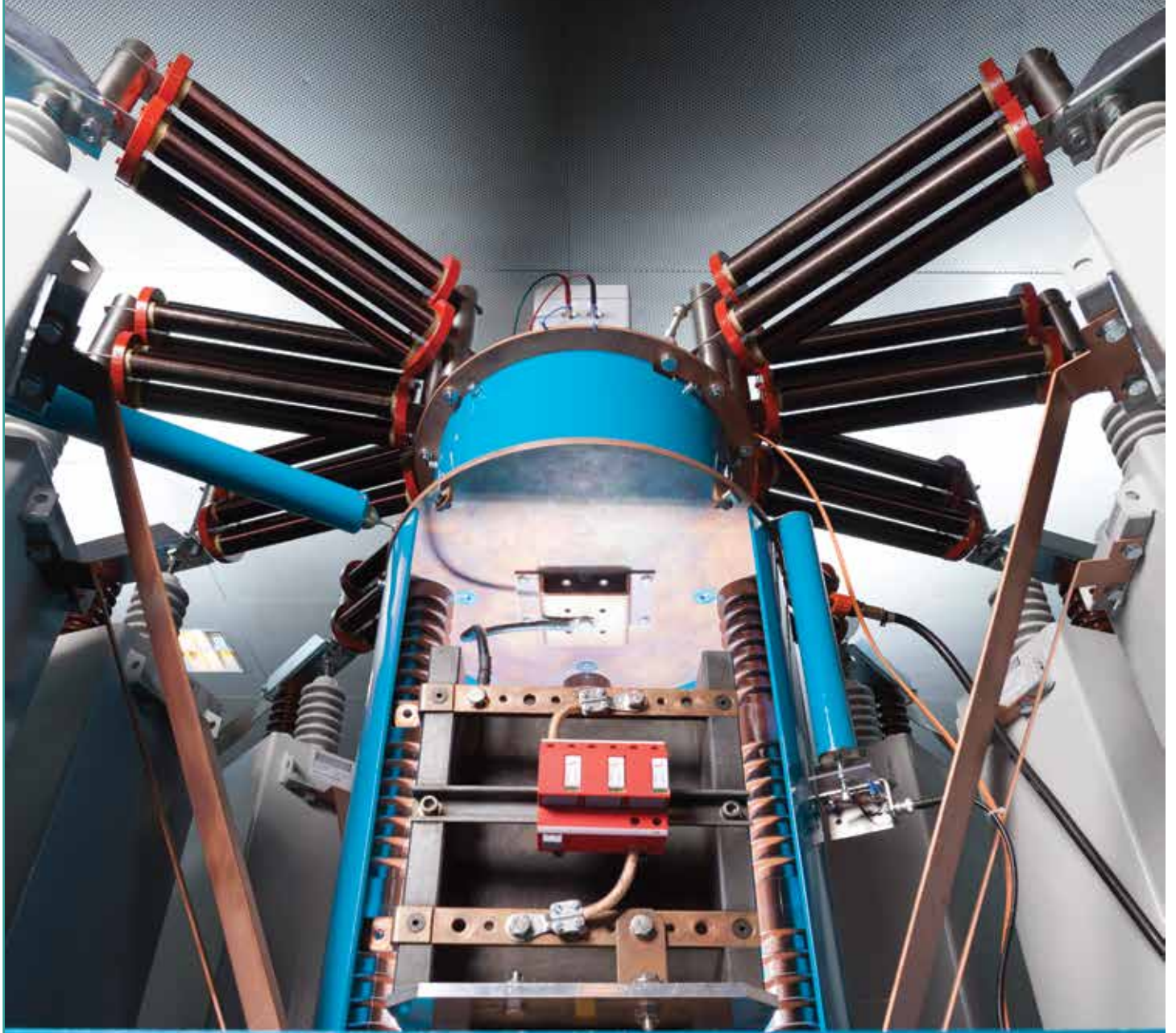
Analogous to the SIMATIC S7-1500 Software Controller, PC-based automation comes with maximum system availability: The software controller operates absolutely independently of the Windows system – this ensures the controller's continued operation during restart or even in case of Windows failure.

### SIMATIC S7-1500 Software Controller

- Flexible controller for special machines with high requirements in terms of performance and functions
- Complies with industry-standard SIMATIC IPCs
- Complies with sector- and customer-specific requirements
- It has increased system availability
- Engineering efficiency
- Security integrated

Enquiries: Kruben Bennie. Tel: +27 (0)11 652 7762.  
Mobile: +27 (0)82 562 9423 or email: [kruben.bennie@siemens.com](mailto:kruben.bennie@siemens.com)





# Compliance of lightning protection components

By TJ Manas, Pontins

*In order to comply with the requirements of the SANS/ IEC Code 62305 [1] series of standards, the lightning protection components must be manufactured and tested as per specified requirements in the SANS / IEC 62561 [2] standard series.*



The components used for installing the external lightning protection system shall meet the mechanical and electrical requirements which are specified in the SANS/ IEC 62561 [2] series. The lightning protection components are categorised according to their function as follows:

All metallic lightning protection components (clamps, conductors, air-termination rods, earth electrodes) exposed to weathering must be subjected to artificial ageing prior to testing. This is to verify the components' suitability for its intended function.

Lightning protection components are subject to natural weathering and exposure to corrosion; it is therefore necessary to artificially age the components before conducting other mechanical strength and electrical property tests.

## Testing of Lightning Protection System components

### Artificial ageing

Artificial ageing takes place in two steps:

#### **Step one: Salt mist treatment**

This test is intended for components or devices which are designed to withstand exposure to a saline atmosphere. The tests are conducted in a salt mist chamber where the specimens are tested with a test level 2 for more than three days. Test level 2 includes three spraying stages using a 5% sodium chloride (NaCl) solution at a temperature between 15°C and 35°C followed by a humidity storage at a relative humidity of 93% and a temperature of 40°C for 20 to 22 hours.

#### **Step 2 : Humid sulphurous atmosphere treatment**

This test is used to evaluate the resistance of materials and components to condensed humidity containing sulphur dioxide. The specimens are placed inside a test chamber where they are treated with a concentration of sulphur dioxide for seven cycles. Each cycle has a duration of 24 hours consisting of sulphur dioxide treatment for eight hours followed by a rest period of 16 hours. Thereafter, the sulphurous atmosphere is replaced. Only components for outdoor use and components that are buried in the ground are subjected to ageing or conditioning before testing. Buried components have additional requirements and measures that must be considered, e.g. No aluminium clamps or conductors may be buried in the ground. Components for indoor use such as equipotential earth bars do not have to be subjected to ageing or conditioning. The same applies to components which are embedded in concrete. These components are often made of non-galvanised steel.



*Test combinations for MV clamps.*

### Air termination systems, masts, rods

The size and dimensions of air termination masts and conductors vary significantly between different structures and different designs, for example, 2 m or 3 m long masts may be installed on flat roofs and 25 m telescopic lightning protection masts may be installed in explosive areas. SANS / IEC 62561-2 [2] specifies the minimum cross sections and allowable materials with the corresponding electrical and mechanical features for each type of air termination mast. For longer air termination masts, the bending resistance of the air termination mast and of the stability of the complete air termination system has to be provided for by means of a static calculation. The required cross sections and materials must be selected based upon these stress calculations. Wind speeds and wind loads also have to be taken into account.

### Connection components

The connection components are simply called 'clamps' and the clamps are used to connect various parts of the lightning protection system together (down conductor to air termination system etc). There are therefore many different clamp combinations that are possible. In the case of lightning current loading, clamps are subject to electrodynamic and thermal testing, which highly depend on the type of conductor and the clamping connection. The clamps also allow for the connection of different types of conductors, these different materials all have differing mechanical strengths and thermal properties. This is particularly evident for stainless steel connection components, where due to the low conductivity, high temperatures



Self supporting air-termination rod.

Lightning protection components are subject to natural weathering and exposure to corrosion.

arise as soon as the lightning current flows through them. In order to test the worst case, not only the different conductor combinations but also the material combinations must be tested.

Possible material combinations for air-termination systems, down conductors and for connection to structural parts.

	Steel	Aluminium	Copper	StSt	Titanium	Tin
Steel (St/tZn)	Yes	Yes	No	Yes	Yes	Yes
Aluminium	Yes	Yes	No	Yes	Yes	Yes
Copper	No	No	Yes	Yes	No	Yes
StSt	Yes	Yes	Yes	Yes	Yes	Yes
Titanium	Yes	Yes	No	Yes	Yes	Yes
Tin	Yes	Yes	Yes	Yes	Yes	Yes

The testing of the clamps must comprise all of the possible conductor combinations and the aged as well as the new components. The clamp connections are then subjected to lightning current impulses of 10/350  $\mu$ s wave shape with 50 kA and 100 kA being applied to each specimen. The clamps must show no signs of damage and the transition resistance must not exceed 2,5 m $\Omega$ . The result of the tests showed that two types of clamps are applicable:

- Heavy Duty (H) = 100 kA (lightning protection level I and II)
- Normal Duty (N) = 50 kA (lightning protection level III and IV)

The selection of the right type of clamp should be done by the whether there is any current division before the clamp location. This test procedure must be performed for all types of connection components.

Detailed test reports should be made available for each lightning protection designer and should be based upon various factors like lightning protection level or lightning protection component.

### Test procedure for electrodes

The SANS / IEC 62561-2 standard places special requirements on conductors such as air termination conductors, down conductors and earthing conductors. These requirements are:

- Mechanical properties (minimum tensile strength, minimum elongation)
- Electrical properties (max. Resistivity)
- Corrosion resistant properties (via artificial ageing)

The mechanical properties of all lightning protection conductors must be tested and observed. Additional tests like the bending test and the current carrying ability must also be applied and observed. Data sheets for all conductors should be available on request by all lightning protection manufacturers and installers.

In order to be able to create long earth electrodes (3 m to 30 m long), the earth electrodes are extendable via rod couplings. Both the earth electrodes and the rod couplings are subject to testing in terms of the standards.

SANS / IEC 62561-2 [2] specifies the requirements for earth electrodes such as material, geometry, minimum dimensions as well as mechanical and electrical properties. The coupling joints linking individual rods are weak points, for this reason, additional mechanical and electrical tests have to be performed to test the quality of the coupling joints. Generally earth electrodes are made of the following materials:

- Hot dipped galvanised steel rods
- Stainless steel rods
- Solid copper rods
- High tensile, low carbon copper clad rods

By far the majority of rods that are installed are the copper clad rods. In order to comply with the requirements of the standards, the minimum copper cladding shall be as follows:

**99,9% Pure electrolytic copper clad to a minimum thickness of 250 microns (0,250 mm) = Grade 'A'**



Test in salt mist chamber.



## PARTNERS PROTECTING AFRICA

Through our partnership with DEHN Africa, **Pontins lightning protection systems** comply with both the design codes of practice and the component codes of practice.

All of our installations make use of components that are manufactured, tested and certified in accordance with the SANS 62561 series of standards and component certificates are issued for all of our installations.

This makes **Pontins lightning protection systems** effective, functional and long lasting.



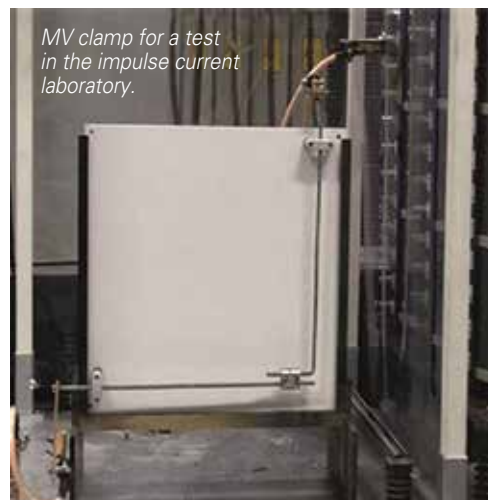
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Testing of LPS components.

In many cases, we have found that substandard (Grade 'B') earth electrodes with a copper cladding of 40 microns are being used by many installers of earthing and lightning protection systems. This practice is non-compliant and should be avoided at all costs. A specimen of two coupled rods undergo an 'Impact Test' by means of a vibration hammer with a blow rate of  $2\,000 \pm 1\,000$  min with a kinetic energy of impact  $50 \pm 10$  (Nm) is applied to the top of the rod. If the rods or the couplings pass the above test without visible defects, they are subjected to artificial ageing and are loaded with three lightning current impulses of wave shape 10/350  $\mu$ s of 50 kA and 100 kA each. In order to pass the test the transition resistance (via the coupling) must not exceed 2,5 m $\Omega$ . After the lightning impulse test the coupling is then subjected to a tensile strength test to determine whether or not the connection is sufficiently strong after the induced lightning currents.



MV clamp for a test in the impulse current laboratory.

## Conclusion

The installation of a functional lightning protection system requires that the components and devices are tested in accordance with the latest standards. Only lightning protection systems that comprise components that are manufactured and tested in accordance with the SANS / IEC 62561 [2] series of standards can be considered to be compliant. Manufacturers' test reports must accompany all lightning protection system certification.

## References

- [1] SANS/IEC 62305. Lightning Protection Standard (LPS) series.
- [2] SANS/IEC 62561: Lightning Protection System Component (LPSC) series.

## Bibliography

DEHN Lightning Protection Guide 3<sup>rd</sup> Edition.  
DEHN Lightning Protection / Earthing Catalogue - January 2015 edition.

- Components and devices in functional lightning protection systems must be tested according to the latest standards before installation.
- Only components and devices tested in accordance with SANS/IEC 62561 are considered to be compliant.
- Manufacturers' test reports must accompany all lightning protection system certification.

take note



Trevor Manas started his lightning protection career at Pontins in 1991 as an installation technician. Within two years, he was promoted to a sales engineer position. In 1996, he was promoted to the position of director and was in charge of ensuring the company's compliance with the earthing and lightning protection codes of practice. In 1999, Trevor became the managing director of Pontins. Enquiries: Email [trevor@pontins.co.za](mailto:trevor@pontins.co.za)

## Powerful PV overvoltage protection

The new VAL-MB product family from **Phoenix Contact** provides powerful and compact protective devices for photovoltaic applications with generator voltages of up to 1 500 Vdc. The protective devices are specially adapted to dc application requirements and certified by KEMA.



Longer inlet funnels and higher screw shafts provide additional protection against arcing. The product range includes protective devices for generator voltages of 600 Vdc, 1 000 Vdc and 1 500 Vdc, as type-1/2 lightning current arresters, as well as pure type 2 surge protection devices. Variants are available with or without remote signaling contact. All protective devices have a short-circuit protection of 2 000 A and can also be used in high-altitude plants up to 6000 meters in altitude.

**Enquiries: Tony Rayner.**  
Email [tonyr@phoenixcontact.co.za](mailto:tonyr@phoenixcontact.co.za)

## Durable and powerful type-1 lightning current arrester

The Flashtrab SEC-PLUS type-1 lightning current arresters from **Phoenix Contact**, which are particularly durable and powerful thanks to Safe Energy Control Technology, have just been complemented by two product variants. The Flashtrab SEC-PLUS 440 product variant is particularly suited to special industrial applications with 440/690 V networks or 400 V power supply systems. The products impress with their strong shock and vibration resistance. This compact variant can be used up to



400 A without an additional back-up fuse. The Flashtrab SEC-PLUS 350 variant is used in the pre-metering area of the main feed, or in industrial applications. High voltage fluctuations and lightning current loads are no problem for the type-1 arrester. The good protection level and backup fuse-free use up to 315 A deliver additional advantages. Both variants are pluggable and can be tested with the CheckMaster 2 test instrument for surge protection devices. Like any other SEC family type-1 arrester, the Flashtrab SEC-PLUS devices are also type-2 arrester tested and certified. The protective devices of the SEC product family have been completely redeveloped and are based on Safe Energy Control Technology (SEC). The spark gap safely prevents any power supply secondary current. This means that the load of the entire installation is reduced to a minimum in the event of a lightning event.

**Enquiries: Tony Rayner.** Email [tonyr@phoenixcontact.co.za](mailto:tonyr@phoenixcontact.co.za)

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## Lightning does not have to cause damage

South Africa has one of the highest lightning ground flash densities in the world. From the latest information supplied by the CSIR, the ground flash density for the Gauteng area is recorded as being 11.7 flashes per square kilometer per annum. Lightning related deaths in the RSA, Swaziland and Lesotho is about four times higher than the global average.

HHK Earthing & Lightning Protection Systems offers customer solutions for structural lightning protection, earthing and surge protection, and the Company will be celebrating 40 years of service next year.

HHK is proud to announce the partnership with Obo-Bettermann, Germany, which is represented locally by O-Line.

HHK designs and installs both industrial and domestic structural lightning protection, specialised earthing systems, installation of surge protection to substations, main and sub-distribution boards, data/ telecom lines, computers and any electronic equipment, etc. All work is strictly in compliance with the SANS Codes of Practice and IEC Standards.

### HHK Earthing & Lightning Protection Systems offer the following services:

- Structural lightning protection systems for both industrial and domestic projects, including all mining plants.
- Provide risk assessment and protection level reports.
- The performance of soil resistivity surveys so that an earth can be designed to exact electrical specification rather than by physical dimensions, based on the Wenner and fall of potential methods.
- Resistance test measurements on installed earthing systems for structural lightning protection and electrical earthing systems.
- All installations in strict accordance with SANS Code of Practice 10313 (2012) in conjunction with SANS 62305 and IEC Standards.
- Supply and install high voltage lightning conductor cable – Obo isCon® - for Protection Levels 1 – 4.
- Designs of lightning protection and earthing systems for structures, substations, computer and data systems, exposed power lines, etc, including approval and stamped drawings by SANS.
- Surge protection to electronic equipment and computers, etc.
- Maintenance tests on lightning protection and earthing systems on all existing structures and mining plants, etc.
- Issuing of Certificates of Compliance (COC's) on all lightning protection and earthing grid systems.



### Earthing & Lightning Protection Systems

Johannesburg HO: P O Box 48903, Roosevelt Park, 2129

Tel: 011 476 6917 • Fax 011 476 2251 • email: info@hkh.co.za



## Why surge protection for petrol stations is critical

Petrol stations are highly vulnerable to lightning strikes and surges owing to their extremely sensitive control and display systems. The necessity of a lightning protection system is essential when considering the highly flammable sources of ignition on site. Operators of petrol stations must ensure that employees, customers and pedestrians are protected against fire and explosion risks caused by fuels and vapours.

The IEC 60364-1 (HD 60364-1) standard specifies that 'property shall be protected against damage as a consequence of overvoltages such as those originating from atmospheric events or from switching'. The surge protective devices recommended in this standard must not be installed in Ex zones (zone 0, 1 and 2), if any. If surge protective devices are located in hazardous zones, adequate measures (e.g. approved enclosures or approved surge protective devices) must be taken to avoid ignition.

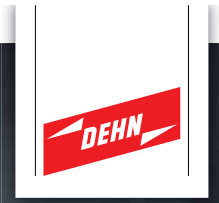
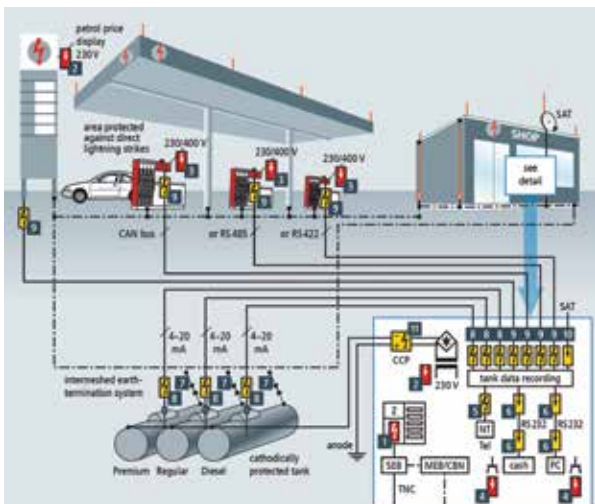
A professional external lightning protection system, consistent lightning equipotential bonding and additional surge protection measures are required to protect petrol stations from direct lightning strikes.

Equipment located in the forecourt, such as the petrol price display, and the incoming utility line are vulnerable to direct lightning strikes. Therefore, lightning current arresters should be installed at the entrance point into the building.

The fuel dispensers are generally located underneath a projecting metal roof and are thus protected against direct lightning strikes. For this reason, and due to the intermeshed earth-termination system, surge arresters are installed at the entrance point of the lines into the petrol station building and at the entrance point of the lines into the fuel dispenser to protect the lines leading to the fuel dispenser electronics.

It is important to interconnect all metal constructions, such as pipes, fuel dispenser enclosures, and tanks, and to connect them to the earth-termination system of the petrol station building. The earth-termination system should have an earth resistance of  $< 10 \Omega$  (recommendation). Spark gaps for use in hazardous areas must be used to connect petrol stations with cathodic corrosion protection to the earth-termination system.

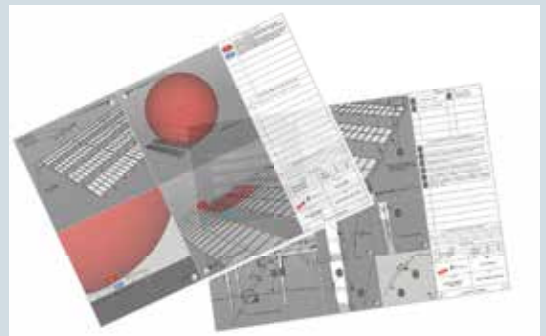
**Enquiries: Alexis Barwise. Tel. 011 704 1487 or email alexis.barwise@dehn-africa.com**



DEHN protects AFRICA

## Concepts and designs for lightning and surge protection systems.

Developed concepts for lightning protection systems of complex installations in line with the IEC 62305 standard (SANS 62305) include drawings, mounting details, bills of material, specification texts (tender texts), concept descriptions and material offers.



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# Fast cables with fire retardant for buses

By J Lehmann, LAPP Group

*Data communication in vehicles is constantly on the rise. Low-frequency data network cables no longer make the grade. For this reason, manufacturers are increasingly equipping their vehicles with high-frequency data network cables, and their use of Ethernet is constantly rising.*

Development on the Ethernet standard began in 1973 at the Xerox Research Centre in Palo Alto, and initially it could only manage three megabits per second. The standard, which back then was not yet a standard but a company-specific product from Xerox, now specifies hardware (cables, distributors, network cards in PCs) as well as software protocols for transmitting data packets. Almost everyone has probably held an Ethernet cable in their hands at some point. It connects computers with one another, and a home PC with an internet router if a wireless connection is not being used to go online. The whole internet is based on Ethernet communication. It is important to note that Ethernet not only refers to the well-known network cables with copper conductors, the standard now also encompasses fibre optic cables and even wireless Ethernet, which has no cables at all.

Ethernet has triumphantly marched its way towards other applications, including production halls in industry where it is increasingly taking over from classic fieldbus systems when it comes to data exchange between sensors, actuators and production control. The advantages are obvious: software used to manage companies – for instance ERP – and software to operate machines are constantly merging further together, so it is perfectly understandable that persons responsible for IT in companies also want to have uniform standards for hardware and software protocols. Ethernet can provide a range of benefits in factories: it bridges long distances of over a hundred

metres, it is highly variable in terms of network structure and it enables the connection of new plug and play devices. It is also real-time capable and can cope with time-critical control tasks, for example if an employee presses a red emergency button. The high data rates of up to ten gigabits per second are impressive, and soon 100 gigabits per second will also be possible. These data rates are necessary because data volumes in factories continue to rise, for instance due to the use of cameras for visual quality control or huge numbers of sensors and actuators at field level.

## Resistant to chemicals and vibrations

Ethernet cables used in offices are not suitable for factory use though. There they must be resistant to oil, chemicals and heat, and often need to withstand millions of movement cycles in drag chains. The cable manufacturers have responded to this and have developed cables and connectors for Industrial Ethernet which are not only resistant to oils and acids but also to vibrations and electromagnetic fields. The Ethernet cables described in the article are extremely resilient and are available for various industrial Ethernet systems such as Profinet and EtherCAT. New challenges are brought, for example, by the foodstuffs industry, in which cables and connectors need to avoid providing attacking surfaces for germs or remaining food, and also have to be compatible with aggressive cleaning agents.



- ECE – Economic Commission for Europe
- PC – Personal Computer
- PUR – Polyurethane
- PVC – Polyvinylchloride

## Abbreviations/Acronyms

Beyond this, however, there are also applications which are so specific that an individual solution needs to be developed. This was the case when a major German manufacturer of buses made their request. The reason behind this is the standard ECE-R 118.01 and the announcement of the Economic Commission for Europe (ECE) three years ago that the fire protection requirements for cables installed in buses would be made stringent at the end of 2015. The new standard concerns cables which are installed in the passenger compartment, but not cables in the engine compartment, which already have their own equally stringent standards. The new standard made it necessary to develop new cables.

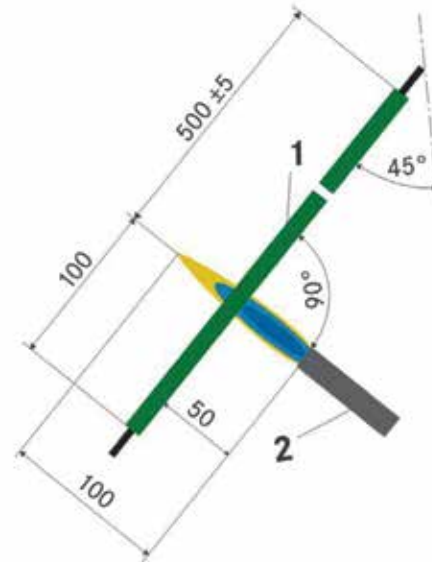
The regulation aims to protect passengers in the event of a fire. Sixty percent of all victims in fire incidents are not killed by the fire itself but by inhaling toxic gases, particularly carbon monoxide. It becomes a precarious situation when cables are present at the scene of the fire. Cables which have to meet special fire protection requirements are often made from Polyvinylchloride (PVC) and contain halogens – chemical elements in the seventh group of the periodic table including fluorine, chlorine and bromine – as flame retardants. These additives prevent the cable sheath from getting burnt away and make it easier to extinguish the fire on the cable once the exterior cause of the fire has stopped, for instance when the fire-fighters have extinguished it. PVC cables are therefore the number one choice in the engine compartment of cars.

Although PVC cables burn slowly in a fire, they produce a high volume of smoke. Furthermore, they outgas halogens, including large volumes of chlorine. If chlorine gas comes into contact with water – when the fire is extinguished, or if smoke enters airways – hydrogen chloride (hydrochloric acid) is formed and also acids such as hydrogen fluoride (hydrofluoric acid) and hydrogen bromide, as well as toxic dioxins. The acids chemically burn airways and in the worst case scenario can result in death. Therefore PVC cables with halogens are not necessarily a bad choice in areas with a high risk of fire – but only if there are no people nearby. This is the reason why PVC flooring is no longer used in public buildings.

*The use of Ethernet cables  
is constantly increasing.*

### PVC cables are taboo in passenger compartments

Such cables have no place in the passenger compartments of buses, where many cables are more or less installed openly, for example those for ticket machines, destination displays and surveillance cam-

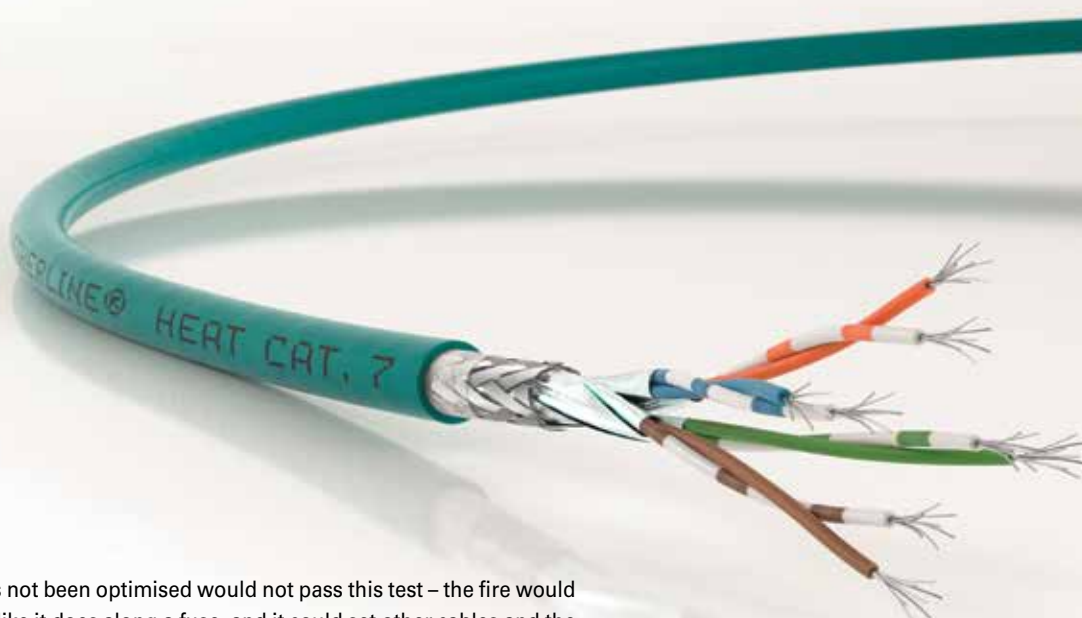


eras – and this finding forms the basis of ECE-R 118.01. So when the request came from the bus manufacturer, cables with PVC sheaths were out of the question. In industry, the alternative to PVC is Polyurethane (PUR). The material has some outstanding properties – it is extremely resistant to oil and many chemicals and is also highly resistant to abrasion and movements which are repeated millions of times, for instance in machinery. PUR also has a few disadvantages though: it is prone to hydrolysis, meaning that it absorbs water, which however is not of any consequence when used in the interior of a bus. The second disadvantage, however, is all the more serious: PUR has worse fire properties than PVC.

The challenge for the Lapp engineers was thus to bring the fire behaviour of PUR up to the same level as that of PVC. The developers managed this with a PUR formulation containing various additives. These substances do not represent any health risk even if they escape into the air during a fire. The additives do not contain any halogens, which is also the case for PUR cables in general. After three years of development work, with the process of acquiring the certification at one of Germany's two assigned testing laboratories itself taking a whole year, the Lapp developers were able to announce their success. The new cable meets the requirements of the new standard ECE-R 118.01, specifically regarding the fact that it does not contain halogens or any other toxic substances.

### Cable with fire retardant

The cable meets the requirements of the compulsory flame test: a flame is held towards the lower end (10 cm along) of a length of cable measuring 60 cm in total, and is then taken away after 15 seconds. The fire on the cable sheath must go out on its own within 70 seconds, and once it has extinguished by itself, at least five centimetres at the upper end of the cable must remain undamaged. A PUR cable



that has not been optimised would not pass this test – the fire would spread like it does along a fuse, and it could set other cables and the interior furnishings on fire before the bus has come to a halt and the passengers have managed to evacuate.

Having said this, some buses have 140 metres of the company's new cable installed in them. This impressive length is found in the first buses to be equipped with the new cable. They are going to a European capital city that has ordered for than one hundred vehicles of this type. The length of the cables varies and they can also be considerably longer, for example with articulated buses, or if travel buses are fitted with an entertainment system – as is the case in long-haul aircraft which, for instance, provide every passenger with a free choice of films. A luxury fitting such as this also dramatically further increases the amount of data. A changeover to Ethernet cables with fibre optic cables for even higher data rates is unlikely though, particularly as the distances to be bridged in buses are not as great as those in aeroplanes. In the buses which are currently being ordered, only Ethernet cables with copper cores are used, and therefore Lapp only provides buses with the copper variety of the optimised fire-protection cable. Other cables such as low-frequency data network cables and live cables can obtain the PUR sheath if there is sufficient demand. After all, there will still be cable types in buses other than Ethernet cables in the future. As long as they are installed in the passenger compartment they must also comply with ECE-R 118.01.

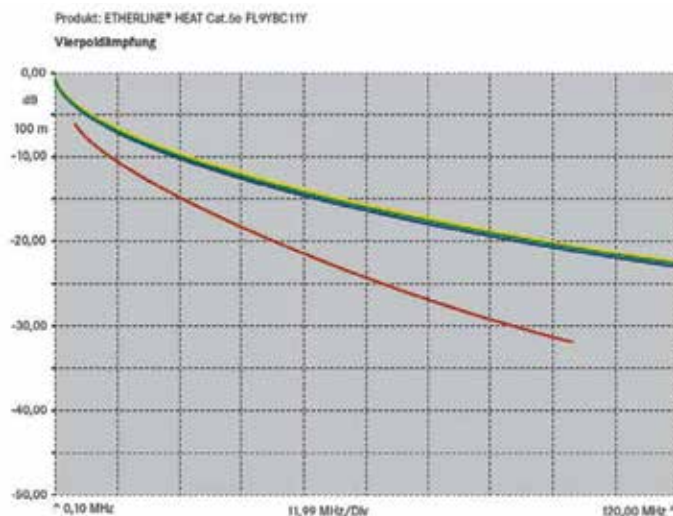
## Four months of 125 °C

Other than ECE-R 118.01, the most important standard for cables in vehicles is DIN ISO 6722 with temperature class B, up to 100°C. For temperature class B, the cable needs to be able to withstand a temperature range of -40 to +100 °C for a long period of time – normally it is -20 to +90. This cable is even more heat-resistant. It has even achieved the advanced special temperature class B (105). The standard specifies that the cable has been tested at a constant operation temperature of 105 °C (for 3 000 hours). The short-term temperature (for 240 hours) is specified as up to 130 °C. The safety buffer for applications in buses and cars is calculated very generously. What car would experience 105 °C for four months? However, such properties could be very sensible for other applications, such as photovoltaic systems in the desert.

## Conclusion

With its properties, the new fire-protection cable made from PUR is suitable for buses and many other applications where people need to

be protected – such as cable for test benches in the motor industry. A similar matter is its use in trams, which currently are not covered in the standard. Trains have the highest requirements as it can take some time for an ICE train to come to a halt, during which time the fire must not have spread too far. The company is looking to develop suitable connection solutions for this.



- Fire protection requirements for cables installed in buses in Germany will be made stringent at the end of 2015.
- The new standard, ECE-R118.01, concerns cables installed in the passenger compartment of the bus.
- This company has developed a cable that meets the requirements of the standard.



Jennifer Lehmann is employed by The Lapp Group.  
Enquiries: Alan Liebenberg, Lapp Southern Africa. Tel. 011 201 3200 or email Alan.Liebenberg@lappgroup.co.za



## Liquid-tight technology for subsea vehicles

Elquip Solutions has introduced a high-end, comprehensive range of flexible conduit systems and components from UK manufacturer Flexicon to the local market.

These conduit systems provide superior cabling protection, particularly in high-demand, hazardous environments such as in the rail or mining industries. Further demonstrating its versatility, Flexicon's liquid-tight conduit system has been used to protect the power supply to subsea remotely-operated vehicles (ROVs) in the oil and gas industry in Brazil, China and Australia.

The 63 mm LTP conduit and special engineered fittings are used to protect the slipping connections inside the winch. This provides 3,3 kV feeds to the power transmission system, which connects the subsea ROV to the surface, according to Mike Cronin, managing director of Elquip Solutions.

"In addition to the power cables, fibre optic elements are included in the single cable connection system called an 'umbilical'. The tail from the slip ring is a loose bundle of copper and fibre

optic cables, which terminates in a junction box on the winch. This bundle needs protecting from sea spray and harsh offshore environments to maximise its service life and provide trouble-free operation," says Cronin.

In the subsea environment it is essential that power is maintained for data to the ROV, because when the ROV is not working, it means the entire rig is down and not drilling. Providing ongoing protection for the slip ring from the environment is therefore vital.

**Enquiries: Mike Cronin. Tel. 011 826 7117**



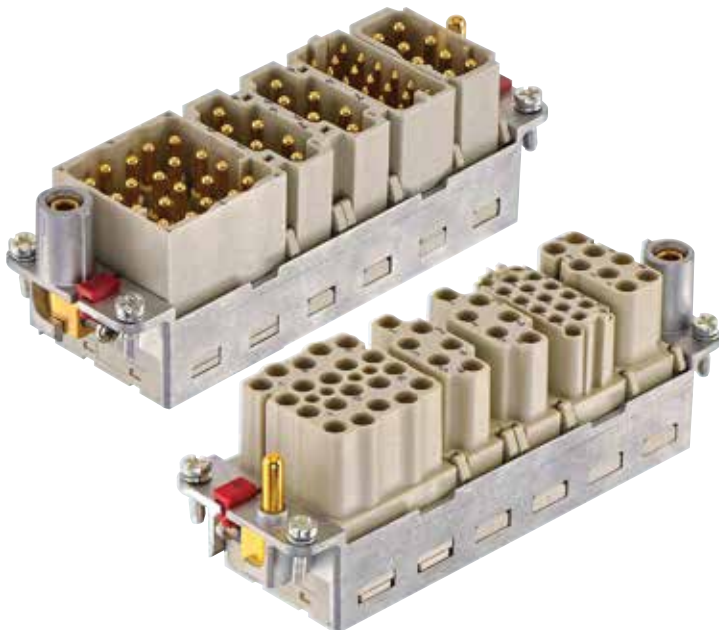
## Specially plated – more stability

The increasing modularisation of industrial production facilities and the rise in mobile equipment employed is resulting in growing demand for connectors capable of High Mating Cycles (HMC). The launch of the new Han-Modular Hinged frame HMC now enables the integration of Han-Modular components into HMC connectors.

The Han-Modular system can now handle HMC as well – the key component being the new Han-Modular Hinged frame HMC which is designed to handle more than 10 000 mating cycles. The new Han-Modular Hinged frame HMC sets itself apart from conventional hinged frames in particular in terms of the PE contact. The contact is specially plated and boasts increased fixation stability in the frame of the Hinged frame HMC.

Since the Han HMC housing is executed with IP65 protection, the new HMC hinged frame also opens up new application fields for Han-Modular. Not only can Han-Modular connectors be plugged and unplugged many thousand times, the modules in HMC housings are also especially well protected against mechanical loads, contact and dust accumulation as well as against water spray.

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Crimp contacts with HMC gold surface and constant normal force

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The Han® HMC (High Mating Cycles) series has been developed on the basis of the proven Han® connector range. The main applications are in modular machines and plant for the industrial and medical sectors as well as for laboratory and test engineering sectors. The Han® B HMC housings come with a long life expectancy in all sizes along with crimp contacts with application grade gold plated surface, it provides flexibility and durability. All existing tooling can continue to be used. Find more information,

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*Stocking up on fuel when the tank truck is in the vicinity – the system enables the company to offer its customers this service.*

# Making empty tanks a thing of the past

## Remote monitoring of tank filling levels

By M Gautschi, Keller

*A practical method for remote monitoring of filling levels in oil and gasoline tanks.*

**A**VIA Osterwalder St. Gallen AG operates more than 120 filling stations in eastern Switzerland. This company sells and distributes motor vehicle and other fuels to corporate and private customers. In essence, this article describes a measurement system that determines the filling level in the oil tank, with a GSM modem, to transmit the filling levels via the mobile telephone network once they have been ascertained. In collaboration with an IT solutions provider based in Widnau, this company has developed software that enables contracting customers to call up current filling levels and previous purchase orders for their tank installations. Customers are also alerted via SMS or email if the filling level falls below a certain limit (which can be freely defined). By replying to these messages, customers can immediately trigger purchase orders. Because they can call up data anywhere and at any time, customers are able to plan their purchasing efficiently. For example, stocks of fuel can be bought in when the price of oil is low, or when a tank truck is nearby.

This service offers far more than convenience for busy private customers who might find themselves returning to an unheated home after a long working day because they forgot to place their fuel order. Most of all, the system offers major economic benefits to facility managers in companies, and for real estate managers who have to coordinate fuel supplies for multiple properties. Gas station opera-

tors and their suppliers (i.e. large oil corporations) can also benefit from a system such as EasyOil. Clients appreciate the convenience of this service and in the last three years, for example, 80% of clients whose contracts would allow them to purchase from other suppliers preferred to order their heating oil in this manner.

*These products guarantee long service lifetimes, even in an aggressive medium such as gasoline, because of their robust housing and design.*

### Cutting-edge technology

The technology behind the system had already been relaunched prior to this redesign. The company searched for a suitable supplier who could deliver the measuring pressure probes to measure filling levels. This is technically possible because the pressure at a specified point in a tank rises in proportion to the filling level. The measured pressure can therefore be used to perform a very accurate electronic calculation of the corresponding filling level. The current content can be determined in litres, taking account of the tank shape.

- A measurement system has been developed that enables customers to call up current filling levels and previous purchase orders for oil and gasoline tank installations.
- Customers are alerted via sms or email if the filling level falls below a certain limit.
- Customers can call up their data anywhere, at any time, and are therefore able to plan their purchasing efficiently.



The benefits of using this system are derived from the combination of measurement and remote transmission. While developing the proposed solution, Keller's pressure measurement experts were able to draw on experience garnered from customers in the water management sector, where similar concepts are used to monitor groundwater and river water levels.

The underlying technology makes it possible to develop special solutions with great flexibility and speed. For customers in the water management sector – to take one example – a GSM modem that supports data exchange via email, SMS and FTP, has been developed. The GSM-3 variant (modified at the customer's request) which offers the option of SMS communication with consumers, has been developed. Customer surveys have confirmed that this is the most reliable version, and the one that customers prefer. More so than email, SMS messages guarantee that customers are informed promptly; they are spam proof and can be personalised. Especially in offices, emails could be called up by different individuals who might not all be authorised to make a purchase decision, thus wasting valuable time.

**Intrinsically safe and temperature resistant**

The GSM-3 comprises the modem itself and what is known as the SB box, to which as many as three pressure transmitters (with voltage outputs of 0,5...4,5 V) can be connected. The box contains three built-in safety barriers (SBs). These circuits make it possible to process the electrical measurement signals to gas stations, where an electrical spark could cause an explosion due to the gases contained in the atmosphere. This is why any pressure transmitter that performs measurements in an environment of this sort must be intrinsically safe. The safety barrier limits the electrical power produced by the measurement system within the area subject to explosion hazards (EX area). The GSM-3 itself may only be installed outside of the EX area. As part of the complete package, level sensor cables used to transmit the measurement signals, are supplied.

Intrinsically Safe (IS) 26 Y Ei level sensors are used for the systems at gas stations, whereas the conventional version is used for heating oil tanks in locations not classified as EX areas. The transmitters in these devices are based on the piezoresistive silicon measuring cell invented by the company's founder and chief executive officer, Hannes W Keller, at the end of the 1960s. The slight mechanical deformation caused by the pressure on a piezoresistive element in the sensor triggers a change in resistance which, in turn, produces the electrical voltage that is used as the measurement signal. In Series 26 Y, which includes the level sensor, the temperature error (as it is known) is compensated electronically.



*IS safe piezoresistive Series 26 Y Ei level sensors are suitable for environments subject to a high explosion hazard.*

*The GSM-3 comprises a modem and what is known as the SB box, to which as many as three pressure transmitters (with voltage outputs of 0,5...4,5 V) can be connected.*

**One-stop expertise**

These products guarantee long service lifetimes, even in an aggressive medium such as gasoline, because of their robust stainless steel housing (degree of protection: IP68) and a design whereby the silicon measuring cell is protected against the measured medium by a stainless steel diaphragm.

Originally, the plan was only to purchase the pressure sensors from Keller, as the project proceeded, it became clear that the company has expertise in the remote transmission of measurement data, as well as in measurement technology. They were therefore used to deliver the entire package.

**Conclusion**

Depending on each system's location where each system is deployed, either the conventional 26 Y level sensor or the intrinsically safe 26 Y Ei version is used, together with the GSM-3 transmission unit and the cables (whose lengths vary according to on-site conditions). Final assembly and installation of the systems takes place at the customers' premises.



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## Data logger measures level, conductivity and temperature

Keller, manufacturer of measuring technology such as isolated pressure transducers and transmitters - represented in southern Africa by Instrotech - has on offer the new data logger, CTD (conductivity, temperature, depth) - a version of the high precision DCX level data loggers for depths of up to 200 m. It's a highly integrated, complete pressure measurement solution for water management. This data logger for longterm monitoring, stores over 50 000 time-stamped level measurements, as well as the associated conductivity and temperature readings in each case. The multipurpose probes have a diameter of 22 mm, making them suitable for all sounding tubes with a nominal diameter of 2,5 cm or greater.

### Conductivity crucial as standard process value

Water conductivity is a measure of purity, making it an important standard process measurement in the water and sewerage sector as well as in the beverage and pharmaceutical industries. Changes in conductivity are a clear indicator of contamination, for example with

particles or salts (chlorides, nitrates, etc.). Typical values lie between >50 mS (salt water) and <5 µS (pure water). Keller supplies conductivity probes combined with level probes based on pressure sensors. These integrated measuring systems are ideal for checking the ingress of seawater, slurry or ferti-

lizer into groundwater, rivers and lakes, or for performing observation tasks relating to building projects or localized water pollution. The Series DCX22 CTD level probes with integrated data logger are available with a robust 316L stainless steel housing or other materials, if necessary, for enhanced chemical compatibility.

### Level measurement: a core competency

Keller is a leading supplier of maintenance free, battery operated level probes with remote data logger for observations at depths of up to 200 m and optional GSM module for remote access. With level measuring tolerances of  $\pm 0,02\%$ FS, Keller's extensive portfolio ranges from data loggers with conventional relative pressure sensors to level probes featuring two isolated absolute pressure sensors that compensate for ambient pressure deviations electrically or using software. All Series DCX-22 products are now available as CTD level probes with integrated conductivity and temperature sensor. At a rate of one measurement per hour, the integrated lithium battery has a life of up to eight years.

**Enquiries: Tel. 010 595 1831 or email sales@instrotech.co.za**



## Guided radar level transmitters improve reliability at UK power station.

Marchwood Power operates a £380 M natural gas-fired combined cycle (CCGT) power station on Marchwood Industrial Park, adjacent to the River Test near Southampton in the United Kingdom (UK). The station generates 842 MW of electricity for the national grid, enough to supply nearly one million homes.

It is currently one of the most efficient power stations in the UK. The under-slung condenser vessel sits directly under the steam turbine in Marchwood Power station, condensing the exhausted steam and returning it to an aqueous state, which is then circulated for reuse in the generation cycle. A reliable, accurate level control is critical in this part of the process; if the vessel gets too high, it could impinge on the turbine itself causing untold damage and loss of generation. The correct condensate level needs to be maintained to ensure the condenser back pressure is at the optimum value, lowering the flash point of water and preventing wet steam from contacting the low pressure turbine blades, assisting steam flow through the turbine and increasing efficiency.

When originally designed and commissioned, the plant installation consisted of three differential pressure transmitters, using two out of three voting method and a single magnetic float gauge on a bypass chamber. However, there were ongoing issues with differential pressure measurement, mainly due to the condensate filled impulse lines and vacuum within the condenser, which meant they often had an unreliable level measurement on at least one, increasing the risk of nuisance trips. A differential pressure-based level system for this type of measurement is complex and requires a lot of interconnecting pipe work, valves and condensate pots.

VEGA recommended that Marchwood opt for additional interconnecting pipe work where the magnetic level gauge is installed, so that they could fit three VEGAFLEX GWR transmitters into bypass tubes, using the same two out of three voting method, which would give them reliable accurate level measurement and control. VEGAFLEX use guided wave microwave pulses which are virtually unaffected by temperature, pressure, vacuum to detect the level. There were no issues with the Guided radar level transmitters improve reliability at bypass tubes sharing the same vessel connection 'manifold', as it is a 'clean' process. The units were mounted to the side of the boiler, alongside the existing MLG, where there was plenty of head room for installation. The measuring range required was over 1,7 m and the temperatures were much lower than the process at 40 °C, (even though VEGAFLEX can go to 450 °C and 400 Bar if needed).

Marchwood installed each GWR in a 50 mm diameter bypass tube configuration, with isolation valves at the top and bottom. Once in place, it just

needed the GWR units to be cabled and they were ready to commission. Marchwood Power engineers carried out the set-up themselves using PACTware software, so they could have a full configuration back-up and calibration record. As well as reducing maintenance costs, the installation of the new sensors was a more reliable, simpler system and the cost was much lower than the original arrangement.

Since installation, no outages due to unreliable levels have been recorded.

**Enquiries: Chantal Groom. Tel. 011 795 3249 or email chantal.groom@vega.com**



## Speed monitors with high input frequency

ifm electronic's range of speed monitors with high input frequency from as low as one pulse per minute up to 60 000 pulses / minute now include an extended operating temperature range down to 40°C below zero. Their luminous OLED display is not only clearer but also brighter.

Several versions are available: Speed monitors DD2503 and DD2603 monitor the rotational speed of one channel with two separately adjustable limit values. A separate switched output is assigned to each limit value and an analogue signal is provided for further processing or display.

The DD2505 and DD2605 monitor two separate input channels, each having one switch point.

The DD2603 and DD2605 can also check that the sensor cabling is intact (when used with the recommended sensors). Other devices in the range fulfil other vital functions: the DR2503 and DR2505 will check that a piece of machinery, such as a hoist or a pump, is rotating in the desired direction, as dire consequences can result if the direction is wrong.

Enquiries: Tel. 012 450 0370  
or email [info.za@ifm.com](mailto:info.za@ifm.com)



## Mechatronic flow meter with digital display



ifm electronic has fitted its new inline flow meters with a rotatable multi-colour display which is clearly visible from all sides. A red/green colour selection of the display values clearly signals to the user when the set values are too high or too low. Moreover, the device has a fast response time of < 10 ms.

The piston located in the valve seat in the housing is lifted by the flowing medium against the spring. The piston position is monitored via a magnetic field sensor and output as an analogue signal. The spring resistance forces the piston to return to its original position with decreasing flow. This

ensures position-independent installation of the flow meter preventing backflow. The sensor head can be rotated by 360°C so that it can be read in any position. Two switching status LEDs on the sensor head, which are clearly visible from all sides, indicate the set and reset points. The device is rated for medium temperatures up to 100°C and it can also measure and display the temperature. Thanks to its three pushbuttons, setting is quick and easy. With the IO-Link functionality the user is more than fit for Industry 4.0.

Enquiries: Tel. 012 450 0370  
or email [info.za@ifm.com](mailto:info.za@ifm.com)

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# Funding and utility connection – two challenges to the uptake of solar power

By K Norris and D Smith, The Jasco Group

*Solar energy.... a hot topic!*

Given the current power challenges in South Africa, as well as a growing trend toward solutions for sustainable electricity, solar technology as a source of energy supply has become a hot topic, particularly for organisations wishing to reduce their reliance on utility power sources. Rooftop solar photovoltaic (PV) plants can help organisations generate their own power, and using grid tie inverter systems enables them to feed excess generated power back to the utility for use elsewhere. However, despite the benefits of such systems, there are two common challenges that have emerged. Firstly, PV plants are a costly investment, and the Return On Investment (ROI) has in the past taken many years to realise, although this is changing as the cost of installation reduces and electricity tariffs continue to increase. This makes obtaining funding for such systems difficult. Secondly, there remain several issues with the connection of solar plants to the main grid, which has slowed the uptake of these solutions. Addressing these challenges is key to harnessing the power of the sun as an alternate, sustainable energy source.

## Grid tie solar systems

Grid tie solar systems are the simplest and most cost effective method for utilising solar energy as a replacement for day-to-day power requirements. On a very basic level, the grid tie inverter converts the direct current (dc) power generated by solar panels, into the alternating current (ac), and injects this ac current into the existing load. Any excess energy is then fed into the power distribution network. The inverter is also able to ensure that energy requirements are drawn from available solar power first, and only utilise utility supply should there be a solar shortfall. This system does not necessarily require a battery for energy storage, although this will extend functionality, so the installation is very simple and efficient, and maintenance is low. However, while the cost of manufacturing solar PV panels and grid tie inverters has reduced over the past few years, as a result of increased demand, greater economies of scale and technological advancements, solar remains a costly solution to implement. The high cost of raw materials and the high-tech conditions required for the manufacture of components keep these solutions out of reach of the average homeowner or business.

## Justify

Justifying this investment is often one of the biggest challenges to the implementation of solar power solutions, and obtaining loans

and funding is typically a difficult sell. ROI takes a few years to realise, and the investment will only typically pay for itself within six to 10 years. The rate of return is dependent on a number of factors, including the type of installation and the existing tariff with the utility. However, what needs to be kept in mind is that solar PV systems have a predictable performance curve of 25 years and a usable life of 35 years. In addition, using a grid tie inverter system, homeowners and businesses will one day be able to feed excess power back to the grid, either offsetting this against utilisation costs or selling this power to the utility provider. PV systems therefore should not be seen as a depreciating asset. They are in fact an asset that not only reduces current costs, but in the long run could be a significant income generator for the owner.

*Justifying this investment is one of the biggest challenges to the implementation of solar power solutions.*

## Quantify

To quantify this value is a relatively simple mathematical exercise with the assistance of financial models. In 2015 the average cost of electricity per kilowatt-hour (kWh) is similar to the Lifecycle Levelised Cost of Energy (LLCE) of a typical grid tie system at around R1,00 per kWh. This means that, calculated over the complete guaranteed performance lifespan of the panels (approximately 25 years), the cost per kWh from a solar PV system will be similar to the municipal cost in 2015. Going forward the cost of electricity from the utility is very likely to increase significantly year on year, while the cost of the installed PV system will remain at its installed price plus the minimal cost of maintenance. If you look at this over the next 10 years, your cost of solar generation would be around R1,00 per kWh, while the utility cost is forecast to be as high as R3,50 per kWh.

## 'Green kWh'

This same trend is likely to continue over the lifespan of the solar PV system. If you project these increases over the 25 year period, the cost difference between now and then would be significant. Effectively, within this period, the solar PV solution could still be generating electricity at R1,00 per kWh, whereas by that stage the cost of utility



- PV plants are costly and Return on Investment is slow.
- The many issues relating to the connection of solar plants to the main grid have slowed the uptake of these solutions.
- Addressing these challenges is key to harnessing the power of the sun as an alternate, sustainable energy source.



power will doubtless have increased many times. It is these future differences in the cost of energy between the utility costs and the fixed solar PV cost that should be recognised as part of the long-term sustainability of owning such an asset. Additionally, in most cases the asset is attached to a building and would result in improved valuation of the building. Not only does this have a positive financial implication, it also has an environmental implication, especially when one considers the Carbon Tax that will be levied as of 2016. The only way to negate the carbon tax is to either recycle or produce 'Green kWh' from a renewable source like solar PV.

### Solar PV loans

In order to drive adoption of solar PV solutions, it is necessary for financial institutions to recognise their value and assist businesses and homeowners with funding these systems. Forward-thinking financial institutions should look to leverage the security of a loan for solar PV power against the asset itself, as it will pay for itself many times over in years to come. The asset could also be recognised as part of the building itself and be financed utilising an extension of the building bond. In addition, government needs to come on board by assisting financial institutions with tax rebates for their efforts in financing Solar PV systems. This is sound strategy, as by funding these systems, financial institutions are contributing to the overall reduction in carbon output and, more importantly, helping to resolving the country's current energy shortages.

### Connecting to utility

In addition to funding, connecting to the utility remains a challenge. One of the most pressing issues is the nature of pure solar solutions (without energy storage capability), in that they are only able to produce energy during daylight hours, and the energy must be used or dumped. For the majority of residential applications where nobody is at home during the day, this generated power will be wasted if a solution to feed this power back into the grid cannot be resolved. Connection codes therefore need to be finalised, and metering for two-way energy flow needs to be implemented. It is also important to find a solution to the problem of optimising the use of all renewable energy generated to the advantage of both the end-user and the utility providers.

### Net metering

The concept of net metering, whereby users sell their excess renewable energy back to the utility for credit and utilise these credits when the renewable source experiences shortfall (such as at night when there is no sun to power solar PV systems) is one that has great potential to benefit all parties concerned. For most residential applications, this form of energy trading works well. Some utilities

may limit the amount of energy you can sell back for credits to the amount of utility energy used (i.e. if you use 2 000 kWh per month, than you may only sell back a maximum of 2 000 kWh per month). Another system would be to annualise this amount, enabling owners to make better use of the credits throughout the year, such as in winter where generation may not match overall consumption.

### Feed-in tariffs

Theoretically, users could manage consumption and generation of energy to a zero balance and not have to spend a cent on energy from the utility for the year. This idea in principle is appealing, particularly for consumers and business, however for utilities this could cause problems. If renewable energy customers are not paying what they used to pay for electricity, but rather supplementing their own power generation with utility power, how does the utility find revenue to pay for the maintenance of the generation, transmission and distribution network the entire system uses? Feed in tariffs have been suggested as one solution to this problem, whereby the utility purchases the excess energy from providers, while users still purchase utility power, and there is no obligation to consume at the same rate as you sell energy.

### Conclusion

Regardless of the challenges involved, solar PV remains the most viable and cost effective alternate energy source for South Africa, a country that experiences significant hours of sunshine for much of the year in the majority of its regions. If these problems can be satisfactorily resolved and solar becomes a mainstream power generation source, not just for the utility but for business and homeowners too, the currently bleak power prospects of South Africa may have a brighter future after all.



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## 'Park Inn by Radisson Cape Town Foreshore Hotel' achieves Green leaf Standard

The Park Inn by Radisson Cape Town Foreshore Hotel through its partnership with Green Leaf Sustainability Services and their Think Planet and Living Responsible Business initiatives has achieved the coveted Green Leaf Eco Standard Core Certification. Driven for sustainable change and environmental impact, the leadership at Park Inn by Radisson Cape Town Foreshore embarked on the sustainability journey with the Green Leaf project to ensure that a lasting legacy remains in the region and that locals will be proud of the impact made by the group. The standard was accomplished through various initiatives such as:

- Introducing low flow water showerheads in the guest rooms
- A lighting retrofit which included swapping out thousands of high energy consuming Halogen Down lights with the significantly more efficient LED versions
- The building uses heat pumps to heat water which are up to ten times more efficient than boilers
- Key card systems are used in all rooms which switch off all lights and air conditioners when the room is unoccupied
- Responsible purchasing practices such as buying over 80% of its products from local suppliers were introduced
- Waste recycling project which reduces the amount of waste entering landfill

Park Inn Foreshore recognises the importance of getting the staff involved in reducing its impact on the environment by actively promoting sustainable business practices through their Think Planet and Responsible Business programs as well as ensuring all employees

receive Responsible Business training to ensure full compliance and participation.

The **Green Leaf Eco Standard** is a global standard for measuring, managing and verifying sustainable business performance in an impartial manner. The Standard is designed to meet and exceed compliance with South African and international Codes of Good Practice and integrated reporting and is a blueprint for achieving a sustainable, profitable future that is 'impact-neutral' and draws on the philosophy and 50-year track record in environmental leadership of its co-founder, the Wilderness Foundation.

**Enquiries: Visit [www.greenleafecostandard.net](http://www.greenleafecostandard.net)**



## Saving R9 000 per month with solar energy installation

**Master Power Technologies (MPT)** has taken its first step into the world of sustainable energy production with a R475 000 solar panel installation at its head office in Randburg. MPT has been researching the efficacy of solar power for some time. "Having done our homework, we decided that implementing a solar solution at our own office would be the best way to demonstrate to clients that we were capable of recommending and installing solar solutions for them," says Master Power chief executive officer, Menno Parsons.

The solution Master Power designed was installed on top of the

car ports in the parking lot. Each of the two parking bays has 80 x 250 watt PV panels coupled to a 20 kW inverter, totalling 40 kW potential power in ideal solar conditions. The solar panels occupy a total area of 600 m<sup>2</sup> and are perfectly suited for a rooftop installation.

The total cost of the system including all the necessary cabling and mounting equipment was R475 000. Therefore, producing an average of 150 kWh per day, the system has an expected payback period of four years and four months in terms of savings from reduced electricity costs. Clarifying the savings MPT will achieve, Parsons says that an average of 150 kWh per day translates into an average saving of R9 000 per month with current electricity tariffs.

With Eskom asking for another 25% increase in its fees, the payback period will actually be far less. "In addition, we haven't even included the cost benefits of having our own green power supply that does not depend on diesel or petrol and allows employees to remain productive during periods of load shedding."

The solar PV system is a once-off cost with a maintenance life of 25 years, which in the long run will provide significant savings. Not only is it economically beneficial, but it is an environmentally friendly means of obtaining an alternative energy source.

The solar project took approximately two months to install. As this was a first for the MPT team, depending on the site, future installations should be conducted in a shorter period.

**Enquiries: Rory Reid. Tel. 011 792 7230 or email [rory@kva.co.za](mailto:rory@kva.co.za)**



## ROSATOM Africa launches website

The African subsidiary of the Russian State Atomic Energy Corporation Rosatom has officially launched its local website [www.Rosatom.co.za](http://www.Rosatom.co.za). The website is aimed at increasing public awareness on nuclear, while also emphasising the company's commitment to transparency and education.

The website which is the first outside of Europe is testament to the company's dedication to the growing African market. According to Viktor Polikarpov, Rosatom regional vice-president of sub-Saharan Africa the website provides information on Rosatom and its comprehensive offering and educates the general public on nuclear and its related industries. By doing so, empowers them to make more informed decisions about the technology. "We envisage the website will become platform where people interested in nuclear and the developments in the industry can visit, and become far more informed on the subject. There is also an interactive quiz on the website which allows you to test your nuclear knowledge," says Polikarpov. The website provides visitors with an easy to understand tutorial on the basics of nuclear technology and features a number of videos on Russian technology. It also incorporates a detailed account of Rosatom's mutually beneficial working relationship with South Africa, and its prospects in other African countries. The global company, which employs 262 000 people and incorporates 360 enterprises and scientific institutions, has had a presence in South Africa since 2013 and has more recently expressed interest in participating in the upcoming procurement process for the 9,6 GW nuclear new build in South Africa.

**Enquiries: Visit**  
[www.rosatom.ru/en/](http://www.rosatom.ru/en/)

## How green is your city?

### Global analysis reveals extent of trend to cleaner energy

Latin American and European cities are the least reliant on fossil fuels to power their electricity, finds new analysis of major cities around the world, released by **CDP** and **AECOM**. Asia Pacific cities continue to exhibit a high dependency on fossil fuels, while North American and African cities sit somewhere in the middle. This year 308 cities are participating in CDP to better manage their climate change strategies. As part of the process, they have been asked to disclose the fuel mix for the electricity that powers their city. In 2015, 162 cities have responded and reveal their use of fossil fuel versus clean power sources, reporting coal, gas, oil, nuclear, biomass, geothermal, hydro, solar and wind.

The results show that of participating cities, Latin American cities average 76% of their electricity from clean sources. European cities in the study average 59% from clean power. Participating cities in the Asia Pacific region collectively receive 15% of their electricity from non-fossil fuel sources. Overall, cities are making significant strides in shifting towards the adoption of low-carbon energy: 35% of cities reporting their energy mix get three quarters of their electricity from non-fossil fuel sources. Furthermore, over a third of the cities disclosing to CDP this year report having some kind of renewable energy target in place. The power generation sector is the single largest carbon emitter in the energy market and currently emits 12,6 gigatons CO<sub>2</sub>e (2015) — equivalent to two years of greenhouse gas emissions from all the world's cars. Moving to cleaner energy sources presents cities with a major opportunity to combat climate change.

Enterprising cities are leading the transition to low-carbon growth by adopting renewable energy, with Santa Monica, San Francisco and Stockholm all setting 100% renewable electricity targets. Stockholm plans to be - not just climate neutral - but fossil fuel free by 2040. The City of Stockholm continues to be a frontrunner when it comes to fighting climate change.

Other major cities are switching to non-fossil fuel electricity. Canberra has committed that by 2020 90% of its electricity supply will be from large-scale renewables, delivering a 40% reduction in greenhouse gas emissions. The City of Austin has committed to sourcing 55% of its electricity from renewable sources by 2025, a goal that the city reports it is on track to meet four years ahead of schedule through energy efficiency programs and renewables purchase power agreements. Hong Kong reports using financial incentives to encourage power companies to invest in renewable energy.

The data suggests that city transitions to clean power will continue, with 96 cities taking actions to decarbonize their energy supply. And these cities understand the business case for doing so: 86% of these cities reporting actions say they see economic opportunities from efforts to tackle climate change. City action on fossil fuel dependency could be accelerated with private-sector support: many cities cite a need for additional financing to help realize their ambitions for low carbon growth.

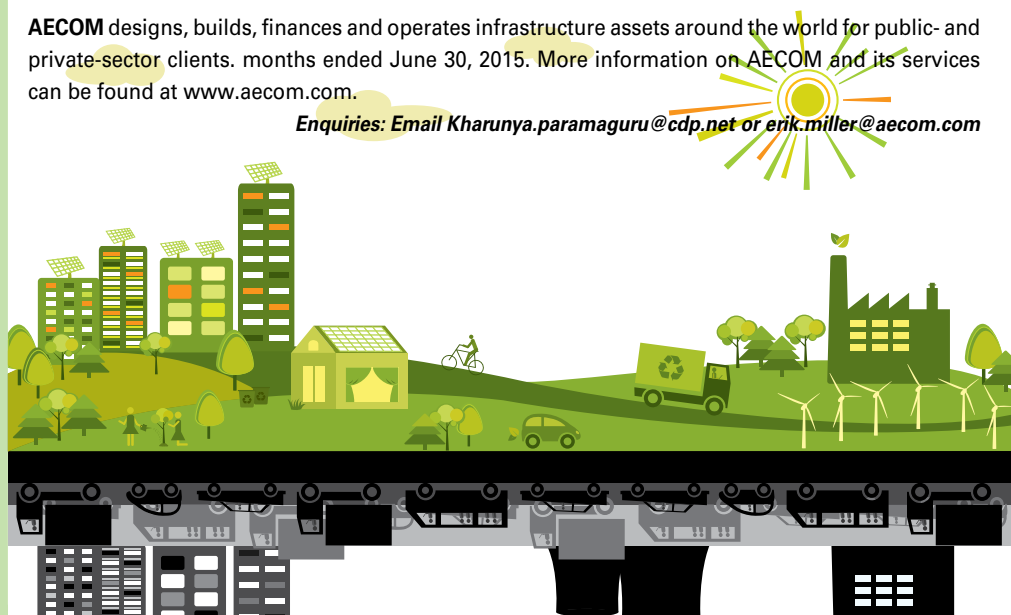
#### About CDP

CDP, formerly Carbon Disclosure Project, is an international, not-for-profit organization providing the only global system for companies and cities to measure, disclose, manage and share vital environmental information.

#### About AECOM

AECOM designs, builds, finances and operates infrastructure assets around the world for public- and private-sector clients. months ended June 30, 2015. More information on AECOM and its services can be found at [www.aecom.com](http://www.aecom.com).

**Enquiries: Email** [Kharunya.paramaguru@cdp.net](mailto:Kharunya.paramaguru@cdp.net) or [erik.miller@aecom.com](mailto:erik.miller@aecom.com)



## Mini-lab provides maxi service

Ten world-class full-service laboratories make up a comprehensive network operated by condition monitoring specialists **WearCheck**, with the head office in Pinetown, Durban. Here, next to the full-service primary laboratory, is a highly specialised mini-laboratory, which provides niche analysis services.

While one of the core functions of the Pinetown mini-lab is to do preparation for aircraft filter analysis, it also provides several other monitoring services and speciality tests on samples that are not generally processed in the main laboratory. This laboratory processes samples from around the country, where speciality analysis is required.

Some of the specialty tests conducted in the mini-lab include the analysis of grease, coolant, Karl Fischer moisture, VPR (varnish potential rating), aircraft and refrigeration.

The three highly-specialised technical staff members who operate the mini-lab also conduct field visits to customers in a variety of industries, such as Illovo, Tongaat Hulett, Gud filters, and more. They take samples from gearboxes, turbines, compressors and any other component that needs monitoring.

These samples are then processed and analysed in the mini-lab, and the results sent to the customer, with recommendations on what corrective maintenance action should be taken, if any is needed.

The on-site sampling is a service that is highly sought-after by mini-lab customers.

The ten full-service WearCheck laboratories operate across the African continent and beyond, and are situated in Gauteng, KwaZulu-Natal, Mpumalanga Province, with international laboratories in India, Dubai, Ghana, Mozambique and Zambia - at Lumwana mine and Kitwe. WearCheck also has a presence in Cape Town, Rustenburg, Steelpoort, Port Elizabeth, Zimbabwe and Namibia.

An eleventh full-service laboratory is scheduled to open soon in the Democratic Republic of Congo (DRC). One of the mini-lab technicians, Shane Goslin, will relocate to the DRC to supervise the initial phase of the new laboratory, which will be on-site at the new Kibali Gold Mine, potentially the largest gold mine in Africa.

**Media queries: Sharon 082 8230539 or sharon@sharonfaypr.co.za**



Field and lab technician Shane Goslin prepares a tray of engine coolant samples for testing.

WearCheck's Trevor Pillay (left, at microscope) is the senior mini-lab technician, and field and lab technician, Shashay Rampersad.

## 'Good. Better. Vast'

Erlangen, Germany. Students from the Marie-Therese-Gymnasium high school in Erlangen bagged the 'German Champion' title in the 2015 'Formula 1 in Schools' contest. The winning model racing car was designed by the students using Solid Edge PLM Software from **Siemens**. Two additional participating teams from Augsburg and Munster also performed well using Siemens technology.

'Good. Better. Vast'. This was the war cry to be heard emanating from the Erlangen-based team 'Vast Velocity' at this year's 'Formula 1 in Schools' contest. Siemens was backing the team in the role of Premium Sponsor, and made available a range of equipment to the young scientists and to every other of the over 200 German teams including the CAD software Solid Edge. This

professional program enabled the students to design the perfectly formed racing vehicle. 'Vast Velocity' and some other teams were also particularly supported by Siemens. The model car secured the team from Erlangen first place in the German Championship, and qualified them to go on to contest the world championship title in Singapore in September. The 'Chasing Shadows' team from the Jakob-Fugger-Gymnasium High School in Augsburg, also supported by Siemens, took 6<sup>th</sup> place in the German Junior Championship. The model racing car of the Team from Muenster was developed with the CAD-CAM process chain with subsequent production on a CNC machine as the competition required.

**Enquiries: Keshin Govender. Email [Keshin.govender@siemens.com](mailto:Keshin.govender@siemens.com)**



## Eaton launches its first ever Experience Centre in South Africa

Power management company, Eaton, has launched its first ever Experience Centre in South Africa. The Centre is specifically designed to showcase Eaton's innovations and demonstrate how they benefit customers in key segments including commercial construction, renewable energy, data centres, oil and gas, mining, utilities. It also exhibits Eaton's innovative products and solutions for customers operating in mobile and industrial hydraulics applications as well as in the automotive industry.

During this event, Eaton also launched the Hybrid Inverter, an energy saving and back-up power system that allows for continued power during load shedding. It runs on energy from the sun and can power small to medium enterprises amongst others switching between main power, solar power as well as battery power - depending on availability. This solution comes at an excellent time as South African businesses are in need of alternative power solutions that ensure uninterrupted productivity and profitability during power outages. The capabilities of this Experience Centre will allow visitors to engage with Eaton's business consulting experts from across the region. This will ensure they are fully prepared to make informed decisions on the best solutions for their businesses.

**Enquiries: Sumaya Abdool.**

**Tel. 011 874 4308**

**or email [sumayaabdool@eaton.com](mailto:sumayaabdool@eaton.com)**

Eaton's Craig de Vasconcellos (regional sales manager (hydraulics)), Portia Thokoane (human resources manager), Shane Kilfoil (managing director), Frank Campbell (president EMEA region), and Tom Kellett (sales, technical support and aftermarket manager (vehicle)).



## 'Fearless' move by Siemens

On 15 September Siemens celebrated the official handover of the new lean manufacturing cell to Fearless Technical Contracts and Services at Siemens in North Riding. When Siemens decided to stop using labour brokers, Tshepo Mokoena and Kaizer Montshonyane took the opportunity on offer from Siemens to register their own business and continue in a new role as a supplier to Siemens and so Fearless Technical Contracts and Services came into being. Under the mentorship of Stassino Morantos, production manager at the Siemens North Riding Manufacturing Facility which is an incubator for small enterprises, Fearless has grown from strength to strength learning to implement lean manufacturing and the importance of continuous improvement of the manufacturing process. Fearless now employs 15 people and has been appointed as a supplier of certain sub assemblies to the Eskom Kusile project.

**Enquiries: Email [kalai.pillay@siemens.com](mailto:kalai.pillay@siemens.com)**



Fearless Technical Contracts & Services: Kaizer Montshonyane (financial director) and Tshepo Mokoena (managing director).



Rita Nkuhlu (Siemens executive director) and Tshepo Mokoena (Fearless).

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**Environmental Management Systems Course**

21 – 22 October 2015

Johannesburg

Carbon Tax is coming, and the importance of an environmental management system is becoming more crucial than ever. The Energy Training Foundation (ETF) is launching the ISO14001 environmental management systems standard training course to teach how the standard helps organisations identify, manage and control activities that have an environmental impact.

**Enquiries: Thieda Ferreira. Tel. 041 582 2043 or email info@entf.co.za**

**Green Building Council of South Africa's (GBCSA) Annual Convention**

2 – 6 November 2015

Cape Town International Conference Centre

The convention will go beyond simply finding ways to cope with the country's current energy crisis and help move South Africa towards more innovation and future-orientated thinking to 'Inspire Better Buildings'.

**Enquiries: Visit [www.greenbuildingconvention.org.za](http://www.greenbuildingconvention.org.za)**

**10<sup>th</sup> Southern African Energy Efficiency Convention (2015 SAEEC)**

11 – 12 November 2015, Emperors Palace

The Southern African Association for Energy Efficiency (SAEE) aims to become the Association in Southern Africa that brings all energy stakeholders in the region together. In order to achieve this synergy, the SAEE is hosting the 10<sup>th</sup> Southern African Energy Efficiency Convention (2015SAEEEC), as an event serving the energy management, environmental, facilities building upgrades, energy engineering, cogeneration, power generation, and efficiency improvement industries.

**Enquiries: Erika Kruger. Tel. 018 290 5130**

**2016 Africa Energy Indaba**

16 – 17 February 2016

Johannesburg

2016 Africa Energy Indaba, the sister event to the Infrastructure Africa conference and taking place in Johannesburg. Regional integration will come under the spotlight. The annual African Energy Ministers Roundtable to be hosted at the Indaba will lead with this key issue and will include the financing of Africa's critical energy infrastructure supported by skills development in Africa.

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