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## READ ONLINE!

Your copy of *ECD* is now available as an online eMag.  
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Welcome to the final issue of *ECD* for the year.

What a whirlwind 2016 has been. It seems we've had it all — from a lengthy federal election on home soil to an even more protracted one in the United States. In sport, we've enjoyed the glory of both the Olympic and Paralympic Games, as well as a couple of football finals that saw the underdogs claim their glory.

We've also endured more severe weather 'events' than most years in recent memory, with virtually every corner of the land hit by calamity at some point during the last 12 months. When South Australia was slammed in late September, the unthinkable happened and the power went out statewide. It didn't take long for the hysteria to start and renewables took a beating when the blame game commenced. At the time of writing this column, the dust has not quite settled, but the incident raised some serious concerns around our energy security and the systems that underpin it. It is a topic we will no doubt hear much more on as it becomes a focus of both federal and state government debate.

In addition to our regular content, you will notice we have a special feature in this issue of *ECD* — *Service Management* — which incorporates valuable information for anyone with a team on the road and covers a host of new developments in hardware, software, fleet and safety.

By now you should be counting down the days till some well-earned time off after what has hopefully been a successful business year. Wishing you all the best over the summer break, as well as a safe and happy Christmas and New Year period. See you in 2017.

Best regards,

*Dannielle Furness* – Editor  
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# ARC FLASH EXPOSURE ARE YOU REALLY DOING ENOUGH?

*Danielle Furness*

Since 2010, between four and nine electrical workers have lost their lives in Australia each year while on the job, with another one to two hundred presenting in emergency rooms suffering electricity-related injuries. These numbers remain static year in, year out — why is this still happening?





It's no secret that working on electrical equipment poses risks. Thomas Edison figured that one out back in the 1860s.

Oddly enough, the development of electrical standards owes more to the insurance industry than anything, where concern over fire hazards in buildings was the big driver for the emergence of rudimentary circuit breakers, current limiting fuses and a voltage-presence testing device. These designs were gradually supported by a range of procedures and guidelines which became recognised as the first formal National Electrical Code in the United States.

So, you are familiar with all the rules, have implemented a safety program of sorts, observe a 'no live work' policy and every employee travels with a van full of PPE. In other words, you've got it covered when it comes to potential electrical injury, right? Maybe... and then maybe not.

It's not as though the prevailing attitude is 'near enough is good enough' when it comes to electrical safety. You won't hear an employer saying "I'm about 75 to 80% sure that no-one will die today based on our policies and procedures" and it's difficult to imagine any employee intentionally cutting corners when their own safety is at risk — not when the stakes are this high. How then, can we explain the unchanging rate of death and injury among electrical workers in Australia year to year?

Four, five or 10 deaths annually may not seem substantial in terms of overall numbers, but the truth is that even one fatality a year is too many when you consider these incidences are almost always preventable.

### Increased exposure

Maybe it's as simple as the changing nature of the work being carried out. According to the National Electrical and Communications Association (NECA), "The proliferation of solar panels, energy storage and uninterrupted power supplies (UPS) used in industrial, agricultural, commercial building and even the residential sector increases the risk of exposure to safety hazards that are inherently associated to nonlinear power sources. With more complicated systems being installed increasing the likelihood and severity of an electrical arc flash the need for a systematic approach to managing occupational health and safety in the electricity industry is needed more than ever."

In addition, NECA highlights that the use of larger transformers to power residential installs means that short-circuit currents are much higher than they used to be.

Arc flash, in particular, has been an increasing focal point within the industry

in recent years. Given the associated risks, it's little wonder. Arcs can cause substantial injury — internally and externally — and additionally create an environment where circuit protection is rendered useless.

In June this year, an underground worker in Western Australia sustained burns when he was performing wiring modifications to a 415 VAC motor control centre. During the work, an incorrectly positioned busbar cover panel came into contact with fuse-holder bolts which were protruding from energised busbars behind the cover panel. The resulting arc flash and blast resulted in burns to the worker's hands and arms, and it was subsequently established that the worker was not wearing adequate PPE for the amount of energy released.

### Isolating the issues

A 2015 report from the National Fire Protection Association in the United States found that the biggest contributing factors to electrical injuries are:

- work inappropriately performed on energised equipment;
- insufficient training for working on or around energised electrical equipment; and
- failure to use appropriate personal protective equipment for electrical safety work practices.

While the causes may have been identified, it doesn't explain why practices and procedures are lagging behind the potential dangers.

In response to the changing landscape and to combat the number of incidents, NECA developed a toolkit of information and resources titled 'An easy guide to arc flash analysis'.

The guide draws attention to WHS Regulations 158 and 161, which both state that "if electrical work is to be carried out on energised electrical equipment an electrician must ensure that risk assessment is carried out by a competent person who has tools, testing equipment and PPE that are suitable for the work and have been properly tested and are maintained".

The guide further clarifies working on energised electrical equipment as any task that includes:

- isolating
- switching
- removing fuses or links
- isolation verification (testing for dead)
- testing
- fault finding
- 'live' work

As NECA points out, these are all pretty fundamental tasks in the average electrician's working day. The association suggests that a 'no live work' policy can't possibly exclude all



## ELECTING NOT TO UTILISE SUITABLE FLAME-RESISTANT WORKWEAR FURTHER COMPOUNDS THE ISSUE.

circumstances where electrical hazards exist. This means that an effective risk assessment is the best possible weapon in your armoury in the fight against worker injury, yet one that many still be deemed too difficult or time-consuming to undertake.

According to the Safe Work Australia Code of Practice 'Managing Electrical Risks in the Workplace' published February 2016, it's a very straightforward process:

1. Identify hazards.
2. Assess risks associated with those hazards.
3. Implement and maintain risk control measures.
4. Review those risk control measures.

As NECA outlines, this process forms part of an overall Electrical Safety Program (ESP), which every electrical contracting business should have in place. The ESP should also include provision for training and utilising appropriately rated PPE, as well as ensuring that workers have the tools for the job. The organisation specifically mentions that all clothing should be flame resistant.

The arc analysis guide says that a good risk assessment process must incorporate a calculation of incident energy, which is then used as a basis for selection of appropriate PPE and controls. Anecdotal evidence — the number of reported arc flash incidents — suggests that this process may be underutilised in the electrical industry.

NECA suggests that many electrical workers are daunted by the prospect of an arc flash calculation and that the procedure may be bypassed as a result. It concedes that to derive complete accuracy involves complicated calculations but suggests that a basic calculation for the purposes of determining safety is much easier than you'd think.

To that end, NECA developed a calculation tool which can be accessed directly from the association's website (<http://neca.asn.au/nsw/content/guide-arc-flash-analysis>), where you will also find an outline of the steps required to ensure that you are selecting the appropriate PPE for the job, along with a sample 'Arc Flash and Shock Hazard Appropriate PPE Required' label. Download the label for application to the board or equipment being worked on, which can be

used as a reference next time or for when others need to make the same choices on appropriate PPE.

### All PPE is not created equal

In November 2015, workwear manufacturer Hard Yakka PROTECT conducted a survey of Australian workers from industries where exposure to arc flash was common. The purpose of the study was to ascertain attitudes towards (and use of) workwear that incorporated flame resistance technology.

The results were shocking, as they indicated that more than one-quarter of respondents (28%) did not wear flame-resistant clothing, despite the inherent risks from arc flash. The reasons were varied — from employers not providing this type of PPE through to discomfort and high cost, none of which seem particularly valid when you consider the possible alternative outcomes.

### Flame resistance matters

Aside from the obvious fundamental dangers of arc flash, electing not to utilise suitable flame-resistant workwear further compounds the issue. The initial flash or blast is only half the problem if your clothes catch on fire. Check out some of the videos available on YouTube if you don't believe us.

Regular clothing, such as cotton or poly/cotton blends, will simply not do the trick. Similarly, supplying PPE to only the minimum required level or assuming that workers are utilising it properly is not enough.

The SWA code of practice points out the limitations and gives an idea of where the buck stops:

"PPE includes protective eyewear, insulated gloves, hard hats, aprons and breathing protection. The PPE should be rated for the work to be done. If working on energised equipment, the PPE must be able to protect the user from the maximum prospective energy available at the work site. Administrative controls and PPE do nothing to change the hazard itself. They rely on people behaving as expected and require a high level of supervision."

This presents another problem — if the equipment supplied is too cumbersome, limits movement, decreases dexterity or is deemed

just plain uncomfortable, then the temptation to remove it will probably win out, regardless of the risks.

### Acknowledging accountability

In July this year, a contracting firm was fined \$60,000 for failing to ensure electrical equipment under their control was adequately maintained, in relation to an incident that occurred three years prior. The Department of Mines and Petroleum Mines found Contractor Crushing Services International was responsible for injuries sustained by an electrician in its employ.

The worker was replacing components in a switch room and was exposed to live conductors due to the lack of a barrier preventing contact with live terminals. He suffered severe burns as a result of the arc flash that followed.

In early September, Essential Energy was fined \$300,000 for failing to comply with its duty of care for workers, following the death of a 47-year-old man in 2013.

The man was electrocuted when an electrical conductor he was holding became re-energised as it came into contact with, or in proximity to, energised overhead conductors while it was being lowered to the ground.

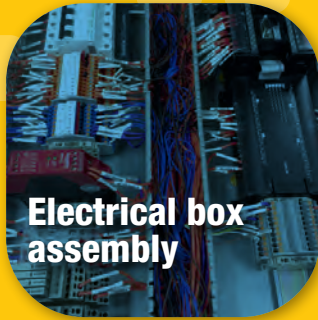
SafeWork NSW's investigation found that while Essential Energy was aware of the risk of keeping the top conductors energised while workers removed the bottom conductors, it chose to keep them energised for service delivery reasons.

The investigation determined that if Essential Energy had ensured the top conductors were de-energised and the power was turned off at the feeder, no power could have come onto the worksite and the incident could have been prevented.

These are only two of the most recent examples of safety breaches. Sadly, both could easily have been avoided.

When it comes to electrical safety, there is simply no excuse for cutting corners or failing in your duty of care. As an industry, we should be aiming for zero fatalities, particularly when it is within our power to prevent injury and death simply through adherence to established processes and procedures.

# Cable Assembly & Box Build Assembly



**Electrical box assembly**



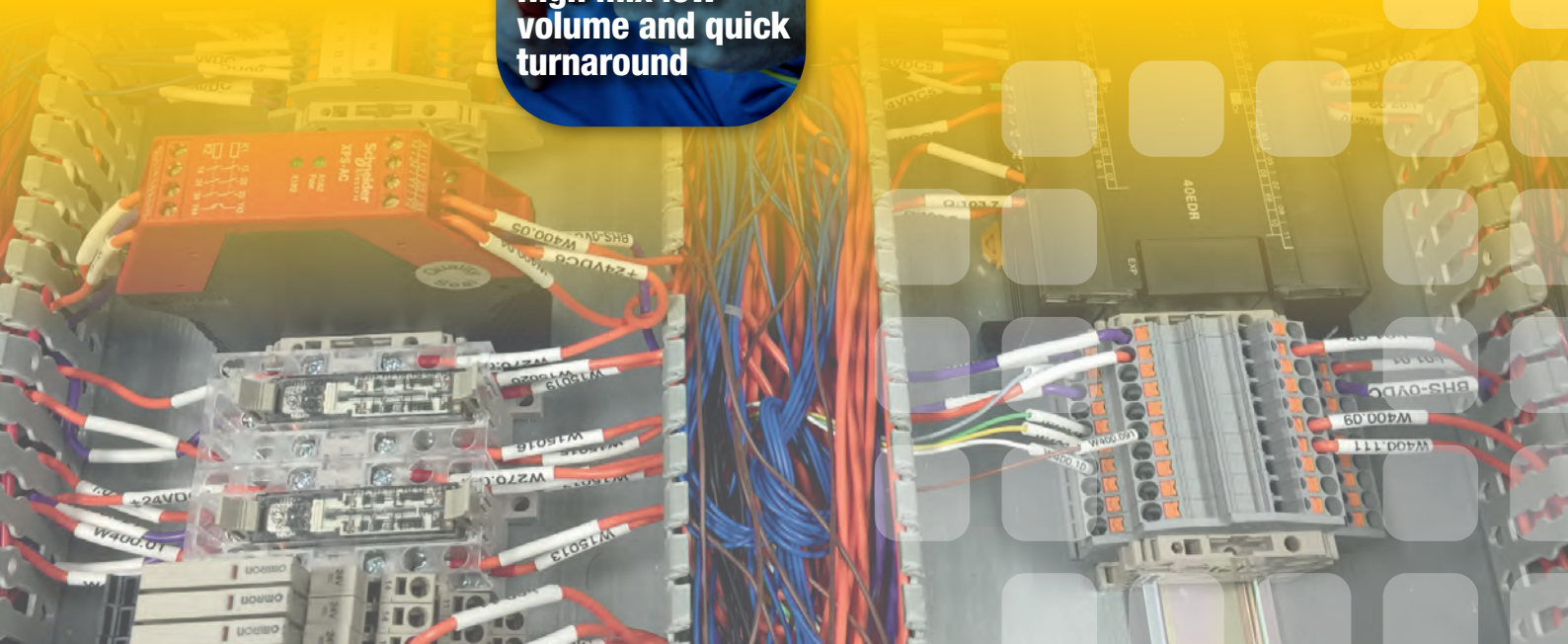
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## ENERGY-SMART HOME TECH DEVELOPED BY CSIRO

Evergen has launched an intelligent home energy management system with technology that was developed by CSIRO.

The system, which combines solar panels and batteries with smart technology, continuously analyses and optimises home energy use.

It chooses the most efficient source for the household's electricity supply at any given time, switching from solar to stored power as required.

The system examines the power consumption patterns of each household, as well as the local weather, to make decisions that reduce energy costs.

It is remotely managed by Evergen and regularly analysed and updated by CSIRO.

CSIRO Energy Director Peter Mayfield said, "CSIRO has been at the forefront of solar and battery technology research for many years, and we are committed to the development of intelligent systems and tools which change the way we use energy."

"We know that consumers are viewing their household electricity differently and taking more control. Intelligent systems allow them to do this with ease."

Evergen Chairman Stephen Dunne said the system is the gateway to energy-smart homes of the future.

"We're excited to be taking the science of CSIRO and building it into an energy system that will benefit families all over Australia," said Dunne.

CSIRO developed Evergen's core energy management intelligence and provided research expertise to help Evergen commercialise the product.

The Evergen system is now available to Australians in an early-release program, with a second-stage release program in January 2017.

## AUSTRALIAN WORKERS DRIVEN AWAY FROM BIG BUSINESS

Research by KPMG demographer Bernard Salt indicates that small and micro businesses are now Australia's fastest growing employment sector.

According to the report, baby boomers and Gen Y are leading the movement to escape the corporate world and become their own boss.

Salt's research was commissioned by nbn and is titled 'Small Business, Big Thinking: The entrepreneurialism of the Aussie workforce'. The report explores how access to fast broadband and digitally disruptive technologies have prompted the emergence of new entrepreneurial groups, which are driving a shift away from big businesses.

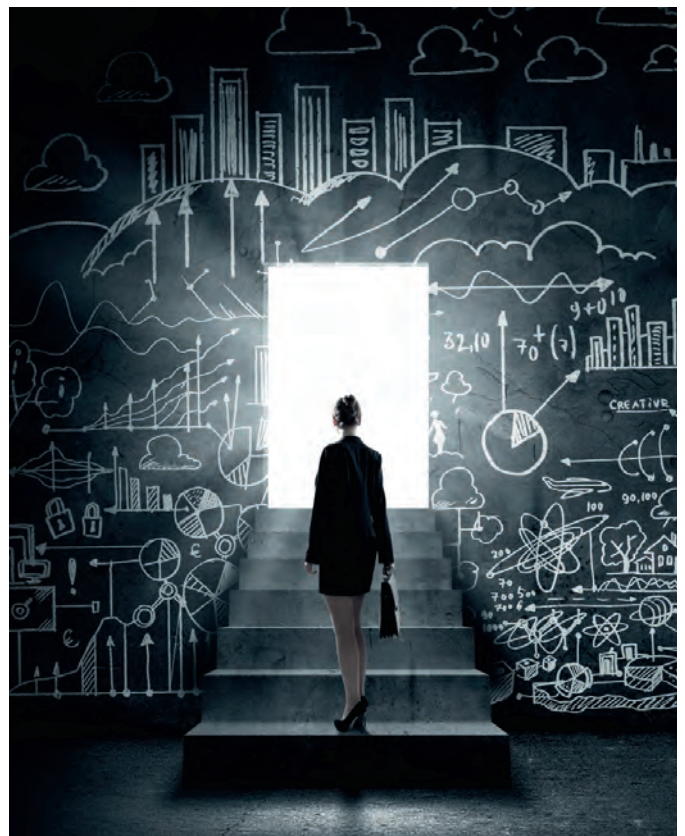
There are now more than 285 new start-up businesses emerging each week in entrepreneurial hotspots such as Riverstone in NSW, Frankston in Victoria, Aspley in Queensland, Mandurah in Western Australia, Hobart in Tasmania and Victor Harbor in South Australia.

"Australians are now empowered to run their business from wherever they want to, access customers from all over the world and to disrupt traditional business models with their innovations, their ideas and their drive," said Salt.

He believes that nationwide access to fast broadband and new technologies, such as virtual reality and high-definition video conferencing, are driving 'entrepreneurialism' among the Australian workforce. People are reinventing themselves as consultants in their field of expertise or taking the plunge to start business ideas of which they have always dreamed.

"Gen Y are rejecting the confines of corporate structures and leading the charge by taking a chance on their own passions in new business ventures, while baby boomers who are no longer shackled down by kids and mortgages are increasingly choosing to spend their last working years reporting to themselves," said Salt.

There are more than 3 million homes and businesses around the country which can already connect to the National Broadband Network. Every Australian is due to have access by 2020.





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## Service body

The Carryboy Tradesman body range is now available for the Foton Tunland, offering a high-quality, secure solution for equipment and tool carrying.

Designed specifically to be fitted to the Foton Tunland single- or dual-cab chassis, the Carryboy body unit combines the easy access of a drop side tray with the security and weatherproofing of a fully enclosed ute, along with the ability to have a roof rack and additional storage areas.

The smooth finish fibreglass body features three wide-opening, full-width doors that have the security of two-step rotary locks, which can be tied into the vehicle's standard central locking and easily opened with high-quality gas struts.

The Carryboy includes both an LED high-level rear brake light and LED internal lights, along with built-in rear lights with stainless steel protection covers.

The heavy-duty rear bumper protects the body and there is an option of a rear step. Inside there is a hard-wearing floor, with the sides carpeted for durability and quality. It additionally features roof racks made from steel and all joints are welded for added strength and powder-coated for a long life. A rear roller bar speeds up loading and unloading from the roof.

Available options include shelving and draws, rack systems, tie-down points and a fold-up bench vice.

**Carryboy Australia**  
[www.carryboy.com.au](http://www.carryboy.com.au)

## Van

Toyota has revised its diesel-powered HiAce range to improve fuel economy in the city while achieving stricter emissions standards.

Recalibration of the HiAce 3.0-litre turbo-diesel engine to meet Euro 5

emissions levels has delivered fuel-economy improvements of up to 4.6% on the official urban cycle. The upgrade to the 3.0-litre 1KD-FTV engine includes a diesel particulate filter with manual as well as automatic regeneration.

The biggest fuel-economy gains around town — where HiAce performs most of its duties — are for the Long Wheel Base (LWB) crew van and Super Long Wheel Base (SLWB) van with the five-speed manual gearbox. These variants also deliver a city-cycle improvement of 3.5% with the optional six-speed electronically controlled automatic transmission. Combined-cycle economy is either unchanged or rises marginally.

Petrol vans were upgraded to Euro 5 early last year. Since then, every new HiAce has been equipped with the safety of electronic vehicle stability control, brake assist for greater stopping power in an emergency, hill-start assist control and an emergency stopping signal.

The local range includes four body styles: LWB van, five-seat LWB crew van, SLWB van and commuter bus. Crew van and bus are turbo-diesel only; the other models offer either the diesel or Toyota's 2.7-litre four-cylinder petrol engine. All grades are trimmed with a dark grey interior.

Other standard HiAce features include driver and front passenger airbags, daytime running lamps, a reversing camera with three-inch monitor in the electro-chromatic interior mirror and anti-skid brakes, air conditioning, power steering, steering-wheel audio controls, clean-air filter, power mirrors, remote central locking, power front windows, cruise control and a multi-information display.

**Toyota Motor Corporation Australia Ltd**  
[www.toyota.com.au](http://www.toyota.com.au)



## Field service software

Oracle has announced an updated release of Oracle Field Service Cloud (formerly known as TOA Technologies). The release, which is part of the company's end-to-end cloud customer service offering, delivers extensive field service enhancements focused on mobility, ease of use and connecting contact centre agents.

Leveraging time-based, predictive, self-learning technology, Oracle says its offering helps create the most efficient job schedules and travel routes for field resources to ensure the right field resource arrives to every job on time, with the parts and knowledge to complete the work the first time.

Expanded Field Resource Manager enables field supervisors to use a mobile device to manage all field activities in real time, with additional insights into field service team capacity and streamlined collaboration. When an event occurs, the Automated Urgent Work Assignment application automatically locates the nearest resource and immediately routes the user to the urgent event. Integration with Oracle's E-Business Suite helps streamline job scheduling and inventory tracking capabilities.

The full Oracle Service Cloud portfolio is delivered across a range of contact centre channels, including web, phone, email, chat, social and in-person field service interaction.

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# HOW TO CHOOSE A RUGGED MOBILE DEVICE

In today's mobile computing market, it can be difficult to understand what the term "rugged" really means.



It is reasonable for a buyer to expect that a device marketed as rugged is at least a little more durable than a standard off-the-shelf consumer product, but how durable and in what ways?

Due to our growing dependence on mobile technology there are few instances where computer downtime does not have an impact on productivity — IT hardware is now ‘mission critical’ for everyone.

### Rugged testing: MIL-STD-810G defined

In 1962, the US Department of Defense (DoD) developed a series of tests, called MIL-STD-810G specifications (Mil-Spec), used to validate the level of ruggedisation in a piece of technology. These standards include dozens of tests with strict parameters used to simulate how a mobile device will operate under a variety of stressors and environmental conditions.

The standard has been revised throughout the years and has become a benchmark across the industry in validating whether a device can be considered “rugged”. It covers a variety of scenarios: drops, vibrations, temperatures, altitudes, water resistance and dust intake, and also includes criteria that limit the number of devices that can be used to pass a specific test.

There is no body that regulates the growing number of durability and MIL-STD-810G claims. Each manufacturer does its own testing. Understanding each test and knowing what questions to ask is critical.

#### **Transit Drop Test: MIL-STD-810G Method 516.6 Procedure IV**

**What is it?** A device is dropped from various heights at 26 different angles (every edge, corner and side) onto 10 cm thick plywood over steel plate on concrete. The height, at which the unit will still turn on and operate, generally between 76 and 300 cm, is the rated drop specification.

**Why does it matter?** Drops are one of the most common causes of damage to business mobile devices.

**Questions to ask:** Does your manufacturer conduct all tests on the same unit to mirror a user’s true working conditions? How many devices did it take to pass? At what height was the unit tested?

#### **Blowing Rain Test: MIL-STD-810G Method 506.5 Procedure I**

**What is it?** A device is blasted with 14.7 cm-per-hour rain and 112 kph winds, for 30 minutes per surface while operational.

**Why does it matter?** Few mission-critical workers can put their work on hold due to rain. This test simulates using the device in inclement weather or on a job site around water.

**Questions to ask:** Many devices are marketed as “water resistant”. What does this really mean? Is it just spill resistant? Did it merely pass the vertically falling rain/drip test (Procedure III)? Is the device only showing an Ingress Protection (IP) rating instead of submitting to this test? Does the manufacturer reveal to what extent they have tested their devices ie, can they be fully immersed?

#### **Vibration Test: MIL-STD-810G Method 514.6 Procedure I**

**What is it?** This test simulates the vibrations typically experienced in a vehicle-mounted environment.

**Why does it matter?** Personnel who use devices in vehicle or workers conducting business on the road need a reliable device to function in their everyday work environment.

**Questions to ask:** Was the device operating during the test? Was it mounted during testing as it actually would be in use? Ask about the specific conditions and duration of testing to ensure

they mirror the types of environments your workers will face in the field.

#### **Sand and Dust Resistance Test: MIL-STD-810G Method 510.5 Procedure I**

**What is it?** Dust then sand is blown at a device over several hours in an environment of 60°C while operational.

**Why does it matter?** This test simulates situations like sandstorms or environments where unsealed devices, and those with fans, can have internal components exposed and damaged due to contaminants.

**Question to ask:** Ask for details about how the test was performed to ensure the test is reflective of the environment your workers may find themselves in. Factories, mills and mines can have these types of conditions as much as outdoor environments.

#### **High Temperature Test: MIL-STD-810G Method 501.5 Procedure II**

**What is it?** An operational test of the device is performed at 60°C for 30 minutes.

**Why does it matter?** This test simulates a device being exposed to high temperatures for an extended amount of time, like a device being left in a vehicle on a sunny day or in a hot factory environment. Most processors run well at room temperature, but when exposed to extreme hot or cold can experience catastrophic failure.

**Question to ask:** How long was the device tested in extreme heat?

#### **Low Temperature Test: MIL-STD-810G Method 502.5 Procedure II**

**What is it?** A device is placed in a -28°C environment for 30 minutes and powered on in the extreme cold.

**Why does it matter?** Successful completion means the device is able to boot in extreme temperatures without damaging the hard drive and losing valuable data. This test simulates the ability to start and operate at extreme winter conditions, without damaging the hard drive or experiencing data migration in an SSD.

**Question to ask:** Ask if this test was performed and how data integrity was tested.

#### **Temperature Shock Test: MIL-STD-810G Method 503.5 Procedure I**

**What is it?** A device goes through three cycles of testing where it is placed in an environment of 93°C then 51°C to test reliability when moving between extreme temperatures.

**Why does it matter?** Typical, commercial-grade devices can experience severe usability issues at temperature extremes. Thermal shock can cause fogging/condensation inside a device, which can impact the screen readability and the internal electronics.

**Questions to ask:** Was this test performed and can I afford to risk damage from thermal shock if it was not?

#### **Humidity Test: MIL-STD-810G Method 507.5 Procedure II**

**What is it?** A device is tested in temperature cycles of 30°C then 60°C at 95% relative humidity.

**Why does it matter?** This test simulates how a unit might work outdoors in a tropical environment or in many plant locations. The main issue in these environments is the ability to transfer heat (reduced by the level of moisture in the air). If the device becomes overheated, units can become inoperable, temporarily or permanently.

**Questions to ask:** Has the device been tested for high humidity? Will it survive everywhere it may be needed?

## Rugged device buyer's guide

Understanding Mil-Spec testing is the first step in selecting the highest quality, most reliable rugged device for your needs. When evaluating products, look beyond the spec sheet. Were the products merely designed to meet Mil-Spec or were they actually tested? Ask for third-party testing results to be 100% confident.

With no governing body conducting Mil-Spec testing, third-party validation is the only way to ensure rugged testing claims are true. Consider how the device will fit into your total mobility solution. Investing in rugged means that your devices need to keep up with the demanding environments of your workers, and last for years to come. Ask these questions:

### ***Were the right tests passed?***

There are numerous types of tests, all done independently, so verify the device has passed the ones that best reflect the environment it will be deployed in. A manufacturer may claim to have a Mil-Spec ruggedised device, but when you read the fine print, you may see it was only tested for altitude and not drops or spills, the most common causes of failure.

### ***What is the fine print?***

Each supplier of rugged computing equipment is expected to assure or guarantee adherence to the standards and can set their own parameters for the testing. Always ask for third-party validation of the tests that were passed.

### ***What is the average annual failure rate?***

In the end, reliability is what counts. Whether a device continues to operate smoothly after several years of hard use in extreme environments is the best determinant of how rugged it really is. Ask for verifiable data on how devices have actually held up under real-world conditions.

### ***What features are included?***

Make sure you select a device that works the way your workers do — think about exposure to daylight, gloved touch capability and a sturdy handle to minimise the potential for drops.

### ***What warranty and support is provided?***

Beyond device warranty, consider the support available during and after deployment. Investing in a device that is easily com-



patible with other systems can save headaches during future technology integrations.

### ***What security measures are put in place?***

When valuable data is on the line, invest in a solution that will protect mission-critical information. Ask about features like fingerprint or smart card readers. Additional security features include the Opal standard for hardware-based disk encryption necessary for DoD applications and mobile device management (MDM).

Any device can be labelled "rugged", but customers armed with the right information can ensure they get the ruggedised mobile computer or tablet that meets their needs and offers the lowest total cost of ownership (TCO).

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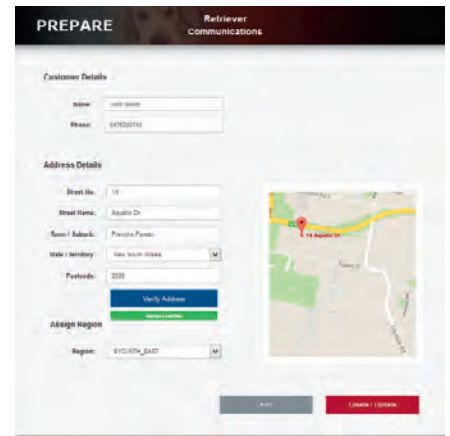
Retriever Communications has announced the release of Retriever Prepare, a project management solution that integrates with in field scheduling and mobile delivery, to help businesses provide a seamless experience from the initial work order appointment booking right through to the on-site project completion.

Created for telecommunications, utilities and a range of other industries that manage multistage work orders/projects, Retriever Prepare improves efficiency and productivity by eliminating the need for manual or EXCEL-based pre-planning processes that often result in disconnect between customers, appointment makers, dispatchers and field technicians. It serves as an additional module to the company's current mobile field worker management Barking Suite Solutions.

Features include: appointment management functionality via a web portal to management appointment slots, technician availability and scheduling coordination and easier scrutiny of organisational compliance; job planning capability via management of tasks required prior to job commencement (eg, parts order) and tracking and recording of all pre-job activities, providing a full audit history.

The module is the result of Retriever's partnership with ISGM, a provider of integrated workforce management solutions and a co-author of Retriever Prepare. The new solution will deploy later this year.

**Retriever Communications**  
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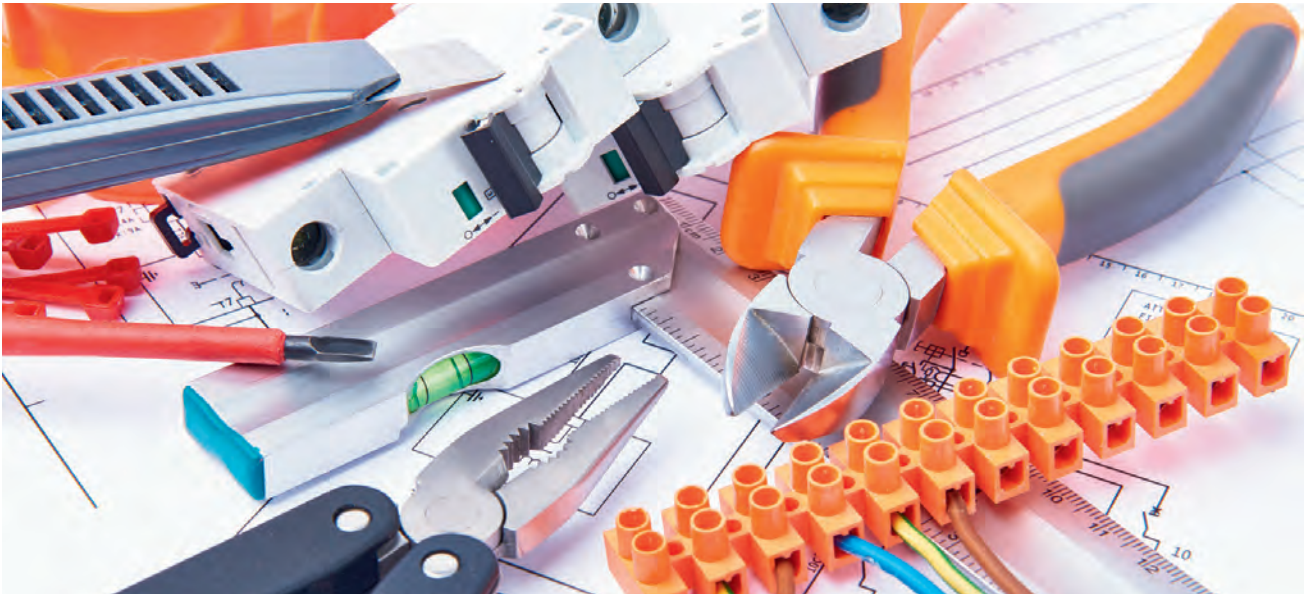


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## There is no substitute for safety in your workplace

Malcolm Richards



At Master Electricians Australia, we spend a lot of time advocating for a range of issues within our industry, but no issue is of more paramount importance to us than electrical safety.

There have been far too many electrical deaths in Australia this year, with in excess of 100 families burying a loved one who has been tragically killed while on the job. The tragedy of each one is that they could have been prevented with a little forward planning and commonsense precautions like turning the power off at the switchboard.

While the number of electrical deaths for 2016 is on a downward trend from previous years, we still believe that one death is one too many, and we will continue to be a strong advocate for increased safety measures in the electrical industry. We simply must get better at electrical safety as a nation, and Master Electricians Australia challenges the contracting industry to set the example.

It is vital that every electrical business is doing all it can to implement a workplace culture that places a premium on safety. A series of checks and balances should be in place to ensure that employers are doing all they can to create a safe working culture. Employers should undertake a full safety audit of their business as well as implement a safety management plan, not only to prevent tragedy from occurring, but also to safeguard against potential legal action (which can lead to financial ruin) in the event of a workplace fatality.

For instance, earlier this year a manslaughter charge was laid against the electrical contractor in charge of the worksite where 20-year-old Jason Garrels was electrocuted in 2012. This manslaughter charge was made following a coronial inquest that found the worksite was not adequately safe. Had a more stringent application of basic electrical safety been in place, a young life would not have been lost and the contractor in charge of the worksite would not have faced criminal charges.

In addition, we have also seen a 24-year-old Victorian man die on the roof of a store in Melbourne after being electrocuted

and a 21-year-old dairy farmer electrocuted while holding a pump at a drainage pit on a farm in rural Victoria.

As an electrical contractor, you can't always control what happens on worksites, but you can control the training and safeguards you put in place to ensure that all staff are as well informed as possible on how to work safely.

Master Electricians Australia acknowledges that it can be difficult for contractors to fully understand complex electrical regulatory frameworks. To assist contractors in creating a culture as conducive to safety as possible, MEA has developed a program named ME Safety, an affordable option to run as an add-on fee-for-service alongside MEA membership.

ME Safety is a fully integrated safety management system designed specifically for the electrical industry for the purpose of protecting both staff and customers via a series of checks and balances.

MEA is passionate about ensuring that every employer, contractor or sole operator in Australia is fulfilling their safety obligations and that they are able to legally defend themselves in the event that an employee does not meet their safety obligations and a tragedy occurs.

The implementation of ME Safety not only reduces the risk of accidents, it also increases business productivity, customer satisfaction, product and service quality, and reduces errors and costs.

Having an extensive and thorough safety program in place can be the difference in not only ensuring that your employees operate in a safe environment, but also providing you with the appropriate legal protection should a tragedy occur.

There simply is no compromise for safety in an industry such as ours. If you're an employee, it is important that you are proactive in promoting safety, because in the event of a tragedy it is too late to decide to think about increasing safety in your workplace. To find out more about ME Safety, please visit our website at [www.masterelectricians.com.au/page/Join/Safety/](http://www.masterelectricians.com.au/page/Join/Safety/).



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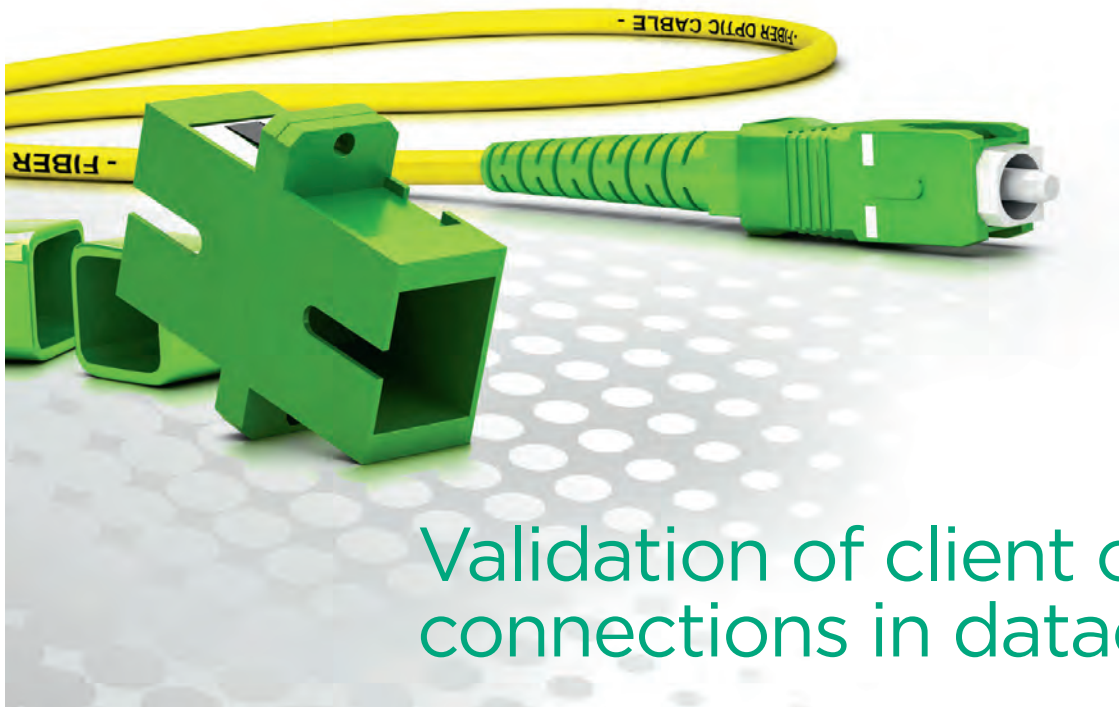
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## Validation of client cable connections in datacentres

**I**ncreased electrical and fibre optic cabling within datacentres are driving client installation and verification demands. Datacentre operators need to test fibre-rich, carrier-neutral environments for redundancy, high performance connectivity and disaster recovery up to 400 Gbps. They require a hand-held, all-in-one tool for testing and troubleshooting electrical cables and fibre optic interconnects between servers, switches and routers at all data rates, using any given interface, located anywhere in the datacentre.

Electrical Ethernet cabling such as Cat5e, Cat6 and Cat6a can be found in most plants for delivery up to GbE rates. Fibre optic is common for most rates >1GbE and can vary in types, connectors and lengths, depending on the application. MPO (multi-fibre push on) trunk cables support up to 72 fibre strands and are typically used for short distances. Single mode fibres are used for longer distances (10–40 km) and higher data rates (up to 100 Gbps). Multimode duplex fibre provides high data rates (up to 10 Gbps) over short to medium distances (up to 300 m).

### Fibre optic client cable testing

**Fibre optic connector inspection:** Dirty or damaged fibre optic connectors can greatly affect network performance. Scratches, chips and contamination on fibre optic connector end faces reduce transmission quality and increase errors. A digital video inspection probe can reduce these issues by verifying the condition and cleanliness of connector end faces during the installation phase. The connector image and detailed pass/

fail status should be displayed as defined by IEC 61300-3-35 ensuring quality and consistency from connector to connector, technician to technician.

**Optic transceiver analysis:** As data rates increase to 40 and 100 Gbps, pluggable optics become more complex and contain additional points of failure. The pluggable optics (CFP, CFP2, CFP4, QSFP+, QSFP28, CXP) support MDIO (management data input/output) information of the optic transceiver. MDIO analysis and testing verifies the performance of the pluggable optic and monitors alarms and errors to isolate issues from the fibre optic cable and connector.

**Fibre optic cable measurement:** Scratched or dirty connectors at fibre cable connections, such as patch panels and adapters, can be detected as fault locations due to excessive optical reflections. An OTDR measurement displays results as a trace showing the fibre optic cable length, macro-bends, losses and size of reflections, as well as an easy-to-view summary of the analysis results. The technician can set pass/fail conditions based on client service agreement value for each event, which are automatically identified within the OTDR trace.

### Electrical client cable testing

**RJ45 electrical cable inspection:** RJ45 electrical cable should be tested to identify failures such as short circuits or breaks of a wire pair. The cable test should also indicate the distance from the instrument to the fault. This gives the technician the confidence in knowing the cable quality and if necessary, the location of any faults within the cable.

### Client service verification

Selection of the proper benchmark verification test can determine if the service level agreement has been met.

RFC 2544 is an IETF standards body test typically used for packet-based network equipment. This traditional benchmark test is used to test the layer two 'pipe' throughput, latency and frame loss measurements after the physical layer has been tested.

Y.1564 is an ITU standards body test used to emulate the 'services' purchased by a client to verify the service acceptance criteria agreed upon between client and service provider.

RFC 6349 is an IETF standards body test of the TCP communication within the packet-based transport network. This test is focused on the client-to-client communication once physical, transport and network layers have been tested. Instruments such as the Anritsu MT1000A Network Master Pro and MT1100A Network Master Flex provide complete electrical/fibre optic cable testing along with industry recognised data throughput benchmark testing that will reduce test times and costs while improving quality.

For further information or to request your free how-to guide please contact Anritsu on 1800-689-685 or [au-sales@anritsu.com](mailto:au-sales@anritsu.com).

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### Digital low-resistance ohmmeter

The Megger DLRO100 digital low-resistance ohmmeter is a readily portable lightweight instrument that can deliver a test current of 100 A. It has internal rechargeable Li-ion batteries that provide power for up to 200 tests on a single charge. This allows users to perform high-current low-resistance testing in almost any location, even if there is no access to a mains supply.

The instrument uses novel circuitry that gives high noise immunity and provides stable readings. For physical protection it features enclosures with an IP54 ingress protection rating, even when the lid is open and testing is in progress.

Operator safety is protected by a CAT IV 600 V safety rating in line with IEC61010. With an optional

DC clamp, dual-ground operation is also supported. This provides safety when working in substations and similar environments by allowing tests to be carried out with both sides of the equipment under test grounded.

The product has capacity to check the resistance of busbar and cable joints, measure wire and cable resistance, and verify lightning conductor bonding. It is also suitable for testing switchgear and circuit breakers during manufacture and in the field. Additionally, it offers a smooth DC output for circuit breaker tests.

The product has a measuring range of 0.1  $\mu\Omega$  to 1.999  $\Omega$  with a resolution of 0.1  $\mu\Omega$ . Results are shown on a large LCD display panel and can also be stored in a large-capacity internal memory for later access via the display or USB download. Versions are available with support for remote operation, Bluetooth connectivity and asset/result tagging.

Manual mode allows the user to initiate the test once the probes are in contact with the object. In auto mode, as soon as the potential leads are connected, the test starts automatically.

In continuous mode, the instrument will continue to test, updating the display after each new test cycle, until the test button is pressed again.

Both standard and Kelvin lead sets are available. They are 5, 10 or 15 m in length. All have a CAT IV 600 V rating.

**Megger Limited**  
[www.megger.com](http://www.megger.com)

### Industrial plugs and sockets

PCE IP66/67 industrial plugs and sockets have good impact resistance, combined with high rigidity and solidity. The product offers high thermal stability, IP66/67 rating and good chemical resistance for a range of various application and industries.

The plugs, sockets and switched interlocked socket outlets are available from 16–125 A in the 230 V and 400 V 50/60 Hz AC range.

The company's range of extra low voltage plugs and sockets for use under the most extreme conditions can accommodate cables from 8–24 mm diameter. The 2- and 3-pole, IP66/67 equipment can handle up to 32 A at 24/42 V DC and AC from 50–500 Hz.

Lloyd's approved containers, plugs and switched interlocked sockets are available at 32 A, 4-pole 3h 440 V. For 63 and 125 A connectors and socket outlets, the PCS (pilot contact system) is a built-in auxiliary contact. It is used as a protective electrical interlock, or for additional control purposes with an isolated connection in the socket outlet rated at 2 A.

In order to prevent the insertion of plugs and sockets of different voltages and frequencies, 12 positions of the earth contact are assigned to the polarising slot, in accordance with IEC 30309-2 series I.

**Leveltec Engineering Pty Ltd**  
[www.leveltec.com.au](http://www.leveltec.com.au)

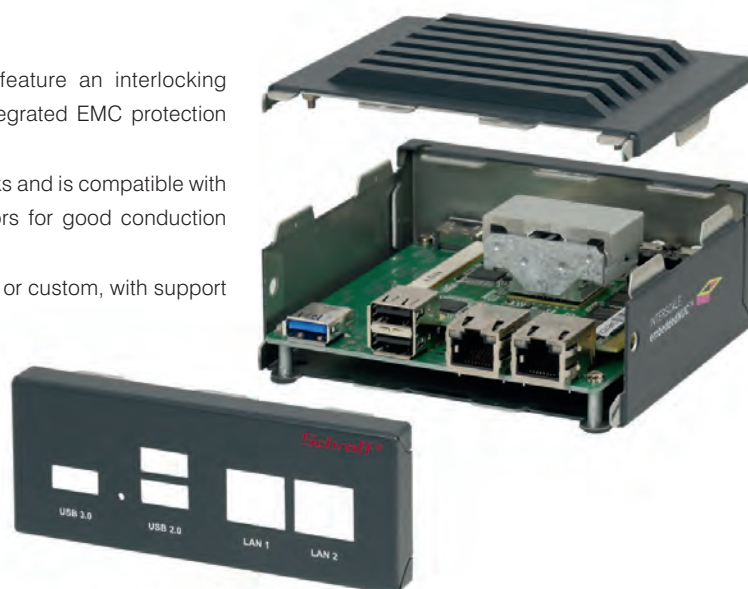
### C cases

Pentair Schroff Interscale C cases feature an interlocking tabbed construction that provides integrated EMC protection and secures with only two screws.

The product has integrated heat sinks and is compatible with the company's flexible heat conductors for good conduction cooling performance.

The product is available in standard or custom, with support from prototype through production.

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**ABB**

# TRANSFORMING SOLAR SOLUTIONS

Consumer demand for home battery storage is on the rise, paving the way for cloud-based monitoring solutions in both new and retrofit applications.



**A**round 1.5 million Australian households already have solar panels installed, according to figures from the Australian Energy Council. The reasonably high uptake levels — around 16.5% of households — are largely due to a combination of mandatory renewable energy targets and feed-in tariff programs, which varied from state to state.

## The end is nigh for tariffs

As many of those programs draw to an end, consumer demand for a way to save and store one's own energy is on the up. According to Bradford Solar, a division of CSR Bradford, six out of every 10 enquiries are from existing solar customers looking to upgrade existing systems and to transform the way they store and consume their energy. The company offers the Tesla Powerwall solution in conjunction with a 3.5 kW SolarEdge inverter, with the entire package installed and ready to monitor in under 4 h.

CSR Bradford Executive General Manager Anthony Tannous says the increased interest is because there were relatively few available options for home owners until fairly recently.

"Until now, there have been few suppliers providing Australian home owners with the option to do this. We have partnered with SolarEdge to provide existing solar owners with the missing piece of their energy solution," he said.

Existing solar users who have already taken charge of their energy use currently enjoy free energy during the day. By upgrading their system, they now have the power to store the electricity generated during the day to run their home at night.

A typical Australian house consumes around 21 kWh per day. Tesla Powerwall is capable of storing 6.4 kWh per day, which is enough to support the average home's evening energy use.

With the end dates for selected feed-in tariffs in Victoria, New South Wales and South Australia looming, it is anticipated that demand will continue to rise.



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### Opportunity in new builds

Demand is not confined to retrofit applications either, with many new home owners electing to reduce their reliance on the grid. Victoria-based Arden Homes has recognised the shift in consumer sentiment and partnered with CSR Bradford to offer the Tesla Powerwall as a standard inclusion in new home builds, with a view to extending the technology offering across more property ranges in the near future.

Arden Homes Director Dean Morrison says that consumers are driving the change.

“Home owner expectations around home design are changing — customers want better-performing homes that are comfortable, beautiful and efficient,” he said.

Consumer group One Big Switch says that Victorian home owners have been subjected to energy price hikes of more than 120% in the last decade.

“We know that through intelligent home design solutions we can maximise a home’s performance,” said Morrison.

“With rising energy bills, it’s no wonder that home owners are looking for ways to gain more control of their energy management and live a lower-impact life. This is one of the reasons that prompted us to introduce this initiative.

“Consumers want to be less dependent on the grid and have greater control over their family’s energy use. This solution allows them to achieve this, making a home more attractive to buyers.

“We know there is a growing curiosity around alternative energy sources as consumers become savvier about how these solutions can create energy savings [and] increase a property’s resale value along with the obvious environmental benefits,” added Morrison.

This thinking is backed by a recent Enigma survey of potential and current home buyers, with 90% of respondents agreeing that solar power allows them reduce energy costs and 76% indicating that they would be more likely to consider a builder who offers solar power as a standard inclusion.

### Managing consumption

Tracking and controlling consumption is just as important as storage. The cloud-based monitoring system allows consumers to monitor their energy usage via a mobile device or home computer, giving home owners the freedom to track and control solar consumption, energy production and energy use at any time. This facility gives consumers the power to manage their household’s efficiency and energy costs by helping to load shift electricity.

*Bradford Energy Solutions*  
[www.bradfordenergysolutions.com.au](http://www.bradfordenergysolutions.com.au)

“For many home owners, government-led rooftop solar feed-in tariff programs have provided significant financial incentives for installing solar systems.

“With these programs now coming to a close, many residents will be looking to save and store their own-generated energy, rather than selling it back to the grid.

“For example, residents in New South Wales had the potential to receive \$0.60/kWh, allowing them to effectively offset much of the cost of their solar investment. When the feed-in tariffs end in December, they will receive as little as \$0.06/kWh from energy shared back to the grid,” said Tannous.

The average household that installs the retrofit upgrade can achieve significant savings.

“A family in Sydney using a 5 kW solar PV system and consuming most of their energy at night could save up to \$1390 per annum with the battery installed. Those with a PV system and no battery would save just \$806,” said Tannous.

## Optical transport tester

The Anritsu Network Master Flex MT1100A optical transport tester addresses the challenges associated with emerging technologies being integrated into core and metro networks, as well as in data centres.

The product is a field-portable multi-100G transport tester that can support native client payloads, including Ethernet, fibre channel, SONET/SDH and CPRI, into various ODU encapsulations. It serves as a comprehensive tool to verify network performance during installation and maintenance.

The instrument can test several rates, from OTU1 through OTU4. It also supports 10 GbE client payload using GFP mapping into ODU2. A multistage mapping option is also now available, which divides capacity of ODU2 into eight 1.25 G ODUflex time slots for more accurate testing.



allows the product to support up to 400 Gbps (100 Gbps x 4) R&D, as well as test up to four independent 100 Gbps ports simultaneously, to increase manufacturing efficiency for 100 Gbps transport equipment.

**Anritsu Pty Ltd**  
[www.anritsu.com](http://www.anritsu.com)

Statistical measurements for BER tests and OTN level alarms are supported. Error and alarm insertion is also available so stress tests on network elements can be conducted. CFP4 and QSFP28 optical modules can also be evaluated.

The product can solve OTN issues, reduce system downtime and lower operating expenses for network operators. It tests a variety of current client signals over the data plane and has a flexible platform that can be easily updated as technologies advance. The modular design also

## Increased safety enclosure

The Hawke International PL511 increased safety enclosure is designed to reduce purchase cost and installation time.

Installing and wiring a small enclosure can be a tedious task, with installation space often at a premium the process can be slow and hard work. Problems with installation are often exacerbated in cold offshore environments where dexterity is inhibited.

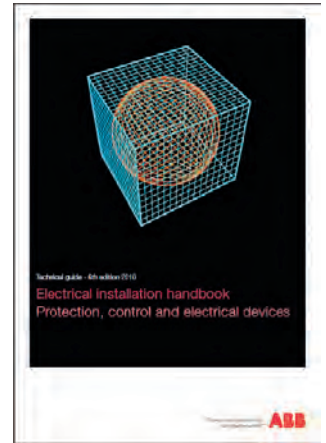
Given that small enclosures are used for the most common electrical distribution applications, this is a problem that affects many installers throughout the Ex industry.

The product's dropped lid body design slices through the enclosure wall, exposing the terminals and providing easy access for wiring. This increased access also allows for terminations to be fully visually inspected.

Moulded from the latest in glass-reinforced plastic material, the product provides an economical alternative to traditional glass-reinforced polyester enclosures, reducing weight and cost while maintaining the material strength characteristics required for harsh and hazardous locations.

The enclosure comes in a standard configuration which includes 6 x 4 mm cross-connected terminals (in pairs) with 2 x earth terminals and 4 x M20mm entries as standard. This configuration should suit most small enclosure applications.

**JT Day Pty Ltd**  
[www.jtday.com.au](http://www.jtday.com.au)



## Electrical installation handbook

The ABB Electrical installation handbook is designed to provide the user of electrical plants with a quick reference tool. It helps in the correct definition of equipment in numerous practical installation situations.

In one single document, the handbook supplies tables for the quick definition of the main parameters of components of an electrical plant and for the selection of the protection devices for a wide range of installations. Some application examples are included to aid comprehension of the selection tables. It is suitable for all those who are interested in electrical plants, useful for installers and maintenance technicians with its brief electrotechnical references, as well as for sales engineers through quick reference selection tables.

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In this age of energy saving, the Muller slim-line SC08.13 Astro Digital Time Switch has saved power by accurately tracking the sun's progress and switching lights, appliances, equipment on or off in relation to sun rise or sunset. This Time Switch will accurately switch at any fixed period before or after sunrise or sunset, any time in the year. With a Daily/Weekly program, block programming, 60 locations, memory reserve of 6 years, this is a well packed Time Switch.

Leading the range for inexpensive cost with European manufacture, the VS10.18 and VS14.18 Analogue Time Switches have been stalwarts in industry. Measuring one module wide, 17.5mm, the single module VS10.18 is a 24 hour Time Switch which goes on and on. If a battery backup is required, the VS14.18, provides security if power drops or other power disturbance occurs.



- SC 08.13 pro programmable with supply disconnected



- VS10.18 Analogue time switch daily program for DIN-rail mounting



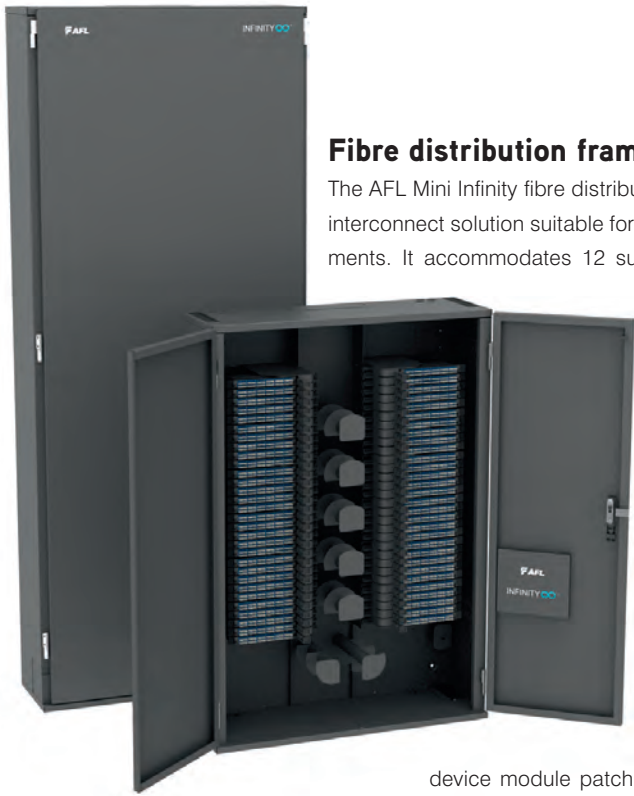
- VS14.18 Analogue Time Switch for DIN-rail



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## Fibre distribution frame

The AFL Mini Infinity fibre distribution frame is a high-density optical interconnect solution suitable for a range of communication environments. It accommodates 12 sub-frames. The product is suitable for high-density fibre management in data centres, co-location and telecommunication environments.

The product is a left and right sectioned mounting frame that is populated with modular swing-out sub-frames as required. This allows both inbound and outbound cables to be separated. Each section will accommodate six sub-frames, totalling 12 when both are fully populated. A range of modules is available to suit fusion splicing, patching, passive device module patching and MTP patching.

Based on a maximum module capacity of 24 fibres, the product can present 1440 spliced terminations.

Features include individual modules, allowing access without adjacent circuit disruption; top and bottom cable entry suitable for both overhead and underfloor cabling; central storage bay accommodating patchcord routing and storage; all front access to suit wall mounting; and fixed length patchcords to suit all patching requirements, minimising inventory.

**AFL**

[www.aflglobal.com](http://www.aflglobal.com)



## Methanol-based fuel cells

The Powerbox Australia range of methanol-based fuel cells (PB-MFC) provides power from 50 W to 10 kW.

The product offers clean, efficient and reliable power for off-grid, remote and critical applications. It can be configured to connect directly to site loads to provide constant, prime power. Alternatively, it can be connected to the site's battery bank to continuously monitor and maintain its charge level. If the battery voltage drops below a predetermined threshold, the fuel cell automatically starts to carry the load and recharge the battery. This prevents unhealthy deep discharge and recharge cycling of batteries, thus delivering longer battery life.

After charging is complete, the product reverts to standby mode automatically. PBMFC systems can be combined with a site's solar PV system to reduce fuel consumption, while ensuring a dependable power source.

The product uses a readily available, low volatility methanol/de-ionised water fuel blend, which provides approximately 1 kWh of energy/L of fuel. The system is fuel efficient as the fuel cell is completely load following.

**Powerbox Australia Pty Ltd**

[www.powerbox.com.au](http://www.powerbox.com.au)

## Wireless network tester

NETSCOUT has introduced the AirCheck G2, its second-generation handheld wireless network tester that provides fast and simple isolation, troubleshooting and diagnosis of wireless issues.

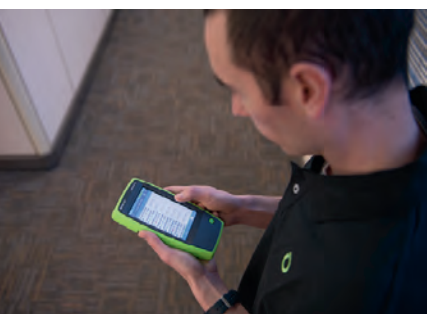
The product is designed to enable IT responders to collect important information to resolve a host of Wi-Fi complaints, ranging from network-based problems and configuration issues to environmental or client device misconfigurations. Featuring a one-button AutoTest that provides a pass/fail indication of the wireless environment, the product identifies common problems and also gives an instant view of test results. This includes network availability, connectivity, utilisation, security settings, rogue hunting and interference detection.

The purpose-built tester supports the latest Wi-Fi technologies (802.11a/b/g/n/ac) and arms technicians with easy-to-understand insights into 802.11ac wireless networks that help to reduce escalations. It also connects to a centralised test results management platform, Link-Live, that facilitates greater job visibility, project control and fleet management for larger distributed environments.

Other features include: a 5" touch-screen display; ethernet tests for AP backhaul verification; 802.11ac 3 stream radio; and automatic uploads of basic connectivity tests to the Link-Live cloud service.

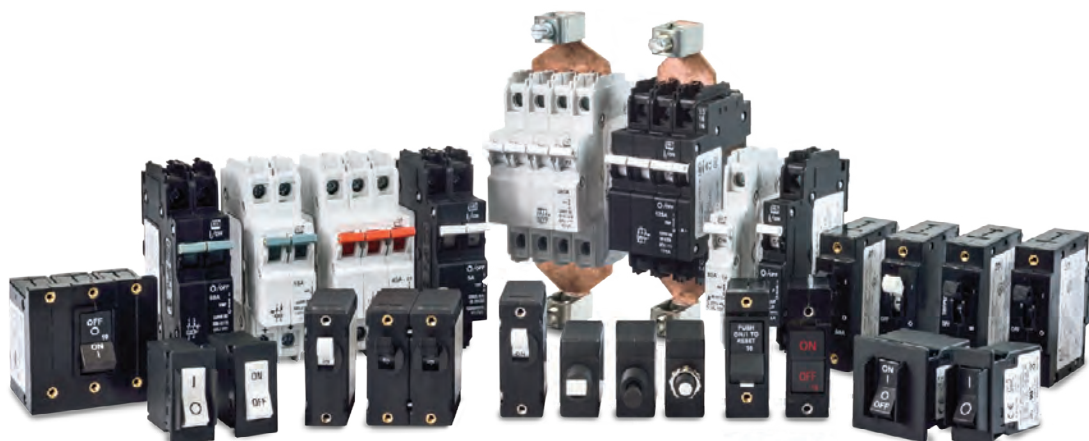
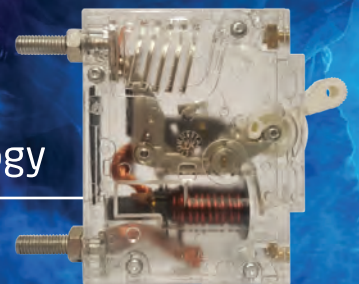
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### Battery-operated appliance tester

The Megger PAT150 is a battery-operated, handheld appliance tester. This instrument performs the full range of required PAT tests. As it is battery powered, the product is suitable for use in locations where an electrical supply is not available, unsafe, or inconvenient. It is available to rent from TechRentals.

The product allows for fast, easy safety testing in all environments including shops, offices and business units.

Features include 10 and 30 mA portable RCD lead testing, adjustable PASS test limits and substitute and mains-powered leakage testing. It also includes 250 V insulation and leakage testing for safe IT testing and surge protected devices.

**TechRentals**

[www.techrentals.com.au](http://www.techrentals.com.au)

### Cable splicer

The EasySplicer from Ultimate Fibre & Comms is designed primarily for FTTH use and is suitable for singlemode and multimode fibres. It is easy to operate, featuring only three buttons, and is capable of automatic calibration according to environmental changes. Manual calibration is also possible.

It uses the V-groove method for splicing, which is the same alignment system as ribbon-splicers. This approach has delivered a small and cost-effective splicer option for installers working on fibre-optic networks.

**Ultimate Fibre & Comms**

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# LIVING ON THE EDGE

*Robert Linsdell, Managing Director ANZ*

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IoT and expansion at the edge of the network are changing how businesses manage their data. Edge data centres mean data can be managed where it's created, and they're helping organisations change and improve the way they work.

**T**he data centre, the IT lifeline of any organisation, has seen huge transformation in recent years. Still relatively new platforms such as public and private cloud — or hybrid combinations of both — are replacing the traditional data centre model.

The promise that comes with these new platforms is that they'll free up IT departments to focus on the business at hand rather than putting out fires or staying behind until 3 am on a Saturday morning completing upgrades.

This is great not just for the IT department, but also for the business as it looks to IT to enable and improve daily processes, not to mention prepare it for new innovations and technologies such as wearable devices and BYOD.

## **Moving out to the edge**

These trends and the wider Internet of Things-driven era are propelling another major transformation away from the data centre at the edge of the network. More and more data is coming through the edge and this is changing the way businesses think about how they manage data across the organisation.



It's all well and good for a company's primary data centre to be fitted with best-of-breed technology, but what about its remote locations such as stores or branch offices? These locations, relying on a data centre, which could physically be hundreds of kilometres away, are potentially open to latency issues or, more importantly, loss of physical operation if the connection to the central data centre is lost.

One answer to this is the micro or 'edge' data centre, an increasingly popular solution for businesses. These are neat, plug-and-play, enclosed systems that fit into smaller spaces than traditional bricks and mortar centres, making them a great fit for remote locations and disaster recovery requirements.

The other challenge we are seeing is companies downsizing their in-house compute but still needing some level of it if only for networking and communications. What's the best way to achieve this — build a new room, leave the space idle? Now companies in this position can also consider edge data centres.

Global research firm MarketsandMarkets predicts this market will be valued at US\$6.3 billion by 2020 — near-30% annual rise from 2015.

Asia-Pacific is expected to be the second-highest regional market, pipped only by North America. As Australia has a reputation for being an early adopter of IT, it's teed up to see huge investment in edge data centres in the coming years.

As well as for remote locations and companies downsizing their compute, we're also seeing adoption among small and medium-sized companies.

Edge data centres have all the same components of a traditional centre — onboard cooling, networking and storage systems, uninterruptible power supply (UPS), security etc. They're small and minimise energy consumption. It's a logical step for a new SMB looking for a simple, modern way to handle IT.

Another key benefit of edge data centres is speed of deployment and mobility. As they typically come preconfigured, they can be deployed in a very short space of time and can be moved easily if needed.

Many household names in IT are now deploying these kinds of solutions. At Emerson, for example, we have the SmartCabinet, SmartRow and SmartAisle — edge data centres of different size to suit different organisations.

### Managing data where it's created

Market intelligence firm IDC said the amount of data being created is doubling every year, which will make 44 zettabytes or 44 trillion gigabytes by 2020.

Public and private cloud, as well as modernisation of traditional data centres, are going a long way towards managing this phenomenal expansion and keeping people and businesses connected — but the role of edge data centres is vital too, particularly as they're being deployed right where data is expanding the most.

As IoT and other aspects of digital evolution continue to shape and change the business landscape, managing the edge might be the edge organisations need to stay ahead.

*Emerson Network Power*  
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### Wall-mount DC power systems

Eaton has launched a wall-mount power system suitable for users in the industrial control, electrical switching and telecommunications industries where the capability to access and monitor reliable battery-backed DC power is required.

The systems are packaged in a format that consumes minimal space and with a form factor that better suits industrial control and electrical switching boards as well as small service closets. It additionally provides sophisticated monitoring and control capabilities.

It can be configured for either AC mains or solar PV power, providing the convenience of a single power system. Battery backup and redundancy supports systems that use PLCs, valves, solenoids, switches and sensors that are powered from 24 or 48 VDC.

It is suitable for a range of applications including oil and gas, mining, commercial buildings, rail and transportation industries, as well as system integrators and switchboard builders.

**Eaton Industries Pty Ltd**  
[www.eatonelectric.com.au](http://www.eatonelectric.com.au)

### Cable replacer

ZigSense model ZS3G-SMS-P2P is a cable replacer matched pair cellular network controller designed to transfer digital ON/OFF commands between two remote sites where no line of sight is available and the distance between the two sites is extremely far.

The two ZS3G-SMS-2 I/O controllers use different SIM card numbers to communicate over existing 3G/4G cellular networks. Digital inputs support 24 VDC and digital 'dry' relay outputs support 125 VAC 3 A. The controller can be powered by 12–24 VDC supply.

The SMS controller can be set up and programmed via English language text messages sent to the controller from a standard mobile phone. There is no need for programming software.

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# GATHERING MOMENTUM

Peter Garrett

Long lauded as the 'next big thing', the Internet of Things is finally gaining momentum.

The Internet of Things has actually been around for some time. According to folklore, the phrase was coined by Kevin Ashton while he was working for Procter and Gamble back in 1999. In a nutshell, the IoT enables sensors and devices to communicate with other sensors and devices via the internet, allowing connected environments to become 'smart'. One of the key building blocks of IoT is the sensor itself, which can collect information, analyse it, report and respond accordingly. The result is smarter cities and intelligent interactions between the environment, humans and devices.

So if the phrase was first used back in 1999, why is it only gaining momentum now? One of the initial prohibitors to widespread adoption was cost-effectiveness, but devices and sensors now cost much less to produce. Another major other hurdle was the prevailing approach to R&D. Costs have come down thanks to the advances in mobile phone technology, which is continually pushing for smarter, faster, smaller. This continual striving for advancement has created a cultural shift in R&D practices and a concerted effort to improve time-to-market schedules in order to meet with demand.

Teamed with crowdfunding and an open-protocol community approach, technology is leaping ahead on a daily basis. It is much easier now to get technology to market and consumers, through the advent of mobile technology, are savvy enough to understand they now form part of the testing process. Combine that with cheap and fast production in countries like China and India, and time-to-market is significantly expedited compared to 10 years ago — and cheaper as well.

The applications for IoT are limitless and obvious examples abound: from managing lighting, heating, cooling and security to smart fridges compiling shopping lists. But IoT has much smarter application potential.

Daniel Burrus, considered one of the world's leading technology forecasters and innovation experts, spoke about the use of sensors in an article on tech website Wired back in 2014. He used a 2007 bridge collapse in Minnesota, which killed many people, as an example of the technology's potential. The collapse was attributed to the use of inadequate steel plates in the bridge's construction, which were not able to handle the loads being experienced.

Burrus suggests that when we rebuild bridges, we will use smart cement — material equipped with sensors to monitor stresses, cracks and warpages. Through the use of this intelligence, cement will issue an alert to fix problems before they become catastrophic. Environmental conditions will also be analysed. For example, if there is ice on the bridge the same sensors in the concrete will detect it and communicate the information to affected vehicles via wireless internet. Once the car knows there is a hazard ahead, it will instruct the driver to slow down. If the driver doesn't, then the car will slow down for them. All of a sudden, the possibilities for IoT applications seem endless.

Closer to home IoT is progressing, and it is changing the way we approach some of our designs. The big challenge for us at mySmartCTI, and in general, is how to make sense of all the data that we are now able to collect via IoT.

Coping with big data is something most businesses are still trying to come to terms with. How do we use it, who needs to know in a timely manner, and what are the important facets to allow change to happen in an acceptable time frame?

Looking at a typical office environment — say, a meeting room — we can easily monitor the presence and absence of people. With IoT and the resulting collection of data, a host of different (yet related) functions can be carried out, depending on the room's occupancy. Lighting levels can be adjusted, temperature control finessed and AV placed on stand-by — not only based on people being present, but also on the number of people. The real bonus is in determining if the room is being optimised and, if not, how we can best make use of that space. IoT makes these decisions possible.

IoT has certainly earned the 'next big thing' title and will most certainly change the way we do things — making environments smarter, more comfortable and even safer. Through IoT, communication between devices has become more fluid and less clunky. As a result, we are able to collect data that empowers us — and the intelligent devices we rely on — to make educated decisions that deliver smart environments and individualised experiences.

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## Rugged laser levels

A family of laser level products from Fluke Australia provides precise reference points while surviving rough handling on the job. The range of professional-grade precision tools is designed to survive a 1 m drop and keep working. All models feature a fast settling, self-levelling gimbal that quickly delivers reference points, expediting electrical and HVAC layouts.

The Fluke-3PR (red laser) and Fluke-3PG (green laser) Point Laser Levels are self-levelling three-point laser levels for fast layout of reference points. Accurate to 6 mm at 30 m, it includes a floor stand for fast, easy overhang and centerline measurements. The green laser is up to three times brighter for improved visibility in outdoor and long range applications;

The Fluke-180LR and Fluke-180LG Line Laser Levels are self-levelling, horizontal and vertical crossline laser levels for rapid, accurate (3 mm at 10 m) levelling and layout.

The Fluke-LDR and Fluke-LDG Laser Line Detectors are suitable for use in high ambient light settings with visual and audible indicators for ease of use. The detectors are compatible with Fluke-180LR (Fluke-LDR) or Fluke-180LG (Fluke-LDG) models and include a mounting bracket for quick, steady positioning.

The Fluke-180LR System and Fluke-180LG Systems are comprehensive, self-levelling horizontal and vertical crossline laser level systems that include a laser line detector and detector bracket for use in high ambient light settings.

All models include magnetic wall brackets for easy, stable mounting.

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## Industrial PoE switches

Antaira Technologies has expanded its industrial PoE networking infrastructure family with the LNP-0500G and LNP-0500G-24 series of Ethernet switches.

The rugged LNP-0500G Ethernet switch comes with a 48 to 55 VDC high-voltage power input and is suitable for applications surrounding surveillance systems, data centres, research labs or any location that requires simple gigabit speed network expansion, eg, quality inspection systems within factory automation. The low-voltage input and ability to provide high-power PoE allows the LNP-0500G-24 switch to fulfil transportation, factory automation vision inspection, solar and remote location surveillance applications. It features a 12 to 36 VDC low-voltage power input by comparison.

Each unit is designed with five gigabit Ethernet ports that are IEEE 802.3at compliant (PoE+) on ports 1-4 (data and power output maximum 30 W/port) and are also backwards compatible with IEEE 802.3af. Both product series provide high EFT, surge (2000 VDC) and ESD (6000 VDC) protection to prevent any unregulated voltage. There is also a built-in relay warning function to alert maintainers when power failures occur.

Both series are backed by a five-year warranty and are IP30 rated, compact, fanless, DIN-rail and wall mountable. Each series is built to withstand industrial networking hazards like shock, drop, vibration, electromagnetic interference (EMI) and temperature extreme version options for either a standard (-10 to 70°C) or extended (-40 to 75°C) operating temperature range.

**Antaira Technologies**  
www.antaira.com.tw

## Fibre test kit

The KI-TK072 fibre test kit from Kingfisher International is designed for Telstra and nbn work. It features Telstra/nbn Workbook integration, optical loss testing for singlemode 1310/1550 nm and 850/1300 nm for multimode.

The device has multifibre ID tone for fibre identification and an optional visual fault locator. Loss testing automation and reporting is made simple using KITS. The KI-TK072 has cleaning tools and material for several connectors and comes with a 3- to 7-year warranty.

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### Analog signal conditioner

Weidmüller's ACT20P-UI-AO-DO-LP is a two-wire loop analog signal conditioner with genuine universal inputs. It has the capability for voltage measurement to 250 VAC, and DC amps to 5 A alongside standard process temperature, resistance or V/I inputs and is configurable from the same 12.5 mm-wide module.

The product also features a digital output and can be programmed as a trip relay or for fault condition monitoring. LED indication provides complete transparency to the unit's status and it is fully programmable via free software using FDT/DTM technology.

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# MONITORING A MONOLITH



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Depending on the strength of the lightning strike's current, large-scale damage or destruction can occur, which often leads to further adverse effects. Since cities are becoming larger and buildings taller — in keeping with the trends toward urbanisation and megacities — lightning strike measurement is becoming increasingly important. Phoenix Contact developed the LM-S lightning monitoring system to detect and evaluate lightning strikes and it is now being used to measure values at the top of the tallest building in the world, the Burj Khalifa in Dubai.

## Magneto-optic Faraday effect

Construction of the 828-metre Burj Khalifa was completed in 2010. With a total of 526,760 m<sup>2</sup> of floor space, the building includes a hotel, restaurants, offices, private residences and two floors of underground parking. Fifty-seven elevators connect the 160 habitable floors and the building also features the world's highest elevator stop, at a height of 638 m. Under windy conditions, the deflection in the top floors of the building is approximately 1.5 m.

The LM-S lightning monitoring system consists of an analyser, a connecting cable and up to three sensors. If lightning strikes a lightning rod such as the one installed on the top of the Burj Khalifa, a magnetic field is created in an arrester that carries the lightning surge current. LM-S uses the magneto-optic Faraday effect to measure these surge currents in lightning arresters. Moreover, the light is polarised in the measuring section located inside the sensor. If the sensor's measuring section detects a magnetic field that has been caused by a lightning strike, the previously polarised light is bent in a measurable way. The lightning event's characteristic values — amplitude, maximum slope, specific energy, charge — are determined and stored together with the date and time of the lightning strike. The sensor transmits the light signal to the analyser via fibre-optic cable.

## Learning from wind power

The lightning monitoring system in Dubai was installed under extreme conditions, and it is also expected to make record-breaking measurements in operation. For example, 10 m cables suffice to connect the sensor in the blade base with the analyser in the hub in wind turbines, whereas the cable used in the Burj Khalifa measures 200 m in length. LM-S was originally developed to prevent lightning strikes from damaging wind turbines, since unscheduled servicing and repairs at these sites repeatedly incur high costs.

In wind turbines, the lightning monitoring system supplements status monitoring — drawing on typical strike characteristics experienced at wind farms and allocating damage symptoms allow for better preventive maintenance planning. Meanwhile, it is becoming increasingly clear that comprehensive lightning protection concepts in buildings can also benefit from this practice — skyscrapers in megacities even more so than single-family homes. Because of this, smart monitoring systems are also used in buildings — these permanently monitor operational states and report the results directly to a central control unit.

## Extreme environmental conditions

A lightning rod is placed on the highest point of a building, as is the case with the Burj Khalifa. The lightning sensor was attached to the rod with metal cable ties. Usually, the sensor is black, but in this case a special white design was selected because of the extreme exposure to direct sunlight at this location; a white sensor absorbs less heat from sunlight. Due to the extreme installation conditions, every single work step needed to be tested multiple times.

The analyser in the Burj Khalifa operates in an air-conditioned server cabinet at a height of 680 m — this spot in the building provided the required space as well as the necessary power supply and data interface. The over-200-metre-long fibre-optic cable between



Lightning sensor on the Burj Khalifa

## Integrating measurement readings

The analyser features an Ethernet interface that integrates it into a standard network, which allows the LM-S operator to easily access data for permanent monitoring. If a mobile network is within range, communication can be handled independently of the existing network structure. The system can be configured and data can be called up using an internal web server. This allows the system to be accessed remotely at all times, eg, by using a smartphone.

The analyser also contains a switching relay with a remote contact fed out of it. This NC contact produces a short pulse for every event that can be evaluated by a counter. This allows the number of lightning strikes to be recorded. The relay contact does not move into its rest position until the system has started up. The relay de-energises in the event of system malfunctions. This means that system readiness can also be queried using the remote contact. When the signal is connected to a controller, a follow-up action can be initiated once lightning has struck.

the sensor and the analyser was specially tested to ensure that it could withstand these environmental conditions. It has a temperature resilience of over 70°C. When the cable was being laid, it had to be fixed in a particularly secure way; at every 10 m in altitude, a small segment of the cable is laid horizontally in order to prevent the cable from stretching and drooping under its own weight.

## Maximum values of over 50 kA

The lightning monitoring system installed on the world's tallest building has already recorded several lightning strikes that hit the very top of the building, all of which had maximum current values of over 50 kA. The building operator uses this information purely for statistical evaluation, since the building already features a comprehensive interior and exterior lightning protection system. Potential irregularities in the Burj Khalifa's electronic and building

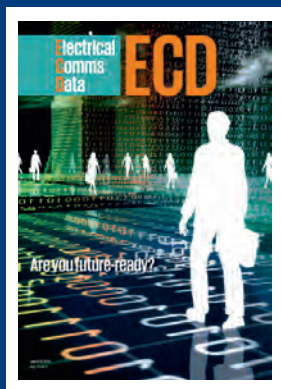
facilities systems are checked against current readings from the lightning monitoring system.

When lightning strikes are measured in buildings or wind turbines, this enables conclusions to be drawn at all times about how the lightning parameters relate to the damage they cause. Moreover, evaluating specific events makes it possible to draw conclusions about the effectiveness of the lightning protection system. Claim settlements also draw on information gathered on lightning strikes with the help of lighting information systems, which can locate a lightning strike with an accuracy of 200 m. After all, one can only determine whether and where a lightning strike hit a building by using a lightning current measuring system — such as the Phoenix Contact LM-S.

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## Integrated energy management software

Schneider Electric has released the latest version of its StruxureWare Power Monitoring Expert software, designed for integrated energy management and electrical distribution management across entire facilities.

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comes with segment-specific implementation support for project execution teams to deliver custom solutions in a consistent, efficient and repeatable way.

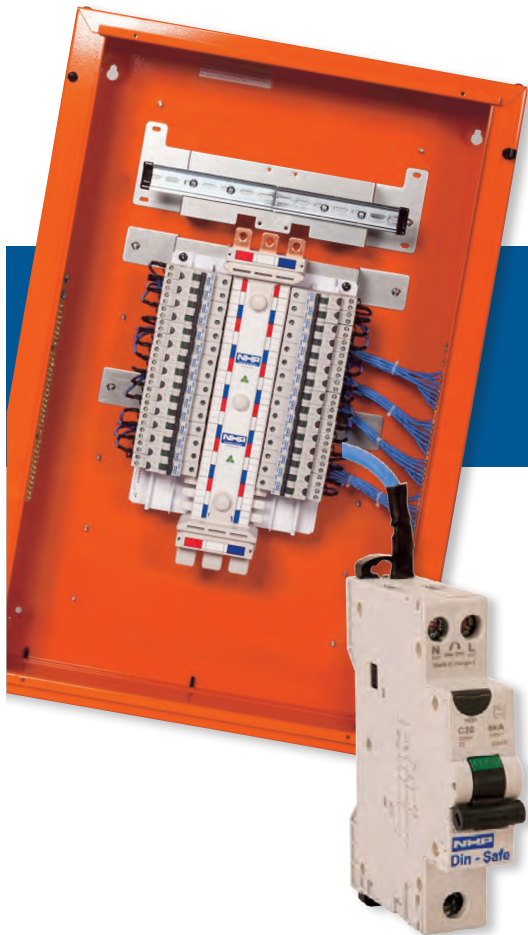
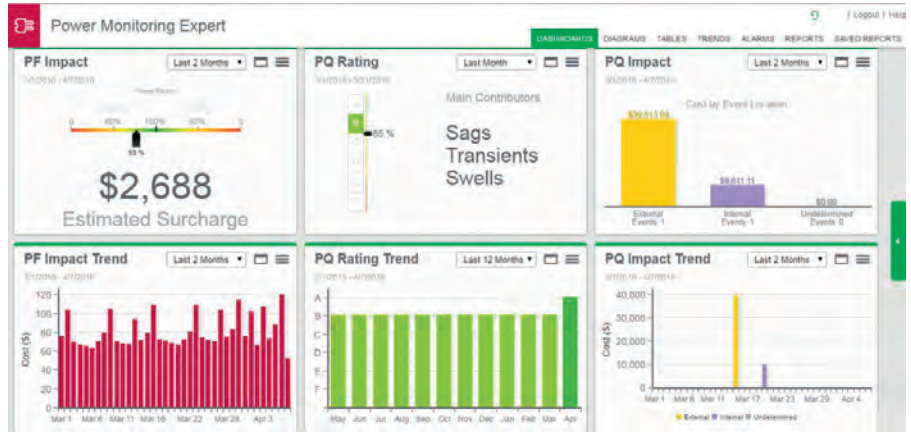
New and enhanced features include: Power Quality Advisor — an optional application module that provides power quality analytics, power quality advisor dashboards, as well as power quality analysis and process impact reports; enhanced cybersecurity features to further safeguard against potential incidents; HTML5 dashboards for simpler workflow and improved visualisations and mobile-friendly viewing; Energy Analysis reporting — delivering four new reports for energy and power usage by state for equipment, as well as an energy intensity (KPI) calculation procedure; and EN50160 - 2010 Report Support.

StruxureWare Power Monitoring Expert is interoperable and scalable, allowing data sharing between applications that makes project design, execution and maintenance highly adaptable to customers' needs.

Users can track the effectiveness of their energy-efficiency measures with the improved Energy Analysis module, while the optional Power Quality Advisor module provides analytics and advisory dashboards to help users gauge the impact of power quality in their facilities. Additionally, a support plan for system integrator partners includes design and quotation training.

### Schneider Electric

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## Rugged pan-tilt-zoom security camera

Panasonic Australia has unveiled the rugged Aero-PTZ security camera, which is designed for applications at height, at sea and on ports, piers and bridges under severe weather conditions, from rain and snow to extreme temperatures and gale-force winds.

The camera's 360° aerodynamic spherical design minimises interference drag for visual stability in winds of up to 217 km/h, while the bodyline helps deter snow and dirt build-up.

The camera features hybrid image stabilisation technology and gyro sensors to minimise the impact of external vibrations. It is equipped with 'active sense' technology, responding to external conditions to initiate built-in wipers to keep the lens clear in rain and snow; a heater, to ensure internal electronics are operating at the optimal temperature; and a defroster, to keep the viewing lens clear. The lightweight, fibreglass body delivers high strength and is resistant to corrosion from exposure to wet conditions such as sea sprays.

The camera incorporates a video stability augment system (SAS) for image stabilisation, virtually eliminating camera shake. It has a high-wind load durability of 60 m/s and can yield clear imagery with its optional long-range IR LED capability for good performance in low- to no-light conditions of up to around 150 m.

The product has Full HD resolution at 60 fps with a 30x optical zoom lens. The camera is IP67 rated, which means it is both waterproof and dustproof, and is vandal-proof to IK10 standards. It operates in extreme hot and cold conditions from -50°C to +55°C. The sphere pan-tilt mechanism allows endless 360° panning and a ±90° tilt range. In addition, the super dynamic function ensures a wider dynamic range compared to conventional cameras.

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## Personal safety app

Fearless, a mobile app developed by security monitoring provider Calamity, is a personal safety system that helps keep workers safe wherever they are. It is of particular benefit to lone workers.

Fearless offers mobile protection to staff and helps businesses quickly comply with some of the toughest WHS requirements. In a dangerous situation, or when staff fail to 'check in' as expected, an alarm is raised through the app and Calamity's 24/7 monitoring centre is alerted. The centre has access to the user's location and uses the phone for audio and camera evidence, allowing live operators to initiate a suitable response. The alarm can either be activated manually or automatically when a countdown timer reaches zero. The system is cloud based, meaning the user is always protected, even in the event of a lost or stolen phone.

The app features a 'journey mode', which provides live updates to emergency contacts or employers if necessary. Meeting mode can be set for a potentially risky meeting or while alone. An alert is raised if a countdown timer reaches zero without being reset by the user. In situations where injury or personal immobilisation is a possibility, such as off-site construction, Man-Down is a function which offers additional protection by flagging any sudden deceleration, non-movement or impact.

It is available via iTunes and Google Play.

### Calamity

[www.calamity.com.au](http://www.calamity.com.au)



## Wireless AC wide-eye camera

The DCS-960L wide-eye panoramic camera from D-Link features a true 180° field of view and is suitable for large rooms and areas with multiple entry points. Most fixed cameras offer a 130° view, which means that multiple cameras are needed or there is a lag in vision as the camera pans.

The product delivers rich detail and crisp image quality due to the HD 720p quality video, while the built-in dewarping technology maximises video quality with less distortion. The camera utilises the latest dual-band Wi-Fi technology for better bandwidth and improved range.

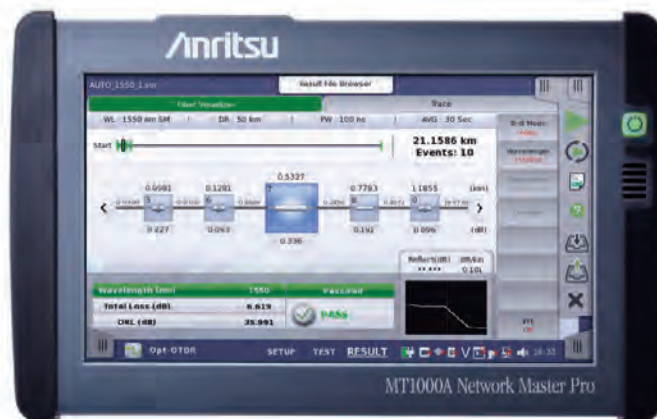
Push alerts notify the user once motion or sound is detected and a 16 GB microSD card provides local recording capability. Built-in IR LEDs deliver night-vision functionality, meaning the camera can see up to 5 m in complete darkness.

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# TRANSITIONING TARIFFS IN AGRICULTURE

*Dr Georgina Davis, Andrew Chamberlin*

The Queensland Farmers' Federation is helping farmers to thrive with a dual approach to rising energy costs by providing clarity to member organisations and advice to government in relation to energy pricing, and by assisting with practical on-farm energy productivity programs.



From 1 July 2016, South East Queensland (SEQ) retail electricity prices were deregulated, meaning the Queensland Competition Authority (QCA) no longer regulates retail electricity prices for residential and small business customers — those consuming under 100 MWh of electricity per year. Retail prices for large customers (over 100 MWh per year) have been deregulated since 2012. Retailers now determine electricity prices and publish their market and standing offers online and on the Australian Energy Regulator's (AER) independent price comparator website (<https://www.energymadeeasy.gov.au/>) where customers are able to evaluate available offerings.

For customers outside SEQ, the QCA reviews the regulated electricity tariffs each year and determines new prices based on a number of factors. The authority has released its final determination for regulated retail electricity prices for 2016–17, while the Queensland Government supports regional and rural Queenslanders by subsidising the additional costs involved in

supplying electricity outside SEQ through payments to Ergon Energy. This subsidy is called the Community Service Obligation (CSO) payment and, unfortunately, results in a lack of transparency of the real service costs and no retail competition within the network area, so most regional customers are on a standard retail contract with Ergon Energy.

Around 35,000 electricity connections in regional Queensland are on tariffs which have been classified as transitional or obsolete, representing around 25% of Ergon Energy's business connections<sup>1</sup>. These tariffs will cease to exist in 2020 driving customers onto potentially more expensive tariffs and many businesses (including agriculture) are concerned that these price increases (together with the annual increases) will threaten their viability.

Irrigated agricultural sectors will be especially impacted by the removal of the specific farming and irrigation tariffs with QCA data highlighting bill increases of between 10 and 100% for



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100% of larger customers currently on some of the transitional tariffs (such as T37 and T66) as they move to 'standard tariffs' by the 2020 deadline. While the QCA's 2016–2017 determination for regulated electricity price increases for small businesses in regional Queensland ranged between 11.2 and 15.8%.

The Agriculture Industries Electricity Taskforce<sup>2</sup> has called on the federal government to address the critical industry and market reform necessary to fix the regional electricity pricing system.

As electricity costs rise, the viability of irrigated agriculture businesses is being challenged. The energy productivity of Australian agriculture has declined more than 33% since 2008, impacting its international competitiveness. An international comparison of Australia's key agricultural trading partners conducted in 2012<sup>3</sup> showed that Australia's average electricity prices had grown by 40% since 2007. Cost increases for irrigated agriculture have generally been in excess of 100%, and as high as 300% over the same period.

## Linking energy efficiency and productivity

There is a risk that some industries in the agricultural sector will be forced to respond to rising electricity prices by irrigating less to avoid high electricity demand charges, leading to a decline in the sector's productivity.

As QFF's Energy Savers Program rolls out audits to over 100 farms across Queensland, there have been some significant energy efficiency and renewable energy opportunities identified, and case study examples where energy efficiency has cut energy costs and improved productivity. Two recent examples include a Central Queensland citrus farm and a Queensland nursery.

**Central Queensland citrus farm:** An irrigation energy audit at a Mundubbera mandarin farm recommended adding variable speed drives to two submersible pumps to reduce power costs and allow greater flexibility in watering, including the ability to water separate blocks at the right pressure without throttling at the outlet. The audit also suggested that a 30 kW solar PV system would be a suitable size for the operation of the packing shed given its seasonal operation.

The farmer reduced the size of the two pumps at the same time as fitting variable speed drives and installed an 83 kW solar PV system. He switched one of the pumps from its own network connection to the packing shed connection to take advantage of the solar PV for irrigating. The farmer will get the costs back in less than five years, with an energy saving of over 170 megawatt hours per year and cost savings of \$41,000 per year.

Of the audit process, the farmer found it helpful to have the information needed to make informed decisions.

"Once I had all the information we went ahead with implementing the recommendations. As well as the energy savings, watering will now be more targeted, resulting in water savings as well. Before installing our variable speed drives, we had to irrigate all three blocks to get rid of the pressure. Now we can just do one or two as required," he said.

**Queensland nursery:** Nurseries use most of their energy for irrigation and there can be energy used for hot water heating, lighting and even cold rooms. Following an energy audit, the owners of a Brisbane nursery replaced a 7.5 kW main irrigation pump with a 5.5 kW pump with a built-in variable-speed drive. As well as energy savings, the pump gives the nursery greater flexibility in irrigation and more consistent watering — with productivity benefits.

The owner said, "With irrigation, we now have constant pressure, so don't have to have a main pump and a pressure pump. We can turn on a tap or a whole section of irrigation and it gives an even pressure across the system. Evenness of water is an important thing."

A solar hot water system was installed to replace an 18 kW electric hot water system and spending an extra \$24 on temperature data loggers gave them the ability to monitor temperature and only heat when they needed to, with huge energy savings.

The owner said that the changes "make it easier to have similar style and size plant, it takes out a variable in production. We are

on track to be well below our target of 100 megawatt hours per year with energy savings of around 33% and cost savings of around \$14,000 per year, exceeding the \$10,000 saving estimated."

Another nursery nearby audited under the program saw an immediate benefit from new pumps and variable speed drives before receiving the first power bill. "I stopped having to fix burst pipes!"



energy technologies; to secure grants through Energy Consumers Australia (ECA); and to identify opportunities to assist farmers to implement energy efficiency and renewables projects with the current suite of low-cost finance offered by the Clean Energy Finance Corporation, QRAA and private financiers.

### The future of Queensland's agricultural sector

One significant outcome from the audits has highlighted the importance of reviewing current and alternative tariffs, with some audits identifying potential savings from simply changing to an alternative tariff. However, concern remains that many regional businesses on the transitional and obsolete tariffs will experience dramatic increases in energy prices and consequently operational costs.

The rising cost of electricity in some cases continues to outpace the energy efficiency savings and productivity improvements that agriculture can achieve. This is impacting the ability for farmers to compete on a level playing field with overseas producers.

QFF is continuing to seek both practical on-farm and policy solutions. QFF is working with the Alliance to Save Energy 2xEP initiative to develop and advocate cross-sectoral solutions; with the Australian Renewable Energy Agency (ARENA) to identify renewable

#### References:

1. Queensland Productivity Commission. Electricity Pricing Inquiry 2016. See Chapter 10: Rural and Regional Industries – Transitional and Obsolete Tariffs.
2. Members of the Electricity Taskforce: National Irrigators' Council; NSW Farmers Association; National Farmers' Federation; Cotton Australia; NSW Irrigators' Council; CANEGROWERS; Queensland Farmers' Federation, Central Irrigation Trust (SA), Bundaberg Regional Irrigators Group (BRIG).
3. 'Electricity Prices in Australia: An International Comparison': A report to the Energy Users Association of Australia by Carbon + Energy Markets, 2012.

*Dr Georgina Davis is QFF's Policy Advisor for Resources. Andrew Chamberlin is QFF's Project Manager – Energy.*

Queensland Farmers' Federation  
www.qff.org.au

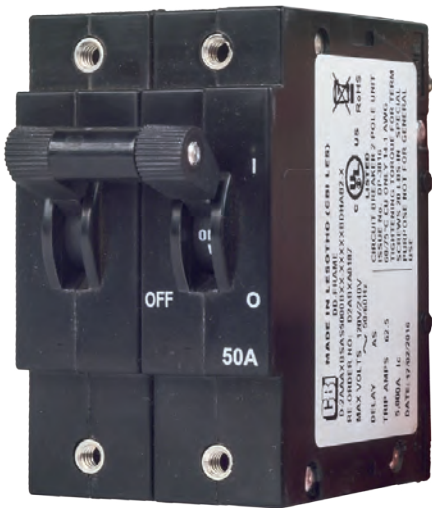
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## Hydraulic magnetic circuit breakers

CBI Electric hydraulic magnetic circuit breakers carry 100% of the rated current independent of the ambient temperature, do not require de-rating due to high temperatures and can always be immediately reset in the event of tripping.

Outside of the standard DIN mounting ranges, CBI also has the CBE range of circuit breakers, which are generally front mounted, rail mounted, snap-in mounted or surface mounted and are available for AC and DC applications. They are suitable for railways, mining, solar and renewable energies, telecom/datacom and military purposes.

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## Network analyser

The Greenlee DataScout 10G Multi Service Network Analyser combines a fully featured Android tablet with a flexible combination of test interfaces capable of testing from legacy DSO TIMS up to 10G Ethernet. It is rugged with a boot time of 20 s and the intuitive interface is suitable to field technicians. Test interfaces can be configured in virtually any combination depending on the customer's needs for a truly custom workgroup solution.

Applications include metro Ethernet, wireless validation, business services, mobile backhaul, PRI-ISDN, ATM and utility substation SCADA testing. The test set uses a plug-and-stay architecture which eliminates removing, damaging or losing modules. Plug-and-stay also enables testing multiple services at the same time without powering off the device to change modules.

The standard 4 GB memory is expandable to 16 GB of internal storage, which can hold numerous test reports, procedures and training videos etc. Email client supports sending/receiving files and reports right to the DataScout 10G. The preloaded Mobi Office suite enables viewing of Word, Excel, PDF and other documents.

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## CAT-6 cable

Times Microwave Systems has introduced its TCAT-6-DB Category 6 Ethernet cable for data cable installation in outdoor environments. TCAT-6-DB features good electrical characteristics and high coverage, water blocked, tinned copper outer shield for optimal grounding. A ripcord is supplied for easy jacket stripping and the black PE jacket offers weather resistance in all environments.

The cable features >90 dB RF shielding and is available in various length assemblies. A range of connectors and customer ground kits completes the offering.

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# Primary protection

Eletrobras, a major Brazilian electric utilities company, is completing major projects throughout Brazil using NOJA Power's Automatic Circuit Reclosers (ACRs).

Eletrobras Distribution Piauí, a subsidiary of Eletrobras, concluded another phase of a project that aims to increase the reliability of Teresina's (Piauí's capital) power distribution networks. The utility reached 100 installed Automatic Circuit Reclosers (ACRs), which reduce the occurrence of power outages.

"The recloser is a protective equipment that, when it detects faults (short circuit) on the network, cuts off the network in seconds and then makes repeated attempts to re-energise the line, in order to avoid long periods of power failure," said maintenance manager from MV and LV Abraão Galeno.

"Statistics show that 70–90% of faults in the electricity distribution system are temporary, so stopping the effect a few milliseconds after the occurrence, the recloser then acts to restore the electrical system automatically, without any operator assistance," said Abrão.

Eletrobras Distribution Piauí is extending this action to all Piauí, in order to reduce complaints by customers regarding power outages.

To improve energy supply, Eletrobras Acre Utility (another subsidiary of Eletrobras) is investing about R\$10 million (AU\$3.77 million) in 212 new NOJA Power ACRs on the electrical distribution networks of the state of Acre in Brazil. The project is being carried out by the distributor's expansion board with resources provided by the World Bank.

NOJA Power's control system allows the recloser to perform automatic trips to open and close circuits in order to protect the electrical system. The device minimises the affected area during interruptions, ensures a higher fault interruption capacity (usually an overload caused by short circuits) and provides increased security and safety for installations and people.



The first step of the project will begin in July with the installation of the ACRs. The second step includes configuring the automation process.

"With these measures, the prospects for improving the quality of supply of energy for the state of Acre are greatly increased, especially in the winter period, because we are tripling the number of these devices on our distribution network, greatly increasing the automation process," said Joaquim Rolim, operations director of Eletrobras Acre Utility.

Eletrobras Distribution Amazonas (EDA) installed four new NOJA Power OSM reclosers in June 2016 in Humaitá's substation, strengthening the overall primary protection of the 13.8 kV equipment. NOJA's ACRs replaced old oil circuit breakers, which are already out of date and have been in use for over 25 years. This new equipment increases the reliability of protection of the distribution system and generation at Humaitá.

NOJA Power's OSM series ACRs benefit from the use of vacuum interrupters and solid dielectric insulation instead of the environmentally unfriendly oil or sulfur hexafluoride (SF<sub>6</sub>) gas used in sectionalisers and older recloser products. Another key feature of the OSM series is its stainless steel enclosure that forms the only solid dielectric unit with controlled internal arc fault venting on the market.

The four reclosers installed in Humaitá are part of a package of 120 reclosers acquired by the Eletrobras Utility.

"All new equipment will be installed in our substations throughout the first half of 2016. It is a major breakthrough in the security of our energy system network and I must highlight the importance of the support received from the Ministry of Mines and Energy and the commitment of the minister, Mr Eduardo Braga," said José Francisco Albuquerque da Rocha, operation director EDA.

**NOJA Power Switchgear Pty Ltd**

[www.nojapower.com.au](http://www.nojapower.com.au)



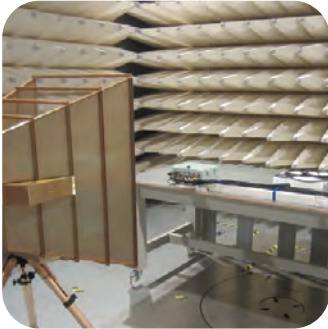


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# Illuminating cultural diversity



The Museum of World Cultures (Museu de Cultures del Món) in Barcelona presents outstanding works from around the world in medieval Catalan buildings. It serves as a platform of preservation and presentation of artistic heritage and knowledge of cultures from Asia, Africa, America and Oceania.

Located on Carrer de Montcada, a street known for its beautiful historic buildings, the museum is set in the Casa Nadal and Casa Marquès de Llió, two medieval Catalan houses with a history that extends far back through the centuries. Extensive restoration and renovation was required to convert these two houses to their current use, which involved joining the two separate buildings into one.

The lighting design was executed by Antonio Sainz from Haz Luz 17 and his main challenge was to illuminate the historic buildings and artefacts in such a way that architecture and art both came into their own without competing with each other.

This was made possible using the ERCO Optec and Pollux lighting tools, which feature specially developed photometric systems that enable the luminaires to be adjusted precisely for optimum beam alignment.

As an added consideration, the exhibits needed to be presented so as to allow the observer to lose themselves in their own contemplation.

ERCO LED technology renders objects in brilliant colours to bring out every nuanced hue and, importantly, it satisfies the stringent conservational criteria applied to precious historic artefacts that are easily damaged by excessive exposure to light.

With a number of exhibits displayed in glass cabinets, the concept includes ambient and accent lighting from the outside to avoid disturbing reflections.

The cabinet temperature needs to remain constant for conservational purposes, making LED lighting tools the ideal solution thanks to heat dissipation via the rear of the luminaire.

Some of the taller cabinets were implemented with frosted glass covers to help guide the light for optimum visual comfort. When the directed light of a spotlight penetrates the semitransparent material, it creates diffuse ambient lighting with precision accents, creating a uniquely expressive illumination.

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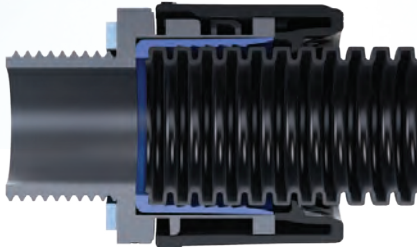
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# 30 degrees of difficulty

Brunswick Town Hall is an iconic Melbourne landmark, built in 1876, which survived the wrecker's ball in 1974 after a local protest campaign. Although it earns its keep today as a popular social venue, it was one of the top 10 energy users in the municipality.

This did not fit well with Moreland Council — the third accredited carbon-neutral council in Australia — but installing solar panels on the three-storey historic building with a 30° slope on its corrugated iron roof presented some difficult installation problems.

Installer Envirogroup also faced the need to overcome the problem of potential traffic disruption, as the location of the Town Hall on Sydney Road, Brunswick is one of Melbourne's busiest arterial roads. Safety was also a major requirement and required the installation of safety rails on the roof and harnesses for all the installers.

The main roof area was also found to be insufficient to house enough conventional solar panels to generate the required energy level of 100 kWp, and using the lower roof area was seen to be inefficient as it is subject to shadowing for part of the day.

The eventual solution was to use the high-efficiency PERC Mono Trina Solar 290 Wp panels, which are more efficient than conventional panels.

The final installation used 345 panels on the main roof, which will generate 111 kWh per year and provide a greenhouse gas offset of 13,981 tonnes, or 33 cars. To get the same energy output with conventional 260 Wp panels would have required more than 400 panels.

The more efficient panels not only reduced the number of panels that were required, it also reduced the installation time as well as obtaining more energy out of the roof space.

According to the lead electrician on the install, Nick Garric, it was the most difficult job he's tackled in the seven years he has been an installer.

"Our installing team members were in safety harnesses for the four-week installation period and, because of the number of panels, we had to lay them in a landscape pattern, rather than the usual portrait configuration.

"This meant our roof access had to be up the 30° slope, rather than along the roof.

"Because of the age of the building and the roof, another difficulty we had to overcome was in running the cables from the panels to the inverter.

"Clearly the 290 Wp panels were the solution for us to get enough panels on the roof to generate the required level of energy, and we had no handling difficulties compared to the standard 260 Wp panels.

"Being on a 30° slope, the panels are largely self-cleaning, whereas if we had to use the lower flat roof areas there would have been significant soiling, as the traffic in busy Sydney Road generates a high level of road grime," Garric said.

Trina Solar Sales Manager Govind Kant said that the Brunswick Town Hall installation is the first use of the 290 Wp solar panels in Australia.

"Although the standard poly modules still have a niche market, the rapid improvement in efficiency with mono modules, coupled with the minimal price gap between the poly and the mono modules, will soon see mono modules becoming mainstream. The extra price on the mono modules is offset by the greater savings on the balance of the system," Kant said.

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