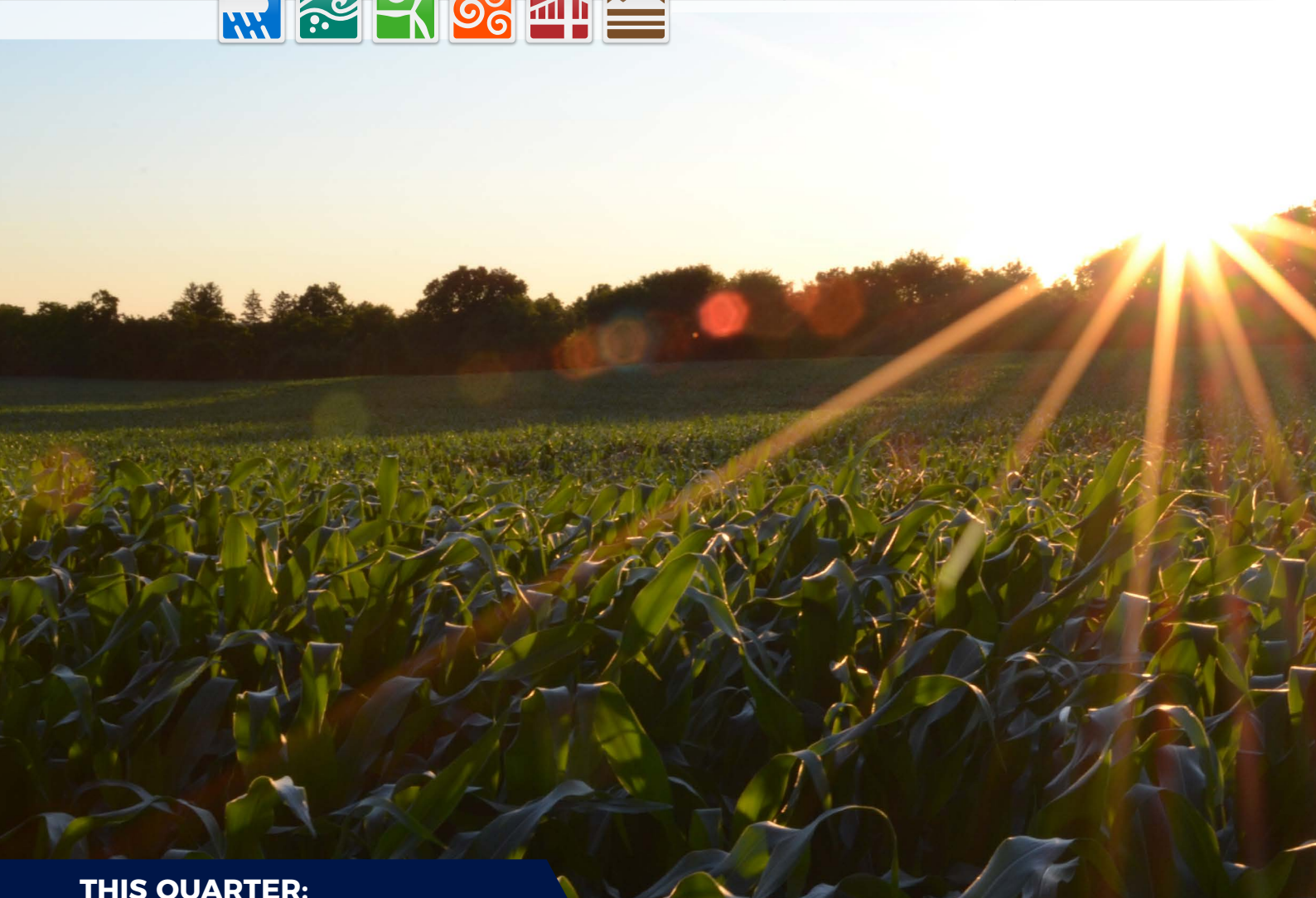




**CAMPBELL
SCIENTIFIC**
WHEN MEASUREMENTS MATTER

**MAY 2017
NEWSLETTER**



THIS QUARTER:

2 -
3 -
3 -
4 -
5 -
6 -

7 -
8 -
8 -
9 -
10 -
10 -

CONNECT WITH US

Like us on Facebook

Follow us on LinkedIn





MESSAGE FROM THE MD



You may notice a new look and feel to this, our latest CSA newsletter. This can largely be attributed to the latest addition to our team, Nikki Hains, who is CSA's new Marketing Coordinator. We are excited to have Nikki on board and I am certain that you will see much more of Nikki's work in the future as she busily promotes our products and services.

Another newcomer since our last newsletter is Dane Lennon who joins our R & D team as an electronics engineer. Although Dane is a recent electronic engineering graduate from James Cook University, he has previously served in Afghanistan in the Australian Defence Force as a driver for Bushmasters and Light Armoured Vehicles.

While gaining two new employees, unfortunately we have also lost a long standing member of the CSA family. Polo Imo has left our employment after almost 10 years of service as a repair technician. Polo has taken up a new role as pastor of one of Newcastle's several Samoan churches. We wish Polo and his family all the best in his new career.

The first quarter of 2017 has been extremely hectic at CSA. Our training manager, Gavin Hewitt, conducted a week long training course in Brisbane in February followed by 4 days of training for our SE Asian Distributors in Kuala Lumpur, Malaysia, in March. Myself, Corrine and Kahill Mitchell also spent a week in Kuala Lumpur conducting our Se Asian Distributor's Conference following Gavin's training course where we enjoyed the company of new and old friends while discussing all things Campbell Scientific.

Alex Thomas and David Hammond were in the US during this same period attending the annual Campbell Scientific Integrator's Conference where they distributed our latest Altoview

offerings. Meanwhile Florent and Natacha from our office were just wrapping up 4 weeks leave visiting family in France. The return of several of our travellers unfortunately happened to coincide with the arrival of Cyclone Debbie and while Townsville was lucky to avoid the impact, air travel into northern Australia was in severe disarray. After a number of over-night stays and rearranged flights, our weary travellers finally made it safely back to the office – albeit a few days late.

While areas just south of Townsville could do little but brace for the impact of Cyclone Debbie, our trusty weather stations and data loggers played a vital role in recording and transmitting data during the event. Oz Cyclone Chasers who are sponsored by CSA together with Dr David Henderson from James Cook University's Cyclone Testing Station deployed several CSA weather stations along the coast in preparation for the impact. We look forward to an upcoming case study on data retrieved during this event.

Finally our long awaited Altoview refrigeration monitoring field trial is about to begin. It is an exciting time as we launch CSA's latest and greatest product.



Steve Bailey
Managing Director



Campbell Scientific Australia offers comprehensive courses designed on giving professionals the “hands-on” programming and software experience they need to optimise their applications.

COURSES AVAILABLE

Field Operators Training Course - 1 Day

This course is geared toward installers and field operators of Campbell Scientific data loggers and equipment.

- Introduction to using Loggernet Software
- Best practice for installation of a weather station
- Troubleshooting techniques and maintenance procedures for site visits

Programming & Software Training Course - 2 Days

This course is suitable for all users of Campbell Scientific data loggers. Beginners are welcome!

- Introduction to using our software to administer, program and collect data from the new generation of data loggers
- The basics of customising a datalogger program to suit your sensor and data storage requirements

Communications Course - 2 Days

This course is for professionals with an intermediate to advanced knowledge of Campbell Scientific data loggers wanting to learn how to program and connect their data loggers to communication networks.

- Covers cell phone modems, Ethernet networks and spread spectrum radios
- How to connect them to the data logger
- How to program for these devices to provide information over services such as Email, FTP and SMS.
- Methods for connecting to and administering a data logger via Loggernet over these communications devices.

COURSE	DATE
Townsville	8-12 May
Sydney	26-30 June
Melbourne	14-18 August



MEET OUR STAFF:

MEHRAD

Moving from Iran, from the super cold North Western city of Tabriz, Mehrad graduated with a Software Engineering degree from the university of Applied Science and Technology. Wanting to further his career, he moved to Townsville, Australia to study an Electrical and Electronics degree at JCU Townsville.








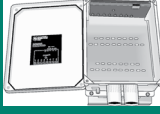
After graduating with honours in 2011, Mehrad took up an R&D engineer's role at Campbell Scientific Australia. Mehrad's innovative side and skills led him to quickly fit into the R&D team. Starting out working on problems to solve and products to design, Mehrad has moved on to working on more challenging products such as our latest product, Altoview. This work requires the latest knowledge about LoRa radios and cutting edge power management units to design a product fit for the demanding IoT Market.

While not at work, you will find Mehrad staying fit and healthy, keeping a strict diet and doing anything from Powerlifting to Crossfit and even competitive table tennis.

DEALS FOR THIS QUARTER!

After some great equipment at a reduced price? Check out our latest list below of SPECIALS for this quarter. The discounts below are the total discount percentage available on this item from your list price (conditions apply – see bottom of table for conditions). If interested, all you need to do is click on the corresponding link and we will get back to you quickly with a quote.

This quarters Newsletter Products are the following:

IMAGE	ITEM	Description	Condition	QTY	DISCOUNT	REQUEST A QUOTE
	CRS451-SA-29-NC-SN	WATER LEVEL RECORDING SENSOR STAINLESS STEEL 29PSIG, STD .1% ACCURACY	Brand new	7	40%	Contact Us
	CRS451-SA-7-NC-SN	WATER LEVEL RECORDING SENSOR STAINLESS STEEL, 7.25PSIG, STD .1% ACCURACY	Brand new	2	40%	Contact Us
	CRS456-SA-29-NC-SN	WATER LEVEL RECORDING SENSOR TITANIUM, 29PSIG, STD .1% ACCURACY	Brand new	6	40%	Contact Us
	CS451-SA-72-SN-U-L30m	PRESSURE TRANSDUCER STAINLESS STEEL, 72PSIG RANGE, STD .1% ACCURACY, W/30m	Brand new	3	60%	Contact Us
	CS451-SA-72-SN-U-L20m	PRESSURE TRANSDUCER STAINLESS STEEL 72PSIG STD .1% ACCURACY W/30m	Brand new	1	60%	Contact Us
	CS475 ¹	RADAR WATER LEVEL SENSOR 20m RANGE, NO CABLE (1)	Like new	1	40%	Contact Us
	OBS-3A-N4-NP-NS (ex loan unit)	OBS-3A TURBIDITY & TEMPERATURE MONITORING SYSTEM, 0-1000NTU, NO PRESSURE AND CONDUCTIVITY SENSOR	Like new	2	45%	Contact Us
	SDMX50	50 OHM COAXIAL MULTIPLEXER W/10X12" ENCLOSURE, NO CABLE	Brand new	1	50%	Contact Us

¹Cable available upon request and at additional cost.

For a full list of our discounted overstocked new or used items, please see the following link: [Hardware Sale](#)





SE ASIAN DISTRIBUTORS CONFERENCE 2017

From the 22nd to the 31st of March 2017, CSA hosted its third SE Asia conference and training, this time in dynamic Kuala Lumpur, Malaysia. The reception and effort provided by our local Malaysian distributors, Surechem Sdn Bhd and GDS Instruments, was outstanding and CSA would like to thank them for their collaboration in making this event a huge success. We were so pleased to welcome ESC Engineering (Brunei), GDS Instruments (Malaysia), PT Cerna (Philippines), PT Gistec (Indonesia), Surechem Sdn. Bhd. (Malaysia) and Wetec (Singapore) to the conference. Overall, we had just shy of 35 attendees from 7 different countries, as Brent Randall, Structural Group Manager from CSI in Utah, USA also kindly joined us and shared his Geotechnical expertise and experience.

The event was organised in 3 phases: a catch-up training (Field Operator and Programming courses) for our new distributors or new distributor staff members, advanced training in Communications and Geotechnical applications, and 2 days of Business Development, Marketing and Strategies discussions for the region. We met many new distributor staff members and had the pleasure of seeing how well they absorbed the new knowledge. They were enthusiastic at learning the features of our dataloggers, as well as our experienced distributors gaining in product confidence and willingness to expand in new markets. It was motivating to watch and brings hope for the future of CS products and services in the SE Asian market. The region is booming with opportunities and unexplored applications, and the sharing of knowledge between distributors and Campbell representatives can only assist in growing our presence in the region. Our distributors are now well equipped to conquer existing and new application opportunities in their respective countries and we are proud to see a community of SE Asian distributors form over the years, and not only collaborating but also forming lifelong friendships.

A special mention should be made to our US colleague Brent Randall, who delivered excellent content to showcase Campbell Scientific Geotechnical products and applications, and some hands on technical training on Geotechnical Instrumentation. With Brent's passion, captivating delivery and funny stories, this 2-day training was the highlight of the conference for not only our distributors but for CSA members alike. Brent also delivered two talks at the Institute of Engineers Malaysia and at the Geotechnical Instrumentation Workshop/Seminar kindly organised by GDS Instruments, where it was a fantastic opportunity to meet Geotechnical enthusiasts and share new measurement technologies with them.

We shared a lot of market knowledge based on our own experience but also thanks to each distributor's feedback. Although each country has its own potential, we identified clear opportunities in Hydromet systems (especially for flood warning systems), Geotechnical and Structural solutions primarily for safety management, an increase in renewable energy farm implementations and a general sense of the benefit of using quality research equipment and reliable data in order to improve commercial and non-commercial practices.

We look forward to sharing more successes, knowledge and good times with our SE Asian distributors for many years to come.

- Corinne Malot (SE Asia Manager)



NEW PRODUCTS

CR310 Compact Datalogger

The newest member of our CR300-series dataloggers, the CR310, is now available. It is similar to our CR300 datalogger, except the CR310 is 2.5 cm longer and includes an integrated 10/100 Ethernet port and removable terminals. Its small size and integrated Ethernet port make the CR310 ideal for small applications requiring Ethernet communication.

The CR310 can measure most hydrological, meteorological, environmental, and industrial sensors. It supports serial communication and uses an onboard compiler that can handle large and complex programs. Other benefits include:

- Ability to measure many 4 to 20 mA sensors natively 24-bit analog-to-digital converter that provides incredible analog measurement accuracy
- Support for Modbus, DNP3, PakBus, and other popular protocols
- Ability to send encrypted/secure email messages and alarms (TLS-encrypted SMTP)
- Integrated charge regulator for directly connecting the battery and solar panel
- Very modest power budget that allows smaller batteries to power the system for longer time periods
- Campbell quality surge and electrostatic discharge (ESD) protection

Besides the integrated Ethernet port, the CR310 has several communication options. Three different embedded radio options are available to cover the unique requirements found worldwide. Soon the CR310 will also have a Wi-Fi option that supports short-range wireless IP communication. These communication options, along with the integrated Ethernet port and integrated charge regulator, reduce costs and simplify installation because the system requires fewer additional peripherals.

Campbell Scientific is excited about the CR310. This new low-cost, high-value datalogger promises to be a valuable addition to our CR300-series datalogger family.

Learn more about the CR310 and its exciting possibilities by reading the blog article on our [website](#).



New Communications Options

As promised, our CR6 dataloggers now have the same radio options as our CR300-series dataloggers. These radio options are suitable for the following regions:

Embedded Radio	Where Used	Frequency
RF407	U.S., Canada	902 to 928 MHz
RF412	Australia, New Zealand	915 to 928 MHz
RF422	Most of Europe and some of Asia	863 to 870 MHz

This option is an ideal solution for short-range wireless IP communications. The CR300-WIFI will come factory-configured as a Wi-Fi access point, but also can be configured to join an existing Wi-Fi network with standard or enterprise (EAP) security.

The radio and Wi-Fi options provide onboard wireless communication capabilities that previously required external peripherals. Reducing the number of additional peripherals not only decreases overall system cost, but eliminates the hassle of integrating and installing the peripherals.

The embedded, license-free radios are a low-cost solution for creating wireless communication links to and between dataloggers. The datalogger/radio combinations consume little power and are easy to install and maintain.



CASE STUDY

Tasmania: Ecological Research

The Warra long-term ecological research (LTER) site located in Southwestern Tasmania was founded in 1995 to monitor long-term ecological health and dynamics within a wet eucalyptus forest. The site area consists of 15,900 hectares (61.4 square miles), partly contained within the Tasmanian Wilderness World Heritage Area (managed for conservation) and partly within state forest (managed for multiple uses, including timber production). Studies at the site have the following main research objectives:

- To study the eco-physiological processes and rates of carbon accumulation and decomposition in a mixed-age, tall, wet *Eucalyptus obliqua* forest originating from past natural wildfires
- To measure the exchanges of carbon dioxide, water vapor, and energy between the forest and the atmosphere using eddy-covariance micrometeorological techniques
- To link eco-physiological processes and rates of carbon accumulation and decomposition with the site biota
- To use flux tower measurements, in combination with remote sensing data and land surface models, to upscale and estimate the net exchanges of carbon and water at regional scales



The Warra LTER site includes a flux tower that is part of the OzFlux Network (www.ozflux.org.au) and the Australian Supersites Network (www.supersites.net.au/supersites). The flux tower consists of an 80-meter (262-foot) guyed steel-lattice tower. Turbulent fluxes of heat, water vapor, and carbon dioxide are measured at the top of the tower using a Campbell Scientific CPEC200 Closed-Path Eddy-Covariance System with a vortex sample intake. A combination of a Campbell Scientific AP200 profile system with eight intakes and a series of Apogee aspirated temperature sensors provides a vertical profile of water vapor, carbon dioxide, and temperature.

The profiles are used to calculate the change in storage (i.e. accumulation or depletion) of the two gases and heat. The change in storage is added to the turbulent fluxes to determine a total flux or net ecosystem exchange for each scalar. A profile system is particularly useful at a site like Warra where the change in storage is significant in times of lower turbulence intensity (e.g. at night) and within the especially large forest canopy.

Supplementary measurements are also made above the canopy with Campbell Scientific instruments, including temperature and humidity, wind speed and direction, rainfall, incoming and reflected shortwave radiation, and net radiation. At ground level, soil moisture content is measured using time-domain reflectometry (TDR) instruments, while soil heat fluxes and soil temperature are also measured.

Since the Warra LTER site was established, more than 200 research projects have been undertaken at the site, and ten of those projects have been designated icon projects, designed with the specific intent of continuing remeasurement in the long term (more than 15 years). The Warra flux tower is one of these ten icon projects.



One of the AP200 intakes and the aspirated temperature probes



Discontinuation of the CR200X-Series Dataloggers

The CR200X retirement is proof that all good things do come to an end. However, we now offer something better—the CR300-series dataloggers!

The small, low-cost CR200(X)-series dataloggers have been very successful, serving as a foundation for thousands of data-acquisition solutions used across the globe. This series began in 2002 when we introduced the CR200, and our first dataloggers with integrated spread-spectrum radios—the CR205, CR210, and CR215. In December 2009, Campbell Scientific replaced the CR200-series dataloggers with the CR200X-series dataloggers, which expanded the memory for the program and operating system.

In developing the CR300-series dataloggers, our goal was to maintain the success of our CR200X-series dataloggers while adding customer-initiated improvements, such as:

- Serial communication capabilities
- Much richer CRBasic command set that is the same as the commands used in our other dataloggers
- Faster processor
- Onboard compiler that can handle large, complex programs

We also upgraded the radios that are integrated in some of the dataloggers. Because of these new features, Campbell Scientific is discontinuing the CR200X-series dataloggers and will cease to accept new orders after January 16, 2018.

The following table should help you transition to the new dataloggers:

Discontinued Model	Replacement Models
CR200X Datalogger	CR300 or CR310 (the CR310 has an integrated 10/100 Ethernet port)
CR211X Datalogger with 922 MHz Spread-Spectrum Radio	<ul style="list-style-type: none"> ➤ Use a CR300 or CR310 with an RF411A radio if the datalogger will be added to a network containing CR211(X), CR210, RF411(A), RF431, RF410, or AVW211 ➤ Use a CR300-RF412 or CR310-RF412 for new 922 MHz networks
CR216X Datalogger with 2.4 GHz Spread-Spectrum Radio	<ul style="list-style-type: none"> ➤ Use a CR300 or CR310 with an RF416 radio if the datalogger will be added to a network containing CR216(X), CR215, RF416, RF432, RF415, or AVW216 ➤ Use a CR300-WIFI or CR310-WIFE for new 2.4Ghz applications ➤ Use a CR300-RF422 for long-range (868 MHz) European applications

At Campbell Scientific, we make quality products that remain in the field many years after we stop manufacturing them. Because of our commitment to our customers, we will continue our customer support and repair services for the CR200X-series dataloggers until at least January 2028, assuming replacement parts remain available.

If you have an queries, contact us today at info@campbellsci.com.au or call us on +61 7 4401 7700.



MEASUREMENTS

Gas Flux & Turbulence – The importance of Spatial & Temporal Synchronicity

Having complete spatial and temporal synchronicity of your eddy covariance (EC) dataset is paramount to making the best possible EC measurement. Consider a situation where two sensors (e.g. a gas analyser and a 3-D sonic) have independent clocks and are each measured at a rate of x Hz – there could be up to 1/x seconds of synchronicity between the measurements. Delaying one of the samples relative to the other creates the possibility of maximizing the covariance and minimizing asynchronicity to $\pm 1/(2x)$ seconds. However, perfect synchronicity is not achievable with delays since the true peak in covariance occurs between discrete samples.

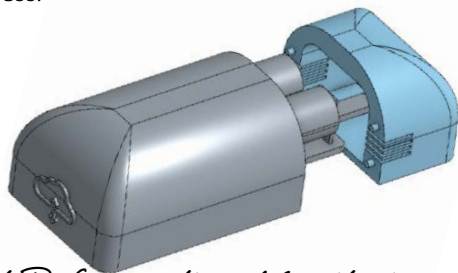
By using the same control electronics and clock for both sensors, the measurements are virtually simultaneous, ensuring you have the maximum covariance. Campbell Scientific's patented IRGASON integrated CO₂/H₂O and 3-D sonic anemometer was designed with this in mind, and is the only system available which provides true temporal and spatial synchronicity of your EC dataset, giving you the best possible measurement. If you're in the market for a new Open Path CO₂/H₂O EC system, think **IRGASON!**

For more information, visit the IRGASON product page (<https://www.campbellsci.com.au/irgason>) or email sales@campbellsci.com.au.



Altoview Catchup

The past 12 months has seen the rapid development and deployment of a Long Range (LoRa) Network to Townsville as part of an end-to-end Internet of Things (IoT) solution. Since Campbell Scientific won a government funded IoT grant in early 2016, a total of five LoRa gateways have been deployed in the Townsville region providing a city-wide LoRaWAN network. The network is open to the public with Altoview providing a free web interface for data access.



Smart Refrigeration Monitoring

CSA have been putting in the hard yards in the last 6 months to develop the first commercially available Altomote for smart refrigeration temperature monitoring. The AM200 Altomote provides automated temperature and humidity monitoring of refrigerators and freezers for healthcare and food service industries. Trials of this new technology in both Townsville and Brisbane will commence shortly.

Altoview Student Day

In April 2017, CSA held an Altoview workshop for university students and industry members. The course was conducted over a single day and included hands on session where students designed Altoview nodes. The day was a great success with all students quickly assembling the nodes and posting data to Altoview. There was minimal assistance from CSA employees, highlighting Altoview's efficiency and ease-of-use.

Looking Forward

Alongside the AM200 refrigeration monitoring trials, CSA is developing a WiFi version of the AM200 for the same application, and plan to trial these units in Australia, Canada, the US and Mexico later this year. Work is also continuing on our Knowledge Transfer Partnership with James Cook University to develop a low-cost LoRaWAN Flood Warning sensor.

If you would like to read more please contact us at info@altoview.com

Visit our website (www.altoview.com) or follow us on facebook (<https://www.facebook.com/altoviewaustralia/>)

Planning a Smart City

Learning applications

In partnership with the Townsville City Council (TCC) and James Cook University (JCU), Altoview will give local students a first look into the widespread applications the new Internet of Things (IoT) platform can provide.

The Townsville Smart City Project is one of the first in Australia to use Low Power Wide Area Network (LPWAN) wireless technology to send data from multiple measurement nodes to the cloud where it is stored using Altoview software. Altoview provides an open-access platform that can be used by the community to develop and test innovative IoT ideas.

What will they learn?

Students will work through real world examples that could be used to help the Townsville City Council plan a smarter city. The activity involves looking at one of the key areas of interest which include monitoring occupancy, activity, electricity, and water in urban areas. Using an activity tracking example, students will be shown how to develop a LoRa node using an Arduino-based development kit to count pedestrian traffic in specific areas of interest. Data will be measured and transmitted wirelessly to the cloud,

where it can be accessed by the Altoview web portal.

With the ultimate aim to encourage innovation, this workshop will provide the necessary tools and knowledge to take advantage of the open-access Altoview platform. This student learning exercise has been developed to provide a real world experience for students and technology enthusiasts in the wider Townsville community.

There has been global interest in the Altoview technology which has the potential for use in agribusiness, hospitality, energy providers, universities, governments, environmental groups and more.

With the IoT community expanding in Townsville and internationally, Altoview presents an innovative end-to-end solution.

NEW REPAIRS PROCESS

New process for Campbell Scientific Australia Repairs

Campbell Scientific Australia has implemented a new RMA form and repair charging process in order to optimise our repairs turnover time.

Due to high administrative overheads, CSA will now charge a minimum of 1 hour labour thus eliminating delays experienced in quoting.

Customers will have the option to select their maximum repair amount for any given item sent for repair. For more information, please refer to our new [RMA document](#).

If you have any queries or questions about CSA's new process please get in contact at info@campbellsci.com.au or call us on +61 (0)7 4401 7700.

TECH TIP: How to know when your datalogger memory is getting full



What does it mean to fill the memory of your datalogger?

By default, your datalogger's final-data memory (memory for stored data) is organised as ring memory. Each data table is its own ring memory. When the ring is full, oldest data are overwritten by newest data. So, you can think of filling the memory of your datalogger as determining the point in time when any new data you store will overwrite any old data you have.

What factors determine how quickly your datalogger memory will fill up?

How much time passes before your datalogger memory fills up depends on the following:

- The number of records allocated to a table
- The number of values being written to the data table each time a record is written
- The data types of those values
- The conditions that determine whether new data is added to a data table (such as how frequently data is written to the table)
- The amount of memory available in your datalogger

How do you calculate how soon your datalogger memory will be full?

If you have a newer datalogger, such as the **CR6**, you can easily determine the time limit by loading the program and letting the datalogger make the calculation. You can find this information in the program details. Starting with OS 28, you can also find helpful information in the DataTableInfo table where each data table in the program is assigned a field called DataFillDays.

Alternatively, click the Station Status button in your datalogger support software (**LoggerNet**, **PC400**, or **PC200W**), and view the Table Fill Times tab.



Note: Table Fill Times statistics cannot be calculated for a CR200(X)-series datalogger.

How often should you collect data?

Don't wait to collect data until your new data is about to overwrite your oldest data. Collect your data as often as you can afford to lose it. Instrumentation in the field is subject to conditions outside of your control. Collecting and reviewing your data is the best way to ensure your system is functioning as designed.

