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LoggerLink Mobile Apps—Data on the Go!



We're excited to announce the release of LoggerLink mobile apps. LoggerLink was designed to give you access to your IP-connected datalogger anywhere your mobile device has a data connection. We've developed two mobile apps—one that runs on iOS devices such as the iPad or iPhone, and another that runs on Android-based phones or tablets.

LoggerLink packs a surprising number of features into a mobile application. You can view data tables, the Public table, or the datalogger's Status table in numerical or graphical format. The new apps let you collect data from the datalogger, and even email that data to your computer once it's collected.

Using LoggerLink you can also set Public variables, toggle Boolean values, edit datalogger settings, and check and set the clock. You can send a new program to the datalogger, retrieve a program or other file from one of the datalogger's drives, pause a currently running program, and even make small program changes via a simple text editor. There's also a page that includes vital information on the health of the datalogger such as battery voltage, internal temperature, operating system ver-

sion, and program errors. To see some of these features in action, check out our LoggerLink video tutorial on the Tutorial downloads page of our website.

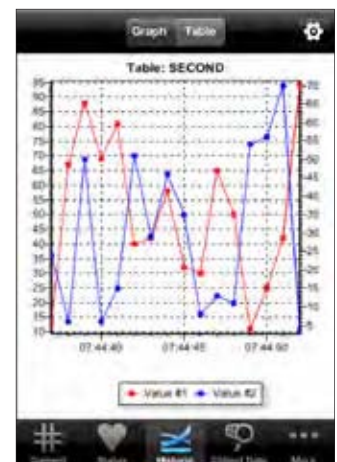
LoggerLink supports our newest generation of PakBus dataloggers—the CR1000, CR3000, CR800 series, and CR200 series. For LoggerLink version 1, the datalogger must be available via an IP connection, such as an NL100, NL115, NL120, NL200, NL240, or cellular modem. The apps support PakBus routing to dataloggers that may not be connected to IP directly, but their neighboring datalogger is. For iOS only, LoggerLink also supports a walk-up-and-connect ad hoc connection using a Wi-Fi RS-232 dongle.

LoggerLink for iOS supports devices running iOS version 4.2 and greater. LoggerLink for Android supports devices running Android version 2.2 and greater. The apps

are available through the Apple App Store or Google Play.

We think you'll find a lot to like in our mobile apps. Why carry around a phone, PDA, and laptop computer? With LoggerLink you'll have the convenience of carrying one device that can be used for managing your datalogger as well as managing your life. And because we offer support for two popular mobile operating systems, you choose the platform—and the device.

Whether you prefer the versatility of a tablet or the portability of a smart phone in your pocket, you'll be able to get your data—on the go!



Loggerlink provides a variety of tools for interacting with your IP-enabled datalogger, including viewing and collecting data, setting variables, and working with programs.

Learn More Here
campbellsci.com/loggerlink



AP200 CO₂ and H₂O Profile System



The ability to accurately measure CO₂ and H₂O in a vertical profile is becoming increasingly important as scientists study carbon and water cycles and their relationship to global climate change. Campbell Scientific engineers have been providing scientists advanced CO₂ and H₂O measurement systems for many years.

The AP200 is Campbell's next-generation gas profile system. It is a low-power, low-cost system capable of measuring carbon dioxide and water vapor using four to eight intakes vertically, and is compatible with towers of varying height. This allows the AP200 to be used for ecosystems as diverse as forests, shrubland, grassland, agricultural systems, or urban environments. When used with an eddy-covariance flux system, the profile information gathered by the AP200 can be used to monitor fluctuations in storage term, giving a more complete picture of CO₂ and H₂O exchange between the surface and the atmosphere.

The new system includes a wide range in operating temperatures, automatic zero/span functions, active pressure control, and sample flow measurement. Its low power consumption makes it well suited to solar-powered applications, freeing the user from the range of the power grid. It is designed to operate autonomously for long periods, storing data in nonvolatile memory. Mobile apps are available that support field maintenance tasks such as viewing and collecting data, setting the clock, and downloading programs. If internet access is available, the AP200 supports remote status checks and data download, minimizing the number of labor-intensive, on-site status checks.



From four to eight intake assemblies are mounted in a vertical profile to a tower and connected to the AP200 system enclosure by easily installed tubes and cabling. Each intake has a mixing volume such that samples represent an average CO₂ concentration at each level. Independent heaters in each intake control the condensation buildup that is common in humid environments.

The nerve center of the AP200 is a CR1000 datalogger. The CR1000 collects, processes, and stores data, switches valves from one level to the next, controls system pressure by adjusting pumping speed, monitors sample flow, regulates temperature of the pump and valve manifold, and performs automated zero/span calibration of the infrared gas analyzer (LI-COR's LI-840A).

The AP200 is manufactured and assembled in Campbell Scientific's ISO 9001-certified manufacturing facility in Logan, Utah.

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Learn More Here

campbellsci.com/ap200



ALERT2 Flood Warning System



New Product

Campbell Scientific's RDP120 is an ALERT flood warning system that supports the new ALERT2 standard for transmitting data. This new system greatly improves the accuracy and performance of systems dedicated to early flood detection and warning. The RDP120 is designed for stand-pipe ALERT installations, and can be a drop-in upgrade for existing stations or a turn-key solution for new installations. It can be ordered with a

variety of datalogger and communication options.

The RDP120 incorporates the new AL200, an encoder, modulator, and sensor interface. The AL200 brings ALERT2 capability to the RDP120, resulting in faster and better data transmission. It is easily configured, and has sensor ports built in. Both the RDP120 and the AL200 are built by Campbell Scientific, so they can be counted on to perform well in harsh, remote environments.

Learn More Here

campbellsci.com/rdp120



Wi-Fi Network Link Interface Available Soon



New Product

Campbell Scientific's NL240 is a wireless networking peripheral that provides Wi-Fi connectivity to our dataloggers and peripheral devices over an 802.11b/g/n network.

The NL240 unleashes the IP capabilities of the datalogger, delivers the power of PakBus networking,

and unwires your serial-based devices. For on-the-go access, pair up the NL240 with our new LoggerLink Apps on your iOS or Android device (see article on page 2).

The NL240 is a low-power, industrial device that goes beyond the typical Wi-Fi serial device server. It offers unique and powerful PakBus networking capabilities, but is easy to configure. More importantly, the NL240 provides direct access to all the IP capabilities of the CR800, CR1000, and CR3000 dataloggers, such as:

- M2M communication of data and events
- PakBus communication over TCP/IP for remote configuration, control, and data collection

- HTTP and FTP for posting, retrieving, and local hosting of data
- Email client for data and control messaging
- ModBus TCP/IP, DNP3, and NTCIP ESS industrial protocol support

The NL240 can take advantage of the thousands of Wi-Fi hotspots available in cafe's, universities, hotels, and airports. Wi-Fi also provides encryption to protect traffic and uses a global set of standards so the same device can be used internationally.

By providing these powerful features, the NL240 can serve a wide range of applications to better meet your networking needs.

Learn More Here

campbellsci.com/nl240



New Lightning Warning Systems



New Product

Campbell Scientific now offers the LW110, a comprehensive lightning warning system. The LW110 continuously monitors local electric field for a 5 to 7 mile radius, and automatically triggers visual and audible alarms when there is potential for lightning. Because warnings are based on measurements of electric field, instead of prior strikes, the system can detect lightning danger before strikes have occurred.

By measuring the electric field at your location, the LW110 removes the guesswork from critical decisions, such as when to seek shelter as a storm approaches and when it's safe to resume activities as a storm passes.

The heart of the new LW110 Lightning Warning System is Campbell Scientific's CS110 Electric Field Monitor. This innovative instrument measures atmospheric electric field using a reciprocating shutter that has minimal maintenance and better performance than the traditional rotating vane field mill.

To provide visual and audible alarms, the LW110 includes either the RA100 Strobe and Siren Alarm or the RA110 Remote Alarm System. The RA100 consists of red, amber, and blue strobes and a siren. The RA110 is similar to the RA100, but it can be installed several miles from the electric field monitor.



The LW110 can be customized to fit your project's specific requirements while retaining its turn-key functionality. Several mounting, power supply, and communication options are available. The LW110 can also include the SG000 Strike Guard Lightning Sensor to monitor actual lightning strikes as far as 20 miles away. Furthermore, the addition of meteorological sensors allows one LW110 to serve as both a standard weather station and a lightning warning system.

A variety of applications can benefit from the LW110 Lightning Warning System. Outdoor spectator events such as ball

games, golf tours, and soccer matches can use this system to protect players and fans. Public swimming pools and other outdoor venues can also benefit. Furthermore, the system is ideal for industrial facilities. Personnel working in exposed locations or facilities dealing with explosives or fuels can take protective measures when warned of lightning danger. The LW110 can then trigger its alarm to indicate when the danger has passed, allowing work to recommence as soon as possible.

Learn More Here

campbellsci.com/lw110



New Operating Systems for CR800, CR1000, CR3000



New Product

Campbell Scientific is dedicated to continually improving our products in order to better meet our customers' needs and to keep pace with changes in technology. These improvements are particularly evident when looking at enhancements added to our datalogger operating systems over the years. These are some of the great new features available with the upgrade from OS 24 to OS 25:

- Enhanced diagnostics for Campbell wireless sensor networks (CWSNs)
- Support for memory expansion with compact flash cards larger than 2 GB

- Support for the new NL240 Wi-Fi interface

For a detailed list of features added from OS 24 to OS 25, please visit our website at www.campbellsci.com/70_103.

New features have increased the size of OS 25 so that CR800 and CR1000 dataloggers manufactured before September 2007 (those with 2 MB of SRAM) will have to be directly connected to a PC running Device Configuration Utility to load the larger OS.* If you have a 2 MB datalogger and remote OS download is necessary (i.e., need to use TCP/IP), you can have your 2 MB datalogger updated to 4 MB. For

details and pricing on the OS 25 memory upgrade, contact your local Campbell Scientific office.

** All CR3000 dataloggers have 4 MB of SRAM and will accept direct or remote downloads of OS 25. CR800s with serial numbers greater than 3605 and CR1000s with serial numbers greater than 11832 have 4 MB SRAM and will accept direct or remote downloads of OS 25.*



Researching Glacial Retreat in the Andes



Case Study

The water supplied by melting glaciers in the high Andes mountains is critical to many towns and cities in that region. Because some of these glaciers appear to be retreating and shrinking, the Community of Andean Nations established the Project on Adaptation to the Impact of Rapid Glacier Retreat in the Tropical Andes (known as PRAA). The project will establish a network of eight measurement stations, all at elevations greater than 4,000 m (13,100 ft), to be installed in Bolivia, Colombia, Ecuador, and Peru.

These stations are being acquired by the PRAA as part of the project's goal to generate knowledge about glacial retreat and high mountain hydrology. The main objective of the station installations is to monitor the behavior of glaciers through radiation and temperature data to determine how much life is left in them. It is hoped that this will allow better water resource management in basins that depend mainly on the melting of glaciers as support for their economy.

Considering the uncertainties of climate change, it is difficult to calculate models of the glaciers' life span by just watching them. So the need arose to install meteorological stations on the glaciers themselves, in an area that would best represent the glaciers' behavior and condition.

The station described here was installed on a glacier on the snow-capped Quisoquipina mountain, near Ausangate peak, part of the Vilcanota mountain range near Cuzco, Peru. EnviroEquip, Campbell Scientific's representative in Peru, oversaw the installation.



To install the station, the researchers had to wait for the best time of year, when it was not too cold and there weren't too many storms, as the glacier is quite inaccessible and dangerous for most of the year. The only way to get to the installation site is on foot; it took approximately five hours, up hill, to get to the site. To make the climb, the installers had to use specialized equipment for mountains and snow. The camp had to be located away from the glacier to avoid the cold generated by it; nevertheless, the temperature at night dropped to -10°C .

The station consists of a CR1000 datalogger, temperature and humidity sensors, and a precipitation gage, all from Campbell Scientific and all powered by a solar panel.

Significantly, in addition to meteorological instruments the station has a Campbell GPS16X-HVS that can determine the movement experienced by the glacier each year. The station also has an SR50A snow-level sensor to determine the amount of annual snowfall on the glacier. This data may help create a better picture of glacier behavior and thus get closer to the data needed to determine the life expectancy of the glacier. The station was mounted on an aluminum tripod the researchers manufactured, with a special balancing system so the instrumented portion of the tripod is always maintained level, even when the glacier moves.

Learn More Here

campbellsci.com/peru-glacier



CS2-Compliant GOES Satellite Transmitters Available



Updated Product

Campbell Scientific recently began shipping TX320 GOES transmitters that conform to the certification standards version 2 (also known as CS2). Good news is that

your existing TX320 and TX312 transmitters are upgradable. When you are ready, we can update the transmitter to be CS2-compliant through our standard RMA process. This upgrade includes a firmware update and a recalibration.

You might also notice that Campbell Scientific no longer ships a CD containing SatCommander. That is because our Device Configuration Utility (DevConfig) now supports

both the TX320 and the TX312 transmitters. DevConfig is a more intuitive interface than SatCommander and is included in our datalogger support software packages. The latest version of DevConfig is available on our website, at no charge at www.campbellsci.com/downloads.



Learn More Here

campbellsci.com/tx320



Colorado: Flood, Road, and Weather Data



Case Study

Networks using the ALERT protocol are designed to give immediate access to data that indicates the likelihood of flood conditions. ALERT stations typically are set up to acquire and transmit hydrological and meteorological data on a timed and event basis. What many users don't realize is that Campbell Scientific dataloggers that are used to run ALERT stations have plenty of capability to spare, and that capability can be leveraged to perform a variety of services.

Douglas County, Colorado, in conjunction with Denver's Urban Drainage Flood Control District (UDFCD), operates an extensive ALERT network to monitor potential flood conditions. In 2008, the county decided that the next ALERT site they set up should also have a camera to monitor stream and road conditions, and a road-temperature sensor to aid the Public Works department with winter maintenance. This would give the station the abilities of a road-weather information system (RWIS).

To accomplish this task, Water & Earth Technologies of Fort Collins, Colorado, worked with Campbell Scientific to design and build the new site as a multipurpose system. The new system has a variety of features:

- The immediacy of an ALERT station
- Real-time and historical weather data for meteorologists
- A cellular router for remote data access and transmission to Weather Underground (WU)
- A camera to send images to WU and to the Public Works department

The Campbell Scientific CR1000 Measurement and Control Datalogger at the heart



of the ALERT station was programmed to instruct the RF500M radio modem to transmit precipitation, water level, wind speed and gust, wind direction, and battery voltage to the UDFCD base station in Denver using the ALERT protocol.

In addition to this normal flood-warning role, the CR1000 acts as a web server, using cellular communications to provide other users with near-real-time images of the stream, along with the same type of data sent to the ALERT network, and temperatures for water, air, and road surface. A staff gauge was painted on one of the bridge piers to be visible by the camera, and this can be used to verify the performance of the water-level sensors. As a public service, the CR1000 is also configured to use its Internet communication abilities to send

current data and camera images to the Weather Underground website (wunderground.com).

This weather station has no access to ac power, but is able to rely solely on solar power. The programmability of the CR1000 enabled use of power-saving techniques such as turning off the camera at night and powering down hungry sensors when they are not needed.

Campbell Scientific dataloggers are great foundations for ALERT systems. And they are flexible enough to meet expanding needs and interesting challenges.

Learn More Here

campbellsci.com/colorado-alert



New Narrowband Radios Coming



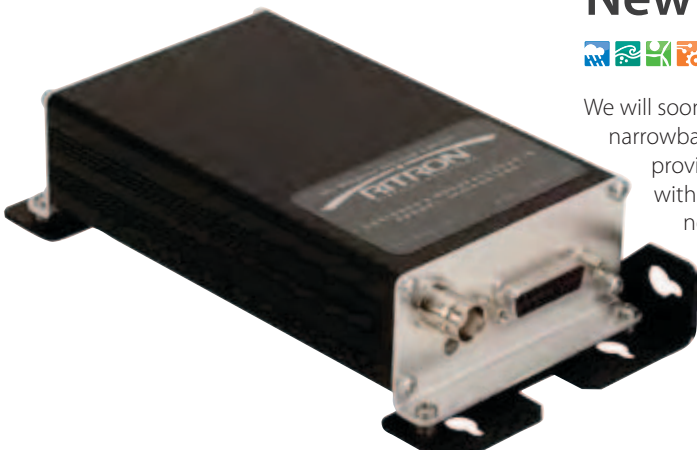
New Product

We will soon be offering the RF320-series narrowband radios that will replace and provide over-the-air compatibility with our RF310-series radios. The new series is based on Ritron's rugged line of DTX-L narrowband analog radios. Each radio will include a

configured Ritron DTX-L radio, mounting bracket, and cable for connecting the radio to a radio modem. Models that support VHF and UHF frequencies will be available. Narrowband radios provide stable long-range communication.

Learn More Here

campbellsci.com/rf320



Who's NAN?



Tips and Tricks

Have you ever had NAN show up, unannounced, in your data? Did you wonder who she is and how she got there? And, more importantly, what do you need to make her go away to get your data back?

Table Monitor: Real Time Monitoring

Public

Field	Value
RecNum	348
TimeStamp	6/13/2012 12:06:41 PM
PTemp	23.26554 deg C
batt_volt	13.17736 volt
AirTempC	NAN deg C

NAN means "not a number", indicating an invalid measurement. She can show up when a sensor's output voltage exceeds the voltage input range specified in the measurement instruction.

VoltDiff

Parameter Type	Value	Comment
Destination	Dest	
Repetitions	1	
Voltage Range	mV2_5C	
Display	1	
RevDiff	True	Measure
SettingTime	0	

The values that end in C (in the Voltage Range selection above) check for an open input. That's what you get if one lead of your sensor becomes disconnected or broken. When that happens, again, NAN will show up as your measurement value.

NAN also carries the message that you have SDI-12 measurement problems or goofy math expressions like zero divided by zero (0/0).

When NAN infiltrates your measurements, she can also turn up in your stored data

Time	Temp	Humid	Wind	WindDir	WindSpd	WindDirC	WindSpdC	WindDirE	WindSpdE	WindDirM	WindSpdM	WindDirS	WindSpdS	WindDirN	WindSpdN	WindDirW	WindSpdW	WindDirSW	WindSpdSW	WindDirNW	WindSpdNW	WindDirSE	WindSpdSE	WindDirNE	WindSpdNE	WindDirSW	WindSpdSW	WindDirNW	WindSpdNW	WindDirSE	WindSpdSE	WindDirNE	WindSpdNE
2011-06-13 10:00:00	23.26554	45.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2011-06-13 10:00:01	23.26554	45.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2011-06-13 10:00:02	23.26554	45.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2011-06-13 10:00:03	23.26554	45.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2011-06-13 10:00:04	23.26554	45.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2011-06-13 10:00:05	23.26554	45.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2011-06-13 10:00:06	23.26554	45.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2011-06-13 10:00:07	23.26554	45.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2011-06-13 10:00:08	23.26554	45.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2011-06-13 10:00:09	23.26554	45.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2011-06-13 10:00:10	23.26554	45.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

NAN is not all bad----she is a good indicator that you have a measurement problem, so you don't want to universally ignore her. However, you can program the datalogger to discard NANs from your data by using CRBasic's output instructions' *DisableVar* (short for "disable variable") feature. *DisableVar* is used to determine whether a measurement is included in the output data.

For example, in the case of an air temperature sensor, *DisableVar* can be set

to **AirTempC = NAN**. Doing so will exclude NAN from the air temperature output data.

Maximum

Parameter Type	Value	Comment
Repetitions	1	
Source	AirTempC	
Data Type	FF2	Temp Data Plot
DisableVar	AirTempC = NAN	
Time	Time	Do NOT store

Don't forget to use your handy-dandy F10 key to insert a variable name when constructing your expression. You can learn more about this feature at: www.campbellsci.com/19_1_9999_154

If all the measurements in the output interval result in NAN, NAN will still be stored in the final storage regardless of what you've done with the *DisableVar*.

If NAN shows up on your doorstep, look for the source of the problem. Connect all wires securely. Check cables for damage. Match the sensor's output voltage range to the datalogger's input voltage range and check your math expressions. It's that easy. Let's send NAN packing!

Inhospitably yours,

Tip



Upcoming Trade Shows

Visit our website for training class schedules and additional listings.

AUGUST

05-10 ESA 9th Annual Meeting
14-16 WASTECON 2012
20-22 StormCon

Portland, OR
National Harbor, MD
Denver, CO

OCTOBER

14-19 Oceans'12
21-24 2012 ASA Annual Meeting
23-25 Automotive Testing Expo

Virginia Beach, VA
Cincinnati, OH
Novi, MI

SEPTEMBER

10-13 Solar Power International
16-19 NRITS Conference
16-20 ASDSO Dam Safety
29-03 WefTec 2012
30-03 Geothermal Energy Expo

Orlando, FL
Biloxi, MS
Denver, CO
New Orleans, LA
Reno, NV

NOVEMBER

04-05 Irrigation Show

Orlando, FL

DECEMBER

04-07 NGW Expo
04-07 AGU Fall Meeting

Las Vegas, NV
San Francisco, CA



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