



Versatile, rugged monitoring stations for harsh environments



Campbell Scientific provides rugged, low-power data-acquisition systems for monitoring temperature profiles and other environmental data in extreme freezing conditions. The versatility of our dataloggers, including the availability of various communication ports, supports a wide range of communication options to retrieve data, including satellite options such as Argos, Iridium, GOES, and Inmarsat BGAN.

From single research stations to large networks, Campbell Scientific monitoring systems are commonly used worldwide in permafrost research. Our systems are widely deployed in both high latitude and

high altitude applications, facing the coldest and harshest conditions. Our flexible equipment is used for cold climate structural research, and has measured permafrost, hydrological, and meteorological conditions in the Arctic, sub-Arctic, and Antarctic, and on the world's great mountain peaks. Long-term, unattended station operation is achieved with low-power use, batteries and solar panels, wireless data retrieval, and large on-board data storage capacity. For example, stations installed in the summer have the capability to monitor conditions while overwintering. For all this capability, our dataloggers can be quite small, making them easily transportable in a backpack.

# **Custom Systems**

Most of the systems we sell are customized. Tell us what you need and we'll help you configure a system that meets your exact needs.

### Dataloggers

Our monitoring stations are based around a programmable datalogger that measures the sensors, then stores and transmits the data. We designed our dataloggers to provide a high level of station customization. They have programmable execution intervals, operating temperature ranges down to -55°C, on-board instructions for commonly used sensors, and adequate input channels to accommodate many different sensor configurations.

If needed, channel capacity can be expanded using multiplexers, including a model designed specifically for thermocouples. Our dataloggers interface directly to most sensors, eliminating external signal conditioning. Powerful on-board instruction sets allow unattended control decisions based on time or conditional events. For example, peripherals such as heaters or specialized sensors can be actuated based on temperature, wind speed, solar radiation, or some other measured parameter or event. These instruction sets contain programmed algorithms that process



measurements and output results in the desired units of measure. Wind vector, wet bulb, histogram, and sample on maxima or minima are all standard to the datalogger instruction sets.

Measurement processing and data storage are programmable, but measurements are typically processed and stored at hourly and daily intervals (e.g., maxima, minima, averages). True averages can be calculated and stored by the dataloggers. Conditional outputs can also be processed and stored. For example, data can be stored at faster intervals based on events such as increased wind speeds or subnormal temperatures.



#### Sensors

Almost any sensor can be measured by our dataloggers, allowing stations to be customized for each site. Sensors used with our stations can measure relative humidity, solar radiation, wind speed and



direction, temperature (air, water, and soil), precipitation, snow depth, snow water equivalent, barometric pressure, soil moisture, and water quality. Our stations can monitor strain gages, accelerometers, pressure transducers, GPS receivers, linear potentiometers, Time Domain Reflectometry, and many other sensor types.

## Communications

We offer multiple communication options for data retrieval, allowing stations to meet exact needs. Telecommunication options include radio frequency, satellite (Argos, GOES, Inmarsat-BGAN, Iridium), telephone (landline, voice-synthesized, cellular), shorthaul, Wi-Fi, Ethernet, and multi-drop. On-site options include storage module, laptop computer, and datalogger keyboard/ display. Robust error-checking and low-power use ensure your data arrives uncorrupted and as scheduled. We can even help you post your data to the Internet.



### Software

Our PC-based support software simplifies the entire data acquisition process, from programming to data retrieval to data display



and analysis. Our software automatically manages data retrieval from networks or single stations. Robust error-checking ensures data integrity. We can even help you post your data to the Internet.

# **Permafrost Case Studies**

Our systems have helped a variety of organizations reach their goals. The following are just a few of these:

The Canadian Permafrost Monitoring Network uses our dataloggers for long-term field observations of active layer and permafrost thermal state. The observations are essential for understanding the present permafrost conditions and the detection of the terrestrial climate signal in permafrost and its temporal and spatial variability. www.campbellsci.com/canadian-permafrost A new Research and Test Facility (RTF) at the University of Alaska, Fairbanks was built on an area with underlying permafrost at various depths. The RTF was instrumented with sensors under the building, in the foundations, in flooring systems, and throughout the wall and roof areas. A nearby weather and geotechnical station also provided additional information about permafrost, foundations, and thermal control of the subsurface building envelope. www.campbellsci.com/alaska-construction



To study global warming, the Canadian Permafrost Monitoring Network collects long-term data at the southern edge of Devon Island Ice Cap in Nunavut, Canada.



The Research and Test Facility in Fairbanks, Alaska is built on an area with underlying permafrost, which presents many foundation and structural design challenges.



815 W 1800 N | Logan, UT 84321-1784 | 435.227.9120 | www.campbellsci.com USA | AUSTRALIA | BRAZIL | CANADA | CHINA | COSTA RICA | FRANCE | GERMANY | SE ASIA | SOUTH AFRICA | SPAIN | UK © 2006, 2017 Campbell Scientific, Inc. August 4, 2017