Earth Sciences

Instrumentation for the Earth Sciences

Campbell Scientific stand-alone data acquisition systems are versatile, rugged, and powerful—factors that make them ideal for earth science applications. Our systems can monitor tilt, temperature, pressure, convergence, displacement, geographic position (GPS receivers), strain, load, vibration, level, flow, creep, and force. The systems can also be configured with sufficient inputs to measure meteorological and hydrological parameters in the same system, thus capturing data relevant to cause-and-effect relationships.

System Benefits

1. Systems measure most commercially available sensors—voltage output, resistive bridge, vibrating wire, 4-20 mA, SDI-12, frequency output, etc.
2. Systems can be used in a variety of earth science applications including volcanology, subsidence, glaciology, air and water quality, seismicity, ground and surface water studies, global warming, paleo (climatology), and slope stability.
3. Systems are rugged and field-capable. Extended operating temperature ranges are up to -55° to +85°C.
4. Wireless and hardwire communication options allow real-time reporting, even from remote locations.
5. Low unit costs and networking capability allow placement wherever measurements are needed.
6. PC software supports data retrieval, data display, and datalogger programming capability.
7. Low current drain allows operation from batteries and solar panels.

Data Acquisition

The versatility of our systems allows them to be customized for each application. We offer a range of dataloggers from the most basic system with just a few channels, to expandable systems that measure hundreds of channels. Scan rates can be programmed from a few hours to 100,000 times per second, depending on the datalogger model. Measurement types, processing algorithms, and recording intervals are also programmable.

Our systems have powerful on-board instruction sets—simply choose sensor type, scan rate, measurement channel, etc. On-board mathematical and statistical processing allows data reduction in the field and allows measurements to be viewed in the desired units, whether that be microstrain, centimeters per second, revolutions per minute, meters, Amperes, or inches.

The system's versatility extends to control. Our systems can monitor and control external devices based on time or measured conditions, allowing savings in time and equipment, and possibly preventing or warning of dangerous conditions. The systems are rugged enough to be used in earth science studies worldwide.

Our systems are stand-alone. Once programmed and powered, no human or computer interaction is required, although data are typically downloaded to a PC for further analysis. A telecommunications or hardwire link allows data to be monitored and graphed in your office rather than in the field. Data from a number of stations and from a number of applications can be monitored from a single laptop or desktop computer.

The low power drain typically allows our data acquisition systems to be powered by solar panels and batteries. If 110/220 ac power, vehicle power, or external 12 Vdc batteries are available, you can use those as well. Non-volatile data storage and a battery-backed clock ensure data capture and integrity.

Sensors

The versatility of our systems begins with sensor compatibility—they can measure virtually every commercially available sensor allowing them to be used in a variety of ways for a variety of measurements. For example, a single CR10X could be used sequentially in slope stability, water quality, and equipment performance applications. Typical sensors that can be used include:

Resources

- Ask Our Expert
- FAQs
- Downloads

Case Studies

- Mt. Sajama: Climate Resea...
- Switzerland's Grimselpass...
- Stump Cross Caverns: Stal...
- Mt. Etna: Volcano Monitor...
- Swiss Alps: Glacier Resea...

Recommended Products

- CR510 Basic Datalogger w...
- CR10X Measurement & Cont...
- CR1000 Measurement and C...
- CR3000 Micrologger®

Integrators

- Kane GeoTech, Inc.
- Locher Environmental Techn...

Related Links

- Geological Society of Amer...

- time-domain reflectometers for measurement of mass wasting, subsidence, or soil moisture
- Carlson strain meters
- meteorological sensors including anemometers, vanes, temperature and relative humidity probes, precipitation gages, barometric pressure sensors, etc.
- vibrating wire strain gauges
- foil strain gauges (in quarter, half, or full bridge strain configurations)
- crack and joint sensors
- tilt sensors and inclinometers
- GPS receivers
- piezoresistive, piezoelectric, borehole, and servo force balance accelerometers
- hydrologic sensors such as current meters, specific ion probes, turbidity meters, multi-parameter water quality sensors, samplers, and a variety of submersible pressure transducers

Because our dataloggers have many channel types and programmable inputs, all of these sensor types can be measured by one datalogger. Channel types include analog (single-ended and differential), pulse counters, switched excitation, continuous analog output, digital I/O, and anti-aliasing filter. Using switched or continuous excitation channels, our dataloggers provide excitation for ratiometric bridge measurements.

Communications

The availability of multiple communications options for retrieving, storing, and displaying data also allows systems to be customized to meet exact needs. On-site communication options include direct connection to a PC or laptop, PC cards, storage modules, and datalogger keyboard/display. Telecommunication options include short-haul, telephone (including voice-synthesized and cellular), radio frequency, multidrop, and satellite.

