

Ag Research

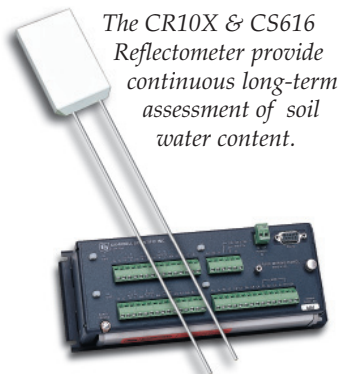
www.campbellsci.com/ag-research

Benefits of Our Systems

1. Open format allows data to be input into third-party software.
2. Most sensors can be measured.
3. Reliable data telemetry.
4. Long-term operation is provided by batteries and solar panels.
5. Systems operate reliably in harsh environments.
6. Onboard statistical and mathematical capabilities.
7. Stations are easily expandable—add new sites or add sensors to existing sites.
8. Powerful software supports programming, data retrieval, and data display.



CR1000



*The CR10X & CS616
Reflectometer provide
continuous long-term
assessment of soil
water content.*



Two Bowen ratio systems calculate evapotranspiration and CO₂ fluxes over a sorghum field near Lincoln, Nebraska.

Campbell Scientific measurement systems are used extensively by agronomists, crop scientists, and soil scientists in agricultural research applications. Our measurement systems feature reliability, accuracy, and the flexibility to measure nearly any parameter. Typical systems include weather/evapotranspiration stations, CO₂ and water vapor flux measurement systems, and systems for monitoring soil parameters.

Weather/Evapotranspiration Measurements

Our weather stations provide long-term, stand-alone monitoring of meteorological parameters for all types of agricultural research applications. Programmable dataloggers allow multiple options for station configuration, measurement and output intervals, and data retrieval. Almost any meteorological sensor can be used including: wind speed and direction, solar radiation, temperature (air, water, soil), relative humidity, dew point, precipitation, leaf wetness, and barometric pressure. Wind vector, vapor pressure, histogram, and sample on maxima or minima are standard in the datalogger instruction sets. Data are typically viewed and stored in the units of your choice (e.g., wind speed in mph, m s⁻¹, knots). Pre-programmed stations calculate potential evapotranspiration using the Penman-Monteith equation; other evapotranspiration algorithms can be entered if preferred.

Surface Flux Measurements

Our flux systems can measure atmospheric gradients or vertical turbulent transport directly. Standard systems that support either aerodynamic or Bowen ratio gradient techniques are available for measuring heat, water vapor, and CO₂ fluxes. Our standard eddy covariance systems use a three-dimensional anemometer and either an open-path krypton hygrometer or LI-COR's open-path H₂O and CO₂ analyzer. Measurements of other trace gas fluxes, such as N₂O and CH₄, are obtained with our TGA100A tunable diode laser analyzer.

Soil Measurements

We can measure nearly every commercially available soil sensor, including tensiometers, heat flux plates, thermocouples, psychrometers, lysimeters, and gypsum blocks.

Our soil water instrumentation is used extensively to monitor water content and matric potential. Our time-domain reflectometry (TDR) systems provide accurate, reliable measurements of soil volumetric water content and bulk electrical conductivity in soils over a wide range of textures and soluble salt concentrations. We offer both long-term, multi-point (up to 512 probes) systems and a portable system for instantaneous soil water content readings. Our sensors that measure soil water matric potential use heat dissipation and electrical resistance methods.

Dataloggers

All of our measurement systems are based around programmable dataloggers that measure the sensors, then process or store the data. We designed our dataloggers to allow a high degree of flexibility. Measurement types, scan rates, and recording intervals are all programmable. On-board processing instruction sets contain programmed algorithms that process measurements and output results in the desired units of measure. Our dataloggers can also control external devices, such as valves and samplers.

Sensors

Most sensors, even those made by other manufacturers, interface directly to our dataloggers. Sensors used in our agricultural research (micromet) systems include sonic anemometers, hygrometers, fine wire thermocouples, and open and closed path gas analyzers, including the CS7500 Open Path CO₂/H₂O Analyzer (LI-COR's LI-7500).

Data Retrieval

We offer multiple communications options for data retrieval; options can be mixed within the same network. Telemetry options include telephone (landline, voice-synthesized, cellular), radio (UHF, VHF, spread spectrum), multidrop, short-haul, Ethernet, and satellite. On-site options include storage module, PDA (requires PConnect or PConnectCE software), and laptop computer.



Many researchers place a weather station adjacent to test plots for a continuous record of meteorological conditions that could impact their research.



An integrated eddy covariance station monitors CO₂ and water vapor fluxes over an alfalfa field.