CAMPBELL SCIENTIFIC, INC.

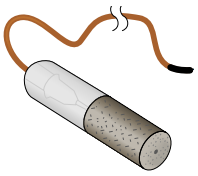
MEASUREMENT & CONTROL SYSTEMS

Soil Water

www.campbellsci.com/soil-science

Benefits of Our Systems

1. Soil water sensors and systems use proven and innovative measurement methods.
2. Versatility is inherent in all systems allowing expansion and custom configuration.
3. Compatibility with a wide variety of sensors.
4. Battery/solar power system provides long-term, remote operation.
5. Communications options include satellite, phone, cellphone, and radio.
6. Dataloggers provide statistical and mathematical processing for on-site data management.
7. Proven reliability even in harsh environments.
8. Expert customer support to get the correct measurement.



229 Soil Water Potential Probe

Soil parameters such as heat flux can also be monitored with our systems.

Our monitoring systems provide accurate, unattended monitoring of soil water parameters.

Campbell Scientific soil water instrumentation is used extensively to monitor water content and matric potential in applications requiring knowledge of soil water inventory or movement. Our soil water instrumentation can be used to automatically monitor multiple probes for time-series information or make point measurements using a portable, hand-held system. Accurate measurements, durability, low power use, proven reliability, and the ability to customize each system make our equipment ideal for a variety of applications including:

- Agricultural research
- Irrigation scheduling
- Road construction
- Slope stability
- Solute transport studies
- Waste storage barrier validation
- Greenhouse/horticultural
- Forestry
- Soil mapping/characterization
- Leak detection
- Soil & atmospheric flux studies
- Watershed studies

Our long-term monitoring systems have proven reliability, even in harsh environments. Our battery-powered dataloggers feature programmable scan rates, measurement types, and recording intervals. They also provide onboard statistical and mathematical functions for on-site data management. Most communications methods are compatible with our systems, including phone (land-line, cellular, and voice-synthesized), satellite, radio, and short haul.

We can measure nearly every commercially available soil sensor, including tensiometers, heat flux plates, thermocouples, psychrometers, lysimeters, and gypsum blocks. We manufacture quality sensors for measuring water content and water matric potential.

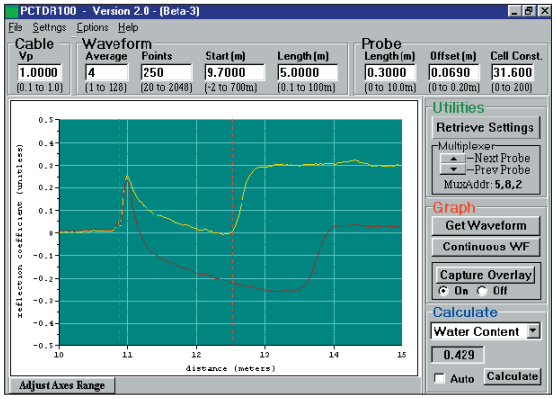
Soil Water Content

We measure soil water content using methods that are sensitive to soil dielectric constant. Our TDR100-based system uses proven time-domain reflectometry (TDR) to accurately and reliably measure soil volumetric water content and bulk electrical conductivity in soils over a wide range of textures and soluble salt concentrations. This system uses coaxial multiplexers to connect the TDR100 to up to 512 TDR probes. The TDR100 features lower current demand and a typical measurement time of 2 seconds. The operating temperature range of -25° to +50°C covers typical applications as well as monitoring frost depth. Windows support software provides setup, troubleshooting, and display of waveforms and measurements. A customized 16" x 18" environmental enclosure is configured to easily mount and protect a CR10X or CR23X datalogger, 12 volt power supply, TDR100, and 8-channel multiplexer.

The CS616-L is a self-contained water content sensor that uses high-speed electronics in the body of the sensor to generate a square wave output with a period that is proportional to water content. Measurement of the square wave by a datalogger's single-ended channel gives precise, high-resolution water content measurements in less than 0.1 seconds—even with long cables.

For portable volumetric water content measurements, the handheld HydroSense consists of a probe and output display. It can be easily carried from site to site and provides immediate soil water content readings. Low power requirements and fast measurement times provide thousands of measurements, powered only by 2 AA batteries.

The portable HydroSense provides instant measurements, displayed as soil water content or water deficit.



Software for the TDR100 provides setup, troubleshooting, and display of waveforms and measurements.

Soil Water Matric Potential

Sensors from Campbell Scientific that measure soil water matric potential use heat dissipation and electrical resistance methods. The 229-L Matric Potential Sensor covers a water potential range from -10 J kg^{-1} to -104 J kg^{-1} by using the temperature response of a heating element embedded in a ceramic matrix. A constant current source is available for reliable and precise heating. Sixteen 229-L sensors are easily multiplexed to a single datalogger differential input channel using the AM416 multiplexer. Watermark and Delmhorst electrical resistance sensors provide an inexpensive method of measuring smaller matric potential ranges.

 (435) 753-2342 (435) 750-9540 fax info@campbellsci.com www.campbellsci.com Printed May 2005