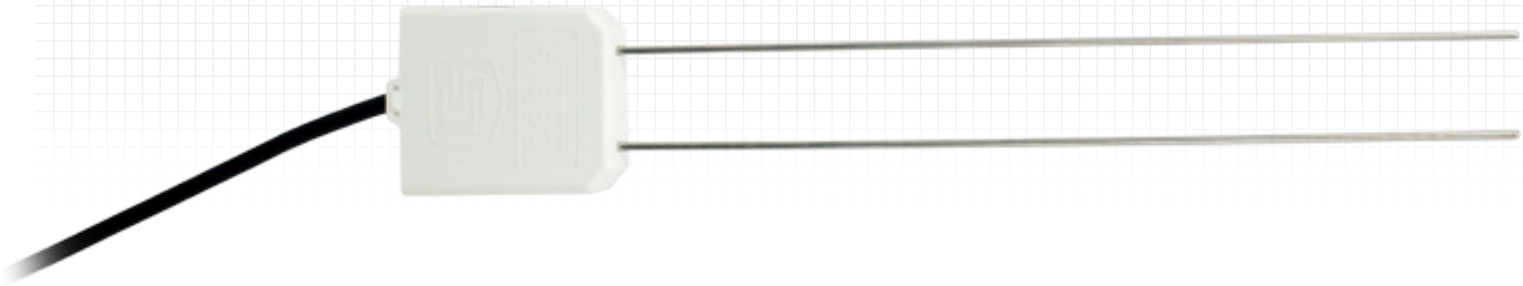
CAMPBELL SCIENTIFIC®
WHEN MEASUREMENTS MATTER

CS616

Water Content Reflectometer

High Accuracy and Precision

Designed for long-term monitoring



Overview

The CS616 measures the volumetric water content (VWC) of porous media (such as soil) from 0% to saturation. The probe outputs a megahertz oscillation frequency, which is scaled down and easily read by a Campbell Scientific datalogger.

Benefits and Features

- Compatible with most Campbell Scientific dataloggers[a]
- High accuracy and high precision
- Fast response time
- Designed for long-term unattended water content monitoring
- Compatible with AM16/32-series multiplexers allowing measurement of multiple sensors
- Probe rods can be inserted from the surface or buried at any orientation to the surface

Technical Description

The CS616 is comprised of two 30-cm-long stainless steel rods connected to the measurement electronics. The circuit board is encapsulated in epoxy, and a shielded four-conductor cable is connected to the circuit board to supply power, enable probe, and monitor the output.

The CS616 uses the time-domain measurement method to measure VWC; a reflectometer (cable tester) such as the TDR200 is not required. This method consists of the CS616 generating an electromagnetic pulse. The elapsed travel time and pulse reflection are then measured and used to calculate soil volumetric water content.

Response Characteristics

The signal propagating along the parallel rods of the CS616 is attenuated by free ions in the soil solution and conductive constituents of the soil mineral fraction. In most applications, the attenuation is not enough to affect the CS616 response to changing water content, and the response is well described by the standard calibration. However, in soil with relatively high soil electrical conductivity levels, compacted soils, or soils with high clay content, the calibration should be adjusted for the specific medium. Guidance for making these adjustments is provided in the operating manual.

[a]*The CS616 is not compatible with our CR300-series, CR200(X)-series, or CR9000(X) dataloggers.*

RF Considerations

The RF emissions are below FCC and EU limits as specified in EN61326 if the CS616 is enabled less than 0.6 ms, and measurements are made less frequently than once a second. External RF sources can also affect the CS616 operation. Consequently, the CS616 should be located away from significant sources of RF such as ac power lines and motors.

Ordering Information

Water Content Reflectometer

CS616 Water Content Reflectometer. Must choose a cable length option and a cable termination option (see below).

Cable Length Options (choose one)

-10 10 ft (3 m) cable length

-17 17 ft (5 m) cable length

-33 33 ft (10 m) cable length

-50 50 ft (15 m) cable length

-U-L User-defined cable length. Enter length, in ft, after the -L.

Cable Termination Options (choose one)

-PT Cable terminates in stripped and tinned leads for direct connection to the datalogger's terminals.

-PW Cable terminates in a connector for attachment to a prewired enclosure.

Installation Tool

CS650G Rod Insertion Guide Tool with Pilot Rod that helps maintain the proper spacing and parallel orientation of the rods during probe insertion. It also helps the insertion of the probe in high density or rocky soils.

The CS650G makes inserting CS616 easier in dense or rocky soils. This tool can be hammered into the soil with force that might damage the sensor if the CS650G were not used. It makes pilot holes into which the rods of the sensors can then be inserted.

Specifications

- Probe-to-Probe Variability: ±0.5% VWC in dry soil, ±1.5% VWC in typical saturated soil
- Accuracy: ±2.5% VWC using standard calibration with bulk electrical conductivity of ≤0.5 dS m^{-1}, bulk density of ≤1.55 g cm^{-3}, and measurement range of 0% VWC to 50% VWC
- Precision: better than 0.1% VWC
- Resolution: 0.1% VWC
- Output: ±0.7 V square wave with frequency dependent on water content
- Current Drain: 65 mA at 12 Vdc (when enabled); 45 µA (quiescent typical)
- Power Supply Voltage: 5 Vdc minimum; 18 Vdc maximum
- Enable Voltage: 4 Vdc minimum; 18 Vdc maximum
- View EU Declaration of Conformity at: www.campbellsci.com/cs616-reflectomer
- Rod Dimensions
  Length: 300 mm (11.8 in)
  Diameter: 3.2 mm (0.13 in)
  Spacing: 32 mm (1.3 in)
- Probe Head Dimensions
  Height: 85 mm (3.3 in)
  Width: 63 mm (2.5 in)
  Depth: 18 mm (0.7 in)
- Weight
  Probe without cable: 280 g (9.9 oz)
  Cable: 35 g per m (0.38 oz per ft)