CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

229, CE4, and CE8

Water Matric Potential Sensor and Current Excitation Modules

Reliable Water Measurements

No maintenance required

Overview

Campbell Scientific's 229 Water Matric Potential Sensor measures soil water potential from -10 to -2500 kPa. The sensor must be connected to either a CE4 or CE8 current excitation module. A Campbell Scientific datalogger controls the current excitation module, measures the probe, and calculates soil water matric potential.

Benefits and Features

- Compatible with most Campbell Scientific dataloggers[1]
- Measures a wide range of matric potential
- Measurements not affected by salts in the soil
- Long lasting, with no maintenance required
- Compatible with AM16/32-series multiplexers allowing measurement of multiple sensors

229 Measurement Details

The 229 Water Matric Potential Sensor consists of a heating element and thermocouple placed in epoxy in a hypodermic needle, which is encased in a porous ceramic matrix.

To calculate soil water matric potential, a CE4 or CE8 current excitation module applies a 50 mA current to the 229's heating element, and the 229's thermocouple measures the temperature rise. The magnitude of the temperature rise varies according to the amount of water in the porous ceramic matrix, which changes as the surrounding soil wets and dries. Soil water matric potential is determined by applying a second-order polynomial equation to the temperature rise. Users must individually calibrate each of their 229 sensors in the soil type in which the sensors will reside.

A reference temperature measurement is required for the 229's thermocouple measurement. Options for measuring the reference temperature include:

- Temperature sensor built into the datalogger wiring panel
- PRT built into the wiring panel of the CR9050 or CR9051E input module for the CR9000X Measurement and Control System

[1]*The 229 is not compatible with our CR200(X)-series or CR510 dataloggers.*

Current Excitation Modules

Either a CE4 or CE8 current excitation module can provide a constant current to the heating element of the 229. The CE4 sources current for up to four 229s, and the CE8 sources current for up to eight. Both modules require a 12 Vdc power source.

The number of 229 sensors measured by one datalogger can be increased by connecting a CE4 or CE8 to one or more AM16/32-series multiplexers[2]. Up to four multiplexers can be connected to the CE4, and up to eight multiplexers can be connected to the CE8.

Specifications

229 Water Matric Potential Sensor

- Measurement Range: -10 kPa to -2500 kPa
- Measurement Time: 30 s typical
- Thermocouple Type: copper/constantan (type T)
- Heater Resistance: ~34 Ω
- Resolution: ~1 kPa at matric potentials < -100 kPa
- Diameter: 1.5 cm (0.6 in)
- Length: 6.0 cm (2.4 in)
- Sensor Weight: 10 g (0.35 oz)
- Cable Weight: ~23 g/m (0.25 oz/ft)

CE4/CE8 Current Excitation Modules

Specification	CE4	CE8
Output	50 mA ±0.25 mA, regulated	
Output Channels	4	8
Power	12 Vdc source required	
Active Current Drain	25 mA + (50 mA) x (number of 229s connected to the CE4 or CE8)	
Dimensions	11.5 x 5.4 x 2.7 cm (4.5 x 2.1 x 1.1 in)	16.5 x 5.4 x 2.7 cm (6.5 x 2.1 x 1.1 in)
Weight	131 g (4.6 oz)	184 g (6.5 oz)
Compliance Information	View EU Declaration of Conformity at: www.campbellsci.com/ce4	View EU Declaration of Conformity at: www.campbellsci.com/ce8

[2]The CE4 and CE8 modules switch currents that are greater than 30 mA, which degrades the contact surfaces of the mechanical relays. Therefore the multiplexer channels to which the CE4 or CE8 have been connected may become unsuitable for other applications (refer to the multiplexer manual for more information).