DOT600

Roadbed Water Content Meter

CAMPBELL SCIENTIFIC®
WHEN MEASUREMENTS MATTER

The DOT600 is used in construction applications to measure volumetric and gravimetric water content of samples of earthen material in roadbeds and foundations. Portability, along with quick and accurate measurements, make the DOT600 a valuable tool for evaluating roadbed material both at the construction site and in the soil-test lab.

Samples collected from laboratory or field sites are compacted to a chosen pressure (15 to 45 psi), then the water content is measured using dielectric permittivity sensitive methods. A separate scale and magnetic linear sensors measure the sample volume, which allows calculation of bulk density and conversion of the measured volumetric water content to gravimetric water content. Measurement results are written to a data table for permanent record. All measurements are controlled by a Campbell Scientific CR850 datalogger. The CR850 includes an eight line display and keypad for interface.

All of the DOT600's components conveniently fit in a rugged case (top photo). Soil is placed in the sample chamber (bottom left) and compacted to a chosen pressure by using the compression cap (bottom right).

Features/Benefits

- Allows operators to monitor:
  - Roadbed volumetric and gravimetric water content
  - Sample bulk density and compaction force
  - Sample volume and weight
- Measures volumetric water content (VWC) with a resolution of better than 1.0% VWC and a precision of better than 0.5% VWC
- Provides a typical accuracy of ±2% VWC
- Makes one measurement in approximately 90 seconds
- Generates a measurement report that can be easily imported into spreadsheets
- Completely portable system

DOT600 Components

- CR850 datalogger
- Wall transformer with cable and connector to charge DOT600 from AC power source
- Sample chamber base
- Sample chamber cylinder
- Ratcheting box-end wrench
- Compression cap
- Sieve, 4 mesh
- DOT600 operating manual
- RS-232 serial cable
- PC200W software
- External Keypad (optional)

Ordering Information

System	
DOT600	Roadbed water content system

Optional Equipment	
CR1000KD	Keyboard/Display for situations in which an external keyboard display is useful.
SC32B	Optically Isolated RS-232 Interface for connecting the CR850 to the RS-232 port on an ac-powered PC.
SC-USB	Optically Isolated USB Interface for connecting the CR850 to the USB port on an ac-powered PC.

The CR1000KD is an optional external keyboard display that can be carried from site to site.

Specifications

*CR850 Datalogger**

Temperature Range: -25° to +50°C

Memory: 2 Mbytes Flash for operating system; 4 Mbytes battery-backed SRAM for CPU usage, program storage, and data storage

Typical Current Drain: ~0.6 mA (sleep mode); 1 to 16 mA (w/o RS-232 communication); 17 to 28 mA (w/RS-232 communication).

**More datalogger specifications are provided on the CR800-series Datalogger Brochure.*

Battery

Type: 2.9 Ahr rechargeable sealed lead-acid

Operating temperature range: -20° to 60°C

Standby charge retention at 20°C for one year: 95%

Lifetime: Approximately 500 cycles with discharge to 50% followed by recharge.

*Scale***

Capacity: 1000 g (35.3 oz)

Accuracy: ±0.05 g (±0.002 oz)

Repeatability: 0.02% FS

***The scale has overload protection in both the up and down directions during shipping. But it only has overload protection in the down direction during use.*

Water Content Measurement

Resolution: 1% volumetric water content (resolution is the minimum change in the measured parameter, water content, that the sensor can repeatedly detect)

Precision: 0.75% volumetric water content (precision is the expected range for repeated measurements on the same sample.)

Accuracy:

Accuracy is defined by comparing DOT600 measured water contents to independently determined values. The independent method is water content by gravimetric method (weighing wet and after oven drying).

The DOT600 water content measurement uses a calibration to convert sensor output period to volumetric water content. This calibration was derived at the factory based on different types of soil. The calibration coefficients will be determined by the Matrl Type selected. Repeated measurements on the sandy loam soil over the water content range from air dry to about 70% saturation show deviations from independent measurements of less than ±1.5% volumetric water content.

Since the gravimetric water content measurement uses sample volume and weight to convert from measured volumetric water content, the accuracy of the gravimetric water content will be less than the volumetric value because of inherent errors of the volume and weight measurements.

Sample Volume and Applied Force Measurement

Sample Volume: ±1.5% for compressed sampled with thickness between .400 in to 1.000 in.

Sensitive Volume: The electromagnetic field penetrates the sample 0.39 in. Sensitive volume is about 3.5 in^3.

Applied pressure range: 0 to 45 psi

Applied pressure measurement accuracy: 1.7 psi

Case

Shipping Weight: 23.45 lbs (10.64 kg)

Outside dimensions:
22” x 17” x 8.5” (55.9 x 43.2 x 21.6 cm)

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