



METER
ENVIRONMENT

SOIL-SPECIFIC CALIBRATIONS FOR METER SOIL MOISTURE SENSORS

Contributors

INCREASE ACCURACY TO $\pm 1 - 2\%$

METER [soil moisture sensors](#) measure the volumetric water content of the soil by measuring the dielectric constant of the soil, which is a strong function of water content. However, not all soils have identical electrical properties. Due to variations in soil bulk density, mineralogy, texture, and salinity, the generic mineral calibration for current METER sensors results in approximately ± 3 to 4% accuracy for most mineral soils and approximately $\pm 5\%$ for soilless growth substrates (potting soil, rock wool, cocus, etc.). Soil-specific calibration increases accuracy to ± 1 to 2% for all soils. METER recommends that soil sensor users conduct a soil-specific calibration for best possible accuracy in volumetric water content measurements.

Studies performed by independent researchers (Czarnomski et al., 2005) indicate that soil-specific calibration of METER's ECH20 line of sensors achieves performance results similar to that of TDR instruments—at a fraction of the price. Note that the resolution, precision, repeatability, and sensor-to-sensor agreement of METER sensors are excellent, so the soil specific calibration of one sensor can be applied to all other sensors of that type in that particular soil. The purpose of this guide is to provide a step-by-step guide for performing a soil-specific calibration on METER soil moisture sensors. For convenience, METER also provides a [Soil Moisture Sensor Custom Calibration Service](#).

METER soil sensor calibration method A (recommended for higher accuracy) is a method based on weighing the entire calibration sample. If you don't have the equipment for method A, you can use method B, a subsampling method following the general procedure for calibrating capacitance sensors outlined by Starr and Paltineanu (2002). The following are links to step-by-step instruction guides for performing both types of soil-specific calibrations.

To calibrate sensors in the TEROS 54 probe, place the TEROS 54 into at least 20 cm of soil. Only use the lower sensor readings (60 cm) for the calibration. Proceed with the calibration as outlined in method A below (or method B), and apply the calibration equation to all sensors.

[See soil calibration method A](#) (recommended)

[See soil calibration method B](#)