

Capacitance moisture probes – ‘Do probes need to be calibrated in the field’?

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Whilst the answer depends on their how they will be used, the answer is usually “No.” However they do need to be “normalised”.

Probes are normalised by matching the raw readings from each sensor at both 0% (held in air) and 100% water levels (submerged in water). Without normalising, these devices would only provide a range of irrelevant raw data that varies slightly with each sensor. By matching the raw reading from each sensor to both 0% and 100% water levels, a comparison of readings taken by different sensors can be made on a common scale. Equipment suppliers should provide you with procedures for normalising their product.

Following the normalisation process, readings can be displayed (typically graphically), permitting irrigators to monitor their soil water levels based on trend changes. This accepted practice, utilising a **default calibration equation** within a product's software, negates the requirement for a complex site specific calibration.

In many cases the graphs employ “millimetres” as the vertical axis units. Herein lies a problem - the readings from probes, presented as “millimetres”, is only an **estimation** of volumetric soil moisture levels and therefore should not be taken literally.

Field capacity and the refill point can be determined through relating known soil moisture conditions to probe values, and analysis of soil moisture trends.

Uncalibrated capacitance probes will show changes in soil water content over time so scheduling irrigation based on the slope of the line is acceptable; however, it must be recognized that a change in the slope of the line can be due to soil moisture availability, change in evaporative demand in response to cooler or cloudy weather, or other factors.

Calibration becomes necessary when a device is to be used to determine the magnitude of plant water use, soil moisture deficit or to calculate a full soil water balance.

In Figure 1, it is clear that the data represents the same trends, regardless of the default or site specific calibration. However, if we look at the first irrigation event at point A:

- The calibrated soil moisture (top line) goes from 144mm to 173mm – a change of 29mm
- The default calibration soil moisture (bottom line) goes from 105mm to 146mm – a change of 41mm

If the default calibration was used and assumed to be correct, the change in soil moisture would be overestimated by 40%.

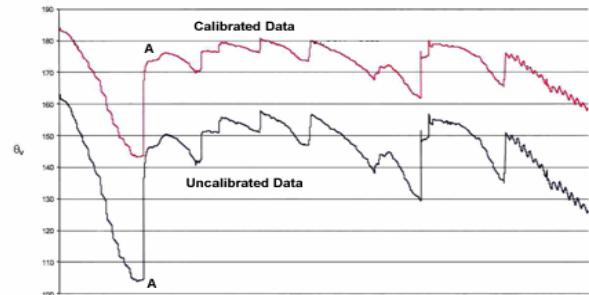


Figure 1: A single data set using a default and site specific calibration (**Source:** Anon. (2001) *Calibration of the Sentek Pty Ltd Soil Moisture Sensors*)

Probes should be installed before the first in-crop irrigation. This irrigation allows them to “Bed-in” so as to be giving a reasonable reflection of soil moisture status thereafter i.e. they can be used to schedule the second irrigation.

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