Weather DATA
Complete Weather Monitoring Solutions

P. 0508 932 843
E. sales@weatherdata.co.nz
W. www.weatherdata.co.nz

FAQs Davis 6440 Soil Moisture Sensor

Adapted from http://www.irrometer.com/faq.html

"At what Centibar value should I be irrigating?"
This depends on the type of crop and the type of soil. There are resources available for many commonly grown crops that can give information regarding recommended tension levels.
Use the following readings as a general guideline:

- 0 – 10 centibars = Saturated soil (field capacity)
- 10 – 20 centibars = Soil is adequately wet (except coarse sands, which are beginning to lose water)
- 30 – 60 centibars = Usual range for irrigation (except heavy clay soils)
- 60 – 100 centibars = Usual range for irrigation in heavy clay soils
- 100 – 200 centibars = Soil is becoming dangerously dry for maximum production.

Your own situation will be unique because of differences in crop, soils and climate. Perhaps the most important soil moisture reading is the difference between today's reading and that of 3 – 5 days ago. A slow increase means the soil is drying out slowly. But a big jump means the soil is losing water very rapidly. The trend can be more informative than the absolute values.

"I don't believe the sensor"
As often as not, the truth is simply not what the user expects, but there are situations that can cause incorrect readings. Some things to consider:

- Are multiple sensors correlating with each other? One problematic sensor/ installation may be possible, multiple problems are unlikely.
- Are the sensors responsive? If the sensors are responding well to irrigation and drying as expected, there is no reason not to believe the reading.
- If the sensors are very unresponsive to expected changes in soil moisture, the sensor may need to be reinstalled. The 6440 sensor depends on a tight bond with the surrounding soil to absorb and release soil moisture. A poorly installed sensor can be just "sitting in the hole" with no ability to move water in and out of the granular matrix.
- Are the sensors in the active root zone? If the sensor is sitting on top of a rock, below a hardpan, or outside of the area being accessed by the plant root systems, water movement can be impeded and the sensor will not reflect the soil moisture available to the crop.
- Is the sensor installed in a heavy soil that has recently been dried out (80cb +)? Heavy soils can actually pull away from the sensor when they become very dry. This can cause the loss of connectivity between soil and sensor. Typically an irrigation event will correct this problem, but reinstallation may be required in extreme cases.

"Sensor always reads 0"
A constant "0" reading can indicate a short in the sensor wiring. If the sensor is at the end of a spliced wire run, try disconnecting the sensor from the cable extension (at the field side) and see if the reading is still "0". If so, there is a short in the wiring between the soil station and the sensor.

“Sensor always reads dry”
A maximum dry reading can indicate a broken or poor wire connection. Typical culprits include bad wire splices, chewed or cut wires, wires pulled out of the sensor, or poor connection to the soil station. A poorly installed sensor can also be constantly dry, with no bond to the soil allowing it to absorb soil moisture.

“Sensor is reading erratically”
Erratic readings are frequently the results of poor connections. Check all wire splices and connection points and ensure they are solid and waterproof.
Stray current from poorly grounded equipment in the field can also cause erratic readings. If it is possible to ground the soil station to a common ground, this may solve the problem.

“How long do the sensors last?”
The expected sensor life is 5+ years. At the five year point we recommend removing the sensors and checking them.

“How can I check the sensors?
The only way to thoroughly check a 6440 sensor is to remove it, soak it in water, and then hang it out to air dry.

A. With a sensor submerged in water, your reading should be from 0 to 5. If the sensor passes this test, go on to step B.
B. Let the sensor air dry for 30 to 48 hours. Depending on ambient temperature, humidity and air movement, you should see the reading go right up from zero to 150+
C. Put the sensor back in water. The reading should return to below 5 within 2 minutes. If the sensor passes these tests, it is O.K.

“How does soil temperature affect the reading?”
Soil temperature affects 6440 sensor readings by 1% of the measured resistance per 1 degree temperature. If you are not using a soil temperature sensor for compensation, it is not unusual to see some movement in the sensor reading from day to night due to temperature effects. Soil temperature changes are typically mild at depths below 30cm.

“What types of soil can I use 6440 sensors in?”
6440 sensors are designed for use in typical soil conditions, from sandy loam to heavy clay. Exceptionally coarse or loose soils like sand or potting mixes do not present good conditions for 6440 sensors, potentially leading to very slow sensor response.

“What does (insert your volumetric measurement here) equal in Centibars?”
6440 sensors represent soil moisture in Centibars (or kPa) of soil water tension, equivalent to the reading given by a tensiometer. There is no direct comparison with volumetric measurements possible without creating a site specific calibration, as different soil types and conditions create different tensions for the same volumetric contents in different soils.

"What soil characteristics affect the 6440 Sensor readings?"
6440 Sensors are affected by the conductivity of the soil water. Salinity is a typical concern and the 6440 has enough internal gypsum to buffer the effects in most soils. A newer sensor can buffer for more than an older one because gypsum does go away over time. Sometimes after a fertilization event the reading may appear artificially wetter but after a flush with the next irrigation cycle they will return to normal.