

TENSIOMETERS

How do tensiometers work?¹

A tensiometer is a closed, water-filled tube with a porous ceramic tip at one end and a vacuum gauge at the other, which acts like an artificial plant root. As the soil dries out, it exerts suction on the water in the tensiometer and this is measured on the gauge.

The higher the reading, the more suction is being applied i.e. the soil is drier and the plant is having to exert more tension to extract water from the soil. A low reading means that water is readily available to the plant.

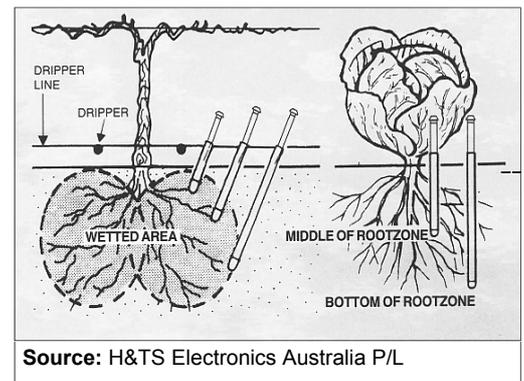
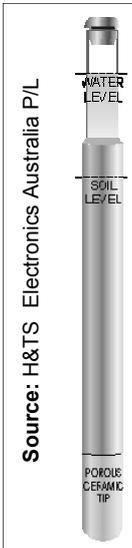
Tensiometers can operate up to tensions of about -85 kPa. They are not suitable for coarse sandy soils as contact with the soil is difficult to maintain.

Placing tensiometers¹

Tensiometers just give readings at a specific depth, as the ceramic tip comes into contact with only a small amount of soil.

The deeper the rootzone, the more tensiometers are required. For example, a rootzone depth of 100 cm would normally have them placed at 30 cm, 60 cm and 90 cm. If the rootzone is shallower, such as for vegetables, then only 2 tensiometers may be necessary e.g. at 20 cm and 50 cm.

After an irrigation the tensiometer readings are low, in the range of -6 to -10 kPa. As the plant removes water from the soil the readings rise. As the next irrigation approaches the readings will rise quickly, to -15 or -20 kPa for vegetables and around -40 kPa for tree crops. This cycle will be repeated after every irrigation.



Advantages:²

- Easy to use
- Measurements taken quickly
- Direct indication of plant suction in kPa provides easy identification of the 'refill' point, when irrigation is required
- Inexpensive
- Simple to install
- Minimal soil disturbance
- No calibration required
- Available locally

The products and companies mentioned on this fact sheet are examples only and are not endorsed in any way. Other tools with similar functions may also be available. Irrigators are advised to speak to an Irrigation consultant or the companies who sell the equipment, for more information on the best system to suit their requirements.

Disadvantages:²

- Require labour input for readings
- Require regular maintenance
- Plant suction increases rapidly nearing irrigation - careful monitoring is required
- Relatively small sphere of influence
- May not be as responsive in coarse sands

Further information

H and TS Electronics Pty Ltd

www.htselectronics.com.au/why.htm

Irrrometer Co.

www.irrometer.com/agcat.htm#Irrrometer

Soil Measurement Systems

www.soilmeasurement.com/tensiometer.html

Measurement Engineering Australia

<http://www.me.com.au/products/Soil-Moisture-Tension-Sensors/1/>

References: 1. **Mallee Water Resources Committee and PIRSA** (revised 2002) *Mallee Wells Irrigation Management Course Manual*

2. **Improving Irrigation Efficiency Project** Irrigation Management Course, Irrigation Scheduling Equipment workshop Presentation