

TENSIOMETERS

The right quantity of water in the soil is of primary importance for an optimum plant growth and yield of crop. Measuring the soil moisture content (in percentages) as well as the determination of the soil suction (in hPa, mbar or cbar) in the soil therefore is one of the most important aspects of complete agricultural physical soil research.

The simplest and most commonly used method to determine the soil suction (and with that the moisture content of unsaturated soil) directly in the field uses the tensiometer.

The tensiometer is available in many types and sizes. They can be applied in normal soils but also in potting compost and other organic and anorganic substrates.

Before a tensiometer is placed in the soil or a substrate a hole needs to be drilled.

14.04 Tensiometer set

This multi-functional set can be applied to execute different research with various types of tensiometers up to a depth of 90 cm.

The standard tensiometer for example is used in irrigation areas for permanent placement.

The Jet-fill tensiometer has an additional water reservoir in order to be able to continuously fill the tensiometer allowing it to be ready for use faster and more mobile.

For fast measurement of soil suction (usually in small areas) the quick draw tensiometer provides measuring results within minutes.

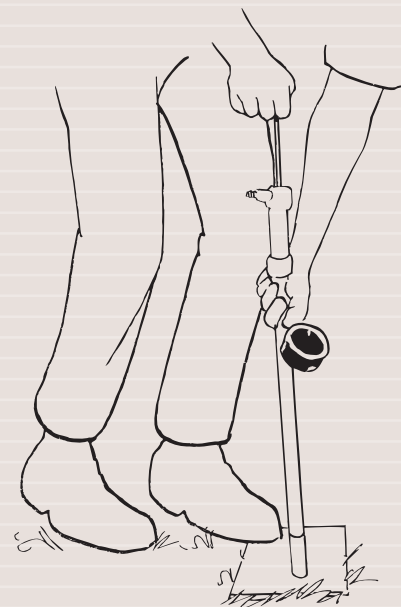
In case of all tensiometers the measuring values are read from the manometer.

In addition to tensiometers in various lengths the set also includes a service set as well as a gouge auger (to pre-drill a hole) with extension rod and a cleaning spatula.

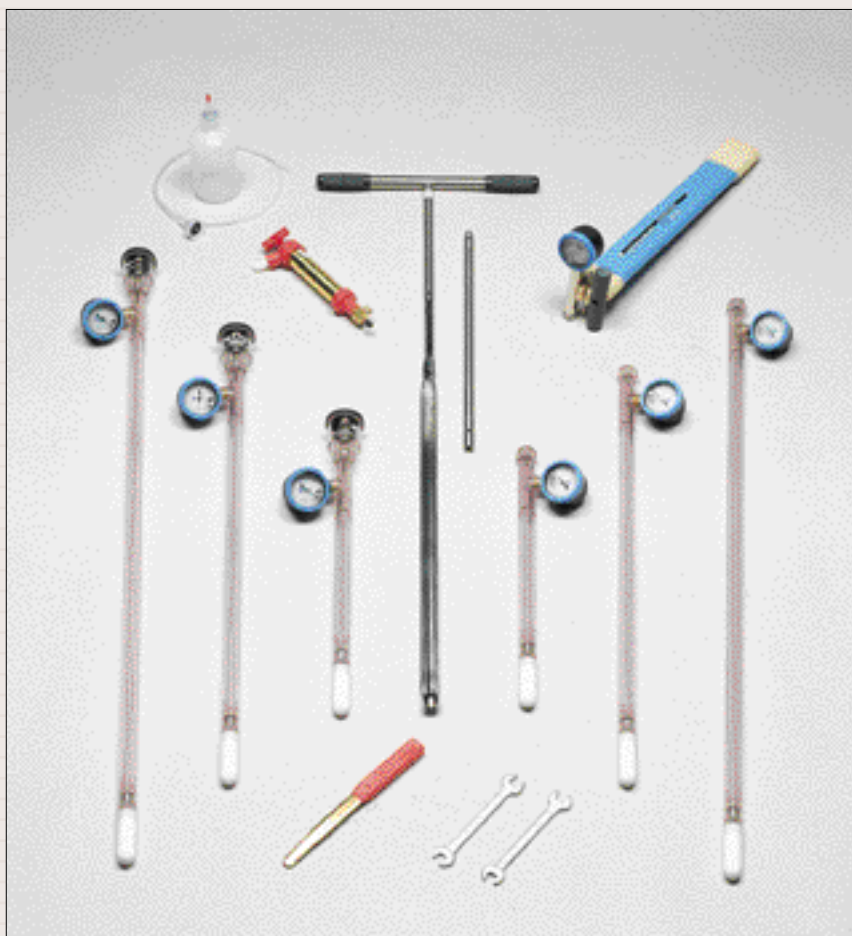
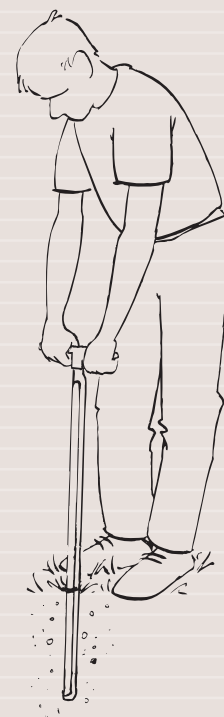


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The air is sucked from the tensiometer after the meter is filled with water.



The hole for the tensiometer is pre-drilled using a gouge auger.



Tensiometer set, complete set

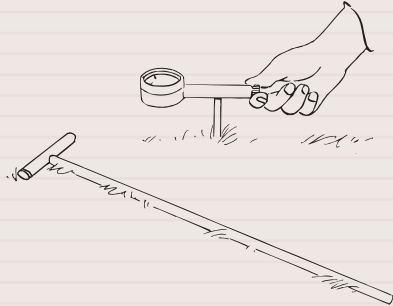


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Pre-setting the tension on the quick draw tensiometer.



The tensiometer is fitted on the tensiometer tube.



14.04.03 Standard tensiometers

The standard tensiometer consists of a clear transparent plastic tube with a ceramic cup at the bottom end and a manometer at the top. The standard tensiometer is delivered in various lengths allowing the execution of simultaneous measurements at various depths in the root zone. For pre-drilling special auger sets can be provided.

14.04.04 Jet-fill tensiometers

The Jet-fill tensiometer basically has the same components as the standard tensiometer but is equipped with a reservoir and a refill mechanism. At a push of the button the Jet-fill mechanism instantly injects water from the reservoir into the body of the tensiometer and removes accumulated air. This tensiometer can be provided in different lengths as well.

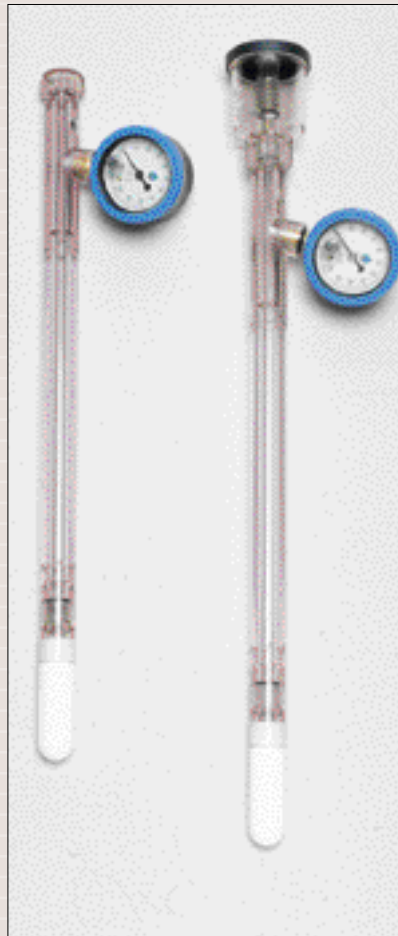
14.04.05 Quick draw tensiometers

The quick draw tensiometer is a small tensiometer that can easily be moved and, using the auger for

pre-drilling, placed into the soil. The small diameter and the super porous ceramic cup and the possibility of pre-setting the tension, allow a measuring period of only a few minutes. After each measurement the tensiometer can be stored in a carrier cylinder in which it is kept humid allowing immediate use in case of a next measurement.

14.50 Electronic tensiometer

The electronic tensiometer is a portable pressure sensor for measurement of the moisture tension in the soil, measured through a tensiometer tube placed in the soil. The measuring device can be moved from tensiometer tube to tensiometer tube allowing an unlimited number of measurements over a short period of time. The hypodermic needle of the tensiometer is fitted on the tensiometer tube through the silicon stopper after which the moisture tension can be read. The meter has a measuring range of 0-1000 hPa with an accuracy of less than 2%. Tensiometer tubes are available in various lengths.



Standard and Jet-fill tensiometer



Quick draw tensiometer



Electronic tensiometer

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14.04.08 Tensior 3 with electronic pressure transducer

The Tensior 3 is a tensiometer with an electronic sensor giving a continuous measuring signal (in hPa). The measuring results are read with a read-out device or datalogger. The tensiometer can only be used in frost free periods, because the pressure sensor is located in the top end of the tensiometer. The tensiometer is fitted with an over-pressure safety and is available in various lengths. The Tensior 3 has a measuring range of -100 till +700 hPa and an output signal of -10 till +70 mV (+/- 3 mV). Power supply is 10.6 Vdc and the current consumption is 1.3 mA. The tensiometers are supplied including cable and calibration certificate.

14.04.09 Tensior 4 with electronic pressure transducer

In case of the Tensior 4 the transducer is located at the bottom end of the tensiometer tube allowing it to be used also in case of frost (frost not too deep into the soil). The pressure transducer can simply be combined with another length of tensiometer



Tensiometers Tensior 3 and Tensior 4

tube. This allows measurement at various depths. The Tensior 4 can be used for measurements in different positions. The Tensior 4 has a measuring range of -1000 till +850 hPa and an output signal of -100 till +85 mV (+/- 3 mV). Power supply is 10.6 Vdc and current consumption 1.3 mA.

14.04.10 Tensior 5 mini tensiometer with electronic pressure transducer

The mini tensiometer Tensior 5 is characterized by its small ceramic cup (diameter 5 mm and a surface area of 0.5 cm²) and the short length of the tube causing only minor disturbance of the soil. The mini tensiometer is used in particular for (point) measurements in soil columns, small lysimeters and pots. The meter yields fast and reliable measuring results and can also be used for measurements in different positions.

The Tensior 5 has a measuring range of -1000 till +850 hPa and an output signal of -100 till +85 mV (+/- 3 mV). Power supply is 10.6 Vdc and current consumption 1.3 mA.



Mini tensiometer Tensior 5

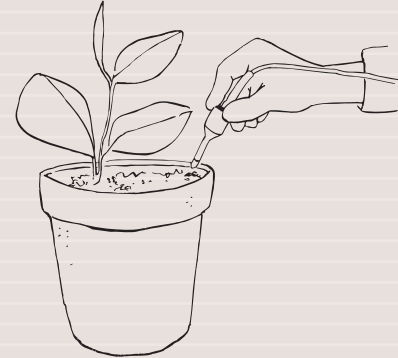


Read-out device for Tensiors

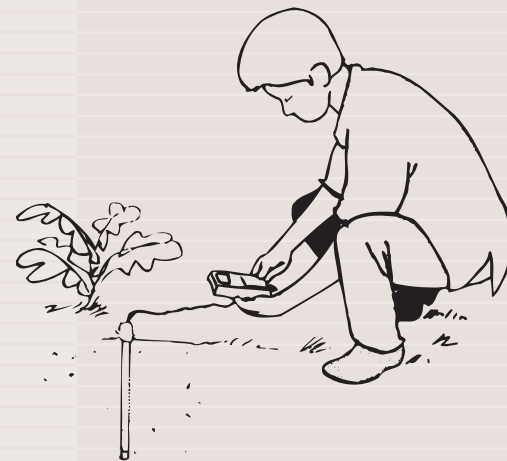


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The mini tensiometer (Tensior 5) is pushed into a pot.



Data are read out and stored in the Infield 7 read-out device.



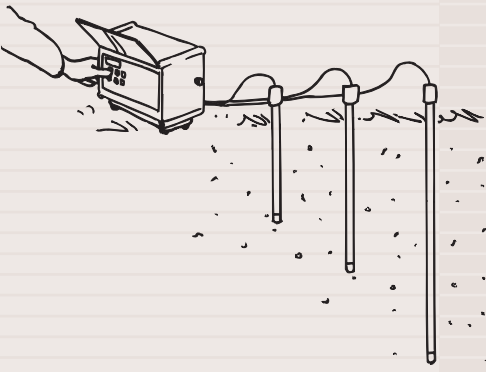


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Read out of the different tensiometers with pressure transducer (tensors) using a datalogger



Advantages Tensors

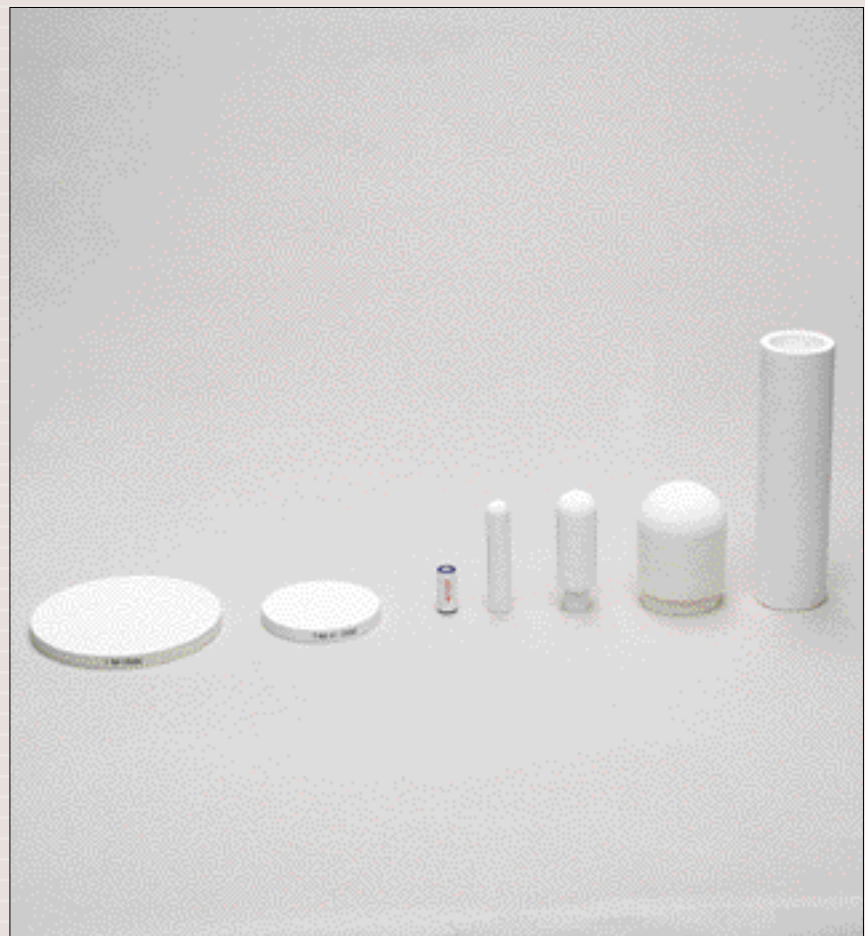
- Robust.
- Water tight (IP68).
- Easy to use.
- Exact, reliable measurements.
- Possibility to connect a data-logger or handheld read-out device.
- Over-pressure safety device.
- Applicable for field-, greenhouse-, and laboratory measurements.

14.99 Porous ceramics

Porous ceramics for soil moisture measurements in the laboratory and/or in the field is available in various dimensions and shapes, such as plates (for the determination of moisture characteristics of samples), cups (of tensiometers), tubes, etc. Special shapes are available on request.

14.29.SB Soil moisture measuring station

The Tensor 4 tensiometers are included in a standard measuring station consisting of a data-logger for 3100 measurements, a solar panel (1W) for the power supply, software to read-out and process data, two Tensor 4 with length 30 cm and two of 60 cm.



Porous ceramics (cups, tubes and plates)