SOIL MOISTURE METERS

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Soil moisture content is one of the factors determining optimal plant growth and crop production. The soil moisture content also plays an important part in environmental research for acidification and pollution.

14.26 Thetaprobe soil moisture measuring system

The Thetaprobe soil moisture sensor measures the soil moisture volume percentage by applying the Frequency Domain technique.

The Thetaprobe measures the soil moisture volume percentage by measuring the changes in the dielectric constant. The changes are converted into a millivolt signal proportional to the soil moisture content.

The sensor consists of a sturdy, watertight synthetic housing which contains the electronics. The housing is fitted with 4 stainless steel measuring probes at one end that can simply be pushed into the soil (or other material).

The sensor is able to measure within a measuring range of 5 - 55 volumetric moisture content with an accuracy of 5% with standard calibration and only 2% with soil specific calibration. The sensor has an output signal of 0-1 Vdc.

The sensor is supplied standard with a 5 meter cable and plug for connection to the soil moisture meter or with wire for connection to a datalogger.

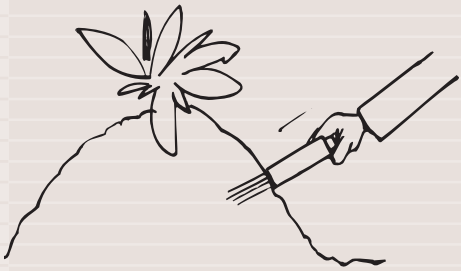
The measurement values are shown on the display of the soil moisture meter and can be stored in the memory (including time and sensor location). These data can be read on a PC.

The meter comes with built-in conversion characteristics for mineral and organic soils. The software allows a further 5 soil specific calibrations to be introduced.

If the moisture content is measured of other materials the meter will give an output signal in millivolts.

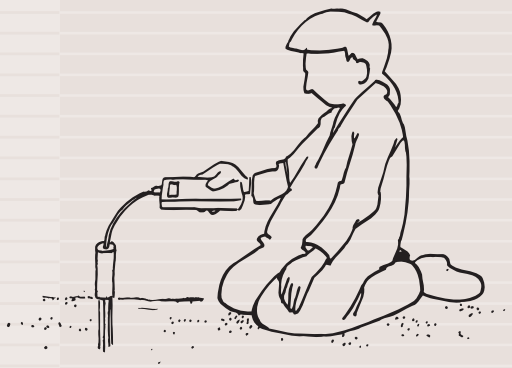
If a series of soil moisture measurements is required the soil moisture sensors can be connected easily to a datalogger (art. no.:21.11.01).

The soil moisture sensor Thetaprobe is pressed into the soil for a surface measurement.



Soil moisture meter with soil moisture sensor Thetaprobe

Using the soil moisture meter the sensor is read-out. Data are stored in the meter's memory.



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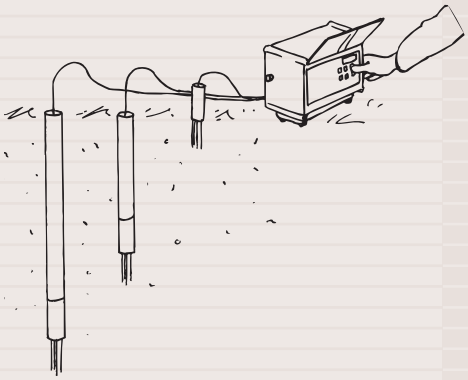
Various sensors are connected to a datalogger.



The number of sensors that can be connected is limited only by the number of channels that is available on the datalogger. It is also possible to bury the soil moisture sensors permanently. To facilitate the installation at greater depths special extension tubes can be supplied.

Advantages

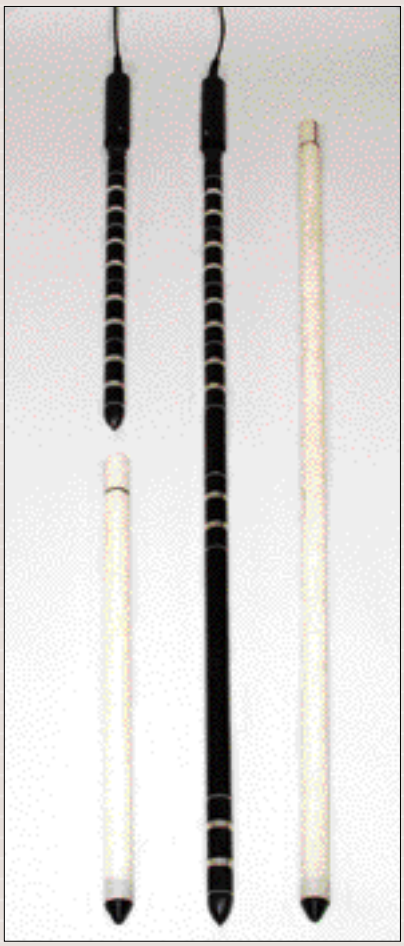
- Easy to use.
- Accurate measurements.
- Direct readings of the volumetric soil moisture content in the field by using the soil moisture meter.
- Data stored in handheld meter and able to be read on a PC.
- Can be connected to a datalogger.
- Cheaper then TDR - or neutron probe systems.
- Applicable in areas with soils with high salt concentrations.
- Fast response time.
- Maintenance free.
- The compact sensors can be placed under any angle.

The Thetaprobe is also available in the form of a profile probe for use in thin-walled tubes that are installed in the soil.
The profile probe is fitted with several measuring elements (4 elements with a measuring range of 40 cm, 6 elements with a measuring range of 100 cm) so that the soil moisture content can be measured at different depths within a vertical soil profile.
The probe measures with an accuracy of ± 3% in a thin-walled tube and has a measuring volume of ± 1.5 litres at each profile depth.
The profile probe can be used as a portable system by using the soil moisture meter or as a fixed system by using a profile probe in combination with a datalogger.
The thin-walled tubes can be placed in the soil with the use of a special auger kit.

The profile probe is installed in a thin walled tube and read-out with the soil moisture meter.

Datalogger with Thetaprobes

Auger kit for profile probe



Profile probes and thin-walled tubes

SOIL MOISTURE METERS

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14.25 Aquaflex soil moisture measuring system

The Aquaflex soil moisture sensor is a 3 meter long flexible sensor for determining the average soil moisture volume percentage over a (horizontal) length of 3 metres and in a cylindrical volume of 6 litres of soil (compensated for temperature and conductivity).

The Aquaflex is sturdy in structure and simple to install and operate. The sensor is maintenance free and provides direct measurements of soil temperature.

The sensor is suitable for taking direct measurements at a location (read out on a handheld meter), for continuous recording (using a datalogger) or for automatic monitoring.

The Aquaflex has a measuring range of 0-60% volumetric moisture content and -10 to +50°C.

It measures with an accuracy of +/- 2%.

Output signal: 4-20 mA, RS 232.

The Aquaflex uses standard batteries or an external supply for its power supply.

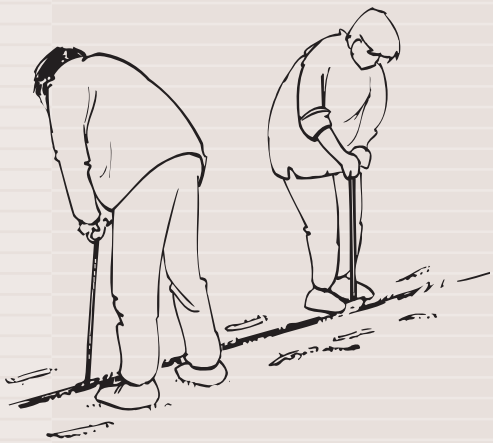
14.22 Soil moisture measuring system with gypsum blocks

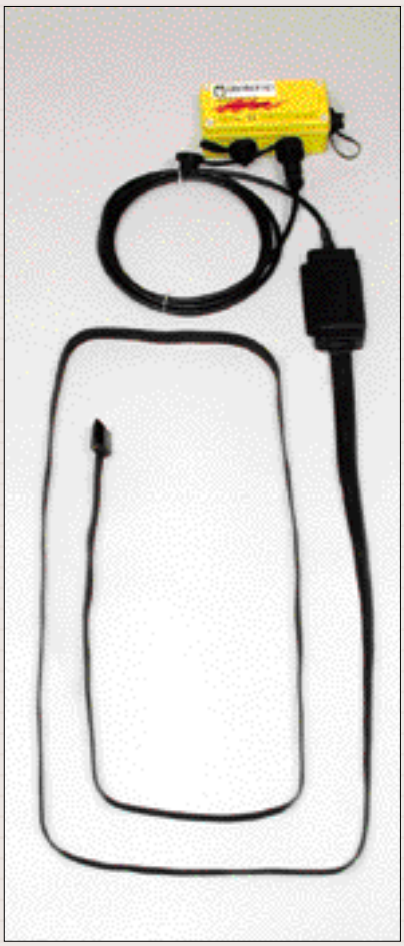
The soil moisture meter can be used in combination with soil moisture blocks (relatively cheap gypsum blocks). The soil moisture content is determined by measuring the resistance between two electrodes inside the gypsum blocks. The condition for reliable measurements is the optimal contact between sensor and soil. The gypsum blocks are permanently buried in the soil at the desired depth. Once buried there the blocks have a life of 3 to 5 years (depending on the type of soil).

The meter is practical and is constructed in sturdy synthetic material. It has a measuring range of 0 - 100% for 3-100kPa. The meter is applied in particular in places where a tensiometer cannot be used (dry soils). It is a system that provides an indication as to when irrigation is required.

To achieve a series of soil moisture measurements the sensors can be connected to a datalogger.

The Aquaflex sensor is installed under the grass.



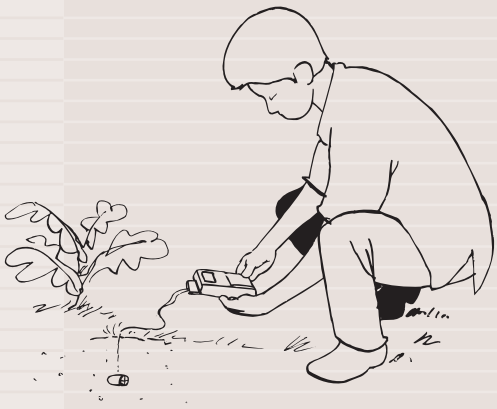


Aquaflex soil moisture senor

Soil moisture meter Aquaflex

Soil moisture meter with gypsum blocks

The soil moisture content is read-out on the soil moisture meter.



Eijkelkamp Agrisearch Equipment
www.eijkelkamp.com

SOIL MOISTURE METERS

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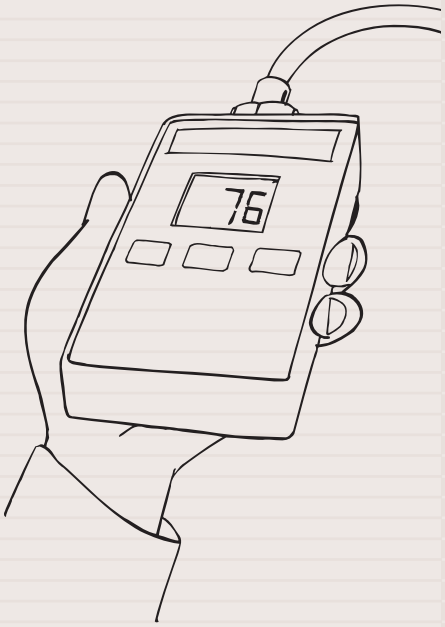
The soil moisture meter Watermark shows the measuring result in kPa.



14.27 Soil moisture measuring system Watermark

Soil moisture sensors that measure the moisture tension in the soil are read-out with the soil moisture meter Watermark.

The measuring principle is similar to that of the gypsum block system. The special sensors however do not dissolve in the soil and have a more consistent distribution of pores so that more accurate measurements are possible.

The soil moisture sensors, which have a measuring range of 0 - 200 kPa (0 - 200 cbar), can be used individually or in combination with a PVC tube (in various lengths) for measuring the moisture tension.

The condition for reliable measurements is the optimal contact between sensor and soil.

Using the special auger the holes are pre-drilled so that the soil moisture sensors can be placed at various depths.

The sensors are buried permanently and have an average life of 3-5 years.

By using a soil temperature meter the temperature measured can be set in the soil moisture meter allowing for temperature correction.

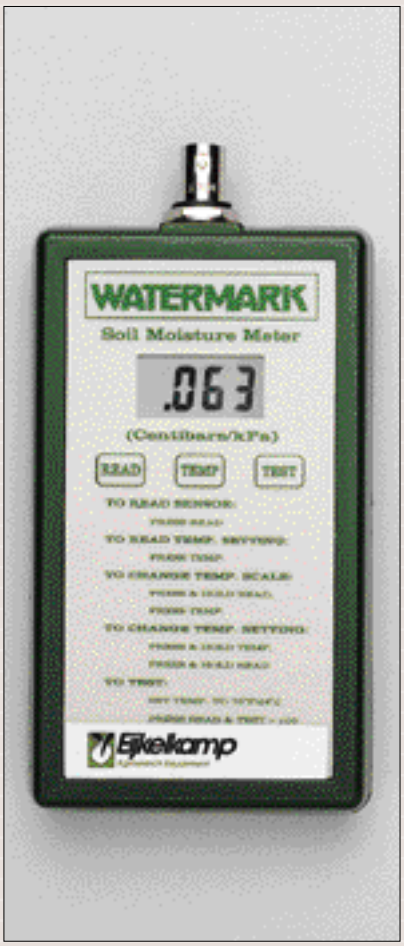
The electrical resistance is converted by the soil moisture meter in moisture tension in kPa.

The soil moisture sensors can be used as a replacement for the tensiometers in most agricultural and landscape irrigation environments.

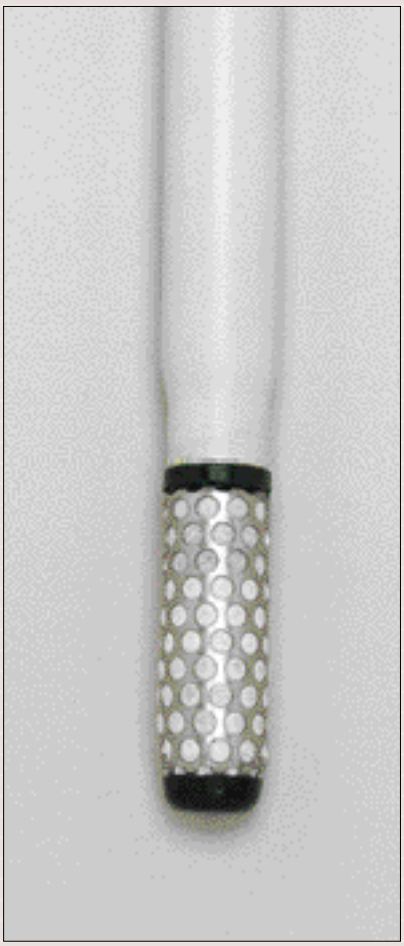
If a series of soil moisture measurements is required the soil moisture sensors can be connected easily to a datalogger.

Advantages

- Applicable in almost all soils.
- Accurate indicative measuring system.
- Easy to use.
- Maintenance free.
- One meter reads all sensors.
- Not affected by freezing temperatures.
- Information for effective irrigation scheduling is quickly available.



Soil moisture meter Watermark



Soil moisture sensor Watermark