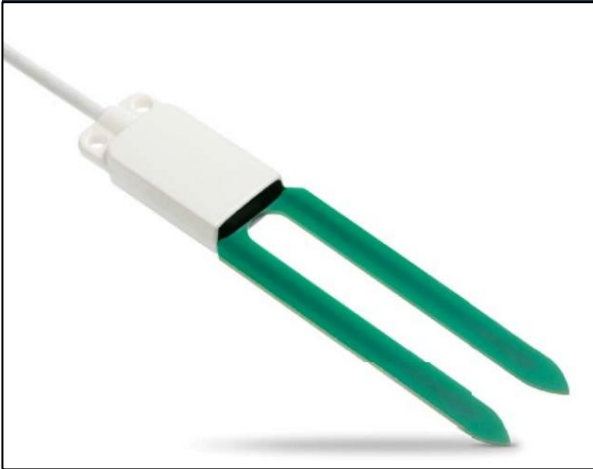


RHTT– SOIL TEMPERATURE-MOISTURE SENSOR (Rev.2 280119)



Description

RHTT probes with two electrodes measure the volumetric water content (VWC) of the soil using a capacitive method which allows quick on site measurements with minimum invasiveness.

Probes are pre-calibrated so don't require other calibrations by the user. The electronic interface is inside protected by a waterproof enclosure in plastic material sealed with epoxy resin that allows to get affordable measurements also in critical environmental conditions.

The probe has two 0...5Vdc analog outputs, compatible with dataloggers and PLC with voltage input channels: one for the volumetric water content and one for the soil temperature. Probes are provided of 5m fix cable (standard or 10m on request), ended by free wires.

Measuring principle (volumetric water content)

The wet soil is made by a solid part (minerals), a liquid part (generally water) and a gaseous part (air, water vapor). The volumetric water content (VWC) is defined as the ratio between the volume occupied by water (V_w) in a specific portion of the soil and the total volume of the on-site soil portion (V):

$$VWC = V_w / V$$

The VWC can be expressed as percentage (% VWC) of water volume of a total volume. The volumetric water content is a parameter used in hydrology for the study of soil hydraulic features and in agriculture to determine the crops irrigation need.

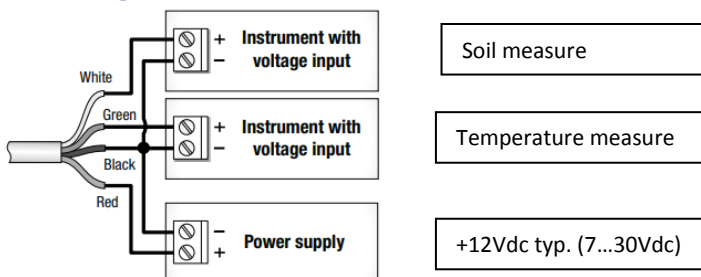
Advantages

- ✓ Integrated temperature measure
- ✓ Easy to install
- ✓ Suitable for all main applications
- ✓ No required maintenance and long lifetime

Main applications

- ✓ Meteorology and Hydrogeology
- ✓ Irrigation systems and Agriculture
- ✓ Bio-compost and bio-filters monitoring
- ✓ Forest monitoring

Electric wiring



Technical features

Model	RHTT-V – Temperature (T) and humidity (RH) soil sensor
Range	RH: 0...60% VWC (Soil volumetric water content) T: -40...+60°C
Transducer	Capacitive (RH) e thermoresistance NTC (T)
Standard outputs	n.2 outputs 0...5Vdc (other on request)
Accuracy	RH: $\pm 3\%$ VWC between 0...50VWC (mineral standard soil, EC <5 mS/cm) T: $\pm 0.5^\circ\text{C}$ (long term stability: $0.1^\circ\text{C}/\text{year}$)
Resolution	RH: 0.1% T: 0.1°C
Power supply	+7...30Vdc (typ. 12Vdc); protections against over-voltages and polarity inversions included
Consumption	2...15mA
Working Temperature	-40...+60 °C
Cable	5m standard (or 10m on request), 4 wires 22 AWG + 1 wire 24 AWG (shield)
Protection degree	IP67
Dimensions	150 x 32 x 10 mm

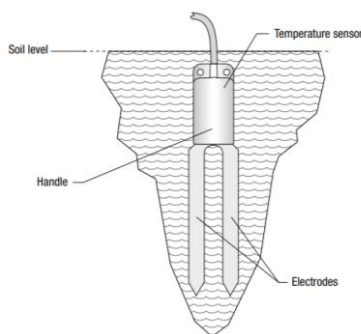
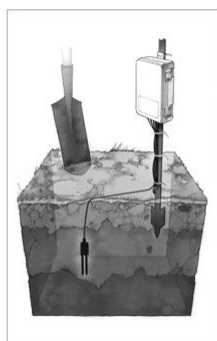
Installing the RHTT

When selecting a site for installation, it is important to understand that the soil adjacent to the sensor surface has the strongest influence on the sensor reading and that the sensor measures the volumetric water content. Therefore any air gaps or excessive soil compaction around the sensor can profoundly influence the readings. Also, do not install the sensors adjacent to large metal objects such as metal poles or stakes. This can attenuate the sensor's electromagnetic field and adversely affect sensor readings. Besides to get accurate measurements, the soil must be strictly in contact with electrodes and probe handle. Indeed the temperature sensor is inside the handle, close to the electrodes, so it's necessary that the handle was completely immersed in the soil to get an accurate temperature measure.

Because the RHTT has gaps between its prongs, it is also important to consider the size of the media you are inserting the sensor into. It is possible to get sticks, bark, roots or other material stuck between the sensor prongs, which will adversely affect readings. Finally, be careful when inserting the sensors into dense soil, as the prongs will break if excessive sideways force is used when pushing them in.

Procedure

1. The RHT sensor was designed for easy installation into the soil. After digging a hole to the desired depth, push the prongs on the sensor into undisturbed soil at the bottom of the hole or into the sidewall of the hole. Make sure that the prongs are buried completely up to the black over-molding. The sensor may be difficult to insert into extremely compact or dry soil. If you have difficulty inserting the sensor, try loosening the soil somewhat or wetting the soil. Never pound it in!
2. Carefully backfill the hole to match the bulk density of the surrounding soil. Be careful to not over stress the cable or over-mold by bending when installing the sensor.



Orientation

The sensor can be oriented in any direction. However, orienting the flat side perpendicular to the surface of the soil will minimize effects on downward water movement.

Removing the Sensor

When removing the sensor from the soil, do not pull it out of the soil by the cable! Doing so may break internal connections and make the sensor unusable.