



Delta-T Devices

The new ThetaProbe adds temperature measurement to its class-leading soil moisture measurement capabilities

The ML3 ThetaProbe makes it easy to take reliable, accurate soil moisture measurements. Simply insert the probe into the soil, connect your data logger or meter, provide 5-14V DC at 18mA, and within seconds you can be measuring soil moisture.

The ThetaProbe's class-leading $\pm 1\%$ accuracy, stability and reliability have made it the preferred choice for thousands of researchers worldwide.

- Soil moisture with $\pm 1\%$ accuracy
- New built-in temp measurement
- New extendable cable system
- Improved performance in saline soils
- Buriable – IP68

The new generation of ThetaProbe

The addition of a thermistor sensor to the ML3 enables the simultaneous logging of soil temperature with soil moisture at depth. A new cabling system makes it simple to extend or replace cables, offering a choice of 1m, 5m, 10m and 25m extensions. ML3 cables and connectors are buriable and environmentally protected to IP68.

The salinity response of the ML3 has been improved - its output has been characterised at EC values up to 2000 mS.m^{-1} .

The temperature range has also been improved with tests demonstrating that the ML3 can operate down to -40 degrees C (non-flexing cables).



ML3 ThetaProbe with GP2 Data Logger

ML3 ThetaProbe Soil Moisture Sensor



Data Logging and readout

The ML3 can be logged by any Delta-T data logger, including the new GP2 (see opposite). In fact any logger that can provide 5 - 14V DC excitation power and will accept the 0 - 1V output signal is suitable.

For portable applications the ML3 connects to the HH2 Moisture Meter - and these can be ordered together in convenient form as the ThetaKit.




ML3 ThetaProbe

Soil Moisture and Temperature Sensor

Installation

ThetaProbes are robust, buriable and maintenance-free. They can be inserted into augered holes or positioned in the wall of a trench (which is then carefully back-filled). Optional extension tubes assist placement and removal when burying at depth.

Design features

| Feature | Description | Advantage |
|--|--|--|
| 4-rod arrangement  | 3 rods are arranged around a central rod. This creates a defined cylindrical zone of measurement, 60mm long x approximately 30mm diameter. | <ul style="list-style-type: none">Retains soil closer to central rod in case of drying and cracking (other designs, and particularly flat PCB sensors, don't do this)Measurements can be made close to the soil surface |
| Replacement rods  | Made of 3mm diameter, resilient, 304 austenitic stainless steel, with sharpened tips. Rods have threaded ends that screw into ThetaProbe body. The exposed rod length is 60mm. | <ul style="list-style-type: none">Withstand repeated insertion in soil. Can be replaced at low cost if bent or damagedHighly resistant to corrosionSharp, narrow rods minimise errors due to soil compaction by the rods |
| Compact cylindrical shape  | The ThetaProbe has a 40mm diameter body, with threaded end. Extension tubes (0.5 and 1.0m) screw onto this thread. Case sealed to IP68. The overall length is 170mm. | <ul style="list-style-type: none">Easy to insert and remove from augered holesRapid attachment of extension tubesHandy size for portable useRugged, waterproof and buriable |



ML3
with **HH2**
hand-held
readout unit

Specifications

| Water content | |
|----------------|---|
| Accuracy | $\pm 0.01 \text{ m}^3 \cdot \text{m}^{-3}$ |
| Range | 0 to $0.5 \text{ m}^3 \cdot \text{m}^{-3}$ |
| Salinity range | $50 \text{ to } 500 \text{ mS} \cdot \text{m}^{-1}$ $< 0.035 \text{ m}^3 \cdot \text{m}^{-3}$ |
| Temperature | |
| Accuracy | $\pm 0.5^\circ\text{C}$, 0 to $+40^\circ\text{C}$ $\pm 0.75^\circ\text{C}$, -20 to $+60^\circ\text{C}$ [1] |
| Output | 0 to 1.0V differential |
| Power | 5 to 14V, 18mA for 1s |
| Sample vol. | Approximately 60 x 30mm diameter |
| Overall size | 170 x 40mm diameter |
| Environmental | IP68, -40 to $+70^\circ\text{C}$ |

[1] Figures apply to sensor only and exclude logger or cabling errors

Applications

- Soil Science
- Agriculture
- Hydrology
- Forestry
- Turf Grass
- Crop Trials



ML3 ThetaKit

Horticulture and Agriculture

ML3 ThetaProbes can be used in a wide range of soils, composts and other growing media. They can be inserted into plant pots, or may be positioned horizontally in a seed tray (minimum 50mm depth of compost).

Environmental Research

Soil water is increasingly seen as one of the critical components for long-term studies of global climate and local environments. Many automatic weather stations can be expanded to include one or more ThetaProbes.

Sports Turf and Golf

The ML3 ThetaKit (see image) is used by sports turf professionals worldwide to spot check soil moisture content and to monitor the performance of automatic sprinklers. The ThetaKit includes the ML3 sensor, HH2 hand-held readout unit (see image top right of page) and accessories all in one convenient package.

Patents

UK patent 2300485B / US patent 5804976

Ordering Information

| ML3 | ML3 ThetaProbe Sensor <i>NB: Order cable separately</i> |
|--|---|
| ML3 ThetaKit | Includes ThetaProbe type ML3, 4 spare rods, HH2 Meter, USB-RS232 adapter cable, insertion kit, user manuals and case. |
| ML/EX50 | 0.5m extension tube. |
| ML/EX100 | 1m extension tube. |
| ML-RODS-3 | Pack of 12 spare rods. |
| ML/INK 1 | Insertion kit for pre-forming holes in hard soils. |
| SM-AUG-100 | 45mm diameter spiral auger to install ThetaProbes at depth, length 1.2m. |
| Cable options | |
| SMSC/sw-05 | 5m cable terminating in bare wires for connection to GP1, GP2, or DL6 |
| SMSC/lw-05 | 5m cable terminating in bare wires for connection to DL2e. |
| SMSC/d-HH2 | 90cm cable, M12 to 25-way D-socket, for connection to an HH2. |
| EXT/SW-01 EXT/SW-05 EXT/SW-10 EXT/SW-25 | 1m, 5m, 10m, and 25m extension cables, M12 connector to M12 connector. |

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