HH150

Hand Held Meter
for the SM150 Soil Moisture Sensor

Quick Start Guide *Version 1*

Delta-T Devices Ltd

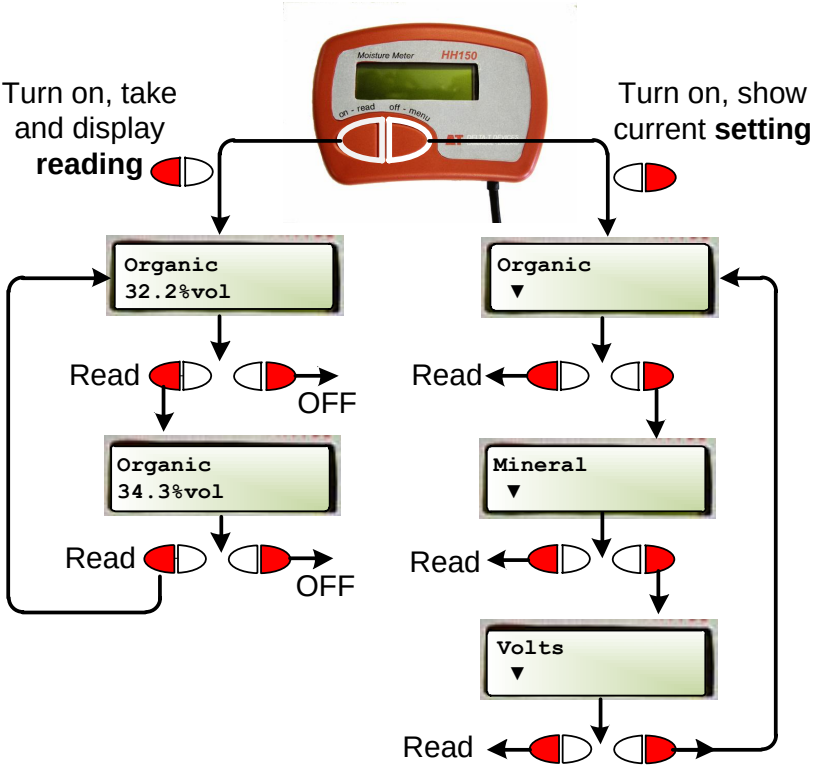
Assemble

Align connectors carefully before pushing parts together.
Screw together firmly to ensure the connection is water-tight.
Keep the sensor and meter in the protective case when not in use.

Insert

- Clear away any stones.
  Pre-form holes in very hard soils before insertion.
- Push the SM150 into the soil until the rods are fully inserted. Ensure good soil contact.
- If you feel strong resistance when inserting the SM150, you have probably hit a stone. Stop, and re-insert at a new location.

Take Readings



- Connect the SM150 sensor to the HH150 meter.
- With the meter OFF, press the right **off – menu** button. This wakes and allows you to set the meter to display readings - either as % volumetric water content of **Mineral or Organic soils, or to show the sensor output in Volts.**
- Press **off** to save the current Setting and turn the meter off.
- With the meter off, press the left **on – read button** to take a reading.

  Repeat as required. You may wish to write down the readings.
  The meter will sleep after 30 seconds.
  The battery should last for about 10,000 readings.

How HH150 calculates Soil Moisture

The HH150 converts the SM150 output to soil moisture in two stages.
First the following table is used to convert volts to $\sqrt{\varepsilon}$.

Linearisation table

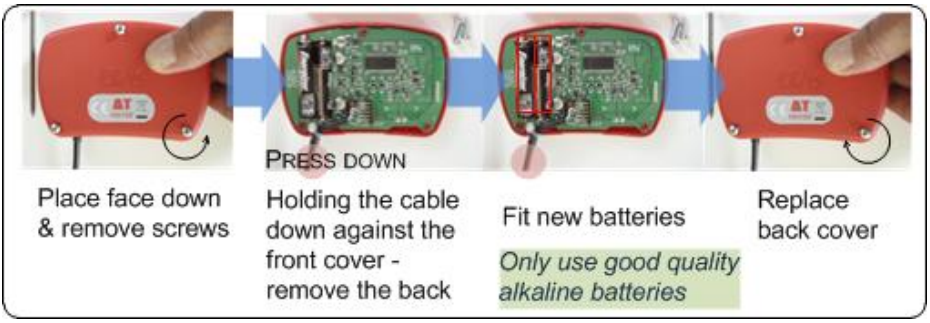
V	√ε	V	√ε	V	√ε	V	√ε	V	√ε
0.000	1.000	0.300	3.576	0.600	5.101	0.900	6.778	1.200	8.924
0.075	1.942	0.375	3.964	0.675	5.503	0.975	7.232	1.275	9.743
0.150	2.620	0.450	4.337	0.750	5.917	1.050	7.720	1.350	10.808
0.225	3.144	0.525	4.713	0.825	6.342	1.125	8.270	1.425	12.242

Then $\sqrt{\varepsilon}$ value is converted to soil moisture θ using
$\theta = (\sqrt{\varepsilon} - a_0)/a_1$

Where a0 and a1 are constants:-
See also the **SM150 User Manual**

	a_0	a_1
Mineral	1.6	8.4
Organic	1.3	7.7

How to change Battery



Specifications *(for full specification see SM150 User Manual)*

SM150 soil moisture sensor	
Accuracy	±3.0% vol over 0 to 70 % vol and 0-60°C *
Measurement range	0 to 100% vol but less accurate above 70%vol**
Salinity error	±5% vol over 100 to 1000 $mS.m^{-1}$ and 0-60% vol
Output signal	0-1V differential ≈ 0 to 60% nominal
Output compatible with	HH150, HH2 GP1, DL6, DL2e
Maximum cable length	1m (HH150 meter) 100m (GP1, DL6 and DL2e data loggers)
Power requirement	5-14VDC, 18mA for 1s
Operating range	-20 to +60°C
Environment	IP68***
Sample volume	55 x 70mm diameter
Dimensions/Weight	143 x 40 mm diameter/ 0.1 kg
HH150 meter	
Accuracy	0.5% of full scale over 5-40°C
Resolution	0.1% of voltage reading
Battery / life/standby life	2xGP alkaline AAA/ 10000 readings/1 year
Environmental	Non condensing
Compliance	CE, FCC & ROHS

* See full specification in **SM150 User Manual**

** Above 85%vol or 1500 mV the HH150 displays "Too wet"

*** With Delta-T supplied cables

Care and Safety

- Do not touch the rods or expose them to other sources of static charge particularly when powered up.
- Do not pull the sensor out of the soil by its cable.

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