

# Decagon 10HS Moisture

Measures the dielectric constant of the soil in order to find its volumetric water content (VWC)

The 10HS is used to measure volumetric moisture content of soils and other material for scientific research and agricultural applications.

The 10HS measures volumetric water content via the dielectric constant of the soil using capacitance technology. The sensor uses a 70 MHz frequency, which minimises salinity and textural effects, making it an ideal sensor in agricultural and standard scientific projects.

10HS Sensor:

- High resolution allows daily or hourly tracking of water use
- Voltage output proportional to water content
- Low-cost dielectric water content sensor
- Low sensitivity to salt and temperature
- Very low power requirement

Applications:

- Irrigation scheduling
- Vadose zone monitoring
- Plant-soil-water interaction studies



Larger Volume of Influence

Looking for a soil moisture sensor with a larger volume of influence? Use the 10HS to accurately measure water content where a large volume of influence is needed, with minimal salinity and textural effects in most soils.

Characterize Spatial Variability

At 10 cm long, the 10HS has a 1 liter area of influence. Imagine the probe running the length of a one liter bottle—the bottle represents the approximate area of influence. The 10HS estimates the volumetric water content of the soil within that volume.

Engineered for Accuracy

The 10HS determines volumetric water content (VWC) by measuring the dielectric constant of the soil using capacitance/frequency domain technology. Using a 70 MHz frequency minimizes salinity and textural effects, making the 10HS accurate in most soils. Factory calibrations can be used in most typical soils with a saturation extract EC of 10 dS/m.

Integrate with CSI Data Loggers

The 10HS's analog signal means no-hassle integration with systems manufactured by other companies (such as Campbell Scientific). An on-board voltage regulator allows the Decagon factory calibrations to be used with any excitation voltage between 3 and 15 V.

Use with the Topp Equation

The 10HS's output can be set to dielectric for use with the Topp Equation or other dielectric-to-volumetric water content conversion equations.



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Reasons to pick the 10HS:

- If volumetric water content is the only measurement you need.
- If you just want a simple, all-purpose sensor with excellent accuracy.
- If you are interested in a large volume of influence.



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## Specifications

Measurement	
Range:	Apparent dielectric permittivity ( $K_a$ ) : 1 (air) to 50 Soil volumetric water content : 0 – 0.57 m <sup>3</sup> /m <sup>3</sup> (0 -57% VWC)
Accuracy:	( $K_a$ ) : $\pm 0.5$ from ( $K_a$ ) of 2 to 10, $\pm 2.5$ from ( $K_a$ ) of 10 to 50 (VWC) VWC: Using standard calibration equation: $\pm 0.05$ m <sup>3</sup> /m <sup>3</sup> ( $\pm 5\%$ VWC) typical in mineral soils. Using soil site specific calibration, $\pm 0.02$ m <sup>3</sup> /m <sup>3</sup> ( $\pm 2\%$ VWC)
Resolution:	( $K_a$ ): 0.1 from ea of 1 to 30, 0.2 from ( $K_a$ ) of 30 to 50 VWC: 0.0008 m <sup>3</sup> /m <sup>3</sup> (0.08% VWC) in mineral soils from 0 to 0.50 m <sup>3</sup> /m <sup>3</sup> (0-50% VWC)
Time	10 ms (milliseconds)
Power	
Power requirements:	3VDC @ 12mA to 15 VDC @ 15 mA On board voltage regulator allows 10HS sensor to be used with any excitation voltage above 3V
Operating Conditions	
Operating Temperature:	0 – 50°C
Interface	
Frequency:	70 MHz
Output:	300 (dry soil) – 1250 (saturated) mV, independent of excitation voltage
Mechanical	
Connector Types	3.5 mm "stereo" plug or stripped and tinned lead wires
Cable Length	5 m standard
Dimensions	Dimensions 14.5 x 3.3 x 0.7 cm

## SENSOR COMPARISON TABLE

	ANALOG SENSORS		DIGITAL SENSORS		
SENSOR	EC-5	10HS	5TM	5TE	GS3
MEASURES	volumetric water content, dielectric permittivity	volumetric water content, dielectric permittivity	<b>volumetric water content, dielectric permittivity, temperature</b>	volumetric water content, dielectric permittivity, temperature,	volumetric water content, dielectric permittivity, temperature,



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				electrical conductivity	electrical conductivity
VOLUME OF INFLUENCE	0.3 L	1 L	0.3 L	0.3 L	0.3 L
DATA LOGGER COMPATIBILITY	Em5b, Em50, Em50R, Em50G, ProCheck, ECH <sub>2</sub> O Check, Campbell Scientific*	Em5b, Em50, Em50R, Em50G, ProCheck, ECH <sub>2</sub> O Check, Campbell Scientific*	Em50, Em50R, Em50G, ProCheck, Campbell Scientific*, SDI-12 capable	Em50, Em50R, Em50G, ProCheck, SDI-12 capable	Em50, Em50R, Em50G, ProCheck, SDI-12 capable
MEASUREMENT RANGE	0 to 100% VWC	0 to 57% VWC	0 to 100% VWC -40 to 50°C	0 to 100% VWC -40 to 50°C 0 to 23 dS/m	0 to 100% VWC -40 to 80°C 0 to 23 dS/m
BEST IF	VWC is all that you need. You're establishing a large sensor network.	You want a large volume of influence.	You have high temperature variability in your soils.  You are monitoring shallow or desert soils where data must be corrected for temperature effects.  You need to monitor soil temperature for biological	You are managing salts in your system. You want to use SDI-12.	You are measuring water content of soilless substrates.  You need high accuracy EC.  You need to measure at high temperatures



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activities.

You want to use SDI-12.

BUT NOT IF

You cannot apply a regulated voltage (only Decagon data loggers).

You are measuring in nursery pots. You are installing in rocky soil.

N/A

You want to monitor soilless substrates or potting soils.

You are doing downhole installations.



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## Accessories



### SMM3 Soil Moisture Meter

Soil Moisture Meter - Configured for Decagon's EC-5 sensor. 10 sensor capacity; IP68 rated enclosure; stand-alone logging capability to 2GB MicroSD Card; Windows software; breakout board; user manual.



### DataTrac 3 Software

DataTrac 3 Software for organising and analysing data



### EM50 Data Logger



### EM50G Data Logger



### EM5B Data Logger



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## Accessories



ProCheck Handheld Reader

