

# TEROS-12

soil water content, temperature & EC

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## overview



The TEROS-12 is a soil moisture, temperature, and EC sensor is built with an epoxy body and stainless steel needles.

The internal circuitry is the same cutting edge design that you'll find in other Decagon soil moisture sensors, but the form factor has been optimized for use in soil-less substrates or harsh environments, giving it a wider range of EC measurement and an increased temperature range. Not only do the steel needles

improve sensor contact, but they also improve the sensor's ability to measure EC in porous substrates such as peat or perlite.

#### **accuracy at a fraction of the cost**

The TEROS-12 measures water content, temperature, and EC independently. Its 70 MHz frequency minimizes salinity and textural effects, making it accurate in most soil or soilless media. Stainless steel needles have an extended surface area to optimize EC measurements, while minimizing substrate disturbance during insertion. Temperature is measured with an onboard thermistor, and electrical conductivity is measured using a stainless steel electrode array.

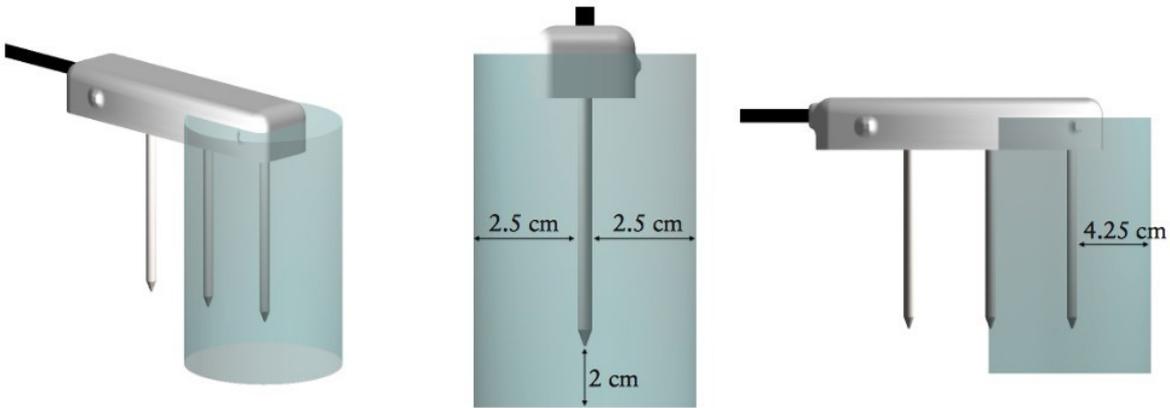
#### **connect to the ZL6 or your own data logger**

The TEROS-12 is a highly versatile sensor and is compatible with a range of data loggers. Connect the TEROS-12 to the ZL6 data loggers for hassle free monitoring. Data can be accessed from the ZL6 directly or remotely via the internet with the ZENTRA Cloud platform.

Alternatively, Edaphic Scientific can connect the TEROS-12 to the ES-SYS monitoring system with a range of other sensors including sap flow, dendrometers, canopy temperature and weather sensors.

Or, the TEROS-12 comes with SDI-12 digital output so that you can connect it to your own, existing data logging system.

#### **sensor measurement zone dimensions**



**whole system monitoring solutions**



Edaphic Scientific is a one-stop shop for a whole system monitoring solution. We provide plant and soil monitoring systems for researchers and growers including wireless, LoRaWAN and modem options.

Our systems not only support dendrometers, but related sensors such as sap flow, soil moisture, weather parameters, and more.

At Edaphic Scientific we want to work with you from the start of your project through to its completion. We can provide:



- Assistance with project and experimental design
- Procurement of all monitoring equipment, including sensors, data loggers and data management software. Edaphic Scientific is a one-stop shop where we can source and find any necessary equipment for your project from our preferred suppliers or third party suppliers
- Installation and training
- On-going assistance with data interpretation and equipment maintenance
- Data correction and analysis, including statistical analysis with the R-package
- Report and publication preparation including tables, figures, graphs, and manuscript writing

## advanced data collection and management solutions



Edaphic Scientific recognises the need for flexible and adaptable sensor and data logging solutions for experimental or environmental monitoring projects.

Data can be downloaded directly in the field from data loggers. A direct connection between the data loggers and your computer, via a USB cable, can be used for manual downloading of data.

Alternatively, data can be downloaded over the internet on your iPhone, iPad or desktop computer with the Eagle.io cloud-based, data management software

solutions. Through this remote based downloading capabilities, you can download, view and manage your data, and system, anywhere in the world and at anytime.

## specifications

feature	specification
accuracy	Apparent Dielectric Permittivity ( $\epsilon_a$ ): $\pm 1 \epsilon_a$ (unitless) from 1 - 40 (soil range), $\pm 15\%$ from 40 - 80 Soil
Soil Moisture	Volumetric Water Content (VWC): Using a generic calibration: $\pm 0.03 \text{ m}^3/\text{m}^3$ ( $\pm 3\%$ VWC) typical in mineral soils that have solution electrical conductivity $< 10 \text{ dS/m}$ ; using medium specific calibration, $\pm 0.01 - 0.02 \text{ m}^3/\text{m}^3$ ( $\pm 1 - 2\%$ VWC) in any porous medium
EC	$\pm 5\%$ from 0 to 5 dS/m, $\pm 10\%$ from 5-23 dS/m
Temperature	Temperature: $\pm 1^\circ\text{C}$ Note: Temperature measurement may not be accurate if sensor is not fully immersed in the medium of interest, due to excessively long equilibration time.
resolution	
Soil Moisture	$\epsilon_a$ : $0.1 \epsilon_a$ (unitless) from 1 - 20, $< 0.75 \epsilon_a$ (unitless) from 20 - 80 VWC: $0.002 \text{ m}^3/\text{m}^3$ (0.2% VWC) from 0 to 40% VWC, $0.001 \text{ m}^3/\text{m}^3$ (0.1% VWC) $> 40\%$ VWC
EC	$0.001 \text{ dS/m}$ from 0 to 23 dS/m
Temperature	$0.1^\circ\text{C}$
range	
Soil Moisture	$\epsilon_a$ : 1 (air) to 80 (water) VWC: 0% to saturation
EC	0 - 25 dS/m (bulk EC)
Temperature	$-40$ to $60^\circ\text{C}$
sensor type	
Soil Moisture	Frequency domain / capacitance
EC	Two probe design
Temperature	Thermistor
general	
Measurement Speed	150 ms (milliseconds)
Output	SDI-12
Operating Environment	$-40^\circ\text{C}$ to $60^\circ\text{C}$



<b>feature</b>	<b>specification</b>
Power Requirements	3.6 - 15 VDC, 0.3 mA quiescent, 25 mA during 150 ms measurement
Cable Length	Sensors come standard with 5 m cable. Custom cable lengths available. Maximum cable length of 75 m.
Cable Connectors	3.5 mm "stereo" plug, or stripped and tinned lead wires (3)
Sensor Size	9.3 cm x 2.4 cm x 6.5 cm
Data Logger Compatibility	Decagon Em50 Series, ProCheck, SDI-12 data loggers
Warranty	One year, parts and labor

## manual & docs

### manuals & integration guides

- TEROS-12 Manual
- TEROS-12 Integrator's Guide

### articles & guides

- How to calibrate soil moisture sensors
- What is a capacitance sensor?
- 5 common mistakes when measuring soil moisture
- The Soil Water Compendium

## related products

- Data loggers and monitoring systems
- PROCHECK portable, handheld meter
- Soil moisture sensors, probes and meters
- Soil water potential sensors
- Pore water samplers
- Soil CO2 concentration
- Soil nutrient analyzer
- Soil pH meter
- Sap flow sensors

- Weather stations