

# Hydra Probe II Soil Sensor

## Benefits

- Instantly measure soil moisture, conductivity, salinity, and temperature
- Optimize soil analysis, watering and fertilization
- Enables measurement of native (undisturbed) soil
- Low risk: ten years of field-proven science
- Measure flow of water, fertilizer from topsoil to sub-root zone
- Performs well in high-salinity soil
- Easier monitoring of remote sites
- Review real-time soil data and trends from the office

## Features

- Instantaneous sensor response
- Serial addressable: multiple units on one cable
- Maintenance-free
- Easily linked to wireless systems
- One-click calibration
- Compatible with most data logging systems
- Digital or analog output
- Compact, rugged for years of in-soil use

## Applications

- Long/short-term soil monitoring
- Spot checking of soil
- Golf green management
- Sports turf management
- Precision agriculture/fertigation
- Geotechnical measurement
- Weather/climate studies
- Watershed management
- Flood control forecasting
- Forest tinder conditions



## Description

Stevens' Hydra Probe II offers a unique advantage over other soil probes by providing an all-in-one, in-situ system that measures 10 different parameters simultaneously. The Hydra Probe instantly calculates soil moisture, conductivity, salinity, and temperature as well as supplying voltage outputs for research applications. The data add science to soil management for better understanding of soil conditions. The result is optimized analysis of soil for scientific study and for enhanced quality and yield of turf and crops.

Hydra Probe sensing technology has been deployed over 10 years by the USDA and is used by NASA for ground truthing of satellite-based soil imaging. A compact, rugged design with potted internal components makes the Hydra Probe easier to deploy than competing sensors and ideal for remote and harsh conditions. Durable construction makes it possible for the units to remain in the field for many years, maintenance-free.

The defined sensing area allows accurate measurements in regions where there are strong soil moisture gradients, such as near the soil surface. Response time to changing soil conditions is immediate, and calibration is as simple as selecting a soil type (sand, silt or clay). Each Hydra Probe is serial addressable, allowing for multiple sensors to be connected to any RS485 or SDI-12 data logger via a single cable. Sensor data can also be sent directly to a radio modem through a small RS485-RS232 converter.

The Hydra Probe uses an electromagnetic signal propagated from the center tine of the probe to measure multiple parameters. The voltages recorded depend on the type of electrical properties of the soil. On-board software converts the raw voltage to standard units of measurement for each parameter. With a standard database or spreadsheet, managers can view real-time soil snapshots or long-term soil trends.

[www.stevenswater.com](http://www.stevenswater.com)

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## Technical Specifications

Measurement	Range	Accuracy
Dielectric Constant	1 to 65 where 1 = Air, 78 = Distilled water	+/- 1.5% or +/- 0.2 whichever is typically greater
Soil Moisture	From completely dry to fully saturated	+/- 0.03 water fraction by volume in typical soil
Conductivity	0-20 dS/m	+/- 2.0% or +/- 0.002 dS/m whichever is typically greater
Temperature	-10 to + 65 C	+/- 0.6 C

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### Environmental

Operating temperature:  
In soils: freezing to +65 C  
Temperature range: -10 C to + 65 C  
Storage temperature: -40 to + 70 C  
Water Resistance: Tolerates continuous full immersion  
Cable: UV resistant, direct burial

### Physical Parameters

Size: Length: 4.9in (12.4 cm)  
Diameter: 1.6 in (4.2 cm)  
Sensing volume: Cylindrical region:  
Diameter: 1.2 in (3.0 cm)  
Length: 2.2 in (5.7 cm)  
Weight: 200g not including cable (approx. 0.08 kg/meter)  
Ruggedness/material: Vibration and shock resistant with potted components in PVC housing and stainless steel tines

### Electrical operation

	SDI-12	RS-485
Electrical	9-20 VDC	9-20 VDC
Communication Protocol	SDI-12 Standard v. 1.2	Custom or open spec
Cable Length	60 meters/197 feet	1219 meters/4000 feet (max. non-spliced 304.8m/1000ft)
Power	<1mA idle ~30 mA active	<10mA idle ~30mA active
Cable	3-wire Power, Ground, Data	4-wire Power, Ground, Com+, Com -
Baud Rate	1200	9600

### Ordering Information

Part #	Description	Part #	Description
93640	Hydra Probe II with 25 ft/7.62m of cable (specify SDI-12 or RS485 signal output)	93640-050 93640-075 93640-100	Hydra Probe II with optional: 50 feet of cable (15.24m) 75 feet of cable (22.86m) 100 feet of cable (30.48m)
93539	Cable: 18 AWG copper wire	92880	Jig for easy probe installation
93342	Handheld data reader	93342-001	Data reader connection option