

Hydra Probe Soil Sensor - JSMHP

0 - 2.5 V Analog Output



Description

The design of the hydra probe patented Hydra Probe design is unique compared to other soil moisture probes because the electrical response of soils can be specified by two parameters, the dielectric constant and the conductivity. The dielectric constant is most indicative of water content while the conductivity is strongly dependent on soil salinity. Unlike other capacitance type sensors, the Hydra Probe measures both of these components simultaneously. The high frequency electrical measurements indicating the capacitive and conductive properties of soil are then directly related to the soil's moisture and salinity content while a thermistor determines soil temperature. These unique sensors feature all three simultaneous read-ings for more definitive analysis of soil conditions.

The small, precisely defined sensing area allows accurate measurements in regions where there are strong soil moisture gradients, such as near the soil surface. Response time is immediate to changing soil moisture conditions, and no calibration is required. Equipped with a direct burial connecting cable, the Hydra Probe allows for data collection over a large study area in a variety of soil conditions.

The data reduction algorithm converts analog voltages to the following outputs: the real and imaginary dielectric constant, temperature, temperature corrected real and imaginary dielectric constants, water content, soil salinity (indicative of nitrate levels), soil conductivity, temperature corrected soil conductivity and temperature corrected soil water conductivity.

The provided data reduction program can operate on a PC or Smart Logger file of raw sensor input data, and output a file consisting of processed data, or the program performs the data reduction algorithm on the data in an ASCII file download format from hand held data reader.

A rugged design with all internal components potted for a robust, zero maintenance design makes the Hydra Probe ideal for remote and environmental hostile conditions. This durable construction makes it possible for the unit to remain in the field for many years, maintenance free.

Features

- Simultaneously measures:
 - Soil moisture
 - Soil salinity
 - Soil temperature
- Instantaneous sensor response
- No calibration requirements
- Compact, rugged, no maintenance design
- The dielectric constant, soil moisture, and conductivity accuracy measurements are improved using 1 of 3 soil calibration constants
- Compatible with most data logging systems with multiple analog inputs

Applications

- Long-term monitoring or spot checking of soil moisture, conductivity, and temperature for:
 - Irrigation management
 - Geotechnical studies
 - Weather/climate studies
 - Watershed management
 - Flood control forecasting

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Technical Specifications

Measurements	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

ENVIRONMENTAL

Operating Temperature

In soils: freezing to +65° C
Temperature range: -10° to +65° C

Storage Temperature

-40° to +70° C

Water Resistance

Tolerates continuous full immersion

PHYSICAL PARAMETERS

Size

Length: 4.9 inches (12.4 cm)
Diameter: 1.6 inches (4.2 cm)

Sensing Volume (cylindrical region)

Diameter: 1.2 inches (3.0 cm)
Length: 2.2 inches (5.7 cm)

Weight

200 g not including cable
(Cable weight approx 0.08 kg/meter)

PHYSICAL PARAMETERS (cont.)

Ruggedness/Material

Vibration and shock resistant with potted components in PVC housing and marine-grade stainless steel tines

ELECTRICAL OPERATION

Data Channels

Four (4) 0-2.5 volt analog output signals. V1, V2 and V3 are used to determine the capacitive and conductive response, and hence water content and salinity, of soil. V4 is for soil temperature.

Cable

Seven (7) wire color-coded 18 AWG copper wire, length up to 100 ft. UV resistant, direct burial cable.

Power

7 to 30 volts DC, typically 20mA, 40 mA maximum

ORDERING INFORMATION

Part #	Description
70030-025	JSMHP with 25' of cable, 0 - 2.5 Volt Output
70030-050	JSMHP with 50' of cable, 0 - 2.5 Volt Output
70030-100	JSMHP with 100' of cable, 0 - 2.5 Volt Output