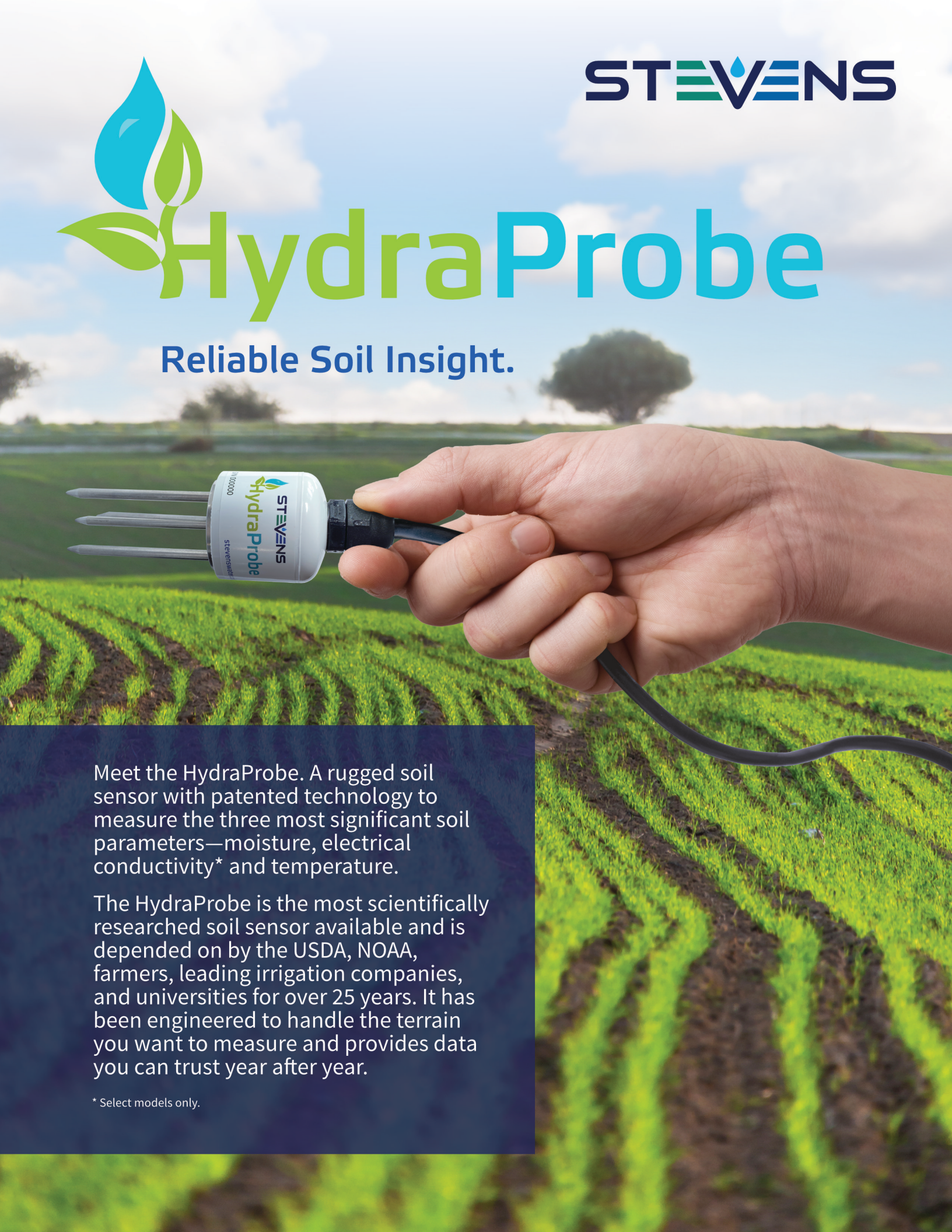
STEVENS

HydraProbe

Reliable Soil Insight.



Meet the HydraProbe. A rugged soil sensor with patented technology to measure the three most significant soil parameters—moisture, electrical conductivity* and temperature.

The HydraProbe is the most scientifically researched soil sensor available and is depended on by the USDA, NOAA, farmers, leading irrigation companies, and universities for over 25 years. It has been engineered to handle the terrain you want to measure and provides data you can trust year after year.

* Select models only.

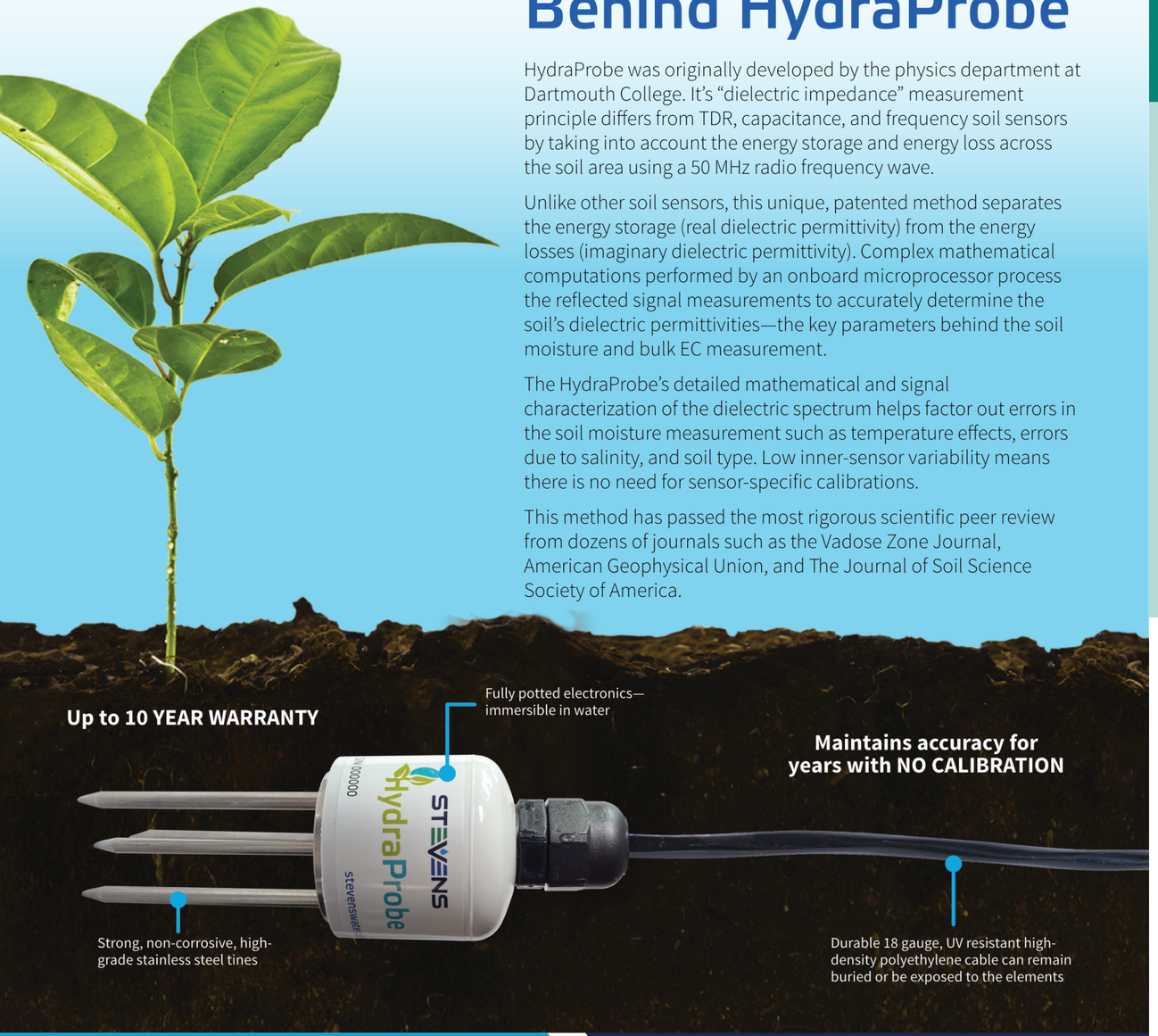
The Science Behind HydraProbe

HydraProbe was originally developed by the physics department at Dartmouth College. It's "dielectric impedance" measurement principle differs from TDR, capacitance, and frequency soil sensors by taking into account the energy storage and energy loss across the soil area using a 50 MHz radio frequency wave.

Unlike other soil sensors, this unique, patented method separates the energy storage (real dielectric permittivity) from the energy losses (imaginary dielectric permittivity). Complex mathematical computations performed by an onboard microprocessor process the reflected signal measurements to accurately determine the soil's dielectric permittivities—the key parameters behind the soil moisture and bulk EC measurement.

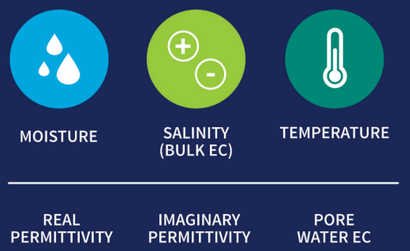
The HydraProbe's detailed mathematical and signal characterization of the dielectric spectrum helps factor out errors in the soil moisture measurement such as temperature effects, errors due to salinity, and soil type. Low inner-sensor variability means there is no need for sensor-specific calibrations.

This method has passed the most rigorous scientific peer review from dozens of journals such as the Vadose Zone Journal, American Geophysical Union, and The Journal of Soil Science Society of America.



Patented Sensor Technology

HydraProbe uses unique "Coaxial Impedance Dielectric Reflectometry" to provide consistent long-term accuracy of moisture, bulk EC and temperature in any soil type. This also provides low inter-sensor variability, so every sensor measures the same without the need to calibrate.



Reliable.

Continual, long-term data without calibration.

- Stable—no sensor drift, ensuring continual accuracy.
- Patented technology that accurately measures moisture and electrical conductivity permits more accurate optimization of watering and fertilization than with just moisture.
- Depended on by the USDA, NOAA, leading irrigation companies, and many universities for over 20 years. Used by NASA for ground truthing of satellite-based soil imaging.
- Soil moisture calibration has been rigorously peer-reviewed, making it one of the most trusted soil sensors available.

Accurate.

Consistent research-grade accuracy every season, every location.

- Unparalleled spatial and temporal measurement consistency. No sensor-to-sensor variations across locations, seasons, soil types or moisture range.
- Instant measurement of the 3 most significant soil parameters simultaneously—moisture, salinity and temperature.
- Unlike most TDR or capacitance-based sensors, HydraProbe is less sensitive to changes in temperature, salinity, and soil mineralogy.

Simple.

Forget calibrating, ignore the soil type. Just set it and forget it.

- Repeatable accuracy and stability without the need for calibration in most soils.
- Digital sensor using the SDI-12 protocol—no setup, just connect to data logger. Compatible with any SDI-12 capable data logger.
- Zero maintenance required.

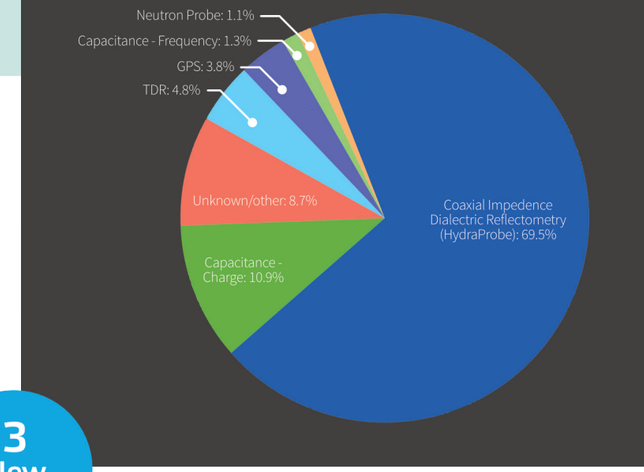
Rugged.

Durable stainless steel tines, fully potted components and a 10-year warranty (select models).

- Can remain in-situ indefinitely, or relocated and re-deployed without worry.
- Ideal for remote locations, harsh environments and applications where data is critical.
- Enables measurement of native (undisturbed) soil, even hard-packed clay.
- Industry-leading 10-year warranty.

Used in more water supply forecast and climatological networks than any other soil sensor

Source: International Soil Moisture Network (https://ismn.geo.tuwien.ac.at/en/)



HydraProbe STANDARD

- VWC (% Moisture)
- Temperature
- 3 soil calibrations
- 5-year warranty

3 New Models

HydraProbe PROFESSIONAL

Everything the STANDARD model has plus:

- Electrical Conductivity (EC)
- Thermal compensation
- Pore water EC
- 5 soil calibrations
- 10-year warranty
- NIST Traceability

HydraProbe PROFESSIONAL-ET

Everything the PROFESSIONAL model has plus:

- Extended temperature range

TECHNICAL SPECIFICATIONS

MEASUREMENT	ACCURACY	RANGE	RESOLUTION
Real dielectric permittivity (isolated)	< ± 0.5% or ± 0.2 dielectric units	1 to 80 where 1 = air, 80 = distilled water	0.001
Soil moisture for inorganic & mineral soil	± 0.01 WFV for most soils ± ≤0.03 max for fine textured soils*	From completely dry to fully saturated (from 0% to 100% of saturation)	0.001
Bulk electrical conductivity	± 2.0% or 0.02 S/m whichever is typically greater*	0 to 1.5 S/m	0.001
Temperature	± 0.3° C	-10°C to +60°C ●● -30°C to +65°C ●	0.1°C
Inter-sensor variability	± 0.012 WFV (θ m^3 m^{-3})	n/a	

ELECTRICAL AND COMMUNICATION	SDI-12	RS485
Power supply	9-20 VDC	9-20 VDC
Power consumption	<1 mA idle / 10 mA active	<10 mA idle / 30 mA active
Cable	3-wire: power, ground, data	4-wire: power, ground, com+, com-
Max. cable length	60 m (197 ft.)	1,219 m (4,000 ft.) Non-spliced: 304.8 m (1,000 ft.)
Baud Rate	1200	9600
Communication protocol	SDI-12 Standard v. 1.2	Custom or open spec
Addressing	Serial; allows multiple sensors to be connected to any RS485 or SDI-12 data logger via a single cable.	

ENVIRONMENTAL

Operating Temperature	-10°C to +60°C ●● -30°C to +65°C ●
Storage Temperature	-40°C to +65°C
Water Resistance	Tolerates continuous full immersion
Cable	18 gauge (20 gauge for RS-485/analog), UV resistant, direct burial
Vibration and shock resistance	Excellent; potted components in PVC housing and 304 grade stainless steel tines

PHYSICAL

Length	4.9" (124 mm)
Diameter	1.6" (42 mm). Optional slim housing version available: 1.4" (35.8 mm)
Weight	7 oz. (200 g). Optional slim housing version available: 6.5 oz. (184 g)
Cable weight	0.86 oz/ft (80g/m)
Sensing volume (cylindrical region)	Length: 2.2" (5.7 cm), diameter: 1.2" (3.0 cm)
Cable length	25'/50'/100' (7.5m/15m/30m)

OUTPUTS

- VWC (% Moisture) ●●●
- Soil conductivity ●●
- Soil conductivity (compensated) ●●
- Real permittivity ●●
- Real permittivity (compensated) ●●
- Imaginary permittivity ●●
- Imaginary permittivity (compensated) ●●
- Temperature (°C/°F) ●●●
- Pore Water EC ●●

AVAILABLE CALIBRATIONS

- General ●●●
- Organic ●●●
- Rockwool ●●●
- Custom 1 ●●
- Custom 2 ●●

** Accuracy may vary with some soil textures.*

● = HydraProbe **STANDARD** ● = HydraProbe **PROFESSIONAL** ● = HydraProbe **PROFESSIONAL-ET**

STEVENS

MEASUREMENTS TO MIND

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