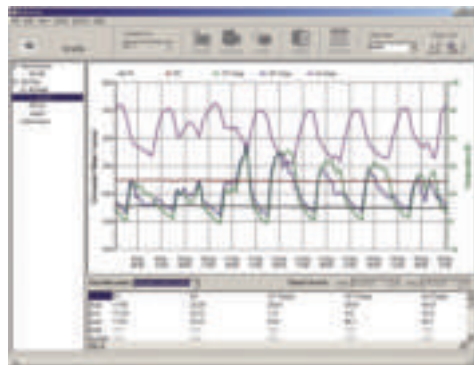
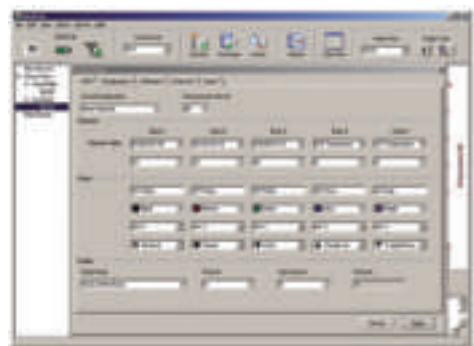


### DataTrac Charting Software

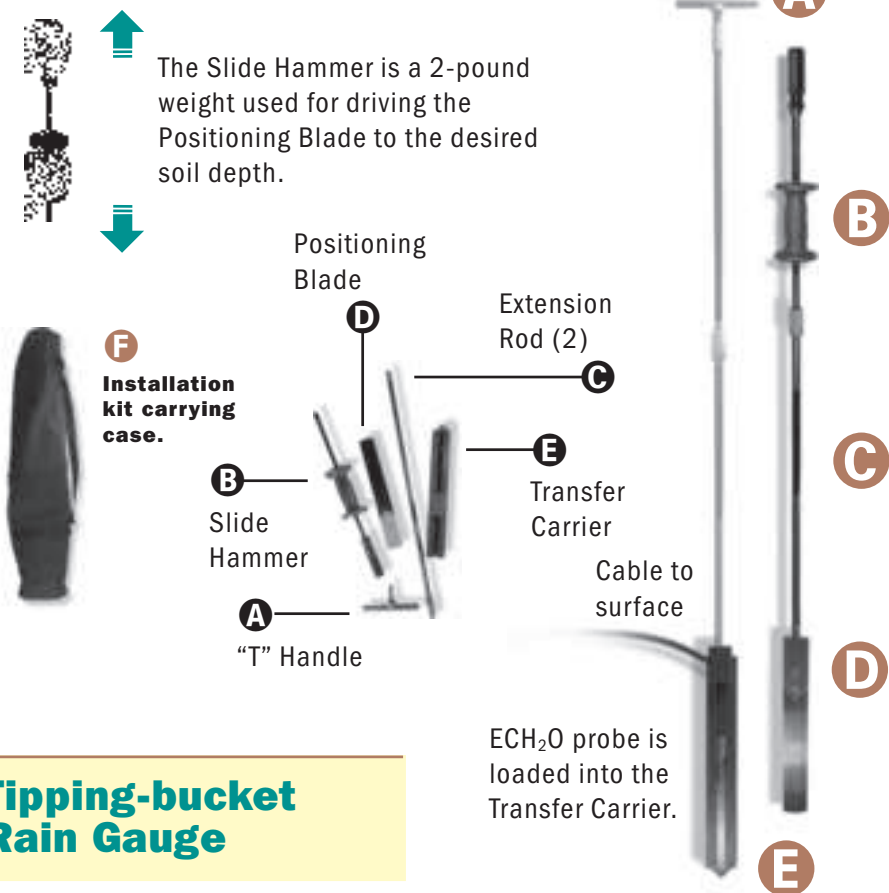


Display collected data in chart form.



Menu for configuring loggers.

For both trench and bore hole installations.



### Tipping-bucket Rain Gauge



THE ECH<sub>2</sub>O RAIN is an electronic

rain gauge which is plug & play with Em5b and Em50 loggers. Funnel dimensions are 5 x 10 cm, and the rain is registered with a resolution of 1 mm or 0.04 inch.

The collector is made of STYROSUN®, which is durable and weatherproof. For comparisons and further information on Rain Gauges see: <http://www.decagon.com/appnotes/RainGaugeanalysis.pdf>

### Soil Temperature Sensor

SOIL TEMPERATURE SENSOR -40° C to 60° C range, 6mm diameter, 37.5mm long cylinder of molded plastic with a 3m cable, plug & play with logger.

- Monitor soil temperature while measuring water content with the model ECT temperature sensor.
- ▶ The stereo-style plug on all Decagon sensors is easy to use.



950 NE Nelson Court  
Pullman, Washington 99163  
800-755-2751  
fax 509-332-5158  
soils@decagon.com  
www.decagon.com  
International 1-509-332-2756

## THE ECH<sub>2</sub>O PROBES

Shortform catalog v1



### ECH<sub>2</sub>O BENEFITS FOR SOIL SCIENCE

- Durable materials for accurate long-term moisture content monitoring.
- Measure the soil dielectric constant to determine volumetric water content.
- Very low power for long-term cost-effective monitoring.
- Measure at different depths over a wide geographic area with relatively low system and maintenance cost.
- Low sensitivity to saline and temperature effects in the soil.
- Extremely high resolution making possible accurate daily or hourly water monitoring.
- Measure temperature and electrical conductivity (EC) together with water content for more useful information about soil conditions.





**ECH<sub>2</sub>O-TE**  
3-prong design, measures soil moisture, electrical conductivity, and temperature. By design, salinity effects on moisture content values are greatly minimized.



**EC-20**  
The original ECH<sub>2</sub>O probe design, 20cm length.



**EC-10**  
The original ECH<sub>2</sub>O probe design, 10cm length.

■ ECH<sub>2</sub>O is a capacitance probe. It measures dielectric permittivity of the surrounding medium. In soil, dielectric permittivity is directly related to the water content. The ECH<sub>2</sub>O probe outputs a value that correlates directly to the volumetric water content.

Model	WATER CONTENT PROBE RANKING				
	EC-5	EC-10	EC-20	ECHO-TE	EA-10
	Length 5cm	10cm	20cm	5cm	10cm
Measurement range	best	good	good	best	good
Low cost	best	best	best	fair	good
Accuracy in high EC	best	low	low	best	low
Accuracy textural variety	best	fair	fair	best	fair
Pots (greenhouse use)	best	good	low	best	good
Sample size	low	fair	best	fair	fair
Measures VWC	best	best	best	best	best
Measures EC	...	...	...	best	...
Measures Temperature	...	...	...	best	...
4 to 20mA control system	...	...	...	...	best

- Gelox Case and hinged cover make it easy to collect data and replace batteries.
- Improved O-ring seal.
- Dedicated download port.
- Reinforced cable strain relief.



▲ Em50 loggers provide a turn-key solution for the ECH<sub>2</sub>O probes.

## Em50 Logger

**Channels** 5.  
**Storage** >36,000 scans. Each scan includes logger name, date, time, and five measurements.  
**Scan Interval**  
User-programmable from 1/minute to 1/day.  
**Communication** RS232 and/or spread spectrum radio.  
**Resolution** <0.1% VWC.  
**Power** 5 AA alkaline batteries.  
**Battery service life** 5 years logging only, 6+ months with radio telemetry.  
**Dimensions** 5" w x 8" h x 2" d  
**Enclosure Rating** IP45, NEMA4X  
Download software included with Em50 purchase.

## ECH<sub>2</sub>O PROBE SPECIFICATIONS

# Long-term soil water content sensors.

Model	EC-5	EC-10	EC-20	EA-10	ECH <sub>2</sub> O TE
Length	5cm	10cm	20cm	10cm	5cm
Measurement	Volumetric Water Content		Volumetric Water Content	Volumetric Water Content	Volumetric Water Content, Electrical conductivity, Temperature
Accuracy	±3% typical on all soils, up to 8 dS/m, ±1 to 2% with soil-specific calibration	±4% typ. on low EC & medium-textured mineral soils, ±1 to 2% w/ soil-specific cal	±4% typ. on low EC & medium-textured mineral soils, ±1 to 2% w/ soil-specific cal	±4% typ. on low EC & medium-textured mineral soils, ±1 to 2% w/ soil-specific cal	MINERAL SOIL : ±3% VWC up to 8 dS/m, ±1 to 2% with soil-specific calibration ROCKWOOL ±3% VWC, 0.5 to 8 dS/m POTTING SOIL ±3% VWC, 3 to 14 dS/m
Range	0–100% VWC	0–40% VWC	0–40% VWC	0–40% VWC	0–100% VWC
Electrical interface	3.5mm plug, 3-wire	3.5mm plug, 3-wire	3.5mm plug, 3-wire	2-wire analog, 4–20mA	3.5mm plug, 3-wire
Supply voltage	2.5–5V DC @ 10mA	2.5–5V DC @ 10mA	2.5–5V DC @ 10mA	line-powered 7–32 VDC, overvoltage & reverse-polarity protected	3–16 VDC, 0.3 mA quiescent, 10 mA for 9 ms measurement
Frequency	70 MHz	5 MHz	5 MHz	5MHz	70 MHz
Output	Voltage, correlated linearly (soil) or polynomially (growing media) with VWC	Voltage, correlated linearly w/soil VWC	Voltage, correlated linearly w/soil VWC	Voltage, correlated linearly w/soil VWC	Serial 3V TTL, 8 bit, 1-stop bit, no parity

ECH<sub>2</sub>O



**EC-5**  
5cm probe length and minimized salinity and textural effects.



**EA-10**  
10cm ECH<sub>2</sub>O probe with 4 – 20mA output.



▲ The above table contains probe specifications. The following specifications are common to all probes:

**Cable Length** 5m  
**Operating Environment**  
-40 to 60°C, 0–100% RH  
**Measurement Time** 10ms  
**Resolution**  
0.002m<sup>3</sup>/m<sup>3</sup> typical with Em50 and Em5b loggers, other loggers may vary.

- External antenna connector.
- RS232 serial cable connectivity.
- Storage for over 36,000 broadcast packets.
- Flexible 9-24V AC/DC power.



## DataStation

The DataStation is a radio base station that allows you to remotely collect and store data from multiple Em50R data loggers. The DataStation is always on, receiving and saving data from Em50R

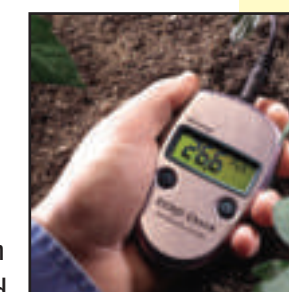
loggers operating in transmit mode. Data can then be downloaded directly from the DataStation to your laptop at your convenience. DataStation data can be exported to spreadsheet programs or graphed and analyzed using ECH<sub>2</sub>O DataTrac software.  
18.4cm L x 10.5cm W x 2.86cm H (7.25"L x 4.125"W x 1.125"H)



▲ The Em5b has 5 channels that allow even scientists on a tight budget to monitor soil moisture and other environmental parameters inexpensively.

## Em5b Logger

For EC-5, EC-10, EC-20, ECR & ECT  
**Storage** 3,400 scans.  
1/minute to 1/day.  
**Communication** RS232  
**Resolution** <0.1% VWC.  
**Power** 4 AAA alkaline batteries, life 3+ years.  
**Dimensions**  
3.75" w x 2.75" h x 1.25" d  
Download software included with Em5b logger purchase.



## ECH<sub>2</sub>O Check

For EC-5, EC-10, & EC-20  
**Measurement speed** <1s.  
**Resolution** 1mV, 0.1%, 0.01 in/ft. Adjustable calibration.  
**Meter accuracy** 3%.  
Power 3V CR2 lithium battery.  
**Battery life** 3–4 years.  
**Case** Stainless steel with silicone elastomer spacer.  
**Case size** 8.9x10.2cm (oval).  
**Weight** 113 grams.  
**Operating environment**  
0–40°C.

▲ Great for sensor testing. Handheld readout.

- ECH<sub>2</sub>O Check Portable readout. Readings are instantaneously displayed in units of volume percent (cm<sup>3</sup>/m<sup>3</sup>), inches per foot (in/ft), or millivolts.