

Decagon Devices, Inc.

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1 Master Specifications: ERG

AccuPAR LP80

Operating Environment:

0° to 50° C (32° – 122° F)

0 to 100% relative humidity

Probe Length: 86.5 cm

Number of Sensors: 80

Overall Length: 102 cm (40.25 in)

Probe Cross-Section: 19 cm x 9.5 cm (.75 x .375 in)

Micro Controller Dimensions: 15.8 x 9.5 x 3.3 cm (6.2 x 3.75 x 1.3 in)

PAR Range: 0 to 2,500 $\mu\text{mol m}^{-2}\text{s}^{-1}$

Resolution: 1 $\mu\text{mol m}^{-2}\text{s}^{-1}$

Minimum Spatial Resolution: 1 cm

Data Storage Capacity: 1 MB Flash

Unattended Logging Interval: User selectable, between 1 and 60 min

Instrument Weight (w/ Batteries): 0.55 kg (1.21 lbs)

Data Retrieval: direct via RS-232

Keypad: 7-Key menu-driven

Clock: 24-hour ± 1 minute per month

Interface Cable: RS-232 cable

Power: Four AAA Alkaline cells.

External PAR Sensor Connector: Locking 5-pin sealed circular connector

Leaf Wetness Sensor

Measurement Time: 10 ms

Power: 2.5 VDC @ 2 mA to 5 VDC @ 7 mA

Output: 320 to 1000 mV @ 3 V excitation

Operating Environment: -20 to 60 °C

Probe Dimensions: 11.2 cm x 5.8 cm x .075 cm

Cable Length: 5 m standard, extension cables are available

Connector Type: 3.5 mm plug or optional “pigtail” adapter (stripped and tinned lead wires)

Data Logger Compatibility (not exclusive):

Decagon: Em50, Em50R

Campbell Scientific: CR10, 10X, 21X, 23X, 1000, 3000, 5000

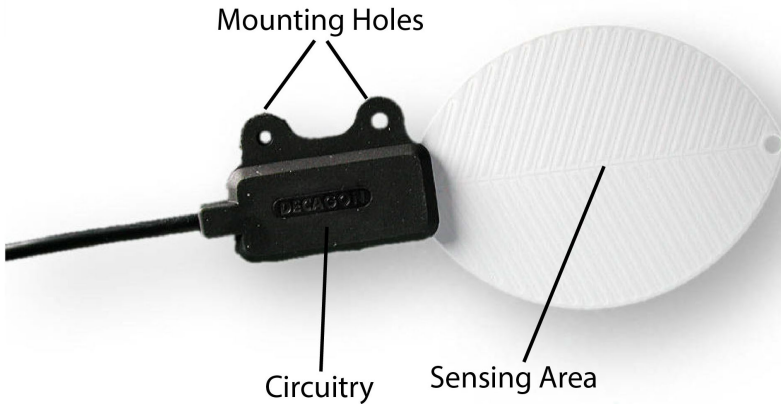


Figure 1: The Leaf Wetness Sensor

MiniDisk Infiltrometer

Total Length: 32.7 cm

Diameter of tube: 3.1 cm

Sintered stainless steel disc: 4.5 cm diameter, 3 mm thick

Length of suction regulation tube: 10.2 cm

Suction range: 0.5 to 7 cm of suction

Length of water reservoir: 21.2 cm

Length of mariotte tube: 28 cm

Volume of water required to operate: 135 ml

Em5b Datalogger

Input Ports: 5, 12-bit analog, or 32-bit digital

Port Type: 3.5 mm “stereo jack” connector

Data Storage: 1 MB (36,800 scans for all five ports)

Memory Type: Non-volatile flash

Battery Capacity: Five AA Alkaline or Lithium batteries

Enclosure: Weatherproof, impact, and UV-resistant polymer

Enclosure Rating: IP55, NEMA3R

Operating Environment: 60 to -40 °C, up to 100% RH

Communication: Dedicated serial port 3.5 mm stereo jack for use with the Decagon USB Cable Adapter (UCA)

Radio (Em50R models):

902-928 MHz ISM *NorthAmerica*

915-928 Mhz ISM *Australia, NewZealand, Israel*

2.4 GHz ISM *Worldwide*

Radio (Em50R): 900 MHz or 2.4 GHz(discontinued)

Cellular (Em50G): GSM/GPRS cellular technology. Cellular service and data hosting service provided by Decagon Devices

Leaf Porometer

Operating Environment: 5 to 40 °C; 1 to 100% relative humidity with desiccant chamber

Accuracy: 10%

Sample Chamber Aperture: 6.35 mm (0.25 in)

Measurement Range: 0 to 1,000 mmol/m²s¹

Microcontroller Dimensions: 15.8 x 9.5 x 3.3 cm (6.2 x 3.75 x 1.3 in)

Data Storage: 4,095 measurements

Data Retrieval: Direct via RS-232

Keypad: Six-key, menu-driven

Clock: 24-hour +/- one minute per month

Interface Cable: RS-232 serial cable (included)

Power Supply: Four type "AA" batteries (included)

Davis Cup Anemometer

- **Wind Direction**

Display Resolution: 16 points (22.5°) on compass rose, 1° in digital display

Accuracy: ±7°

- **Wind Speed**

Range: 2 to 175 mph., 4 to 280 kph, 2 to 152 knots, 0.9 to 78 $\frac{m}{2s}$

Accuracy: ±5%

- **System Hardware Compatibility**

Em50 Firmware version 1.19 or greater

ECH20 Utility 1.11 or greater

KD2 Pro

Operating Environment

Controller: 0 to 50 °C

Sensors: -50 to +150 °C

Controller

Power: 4 AA batteries

Battery Life: At least 500 readings in constant use or three years with no use (battery drain in sleep mode < 50 uA)

Case Size: 15.5 cm x 9.5 cm x 3.5 cm

Display: 3 cm x 6 cm, 128 x 64 pixel graphics LCD

Keypad: 6 key, sealed membrane

Data Storage: 4,095 measurements in flash memory (both raw and processed data are stored for download)

Interface: 9-pin serial

Read Modes: Manual and Auto Read

Sensors

6 cm (small) single needle (KS-1)

Size: 1.3 mm diameter x 6 cm long

Range:

0.02 to 2.00 $\frac{W}{(m*K)}$ (thermal conductivity)

50 to 5000 $^{\circ}C * \frac{cm}{W}$ (thermal resistivity)

Accuracy:

(Conductivity): $\pm 5\%$ from 0.2 to 2 $\frac{W}{(m*K)}$ $\pm 0.01 \frac{W}{(m*K)}$

from 0.02 to 0.2 $\frac{W}{(m*K)}$

Cable length: 0.8 m

10 cm (large) single needle (TR-1)

Size: 2.4 mm diameter x 10 cm long

Range:

0.1 to 4.0 $\frac{W}{(m*K)}$ (thermal conductivity)

25 to 1000 $^{\circ}C * \frac{cm}{W}$ (thermal resistivity)

Accuracy:

(Conductivity): $\pm 10\%$ from 0.2 to 4.0 $\frac{W}{(m*K)}$

$\pm 0.02 \frac{W}{(m*K)}$ from 0.1 to 0.2 $\frac{W}{(m*K)}$

Cable length: 0.8 m

3 cm dual-needle (SH-1)

Size: 1.3 mm diameter x 3 cm long, 6 mm spacing

Range:

0.02 to 2.00 $\frac{W}{(m \cdot K)}$ (thermal conductivity)

50 to 5,000 $^{\circ}C \cdot \frac{cm}{W}$ (thermal resistivity)

0.1 to 1.0 $\frac{mm^2}{s}$ (diffusivity)

0.5 to 4.0 $\frac{mJ}{(m^3 K)}$ (volumetric specific heat)

Accuracy:

(Conductivity) $\pm 10\%$ from 0.2 to 2 $\frac{W}{(m \cdot K)}$

$\pm 0.01 \frac{W}{(m \cdot K)}$ from 0.02 to 0.20 $\frac{W}{(m \cdot K)}$

(Diffusivity) $\pm 10\%$ at conductivities above 0.1 $\frac{W}{(m \cdot K)}$

(Volumetric Specific Heat) $\pm 10\%$ at conductivities above

0.1 $\frac{W}{(m \cdot K)}$

Cable length: 0.8 m

6 cm (thick) single needle (RK-1)

Note: The RK-1 is available for purchase and is not included with standard KD2 Pro.

Size: 3.9 mm diameter x 6 cm long

Range:

0.10 to 6.00 $\frac{W}{(m \cdot K)}$ (thermal conductivity)

17 to 1000 °C * $\frac{cm}{W}$ (thermal resistivity)

Accuracy (Conductivity):

±10% from 0.2 to 6.0 $\frac{W}{(m \cdot K)}$

0.02 $\frac{W}{(m \cdot K)}$ from 0.1 to 0.2 $\frac{W}{(m \cdot K)}$

Cable length: 0.8 m

5TM**Volumetric Water Content**

Range: Apparent dielectric permittivity (ϵ_a): 1 (air) to 80 (water)

Resolution: ϵ_a : 0.1 ϵ_a (unitless) from 1 to 20, < 0.75 ϵ_a (unitless)
from 20 to 80 VWC: 0.0008 m³/m³(0.08% VWC) from 0 to 50% VWC

Accuracy: ϵ_a : ±1 ϵ_a (unitless) from 1 to 40 (soil range), ±15% from 40 to 80 (VWC)

- Using Topp equation: ±0.03 m³/m³(±3% VWC) typical in mineral soils that have solution electrical conductivity < 10 dS/m
- Using medium specific calibration, ±0.01 to 0.02 m³/m³(±1 to 2% VWC) in any porous medium.

Temperature

Range: -40 to 60 °C

Resolution: 0.1 °C

Accuracy: ±1 °C

General

Dimensions: 10 cm (l) x 3.2 cm (w) x 0.7 cm (d)

Prong Length: 5.2 cm

Dielectric Measurement Frequency: 70 MHz

Measurement Time: 150 ms (milliseconds)

Power requirements: 3.6 to 15 VDC, 0.3 mA quiescent, 10 mA during 150 ms measurement

Output: RS232 (TTL) or SDI-12

Operating Temperature: -40 to 60 °C¹

Connector Types: 3.5 mm (stereo) plug or stripped & tinned lead wires (Pigtail)

Cable Length: 5 m standard; Maximum 75 m. Please contact Decagon if you need longer cable lengths.

Data logger Compatibility (not exclusive):

- Decagon: Em50, Em50R, and Em50G
- Campbell Scientific: Any logger with serial I/O (CR10X, CR850, 1000, 3000, etc.)

¹Customers may use sensors at higher temperatures under some conditions, please contact Decagon for assistance.

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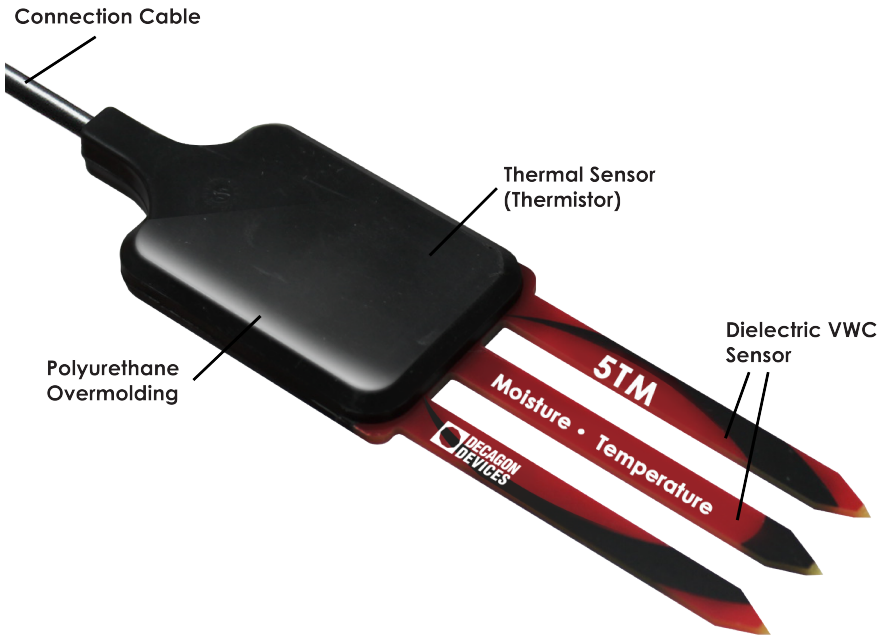


Figure 2: 5TM Components

Em50

Input Ports: 5, 12-bit analog, or 32-bit digital

Port Type: 3.5 mm “stereo jack” connector

Data Storage: 1 MB (36,800 scans for all five ports)

Memory Type: Non-volatile flash

Battery Capacity: Five AA Alkaline or Lithium batteries

Enclosure: Weatherproof, impact, and UV-resistant polymer

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