READ FIRST

This guide describes how to start using your soil moisture sensors immediately. If you read nothing else, read through this guide.

For more detailed information, download the complete user manual online at [www.decagon.com/sm](http://www.decagon.com/sm)

OVERVIEW & BASICS

Before installing your sensors in the field, set up and test your system (sensors and data loggers) in your lab or office. Make sure that you are using the most up-to-date software and firmware with Decagon data loggers. Visit the individual Decagon data logger product page for the most up-to-date software and firmware.

Take some measurements with the sensor using a ProCheck. Keep in mind that sensors will not necessarily read 100% VWC in water and 0% in air. The sensors are optimized to read soils, and the factory mineral calibration is done in real soils; not air and water.

You can check sensor functionality in air and water:
Values below are given in terms of % VWC using the factory mineral soils calibration

<table>
<thead>
<tr>
<th>MODEL</th>
<th>WATER</th>
<th>AIR</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC-5</td>
<td>50-60</td>
<td>slightly negative</td>
</tr>
<tr>
<td>10HS</td>
<td>50-60</td>
<td>slightly negative</td>
</tr>
<tr>
<td>5TE</td>
<td>~98</td>
<td>slightly negative</td>
</tr>
<tr>
<td>5TM</td>
<td>~98</td>
<td>slightly negative</td>
</tr>
<tr>
<td>GS3</td>
<td>~98</td>
<td>slightly negative</td>
</tr>
</tbody>
</table>

Sensors vary less than 1% from one sensor to the next. If you would like to check this for yourself, compare the output of the sensors when they are placed in Peak Gold brand anti-freeze (ethylene glycol) rather than water. Ethylene glycol has a dielectric permittivity similar to that of unsaturated soils.

Watch our installation video [www.decagon.com/install](http://www.decagon.com/install) for important set-up information. Installation methods and protection measures (including using PVC pipe to protect cables where they emerge from the soil) will have a critical impact on sensor function and data quality.
PROPER SENSOR INSTALLATION

1. Auger or trench a hole to the desired sensor depth.
2. Insert the sensor into undisturbed soil vertically, or horizontally.
3. Use the ProCheck to take a reading of the sensor. If you don’t think that the sensor has good soil-to-sensor contact, uninstall and reinsert into undisturbed soil.
4. When you are confident that the sensor has good soil-to-sensor contact, backfill the soil in the trench or hole to the approximate bulk density of the surrounding soil.
5. Protect the cables with PVC casing above the ground surface.
6. Plug your sensors into the data logger and configure the logger with Decagon software.

**Warning:** Incorrect sensor installation can void your sensor warranty.

**Warranty:** All Decagon products have a 30-day satisfaction guarantee and a one-year warranty.
You can configure your data loggers using either DataTrac 3 or ECH2O Utility Software.

Use virtual tools to calculate meaningful metrics, such as plant available water and vapor pressure deficit.

Pick your measurement interval by selecting "sensors and measurements."

Select the sensor plugged into each port.
**ECH₂O Utility**

**ECH₂O Utility** is included with every Em50 logger purchase.

Pick your measurement interval.

Select the sensor plugged into each port.

Try out DataTrac3 free for 30 days at www.decagon.com/datatrac3
SOIL CALIBRATION INFORMATION

Decagon has developed factory calibrations that can be used with typical soils and some soilless substrates. These calibrations are incorporated into Decagon software. If you choose to do a custom calibration, you only need to calibrate one sensor type (not every sensor) to your specific soil. We have complete instructions on custom calibrations at:

www.decagon.com/calibrate

Decagon can provide you with a custom calibration service.

USING SENSORS WITH NON-DECAGON DATA LOGGERS

Our user manuals and integrator's guides have complete information for interfacing Decagon sensors with non-Decagon loggers. In addition, we suggest that you use the specific logger manual during set-up. Below are some general guidelines to get you started.

<table>
<thead>
<tr>
<th>MODEL</th>
<th>EXCITATION</th>
<th>OUTPUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC-5</td>
<td>2.5-3.6 V</td>
<td>analog</td>
</tr>
<tr>
<td>10HS</td>
<td>3.6-15 V</td>
<td>analog</td>
</tr>
<tr>
<td>5TE</td>
<td>3.6-15 V</td>
<td>digital</td>
</tr>
<tr>
<td>5TM</td>
<td>3.6-15 V</td>
<td>digital</td>
</tr>
<tr>
<td>GS3</td>
<td>3.6-15 V</td>
<td>digital</td>
</tr>
</tbody>
</table>

Factory calibrations for typical mineral soils and soilless substrates can be found in the user manual.

Lightning: If you are using the sensors in a lightning-prone areas, follow our directions for providing lightning protection at:

www.decagon.com/lightning
RELATED DECAGON PRODUCTS

**GS3**
Volumetric water content, temp, EC

**5TE**
Volumetric water content, temp, EC

**5TM**
Volumetric water content, temp

**EC-5**
Volumetric water content

**10HS**
Soil matric potential, temp

**MPS-2**
Leaf wetness sensor
Duration of leaf wetness

**RT-1**
Rugged temperature sensor

**PYR**
Total solar radiation

**QSO-S**
PAR photon flux

**CUP**
Anemometer
Wind speed, direction

**TEMP/RH**
Temp and relative humidity

**CTD SENSOR**
Water depth, temp, EC

**DRAIN GAUGE**
Deep drainage monitor

**ECRN-50**
Low-resolution rain gauge

**ECRN-100**
High-resolution rain gauge

**DATATRAC 3**
Graphing and database software

**EM5OR DATA LOGGER**
Radio data logger

**EM5OG DATA LOGGER**
Cellular data logger

**EM50 DATA LOGGER**
Direct connect logger

**PROCHECK**
Sensor read-out and storage system
SOIL MOISTURE PRODUCTS,

Seller warrants new equipment of its own manufacture against defective workmanship and materials for a period of one year from date of receipt of equipment (the results of ordinary wear and tear, neglect, misuse, accident and excessive deterioration due to corrosion from any cause are not to be considered a defect); but Seller’s liability for defective parts shall in no event exceed the furnishing of replacement parts F.O.B. the factory where originally manufactured. Material and equipment covered hereby which is not manufactured by Seller shall be covered only by the warranty of its manufacturer. Seller shall not be liable to Buyer for loss, damage or injuries to persons (including death), or to property or things of whatsoever kind (including, but not without limitation, loss of anticipated profits), occasioned by or arising out of the installation, peration, use, misuse, nonuse, repair, or replacement of said material and equipment, or out of the use of any method or process for which the same may be employed. The use of this equipment constitutes Buyer’s acceptance of the terms set forth in this warranty. There are no understandings, representations, or warranties of any kind, express, implied, statutory or otherwise (including, but without limitation, the implied warranties of merchantability and fitness for a particular purpose), not expressly set forth herein.

Model Number: EC-5, 10HS, 5TE, 5TM, GS3. Year of First Manufacture:2001Manufacturer’s Name: Decagon Devices, Inc. 2365 NE Hopkins Court Pullman, WA 99163 USA

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