

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

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The ECH<sub>2</sub>O Check is a hand-held readout device designed for use with Decagon's ECH<sub>2</sub>O soil moisture sensors. It does not store any data; it is simply used for making a quick measurement. It has a simple two-button interface to initiate readings, scroll through different unit options, and adjust calibration.



*ECH<sub>2</sub>O Check Diagram*

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

To turn on the ECH<sub>2</sub>O Check, simply press the left button labeled **I**. The ECH<sub>2</sub>O Check will remain on as long as you are using it, and will shut off automatically when not in use for more than 5 minutes.

## Choose Sensor Type

The ECH<sub>2</sub>O Check has different calibration settings for each type of ECH<sub>2</sub>O sensor. Before using, make sure to set the ECH<sub>2</sub>O Check to the proper sensor type that you will be using. To display and set the sensor types, press and hold the left **I** button, then press the right **II** button repeatedly to cycle through types:

**E5** is for the ECH<sub>2</sub>O EC-5 soil moisture sensor

**10H** is for the ECH<sub>2</sub>O 10-HS soil moisture sensor

**E10** is for the ECH<sub>2</sub>O EC-10 soil moisture sensor

**E20** is for the ECH<sub>2</sub>O EC-20 soil moisture sensor

**USR** is for user-set calibration. Refer to the reverse side of this guide for information on adjusting calibration.

## Choose Display Mode

The ECH<sub>2</sub>O Check can display its data in terms of three different units: volumetric water content percentage, inches per foot, and ADC counts. These modes are displayed in the upper right corner of the ECH<sub>2</sub>O Check LCD as "PCT," "IPF," and "ADC," respectively. The mode can be changed by repeatedly pressing the right **II** button. Here is a definition of the three modes:

**PCT:** This is the volumetric water content percentage, meaning the amount of total soil volume that consists of water. This is generally a number between 0 and 50%, assuming that typical soils have 50% mineral and organic matter and 50% pore space that can be filled with air or water.

**IPF:** This value means "Inches per foot," which is another unit of volumetric water content measurement. It is defined as the depth of water (in inches) per foot of soil.

**ADC:** This is the Analog to Digital Converter number, which is the same type of raw data you would receive from the Em5b or Em50 data logger.

## Taking a Measurement

To take a measurement, attach an ECH<sub>2</sub>O sensor to the ECH<sub>2</sub>O Check, and press the **I** button. The ECH<sub>2</sub>O Check will initiate an instant reading.

## Changing the user-set calibration terms

You may want to adjust the user-set calibration terms to reflect any soil specific calibration that you have calculated. To do so, you must enter the "USR" menu and adjust the slope and offset. You cannot adjust the calibration of the EC-5, 10HS, EC-10, and EC-20 modes. To manually adjust calibration terms for the "USR" setting, do the following:

**Note:** *User calibration cannot be applied to the 10HS. For further information, please contact Decagon.*

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1. Turn on the ECH<sub>2</sub>O Check, then hold the **II** button continuously for 10 seconds. The calibration adjustment menu will appear. Use the right **II** button to scroll through the calibration adjustment options. They are described as follows:

**SU** (adjust slope up)

**SD** (adjust slope down)

**IU** (adjust intercept up)

**ID** (adjust intercept down)

**STO** (store changes)

**Esc** (escape the calibration menu)

2. Once you have accessed the desired adjustment option, use the **I** button to change the numbers.

3. Once you have finished adjusting the slope and intercept, advance to the “Sto” screen, then press the left button **I** to store the new values.

**Note: Changes will not be stored if the ECH<sub>2</sub>O Check turns off before using “Sto” menu.**

4. If you wish to discard any changes that haven’t been stored, advance to the “Esc” screen and press the **I** button once to return to the main screen.

### **Calibration Settings:**

#### **Mineral Soil (Factory Calibration):**

EC-5: slope = 085, intercept = 048

10-HS: polynomial calibration (factory set only)

EC-10: slope = 057, intercept = 038

EC-20: slope = 042, intercept = 029

#### **Potting Soil:**

EC-5: slope = 130, intercept = 696

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## **Troubleshooting FAQ**

### **Q: Why does my ECH<sub>2</sub>O Check display a negative percentage value when I measure my sensor in air or very dry sand?**

A: The ECH<sub>2</sub>O Check has been calibrated with settings that make the assumption that you are using the sensor in some type of soil or growth medium, which typically has some dielectric component to it, regardless of the moisture. Therefore, when measurements are taken in these very dry conditions, where there is little or no dielectric, a negative value is displayed. This is normal, and does not mean the sensor is not functioning.

### **Q: Why doesn’t my EC-10 or EC-20 sensor display a 100% value when placed in pure water?**

A: For the EC-10 and EC-20, the optimal measurement range in soil is from oven dry to saturated water content, which is typically 40 to 50%. Above saturation, the change in sensor output with increasing water content is near 0. The ECH<sub>2</sub>O sensor uses an electromagnetic (EM) field to sense the dielectric of the surrounding medium. As water content increases, the width of that EM field diminishes somewhat. As it approaches 100% VWC (water with no soil), the EM field diminishes to a fraction of its original size, and primarily measures the sensor surface itself. Therefore, changes in water content above that level result in relatively the same millivolt output from the EC-10 and EC-20 sensor. However, our tests on the EC-5 and 10HS sensors indicate that its response allows for measurements up to 90% VWC and 56% VWC, respectively.



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