

# Wireless Soil Moisture Sensor

PS-3228

## About the product



The Wireless Soil Moisture Sensor measures the water content of soil and reports it in units of volumetric water content (VWC) percentage. The sensor consists of the Wireless Soil Moisture Sensor box and the Soil Moisture Sensor Probe.

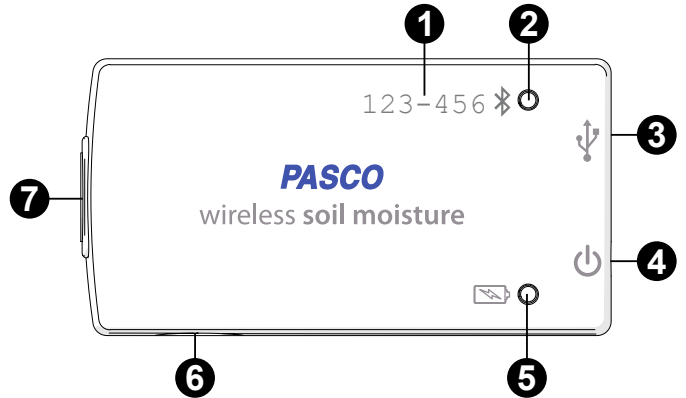
### What's Included

- Wireless Soil Moisture Sensor Box
- Soil Moisture Sensor Probe
- USB Cable

### Required Items

- **Data Collection Software**  
This product requires PASCO software for data collection and analysis. Either SPARKvue or PASCO Capstone can be used.


## Part names and functions




**1 Device ID**  
Use to identify the sensor when connecting using Bluetooth.

**2 Bluetooth Status Light**   
Indicates the status of the Bluetooth connection.

LIGHT	STATUS
Red (blink)	Ready to pair
Green (blink)	Paired
Yellow (blink)	Remotely logging data

**3 USB Port**   
Use with the USB cable to connect to a USB wall charger to charge the battery. Can also be used to send measurement data to software when connected to a USB port of a computer or mobile device (iOS devices not supported).

**4 Power Button**   
Press and hold for one second to turn the sensor on or off.

**5 Battery Status Light**   
Indicates the battery level and charging status.

LIGHT	STATUS
Red (blink)	Low battery level
Green (solid)	Fully charged
Yellow (solid)	Charging

**6 Threaded Hole**  
Use for mounting the sensor, such as to a mounting rod. Accepts 1/4–20 screws.

**7 Soil Moisture Probe Port**  
Use for connecting the soil moisture probe to the sensor box. Line up the arrow on the back of the sensor box with the arrow on the plug to connect the plug in the correct direction.

## Getting started

Before using this device in the classroom, you need to charge the battery, install data collection software, and check for a firmware update.

### Charge the battery

The Wireless Soil Moisture Sensor contains a rechargeable battery that lasts an entire school day when fully charged. Charge the battery before using the Wireless Soil Moisture Sensor for the first time since it is not shipped with a full charge.

To charge the battery, connect the sensor to a USB wall charger or powered USB port using the USB cable. The battery status light will be solid yellow while the battery is charging. The light will change to solid green when the battery is fully charged.


### Install or update data collection software

The latest update of PASCO Capstone or SPARKvue is required to use the Wireless Soil Moisture Sensor. Download and install the software from the PASCO website. Check if an update is available if the software is already installed.

#### SPARKvue

Windows and Mac Computers

Download: Go to [pasco.com/sparkvue](https://www.pasco.com/sparkvue) then click **Downloads**.

Update: Click  then select **Check for Updates**.

Mobile Devices and Chromebooks

Search for SPARKvue in your device's app store. SPARKvue will automatically install future updates.



#### PASCO Capstone

Windows and Mac Computers

Download: Go to [pasco.com/capstone](https://www.pasco.com/capstone) then click **Downloads**.

Update: Click **Help** then select **Check for updates**.

### Check for a firmware update

Update the sensor firmware to access the latest features and bug fixes. Sensor firmware is installed using SPARKvue or PASCO Capstone. Connect the sensor to SPARKvue or PASCO Capstone to check for a firmware update.

#### SPARKvue

1. Turn on the Wireless Soil Moisture Sensor.
2. Open SPARKvue then click **Sensor Data**.
3. Select the sensor that matches the device ID.
4. If a notification appears, click **Yes** to update the firmware. If a notification does not appear, the firmware is up to date.


#### PASCO Capstone

1. Turn on the Wireless Soil Moisture Sensor.
2. Open Capstone then click **Hardware Setup**.
3. Select the sensor that matches the device ID.
4. If a notification appears, click **Yes** to update the firmware. If a notification does not appear, the firmware is up to date.

## Using the sensor

### Connect the probe to the sensor

The plug on the soil moisture probe connects to the port on the sensor box in a specific direction. Line up the arrows on the front of the sensor box with the arrows on the plug to connect the plug in the correct direction (Figure 1).

 **Note:** If you are not getting any response from the sensor while recording data, make sure that the probe plug is firmly connected to the sensor.

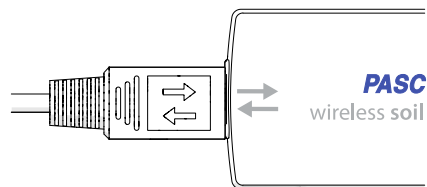




Figure 1. The arrow on the plug lined-up with the arrow on the sensor box.

### Install the probe in soil


When installing the probe, it is best to maximize contact between the probe and the soil. Any air gaps or excessive soil compaction around the probe can affect the readings.

 **Note:** The sensor box is not waterproof. Seal the sensor box and the probe plug inside of a waterproof bag when taking measurements in wet environments. Keep the sensor box off the ground.

1. Dig a narrow, 10-inch long trench in the soil to a desired depth.
2. Place the probe into the trench horizontally with the flat size perpendicular to the soil surface (Figure 2).

 **Note:** Be careful when inserting the probe into dense soil. The probe will break if excessive sideways force is used when pushing it in. Do not pull the probe out by the cable when removing the probe from soil.

3. Cover the entire probe with soil. Tamp down the soil along the probe with your fingers to match the compaction of the surrounding soil.

 **Tip:** To obtain the most accurate measurement of soil moisture, repeat this step several times. Record a new measurement each time and find the average the measurements.

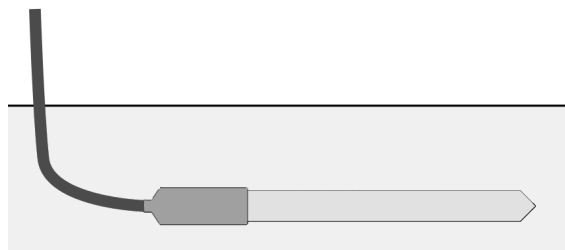


Figure 2. Soil moisture probe installed in soil.

## Soil moisture measurements

The sensor measures soil moisture in units of volumetric water content (VWC) percentage. Volumetric water content is the ratio of water volume per unit of soil volume.

Dry soil consists of solid material and air pockets. Consider a soil sample with a volumetric ratio of 55% solid material and 45% air pockets. As water enters the soil, the air pockets begin to fill with water. A sample measuring 10% VWC would be 55% solid material, 35% air pockets, and 10% water. The soil is saturated when all the air spaces are filled with water. In this example, the maximum volumetric water content would be 45%.




The sensor provides VWC measurements for three types of soil:

- **Clay**  
Use this measurement for soil that is smooth to the touch and easily compacted. This type of soil will be sticky and clump together when wet but crack as it dries.
- **Sand**  
Use this measurement for soil consisting of coarse and gritty particles.
- **Loam**  
Use this measurement for soil consisting of a mixture of sand, clay, and silt. Loam is often high in dark, composted material and found in most commercial garden soils.





## Connect the sensor to software

Connect the sensor to SPARKvue or PASCO Capstone to collect data.

### SPARKvue

1. Turn on the Wireless Soil Moisture Sensor.
  2. Open SPARKvue then click Sensor Data .
  3. Connect the Wireless Soil Moisture Sensor to SPARKvue:
    - USB: Connect the Wireless Soil Moisture Sensor to your device using the USB cable.
-  Note: USB is not supported for iOS devices.
- Bluetooth: Select the Wireless Soil Moisture Sensor that matches its device ID.
  4. Select  the measurements you want to display.
  5. Select a Template to display your data.
  6. Click Start  to begin data collection.

### PASCO Capstone

1. Turn on the Wireless Soil Moisture Sensor.
2. Open Capstone then click Hardware Setup .
3. Connect the Wireless Soil Moisture Sensor:
  - USB: Connect the Wireless Soil Moisture Sensor to your computing device using the USB cable.
  - Bluetooth: Select the Wireless Soil Moisture Sensor that matches its device ID.
4. Click Data Summary  then click and drag a measurement to a display, such as a Graph .
5. Click Record  to begin data collection.

## Additional resources

### Software help

Additional information on how to use the Wireless Soil Moisture Sensor with SPARKvue and Capstone can be found in the SPARKvue and PASCO Capstone Help. The help can be accessed within the software or online.

#### SPARKvue

Software: Click  then select Help.

Online: [pasco.com/help/sparkvue](https://pasco.com/help/sparkvue)

#### PASCO Capstone

Software: In the menu bar, click **Help** then select **PASCO Capstone Help**.

Online: [pasco.com/help/capstone](https://pasco.com/help/capstone)

### Product information

Visit the product web page at [pasco.com/product/PS-3228](https://pasco.com/product/PS-3228) for additional information including:

- Specifications
- Buying Guide
- Experiments
- Documents



### Technical Support

Need more help? Our knowledgeable and friendly Technical Support staff is ready to provide assistance with this or any other PASCO product.

Phone (USA)	1-800-772-8700 (Option 4)
Phone (International)	+1 916 462 8384
Online	<a href="https://pasco.com/support">pasco.com/support</a>

## Regulatory information

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### Warranty, Copyright, and Trademarks

#### Limited Warranty

For a description of the product warranty, see the Warranty and Returns page at [www.pasco.com/legal](http://www.pasco.com/legal).

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### Product end of life disposal instructions



This electronic product is subject to disposal and recycling regulations that vary by country and region. It is your responsibility to recycle your electronic equipment per your local environmental laws and regulations to ensure that it will be recycled in a manner that protects human health and the environment. To find out where you can drop off your waste equipment for recycling, please contact your local waste recycle or disposal service, or the place where you purchased the product.

The European Union WEEE (Waste Electronic and Electrical Equipment) symbol on the product or its packaging indicates that this product must not be disposed of in a standard waste container.

### Battery disposal instructions



Batteries contain chemicals that, if released, may affect the environment and human health. Batteries should be collected separately for recycling and recycled at a local hazardous material disposal location adhering to your country and local government regulations. To find out where you can drop off your waste battery for recycling, please contact your local waste disposal service, or the product representative. The battery used in this product is marked with the European Union symbol for waste batteries to indicate the need for the separate collection and recycling of batteries.

### FCC statement

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

### CE statement

This device has been tested and found to comply with the essential requirements and other relevant provisions of the applicable EU Directives.