

# Wireless Soil Moisture Sensor

## Model: WH51

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# **1. Introduction**

Thanks for purchasing this WH51 soil moisture sensor. This device measures soil moisture. The data can be streamed by GW1000 Wi-Fi Gateway(sold separately) and can be viewed on our WS View mobile application after the Wi-Fi configuration done . Or a receiver console can be used to display the received sensor value.

To ensure the best product performance, please read this manual and retain it for future reference.

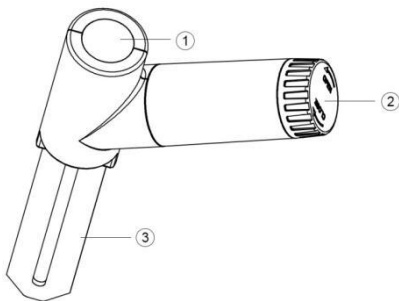
## **2. Getting Started**

### **2.1 Parts List**

One Soil Moisture Sensor

One User Manual

### 3. Overview



- 1 LED Indicator (RF transmission)
- 2 Battery Cap
- 3 Soil Moisture Sensor

## **3.1 Features**

### **Soil Moisture Sensor**

- Measures soil moisture content every 70 seconds.
- Custom Mode: with 0%AD and 100%AD custom mode to manually calibrate the low/high moisture value so that you can get more accurate result for different soil types. This mode can only be activated through WS View app and in live data display mode.
- Long wireless range, up to 300 feet (100 meters) in open areas

### **When paired with a GW1000 Wi-Fi Gateway:**

- Monitor live sensor data on the Live Data page of the WS View app

(requires the gateway and your phone is using the same Wi-Fi network)

- Up to 8 channels supported. Channel names can be edited on the app.

### **When paired with a Weather Station Console (HP2551/HP3500/HP3501):**

- View soil moisture data in real-time on the Display
- Up to 8 channels supported. Channel names can be edited on the Display (for HP2551 only).

### **When uploaded to Ecowitt Weather Server:**

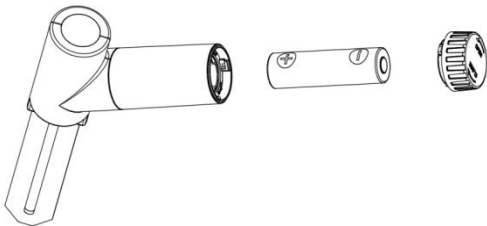
- View current soil moisture data & history records & graph on the website
- Set and receive email alerts from the server

- Channel names can be edited on the website
- Remote monitoring with smart phone, laptop, or computer by visiting the website

**Note:** The WH51 and WN51 will be recognized as the same sensor type by the software. If you purchased both, they will share the eight channels together and the total quantity of the two sensors could not exceed eight.

## 4. Setup Guide

### 4.1 Install batteries



1. Open the battery cap of the soil moisture sensor
2. Insert one AA battery and close battery cap.
3. After inserting the battery, the remote sensor LED indicator will light for 4 seconds, and then flash once per 70 second thereafter. Each time it flashes, the sensor is

transmitting data. You may go to **Section 5** now to complete the GW1000 gateway configuration first to make its data displayed and resume the steps followed below.

4. Before install the sensor into its permanent location, we would suggest test the sensor in air, and see if moisture reading is 0. And then put the sensor into a cup of water, the sensor should have its reading increased to 90% or above. Once sensor detected a significant data change, sensor will transmit every 10s. Once sensor has been confirmed working correctly, then you can go to next step.
5. Insert the sensor totally into the soil of your desired location. Please do not use excessive force to push the sensor into the soil to avoid any damage.



## **5. Wi-Fi Configure with gateway**

To view the soil moisture data on your mobile application and receive email alerts on our weather server, you need to pair this device with our GW1000 Wi-Fi Gateway or HP2551/HP3500/HP3501 Weather Station (sold separately).

### **5.1 Pair with Gateway**

If GW1000 has been in operation, and you have never had any WH51 soil moisture sensor setup before, just power up the sensor and GW1000 will pick soil moisture data automatically.

Note: The gateway can support max 8 soil moisture sensors. Each new sensor will be recognized as a new channel according to the Power-on sequence. You may attach a label of the channel on each sensor for distinction. The

channel name can be edited both on the app and ecowitt.net(will not sync).

If you want to use a new WH51 sensor to replace the old one(already configured on certain channel), please try the following:

1. Open the Sensor ID page on the WS View app, and find your old sensor ID.
2. Power off the old sensor and power on the new sensor.
3. Click Re-register on the Sensor ID page.

Then the new sensor will be learned and the old sensor will be erased.

## **5.2 Wi-Fi Connection for the Gateway**

For this part, please refer to the manual of the GW1000 Wi-Fi gateway.

Any question, please contact the customer service.

## **6. View Online Data on WS View**

When the Wi-Fi configuration is done, you can view the live data of your soil moisture sensor on the WS View application.

Back	Live Data GW1000B-WIFI8980	More
Indoor Temperature 26.9 °C		Indoor Humidity 75 %
Absolute Pressure 1007.7 hPa		Relative Pressure 1007.7 hPa
/	CH1 Soil	0 %
/	CH2 Soil	0 %
/	CH3 Soil	0 %
/	CH4 Soil	0 %
/	CH5 Soil	0 %
/	CH6 Soil	0 %
/	CH7 Soil	0 %
/	CH8 Soil	60 %
Firmware Version GW1000B_V1.4.7		

Note: It requires your phone and the gateway using the same network to view your sensor data on the WS View app.



To remote monitor the sensor data, please upload the data to our free Ecowitt Weather Server: <https://www.ecowitt.net>.

Detailed operation instructions can be found on the GW1000 manual.

Any question, please feel free to contact our customer service at [support@ecowitt.com](mailto:support@ecowitt.com)

## **7. Custom mode**

When in LIVE DATA display mode, you can calibrate the soil moisture sensor by enable the Custom mode. (Click More – Choose Calibration – Choose Soil Calibration – Tick the box on the left side of the Customize).

Back	Live Data GW1000B-WIFI8980	More
Indoor Temperature 26.5 °C	<b>Live Data</b>  <b>Weather Services</b>  <b>Calibration</b>  <b>Rain Totals</b>  <b>Device Settings</b>  <b>Sensors ID</b>	
Outdoor Temperature 28.0 °C		
Absolute Pressure 1007.9 hPa		
Solar Radiation 0.00 w/m <sup>2</sup>		
Wind Speed 12.24 km/h		
Wind Gust 12.96 km/h		
Rain		
Rain Rate		
Rain Day		
Rain Week		
Rain Month		
Rain Year		
 CH2 Soil		
 CH4 Soil		

Back	Calibration GW1000B-WIFI8980	More
PM2.5 Gain:	<input type="text" value="1.0"/>	
SolarRad Gain:	<input type="text" value="1.0"/>	
UV Gain:	<input type="text" value="1.0"/>	
Wind Gain:	<input type="text" value="1.0"/>	
Rain Gain:	<input type="text" value="1.0"/>	
InTemp Offset:	<input type="text" value="0.0"/>	°C
InHumi Offset:	<input type="text" value="0"/>	%
Abs Offset:	<input type="text" value="0.0"/>	hPa
Rel Offset:	<input type="text" value="0.0"/>	hPa
OutTemp Offset:	<input type="text" value="0.0"/>	°C
OutHumi Offset:	<input type="text" value="0"/>	%
WindDir Offset:	<input type="text" value="0"/>	Degrees
<input type="button" value="Soil Calibration"/>		
<input type="button" value="Save"/>		
<input type="button" value="Reset to Defaults"/>		

Navigation icons: Home, Back, Forward



Back	Soil AD GW1000B-WIFI8980	More
CH2 Soil	Now AD 182 <input type="checkbox"/> Customize	
<b>28%</b>	0%AD <input type="text" value="70"/>	
	100%AD <input type="text" value="500"/>	
CH4 Soil	Now AD 20 <input type="checkbox"/> Customize	
<b>0%</b>	0%AD <input type="text" value="70"/>	
	100%AD <input type="text" value="500"/>	
<input type="button" value="Save"/>		
<input type="button" value="Reset"/>		

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### Custom OFF:

Moisture level is calculated based on default dry and wet definition:

Dry (0%AD) AD: 70

Wet (100% AD) AD: 500

$$\text{Soil Moisture} = (\text{moisture AD} - 0\%AD) * 100\% / (100\% AD - 0\%AD)$$

Example: when sensor moisture AD is 310, calculated moisture is:

$$(310 - 70) * 100\% / (500 - 70) = 56\%$$

This is a fixed slope rate linear system.

### Custom ON:

When pot soil at dry or wet condition is not giving the moisture sensor output value that is close to its default assumption, it will give

inaccurate moisture level results. It is commonly happening with different soil type that gives very different output value at same moisture level condition. We introduced this custom mode to make this slope flexible so that it can match your soil type.

This becomes a variable slope rate linear system.

### **Adjusting principle:**

**0%AD** is used to adjust for dry condition reading inconsistency.

When the displayed moisture readings are too high at dry soil condition, you could lower the slope rate by increasing the 0%AD value.

**100%AD** is used to adapt for wet condition reading inconsistency.

When the displayed moisture readings are too low at extremely wet soil condition, you could decrease the 100%AD value to fix it.

Please refer to the below example for better understanding.

**For example:**

When you use this product at the first time, you may turn off the custom mode and test the product at the following two situations:

**Situation One:**

Place the sensor into a glass of fresh water, and the displayed moisture readings is much lower than 95%(e.g.70%).

**Solution:**

Enable custom mode, and adjust the 100%AD

value.

Calculate the 100%AD value with the formula:

$$\text{Soil Moisture} = (\text{moisture AD} - 0\%AD) * 100\% / (100\%AD - 0\%AD)$$

If:

$$\text{Now AD} = 183$$

$$0\%AD = 70$$

$$\text{Target Soil Moisture Reading} = 95\%$$

Then:

$$95\% = (183 - 70) * 100\% / (100\%AD - 70)$$

Result: 100%AD = 188(take the Integer part)

Then you can adjust the default 0%AD value to 188 and touch the screen for once to update the data. When you get your expected moisture reading, click Save to save the setting.

## **Situation Two:**

Leave the sensor aside without touching any water, and the displayed moisture readings are much higher than 10% (e.g.40%).

## **Solution:**

Enable the custom mode and adjust the 0%AD value.

Calculate the 0%AD value with the formula:

$$\text{Soil Moisture} = (\text{moisture AD} - 0\%AD) * 100\% / (500 - 0\%AD)$$

If:

$$\text{Now AD} = 183$$

$$100\%AD = 500$$

$$\text{Target Soil Moisture Reading} = 10\%$$

Then:

$$10\% = (183 - 0\%AD) * 100\% / (500 - 0\%AD)$$

Result: 0%AD = 147(take the Integer part)

Then you can adjust the default 0%AD value to 147 and touch the screen for once to update the data. When you get your expected moisture reading, click Save to save the setting.

**Note:** The soil moisture sensor should be inserted totally into the soil for accurate result.

Record the 0%AD and 100%AD value for future use (when WIFI network changed).

Note: In general, the device has been calibrated in the factory, and you don't need to calibrate it on your side.

## 8. Specification

Moisture Range:0~100%; Resolution: 1%  
0%AD setting range:0~200;

Initial value: default to factory calibration.

100%AD setting range:0%AD+10~1000;

Initial value: default to its factory calibration

Frequency: 433/915/868 MHz(optional)

Sensor reporting interval: 70 seconds

Transmission distance in open field: 100m(300 feet)

IP66 waterproof

### Power consumption

- Soil moisture sensor: 1xAA Alkaline batteries (not included)
- Battery life: Minimum 12 months



## **9. Warranty Information**

**We disclaim any responsibility for any technical error or printing error, or the consequences thereof.**

**All trademarks and patents are recognized.**

We provide a 1-year limited warranty on this product against manufacturing defects, or defects in materials and workmanship.

This limited warranty begins on the original date of purchase, is valid only on products purchased, and only to the original purchaser of this product. To receive warranty service, the purchaser must contact us for problem determination and service procedures.

This limited warranty covers only actual defects within the product itself and does not cover the cost of installation or removal from a fixed installation, normal set-up or adjustments,

or claims based on misrepresentation by the seller, or performance variations resulting from installation-related circumstances.