

# **WATERMARK**

## **ELECTRONIC MODULE**

### **▫ BATTERY VERSION ▫**

#### **INSTALLATION AND OPERATING INSTRUCTIONS**

#### **WATERMARK SENSORS**

#### **and the**

#### **WATERMARK ELECTRONIC MODULE – BATTERY VERSION**

#### **WATERMARK ELECTRONIC MODULE – BATTERY VERSION (WEM-B)**

The WATERMARK Electronic Module – Battery Version (WEM-B) with its pair of sensors, is used to control a battery operated irrigation valve/controller that has a sensor connection available.

#### **WATERMARK SENSORS**

The WATERMARK Soil Moisture Sensors are installed in an active root system area, representative of that plant material which is being used as the control point for the individual valve zone or the Hydrozone area. If used to control multiple valves, select the area of heaviest water use. In selecting the site, factors such as sprinkler distribution, topography, appearance of the turf or plant material and the amount of sun exposure should be considered. It would be preferable to locate the sensor in the drier area, avoiding low spots, which may be on the wetter side due to runoff and drainage. Wires from the sensors are run back to the location where the WEM-B is mounted.

#### **Installing WATERMARKS**

WATERMARKS are installed beneath the ground with two sensors at each location in the active root system of the turf or plant material being monitored. Depth of placement varies with the rooting depth of turf or plant material.

#### **TYPICAL INSTALLATION DEPTHS**

Shallow Rooted Turf.....2" to 5" deep (in root system)  
Deep Rooted Turf.....6" to 8" deep (in root system)  
Shrubs/Ground Cover.....8" to 14" deep (in root system)  
Trees.....16" to 24" deep (in root system)

## How to Install

### STEP 1:

Soak WATERMARK sensors in water before installation. Always install a “wet” sensor.



**STEP 2:** For root systems that are less than 12” deep, sensors are installed 4” to 6” apart at each location at the same depth (see Typical Installation Depths). For root systems deeper than 12” (deep-rooted shrubs or trees), sensors are installed at slightly varying depths. This gives an “average” reading, over the entire root profile, of the two sensors combined to activate or eliminate irrigation as needed. Sensor wires are run below grade to the adjacent splice box located 2-3 feet from the sensors.

**STEP 3:** Install a splice box (Ametek #182001/2 Econo Box or equal) within 2-3 feet of the sensor location and cut a trench from the splice box to the sensor location for the sensor wire run.

**STEP 4:** At the end of the trench, excavate a hole to the depth required for the sensors to be installed (see Typical Installation Depths). Install the two sensors 4” – 6” apart by pressing them partly into the soil at the appropriate depths in this hole. A piece of 1/2” PVC pipe (class 315) can be used as an insertion tool to push the sensor in, being careful not to pinch the wires. Be sure sensors are installed in the active root system of the turf, shrubs or trees. Sensors should be installed at a downward angle into the soil, NOT horizontal. Sensors **MUST** be firmly packed in the soil.



Note: The sensor wires can be run in conduit if desired. The top of the sensor will socket inside 1/2” class 315 PVC pipe, and can be solvent welded with ABS to PVC cement.

**STEP 5: Backfill the sensors firmly** to ensure a snug fit and run the sensor wires to the splice box. Backfill the sensor wire trench.

**STEP 6:** Separate the two conductors for each sensor and strip insulation for making a splice. Always use waterproof wire connectors, like those used with irrigation valve wiring. Splice one wire from each sensor together, running them in series. Then splice each remaining wire to the wires running back to the WEM-B. Refer to Sensor Wire Sizing Chart:

### SENSOR WIRE SIZING

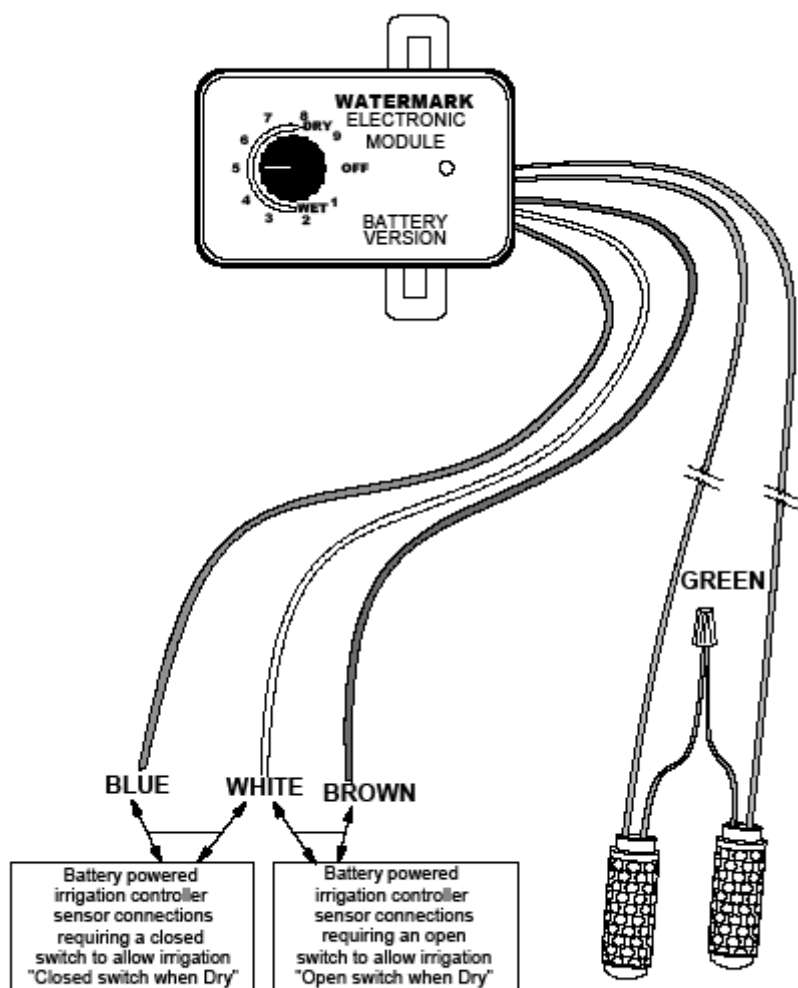
Length of Run	Wire Size
Up to 1000'	#18 AWG-UF Valve Wire
1000' to 2000'	#16 AWG-UF Valve Wire



**You are now ready to install the WATERMARK Electronic Module – Battery Version (WEM-B):**

**Step 7:** Typically the WEM-B is mounted in the valve box along with the battery operated irrigation valve/controller it is connected to. Two mounting tabs are provided to secure the WEM-B in place. A nylon wire tie can easily be used to affix the WEM-B to the PVC pipe next to the battery operated valve/controller, or screws can be used to fasten it to the valve box wall or lid.

Run wires from the battery operated irrigation valve/controller's sensor connection to the WEM-B and make waterproof connections as follows (see wiring diagram):



On the controller side of the WEM-B, connect the white wire and either the blue or brown wires to the sensor connection of the battery powered valve/controller. The White/Blue wire combination is for controllers that need a closed switch when dry. The White/Brown wire combination is for controllers that need an open switch when dry. Consult your controller owner's manual for specifics on which switch type is required.

On the sensor side of the WEM-B, connect one green wire to each sensor. The remaining two sensor wires (one from each sensor) are connected to each other (sensors wired in series, see step 6).

The WEM-B functions as a switch, powered by its own internal 9 volt battery that opens or closes to indicate the need to water. This switch connects to the battery powered irrigation valve/controller's sensor circuit. Replace the 9 volt battery yearly, or whenever the light stops flashing. The red light flashes approximately every 15 seconds to indicate the battery has sufficient charge.

**PLEASE NOTE:** Sensors must be located in and irrigated by the **last valve** to run in each valve "group". Resequence valves to accomplish this as necessary.

### **SOIL MOISTURE SETTING**

Each Hydrozone, or "irrigation need" group can be set for differing soil moisture levels. The adjustment dial gives you from very wet (position #1 – 10 centibars of soil suction) to dry (position #9 – 80 centibars of soil suction). The range from position #1 to #4 (approximately 10 centibars to 25 centibars) is the normal range for most water sensitive turf or plant material. The intermediate to drier end of soil moisture is from position #5 to #9 (approximately 35 to 80 centibars) is useful for most shrubs and ground cover. The WEM-B is adjustable from 10 to 80 centibars and has an OFF position to allow for overriding the sensors.

### **PROGRAMMING THE CONTROLLER**

Keep in mind that your Soil Moisture Sensors only serve to override your irrigation controller/time clock to prevent excessive or unnecessary irrigation. The irrigation controller is still "in control" and determines "when" irrigation can occur and "how long" a given valve can run. Thus, the key to successful use of this entire system depends on properly

programming your irrigation controller. The correct procedure in programming is as follows:

1. Allow the controller to come on as often as possible (except maybe the night before the mowing day). This means the controller is daily “asking” the moisture sensors if irrigation is needed. It will operate *ONLY* when the sensors say it’s necessary.
2. Set the valve cycle timer (duration or run time) for short cycles. This prevents the runoff you often see with longer cycles. The soil can absorb the water only so fast, and long cycles usually don’t permit all the water to penetrate the soil where it’s needed.
3. With short cycles, you’ll need to have several repeat cycles, or start times, each day. Have an irrigation consultant help you set up a program of this type to meet peak consumptive use based on your specific system and plant material. Since this program can be used year round (except in freezing climates) with your moisture sensor control, you will eliminate the need for seasonal program adjustments. The sensors will automatically adjust the irrigation to whatever is needed, regardless of the weather.
4. Monitor your system and plant material to fine tune your moisture settings for proper balance and correct plant response. You can fine tune by:
  - A. Adjusting the moisture setting for a wetter or drier control.
  - B. Changing the programmed cycle duration to prevent excessive runoff.
  - C. Changing the number of repeat cycles, or start times, to increase or decrease total irrigation “potential” to meet the peak consumptive use of the turf or plants.

In setting up this final program, it may be advisable to use the services of a consultant who can help you evaluate your irrigation system efficiency and provide you with a schedule that matches your specific situation.

Once you have established a balanced program, further adjustments become less necessary. All you need to do is monitor the results, thus eliminating the constant programming of the controller for seasonal needs.

**NOTE:** The WaterPerfect Irrigation Scheduling and Water Management Software program is available to assist you in creating a recommended schedule for the controller and selection of an appropriate moisture setting. Please refer to the WaterPerfect brochure.

## **INDICATOR LIGHT**

Each WATERMARK Electronic Module - Battery Version (WEM-B) comes with an indicator light. Whenever the dial position is changed, the light flashes to indicate it has read the sensors. This light will also momentarily flash approximately every 15 seconds indicating the unit is operating. When turned to the Off position, three quick flashes of the light indicate battery status is good.

## **BATTERY REPLACEMENT**

Remove the rubber plug in the bottom of the WEM-B to access the 9 volt battery. Remove the old battery from the battery clip and insert a new battery. Be sure the clip is tight on the battery terminals. Insert the battery into the rubber plug. Insert the rubber plug into the housing of the WEM-B by placing the battery bottom end in first, then working the rest of the plug in. A final "burp" of air can be released from the opposite end when fully in place. Inserting a narrow screwdriver, or other smooth small diameter object, in the gap at the terminal end when inserting the plug will help to fully seat it in place, then pull out the screwdriver once fully inserted. This keeps the WEM-B moisture resistant to ensure good battery life.

## OPERATING/FINE TUNING YOUR SYSTEM

With your Soil Moisture Sensors installed and wired, you are now ready to begin using them to control your irrigation system. For newly landscaped areas, it is advisable to temporarily bypass the sensors. This allows you to continue operating your irrigation controller as needed to establish a good root system for the first 60-90 days. Once this has been completed, and the root system has been established, you can begin to use and fine tune the WATERMARK soil moisture control system.

## TESTING YOUR SYSTEM

1. Set Moisture Control Dial to OFF position. All valves should operate on a manual controller/time clock sequence.
2. Set Moisture Control Dial to a DRY position. Sensors will override valve (prevent operation) when soil is wet.
3. Set Moisture Control Dial in the WET range. When soil has been allowed to dry sufficiently, sensors will allow valves to operate on the programmed controller/time clock sequence.
4. Verify soil water status in sensor area with a soil probe.



*Watermark Irrigation  
No More than necessary  
No Less than required*

## IRROMETER COMPANY, INC.

P.O. Box 2424 - Riverside, CA 92516  
Phone (951) 689-1701 - Fax (951) 689-3706

[www.irrometer.com](http://www.irrometer.com)

[techsupport@irrometer.com](mailto:techsupport@irrometer.com)

