

INSTALLATION AND OPERATING INSTRUCTIONS

WATERMARK WATERMARK Electronic Module BATTERY VERSION — WEM-B



Automates your Irrigation Controller to Water ONLY when Necessary

For use with Battery Powered DC Irrigation Controllers
with Sensor (Rain Switch) Connections.

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

CoolSeason Turf 2" to 5" (5 to 13 cm) deep, in root system
Warm Season Turf 6" to 8" (15 to 20 cm) deep, in root system
Shrubs/Ground Cover 8" to 14" (20 to 35 cm) deep, in root system
Trees 16" to 24" (40 to 61 cm) 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" (30 cm) deep, sensors are installed 4" to 6" (10 to 15 cm) apart at each location at the same depth (see *Typical*



Installation Depths). For root systems deeper than 12" (30 cm) (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 (60-91 cm) from the sensors.

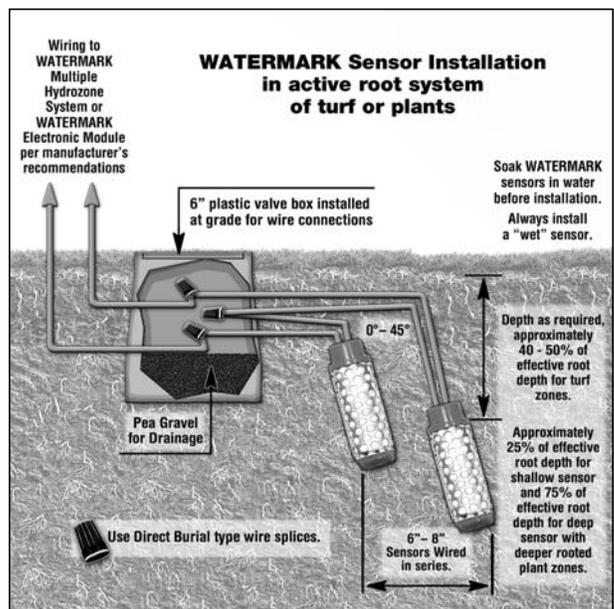
STEP 3:

Install a splice box (Ametek #182001/2 Econo Box or equal) within 2-3 feet (60-91 cm) of the sensor location and cut a trench from the splice box to the sensor location for the sensor wire path.

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 4:

At the end of the trench, excavate a hole to the depth required for the sensors to be installed (see *Typical Installation Depths*). Fill the bottom of the hole with a thick slurry made of soil removed from the hole and water, then firmly push the sensor down into the mud in the bottom of the hole. This will "grout in" the sensor to ensure maximum surface contact between the sensor surface and the surrounding soil. Alternately, the sensor can be firmly pushed to the bottom of the access hole as long as it is a tight enough fit to ensure adequate contact. A snug fit is absolutely necessary. A piece of 1/2" PVC pipe (class 315) (.875", 22 mm OD) 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. For deeper placement, a vertical borehole can be made with a piece of pipe and the sensor inserted to the bottom of the hole, into the thick slurry mixture. Sensors **MUST** be firmly packed in the soil.



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 Control Module. Refer to *Sensor Wire Sizing Chart*.

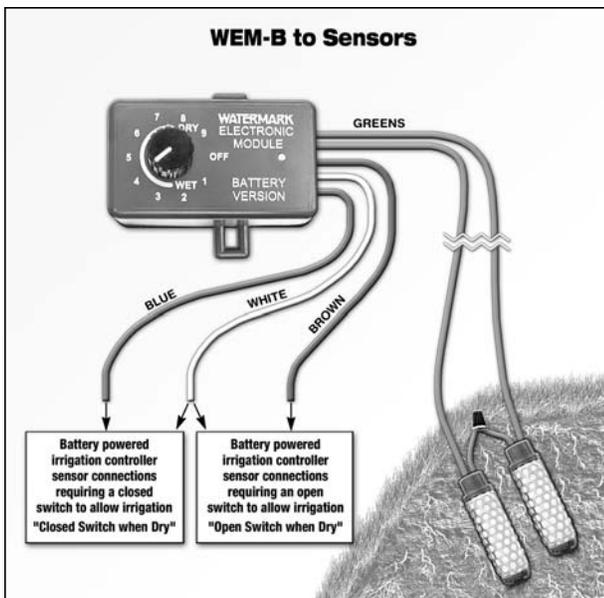
Sensor Wire Sizing Chart

Length of Run	Wire Size
Up to 1000' (up to 305 meters)	#18 AWG-UF (1.02 mm) Valve Wire
1000' to 2000' (305 to 610 meters) . .	#16 AWG-UF (1.29 mm) 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 to which it is connected. 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 to allow irrigation when dry. The white/brown wire combination is for controllers that need an open switch to allow irrigation 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

The valve/controller module can be set for differing soil moisture levels. The adjustment dial gives you from very wet (position #1 – 10 centibars of soil water suction) to dry (position #9 – 80 centibars of soil water 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) and 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 (dispose of responsibly)



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.

WARRANTY: The IRRMETER COMPANY warrants its products against defective workmanship or materials under normal use for one year from date of purchase. Defective parts will be replaced at no charge for either labor or parts if returned to the manufacturer during the warranty period. The seller’s or manufacturer’s only obligation shall be to replace the defective part and neither seller nor manufacturer shall be liable for any injury, loss or damage, direct or consequential, arising out of the use of or inability to use the product. This warranty does not protect against abuse, shipping damage, neglect, tampering or vandalism, freezing or other damage whether intentionally or inadvertently caused by the user.

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