

## INSTALLATION AND OPERATING INSTRUCTIONS

# WATERMARK

## Watermark Electronic Module Dry Contact Version – DC Dry Contact with Internal Timer – DC-T

### SMART IRRIGATION CONTROL

The WATERMARK Electronic Module Dry Contact (WEM-DC & WEM-DC-T) is a modified version of the WEM designed to interface with irrigation controllers that have a sensor input option or other device requiring a dry contact switch closure to enable a function. On some models of these controllers the sensor circuit is capable of isolating particular valves or valve groups. The WEM-DC & WEM-DC-T may be able to control these groups if the controller has the appropriate capacity. Please contact IRROMETER for controller compatibility and wiring details for your application. The WEM-DC & WEM-DC-T may be mounted indoors or outdoors.



### 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 or the Hydrozone area. If used to control an entire controller, select the area of greatest water demand. 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 a 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 is mounted.

### INSTALLING WATERMARK SENSORS

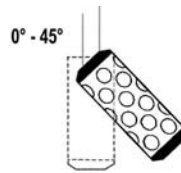
WATERMARKS are installed beneath the ground with two sensors at each location in the active root system of the turf or plant being monitored. Depth of placement varies with the rooting depth of the plant material being monitored.

#### Typical Installation Depths –

Cool Season Turf	2" to 5" deep (in root system)
Warm Season 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)

**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 various depths. This gives an "average" reading, over the entire root profile, of the two sensors combined to activate or eliminate irrigation as needed.

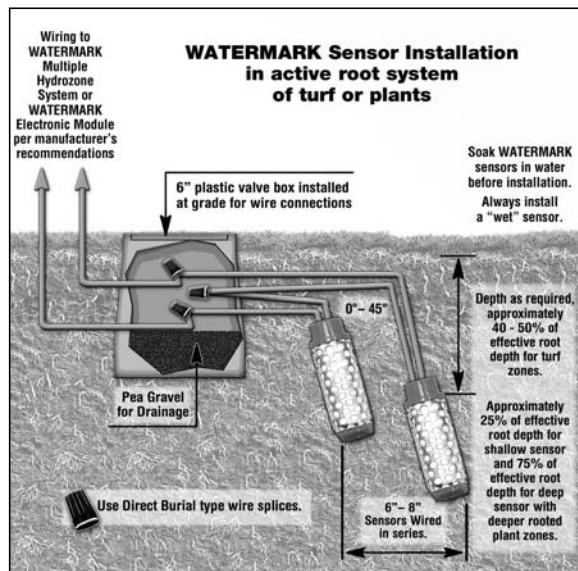
**Step 3** — Install a splice box (Ametek #182001/2 Econo Box or equal) within 2-3 feet of the sensor location and cut a trench from the splice box to the sensor location to bury the sensor wire.

**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.

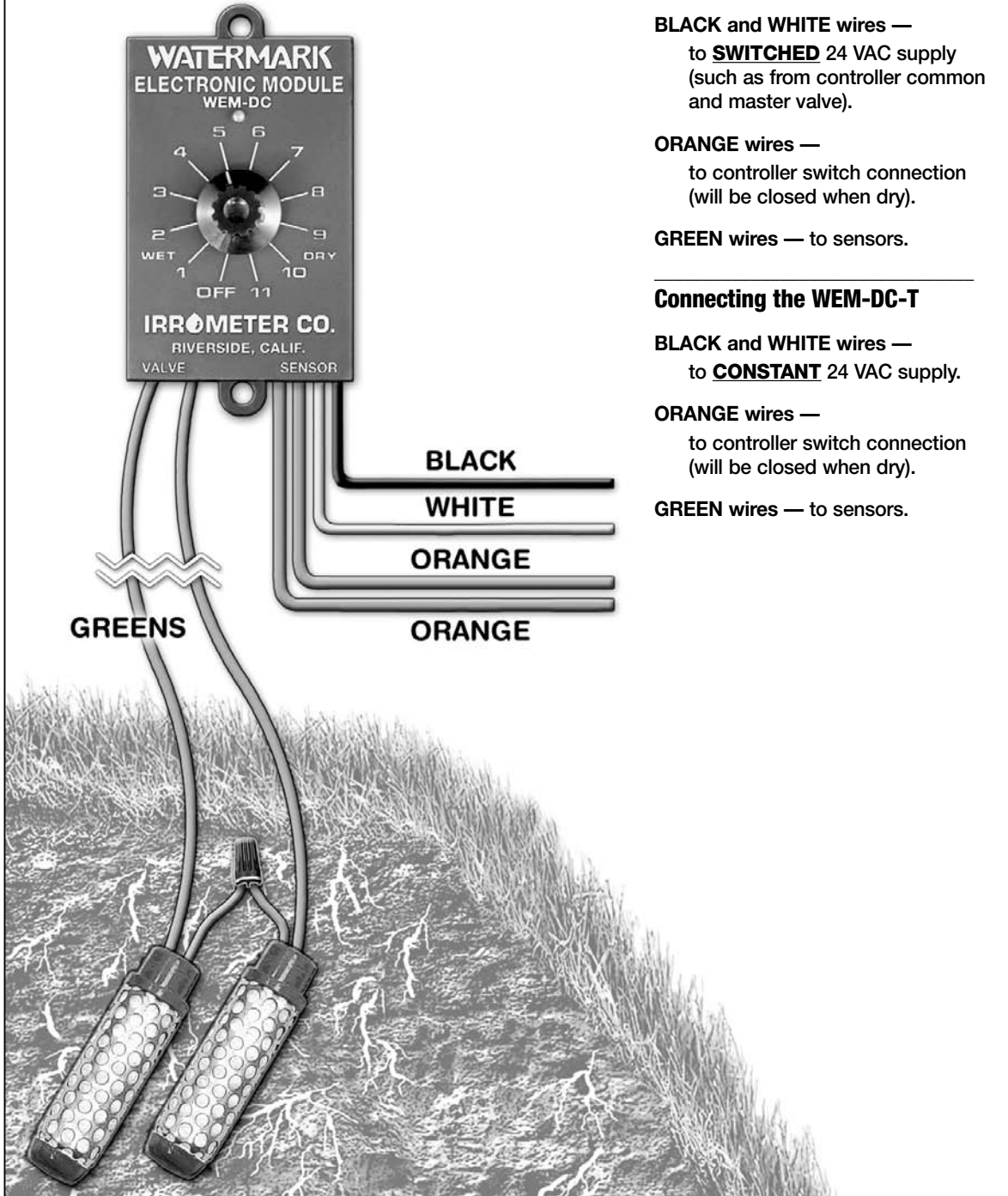
**Step 4** — At the end of the trench, excavate a hole to the depth required for the sensors to be installed. Fill the bottom of the hole with a thick slurry made of soil removed from the hole and water, then firmly push the sensor down into the mud in the bottom of the hole. This will "grout in" the 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) can be used as an insertion tool to push the sensor in, being careful not to pinch the wires. Be sure the sensors are installed in the active root system of the turf, shrubs or trees. Sensors should be installed vertically or to a 45° downward angle into the soil. 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 the waterproof splices. Splice one wire from each sensor together, running them in series. Then splice each remaining wire to the wires running back to the site where the WEM is located. Refer to *Sensor Wire Sizing Chart*.



## WEM-DC or WEM-DC-T



### Connecting the WEM-DC

**BLACK** and **WHITE** wires —  
to **SWITCHED** 24 VAC supply  
(such as from controller common  
and master valve).

**ORANGE** wires —  
to controller switch connection  
(will be closed when dry).

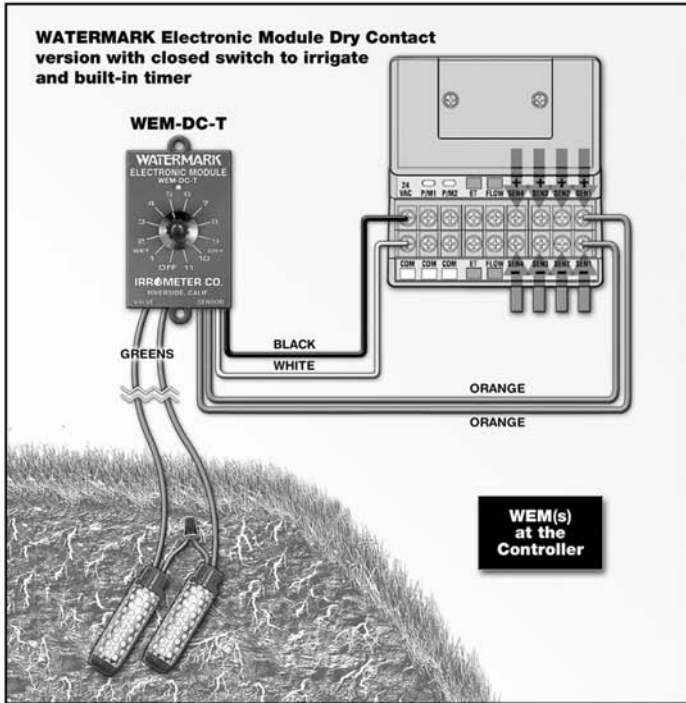
**GREEN** wires — to sensors.

### Connecting the WEM-DC-T

**BLACK** and **WHITE** wires —  
to **CONSTANT** 24 VAC supply.

**ORANGE** wires —  
to controller switch connection  
(will be closed when dry).

**GREEN** wires — to sensors.



This modified **WATERMARK** Electronic Module differs from the standard version and is for use with constantly powered applications, i.e. where no power interruption is designed into the system operation. The diagram here illustrates how it would connect to the Hunter ACC controller system in such a fashion. Other controllers or equipment control panels would connect similarly:

- 24 VAC power to the black and white wires
- Dry contact switch connection to the orange wires, which are closed when the moisture sensors report equal to, or dryer than, the setting on the dial. Switch will be open when wetter than the setting.

This module has an internal timer that re-reads the attached sensors every five minutes and changes the switch position accordingly, if necessary.

Please refer to the instruction booklet included for information on proper sensor installation and placement.

#### Sensor Wire Sizing Chart

Up to 1000'	.....	#18 AWG-UF Valve Wire
1000' to 2000'	.....	#16 AWG-UF Valve Wire
2000' to 3000'	.....	#14 AWG-UF Valve Wire

**PLEASE NOTE: Sensors must be installed in the area irrigated by the last valve to run in each valve "group". Resequence valves to accomplish this as necessary. Keep a record in the controller enclosure of which valves are in each group, and which valves water the sensors.**

#### INSTALLING THE WATERMARK ELECTRONIC MODULE (WEM-DC & DC-T)

**Step 7** — Typically the WEM-DC (DC-T) is mounted on the wall, or in the control enclosure, near the irrigation controller (when used to control Hydrozones or the entire controller).

#### PROGRAMMING YOUR IRRIGATION CONTROLLER

*NOTE: Programming may vary depending on how the irrigation controller interprets the sensor port signal. The following guidelines may not apply to all controllers. Contact your controller manufacturer for specific instructions.*

#### Soil moisture setting

Each "irrigation need" group can be set for differing soil moisture levels. The WEM-DC (DC-T) is adjustable from 10 to 120 centibars and has an OFF position to allow for overriding the sensors. The adjustment dial gives you from very WET (Position #1) to very DRY (Position #11):

**Positions #1 to #4** (approximately 10 centibars to 25 centibars): This is the normal range for most water sensitive turf or plant material.

**Positions #5 to #8** (approximately 35 centibars to 70 centibars): This is the intermediate to drier soil moisture and is useful for most shrubs and ground cover.

**Positions #9 to #11** (approximately 85 centibars to 120 centibars): This is the very dry end of the soil moisture range and should be used with caution. Some deep-rooted, drought tolerant, plant material may be able to tolerate this level of dryness.

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 programming procedure is as follows:

1. Allow the controller to come on as often as possible (except maybe the night before, or morning of, the mowing day). This means the controller is frequently "asking" the moisture sensors if irrigation is needed. It will operate ONLY when the sensors say it is necessary.
2. Set the valve cycle timer (duration/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 is needed.
3. With the short cycles, you'll need to have several repeat cycles, or start times, each day. You may want to seek the advice of a professional irrigation consultant to 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 repeat cycles, or start times, to increase or decrease total irrigation "potential" to meet the peak consumptive use of the turf or plants.

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.

A free software program is available to assist you in creating the optimum schedule for your landscape. You can download our **WaterPerfect** program by visiting our website at [www.IRRMETER.com](http://www.IRRMETER.com), go to "downloads", select "WaterPerfect". When prompted, use the word "conserve" without the quotation marks, for both the user name and password. The program requires Microsoft® Excel®. If you perform an irrigation audit on your landscape, you will have all the data necessary to input into the program, which will then generate a recommended schedule to be programmed into the controller.

#### INDICATOR LIGHT

Each WATERMARK Electronic Module (WEM-DC & WEM-DC-T) comes with an indicator light to make the unit simple to use and easy to understand. When the irrigation controller is powering a valve being controlled by the WEM, and the soil moisture conditions are at or drier than the setting you have selected on the WEM, then the light will come on, indicating irrigation is allowed. When the irrigation controller is powering a valve being controlled by the WEM, and the soil moisture conditions are wetter than the setting you have selected on the WEM, then the light will not come on, indicating irrigation is not needed and has not been allowed.

#### WEM OVERRIDE

There may be times when the WEM needs to be bypassed to allow the controller to operate in manual mode, for system maintenance, etc. There are two ways to bypass the WATERMARK Electronic Module. The first can be done at the WEM by turning the Moisture Control Dial to the "OFF" position. This closes the WEM switch and allows the valve(s) connected to the WEM to operate as desired.

As a second way – many controllers also have a sensor bypass circuit that can be used to bypass the attached sensor (WEM-DC & WEM-DC-T) for manual operation, etc. It may be preferable to use the controller's bypass feature to avoid changing the moisture setting on the dial of the WEM module.

#### 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 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 a manual controller/time clock sequence.
4. Verify soil water status in sensor area with 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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