



Smart Watering With Weather-Based Irrigation Controllers



To promote water-smart irrigation, many landscapes feature a weather-based irrigation controller (WBIC). WBICs use current local weather data to adapt landscape irrigation schedules, only watering plants when they need it. The U.S. Environmental Protection Agency's (EPA's) WaterSense® program labels WBICs that have been independently certified to meet performance criteria detailed in the [WaterSense Specification for Weather-Based Irrigation Controllers](#). Replacing a standard clock timer with a WaterSense labeled irrigation controller can save an average home thousands of gallons of water annually. This document summarizes the benefits of WaterSense labeled WBICs, explains how they work, and describes the additional features they have.

Background

At the core of an irrigation system is the controller or timer, where irrigation schedules are set, determining the amount of water applied to the landscape. The controller or timer is the key interface between the irrigation system and end user in charge of operating that system. Homeowners and irrigation professionals can control when and how much water is applied to the landscape using controllers or timers.

In addition to water savings, WaterSense labeled controllers also provide a level of convenience, reducing the need to change irrigation schedules to continually match plant water needs as the seasons change. Furthermore, many labeled controllers provide the additional convenience of app-based interfaces, allowing users to view water amounts and control irrigation right from their mobile devices. This added convenience allows consumers to track their irrigation water use, increasing their awareness of how much water they use outdoors. Additionally, several labeled models integrate their app-based software into smart homes systems, adding the option of remote control over watering times.

Benefits of WaterSense Labeled WBICs

A properly designed, installed, and maintained irrigation system can provide the right amount of water across a landscape, ensuring water efficiency and curb appeal. The controller is the brain behind any good system. In particular, WaterSense labeled weather-based irrigation controllers:

- **Provide a healthy, beautiful landscape:** WaterSense labeled controllers help landscapes flourish and remain healthy by customizing irrigation times for each different plant zone to only provide plants the water they need.
- **Save money:** WaterSense labeled controllers help users reduce overwatering and may lower water expenses. Products are available at a variety of price points and are often incentivized by water utility [rebate programs](#).
- **Reduce water waste:** WaterSense labeled controllers avoid unnecessary watering and decrease the amount of water running off the landscape, helping to reduce the amount of pollution flowing to local waterways.

Photo (above left) courtesy of Hunter Industries Incorporated.

- **Provide convenience:** Properly programmed WBICs save users the time and effort required to keep current on the weather and adjust watering schedules. App-based products provide the added convenience of monitoring and controlling water use from mobile devices, whether onsite or from afar.

How Do WaterSense Labeled WBICs Work?

WaterSense labels WBICs that create or modify irrigation schedules based on evapotranspiration (ET) principles, which are a function of weather conditions and plant type. ET is the quantity of moisture that is both transpired by a plant (i.e., the water vapor released from its leaves) and evaporated from the soil and plant surfaces. WaterSense labeled WBICs develop or adjust irrigation schedules based on attributes in the landscape (e.g., plant type, soil type, slope) and local weather. The data that determine when the system will water are provided either by a weather sensor located on the landscape, or via a signal from a nearby weather station. As a result, WBICs automatically reduce the watering times or days when less water is needed, typically during the cooler months or when rainfall is plentiful.

WaterSense labeled WBICs come in a variety of models that range in price, complexity and capacity. Models range from those that are intended for small residential landscapes to those that can control large commercial landscapes' watering systems. **Stand-alone controllers** can replace an existing controller or be installed in a new irrigation system, as they provide all scheduling capabilities. **Add-on** and **plug-in devices** connect to standard clock timer

controllers. These devices can be installed to upgrade an existing irrigation controller, providing the weather-based watering feature to an existing system. They could also be paired with a new, compatible standard clock timer controller and installed in a new system, or replace a controller in an existing system.

WaterSense even labels WBICs that can be attached to a hose bibb instead of an entire system, bringing weather-based control to landscapes with only one or two zones that are typically watered with microirrigation, such as gardens, trees, or shrub beds. Similar to WBICs that control in-ground irrigation, users can program their landscape attributes, which when combined with weather data, provides the right amount of water only when plants need it.

One important aspect of labeled controllers pertains to where their weather data come from—onsite weather sensors and/or weather signals from local weather stations.



Onsite weather sensor. Photo courtesy of Hunter Industries Incorporated.

Onsite sensor-based controllers use real-time measurements of locally measured environmental variables (e.g., temperature, humidity, solar radiation) to adjust irrigation scheduling. An onsite sensor-based system can also store historic weather information, which it can use to modify the expected irrigation requirement for the day or calculate onsite ET for the landscape. In contrast, **signal-based controllers** receive a regular signal of weather data from local weather station(s) to update the watering schedule for the controller. For example, if the weather is cool and damp, scheduled runtimes may be shortened or eliminated by the controller. Or if rain is predicted, some controllers will withhold irrigation until the following day.

Additional Features Enhance Performance

WaterSense labeled controllers have many capabilities that allow them to be water-efficient, including the following features:

- Irrigation program information and settings are retained in the controller's memory when the



Photo courtesy of Rain Bird Corporation.

power source is lost and no backup battery is available.

- Irrigation can be customized on landscapes that have multiple zones with various watering requirements.
- Alerts tell the user if the controller is not operating in smart mode (e.g., if there is a problem with the signal or local sensor input that stopped it from automatically adjusting irrigation).
- Because multiple states in certain climate regions have mandated rain sensors, the controller must be able to connect to them.
- To comply with local utility mandates, the controller must be able to accommodate watering restrictions.
- A water budget feature (also known as “percent adjust”) allows users to adjust water applied to the landscape without changing the detailed settings in the controller’s program.
- If the product loses real-time weather input or a weather signal, it can use a proxy of historical weather data or the percent adjust/water budget feature.
- If the user runs a manual troubleshooting test cycle, the controller will automatically return to smart mode within a specified time period as designated by the manufacturer.

A searchable list of WaterSense labeled controllers, their attributes, and compatible base controllers (where applicable) is available on the [WaterSense website](#).

Installing a Controller

Manufacturers include instructions for installing WBICs within the product packaging, and many are also available online. Most manufacturers also provide training on the installation and operation of their irrigation controllers for professionals and homeowners to learn more about installing these products. Contact your local irrigation products distributor



Photo courtesy of Hunter Industries Incorporated.

Better Control Is Just One Piece of the Puzzle

While a WaterSense labeled controller can help reduce unnecessary watering, a holistic approach to landscaping and irrigation is required to achieve the full potential of water savings:

- Many homes’ irrigation systems operate at a water pressure that is too high for sprinkler nozzles and can lead to excessive irrigation flow rates, misting, fogging, and uneven coverage. Install [WaterSense labeled spray sprinkler bodies](#) to regulate system pressure at the sprinkler nozzle.
- Utilize [microirrigation](#) in flower beds and other non-turf areas to deliver water directly to the root zone of plants, where it is needed most, preventing runoff and reducing evaporation.
- Choose a portion of your yard to be a [water-smart landscape](#). Plants that are adapted to your specific climate can reduce the need for supplemental irrigation.
- [Select an irrigation professional](#) certified by a WaterSense labeled program to assist with designing, installing, maintaining, or auditing your system to maximize water efficiency.



or home improvement retailer to find a class in your area. Contractors can become [certified irrigation professionals](#) through programs that have earned the WaterSense label; [find a professional certifying organization](#) near you.

While WaterSense recommends that a certified irrigation professional install and program WBICs, many WaterSense labeled controllers are available in big box stores in regions where in-ground irrigation is prevalent or online, allowing a homeowner to purchase a labeled controller and install it themselves. Installation for these products is typically straightforward in a few steps, but remember the following tips:

- Always follow the manufacturer's instructions.
- After initial installation, closely monitor the landscape for a few weeks and adjust the controller if the landscape is too wet or too dry.
- To realize full savings from an efficient irrigation schedule, ensure the system is functioning properly—no overspray, broken sprinklers, or leaks.

Programming for Water Savings

Correctly programming the controller is necessary to achieve water savings. Many controllers have default settings to water plants at levels that meet 100 percent of a plant's theoretical water needs. These theoretical water needs focus on maximizing crop yield. Landscape plants, however, should be treated differently than crops, because a landscape typically reflects a mixture of plant species with varying vegetation density and microclimates. Most plants will require less than their theoretical water needs to maintain proper health and appearance. Thus, a WBIC can be adjusted to better reflect the plant's actual water needs.

The “percent adjust” or “water budget” feature present on all WaterSense labeled controllers is a simple way to adjust the amount of water that is applied to the landscape. This feature should be a simple dial or button to increase or decrease the water applied to a specific irrigation zone.

Maintaining Savings

Once a WaterSense labeled controller is installed and programmed, the controller automatically takes

care of seasonal weather adjustments, thereby not requiring constant monitoring. However, no irrigation control system should be installed based on “set it and forget it.” Contractors or users will need to periodically inspect the landscape to ensure that the irrigation system is performing properly. This is especially important after installation. End users should typically spend a couple of weeks monitoring their landscape after a labeled controller is installed. If it looks lush and green, watering can be reduced using the water budget feature on the controller. Users should continue to adjust the controller's water budget feature until they find a balance that is both water-efficient and healthy for their plants.



Above image courtesy of Rain Bird Corporation.

Many WaterSense labeled controllers provide water use information to the end user on smart phones or other mobile devices. This allows end users to compare water use from

season to season and change behavior, irrigation products, or landscape attributes to maximize water savings. While some labeled controllers estimate water use based on runtimes and estimated precipitation rates of sprinklers, others are compatible with flowmeters, providing actual measured water use data to the end user.

For more information about WaterSense labeled WBICs, visit <https://epa.gov/watersense/irrigation-controllers>.

For more information about smart outdoor water use, visit <https://www.epa.gov/watersense/outdoors>.

