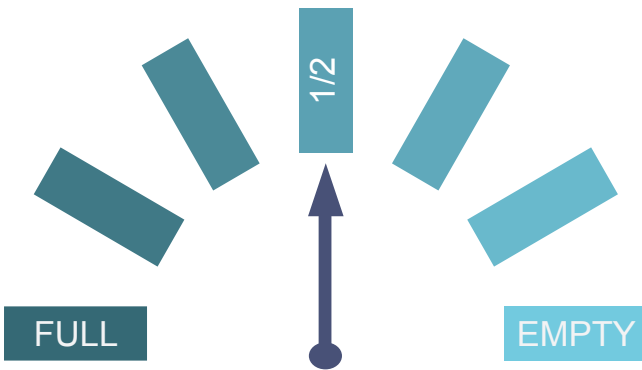


SOIL MOISTURE SENSORS for homeowners

Many property owners irrigate based on a set schedule rather than on plant water needs which can lead to overwatering.

Soil moisture sensors allow irrigation when plants need water. They work like a fuel gauge on a car's gas tank. When the needle drops to 50 percent soil moisture in the root zone, it's time to fill the soil moisture tank.



Soils, Plants and Water

Soils act like a sponge, absorbing and holding water for plants. Soil texture and structure determine how much and how quickly water can be absorbed.

Heavy clay soils have small pore space that allows for greater water holding capacity. Sandy soils have large pore space and drain quickly, retaining less water.

After rain or irrigation, all the pore spaces fill up and the soil becomes saturated. After the excess water is drained, the soil is at field capacity- optimum for healthy plant growth. If

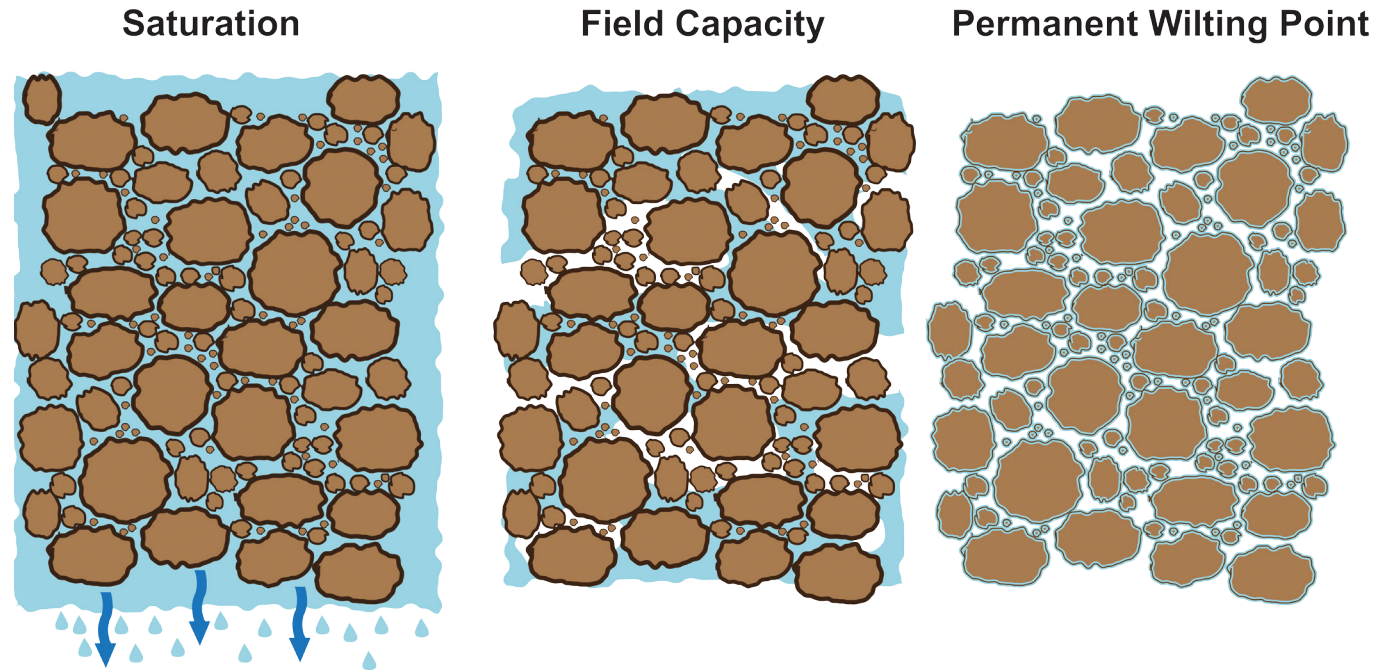
soil dries out and the water evaporates or is used by plants, it is considered to be at the permanent wilting point. This can cause plant stress or death. The figure below shows the water availability for plants in the soil.

Overwatering can be just as detrimental to plants as underwatering. If the soil stays waterlogged for extended periods, plants are unable to take up nutrients and will show stress signs similar to a drought-stressed

plant. Valuable nutrients like nitrogen may also leach through the soil and become unavailable for plant growth.

Soil Moisture Sensor Research

The table below shows water savings from three university studies across the United States.



University	Location	Water savings		Conditions
New Mexico State University	Tall fescue plots	2012	46%	Sensors compared to a typical residential controller with a set irrigation schedule.
		2013	38%	
	Bermudagrass plots	2012	61%	
		2013	45%	
University of Arkansas	Bermudagrass plots	60-73%		Soil sensors compared to controllers with and without rain sensors.
University of Florida	Bermdagrass plots	59%		Installed sensors at homes with historically high water use. Sandy sites.
	Residential	65%		

Where Should I Install the Sensor?

For most residential and small commercial irrigation systems, one soil moisture sensor is usually sufficient for the entire landscape.

Multiple sensors may be appropriate for large properties where there is wide variation in plant water requirements. When installing one sensor, select an area of the property that represents the entire landscape. If there are areas where soil moisture sensor control is not desired – such as high water use plants or under eaves that get little rainfall – simply put those plants on a different controller program.

The irrigation schedule is then based on this reference point. Schedules for other zones are modified to reflect the variations within a landscape. For example, shady areas will get about half as much water as full-sun turfgrass zones. Plant type and other microclimates should be taken into account, when creating an irrigation schedule.

Install the sensor within 500 feet of the controller in the middle of a zone. The

soil moisture sensor should be placed at least four feet away from sprinkler heads, walkways and rooflines - typically wet areas in a zone. Proper placement will prevent erroneous soil moisture readings that are not typical for the rest of the landscape. It's also important to make sure you have good sensor-soil contact.



Maintain lawn health with proper watering.

Install the soil moisture sensor on the last zone on the irrigation system, which allows all stations to receive water. Simply switch the wires on the controller. For example, if the sensor is installed within zone 2, move those wires to the last zone on the controller.



Prevent overwatering with a soil moisture sensor.

Follow the manufacturer's installation instructions completely. There are differences between brands. Some soil moisture sensors are buried beneath the lawn root zone and wired into the common wire in an electric valve. All brands require calibration before they can begin taking soil moisture readings. At least one brand is wireless and shovel free, but still requires calibration. See the soil moisture sensor table for a list of residential soil moisture sensors, along with product information and links to company web sites.



Rain Bird SMRTY-Y

Photo courtesy of Rain Bird Corporation



Toro Precision Soil Sensor

Photo provided courtesy of the Toro Company



Hunter Industries Soil Klik

Photo provided courtesy of Hunter Industries Incorporated



Baseline Systems WaterTec

Photo provided courtesy of Baseline Systems



Irrrometer WaterSwitch

Photo provided courtesy of Irrrometer

Buying a Soil Moisture Sensor

Residential soil moisture sensors can be purchased from irrigation contractors or from local irrigation distributors. Depending on historical water use, the payback time can vary between one and five years.

Most soil moisture sensor products work with any brand of irrigation controller. Simply wire the soil moisture sensor module into the controller and install the sensor in the root zone according to manufacturer instructions.

Maintenance Matters

Like any piece of equipment, soil moisture sensors need maintenance. For a wireless soil moisture sensor, check battery strength

in the screen of the soil sensor module next to the controller. Make a plan to replace batteries at the same time you change batteries in your smoke alarm. For the wireless soil moisture sensor, watch for any messages such as, “signal lost.” Although this happens rarely, follow the manufacturer’s instructions to reboot the sensor.

For soil moisture sensors wired into an electric valve common wire, it’s a good idea to check the readings on the module next to the controller. Check waterproof wire nut connections in the valve box. Whether wired or wireless from the landscape installation location, it’s a good idea to re-calibrate your sensor about once a year.

Benefits of Soil Moisture Sensors

When soils are no longer saturated with water, it means fewer insects and fungal diseases. With a much drier landscape, weeds attracted to wet conditions will pose less of a challenge. Soil moisture sensors prevent common issues in the landscape due to over and under watering. Sensors promote:

- Deeper root systems
- Fewer water hog weeds
- Lower disease pressure
- Right amount of water at the right time



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Brand	Model name	Description	Instructional materials
Baseline Systems	WaterTec™ S100	Add-on unit that works with any brand of controller. Soil moisture sensor is buried near a valve. Wire is run to common wire in valve box back to the controller. Automatic soil calibration feature.	User Manual
Hunter Industries	Soil Klik™	Add-on unit that works with any brand of controller. Hunter’s Soil Klik is buried in a representative area of the landscape. Eighteen gauge wire runs from the sensor back to the controller. Works with any brand of controller.	User Manual
Irrrometer	WaterSwitch (WS1)	Add-on unit that works with any brand of controller. Sensor is buried in a representative area of the landscape. Eighteen gauge wire runs from the sensor back to the controller. Works with any brand of controller.	Installation Videos User Manual
Rain Bird	SMRT-Y Soil Moisture Kit	Add-on unit that works with any brand of controller. Stainless steel soil moisture sensor is buried near a valve. Wire is run to common wire in valve box back to the controller. Automatic soil calibration feature.	User Manual
Toro	Precision™ Soil Sensor	Add-on unit that works with any brand of controller. Wireless communication from sensor back to the controller. Shovel-free installation. Uses stainless steel probe spikes. Freeze detection feature. Up to three sensors can be installed with a Toro Evolution controller.	User Manual