



HOMEOWNERS GUIDE TO SPRINKLER SYSTEMS

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Healthy landscapes offer a variety of advantages for the home. They add aesthetic value, erosion protection and temperature control while providing outdoor space for relaxing and entertaining. Oftentimes however, North Texas landscapes are over-watered, over-fertilized and over-applied with pesticides. These practices can be detrimental to your landscape and to our water resources.

The EPA estimates that a household's outdoor water use can exceed the amount of water used for all other residential purposes in dry climates like that of North Texas! In some households, during the summer, as much as 50% of a total water budget can be spent on landscape irrigation.

By incorporating the best irrigation practices and by selecting the right plant material for your specific needs, you can drastically reduce water, fertilizer and pesticide use.

Remember, irrigation systems are designed to supplement the lack of rainfall during dry periods. Your "system" might just consist of you, a faucet and a hose-end sprinkler or soaker hose. It might also include an automated controller with permanent irrigation heads. In either case, irrigating less often, but deeply will result in a healthier lawn and landscape.

AUTOMATED SYSTEMS

Automated irrigation systems are designed to maintain soil moisture and to protect the overall health of your landscape. In times of sufficient or excessive rainfall, irrigation systems should be turned off. When supplemental water is needed, all irrigation systems should precisely deliver the water without waste. To help determine your most efficient delivery system, calculate your plants' water needs accurately, consider your soil type, and think about the slopes in your terrain.

SYSTEM PARTS AND COMPONENTS

In order to keep your system running at peak performance, it's important to understand the key parts and components to your in-ground irrigation system, which are defined and numbered below. In addition to what you see above ground, automated in-ground irrigation (or sprinkler) systems are built on a framework of underground PVC pipes and fittings. They are designed to safely deliver water from the city's main water line to different zones of your yard. Wiring runs along these pipes to transmit signals from the irrigation controller to the valves in each zone. When your controller sends a signal, these valves open and water flows through the pipes to your irrigation head or drip tubing. In the case

of pop up heads, the pressure causes the nozzle to “pop up” from the ground so that it can precisely direct water to your plant’s root zone. Each system is different based on the unique characteristics of the site and the plant material that lies within. With a basic understanding of these components, and a little proper maintenance, you can keep your lawn and landscape looking it’s best while keeping your water bill in check.

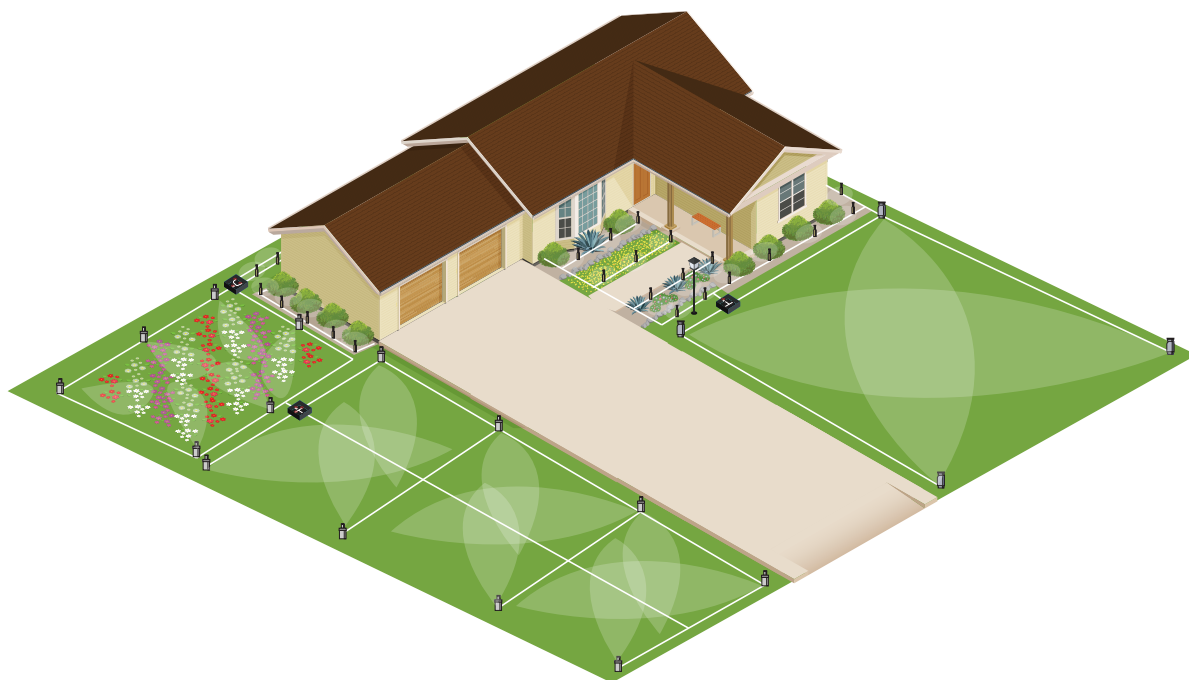


Figure 1: Graphic representation of an inground irrigation system

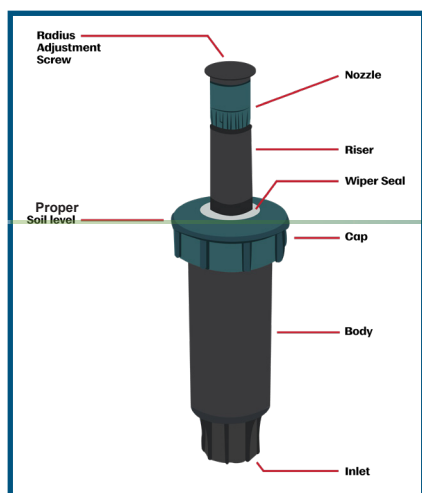


Figure 2: The components of a sprinkler body

CONDUCTING AN IRRIGATION CHECKUP (FIND IT, FLAG IT, FIX IT)

Check your irrigation system at least twice during a season for problems. Most of the time checking each sprinkler head for proper function and distribution will identify problems *before* the plants in your landscape start suffering.



Typical problems with irrigation systems are related to poor water distribution and/or a lack of routine maintenance. Sprinkler heads should be adjusted properly to avoid misting or over-spraying sidewalks, driveways and streets. Use the simple steps below to identify and fix problems yourself, or call a [TCEQ licensed irrigator](#).

STEP 1. If you have the original irrigation system design, make a copy so you can make notes on it. If you do not have the original design, you may find it useful to sketch the irrigation layout and number of sprinkler heads in each zone. Number the heads on the sketch so you can make notes about each head.

STEP 2. Run each station and observe each sprinkler head to see if the head is running and distributing water properly. Note which sprinkler heads are working correctly and which require attention. You might want to place a flag near the heads that have issues in addition to noting them on our paper. Irrigation flags are good to have on hand, can be found at your local hardware store and are very inexpensive.

STEP 3. Repair all problems yourself or hire a licensed irrigator. Your local irrigation supply company can be a valuable resource in locating the proper parts or may suggest a reputable licensed irrigator. Most repairs also require cleaning out a sprinkler head or filter, in additions to flushing out the area of the repair. Once all repairs are made, you are ready to run the system and verify each station's run time. (See the Catch Can Test)

LOOK FOR ANY OF THESE COMMON ISSUES:

Problem: Sprinkler head spraying water onto the sidewalk, driveway, or road

Fix: Redirect pop up nozzles so that water is applied only on the landscape. If your spray pattern is greater than your landscaped area you may need to replace the nozzle with a different spray pattern.

Problem: Spray nozzle missing, not operating, or reduced water flow

Fix: Replace nozzle and filter; check nozzle and filter for damage or blockage.

Problem: Head not popping up

Fix: Using your foot, firmly but gently press the pop-up riser on the sprinkler head all the way down, and release so it pops back up. (You may get wet doing this!) Repeat this 4 or 5 times, if necessary, to loosen and flush out debris caught between the riser and the cap. If this doesn't work, turn off the water and try pulling up the riser on the sprinkler with your hand. Even with the proper spring resistance, the riser should move easily up and down without hanging up.

Problem: Sprinkler head broken, bubbling or gushing water from top

Fix: Replace cracked or broken nozzle.

Problem: Poor distribution pattern

Fix: Check nozzle for damage or blockage; replace nozzle with proper pattern; increase or decrease throw distance by turning screw on top of nozzle. Tighten the screw to decrease the throw or loosen the screw to lengthen the throw.

Problem: Sprinkler head no longer straight up and down

Fix: Realign pipe to an upright perpendicular position. This may require you to loosen the soil around the irrigation head and riser, pull the head perpendicular and then tamp the soil back in place or re-install the riser tee.

Problem: Sprinkler heads creating a cloud of mist

Fix: This is usually caused by too much pressure. Consider installing a pressure regulator at the meter or using pressure regulating heads

Problem: Grass, shrubbery or tree blocking distribution pattern

Fix: Prune overgrown plant material. Raise or lower riser (within reason). Move sprinkler head if necessary.

Problem: Sprinkler head sunken into the ground, not fully popping up

Fix: Install a new riser to raise the head to be even with the grade of the soil.

Problem: Dry landscape areas or poor coverage

Fix: Check the pressure of the system. Check and clean nozzles and filters. Adjust increase distribution uniformity. Avoid irrigating when windy. Maintain a mulch layer on all planted beds. Aerate the soil and add $\frac{1}{4}$ - $\frac{1}{2}$ inches of sifted compost to lawn area. In sloped areas, consider the "Cycle and Soak" method.

Problem: Water bubbling, dripping or gushing all the time

Fix: Repair broken or leaking pipe or valve.

Problem: Valve box full of water

Fix: Check to make sure the valve is not leaking. Look for signs of excessive water run off due to excessive run times. Excessive rainfall may also be a contributing factor during wet periods. Do not irrigate during these periods.

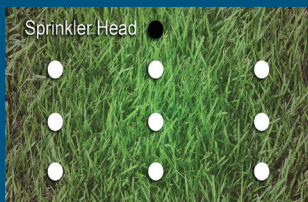
Problem: Runoff occurs before adequate water applied

Fix: Use the “Cycle and Soak” Method. – On your irrigation controller, set the station to run for two or three short intervals instead of one longer cycle.

Problem: Area along road, driveway or sidewalk stays too dry

Fix: Correct poor distribution. Utilize the “Cycle and Soak” Method. Aerate the soil and add ¼ -½ inches of sifted compost. The best alternative for this area may be to hand-water or utilize soaker hoses.

CATCH CAN TEST



A catch can test is used to determine how long to run an irrigation system or hose-end sprinkler and to verify how well the water is distributed over the landscape. The root zone (where water and nutrient absorbing roots grow) is typically 6-8 inches deep. Usually about 1 inch of water will fill this root zone, but in many cases, irrigation systems apply water faster than the ground can absorb. During a summer drought with high temperatures, the water requirement may be higher. Each type of sprinkler (spray, rotors, multi-stream rotor, drip) applies water at different rates; therefore, a catch can test is essential to determine the run time and efficiency of the system.

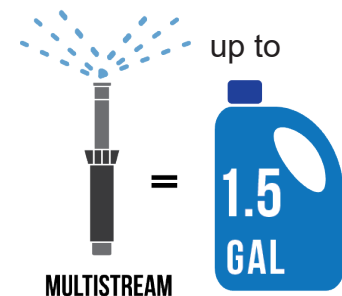
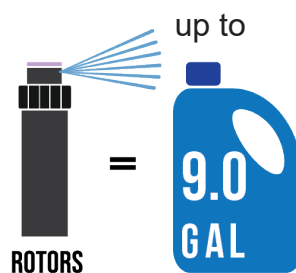
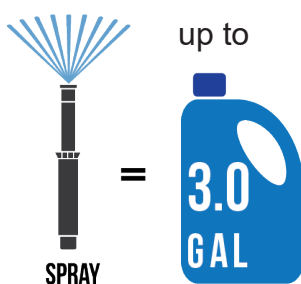
This grid shows placement of catch cans in relation to a sprinkler head.



Watch our catch can test instructional on YouTube

www.tinyurl.com/agrican

SPRINKLER HEAD OUTPUT PER MINUTE



THE MOST COMMON IRRIGATION ISSUES

- Over Watering
- Improper Scheduling Practices
- Improper Design and Installation
- No Routine Maintenance

WHERE TO LOCATE LEAKS

When looking for leaks, in addition to cracked or broken components, pay special attention to areas where parts are adjoined. Use the proper cleaners, glue and thread tape where appropriate, and hand tighten per manufactures specifications to reduce leakage. Erosion of soil and over-saturated or spongy areas are clues to help locate both minor and severe leaks.

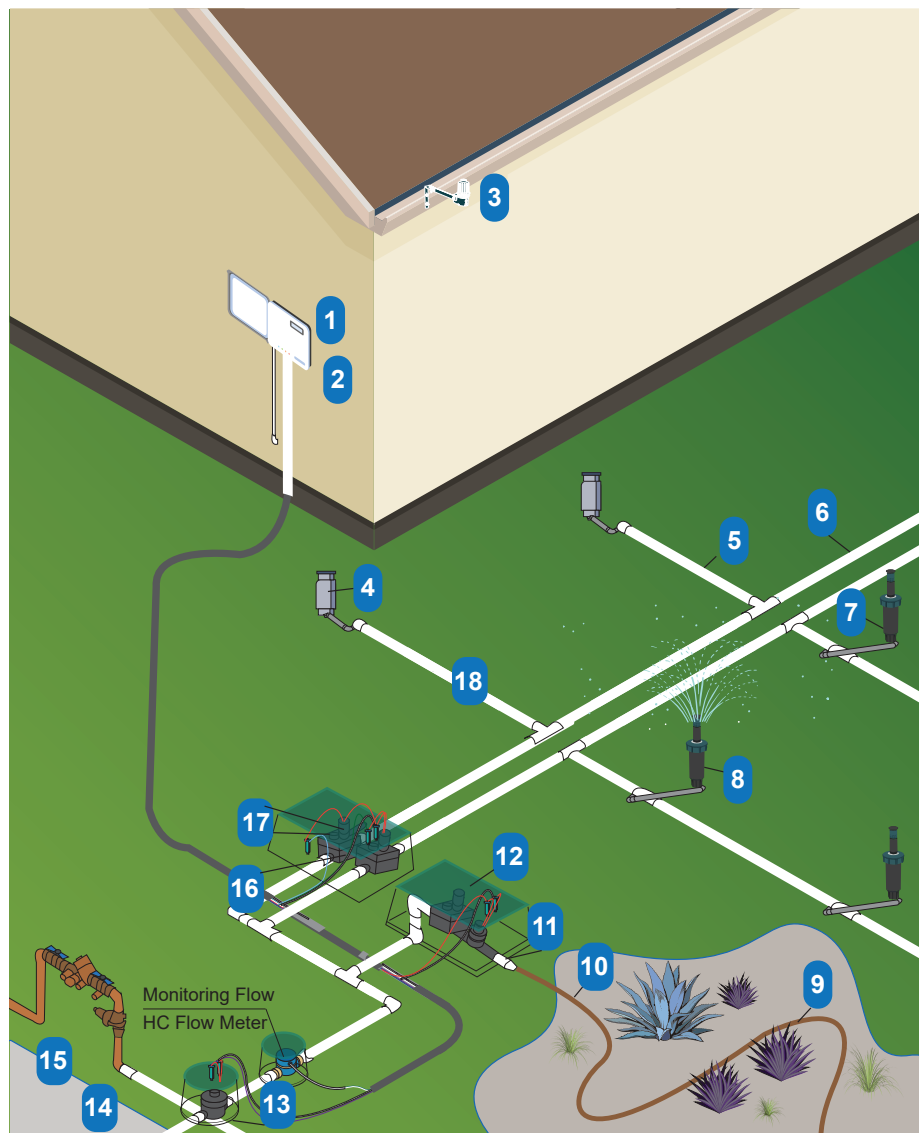
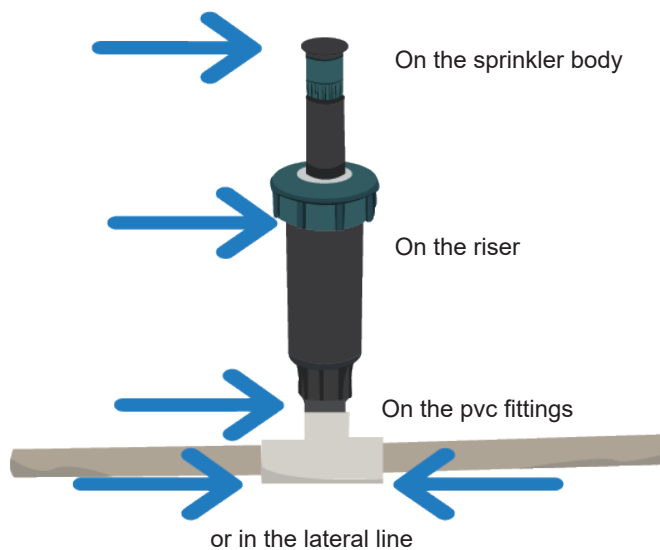


Figure 3: Parts and Components of an Inground irrigation System

PARTS AND COMPONENTS OF YOUR SPRINKLER SYSTEM

1. IRRIGATION CONTROLLER

The controller works like an alarm clock, automatically opening and closing valves according to a preset timed schedule. Most controllers are very easy-to-set after familiarizing yourself with the operating manual. If you have misplaced your operating manual, an online version can be found by searching your specific model number. Most new controllers allow for seasonal adjustments and “Cycle and Soak” settings as well as the addition of sensors that shut off the system when it rains. If your controller does not have one of these functions, consider replacing with a newer version to help efficiently manage water, which will likely help reduce your water bill.

2. SMART CONTROLLER

An irrigation controller that when programmed and maintained properly can use weather-based calculations and environmental conditions to determine how much water to apply to a landscape based on the plant water needs. Many new smart controllers allow you to make adjustments via your cell phone or by virtual voice assistants.

3. RAIN and FREEZE SENSOR

These tools aid the homeowner by preventing the irrigation system from running during a rain event or when temperatures are near or below freezing. Freeze sensors can also aid in preventing damage to irrigation systems and help avoid icy safety hazards. It is important to note that rain and freeze sensors are required in most areas and applications.

4. ROTOR

Rotor sprinklers (or gear driven rotors) are an alternative to spray heads that rotate side to side (ranging from 45-360 degrees) and deliver water in one large single stream at slower rates than spray heads. This means there is less wasted water running-off. They have a higher operating water pressure (between 45 and 50 psi) and have a precipitation rate usually between 0.5 and 1 inch per hour. Rotor sprinklers are a great choice for medium to very large areas of turf and are ideal for slow-draining or sloped landscape areas.

5. MAIN LINE

This pipe supplies water from the point of connection to the control valves and is under constant pressure whether the irrigation system is running or not.

6. LATERAL LINE

The name of the pipe installed downstream from each control valve where the sprinklers are attached. When the valve is open, the lateral line fills with water and raises the sprinkler riser.

7. SPRAY HEAD

A fixed (ranging from 45-360 degrees) spray sprinkler component that pops up from the ground and applies water in a set pattern, usually from 5 to 25 feet in range. They are used primarily for lawns, in some landscape areas, and when improperly designed and maintained, can put out a mist of water that easily evaporates or is blown off during windy conditions. With application rates that are typically higher than other irrigation technologies, the biggest problem with fixed-spray heads is that they often put out water faster than our hard clay soil can absorb it, contributing to increased runoff and higher water bills.

8. MULTI-STREAM ROTORS

Also known as rotary nozzles, these pop-up head nozzles use multiple water streams to apply larger droplets of water slowly and evenly for greater efficiency and increased water savings. They are perfect for landscapes with slopes or clay soils. Many have an adjustable pattern from 45 to 360 degrees in addition to radius adjustment. Other multi-stream nozzles can be purchased to mimic the specific pattern of your existing sprinkler nozzles.

9. DRIP EMITTER

The part of a drip irrigation system that produces the water droplets. Emitters can be stand-alone pieces that are attached to the tubing (point source) or they can be included in the tubing during manufacturing (in line.) Drip emitters deliver water at very low rates (measured in gallons per hour) and they operate under reduced pressure when compared to other irrigation technologies. They help reduce water losses and have the potential to reduce fungal pathogens that affect leaf tissues when installed and used properly.

10. DRIP TUBING

The part of a micro-irrigation systems that allows water to slowly drip to a plant's root zone where it can be easily and efficiently used. Drip tubing minimizes water losses through evaporation, which are common when using other overhead spraying technologies. A properly designed and installed drip irrigation system can be up to 90% efficient, making it the best technology for landscape beds and hard-to-irrigate areas.

11. PRESSURE REGULATOR

Sprinkler systems need 30 to 50 psi to run under optimal conditions. Drip irrigation components work best between 15 to 25 psi. Depending on your utility, your water pressure may significantly exceed these amounts, leading to inefficient application or problems in your system. A pressure regulator is a tool to maintain a constant downstream operating pressure.

12. VALVE BOX/COVER

Plastic box that contains the sprinkler valve (usually green or black). They can be round or rectangular in shape.

13. MASTER VALVE

The master valve is installed on the mainline after the backflow preventer and before the electronic control valves. It can be shut off to protect the landscape from flooding in the case of a ruptured main or malfunctioning valve.

14. WATER METER

A device that measures the volume of water delivered to a property. Some water meters measure water in gallons while others measure in cubic feet. Most residential water meters are located near the curb or sidewalk at the front of the property in a concrete or metal "box." The water meter box will have a metal or plastic lid and may be marked, "Water Meter."

15. BACKFLOW PREVENTER

The mechanical device that protects the potable water supply from potential contamination from irrigation water. The type of backflow preventer used depends on the degree of hazard and the piping system involved, but they are required by regulatory agencies to protect the domestic water supply from contamination. Consult local building codes for laws applicable in your area.

16. VALVE

A valve is like a faucet, allowing water to pass through in response to commands from the controller. As valves receive an electronic signal to open, water flows to your sprinklers. When this signal stops, the valve closes, and the flow of water stops.

17. SOLENOID

The electromagnet component, connected by wire, to a controller which causes the opening and closing of automatic control valves.

18. PVC PIPE

The white semi-rigid plastic piping commonly used in irrigation systems.

TERMS TO KNOW

NOZZLE

The component of the sprinkler head that sprays water. A nozzle's design as well as its size, shape, and placement control the distance, watering pattern and distribution efficiency of the sprinkler. Typically, they are sold separately from the sprinkler head and come in varying spray patterns and distances.

NOZZLE STEM (Sometimes also called a Nozzle Riser)

A component of the sprinkler head that the nozzle attaches to. It pops up during operation (when the sprinkler zone is running).

RISER

The name for the section of pipe connected above a lateral line to support a sprinkler or nozzle. Whether segmented for custom adjustments, flexible or rigid risers will have male pipe threads on each end to allow for removal or repair.

CYCLE

A period of time when the sprinkler system is operating to provide water to the landscape.

START TIMES

When programming a controller, this is the precise time you want to begin watering. This is the time that the first station in a program will begin to run and the other stations in the program will follow in sequence. It is important to note, start times usually apply to the entire program, not to individual stations.

ZONE

A zone is the section of an irrigation system regulated by a single control valve. Zones should be made up of similar sprinkler types and contain plant materials with similar watering requirements, in addition to similar soil type, slope and sunlight conditions. Spray nozzles, Rotors, Rotary nozzles and Drip irrigation tubing each require their own zone (or zones) to adjust and maintain efficient water application.

EVAPOTRANSPIRATION (ET)

The measure of water lost due to the combination of evaporation (water lost from the soil) and transpiration (water loss from plants.) ET is used by irrigation networks like WaterMyYard.org,

WaterIsAwesome.com and some smart controllers to help determine the amount of watering needed by a landscape.

PRECIPITATION RATE (PR)

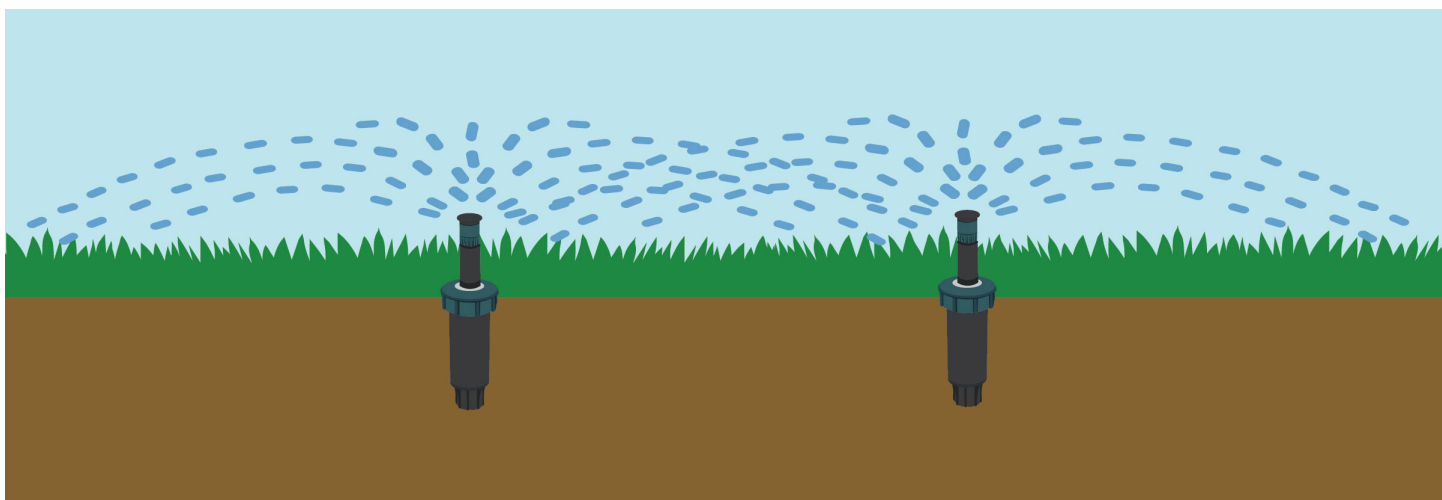
The rate at which a sprinkler system applies water to your landscape, usually expressed in inches per hour.

DISTRIBUTION UNIFORMITY (DU)

This is a measurement of how evenly water is distributed in a sprinkler system. The higher the DU, the better the coverage of the area, thus avoiding excessively wet or dry landscape areas. The spacing and adjustment of your sprinklers, the type of sprinkler used, as well as water pressure and wind affect DU. Many cities and water providers offer free irrigation audits, which, in addition to assessing DU, help to identify areas where repairs are needed.

HEAD TO HEAD COVERAGE

By law, sprinkler systems must be designed so that water from one sprinkler overlaps all the way to the next sprinkler head. This increases the irrigation system's efficiency and helps prevent overly dry or wet spots in the landscape, thus aiding in growing healthy plants..



Homeowner Irrigation Check-up

Watering Days

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday

Maintenance Issues

	Zone Type (S,R,MP,D,B)	Run Time (min)	Leaking Pipe	Broken Head	Broken Nozzle	Nonvertical Head	Clogged Filter	Overspray (spraying hardscape)	Misting (high pressure)	Runoff (long run time)
Zone 1										
Zone 2										
Zone 3										
Zone 4										
Zone 5										
Zone 6										
Zone 7										
Zone 8										
Zone 9										
Zone 10										
Zone 11										
Zone 12										

S - Spray R - Rotor MP - Multistream D - Drip B - Bubblers

Maintenance Notes

Zone 1
Zone 2
Zone 3
Zone 4
Zone 5
Zone 6
Zone 7
Zone 8
Zone 9
Zone 10
Zone 11
Zone 12



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