

Irrigation 101 System Fundamentals

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Class Goals

- Check for Problems - Conducting a Site Evaluation
- Tune up your irrigation system and be ready for the irrigation season, including the hot months
- Learn to fix leaks, broken sprinklers/nozzles, repair irrigation control valves



Evaluation



Check for problems

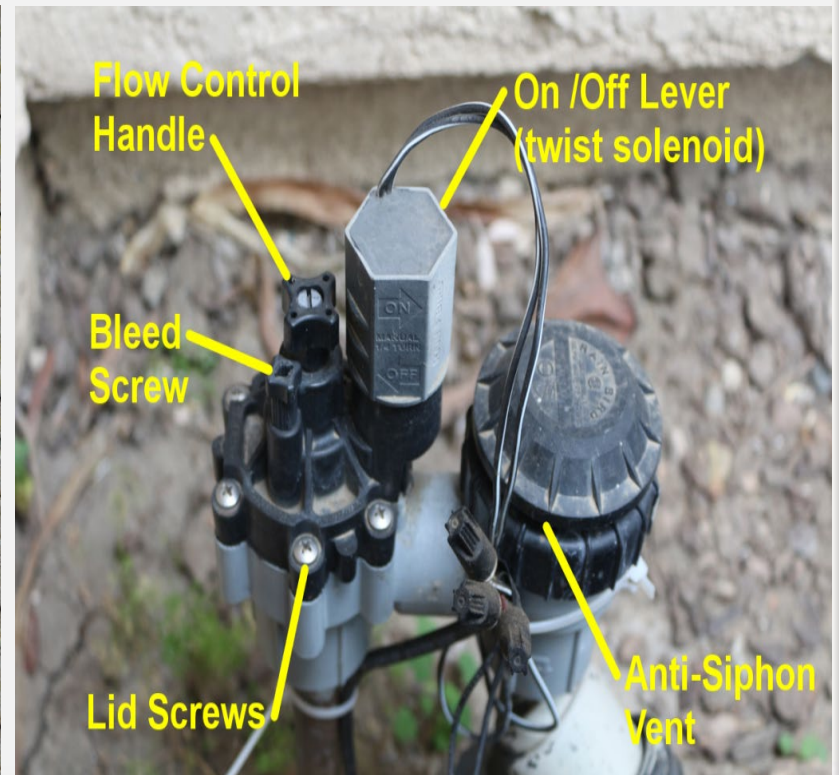
- Turn on each valve, one at a time.
- Carefully inspect your irrigation system.
- Use our Site Evaluation checklist to complete your test.

Run a System Test

From your Timer



Manually at Valve






Irrigation Timers/Controller

An irrigation timer or controller is the **brain** of an irrigation system

It tells the sprinkler system:


- * how long to supply water to the sprinklers- called **run time**
 - * what days to water- called **watering days**
 - * what time to start watering- called a **start time**
- *Should at minimum be change seasonally..





Irrigation Watering Schedule

Check your systems regularly



Winter	DECEMBER				JANUARY				FEBRUARY			
	Minutes per week	Days per week	# of cycles per day	Minutes per cycle	Minutes per week	Days per week	# of cycles per day	Minutes per cycle	Minutes per week	Days per week	# of cycles per day	Minutes per cycle
Turf/Fixed Spray	8	1	4	2	8	1	4	2	12	1	4	3
Shrub Spray Fixed	3	1	3	1	4	1	4	1	8	1	4	2
Drip System	8	1	4	2	12	1	4	3	20	1	4	5
Turf/Rotary Nozzle	32	1	4	8	32	1	4	8	56	1	4	14

Spring	MARCH				APRIL				MAY			
	Minutes per week	Days per week	# of cycles per day	Minutes per cycle	Minutes per week	Days per week	# of cycles per day	Minutes per cycle	Minutes per week	Days per week	# of cycles per day	Minutes per cycle
Turf/Fixed Spray	24	2	4	3	32	2	4	4	36	3	4	3
Shrub Spray Fixed	12	1	4	3	20	1	4	5	24	2	4	3
Drip System	28	1	4	7	44	1	4	7	56	2	4	7
Turf/Rotary Nozzle	96	2	4	12	144	2	4	18	180	3	4	15

Summer	JUNE				JULY				AUGUST			
	Minutes per week	Days per week	# of cycles per day	Minutes per cycle	Minutes per week	Days per week	# of cycles per day	Minutes per cycle	Minutes per week	Days per week	# of cycles per day	Minutes per cycle
Turf/Fixed Spray	48	4	4	3	64	4	4	4	48	3	4	4
Shrub Spray Fixed	32	2	4	4	32	2	4	4	32	2	4	4
Drip System	72	2	4	9	80	2	4	10	72	2	4	9
Turf/Rotary Nozzle	240	4	4	15	256	4	4	16	216	3	4	18

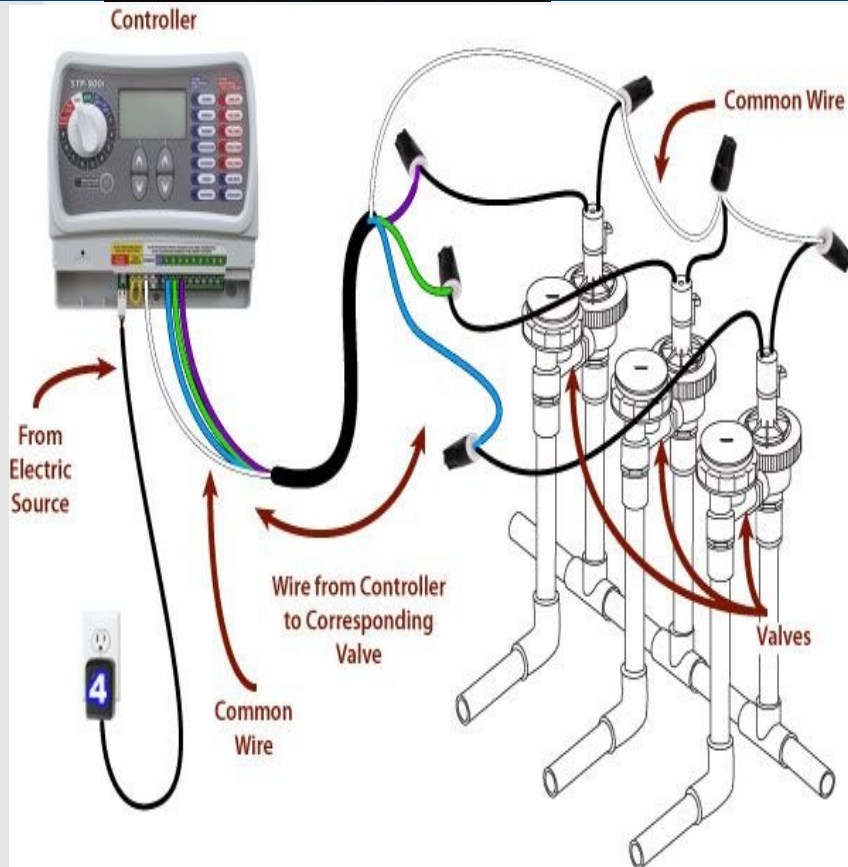
Fall	SEPTEMBER				OCTOBER				NOVEMBER			
	Minutes per week	Days per week	# of cycles per day	Minutes per cycle	Minutes per week	Days per week	# of cycles per day	Minutes per cycle	Minutes per week	Days per week	# of cycles per day	Minutes per cycle
Turf/Fixed Spray	36	3	4	3	24	2	4	3	12	1	4	3
Shrub Spray Fixed	25	2	4	3	16	1	4	4	8	1	4	2
Drip System	56	2	4	7	36	1	4	9	16	1	4	4
Turf/Rotary Nozzle	168	3	4	14	112	2	4	14	52	1	4	13

Quick sprinkler tips

- Check system regularly for leaks or missing drip emitters
- Adjust and straighten sprinklers for overspray on hardscape like sidewalks and drive ways
- Install check valves for low head drainage

Call us at (916) 774-5761
to schedule a Water Wise House
Call if you have questions.

Timer Wiring Guide



- The controller has a valve circuit (often called a "station" or "zone") for each of the valves it operates.
- It turns on the valves by sending a 24-volt current to the valve from the circuit/station and by activating the solenoid.
- Buzzing solenoids are usually caused by insufficient voltage reaching the valve solenoid.
- The valve solenoid is the small device attached to the valve that the wires lead to. It is what makes the valve open and close when an electrical signal is transmitted to it by the irrigation controller. It is normal for the solenoid to make noise, it clicks when the valve is turned on or off. It is also normal for a very soft buzzing sound to be heard when the valve is activated, but you should not be able to hear it unless you put your ear near it. If you can easily hear it buzzing, that is not normal.

Site Evaluation/Troubleshooting



Irrigation Site Evaluation

Date: _____

Existing Irrigation Controller
Model: _____

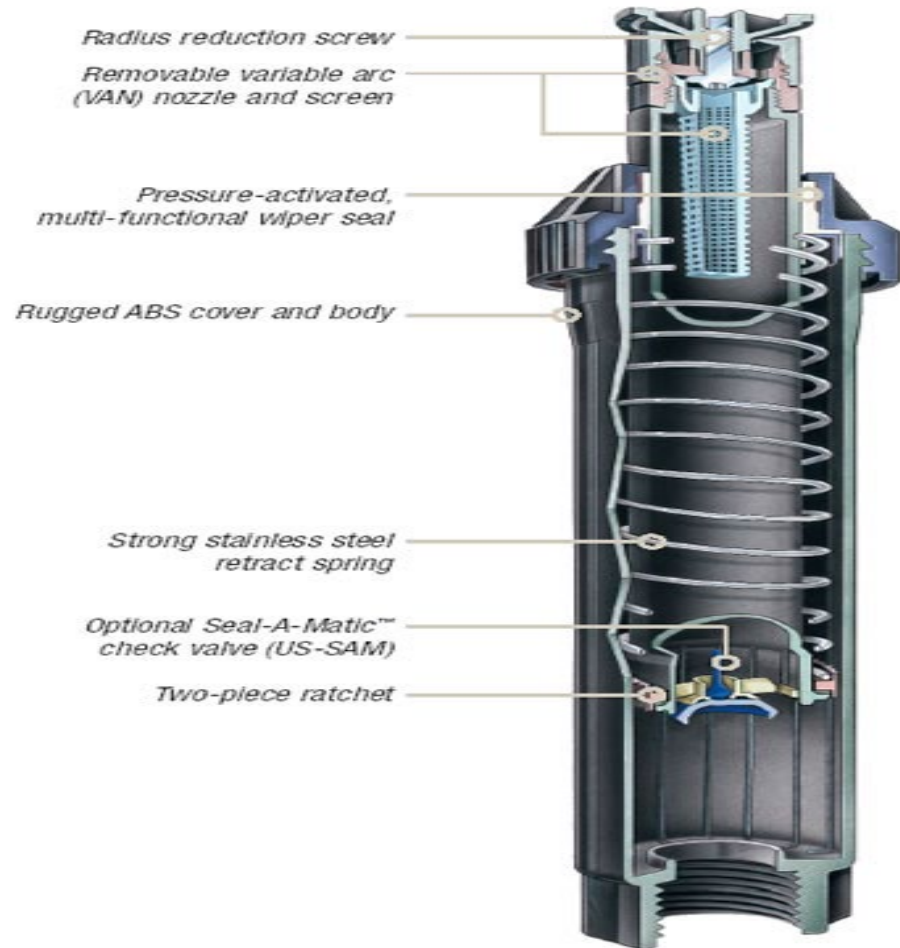
Make: _____

Number of Stations: _____

Landscape Findings	Station Number												
	1	2	3	4	5	6	7	8	9	10	11	12	
Location of Landscape: F=Front Yard, B=Back Yard, N/A=No station													
Type of Landscape: T=Turf, S=Shrubs, A=Annuals, X=Tree, M=Mixed													
Irrigation Delivery: S=Spray, R=Rotor, D=Drip, B=Bubbler, M=Mixed													
Number of sprinklers in this station:													
Topography Problems:													
1. Area Overwatered (excessive irrigation run times).													
2. Area is heavily shaded and saturates easily.													
3. Excessive runoff.													
4. Pooling of water near plants.													
5. Sloped area that would benefit from "cycle and soak" irrigation.													
6. Low head drainage.													
7. Spray pattern blocked by plants.													
Irrigation Control Valve Problems:													
1. Valves not separated by plant water requirements.													
2. Leaking irrigation control valve													
Sprinkler Problems:													
1. Broken or clogged sprinkler nozzles.													
2. Broken pipe.													
3. Broken sprinkler body.													
4. Sunken or low sprinkler heads which are buried in grass.													
5. Sprinkler heads or nozzles are different brands or delivery rates.													
6. Tilted or leaning sprinkler heads.													
Water Pressure Problems:													
1. Overspray or incorrect sprinkler arc.													
2. Too much water pressure													
3. Too little water pressure													
Drip Irrigation													
- Filter on station?													
- Pressure regulator on station?													
- Station operates at the correct pressure?													
1. Break in drip pipe or tubing.													
2. Emitter comes off the tube due to high pressure.													
3. Plugged or clogged emitter(s) with uneven or no flow.													
4. Missing or broken drip emitters													
5. Drip system waters too much													
6. Drip system waters too little													

Comments: _____

Sprinkler Parts



Broken/Clogged Nozzles



Replace nozzle

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**Remove nozzle, clean,
and replace**

Nozzles and Screens



Tips on Spray Nozzles

- Replace with same brand, and throw 6', 8', 12', radius ½ circle, full, etc. and precipitation rate.
- Adjust to keep off hardscape. Each has an adjustment screw in center of nozzle.
- Nozzles may be male thread or female thread based on sprinkler body brand.
- Always install supplied screen.



Non Uniform Precipitation Rate

Need to use the same type of heads and same nozzle size



	5F	5H	5Q			
5 Series MPR 5 foot radius						
	8F	8H	8Q	8T		
8 Series MPR 8 foot radius						
	10F	10H	10Q	10T		
10 Series MPR 10 foot radius						
	12F	12H	12Q	12T	12TQ	
12 Series MPR 12 foot radius						
	15F	15H	15Q	15T	15TQ	
15 Series MPR 15 foot radius						
15 Strip Series 15 foot radius	15EST	15CST	15RCB	15LCS	158ST	988T
	5F-B	5H-B	5Q-B	5CST-B		
5 Series MPR stream bubblers						
	8H-FLT	8Q-FLT				
8 FLT Series low trajectory						

Broken Pipe



**Need to cut pipe and glue
a repair coupling**

Tips for Broken Pipe Repairs

- Shut off irrigation system and let dry out 1-2 days before digging.
- Dig out pipe 1' foot on each side of break and 6" below pipe.
- Use cardboard or a piece of wood to put dirt that's being removed on.
- Measure for a repair coupling.
- Cut pipe to measurement needed.
- Be sure inside the pipe is clean in both directions. Flush for a couple of seconds if necessary.
- Use a repair coupling with PVC Primer and PVC glue to make repair. Use gloves.



PVC Cutters, Primer and Glue



Repair Couplings



Measure the slip fix



Use primer and glue and install

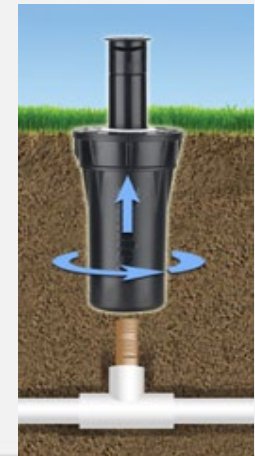
Broken Sprinkler Body



Dig up sprinkler head, unscrew and replace with a new one

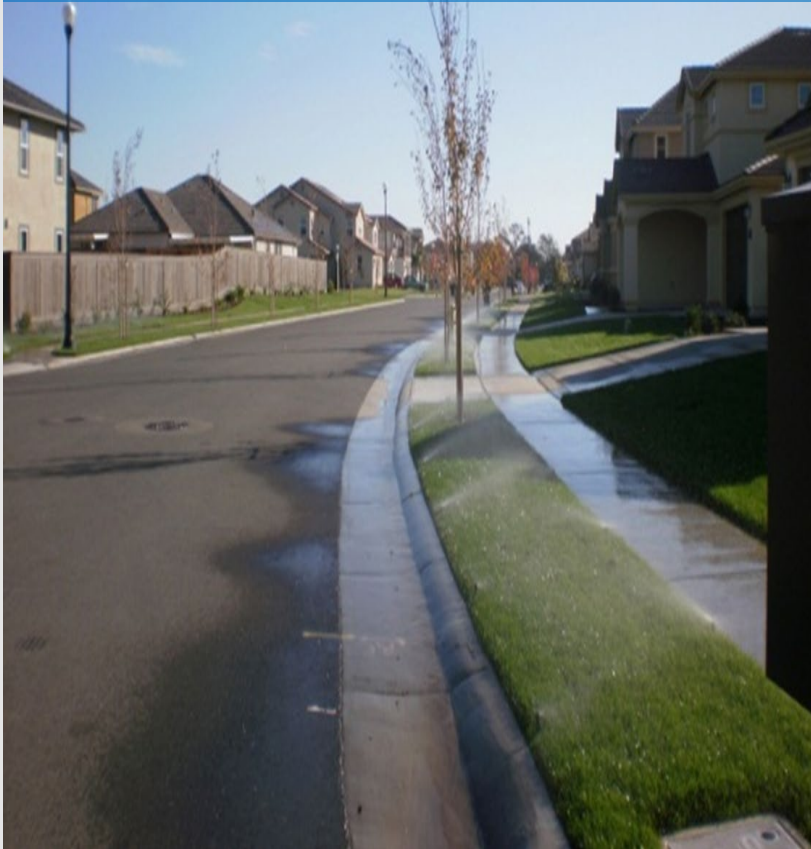
Tips for Replacing Sprinkler Heads

- Dig around the sprinkler head, remove turf/dirt, until pipe, riser and head are completely exposed. Place the removed dirt on cardboard or a piece of wood.
- Unscrew from riser, may need channel lock pliers to hold riser while unscrewing the head. Keep dirt out of riser, flush if necessary.
- Replace with head same brand, body size 4", 6" 12" for proper height. Ensure nozzle has and same throw 6', 8', 12', radius ½ circle, full, etc. and precipitation rate as before.
- Replace and adjust to keep off all hardscapes, buildings or other landscaped areas.



Overspray

**Use adjustment screw
to turn down the ARC**

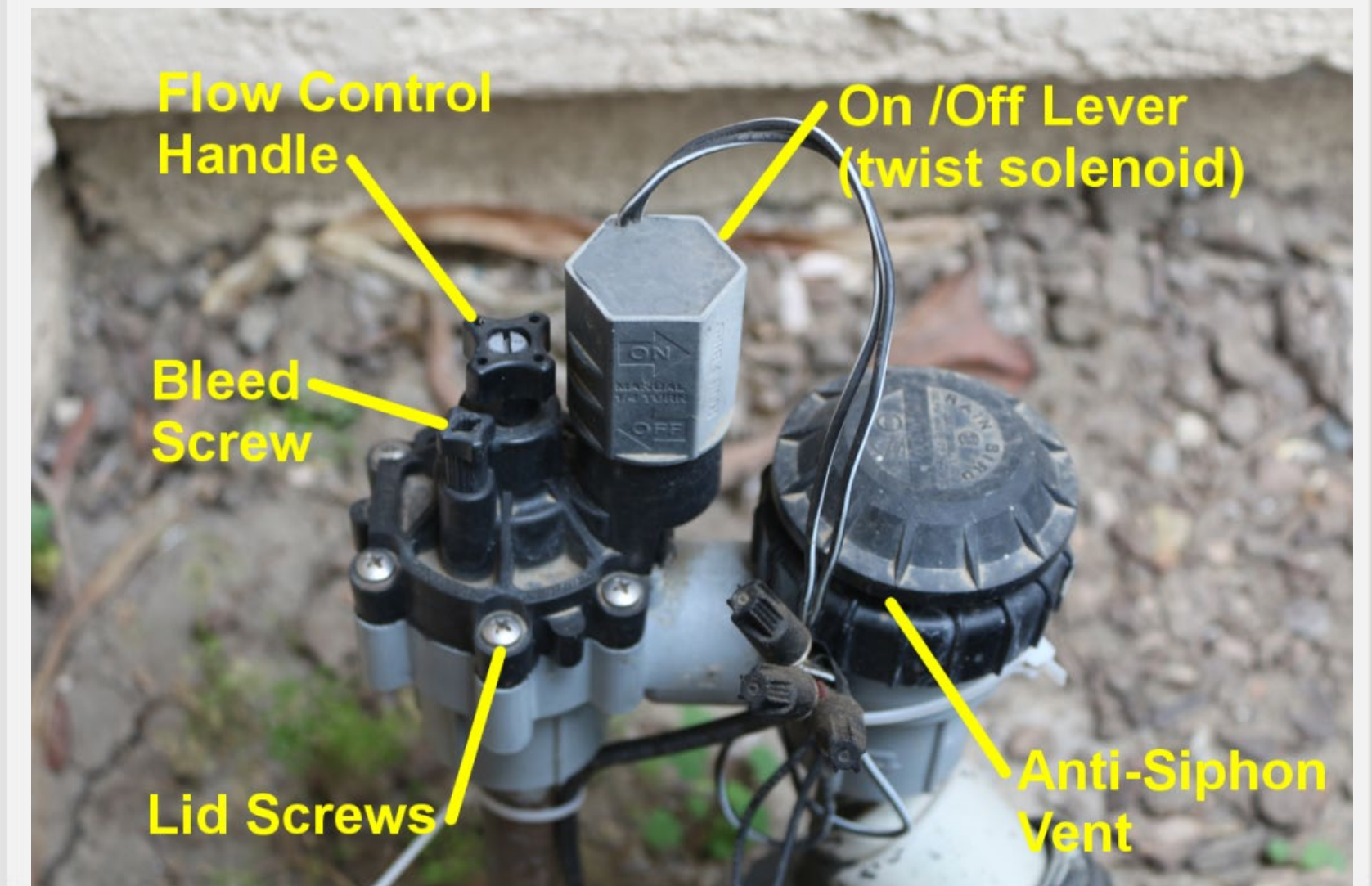


Tips for Correcting Overspray

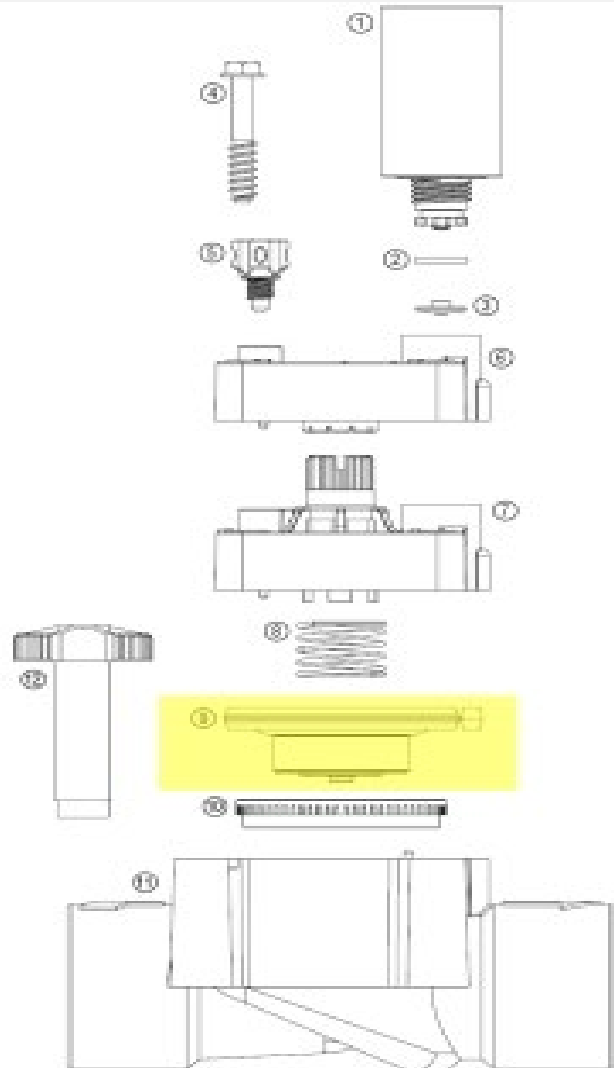
- Confirm the nozzle is the correct size for the spacing and radius for the area, if not change nozzles to match necessary throw based on feet - 4', 6', 8', 12', etc.
- Turn valve/zone on manually to adjust overspray from nozzle.
- Use a small screw driver to adjust the set screw on the top of the nozzle. This will only work if filter is installed.
- Use square or rectangular spray nozzles in parkway strips.
- Adjust flow control on valve for high pressure or see high pressure slide.



Valve Parts



Valve Parts



Valve Repair



Bad Diaphragms cause this

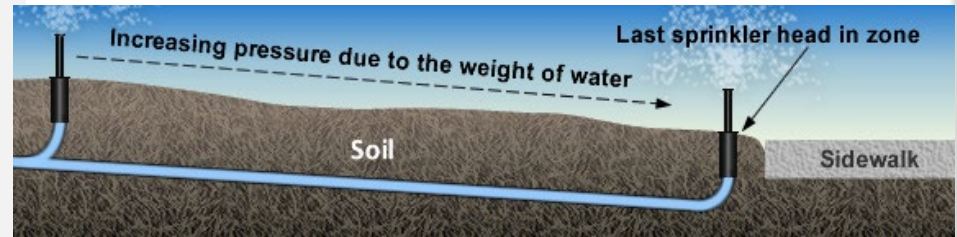
Low Head Drainage



RainBird SAM



Hunter HCV



Install check valves or heads with check valves



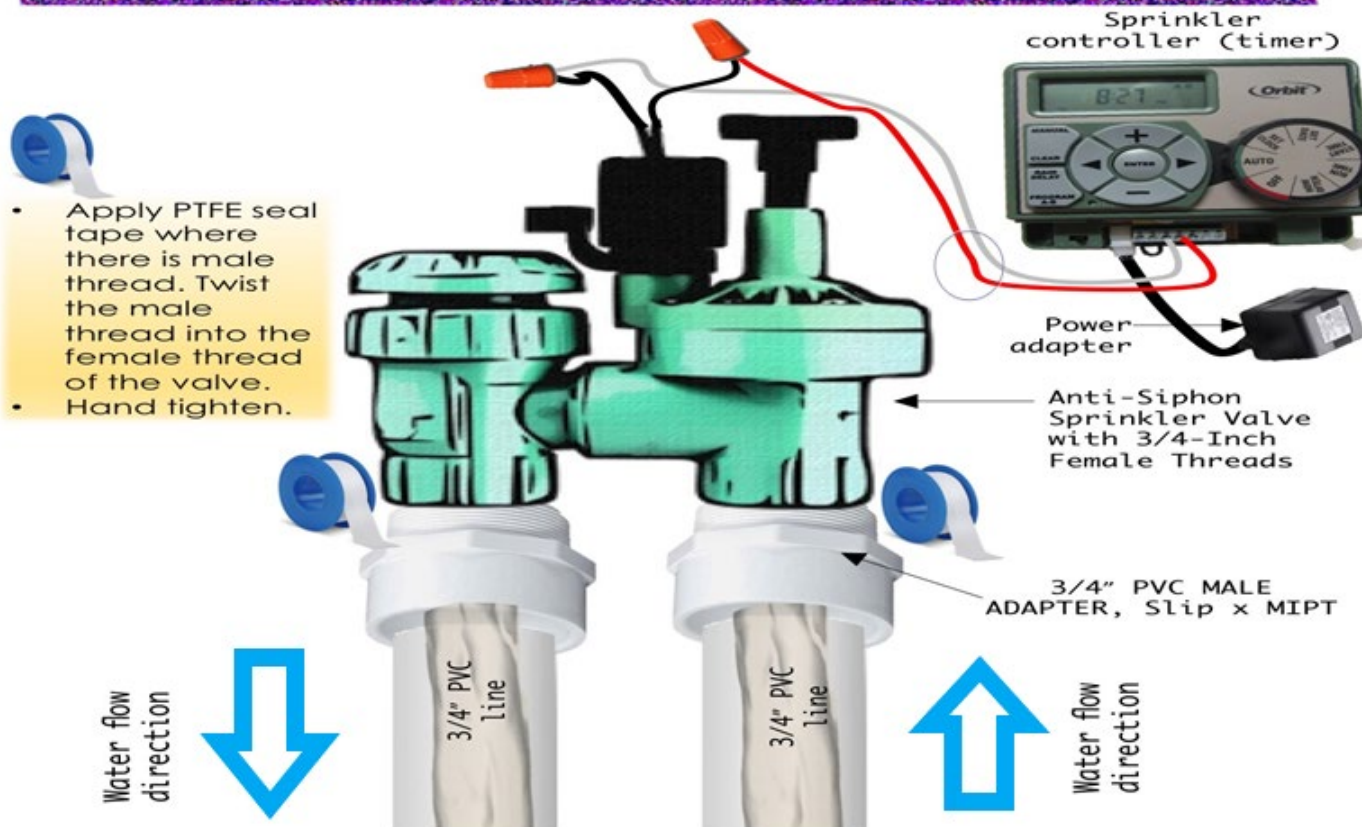
Hunter Pro-Series

Replacing a Valve



Replacing a Valve

The bottom of the Anti-Siphon Sprinkler Valve must be at least 6" above the highest sprinkler head.



Spray Pattern Blocked



Tips for Sunken and Blocked Sprinkler Heads

- Spray systems need to have head to head coverage at all times. Any type of blockage affects distribution uniformity and efficiency of the irrigation system.
- Remove and replace sprinkler head with taller model depending on thatch level or soil height. Install a riser extension or new riser to achieve desired height.
- Trim or remove shrubs that block spray pattern.
- Move head to proper location if need be. See "Funny Pipe."



Sunken or Low Heads



**Raise the head or
add a taller head**



SJA-1805

SJA-1205

SJA-605



SJA2-1805

SJA2-1205

SJA2-605



Tilted or Leaning Heads

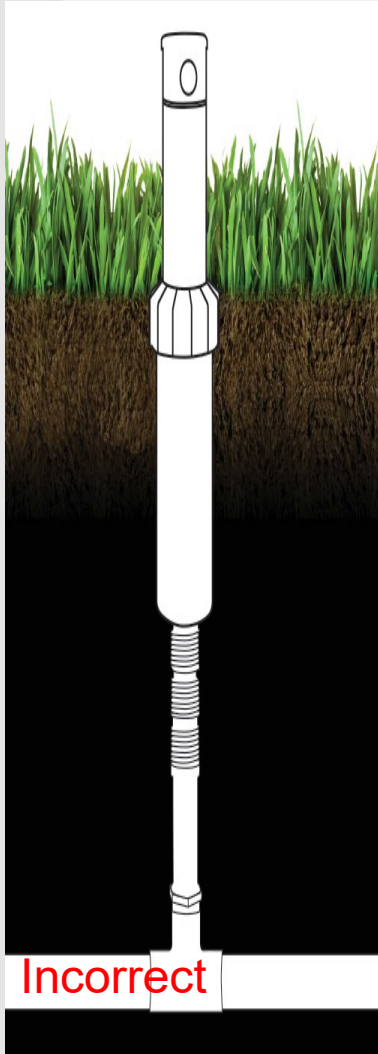


Tips for Tilted Sprinkler Heads



- Spray systems need to have head to head coverage at all times.
- Tilted heads do not reach other heads, often times they create a dry spot.
- Or they create wet spots when they are pointed down.
- If installed on a swing joint, retilt and pack around them with soil. If on riser, add street elbows or swing joint.



Broken Pipe/Riser/Nipple



Tip's for Risers/Nipples

- A “riser” is used to connect the sprinkler head to the underground lateral pipe.
- Purchase a riser extractor tool. 
- Risers should have some flexing capability like poly pipe, swing joint or (3) Marlex 90 degree elbows for some movement.
- The swing joints allow you to rotate the heads to just about any position or height.
- Poly Cut off Risers make it easy to cut for the correct length. 

High Pressure Problem



High pressure requires pressure reduction!

Tips for High Pressure

- Spray systems should operate around 30-40 psi.
- High pressure can cause misting and water waste.
- It can also shorten the life of a system and cause unnecessary wear and tear on the irrigation system.

Recommendations

- Install a pressure regulator at the house main to the irrigation supply line.
- Add pressure regulator at the irrigation control valve.
- Upgrade to pressure reducing sprinklers.



Low Pressure Problem



Tips for Low Pressure

- Spray systems should operate around 30-40 psi.
- Low pressure can cause flooding and water waste runoff.
- It can also cause brown spots in turf and kill shrub or groundcover.
- Hydraulic Malfunctions - Check to make sure all valves from the supply line to the irrigation control valve are fully open. And make sure pressure regulator is functioning properly.
- Leaks or pipe breaks will negatively affect pressure to the zone.
- Check for overlapping schedules on the timer or timers (especially an issue if you have more than 1).
- Look for clogged heads.
- If designed poorly, consider low flow heads. By lowering the demand of the system, dynamic pressure can be gained.

Water Efficient Upgrades

- Weather-based Irrigation Controllers (Smart Timers)
- Low Precipitation Multi Stream Nozzles
- Weather Sensors



Smart / Weather Based Timers



"Smart" Irrigation Controllers

- Reduce outdoor water use by using information about site conditions (such as the site's sun exposure, soil moisture, rain, wind, slope, soil, plant type and more).
- They apply the right amount of water based on those factors, to maintain healthy growing conditions.
- Uses real weather data to schedule irrigation that matches plant needs.
- Control from a computer or smart device.
- Access and manage your watering schedule from anywhere in the world. Or better yet, allow the device to calculate run times for you.

<https://rachio.com/>

<https://bhyve.orbitonline.com/>

Rotary Nozzles



Tips for Rotary Nozzles

- Easy-to-install retrofits for pop-up irrigation heads. Immediate improvement in the distribution uniformity.
- Reduced runoff on slopes and clay soils.
- Increased radius range. Up to 36 feet. Adjustable for precise settings.
- Considerably less water flow per minute than conventional spray nozzles, reducing water use. **Run them at least twice as long.**
- Better head to head coverage.
- Wind resistant multi stream. Good for slopes.
- **Matched Precipitation Rate** to eliminate wet or dry spots.
- Male and female threaded available.

Freeze, Rain and Soil Sensor

- Irrigating during or right after a rainstorm is one of the most pointless and wasteful irrigation practices.
- A rain shutoff device such as a rain sensor or a soil moisture sensor may be the perfect solution.
- Is the law now not to water landscape within 48 hours of a significant rain event or $>$ than .25" of rain.
- Prevents liability from slippery conditions when water freezes on sidewalk.



Internet Resources

California Landscape Contractors Association- www.CLCA.com

City of Roseville- www.roseville.ca.us/savewater

Regional Water Authority- www.bewatersmart.info

DIY Network-<https://www.diynetwork.com/.../landscaping/how-to-install-a-drip-irrigation-system>

Drip Depot-<https://www.dripdepot.com/Drip/Systems>

The Irrigation Association- www.irrigation.org

Hunter Industries-<https://www.hunterindustries.com/product-line/Micro%20Irrigation>

Irrigation tutorial- www.irrigationtutorials.com

Jain- <https://jainsusa.com/training/point-source-inline-irrigation/>

Netafim-<https://www.netafimusa.com/landscape/>

Peaceful Valley (Drip Tape)-<https://pdfs.groworganic.com/media/pdfs/catalog/Tools-Irrigation-2020-WEB.pdf>

Landscape Products-<https://landscapeproductsinc.com/>

Rain Bird-<https://www.rainbird.com/professionals/products/drip-irrigation>

Sprinkler Warehouse-<https://www.sprinklerwarehouse.com/products/drip-irrigation>

Toro-<https://www.toro.com/en/homeowner/irrigation-landscape-drip>

WUCOLS-Water Use Classification of Landscape Species- <https://ucanr.edu/sites/WUCOLS/>

YouTube https://www.youtube.com/results?search_query=drip+irrigation+channel

Water Wise House Calls

Why struggle with your irrigation?

Call us!

- Call us to schedule an appointment. Our water-use specialists can come to your home and analyze your indoor and outdoor water use, including checking your sprinklers.
- House Calls are free to Roseville residents and are available weekdays to suit your schedule.
- Call **(916) 774-5761** to schedule your appointment today.

H2OGUY

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ROSEVILLE
CALIFORNIA
Be in the know.



Questions?

Thank you for your participation and
doing your part!