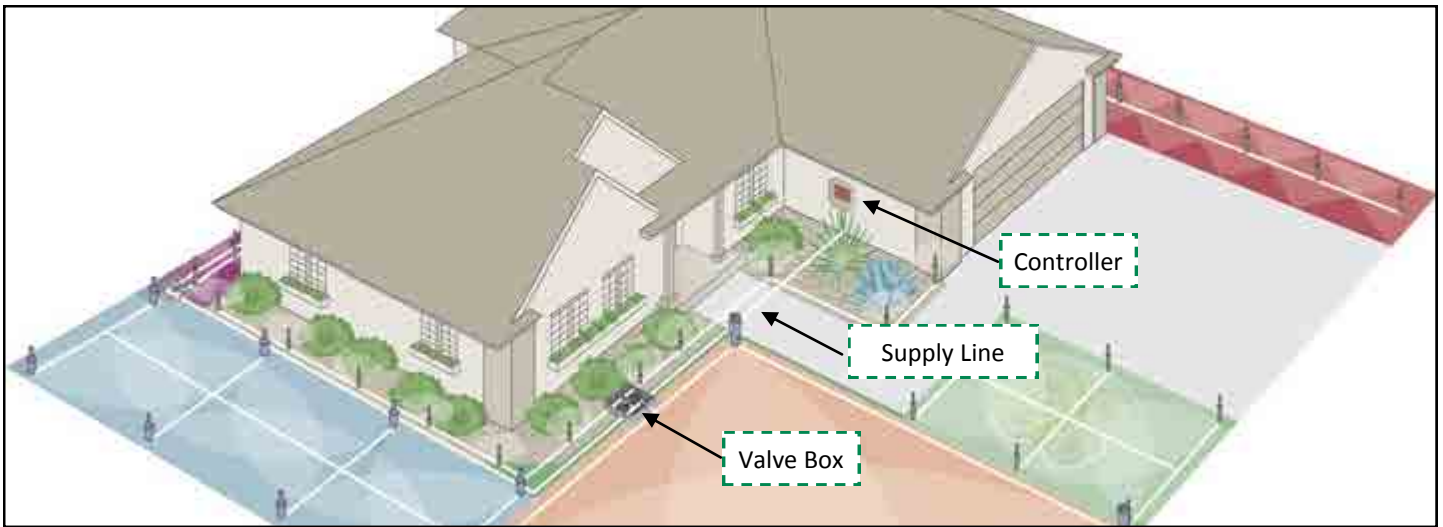
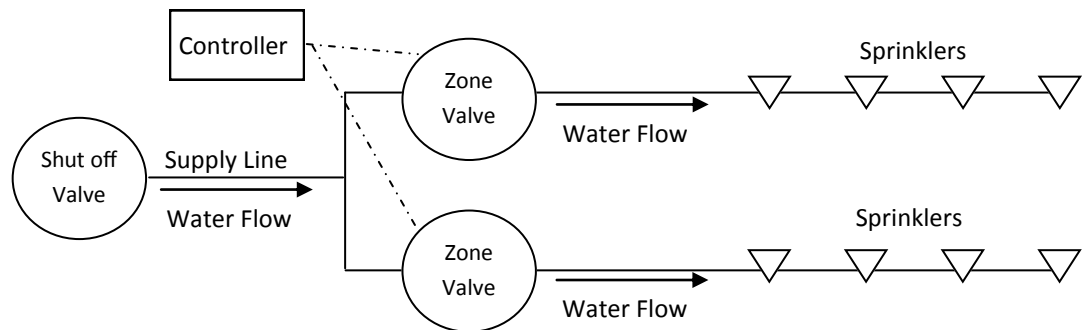




Troubleshooting and Maintenance Guide for Residential Automatic Valves



BASIC AUTOMATIC
IRRIGATION SYSTEM
COMPONENTS
DIAGRAM



Valves are an essential part of any sprinkler system. They are the link between the "brains" of the system (the controller) and the sprinkler heads, to turn the water on and off.

Most automatic sprinkler systems are set up with two types of valves. A brass "gate valve" or "ball valve" is usually located right after the "tee" where the sprinkler system cuts off from the main source of water to the house. This valve, referred to as the "shutoff valve," is used to shut down the sprinkler system for repairs or winterizing without shutting off the water to the entire house. It is recommended that all systems be equipped with a shutoff valve installed in a box for easy access. Some systems also require the use of a back-flow preventer. Check local building codes.

The second type of valve is the sprinkler "zone valve." Each zone valve is piped to a set of sprinklers. When the valve is turned on, either by hand or in response to an electronic signal from the controller, all the sprinklers piped to that particular valve go on. In most cases, there are several valves located together (called a manifold). These are often in a valve box if underground.

Why are several valves needed? All systems are limited by a combination of the pressure of the water (psi) and the number of gallons per minute (gpm) available. Each sprinkler uses a certain number of gallons per minute of water. This release of water through the nozzle reduces water pressure to a certain degree while the system is working. For maximum performance, each zone is controlled by one valve and is set up with the proper amount of sprinklers so that the psi and gpm capacity of the system is not exceeded. The purpose of this information is to address questions and problems related to zone valves.

Types of Zone Valves

There are two basic types of zone valves commonly available.

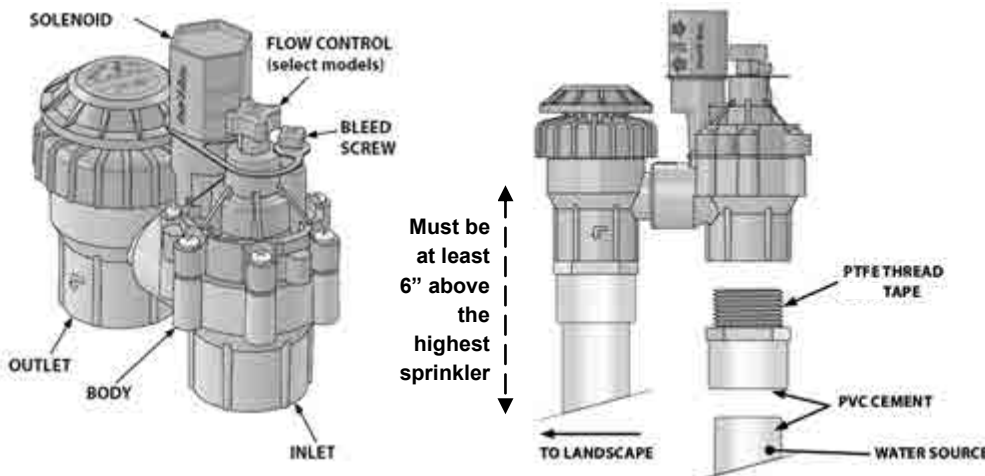


Anti-Siphon Valves

Anti-siphon valves have a built-in backflow device to prevent possibly contaminated water from flowing backward into the household supply. If approved by your local codes, these types of valves provide inexpensive backflow protection. Anti-siphon valves must be installed at least 6" above the highest sprinkler head on the line in order for the backflow device to work properly. Both automatic and manual versions are available.

Anti-siphon valves are an inexpensive choice and easy to install and maintain. The built-in anti-siphon backflow device prevents potential contamination of household water supplies from fertilizers and other toxic chemicals which may enter the system.

Check your local codes for the types of backflow protection required in your area. Electric models are simple to hook up to a controller for automatic watering. They are best suited to plans where there is not more than a slight rise in elevation, and fairly clean source water.



Installation Notes

- Must be installed upright
- Must be installed at least 6" (15,2 cm) above the highest point of water in the pipe and sprinklers it serves
- No valve can be located downstream of the anti-siphon valve
- Must not be subjected to operating pressure for more than twelve (12) hours in any twenty-four (24) hour period
- Uniform Plumbing Code Sec. 1003 (2) 602.2 Consult local codes

Caution: This valve is designed as a zone valve and as such may not function properly, resulting in water contamination, if installed where constant pressure is placed on the outlet (sprinkler) side of the valve. The manual version **is not** suitable for use in a continuous open position as a main shutoff valve or as a means of inexpensive backflow prevention for an entire system; nor are the automatic models to be used as a master valve where other valves will be installed downstream.



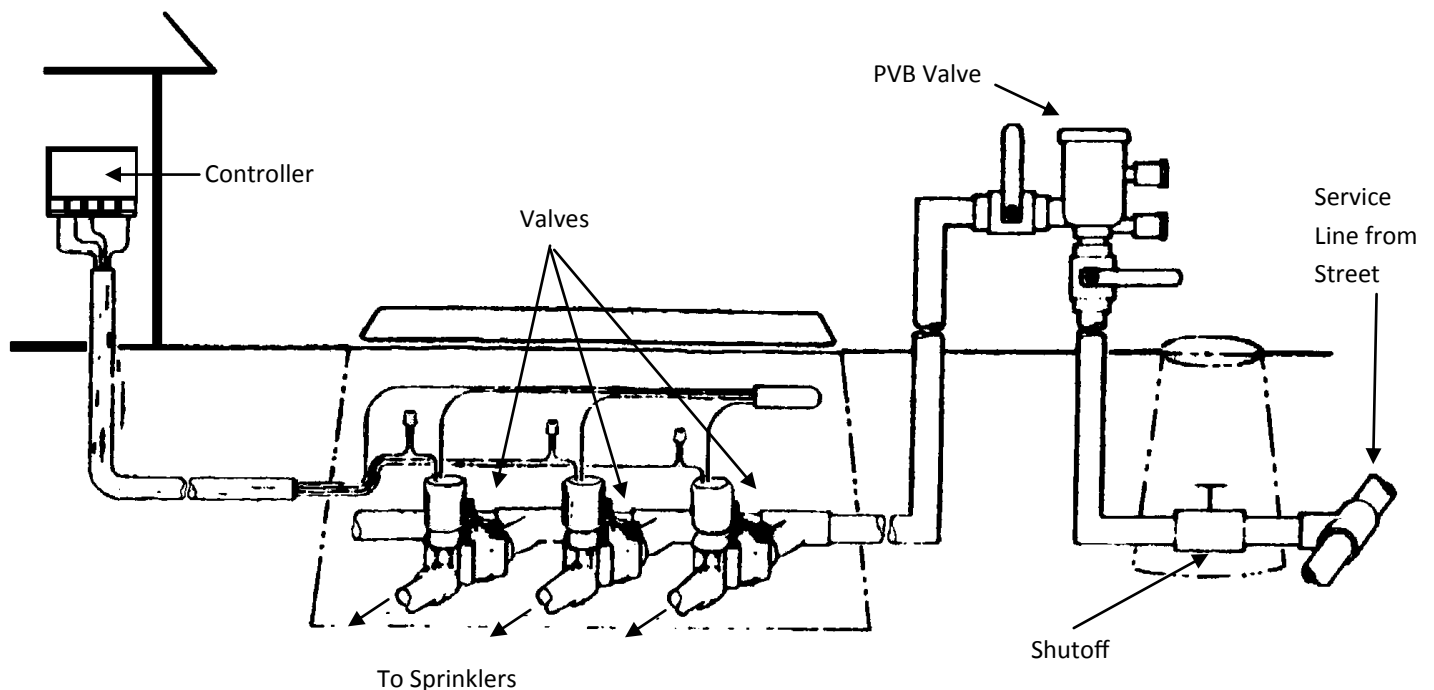
In-Line Valves

The second type of zone valve is an "in-line" valve. It is installed below ground, preferably in a valve box for ease of maintenance. A separate backflow preventer is required for backflow protection. In-line valves are automatic valves.

In-line valves are suitable for sites with all types of elevation changes. Because of their protected location, in-line valves are less likely to be tampered with by children or vandals, and less likely to incur freeze damage than above ground models. An in-line valve is also suitable for use as a master valve.

In situations where the water is pumped from a lake, well, ditch, or other "dirty" water source, sand and other debris should be filtered from the line through a filter with a 100 mesh screen. If water supply is also used as a drinking water source, a separate backflow prevention device is required to prevent potential contamination should fertilizers or toxic chemicals in the water be siphoned backwards through the lines.

If your water is supplied by a municipal water system, check with your local Rain Bird dealer or plumbing supplier for the type of backflow prevention device required in your area. For specific information about backflow and the types of backflow prevention devices available, please call our toll-free number. 1-800-RAIN-BIRD, and request a "Backflow Prevention Handbook."



Tips On New Installations

Tapping Into Your Water Source

Turn off the water at the meter. Cut into your household service line and install a system appropriate tee, after the meter. The tee selected will depend on the type of service line piping. The cut can be done anywhere on the line, depending on the layout of your system and the location of your first manifold. Unless unregulated static pressure is over 80 psi, tap into the line before the household pressure regulator. In freezing climates, you will probably be tapping into your source inside a basement.

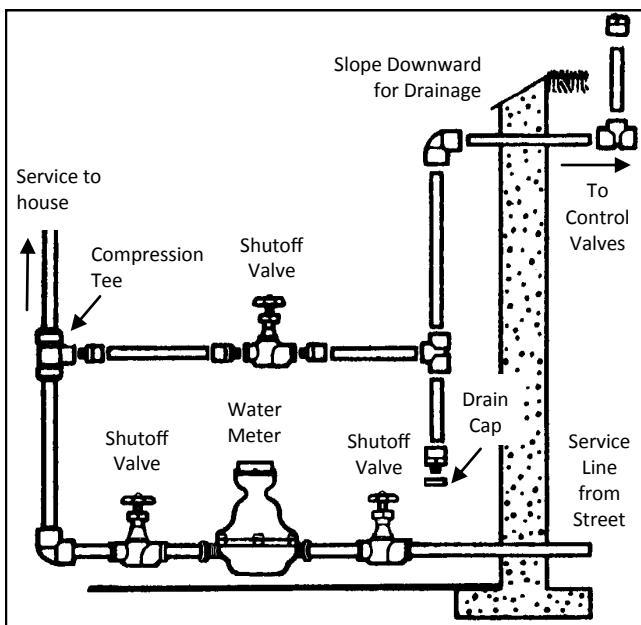
Next, install a gate or ball valve to act as your system shutoff valve. House the valve in a valve box for easy access in below ground situations. Once this valve is installed and tested, the valve at the meter may be left open for water usage inside the house. In freezing climates, your next step will be to install a manual drain valve so that the water can be drained from the pipes between the zone valves and the shut-off valve.

Install Schedule 40 PVC, thick-walled pipe up to the valves. In basement installations, you will need to drill a hole through the wall to direct the pipe out to the valves. For convenience in "blowing out" the system for winter, access to the line by means of a tee with a capped 1" riser may be installed at this point.

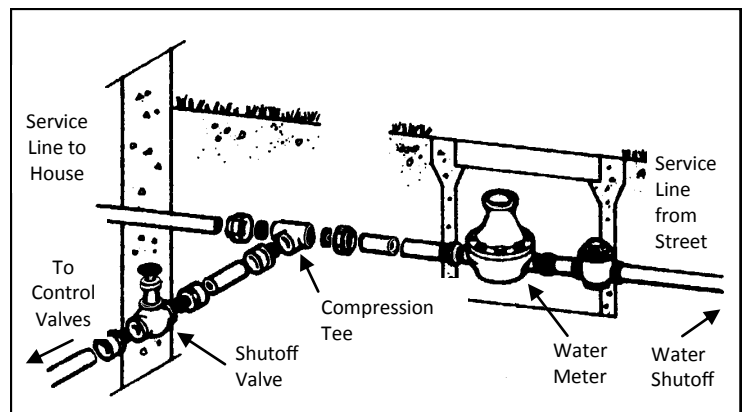
If a backflow preventer is to be used, install it outside at the proper height.

Important: Remember to flush the line. Turn on the water at the shutoff valve and flush the pipes free of dirt.

Meter in House



Meter in Yard



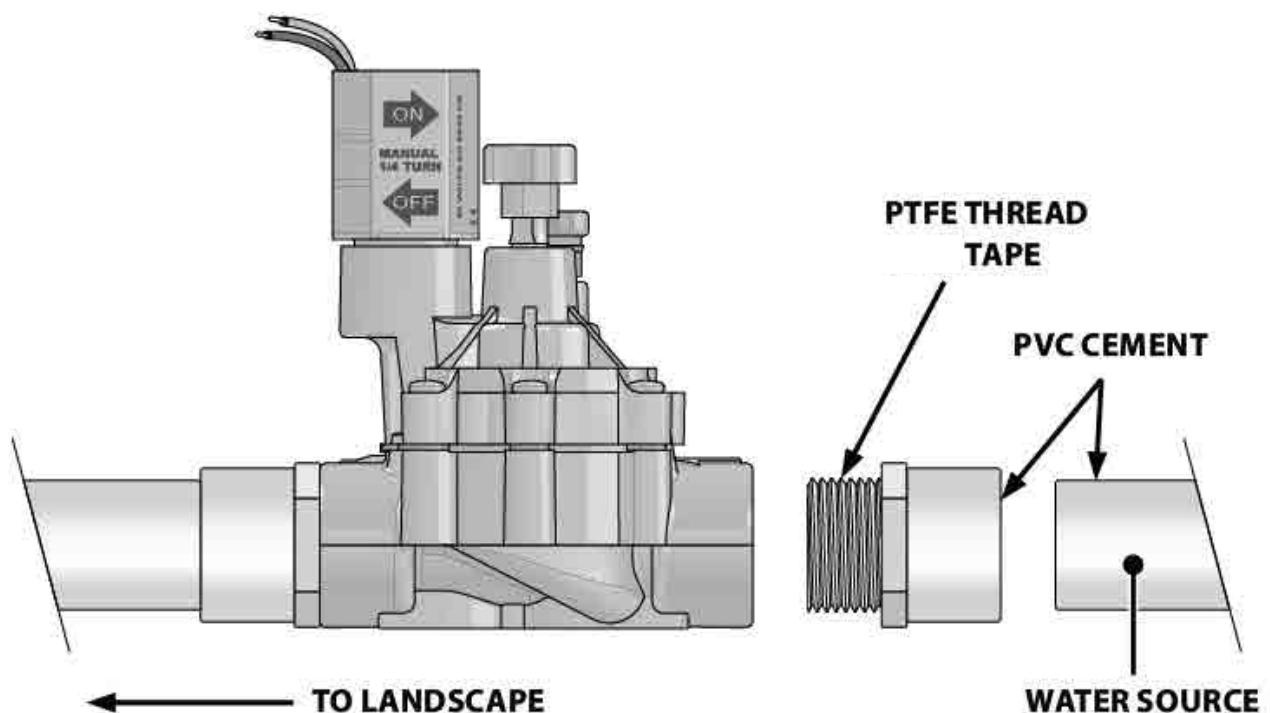
Installing the Valves

If you are installing a new in-line valve manifold, or grouping anti-siphon valves together, keep in mind that the location should be easily accessible for maintenance. Locate the manifold where you are not likely to be sprayed by the sprinklers when turning the system on manually. On larger systems, separate valve groups may be required for the front and back yards. It is a good idea to keep a plan showing where all in-ground valves and pipes have been installed.

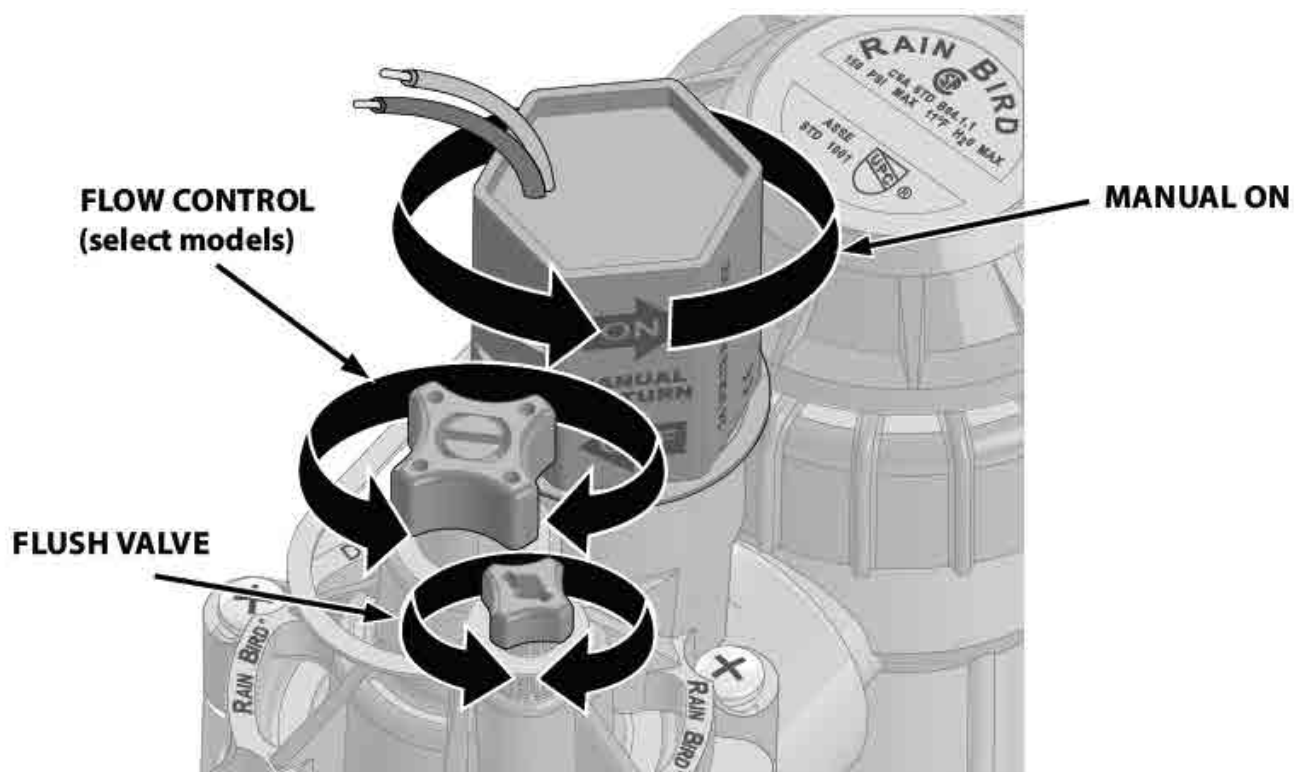


Important: Be sure to flush the line coming up to the valves, before installing the valves.

Tip: If using a manifold for underground valves partially assembling the manifold ahead of time will make the job easier. Be sure that the valve is installed horizontally according to the arrows printed on the body for the direction of flow. Valve operation may be erratic and valve warranty is void if installed backward or in a vertical position. Do not over-tighten or use any kind of pipe dope. Call our toll-free Technical Services Hotline for any questions on system installation: 1-800-RAIN-BIRD.



Installing the Valves (Continued)



Most valves have a flush mode which allows a little extra water through the valve to clean it out. To flush valve to clear debris: Turn the bleed screw counter-clockwise **ONLY** 1 turn. Flush one minute and turn clockwise to close. Test and flush each line before sprinklers are attached.

How to Operate

Several models of Rain Bird 24 Volt valves are available for home use. Minimum current requirements for opening the smaller valves is .30 amps and for holding the valve open is .19 amps. Larger valve models have slightly higher requirements. All Rain Bird valves are designed to work with Rain Bird controllers and other controllers that have a power output sufficient to activate the valve. Your Rain Bird valve offers some simple features you should be familiar with. **Note:** Some valves have only part of these features.

See the diagram above for information on flushing the valves.

- a. Flow control - Regulates the amount of water passing through the valve. Does not turn on or off the valve. (Not available on all models.)
- b. Flush Valve / Manual bleed - Turns the valve on manually by "bleeding" water off of the diaphragm. External bleed valve models have a knob or screw to turn and the water sprays out of the top of the valve.
- c. Manual On/Off - Turn solenoid 1/4 turn counterclockwise to turn valve on manually. Do not turn past 1/4 turn or the Solenoid may come loose and release pressurized water.

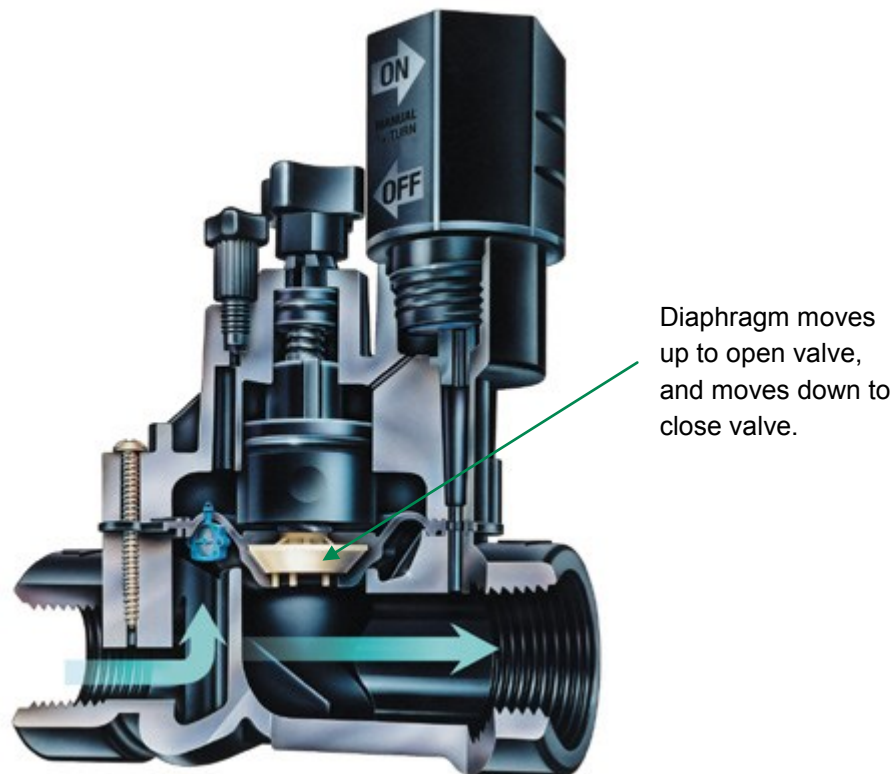
Troubleshooting

How the Valve Works

It is easier to troubleshoot valves if you know a little about how the valve works. When an electrical impulse is transmitted to the solenoid (black cylinder with wires), an electromagnetic field causes a small metal plunger in the solenoid to move upward. When the plunger moves upward, a small hole (port) in the valve is uncovered. Water in the chamber above the closing mechanism (either diaphragm or piston) flows through the port and out of the valve, relieving water pressure needed to hold the valve closed. At this point, the pressure of the incoming flow of water is now greater than the pressure in the chamber above the diaphragm, and the force of the water pushing up underneath the diaphragm opens the valve.

When the solenoid is de-energized, the plunger moves down, closing the small port. Water flowing through a small hole in the closing mechanism refills the chamber above the diaphragm and builds up pressure. The increased pressure forces the diaphragm downward, thus closing the valve. All valves have a range of pressure and water flow that must be maintained in order to work properly.

Now that you have an idea of the way the valves work you can see why sufficient pressure and flow are important. If a problem does occur, it is also very important to ensure that the small internal ports are not blocked by debris. Adequate flushing is the key to success in a new installation.



Valve Cutaway Diagram

TROUBLESHOOTING GUIDE

1. For any problem, check the basics first.	A. Is controller plugged in and properly programmed? B. Is master shut off valve open? C. Is flow control on valve in an "open" or "flow" position? Not all models have this feature. Check the instructions that came with your valve, or see "How to Operate" section of this packet. D. Are water pressure and flow rate adequate for your particular valve model? (Check the instructions that came with the valve or call us toll free at 1-800-RAIN-BIRD for the requirements of your particular Rain Bird valve model.) If your pressure is too low, investigate these causes: • Pressure drain from washing machines, showers, etc. or broken pipe • Master shutoff valve not fully open • Blockage in main supply line; to repair, cut main line, flush line, and repair cut • Too many heads on line; redesign system layout to reduce the number of heads operating at once • Inadequate pressure at the point of connection E. Is valve in "Manual Off" position? See "How to Operate" section of this packet. F. If your system is supplied by a pump, is it working?	
SYMPTOM	CAUSE	DIAPHRAGM VALVE REMEDY
2. Valve won't turn on with controller	A. Check the Basics as in No. 1 above	If all basics check out, see if the valve will work manually. On some models you will need to turn the solenoid 1/4 turn counterclockwise. On other models, turn the screw in the center of the bonnet (water should spray out of the top of the valve temporarily). Check your valve operating instructions or refer to section entitled "How to Operate," in this packet of information. If the valve works manually, go on to step 2-B. If the valve doesn't work, go on to step 2-D.
	B. No power between controller and valves	Check by pressing the "Manual Start" button of the controller and advance to the desired station. Attach a circuit tester (voltmeter) to the common terminal and the station terminal of the controller. If you do not get a 24-30 volt reading, the problem is in the controller. Check for shorted or broken wiring. Follow directions as above, except attach voltmeter to common wire and station wire nearest valve. If you do not receive a 24-30 volt reading, replace or repair wiring.
	C. Solenoid burned out or clogged	The solenoid should make a distinct "click" when activated. If controller and wiring check out, try unscrewing the solenoid and swapping it with a nearby valve of the same model. Using the "Manual Start" on your controller, check the station again to see if the borrowed solenoid activates the valve. If so, replace solenoid. If not check 2-D.

TROUBLESHOOTING GUIDE

SYMPTOM	CAUSE	DIAPHRAGM VALVE REMEDY
2. Valve won't turn on with controller (continued)	D. Valve opening mechanism damaged or clogged with debris.	See if you can flush debris from the valve by using the flush mode. If not, turn off the water, disassemble, inspect and clean the valve (See Diaphragm Valve Disassembly Procedure). Pay particular attention to cleaning the small bleed ports underneath the solenoid and on the surface of the diaphragm. Check to see that the diaphragm is not torn or damaged. Replace diaphragm if damaged. If water is particularly dirty, install a 100 mesh or finer filter before the valve to prevent future grit build-up.
	E. Valve installed backwards	Reinstall valve so that water flow is the same direction as arrows embossed on valve.
3. Valve won't turn off with controller	A. When the valve won't turn off with the controller, the foremost goal is to stop the flow of water.	• Put controller in auto/off mode. If watering continues. . . • Unplug controller. If this stops the watering, the problem is probably in the controller. If watering continues. . . • Turn flow control knob (if there is one) to lowest flow position. If this does not shut off the flow completely. . . • Turn off manual main shut off valve to sprinkler system • When water flow is stopped, check steps B through D for troubleshooting procedure
	B. Solenoid burned out or plunger clogged	Check solenoid as in 2-C. Check for dirt impeding the movement of the plunger. To do this, turn off the water and remove power to the solenoid . Unscrew the solenoid. Sometimes the plunger inside the solenoid can become stuck in the upward position due to dirt in the solenoid. Run water into the solenoid to dislodge dirt. Push a piece of wire into the small hole in the retainer at the bottom of the solenoid to see if the plunger inside will move up and down freely. If not, replace the solenoid.
	C. Valve closing mechanism stuck in open position due to debris or damage	See Valve Disassembling Procedure A. Check small ports for blockage by debris; rinse and inspect diaphragm and diaphragm seat for dirt or damage. Replace diaphragm if damaged.
	D. Damaged or misaligned parts allow water to leak from valve	Check valve body and bonnet for cracks. Check integrity of seal between body and bonnet and solenoid and bonnet. Repair or replace parts as necessary to stop leak.
	E. Valve set in "Manual On" mode	Depending on the model, you will need to be sure the solenoid is tightened into the full clockwise position ("Manual Off") or turn the bleed screw or knob on top of the valve clockwise to tighten. See section entitled "How to Operate."

TROUBLESHOOTING GUIDE

SYMPTOM	CAUSE	DIAPHRAGM VALVE REMEDY
4. Water leaks out at sprinkler heads when station is off.	A. Closing mechanism dirty or damaged and does not seat properly	See Diaphragm Valve Disassembly Procedure. Check small ports for blockage by debris; rinse and inspect diaphragm and diaphragm seat for dirt or damage. Replace diaphragm or valve body if damaged.
	B. Valve not fully in "Manual Off" mode	See 3-E above.
	C. Solenoid burned out or obstructed	Turn off water. Remove solenoid. Check for twisting or damage to solenoid O-ring. Check solenoid plunger as in 3-B above. Rinse bottom of solenoid and seating surface inside valve. Replace solenoid if damaged.
	D. Low head drainage	It is normal for water to temporarily continue to drain from the piping through the lowest head on the line. The longer the piping, and the lower the slope of the pipe, the longer this will take. Stop watering on the soggy zone for two days. Check the lowest head on the line. If area is very wet or a small amount of water drips from sprinkler, see 4-A and 4-B above. If area around sprinkler has dried out somewhat, the problem is probably due to drainage from the piping. This line drainage can be stopped by using a Rain Bird Sprinkler or Rotor with a SAM Check Valve. Different models are available through professional installers, retailers, or the Rain Bird Online Store.
5. Valve won't turn off manually	A. Valve in "Manual On" mode	See 3-E above
	B. Valve closing mechanism stuck in open position	See 3-C above
	C. Solenoid energized	Stop power to valve
6. Valve won't turn on manually	A. Flow control in closed position	See 1-C above
	B. Valve opening mechanism blocked by debris.	See 2-D above
	C. Valve in "Manual Off" mode.	See 2-A above

TROUBLESHOOTING GUIDE

SYMPTOM	CAUSE	DIAPHRAGM VALVE REMEDY
7. Water leaks out at valve	A. Leaking round pipe connections	Tighten connections (use PTFE thread tape only).
	B. Leaking between bonnet and body	Check that diaphragm washer is properly in place. Tighten bonnet screws. If still leaking evaluate for replacement with model number appropriate for your valve. Refer to the last page for replacement parts or call our Technical Service hotline for assistance in identifying valve or part numbers. 1-800-RAIN-BIRD
8. Valve slams on/off (water hammer)	A. Excessive water pressure	Install pressure regulator on line before valves to reduce pressure.
	B. Valve closing/opening mechanism worn	Replace diaphragm with model number appropriate for your valve. Refer to the last page for replacement parts or call our Technical Service hotline for assistance in identifying valve or part numbers. 1-800-RAIN-BIRD
	C. Air bubble in line	Shut off water at main shut off valve and drain the line to release air bubble. Slowly refill the line.
	D. Valve too small for amount of flow	Replace with larger valve.
	E. Pipe is too small for the flow	Use larger pipe which will slow the velocity of water leading up to the valve and reduce water hammer.
9. Water runs continuously when valve is not activated; shuts off when valve is activated.	A. Valve installed backwards	Reinstall valve according to arrows on valve depicting direction of flow.

Diaphragm Valve Disassembly Procedure



To inspect the inside of the valve for cleaning or replacement of the diaphragm:

1. Shut off the water at the master shut off valve.
2. Unscrew all bonnet screws if present or unscrew jar-top lid. On some models, the bleed screw and/or flow control knob will also need to be removed.
3. Remove bonnet assembly to expose the spring, diaphragm, and rubber gasket (if any) and filter (if any). Remove and inspect the spring, diaphragm, and rubber gasket for wear or damage. Inspect the diaphragm for clog or a tear in the small hole on its surface.
4. Inspect the valve body for dirt on the diaphragm seat.
5. Inspect the bonnet for dirt clogging the small bleed port near the solenoid.
6. Rinse dirt off if necessary, or use a wire to gently dislodge dirt from the bleed port.
7. Install new diaphragm if necessary. Do not forget to replace the spring. Some new replacement diaphragms are an all-in-one design and do not have a separate rubber gasket to install. Be sure that the holes line up.
8. Press the bonnet firmly back in place. Replace the screws and tighten or screw jar top lid back on. Pressure test the valve to assure that all of the screws are tight enough to prevent any water leakage between the valve body and bonnet.

To replace the solenoid:

1. Ensure valve is off with no power going to solenoid.
2. Remove controller wires.
3. Unscrew the solenoid.
2. Check for debris clogging the small port where the solenoid seats.
3. Rinse off the solenoid to remove debris.
4. Check condition of solenoid O-ring.
5. Replace solenoid if necessary with part number applicable to your particular model.



Replacement Parts

Valve Model	Solenoid P/N	Diaphragm P/N	Images
CP, CPF, DASASVF	B60599	B60488	
JTV, JTVF	B60599	B36330	
DV, DVF, ASVF	20858801	21074603	
HV, HVF	236307	231900	



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Questions?

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1-800-RAINBIRD (800-724-6247)
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