Section 6

IRRIGATION MAINTENANCE & TROUBLESHOOTING

LEARNING OBJECTIVES

1. Understand the reasons for performing irrigation systems maintenance
2. Understand how to perform a preseason irrigation system inspection and maintenance checkup
3. Understand how to perform an end of season irrigation system shut down
4. Learn how an irrigation valve works
5. Learn how to identify and troubleshoot irrigation valve and controller problems

1. SEASONAL IRRIGATION SYSTEMS MAINTENANCE

- Understand the reasons for performing irrigation systems maintenance

1.1-1.2 SEASONAL MAINTENANCE

- Regular maintenance is essential to the proper operation of an efficient irrigation system over time and can:
  - Prevent water waste
  - Extend the useful life of the irrigation system
  - Save plants
  - Save money
- Include terms to cover regular checks and repairs in maintenance contracts

2. PRESEASON INSPECTION & MAINTENANCE

- Understand how to perform a preseason irrigation system inspection and maintenance checkup

2.1 IRRIGATION CONTROLLER CHECK-UP

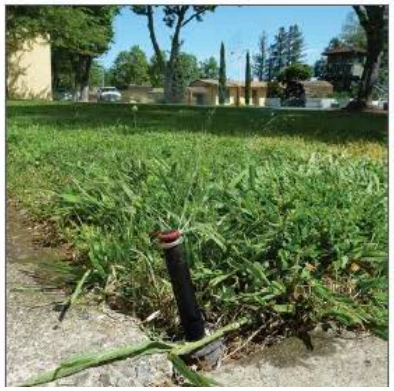


- Check the date and time on the controller and reset if necessary
- Adjust the irrigation controller for a spring schedule
  - Further information is provided in Sections 8 and 9
- Replace the back-up battery if necessary
  - It is recommended to change the battery at least every other year
- Activate the valves

2.2 FLUSH THE IRRIGATION SYSTEM

- Flush filter(s) on drip irrigation zones
- Remove the end cap, bubbler, or sprinkler head that is farthest away from valve
- Turn on the valve for 30 seconds or until the water runs clear
- Turn off the valve and replace end cap or sprinkler head
- Clean individual sprinkler screens

2.3 IRRIGATION SYSTEM CHECK-UP

- Activate valves
- Look, listen, and feel
- Flag troubled areas
- Fix flagged areas
- Repeat with all hydrozones

- Water pressure
- Clogged nozzles
- Arcs out of adjustment
- Tilted, sunken, or raised heads
- Wiper seals

- Plant material blocking spray
- Damaged or missing emitters or fixtures
- Punctured lines
- Severed lines

3. END OF SEASON SYSTEM SHUT DOWN

- Understand how to perform an end of season irrigation system shut down

3.1 END OF SEASON SHUT DOWN

- In many areas, irrigation is not required during the winter months
- Preparing the irrigation system for the winter months will protect system components and extend their useful life

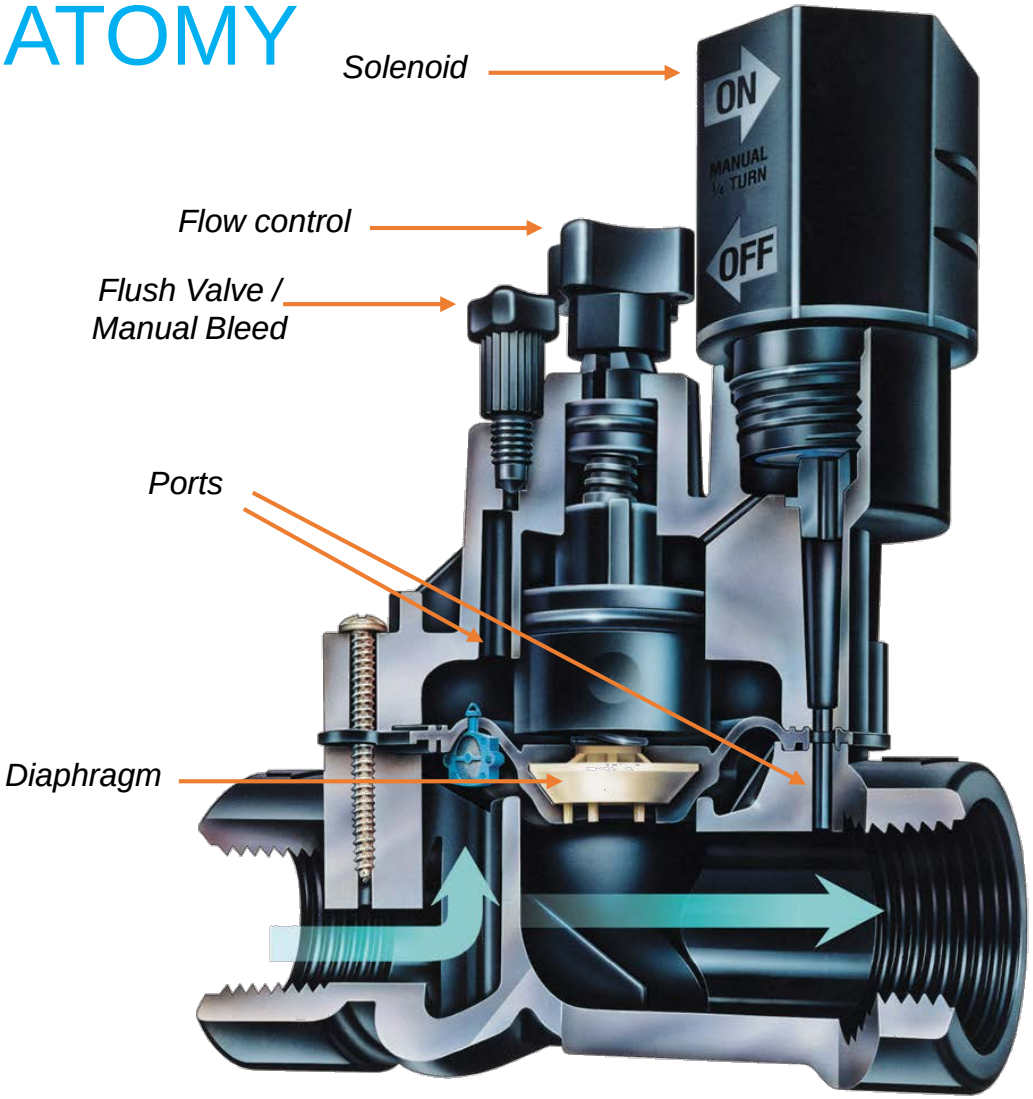
- Turn off the water
- Open valves to release pressure in the pipes
- Close valves once pressure has been released
- Set the Irrigation controller to the “rain”, “suspend”, or “off” setting
- Drain water out of irrigation components
- Install a freeze blanket on backflow device

4. VALVE ANATOMY & OPERATION

- Learn how an irrigation valve works

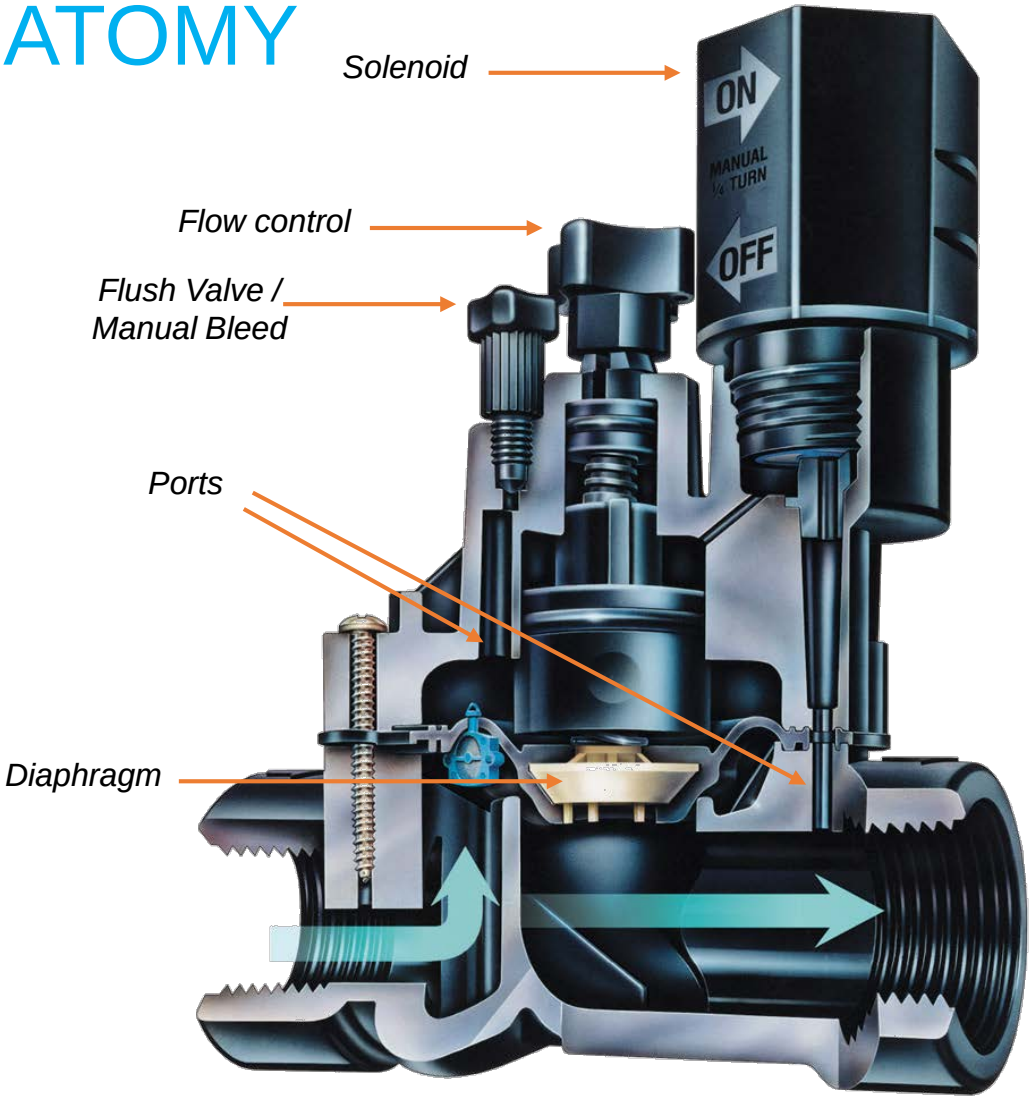
4.1-4.2 VALVE ANATOMY

- Allows water to pass through when the diaphragm moves up and stops it when it moves down
- Valve opens when one of the ports is opened, allowing water in the upper chamber to leave the valve
- Results in higher pressure below the diaphragm to open the valve



4.2-4.3 VALVE ANATOMY

- Solenoid port opened with an electrical impulse from the controller
- Flush valve or manual bleed port is opened by turning the knob to manually bleed water from the upper chamber
- Flow control regulates the amount of water that passes through the valve
    - Do not use to turn the valve on or off



5. VALVE, CONTROLLER, & FIELD WIRE TROUBLESHOOTING

- Learn how to identify and troubleshoot irrigation valve and controller problems

5.1 VALVE, CONTROLLER & FIELD WIRE TROUBLESHOOTING

- Three possibilities for valve malfunction
- Use a consistent and logical process of elimination to find the issue
  - Start either at the controller and work towards the valve, or at the valve and work towards the controller

1. Hydraulic: impaired water flow
2. Mechanical: something physically stopping the valve from operating
3. Electrical: an issue with the valve solenoid, the field wiring, or the irrigation controller

5.2 STEPS FOR TROUBLESHOOTING

- Check that the water is on at the POC
- Check the controller
  - Power, program, fuses and sensors, terminals
- Check the valve
  - Open the valve by turning the solenoid
    - If the valve opens, the issue is electrical
  - Open the valve using the flush valve/manual bleed
    - If the valve does not open, the issue is hydraulic or mechanical
- If the problem is electrical:
  - Check field wire connections at controller terminals and at the valve
  - Look for broken or cut wires

5.3 VALVE WON'T OPEN

Cause	Solution
Valve tuning (flow control)	Tune the valve using the flow control. If the flow control is too tight, the diaphragm cannot rise to allow the valve to open.
Bad solenoid	Solenoids click when activated. Use volt/ohm meter to determine if there is a continuity issue. Replace solenoid if not functioning.
Valve mechanism clogged or damaged	Flush debris from valve using flush port. If unsuccessful, valve requires disassembly to clean ports and diaphragm. Replace diaphragm if necessary.
Poor wire connection	Reconnect and seal connection with water proof connectors.
Controller problem	Use volt/ohm meter to determine if the controller is sending a 24V signal. Issue could be fuse, transformer, or controller.
No power to valve	Use volt/ohm meter to determine if there is a continuity issue. Repair or replace wiring.

5.4 VALVE WON'T CLOSE

Cause	Solution
Controller problem	Check controller and adjust start times in all programs as needed. Try turning the controller off, and turning off the power to the controller.
Valve manually opened	Check that the flush valve is properly closed and that the solenoid is tight to enable pressure to build on top of the diaphragm.
Valve tuning (flow control)	1. Manually or electrically activate the valve. 2. Fully open the flow control valve (counterclockwise). 3. Slowly close the flow control valve ¼ turn at a time until the spray patterns dip/reduce. 4. Back off ½ turn. 5. Do not use the flow control valve to reduce pressure.
Valve mechanism clogged or damaged	Flush debris from valve using flush port. If unsuccessful, valve requires disassembly to clean ports and diaphragm. • Replace diaphragm if necessary. • Check for damaged valve seat. • Check solenoid plunger for deterioration. • Check for cracks in the valve body or bonnet and integrity of seals.

6. IRRIGATION MAINTENANCE & TROUBLESHOOTING REVIEW QUESTIONS

6. IRRIGATION MAINTENANCE & TROUBLESHOOTING REVIEW QUESTIONS

1. Why is it important to perform regular maintenance on irrigation systems?
2. What would you do to prepare an irrigation controller for the irrigation season?
3. What steps would you take to conduct a check-up on an irrigation system at the beginning of the irrigation season?
4. What steps would you take to prepare an irrigation system to be shut down at the end of the irrigation season?
5. Describe the function of an irrigation valve.
6. Describe how an irrigation valve is opened by the irrigation controller.
7. Describe two methods of manually operating an irrigation valve.
8. What are the three possibilities for valve malfunction?