

# Sprinkler System Operation and Retrofit

For Water Returns  
May 30, 2009  
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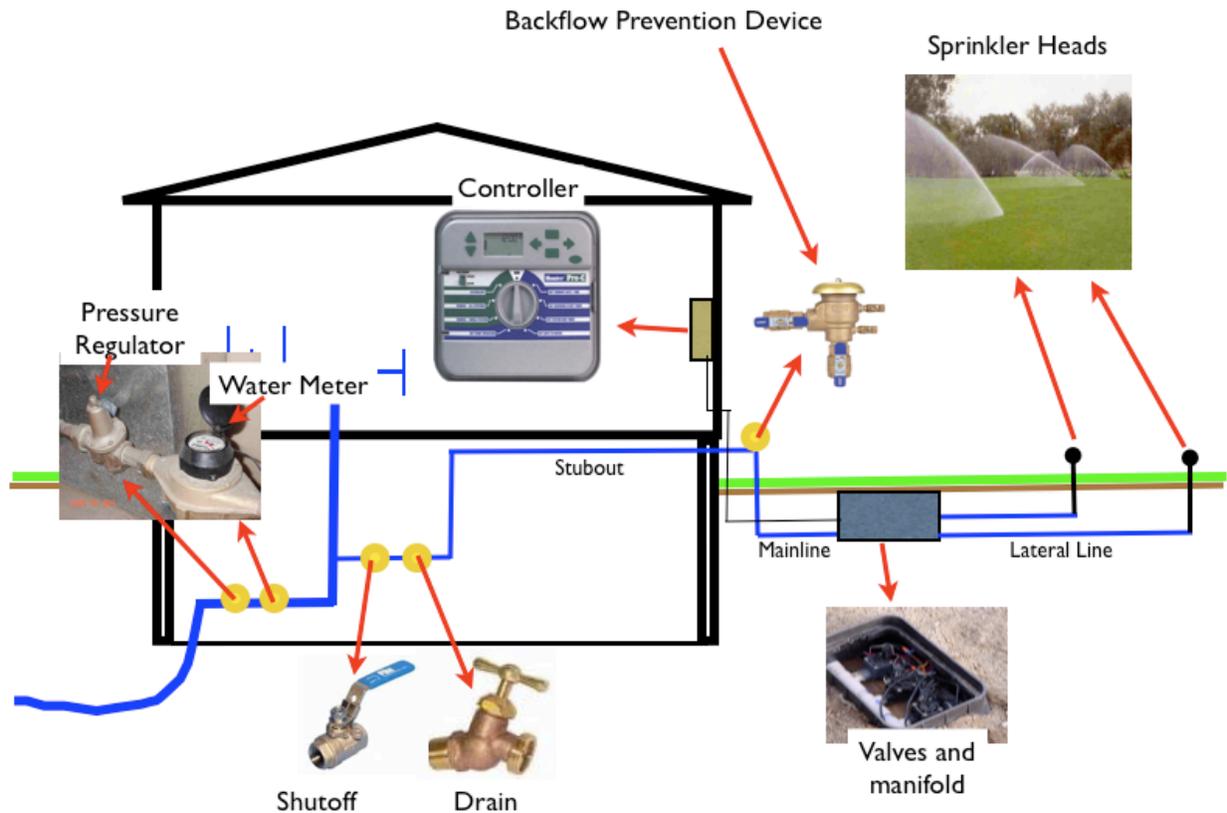
## RESOURCES:

[www.irrigationtutorials.com](http://www.irrigationtutorials.com) -- good website with lots of reliable information.  
[www.sprinklerwarehouse.com](http://www.sprinklerwarehouse.com) -- probably the best site for ordering materials from the internet.

Sites for major brands: [www.hunterindustries.com](http://www.hunterindustries.com), [www.rainbird.com](http://www.rainbird.com),  
[www.toro.com](http://www.toro.com), [www.irritrol.com](http://www.irritrol.com), [www.weathermatic.com](http://www.weathermatic.com), [www.netafim.com](http://www.netafim.com).

Local wholesale: CPS Distributors, DBC Irrigation Supply, Ewing Irrigation, L.L. Johnson Distributing Company, and John Deere Landscapes.

Local Retail: Home Depot, Lowes, Ace Hardware, ABC Plumbing, Sprinkler World, Sprinklers Inc.



TYPICAL RESIDENTIAL SPRINKLER SYSTEM SCHEMATIC

## \*\*\* SPRINKLER SYSTEM OPERATION AND TUNE-UP \*\*\*

### 1. SPRINKLER SYSTEM BASICS

Purpose of Irrigation: Put the Proper Amount of Water in the Root Zone when Needed.

Pressure Regulator(s): reduce source pressure to 65 psi or so. Note: turn clockwise (!) to increase pressure.

Water Meter: useful tool for checking leaks.

Stubout: pipe taking water from basement or crawl space to outside the house.

- Normally 3/4 copper. 1" would be better. New houses may have PEX pipe.
- Shutoff valve stops water flow to the sprinkler system. Ball valve preferred.
- Drain required for winterization.

Backflow prevention device, required by code to prevent contamination.

- PVB (pressure vacuum breaker) must be 18" above high point in the yard.
- RPA (reduced pressure assembly), more expensive, used if PVB doesn't meet code.
- Drains on both sides of device recommended for winterization.
- Copper preferred to PVC for above-ground pipe because of freezing.
- Repair kits available for some brands, especially Febco.

Valves and Valve Manifold

- Main line to valves normally 1" PVC.
- Manifold distributes water to individual valves, normally within valve boxes.
- Manual drain in valve box recommended for winterization.
- Malfunctioning valves normally fixed by replacing solenoid, cleaning, or replacing valve components.

Controller (clock)

- Recommended placement in the garage.
- Connected to valves with 18 gauge sprinkler wire.
- Set clock correctly to conserve water.
- "Smart" controllers adjust automatically for ET (evapotranspiration)
- Soil moisture sensors control irrigation based on actual soil conditions

Lateral pipe: connects valves to sprinkler heads in the landscape

- In Colorado Springs area, normally 1" poly for residential. PVC sometimes used.
- Poly stretch coupling useful for repairing broken or leaking pipe. PVC expandable coupling available for PVC repair.
- Swing line (funny pipe) recommended for connecting lateral pipe to sprinkler heads.

Sprinkler heads

- Pop-up sprayheads, 5' - 15' radius (17' available, not recommended)
- Gear driven and impact rotors, 15' - 30' radius (larger than 30' not common for residential)
- Low precipitation/stream rotors
  - - MP Rotators, 5' - 30' radius
  - - Rainbird Rotary Nozzles, 13' - 24' radius

2. SEASONAL MAINTENANCE AND TUNE-UP

- Set pressure properly (Rule of thumb: 65 psi static)
- Check for leaks
- Observe operation -- check each head
- Clean or replace malfunctioning heads
- Adjust heads:
  - - Straighten and lower or raise as required
  - - Set arc and radius properly
  - - Replace nozzles as required
- Set controller properly
  - - Set Time and Date
  - - Set Zone Run Times for Each Program
  - - Set Start Time(s) for Each Program
  - - Set Watering Days for Each Program
  - - Set Seasonal Adjustment if Available

SEASONAL WATERING GUIDE FOR KENTUCKY BLUEGRASS							
	April	May	June	July	August	Sept	Oct
Historical monthly requirement, <b>inches*</b>	3.2	4.7	5.7	6.3	5.4	4.1	2.5
Seasonal adjustment on controller	50%	75%	90%	100%	85%	65%	40%
Runtime, <b>minutes</b> per zone**							
Typical pop-up sprays	10	15	18	20	17	13	8
Typical rotors, gear-driven	30	45	54	60	51	39	24
MP Rotators (Hunter)	40	60	72	80	68	52	32
*This includes rainfall plus irrigation, numbers provided by Colorado Springs Utilities. Actual weather conditions will be significantly different than historical averages. Rounded to nearest 5% of July #.							
** Assuming 3 days a week, averaging 13 cycles per month. Based on theoretical precip rates, accounting for NO RAINFALL. (If runoff occurs, cycles should be broken into multiple starts.)							
Note 1: REAL WORLD conditions may be dramatically different than this guide.							
Note 2: For maximum water savings, reduce time incrementally until grass is slightly stressed.							
Note 3: Recommend installing a rain sensor to account for rainfall and reduce sprinkler run time.							
Note 4: Try scheduling only 2 automatic cycles per week. Run third cycle manually as needed.							

### 3. TECHNICAL ENHANCEMENTS

Rain Sensor -- prevents sprinkler operation when irrigation not needed

High efficiency nozzles

- MP Rotator -- 75-80% efficiency rating
- Rainbird Rotary Nozzles -- unknown, but probably greater than 70%
- Toro Precision Series spray nozzle -- not yet determined, but better than older spray nozzles

Pressure regulating valves and heads

- Valves allow different pressures for different zones
- Rainbird PRS -- 30 psi at each head, ideal for popups
- Hunter MPR40 -- 40 psi at each head, good for MP Rotators

“Smart” controllers

- ET controllers adjust based on remote weather station
- On-site weather stations
  - - Weathermatic Smartline
  - - Hunter ET System
  - - Hunter Solar Sync

Soil moisture sensors

- Calls for irrigation only when soil needs it
- Good choice -- Baseline WaterTec

### \*\*\* RETROFIT FOR RESIDENTIAL IRRIGATION \*\*\*

#### 1. IMPROVE COVERAGE AND INCREASE SYSTEM EFFICIENCY

Short Detour: Hydraulics

- Pressure -- rule of thumb, 65 psi static to provide 30-40 psi at heads.
- Flow -- limit to 10 gpm per zone or less.
- Velocity and pipe sizing -- use 1” for most residential systems.

Even coverage is the key to irrigation efficiency

- Head-to-head coverage
- Matched precipitation -- It’s the nozzles that count!
  - - Popup sprays automatically matched
  - - Traditional rotors require correct nozzle choice
  - - Low precip/stream rotors -- automatically matched

### Classroom Examples

- Square, 30 x 30 -- rotors preferable to popups
- Rectangle, 25 x 75 -- nozzle selection determines zones
- Rectangle, 20 x 60 -- MP Rotators solve popup shortfall
- Conclusion: It's the nozzles that count!

### Irregular Shapes Present Challenges

- Variable Arc Nozzles
- End strips, center strips, corner strips, side strips
- Corner nozzles for MP Rotator

## 2. ACCOMMODATE CHANGES IN LANDSCAPE

### Turf converted to planting beds

- Organic material -- at least 3 cubic yards per 1000 square feet of plant area
- Rototill thoroughly

### Classroom examples: back yard, front yard

- Flag old heads
- Flag new head locations
- Option: move heads using swing line
- Option: install new lateral lines (usually best)

## 3. PROVIDE IRRIGATION TO PLANTING BEDS (Drip Irrigation)

### Characteristics

- Low volume, low flow (gph - gallons per hour)
- Commonly used to water shrubs, flowers, trees
- More "art" than "science"
- Thin-Walled Pipe
- Filter associated with valve or faucet
- In-line pressure regulator, normally 30 psi

### Water Source

- Faucet Assembly
- Electric Valve
- Manual Valve
- Rainbird "Spray-to-Drip Retrofit Kit"
- Or some combination that fits your particular needs

### Pipe and Fitting Anomalies

- Drip pipe features thin walls
- Drip pipe easily confused with swing line
- 1/2" pipe varies from brand to brand
- 1/2" fittings can be very different sizes
- Good solution: Rainbird multi-dimensional compression fittings
- 1/4" tubing can be used with emitters

### Application Devices

- Drip emitters
- In-line drip tubing
- Bubblers
- Microsprays
- And even popup sprays -- although technically not "drip"
- "Tree Rings"

Rules of Thumb for Drip Pipe (See Rainbird Catalog page 189 for more details.)

Pipe Size	1/2"	3/4"
Max Length	300 feet	600 feet
Max Flow	200 gph	400 gph

Rules of Thumb for Netafim (See also Rainbird Catalog page 183)

<b>TECHLINE Maximum Length of a Single Lateral (feet)</b>									
<b>Dripper Spacing</b>		<b>12"</b>			<b>18"</b>			<b>24"</b>	
<b>Dripper Flow Rate (GPH)</b>		<b>0.4</b>	<b>0.6</b>	<b>0.9</b>	<b>0.4</b>	<b>0.6</b>	<b>0.9</b>	<b>0.6</b>	<b>0.9</b>
<b>Inlet Pressure (psi)</b>	<b>15</b>	292	233	175	410	322	247	405	308
	<b>25</b>	397	312	238	558	438	335	553	423
	<b>35</b>	486	365	279	656	514	394	649	497
	<b>45</b>	520	407	311	732	574	439	725	555

## Conversion Example: Parkway from Popups to Techline

### How to Install Drip

- Plant design first
- Determine plant water needs
- Supply lines to beds
- Drip tube in beds
- Attach application devices
- Add more plants...add more irrigation

### Drip Scheduling

- Avoid overwatering
- Water thoroughly but infrequently. Rule of thumb: once or twice a week for new plants, less frequently for mature plants, every ten days or two weeks for trees.
- Use separate program on the controller or control manually.

### Modifications as landscape matures

- Focus on the root zone
- Transition from point irrigation to "grid"
- Enlarge "Tree Rings"
- More mature xeric plants may need no irrigation

### Maintenance Issues

- Clean filter, at least once a year
- Repair leaks
- Check emitters at least once a year