Why Does Your System Need Surge Protection?

Today's electronic equipment and solid-state components are very vulnerable to voltage surges—small or large. Electrical surges are by far the biggest cause of problems with electrical circuits. Damaging surges may be produced by lightning, pumps being turned on or off, the energizing or de-energizing of a transformer, or a power source short. A typical 120-volt power line each year can have as many as 2,500 surges of over 6,000 volts.

“But I don't have a lot of lightning in my area.”

While lightning is, in fact, more common in certain areas of the country, it happens everywhere. Damage can be instantaneous. About half of all lightning strikes are 20,000 volts and 20,000 amps, but strikes can exceed 100,000 volts and can travel three miles through the ground. Each flash of lightning can contain as many as 45 strikes. The average region in the United States can expect two to 30 strikes per year within a square mile.

Irrigation systems are particularly susceptible because they have large amounts of wire buried in the ground that can attract lightning. While you cannot protect against a direct lightning strike, you can protect against its indirect electrical energy with surge protection and proper grounding.

Surge damage happens in the first few milliseconds of the surge. Because surges are so fast, even fuses, circuit breakers and GFIIs are not quick enough to protect from the damage.

For Your System's Protection...

The theory behind most surge protection is to provide a path of least resistance for electrical surges so they dissipate harmlessly in the ground. Such surge protection involves both surge arrestors and proper grounding.

Surge Arrestors – Varistors and Metal Oxide Varistors

Rain Bird uses varistors as surge arrestors because they are much faster than other products available on the market today. Varistors "clamp" voltage that
continued from front

exceeds a certain level and shunts the excessive energy to a harmless path in the ground.

An M.O.V. or Metal Oxide Varistor is a bilateral device (with no polarity) that is particularly effective at redirecting surges. It is small and easily mounts on PC boards. It is very fast, can handle moderately high power surges and is self-extinguishing.

**Protection From the Ground Up - Your Grounding System**

Grounding is the essential backbone of a lightning protection system. No matter how much you spend on surge equipment and how much of it you install, it's only as good as the grounding system you connect it to.

Good grounding breaks up the electrical energy of lightning then directs it to a path to the ground that has less resistance than the path through the irrigation equipment. Components of an effective grounding system include a grounding conductor, bonding connector or clamp, one or more grounding rods, the soil in contact with the electrode(s), and the surrounding earth.

**Grounding Rod**

The ground wire from the device you are protecting to the grounding grid should be at least one wire size larger than any other wire connected to the device. Rain Bird recommends a number eight solid, bare copper wire.

Using soil additives and keeping the ground moist with a dedicated sprinkler can reduce resistance and encourage energy to travel to the ground.

A soil moisture level of 17% offers the best soil conductivity. Soil resistance can also be lowered by adding chemicals, but care should be taken to avoid damaging surrounding landscaping.

Note: When a grounding grid is first installed, you will be unable to get a true ohms reading because the rod surface will not be in good contact with the soil. Wait 5 to 6 weeks for a meaningful reading. Then check the grounds at least once a year.

<table>
<thead>
<tr>
<th>Soil type</th>
<th>Approximate earth resistance (ohms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loam</td>
<td>5-50</td>
</tr>
<tr>
<td>Clay</td>
<td>4-100</td>
</tr>
<tr>
<td>Sand/Gravel</td>
<td>50-1,000</td>
</tr>
<tr>
<td>Limestone</td>
<td>4-10,000</td>
</tr>
<tr>
<td>Shale</td>
<td>5-10,000</td>
</tr>
<tr>
<td>Sandstone</td>
<td>20-2,000</td>
</tr>
<tr>
<td>Granite</td>
<td>1,000</td>
</tr>
<tr>
<td>Slate</td>
<td>600-5,000</td>
</tr>
</tbody>
</table>

**Editorial by Rod Waller**

As the new year begins, it's a great time to tell you each thank you for the hard work and dedication you put into servicing your customers and representing Rain Bird faithfully in 1999. Please take a bow. You deserve it.

I've seen the pride you take in your work. It's a dedication that's been reflected in the outstanding results we've seen throughout the year. You've found creative ways to solve problems, keep things green and make customers happy. When the bar was raised, you responded with enthusiasm, professionalism and integrity.

Here are a few of the highlights I'll remember from the year. The Rain Bird Turf and Golf Divisions held three Professional Improvement Training Camps in 1999 with turnouts that exceeded expectations. Those who attended asked great questions, studied for tests, challenged the instructors, and overall, gave very positive feedback on the class.

Looking back, I also want to thank the "veterans" of irrigation from throughout the country who have guided those new to the industry this year. The newcomers have appreciated both the value of your experience and your willingness to share. It's contributions like yours that will keep our industry moving ahead.

Finally, response to the Authorized Service Center (ASC) Technical Newsletter and Controller Testing Program have been fantastic. I am also encouraged to see you taking advantage of the ASC Workshop Program by hosting training seminars for contractors. This type of education will build a strong future for us all.

As the Rain Bird ASC Program prepares to meet demands for the Year 2000 and beyond, each of you shares the credit for our success. Your interest in the program reflects directly to the customers in the better service you provide. Thanks again, from all of us at Rain Bird, for a job well done.

Sincerely,
Rod Waller - ASC Technical Services Manager

By Beatrice John, Product Manager

If you're looking for more options and flexibility in the field, take a look at a few of Rain Bird's latest additions. These are just some of the newest products available to make design and installation more efficient and reliable for you and your customers.

NEW! One-inch Manifold Systems

Eliminate the glue, mess and drying time in the field with Rain Bird's new pre-assembled manifold systems. Installation is quicker and easier with this pre-assembled system. Most importantly, each manifold system is pressure-tested after assembly to ensure leak-proof operation. One-inch manifold systems are available in two-, three-, four- and six-valve configurations. Models are also available with pre-installed slip outlet DV valves and direct bury wire connectors for further installation ease.

NEW! Pump -Start Relay (up to 5 hp) - UL Listed

Now you can combine reliable technology and convenience with a UL listing. Rain Bird's new R200 pump start relay activates pump motors of up to five hp and combines dependable relay technology from Square D with a UL listing. Most pump-start relays on the market are not UL listed. For your convenience, the R200 includes six wire nuts with the two low-voltage and four high-voltage leads, all pre-installed.

NEW! Turf Swing Joints - TSJ Series

Whether you're looking for a one-inch or three-quarter-inch size, Rain Bird's new turf swing joints offer a convenient option for design flexibility. New one-inch swing joints are built with a double o-ring seal, a swept elbow design that lowers pressure loss and stronger molding, proven to last 60% longer than competitors' in water hammer testing. The three-quarter-inch swing joints also offer leak-free reliability and operation at an economical price. For custom-length joints, a three-quarter-inch fittings kit is available for use with contractor-supplied SCH40 pipe.

For more information on these newest product releases, turn to the Rain Bird Accessories Products and Pricing Catalog.

The Cost of Kilowatts Today

by Rod Waller

How Much Does Electricity Cost for Your Controller?

Have you ever wondered how much it costs for the electricity to operate an ESP controller? Several homeowner's associations have. It becomes an important question particularly when they have the controller for the community's or development's "common area" mounted on the property, drawing from their electrical service.

The formula below is useful for calculating the operating costs for any controller, whether it's solid state or electromechanical. Simply find the data you need for your particular controller in the Reference section of Rain Bird's Landscape Irrigation Products Catalog. (You'll find the most current version of this catalog online at www.rainbird.com.)

Here, we'll use an ESP-LX+ model as an example. The ESP-LX+ uses approximately 0.13 amps of magnetization current to keep the transformer operating at its peak. Remember that all amperage values listed here are for 120 volts of AC current.

1. Volts x Amps = Power (watts)
   In our case, 120 volts x 0.13 amps = 15.6 watts

2. Now, translate the watts into kilowatt-hours (1000-watt-hours equals 1 kilowatt-hour or kWh) and multiply the kWh by the cost of the power per kWh.

To find the current cost of power in your area, call your local power company or look at your latest billing statement to determine the cost of electricity in kilowatt hours.

Here, we'll estimate that the cost of local power is 10 cents per kilowatt hour. In this case, the power would cost $13.56 per year or less than 4 cents a day.

Example:

To continue our example, well estimate that the cost of local power is 10 cents per kilowatt hour. In this case, the power would cost $13.56 per year or less than 4 cents a day.

Example:

Total Power Cost = \(\frac{\text{Watts} \times \text{hours} \times \text{day}}{1000} \times \text{cost of electricity $\, XX/kWh}\)

Yearly Power Cost = \(\frac{15.6\, \text{watts} \times 24\, \text{hours/day}}{1000} \times (365\, \text{days}) \times 0.10\, \text{cents/kWh} = \$13.66\)

Daily Power Cost = \(\frac{15.6\, \text{watts} \times 24\, \text{hours/day}}{1000} \times (1\, \text{day}) \times 0.10\, \text{cents/kWh} = \$0.037\)

Costs: $13.56 per year or $0.037 per day to run the controller.
Low Volume Irrigation in High Demand

Keys To A Reliable Drip System

Part I: Xerigation Control Zone Issues

With today's increased consumer awareness and attention to environmental factors and water conservation, drip irrigation has become one of the fastest growing segments of the irrigation industry. As drip systems increase in popularity, it has become important for professionals to have an understanding of good drip irrigation design practices, said Mike Baron, Director of Rain Bird's Landscape Drip Division. A drip system delivers water slowly, at low pressure, at or near the root zones of landscape plant material. Baron said that, because of this, it's important to keep three key issues in mind: filtration, pressure regulation and flow compatibility.

“Many problems in a drip system can be traced back to a design oversight having to do with one of these three control zone issues,” said Baron.

1. Filtration

“If I’m using potable water, why do I have to filter it?” Baron explains that the answer to that question can best be seen by looking at an aerator screen such as that often found in a kitchen sink faucet. Unscrew the faucet tip, and you’ll always find small particles of sand or rust caught in the aerator screen. Such particles can clog a low flow emitter, so you need to filter water to keep your drip system reliable and trouble-free.

2. Pressure Regulation

When using Rain Bird drip products, 50 psi is the magic number, the maximum pressure we recommend for operating a drip system installed with polyethylene drip tubing. “Exceed 50 psi,” says Baron, “and you are likely to blow emitters right out of the tubing.” Therefore, always use a pressure regulator if there’s any chance whatsoever that your drip system will see pressures in excess of 50 psi. Another reason this is a good practice is that pressures in excess of 50 psi will cause most threaded, pressure-compensating emitters to flow less than their rated flow.

3. Flow compatibility

Drip irrigation is known for its efficient use of water. That means you can water a given area using a much lower flow rate than if you were watering with conventional sprays. That’s great for saving water and keeping water off windows, but maybe not-so-great for your electric valve. All valves have a minimum flow specification that can be found in the manufacturer’s catalog. If the flow in a drip zone falls below the valve’s minimum flow specification, you can run into problems such as valve weepage or a valve that just won’t shut off, especially in drip retrofit situations.

To avoid this flow problem, use a Rain Bird XCZ-075 Control Zone. It puts a 200-mesh filter immediately upstream of the DV valve while ensuring a minimum flow specification of 0.2 gpm or 12 gph. The filter is pressure-rated to 150 psi, so it performs reliably upstream of the valve, under constant pressure. Rain Bird also offers the 100-PEB valve, which has a very low minimum flow specification of 0.25 gpm.

Like the valve, pressure regulators need to be matched to the flow rate. Remember to check the flow rate specification for your pressure regulator. “Using a regulator rated for 2 to 22 gpm operation for a low volume system that flows only 75 gph (1.25 gpm) is the same as using no regulator at all,” explained Baron. Remember, Rain Bird’s low flow pressure regulators work from 0.1 to 5.0 gpm (6 to 300 gph), and the medium flow regulators work from 2 to 22 gpm.

Don’t miss the second half of this two-part series in the next issue. PART II—Why aren’t my emitters flowing evenly or at all? How do you know a drip system is really working since you can’t see the water?