Ready Net Go, Inc.

IT Solutions for Businesses ... *Moving Forward*

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Surge Protectors & Arresters

Protecting PCs, multimedia equipment and other electronic devices has never been easier thanks to advances in power protection equipment. Surge protectors and arresters have made great strides over the years and are essential for businesses and consumers to help mitigate damage to devices from surges and spikes. We'll review what you need to know to choose the best surge protector(s) and/or whole house arrester in this newsletter.

Background

Surge protectors and arresters are necessary to defend electronic equipment against electrical surges and spikes that may travel over electric wires, telephone wires, and cable wires within a building. Surges and spikes are simply increases in the amount of energy typically transferred on a particular line.

The typical voltage on a residential or commercial electric circuit is around 120 volts. If the voltage increases above this level, it is considered a surge. Surges last a couple of seconds and are between 120 - 500 volts. Spikes, on the other hand, last less than a second but can pack thousands of volts in its charge. Both events degrade performance of devices over time and can cause irreparable damage if the surge or spike is strong enough.

Most people think about surges and spikes only during lightning storms but these events occur more often than we realize. In fact, many estimates suggest that the majority of power surges occur inside the home or business inadvertently. Culprits include electric devices that require large amounts of energy when they start like air conditioners, compressors/ pumps, power tools, laser printers, portable heaters, and dryers.

You may turn on your PC while another device is starting which may for an instant cause an increase in voltage on the line. This surge may not "fry" your device or even be noticeable to you, but over time, this surge along with many others will shorten your devices' lifespan.

This is why it is very important to have a constant level of protection on your electronic devices especially ones that are expensive (e.g., TVs, stereos, appliances) and/or contain data (e.g., computers, laptops, backup devices).

With adequate surge protection, you reduce the likelihood that excess voltage (surges and spikes) will damage your devices.

Tip of the Month

GFCI vs. Surge Protectors

A ground fault circuit interrupter **(GFCI)** is a special outlet used to prevent electrocutions. They are normally installed in wet locations such as in bathrooms, kitchens, outdoors and anywhere there is a potential for your body to become an unintended path to ground. If the GFCI outlet detects that the current from hot to neutral has changed, it shuts off in less than a second and must be reset before using again.

Surge protectors and **whole house arrestors** detect excess energy traveling along electric, telephone and cable wires and redirects this excess energy to the grounding wire outside the building (sending the energy to earth). If the units function normally, your devices will be protected and you may not realize any surges or spikes have occurred.

Remember: GFCI outlets protect people while surge suppressors protect equipment.

Websites Worth Watching

1. www.doityourself.com - Informative site giving advice on numerous projects to tackle yourself. Topics include electrical, plumbing, gardening, painting, auto repair, remodeling and much more.

Basic Electrical Definitions

Voltage (Volt) – a measure of electrical pressure or movement of potential energy between two locations. Electricity flows from an area of low pressure or potential energy to an area of higher pressure or potential energy. When you turn on an electrical device, the device draws energy across the electric line.

Ampere (Amp) – a measure of electric current. Within a typical home or business you'll find many electrical circuits each connected to the various outlets, lights, and other electric devices in the structure. Each of these circuits is rated for a specific amperage such as 15 or 20 amps for outlets, 30 amps for dryers and pumps, 40 or 50 amps for stoves/ovens. With increased amps, a circuit can deliver more electric current.

Volt-Amp (VA) - a measure of potential power. This figure is used for sizing wiring and circuit breakers. The VA rating may be equal to or greater than the watts.

Joule - a unit of energy expended to produce 1 watt of energy per second. Surge protectors use joules for their surge energy rating. Ex: a surge protector with a 1,800 joule rating, will be able to withstand 1,800 joules of energy without failure. Look for units that provide at least 1,500 joules of protection or more. The higher the rating the better protection you will receive over time.

Watt – a measure of actual electric power.
1 watt = 1 joule/sec To figure out the number of watts a device uses, use the following formula.

Watts = Volts x Amps

Example: What is the power consumption of a device with a voltage supply of 15 volts and a current flow of 3 amps? Answer: W = 15V × 3A W = 45 watts

Clamping voltage – level at which the surge protector begins to work by redirecting the excess voltage to ground. Look for devices that list 330 or 400V.

Let-through voltage rating – indicates the amount of residual voltage that passes through the protector after it has reached its clamping voltage. Look for a value less than 120. On many devices, the clamping voltage and let-through voltage may be the same value.

Ground Potential Difference - in certain locations, the voltage in the grounding system in one building may be different than the voltage ground in a nearby building. If these buildings are connected by any electric lines, coax/data cables or telephone wires, the service entrances must have surge protectors installed to prevent surges, spikes and static electricity buildup from transferring from one building to the other.

Surge Protectors

There are two types of surge protectors: individual units attached to wall outlets or whole house surge arresters that protect the entire building.

Surge protectors are an important piece of hardware for nearly all electronic equipment. They work by diverting excess electrical energy to the grounding wire. If your wall outlet is not properly grounded, a surge protector will not protect your devices. First off, before investing in a surge protector, make sure the building's wiring is up to code.

Several factors are important in deciding which surge protector to purchase. The most widely advertised is the surge rating capacity measured in joules. Some surge protectors are rated for 350 joules while others are rated for 10,000 joules. It's best to figure out the total watts you want to protect and use a surge protector that has a joule rating greater than this amount. Be aware that the

Figure 1. APC SurgeArrest P8VT3. This surge protector has 8 outlets as well as telephone and coax ports to protect DSL and cable connections.

manufacturer APC uses an eP joules rating which is generally a higher number than their joules rating. For instance, the APC SurgeArrest (*Figure 1*) has an eP joule rating of 2525 while the surge energy rating is 1750 joules. APC indicates that the eP joule rating is

the level at which the unit deactivates. When comparing brands, use APCs eP joules rating.

The clamping voltage is considered even more important than the joule rating. This rating indicates the voltage at which the surge protector will start sending excess voltage to ground. A lower number means better protection - 330V is the industry standard.

Many surge protectors have a ground fault wiring indicator light which indicates if the outlet is properly grounded (*Figure 2*). If you see a red light, it indicates there's a problem. For surge protection to work, you'll have to investigate the wires attached to the outlet receptacle.

It's important to remember that surge protectors do not last indefinitely. Many recommend replacing them every couple of years due to the constant strain they are under. Look for units that provide a power protection light that indicate if the unit is functioning properly.

Lastly, no surge protector can withstand a direct hit by lightning. The only surefire way to prevent damage to your equipment by lightning is to unplug the devices from the wall. It may be inconvenient, but it is the only way to prevent costly replacements or contacting your insurance company to process a claim.

Figure 2. Belkin Pivot-Plug Surge Protector. The receptacles pivot on this protector allowing cords to fit even in tight spaces. For less than $50, it provides over 4,300 joules of protection with a $300,000 connected equipment warranty.

What to look for in a surge protector

1. Transient Voltage Surge Suppressor (TVSS) – ensure the protector lists UL standard 1449 which indicates it has passed certain tests.
2. Let-through voltage – the amount of voltage that is allowed to pass through a surge arrester or suppressor. Look for less than 120
3. Clamping voltage – Level at which the protector starts working. Look for 330 or 400V.
4. 3 line protection – hot, neutral and ground. Look for "L-N, L-G, N-G" (line to neutral, line to ground, neutral to ground) on the product's spec sheet.
5. Ground fault indicator light – this light will notify you if the outlet is properly grounded.
6. Cable and Phone line inputs – in addition to electric plugs, cable lines and phone lines also need to be protected.
7. At least 1,500 joules surge energy rating – higher is better. Many have device listings on the package such as TV, PC, stereo, to help consumers narrow the choices.
8. Warning system - some devices offer an audible signal or light to let you know when the surge protector needs to be replaced.

   Tip: when you replace your computer, replace the surge protector.

Whole House Surge Arresters

While surge protectors are a necessity for nearly every household these days, if you're looking for even greater protection, whole house surge arresters can provide the extra insurance needed to protect your valuable appliances and electronic devices throughout the entire home or in commercial locations.

Whole house surge arresters are installed either on the outside of the building near the electric meter (*Figure 3*) or inside, next to or within the circuit breaker panel(s). New homes as well as older homes can be retrofitted.

Surge arresters mitigate surges occurring from outside the building only, such as through lightning or utility transmissions, so they are used in combination with outlet surge protectors within the building.

While outlet surge protectors are rated for a surge of 6,000 volts, surge arresters are rated for ~20,000 volts (equivalent to a lightning strike). They work just like surge protectors by diverting extra energy to ground but they do it on a much greater level.

In addition to protecting all electronic devices plugged into outlets, whole house surge arresters can also protect the building's wiring, circuit breaker panel, and telephone/coax cables. Some arresters can be installed by the homeowner, others must be installed by a licensed electrician.

Figure 3. A surge arrester installed on the electric meter service entrance. Other arresters installed inside near the main panel can also protect phone and cable lines.

How to Determine the Number of Watts a Device Will Use

Electric devices can be pretty cryptic in their device specifications (located on the tags or on the outside of the box). Fortunately, most surge protectors indicate the amount of watts they support. Look under the power section for headings such as Power Consumption, Power Supply or AC Adapter Rating.

Example 1: The HP LaserJet P3010 (printer) lists the following on the Technical Specifications sheet:

Power Consumption
Active: 780 watts; Standby: 14.5 watts; Powersave: 8.5 watts; Off: 0.6 watts

Typical Electricity Consumption (TEC): 3.267 kWh/Wk

While the printer is running, it will use 780 watts. If it is idle, it will use 14.5 watts and if the unit is off for an extended period of time (i.e., overnight), it will use 8.5 watts. If you are looking for a surge protector for this laser printer, you would need to find one that supports at least 780 watts, preferably more than 1000 watts. Note: If you want to attach additional devices to the surge protector, it will need to have an even higher surge energy rating. The lowest surge energy rating we recommend is 1,500 joules to protect 1,500 watts.

Example 2: If your device doesn't list the watts outright you can still figure it out. For instance, a typical electronic device will list the following on the Technical Specifications sheet or appear on the tag attached to the device:

External Power Supply - 100-240VAC + 12V / 3A

100-240VAC indicates the type of circuit on which the unit can be used. In the US, we have 110V circuits, while many foreign countries use 220V circuits. The 100-240V number just means that the device can be used on any circuit between 100 and 240 volts.

The second part, 12V / 3A indicates that the device has a voltage supply of 12 volts and a current flow of 3 amps. If we multiply 12V * 3A we get 36 watts - this is the power requirement for the device.

Conclusion

Surge protectors and whole house arresters are a necessity nowadays for both businesses and consumers. They both function by providing a means for excess energy to be safely diverted to ground. A whole house arrester is the first line of defense stopping excess energy from entering the building. Surge protectors then protect devices at individual outlets.

There's no limit on the number of surge protectors you use and no limit on the type of device you connect. Any electric device that is expensive to replace is a candidate including major appliances, computer equipment, TVs and even small electrics.

The one thing to keep in mind is that although lightning is the most feared as far as damage to electronics is concerned, surges originating from within your home account for the majority of problems.

While unplugging your devices from the outlets is the failsafe method, installing a whole house surge arrester and using surge protectors throughout the building will help mitigate damage from the eventual surges and spikes every serviced building receives.

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