

Why the increased need for surge protection?



Surge protection devices are evolving from being “accessories” toward “necessities.” Learn why more OEMs and panel builders are making the smart move to include these devices in their designs.

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Surge protection devices (SPDs) were, in the past, often tacked on in applications where some additional protection might be appropriate. In many cases the addition of SPDs was a case of locking the barn after the horse had run away. People become true believers in the devices’ value after dealing with disastrous surge-related equipment failures. Today, more engineers are seeing the value of incorporating SPDs in an increasing number of their designs.

The expanded use of SPDs is largely due to the changing nature of the equipment and systems they protect. Today’s increasingly digital technology is also increasingly susceptible to surge-related damage. Should you be making additional use of these devices in your designs?

Basics of SPDs

SPDs have long been used to protect highly sensitive or critical electric-powered devices. SPDs shield electrical equipment from transient voltages, protecting downstream devices both from large, instantly destructive surges as well as from repetitive, lower-intensity power fluctuations.

Many people operate under the incorrect belief that the greatest risk of an equipment-killing surge is from lightning strikes. Lightning can be the source of the

most catastrophic surges, but it is actually one of the least common surge sources. About 80 percent of surges are caused by internal power disturbances such as load switching, variable frequency drives, and HVAC systems.

While damage from lightning is uncommon, it can create problems in unexpected ways. People assume a lightning strike to incoming power lines is the only source of danger. In truth, it has other points of entry. Metal light poles in a parking lot and your rooftop HVAC unit basically act like lightning rods. When struck by lightning, the current can backfeed into your power distribution system, creating damage across the network.

Increased need

Electrical devices of all types have evolved greatly over the last few decades. They have become increasingly digitalized, providing an amazing array of new functions and features. But those advances come at the cost of increased sensitivity to power fluctuations. Older devices could shrug off most surges, but the more sophisticated circuitry of today’s equipment makes it much more prone to surge damage. Those surges may be more frequent than you imagine.

If you've ever noticed a slight dimming of lights when a piece of equipment is switched on, you're seeing a power surge. These surges may be relatively low in intensity, but they have a cumulative effect. They add up over time, degrading and damaging electrical equipment.

Increased code requirements

NEC code has long ensured appropriate surge protection for critical electrical applications like emergency facilities, renewable energy sites, and elevators. Recognizing the increased sensitivity of much modern electrical equipment, the 2020 NEC code expanded SPD requirements to include eight additional applications or types of equipment. Not all states have adopted the 2020 version, but it is only a matter of time until they do. The fact that all new homes being built must include surge protection indicates the value of these protective devices.

New applications, new SPD needs

With more sensitive electrical devices located throughout most commercial buildings and facilities, engineers are increasingly taking a cascading protection scheme. Rather than a single SPD located at the service entrance, multiple SPDs are located throughout the system, for example at each motor control center or panelboard, and sometimes at specific pieces of equipment. Download the white paper "[Regulatory and industry updates for surge protective devices \(SPDs\)](#)" to see a schematic of how this scheme could be implemented.

Facility managers are rapidly moving away from costly, high maintenance lighting types, replacing them with brighter and far more efficient LEDs. These LEDs, like other current generation electrical devices, are more sensitive to voltage fluctuations than older technology. A great example of the value of SPDs was the deployment of LED parking lot lighting by a national retailer. While the project delivered the promised energy savings, those were offset by the increased maintenance costs, much of it due to surge related failures. The company subsequently added SPDs, reducing lighting maintenance costs by 90%, with a six month return on their investment in surge protection.

Added features

SPDs may include features to indicate their status or condition. Some have a counter that tallies surge

events. However, the parameters for measurable events vary between manufacturers. Some count even slight variations in power levels. This enables the manufacturer both to overstate the importance of the SPD and to encourage premature replacement.

In fact, most line voltage has frequent but inconsequential voltage changes. That may make this an unreliable way of knowing the actual remaining useful life of the SPD. Before relying on these counters to assess the remaining life of the SPD, inquire about the parameters used to identify a "countable" power event.

An alternative, and more reliable, feature is an end-of-life indicator located on the front of the SPD that provides at-a-glance confirmation that the SPD needs to be replaced.

In some applications, the availability of auxiliary contacts on the SPD can be valuable. They enable maintenance or operations managers to remotely monitor the device status, reducing the need to physically visit and assess SPD condition. This also adds safety by preventing the need for a maintenance person to open a panel or piece of equipment to check the SPD.

Some SPDs are designed with a "consumable" element, a pluggable cartridge that contains the actual sensor. In applications where SPDs require frequent replacement, the cartridges can be quickly replaced, while the base and wiring remain intact. This makes replacement a simple and speedy maintenance task.

SPDs for all applications

SPDs are moving from the realm of "accessories" toward "necessities." The ever-increasing number of more sophisticated and more power quality sensitive electrical devices is driving a surge in the demand for SPDs. The additional investment is consistently paid back in the protection it provides for equipment. Beyond the repair or replacement cost for surge damaged equipment, there's also the associated maintenance cost, as well as the downtime involved.

OEMs and panel builders should consider a more proactive approach in their equipment and panel designs, building in the protection offered by SPDs. Doing so will often save significant costs and headaches down the line.