Focus on Surge Protective Devices in the Home

Andi Haa, Quality Plus

To paraphrase a popular advertisement, what's in *your* home? Refrigerators, ovens, sound systems, lighting systems, monitoring systems, heating and cooling systems, security systems— basic or high-tech, it doesn't matter. They are all subject to disturbance or destruction as a result of electrical transient activity. In brief, transients are short bursts of voltage or current that can—and do—negatively impact your equipment. The damage caused varies with the sensitivity of your equipment and the level of transient that gets into your electrical system.

Transients can come into your system because of external utility/grid events, including substation switching events, blown transformers, or external faults on the line, to name a few. Although lightning events are the easiest to recognize as a potential cause of externally generated transient activity, brownouts, sags, blackouts, or other similar events also cause transients, particularly when electrical systems are recovering from these events.

Internally, transients can be generated by switching lighting or appliances on or off or by malfunctions within home electrical systems.

Figure 1 illustrates two typical transients. They are measured by duration (50 ns to 2 ms), rise time (10 ns to 100 µs), frequency (20 Hz to 20 MHz, ringing transients), and voltage (up to 20 kV).

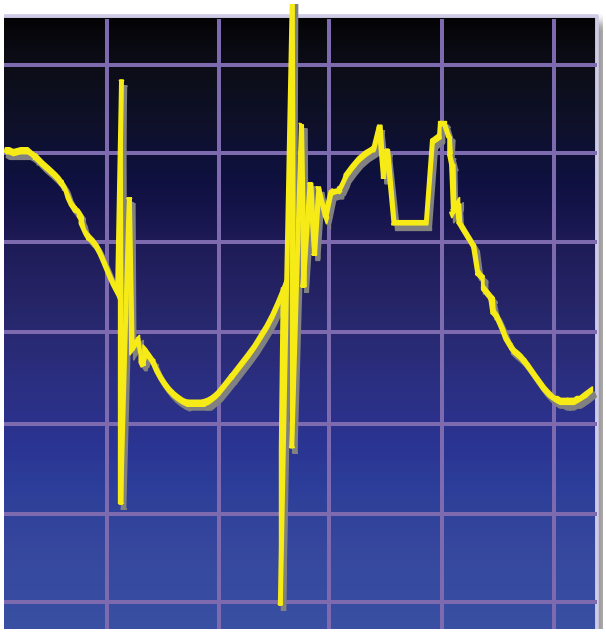

Figure 1. The first transient (left) is an impulse transient, typically associated with external events; the second transient is a ringing (oscillatory) transient typically associated with internal switching events. Ringing transients also occur as external transients enter the system.

NEMA, as well as UL, IEEE, IEC, and other organizations, recognizes the need to provide protection that will mitigate damage to equipment caused by transient activity.

As a result, the NEMA Low-Voltage Surge Protective Device Section and IEEE recommend a cascade protection approach for the installation of surge protective devices (SPDs).

Figure 2 illustrates the placement of SPDs at strategic locations in the cascade protection scheme. The goal is to have at least two stages of protection between the source of the transient and the equipment to be protected.

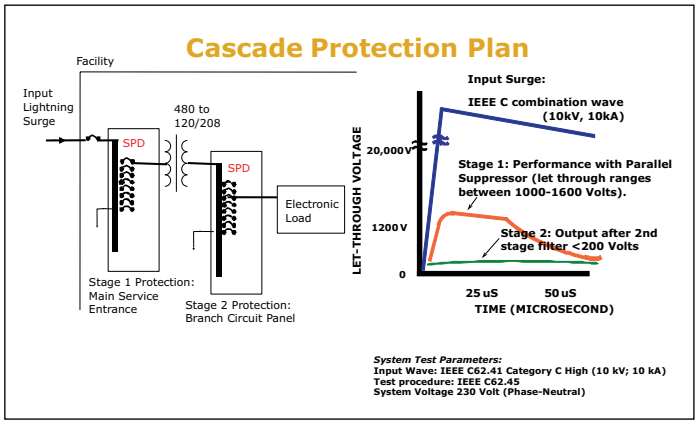

Figure 2. In this graph, the blue line is a surge without any protection. Note that the voltage level exceeds 20,000 V. The red line is a surge with one SPD installed. Note that the voltage level still exceeds 1,200 V, which can cause damage. The green line is what remains of the initial surge with two SPD devices installed.

What does this mean to you, as a homeowner? Have an SPD installed on your main electrical panel. If you have separate distribution panels in your home, have SPDs installed there as well. Finally, using individual equipment protection, such as plug-in SPD devices, and installing coax and data devices will help build a protection "fortress."

What's in YOUR home?

Visit www.nemasurge.org for more information on protecting your home and on NEMA manufacturers that can help you meet your surge protection needs.

Ms. Haa has been in the SPD industry for more than 20 years. She is a member of UL 1449 STP and IEEE SPDC and is the chair of SPDC Subcommittee 3.2; vice chair of SPDC Subcommittee 3.6; and vice chair of Working Group 3.6.6 and 3.6.9.