

Surge Protective Devices

A Sales Primer in Distributed Surge Protection



TERMINOLOGY

Recently, there have been changes in the nomenclature used to describe Surge Protection Equipment. In an effort to reduce confusion, we have adopted the language from the NEC.

Article 285 of the NEC title has been updated to be consistent with UL and IEEE. The term Transient Voltage Surge Suppressor (TVSS) is being replaced by Surge Protective Devices (SPDs). The requirements for SPDs were changed and they are now identified by Type 1, 2, 3, or 4 depending upon where the SPD will be incorporated within the power distribution system.

Additionally, UL 1449 3rd edition changes include adding a “nominal surge rating” to Type 1 (10kA or 20kA) and Type 2 (3kA, 5kA, 10kA or 20kA) SPDs; an increase in Operating Voltage Testing at 115% of nominal (as opposed to 110%); and a new Voltage Protection Rating Test.

Type 1 SPDs were previously called Surge Arrestors or Secondary Surge Arrestors. These terms will not be used and the device will be referred to as a Type 1 SPD due to its location within the power distribution system. This is typically on the **supply side** of the service disconnect overcurrent device (main service panel).

Type 2 SPDs are typically service entrance SPD panels or branch circuit SPD panels that are connected on the **load side** of the service disconnect overcurrent device (main service panel).

Type 3 SPDs are typically surge receptacles or cord connected point-of-use devices. They are permitted to be installed anywhere on the load side of a branch circuit up to

the equipment served, provided the connection is a minimum of 10m (30ft.) from the service panel. Note: If the distance is less than 10m, a Type 2 SPD (or a Type 3 SPD tested to Type 2 requirements) must be used.

Type 4 SPDs are UL Recognized Components.

MOV Metal Oxide Varistor: Semi-conductor device which has the property of maintaining a relatively small voltage change across its terminals while a disproportionately large surge current flows through it. These are known to be the most cost and size effective surge suppression components.

SADS Silicone Avalanche Diodes: Used in protecting electronic circuits from surges, the device is voltage limiting and operates by shunting excess current when the induced voltage exceeds the rating. SADs work well in high frequency and low surge current applications. The disadvantage of SADs are their low surge current capacity and they are costly compared to an MOV.

Gas Tube: Crowbar devices that essentially change from an insulator to a conductor during an overvoltage condition. These types of devices are prone to rapid degradation after receiving surges.

Filters: Enhance the characteristics of surge protection and provide an additional benefit of noise rejection.

SURGE PROTECTOR TYPES		LEVITON PRODUCT FEATURES
Type 1	 <p>Cat. No. 55175 Cat. No. 50240-MSA</p>	Leviton Type 1 SPDs offer first line defense against external surges. They use the largest MOV's in the business (40mm & 53mm) and are outdoor rated. Plus, some of our Type 1 SPDs feature an audible alarm warning that the device is no longer providing the rated surge protection.
Type 2	 <p>Cat. No. 75120 Cat. No. 57120-CM3 Cat. No. 32120-DY3</p>	Leviton Type 2 surge panels use UL-recognized surge fuses. We offer models that contain replaceable modules, surge counters and 7-Mode protection. We also offer models that can be used for both Delta and WYE transformers. These SPDs conform to NEMA LS 1 guidelines.
Type 3	 <p>Cat. No. S2000-OPS Cat. No. T8280-W Cat. No. 5480-IGI</p>	Leviton offers SPDs to meet all point-of-use applications. Our surge strips provide triple-redundant protection: Thermal Cut-off Fuse (TCO), Neutral-Ground Fuse and Circuit Breaker(CB). We also offer tamper-resistant receptacle versions, IG versions and quads.
Type 4	 <p>Cat. Nos. 51020-DIN Cat. No. 51005-DIN Cat. No. 3803-485</p>	Leviton's Type 4 SPDs are UL recognized components, and are available in a variety of configurations, including DIN rail mount, wall mount and leaded.

POSITIONING

Leviton's panel mounted Surge Protective Devices (SPDs) provide outstanding surge suppression performance, as verified by actual testing to IEEE C62.41 Standards. In addition to performance, Leviton's panel mounted SPDs offer the basis for applying a distributed approach to surge suppression, which acts to knock down high-energy transients at the building entrance and/or sub-panel so they're manageable for the smaller SPDs that protect PCs and other equipment at point-of-use.

Leviton offers a broad range of SPDs for almost any requirement. Many of our surge panels have easily replaceable modules, which dramatically reduces maintenance costs.

Additionally, Leviton SPDs are offered in many different enclosure styles, with a variety of options such as surface or flush mounting and an optional surge counter.

All Leviton SPDs incorporate large MOVs as opposed to lower cost small MOVs in parallel. Large MOVs offer an improved surge current rating and greater reliability, which ensures that the product will perform for many years.

Finally, Leviton's world-class service team will provide on-site application support on an as-needed basis.

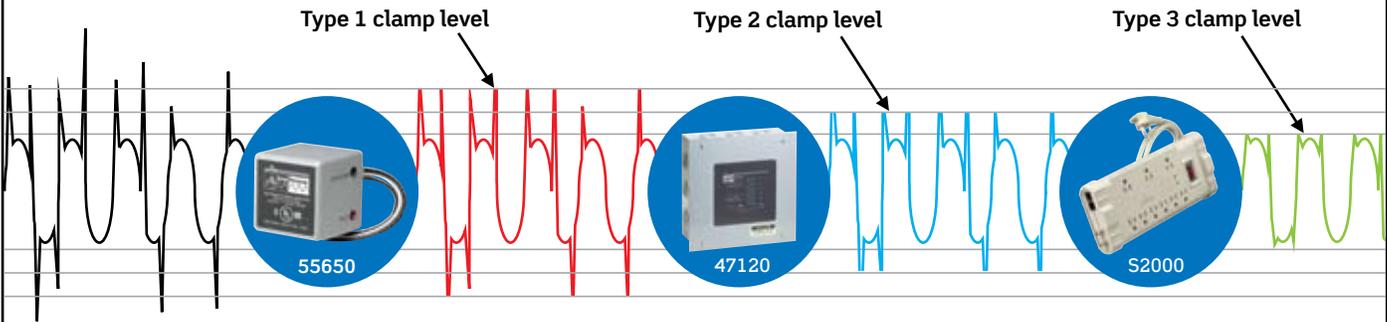
When having a conversation with a prospective client, here are some leading questions that will help you in determining their specific needs:

1. Are you experiencing fluctuating power or dimming lights?
2. Does your equipment experience premature failure?
3. Is your facility experiencing EMI, RFI or noise related disturbances?
4. Does your facility have existing surge suppression?
5. Is your area prone to lightning strikes?
6. Have you experienced either brown outs or black outs in your area?
7. Are you experiencing any resets with your PLC or controls?
8. Are you near the end of the line in your utility grid?
9. Do you experience any glitches or resets at a specific time of the day?
10. Do you use a generator regularly or for utility power loss?
11. How costly would down time be relative to your organization? (Use the Dollars & Downtime Power Quality Survey to assist in determining this number)

COMPETITORS PRODUCT FEATURES	LEVITON ADVANTAGE
<p>Many use smaller MOVs in parallel, which does not provide the same performance and tends to be less reliable.</p> <p>Most do not offer audible alarms</p>	<p>Audible alarm is more effective at warning when the SPD is no longer offering surge protection.</p> <p>Larger MOVs provide for increased surge current protection, more reliable operation and increased product life.</p>
<p>Many competitors' SPDs can only be used for either Delta or WYE transformers (but not both).</p>	<p>Leviton SPDs feature replaceable modules that result in lower maintenance costs.</p> <p>Our UL Recognized surge fuses are typically more reliable than non-Recognized fuse designs</p>
<p>Most competitors provide just one or two levels of protection; either TCO, CB or both.</p> <p>Very few offer quads.</p>	<p>Leviton offers surge strips and receptacles that meet the NEC 2008 TR requirements.</p> <p>The additional neutral-ground fuse protection offers a third level of protection against temporary over-voltages.</p>
<p>Most offer limited mounting options (typically only side-wall mounting).</p>	<p>Leviton Type 4 SPDs feature the greatest variety of mounting options.</p> <p>Leviton is a Rockwell Automation Encompass Partner, and our SPDs are a featured product. They are typically used in industrial automation applications.</p>

How To Implement an Effective Surge Protection Network

SURGE PROTECTIVE DEVICES



SURGE PROTECTION DEVICE PERFORMANCE	TYPE 1	TYPE 2	TYPE 3
	Typically mounted on the line side of the main service entrance. Protects against external surges caused by lightning or utility capacitor bank switching	Typically serves a branch circuit and protects against residual lightning energy, motor driven surges and other internally generated surges.	Typically used at the protected equipment. Provides point-of-use protection, easily replaceable and it provides the last line of defense against a lightning strike.

Standardization

The SPD Types (Type 1, 2, 3, 4) are the UL, NEC and IEEE attempt to harmonize with the IEC 61643-1 standard that uses Class 1, 2, 3 designators. The sole reason that UL did not use Class 1, 2 and 3 is that North, Central & South America leans towards the IEEE documents which do not include the 10x350µs waveform, as it does not adequately represent the conditions experienced during a lightning strike. Since the test is different, the name had to be different.

The drawing below identifies category A, B and C as defined in the IEEE Trilogy. Category C ranges from the transformer secondary to just inside the building entrance. Category B includes all of the branch or sub-panels and Category A includes the receptacles and point of use devices such as cord connected or plug in surge devices. Note: There is purposeful overlap between the categories as it is not a demarcation line but a transition. The figure below is from IEEE C62.41.2 which is the Recommended Practice on Characterization of Surges in Low-Voltage (1000V and Less) AC Power Circuits.

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