

Surge Protection for UPS Applications

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Recently, there has been some confusion regarding the uninterruptible power supplies' (UPS) role in transient protection. In fact, a UPS will not protect against the same types of disturbances as a transient voltage surge suppressor (TVSS). Typically purchased to provide stand-by power to critical equipment, a UPS will not protect against high-energy transients. Often, manufacturers advertise having surge protection integral to their UPS. In most cases, this built-in protection consists of one or more metal oxide varistors (MOVs) installed for the sole purpose of protecting the sensitive control components within the UPS. While this does provide some base level, "single shot" protection, the electronic loads attached to the UPS are not properly protected. Furthermore, the clamping voltage of the MOV's in the UPS is significantly higher than that of a UL 1449 rated TVSS. **Table 1** shows a comparison of these clamping values. Not only providing lower clamping voltages, the TVSS also has the ability to handle multiple surges. Known as "Life Cycle Surges", the TVSS will clamp a minimum of 3,000 surges without degrading. UPS manufacturers do not perform life cycle testing (see **Table 1**).

Clamping voltage (120V Systems)	UPS	TVSS
Cat A (6kV/.5kA)	800V	400V
Cat B (6kV/3kA)	1000V	500V
Cat C (20kV/10kA)	1200V	600V
"Life Cycle Testing"	No	Yes

Table 1.

The only solution to this problem is to provide additional TVSS to the UPS system. The Institute of Electrical and Electronics Engineers, Inc. (IEEE) agrees with this solution. The following paragraph is taken directly out IEEE's Emerald Book.

"It is recommended practice that both the input circuit to the UPS and the associated bypass circuits (including the manual bypass circuit) be equipped with effective Category 'B' surge protective device..."

Typical UPS come equipped with either single or dual input terminals. For single input systems it is only required to have one TVSS on the line side of the UPS. Because dual input systems consist of two separate power sources, one that feeds the UPS and one that feeds the maintenance bypass circuit, it is required that two TVSS be utilized

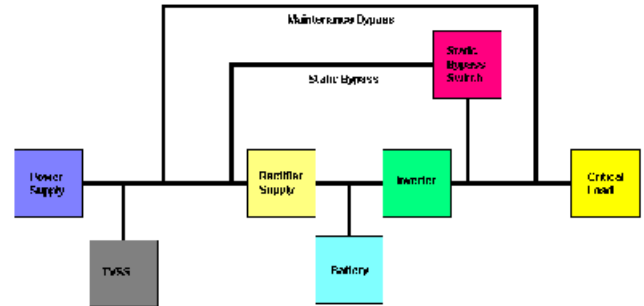


Diagram 1.
Single Input UPS

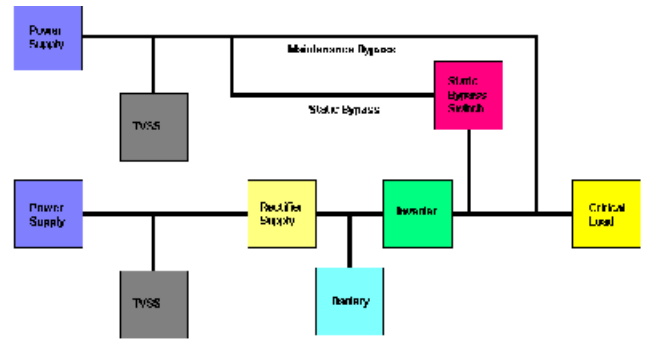


Diagram 2.
Dual Input UPS

Liebert takes IEEE's directive one-step further by also suggesting surge protection at the connected branch panel, as shown in **Diagram 3**. High-energy transients entering the electrical system through service entrance would be clamped at the UPS and then again at the branch panel in order to provide the best protection for the critical loads downstream.

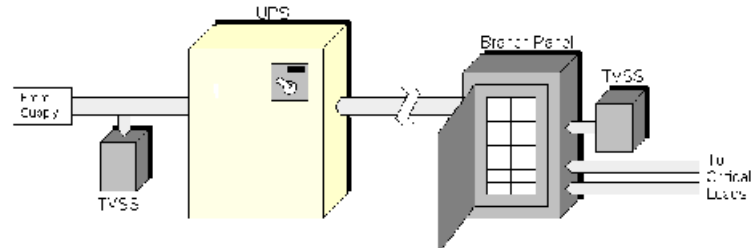


Diagram 3.

Reference:
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