

## Uninterruptible Power Supplies (UPS)... Is Yours Adequately Protected?

For more than 20 years we have proclaimed the virtues and necessity of protecting the INPUT to a UPS system with a surge protective device (SPD ).

While there is no panacea or "one size fits all" when it comes to power protection; a UPS system comes the closest. A quality, True on Line Double-Conversion UPS will provide it all in one box; Voltage Regulation, Power Conditioning, Battery Back-Up, plus limited surge protection (i.e. maybe just a couple of MOV's).

While UPS manufacturers have touted the surge suppression built into their wares; we have seen and heard real-life nightmares of critical and expensive equipment supported by a UPS system taken out by a surge or lightning strike.

Recently Surge Suppression Incorporated conducted tests on UPS devices from well-known UPS manufacturers using three different UPS typologies - stand-by, line interactive and double conversion.

**SERIES 1** Just a basic stand by - off-line - UPS. This type is just basic back-up unit with limited battery support time and typical 4 millisecond transfer time to battery.

**SERIES 2** Line Interactive models, a little more advanced than the stand-by, virtually no transfer to battery time and offering both Buck and Boost output regulation.

**SERIES 3** True On Line, High Frequency Double Conversion units, no switch time, "hot" inverter/rectifier.

SSI performed a series of two surge tests utilizing a 2,000v 67A 100kHz oscillatory ringwave on each of the three different series; the first **WITHOUT** an SPD protecting the input to the UPS and the second **WITH** an SPD protecting the input.

SSI Model S-SPT120-30 (120v 30amp SPD with Frequency Responsive Network) was used in the testing to document Let-Through-Voltage after the impulse was registered.

Following are the results:

Surge Mode	Series 1 Let-through	Series 2 Let-through	Series 3 Let-through
Line - Neutral W/O SPD	99v	48v	18v
Line - Neutral With SPD	27v	15v	13v
Line - Ground W/O SPD	587v	675v	1,397v
Line - Ground With SPD	35v	15v	23v
Neutral - Ground W/O SPD	596v	787v	1,404v
Neutral - Ground With SPD	25v	26v	27v

These tests show that a UPS typically has decent protection for spikes between L-N. However, all technologies tested have entirely inadequate protection from L-G and N-G.

Now consider that UPS devices have their own sensitive electronics that control their operation. If these electronics are damaged by surges, the UPS may not function or will go into by-pass mode where the equipment the UPS is feeding is getting unfiltered power direct from the electric utility. Not a good situation.

If the sensitive or critical equipment is important enough to warrant a UPS system, then the UPS warrants being protected by a quality SPD.