

TECH NOTE

From Zero Surge Inc.

January 2019

Protecting Against In-Rush Current After Power Is Restored

One of the main benefits of Zero Surge's Series Mode Filter Technology is that it prevents the damaging initial wave of power that can occur during a power restore event. A traditional surge protector cannot perform this task because its main component, the metal oxide varistor (MOV) does not react to changes in current or to voltage below its set value (at minimum 330 volts). Using the Dranetz HDPQ Xplorer, we can show you what happens during this event.

We connected the voltage and current probes to separate channels of the Xplorer before and after a Zero Surge 6R15W-4USB. All Zero Surge products use the same filter technology so this applies to any of our products. A multifunction inkjet/scanner/copier was used as the load. Power was physically interrupted for two seconds and reconnected. These are the screen shots of the data just after power was restored.

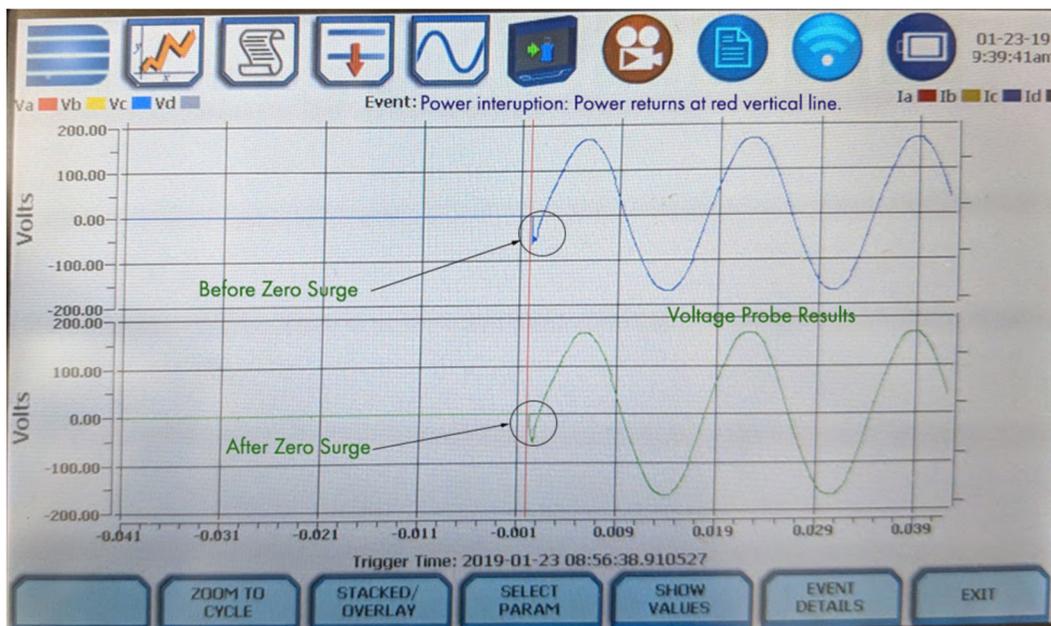


Figure 1: Voltage Probe Results

From Figure 1, you can see the voltage wave before the Zero Surge unit represented by the blue line on top. The red vertical line shows where power was restored. The Xplorer marks this as a triggered event and marks the start time of the event with a red line. Note the circled areas just as power is restored. The pre-Zero Surge voltage has a sudden pulse with a flat bottom before returning to the normal wave. The Zero



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Surge unit was able to make this pulse slow down and catch up to the main power wave. It is a subtle difference, but your sensitive electronics can “sense” the difference. What is more impressive is the current probe results.

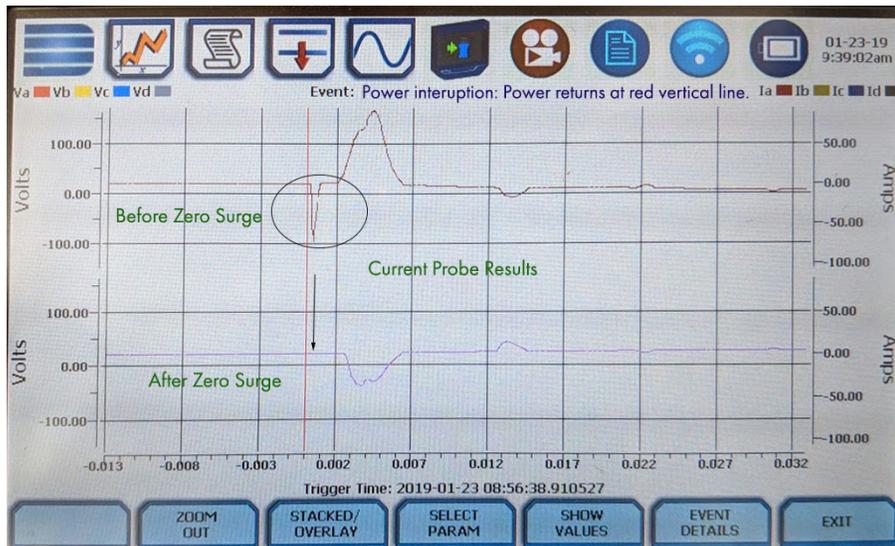


Figure 2: Current Probe Results

Do you notice the difference between the top (pre-Zero Surge) and bottom (post-Zero Surge) current results? Just after power is restored, there is a large wave of current that is preceded by a pulse of current. This pulse has a very steep rate of change (di/dt) which is the main cause of surge related damage. It is this in-rush of current that has a high change of current over time that “shocks” your electronics. In this case, Zero Surge completely absorbed this pulse. The load was still able to pull current to get it started, but it was not exposed to the first damaging pulse. The first damaging pulse was absorbed by the Zero Surge unit and clean power was passed onto the load.

Therefore, using MOV protection technology is not good enough to protect against the damage caused by power interruptions. A UPS will not always protect against this same problem either. As the power source is changed back from the battery to the building power, you can experience this same in-rush current pulse.



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