ipvleta1
11March1998

VOLTAGE LET THROUGH

General

Voltage let through can be a confusing subject, especially since different manufacturers of power treatment vary their rating techniques. Voltage let through refers to the amount of transient voltage passed through a power conditioning unit to the load. A transient is a high amplitude, short duration spike or surge superimposed on the normal waveform which is caused by switching electrical loads, switch-mode power supplies, and lightning. In recent years, the use of microelectronic circuits has increased rapidly. Due to this technological ad-vancement, problems related to transients have also increased tremendously. Surges up to 6000 volts can appear at the power out-lets inside buildings. These surges cause equipment to mal-function and component damage.

Electronic components are damaged and disrupted by excessive electrical energy levels that last for very short periods of time. Energy is a function of voltage or current over a period of time. The ability of a transient to cause disruption or damage depends on the energy contained in the transient.

There are many devices that are designed to suppress transients to safe values. One well known device is the transient voltage surge suppresser (TVSS). Other technologies, such as, power conditioners and isolation transformers provide just as much or better attenuation as the TVSS and more total power treatment ability.

ANSI/IEEE C62.41 and UL 1449

The Institute of Electrical and Electronics Engineers (IEEE) 587 states that “6000 volts is the largest transient that the interior of a building would experience, and that it’s harshest interior surge environment is one that would experience 100 surges of 6000 volts, 3000 amps in a years time”. As a result of this, a standard of how to test surge suppressers has been put into place. The American National Standards Institute (ANSI) C62.41 standard is a list of different waveforms a surge suppresser is to be tested with. There are three categories (A, B, and C) each having three sub-categories (1, 2, and 3). Under-writers Laboratories (UL) 1449 is the listing a surge suppresser gets when it is tested with the ANSI/-IEEE C62.41 waveforms, and it refers to the let through voltage. The ratings range from 330 volts to 6000 volts.

Extreme care must be given when comparing the let through voltages of different suppressers. A suppresser that has a let through voltage of 330 volts when tested with a category A3 waveform may not be any better than a suppresser that has a let through voltage of 400 volts when tested with a category B3 waveform. This is because the category B3 waveform has a current value 2 ½ times larger than the category A3 waveform. When the voltage and/or current is increased on the tested waveform, the let through voltage also increases.

Power Purifier

The *Power Purifier* is a double magnetic conversion line interactive power conditioner that performs output voltage regulation, harmonic attenuation, electrical noise attenuation, power factor correction, and spike attenuation providing your equipment with 99.95% protection from power anomalies. The *Power Purifier’s* let-through voltage is compatible with U/L 1449 class 330 volts when subjected to a 6000 volt / 3000 amp (category B3) combination waveform. The actual voltage let-through is less than 192 volts peak, 170 volts of that is the actual output waveform meaning that there is only 12 volts from the transient let through. Attenuation is achieved mainly by the isolation of the primary and secondary windings. There are no components which will fail over time due to the constant exposure to transients.

Other Technologies

There are some TVSS's that provide good spike attenuation and are rated at UL's best rating of 330 volts let through. Even so, the very component that atten-uates the spike in a TVSS device (MOV) is prone to failure over time. The TVSS also does not regulate voltage, attenuate harmonics, attenuate electrical noise, correct poor power factor, or isolate the load, providing the equipment with minimal power treatment.

Some TVSS manufacturers say their products protect equipment from surges of up to 6000 volts as described in ANSI/IEEE C62.41, but they do not tell you what type of equipment is being protected and to what extent. This information is misleading to the customer. In order for it to be reliable, you need to know the voltage and current that was used to test these units (if they were tested at all) and the let through voltage.

These units are normally tested with the category A waveform which is more than 15 times less intense than the category B waveform.

Summary

In order to fully understand a device's spike attenuation capability, three critical pieces of information are needed: the voltage and current the device was tested with, and it's let through voltage. Don't be fooled by specifications that say the unit meets or exceeds ANSI/IEEE C62.41 because that has no relative meaning to the amount of spike attenuation it provides. The ANSI/IEEE C62.41 standard is just a guideline for testing, you could drill holes in a book, put some wires through it and test it according to ANSI/IEEE C62.41. It would meet ANSI/IEEE C62.41 but provide no spike attenuation.

The *Power Purifier* attenuates a category B3 waveform (6000 volts / 3000 amps) to an actual let through voltage less than 12 volts. When using the *Power Purifier* for voltage regulation, power factor correction, electrical noise attenuation, and harmonic attenuation, you can be assured that your mission critical equipment will also have excellent spike attenuation.