Power Quality 101

Technical Bulletin

The service life of any piece of electronically controlled equipment is, to a large degree, determined by the quality of the electrical service that it receives power from. Most electronics have an incredibly long theoretical life, but a fairly short “real-world” life. This is mainly due to two factors. The first, and most critical, is the quality of the supply power. The second is environmental, actually dust and dirt getting on and in the equipment. If you were to take a motherboard from a computer, put it in a vacuum and give it a perfect sine wave to the power supply, you would replace nothing except, maybe, the power supply, for a few thousand years, or so. Unfortunately, they don’t last that long in real life. We don’t normally dust the insides of our computers or TVs, and we don’t give them clean power.

The number one complaint from electronics (commercial and residential) owners is downtime. The number one cause of downtime (other than user error, neglect, or abuse) is poor power quality. According to Utility Industry information, power quality is at an all-time low, and with deregulation rolling along, it’s getting worse.

There are several issues that can be easily addressed to improve the overall quality of any electrical system. This paper briefly addresses the areas that appear to have the most detrimental effects on electronic equipment and electronically controlled machinery.

1. GROUNDING. A low resistance, single-point ground is imperative to both surge protection and power quality. A regular check and upgrade (as needed) of grounding systems will reduce interference and line noise, improve power factors, and reduce the risk of accidental electrocution. Periodic maintenance will also help decrease potentially damaging harmonics, and improve the efficiency and durability of surge protection equipment. Grounding is covered in depth in Grounding 101.

2. ELECTRICAL TUNE-UP. An electrical tune-up consists of a periodic inspection and maintenance of an existing system. Check grounding, verify and tighten all connections, including Lines, Neutral, and Ground at panels, breakers, disconnects, switches and receptacles. Clean up any corrosion on connections. Verify breaker integrity (IR check). Replace worn, broken, or damaged components as needed.

3. SPD (SURGE PROTECTIVE DEVICE). A properly designed and installed surge protection system provides two critical power quality functions.

    A. It reduces potential damage from spikes and surges caused by lightning, inductive loads, and utility “glitches” (including major events like grid-shift, as well as the daily issues of Capacitor switching and temporary “crossover”.

    B. SPD systems incorporate filtering in the internal components, therefore low-level surges, line noise and RFI/EMI will be reduced or eliminated. This will lower the number of electronic “hiccups” a system experiences and increase the life of the equipment that is being protected.

By following the simple, inexpensive procedures listed above, you can expect to see a noticeable reduction in system downtime, and improved performance from all electrical equipment.

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