Quiet power

Delicate electronics drive demand for greater protection in retail stores, IT closets, industrial plants, and data centers. **by Dan Carazo**

Today, far more sensitive electronic equipment and delicate mission-critical systems require protection from poor electrical environments. And as the cost of running new "clean" electrical lines continues to increase, so will the need for power-conditioned electrical products that remove unwanted noise from power sources.

"Because they are susceptible to noise and transients, circuit protection plays a large role for low-voltage networks, servers, VDV equipment, and security systems—and it is expected that this emphasis will continue over the next several years," said Suzette Albert, senior product marketing manager for SolaHD, EGS, Emerson Industrial Automation. She added that surge protection and filtering devices are considered one of the simplest and lowest-cost power quality solutions.

"The biggest trend is to provide products that combine filtering and surge protection," explained Albert. "These are products that are designed to limit high-voltage spikes to an acceptable level, filter high-frequency noise caused by low-energy transients, and provide data/signal line protection."

According to David Joy, vice president of marketing for Emerson Network Power, expanding data center construction has created strong demand for 750kVA UPS systems. "There has been a large build-out of enterprise class data centers to fulfill the requirements and trends of capacity, availability, consolidation, recentralization, regulation, higher-power density, virtualization, and energy efficiency," said Joy.

"Computer equipment, including servers and networking, have increased in power density leading to higher kVA or kW demand. We have seen a number of applications moving from multiple single-phase UPSs in individual racks to using a centralized higher-power three-phase UPS to power the room," added Joy, who sees strong UPS sales into several industries. "Power sales into the financial industry grew by at least 15% to 20% year over year in 2006 and 2007, but by the second quarter of 2008 we began to see slower activity. We do expect continued growth in the government, healthcare, and professional services industries."

"The market for transformer-based power-conditioning and power-conditioned UPSs is growing at a mid-single-digit rate, and is expected to remain at or near the current rate in the midterm," reported Gareth Davis, general manager for Chloride Power. "The higher growth markets are related to the continued build-out and expansion of data and VoIP systems in both large and small organizations and as systems are updated to the latest technology."

Based on growth that is linked to the expanded use of microprocessor-based applications, active tracking filters with surge protection are providing solid market growth. "Revenues are growing at a relatively moderate rate with a revenue growth rate of about 5% for surge protection devices and 9% for filtering devices," Albert reported.

"Active tracking filters with surge protection provide protection against the full spectrum of voltage transients and noise," she said, explaining that these products continuously track the input AC power line and respond instantly upon detecting extraneous high-frequency noise and high-voltage transients by everyday events.

According to Albert, a significant number of these products incorporate new enhancements—including hard-wired, DIN rail mounting, lower clamping levels, higher temperature ratings, higher surge capacity, LED status indicators, and audible alarms.

"In the past two years, protection of POS systems—particularly in convenience stores—and protection of network switches in IT closets have both shown good growth," said Davis, cautioning that all aspects of the power protection device, including noise reduction, must be specified.

"This is especially true when protecting critical infrastructure devices that will operate in typical electrical environments," he noted. "Typically contractors, MROs, and installers are interested in meeting a given specification at the best price, which forces specifiers or end-users to clearly and fully specify the product that is required for the given application."

Davis suggested that distributors point out the critical importance of power protection when product cost remains an issue with buyers. "As costs for power protection devices increase, some customers consider reducing or eliminating the level of protection on their equipment—but usually only until the first disaster occurs," he said. ■

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PLUGGED IN: A power conditioner acts upon voltage rather than electric power. *(Source: Wikipedia)*

STREAMLINING SAFEGUARDS

As data center managers continue to respond to increasing pressure to render their facilities more energy efficient, one of the challenges they face is getting UPS systems to operate at peak efficiency.

John Musilli, a board member of the Sacramento, California-based Data Center Institute, noted that those in existing facilities can make several tweaks to optimize older systems—one of them being good battery maintenance. "If you have maintained your batteries correctly, you can pick up 1% to 2% of power efficiency," he said, noting that if the batteries are weak, or if they have been poorly maintained, they are constantly draining power off of the UPS to charge themselves, resulting in wasted power.

Correct voltage settings also boost efficiency. Musilli noted that there is often a margin of error between what the utility claims to be supplying and how many volts are actually coming in. Therefore, if the system is set up for 480V, and only 460V is arriving at the facility, the heat generated from the conversion is another source of waste.

Over the past several years, boosting power efficiency has become easier for new facilities, as UPS manufacturers are incorporating better components. "Manufacturers have improved the technology that's inside the UPS box to make it more efficient and have improved its electrical characteristics with respect to how much harmonic distortion is put on the line," said Rob Bunger, director of business development, North America, Enterprise and Systems at APC by Schneider Electric.

Another way that manufacturers are addressing energy efficiency is by applying different topologies—how the power is actually converted within the UPS. The most common topology in U.S.-based data centers is double conversion: The incoming AC power is converted to DC, and then transferred back into a clean AC output. Several years ago, this resulted in a maximum of approximately 91% efficiency; today, there are double conversion UPSs that boast efficiencies of 96%.

One of the issues with double conversion UPS units is that they become less efficient as the demand on them decreases. For example, if the UPS is designed to support 800kW of power and only 100kW is being drawn from it, it's only operating at a fraction of its optimum efficiency. This is where modular UPS systems come in: By first installing a UPS of, say, 125kW, facilities can start out with systems that run closer to their peak efficiencies, "right-sizing" their loads to their actual needs.

"Now you're matching your load and you're staying in the upper ranges of the UPS's capacity," said Robert McFarlane, principal of Shen Milsom & Wilke, a consulting firm based in New York City.

Bunger explained that modular UPS systems enable data center managers to configure facilities with the future in mind—but without having to fully predict it. With one system, for example, users can set up their bypass panel to eventually support up to four units, starting with one and adding UPS modules as the load increases. "This way, you are able to operate at a better place on your UPS efficiency curve, and if you don't end up growing, you didn't waste money buying equipment that you didn't need," he said.

One way to better gauge usage is through power-monitoring technologies, which enable data center managers to "right-size" their systems more accurately. McFarlane encourages electrical distributors to inform contractors about the benefits of incorporating digital kW meters—which can be attached to the panel of the main feed—into their designs. "These are not particularly expensive, and they can allow people to monitor how much power they're really using, instead of relying on the power company," he said. ■

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