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WITH ROBERT GROSSMAN

Do Not Underestimate the Power of the UPS

Once considered a pricey luxury used to protect only the most sophisticated computer systems, the uninterruptible power source (UPS) has achieved the status of workhorse guardian.

Now more affordable than ever, UPS units have become an essential piece of equipment in myriad settings, from large data centers to home entertainment systems. But nowhere is a UPS application more essential than for security. In a day and age when most products incorporate microprocessors and, therefore, require boot-up time, UPS units have become even more critical. Consider a half-second loss of power to a system could easily result in a reset time of several minutes or longer — an unacceptable episode for equipment that requires 100-percent uptime, such as surveillance cameras and access control systems.

While UPS systems are designed and specified differently depending on the manufacturer, there are some commonly accepted guidelines that, for the most part, apply to all. I'll do my best to address the most common questions here in a question-and-answer format.

Q. What equipment should use a UPS?

A. In the event of a power sag or outage, a UPS functions to reduce the chance of equipment damage or time delay for rebooting. Any equipment that fits into this category clearly needs to be protected.

A secondary category is equipment that requires 100-percent uptime, such as surveillance cameras, access control systems and other electrical devices that cannot be manually operated during an extended power failure.

The third equipment category often receives less consideration, but can be no less vital: ensure that you have a UPS on accessory devices that will be needed during a power outage. These include rack service lights, keyboard-video-mouse (KVM) switches, cordless telephones and similar devices.

Q. How are UPS sizes determined?

A. A UPS system is sized by two determining factors: runtime and load rating. The latter figure often receives the most attention because it represents the amount of power the UPS is designed to supply. A good rule



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of thumb here: the UPS should provide an amount 25-percent greater than the cumulative power requirements of the attached equipment.

The significance of the runtime figure must not be misjudged. This rating determines how many minutes the UPS will continue to provide power at full load to the connected equipment. If an 800 volt-amps (VA) UPS has a runtime of 15 minutes, and a longer runtime is required, operate it at half load to almost double the runtime.

Q. How much runtime is required?

A. Most power brownouts last a few seconds or less, so a UPS with limited runtime is perfectly suitable for applications in similar periods of reduced voltage. However, the runtime on a UPS should be specified either to exceed the worst-case downtime or to allow the orderly shutdown of attached equipment.

If your facility has a generator, the UPS need only bridge the gap between the loss of utility power and the availability of generator power. In event of power loss, modern generators are able to come online in a matter of a few seconds. Older equipment can take up to 10 minutes or longer to kick in if the generator isn't well maintained.

To be most prudent, figure 20 minutes of runtime at a minimum — no matter how modern the generator. Thirty minutes is good for older generators. And if the unit can't be brought online in half an hour, chances are your system will be shutting down. →



An uninterruptible power source (UPS) is deployed between a power supply and a device, such as computers, to protect equipment from the adverse effects of power outages, sags, surges and the like. A centralized UPS or standalone device, such as the APC 3000 Series unit pictured above, is an essential part of the foundation of every security system.

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Note that too much runtime isn't practical. It will increase the cost of the UPS system exponentially, add size and heat, and won't likely give you a tangible benefit. Why? Because most power drops are extremely short in duration. There will be more batteries to test and maintain, and the maintenance expense will be significantly higher than a UPS that has been sized correctly.

Q. My equipment says watts, but my UPS says VA. Are they the same?

A. No, and this is a major issue when deploying a UPS. To calculate the wattage (W) rating of a UPS, manufacturers multiply the VA rating with a "power factor" or the actual amount of power drawn by the equipment. So, a 1,000VA UPS specified with a factor of .8 will deliver 800W, while a similarly specified UPS with a power factor of

1 will deliver 1,000W, both at the rated runtime.

Since UPS factors can range from .66 to 1 (modern computers can be as high as 0.97), disregard the VA rating and focus on watts. If you can't find the wattage rating, contact the manufacturer or move on to another unit.

Q. Should I use a large UPS or individual units?

A. The old school of thinking, particularly for CCTV systems, was to buy one large UPS system for all of the equipment. This was easy to do since the power requirements of the system were fairly predictable and not likely to grow exponentially. Access control computers worked with small, standalone UPS units and field devices could be hooked to a central UPS or smaller local units.

Digital recording has caused system designers to rethink UPS sizing.

Systems are often designed with expansion capability in mind, but sizing the UPS for the eventual growth of a CCTV system can be extremely costly and wasteful. Adding additional inputs or additional storage time can double or triple UPS requirements. And if the expansion isn't completed as planned, there is a lot of excess capacity that still requires maintenance and periodic battery replacement.

One answer is to use modular UPS units located in the bottom of the rack. When a rack is added, a new UPS can be sized to support the additional equipment. The rack room will still need to be sized for the expanded amount of utility (and generator) power, but the UPS is sized as needed and expanded on demand.

A second method is a hybrid solution. A large UPS is installed for an entire system, but it is sized for a very limited amount of expansion. Any



further system expansion would be handled with modular units as described above. In the event field devices are expanded, the rack room equipment can be taken off the UPS one rack at a time and backed up with standalone units to free up more power on the main UPS.

Q. What differentiates “cheap” from quality UPS units?

A. In the case of the UPS, there are three key differences between low- and high-end models.

The first difference is that UPS manufacturers, as in other industries, occasionally take liberties with their published specifications. A high-end UPS is far more likely to achieve its specified runtime under a full load than a low-end model. This is due in part because of the way UPS manufacturers are allowed to calculate power draw. Therefore, a cheaper UPS

may be comparable to a much less powerful high-quality unit, negating the price difference.

Second, a more expensive UPS is likely to have features that can be considered critical to a security application. For example, some UPS units perform self-diagnostics on their batteries. Users are alerted to a battery failure and have the capability to replace the batteries while the UPS is online and powered up. Users will know when the batteries fail in a low-end model when their equipment suddenly stops working during a power glitch.

The third difference lies in how closely the power output from the UPS resembles utility power. The best units generate true sine waves, while lower-end equipment generates square waves. Without getting technical, equipment that is dependent on power line frequency will not func-

tion as well when powered by a cheap UPS. Simply, if the equipment you are using is well made, it will filter and regulate incoming power sufficiently so that the accuracy of the UPS power output won't matter.

Q. What UPS features should I have?

A. Two critical features that often come standard on high-end UPS units are self-testing and field-replaceable batteries. These are essential for industrial and security applications and are baseline requirements. Do not consider a UPS without them. Select a configuration (rack mount or tower) that best suits your application, and look for a manufacturer that has been around for a while. UPS batteries are not standardized among manufacturers, and replacements will likely need to be purchased in the future. ■

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