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How Unique and Customizable UPSs Can Fulfill Your Niche Needs

Sponsored by: Marathon Power

Marathon Power provides custom and application-specific uninterruptable power supplies (UPSs), many of which fill a niche in the UPS market. Its off-the-shelf products are designed to fit unique needs but also serve as a jumping-off point for further customization, providing the client with a tailored product. Marathon Power follows UPS market trends closely to keep up with the latest technology and provides fast product delivery to keep clients' critical equipment up and running, minimizing possible downtime.

Sizing a UPS

A UPS goes unnoticed until it is needed. Power outages are unpredictable and are common during disasters; a UPS keeps equipment up and running during those trying times. In some cases, users simply need time to shut down equipment properly. In others, a UPS may be used to keep hardware running until a generator comes on, or even to keep equipment going for hours or days if necessary. The equipment's power draw determines the capacity (power rating) a UPS should have.

Power outages are unpredictable and are common during disasters; a UPS keeps equipment up and running during those trying times.

Key factors in sizing a UPS are the power capacity, the volt amp (VA) and the watt (W) rating. The energy storage type and capacity determines how long equipment will run after the power goes out.

Purchasing a UPS with a capacity larger than the calculated rating is generally better than purchasing a smaller one, provided space is available. This allows some headroom for the addition of future loads to the UPS. A typically stated volt amp or watt rating is for a relatively constant load, meaning it does not include the instantaneous power like startup or inrush current, which can be higher. Some equipment ratings may be in volt-amps rather than watts. In this case, some simple math can be used: watts can be found by multiplying volt amps by power factor (W = VA x PF). The power factor must either be given, or in many cases can be estimated based on the type of equipment and the watt rating provided.

Power Conversion

UPSs with the same energy storage and volt amp rating vary in how they back up equipment. Since a UPS stores its energy as direct current (DC) power but provides it as alternating current (AC), the efficiency of the DC-to-AC conversion is important to consider. There are three output options when converting DC to AC power: square wave, simulated sine wave and a true sine wave.

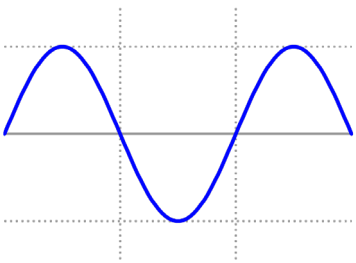

Figure 1: A stepped square wave is better than a simple square wave because it has similar attributes to a true sine wave, but a true sine wave is the best. Source: Marathon Power

Mains AC power and AC power from a generator deliver a true sine wave, which is low-noise and compatible with most equipment. The conversion from DC to AC can be done in many ways, but the easiest and least expensive way is to create a square wave that alternates positive and negative, much like a sine wave. A square wave is a poor approximation of a sine wave. A simulated sine wave or stepped square wave creates a number of steps

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that better approximate a sine wave. It is also better than a simple square wave because it has similar attributes to a true sine wave. It is also easier and less expensive to create than a true sine wave and works with most IT equipment.

True sine wave UPSs are ideal because stepped square waves can create heat and other undesirable effects that may be detrimental for long-term use. Creating a pure sine wave is more complicated and comes with additional expenses, but is often necessary.

UPS Types

All UPSs contain basic elements, including energy storage, a charger, a DC-to-AC inverter and a transfer switch; most also contain basic surge protection circuitry. The interconnections between these and other circuitry impacts the level of protection and the efficiency of a UPS.

Offline UPSs are the most basic type. These detect when a power drop or outage is occurring and switch over to the energy storage until the power is restored. An offline UPS typically contains surge protection but in normal operation does little else to condition the power.

Line interactive adds another layer to the offline UPS. In the case of a brownout, in which power is not completely lost, a line interactive UPS will use a voltage regulation circuit (typically a transformer) to step power up or down to correct for low voltage instead of switching to a battery backup. This avoids having to use up the power storage of the UPS unless it is absolutely necessary.

Double conversion or **online UPSs** take things a step further than line interactive types. In this setup, power is constantly passed through the system even when normal power is present. This has the added benefit of cleaning up any power issues as well as stepping up and down any voltage issues. The device being protected by the UPS will always receive clean power no matter what happens on the input side.

Important UPS Specifications

Transfer time — the amount of time it takes for a UPS to switch to backup power — is another important factor when specifying a UPS. If a UPS is too slow to switch between AC and backup mode, the connected equipment could momentarily shut off or drop out during an outage, causing damage, equipment malfunction or loss of data and material.

Energy storage is a key part of a UPS. The type of storage used has as significant an impact as how much energy is stored. The most common UPS storage method is a lead-acid battery. New battery technologies such as lithium, nickel cadmium (NiCad) and nickel metal hydride (NiMH) are sometimes used. The storage type will impact the UPS in a few important ways, including its physical size and weight, environmental friendliness and cost. Depending on the type of energy storage, some UPSs can deliver stored power very fast, while others are slower.

One often overlooked aspect of a UPS is communication. UPSs may seem like "dumb" devices — they are simply expected to switch on when the power goes out. However, newer UPSs have the ability to provide information and feedback, such as how much backup time is left or signaling a device with the time left until its energy storage runs out. UPS communication ranges from an RS232 serial port or a USB to a network connection that allows the device to be monitored remotely. The ability to monitor a UPS over a network means that remote users can quickly see the status of the UPS and track outages as well as backup times. It also means notifications can be sent out to alert operators when necessary. Other options such as dry contact (relay) outputs can also be used for industrial control and operation.

Figure 2: A supercapacitor UPS is perfect for short outages, such as a switchover to a generator or for brownouts. Source: Marathon Power

Supercapacitor UPS

Supercapacitors may be more appropriate as energy storage for some applications. Unlike batteries, capacitors do not store energy by a chemical reaction. Instead, they store energy as a buildup of charge between two closely spaced plates. Supercapacitors require no maintenance, provide high current and charge quickly. However, they have less energy storage capacity than batteries. A supercapacitor UPS is perfect for short outages such as bridge power during a switchover to a generator, or for brownouts and momentary power interruptions. They feature longer service lives, require no maintenance, are environmentally friendly and are highly reliable when compared to batteries.

According to research from the Electric Power Research Institute, the majority of outages last no more than a second, meaning there is seldom a true need for battery-backed UPS. In applications that typically experience interruptions from a few cycles to about a minute, supercapacitor UPSs are incredibly useful. They are also less wasteful for "green energy" applications, as opposed to disposable batteries.

Niche Markets

While a mass-produced UPS may be fine for general use, power-critical applications may require a more robust UPS solution. In hospitals and healthcare facilities, which are home to power-hungry equipment, even a momentary loss of power can threaten lives. Even with a generator, commonly found in hospitals, switchover time and generator failures can be problematic. Having backup power in medical equipment may save lives.

Industrial automation, which includes semi-conductor manufacturing, is growing every year, but it can't function without reliable power. In addition, safety systems and network equipment built into automation equipment is necessary for the equipment to run. Industrial automation equipment requires a UPS that can stand up to dirt or the physical abuse experienced in harsh environments. This is where a UPS from Marathon Power can shine.

Figure 3: A hardwired UPS designed to keep an automated manufacturing system running during a power problem can make sure that a process can continue uninterrupted, thereby avoiding lost time and material. Source: Marathon Power

Traffic monitoring equipment, from toll reading devices to traffic lights, is revolutionizing travel. When power is lost and traffic lights go out, driving becomes chaotic. Likewise, a tollbooth with no power loses both valuable traffic data and revenue. Traffic equipment experiences some of the worst environmental conditions, from sweltering sunny days to below-freezing temperatures to heavy rain or inches of snow. In these environments, a standard UPS just doesn't cut it, so it is important to have one designed for the application. The UPS must be up to the task so that traffic equipment keeps working to keep roads safe.

Test and measurement is another power-critical application. Many tests last days, weeks, months or even years. In the event of a power outage, a test that has been running for months becomes invalid and needs to be restarted, incurring a significant cost. In cases like these, a UPS designed to keep the equipment going could save time and money, yet they aren't always used.

Finally, security systems must always be ready, even when the power goes out. What good is having a security system if it is inoperable when needed the most? Looters are a common occurrence during disasters because powerless security systems are offline. A UPS designed to keep a security system on when the power is out can make sure that property stays secure.

Marathon Power Solutions — Standard and Custom

While UPSs have been in use for many years, the right UPS is much more than a commodity device: it is essential.

Marathon Power offers multiple product lines, including online and line interactive devices. Its UPSs are capable of true sine wave output, often with the built-in efficiency of line interactive technology. Marathon Power is especially proud to offer state-of-the-art, energy-efficient and maintenance-free supercapacitor UPSs.

In addition to offering off-the-shelf products, Marathon Power can customize any product to fit any need. UPS customization means that it can be matched to an application. For example, moisture-resistant and long-life components are used for ruggedized applications, as would be required for traffic monitoring devices. The firmware loaded on a UPS dictates what it does and how it operates, impacting switchover voltages, alerts and the interface. Customized firmware allows a UPS to precisely match an application. In addition, all Marathon Power products are made to ISO 9001 certified standards, making them a stable, total quality-oriented supplier capable of meeting the specific needs of its customers.

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ABOUT MARATHON POWER, INC.

Marathon Power Inc. offers uninterruptible power supplies with a focus on OEM and niche markets, such as medical/healthcare, automation and process control, test and measurement, traffic control and other applications that require a specialized product. In addition to a standard range of customizable models, the company offers unique products such as the battery-less Supercapacitor UPS as well as various Ruggedized units.