The Benefits of Modular UPS

- *What is a modular UPS*
- *The difference between modular and scalable*
- *The benefits of modular UPS*

EXECUTIVE SUMMARY:
Modular UPS systems are important for sites that need UPS systems that will meet current and future power needs. We will review some solutions that deliver this cost-efficient, flexible, and scalable solution.

Modular UPS Systems for Today and Tomorrow

The increasing popularity of modular UPS systems can be attributed to the changing power requirements in many industries that require the ability to increase power capacity quickly and easily. Their flexibility and redundancy also contribute to their appeal. Modular systems also reduce maintenance costs by allowing for easy modular replacement by facility staff. With an initial cost that is higher than traditional UPS systems, is a modular UPS the right choice for your facility?

What is the Difference Between Modularity and Scalability?

A UPS can be both modular and scalable and the terms can be confusing. If a UPS is **modular** you can add power to it by attaching another module. If it is **scalable** then the same unit can be given a capacity increase.

A modular UPS allows for the addition of modules that increase the power capacity and/or runtime of the UPS to meet changing power requirements. By adding additional modules, the UPS system can quickly and easily add capabilities as required and most are designed for easy installation of new modules. A modular UPS is designed to handle the additional capacity (load) and still operate efficiently which protects the health and lifespan of the UPS and saves money.

If the UPS is scalable, it has the ability to increase power or runtime with only having to incur the cost of the additional power or battery module(s), it's a flexible "pay as you grow" approach. Scalability can be used for either large capacity increases or when full equipment redundancy is required. UPS systems or modules, running in parallel for redundancy may be known as N+X. In this configuration, one or more UPS modules or units are installed in the same chassis or configuration but designed to provide redundancy. "N", in this case, is the power capacity required by the connected loads, and "X" is the number of modules added in addition to that capacity. This is normally used as a safeguard to ensure load availability if there is a power module failure.

Modular Solutions Are Available in Single or Three-Phase Configurations

Modular UPS are becoming more popular and are available in three-phase and single-phase configurations and both can give data centers the flexibility to expand as needed. Most leading manufacturers offer modular options that include features that make these systems ideal for the data centers of today.

Modular Single-Phase systems
Modular single-phase options are available in a power range of 4kVA - 20kVA N+1. These modular single-phase UPS are ideal for applications such as business-critical applications in server rooms and network closets, front and back-end retail installations, banking, call centers, 911 centers, any applications that require extended runtimes, remote or other mission critical applications.

The APC Smart-UPS Modular Ultra, single-phase UPS, by Schneider Electric, provides on-line power protection in ultra-high power density, with Li-ion batteries in a modular, internally redundant-capable architecture. It provides up to 2.5x more power density in half the size and weight of comparable UPS systems. These units are scalable with up to 20kW of power protection. Remote monitoring and management through EcoStruxure IT connection via the embedded network port.

Modular Three-Phase systems
Modular three-phase options offer power rating up to 1MW (2MW in parallel) and are ideal for applications such as data centers, colocation, hosting, Edge, commercial and industrial facilities, banking, financial and insurance, education, government, marine, oil & gas, transportation, minerals, metals, mining, healthcare, retail and wholesale, and UL924 emergency lighting.

The three-phase APC Symmetra PX UPS is a modular, redundant, scalable, power protection system designed to cost effectively provide high levels of availability. Made up of dedicated and redundant modules, power, intelligence, battery and bypass, all engineered into a design that is easily and efficiently serviceable, this architecture can scale power and runtime as demand grows or as higher levels of availability are required. It features self-diagnostic capabilities and standardized modules that mitigate the risk of human error resulting in increased overall data center reliability.

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The Benefits of Purchasing Modular UPS Systems

As the demand for computing power, higher efficiency and flexibility grows, a Modular UPS can be the ideal solution to meet those requirements. Built for today but able to grow for tomorrow, these UPS systems offer many benefits.

Mean Time To Repair (MTTR)

The shorter the Mean Time to Repair (MTTR) to the more quickly your facility can get back to business. Modular UPS offer the shortest MTTR options.

If a power module fails, it can easily be replaced with just a single power module. In a standard UPS with a single large power module, if the power module fails, the UPS is essentially useless and the whole unit must be replaced. The modular UPS is designed with several smaller, lower-capacity modules that are readily available, easy to handle and move, and can usually be replaced by internal staff.

Consider this example, if a single-module or standard 100kW UPS has a power module failure, you need to either replace the entire UPS, or the 100kW power module. In a modular UPS, the 100kW load capacity may be configured with 10 different 10kW power modules. If one of those 10kW power modules fails, there is still 90kW of available power capacity and the replacement of a single 10kW power module is easier and less expensive.

If the unit is configured for N+1, N+2, or more, it is even easier and has a shorter mean time to repair because the redundant power module will pick up the load immediately. The redundancy would be reduced or lost temporarily until the failed power module is replaced, but you still have full protection for the load which is vital for mission critical applications.

There is a price premium for modular UPS, but the added redundancy is worth the initial investment if your facility requires constant uptime. In addition, it is much more economical to replace a single failed 10kW power module in a 100kW UPS than replacing an entire 100kW UPS if the power module in a standard UPS fails which helps justify the higher initial cost.

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Plug and play capability

Most modular UPS systems offer easy installation, maintenance, replacement and positioning. With its smaller and lightweight form when compared to traditional UPS, a modular unit allows for easy installation and movement for all but the biggest units. Some maintenance can be performed without the need for bypass. Replacing one module in a system is easier than replacing a whole UPS unit and, for the most part, can be done without a service call or having to put a redundant system in bypass. The UPS batteries are also generally user-replaceable by a user that is trained to perform upgrades and replacements of the batteries.

Lithium-ion Battery options

Some modular UPS systems offer Lithium-ion battery options giving facilities these benefits.

- Lithium-ion technology can double or triple battery service life, reducing the risks of downtime or load interruption during maintenance or replacement. Lithium-Ion batteries also offer up to 10X the cycle life of VRLA batteries.
- Lithium-ion batteries provide multiple times the energy and power density compared to VRLA. As a result, UPS systems built with Li-ion batteries take up only about one-third the space of a VRLA-based solution that delivers the same power.
- Li-ion batteries can withstand a wider temperature range than VRLA batteries allowing their placement in more challenging environments.
- The smaller footprint and wider temp range of lithium-ion batteries can reduce the space needed in a battery room and increase the optimal operating temperature range, reducing cooling costs.
- Lithium-ion batteries offer at least a two-thirds reduction in weight providing more flexibility in terms of where they can be installed and avoiding costly building modifications.
- Li-ion batteries always come with sophisticated battery monitoring systems (BMS) that provide a clear picture of battery runtime and health.

Redundancy
More and more facilities are finding that there is no room for downtime. Ensuring uptime with a redundant UPS system is easy with modular UPS. By adding modules with free or open capacity, the level of redundancy is increased, reducing the chance for failure.

Add more power to the same infrastructure
Adding modules can help you to meet your increasing power needs as that demand increases. Just add as many modules as needed rather than replacing equipment.

Build a mission critical power solution specific to your needs
Modular UPS design allows you to add capacity or redundancy and increase runtime as your power needs change. But they also offer the ability to specialize the function of modules. Power-protection and cooling units can be manufactured in a variety of configurations to target the particular availability and cooling requirements of different parts of the data center. Having this flexibility adds to the overall efficiency of the system.

Higher level of efficiency with scalable load
Because a UPS running too low or too high of its capacity is not efficient, removing or adding modules when needed can ensure that UPS systems are running as efficiently as possible. When UPS systems run more efficiently their overall energy consumption is lower and the efficient operation places less stress on the battery and the unit itself, protecting the product lifespan.

Rapid adaptation to the business environment
With new equipment being added and IT equipment changing every 2 to 3 years, the contents of data centers are under constant revision. New equipment might have different sizes or shapes, different power or cooling requirements, different plugs, and so on. Modular UPS systems can easily be scaled up or reconfigured to meet these changing IT needs.

Summary

As data centers face increased pressures to add power quickly and less expensively, modular UPS will continue to provide a cost-effective and

flexible option. Their ease of installation, lower MTTR and easy replacement combined with their efficiency and redundancy will continue to earn their spot in the ever-shrinking data center budget.

Power Solutions can help you find the best modular UPS option for your data center. Contact us for assistance, 800-876-9373 or Engineering@power-solutions.com

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