

Latest modular UPS technology boosts data center efficiency and flexibility

With the intensifying demand for space, power and cost containment in their facilities, today's data center owners and operators have turned to modular designs to gain the flexibility and cost efficiencies they need. Modular infrastructure allows for rapid deployment of power equipment, lean construction, containerization, prefabrication of standard devices, easy retrofitting and the ability to expand only as needed.



Large centralized infrastructure often has resulted in overprovisioning for future growth, leading to wasted real estate and equipment. It has required maintenance staff to shut down systems while they locate faults in the centralized infrastructure that is critical to all the center's operations. These days, however, data centers are built in modular blocks that help isolate problems while keeping the data flowing. Modular infrastructure now has evolved to even higher levels of availability and efficiency with the latest technology for uninterruptible power supply (UPS) systems.

A new type of modular UPS eases maintenance

UPS capabilities are among the most critical for data centers; yet, they have been among the most vulnerable and troublesome when a failure occurs.

Traditional UPS systems are housed in large frames that are very complex to install and service. Since redundancy is required in most instances, data centers typically have two of these large, hundred-kilowatt frames, with a third cabinet to house all the cabling of the output isolation switches. If a failure were to occur in the primary UPS, the system would need to be taken down to repair it while switching to the backup UPS.

Likewise, expanding capacity with such a centralized system becomes difficult. Engineers must touch the entire infrastructure, upstream and downstream, a time-consuming and expensive process that in most cases requires the scheduling of downtime.

Consequently, modular UPS units have become popular as a way to limit interruption of operations for maintenance or replacement. Modular UPS recently has taken a big leap forward with the development of [decentralized parallel architecture \(DPA\)](#)

that eliminates single points of failure and downtime during maintenance while significantly easing installation. The most advanced designs of these DPA UPS modules—well-proven in Europe and Asia for the past two years, and now being introduced in North



Elina Hermunen,
Global head of marketing,
ABB UPS business

America—make protecting the power in modern data centers nearly as simple as pulling a suitcase from a shelf.

While one fault can bring down an entire centralized UPS system, DPA allows full operations to continue during UPS maintenance or in the unlikely instance when a module may fail. With an advanced system of this type, a typical configuration may include up to five 100 KW modules installed in a single frame. Each standardized module houses all the hardware and software required for it to operate independently of the other modules. These self-contained components include rectifier, inverter, battery converter, static bypass switch, back-feed protection, control logic, display, and Mimic diagram for monitoring and control.

Typically, a modular UPS system will contain at least one extra module for redundancy beyond the critical-load capacity needed. If any individual module fails or otherwise requires maintenance, it can be swapped out of the frame while the system remains online in double conversion without interfering with any operations and without transferring the load to bypass. The remaining modules continue to supply a full level of protection. Maintenance on the pulled module can be conducted offline and offsite while the spare module takes over its duties.

As the data center grows, operators can simply add more modules to provide the required power backup, with no need for over-specifying when the facility is initially enlarged. One way to set up DPA modules is to use multiple frames holding up to five 100 KW modules each. As many as six frames can easily be combined to furnish up to 3 MW of protection. This standard has been configured by ABB, which is one of the first suppliers to introduce modules that can scale to megawatt proportions.

Furthermore, with a footprint about

half the size of conventional UPS technology, a modular system can be particularly effective for data centers in crowded urban areas with little or no physical space for expansion.

“The modular UPS streamlines and simplifies installation, maximizing reliability and availability while minimizing total cost of ownership,” says Elina Hermunen, global head of marketing for ABB’s UPS business. “It makes the system easier to manage and also allows for different architectures inside one data center with various levels of security, as you may find with colocation centers.”

The future of UPS

What may be the next evolutionary steps for UPS capabilities? Hermunen forecasts that UPS modules will become increasingly important and flexible technology for use in conjunction with data center microgrids powered by renewable resources. Easily maintained UPS modules will filter the highly variable power quality these sources generate to provide a clean and steady sinus wave for data center power.

She also anticipates that, before long, increasingly smart UPS systems will be able to predict power supply issues. “Data centers are becoming more automated,” she observes, “so UPS has to integrate into monitoring and managing systems. In a few years we will be focusing not just on reliability and availability but also predictability. UPS devices will collect and analyze data to predict what is likely to happen.”

As for now, modularity is rapidly becoming the standard for UPS, largely because of its ability to dramatically slash the cost of one of the data center’s greatest financial burdens—maintenance and service. A variety of DC and AC concepts are likely to be tested, with placement of UPS devices at different stages of power distribution. “We’ll end up not with just one standard

model of how data centers will be built and protected,” Hermunen advises, “but the options will be narrowed to just a few, with decentralized parallel architecture currently among the hottest prospects for success.”

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