Power packed

Smart modular UPS designs

NICOLE NÄGELE – with its acquisition of the innovative uninterruptible power supply (UPS) company, Newave Energy, based in Switzerland, ABB is now able to offer a complete range of UPS products that suits all flexibility, availability and power needs. Newave is active in the medium- and high-power UPS range, which is the most attractive market segment since it represents a large and fast-growing part of the overall UPS market. Newave's products are the core of ABB's UPS offerings and are based on a robust design philosophy that ensures best performance.

Just over a decade ago, the last Strowger telephone exchange was taken out of service. These stalwarts of the telecom industry were first installed in the 1920s and many of them served for over 50 years. Such longevity expectations for a product being installed today is almost unheard-of. Technology is evolving at such a rate that even forecasting one decade ahead, let alone five, is next to impossible. And this has a direct effect on UPS design. Because UPSs are found in an astonishing variety of industrial, commercial, academic and medical settings, all of which are subject to rapid technological change, they have to be flexible enough to cope with power demands that change over time. Not only is the supported load likely to increase with equipment expansion, but overload conditions may also become more demanding as power quality varies, for whatever reason.

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Added to this is the increasing criticality of infrastructure in today's society. As has recently been seen, events such as a bank's IT system dropping out for a few days can have a financial impact that runs into the hundreds of millions of dollars. So, UPS protection must be available at all times – and this creates its own maintenance challenges.

Cost is also an issue. Few organizations will write a blank check for an open-ended power backup solution. Efficiency is demanded, not only for cost reasons, but to ensure that an environmentally friendly approach is taken; there is always pressure to be "green."

This drive for more efficiency, flexibility and availability has been key to the development and uptake of modular UPS solutions. The scalability of modular architecture can deliver major reductions in electricity consumption and CO_2 emissions, and help specifiers make flexible plans for power and space requirements for both immediate and changing future needs → 1.

Full product palette

Newave Energy, a leading manufacturer of uninterruptible power supply solutions,

Title picture
By acquiring Newave Energy, ABB has filled out its UPS product portfolio and can now deliver devices to suit almost any flexibility, availability and power need at a reasonable cost.

1 UPS scalability saves power, reduces emissions and simplifies the designer's job.

2 Modular UPS design brings many advantages.

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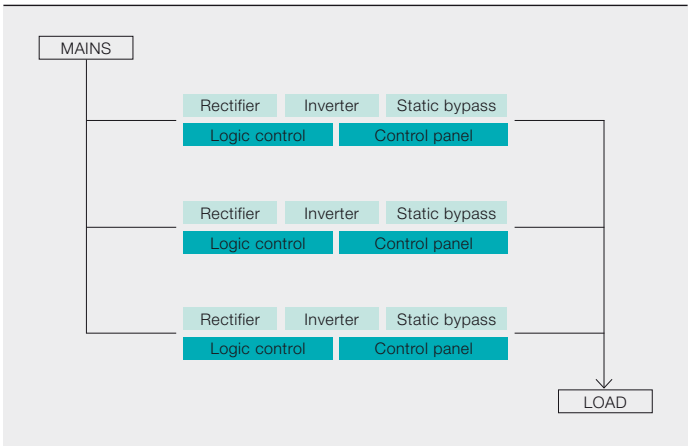
was acquired by ABB in March 2012, thus closing a product gap in core datacenter electrification and industrial power quality. Although ABB has a strong presence in industrial markets and already offers industrial UPS products, Newave is active in the medium- and high-power UPS range. This is the most attractive market segment since it represents 50 percent of the overall UPS market and has a yearly growth rate of 6 to 10 percent. This pioneering company introduced modular and transformer-less UPS technology in 2001. Today, these concepts form the foundation of the most important architectural trends in the UPS market. Although Newave has a comprehensive product portfolio containing both traditional free-standing and modular UPS, the majority of its sales are now of modular three-phase UPS. Today, close to 70 percent of its sales are of modular UPS systems. The UPS market is an exciting one and of huge size: $6 billion to $7 billion annually (the global market for UPS Systems is projected to reach $14 billion by 2017 [1]). Underlining the prospects for this market is the fact that more than half of electricity demand is accounted for by the information technology market. In the United States alone, about 8 percent of the electricity consumed can be attributed to the use of the Internet, ranking it higher than the steel and chemical industries [2]. Combining ABB's and Newave's market presence and technological expertise will allow ABB to offer a complete range of UPS solutions to industrial, commercial and datacenter clients.

Modular UPS

Systems based on a modular UPS topology currently represent the fastest-growing segment of the three-phase UPS market. Scalability, maintainability and availability are the key benefits offered by modular UPSs. Not all modular UPS systems are the same, though: The engineers at Newave have designed their modular, double-conversion three-phase UPS systems using decentralized parallel architecture (DPA), which eliminates single points of failure. Each UPS module contains its own independent control and static bypass switch, meaning each is a UPS in its own right → 2. Clever paralleling schemes allow the modules to work as one system but without interdependence → 3. In the unlikely event that one UPS module were to fail, the overall system will continue to operate normally but with one module fewer of capacity. As it is usual for UPS systems to be over rated, this offers very high reliability.

The Newave DPA concept provides each UPS module with its own independent static switch, rectifier, inverter, logic control, control panel and battery charger. Even the batteries can be configured separately for each module, if required,

3 Clever paralleling systems allow the modules to work as one system but without interdependence.



4 The main application for this kind of UPS technology are data centers.

which makes the parallel system fully and truly redundant. With all of the critical components duplicated and distributed between individual units, potential single points of failure are eliminated. System uptime is further maximized by the true safe-swap modularity of the modules.

Availability

Mean time between failures (MTBF) and mean time to repair (MTTR) are common parameters in the UPS industry and both impact system availability. Modular UPS designs maximize the system's MTBF. Quick and simple repair by swapping modules, which can often be held as spares on site or at a close by service center, minimizes the system's MTTR. Not only does this improve availability but it also reduces cost as service engineers spend less time on site and any risks of data or production loss are minimized. Inventory levels of specialist spare parts is reduced and the need for highly skilled on-site technicians is eliminated. Thanks to the compact design and low weight of the modules, inserting additional modules or replacing existing ones during operation is easy and can often be performed by a single technician.

Modular and transformer-less UPS technology concepts form the foundation of the most important architectural trends in the UPS market.

Efficiency

Electrical efficiency is especially important in UPS applications as the direct waste energy is not only expensive and environmentally unfriendly but, because many UPS systems operate in air-conditioned environments, extra energy and capital expenditure have to be employed to remove excess heat. The modular UPS products available from ABB offer best-in-class energy efficiency. The Newave modular products can operate in voltage-regulating, double-conversion mode where all power is converted from AC to DC and then back to AC. Alternatively, they can be set to an economoy mode (eco mode >99 %) where the load is supplied very efficiently through the static switch and inverter operation is invoked only if the input supply goes out of tolerance.

Cost

Although the initial capital cost of a true modular system is typically slightly higher than that of a legacy UPS design, the picture changes when total cost of ownership (TCO) is taken into account. Improved energy efficiency, as well as other savings, means that the modular system's extra cost will often be recovered within its first year of operation. Floor space is always at a premium and can also be expensive, so the compact design of ABB's UPS products is another economic benefit when compared to legacy UPS designs.

Trying to cater for future power requirements with traditional stand-alone UPS systems can lead to over-specification, creating a wasteful gap between installed capacity and the size of the actual critical load, and making inefficient use of costly floor space. However, rack-mounted configurations can be right-sized by inserting or removing "safe-swappable" modules, enabling power to be added as requirements grow without any footprint penalty. This safe-swap technology, along with significant reductions in repair time, can also achieve the so-called six nines availability (99.9999 percent) – highly desirable for data centers in pursuit of zero downtime.

ABB is now in the fortunate position of having a comprehensive range of power protection products to guard all types of loads from sags, surges and outages.

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