



Power Innovations
INTERNATIONAL, INC.



Application Note 5102

UPS DC Conversion Process Critical for Battery Reliability Flexibility and Longevity

The Challenge

Online uninterruptible power supply (UPS) systems convert AC power into DC power as part of a dual stage isolation and conversion process. In order to implement this conversion process, manufacturers use a variety of techniques and circuits.

One common conversion practice among manufacturers is to utilize the batteries as storage and filter networks to stabilize the DC bus. Although this is a simple and inexpensive process, within a short period of time it destroys the batteries. This process also limits the ability to change batteries while a UPS system is running, and ultimately eliminates any possibility of running the system without batteries.

Because large UPS systems utilize expensive battery banks, replacing batteries is costly and inconvenient. When power loss cannot be tolerated and batteries are compromised or fail prematurely, the value of the UPS system is ultimately lost.

What to Ask

When selecting an online UPS system, it is important to ask whether the system can operate continuously without connecting batteries. In order for a UPS system to function without batteries, it must generate a clean and stable DC bus, sufficient to supply the inverter at full load.

DC rectifiers and regulators must be efficient in the conversion process of AC voltage to DC voltage. Simple, inefficient rectifiers are easy and inexpensive to build; however, they cause increases in operating costs and decreases in system reliability.

Some countries require power factor correction on device inputs to help eliminate the repercussions of poor power conversion. In order to maximize the conversion process, efficient systems must track the AC voltage and current waveforms, and use the product of both to convert and switch rapidly.

The Solution

The Q-LS™ Series of Uninterruptible Power Quality™ (UPQ™) systems use 6-pulse and 12-pulse, fully-controlled rectifiers. A phase shift transformer is added to reduce harmonic current to around 15% and to improve the power factor to over 0.8%. This topology makes the Q-LS Series both reliable and efficient.

The control circuit regulates the DC bus within 1%. The rectifier is designed to operate under a wide range of AC inputs (from 177 to 300 VAC) to accommodate varying power conditions. Special electronics are used to protect against extra under-voltage and over-voltage conditions, to improve reliability, and to shutdown the rectifier in case of emergency.

Q-LS™ Series Conversion Process

CHALLENGE

The UPS power conversion process utilizes and eventually destroys batteries, adding additional costs and inconvenience.

SOLUTION

The Q-LS™ Series uses 6-pulse and 12-pulse, fully controlled rectifiers, which reduce harmonic current and improve the power factor.

The Q-LS Series is designed for ease of maintenance and service. All serviceable parts and components are located on slide trays and rails for quick accessibility and maintenance.

Additional Benefits

In addition to providing power quality, Power Innovations also enables remote monitoring and control of critical operations. With the UPQnet-agent II™ – via a network, an IP address, or a dial-up connection – a comprehensive, easy to understand, and secure Web page provides the vital information necessary to manage the Q-LS Series.

Power: The Critical Need

In the corporate world, as well as in the consumer community, predictable, pure electric power is a necessity. Current utility power is not reliable. Without clean, consistent power, today's technologies cannot function properly, and operations and service are compromised or cease.

Fluctuations in power supply—spikes, dips, brownouts, noise, and frequency variations—can all lead to a crippling loss of data resources. The effects of these problems range from erratic operation to hardware damage to irreversible losses of mission-critical data and operations.

Competing Technology

In the past the number one issue in dealing with power was the backup of equipment in the event of power failure. The basis of typical UPS machines and generators on the market today is still backup power; however, electrical equipment requires a new level of power generation and management tools that extend and enhance this most critical resource.

Power Innovations' Uninterruptible Power Quality (UPQ) systems address today's number one power issue—power quality. While Q-LS Series systems efficiently handle power backup, they are also designed to accept the power that is available, regardless of quality, and then isolate, filter, and regulate that power to provide pure, clean, reliable power to connected equipment.

Power Innovations

Launched in 1997, Power Innovations has pioneered a revolutionary set of solutions to generate, store, and manage AC power. Power Innovations' mission is to provide and manage continuous high-quality power in conjunction with, or even independent of, utility services worldwide. Power Innovations is helping forward-thinking companies accomplish this goal through a new class of technology called Uninterruptible Power Quality (UPQ).

Today, Power Innovations' UPQ systems, coupled with its UPQnet-agent II IP management tools, assist organizations of every size in addressing the key issues surrounding power management. On its own, this is an area of tremendous need and opportunity that has Power Innovations poised for long-term success.

Power management is just one arm of Power Innovations' long-term strategy. The company is involved in the development of a spectrum of solutions for power storage. Ultimately, Power Innovations will premier revolutionary solutions for the generation of new power. Together, these three areas are the foundation of Power Innovations' long-term strategy.

Powering Life

Powering Miracles
Powering Peace of Mind
Powering Life's Connections
Powering the Human Spirit
Powering Freedom
Powering Innovation



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