



HiPerGuard

Inside Data Centers: The Medium Voltage
Uninterruptible Power Supply designed to
protect critical facilities

HiPerGuard

Medium Voltage Uninterruptible Power Supply

A large data center needs a power protection scheme that can supply a sizeable amount of power in a very reliable and efficient way. A power protection and distribution approach at the medium-voltage (MV) level provides the perfect solution.

Continuous growth of the data center industry, particularly in the hyperscale space, is resulting in a dramatic increase in data center facility power needs.

This trend is driving new strategies to fulfill customer ideals pertaining to higher efficiency, higher availability and minimal maintenance in parallel with the need to reduce capital investments.

The output voltage is regulated no matter what input supply disturbances are present.

With all things considered, the natural next step for power protection for large critical power facilities is an MV-based system.

ABB's HiPerGuard MV uninterruptible power supply (UPS) – based on impedance (Z) isolated static converter (ZISC) architecture – is the most recent addition to ABB's Power Protection product portfolio and represents the next generation of MV UPS intended for multi-MW power protection.

The UPS's high-performance inverters – designed using ABB proprietary power electronics technology – combine with the ZISC architecture to ensure that the output voltage is regulated no matter what input supply disturbances are present. The HiPerGuard MV UPS provides continuously regulated, filtered power.

To maximize scalability and optimize total cost of ownership, the HiPerGuard MV UPS system is built using UPS blocks, each with a rated power of

2,250 kVA. Up to 10 of these blocks can be paralleled in a so-called hard-parallel configuration to give 22.5 MVA. The hard-parallel configuration allows fast deployment of additional units, increasing the overall system capacity without additional complexity.

ABB's HiPerGuard MV UPS was designed to meet the typical requirements of a large data center:

Maximum availability

The HiPerGuard MV UPS offers a high uptime that is driven by a robust MV design approach that delivers high power levels from single blocks, a lower switchgear count and a modular design that allows the loss of up to two converters without automatic transfer to bypass mode.

Other internal redundancies for fans and switched-mode power supplies further increase system availability.

For large parallel, if the system designer includes a redundant unit in the system, unit maintenance is possible while keeping the system online and the load fully protected, thus yet further increasing system availability.

The HiPerGuard MV UPS's flexibility allows it to accommodate several common data center architectures.



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High performance

The HiPerGuard MV UPS delivers a clean output voltage in accordance with IEC62040-3 class 1 and can also supply high fault currents for downstream protection and fault clearing of up to five times nominal current.

Efficiency

ABB's HiPerGuard MV UPS has a class-leading efficiency of 98 percent for the load spectrum from 50 percent up to full rated load and better than 96 percent for 25 to 50 percent load. Low no-load losses and modular design ensure a near-flat efficiency curve, allowing maximum foreseen capacity to be installed on day one, whilst minimizing energy wastage if the initial loading is low.

Operating cost-effectiveness

Because the power protection is at the MV level, facility build and operation costs are reduced as currents and electrical losses are lower at this higher voltage and cables can be thinner.

An MV UPS can be placed on less expensive real estate – for example, in an electrical room or substation – distant from the loads. Furthermore, because MV requires less infrastructure, reliability is inherently improved.

Flexibility and scalability in large power applications

The HiPerGuard MV UPS's flexibility allows it to accommodate several common data center architectures, such as “distributed redundant,” or “shared redundant” or “catcher.” These are in

addition to the hard-parallel configuration mentioned above. Utilizing groups of 22.5 MVA configurations in hard-parallel mode gives a new perspective on using known architectures – and on a significantly higher power level as large backup systems such as diesel or gas generators are supported by the architecture. The hard parallel system allows fast deployment of additional units, increasing the overall system capacity without additional complexity.

Indoor and outdoor HiPerGuard MV solutions are possible as are versatile energy storage options with autonomies that range from a few seconds up to several minutes.

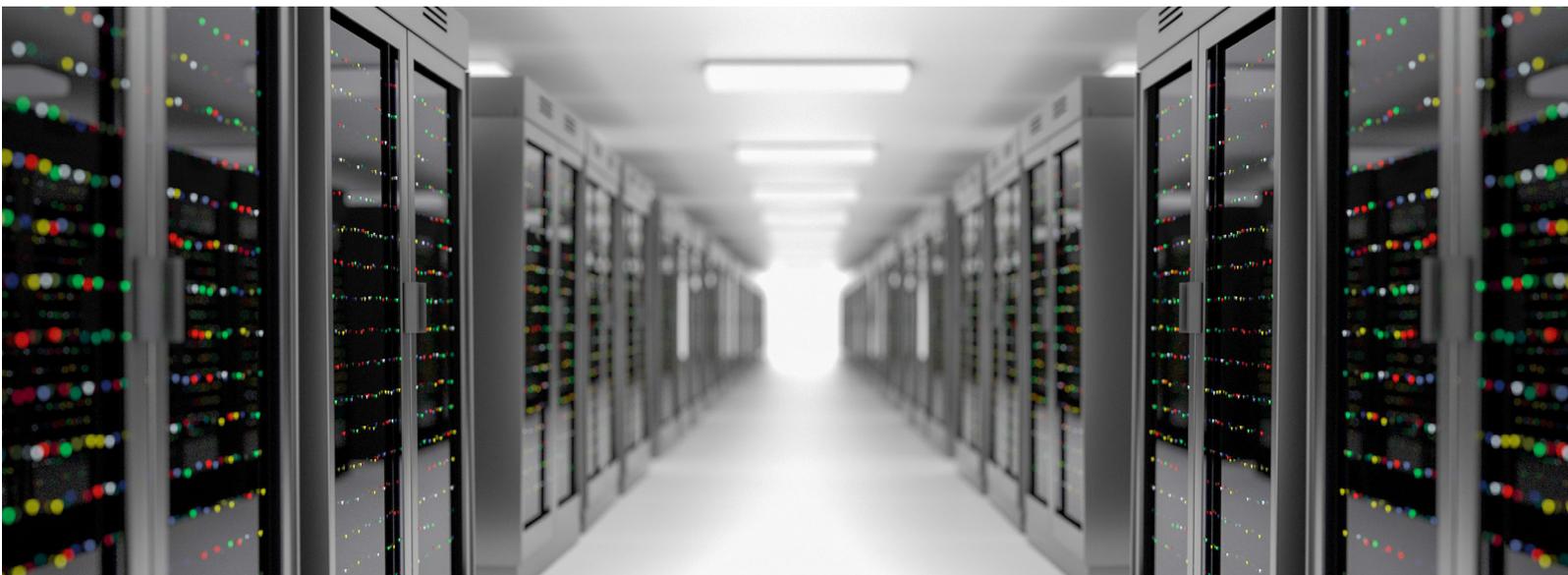
Grid support functions

With the rise of renewable energy generation comes a potential for UPS equipment to provide grid support functions in addition to their primary task of load protection.

Large data centers have a significant stranded power generation capacity due to their redundant design and battery systems. This infrastructure can generate an income stream through grid support services such as demand management and frequency regulation, as well as increase engagement in corporate social responsibility by helping out local community power schemes.

In addition to its core purpose as a load protection system, the ABB HiPerGuard MV UPS ZISC topology is also ideal for injecting real power into – or absorbing it from – the electrical network on request from an external power plant controller

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01. Operating at MV levels allows the HiPerGuard to supply power protection to large data centers – at lower overall cost.



03. Power support for the grid.

03a. Power flow in normal mode of operation.

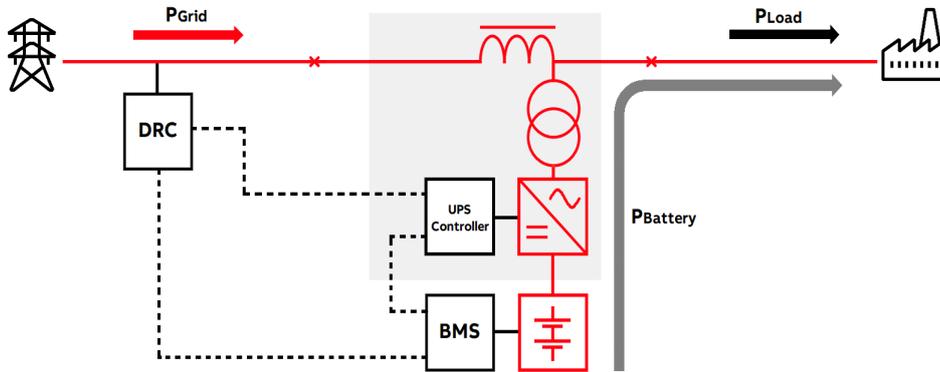
03b. Power flow with grid support functionality.

when network stability is threatened.

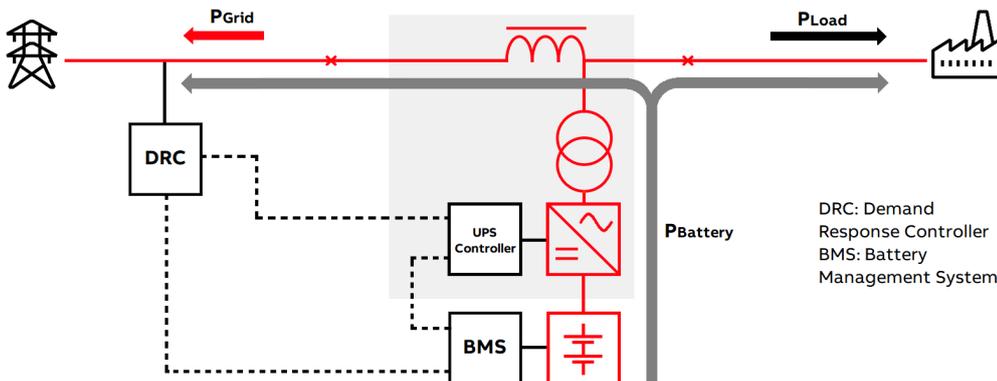
The HiPerGuard MV UPS is the ideal solution for data centers that need power protection in the multi-MW range.

On request, the HiPerGuard MV UPS will step in to supply power to the site critical load, thus reducing the drain on the grid, allowing it to recover. If the power relief requested would leave the critical load short, the UPS will support the full load and inject just any excess capacity into the grid – ie, the maximum available power to be injected into the grid is the HiPerGuard MV UPS system rating minus the required load power.

The HiPerGuard’s modular approach allows unparalleled serviceability and redundancy while maximizing uptime. The HiPerGuard MV UPS is the ideal solution for large data centers that need power protection in the multi-MW range and the UPS covers every aspect the data center needs over the 15 years’ lifetime of the product with minimized maintenance and maximized efficiency, leading to an optimal total cost of ownership.



03a



DRC: Demand Response Controller
BMS: Battery Management System

03b



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