
TECHNICAL SPECIFICATION

HiPerGuard

Medium Voltage UPS - 6.6 kV up to 24 kV



HiPerGuard

HiPerGuard is the next generation of medium voltage UPS intended for multi megawatt power protection.

Based on the impedance isolated static converter (ZISC) architecture, the HiPerGuard MV UPS introduces a flexible solution with high reliability and high efficiency for critical power installations.

The HiPerGuard is the most recent addition to ABB's Power Protection product portfolio, creating a complete power protection solution.

Medium voltage

The transition from low voltage (LV) to medium voltage (MV) level is a natural progression of power protection for large critical power installations. The approach offers two main benefits. It increases reliability and reduces costs of the critical power facility build and operation.

Increased reliability is derived from the MV design approach with larger protected load blocks, lower switchgear count and the operating culture of medium voltage systems.

Installing the power protection at the MV level provides the most energy efficient configuration as the lower currents at this voltage result in smaller cables and lower losses.

Complete power protection

Reliable and clean power with optimized operating cost



High Efficiency

- Leading efficiency UPS - 98% at 50% to 100% loading.
- Substantial energy savings during the product lifespan when compared to rotary systems.

Performance

- Performance in line with IEC62040-3 Class 1.
- High fault clearing capability.
- Higher availability due to modular design.

Flexibility

- Scalable power from 2.5MW up to 25MW in parallel allows load growth with less stranded capacity, minimizing CAPEX.

Sustainability

- CO₂ emissions reduced thanks to the high efficiency .

Connectivity and monitoring

- Remote monitoring and diagnostics.
- ABB Ability™ to increase productivity and safety at lower costs.

Serviceability

- Plug and play power converters.
- Power converters and energy storage at low voltage.
- MTTR typically less than fifteen minutes.
- Comprehensive service log.
- Up to ten years between intrusive maintenance activities.

PowerExchanger

- System energy storage reserve available for grid support services or peak shaving.

ZISC Architecture

Impedance (Z) Isolated Static Converter

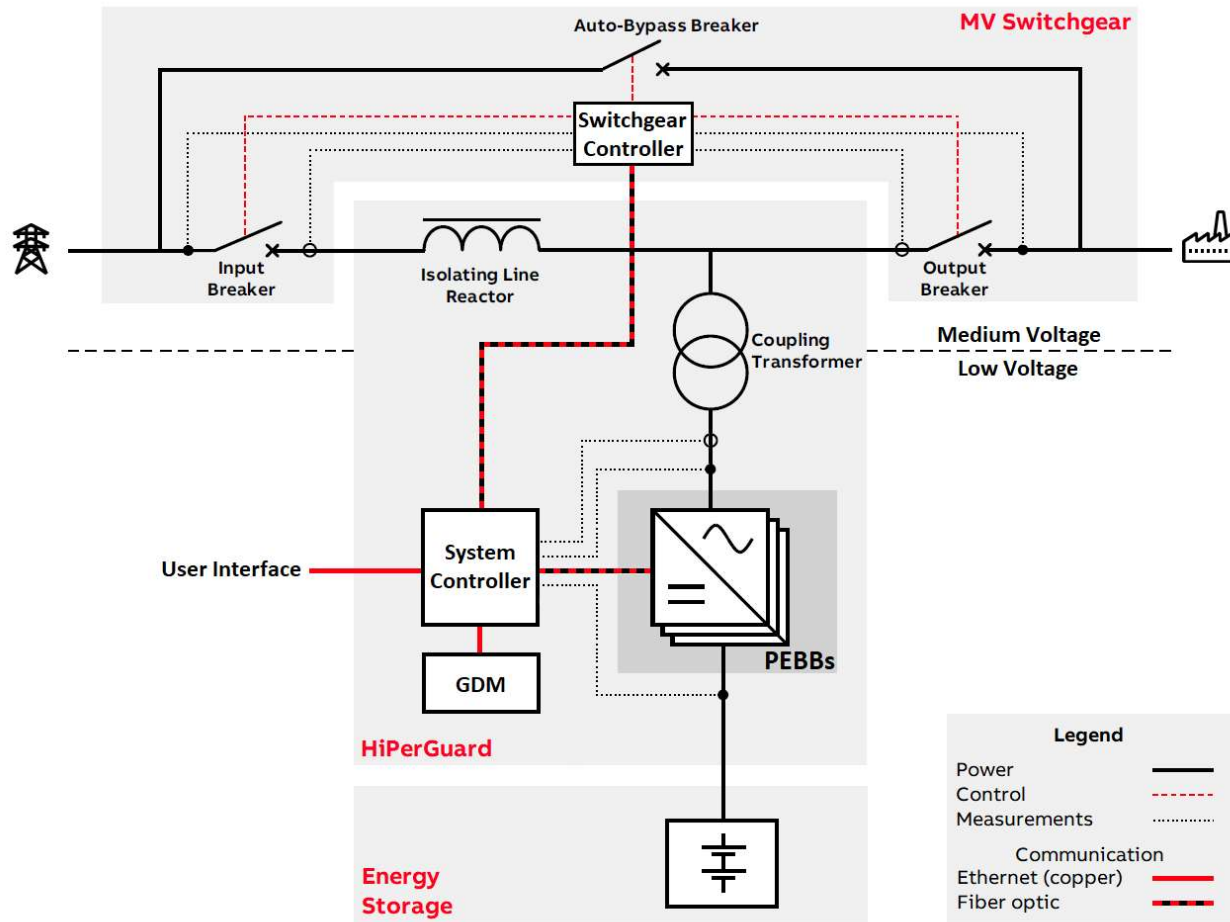


Figure 1: Diagram of HiPerGuard MV UPS based on the ZISC architecture

ZISC is a high performance, high-efficiency power conditioning and uninterruptible power supply architecture. It provides protection from a full spectrum of utility voltage events and supplies continuous clean power to the protected load.

ZISC architecture is based on an isolating line reactor coupled with the high-performance ABB

power converters. This simple approach, backed up with advanced control, provides unmatched availability and performance, with class-leading efficiency.

Combined with a modern energy storage, ABB's ZISC provides autonomies from seconds to many minutes.

*** Note:** MV switchgear and energy storage are not included. Please contact ABB for more information about the complete solution.

System configuration and communication

Hard Parallel and/or Redundant configuration

Multiple units can be connected in a parallel configuration to increase the capacity of a system. Paralleling of the HiPerGuard MV UPS can have several advantages including high fault clearing capability downstream, centralized facility protection at MV level, elimination of stranded capacity, and simplicity of design eliminating complicated distribution architectures.

By using up to 9 units in parallel, the HiPerGuard MV UPS can achieve 20MVA complete power protection with N+1 redundancy. With communication between each unit, the configuration does not require an overriding a master controller.

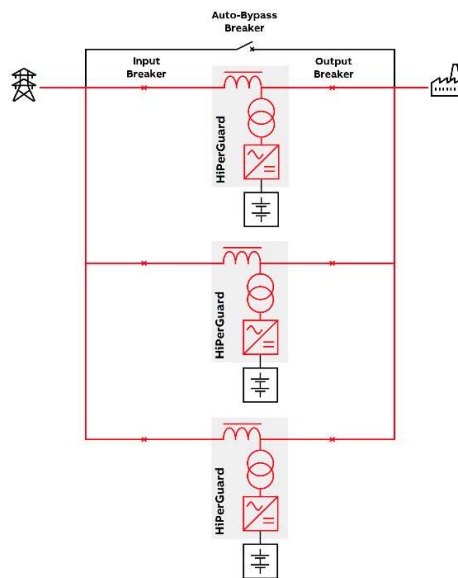


Figure 2: Hard parallel configuration

PowerExchanger

The HiPerGuard MV UPS can interface with an external Demand Response Controller or Energy Management System via Modbus TCP™ to provide grid support services. The energy storage connected to the HiPerGuard can be used to provide peak shaving or support on renewable energy source integration.

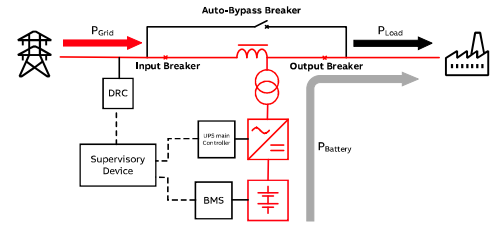


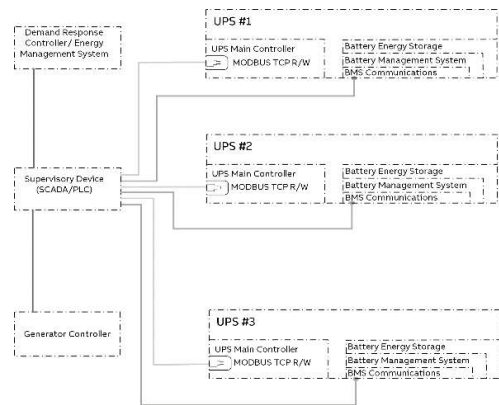
Figure 3: Peak shaving

External communications

Supervisory Device

- Modbus TCP™

Remote monitoring/control/service



Internal system communications

MV Switchgear

- Fiber optic remote I/O

MV UPS system

Hard Parallel system (UPS to UPS)

- Ethernet

Operating principle

The HiPerGuard MV UPS protects the load by supplying continuously regulated voltage, irrespective of utility conditions. The high-performance power electronic inverters ensure that the output voltage is regulated for combinations of input supply voltage disturbances.

The resulting performance is continuous clean power in accordance with IEC62040-3 VI SS 111, while having efficiency > 98% for the load spectrum from 50% up to rated full load and the ability to supply high fault currents for downstream protection.

The medium voltage switchgear forms a bypass arrangement, with the input breaker also having an active role in the normal operation, in the presence of deep sags.

The HiPerGuard MV UPS continuously regulates the voltage to the load. An input power factor of close to unity is maintained under normal supply voltage conditions, regardless of the load power factor.

For deep sags and outages, the input breaker will open while the HiPerGuard MV UPS maintains the supply of the load.

Power Conditioning Mode

During Power Conditioning Mode, the power converters can control the real and reactive power from the utility to the load, without cycling the energy storage. At the same time, the HiPerGuard MV UPS is continuously conditioning and filtering any utility disturbances like voltage imbalances, as well as providing reactive current support to the critical loads.

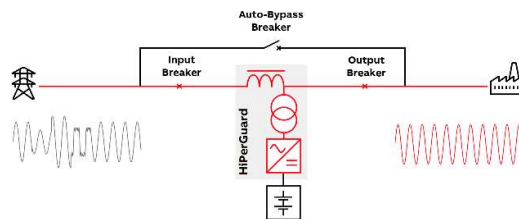


Figure 5: HiPerGuard MV UPS Power Conditioning Mode

Independent Mode

If the utility power is no longer available, the HiPerGuard MV UPS will instantly provide all active and reactive power required by the load. Without commuting any static transfer switch or similar device, HiPerGuard seamlessly transfers the load to the energy storage, operating now in Independent Mode. At the same time, to avoid undesired grid back feed, HiPerGuard will command the Input Breaker to open. The energy storage allows ride-through time for either the utility power to be restored or for the time necessary for an alternative energy source to be activated, such as a standby generator, for example.

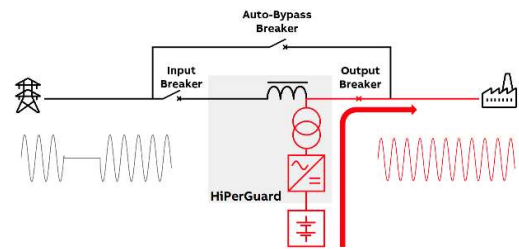


Figure 6: HiPerGuard MV UPS Independent Mode

Efficiency

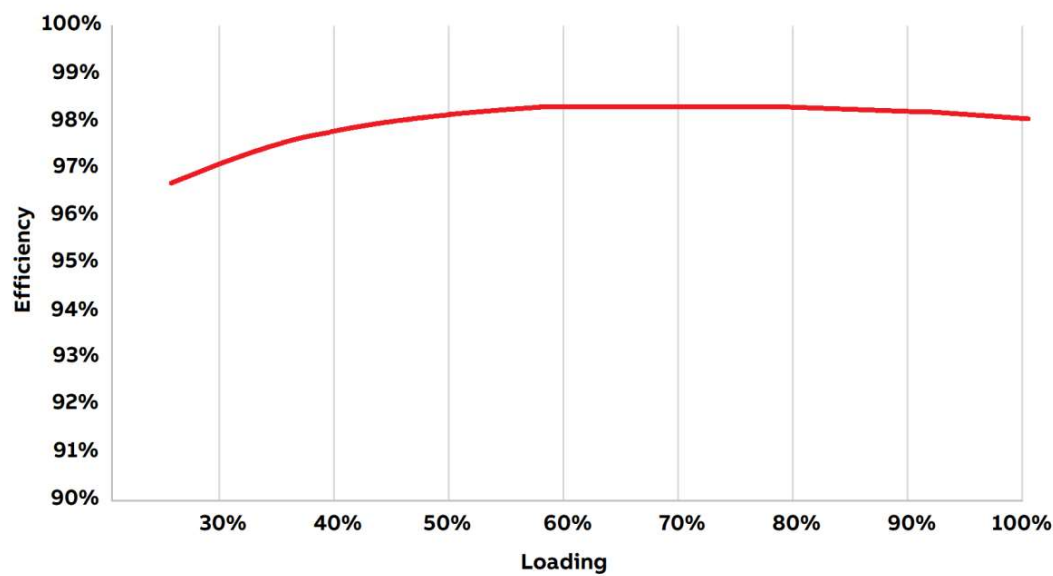


Figure 7: HiPerGuard MV UPS efficiency graph

HiPerGuard MV UPS Loading	25%	50%	75%	100%	
HiPerGuard MV UPS Efficiency	96%	98%	98%	98%	Under nominal conditions

Technical data

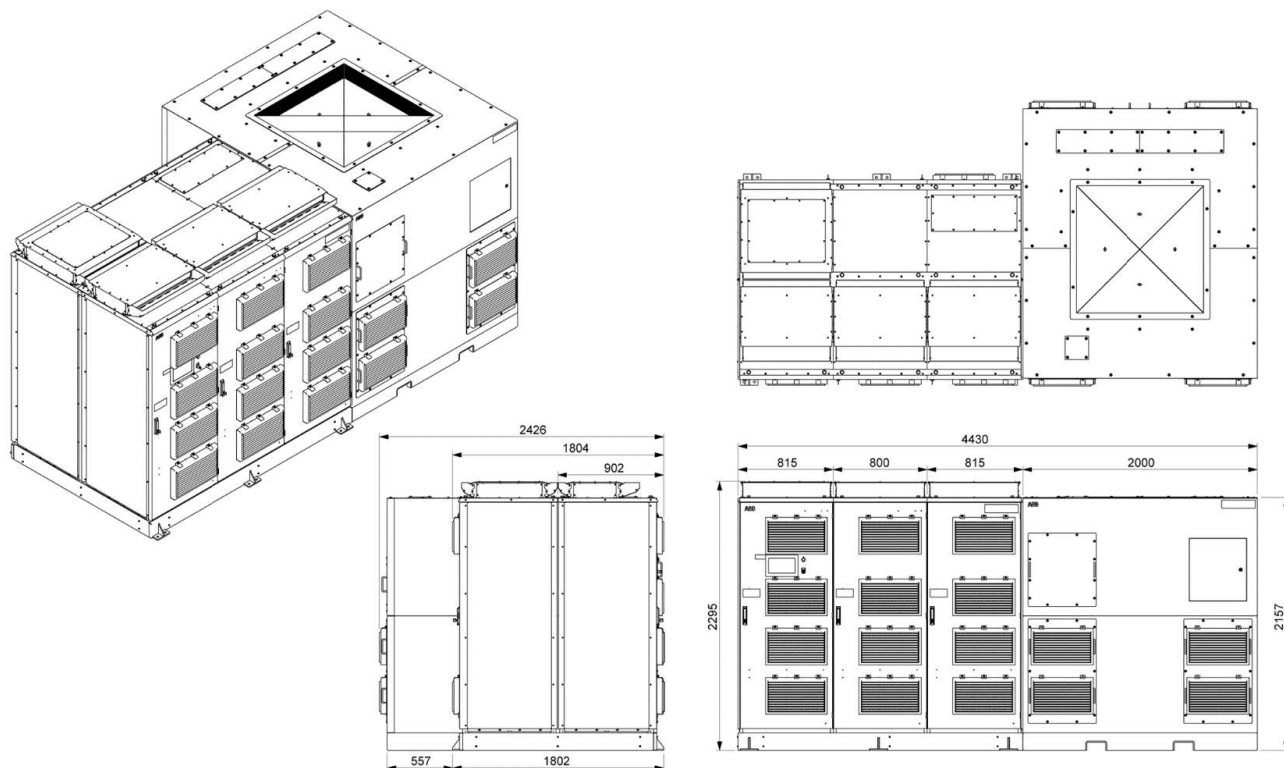
Product Class	7.2 kV IEC	12 kV IEC	15 kV ANSI	24 kV IEC
General				
Rated Voltage ¹	6-6.6 kV	10 – 11 kV	12.47 – 13.8 kV	20 – 22 kV
Rated apparent power		2500 kVA		Single unit
Rated active power		2500 kW		Load power factor 1.0
Hard parallel configuration		Up to 10 units		
Performance				
Efficiency		98% for 50% to 100% loading 96% for 25% to 50% loading		Under nominal conditions
Dynamic output performance		In line with IEC62040-3 VI SS 111		
Architecture		ZISC enabled line interactive		
Input				
Voltage tolerance		±10 %		From nominal voltage
Rated frequency		50 Hz/60 Hz		
Frequency tolerance		± 2 %		From rated frequency
Displacement power factor at supply		> 0.96		Under nominal conditions
Battery charging power		0-50%		Grid supplied on top of the load current Two setpoints, grid and generator (default is 10% for both)
Power Distribution system		IT, 3-Wire Input		Please contact ABB for other distribution systems
Current distortion THDi		< 3%		Full linear load, under nominal conditions, operating on power conditioning mode
Output				
Steady-state voltage variation		±1 %		
Rated frequency		50 Hz or 60 Hz		
Frequency accuracy		± 0.1%		Applicable to independent mode only
Load power factor range		0.9 leading to 0.8 lagging		
Maximum fault clearing current				
Independent mode		360%, 2 s		
Power conditioning mode		460%, 2 s		
Overload power ratings				
Power conditioning mode		110%, 5 min 135%, 1 min		From nominal conditions
Independent mode		125%, 30 s		Battery sizing dependent
Power Distribution system		IT, 3-Wire Output		Please contact ABB for other distribution systems
Voltage distortion THDv		< 2.5%		Full linear load, under nominal conditions, operating on power conditioning mode

Note¹: For voltages not listed, please contact ABB.

Technical data

Energy Storage		
Energy storage type	Li-Ion batteries (not included)	
Energy storage supplier	ABB recommended	
Energy storage autonomy range ²	15 sec to 15 min	
Voltage Range	Typically 520 Vdc to 750 Vdc	
Inverter fast charging power	Typically 250 kW	
Auxiliary charger	Yes	
MV Switchgear		
MV Switchgear supplier	ABB qualified (not included)	
Environmental		
Operating temperature range	0 °C - 40 °C	Excluding energy storage Daily and yearly maximum averages apply Nominal system temperature is based on 25°C
Storage temperature range	-20 °C - +60 °C	Excluding energy storage
Relative humidity	5 – 85 %	
Max. altitude without derating	1000 m	
Pollution degree	2	
Protection class	IP21 (NEMA1)	
Cooling	Forced air	
Air flow	17,310 m³/hour	
Heat dissipation	< 50 kW	Under nominal conditions
Acoustic noise at 1 m	< 80 dBA	
Interface		
System display	10.1" touchscreen display	
Display advanced functionality	Comprehensive service log	
Communication	Ethernet Modbus TCP™	
Hardwired interface	Digital Inputs Relay outputs	
Note²: For other autonomy options, please contact ABB.		

Dimensional data



Weight		
Power Conversion Unit	4,350 kg	
Medium Voltage Magnetism	5,355 kg	Including isolating line reactor and coupling transformer
Connections		
AC Input / AC Output	Top	HiPerGuard MV UPS only, system input/output MV switchgear is project dependent
DC Input	Top / Bottom	Including isolating line reactor and coupling transformer
Connection Type	Cable	



<https://abb.com/ups>

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