VERTIV.™

Liebert® HIPULSE-EX™

80kVA - 200kVA
Efficient, Flexible Power Optimized
For Medium Size UPS Applications

Enabling Tomorrow's

CRITICAL EDGE INFRASTRUCTURE

We helped some of the largest names in the industry bring new capacity online faster and at a lower cost when search and social media increased demand for storage and computing.

Protecting your critical technologies takes more than just great software and equipment. It takes a level of experience that only comes from years of finding solutions when the industry needed them most. We were the first to protect mainframes with precision cooling systems.

And now as challenges and demands grow, we continue to find better ways to help you strengthen your most vital applications. Formerly the Network Power business of Vertiv, we've brought together the most trusted and experienced names in critical infrastructure.

We were the first to introduce an integrated enclosure system to distributed networks.

Complemented by a network of nearly 250 service centers worldwide. It's a combination of experience and resources that allow us to better adapt to what's needed, anticipate what's next and continue to find solutions in ways other companies simply can't.

Our portfolio spans power, thermal and infrastructure management products, software and solutions.

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APPLICATIONS

- **Information Technology**
  - Data Centers
  - Servers (LAN, WAN, MAN, ERP, e-mail, web and others)
  - Networking
- **Telecommunication**
  - Mobile 2G, 2.5G, 3G and the likes
  - Paging
  - Fixed (including WLL)
- **Industrial Automation**
  - Process (including instrumentation)
  - Motion (digital drives & robotics) and motor loads
- **Transport Automation**
  - Airport automation and flight booking
  - Others including railways & road transport automation & ticket booking
- **Banking, Insurance and Financial Services**
- **Software Development Houses / Software**
  Technology Parks (STP)
- **Building Automation**
  - Access Control
  - Security System
  - Fire Alarm System
  - Emergency Lighting
  - Other Critical Applications
- **Medical Diagnostics**
  - Magneto Resonant Imaging
  - CT Scanning
  - CathLab
- **Satellite**
  - Uplinking
  - Earth Stations

From reliability to availability, from scalability to redundancy, from user-friendliness to maintainability, from parallelibility to connectivity, from investment protection to lower cost of ownership, whichever value you need, Hipulse-EX™ addresses them efficiently and effectively.

Hipulse-EX™ is carefully designed to maximise the "availability" of your critical loads to ensure that your business is protected to the extent possible against power failure and/or power quality problems. This is the prime objective for which the Hipulse-EX™ is built. Besides this, Hipulse-EX™ is designed to address many other "customer values".

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We have studied the emerging needs of our customers and have engineered what we have learned into the Hipulse-EX™. Now it offers you more value and power per square meter. You will find that the Hipulse-EX™ offers unique features that address the needs of your business today and is designed to handle the needs that are expected in future.

FEATURES TO PROTECT YOUR NETWORK

- Rated at 0.8 output power factor to deliver more real power
- Handle Leading power factor loads without KW de-rating under specified conditions
- On-Line Double Conversion
- IGBT-based PWM Inverter
- Wide input voltage tolerance (+15 / -15%)
- Wide input frequency tolerance (45Hz-65Hz)
- High overload capability of static bypass (14 times for 10 milliseconds and 10 times for 100 milliseconds)
- Capability to handle:
  - High crest factor loads
  - 100% non-linear loads
  - 100% unbalanced loads
- Built-in maintenance bypass (Single and 1+N Models)
- Wrap-around maintenance bypass (optional)
- Front access for spares replacement and preventive maintenance
- Easy Dual bus configuration architecture
- Provision to use any type of battery: Wet cells (Tubular Plant), Valve Regulated Lead Acid (VRLA) /Maintenance Free and Nickel Cadmium.
- Adjustable frequency synchronization window up to 9% in the static bypass
- Provision of automatic battery circuit breaker instead of using conventional isolator in the DC path
- Field protocols ModBus / Jbus
- Network protocols SNMP/HTTP NIC Card
- Wall-mount RAM (Remote Alarm Monitor) Box.
- Overload capability of the UPS:
  - 110% full-load for 60 minutes
  - 125% full-load for 10 minutes
  - 150% full-load for 1 minute
- Easy Scalability (Parallel 1+N configuration Up to 6 modules paralleling) without centralised Main Static Switch (MSS)
- Bypass Switch
- Compact footprint

BUILT IN INVESTMENT PROTECTION

- Temperature-compensated battery charging (optional)
- Automatic battery testing
- Field settability of end-cell voltage of the battery
- Protection against deep discharge of battery
- Battery circuit breaker instead of using AC isolator
- Short-circuit proof inverter
- Back-feed protection
- Standard dry contacts (Optional)
- Choice between 6 or 12-pulse rectifier
- Choice of array of input harmonic filter options
- Compatible with Liebert AF, the active harmonic filter

The system's advanced true-online, double conversion topology features a Micro-processor based controlled, 6/12 Pulse SCR based Rectifier and IGBT Inverter.

6 / 12 Pulse Rectifier

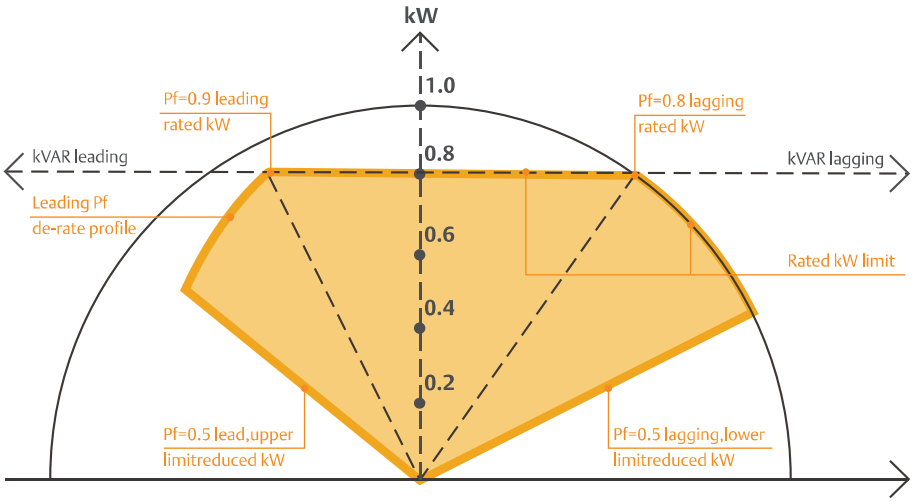
The rectifier provides up to 0.99 Input Power Factor (PF), up to 3% of Input Current Total Harmonic Distortion (THDi) with Optional configurations of Harmonic filters and the widest input voltage window and frequency tolerances.

PWM Based IGBT Inverter

Advanced inverter control technology provides the highest output power quality, ensuring very low output voltage THD and superior waveform to protect connected loads.

It operates under a wide variety of conditions, handling 100% non-linear loads with 3:1 crest factor, as well as 100% unbalanced loading.

The inverter control enables HIPULSE-EX to be suitable for the widest ranges of loads required by the market; delivering full active power rated kW up to 0.9 leading PF loads.



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Selected Power Options

- **Input Isolation Transformer**
  - Compatible with Liebert AF, the Active Harmonic Filter
  - Wide range of solutions specially designed for handling current harmonic on bypass at different stages
  - Available for rectifier and / or bypass supply

- **Protection Degree (IP) for Hipulse-EX™ Enclosure**
  - To address stressed environmental conditions, UPS with higher than IP20 degree of protection can be made available for most of the kVA ratings of the Hipulse-EX™

- **DC Ground Fault Indication**
  - This provides indication of occurrence of battery ground fault problems

- **Top Cable Entry**
  - This is available for a wide range of our Hipulse-EX™ ratings

- **i-Enersave Module**
  - Purpose of this logic is to optimally load each UPS system in a multi UPS parallel system so that each UPS works in its most efficient band of operation while total installation being subjected partial load. This logic keeps minimum number of UPS system in Opera tion as per load demand. The choice of redundancy level is settable in the logic to have high up-time depending on criticality index of load, it has wide use in industries where load pattern is highly dynamic.
  - Auto Sleep and Auto sequencing options available with this logic ensures no UPS System is spared from regular health check up, if prolonged conditions persist. Thus enhanced efficiency of overall system reduces Energy cost and increased customer profitability. This tacitly reduce consumption of natural resources, combustion of fossil fuel, hence reduction in green house gas emission and carbon footprint.

Power Walk-in for 1+N System
- The module power walk-in is standard. This option can be for the module restart delay after the mains return. This is very useful for applications with motor generator at the input

LBS
- This ensures the synchronisation of outputs of two Independent UPS systems to form Dual Bus Architec ture for High availability of Critical Bus

Liebert® LTS, Static Transfer Switch
- This allows critical load to be transferred between two independ ent, synchronised AC power sources without any risk of load disturbances
- This allows automatic transfer of load between the two sources

TVSS
- This is a Transient Voltage Surge Suppressor
- This offers protection from damag ing transients and electrical line noises
- This is normally connected at the I/P and O/P path of Hipulse-EX as an optional item

The Best Investment you can make in a UPS System: Reliability, Efficiency and Value in a compact package

How can I get the highest levels of Protection and Availability?

- The Liebert Hipulse-EX™ gives you built-in reliability with power supply cards, highly efficient stratified cooling of critical components and cooling fans.
- Wider input voltage and frequency tolerances contribute to high power availability.
- Dual bus compatibility and system redundancy further enhance the availability of power.
- High overload protection handles 110% overload for 60 minutes, 125% for 10 minutes, and 150% for 1 minute.

How can I save on my electricity bill and investment costs?

- The improvement in input power factor of the Liebert Hipulse-EX™ can actually reduce your electricity usage.
- The unique ability of the Hipulse-EX™ to adjust power walk-in from 2 seconds to 10 seconds selectable, along with reduced input current distortion and power factor correction, also enables you to save money by reducing backup generator sizing requirement.
- The unit's with transformer compact footprint requires less floor space, leaving you with more room for other equipment.
- Hipulse-EX™ has features to Parallel up to six UPS an modules in redundant configuration for added reliability and serviceability, also it is compatible with Load Bus Synchronization (LBS).

How can I satisfy the requirements of the latest generation servers?

- Liebert Hipulse-EX™ is capable of driving wide ranges of loads, from 0.8 lagging to 0.9 leading without kW de-rating, this feature makes the UPS able to follow the latest IT industry trends, with more active power available for all kind of loads.

How can I protect also my upstreamconnected devices?

- The Liebert Hipulse-EX™ provides the clean best level of upstream power with the lowest level of input current THDi in the industry with additional filters.
- This ensures that clean power flows upstream, avoiding damage to other loads connected to the upstream power distribution bus.

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How can I protect and extend the life of my batteries?
- Liebert Hipulse-EX™ minimize transfers to batteries thanks to its wide input voltage tolerance.
- Temperature-compensated battery charging extends battery life.

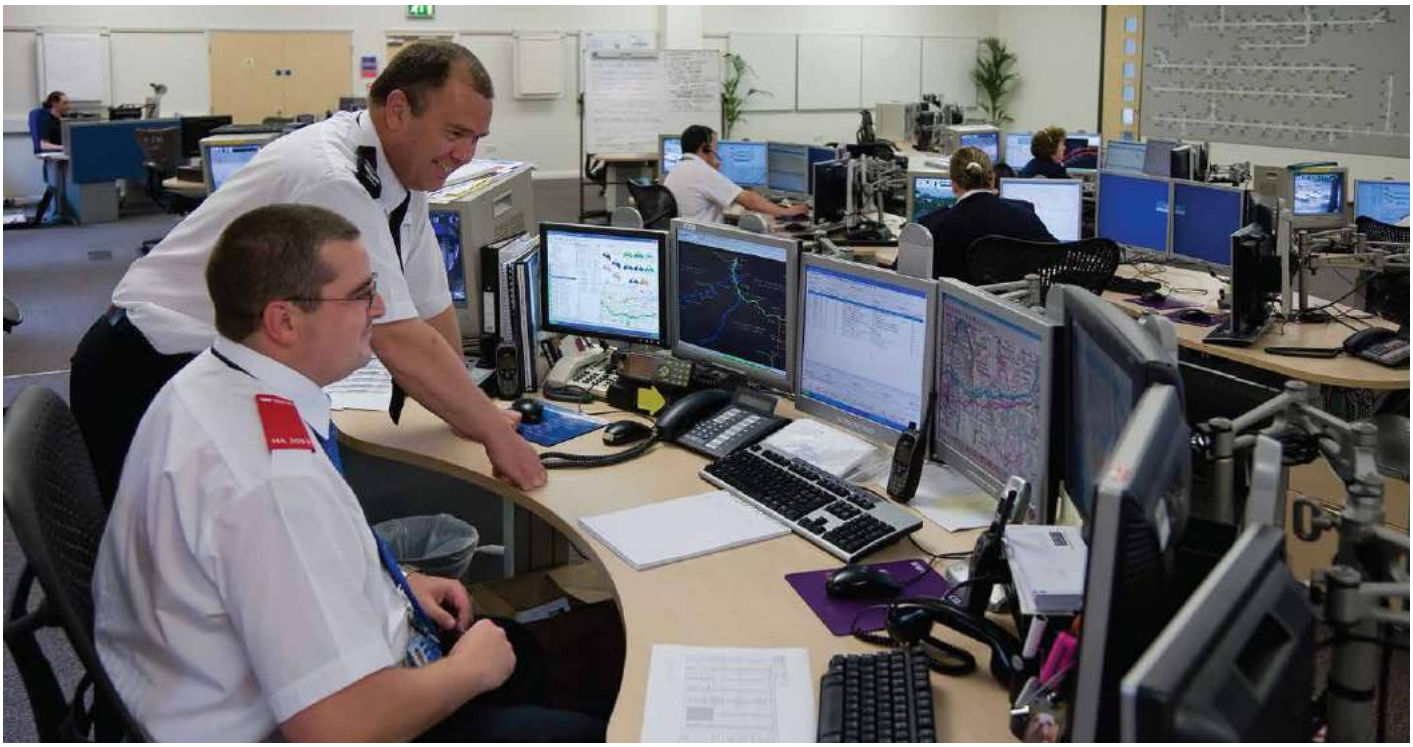
How can I ensure the UPS will work under the most severe conditions?
- The wide input voltage window of +15/- 15% and a frequency tolerance of +/-10% provide high quality power, even when input parameters are below standard. This helps to minimize transfer to battery, reduc ing thecharging and discharging cycles.
- Back-feed protection sensing ensures system integrity.
- Short-circuit-proof, IGBT Inverter provides highest output power quality.

How can I easily maintain my UPS?
- Liebert Hipulse-EX™ includes a built-in maintenance bypass, optional wraparound maintenance bypass with IP 20 UPS enclosure protection -even with the front doors open.
- Redundant configuration allows you to utilize one module while the other is being serviced.
- Dual bus compatibility enables you to transfer the load to an alternate power source for maintenance activities.

How can I monitor and communicate with my UPS?
- To meet a variety of needs, the Hipulse-EX™ can provide power simultaneous communications through a Relay Contact Card, OpenComms™ Web Card and MODbus J-Bus Card and MultiLink™ shutdown software.

How can I satisfy my particular installation needs?
- Flexibility is achieved through many choices including type of battery, number of single and multi-unit configurations, and an array of internal and external power and communication options.
- Auto restart capability provides added availability.
- Ultra-quiet performance with noise levels below 75dB allows greater altitude in where to place the unit.
- Adjustable power walk-in, numerous user specified settings, a choice of power monitoring communications alternatives and user friendly control are all handled through the menu-driven LCD control panel with detailed data reporting.
- Vertiv is recognized to be a great solution provider. Please contact your local Vertiv India office.

How can I check my UPS status?
- The Hipulse-EX™ features easy access for service thanks to front accessibility of critical components, self-diagnostics and various monitoring options.
- Large and user-friendly LCD display provides operating information on front panel of UPS Module.

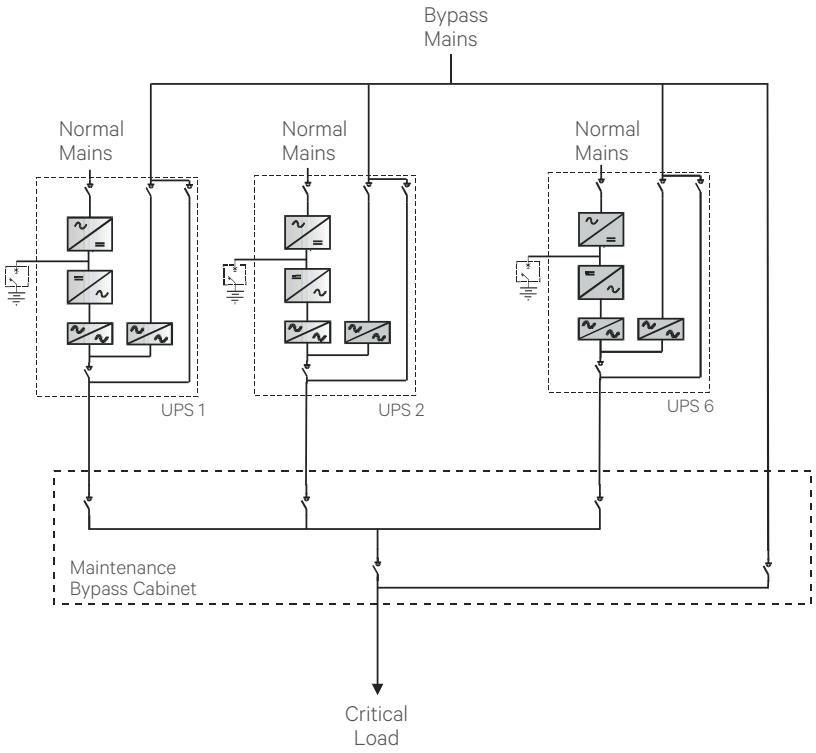


Hipulse-EX™ can be scaled up to as high as 6 modules using any of the following configurations to achieve either scalability or redundancy of desired percentage

- 1+N configuration without any kind of centralised static switch
- Some more configurations are explained further in this brochure
- For other configurations, please contact our nearest sales office / representative

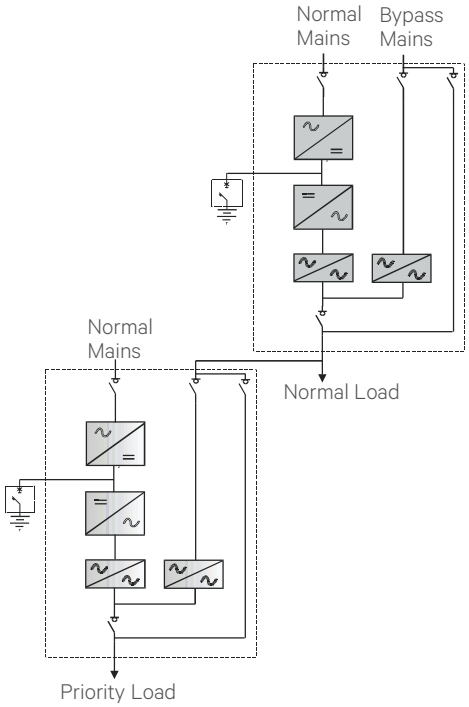
1+N Configuration with Distributed bypass System

- Up to six modules in parallel
- Increase the system reliability
- Increase the availability of quality power following the load demand even if it was not forecasted or planned at the beginning of the project: ease of techno economic Expandability
- Increase the maintainability
- The total load is less than or equal to the rating of the single UPS (depending on the desired redundancy level) and is shared between all modules



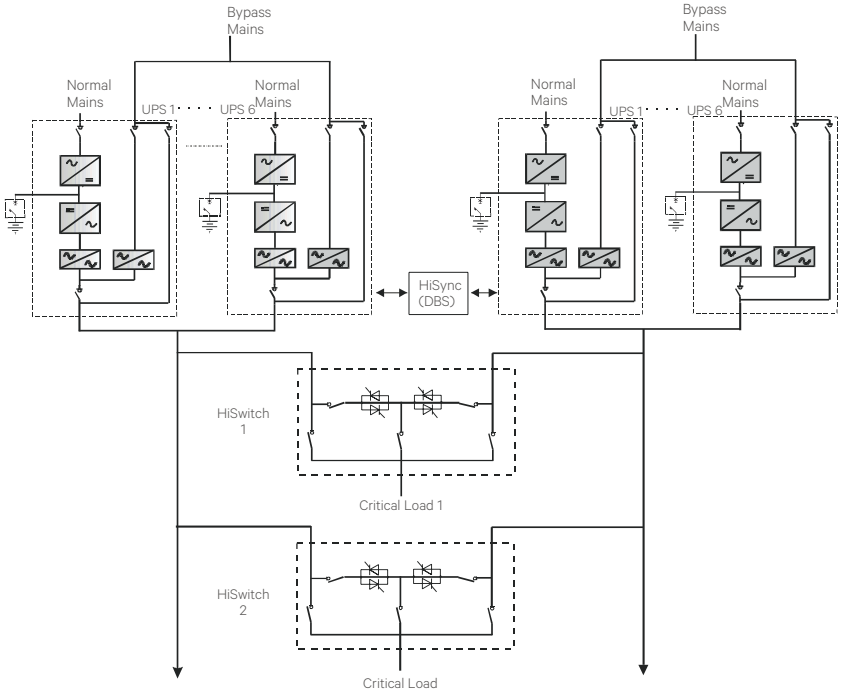
Hot Stand-by Configuration

- Feed one (Priority) or two (Priority and Normal) load banks depending on the application need
- Increase the reliability of the priority load
- Increase the maintainability
- Easy connection can be implemented in the existing Installation regardless of the UPS size, the generation of (device or technology or philosophy of control) and the manufacturer



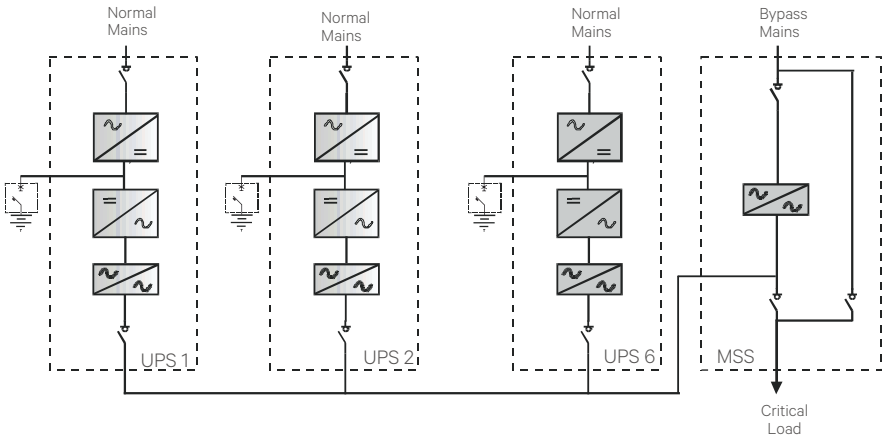
Dual Bus System with Liebert LTS, STS2 or Hiswitch2

- Provide supply to the loads from two independent power sources
- The two may be different in terms of power rating and redundancy
- The two BUS outputs are in synchronism between them
- Automatic transfer of the load between the two sources in case of fault using Liebert LTS
- Increase dramatically the maintain ability and reliability



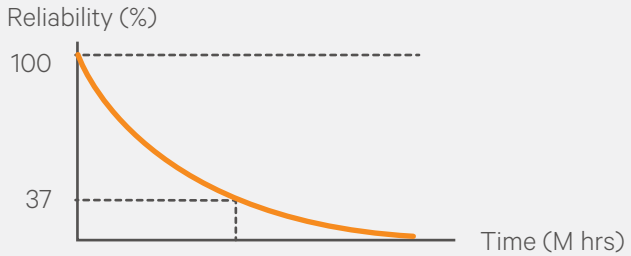
Multimodule Configuration WITH Centralised Bypass Called Main Static Switch (MSS)

- Up to six Modules in parallel
- Increase the system reliability
- Increase the power availability up to the MSS Capacity
- Increase the maintainability
- The Total load is less than or equal to the rating of the single UPS (depending on the desired redundancy level). The load is shared between all modules.



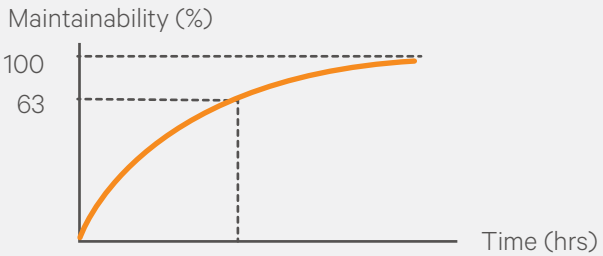
Availability Fundamentals
A = MTBF / (MTBF + MTTR)

- MTBF (Mean Time Between Failures)



MTBF
– 37% chance of still working

- MTTR (Mean Time To Repair)



MTTR
– 63% chance of having been repaired

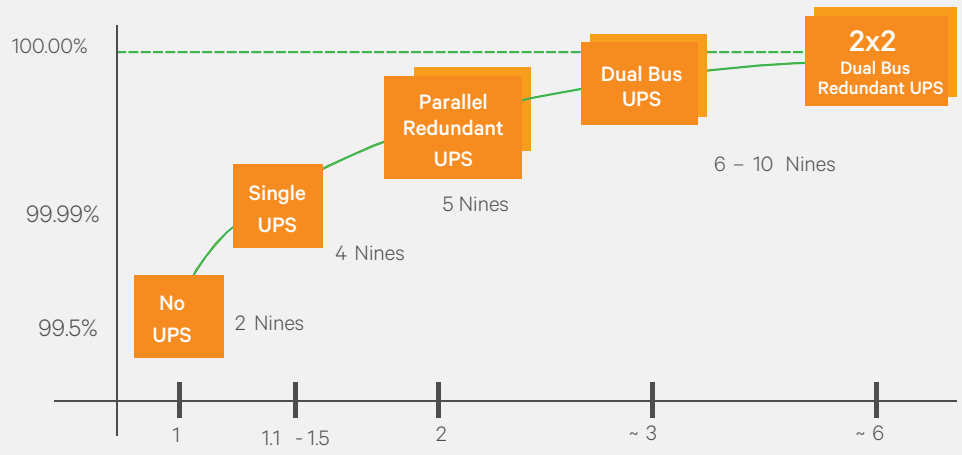
High Availability – High Nines

How Critical Is Uptime?

Availability (%)	Outage Time / year
99.0	90 Hours
99.9	9 Hours
99.99	0.9 Hour
99.999	5 Minutes
99.9999	0.5 Minute
99.99999	3 Seconds
99.999999	0.3 Seconds
99.9999999	30 Milliseconds

What do we Need?

% End-To-End Availability



Relative power system cost

UPS: IEC 62040 series of standards

Safety, Electromagnetic Compatibility and Performance

Worldwide

- European Community (EN 62040 series)
- India (BIS - ETD 031 5064)
- USA and Canada (UL1778 - future UL/CSA 62040-1)
- Australia (AS 62040 series)
- China (GB 7260 series)

IEC 62040-3 UPS performance, specifies

- Dependency on the input supply
- Double Conversion, Standby & Line Interactive

Power Communication Options

When choosing the best system to protect your mission critical applications, an important consideration would be the software and communication options. As part of our commitment to provide the best solution for you, we offer a wide range of sophisticated software and communication options for Hipulse-EX™.

Communications Options

- **OpenComms™ Web Card**
- to meet the needs of network managers by providing interface to network management systems through SNMP/HTTP Protocols and Control through Building Management Systems Via Modbus and Jbus Protocols.

- **Relay Contact Card**
- addresses the basic monitoring and communications needs of users/maintenance personnel.

- **Other Remote Communications**

The Liebert Hipulse-EX™ provides other communications alternatives through RS-232 & RS-485 ports.

In addition to remote communications, service personnel can also use the RS-232 port for local downloading of data, while the RS-485 port can be utilized for a variety remote communications application.

Software Solutions

- Liebert UPS Monitoring Software.
- Facility wide monitoring (SiteScan).
- Shutdown software for your computer equipment : MultiLink ™ Automated System.
- Simultaneous monitoring via different protocols.
- Vertiv Power Quality Monitoring solutions.
- Wall mounted RAM (Remote Alarm Monitor) Panel.

Local Communications

Liebert Hipulse-EX™ provides excellent local communications through its LED-based mimic diagram and LCD panel. While the mimic shows the live power path, the back-lit contrast-adjusting LCD provides you with detailed data on the unit and the system in twelve different languages through a user-friendly menu.

Liebert Power Monitoring Capabilities:

- MultiLink™ Automated System Shutdown Software
- OpenComms™ Nform Monitoring System
- SiteScan™ Web Comprehensive
- Remote Alarm Monitoring Box
- Third-Party Monitoring Systems

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MODEL		Hipulse-EX™			
Nominal Rating (kVA)		**80kVA**	**120kVA**	**160kVA**	**200kVA**
Nominal Rating (kW)		**64kW**	**96kW**	**128kW**	**160kW**
Rectifier Type		6P	6P	6P	6P
Physical Characteristics					
Depth (mm)		875	875	875	875
Width (mm)		900	1250	1250	1250
Height (mm)		1900	1900	1900	1900
Weight (kg)		750	1000	1200	2000
Input					
Voltage		380/400/415Vac 3P-4Wire			
Input Voltage Range		-15%,+10%			
Frequency		50Hz or 60Hz			
Input frequency Range		50 or 60 Hz ±5%			
Input Current Distortion with Linear load (with filter)		5-10% with optional filter			
Power Factor (with filter)		0.9 with optional filter			
Output					
Voltage		380/400/415V – 3 Phase with Neutral			
Frequency					
Voltage Stability	Steady State	±1%			
	Transient State	±5%			
Frequency Stability	Synchronized with internal clock	±0.1%			
	Synchronized with bypass	±1%			
Overload Capability	101-110%	60 minutes			
	111-125%	10 minutes			
	126-150%	1 minute			
Voltage Distortion with Linear Load		≤ 1%			
Voltage Distortion with 100% Non-Linear Load		≤ 5%			
Permissible Load Unbalance		100%			
Non linear load capability		100%			
Phase Angle displacement accuracy	100% balanced load	± 1^0			
	100% unbalanced load	± 1^0			
Standards and Approvals					
General and Safety requirements for UPS (1999)		IEC 62040-1-1			
EMC requirements for UPS (2005)		IEC 62040-2			
Design & Test Methods (1999)		IEC 62040-3			

Note: Specifications considering 400V nominal voltage

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