



Liebert® HIPULSE-U™

30kVA - 500kVA

Utmost Reliable Power Solution for
Critical Business Applications





Utmost Reliable Power Solution for Critical Business Applications

The Liebert® Hipulse-U™ offers a reliable, scalable and user-friendly solution to ensure availability of various critical applications. The Liebert® Hipulse-U™ offers protection to your investment, and provide lower cost of ownership through its digital architecture and range of options which you can customize specifically for your needs.

Information Technology

- Large Internet Data centers
- Coloration Facilities
- Server Farms
- Internet Service Providers



Telecommunication

- Mobile (3G,4G)
- Fixed (including WLL)
- MSC, BSC centers



Industrial Automation

- Process Control Equipment
- Motion (digital drives and robotics)
- Transport Automation
- Airport automation
- Railways and Road transport automation and ticket booking



Corporate Parks

- Banking, Insurance and Financial Services.
- Credit Card Operation
- Stock Exchange Operation
- Software Development Houses/Software Technology Parks
- BPO / KPO / EPO operations



Building Automation

- Access Control
- Security System
- Fire Alarm System



Satellite

- Uplinking
- Earth Stations
- Broadcasting & Entertainment



Medical Diagnostics

- Magneto Resonant Imaging
- CT Scanning/Cath Lab
- Multiple medical imaging units

Liebert® HIPULSE-U™

30kVA - 500kVA

Utmost Reliable Power Solution for Critical Business Applications



Feature-Loaded UPS

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



Built Investment Protection

- Automatic battery testing
- Field settability of EOD of the battery
- Selectable times for boost charging duration of the battery (15 steps with each step of 1 hour)
- Protection against deep discharge of battery
- Short-circuit proof inverter
- Back-feed protection
- D-level lightning protection
- With 3 auxiliary power supply to ensure redundancy under any condition
- Standard dry contacts
- Choice between 6 or 12 pulse rectifier for 120kVA to 500kVA capacity range
- Choice of array of input harmonic filter options
- Temperature-compensated battery charging (optional)

FEATURES TO PROTECT YOUR NETWORK

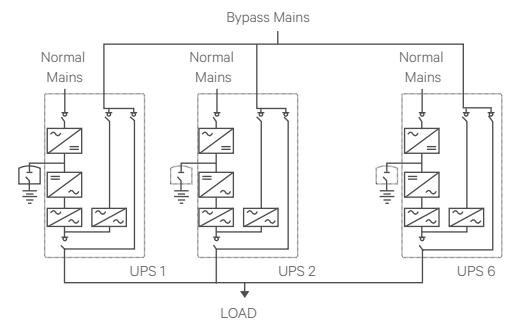
- Fully Digital, twin DSP controlled
- Rated at 0.9 output power factor to deliver more active power
- Handle leading power factor loads without KW derating under specified conditions
- On-Line Double Conversion IGBT-based PWM Inverter
- Wide input voltage tolerance (+20/-20%)
- Wide input frequency range of 45Hz to 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
- Front access for spares replacement and preventive maintenance
- Easy Dual bus configuration architecture
- Adjustable frequency synchronization window up to 6% in the static bypass
- Field protocols ModBus / Jbus
- Network protocols SNMP
- Overload capability of the UPS:
 - 110% full load for 60 minutes
 - 125% full load for 10 minutes
 - 150% full load for 1 minutes
- Compact footprint

Selected Configurations

Hipulse U is scalable to maximum 6 units using any of the following configurations to achieve either scalability or redundancy of desired percentage

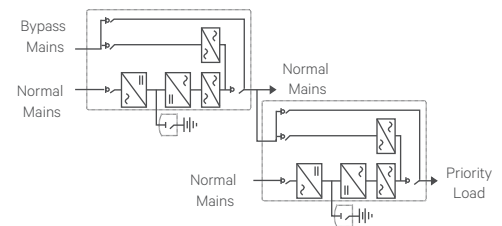
1+N Configuration with distributed bypass System

- Up to six units in parallel
- 1+N configuration without any kind of centralized static switch
- Augment 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
- Enhanced 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 among all units



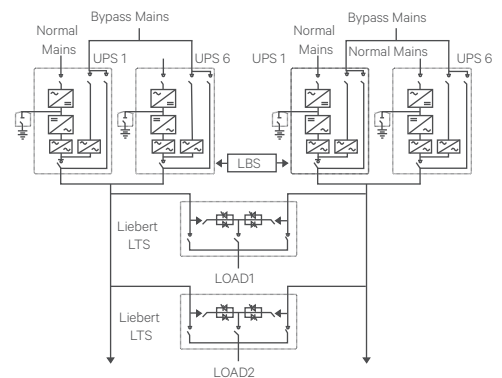
Hot Stand-by Configuration

- Feed one (Priority) or two (Priority and Normal load banks depending on the application need
- Increase the reliability of the priority load
- Enhanced the maintainability and reliability
- Easy connection
- Can be implemented in the existing installation regardless of the UPS size, manufacturer & its control.



Dual Bus System with Liebert® LTS, STS2 or Hiswitch2

- Provide supply to the loads from two independent power sources
- Synchronizes the output of two independent bus
- Automatic transfer of the load between the two sources in case of fault using Liebert® LTS
- Increase dramatically the maintainability and reliability



Liebert® Hipulse U™ Accessories

Intelligent Paralleling

- Intended to increase system efficiency and to reduce the operating hours on the UPS
- This feature will put one or more paralleled units into standby operation when number of redundant modules is above the user-specified threshold

Liebert® Active Filter

- Optional super filter to reduce THDi to <5% and improve input PF up to 0.93 without additional system footprint.

Isolation Transformer

- Additional transformer for output or bypass supply depending on application

Rectifier or Bypass supply

- This allows UPS to be configured in Single or Dual Main supply to ensure system adaptability and reliability

DC Ground Fault Indications

- This provides indication of occurrence of battery ground fault problems

Protection Degree (IP)

- To address stressed environmental conditions, Hipulse-U UPS with higher than IP 20 degree of protection can be made available for most of the kVA ratings

Top Cable Entry

- Available for a wide range of our Hipulse-U ratings

Load Bus Synchronisation (LBS)

- Ensures the synchronisation of outputs of two independent UPS systems to form Dual Bus Architecture for High availability of Critical BUS

Liebert® LTS, STS2 or Hiswitch2

- This allows critical load to be automatically transferred between two independent, synchronized AC power sources without any risk of load disturbances

TVSS (Transient Voltage Surge Suppressor)

- This offers protection from damaging transients and electrical line noises
- This is normally connected at the bypass path of Hipulse-U or inside the Static Transfer Switch as an optional item

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-U.

- Control through Building Management Systems via Modbus and Jbus protocols
- Web-enabled Monitoring and Management through SNMP protocols
- Network Management Systems ready (HP OpenView, CA unicenter, Novell Managewise, etc)
- Software Solutions
 - Site Monitor Software
 - Facility wide monitoring by SiteScan
 - Shutdown software for your computer



Specifications

Nominal Ratings		30	40	60
Rectifier Type		6P	6P	6P
Input				
Nominal input voltage			380/400/415Vac 3-wire plus ground	
Input voltage range			290 to 498Vac	
Nominal input frequency			50/60Hz	
Input frequency range			45-55Hz / 55-65Hz	
Input current distortion with linear load (with filter)			5% with optional filter	
Power factor (with filter)			0.9 with optional filter	
Output				
Nominal output voltage			380/400/415Vac - 3 Phase with Neutral	
Frequency				
Voltage stability			±1% (Steady state); ±5% (Transient state)	
Transient recovery time			20 milliseconds to 1%	
Frequency stability			±0.1% (Synchronized with internal clock); ±6% (max)(Synchronized with bypass)	
Overload capability			101-110%, 60minutes; 111-125%,10minutes; 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%	
Load handing capability without kVA derating			0.5 lagging to 0.9 leading	
Phase angle displacement accuracy	100% balanced load	±1°		
	100% unbalanced load	±1°		
Dimensions and weight				
Depth (mm)			810	
Width (mm)			715	
Height (mm)			1615	
Weight(kg)		530	590	670
General				
General and safety requirements for UPS			IEC 62040-1-1	
EMC requirements for UPS			IEC 62040-2	
Design & Test Methods (1999)			IEC 62040-3	

*Conditions apply

Specifications are subject to change without any prior notification

Specifications considering 400V nominal voltage

Specifications

Nominal Ratings		80	100	120		160		200		300		400		500
Rectifier Type		6P	6P	6P	12P	6P	12P	6P	12P	6P	12P	6P	12P	12P
Input														
Nominal input voltage		380/400/415Vac 4-wire plus ground												
Input voltage range		290 to 498Vac												
Nominal input frequency		50/60Hz												
Input frequency range		40-70Hz												
Input current distortion with linear load (with filter)		3 to 10% with optional filter												
Power factor (with filter)		0.88 to 0.97 with optional filter												
Output														
Nominal output voltage		380/400/415Vac 4-wire plus ground												
Frequency														
Voltage stability		±1% (Steady state); ±5% (Transient state)												
Transient recovery time		20 milliseconds (max)												
Frequency stability		±0.1% (Synchronized with internal clock); ±6% (max)(Synchronized with bypass)												
Overload capability		105%, 60minutes; 125%,10minutes; 150%, 1 minutes; >150%,<200 millisecond												
Voltage distortion with linear load		<1%												
Voltage distortion with 100% Non- linear load		<5%				<3.5%								
Permissible load unbalance		100%												
Non linear load capability		100%												
Load handing capability without kVA derating		0.5 lagging to 0.9 leading												
Phase angle displacement accuracy	100% balanced load	±1°												
	100% unbalanced load	±1°												
Dimensions and weight														
Depth (mm)		855												
Width (mm)		900		1540	1250	1640	1240	1740	1640	2280		2640		
Height (mm)		1900												
Weight(kg)		900		1400	1200	1750	1200	1850	1600	2550	2200		2900	
General														
General and safety requirements for UPS		IEC 62040-1												
EMC requirements for UPS		IEC 62040-2												
UPS classification according to CENIEN 6240-3		VFI-SS-111												

*Conditions apply

Specifications are subject to change without any prior notification



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Liebert® eXM™

80kW - 200kW

Efficient, Flexible Power Optimized
For Medium Size UPS Applications





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.



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



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

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.



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.



FEATURES

- Online mode Efficiency exceeding 96% at partial load
- ECO mode availability for parallel configurations
- Unity output PF (kVA=kW)
- Powerful battery charging capability
- Flexible air flow management; from back and top
- Top or bottom cable entry
- Integrated transformer option
- Full frontal access for installation and service
- LIFE™ remote diagnostic and preventive monitoring service
- Robust internal architecture makes it suitable for light industrial application

Efficient, Flexible Power Optimized For Medium Size UPS Applications

Medium Size UPS as dynamic as your business

Small and medium sized businesses need UPS solutions that deliver lower first costs and ongoing operational savings, high reliability, and enable speed and flexibility in a dynamic IT environment.

Vertiv's commitment is to deliver the most technologically advance product for our customer's mission critical applications, is once again reiterated by our next generation UPS series Liebert® eXM™

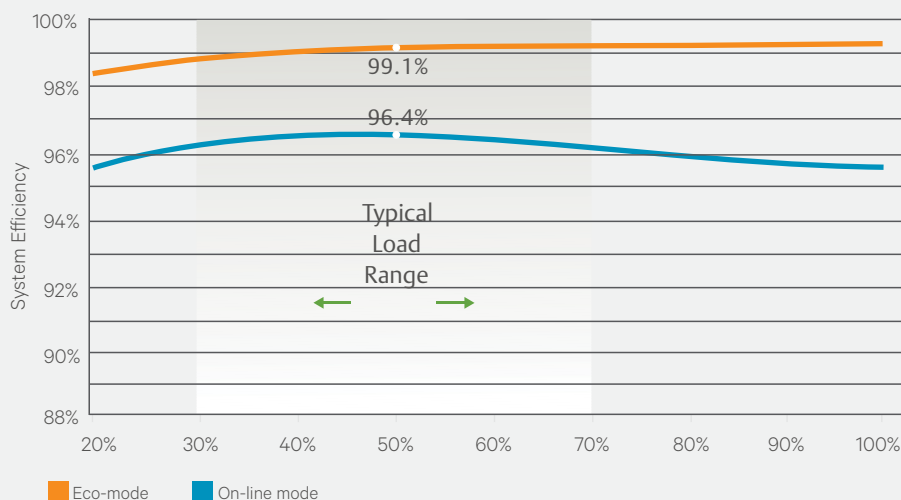


Highly Efficient, most flexible and reliable transformer free UPS for small and mid-tier applications.

Efficient power protection that can meet your capital requirements. Our latest ECO Mode option delivers over 99% efficiency, while the Double Conversion Mode has been optimized to exceed 96%.

Flexible configurations provides an ideal mix of both row-based and room-based benefits, optimized to deliver excellent performance at low total cost of ownership and allow organizations to meet stringent Service Level Agreements.

Reliability is the epicenter of Liebert® eXM™. Its Internal and external architecture is rugged enough to handle input faults, load faults, temporary overloads, input power disturbances and even light industrial environment.



Liebert® eXM™'s Efficiency credentials and performance is certified by TÜV -Rheinland in accordance with IEC/ EN 62040-1, IEC/ EN 62040-3

Liebert® eXM™ efficiency curve in double-conversion mode: Liebert® eXM™ UPS saves over USD1,000/year for every percentage point gain in efficiency. **USD 0.1/kWh

Efficient System

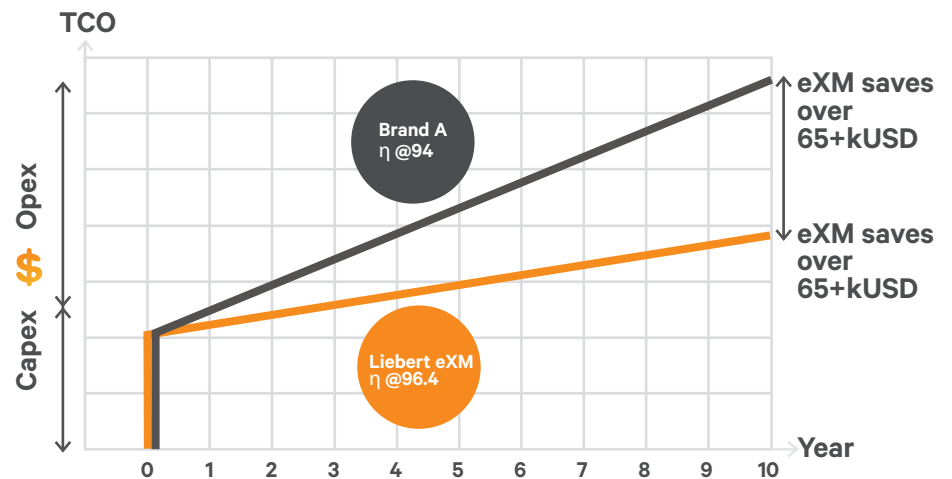
Since the need for improving energy efficiency has become more ubiquitous, many manufacturers have introduced energy efficient UPS system to meet the customers' needs on energy conservation. But they fail to communicate the true picture of efficiency with respect to load at the typical operating condition.

Mostly, UPS efficiency is judged at full load calculations –but your system rarely runs at full load. Compare double conversion efficiencies in the 30-70 percent load ranges to get a true picture of operating costs.

This is where Liebert® eXM™ draw out the critical difference by consistently exceeding unmatched over 96% efficiency level.

Similarly, under ECO mode Liebert eXM constantly delivers over 99% efficiency across the typical load range and It is able to do so even in parallel operation without the need for an external accessories thus saving on initial cost and also, while ensuring high level of availability by transferring the load to inverter and vice versa in less than 2ms, in case of utility voltage anomaly of failure.

TCO performance at typical 40-60% load level



When two or more UPS are paralleled to reach the required capacity, an integrated Intelligent Paralleling algorithm can be established. Intelligent Paralleling evenly distributes the operating hours across the connected UPS units by rotating the active ones thus maximizing the total system efficiency.

With its advanced efficiency techniques, Liebert® eXM™ contribute to minimizing the carbon footprint of mission critical applications, helping data centers to meet the industry's environmental and efficiency compliance standards.



Flexible Configuration and Design Options

Liebert® eXM™ provides a power protection solution of proven quality for customer's IT services. Attributes like flexible air flow management; from front and top cable entry optimized the total cost of ownership of the electrical infrastructure and easily adapts to different installation requirement. **From a row of racks in a data center to the corner of a equipment room** (fed from cables running above the units or beneath the raised floor).

For installations that require full galvanic isolation. Some ratings of Liebert® eXM™ can come equipped with an integrated transformer, offering a certified proven solution with a zero footprint impact. **Customized to fit specific needs.**

Liebert® eXM™ is designed to take care of your dynamic distribution needs, Liebert® eXM™; 80-120kVA can house complete distribution assembly; including input, output, bypass and maintenance switch.

Inbuilt distribution assembly reduces the capital and commissioning expenses to be incurred to set up switch distribution infrastructure.

For higher ratings, an optional switch side car can be ordered to facilitate the full arrangement of switch assembly. This side car arrangement greatly optimized the overall space and initial cost by also enabling top cable entry.



Liebert eXM (160-200 kVA) with switch sidecar



Liebert eXM with inbuilt isolation transformer



Liebert eXM detached from the wall



Liebert eXM adjacent to the wall

High Availability

Liebert® eXM™ has been designed to maximize the availability of secure power, leveraging Vertiv's experience and expertise in developing high MTBF UPS solutions and Low MTTR through a Design for- Serviceability /Maintainability construction.

There are numerous factor contributes to the reliability of Liebert® eXM™. But, one of then is the **rugged internal topology** wherein the internal air channel is designed in such a way that internal hot air drives directly towards heat sink without distressing the PCB's and other internal sensitive circuits consequently the improver service life of component prevent premature failure and ensue utmost reliability

Liebert® eXM™ provides enhanced fault tolerance at partial load versus a traditional fixed capacity monolithic UPS. It can tolerate internal power module failures and still support a partial load without going to bypass.

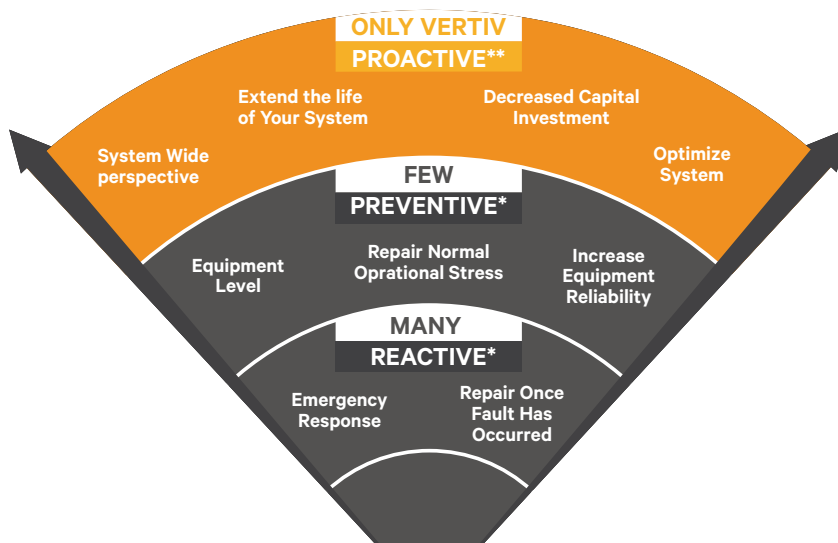
Liebert® eXM™ battery charger can deliver 15% of the nominal UPS power for battery recharge, so being able to provide adequate current to charge even batteries with a long backup time, thus making it ideal for prolong battery powered application.





Serviceability

Many Services organizations can perform basic repair activities and maintain equipment at the some level of competency, but VERTIV services can take your critical maintenance to the next level-proactive maintenance that can significantly extend the life of you power systems.



LIFE™ Remote Diagnostic and Preventive Monitoring Service

The LIFE™ remote diagnostic and preventive monitoring service provides early warning of UPS conditions and out of tolerances legs. This allows effective proactive maintenance, fast incident response and remote trouble shooting, giving customers complete security and peace of mind.

With LIFE™ services you will benefit from:

- Uptime Assurance
- First Time Fix Rate
- Proactive Analysis
- Minimized total cost of ownership of your equipment
- Fast incident Response
- Reporting

Customer Monitoring Interfaces

Human-Machine Interface

A comprehensive, easy to use Touch Screen LCD interface provides robust monitoring and control, as well as a user-friendly graphical display, reducing the likelihood of human error.

A Single-line mimic diagram shows system status at a glance.

Hardware Connectivity

Liebert® eXM™ allows for the monitoring and control of networked UPS through different protocol options:

- The integration of UPS with Building Monitoring and Automation Systems via MODBUS RTU, MODBUS/TCP protocols
- The integration with synoptic panels via a dry contact board

Software Connectivity

Liebert® Nform™ will monitor the Liebert® eXM™ via SNMP protocol. Authenticated alarm management, trend analysis and event notification delivers a comprehensive monitoring solution.

Liebert® SiteScan™ Web allows users to virtually monitor and control any piece of critical support equipment. Its features include real-time monitoring and control, data analysis, trend reporting, and event management.



Intelligent and intuitive, interface, system monitoring and DCIM solutions combine to make your infrastructure ready to enhance performance today and tomorrow.



Vertiv's Trellis™ platform is a real-time infrastructure optimization platform that enables the unified management of data center IT and facilities infrastructure.

The Trellis™ platform software can manage capacity, track inventory, plan changes, visualize configurations, analyze and calculate energy usage, and optimize cooling and power equipment.

The Trellis™ platform monitors the data center, providing a thorough understanding of system dependencies to help IT and facilities organizations keep the data center running at peak performance. This unified and complete solution, delivers the power to see the real situation in your data center, make the right decision and take action with confidence.



Specifications

Nominal Ratings(kVA/kW)	80kVA/kW	100kVA/kW	120kVA/kW	160kVA/kW	200kVA/kW
Input					
Nominal input voltage(V)	380/400/415				
Input voltage range without battery discharge (V)	229~478				
Nominal input frequency(Hz)	50/60				
Input frequency range(Hz)	40-70				
Bypass voltage tolerance(%)	Upper limit: +10%, +15%, or +20% default: +15%; Lower limit: -10%, -20%, -30% or -40% default: -20%				
Bypass frequency tolerance(%)	+/- 10% or +/- 20%, default: +/-10%				
Input power factor(kW/kVA)	>0.99				
Current THD at full linear load(THDi%)	<3%				
Battery					
Number 12V battery per string(Min-Max)	30-44				
Temperature compensation (mV/°C/cl)	-3.0 (selectable from 0 to -5.0 around 25°C or 30°C, or inhibit)				
Battery Charger max. (A)	20	24.5	30	40	49
Output					
Nominal output voltage (V)	380/400/415				
Nominal output frequency (Hz)	50/60				
Nominal active power (kW)	PF=1				
THDv with 100% linear load (%)	<1%				
Inverter overload capacity	110% for 60 min; 125% 10min; 150% for 1 min				
Efficiency					
Online mode efficiency	Up to 96.4%				
ECO mode efficiency	Up to 99.1%				
Dimensions and weight					
Dimensions (W x D x H) mm	600 x 1000 x 2000				
Weight(Net weight)	385	430	430	475	520
General					
Nosie at 1 m dB(A)	57	59	59	61	64
Altitude	=1500; derate power by 1% per 100m between 1500m and 300m				
Ventilation	Front to back standard/ Front to top (optional)				
Protection level IEC (60529)	IP 20 Standard				
General and safety requirements for UPS	EN62040-1 / IEC62040-1 /AS62040-1				
EMC requirements for UPS	EN62040-2 / IEC62040-2 / AS62040-2 (Class C2*)				
Method of specifying the performance and test requirements of UPS	EN62040-3 / IEC62040-3 / AS62040-3 (VFI-SS-111)				

*Class C3 is standard whereas class C2 is optional
Specifications are subject to change without any prior notification



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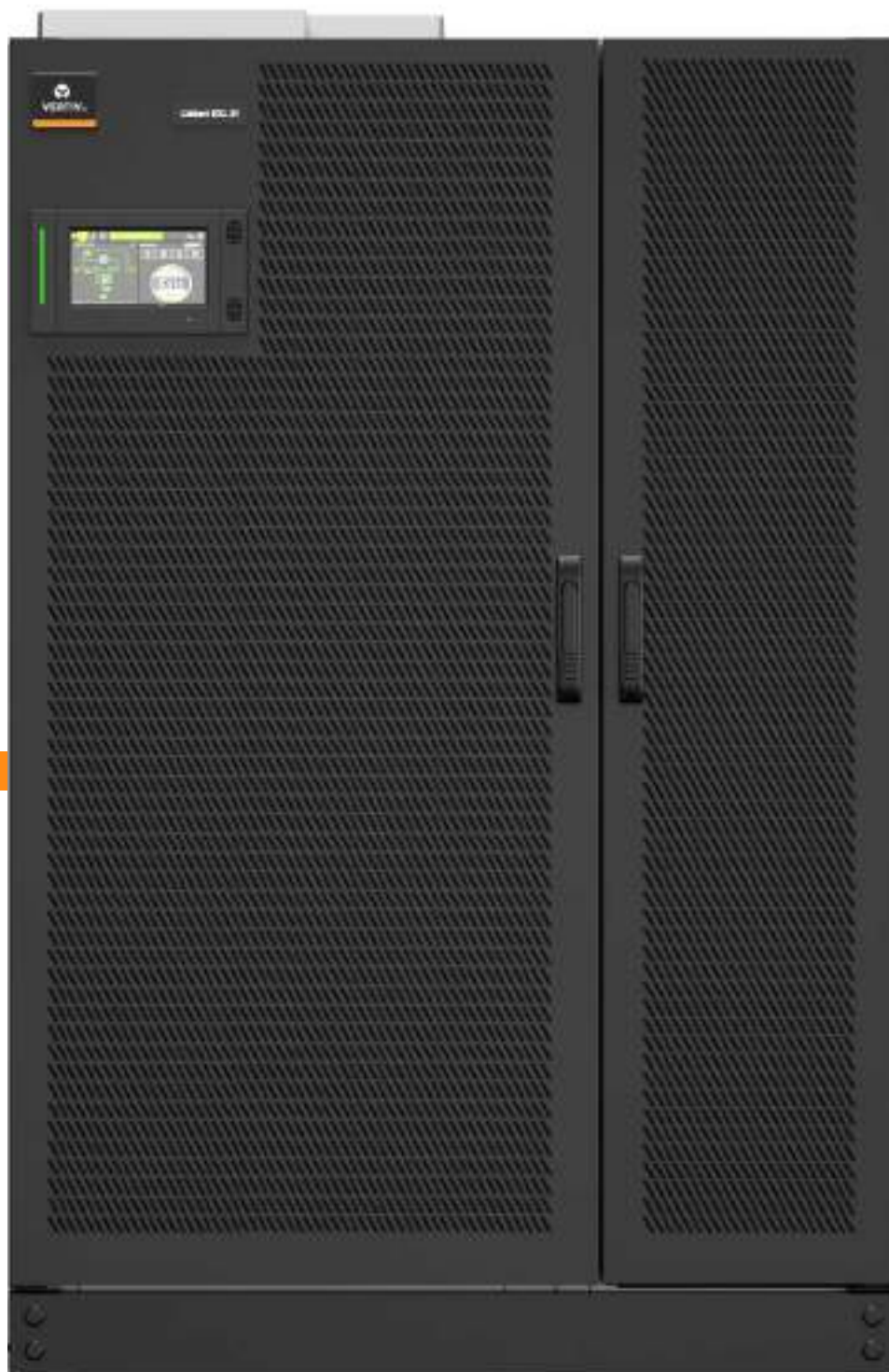
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Liebert® EXL S1

from 300 to 1250 kW

Beyond the Power Revolution



Liebert® EXL S1 from 300 to 1250 kW

About Vertiv

Vertiv brings together hardware, software, analytics and ongoing services to ensure its customers' vital applications run continuously, perform optimally and grow with their business needs. Vertiv solves the most important challenges facing today's data centers, communication networks and commercial and industrial facilities with a portfolio of power, cooling and IT infrastructure solutions and services that extends from the cloud to the edge of the network. Headquartered in Columbus, Ohio, USA, Vertiv employs around 20,000 people and does business in more than 130 countries. For more information, and for the latest news and content from Vertiv, visit [Vertiv.com](https://www.vertiv.com).

Vertiv.com

OUR PURPOSE

We believe there is a better way to meet the world's accelerating demand for data - one driven by passion and innovation.

OUR GLOBAL PRESENCE

Manuf. and Assembly Locations **19**
Service Centers **270+**
Service Field Engineers **2,700+**
Technical Support/Response **330+**
Customer Experience Centers/Labs **17**



US AND CANADA

Manuf. and Assembly Locations **7**
Service Centers **120+**
Service Field Engineers **850+**
Technical Support/Response **120+**
Customer Experience Centers/Labs **4**



LATIN AMERICA

Manuf. and Assembly Locations **1**
Service Centers **20+**
Service Field Engineers **300+**
Technical Support/Response **25+**
Customer Experience Centers/Labs **2**



EUROPE, MIDDLE EAST AND AFRICA

Manuf. and Assembly Locations **5**
Service Centers **70+**
Service Field Engineers **600+**
Technical Support/Response **95+**
Customer Experience Centers/Labs **6**



ASIA PACIFIC

Manuf. and Assembly Locations **6**
Service Centers **60+**
Service Field Engineers **950+**
Technical Support/Response **90+**
Customer Experience Centers/Labs **5**

Liebert® EXL S1 from 300 to 1250 kW

Liebert® EXL S1 the New T-free Monolithic UPS Generation Delivering Secure Power and Maximized Energy Saving

Liebert EXL S1, the new generation of 80-NET™ UPS, delivers unsurpassed performance to medium-large data centers as a result of proven track record, successes, a reliable large installed base and more than 15 years of acquired experience with the 80-NET and Liebert EXL technology.

The new Liebert S1 is a monolithic product that features a transformer-free design with a full IGBT three-level topology. It provides extraordinary features, including a double conversion efficiency of up to 97%, further improved to 99% with the dynamic online mode. Moreover, the intelligent paralleling optimizes efficiency at partial load, achieving superior running cost savings as well as reduced TCO and CO₂ emissions.

Liebert EXL S1 Dynamic Grid Support feature can provide frequency regulation by controlling the input power to support services such as frequency regulation-up, regulation-down, or both via charging and discharging of the battery.

Liebert EXL S1 can operate with both standard VRLA and new Li-ion batteries thus adapting to all possible requirements in terms of runtime, life expectancy and TCO, and showing extreme flexibility.

Furthermore, its higher power density in a minimum footprint optimizes the availability of IT space and reduces related costs.

Liebert EXL S1, available from 300 to 1250 kW, delivers secure power while providing first class load protection and maximum energy saving for mission critical applications.



Liebert® EXL S1

At Vertiv we believe that being mindful of product design, development, use, and disposal are important to the longevity of our industry.

Checkout these environmentally conscious features of the Liebert® EXL S1:

- Up to 99% operating efficiency in Dynamic Online mode, maximizing energy usage and minimizing losses, while still securing the critical load against grid events within IEC 62040-3 Class 1 limits.*
- Intelligent paralleling algorithms maximize efficiency on parallel installations at partial load.
- Dynamic Grid Support capability allowing end users to support the integration of renewable energy sources.
- Environmental compliance (IEC 62040-4) promotes reduction of any adverse environmental impact during a complete UPS life cycle.



Highlights

- Extraordinary double conversion efficiency up to 97%
- Dynamic Grid Support for enhanced grid interactive capabilities
- Maximized active power at unity power factor
- Compact footprint for optimum space utilization
- Li-ion battery option with Battery Monitoring System integration.
- Optional integrated backfeed protection

Liebert® EXL S1 from 300 to 1250 kW

Capacity & Installation Flexibility from 300 kW up to 9.6 MW

Liebert® EXL S1 features a transformer-free design with full IGBT three-level double conversion technology, providing extraordinary savings on installation and running costs, while at the same time delivering first class load protection.

Liebert EXL S1 also features a full IGBT three-level rectifier allowing for electrical infrastructure cost saving, reducing the size of gensets, circuit protection, cabling and transformers.

Flexibility and Compatibility

Liebert EXL S1 can be fully adapted to meet diverse system requirements in terms of power capacity and redundancy allowing for different system designs, thus ensuring maximum flexibility:

- Output Power Factor up to 1
- No power derating from 0.4 lagging to 0.7 leading
- Optimum space/power ratio

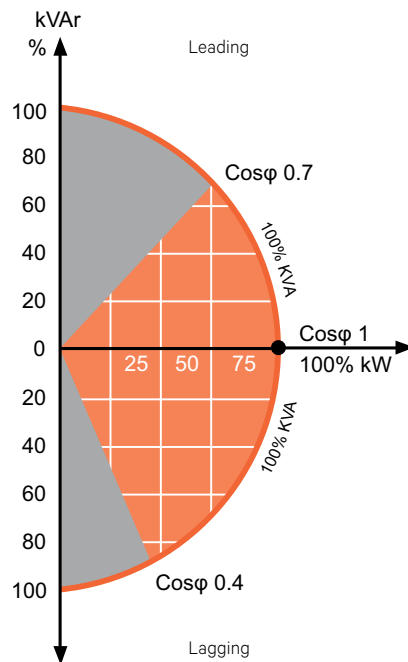


Figure 8: Power Factor Output Diagram

Maximized active power, high efficiency and complete compatibility for modern, mission critical IT loads.

Features and Performance

- Transformer-free design
- Full IGBT three-level NPC2 topology
- Excellent input performances:
 - PF > 0.99
 - THDi < 3%
- Automatic output power upgrade of up to +10%
- Three and four wire electrical compatibility
- Centralized and distributed parallel capabilities
- Seismic compliance



Improved Efficiency

Liebert® EXL S1 delivers an outstanding double conversion efficiency of up to 97%, which further increases up to 99% with the dynamic online mode, consequently reducing operating costs and energy dissipation (kW) to a minimum. This significantly minimizes the consumption of the cooling system, providing an overall TCO reduction and rapid payback time.

Furthermore, through its intelligent ECO mode efficiency and the intelligent paralleling feature Liebert EXL S1 can optimize efficiency even at partial load achieving additional superior cost savings.

Liebert EXL S1 levels of efficiency and consequent electricity cost savings can be attributed to:

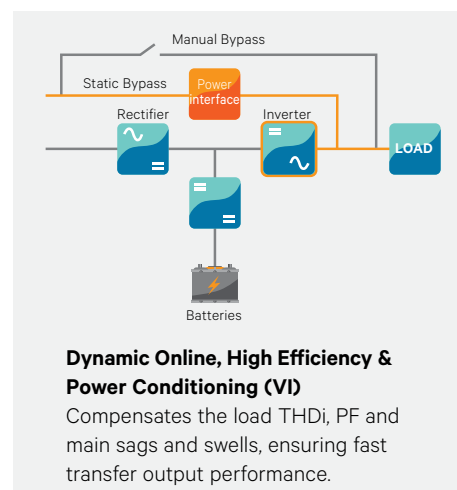
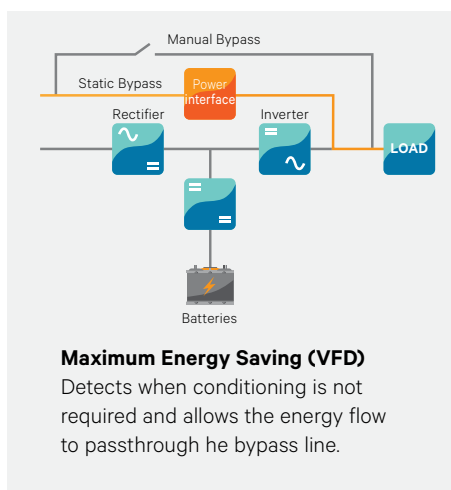
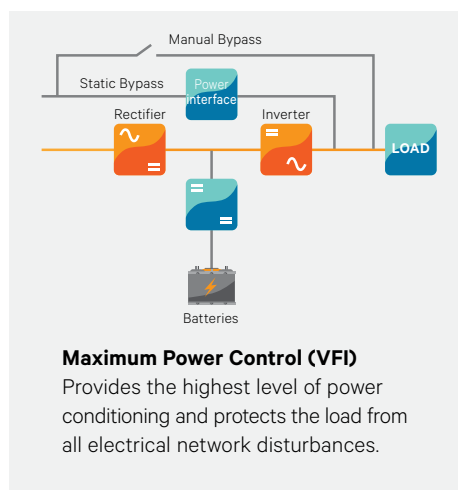
- Latest generation IGBT
- Adoption of a three-level NPC2 topology for both rectifier and inverter
- DC controlled fan speed
- Intelligent paralleling mode
- Advanced digital technology and fast transfer

The seamless activation of Liebert EXL S1's functioning modes ensures the highest level of efficiency without compromising power quality and availability.

The dynamic online mode ensures Class 1 output performance under most stringent conditions:

- Network fault (voltage variation, high/low impedance mains failures)
- Load fault (short circuit downstream of the UPS)
- Type of load connected (PDU transformer)

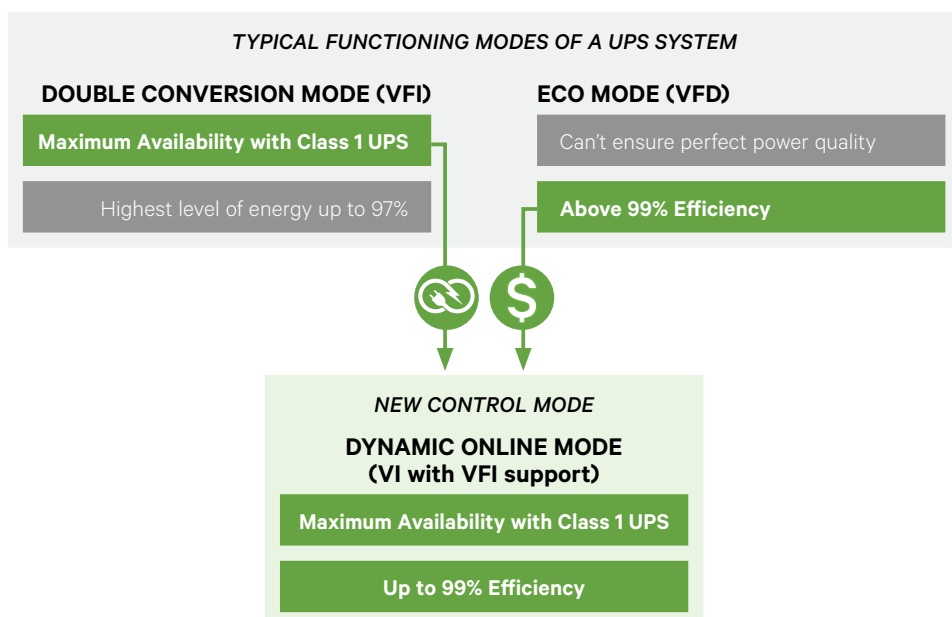
The unit is able to discriminate between various types of interferences and rapidly respond, while at the same time ensuring compatibility with downstream equipment such as servers, transformers, STS or mechanical loads.



Dynamic Online mode: No more availability tradeoff with efficiency

Dynamic Online mode is the latest high efficiency mode of operation offered by Vertiv, developed for those that do not want to trade off any level of availability for incremental gains in efficiency. Dynamic Online mode enables **operating efficiency up to 99% without sacrificing availability**. In fact, while in this mode, the inverter can instantaneously assume the load and maintain the output voltage within the IEC 62040 Class 1 specification, thus offering the same level of availability typically achieved in a double conversion operating mode.

Dynamic Online mode is therefore able to combine the superior availability of a double conversion operating mode with the excellent energy cost savings of a high efficiency mode for a reduced total cost of ownership.



Liebert® EXL S1 from 300 to 1250 kW

Liebert® EXL S1 Dynamic Grid Support Feature

Intermittent renewables continue to challenge conventional energy generation. Evening out this renewable supply requires new energy storage services behind the meter. Operators of data centers and other types of critical infrastructure have a key role to play in this shifting energy landscape which presents new ways to generate revenue and lower costs.

Liebert® EXL S1 can provide frequency regulation by controlling the input power to support services such as frequency

regulation-up, regulation-down, or both via charging and discharging of the battery.

Dedicated controls always maintain the necessary battery energy to support the critical load in event of an outage.

By enabling UPS grid services with elevated speed of response to frequency variations and other external commands, Vertiv allows data center owners to participate in specific demand and response programs (e.g. Fast Frequency Response and Peak Shaving).

The total response time from the moment receiving the signal for the Dynamic Grid Support to the time reaching the specified power is below 0.5 second.

Offering your site's energy demand flexibility will enable access to new revenue streams and cost saving opportunities. With a focus on your site's primary function these benefits can be realized with Liebert EXL S1 without operational impacts.

Dynamic Grid Support is available for a number of markets, including:



Data Center



Commercial



Industrial



Telecommunications



Transportation

APPLICATION EXAMPLE



A 1 MW data Center

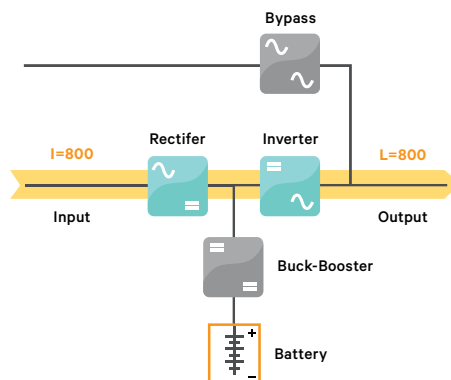


can generate revenue up to

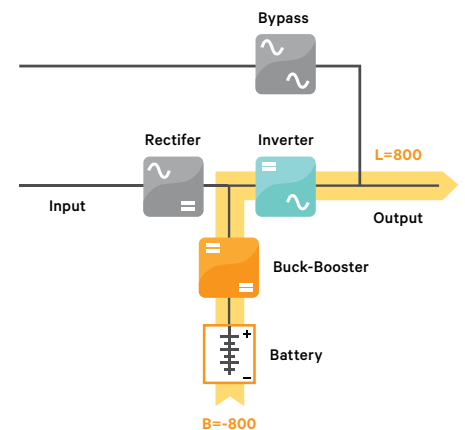


100.000 € each year

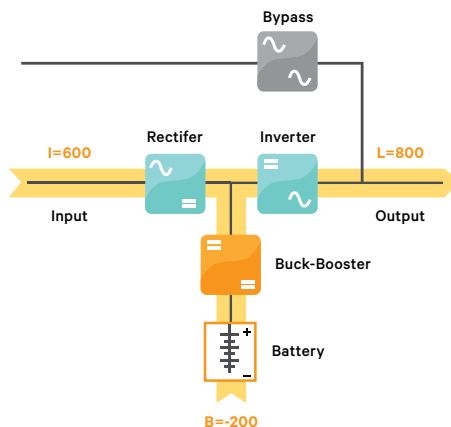
Grid Operating Modes Dynamic Grid Support



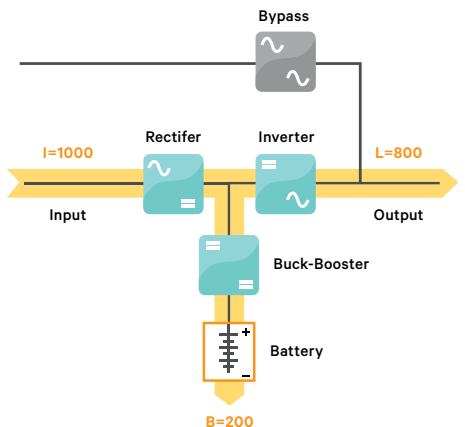
Standard UPS operation (normal operation)



Discharge mode (full disconnection)



Discharge mode (Partial disconnection)



Recharge mode

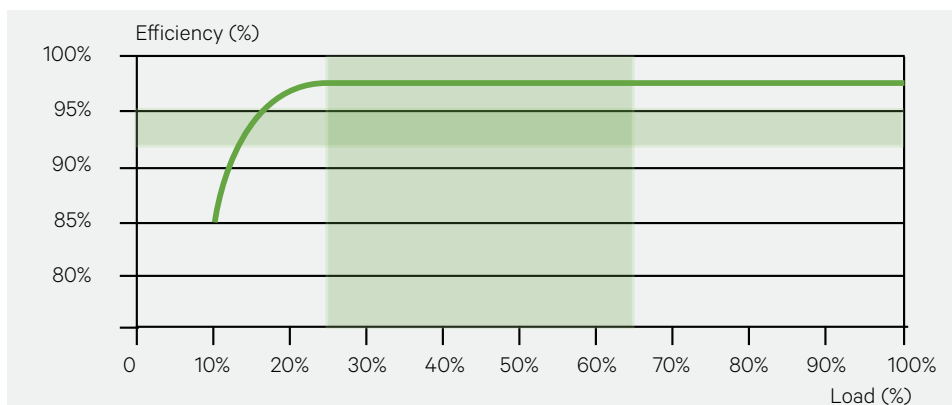
Intelligent Paralleling

Liebert® EXL S1 Intelligent Paralleling Feature

Activating the intelligent paralleling feature optimizes efficiency at partial load, thus achieving superior running cost savings. Enabling this feature allows the system to automatically adapt capacity to meet immediate load requirements by switching excess units to standby mode, while ensuring continued system availability.

Furthermore, the Intelligent Paralleling feature allows each Liebert EXL S1 unit to operate in standby mode for the same amount of time, ensuring an equal life-span of module components.

This intelligent paralleling feature further maximizes Liebert EXL S1's double conversion efficiency at partial load and allows for an overall energy dissipation and TCO reduction.

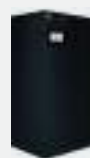


Liebert® EXL S1 AC/AC efficiency with Intelligent Paralleling feature



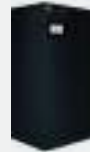
33%

Four units at 33% load each = 96% efficiency.



65%

Liebert® EXL S1 Intelligent Paralleling:
two units at 65% load each = 96.8% efficiency.

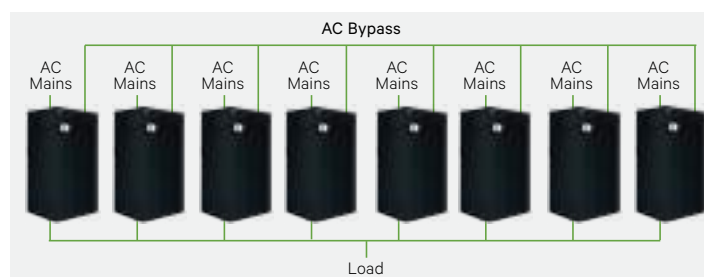


Parallel Configurations

The Liebert EXL S1 can be connected with up to 8 units in parallel, where single units can be serviced while the remaining units continue to power the load. A Liebert EXL S1 unit continues to operate even while it's being upgraded to a parallel system due to the upgrade occurring via software settings. Liebert EXL S1 can support both distributed and centralized parallel configurations providing maximum energy saving via double conversion and intelligent ECO mode, allowing to operate with a system efficiency of up to 99%.

Distributed Parallel Configuration

Paralleling single Liebert EXL S1 units offers advanced scalability. In a distributed parallel configuration, each unit has a dedicated static bypass switch, providing parallel operation without the need for a system control cabinet, thus reducing initial installation costs.

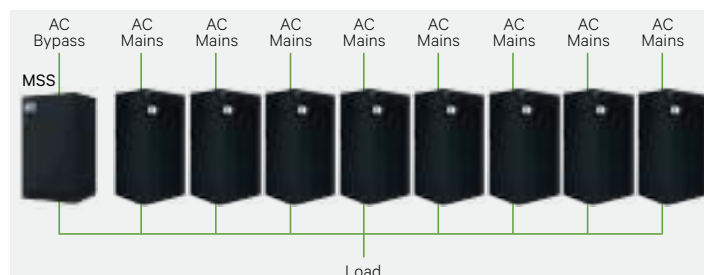


Liebert® EXL S1 distributed parallel configuration, with 8 UPS units in parallel

Centralized Parallel Configuration

With the Liebert EXL S1's centralized parallel configuration, the internal static bypass switch of each unit is disabled and an external Main Static Switch (MSS) rated for the desired maximum capacity, is installed. Therefore, the reserve supply to the loads operates via one central piece of equipment (MSS).

The MSS can easily be integrated into any switchgear, thus simplifying cabling and installation. System level commands are given to the MSS via its integrated touch screen display.



Liebert® EXL S1 centralized parallel configuration, with MSS plus 8 UPS units in parallel

Liebert® EXL S1 from 300 to 1250 kW

User Interface and Advanced Diagnostic

Liebert® EXL S1 makes your mission critical space a peaceful place through its advanced diagnostic capability, measuring and logging, enhanced event analysis as well as an intelligent colored multi-language touch screen display.

Liebert EXL S1 advanced DSP control platform together with the patented Vector Control technology enables increased performance of three-level power converters and real time control of output power quality, guaranteeing continuous operation and premium protection for your customer's business.



Bypass Input

Voltage and frequency measurements.

Mains Input

Current, voltage and frequency values of the three input phases.

Warning/fault

Alerts of anomalies on bypass, rectifier, inverter, booster/charger, battery and load.

Events log

Date and time of important UPS events, alarms and other warnings.

Measurements

Voltage, current and frequency values of each internal functional block.

Battery

Status/values including temperature, cell voltage, capacity run time and testing.

Vertiv™ LIFE™ Services

Status of Vertiv LIFE Services connections and calls.

Tools

LCD settings and language selection.

Output

Voltage, current, frequency, and battery measurements.

Reduced TCO

Neutral Carbon Footprint

Liebert® EXL S1's new generation architecture has been designed to reduce energy and heat dissipation, consequently minimizing the demand and consumption of air conditioning systems.

The combination of these factors, coupled with a double conversion efficiency of up to 97%, reduces CO₂ emissions to a minimum. This contributes to ensuring that your customers' data centers are a step closer to meeting the industry's environmental and efficiency compliance standards.


97%

Double Conversion

Efficiency



CO₂

950 tons

of CO₂ saved every year

Advanced control diagnostic, excellent operating efficiency, intelligent paralleling feature, minimum footprint and high energy density make Liebert EXL S1 the perfect UPS to deliver secure power to all mission critical applications, maximum energy saving and rapid return on investment.

Liebert EXL S1 provides system capacity from 300 kW up to 9.6 MW which can be adapted according to diverse design requirements in terms of flexibility, redundancy and system reliability.

Furthermore, its high power density in a minimum space allows customers to maximize the number of racks and servers housed in their data center, thus granting more space for IT equipment.

The Liebert EXL S1 technology, has brought extraordinary benefits in terms of:

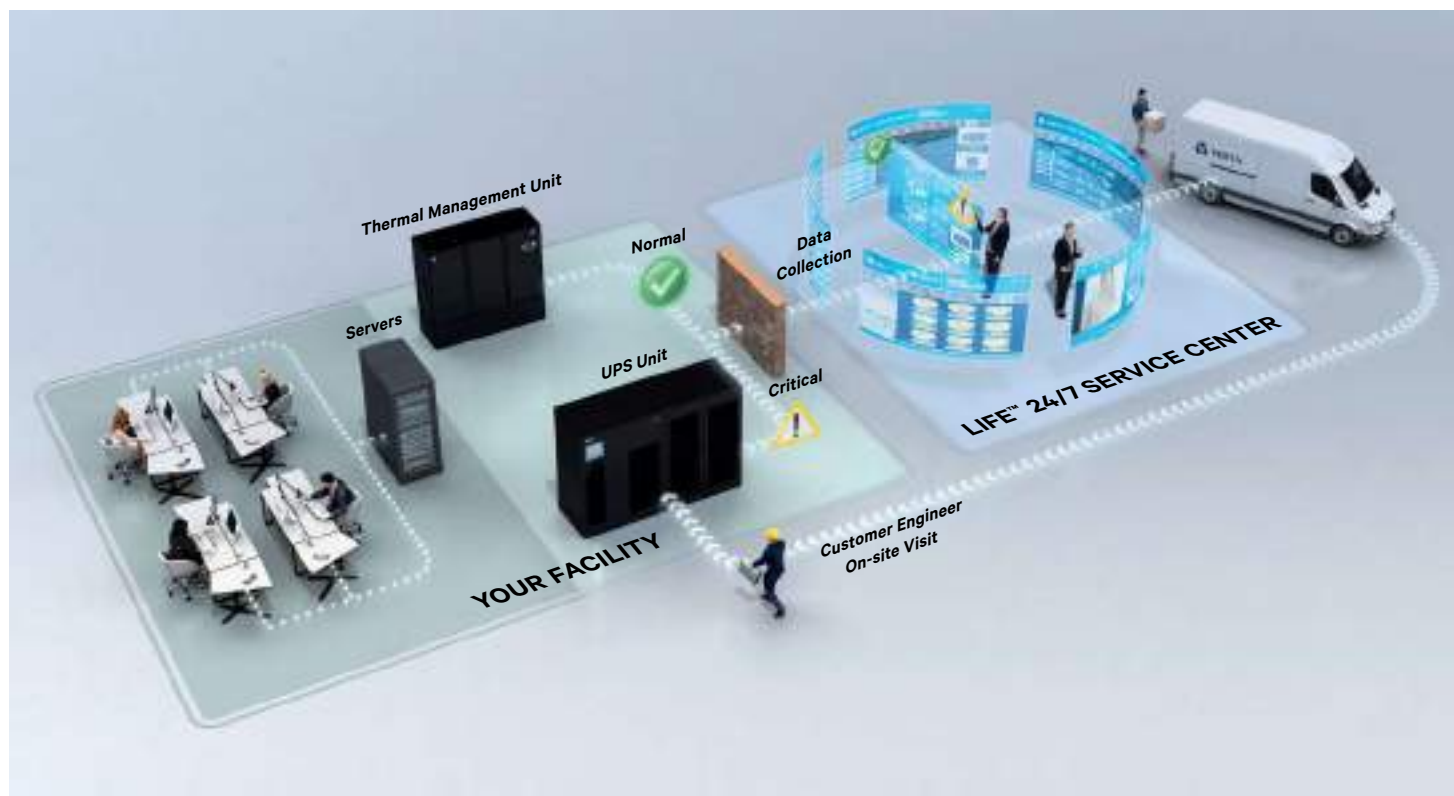
- Zero impact on upstream infrastructure
- Perfect compatibility with modern mission critical loads
- Enhanced performances for maximum energy saving
- CO₂ emission reduction
- Maximum system flexibility for all installations
- Reduced TCO



Liebert® EXL S1 from 300 to 1250 kW

Vertiv™ LIFE™ Services Remote Diagnostic and Preventive Monitoring

Vertiv's service program is designed to ensure that your critical power protection system is maintained in an optimum state of readiness at all times.



The **Vertiv™ LIFE™ Services** Remote Diagnostic and Preventive Monitoring provides early warning of UPS conditions and out of tolerances. This allows effective proactive maintenance, fast incident response and remote trouble shooting, giving customers complete security and peace of mind. With Vertiv LIFE Services you will benefit from:

Uptime Assurance

Constant monitoring of UPS parameters, thus maximizing the system's availability.

First Time Fix Rate

Pro-active monitoring and data measuring ensure that when our customer engineers are dispatched on-site, they arrive prepared for first time resolution.

Proactive Analysis

From Vertiv LIFE Services centers, our experts proactively analyze the data and trends of your equipment, to recommend actions to ensure their best performance.

Minimized Total Cost of Ownership of Your Equipment

The continuous monitoring of all relevant parameters in turn maximizes unit performance, reduces on-site maintenance and extends the life of your equipment.

Fast Incident Response

Vertiv LIFE Services allows for immediate definition of the best course of action, as a result of the regular communication between your Liebert® EXL S1 system and our Vertiv LIFE Services centers.

Reporting

You will receive a comprehensive report detailing the working order of your equipment and its operational performance.

Customer Monitoring Interfaces

LCD Touch Screen Features

- High security access with separate password levels for users and service engineers
- User-friendly graphical interface
- Single-line mimic diagram showing system status
- Dedicated warning/fault and event log page used to monitor USP status and important events
- Dedicated measurements page for all UPS internal functional blocks

Hardware Connectivity

Liebert® EXL S1 allows for the monitoring and control of networked UPS, through different protocol options:

- The integration of UPS with Building Monitoring and Automation Systems via MODBUS RTU, MODBUS/TCP or JBUS protocols
- The integration of UPS in Network Management Systems through SNMP protocol
- Two slots for additional connectivity cards are available for specific protocol requirements.

Software Connectivity

Vertiv connects and protects your network with core-to-edge solutions and unmatched expertise.

For maximum visibility and effective monitoring in one view, pair your Vertiv™ UPS with a software solution.

Vertiv™ Environet™ Alert

Vertiv Environet Alert provides industry companies with critical facility monitoring software that is affordable and easy to use. This solution delivers superior monitoring, alerting, trending and data organization. Get monitoring, alerting and trending at a price that's right for your business.



Liebert® EXL S1 from 300 to 1250 kW

Global presence for a close partnership. Everywhere.

Global AC Power Sites

 **4** Laboratories and R&D

 **5** Manufacturing Sites

 **3** Witness Test Sites

 **9** Main Training Centers

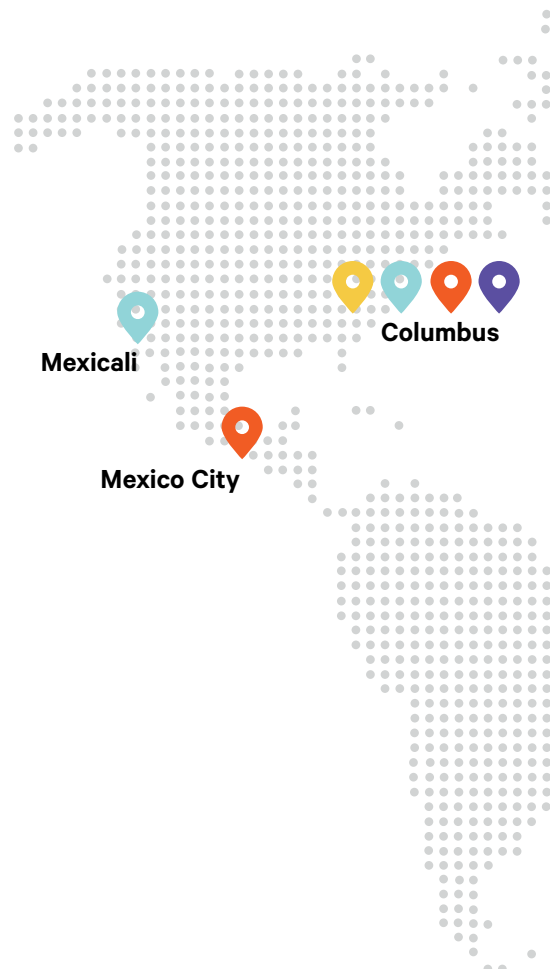
 Global Network of Regional Sales and Service Representatives

AC Power Highlights

 **100K+**
Square meter of manufacturing space

 **Up to 12MW**
available for witness tests

 **92k**
hours of technical training each year



Main Witness Test and Customer Experience Center sites.

Vertiv™ state-of-the-art Customer Experience Centers enable our customers to experience first-hand a wide variety of data center technologies, supported by constant consultation from R&D and engineering specialists. Each center also offers virtual tests allowing customers to attend remote experiences.

Bologna, Italy - Customer Experience Center

- **800+** Customers every year
- From **50+** countries
- **10+** people dedicated
- **1700 m²** Witness Testing
- **650 m²** Showroom
- **650 m²** Academy
- **5** testing stations, each providing up to 3.5 MVA of capacity = total 4 MW
- **140+** witness test every year
- **400+** UPS systems tested each year
- **Up to 4000 A** simultaneous test at full load

Validation experiences

- **Demo** on new products to demonstrate UPS performance
- **Standard** validation test showing UPS performances
- **Customized** session to validate customer's specific needs.

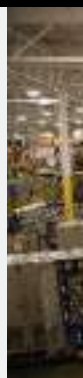


Delaware, US - Power Test Center

- **4.000+** m², including **280+** m² customer observation suite
- **40** testing bays, each containing multiple distinct test stations - total 12 MW available
- **100+** tour-factory witness test each year

Validation experiences

- **Steady-state** - 0% to 100% plus overload, unbalanced loading; non-linear loading
- **Dynamic** - 0% to 100% step loads plus overload, unbalanced loading; non-linear loading
- **Overload and faults** (>100%, 125%, 150%)
- **Customer special tests**





Mianyang, China - Power Test Center

- **100+** Customers every year
- From **25+** countries
- **2** people dedicated
- **180 m²** Witness Testing
- **60 m²** Showroom
- **2** testing stations, each providing up to 1.2 MVA of capacity = total 2.5 MW
- **40+** witness test every year
- **100+** UPS systems tested each year
- **Up to 1.8 A** simultaneous test at full load

Validation experiences

- **Demo** on new products to demonstrate UPS performance
- **Standard** validation test showing UPS performances
- **Customized** session to validate customer's specific needs.



Liebert® EXL S1 from 300 to 1250 kW

Liebert® EXL S1 Specifications

Technical Specifications	300	400	500	600	800	1000	1200	1250
UPS Rating (kVA)	300	400	500	600	800	1000	1200	1250
Output active power at 35 °C*(kW)	300	400	500	600	800	1000	1200	1250
Output active power at 40 °C (kW)	270	360	450	540	720	900	1080	1125
Input								
Nominal mains input voltage / voltage range* (V)	400 (280 to 460), 3Ph or 3Ph + N							
Nominal bypass input voltage / voltage range* (V)	400 (380/415 selectable), 3Ph or 3Ph + N							
Nominal frequency / frequency tolerance (Hz)	50±6%(60 selectable)							
Input Power Factor	≥ 0.99							
Input current distortion (THDi) (%)	≤3							
Integrated Backfeed Protection Device	Optional							
Output								
Nominal output voltage (V)	400 (380/415 selectable), 3Ph or 3Ph + N							
Nominal output frequency (Hz)	50 (60 selectable)							
Output voltage stability by load variation 0-100% (%)	±1							
- static - dynamic	Complies with IEC/EN 62040-3, Class 1							
Output frequency stability								
- synchronized with bypass mains (%) - synchronized with internal clock (%)	±2 (1, 2, 3, 4, 5 selectable)							
	±0.1							
Inverter Overload Capacity*	110% continuous, 125% for 10mins, 150% for 1min							
Short circuit current for 200 ms*	Up to 2.0In							
Load crest factor handled without derating the ups (Ipk/Irms)	3:1							
Compatibility with loads	Any power factor (leading or lagging) up to 1							
Battery								
Permissible battery voltage range (V)	396 to 700							
Float voltage for VRLA @ 20 °C (V/cell)	2,27							
End cell voltage for VRLA (V/cell)	1.65							
Float Voltage stability in steady state condition (%)	≤1							
DC ripple voltage without battery (%)	≤1							
Battery Switch	Not included							
Bypass								
Manual Maintenance Bypass	Included 300-500 kW				Not included 600-1250 kW			
General and System Data								
Classification according to IEC/EN 62040-3	VFI-SS-111							
Operating Temperature (°C)	0-40							
Maximum relative humidity @ 20 °C (non condensing) (%)	up to 95							
Protection degree with open doors	IP 20							
Frame colour (RAL scale)	7021							
Noise @ 1 metre as per ISO 3746 (dBA ± 2dBA)	69	71	76	78				
	65 dBA @partial load		70 dBA @partial load		72 dBA @partial load			
Parallel configuration	up to 8 units in parallel							
Access	Front and Top (no rear access required)							
- VFI efficiency - Dynamic Online (VI) efficiency - VFD efficiency	up to 97% up to 99% above 99%							
Dynamic Grid Support	Included							
Dimension and Weight								
Height (mm)	1950							
Width (mm)	1000	1250	1600	2000	2650	3250		
Depth (mm)	900							
Net Weight (kg)	725	990	1135	1550	2275	2625		

*Conditions apply

Data Center Infrastructure for Large Applications

Static Transfer Switch



Liebert® CROSS

- Ensures redundant power for critical loads, switching between two independent power sources
- Solid-state transfer switch available as 2/3/4P versions with full PF range to guarantee compatibility with all load types
- Extremely reliable and flexible architecture.

- 1 AC Power
- 2 Infrastructure Management & Monitoring
- 3 Power Switching & Controls
- 4 Thermal Management
- 5 Racks & Integrated Cabinets
- 6 Surge Protection
- 7 DC Power



UPS



Liebert® Trinerity™ Cube 3.4 MW

- Highest average operating efficiency in the industry: 99%, with dynamic online mode
- Unprecedented levels of installation flexibility
- Hot scalability up to 3.4 MW.



Liebert® EXL S1 1250 kW

- Three-level double conversion efficiency of up to 97% plus intelligent paralleling
- Dynamic online mode (VI) efficiency up to 99%
- Intelligent ECO mode (VFD) efficiency above 99%
- Enhanced energy density and compact footprint
- Parallel system configuration up to 8 units with both centralized and distributed parallel capabilities.



Liebert® APM 600 kW

- Versatile and modular UPS for row and room applications
- Designed to operate with a maximum energy efficiency of up to 96.3%
- Hot-swappable power modules
- Flexible configuration with 30 kW and 50 kW power module capacities.

Remote Diagnostics

Vertiv™ LIFE™ Services Remote Diagnostic and Preventive Monitoring

With Vertiv LIFE Services you will benefit from:

- Uptime assurance
- First time fix rate
- Proactive analysis
- Minimized total cost of ownership of your equipment
- Fast incident response
- Reporting.

Watch the Vertiv products come to life from the comfort of your home, office, or directly on-site through the power of augmented reality with the **Vertiv™ XR App**.

Download it free of charge and experience your future digital infrastructure like never before!

Google Play



Apple Store



*Under certain rare site conditions with dynamic online mode active, the UPS performance will not meet IEC 62040 Class 1 but will meet IEC 62040 Class 2 specification. Please consult Vertiv application engineering for more details.

