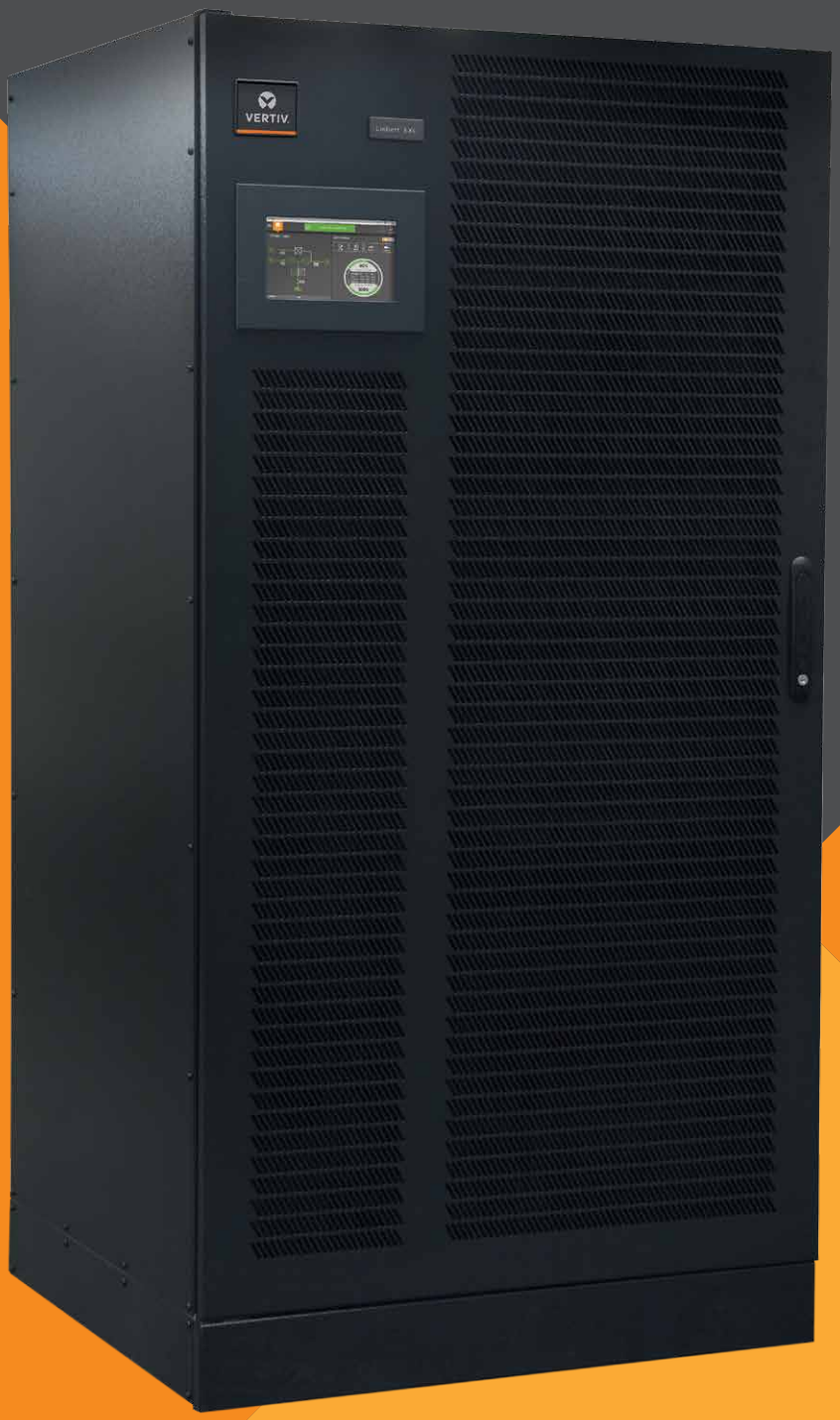
VERTIV.™

Liebert® EXL™ S1

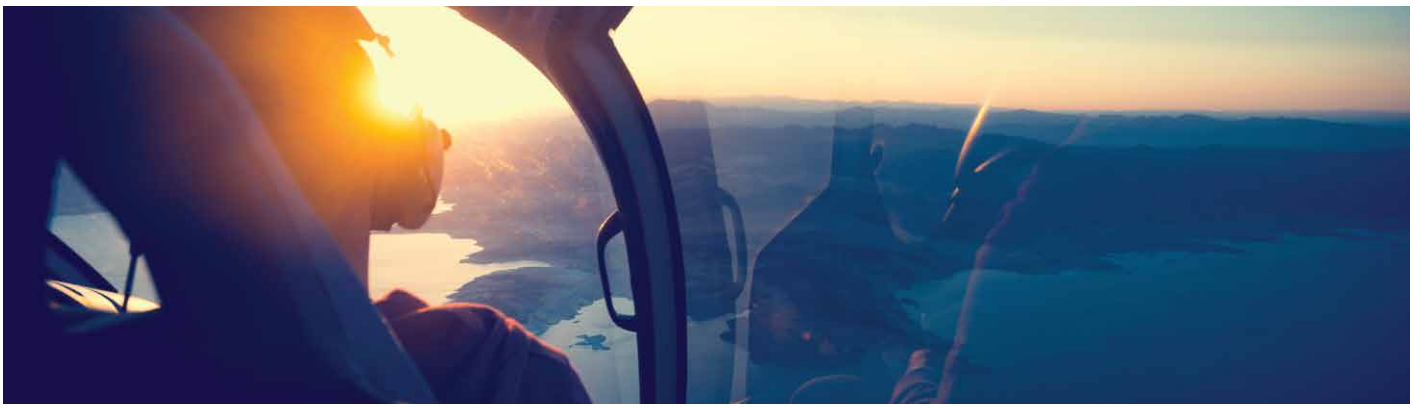
100 kW to 1200 kW

Enhanced Design and Improved Efficiency



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

HIGHLIGHTS

- Extraordinary double conversion efficiency up to 97%
- Intelligent ECO mode efficiency above 99%
- Intelligent paralleling feature optimizes efficiency at partial load
- Maximized active power at unity power factor
- Compact footprint for optimum space utilization
- Backward compatibility with previous 80-NET generation
- Li-ion battery option to adapt to all scenarios

Liebert® EXL™, 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 10 years of acquired experience with the 80-NETtechnology.

The new Liebert® EXL™ is a monolithic product that features a transformer-free design with a full IGBT three-level topology, providing extraordinary features including a double conversion efficiency of up to 97% plus intelligent paralleling to optimize efficiency at partial load, thus achieving superior running cost savings as well as reduced TCO and CO_2 emissions.

Liebert® EXL™ 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™, available from 100 to 1200 kW, delivers secure power while providing first class load protection and maximum energy saving for missioncritical applications.

>2.5 GW

WORLDWIDE

Liebert® EXL™ S1

100 kW to 1200 kW
Enhanced Design and Improved Efficiency

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

FEATURES

- 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%
- Output PF diagram symmetrical respect to zero
- Three and four wire electrical compatibility
- Centralized and distributed parallel capabilities
- Seismic compliance

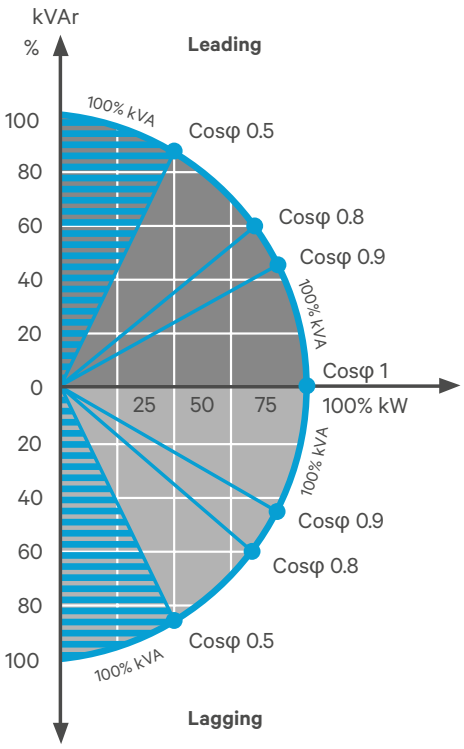
Capacity & Installation Flexibility from 100 kW up to 9.6 MW

Liebert® EXL™ 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™ 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 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
- Output Power Factor diagram symmetrical respect to zero
- Permanent 100% kVA - no derating with any load (lagging or leading)
- Optimum space/power ratio



Improved Efficiency

Liebert® EXL™ delivers an outstanding double conversion efficiency of up to 97%, 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™ can optimize efficiency even at partial load achieving additional superior cost savings.

Liebert® EXL™ 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

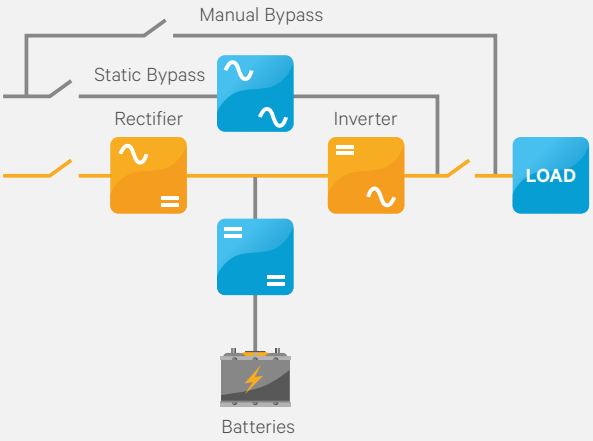
The seamless activation of Liebert® EXL™'s functioning modes ensures the highest level of efficiency without compromising power quality and availability.

Fast transfer technology ensures the quickest response time under various conditions:

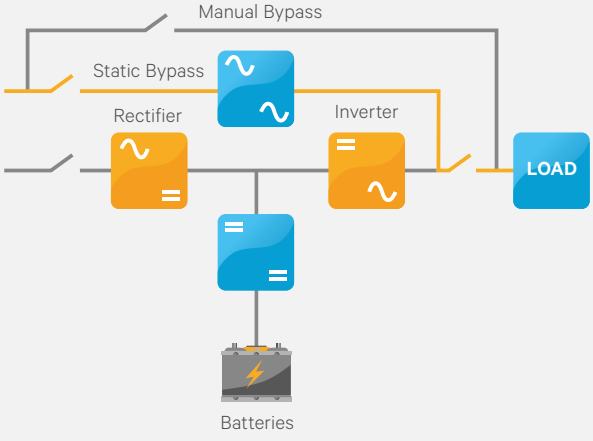
- Network fault (voltage variation, high/low impedance mains failures)
- Load fault (short circuit downstream of the UPS)
- Type of load connected (PDU transformer)

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.

Double Conversion Mode (VFI) provides the highest level of power conditioning and protects the load from all electrical network disturbances.



Intelligent ECO Mode (VFD) detects when conditioning is not required and allows the energy flow to pass through the bypass line.

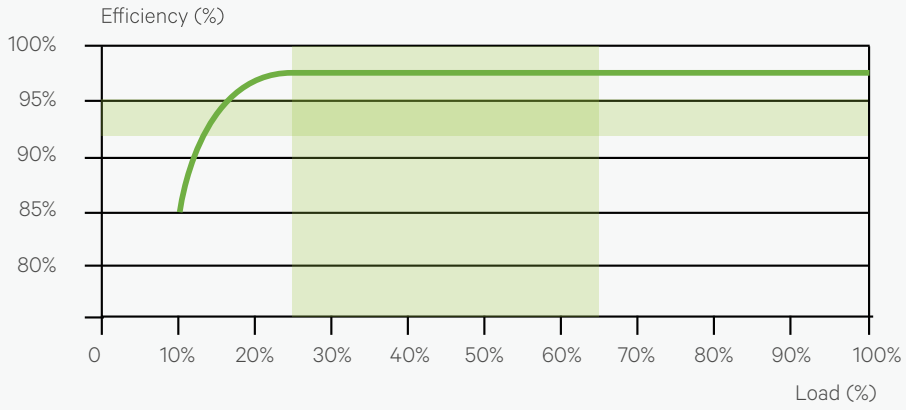


Intelligent Paralleling

Liebert® EXL™ 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 unit to operate in standby mode for the same amount of time, ensuring an equal lifespan of module components. This intelligent paralleling feature further maximizes Liebert EXL's double conversion efficiency at partial load and allows for an overall energy dissipation and TCO reduction.



Liebert EXL AC/AC efficiency with Intelligent Paralleling feature

33%

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

65%

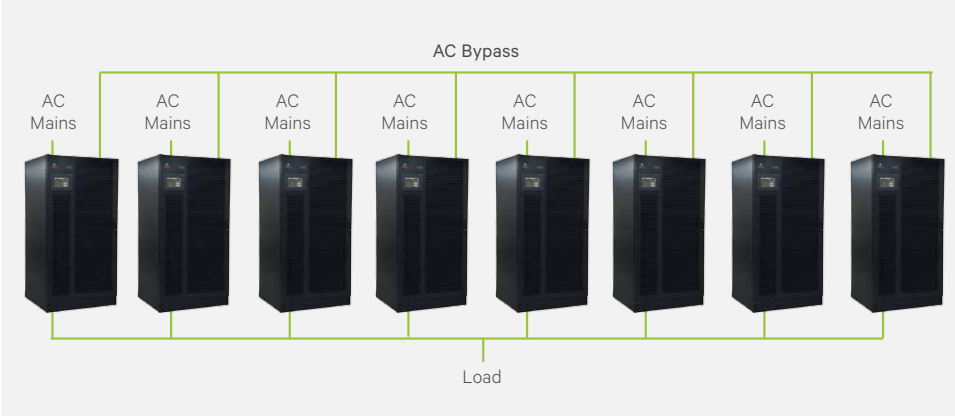
Liebert EXL Intelligent Paralleling: two units at 65% load each = 96.8% efficiency

Parallel Configurations

The Liebert® EXL™ 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™ unit continues to operate even while it's being upgraded to a parallel system due to the upgrade occurring via software settings. Furthermore, Liebert® EXL™ is backward compatible with the previous 80-NET generation, so as to facilitate any legacy system power upgrade. Liebert EXL 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™ 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 distributed parallel configuration, with 8 UPS units in parallel

Centralized Parallel Configuration

With the Liebert® EXL™'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).

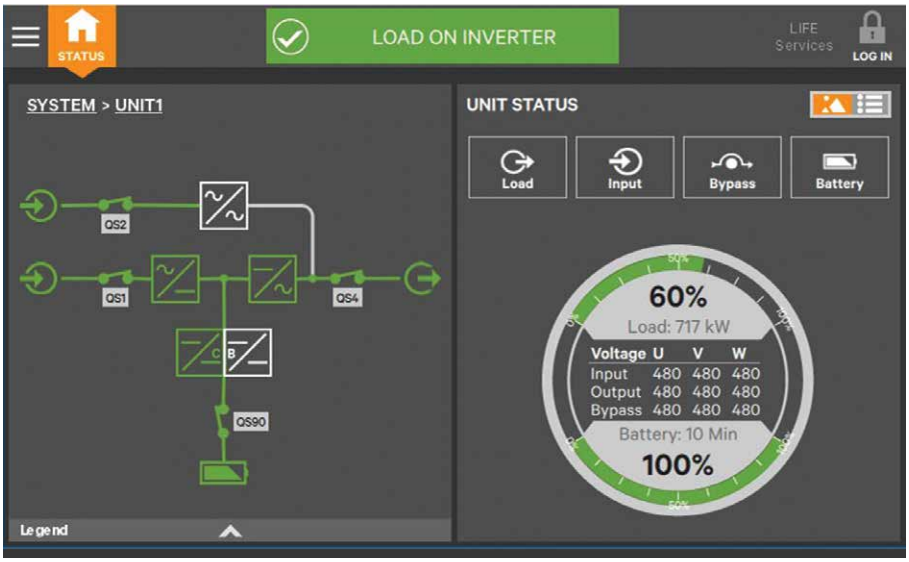
The MSS can easily be integrated into any switchgear, thus simplifying cabling and installation. System level commands are given to the MSS via its integrated touch screen display.

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

User Interface and Advanced Diagnostic

Liebert® EXL™ 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™ 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'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 CO_2 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

CO_2

950 tons

of CO_2 saved every year

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

Liebert® EXL™ provides system capacity from 100 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™ 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
- CO_2 emission reduction
- Maximum system flexibility for all installations
- Reduced TCO

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 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™ 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, MOD BUS/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

Liebert® Nform™ will monitor the Liebert® EXL™ via SNMP protocol. Authenticated alarm management, trend analysis and event notification delivers a comprehensive monitoring solution. Available in a variety of versions to suit anything from small computer rooms to multiple location distributed IT networks, Liebert Nform enables:

- Condition based system state recording
- Alarm event exporting to disk
- SMTP email
- Execution of external program
- Shut down clients

Liebert SiteScan® is a centralized site monitoring system which ensures maximum visibility and availability of critical operations. 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.

VERTIV™ TRELLIS™ PLATFORM

Vertiv's Trellis platform is a realtime infrastructure optimization platform that enables the unified management of data centre 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.

Customer Experience Center

Vertiv™ state-of-the-art Customer Experience Center located in Castel Guelfo (Bologna - Italy), enables our customers to experience first-hand a wide variety of data center technologies, supported by constant consultation from R&D and engineering specialists.

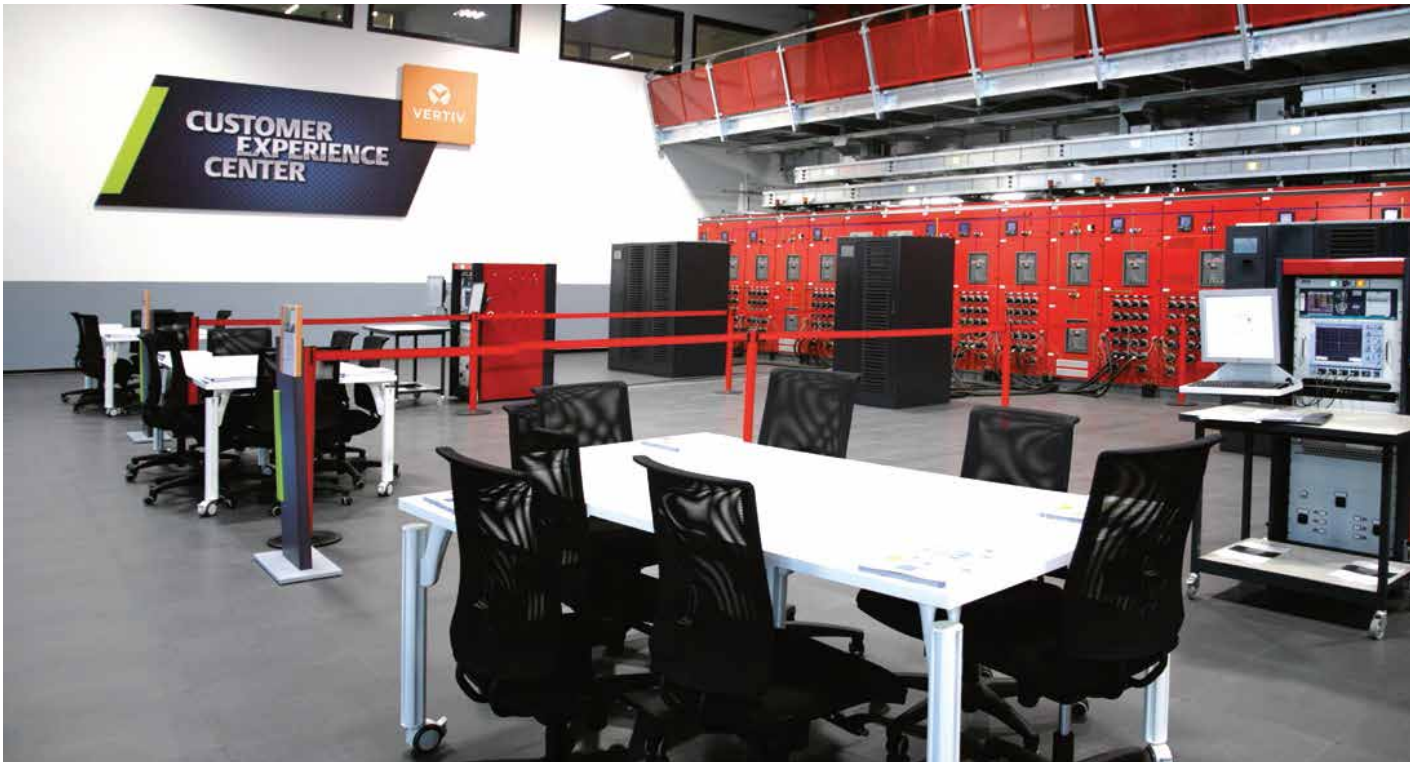
Customers visiting the center will be able to witness pre-installation demonstrations, covering the technical performance, interoperability and efficiency of Vertiv UPS systems under real field conditions. These processes can be experienced from the facility's control room, where real-time performance measurements and reporting will be available while providing full visibility of the demonstration area. The center can host simultaneous tests at full load of up to 4000 A.

The customer validation area specifically dedicated to UPS consists of four testing stations, each one providing up to 1.2 MVA of capacity. Testing includes individual modules, as well as complete power systems, with the added possibility of the customer's switchgear support systems being connected, thus guaranteeing smooth, rapid installation and commissioning of large power systems.

Testing is also customized based on the complexity, size and number of UPS components in the configuration.

Our Customer Experience Center offers three validation experiences:

- **Demo** - carried out on new products to demonstrate UPS performance
- **Standard** - validation test showing UPS standard technical perfor mances in compliance with UPS catalogue and IEC 62040-3 standards
- **Customized** - session tailored to validating customer's specific technical performance needs.



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VERTIV.

Liebert® EXL S1 Specifications

TECHNICAL SPECIFICATIONS											
UPS Rating (kVA)	**100**	**120**	**160**	**200**	**300**	**400**	**500**	**600**	**800**	**1000**	**1200**
Output active power at 35 °C*(kW)	100	120	160	200	300	400	500	600	800	1000	1200
Output active power at 40 °C (kW)	90	108	144	180	270	360	450	540	720	900	1080
INPUT											
Nominal mains input voltage / voltage range* (V)	400 (200 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±10%(60 selectable)										
Input Power Factor	≥ 0.99										
Input current distortion (THDi) (%)	≤3										
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	Complies with IEC/EN 62040-3, Class 1										
• dynamic											
Output frequency stability	±2 (2, 3, 4, 5 selectable)										
• synchronized with bypass mains (%)	±0.1										
• synchronized with internal clock (%)											
Inverter Overload Capacity*	110% continuous, 125% for 10mins, 150% for 1min										
Short circuit current for 200 ms	2.2 In										
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 100-500 kW							Not included 600-1200 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)	65		67		69		71	76		78	
	64 dBA @partial load		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)										
AC/AC efficiency:											
• VFI according to IEC/EN 62040 definition (%)	up to 97%										
• VFD according to IEC/EN 62040 definition (%)	up to 99%										
DIMENSION AND WEIGHT											
Height (mm)	1950										
Width (mm)	500		750		1000		1250	2000		2650	
Depth (mm)	900										
Net Weight (kg)	370		510		725		990	1550		2275	

*Conditions apply

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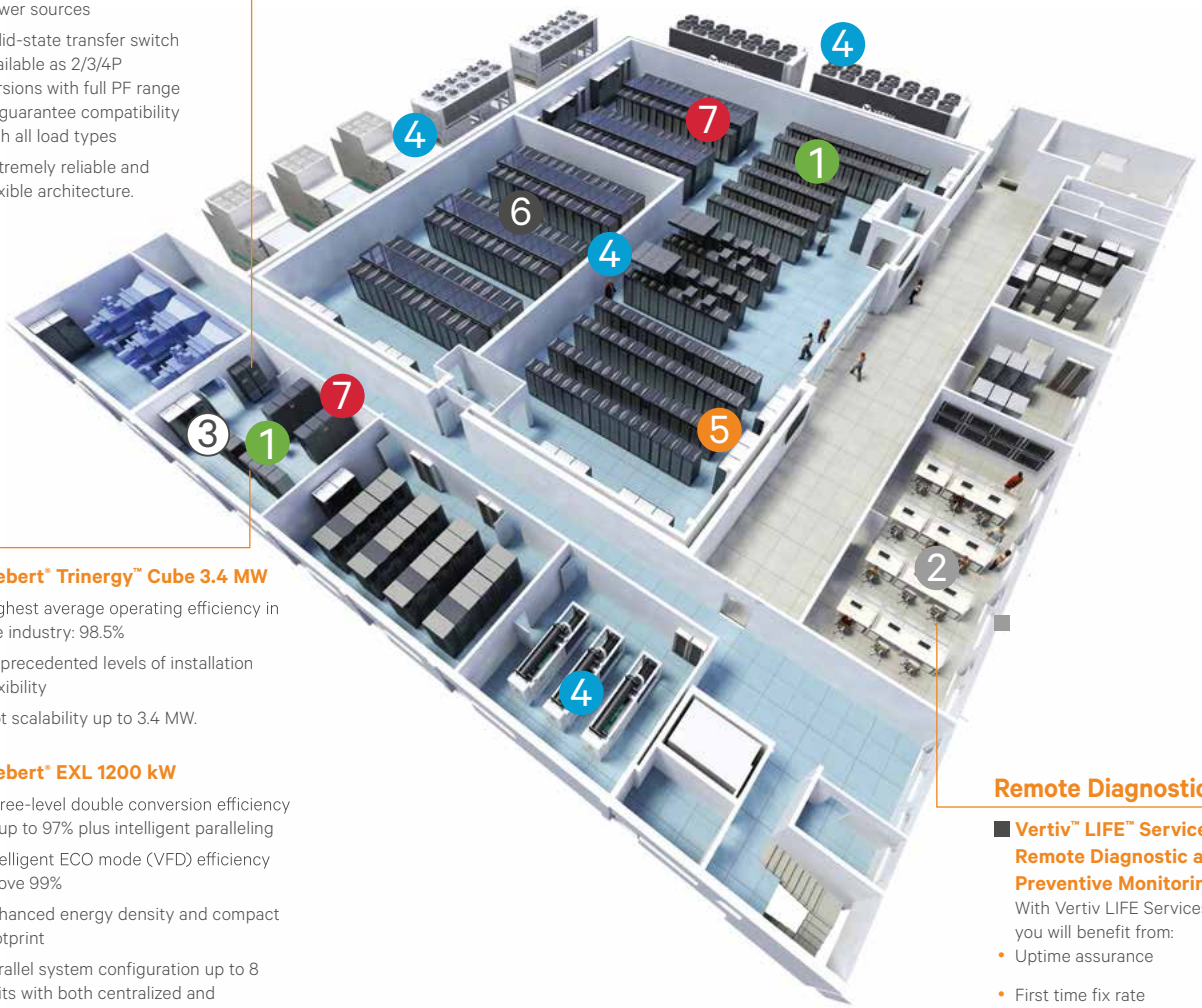
Data Center Infrastructure for Large Applications

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.



UPS

Liebert® Trinergy™ Cube 3.4 MW

- Highest average operating efficiency in the industry: 98.5%
- Unprecedented levels of installation flexibility
- Hot scalability up to 3.4 MW.

Liebert® EXL 1200 kW

- Three-level double conversion efficiency of up to 97% plus intelligent paralleling
- 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® NXL 800 kVA

- UPS for critical high power applications
- Provides greater power capacity along with superior reliability
- Meets power requirements and energy efficiency in high availability data centers.

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.

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