



LIEBERT® TRINERGY™ CUBE

from 400 kW to 1.6 MW

Beyond the Power Revolution



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.

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 **28**
 Service Centers **250+**
 Service Field Engineers **2,650+**
 Technical Support/Response **300+**
 Customer Experience Centers/Labs **16**

<p>US AND CANADA Manuf. and Assembly Locations 13 Service Centers 100+ Service Field Engineers 850+ Technical Support/Response 120+ Customer Experience Centers/Labs 4</p>	<p>LATIN AMERICA Manuf. and Assembly Locations 1 Service Centers 20+ Service Field Engineers 240+ Technical Support/Response 20+ Customer Experience Centers/Labs 2</p>	<p>EUROPE, MIDDLE EAST AND AFRICA Manuf. and Assembly Locations 9 Service Centers 70+ Service Field Engineers 590+ Technical Support/Response 90+ Customer Experience Centers/Labs 5</p>	<p>ASIA PACIFIC Manuf. and Assembly Locations 5 Service Centers 60+ Service Field Engineers 970+ Technical Support/Response 80+ Customer Experience Centers/Labs 5</p>
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Liebert® Trinergy™ Cube



Liebert Trinergy Cube 1600 kVA/kW

Standard Features

- Hot-serviceable 400 kW power cores
- Dynamic Online (VI) mode
- Redundant DC variable speed fans
- Transformer-free design
- Up to 99% efficient
- Unity/Symmetrical power factor
- 100 kA short circuit withstand rating
- Backfeed disconnect
- Advanced status-at-a-glance 12-inch touchscreen control panel
- Lithium-ion battery compatible
- Parallel up to 8 units
- Top and bottom entry cable access
- Front and top only service access
- Circular redundancy mode
- Accepts distributed or common battery systems

Optional Features

- Hot-scalable 400 kW power cores
- Internal N+1 redundancy
- Single input jumpers
- DC battery ground fault detection
- Distributed paralleling
- Seismic anchoring kit
- Load bus synchronization
- Emergency Power Off
- Unity communications card allowing dual simultaneous protocols
- Remote alarm status panel
- FCC Part 15 compliance
- Common battery system DC switchboard

Overview

Trinergy™ Cube is a modular, hot-scalable, transformer-free UPS that features optimized, industry leading footprint and power density, excellent operating efficiency and robust electrical protection to achieve superior cost savings.

Key Benefits

- Add power cores as business demands grow
- High system availability by design
- Space-saving design minimizes footprint
- Maximizes power density
- Maximizes active power capacity
- Reduces operating expenses
- Drives down cost of ownership
- Easy to service and install
- Flexible configurations
- Eliminates upstream electrical disturbances
- Ensures robust power protection
- Compatible with modern electrical loads
- Delivers proactive remote services
- Intelligent and secure control is customizable by user
- Flexible energy storage options

“We needed to create a future-proof data center, achieved through using security, power supply and cooling infrastructure that was capable of preventing any kind of interruption or fault so that we could continue to provide an efficient and prompt service to all our clients”

Nicola Gallico, Head of Networks at Welcome Italia

With Vertiv™ Services, your critical systems are fully maintained and protected throughout their entire lifecycle. Proactive support extends the life of your power systems, decreases your capital investment, optimizes system efficiency and effectiveness, and increases overall system availability.

Availability - Uptime Enhancement

Liebert® Trinerger™ Cube makes your mission critical space a peaceful place through its advanced diagnostic capability, data tracking, measuring and logging, as well as predictive maintenance and event analysis features. Combined with a fault tolerant architecture, concurrent maintainability and hot scalability, Liebert Trinerger Cube guarantees continuous operation and premium protection.

Key availability features

- **Remote Diagnostics:**

Vertiv™ LIFE™ Remote Diagnostic and Preventive Monitoring Services provides continuous insight into critical power and cooling equipment operation to improve performance, streamlines service processes for faster issue resolution, and adds deep equipment and service expertise to any organization without overhead.

- **Predictive Maintenance:**

Liebert Trinerger Cube together with Vertiv LIFE Services is capable of verifying the health of its IGBT, capacitors, fans, contactors and batteries to determine maintenance needs and ensure critical continuity.

In fact, LIFE Services connects critical systems with Vertiv engineers who continuously monitor and analyze real-time operating data to identify trends, predict behaviors, and respond immediately to out-of-norm conditions, either resolving issues remotely or dispatching a field engineer within minutes. The result is a connected service experience that leverages data and expertise to optimize equipment performance and maximize availability.

- **Event Analysis:**

Precise event tracking, allows the detection of external phenomena that have the potential of impacting data center availability.

- **Data Logging:**

Liebert Trinerger Cube is capable of capturing all relevant data from efficiency to uptime parameters. Access to this information allows data center managers to control their physical space, optimize its usage and independently calculate PUE.



Sizing Your System

Scalable up to 12.8 MW; the highest active power rating available thanks to three dimensional modularity: Vertical, Horizontal and Orthogonal.

Vertical Modularity

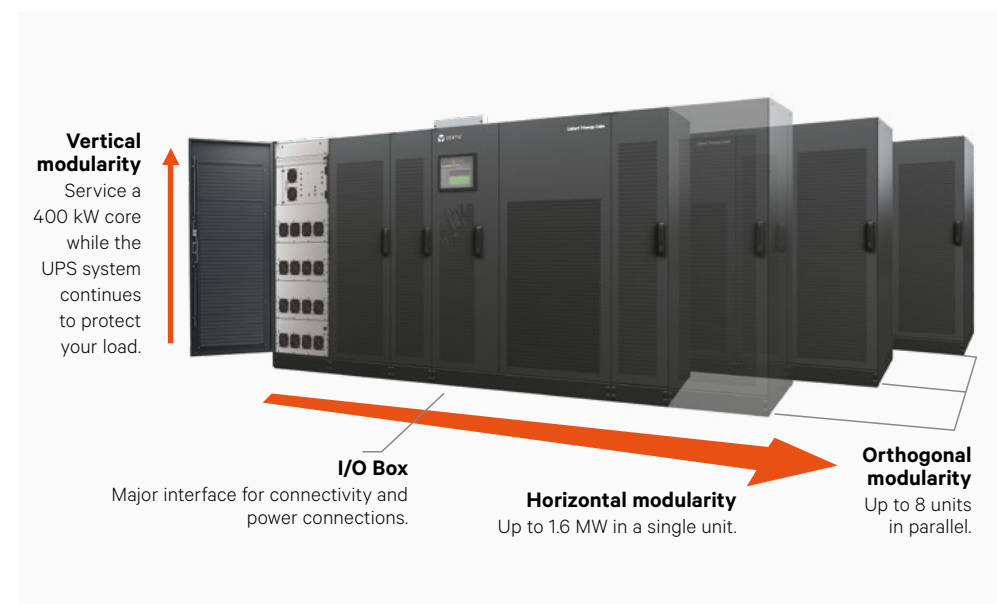
The stacked drawers in each core can be individually extracted for service purposes while the UPS continues to protect your load.

Horizontal Modularity

Liebert® Trinerger™ Cube can scale up to 1.6 MW in power by adding complete cores (UPS modules) side-by-side and around the input/output power section.

Orthogonal Modularity

Is the ability of Liebert Trinerger Cube to work with up to 8 complete UPS (fully populated with cores) in parallel.



Optimized TCO

Continuous availability, unparalleled operating efficiency, optimized installation space, smart capacity and minimized electrical infrastructure costs, make Liebert® Trinerger™ Cube the ultimate UPS solution with an optimized TCO and rapid return on investment.

Liebert Trinerger Cube is the only unit in the market which allows for **hot scalability from 400 kW to 1.6 MW in a single UPS**, thus providing significant electrical infrastructure and space savings. Furthermore, its high power density running up to 400 kW per core, allows customers to maximize the number of racks and servers housed in their data center, thus granting more space for IT equipment.

Liebert Trinerger Cube's highly efficient technology and TCO capabilities also come from Vertiv's expertise in the area of thermal management. An in-depth study of the **ventilation system and internal aerodynamics of the unit** has brought extraordinary results in terms of power density and power adaptability for efficient operation in all climates.

Minimal Carbon Footprint

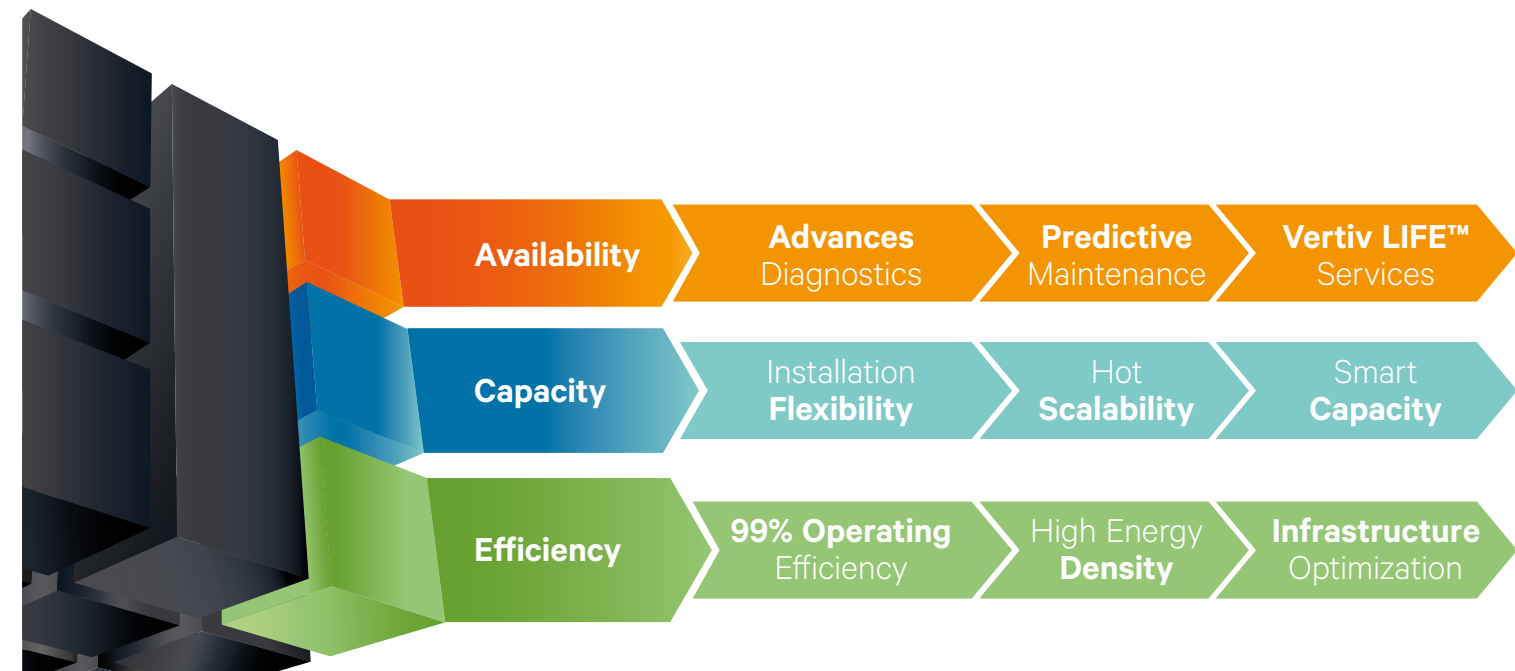
Liebert Trinerger Cube's new generation architecture has been designed to **reduce energy and heat dissipation, thus minimizing the demand and consumption of air conditioning systems.**

The combination of these factors, coupled with its 99% maximum efficiency, 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.

“As a company in the field of climate research it was of particular importance for us to find a solution that reduces energy consumption” Because of its high efficiency and low energy losses, Liebert Trinerger Cube achieves significant savings of carbon dioxide emissions, and that was a determining factor when making the decision.

Ulf Garternicht, Project Manager & Head of Department at DKRZ



Capacity & Installation Flexibility

With its high power density cores, Liebert® Trinergy™ Cube is the only static, hot-scalable UPS today able to reach up to 1.6 MW in a single unit, thus allowing extraordinary flexibility and capacity levels.

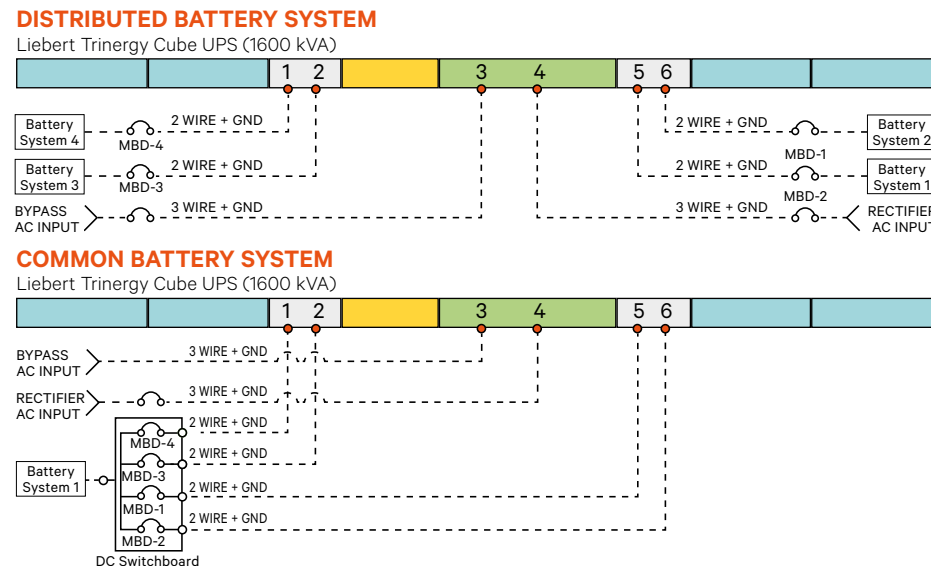
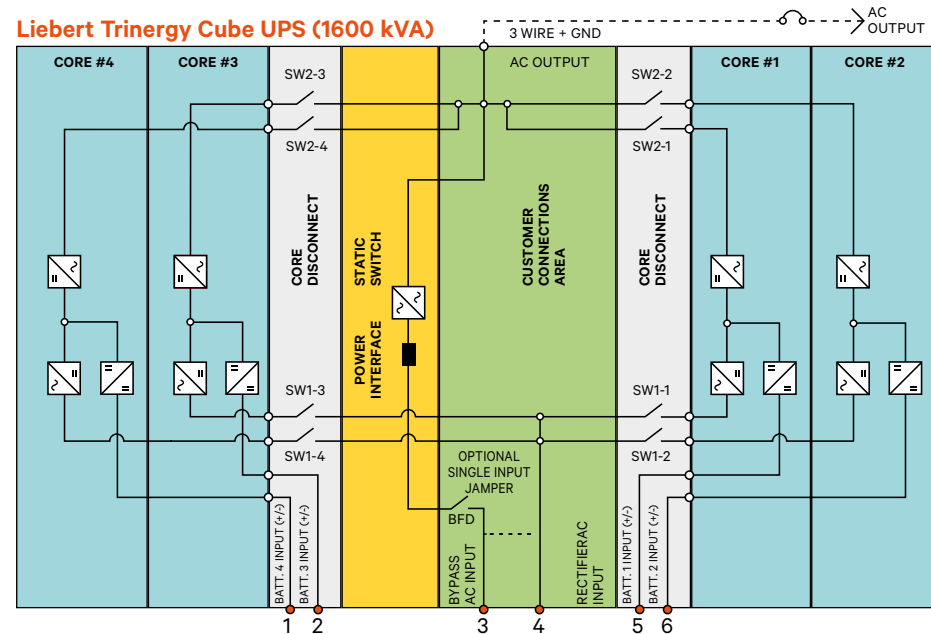
Furthermore, its new generation architecture and connection types allow Liebert Trinergy Cube to deliver unprecedented levels of installation flexibility.

The system can thus be configured in a vast range of layouts, whether it be a **straight row, L-shape or back-to-back**, the system easily adapts to available floor space.

The Liebert Trinergy Cube architecture and flexibility features deliver **significant infrastructure upgrade cost savings**, easily adapting to new or existing installations without impacting power infrastructure.

This is possible through:

- **Hot scalability** - minimized initial investment (CAPEX), adding power cores as business demands grow
- **Distributed parallel capabilities**
- **Simplified cable routing** with unlimited input/output power connection availability
- **Three dimensions of modularity** for maximum capacity or redundancy
- **Smart Capacity** - adapting required power to meet the specific installation conditions in terms of climate management and circuit breaker size
- **Three-wire**, single or dual input without footprint impact
- **Seismic compliance** - ensuring power protection in any geographical location from California to Japan.



Smart Capacity Adaptive Performance

Liebert Trinergy Cube **intelligently adapts load power supply** to respond to the environmental conditions of the installation site. The system's I/O Box and cores are rated to operate continuously up to 55°C and provide increased performances down to 20°C.

Furthermore, **the maximum input current is adjustable to meet specific protection rating requirements.** Liebert Trinergy Cube's smart capacity ensures the best possible usage of physical infrastructure, providing maximized power to the load and optimizing each individual configuration based on the specific site conditions.

Unparalleled Efficiency

Liebert® Trinergy™ Cube delivers an unparalleled efficiency above **99%**, thus reducing operating costs to a minimum.

The unparalleled 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
- Hot-scalable power cores
- Three dynamic functioning modes: VFI, VFD, Dynamic Online (VI)

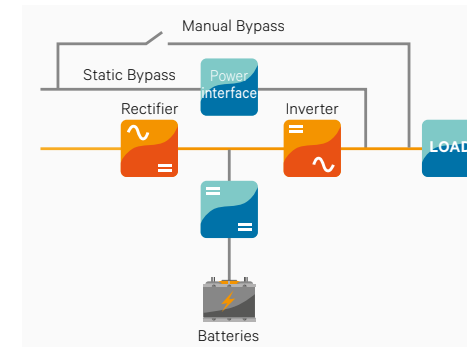
The seamless activation of Liebert Trinergy Cube's functioning modes ensures the highest level of efficiency without compromising power quality and availability.

Dynamic Online mode ensures IEC 62040-3 Class 1 output performance under most stringent conditions:

- Network fault (voltage variation, high/low impedance mains failures)

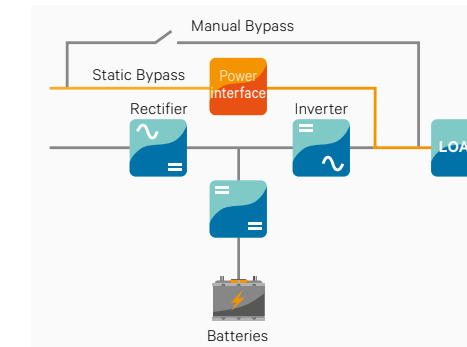
- Load fault (short circuit downstream of the UPS)
- Type of load connected (PDU transformer).

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



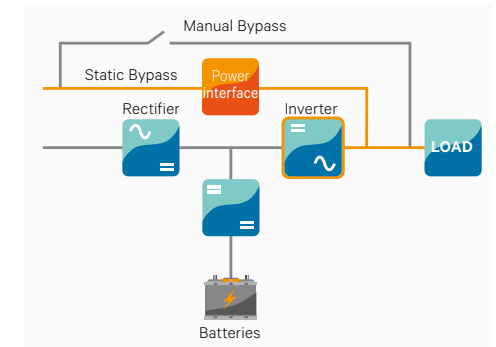
Maximum Power Control (VFI)

Provides the highest level of power conditioning and protects the load from all electrical network disturbances.



Maximum Energy Saving (VFD)

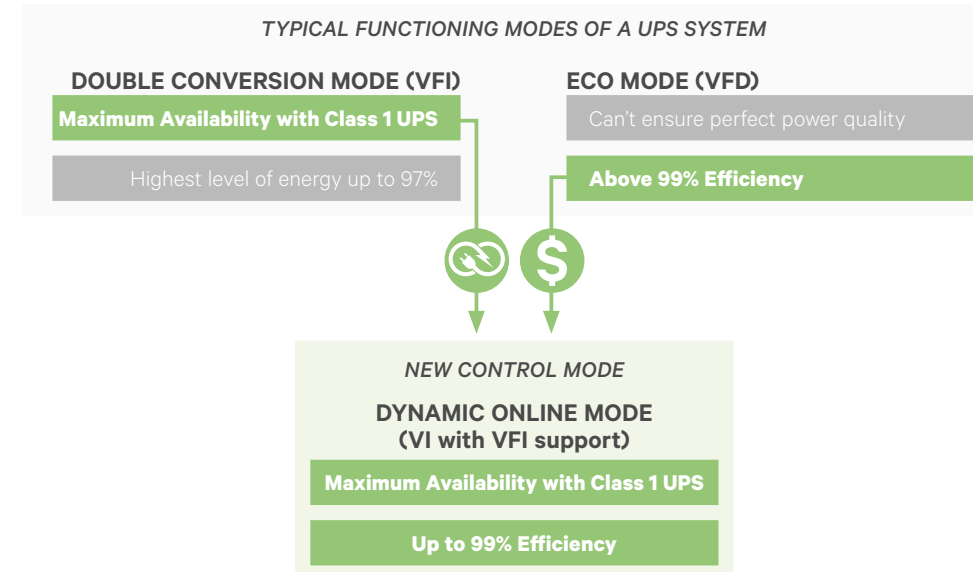
Detects when conditioning is not required and allows the energy to flow through the bypass line.



Dynamic Online, High Efficiency & Power Conditioning (VI)

Compensates the load THDi, PF and main sags and swells, ensuring Class 1 transfer output performance.

Dynamic Online mode: No more availability tradeoff with efficiency



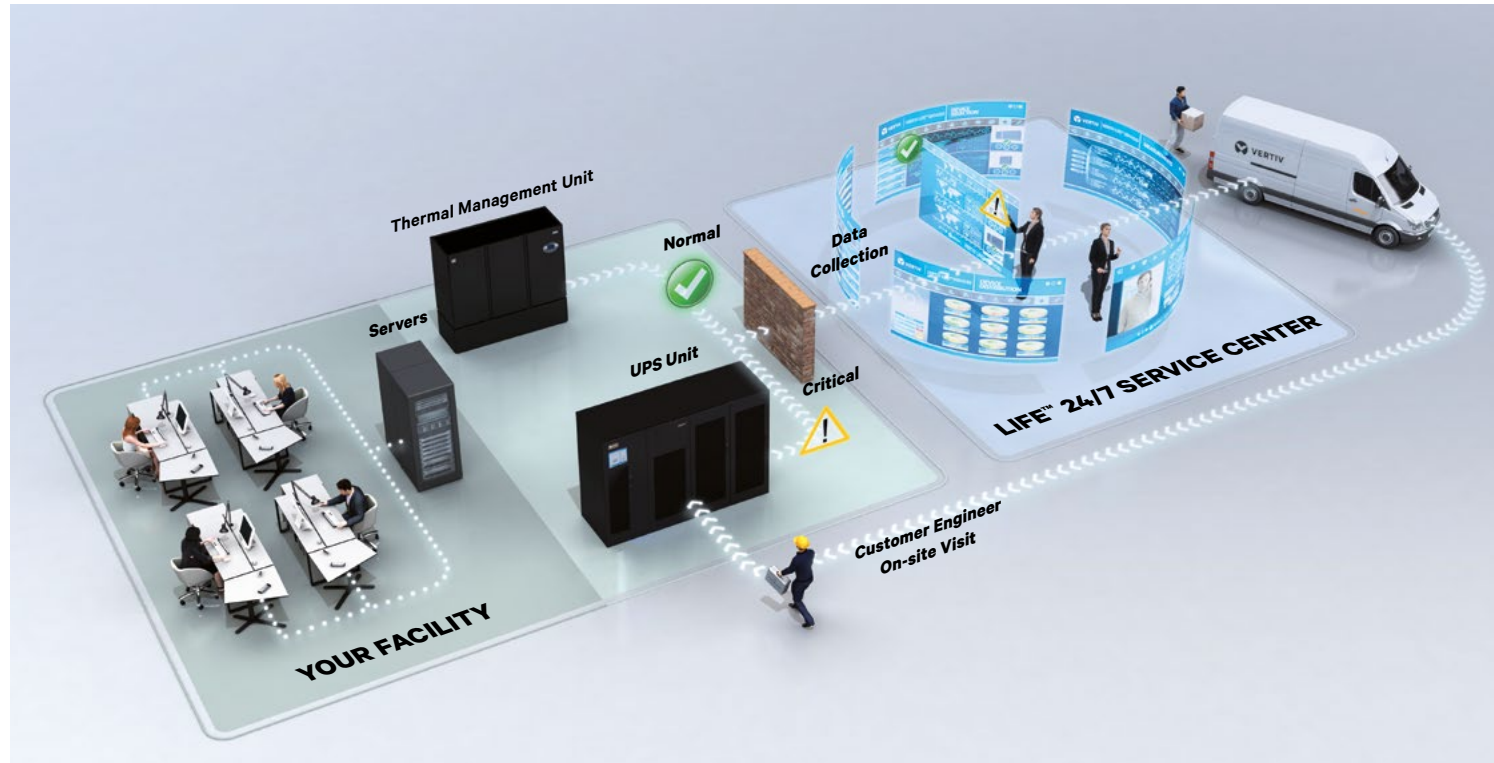
Dynamic Online mode is the latest high efficiency mode of operation offered by Vertiv, developed for those that do not want to trade off any level of availability for incremental gains in efficiency.

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.**

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. Vertiv LIFE Services leverages the embedded intelligence in your equipment, IoT technology, and the expertise and resources of our service organization to deliver a connected service experience that optimizes equipment performance and reliability, reduces downtime and minimizes overhead costs.



Maintain optimum performance:

Continuous data-driven expert analysis of critical power and cooling systems enables ongoing maximization of equipment reliability and efficiency.

Reduce downtime:

Remote diagnostics and direct connection to field service provide the fastest possible reaction and resolution, improving first-time fix rates and time-to-repair.

Minimize overhead:

LIFE Services is a cost-effective approach to ensuring the availability and performance of critical systems, providing deep expertise and fast response without having to dedicate on-site personnel to monitor and manage equipment service.

Customer Monitoring Interfaces

LCD Touchscreen Features

- High security access with separate password levels for users and service engineers
- User-friendly graphical interface
- Single-line mimic diagram showing system status
- Contemporary dashboard-style indicators for major system values and conditions
- Automatic charting display for logged power and environmental data.

Hardware Connectivity

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

- Native LIFE™ Card provides optional real-time monitoring of UPS performance via LIFE over IP, PSTN, or GSM.
- Integration of UPS with Building Monitoring and Automation Systems via BACnet IP, BACnet MSTP, Modbus TCP, Modbus RTU, SNMP or YDN23 is available with optional Liebert® IntelliSlot™ Unity™ Card.

Software Connectivity

Vertiv™ Nform™ will monitor the Liebert Trinerger Cube 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, Vertiv Nform enables:

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

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

The optional Liebert® IntelliSlot™ SiteScan® Web Protocol Card provides a ground-fault-isolated EIA-485 Liebert Protocol connection to a Liebert SiteLink-E™, which allows Liebert SiteScan Web monitoring and control of your Liebert equipment.

Vertiv™ Trellis™ Platform

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

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

The Vertiv 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.

The future of service is connected and it's available today through Vertiv LIFE Services.

Global presence for a close partnership. Everywhere.

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.

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



Delaware, US Power Test Center

- **4.000+** m², including **260+** m² customer observation suite
- **7** test bays, each containing multiple distinct test stations
- **800+** tour 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**

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
- **4** testing stations, each providing up to 1.2 MVA of capacity = total 2.5 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.

Shenzhen, China Power Test Center

- **100+** Customers every year
- From **25+** countries
- **5+** people dedicated
- **180 m²** Witness Testing
- **60 m²** Showroom
- **4** testing stations, each providing up to 1.2 MVA of capacity = total 2.5 MW
- **100+** 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® Trinergy™ Cube Specifications

Technical Characteristics	
UPS Rating (kVA)	400 to 1600
Output Active Power (kW)	400 to 1600
Input AC Parameters	
Input Voltage to Rectifier/Bypass (VAC)	480, 3-phase, 3-wire
Permissible Input Voltage Range	+10%, -10%
Input Frequency (Hz)	60 ± 5Hz
Input Power Factor	≥ 0.99
Input Current Distortion (THDI) at Nominal Voltage at Full Load (%)	≤ 3.0
Power Walk-In (seconds)	1 to 90 (selectable in 1 second increments)
Internal Backfeed Protection	Yes
Input connection	Single or dual feed
Short circuit withstand rating (kA)	100
Battery & DC Parameters	
Battery Type	Vertiv HPL, Lithium ion, VRLA (Valve Regulated Lead Acid), VLA (Vented Lead Acid)
Nominal Battery Bus (VDC) / Battery Float Voltage (VDC)	480 / 540
DC Ripple at Float Voltage	< 1.0% (RMS value) < 3.4% Vpp
Temperature Compensated Battery Charging	Standard with Vertiv™ VRLA Battery Cabinets
Output Parameters	
Load Power Factor Supported (Without Derating)	0.7 Leading to 0.4 Lagging
Output Voltage (VAC)	480, 3-phase, 3-wire
Output Voltage Regulation (%) / Output Voltage Regulation (50% Unbalanced Load) (%)	< 1.0 (3-phase RMS average) / < 2.0 (3-phase RMS average)
Output Frequency (Hz)	60 ± 0.1%
Output THD at Nominal Voltage (Linear Load) (%)	≤ 1.5 (RMS value)
Output THD at Nominal Voltage including a 100kVA Non Linear Load per IEC 6204-3 (%)	≤ 5.0 (RMS value)
Transient Recovery 100% Load Step / 50% Load Step / Loss of/Return to AC Input Power	±4% / ±2% / ±2% (RMS average for one cycle)
Voltage Displacement (Balance Loads) / Voltage Displacement (50% Balance Loads)	120 deg ±1 deg / 120 deg ±2 deg
Overload at Nominal Voltage and 77°F (25°C)	110% continuously, 125% for 10 minutes, 150% for 60 seconds, 200% for 200 milliseconds
Overload in Bypass Operation at 104°F (40°C)	110% continuously, 125% for 10 minutes, 150% for 60 seconds, 700% for 600 milliseconds, 1000% for 100 milliseconds
Efficiency	
Double conversion mode	Up to 96.8%
Dynamic Online mode	Up to 99%
ECO mode	Up to 99.2%
Physical Characteristics	
Dimensions for Core 400 kW, W x D x H (In)	26.8 x 36.1 x 77.0
Dimensions for Core Disconnect (connects up to two Cores to I/O Box), W x D x H (In)	16.8 x 36.1 x 80.3
Dimensions for I/O Box 2400A, W x D x H (In)	62.2 x 36.1 x 80.3
Weight for Core 400 kW (lb)	1300
Weight for Core Disconnect (connects up to two Cores to I/O Box) (lb)	435
Weight for I/O Box 2400A (lb)	2050
Color	Black, RAL 7021
Protection Class, UPS Enclosure	NEMA 1, IP 20 (with and without front door open)
Environmental	
Operating Temperature	32°F to 131°F* (0°C to 55°C*)
Relative Humidity	0% to 95%, non-condensing
Operating Altitude	Up to 3300 ft (1000 m) without derating
Heat Dissipation at Full Load in VFI (BTU/h)	52440 (400 kW per Core)
Airflow at Full Load in VFI (CFM)	up to 3225 (per 400 kW Core)
Paralleling	Up to 5 cores (4 cores for capacity and 1 core for redundancy) in one unit, up to 8 units in parallel
Hot Swappable core	Yes
Communications	
Control panel	Multifunction 12-inch Color Touchscreen
Options	2 Liebert® Intellislots
Card Compatibility	IS-UNITY-DP, IS-485EXI
Protocols	BACnet IP, BACnet MSTP, Modbus TCP, Modbus RTU, SNMP, YDN23, LIFE™ Services
Inputs/outputs	8/12 Programmable (Form C)
Standards	
Transportation / Safety	ISTA Procedure 3B / UL 1778 5th Edition; CSA 22.2 NO 107.3
EMI / Surge	IEC 62040-2; FCC Part 15, Class A / ANSI C62.41, Category B3
Seismic	IBC 2015, CBC 2016, ASCE, OSHPD
Options	
Vertiv HPL Lithium Battery	
Vertiv VRLA Battery Cabinets	
DC battery ground fault detection	
Single input jumpers	
Seismic anchoring kit	
Emergency power off	
Load bus synchronization	
Remote alarm status panel	
FCC Part 15 compliance	
System-level factory witness testing	
Common battery system DC switchboard	

* Conditions apply.



Vertiv.com | Vertiv Headquarters, 1050 Dearborn Drive, Columbus, OH, 43085, USA

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SL-30830 (R010/20)