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

US AND CANADA
Manuf. and Assembly Locations 13
Service Centers 100+
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 240+
Technical Support/Response 20+
Customer Experience Centers/Labs 2

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

ASIA PACIFIC
Manuf. and Assembly Locations 5
Service Centers 60+
Service Field Engineers 970+
Technical Support/Response 80+
Customer Experience Centers/Labs 5
Liebert® Trinergy™ Cube

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

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.

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
Availability - Uptime Enhancement

Liebert® Trinergy™ 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 Trinergy 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 Trinergy 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 Trinergy 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.

“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
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® Trinary™ 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 Trinary Cube to work with up to 8 complete UPS (fully populated with cores) in parallel.
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)

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.

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.
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 Trinergy 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

Liebert Trinergy 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 Trinergy 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.

**Optimized TCO**

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

**Minimal Carbon Footprint**

Liebert Trinergy 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.
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.

The future of service is connected and it’s available today through Vertiv LIFE Services.
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® Trinergy™ 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 Trinergy 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.
## 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% to -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:** < 10% (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
  - 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 1073
- **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**
- **Sesemical 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**