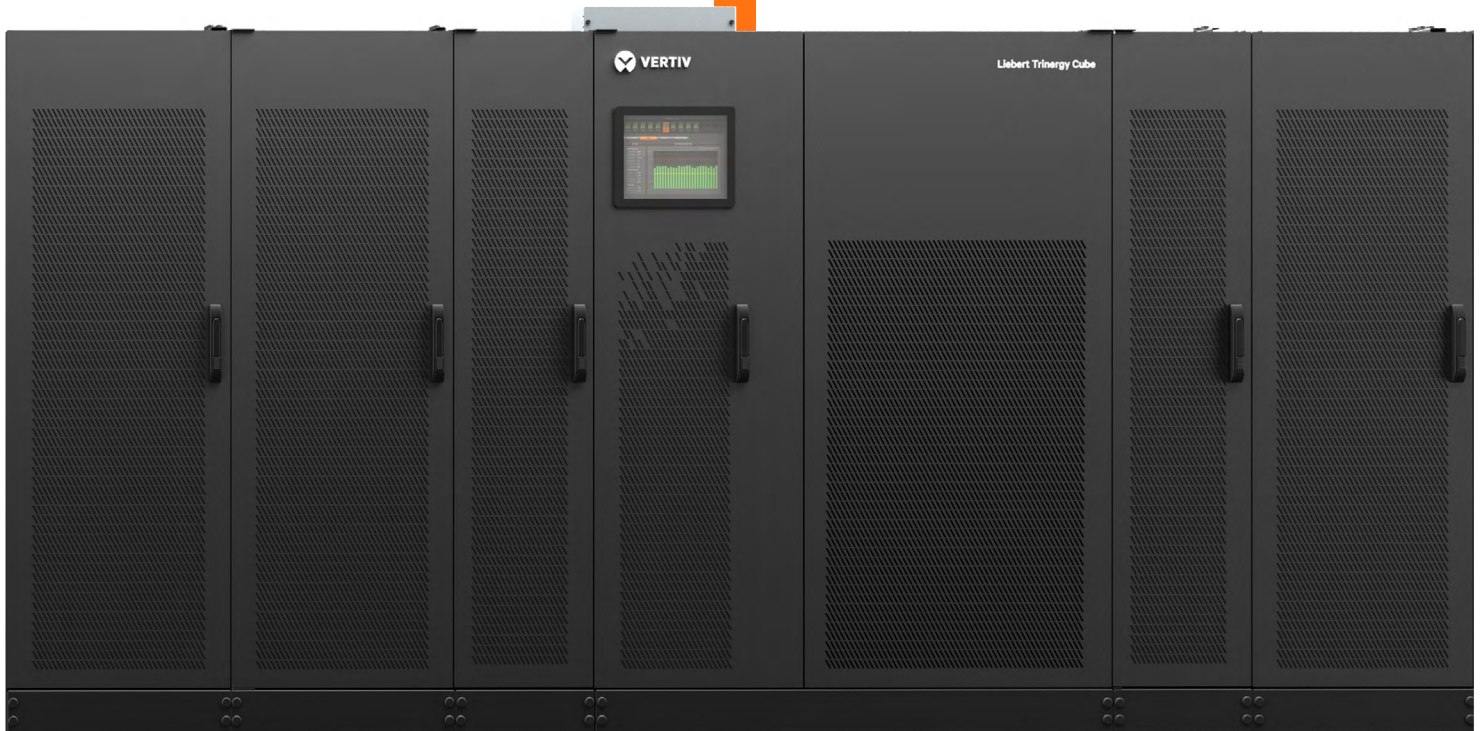




Liebert® Trinergy™ Cube

from 150 kW to 3.4 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.

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**

<p> US AND CANADA Manuf. and Assembly Locations 7 Service Centers 120+ 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 300+ Technical Support/Response 25+ Customer Experience Centers/Labs 2</p>	<p> 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</p>	<p> ASIA PACIFIC Manuf. and Assembly Locations 6 Service Centers 60+ Service Field Engineers 950+ Technical Support/Response 90+ Customer Experience Centers/Labs 5</p>
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Liebert® Trinergy™ Cube

The New Generation of Liebert Trinergy UPS Delivering Unsurpassed Performance to Enterprise Data Centers



Designed around your IT space, **Liebert Trinergy Cube** is ready to evolve with growing business demands.

It offers the highest level of power availability as well as reduced TCO, minimum energy consumption and CO₂ emissions.

Liebert Trinergy Cube boasts unparalleled features **delivering up to**

99% with dynamic online mode and power density per core running up to 200 kW or 400 kW.

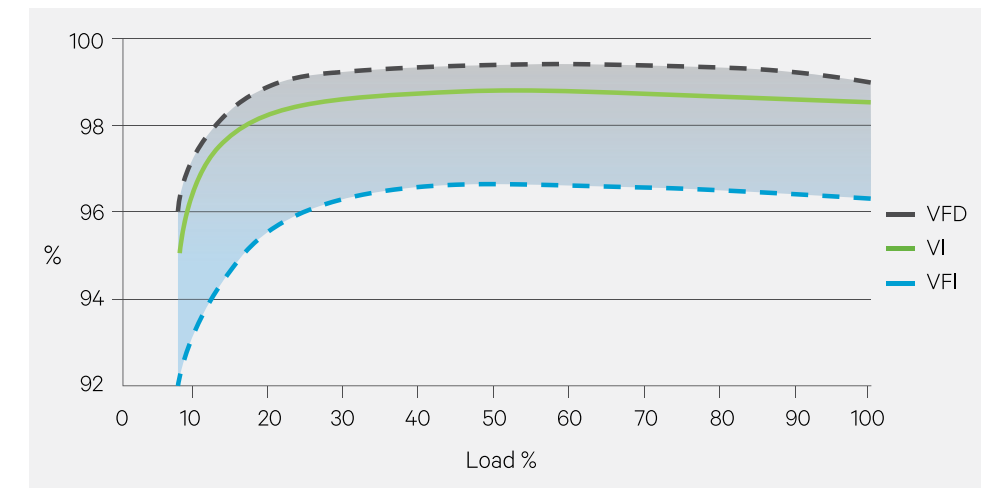
Its optimized efficiency at partial load conditions and hot scalability up to 3.4 MW means that **Liebert Trinergy Cube** delivers adaptability not available anywhere else in the market.

Liebert Trinergy Cube's hot scalability, allows it to meet any power system requirement from 150 kW up to 27 MW in parallel.

Liebert Trinergy Cube goes beyond the power revolution, to allow the greatest advantages in terms of availability, capacity and efficiency.

HIGHLIGHTS

- Dynamic online mode for highest availability and up to 99% efficiency
- Maximum efficiency in the industry: 99% with dynamic online mode
- Hot scalability up to 3.4 MW in a single unit and up to 27 MW in a parallel system
- Unprecedented levels of installation flexibility
- Smart capacity - adaptive power rating
- Li-ion battery option to adapt to all scenarios
- Vertiv™ LIFE™ Services Remote Diagnostic and Preventive Monitoring
- Optional integrated backfeed protection



Liebert® Trinergy™ Cube maximum efficiency up to 99.5%

Availability - Uptime Enhancement

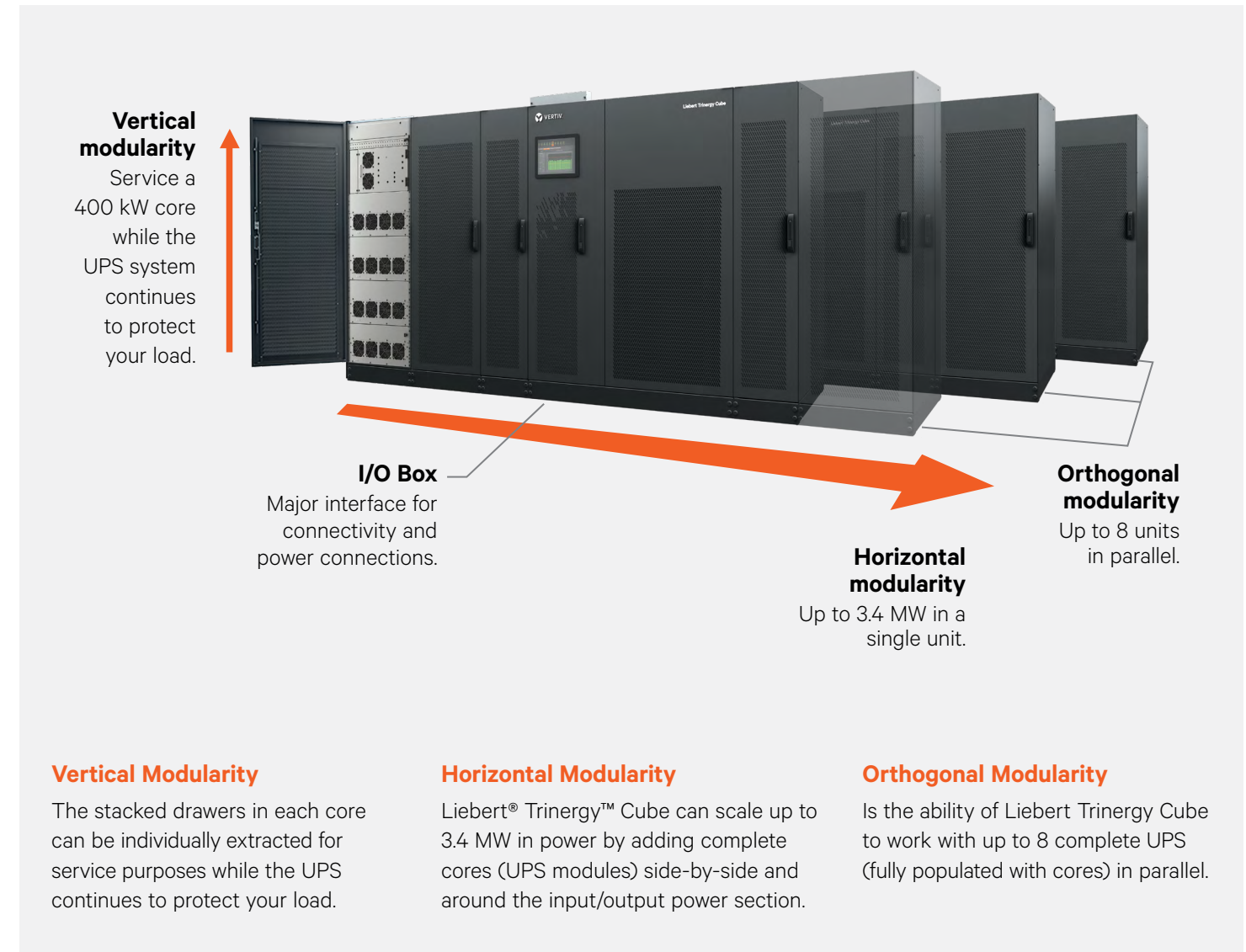
Liebert® Trinergy™ Cube makes your mission critical space a peaceful place through its advanced diagnostic capability, data tracking, measuring and logging, as well as predictive maintenance and event analysis features. Combined with a fault tolerant architecture, concurrent maintainability and hot scalability,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

Key availability features

- Remote Diagnostics:**
 Vertiv™ LIFE™ Services Remote Diagnostic and Preventive Monitoring, increases uptime and operational efficiency by continuously monitoring and tracking performance trends
- Predictive Maintenance:**
Liebert Trinergy Cube is capable of verifying the health of its IGBT, capacitors, fans, contactors and batteries to determine maintenance needs and ensure critical continuity
- 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.
- Event Analysis:**
 precise event tracking, waveform capturing and harmonic spectrum analyses allow the detection of external phenomena that have the potential of impacting data center availability

Sizing Your System

Scalable up to 27 MW; the highest active power rating available thanks to three dimensional modularity: Vertical, Horizontal and Orthogonal.



Liebert® Trinergy™ Cube LCD touch screen: interface for data tracking, logging and event analysis

Capacity & Installation Flexibility

With its high power density cores, **Liebert® Trinergy™ Cube** is the only static UPS today able to reach up to 3.4 MW in a single unit, thus allowing extraordinary 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.

Adaptability

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
- Centralized and distributed paralleled 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 and four wire - allowing effortless replacement of legacy equipment
- Seismic compliance - ensuring power protection is available in any geographical location from Italy to Japan.

SMART CAPACITY ADAPTIVE PERFORMANCE

Liebert Trinergy Cube

intelligently adapts load power supply to respond to the environment 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 **99%** maximum efficiency and up to 99.5% maximum efficiency, 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)

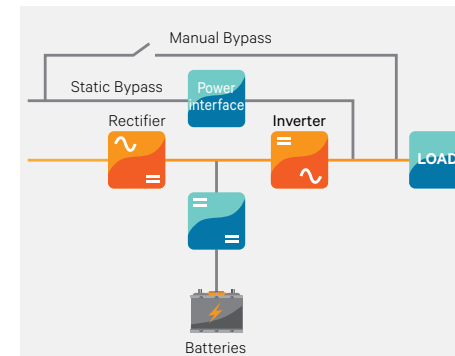
The seamless activation of **Liebert Trinergy Cube's** functioning modes ensures the highest level of efficiency without compromising power quality and availability.

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

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

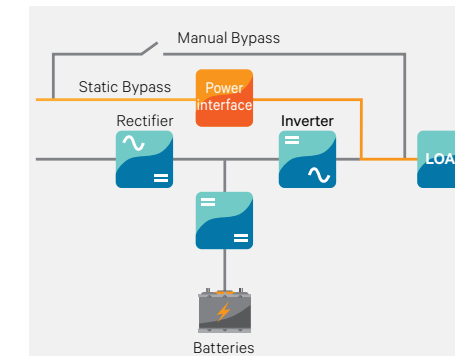
- Load fault (short circuit downstream of the UPS)
- Type of load connected (PDU transformer).

The unit is able to discriminate between the 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.



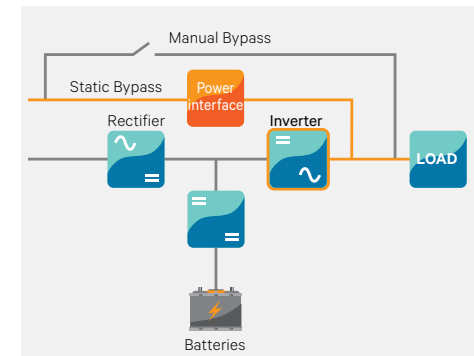
Maximum Power Control (VFI)

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 flow to pass through the bypass line.



Dynamic Online, High Efficiency & Power Conditioning (VI)

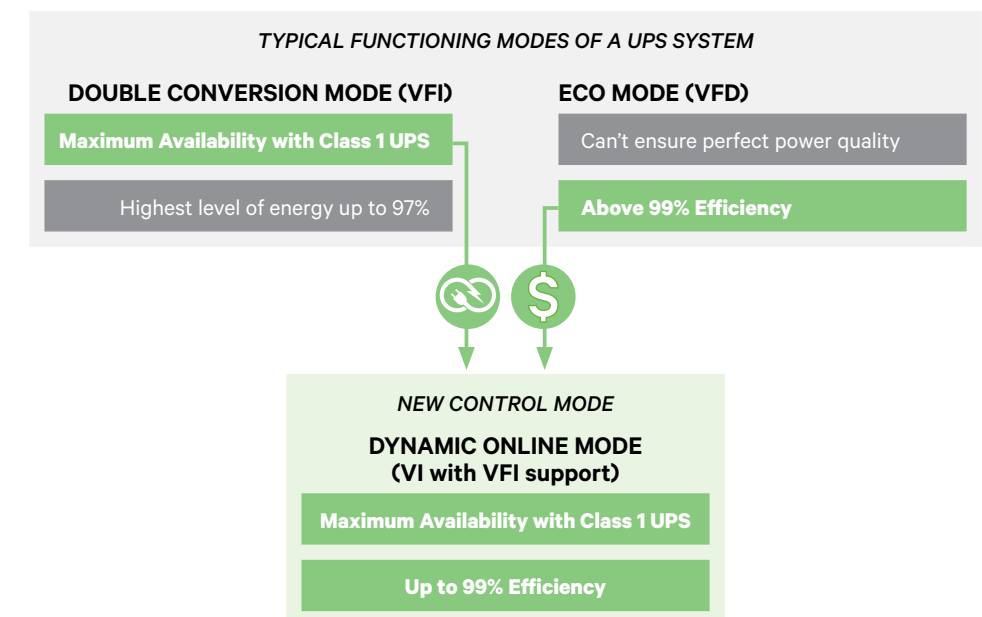
Compensates the load THDi, PF and main sags and swells, ensuring fast transfer output performance.

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.



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.

Liebert Trinergy Cube is the only unit in the market which allows for hot scalability from 150 kW up to 3.4 MW in a single UPS, thus providing significant electrical infrastructure and space savings. Furthermore, its high power density running up to 200 kW or 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.

NEUTRAL 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.

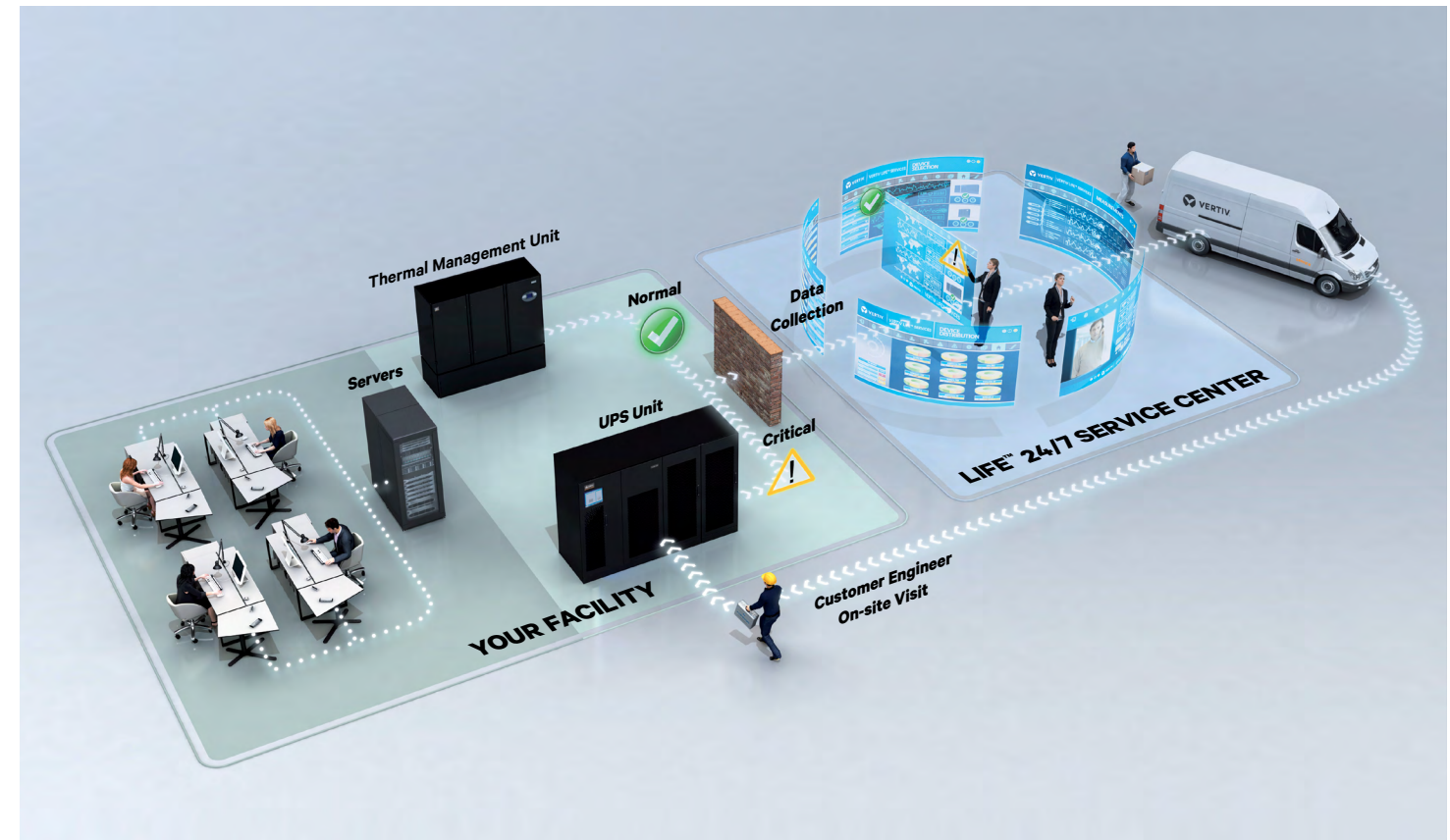
The combination of these factors, coupled with its 99% maximum efficiency, reduces CO₂ emissions to a minimum.

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.



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® Trinergy™ Cube** 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
- 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:

- 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® Trinergy™ Cube Specifications

Technical Specifications

System Range	150 kW - 27 MW
Core Adaptive Power Rating (kVA)	up to 200 / 400
Core Power Rating at 35°C (kW)	up to 200 / 400

General

Maximum Efficiency with Dynamic Online	99%
Maximum Efficiency	up to 99.5%
Airflow (m ³ /h)	up to 1450 (200 kW Core) / 2600 (400 kW Core)
Heat Dissipation at Full Load in VFI (kW)	7.7 (200 kW Core) / 15.4 (400 kW Core)
Paralleling	up to 10 cores in one unit, up to 8 units in parallel
Hot Swappable core	Yes
Withstand Rating (kAIC)	up to 100
Audible Noise (dB)	65 dBA (at partial load)
Altitude Max (m)	1000 m without derating
Operating Temperature (°C)	0-55

Input

Input Wiring	3 ph + N + PE, 3 ph + PE
Input Voltage Range (V)	200-480
Input Frequency Range (Hz)	45-65
Input Power Factor	0.99
Input THDi	3%
Soft Start Capability	Yes
Integrated Backfeed Protection Device	Optional

Output

Output Wiring	3 ph + N + PE, 3 ph + PE
Configurable Voltage Rating	380 V, 400 V, 415 V, 50/60 Hz
Permitted Load Power Factor	up to 1, any PF leading or lagging; crest factor up to 3:1
Output UTHD	<1.5% (100% linear load); <5% (reference non linear load)
Overload on Inverter	see Liebert Trinergy Cube APP dynamic specification
Short Circuit Current (A)	up to 650 A (200 kW Core) / 1300 A (400 kW Core)

General Characteristics

HMI	12-inch Color Touchscreen Including Web, SNMP, MODBUS/Jbus Protocols
Multi-language	Standard

Battery

Type	VRLA (Li-Ion, Pure Lead, Flywheel upon Request)
Charging Method	ABM Technology or Float
Battery Voltage Range	396-700

Dimension and weight

	(W x D x Hmm)	(Kg)
Core 200 kW	500 x 910 x 1950	465
Core 400 kW	675 x 910 x 1950	610
I/O Box 600 A	1150 x 910 x 1950	800
I/O Box 1200 A	1625 x 910 x 1950	1190
I/O Box 2400 A	2150 x 910 x 1950	1575
I/O Box 3000 A	3800 x 910 x 1950	Upon request
I/O Box 4000 A	2650 x 1820x1950 (back to back configuration)	Upon request
I/O Box 5000 A	3000 x 1820x1950 (back to back configuration)	Upon request

Accessories

	External Battery Cabinets with Long-life Batteries, Li-Ion Batteries, Pure Lead Batteries and Flywheel upon Request, Intellislot Connectivity, Maintenance Bypass Switch
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Communications

Slots	2 Intellislots
Protocols	SNMP, MODBUS TCP/IP, MODBUS RTU
Inputs/Outputs	9/8 Programmable

Compliance with Standards

Safety	IEC 62040-1, IEC 60950-1
EMC	IEC 62040-2
Performance	IEC 62040-3

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 test 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
- 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.



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: 99% with dynamic online mode
- Unprecedented levels of installation flexibility
- Hot scalability up to 3.4 MW.



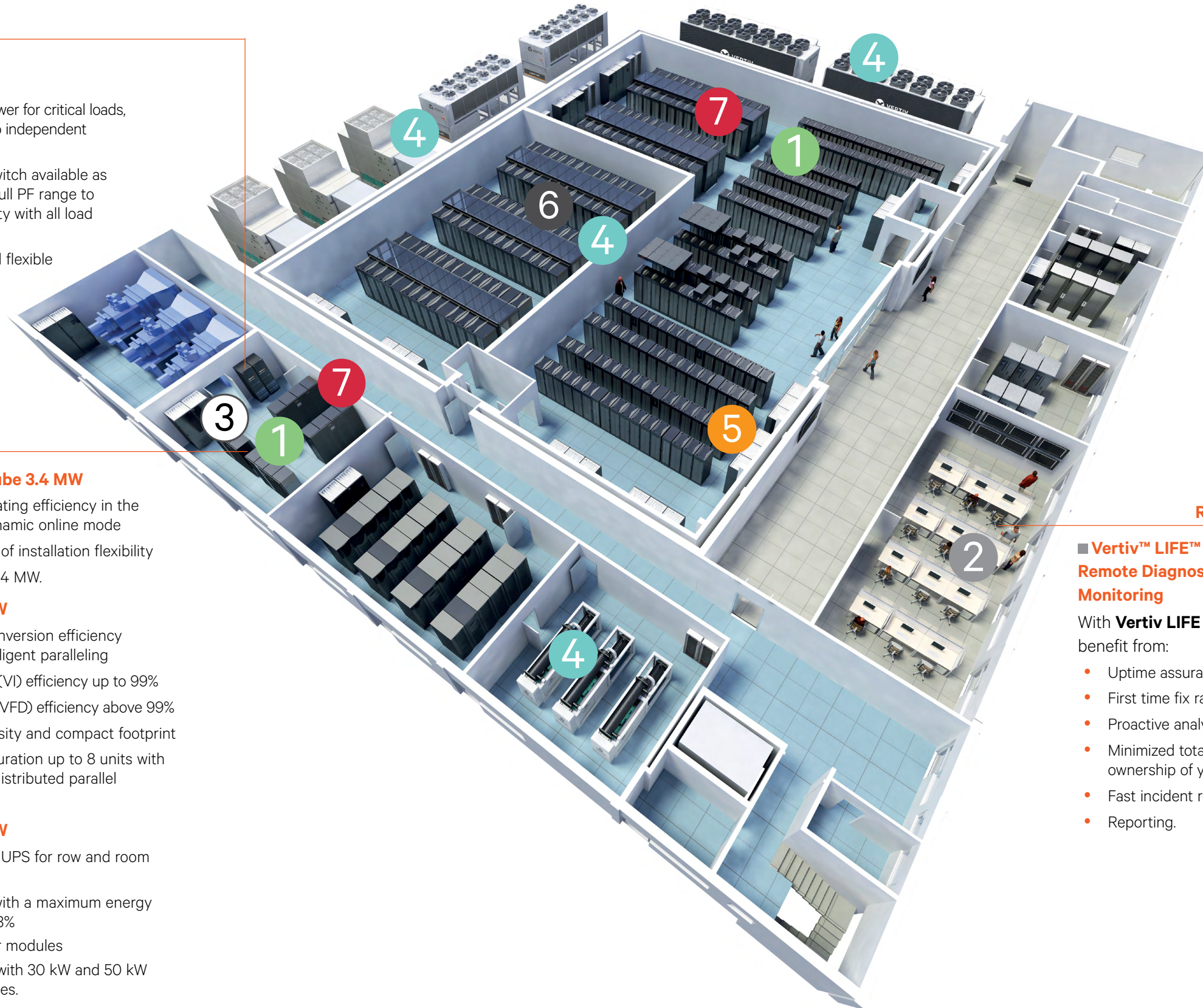
Liebert® EXL 1200 kW

- Three-level double conversion efficiency of up to 97% plus intelligent paralleling
- 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.



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

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.

