Vertiv™ Liebert®

APM Plus

50 to 500 kW

The Next Generation Versatile and Modular UPS Fit for Row and Room Applications



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 faced by 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 24,000 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 PRESENCE

GLOBAL PRESENCE
Manuf. and Assembly Locations **23**
Service Centers **290+**
Service Field Engineers **3,300+**
Technical Support/Response **250+**
Customer Experience Centers/Labs **14**

EUROPE, MIDDLE EAST AND AFRICA
Manuf. and Assembly Locations **9**
Service Centers **65+**
Service Field Engineers **620+**
Technical Support/Response **75+**
Customer Experience Centers/Labs **5**



AMERICAS
Manuf. and Assembly Locations **10**
Service Centers **170+**
Service Field Engineers **1,500+**
Technical Support/Response **105+**
Customer Experience Centers/Labs **5**

ASIA PACIFIC AND INDIA
Manuf. and Assembly Locations **4**
Service Centers **55+**
Service Field Engineers **1,190+**
Technical Support/Response **70+**
Customer Experience Centers/Labs **4**

Vertiv™ Liebert® APM Plus, The Next Generation Versatile and Modular UPS Fit for Row and Room Applications

HIGHLIGHTS

- Remarkable double conversion efficiency - up to 97%
- Dynamic online mode efficiency - up to 98.8%
- Flat efficiency curve
- High power density
- Fit for the row or room applications
- Modular and scalable
- Hot-swappable power modules and bypass module
- Distributed module control system
- Unitary output power factor and symmetrical power factor diagram
- Reliability boosters- Robust air channels, PCBs embedded with conformal coating
- Integrated parallel and load bus synchronization
- Intelligent paralleling function
- User-friendly 9-inch LCD touch screen display
- Supports UPS self-capacity test without load banks

APPLICATIONS

- Enterprise Data Centers
- Cloud and Colo Data Centers
- Telecom IDC
- Process Control Centers
- Workstations

The all-new Vertiv™ Liebert® APM Plus is a modular high density transformer-free UPS which brings exceptional features for mission-critical applications. Its' extraordinary double conversion efficiency of up to 97% ensures remarkable operational cost savings, reducing both the Total Cost of Ownership (TCO) and the environmental impact.

The built-in scalability of the Liebert APM Plus also allows for fast, simple progression in system capacity through featured FlexPower technology. Each power module combines scalable power with independent DSP control to auto-regulate operation, thus enhancing overall availability.

The Liebert® APM Plus UPS offers ultra high-density power modules of size 3U and occupies the smallest footprint of 0.6 m^2 (500 kVA) in its range. It saves up to 20-50% floor space depending on the different configurations over the competition and conventional UPS system.

The Liebert® APM Plus features a large multilingual touch screen LCD display giving users access to key operating information including alarm status, configuration, start-up/shutdown, transfer, and advanced metering. It offers network connectivity communications card, and optional software monitoring, all designed to ensure visibility, control, and peace of mind for manned or unmanned locations.



Modular, Scalable Configuration

The modular architecture of the Vertiv™ Liebert® APM Plus allows a single unit capacity to be scaled up to a maximum of 500 kW in one single unit. There are two different frames available, each with a specific maximum cabinet capacity.

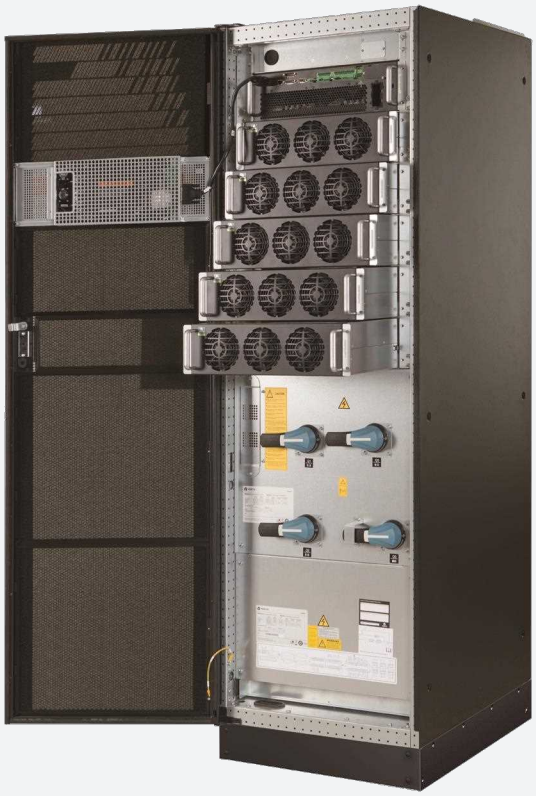
Liebert APM Plus 50 kW - 250 kW

Reaching up to 250 kW with 50 kW power increments in a frame same as a server rack cabinet, with the ability to extend runtime with dedicated battery cabinets.

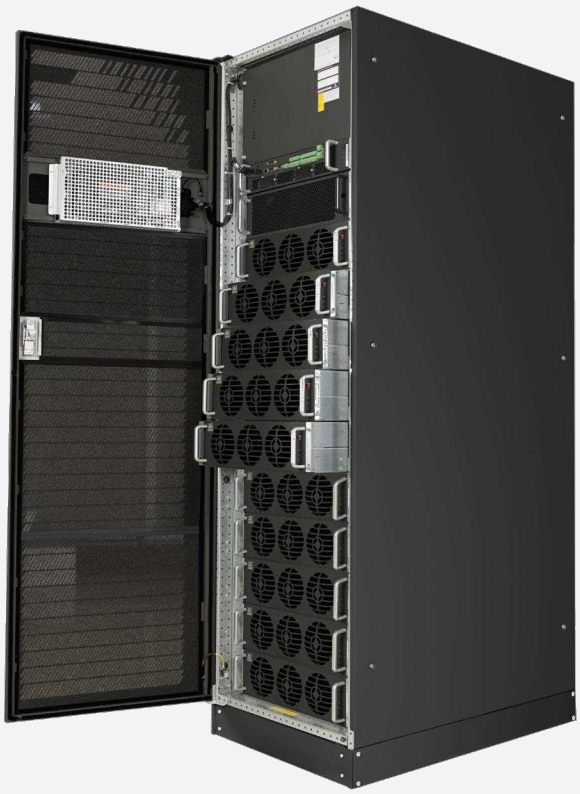
Liebert APM Plus 50 kW - 500 kW

Reaching up to 500 kW with 50 kW power increments in a frame same as a server rack cabinet, with the ability to extend runtime with dedicated battery cabinets.

Liebert® APM Plus 50-250 kW



Liebert® APM Plus 50-500 kW



Highly Efficient and Lowest TCO

Vertiv™ Liebert® APM Plus delivers an **outstanding Double conversion efficiency of up to 97%**, which further increases up to 98.8% with the Dynamic online mode, consequently **reducing operating costs and energy dissipation (kW)** to a minimum. This significantly minimizes the consumption of the cooling system, providing an overall TCO reduction and rapid payback time.

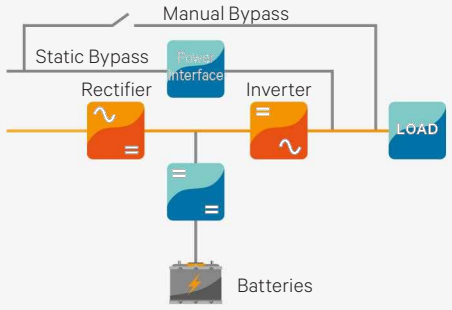
Furthermore, the Liebert APM Plus can optimize efficiency at partial load thereby attaining additional cost savings through the intelligent paralleling feature. The efficiency and electricity cost savings of Liebert APM Plus can be attributed to:

- Latest generation IGBT
- Adoption of a three-level T-type converter topology
- DC controlled fan speed
- Intelligent paralleling mode
- Advanced digital technology and fast transfer

The seamless activation of Liebert APM Plus'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:

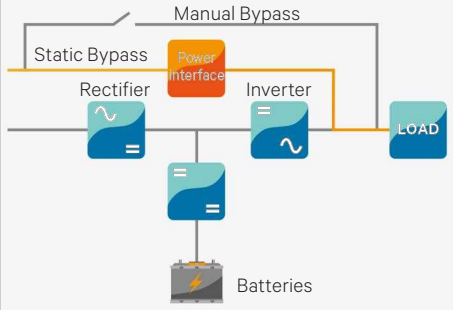
- Network fault (voltage variation, high/ low impedance mains failures)
- Load fault (short circuit downstream of the UPS)
- Type of load connected (PDU transformer)

The unit discriminates between various interferences and responds rapidly, meanwhile also **ensures compatibility with downstream equipment** (such as Transformers, STS, mechanical loads, etc).



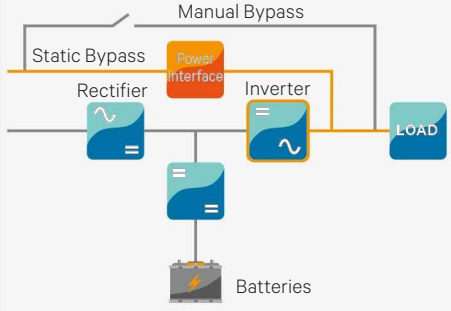
Maximum Power Control (VFI)

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)

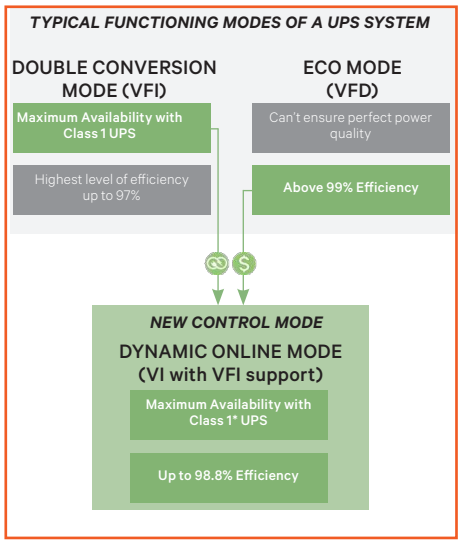
Compensates the load THDi, PF, main sags and swells, ensuring fast transfer output performance.

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 98.8% 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.



*Conditions apply

Robust and Proven Design

Proven Hot-swappable Design

Reliable contactors in conjunction with sophisticated software and independent control architecture ensures seamless swapping capabilities resulting in reduced MTTR.

Innovative Internal Air Channel

Designed in a way that internal hot air drives directly towards heat sink without distressing the PCB's and other internal sensitive circuits, **improving the service life of components and UPS reliability.**

Conformal Coating

Applied as a standard feature for all PCBs in Liebert® APM Plus. Its primary purpose is to **protect the electronics from environmental elements and corrosion.** The coating acts as both a protective shield and insulative material for a PCB.

Tolerates Higher Ambient Temperatures

Internal components and circuitry of Liebert APM Plus are designed to **seamlessly operate up to 40 °C** without any capacity impact and further can sustain high ambient temperature up to 50 °C with auto-derating.

Integrated Backfeed Contacts

Backfeed prevents any potential risk from electric shock on the UPS mains and bypass input AC terminals in the event of a failure of the rectifier and bypass static switch SCR. The control circuit includes output dry contacts that activate an external isolating device (optional) upon backfeed detection.

Scalable up to 2 MW

4 units of intelligent paralleling help to achieve maximum capacity up to 2 MW. Comes with integrated parallel and LBS communication ports, and allows a single touch to initiate inverter ON/OFF for all parallel connected UPS system.

Symmetrical Power Factor Compatibility

Liebert APM Plus is fully adapted to meet diverse system requirements in terms of power capacity and redundancy allowing different system designs.

- Output Power Factor up to 1
- No power derating from 0.5 lagging to 0.5 leading
- Optimum space/power ratio

Flexible Battery Configuration

Compatible with numerous battery configurations that includes traditional external battery banks with string lengths varying between 28 and 44 batteries.

In a parallel system, batteries can be installed in a common bank to maximize cost-effectiveness and minimize floor space. Extended battery life is further ensured through a temperature compensated charging algorithm which prevents battery damage, thus prolonging life span.

Higher Short Circuit Handling Capacity

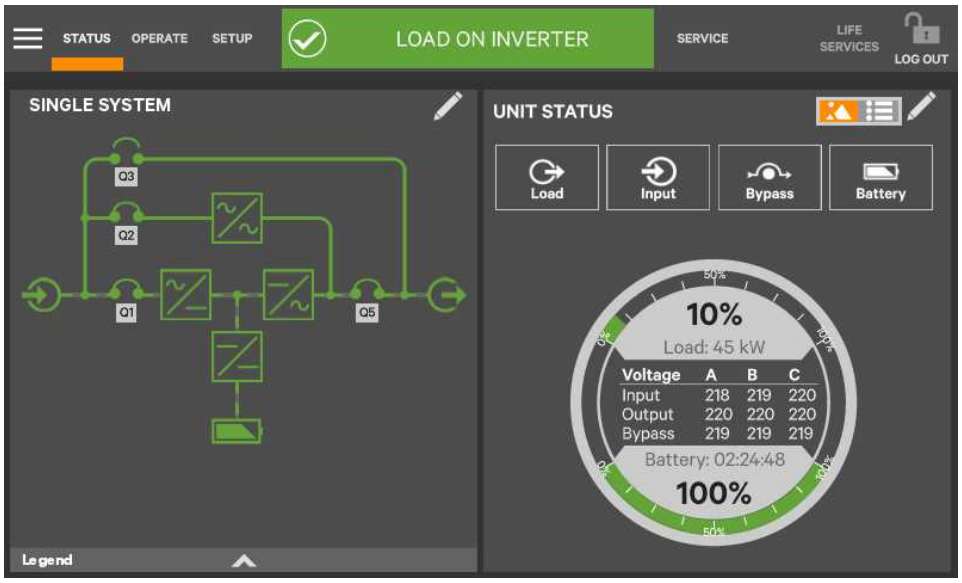
During the short circuit, the load will be transferred via bypass to clear higher short circuit currents. Fuse is considered optionally to clear short circuit capacity of up to 65 kA. It is available for selected models only.



User Interface and Advanced Diagnostic

Vertiv™ Liebert® APM Plus 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 APM Plus 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 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

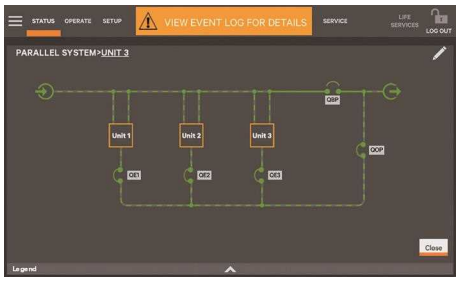
Status of Vertiv Life Services connections.

Tools

LCD settings and language selection.

Output

Voltage, current, frequency, and battery measurements.





Designed for Easy Service and Maintenance



Designed for ease of service

Vertiv™ Liebert® APM Plus is designed to allow access to cable terminal blocks, switches and all the replaceable components including power modules, bypass module, and communications from the front side for both installation and maintenance purposes.

Hot-swappable Design

Hot-swappable building blocks sub-assembly enables an easy and fast on-site replacement, thus reducing MTTR.

Flexible Monitoring and Management Options

Hardware Connectivity

Vertiv™ Liebert® APM Plus allows for the monitoring and control of networked UPS through different protocol options.

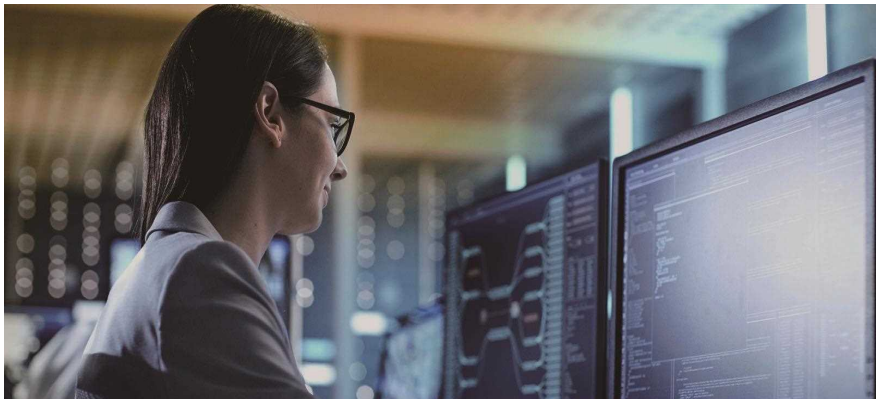
The integration of UPS with network management systems, via SNMP protocol, and building management systems, via MODBUS TCP/RTU and BacNET MSTP/IP. As an option, environmental sensors can also be attached to the UPS via monitoring card.

The integration with synoptic panels via a dry contact board.

Software

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.



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 service provides early warning of UPS conditions and out of tolerances. This allows effective proactive maintenance, fast incident response and remote troubleshooting, 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 Service 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

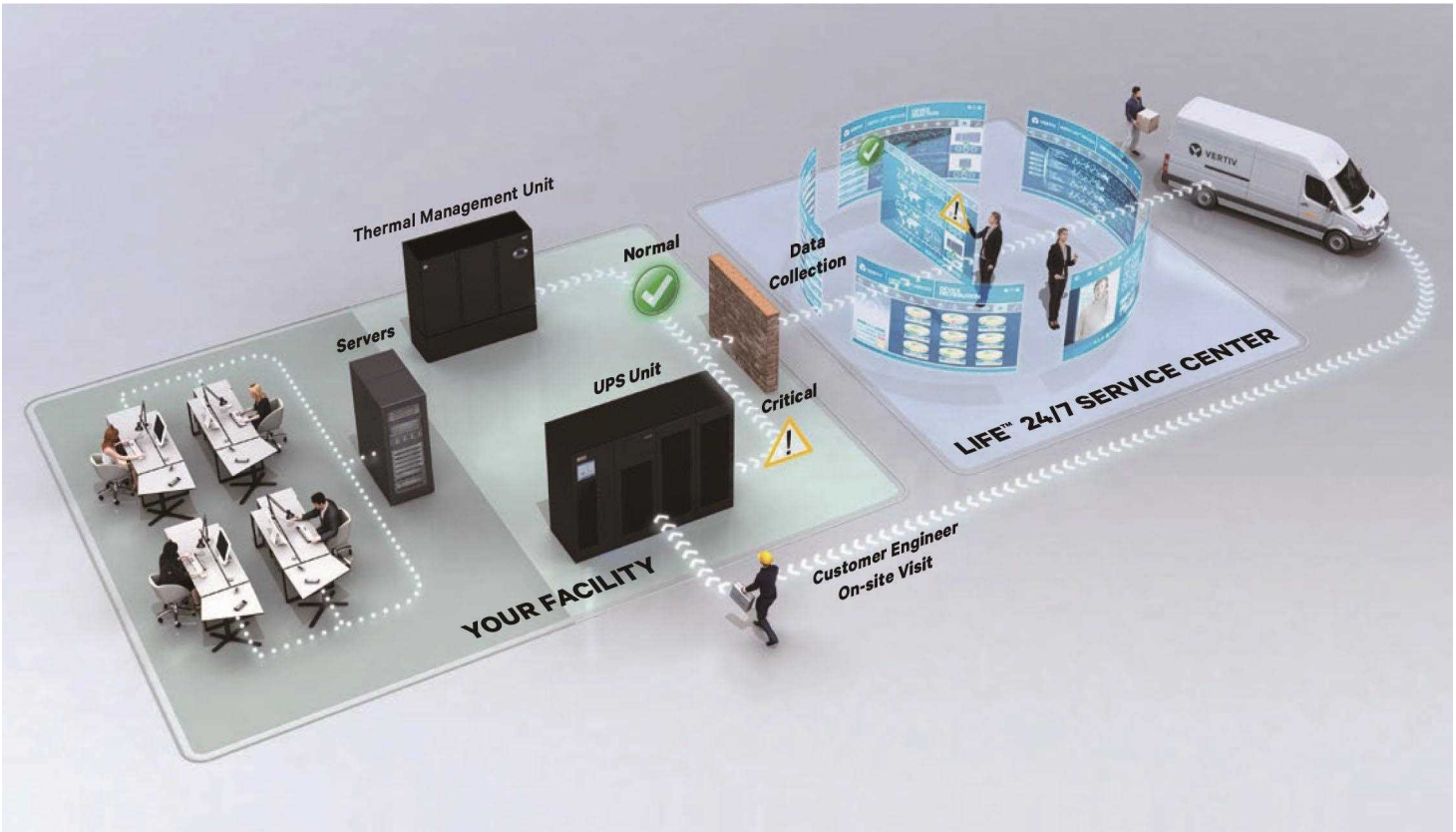
The continuous monitoring of all relevant parameters in turn maximizes unit performance, reduces on-site maintenance and extends the life of your equipment.

Fast Incident Response

Vertiv Life Services allow for the immediate definition of the best course of action, as a result of the regular communication between your Liebert® APM Plus system and our Vertiv Life Service centers.

Reporting

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



Flexible Optional Subassemblies that Meets the Customer Infrastructural Needs

1. Switch Assembly Cabinet

It comes with integrated switches to bring the isolation at the edge of the UPS. Enables bottom entry for cable terminations in 500 kVA frame.

2. Top Cable Entry Cabinet

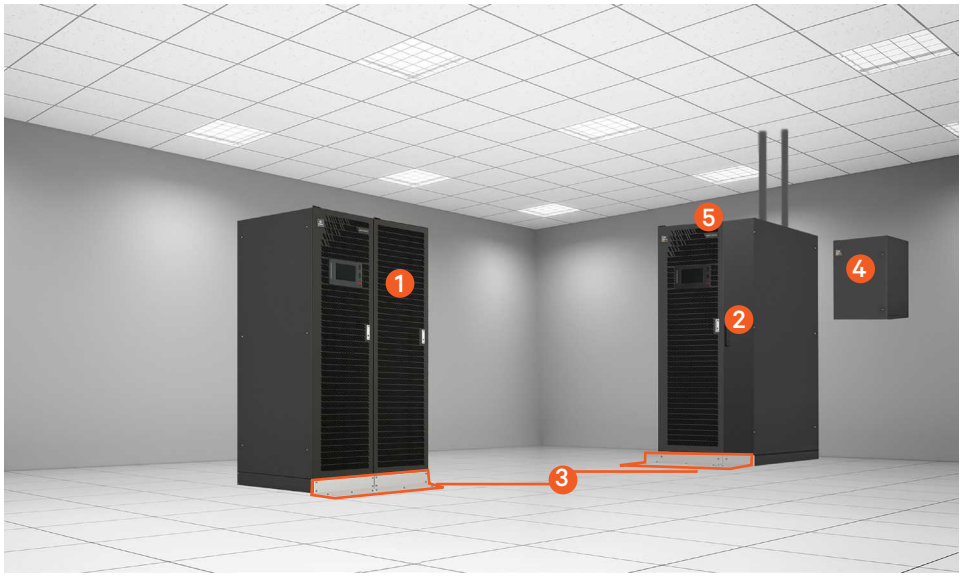
It enables top cable entry access in 250 kVA frame.

3. Seismic Anchor kit

It avoids and reduces the damage to UPS caused by the earthquake vibration.

4. BCB Box

It protects the battery string from short circuit and end of discharge and isolates during emergency power off (EPO).



5. Top Fan Subassembly

It enables the airflow from front to top side and eliminates the need for rear space for maintenance. Applicable for 250 kVA frame.

Delivered as a Complete Integrated Solution - Vertiv™ Liebert® APT



Liebert® APT Comes with

+ Upstream Distribution
+ Liebert® APM Plus
+ Downstream Distribution
+ Top-notch Power Train Manager Console

Technical Specifications

Nominal Ratings (kVA/kW)	50-250	50-500
Input		
Nominal input voltage (V)	380/400/415 (three-phase and sharing neutral with the bypass input)	
Input voltage range without battery discharge (V)*	228 to 478	
Nominal input frequency (Hz)	50/60	
Input frequency range (Hz)	40 to 70	
Bypass voltage tolerance (%)	Upper limit: +10, +15, or +20, default: +15 Lower limit: -10, -20, -30, -40, default: -20	
Bypass frequency tolerance (%)	±10	
Input power factor (kW/kVA)	0.99	
Input THDi*	<3% (full load)	
Battery		
Battery blocks per string	28-44*	
Battery charger max. (A)	75	150
Output		
Nominal output voltage (V)	380/400/415 (three-phase and sharing neutral with the bypass input)	
Nominal output frequency (Hz)	50/60	
Power factor @ 40 Deg C	Unity	
THDv with 100% linear load (%)	2	
Inverter overload capacity	<105% for Continuous; <110% for 1hr; <125% 10 min; <150% for 1 min; >150% for 200ms	
Efficiency*		
Double conversion mode	Up to 97%	
Dynamic online mode	Up to 98.8%	
Eco mode	Up to 99%	
Dimensions and weight[1]		
Dimensions (W x D x H), mm	600 x 850 x 2000	600 x 1000 x 2000 (single/no switch); 1200 x 1000 x 2000 (four switches)
Shipping dimensions (W x D x H), mm	800 x 1000 x 2180	710 x 1120 x 2200 (single/no switch); 1310 x 1120 x 2200 (four switches)
Weight, kg	447	600 (no switch); 608 (single switch); 824 (four switches)
Shipping weight, kg	455	610 (no switch); 618 (single switch); 847 (four switches)
General		
Noise within 1 m at the front according to ISO7779, dBA[2]	68	<70
Altitude	1500 m no derating, 1500 to 3000 m derate power by 1% per each 100 m increase	
Protection level	IP20 (IP21, IP31 optional)	IP20
General and safety requirements for UPS	IEC 62040-1	
EMC requirements for UPS	IEC 62040-2	
UPS classification according to IEC EN 62040-3	VFI-SS-111	
Environmental aspects- requirements and reporting	IEC 62040-4	

** Conditions apply*
1. 250kVA frame details are without side cabinet and top fan subassembly
2. With standard unit only



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