VERTIV™

NETSURE™

400V DC Power Solutions

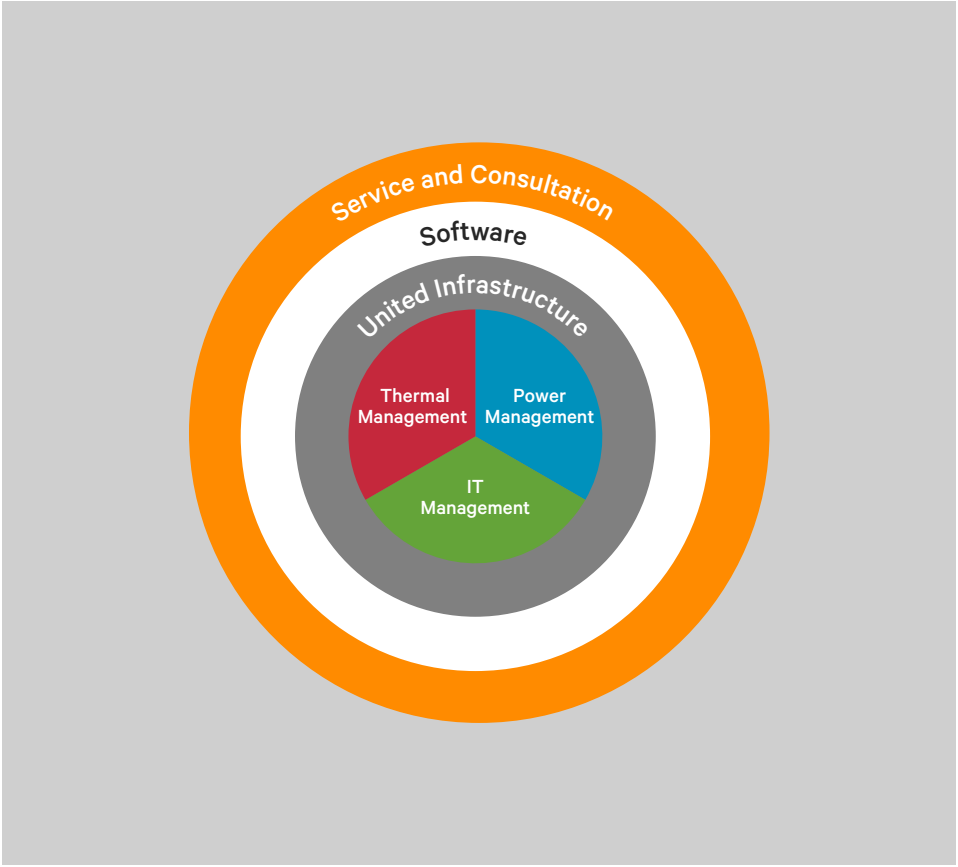
Vertiv, formerly Emerson Network Power, designs, builds and services mission critical technologies that enable vital applications for data centers, communication networks, and commercial & industrial environments.

We support today's growing mobile and cloud computing markets with our portfolio of power, thermal and infrastructure management products, software and solutions, all complemented by our extensive global service network.

We help strengthen the world's most vital applications by bringing together global reach and local knowledge, and our decades-long heritage, including brands like Chloride®, Liebert® and NetSure™.

Vertiv
Your Vision, our Passion

With a unique combination of industry expertise, technology, and resources, our mission is to support and power mission-critical technologies that drive possibility.



Chloride®

Our global industrial power solutions meet the most demanding technical specifications and provide safe, reliable power - no matter the challenge

NetSure™

Our global intelligently engineered DC power systems deliver high availability, energy efficiency and scalability for converged networks

Liebert®

Our global power and thermal management solutions are some of the world's most efficient and reliable power and cooling technologies

The Path to Optimized Site Architecture

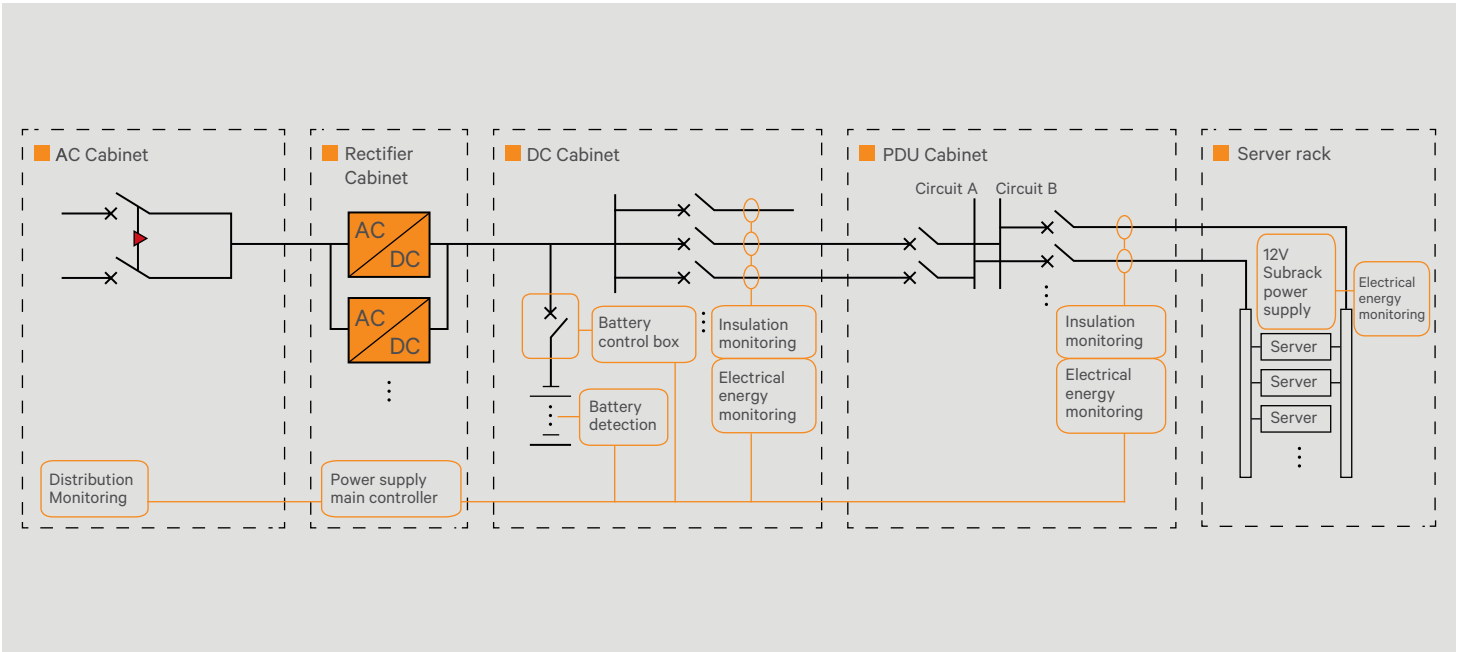
As the nature of the telecommunications and computing industry evolves, so too must the infrastructure that supports it.

Whether you are trying to contain expanding costs, increase energy efficiency, streamline power distribution, or manage an increasing mix of telecom and IT equipment, 400V DC power technology can enable meeting your site goals. This technology combines the proven benefits of 48V DC power – modularity, scalability, ease of integration – with the cable and installation savings benefit of higher voltage distribution.

400V DC power is designed to ensure the highest levels of efficiency and reliability. Based on a flexible architecture, 400V DC power can be implemented at a wide variety of different telecom and data centers sites. Whether your site equipment powering needs include 400V DC, 48V DC, or AC power – or a combination of all three – 400V DC can be the backbone infrastructure of a cost effective and efficient site design.

Let Vertiv's experts work with you to optimize your site's power architecture to meet the needs of the 21st century.

Typical HVDC System Architecture



System Configurations

Integrated System
(Max configuration: 375 A @ 400 Vdc)

Distributed System
(Max configuration: 2250 A @ 400 Vdc)

TECHNICAL PARAMETERS	INTEGRATED SYSTEM	DISTRIBUTED SYSTEM
System Model	NetSure HVT E02 CA1	NetSure HVT E02 CN1
Capacity	375A (150 KW)	900 A (360 KW)
AC Unit	AC input: 400 A/3P×2 (manual/auto) AC output: 32 A/3P×1, 16 A/1P×1	AC cabinet: PD380/630AFH, PD380/800AFA, PD380/1000AFH
DC Unit	Battery input: 500 A×2, Fuse Load output: 50 A/2P×32, MCB	DC cabinet: PD400/1200DF, PD400/1600DF Secondary distribution cabinet: PD400/630DF
Rectifier Module	R400-15000e	
Controller	M822E	
PDU Cabinet	PD400/250DF, PD400/400DF	
Server Distribution Unit	10 bi-polar MCBs	
12V Server Power Supply	PSC121000/1500	
Insulation Detector	EGU01	
Battery Detection Device	BM400V1	
Battery Control Box	PDB400/1000DF, PDB400/1250DD	

System Parameters

	PARAMETER NAME	DESCRIPTION
Environmental Conditions	Operating Temperature	-10°C ~ 50°C
	Storage Temperature	-40°C ~ 70°C
	Elevation	≤2000m (derating is required for elevation higher than 2000m)
AC input	Input supply	TN-C, TN-S, TN-C-S, 3-phase 4-wire, 3-phase 5-wire
	Input Voltage Range	260 Vac ~ 530 Vac, take full load above 304 Vac
	Input Frequency Range	40 Hz ~ 70 Hz
	Power Factor	>0.99
DC Output	Rated Output Voltage	378 Vdc
	Rated Nominal Voltage	400 Vdc
	Output Voltage Range	280 Vdc ~ 400 Vdc
	Current Sharing Imbalance	≤±5% (10% ~ 100% load range)
	Efficiency	≥96.5%
EMC Performance	Conducted Emission Radiated Emission	Class A EN300386
Lightning Protection	AC Side	Can withstand 8/20 μs simulated lightning surge current of up to 20 kA, ±5 times; 8/20 μs simulated lightning surge current of 40kA, 1 time
	DC Side	Can withstand 8/20 μs simulated lightning surge current of up to 10kA, ±5times
Safety Performances	Safety	Compliant with the IEC60950 standard and CE-certified
	IP Level	Above IP20, effectively preventing human and screw drivers from accidentally touching live conductors
Environmental Protection	Noise	At ambient temperature of 25°C, ≤65dB (A)
	ROHS Compliance	Comply with R5 of RoHS directives

Features

- High safety, no accessible bare live conductor is present when the door is closed or opened; Insulation failure or grounding fault alarm functions are supported for DC buses and DC output branches; Separate distribution monitoring is supported for DC distribution units with 7-inch touch screens to display the running status and provide automatic fault alarms.
- High power factor, high-efficiency and low current THD.
- Strong ability in adapting power grids. Normal operation within the input voltage range of 260~530 VAC and can withstand 600 VAC input with automatic protection against phase failures.
- Web-based monitoring. Real time remote access and supervision via Ethernet, Modem or RS232 port.
- Digital active load sharing. Stable load sharing function with imbalance <±5%, rectifier can operate steadily with active load sharing function when the controller is disconnected.
- Safe and reliable. Comprehensive lightning protection at the AC side, DC side and signal interfaces.
- Damage-free hot plug-and-play support for rectifier and controller modules; easy and fast online maintenance.
- Startup with diesel generator input. With resistance to transient over voltage of diesel generator, the system does not require strong diesel generator outputs.
- Specialized parallel design for capa city expansion. Easy online parallel connection or upgrading cut-in.
- Higher power density and small footprint.
- Green design. Rectifier standby supported to improve system efficiency; advanced EMC design for Class A conduction and radiated emissions.

Rectifier R400-15000e

Features

- Strong adaptability to the grid and environment
- High power factor, power density and efficiency
- Low current THD with low harmonic pollution
- Hot plug-and- play technology
- High power density and small dimensions
- Rectifier redundancy function
- Automatic isolation of output circuit fault
- Intelligent active load sharing upon controller failure
- Internal level D lightning protection unit
- Outstanding EMC performance
- Compliance with domestic and international safety standards

R400-15000e

Controller M822E

Features

- Comprehensive intelligent monitoring and management: monitors and displays all types of information about AC cabinet, DC cabinet and rectified cabinet for automatic protection and fault alarm function.
- Intelligent battery management, automatic conversion between FC (float charging) and BC (boost charging), automatic voltage regulation, stepless charging current limit, temperature compensation, battery capacity calculation and online battery test.
- 8× DO and 6 × DI, with DO configured in the field.
- Up to 4000 pieces of historical alarm records and 10 sets of battery test data can be stored.
- Supports downloads via USB and software online upgrading.
- Intelligent rectifier redundancy control function.
- CAN bus is used to communicate with rectifiers, which is more reliable, stable and provides better real time performance than Rs485.
- Quick and convenient maintenance thanks to hot plug-and-play function of controller module.
- Supports TCP/IP, SNMP, Web browser, remote download, and remote test/ communication/adjustment/control functions.

M822E

Controller

FEATURES	DESCRIPTION
EMC	EN 300386 Class B
Protection	IP20

Rectifier

FEATURES	DESCRIPTION
Input voltage	260Vac ~ 530Vac
Output voltage range	280Vdc ~ 400Vdc
Max output power	15 KW
Weight	≤12 Kg

Rectifier Cabinet

Features

- Power system controller monitors the rectifier cabinet status in real time; the 7-inch touch screen controls and manages the power system, and displays the system information.
- Supports remote monitoring and alarm function.
- High IP level without a bare live conductor.
- High level lightning protection at AC side with more than 40 kA capacity for discharging lightning surge current.
- Supports multiple cabinets connected in parallel for capacity expansion to 2250A.
- AC input of each rectifier supports independent MCB control.
- Supports integrated AC and DC distribution.
- Higher density: The footprint of a single cabinet 900 A system is only 600mm × 800mm.
- Full front access, easy front and rear maintenance; free cabling.
- Complies with China and EU environmental requirements.

Configuration

ITEM	DESCRIPTION	REMARK
AC Input	300 A/3P × 3 terminals	Three PCS 250 A/3P MCBs can be configured
DC Output	Copper bus	
Rectifier Module	R400-15000e	
Controller Module	M822E	
AC SPD	20 kA, up to 40 kA	
DC SPD	10 kA	

Three cabinets can be connected in parallel to provide a system capacity of up to 2250 A@400 Vdc.

Mechanical Parameters

MODEL	DIMENSION (W × D × H) IN MM	WEIGHT	REMARK
NetSure HVT E02 CN1	600 × 800 × 2000	≤200 kg	Excluding rectifier
NetSure HVT E02 CA1/C71	600 × 800 × 2200	≤200 kg	Excluding rectifier

AC Cabinet

Features

- Supports two AC inputs with mechanical interlock, and manual or auto switching function.
- Configured with an independent distribution controller unit that works independently to monitor the AC cabinet voltage, current, and branch status in real-time.
- Supports remote monitoring via Rs485 communication interface.
- Various kinds of AC information such as detected AC voltage, current, frequency, & lightning protection parameters are shown on the LCD screen.
- Supports top & bottom free cabling, full front access, flexible and convenient front & rear maintenance.
- Complies with IEC safety and lightning protection standards exhibits high safety.
- Level B or C lightning protection is available on the AC side.
- Complies with China and EU environment protection requirement.

Configuration

ITEM	PD380/630AFH	PD380/800AFA	PD380/1000AFH
AC Input*	3-phase 4-wire, 3-phase 5wire Two AC inputs, manual switching Input current: 630 A	3-phase 4-wire, 3-phase 5-wire Two AC inputs, automatic switching Input current: 800 A	3-phase 4-wire, 3-phase 5wire Two AC inputs, manual switching Input current: 1000 A
AC Output	3-phase 3 × 250 A (MCCB) 3-phase 1 × 63 A (MCB) 3-phase 1 × 32 A (MCB) Single-phase 3 × 32 A (MCB) Single-phase 3 × 20 A (MCB)	3-phase 3 × 250 A (MCCB)	3-phase 10 × 250 A (MCCB) 3-phase 1 × 63 A (MCB) 3-phase 3 × 32 A (MCB)
MECHANICAL PARAMETERS			
Dimension (W × D × H) (mm)	800 × 800 × 2000		
Weight	≤ 250 kg		

* Optional ATS at AC input

DC Cabinet, Secondary Distribution Cabinet

Features

- Adaptive design that supports the installation of multiple types of protective devices.
- Intelligent design, with a separate distribution monitoring unit to realize the distributed power supply.
- LCD displays various kinds of information of DC cabinet and monitors the DC cabinet voltage, current, and branch status in real time.
- Supports remote monitoring & alarm function, with RS485 communication interface.
- Patented SPD module is configured on the DC side, which provides more than 10 kA surge protection capacity.
- Supports top & bottom free cabling, convenient and flexible front & rear operation and maintenance.
- High level security protection, More than IP20 protection level without a bare live conductor.
- Parallel expansion interface ensures reliable and safe capacity expansion.
- Complies with China and EU environment protection requirements.

Configuration

ITEM	PD400/630DF-2-Y3	PD400/630DF-2-Y4	PD400/1200DF-2-Y1	PD400/1600DF-2-Y1
Type	Secondary distribution cabinet	Secondary distribution cabinet	DC cabinet	DC cabinet
Battery Input			Fuse: 2 × 1250A	Fuse: 2 × 1600A
DC Input	Fuse: 1 × 630A	Fuse: 1 × 630A	Parallel copper bus: 1250A	Parallel copper bus: 1600A
DC Output	MCB: 56 × 32A/2P	Fuse: 10 × 250A	MCB: 8 × 250A/3P	Fuse: 5 × 630A; 5 x 250A
Distribution Monitoring	Separate distribution monitoring			
Insulation Monitoring	Embedded			
DC SPD	Embedded			
Parallel Connection Interface	With parallel connection interface of copper bus			
MECHANICAL PARAMETERS				
Dimension (W × D × H) (mm)	800 × 600 × 2000		800 × 800 × 2000	
Weight	≤300 kg			

Power Distribution Unit Cabinet

Features

- A/B isolated input and output, meets the main backup requirement of the server.
- Adaptive design, optional input MCB or fuse.
- The LCD display monitors the total DC voltage, current, and branch load status in real time.
- Supports remote monitoring & alarm function with RS485 communication port.
- Supports top & bottom free cabling- easy, convenient installation & maintenance.
- More than IP20 protection level without a bare live conductor.
- Optional insulation monitoring function realizes the online monitoring of system insulation.
- Optional branch current detection function to realize the kWh calculation of each load branch.
- Complies with China and EU environment protection requirements.

Configuration

ITEM	PD400/250DF	PD400/400DF
DC Input	Fuse: 2 × 250 A, or MCB: 2 × 250 A	MCB: 2 × 400 A
DC Output (bi-polar MCB)	MCB: Route A, 24 × 32 A; Route B, 24 × 32 A	
Branch Current Detection	Optional	
Insulation Detector	Optional	
MECHANICAL PARAMETERS		
Dimension (W × D × H) (mm)	800 × 400 × 2000	
Weight	≤200 kg	

Battery Control Box

Features

- Independent MCB design, convenient to maintain & operate.
- Supports wall mounted and battery rack mounted installations.
- The MCB alarm dry contacts are available to monitor the MCB on/off status.
- Embedded battery detection device streamlines battery management.
- Top & bottom free cabling- easy to install & maintain.

Configuration

MODEL	PDB400/1000DF	PDB400/1250DD
Capacity	1 × 1000 A	1 × 1250 A
MECHANICAL PARAMETERS		
Dimension (W × D × H) (mm)	550 × 200 × 800	
Weight	≤40 Kg	

Insulation Detector

Features

- Supports the monitoring of two independent copper buses and the insulation failure of each branch.
- Branch capacitor automatic compensation function with high detection precision of grounding resistance.
- Insulation fault alarm threshold can be set & configured, adapts to di erent load conditions and weather conditions.
- Alarm information can be transmitted to the distribution monitoring unit via the RS 485 port using the master/salve structure.
- Intelligent design with self detection function.

Configuration

ITEM	DESCRIPTION	REMARK
Ambient Temperature	-10°C ~ 50°C	
Power Supply Voltage	80 Vdc ~ 400 Vdc	
Branch Detection Precision	±10%	Detection Range: 2 ~ 50 kΩ
Communication Port	RS485	
MECHANICAL PARAMETERS		
Dimension (W × D × H) (mm)	117 × 120 × 88	
Weight	≤1.5 Kg	

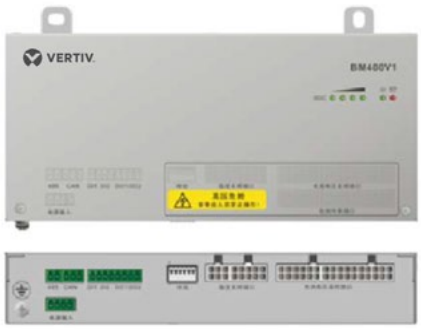
Battery Detection Device

Features

- Can configure 1 to 6 battery sampling modules to realize voltage sampling of 31 to 186 batteries.
- Up to 32 modules can be cascaded to measure the cell voltage of one battery string or multiple battery strings.
- Quick sampling of battery voltage, and sampling speed of cell reaches MS level, and internal resistance measurement function can be realized when used with discharging module.
- Single cell voltage measurement range: 0.2 to 20V with high measurement precision to realize the measurement of 0 to 400V total battery voltage.
- Multiple temperature sensors are configured to precisely measure the battery temperature.
- One route of current measurement function is configured to acquire as well as monitor the charging and discharging current of battery string in time frame.
- Alarm voltage threshold which can be set and configured.
- Two dry contacts are respectively configured for DI and DO for control signal input, alarm, or control signal output.
- RS485 and CAN communication ports are provided for high level monitoring and communication. The relevant parameters of battery sampling module can be set & configured via controller.
- Safety and EMC comply with CE certification directives.

Configuration

ITEM	DESCRIPTION
Ambient Temperature	-20°C ~ +65°C
Power Supply Voltage	36 Vdc ~ 60 Vdc
Branch Detection Precision	≤±5%
Communication Port	≤±1°C
Ambient Temperature	≤±1%
Power Supply Voltage	31 for single module and up to 992 can be extended
Branch Detection Precision	<1s
Communication Port	RS485 and CAN
Indicator	Run indicator, alarm indicator and 4 battery capacity indicators (SOC)
MECHANICAL PARAMETERS	
Dimension (W × D × H) (mm)	110 × 43 × 255
Weight	≤0.8 Kg



400/12VDC Power System

- Rack mounted “3U” 12V DC power system.
- Compatible with both AC and DC input power supply.
- Tolerate wide range of DC input voltage :180Vdc ~ 410Vdc.
- Hot-swappable converter modules, ensures highest availability.
- System performance can be monitored remotely via several monitoring interfaces such as RS 232, ethernet among others.
- Designed based on soft switching platform, enhances system efficiency up to 95%.

PSC Series Sub-rack

TECHNICAL PARAMETERS	DESCRIPTION
AC Input / DC Input voltage range	AC Input: 85- 300Vac; DC Input: 180-410VDC
Nominal output voltage	12VDC
Converter Module	R12-3000
Controller Module	M222B
DC output voltage range	12-13.2VDC
Operating temperature	-10°C to +75°C (derating above 45°C)
Dimensions	19 inches wide, 3U height

400/48VDC Power System

It is a rack mounted 400/48VDC power system, designed to power up 48VDC supported telecom & networking equipments. It is equipped with modular and robust hot pluggable converter and controller modules that guarantees highest uptime of connected devices. And it also delivers excellent performance that not only protects customer equipments but also reduces their operational expenses substantially.

TECHNICAL PARAMETERS	DESCRIPTION
DC Input voltage range	DC Input: 190-410VDC
Converter Efficiency	>96%
Converter Module	C400/48-2000e3
DC output voltage range	-42 VDC to -58 VDC
Operating temperature	-40°C to +80°C (derating above 65°C)
Dimensions	19 inches wide, 2U height

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