



VERTIV™

NetSure™

710 Series

DC Power System



KEY FEATURES

- **Modular Design** — simple to install and operate; allows incremental cost-effective system growth
- **Advanced Controller** — offers battery management, AC service monitoring, site monitoring and configuration management
- **Remote Access** — options allow users to view, control and interact with the system using an Ethernet interface
- **Plug'n'Play** — add rectifiers and converters without changing the settings and making adjustments; no system interruption
- **Front Accessible** — allows for easy installation, additions and maintenance
- **High Density** — compact design takes up less floor space; houses eight 3000 watt rectifiers or a combination of rectifiers and up to four 1500 watt converters per shelf (2RU each)
- **Constant Power** — delivers more current at lower voltages to meet load or recharge demand
- **Safety Compliance** — NEBS Level 3 certified; UL Listed to UL subject 1801

3000 watt constant power rectifiers from Vertiv™ provide up to 125 amps at +24VDC (111 amps at 27.0VDC and 115 amps at 26.0VDC).

With eight units per shelf, these rectifiers provide up to 1000 amps in two rack units (3.5-in.) of space. The NetSure 710 system also accommodates 1500 watt DC to DC converters to provide -48VDC at 31 amps per module and 500 amps per system. The converter modules occupy the same positions as the rectifiers and feature the same plug-n-play capability.

The modular NetSure 710 power system with 3000 watt rectifiers and 1500 watt DC to DC converters provides up to 2000 amps of current for +24 volt systems with up to 500 amps at -48 volts.

The basic components of the power system include the ACU+ control unit, module mounting shelf assemblies which house the rectifiers and converters, and a modular distribution cabinet.

The NetSure 710 power system contains a powerful, microprocessor-based control system capable of monitoring and controlling up to 32 rectifiers and converters. The ACU+ controller provides a 4x16-character alphanumeric display, which can be activated at the touch of a keypad.

Each shelf can accommodate up to eight plug'n'play rectifiers or a combination of up to eight rectifiers and converters (max of four converters per shelf), which are controlled by the ACU+. Additional shelves can be added as load requirements increase.

The NetSure 710 distribution cabinet is modular by row and position. Four distinct distribution cabinet sizes are available to accommodate from one to four distribution panels. This allows the system to be configured in relay racks of various heights for installation in low-profile sites or atop batteries or other equipment to make more effective use of floor space. Several distribution panels are available offering different combinations of distribution positions, low voltage disconnect and battery disconnect options.

Application

The NetSure 710 system is ideal for wireless applications such as cell sites, co-location, huts and large vaults or enclosures.

With over 2 million NetSure® rectifiers deployed in the field, Vertiv™ has achieved remarkable MTBF and reliability performance.



Rectifier R24-3000



NetSure® 710

Rectifiers

The modular R24-3000 high frequency constant power rectifier is designed with the latest patented switch-mode technology using DSP (Digital Signaling Processor) functionality. Use of DSP technology results in fewer components and optimized operation. Plug'n'play technology allows for easy system configuration. System capacity can be increased by simply plugging an additional rectifier into an existing rectifier shelf or a newly added expansion shelf — no adjustments or setup are required. The NetSure® 710 power system can house up to 32 rectifiers, which provide load power, battery float current and battery recharge current. The rectifiers are monitored and controlled by the ACU+. The rectifiers allow the user to appropriately size a power plant to meet specific applications.

Converter

The modular C24/48-1500 is a high frequency DC to DC converter utilizing similar switch-mode and DSP technology as the rectifier. It also provides plug-n-play operation. The NetSure® 710 power system can accommodate up to 16 converters for load power.



Converter C24/48-1500

Rectifier/Converter Shelf

The NetSure® 710 rectifiers and converters are housed in modular shelves each of which accommodates eight rectifiers or a combination of eight rectifiers and converters, four converters maximum per shelf. The shelves are 23" (58.42cm) wide and 3.5" (8.89cm) high. System capacity can be easily expanded with additional shelves. A maximum of four shelves can be installed in each bay. AC input options are available for individual and dual rectifier feed with front access installation. The converter module input is provided directly from the +24VDC bus in the shelf.

Distribution

The NetSure® 710 system includes a modular distribution product line sized to accommodate from one to four distribution panels each. Each panel is rated at 600 amps load. The maximum load per distribution cabinet is 2000 amps.

The distribution cabinet can be factory mounted in a relay rack or shipped loose for mounting in a customer supplied relay rack or cabinet rails.

A wide variety of panels provide multiple combinations of distribution positions, low voltage disconnect and battery disconnect. Distribution cabinets are front accessible, modular in design and are initially configured in the factory. Circuit breakers and/or fuse modules plug into the multi-position distribution panels to provide for easy installation. Distribution device options include 1 to 250 amp bullet-style circuit breakers, 3 to 125 amp TPS-style fuses in plug-in bullet-style holders, 100 to 800 amp GJ/218-style circuit breakers, 70 to 250 amp TPL-B style fuses and 70 to 600 amp TPH-style fuses. These devices can be configured for both +24V load and battery disconnect and -48V load. A GMT fuse module is also available.



Modular Distribution Cabinet

AC Input

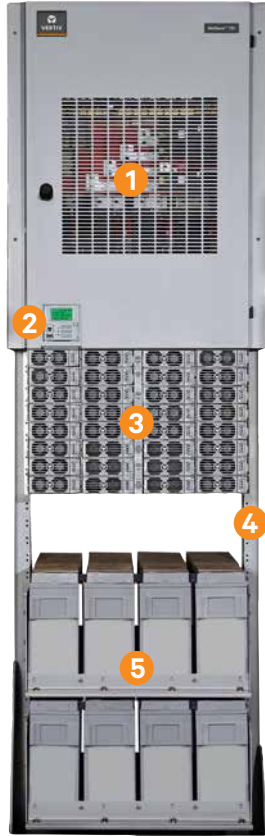
The AC input feed to the rectifiers in the NetSure 710 system is easily accessed from the front of the cabinet. Conduit knockout openings are located on the top left and right sides.

Monitoring/Control

The ACU+ is the single point of adjustment for such features as float voltage, test/equalize voltage, high voltage shut-down and current limit for all rectifiers and converters in the power system. The 4-line display allows users to view specific alarm conditions, system measurements and system settings. All measurements and adjustments can be performed locally via the alphanumeric display on the front of the ACU+ controller or remotely via Ethernet.

The ACU+ provides local indicators and the ability to transmit various alarm conditions including rectifier failure, high voltage shutdown and AC failure. Remote and local communication is available using an Ethernet connection (HTTP web browser or SNMP). Designed for advanced battery management and site monitoring, this controller interfaces with a variety of supervisory modules that monitor and control external equipment such as generators, batteries, remote distribution and more.





+24VDC NetSure® 710
with Battery Trays

System Elements

1. DC Distribution Cabinet
2. ACU+ Controller
3. Rectifiers/Converters
4. Relay Rack
5. Rack Mount Battery Trays

Battery Trays

The NetSure® 710 power system can be configured with rack-mount battery trays which are available with optional battery disconnect circuit breakers.

NetSure 710 – System Specifications

SYSTEM FEATURES	
Nominal System Voltage	+24VDC
Control	Microprocessor (ACU+)
RATED OUTPUT CAPACITY	
Bay	2000 amps
Rectifier	3000W (R24-3000)
Shelf	1000 amps
Distribution Panel	600 amps
PHYSICAL CHARACTERISTICS	
Framework Type	Relay rack (can be mounted in enclosures)
Mounting Width	23 inches
Mounting Depth	20 inches
Access	Front access for installation, operation and maintenance
ENVIRONMENTAL	
Operating Temperature	-40°F to 104°F (-40°C to 40°C) continuous operation
Storage	-40°F to 185°F (-40°C to 85°C)
Humidity	0% to 95% relative humidity, non-condensing
Ventilation	Rectifiers and converters are fan-cooled front to rear
EMI/RFI Suppression	Conforms to FCC rules Part 15, Subpart B, Class B and EN55022 Class B, radiated and conducted
Safety Compliance	UL Listed 1801, cUL, NEBS Level 3

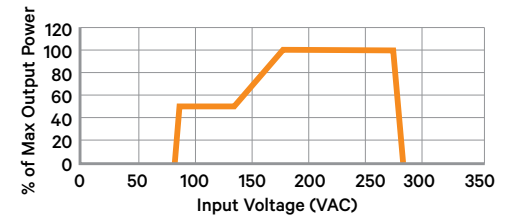
Rectifier - Specifications

R24-3000											
AC INPUT											
Nominal Voltage	Single phase 208/240VAC										
Operating Voltage Range	180VAC to 264VAC										
Frequency	47 Hz to 65 Hz										
Power Factor (PF)	>0.98 from 50% to 100% load										
Total Harmonic Distortion	≤5% from 50% to 100% load										
Input Current	Max 18.7 amps										
Inrush Current	Inrush current does not exceed 200% of the rated input rms value										
Input Protection	If the input voltage decreases or increases beyond a non-adjustable predetermined value, the rectifier circuitry shuts down, disabling the output. The rectifier will recover automatically when the AC input is re-established and exceeds 105VAC maximum (low voltage restart point) or when it decreases to 265VAC minimum (high voltage restart point). Overcurrent is protected by an internal fuse.										
Operating Efficiency	93.5% peak 92% minimum at full load, nominal line										
DC OUTPUT											
Output Voltage Range	+21.0VDC to +28.5VDC										
Output Power	Constant power limiting operation 3000W maximum from 180VAC to 264VAC										
Output Current	125A @ +24VDC										
Regulation	Steady state output voltage remains within +/-0.5% from 180VAC to 264VAC input and from 5% to 100% load										
Voice Band Noise	The voice-frequency noise generated by the rectifiers does not exceed 32dB _{BrnC} output noise from 5% to 100% load										
Wide Band Noise	Does not exceed 250 mv peak-to-peak or 50 mv rms										
Psophometric Noise	Does not exceed 1 mv from 5% to 100% load										
PROTECTION											
Current Limiting	The output current limit is adjustable from 12.5 to 125amps										
Over Current	Internal fuse										
High Voltage Shutdown	If rectifier detects over voltage it will turn off. After 5 seconds it will restart; if it encounters another over-voltage within 5 minutes it will turn off and remain off until AC input is reset.										
STATUS / ALARM INDICATORS AND MONITORING											
Visual Indicators	<table border="0"> <thead> <tr> <th>Status</th> <th>Visual indicator color</th> </tr> </thead> <tbody> <tr> <td>Normal operation</td> <td>Green</td> </tr> <tr> <td>Alarm</td> <td>Yellow</td> </tr> <tr> <td>Rectifier failure alarm</td> <td>Red</td> </tr> <tr> <td>Fan failure alarm</td> <td>Flashing red</td> </tr> </tbody> </table>	Status	Visual indicator color	Normal operation	Green	Alarm	Yellow	Rectifier failure alarm	Red	Fan failure alarm	Flashing red
Status	Visual indicator color										
Normal operation	Green										
Alarm	Yellow										
Rectifier failure alarm	Red										
Fan failure alarm	Flashing red										
Status Settings	The ACU+ controller establishes all rectifier settings										
PHYSICAL CHARACTERISTICS											
Mounting	Plug-in installation										
Dimensions (H x W x D)	1.63 x 4.88 x 15 inches (41.4 x 124 x 380mm)										
Weight	6.4 lbs. (2.9kg)										

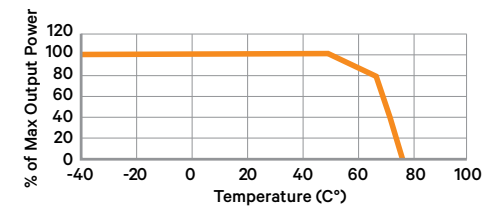
ENVIRONMENTAL

Temperature	-40°F to 113°F (-40°C to 50°C) at full rated output
Altitude	Up to 5000' (1524m) at full rated output
Ventilation	Front to back with speed-controlled fan (field replaceable)
Audible Noise	The rectifier does not produce sound levels above 60dB(A), measured 0.6m in front of the rectifier, at the same horizontal line as the middle of the rectifier at 25°C
Protection	The rectifier detects internal temperature and reduces output power to maintain components within design parameters. It recovers automatically when temperature is within normal operating range.
Safety Compliance	UL recognized (UL60950) for USA & Canada, CE marked

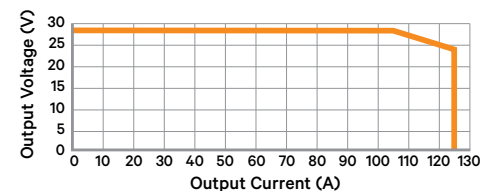
Output Power vs. Input Voltage at Ambient Temperature <50°C



Output Power vs. Input Voltage at Ambient Temperature <50°C



Output Voltage vs. Output Current, Max. Output Power 3000W



C24/48-1500 Converter - Specifications

DC INPUT

Nominal Voltage	+24VDC
Operating Voltage Range	+20.5VDC to 30.0VDC
Input Current	Max 83.3 amps
Input Protection	If the input voltage decreases beyond a non-adjustable predetermined value, the converter circuitry shuts down, disabling the output. The converter will recover automatically when the DC input voltage returns within normal operating limits. Overcurrent is protected by an internal fuse.
Operating Efficiency	91.2% peak 86% at full load, nominal line

DC OUTPUT

Output Voltage	-48VDC to -54VDC
Output Power	1500W maximum
Output Current	31.25 amps maximum
Regulation	Steady state output voltage remains within +/-0.5% from 20.5VDC to 30.0VDC input and from 5% to 100% load
Voice Band Noise	The voice-frequency noise generated by the converters does not exceed 32dBnC output noise from 5% to 100% load
Wide Band Noise	Does not exceed 250 mv peak-to-peak or 50 mv rms

PROTECTION

Current Limiting	32 amps to 36 amps
High Voltage Shutdown	55.2 volts to 60 volts
Parallel Operation	Electronic blocking circuitry

Status / Alarm Indicators and Monitoring

Visual Indicators	Status	Visual indicator color
	Normal operation	Green
	Alarm	Yellow
	Converter failure alarm	Red
	Fan failure alarm	Flashing red

PHYSICAL CHARACTERISTICS

Mounting	Plug-in installation
Dimensions (H x W x D)	1.63 x 4.88 x 15 inches (41.4 x 124 x 380mm)
Weight	5.5 lbs. (2.5kg)

ENVIRONMENTAL

Temperature	-40°F to 113°F (-40°C to 50°C) at full rated output
Altitude	Up to 5000' (1524m) at full rated output
Ventilation	Front to back with speed-controlled fans (field replaceable)
Audible Noise	The converter does not produce sound levels above 60dB(A), measured 0.6m in front of the converter, at the same horizontal line as the middle of the converter at 25°C
Protection	The converter detects internal temperature and reduces output power to maintain components within design parameters. It recovers automatically when temperature is within normal operating range.
Safety Compliance	UL recognized (UL60950) for USA & Canada, CE marked

Vertiv™ – A complete spectrum of best-in-class reliable power, precision environmental and connectivity solutions for today's telecommunications and data network infrastructure.

Additional Information

For additional specification, engineering and installation information use specification numbers 581127000 (power system) and 588705200 (power shelf for 3000W rectifiers and 1500W converters).

For ordering information, request SAG581127000, PD588705200.



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