



**VERTIV™**

**NetSure™**

**502 SERIES**

**DC POWER SYSTEM**



KEY FEATURES

- **High efficiency** – 96.5%, lower operating costs as a result of reduced power consumption.
- **Supports Ethernet, SNMP V2 & SNMP V3, ModBus and RS485 communication interfaces** – enables remote control & monitoring.
- **NetSure™ rectifiers are designed to operate from -40°C to +80°C, providing a minimum 1750 W output at 65°C** – suitable for harsh environmental conditions.
- **Extremely wide AC voltage range window** – 85 VAC to 300 VAC.
- **Several distribution configuration options** – battery disconnect breakers, load breakers, and GMT fuses up to 15 A to meet application needs.
- **NEBS Level 3 and UL Listed** – complies with industry standards.
- **Monitoring and battery test and charge functions** – advanced battery management features and AC service monitoring.
- **Configuration file capability** – minimizes installation time and allows planned network conformity.

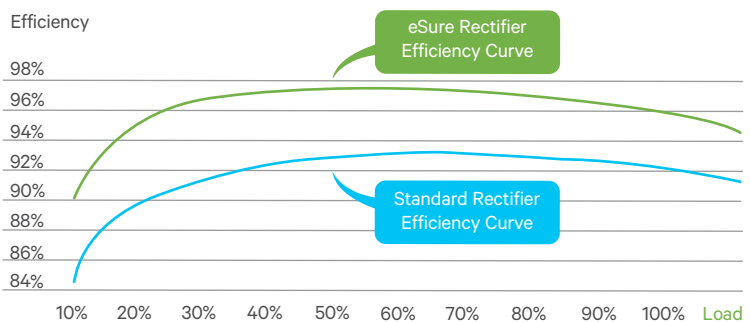


eSure™ rectifiers from Vertiv™ provide efficiency levels up to 96.5%, reducing heat and energy loss over 50%.

The NetSure 502 DC Power Solution is a flexible system capable of providing DC power through the use of 2000 W rectifiers and a variety of output distribution options. The system is available in a bulk output configuration, integrated distribution configuration and a distribution panel style configuration. The NetSure 502 is available in both 19" and 23" rack-mount configurations, suited for up to 600 amp power requirements in the most harsh environments. The system is supported by a single SCU+, ACU+ or NCU controller that provides all control and operational conditions, as well as historical site data and external signal conditioning and monitoring. Each initial rectifier shelf includes a slot for the controller and space for the rectifiers. Distribution is either provided by output bus bars, fuses or breakers located in the power shelf, or an externally mounted distribution panel.

Distribution options include load low-voltage disconnect (LLVD), battery low-voltage disconnect (BLVD), or no low-voltage disconnect. Plug-in rectifiers, AC connectivity and DC load outputs enhance the overall flexibility of the system by minimizing installation and start-up time. This dynamic system also offers alternative AC input configurations, relay rack configurations, battery tray options, and pre-configured output load kits.

The NetSure 502 is designed for 40 amp to 600 amp loads. This cost-effective solution is NEBS Level 3 compliant and UL Listed. Rated for continuous operation from -40 °C to +65 °C, this system is designed for the harsh outside plant environment, as well as customer premise FTTx, wireless back-haul, microwave, DLC, DAS and small cell applications.



This graph demonstrates eSure ultra high efficiency of 96.5% versus standard rectifier efficiency around 93%



**The NetSure™ 502 system is ideal for wireline and wireless applications such as switch sites, co-location, huts and large vaults or enclosures, as well as FTTx electronics.**

## eSure™ Rectifiers

*Ultra high efficiency of 96.5% is achieved with the eSure R48-2000e rectifier. eSure rectifiers from Vertiv deliver the most reliability and highest efficiency in the industry, reducing power consumption and lowering operation cost.*



The NetSure 502 Series supports eSure rectifiers. The R48-2000e is a modular, high frequency constant power rectifier designed with the latest patented switch-mode technology using DSP (Digital Signal 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 shelf or a newly added expansion shelf — no adjustments or setup are required. The NetSure 502 rectifiers provide load power, battery float current and battery recharge current. The rectifiers are monitored and controlled by the SCU+, ACU+ or NCU.

The modular design of these units facilitates power plant sizing to application needs. Beyond reducing operating costs, Vertiv has maximized the value of eSure rectifiers by making them backwards compatible with existing NetSure DC Power Systems. Both unit types can be used in a system together.

The eSure rectifier provides up to 100% of rated power at 55°C. As the temperature increases from 55°C to 80°C, the thermal power limit circuit linearly decreases power. In the typical operating range, eSure rectifiers have a power factor greater than .99, total harmonic distortion less than 5%, and efficiencies up to 96.5%. Each hot-swappable rectifier has an integral multi-speed cooling fan and a tri-LED status indicator.

## Environmental Endurance

### Great output power at high temperatures

NetSure 502 rectifiers deliver high output power in relation to ambient temperature conditions, making them especially suitable for high-temperature environments. In a system with rectifiers operating at 65 °C, the output is still a minimum 80% of full power.

### Extremely wide AC voltage range window

The AC voltage input range vs. rectifier output is another extraordinary feature of this small system. The rectifier's input voltage ranges from 85 VAC to 300 VAC. Between 176 VAC to 300 VAC, the output is 100% of full power.

Designed for global use, the NetSure™ controller with stands high telecom standards, providing great reliability and availability.



ACU+ Controller



NCU Controller

**As load demand grows, the system can be easily expanded with additional modular components.**

## Rectifier Shelves

The rectifier shelves integrated into the NetSure 502 system are 3.5" (2 RU) high and available in 19" and 23" widths. These shelves provide front to back ventilation and can be mounted directly above or below other electronic equipment, maximizing revenue-generating space. Each unit will operate from 120/208/240 VAC and is equipped to accommodate plug-in AC connections or line cords. DC output connection options for each shelf include plug-in DC jumpers for GMT load, two-hole compression lugs or bus bar terminations for larger conductors for connection to local or remote distribution and batteries. The shelf with rectifiers is NEBS Level 3 compliant, UL Listed and meets FCC Class B EMI/RFI requirements.



## Controller

The SCU+, ACU+ and NCU are powerful control units that enable remote monitoring of the main AC supply, DC power plant, battery backup and site environment.

The controller enables advanced battery management such as sophisticated boost charge control, remaining capacity testing, constant current discharge testing and scheduled discharge testing. With basic energy saving functions, the SCU+ is a cost-efficient system component. For more sophisticated site monitoring the ACU+ or NCU is available as an option. Information and alarms from a specific site are monitored or checked with a web browser or SNMP. The NCU supports multiple web browsers including IE, Firefox, Chrome and Safari. Standard supported protocols include ModBus, SNMP V2 & V3. Encrypted security is provided by IPv6 and SNMP V3.

## Distribution

Output distribution for the NetSure 502 is available in three different forms. Bulk distribution can be provided through lug landing points on the rear or top of the shelf. Internal distribution is attained through GMT fuses or circuit breakers. Internal distribution options include: (5) 15 A positions and (8) 10 A Amp positions; or (4) load circuit breakers (0 A to 100 A) and (5) 10 A GMT fuses; or (2) load circuit breakers (0 A to 100 A) and (2) battery disconnect circuit breakers (0 A to 125 A) and (5) 10 A GMT positions. External distribution panel options for the (1) row panel include: (24) load circuit breaker positions or (18) load circuit breaker positions plus (6) battery disconnect positions or (16) load positions and (8) battery disconnect positions for a 23" arrangement; and (19) load circuit breaker positions or (14) load circuit breaker positions plus (5) battery disconnect positions for a 19" arrangement.

Options for the (2) row panel include (39) load breaker positions and (9) battery disconnect positions for the 23" shelf and (29) load breaker positions and (9) battery disconnect positions for the 19" models.

All distribution options can be outfitted with a (20) position GMT panel that provides either 80 A or 40 A on A and 40 A on B load. All internal and external distribution panel options are available with low-voltage disconnect capability.

NetSure™ 502 systems come in many different configurations



1. AC input wiring
2. eSure™ rectifier (R48-2000e)
3. ACU+ controller
4. Distribution panel

This highly flexible DC power system is available in bulk output shelves, integrated distribution shelves or externally mounted distribution panel systems. These alternatives are optimal for rack-mounting in any building, shelter or cabinet installation.

NetSure 502 is easily integrated into any Vertiv outdoor enclosure when a pre-manufactured space-efficient outdoor solution is needed. The system can also be shipped loose or mounted in a relay rack with battery trays. The three following core configurations define the combination of rectifier and distribution shelves and determine the ultimate capacity of the system.

### Bulk Output Distribution 582136800



The bulk solution provides an easy method for upgrading inefficient and/or obsolete rectifiers without the expense of buying a new DC plant. When distribution is already available and bulk -48 VDC power is needed, these (2) new configurations are ideal. Bulk output connection points are provided on the rear or top of these shelves. Optional AC input is available through top or rear access to the system. Up to 400 A of power is provided in up to 6 RU of space. Mount the system in a 19" or 23" rack, connect your load cables, plug-in AC cords, add rectifiers and you are ready to provide power.

### Internal Distribution 582136700

Our most compact system measures 2 RU high, with distribution capability and rectifiers in the same shelf. Available in 19" and 23" widths, the system provides distribution space for GMT fuses up to 15 A or a combination of 100 A circuit breakers and GMT fuses. Configuration options include battery low voltage disconnect (BLVD), load low voltage disconnect (LLVD) or no low voltage disconnect. An external GMT fuse panel with (20) positions is available in both an A and A/B configuration.



### External Distribution Panel 582136800



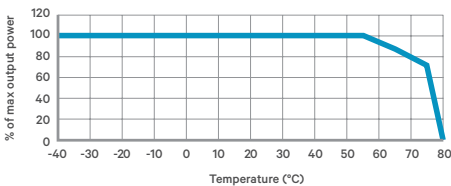
If multiple distribution points are needed our 23" system provides up to (39) load bullet breaker positions and up to 9 battery disconnect positions. In a 19" system, there are up to (29) load bullet breaker positions and (9) battery disconnect positions. Bullet breakers up to 250 A can be used in this panel. An optional GMT fuse panel is available for GMT fuses. This system offers up to 600 A output current capacity in 14 RU of space.

## System Specifications, NetSure™ 502

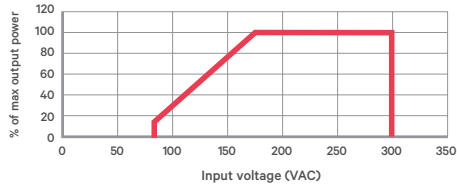
INPUT				
System Voltage, Nominal	120 VAC, 208 VAC, 240 VAC			
Output Capacity	19" integrated up to 80 A 23" integrated up to 120 A 19" rear bulk systems up to 365 A 23" rear bulk systems up to 450 A 19" & 23" top bulk systems up to 400 A 19" & 23" externally mounted distribution panel systems up to 600 A			
Framework Type	Mountable relay rack (can be mounted in enclosures)			
Dimensions, Mounting	<b>Equipment</b>	<b>Height</b>	<b>Width</b>	<b>Depth</b>
	Rear bulk output shelves	2 RU/shelf	19" or 23"	13.6"
	Top bulk output shelves	Up to 6 RU	19" or 23"	12.5"
			19" or 23"	12.5"
		19" or 23"	13.1"	
Access	Rear bulk output shelves – Rear for installation, front for operation and maintenance Top bulk output system – Top for installation, front for operation and maintenance Integrated distribution system – Front for installation, operation and maintenance Externally mounted distribution system – Rear, front and top for installation, front for operation and maintenance			
Control	SCU+, ACU+ or NCU controller			
ENVIRONMENTAL				
Temperature Range, Operating	-40 °C to +80 °C (-40 °F to +176 °F) see rectifier specification for any derating			
Storage	-40 °C to +80 °C (-40 °F to +176 °F)			
Humidity	0 to 95%, non-condensing			
Ventilation	Fan-cooled front to rear			
EMI/RFI	Conforms to FCC rules Part 15, Subpart B, Class B and EN55022 Class B, radiated and conducted			
Safety Compliance	UL 60950 Recognized (US & Canada) – Rear bulk distribution system and integrated distribution system UL 1801 Listed (US & Canada) – top bulk and external distribution panel system NEBS Level 3			

## eSure™ Rectifier Diagrams (R48-2000e)

Output Power vs. Temperature at Input Voltage >176VAC



Output Power vs. Input Voltage at Ambient Temperature <45°C



## Rectifier Specifications, R48-2000e

AC INPUT RECTIFIER	
Input Voltage, Nominal	120 VAC, 208 VAC, 240 VAC
Input Voltage, Operating Range	85 VAC to 300 VAC extended range to 300 VAC without damage
Frequency	45 Hz to 65 Hz
Power Factor (PF)	0.99 ≥ to 50% load
Total Harmonic Distortion	<5% from 50% to 100% of rated load
Input Current, Maximum	13 A
Inrush Current	Inrush current does not exceed 150% of the rated input steady state peak value.
Operating Efficiency	96.5%
DC OUTPUT	
Output Voltage, Adjustment Range	-42 VDC to -58 VDC
Constant Power Limiting Operation	2000 W @ -48 VDC See derating chart for voltages less than 176 VDC or temperatures higher than 55 °C.
Output Current	41.7 A @ -48 VDC
Regulation	Steady state output voltage remains within +/-1% for any combination of input voltage and temperature from 5% to 100% load
Voice Band Noise	Does not exceed 38 dB <sub>BrnC</sub> output noise from 20% to 70% load
Wide Band Noise	Does not exceed 250 mv peak-to-peak, or 100 mv rms per Telcordia GR-947-CORE
Psophometric Noise	<2 mV at 20% to 70% of rated load
Protection	High Voltage shutdown fixed and selective capability. Fixed – requires manual restart. Selective – If rectifier detects over voltage it will turn off. After 5 seconds it will restart; if it encounters an over voltage within 5 minutes it will turn off and remain off until reset.
ENVIRONMENTAL	
Temperature	-40 °C to +80 °C (-40 °F to 176 °F )
Altitude	2000 m (6560 ft) at full power
British Thermal Unit (BTU)	326.9 BTU/hour
Ventilation	Front to back with speed-controlled fan (field replaceable)
Audible Noise	The rectifier does not produce sound levels above 50 dB(A), measured 0.6 m in front of the rectifier, at the same horizontal line as the middle of the rectifier at 25 °C
STATUS /ALARM INDICATORS AND MONITORING	
Visual Indicators	Green LED: Normal Operation      Yellow LED: Alarm Red LED: Failure                      Flashing Red LED: Fan Failure
Status Settings	Controller establishes rectifier settings
RECTIFIER PHYSICAL SPECIFICATIONS	
Mounting	Plug in installation
Dimensions (H x W x D)	86 x 84.5 x 272 mm (3.39" x 3.33" x 10.71")
Weight	2.4 kg (5.3 lbs)
Safety Compliance	UL 60950 Recognized (US & Canada)

## Additional Information

For additional specification, engineering and installation information, request specification number 582136700 (integrated distribution configuration) or 582136800 (bulk and external distribution configurations) or 1R482000e (eSure rectifier).

For ordering information on the complete system, request SAG582136700 or SAG582136800.



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