

■ DC Power for  
*Business-Critical Continuity™*

# NetSure® 701 Series

*DC Power System*





### Key Features

- **High Efficiency** — approaching 97%, eSure™ rectifiers reduce power consumption for lower operating costs
- **Modular Design** — simple to install and operate; allows incremental cost-effective system growth
- **Single Point Adjustment** — no tools required to change settings and make adjustments; MCA controls up to 72 rectifiers
- **Remote Access** — options allow users to view, control and interact with the system using an Ethernet, modem, RS 232 or LMS1000 interface
- **Plug'n'Play** — add rectifiers 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 six 3200 watt rectifiers per shelf (3RU), system can be configured with up to two bays
- **Constant Power** — delivers more current at lower voltages to meet load or recharge demand
- **Safety and EMC Compliance** — NEBS Level 3 certified, UL Listed to UL subject 1801, FCC Class B

## eSure™ rectifiers from Emerson provide efficiency levels near 97%, reducing heat and energy loss by 58%.

The modular NetSure® 701 Series DC power system with 3,200 watt rectifiers provides up to 4,000 amps of power for -48 volt systems. 3,200 watt constant power rectifiers provide up to 67 amps (59 amps at 54.0VDC and 62 amps at 52.0VDC) with a current limit of 67 amps. With six units per shelf, these rectifiers provide up to 402 amps in three rack units (5.25-in.) of space.

The basic components of the power system include the meter-control alarm unit (MCA), rectifier shelves which house the rectifiers, and up to two modular distribution cabinets with rear copper bus inter-bay power connections, allowing the system to be expanded to either side of the main bay.

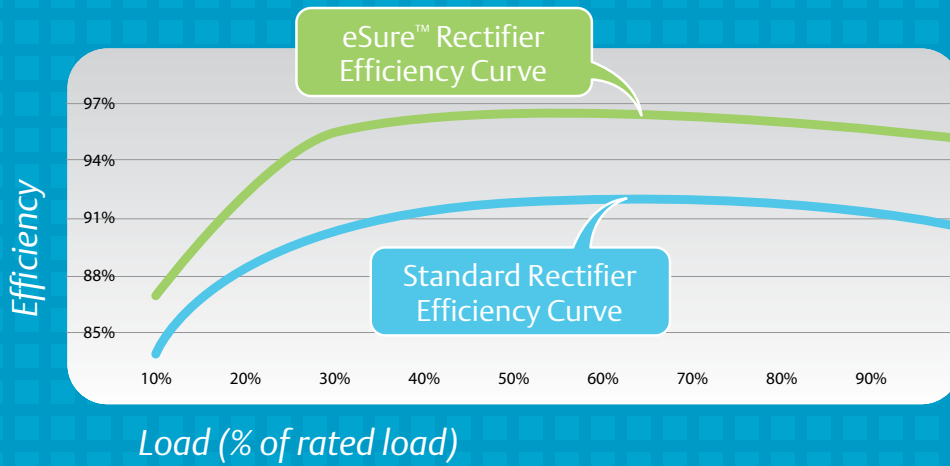
The NetSure® 701 power system contains a powerful, microprocessor-based meter-control alarm system capable of monitoring and controlling up to 72 rectifiers. The MCA provides a 16-character alphanumeric display, which can be activated at the touch of a keypad.



NetSure® 701

Each rectifier shelf can accommodate up to six plug'n'play rectifiers, which are controlled by the MCA. Additional shelves can be added as load requirements increase.

The NetSure® 701 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.



This graph demonstrates eSure® ultra high efficiency approaching 97% versus a standard rectifier efficiency curve around 92%

The NetSure® 701 system is ideal for wireline and wireless applications such as switch sites, co-location, huts and large vaults or enclosures, as well as data centers.

## Rectifiers

*Introducing the eSure™ rectifier from Emerson. The R48-3200e, available in Fall 2009, approaches 97% efficiency and is the first of the ultra high efficient eSure™ rectifier line. eSure™ rectifiers deliver the most reliability and highest efficiency in the industry, reducing power consumption and lowering operation cost.*

The NetSure® 701 Series supports eSure™ rectifiers and standard rectifiers. The R48-3200e and R48-3200 are both modular, high frequency constant power rectifiers 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® 701 Series houses up to 72 rectifiers, which provide load power, battery float current and battery recharge current. The rectifiers are monitored and controlled by the MCA. The modular design of these units facilitates power plant sizing to application needs.

Beyond reducing operating costs, Emerson 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.

## DC to DC Converters

A modular DC to DC converter system provides up to 320 amps at +24VDC via high frequency switch mode converters rated at 20 amps each. The system accommodates up to two rack-mount converter shelves, each of which houses eight 20 amp modules. Distribution devices for the +24 volt output are located in the main distribution cabinet and are available in various quantities.

## Rectifier Shelf

The NetSure® 701 rectifiers are housed in modular shelves that accommodate six rectifiers per shelf. The rectifier shelves are 23" (58.42cm) wide and 5.25" (13.33cm) high. System capacity can be easily expanded with additional shelves. A maximum of six rectifier shelves can be installed in each bay. An individual AC feed is provided for each rectifier on each shelf.



eSure™ Rectifiers

## Monitoring/Control



The MCA provides a single point of adjustment for such features as float voltage, test/equalize voltage, high voltage shut-down and current limit for all rectifiers in the entire power system. The rugged, temperature hardened LED 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 MCA panel or remotely via optional software and hardware. The MCA provides local indicators and the ability to transmit various alarm conditions such as rectifier failure, high voltage shutdown and AC failure. Remote and local communication is available using an Ethernet connection (web browser (HTTP) or SNMP), modem or RS-232 interface. In addition, the Lorain® Monitoring System, LMS1000, can be configured into this system (refer to 586505500 documentation for specifications).

## AC Input



*Top AC Wireway Input  
(cover removed)*



*Bottom AC Wireway Input  
(cover removed)*

Each rectifier shelf in the NetSure® 701 power system allows for input feeds to the rectifiers. Three shelf types are available: hard-wired single-phase input feed per rectifier, twist-lock line cord feed per rectifier, hard-wired three phase (208/240VAC) with each feed supplying three rectifiers. For hard-wired applications, there are conduit knockout openings on the rear and side of each shelf. Each conduit opening allows for installation of the circuits necessary to power up the (3) rectifiers on that side of the shelf. If space is a problem then an AC wireway option is available that will allow for the connection of the AC cables at the top of the bay. At the factory, cables are run from this connection point down into the shelves and enclosed in a sheet metal cover. Once again conduit knockouts are provided at that top of this cover.

## Distribution



The NetSure® 701 power system includes a modular distribution product line that can be designed with one to two distribution cabinets – sized to accommodate from one to four distribution panels each. Each panel is rated at 500 amps load. The maximum load per distribution cabinet is 2000 amps. The two, three and four-row distribution cabinets can be interconnected via copper inter-bay bus bars for a total system capacity of up to 4,000 amps with two bays.

The system can also be expanded with additional bays that are not adjacent to each other via extended length communications cables and inter-bay power cabling. 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 plug-in circuit breakers, 3 to 100 amp TPS-style fuses in plug-in holders, 100 to 600 amp GJ/218-style circuit breakers and 70 to 600 amp TPH-style fuses. These devices can be configured for both load and battery disconnect. A GMT fuse module is also available.

The NetSure® 701 Series' extensive monitoring capabilities, easy configuration and maintenance are all backed by the resources and quality reputation of a nationwide service organization.



-48VDC NetSure® 701  
with Battery Trays

The NetSure® platform is globally renowned with over **1 million** units deployed and an unmatched reliability of less than 0.5% failure rate (200 years MTBF).

## Battery Stand or Trays

The NetSure® 701 power system can be configured with a NEBS Level 3 certified modular front access battery stand to provide an entire power plant in one bay. Available options include manual battery disconnect/protection, low voltage battery disconnect, battery current monitoring and battery recharge current limit (refer to 588820000 documentation for specifications). Rack-mount battery trays are also available with optional battery disconnect circuit breakers.

### NetSure® 701 General Specifications

#### System Characteristics

Nominal System Voltage	-48VDC
Rated Output Capacity	
System	4000 amps
Bay	2000 amps
Rectifier	3200W
Shelf	402 amps
Distribution Panel	500 amps
Framework Type	Relay Rack (can be mounted in enclosures)
Mounting Width	23 Inches
Mounting Depth	18 Inches Single Bay 21 Inches Two Bays
Access	Front, sides and rear for installation, front for operation and maintenance
Control	Microprocessor (MCA)

#### 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	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 certified

## Rectifier Specifications

Electrical Specifications	R48-3200	R48-3200e
<b>AC Input</b>		
Nominal Voltage *	Single phase 208/240VAC	
Operating Voltage Range *	176VAC to 275VAC	
Frequency *	45 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 20.4 amp	Max 19.4 amp
Inrush Current *	Does not exceed 150% of the rated input steady state peak 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 95VAC (low voltage restart point) or when it decreases to 285VAC (high voltage restart point). Overcurrent is protected by an internal fuse.	
Operating Efficiency	92% peak	96.8% peak
<b>DC Output</b>		
Output Voltage Range *	-42.0VDC to -58.0VDC	
Output Power *	Constant power limiting operation 3200W maximum from 176VAC to 290VAC 1600W @ 120VAC	600W @ 85VAC Derated for input voltage (see diagram) 3200W @ Vout >48VDC
Output Current *	67 amps max	
Regulation *	Steady state output voltage remains within +/-0.25% for any combination of input voltage from 5% to 100% load	
Voice Band Noise *	The voice-frequency noise generated by a rectifier does not exceed 32dBmC output noise from 10% to 100% load	
Wide Band Noise *	Does not exceed 250 mv peak-to-peak, or 30 mv rms per Telcordia GR-947-CORE	
Psophometric Noise	Does not exceed 1 mv 10% to 100% load	Does not exceed 2 mv 10% to 100% load
Output Protection *	<p>Current Limiting Over Current: The output current is limited to 67amps. Output current limit set point 5.5 to 67 amps. Internal fuse</p> <p>High Voltage Shutdown: 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.</p>	

\* This specification applies to both the R48-3200 standard rectifier and the R48-3200e high efficiency unit.

## Rectifier Specifications (continued)

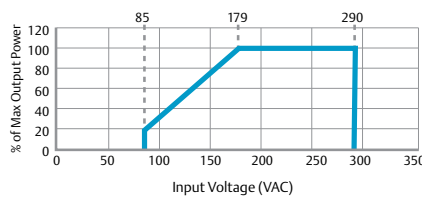
### Electrical Specifications R48-3200 & R48-3200e

### R48-3200e

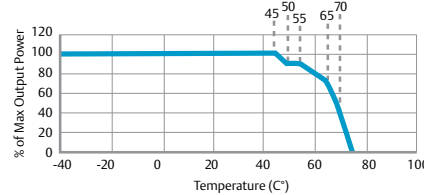
Environmental	
Temperature *	-40°F to 113°F (-40°C to 45°C) at full rated output. -40 to +167°F, -40 to +75°C (operating and storage).
Altitude *	Up to 6562' (2000m) at full rated output
Relative Humidity *	0 to 95%
Ventilation *	Front to back with speed-controlled fan (field replaceable)
Audible Noise *	The rectifier does not produce sound levels above 53dB(A), measured 0.6m 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 *	Normal operation = Green LED Alarm = Yellow LED Rectifier failure alarm = Red LED Fan failure alarm = Flashing red LED
Status Settings *	The MCA controller establishes all rectifier settings. Reported via CAN bus to system controller.
Rectifier Physical Specifications	
Mounting *	Plug-in installation
Dimensions (H x W x D) *	5.20 x 3.36 x 11.3 inches (132 x 85.3 x 287mm)
Weight	7.7 lbs. (3.5kg) <span style="float: right;">6.8 lbs. (3.1kg)</span>
Safety Compliance *	UL recognized (UL 60950) for USA & Canada, CE marked, EN 300 386:2001 class B, FCC part 15 class B, IEC 60950, EN 60950

\* This specification applies to both the R48-3200 standard rectifier and the R48-3200e high efficiency unit.

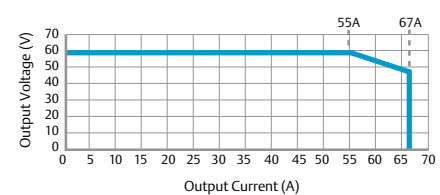
### Output Power vs. Input Voltage at Tamb <45°C



### Output Power vs. Temperature at Uin > 176VAC



### Output Voltage vs. Output Current, Max. Output Power 3200W



### Additional Information

For additional specification, engineering and installation information use specification numbers 582126000 (power system), 1R483200 or 1R483200e (rectifiers) and 588705000 (power shelf for 3200W rectifiers).

For ordering information on the complete system, request SAG582126000, PD588705000.

Emerson (NYSE: EMR), based in St. Louis, Missouri (USA), is a global leader in bringing technology and engineering together to provide innovative solutions to customers through its network power, process management, industrial automation, climate technologies, and appliance and tools businesses. For more information, visit: [Emerson.com](http://Emerson.com).

Emerson Network Power, a business of Emerson (NYSE:EMR), is the global leader in enabling *Business-Critical Continuity™* from grid to chip for telecommunication networks, data centers, health care and industrial facilities. Emerson Network Power provides innovative solutions and expertise in areas including AC and DC power and precision cooling systems, embedded computing and power, integrated racks and enclosures, power switching and controls, monitoring, and connectivity. All solutions are supported globally by local Emerson Network Power service technicians. For more information on Emerson Network Power's full suite of solutions specifically supporting the communications network infrastructure, including NetSpan™, NetReach™ and NetXtend™ outside plant enclosures and equipment, NetSure® DC power systems, and turnkey services, visit: [EmersonNetworkPower.com/EnergySystems](http://EmersonNetworkPower.com/EnergySystems).

Learn more about Emerson Network Power products and services at: [EmersonNetworkPower.com](http://EmersonNetworkPower.com).

This publication is issued to provide outline information only which (unless agreed by Emerson Network Power Energy Systems, North America, Inc. in writing) may not be used, applied or reproduced for any purpose or form part of any order or contract or be regarded as a representation relating to the products or services concerned. Emerson Network Power Energy Systems, North America, Inc. reserves the right to alter without notice the specification, design or conditions of supply of any product or service.

Emerson®, Emerson Network Power™, Business-Critical Continuity™, LORAIN®, NetSpan™, NetReach™, NetXtend™ and NetSure® are trademarks of Emerson Electric Co. and/or one of its subsidiaries.

### **Emerson Network Power**

#### **Energy Systems, North America**

4350 Weaver Parkway, Warrenville, IL 60555

**Toll Free:** 800-800-1280 (USA and Canada)

**Telephone:** 440-246-6999 **Fax:** 440-246-4876

**Web:** [EmersonNetworkPower.com/EnergySystems](http://EmersonNetworkPower.com/EnergySystems)

**EnergyNet:** [Secure.EmersonNetworkPower.com](http://Secure.EmersonNetworkPower.com)

### **Emerson Network Power.**

The global leader in enabling *Business-Critical Continuity™*.

■ AC Power

■ Connectivity

■ DC Power

■ Embedded Computing

■ Embedded Power

■ Monitoring

■ Outside Plant

■ Power Switching & Controls

■ Precision Cooling

### **Emerson Network Power.com/EnergySystems**

■ Racks & Integrated Cabinets

■ Services

■ Surge Protection