

SYSTEM OVERVIEW

Description: -48V DC @ up to 2000 Amperes Bulk Output Power System

The Vertiv™ NetSure™ 722NBBB Bulk Output Power System is intended for use to expand or replace legacy -48V DC rectifiers while retaining the distribution power board. It can be used with any -48V DC power system, regardless of vendor or plant type.

The 722NBBB is an integrated power system containing rectifiers, intelligent control, metering, and monitoring.

This power system is designed to power a load while charging a positive grounded battery. This power system is capable of operating in a batteryless installation or off battery for maintenance purposes. The power system is designed for operation with the positive output grounded.

This system consists of the following components.

- **Main Rectifier Module Mounting Shelf**

The system contains a main rectifier module mounting shelf. This shelf houses up to five (5) rectifier modules, the controller, a controller interface board, and a system interface board. Refer to Power Data Sheet PD588705000 for more information.

NCU (NetSure™ Control Unit): The controller provides power system control (including optional low voltage battery disconnect (LVBD) and low voltage load disconnect (LVLD) control), rectifier control (including a charge control function), metering functions, monitoring functions, and local/remote alarm functions. The controller also supports rectifier temperature compensation if the system is equipped with a temperature probe(s).

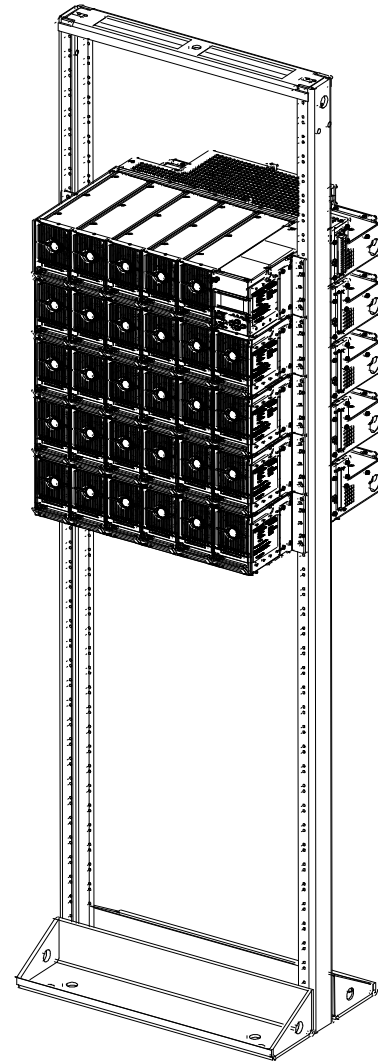
Temperature probe(s) may also be designated to monitor ambient temperature and/or battery temperature. The controller also provides data acquisition, system alarm management, and advanced battery and energy management. The controller contains a color LCD display and keypad for local access. The controller provides an Ethernet port and comes with comprehensive webpages for remote access. The controller has SNMP v3 capability for remote system management. The controller supports software upgrade via its USB port. Refer to the NCU Controller Instructions (UM1M830BNA) for more information.

- **Expansion Rectifier Module Mounting Shelf**

The system contains one or more expansion rectifier module mounting shelves, each of which houses up to six (6) rectifier modules. Refer to Power Data Sheet PD588705000 for more information.

- **Rectifier Modules**

The system contains rectifier modules, which provide load power, battery float current, and battery recharge current during normal operating conditions. Refer to the Rectifier Instructions (UM1R483500E) for more information.



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General Specifications

See detailed specifications starting on page 24.

Family:	Vertiv™ NetSure™
System Spec. No.:	582127100
System Model:	722NBBB
System AC Input Voltage	AC input is connected to the individual rectifier shelf(s). See PD588705000 for ratings.
System DC Output Voltage	-48V DC, nominal
System Output Capacity:	2000A, maximum
588705000 Shelf Ratings:	See PD588705000.
1R483500E Rectifier Rating:	See UM1R483500E.
System Agency Approval:	UL 60950 Recognized; CAN/CSA 22.2, No. 60950-00, NEBS
Framework Type:	Relay Rack Mounted
Mounting Width:	23 Inches, nominal
Mounting Depth:	
588705000 Rectifier Mounting Shelf:	18.75 Inches
Access:	Front for Operation Front and Rear for Installation and Maintenance
Control:	Microprocessor
Color:	Module Faceplates: Textured Gray Module Mounting Shelf and Module Bodies: Bright Zinc Plating
Environment:	-40°C to +65°C (-40°F to +149°F)

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RELATED DOCUMENTATION **27**

MAIN COMPONENTS ILLUSTRATIONS

582127100

COMMON EQUIPMENT

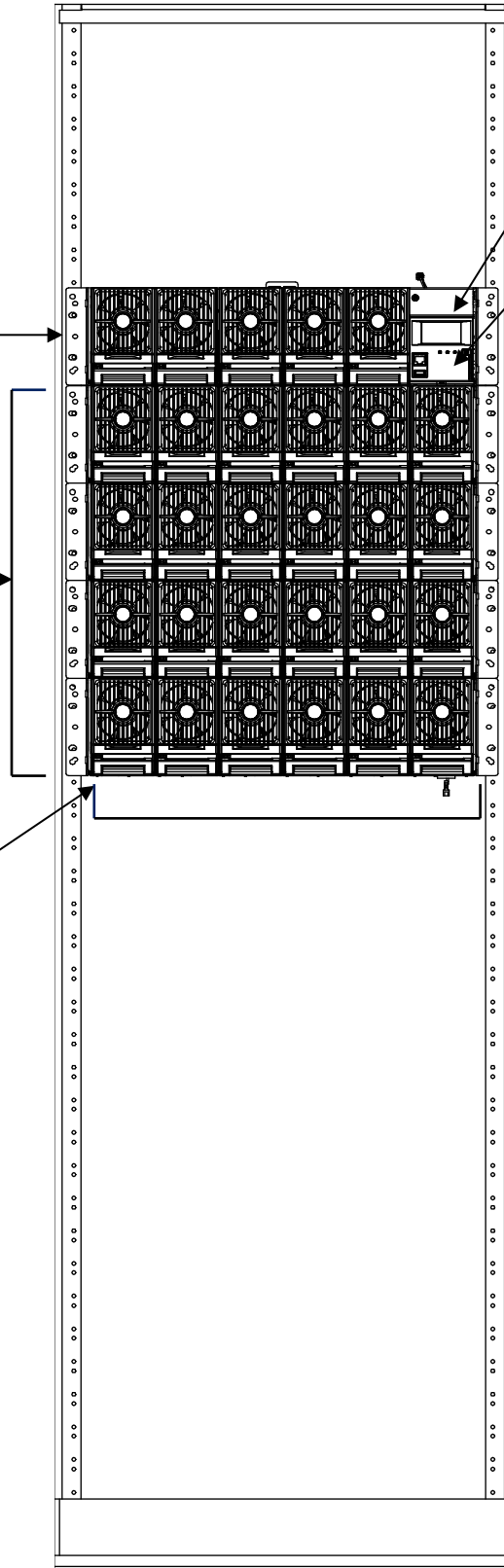
[List 1:](#) Relay Rack or Rail Mounted System

[List 2:](#) Ship Loose System

Main Rectifier Module Mounting Shelf:
58870500061,
58870500062, or
58870500063
(see PD588705000)

Expansion Rectifier Module Mounting Shelf(s):
58870500051,
58870500052, or
58870500053
(see PD588705000)

Rectifier Module:
[1R483500E](#)
(see UM1R483500E)



System Interface Board and Controller Interface Board (behind panel)

NCU Controller (Main Rectifier Module Mounting Shelf):
[1M830DNA](#)

[List 10:](#) Main Rectifier Module Mounting Shelf Interface Components (Provides DC output lug landing busbar assemblies for the main rectifier module mounting shelf.)

[List 11:](#) Expansion Rectifier Module Mounting Shelf Interface Components (Provides DC output lug landing busbar assemblies for an expansion rectifier module mounting shelf and busbar interconnecting links.)

[List 20:](#) Main Rectifier Module Mounting Shelf to Expansion Rectifier Module Mounting Shelf Interface Components (Provides mounting angles and DC output lug landing busbar assemblies which span between a main rectifier module mounting shelf and an expansion rectifier module mounting shelf.)

[List 21:](#) Expansion Rectifier Module Mounting Shelf to Expansion Rectifier Module Mounting Shelf Interface Components (Provides mounting angles and DC output lug landing busbar assemblies which span between an expansion rectifier module mounting shelf and another expansion rectifier module mounting shelf and busbar interconnecting links.)

LIST DESCRIPTIONS

List Numbers

List 1: Common Equipment (Relay Rack or Rail Mounted System)

Features

- ◆ Provides common equipment for one “bulk output” bay rated for up to 2000 amperes mounted in a relay rack or on shipping brackets.

Ordering Notes

- 1) Order a relay rack or shipping brackets per “Relay Racks and Shipping Brackets” on page 13. If required, order relay rack transition plates per “Transition Plates to Mount Relay Rack on Top of GNB Absolyte IIP Batteries” on page 14. If required, order Relay Rack Isolation Kit as applicable per "Relay Rack Isolation Kit" on page 14.
- 2) Order interface components for the main rectifier module mounting shelf as required per [List 10](#) or interface components for the main rectifier module mounting shelf and one (1) expansion rectifier module mounting shelf per [List 20](#).
- 3) Order interface components for one (1) to four (4) expansion rectifier module mounting shelf(s) as required per [List 11](#) or interface components for an expansion rectifier module mounting shelf to an expansion rectifier module mounting shelf per [List 21](#). In systems using List 20 and List 21 interface components, if a fourth expansion rectifier module mounting shelf is required, also order a [List 11](#) for the fourth expansion rectifier module mounting shelf.

List 2: Common Equipment (Ship Loose System)

Features

- ◆ Provides common equipment for one “bulk output” bay rated for up to 2000 amperes to be mounted in a customer rack.

Ordering Notes

- 1) Order interface components for the main rectifier module mounting shelf per [List 10](#).
- 2) Order interface components for one (1) to four (4) expansion rectifier module mounting shelf(s) as required per [List 11](#).

List 10: Main Rectifier Module Mounting Shelf Interface Components

Features

- ◆ Provides DC output lug landing busbar assemblies for the main rectifier module mounting shelf. Provides shelf rack mounting hardware. The main rectifier module mounting shelf must be ordered separately. Refer to Power Data Sheet PD588705000.
- ◆ The main rectifier module mounting shelf provides a mounting slot for the controller. Also provided in the main rectifier module mounting shelf is the system interface board which provides customer connections for two (2) external battery fuse alarm inputs, four (4) external load fuse alarm inputs, one (1) load shunt input, one (1) battery shunt input, one (1) LVD driver output, one (1) LVD sense input, and RS-485 port. Two temperature inputs are provided directly to the internal system interface board. Also provided in the main rectifier module mounting shelf is the IB2 controller interface board which provides eight (8) programmable form-C relay outputs, eight (8) programmable binary inputs, and two (2) temperature inputs.

Ordering Notes

- 1) For a shipped loose system, order one (1) List 10 per system.
- 2) Order the main rectifier module mounting shelf per PD588705000 (choices are 58870500061, 58870500062, or 58870500063).
- 3) Order up to five (5) rectifier modules for the main rectifier module mounting shelf, P/N [1R483500E](#).
- 4) Order a rectifier module mounting position blank cover panel, P/N 21140440, for each empty rectifier module mounting position in the system, as desired.
- 5) Order one (1) NCU controller, P/N [1M830DNA](#).
- 6) Order output lugs and lug hardware kits as required per “Standard Crimp Lugs and Lug Hardware Kits” on page 15. See also Table 7.

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List 11: Expansion Rectifier Module Mounting Shelf Interface Components

Features

- ◆ Provides DC output lug landing busbar assemblies for one expansion rectifier module mounting shelf and busbar interconnecting links. Provides shelf rack mounting hardware. The expansion rectifier module mounting shelf(s) must be ordered separately. Refer to Power Data Sheet PD588705000.

Ordering Notes

- 1) For a shipped loose system, order one (1) to four (4) List 11 per system. In systems using List 20 and List 21 interface components, if a fourth expansion rectifier module mounting shelf is required, also order a List 11 for the fourth expansion rectifier module mounting shelf.
- 2) Order one (1) to four (4) expansion rectifier module mounting shelf(s) per PD588705000 (choices are 58870500051, 558870500052, or 58870500053).
- 3) Order up to six (6) rectifier modules per expansion rectifier module mounting shelf, P/N [1R483500E](#).
- 4) Order a rectifier module mounting position blank cover panel, P/N 21140440, for each empty rectifier module mounting position in the system, as desired.
- 5) Order output lugs and lug hardware kits as required per “Standard Crimp Lugs and Lug Hardware Kits” on page 15. See also Table 7.

List 20: Main Rectifier Module Mounting Shelf to Expansion Rectifier Module Mounting Shelf Interface Components

Features

- ◆ Provides mounting angles and DC output lug landing busbar assemblies which span between the main rectifier module mounting shelf and one (1) expansion rectifier module mounting shelf. Provides shelf rack mounting hardware. The main and expansion rectifier module mounting shelf must be ordered separately. Refer to Power Data Sheet PD588705000.

Note: *List 20 provides the interface components for a two-shelf (main and expansion) arrangement to eliminate the linking busbars between the first two shelves. One set of output busbars (one busbar per polarity) is provided for the two shelf arrangement.*

- ◆ The main rectifier module mounting shelf provides a mounting slot for the NCU controller. Also provided in the main rectifier module mounting shelf is the system interface board which provides customer connections for two (2) external battery fuse alarm inputs, four (4) external load fuse alarm inputs, one (1) load shunt input, one (1) battery shunt input, one (1) LVD driver output, one (1) LVD sense input, and RS-485 port. Two temperature inputs are provided directly to the internal system interface board. Also provided in the main rectifier module mounting shelf is the IB2 controller interface board which provides eight (8) programmable form-C relay outputs, eight (8) programmable binary inputs, and two (2) temperature inputs.

Ordering Notes

- 1) For a relay rack or rail mounted system consisting at the minimum of one (1) main rectifier module mounting shelf and one (1) expansion rectifier module mounting shelf, order one (1) List 20 per system.
- 2) Order the main rectifier module mounting shelf per PD588705000 (choices are 58870500061, 558870500062, or 58870500063).
- 3) Order an expansion rectifier module mounting shelf per PD588705000 (choices are 58870500051, 558870500052, or 58870500053).
- 4) Order up to five (5) rectifier modules for the main rectifier module mounting shelf, P/N [1R483500E](#). Order up to six (6) rectifier modules for the expansion rectifier module mounting shelf, P/N [1R483500E](#).
- 5) Order a rectifier module mounting position blank cover panel, P/N 21140440, for each empty rectifier module mounting position in the system, as desired.
- 6) Order one (1) NCU controller, P/N [1M830DNA](#).
- 7) Order output lugs and lug hardware kits as required per “Standard Crimp Lugs and Lug Hardware Kits” on page 15. See also Table 7.

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List 21: Expansion Rectifier Module Mounting Shelf to Expansion Rectifier Module Mounting Shelf Interface Components

Features

- ◆ Provides mounting angles and DC output lug landing busbar assemblies which span between an expansion rectifier module mounting shelf and another expansion rectifier module mounting shelf and busbar interconnecting links. Provides shelf rack mounting hardware. The expansion rectifier module mounting shelves must be ordered separately. Refer to Power Data Sheet PD588705000.

Note: List 21 provides the interface components for a two-shelf (expansion shelves) arrangement to eliminate the linking busbars between the two shelves. One set of output busbars (one busbar per polarity) is provided for the two shelf arrangement.

Ordering Notes

- 1) For a relay rack or rail mounted system consisting at the minimum of one (1) main rectifier module mounting shelf and three (3) expansion rectifier module mounting shelves, order one (1) List 21 per system. In systems using List 20 and List 21 interface components, if a fourth expansion rectifier module mounting shelf is required, also order a [List 11](#) for the fourth expansion rectifier module mounting shelf.
- 2) Order expansion rectifier module mounting shelves per PD588705000 (choices are 58870500051, 58870500052, or 58870500053).
- 3) Order up to six (6) rectifier modules per expansion rectifier module mounting shelf, P/N [1R483500E](#).
- 4) Order a rectifier module mounting position blank cover panel, P/N 21140440, for each empty rectifier module mounting position in the system, as desired.
- 5) Order output lugs and lug hardware kits as required per “Standard Crimp Lugs and Lug Hardware Kits” on page 15. See also Table 7.

ACCESSORY DESCRIPTIONS

NCU (NetSure™ Control Unit) Controller, P/N 1M830DNA

Features

- ◆ Provides one (1) Model M830DNA, Spec. No. 1M830DNA system controller.
- ◆ Factory programmed with the configuration file required for the system configuration ordered.

Note: For custom NCU configurations, contact Vertiv.

Restrictions

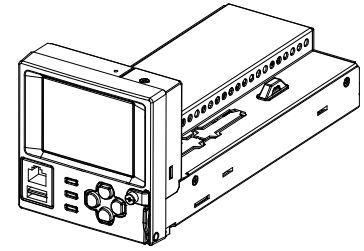
Only one (1) controller per power system is required.
Mounts in the main rectifier mounting shelf.

Ordering Notes

- 1) Order one (1) NCU Controller (P/N 1M830DNA) per power system (to be installed in a main rectifier module mounting shelf).
- 2) Order up to four (4) optional temperature probes for ambient and battery temperature monitoring, as required. The temperature probe(s) may also be used for the battery charge temperature compensation feature and BTRM (Battery Thermal Runaway Management). Refer to “Optional Temperature Probes” on page 9 for additional information.
- 3) Order optional supervisory modules as desired (shipped loose).

- [SM-TEMP](#) (Supervisory Module for Temperature Probes).

Note: A system can have up to (8) SM-Temp modules for a total of sixty-eight (68) temperature probes that can be used in the power system for ambient and battery monitoring.



Optional Temperature Probes

Features

- ◆ Up to two (2) temperature probes can be connected to the IB2 (Controller Interface Board). Up to two (2) additional temperature probes can be connected to the System Interface Board. Any combination of the four (4) temperature probes can be programmed to monitor ambient temperature and/or battery temperature. A temperature probe set to monitor battery temperature can also be used for the rectifier battery charge temperature compensation feature, or the battery charge temperature compensation feature can be programmed to use the average or highest value of all battery temperature probes. The battery charge temperature compensation feature allows the controller to automatically increase or decrease the output voltage of the system to maintain battery float current as battery temperature decreases or increases, respectively. Battery life can be extended when an optimum charge voltage to the battery with respect to temperature is maintained. A temperature probe set to monitor battery temperature can also be used for the BTRM (Battery Thermal Runaway Management) feature. The BTRM feature lowers output voltage when a high temperature condition exists to control against battery thermal runaway.
- ◆ The temperature sensor end of the probe contains a tab with a 5/16” clearance hole for mounting.
- ◆ Temperature probes can also be used with the optional [SM-Temp Temperature Concentrator](#).

Restrictions

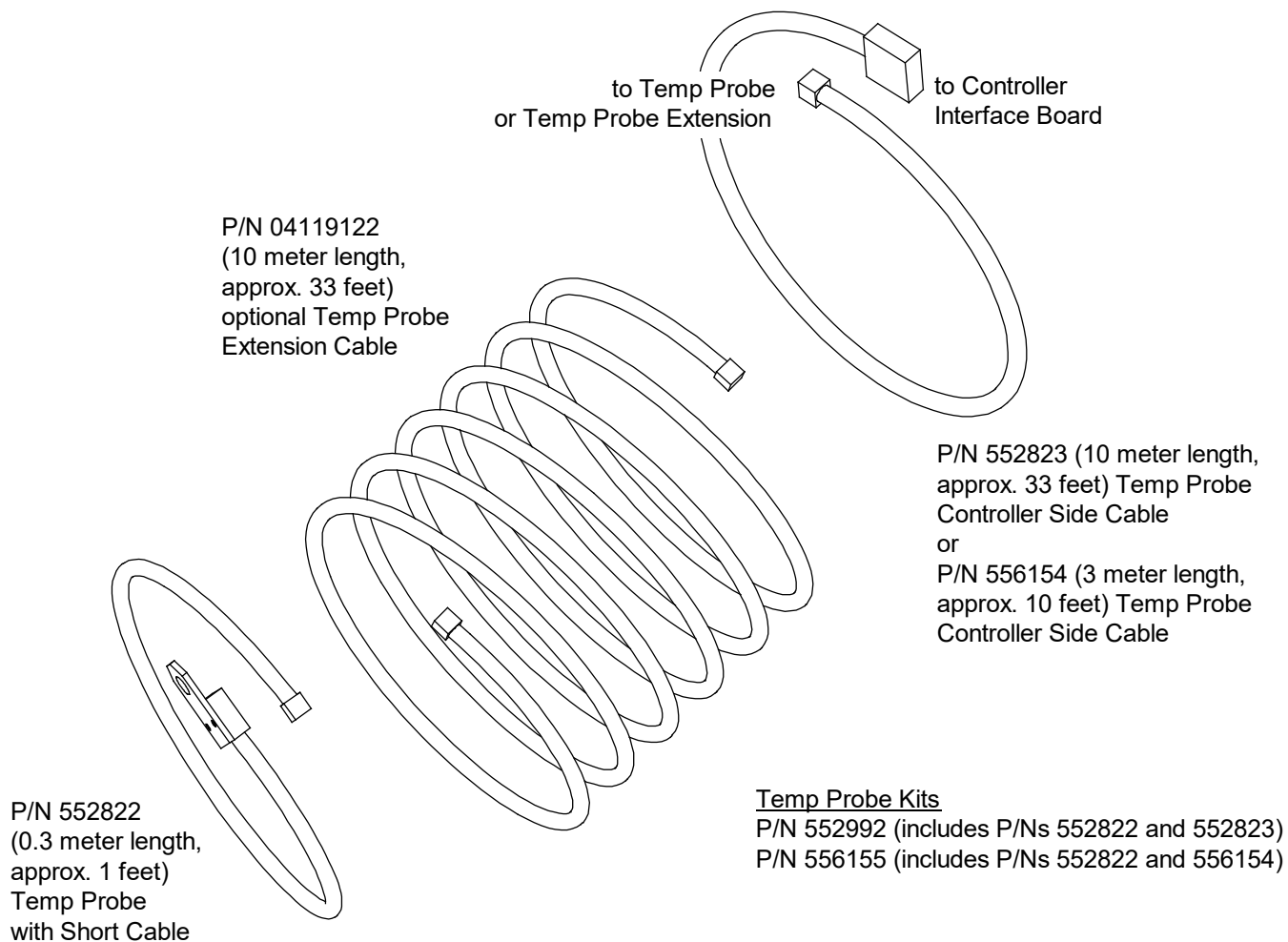
A temperature probe programmed to monitor battery temperature should be mounted on the negative post of a battery cell to sense battery temperature. A temperature probe used for battery charge temperature compensation and/or BTRM (Battery Thermal Runaway Management) should also be mounted on the negative post of a battery cell. A temperature probe programmed to monitor ambient temperature should be mounted in a convenient location, away from direct sources of heat or cold.

Ordering Notes

- 1) Order temperature probes as required. Note that each temperature probe consists of two pieces which plug together to make a complete probe (see the following illustration). For a complete temperature probe, order one (1) P/N 552992 (10.3 meters) or one (1) P/N 556155 (3.3 meters). If additional length is required, order temperature probe extension cable P/N 04119122 (10 meters).
- 2) If more probes are desired, order one or more SM-Temp Temperature Concentrator, P/N 547490. See [Optional SM-Temp Temperature Concentrator](#) on page 12.

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In-Line Fuse and Resistor Pigtail Kits

In-line fuse kits should be used for connecting to battery or bus potentials for use with the digital inputs on the IB2 Interface Board and the battery midpoint/block voltage inputs on the EIB Extended Interface Board. In-line resistor kits should be used for connecting to shunts for use with the EIB Extended Interface Board and SMDU+ Shunt Interface Board.

1A In-Line Fuse Pigtail Kit, P/N 431300200

Features

- ◆ In-line fuse pigtail kit with 3/8" ring lug.

Ordering Notes

- 1) Order Kit P/N 431300200, as required.

1A In-Line Fuse Pigtail Kit, P/N 431300300

Features

- ◆ In-line fuse pigtail kit with 5/16" ring lug.

Ordering Notes

- 1) Order Kit P/N 431300300, as required.

1A In-Line Fuse Pigtail Kit, P/N 535135

Features

- ◆ In-line fuse pigtail kit with a splice connector, 3/8" ring lug, and 1/4" ring lug.

Ordering Notes

- 1) Order Kit P/N 535135, as required.

49.9 Ohm In-Line Resistor Pigtail Kit, P/N 424227900

Features

- ◆ In-line resistor pigtail kit with 3/8" ring lug.

Ordering Notes

- 1) Order Kit P/N 424227900, as required.

49.9 Ohm In-Line Resistor Pigtail Kit, P/N 424228000

Features

- ◆ In-line resistor pigtail kit with a splice connector.

Ordering Notes

- 1) Order Kit P/N 424228000, as required.

49.9 Ohm In-Line Resistor Pigtail Kit, P/N 424228100

Features

- ◆ In-line resistor pigtail kit with 5/16" ring lug.

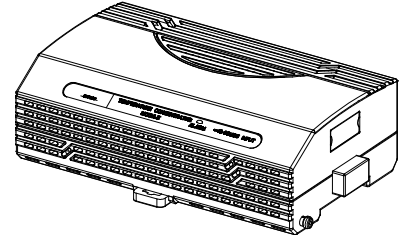
Ordering Notes

- 1) Order Kit P/N 424228100, as required.

Optional SM-Temp Temperature Concentrator, P/N 547490

Features

- ◆ Allows for multiple temperature probes to be used for ambient temperature monitoring, battery temperature monitoring, temperature compensation, and/or BTRM (Battery Thermal Runaway Management).
- ◆ Provides (8) temperature probe inputs per SM-Temp.
- ◆ Can cascade up to (8) SM-Temp modules, connecting up to sixty-four (64) temperature probes.
- ◆ The SM-Temp Concentrator is connected at the end of the Controller CAN bus. Via the CAN Bus, the NCU reads each temperature probe from each SM-Temp Concentrator.



Ordering Notes

- 1) Order SM-Temp Temperature Concentrator, P/N 547490, as required.
- 2) Order up to (8) temperature probes for each concentrator. See “Optional Temperature Probes” on page 9.

Rectifiers

Rectifier Module, P/N 1R483500E

Features

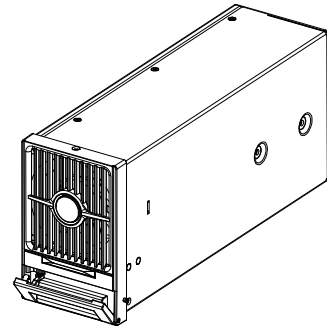
- ◆ Provides one (1) Model R48-3500e, Spec. No. 1R483500E, 3500 watt / -48 volt rectifier module.
- ◆ Refer to the Rectifier Instructions (UM1R483500E) for more information.

Restrictions

For use in Spec. No. 588705000 rectifier module mounting shelf.

Ordering Notes

- 1) Order by P/N 1R483500E as required. The main rectifier module mounting shelf holds up to five (5) rectifier modules. Each expansion rectifier module mounting shelf holds up to six (6) rectifier modules.



Rectifier Module Mounting Position Blank Cover Panel, P/N 21140440

Features

- ◆ Covers one (1) unused rectifier module mounting position.

Restrictions

For use in Spec. No. 588705000 rectifier module mounting shelf.

Ordering Notes

- 1) Order by P/N 21140440 as required. Order a rectifier module mounting position blank cover panel for each empty rectifier module mounting position in the system, as desired.

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Relay Racks and Shipping Brackets

Features

- ◆ The system is factory mounted to the relay rack or shipping brackets specified when ordered.
- ◆ Relay racks (except P/N 541340) are 23" standard mounting with 3" deep uprights. P/N 541340 is 23" standard mounting with 6" deep upright.
- ◆ When ordered with shipping brackets, the system is mounted on shipping brackets bolted to a shipping skid. The shipping brackets can mount a system up to 22RU high.

Note: *If the system is shipped on shipping brackets, rectifier module mounting shelves are installed in groups of two or less. Space has been provided for pallet forks to fit between the sets of rectifier module mounting shelves to allow transferring the shelves from the shipping brackets to the customer rack.*

Ordering Notes

- 1) Order from relay racks and shipping brackets listed in [Table 1](#).

Part Number	Size	Available Mounting Positions (1RU = 1-3/4")	Notes
509638 509639	Shipping Brackets	22RU	--
562360	43.156"H x 24.376"W x 15"D	23RU	Seismic (Note 1)
559817	51.906"H x 24.376"W x 15"D	28RU	Welded
564169	72.000"H x 25.380"W x 18"D	38RU	Seismic (Note 1)
559818	72.000"H x 24.375"W x 15"D	38RU	Welded
559820	84.000"H x 24.375"W x 15"D	45RU	Welded
562353	84.000"H x 25.800"W x 18"D	45RU	Seismic (Note 1)
562355	85.750"H x 24.375"W x 15"D	46RU	Welded
559821	90.000"H x 24.375"W x 15"D	48RU	Welded
559822	96.000"H x 24.375"W x 15"D	51RU	Welded

Note 1: *Complies with Bellcore Seismic Zone 4 requirements.*

Table 1
Available Relay Racks and Shipping Brackets

Transition Plates to Mount Relay Rack on Top of GNB Absolyte IIP Batteries

Features

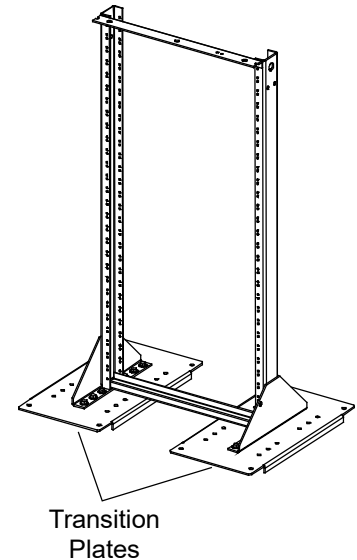
- ◆ Transition Plate Kits can be ordered to mount relay rack P/Ns 543151, 543152, 543153, 543154, 543155, or 543156 on top of GNB Absolyte IIP batteries.
- ◆ Each kit consists of two transition plates with three hole patterns and hardware (3/8") to mount the plates to the above listed relay racks. Customer must supply hardware to mount the transition plates to the battery.

Restrictions

Used with relay rack P/Ns 543151, 543152, 543153, 543154, 543155, or 543156 only.

Ordering Notes

- 1) Order P/N 509819 for a Transition Plate Kit to mount relay rack on top of a GNB 3-100A19, GNB 3-100A27, or GNB 3-100A33 battery.
- 2) Order P/N 514596 for a Transition Plate Kit to mount relay rack on top of a GNB 6-90A09 battery.
- 3) Order P/N 514880 for a Transition Plate Kit to mount relay rack on top of a GNB 3-100A21, GNB 3-100A25, or GNB 3-100A31 battery.



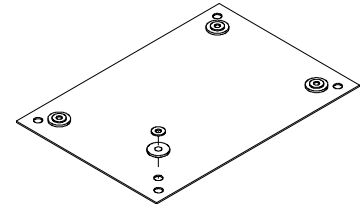
Relay Rack Isolation Kit

Features

- ◆ Provides electrical isolation of the relay rack from the concrete floor. Includes an insulating pad, four (4) insulating bushings, and four (4) flat washers to be used with the anchors used to mount the relay rack to the floor.

Ordering Notes

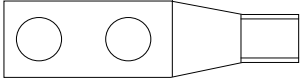
- 1) Order P/N 10019125 for a Relay Rack Isolation Kit to be used with 23" seismic relay racks P/N 562353.



Standard Crimp Lugs and Lug Hardware Kits

Standard Crimp Lug Tables

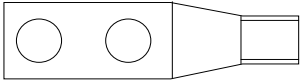
Lead Size	Part Number
14-10 AWG	245342300
8 AWG	245390200
6 AWG	245346700
4 AWG	245346800
2 AWG	245346900



Lugs should be crimped per lug manufacturer's specifications.

Table 2
Crimp Lug
Two-Hole, 1/4" Bolt Clearance Hole, 5/8" Centers

Lead Size	Part Number
6 AWG	245349900
4 AWG	245350000
2 AWG	245348200
1/0 AWG	245347100
2/0 AWG	245347200
3/0 AWG	245347300
4/0 AWG	245347400
250 kcmil	245347500
300 kcmil	245347600
350 kcmil	245347700
400 kcmil	245347800
500 kcmil	245347900
600 kcmil	245348000
750 kcmil	245348100



Lugs should be crimped per lug manufacturer's specifications.

Table 3
Crimp Lug
Two-Hole, 3/8" Bolt Clearance Hole, 1" Centers

3/8-16 Lug Hardware Kit, P/N 556277

Features

- ◆ Provides the following.
 - Fourteen (14) 3/8-16 x 1-1/4" bolts.
 - Fourteen (14) 3/8" lock washers.
 - Fourteen (14) 3/8" flat washers.
 - Seven (7) nut plates, 3/8-16 x 1" centers, P/N 555928.

Ordering Notes

- 1) Order Kit P/N 556277, as required.

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Customer Cables

CAN Bus Input Cable, P/N 556430

Features

- ◆ Provides a 26" NCU CAN Bus cable. This cable is used to extend the end of the NCU CAN Bus located in the bottom-most rectifier shelf up into the top most rectifier shelf. See Table 4 for cable pinouts and wire colors.

Ordering Notes

- 1) This cable is factory provided for relay rack or rail mounted systems (List 1). For a replacement cable order P/N 556430, as required.

CAN Bus Output Cable, P/N 556238

Features

- ◆ Provides a 10' NCU CAN Bus cable. This cable is used to extend the end of the NCU CAN Bus outside the main rectifier shelf to other equipment. See Table 4 for cable pinouts and wire colors.

Ordering Notes

- 1) Order P/N 556238, as required.

P/N 556430 (Int. CAN)		
Signal	Wire Color	TB5
CAN-H	Black	CANx-1
CAN-L	Red	CANx-2
P/N 556238 (Ext. CAN)		
Signal	Wire Color	TB5
CAN-H	Black	CANx-1
CAN-L	Red	CANx-2

Table 4
NCU Controller CAN Bus Cables

Replacement Assemblies

Ordering Notes

- 1) Refer to the following table. Refer to the separate rectifier descriptions in this section for their part numbers.

Item	Part Number
NCU Controller	1M830DNA
IB2 Controller Interface Board	MA4C5U31

Table 5
Replacement Assemblies

RECOMMENDED WIRE SIZES, BRANCH CIRCUIT PROTECTION, CRIMP LUGS, AND WIRING ILLUSTRATIONS

Relay Rack Frame Grounding Requirements

For relay rack grounding requirements, refer to the current edition of the American National Standards Institute (ANSI) approved National Fire Protection Association's (NFPA) National Electrical Code (NEC), applicable local codes, and your specific site requirements.

A customer's grounding network lead can be attached to the top of each relay rack. Provision is made for installing a lead with a two-hole lug that has 1/4" bolt clearance holes on 5/8" centers. Refer to Table 2 for lug selection.

AC Input Branch Circuit Protection and Wire Size Selection

AC input connections are made to the rear of the rectifier module mounting shelf(s). Refer to Power Data Sheet PD588705000 for connection details.

External Alarm, Reference, Monitoring, and Control Connections

Recommended wire size is 22 AWG for loop lengths up to 200 ft. and 18-20 AWG for loop lengths over 200 ft. Refer to Figure 1, Figure 2, Figure 3, and Table 6.

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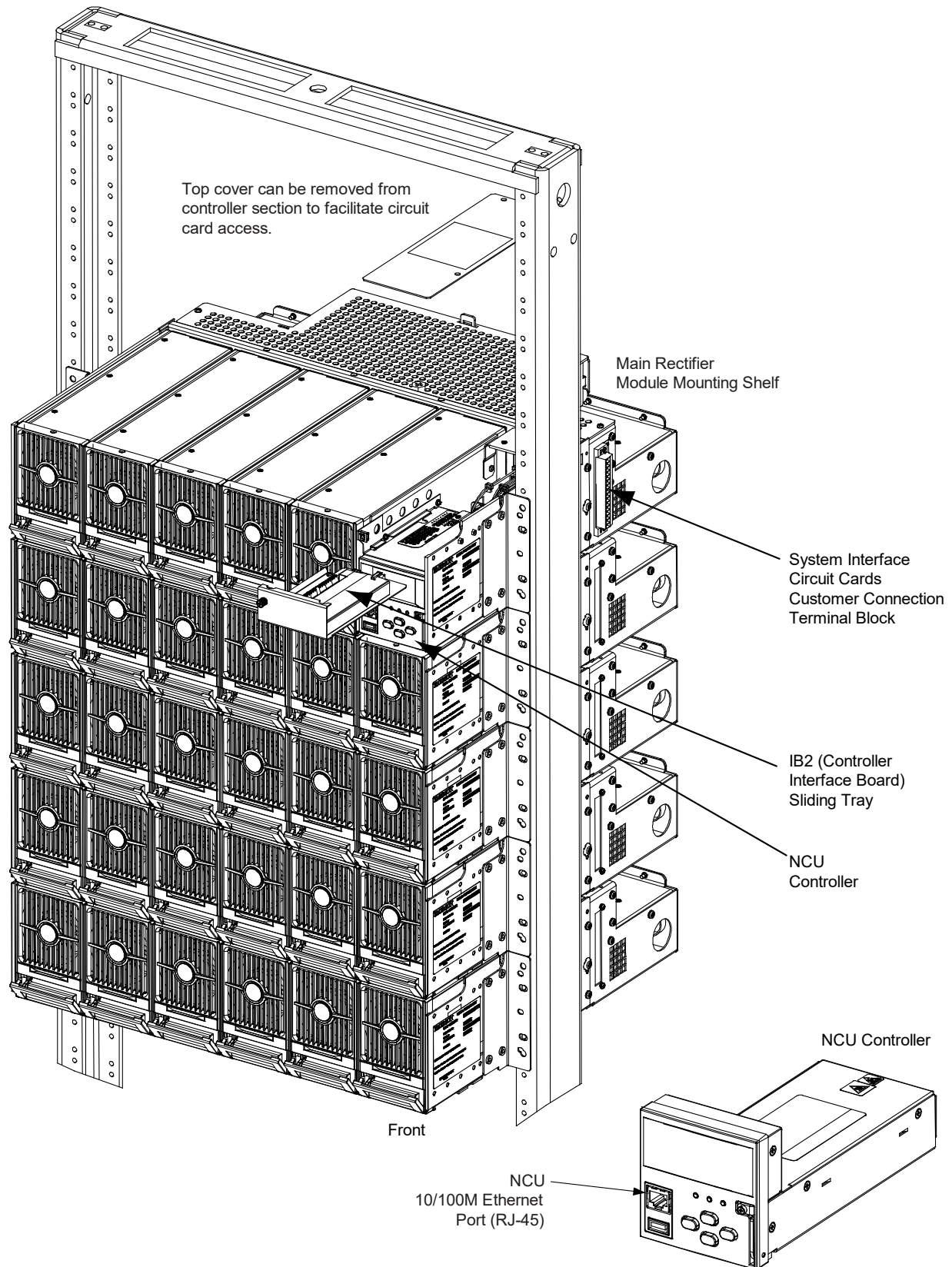
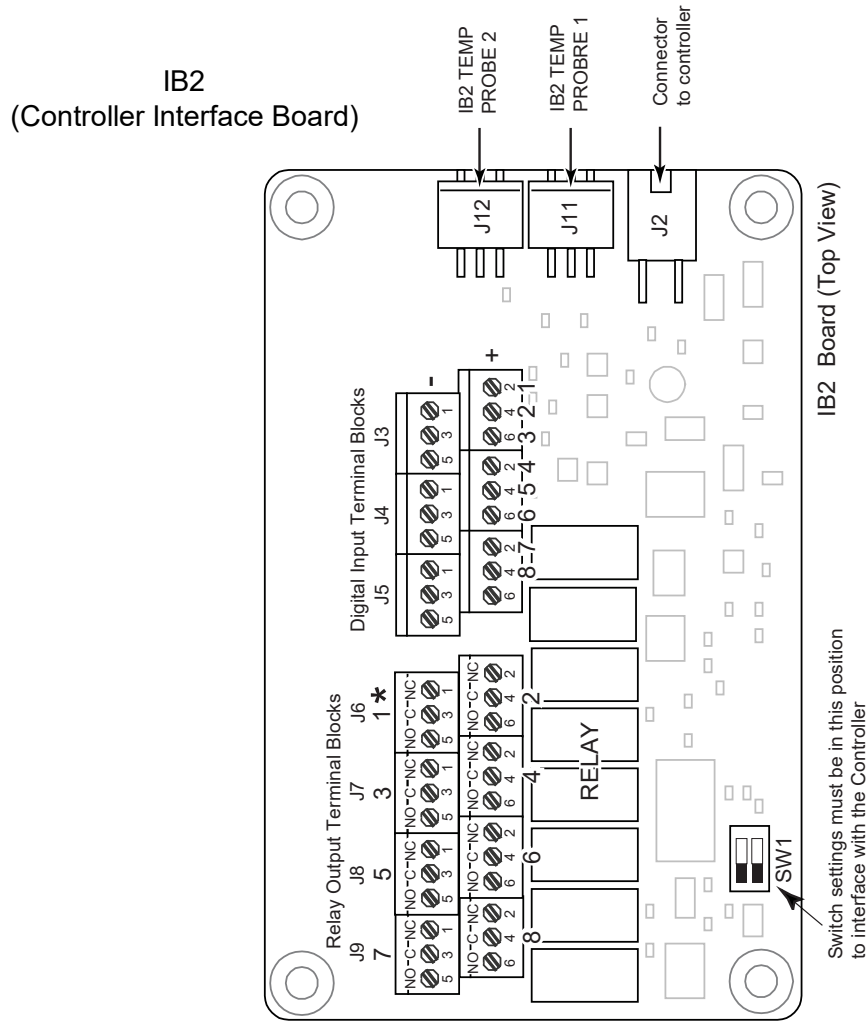


Figure 1
External Alarm, Reference, Monitoring, and Control Connections Locations

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* The relay assigned to “Critical Summary” alarm (relay 1 by default) will operate in the “Fail Safe Mode”. “Fail Safe Mode” means Relay 1 is de-energized during an alarm condition, opening the contacts between the C and NO terminals, and closing the contacts between the C and NC terminals.

The remaining seven (7) relays energize during an alarm condition, closing the contacts between the C and NO terminals, and opening the contacts between the C and NC terminals.

Not all I/O points are available for customer connection (some are used for factory system connections).

J3-J9:

Wire Size Capacity: 16-26 AWG.

Recommended Torque: 2.2 in-lbs.

Figure 2
 IB2 (Controller Interface Board) Connections

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The end of the Controller CAN Bus is routed from the bottom-most rectifier shelf into the top-most rectifier shelf via cable P/N 556430. Use cable P/N 556238 to connect external devices to the end of the Controller CAN bus. Access the connector by removing the top cover from the controller section of the shelf.

A CAN termination plug must be installed if an external device or system is not connected here.

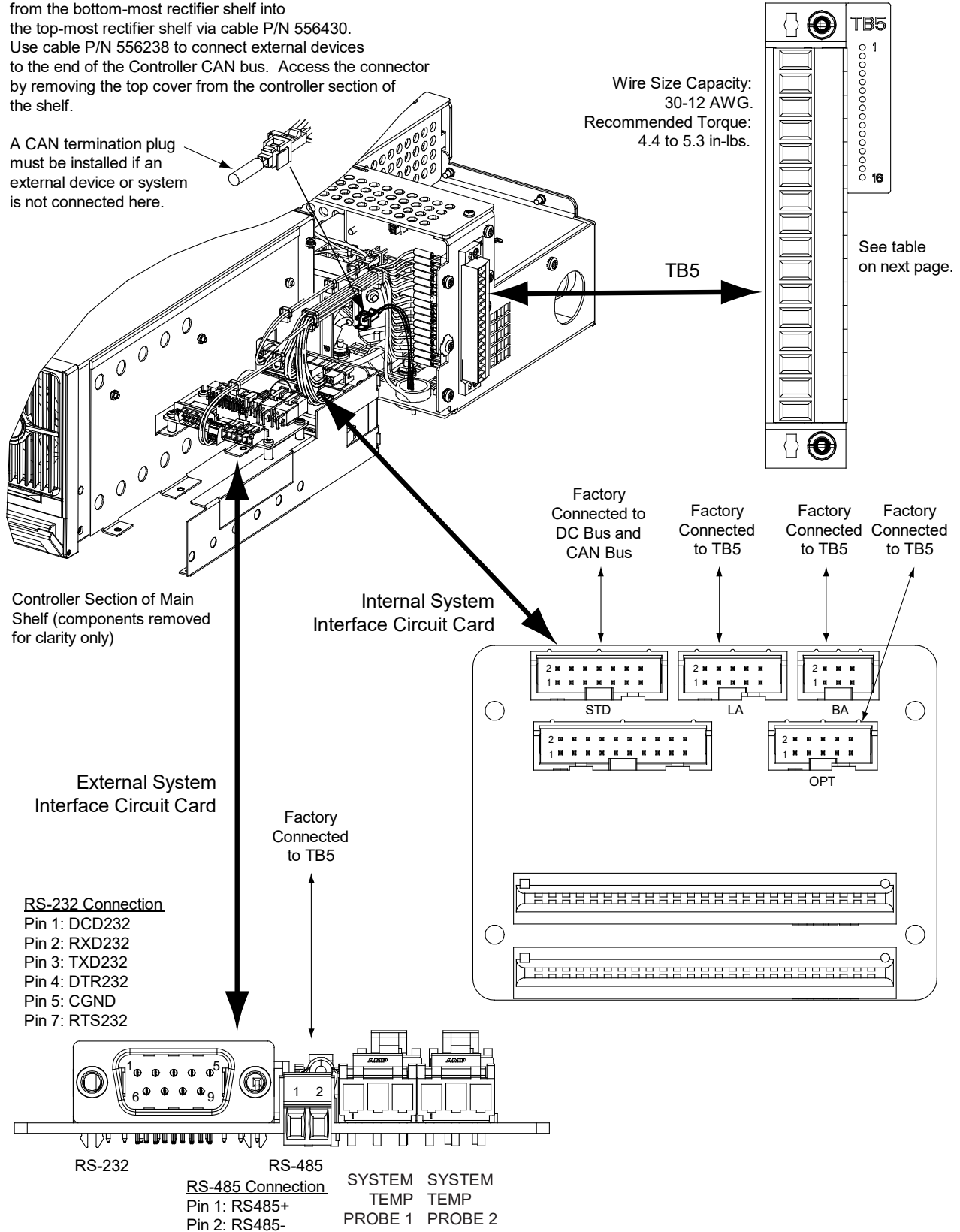


Figure 3
System Interface Boards Connections

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RS-485 (System External Interface Circuit Card)		LA (System Internal Interface Circuit Card)	
Signal	TB5	Signal	TB5
RS-485 (+)	1	Load Fuse Alarm 1	13
RS-485 (-)	2	Load Fuse Alarm 2	14
OPT (System Internal Interface Circuit Card)		Load Fuse Alarm 3	15
Signal	TB5	Load Fuse Alarm 4	16
Battery 2 Shunt (-)	3	Load Fuse Alarm 5	not available
Battery 2 Shunt (+)	4	Load Fuse Alarm 6	not available
Load Shunt (-)	5	Load Fuse Alarm 7	not available
Load Shunt (+)	6	Load Fuse Alarm 8	not available
LVD2 Sense (-)	7	Load Fuse Alarm 9	not available
LVD2 Drive (+)	8	Load Fuse Alarm 10	not available
SPD (-)	not available	STD (System Internal Interface Circuit Card)	
LVD2 Drive (-)	9	Signal	TB5
SPD (+)	not available	Battery 1 Shunt (-)	not available
LVD2 Sense (+)	10	LVD1 Drive (+)	not available
BA (System Internal Interface Circuit Card)		LVD1 Drive (-)	not available
Signal	TB5	Battery 1 Shunt (+)	not available
Battery Fuse Alarm 1	11	LVD1 Sense (-)	not available
Battery Fuse Alarm 2	12	LVD1 Sense (+)	not available
Battery Fuse Alarm 3	not available		
Battery Fuse Alarm 4	not available		

Table 6
System Interface Circuit Cards Signals Available on TB5

DC Output Connections

DC output leads are connected to the output busbars located on the back of the rectifier shelves. These busbars provide 3/8" clearance holes for installation of customer-provided two hole lugs that have 1 inch centers and 3/8 inch bolt clearance holes. Customer must order or provide lug mounting hardware.

You connect DC output leads per a single rectifier shelf in the system or for pairs of rectifier shelves in the system (depending on how many shelves are in the system). Refer to Figure 4.

DC output cables can either enter from the right, from the left, or from the rear by repositioning the lug landing busbars. See UM582127100 for details.

For recommended wire sizes and lug selection, refer to Table 7. For additional lug information, refer to Table 3. Lugs should be crimped per lug manufacturer's specifications. See also "3/8-16 Lug Hardware Kit, P/N 556277" on page 15.

Individual Rectifier Shelf DC Output Connections ⁴			
Ambient Operating Temperature	Recm 90°C Wire Size ¹ (AWG)	Loop Length ² (feet)	Recommended Crimp Lug ³
40°C	(2) 4/0	87.2	245347400
Pair of Rectifier Shelves DC Output Connections ⁵ [One (1) DC Output Connection per Two (2) Rectifier Shelves]			
Ambient Operating Temperature	Recm 90°C Wire Size ¹ (AWG)	Loop Length ² (feet)	Recommended Crimp Lug ³
40°C	(3) 300 kcmil	185.5	245347600

¹ Wire sizes based on recommendations of the American National Standards Institute (ANSI) approved National Fire Protection Association's (NFPA) National Electrical Code (NEC). Table 310-16 for copper wire at 90°C conductor temperature, operating in ambient of 40°C was used. For other operating ambient temperatures, refer to the NEC. For operation in countries where the NEC is not recognized, follow applicable codes.

² Wire sizes listed are sufficient to restrict voltage drop to 1.0 volt or less for the loop lengths shown. Loop length is the sum of the lengths of the positive and negative leads.

³ Two-hole lug, 3/8" bolt clearance hole, 1" centers. Lugs should be crimped per lug manufacturer's specifications.

⁴ Single shelf equipped with six (6) rectifiers.

⁵ Two shelves equipped with a total of twelve (12) rectifiers.

Table 7
Recommended DC Output Wire Sizes and Lugs

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-48V DC OUTPUT CONNECTIONS

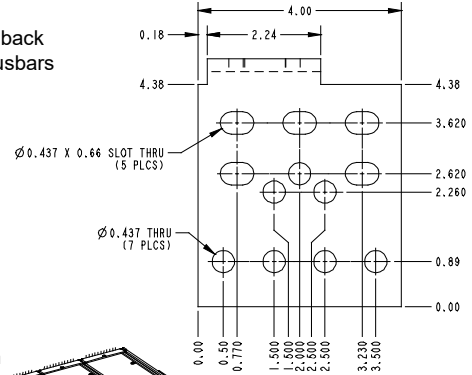
3/8 Clearance Holes on 1" Centers
(Customer must order or supply
lug mounting hardware.)

Maximum Lug Width:

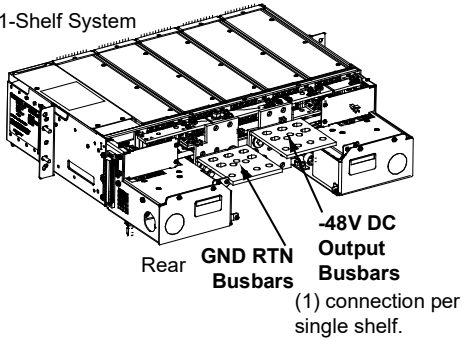
- 1.31" for three (3) lugs per polarity.
- 1.78" for two (2) lugs per polarity.

DC Output Connection Options

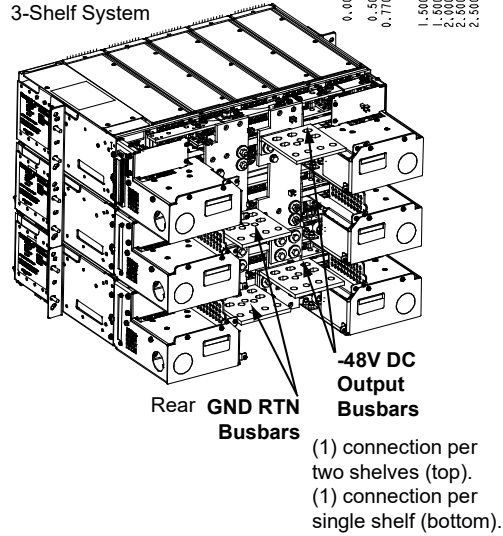
1. Route cables left, right, or out the back by repositioning the lug landing busbars (see UM582127100).
2. Make connections to each shelf (List 10 and 11).
3. Make connections to every two (2) shelves (List 20 and 21).



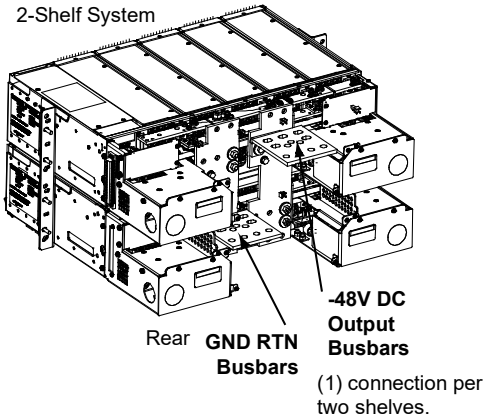
1-Shelf System



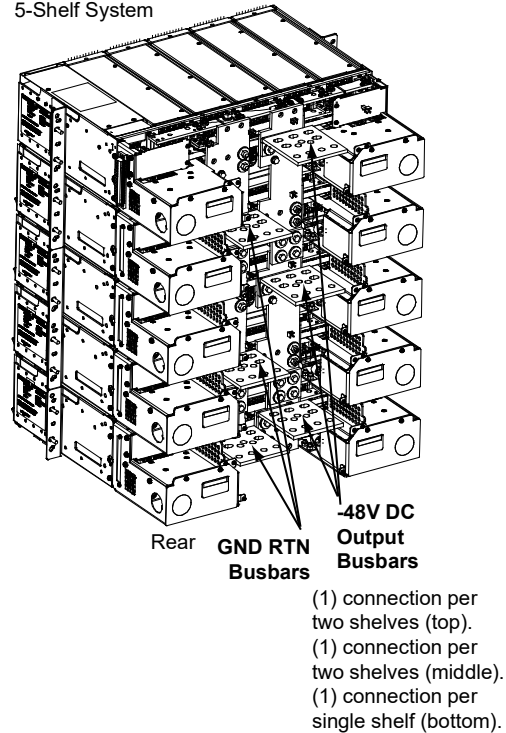
3-Shelf System



2-Shelf System



5-Shelf System



4-Shelf System

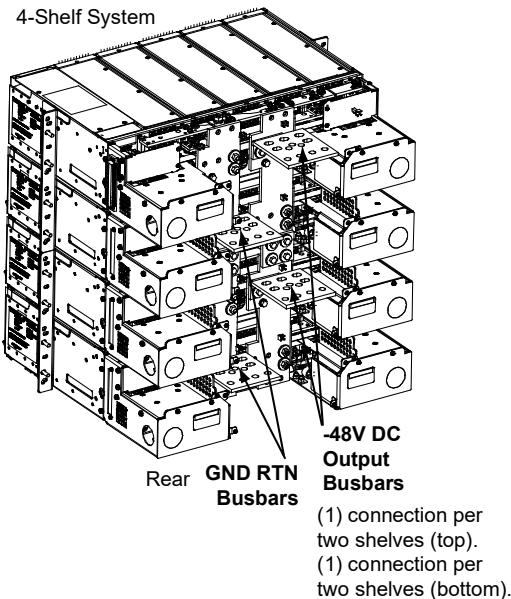


Figure 4
DC Output Connections

SPECIFICATIONS

1. SYSTEM

1.1 Environmental Ratings

- 1.1.1 Operating Ambient Temperature Range: -40°C to +65°C (-40°F to +149°F).
- 1.1.2 Storage Ambient Temperature Range: -40°C to +85°C (-40°F to +185°F).
- 1.1.3 Humidity: This Power System is capable of operating in an ambient relative humidity range of 0% to 95%, non-condensing.
- 1.1.4 Altitude: Capable of operating in an altitude range of -200 feet to 10,000 feet. The maximum operating ambient temperature should be de-rated by 3°C per 1000 feet above 5000 feet.
- 1.1.5 Mounting: This product is intended only for installation in a restricted access location on or above a non-combustible surface.

This product must be located in a controlled environment with access to crafts persons only.

This product is intended for installation in network telecommunication facilities (CO, vault, hut, or other environmentally controlled electronic equipment enclosure).

This product is intended to be connected to the common bonding network in a network telecommunication facility (CO, vault, hut, or other environmentally controlled electronic equipment enclosure).

The DC return connection to this system can remain isolated from system frame and chassis (DC-I).

This system is suitable for installation as part of the Common Bonding Network (CBN).

Rectifier and rectifier mounting shelf ventilating openings must not be blocked and temperature of air entering rectifiers must not exceed the rated operating ambient temperature range.

Clearance requirements are:

- a) Recommended minimum aisle space clearance for the front of each bay is 2'6".
- b) Minimum spacing from the rear of the bay to a wall or other solid surface is that which is specified for proper rectifier module mounting shelf ventilation. Refer to the rectifier module mounting shelf Power Data Sheet for ventilation spacing requirements.

Note: *Minimum rear spacing specified for ventilation may not permit installation and maintenance of the system.*

Recommended minimum aisle space clearance for the rear of each bay is 2' 0" to allow for installation and maintenance.

1.2 Compliance Information

- 1.2.1 Safety Compliance: This unit meets the requirements of UL 60950-1, Standard for Information Technology Equipment, and is UL Recognized as a power supply for use in Telephone, Electronic Data Processing or Information Processing Equipment. This unit meets the requirements of CAN/CSA 22.2, No. 60950-00 and is tested and Certified by UL ("c UR") as a Component Type Power Supply.
- 1.2.2 NEBS Compliance: Compliance verified by a Nationally Recognized Testing Laboratory (NRTL) per GR-1089-CORE and GR-63-CORE. Contact Vertiv for NEBS compliance reports.

Rectifier Modules: In order to remain compliant during a fan failure condition, the backup battery connection must be utilized to provide sufficient power to the loads for up to eight (8) hours when the system is operated at greater than 50% output power. If no backup battery connection is used, the system must operate with a redundant module installed.

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1.3 System Interface Board Ratings

1.3.1 Battery Fuse Alarm Input Rating

(A) The default is 400mV. Anything greater than 400mV causes alarm to be raised.

1.3.2 Load Fuse Alarm Input Signal

(A) Anything greater than 19V causes alarm to be raised.

1.3.3 Battery and Load Shunt Input Rating

(A) 1mV – 150mV.

1.3.4 LVD Sense Input Rating

(A) Normal state is at 60V or less. A RTN signal indicates the contactor is open.

1.3.5 LVD Driver Output Rating

(A) Mono-stable, normal state is 60V or less at 1A continuous rating. Normally closed contactors are used for mono-stable option.

(B) Bi-Stable, normal state less than 60V and 2A at 500ms – 1000ms pulse rating.

1.4 IB2 (Controller Interface Board) Ratings

1.4.1 Digital Input Ratings

(A) Maximum Voltage Rating: 60V DC.

(B) Active High: > 19V DC.

(C) Active Low: < 1V DC.

1.4.2 Relay Ratings

(A) Steady State: 0.5 A @ 60V DC; 1.0 A @ 30V DC.

(B) Peak: 3 A @ 30V DC.

2. MODULE MOUNTING ASSEMBLY

Refer to PD588705000.

3. RECTIFIER

Refer to the Rectifier Instructions (UM1R483500E).

4. CONTROLLER

Refer to the NCU Controller Instructions (UM1M830BNA).

For controller factory settings, refer to the Controller Configuration Drawing (C-drawing).

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MECHANICAL SPECIFICATIONS

Overall Dimensions

Refer to PD588705000 for rectifier module mounting shelf dimensions.

Refer to [Table 1](#) for relay rack dimensions.

Weights

Weights		
List Number or Part Number	Net Weight (lbs), each	Description
Common Equipment		
58212710001	Dependant on options ordered.	Common Equipment (Relay Rack or Rail Mounted System)
58212710002	Dependant on options ordered.	Common Equipment (Ship Loose System)
58212710010	6	Main Rectifier Module Mounting Shelf Interface Components
58212710011	7	Expansion Rectifier Module Mounting Shelf Interface Components
58212710020	10	Main Rectifier Module Mounting Shelf to Expansion Rectifier Module Mounting Shelf Interface Component
58212710021	10	Expansion Rectifier Module Mounting Shelf to Expansion Rectifier Module Mounting Shelf Interface Components
Rectifier Shelf		
58870500051 58870500052 58870500053	21	Expansion Rectifier Shelf
58870500061 58870500062 58870500063	24	Main Rectifier Shelf
1R483500E	7	Rectifier Module
1M830DNA	2.2	NCU Controller
Relay Racks		
543159	32	Relay Rack
543151	35	Relay Rack
543152	36	Relay Rack
543153	42	Relay Rack
543154	44	Relay Rack
543155	46	Relay Rack
543156	51	Relay Rack
543157	63	Relay Rack
543161	103	Relay Rack
543162	113	Relay Rack
541340	243	Relay Rack
547862	246	Relay Rack
543163	81	Relay Rack
543164	123	Relay Rack

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RELATED DOCUMENTATION

System Installation and User Instructions:	UM582127100
NCU Controller Instructions:	UM1M830BNA
Rectifier Module Mounting Shelf Power Data Sheet:	PD588705000
Rectifier Instructions:	UM1R483500E
Main Schematic Diagrams:	SD582127100 (System) SD588705000 (Module Mounting Shelf)
Main Wiring Diagrams:	T582127100 (System) T588705000 (Module Mounting Shelf)

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