SYSTEM OVERVIEW

Description: -48V DC @ up to 30 amperes (1600W) Power System.

The NETSURE™ 201NNFB DC Power System is a complete integrated power system containing rectifiers, intelligent control, and distribution. This power system consists of the following mounted in a 1RU high by 19" wide shelf (adapter brackets are available which allow for 23" relay rack mounting).

- **400W (7.5A) or 800W (15A) Rectifier Modules**

  The shelf accommodates two (2) 400W or 800W Rectifier Modules. The Rectifier Modules provide load power, battery float current, and battery recharge current during normal operating conditions. The Rectifier Modules are designed to provide constant power. They are designed with the latest patented switch-mode technology using DSP (Digital Signal Processing) functionality for efficient operation. This means that, within the normal operating ambient temperature range and input voltage range, the maximum available output power is a constant 400W or 800W. Within these ranges, the Rectifier Modules operate in one of three modes, depending upon load demands. Transition between modes is completely automatic. If ambient temperature rises above or input voltage falls below acceptable values; Rectifier Modules continue to operate but at derated output power levels.

  1) **Constant Voltage Mode:** For any initial output voltage setting from 48 to 56 volts, output voltage remains constant regardless of load. This is the normal operating condition, in which loads are being supplied and batteries are float charged. Rectifier Modules operate in the Constant Voltage Mode unless load increases to the point where the product of load current and output voltage is approximately 400W or 800W.

  2) **Constant Power Mode:** As load increases above approximately 400W or 800W (non-adjustable), output current continues to increase, but output voltage decreases as required to maintain constant output power. Rectifier Modules operate in the Constant Power Mode unless load continues to increase to the point where the current limit setting is reached.

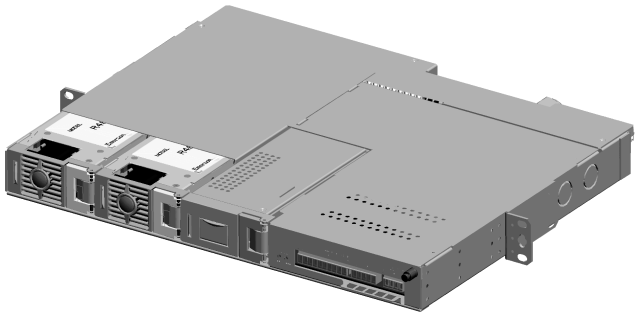
  3) **Constant Current Mode:** If load increases above the current limit setting, output voltage decreases linearly to maintain output current at current limit.

- **LCU (Local Control Unit)**

  The LCU controls the operation of all Rectifier Modules (including temperature compensation) and provides system alarm functions. The LCU also provides optional Low Voltage Battery Disconnect (LVBD) control.

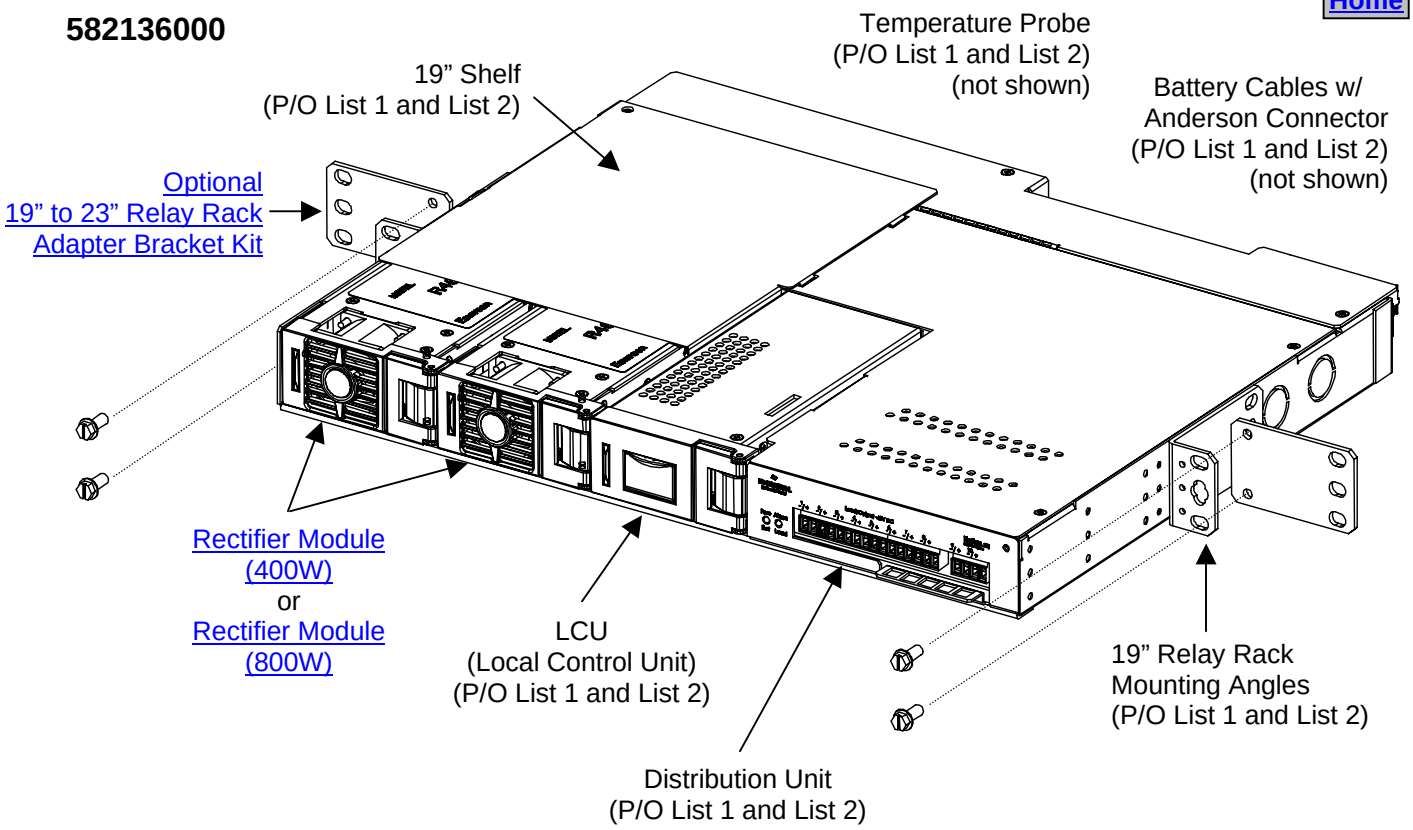
- **Distribution Unit**

  The Distribution Unit provides DC distribution through up to ten (10) GMT fuses. It also provides the connections for system battery input. The Distribution Unit can also be equipped with an optional Low Voltage Battery Disconnect (LVBD) contactor.



Family:	NETSURE™
Spec. No.:	582136000
Model:	201NNFB
Input Voltage	
400W Rectifier Module:	Nominal 120/208/240 volts AC, single phase, 3-wire (L+N+PE or 2L+PE), 50/60 Hz, with an operating range of 100 to 250 volts. Acceptable input frequency range is 45 to 65 Hz.
800W Rectifier Module:	Nominal 208/240 volts AC, single phase, 3-wire (L+N+PE or 2L+PE), 50/60 Hz, with an operating range of 200 to 240 volts. Acceptable input frequency range is 45 to 65 Hz.
Output Voltage:	-48 Volts DC
Output Capacity:	
Rectifier Module:	400W (7.5A) or 800W (15A)
System:	800W (15A), maximum (w/ 400W Rectifiers) 1600W (30A), maximum (w/ 800W Rectifiers)
Agency Approval:	UL 60950 Recognized, CAN/CSA 22.2, NEBS
Framework Type:	Relay Rack Mounted
Mounting Width:	19” or 23”, nominal
Mounting Depth:	14”
Mounting Height:	1.75” (1RU)
Access:	Front and Rear for Installation, Front for Operation and Maintenance
Control:	Microprocessor
Color:	Front Panels are Gray, Shelf is Galvaneal
List Options:	System with BLVD, System w/out BLVD, Rectifier Module (800W), Rectifier Module (400W), AC Line Cord (208/240VAC, Straight Plug, 14’ Length), AC Line Cord (208/240VAC, Twist-Lock Plug, 14’ Length), AC Line Cord (120VAC, Straight Plug, 14’ Length), AC Line Cord (120VAC, Twist-Lock Plug, 14’ Length), Blank Panel for Empty Rectifier Module Mounting Position, Optional External Battery Cables with Anderson Connector for (1) Battery String, Optional External Battery Cables with Anderson Connector for (2) Battery Strings, Relay Rack Earthquake Anchor Kit, Battery Tray for 23” Relay Rack, Battery Tray for 19” Relay Rack
Accessory Options:	Relay Racks, Optional 19” to 23” Adapter Bracket Kit, Distribution Devices, External Battery Disconnect Unit, Battery Cabinets, Spare Anderson Battery Connector, Replacement Components, Wiring Notes, Wiring Illustrations
Environment:	-40°C (-40°F) to +75°C (+167°F), with deratings (see SPECIFICATIONS section)

582136000



Other List Options

List 41: AC Line Cord (208/240VAC, Straight Plug, 14' Length)

List 43: AC Line Cord (208/240VAC, Twist-Lock Plug, 14' Length)

List 45: AC Line Cord (120VAC, Straight Plug, 14' Length)

List 47: AC Line Cord (120VAC, Twist-Lock Plug, 14' Length)

List 50: Blank Panel for Empty Rectifier Module Mounting Position

List 71: Optional External Battery Cables with Anderson Connector for (1) Battery String

List 72: Optional External Battery Cables with Anderson Connector for (2) Battery Strings

List 89: Relay Rack Earthquake Anchor Kit

List 93: Battery Tray (23")

List 94: Batter Tray (19")

List 1: System with Battery Low Voltage Disconnect (BLVD)

List 2: System w/out Battery Low Voltage Disconnect (BLVD)

Other Accessory Options

Relay Racks

Distribution Devices

External Battery Disconnect Unit

Battery Cabinets

Spare Anderson Battery Connector

Replacement Components

Wiring Notes

Wiring Illustrations

SEE ALSO

System Overview

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Ordering Information

List Descriptions

Accessory Descriptions

Specifications

Physical Size Information

Related Documentation

TABLE OF CONTENTS

System Overview | Picture | Ordering Information (List Descriptions | Accessory Descriptions) | Specifications | Physical Size Information | Related Documentation

ORDERING INFORMATION

List Options

Order the following by the items Part Number as specified in the following table.

When viewing electronically, click on the *List #* to jump to the detailed description page.

List Number	Part Number	Description
1	58213600001	System **with** Low Voltage Battery Disconnect (LVBD).
2	58213600002	System **w/out** Low Voltage Battery Disconnect (LVBD).
Order by P/N	1R48800	Model R48-800 Rectifier Module (800W)
Order by P/N	1R48400	Model R48-400 Rectifier Module (400W)
41	58213600041	AC Line Cord (208/240VAC, 14' Length, IEC 320-C15 Right Angle Plug at Shelf End, NEMA 6-15P Straight Plug at Customer End)
43	58213600043	AC Line Cord (208/240VAC, 14' Length, IEC 320-C15 Right Angle Plug at Shelf End, NEMA L6-15P Twist-Lock Plug at Customer End)
45	58213600045	AC Line Cord (120VAC, 14' Length, IEC 320-C15 Right Angle Plug at Shelf End, NEMA 5-15P Straight Plug at Customer End)
47	58213600047	AC Line Cord (120VAC, 14' Length, IEC 320-C15 Right Angle Plug at Shelf End, NEMA L5-15P Twist-Lock Plug at Customer End)
50	58213600050	Blank Panel for Empty Rectifier Module Mounting Position
71	58213600071	Optional External Battery Cables with Anderson Connector for (1) Battery String
72	58213600072	Optional External Battery Cables with Anderson Connector for (2) Battery Strings
89	58213600089	Relay Rack Earthquake Anchor Kit
93	58213600093	Battery Tray (23")
94	58213600094	Battery Tray (19")

Accessory Options

Order the following by the items Part Number as specified in the following table.

When viewing electronically, click on the *link* to jump to the detailed description page.

Description		Part Number
Relay Racks	51-3/8"H x19"W, Welded	525003
	51-3/8"H x23"W, Welded	525004
	7'0" H x 19"W, Welded	524988
	7'0" H x 23"W, Welded	524913
	7'0" H x 19"W, Seismic Zone 4	528183
	7'0" H x 23"W, Seismic Zone 4	525111
Optional 19" to 23" Adapter Bracket Kit		540993
Distribution Devices		See ACCESSORY DESCRIPTIONS Section
External Battery Disconnect Unit		535282 (Circuit breaker must be ordered separately. See ACCESSORY DESCRIPTIONS Section.)
Battery Cabinets		See ACCESSORY DESCRIPTIONS Section
Spare Anderson Battery Connector		133195 (for one battery string) 133196 (for two battery strings)
Replacement Components		See ACCESSORY DESCRIPTIONS Section
Wiring Notes Wiring Illustrations		See ACCESSORY DESCRIPTIONS Section

LIST DESCRIPTIONS

List 1: System with Low Voltage Battery Disconnect (LVBD)

Features

- Consists of a 1RU high by 19" wide shelf e/w a Distribution Unit **with** BLVD and an LCU (Local Control Unit).
- (2) 8 AWG 48" long battery cables factory connected inside the shelf. Terminated at the customer end in an Anderson battery connector. Mating Anderson battery connector provided (P/N 133195 which includes connector housing and two 10 AWG lugs).
- Temperature probe (3 meters long) factory connected inside the shelf.

Restrictions

Each shelf holds up to two (2) Rectifier Modules.

See also the Restrictions under "Distribution Devices" in the ACCESSORY DESCRIPTIONS section.

Ordering Notes

1) Order List 1 as required.
   Also order the following as required.
2) Order up to two (2) Rectifier Modules for each List 1: P/N 1R48400 (400W) or P/N 1R48800 (800W).
3) Order one (1) List 41, 43, 45, or 47 for each Rectifier Module ordered.
   Each List 40-47 contains one (1) AC Input Line Cord.
4) For any unused Rectifier Module mounting position, order one (1) List 50 Blank Panel.
5) Order Optional External Battery Cables with Anderson Connector for one (1) to two (2) Battery Strings per List 71 or 72.
6) Order Relay Rack Anchor Kit(s) per List 89.
7) Order Battery Trays per List 93 or List 94.
8) Order Relay Racks per ACCESSORY DESCRIPTIONS section.
9) Order optional 19" to 23" Adapter Bracket Kit for 23" relay rack mounting.
10) Order Distribution Devices per ACCESSORY DESCRIPTIONS section.
11) Order External Battery Disconnect Unit per ACCESSORY DESCRIPTIONS section.
12) Order Battery Cabinets per ACCESSORY DESCRIPTIONS section.
13) Order Spare Anderson Battery Connector per ACCESSORY DESCRIPTIONS section.

List 2: System w/out Low Voltage Battery Disconnect (LVBD)

Features

- Consists of a 1RU high by 19" wide shelf e/w a Distribution Unit **w/out** BLVD and an LCU (Local Control Unit).
- (2) 8 AWG 48" long battery cables factory connected inside the shelf. Terminated at the customer end in an Anderson battery connector. Mating Anderson battery connector provided (P/N 133195 which includes connector housing and two 10 AWG lugs).
- Temperature probe (3 meters long) factory connected inside the shelf.

Restrictions

Each shelf holds up to two (2) Rectifier Modules.

See also the Restrictions under “Distribution Devices” in the ACCESSORY DESCRIPTIONS section.

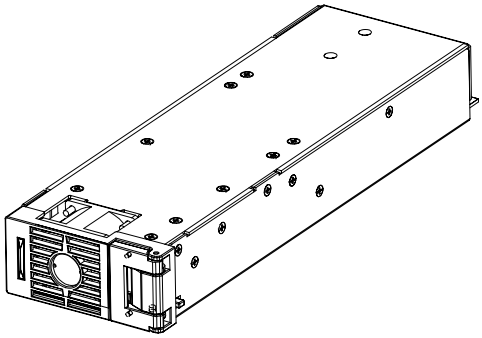
Ordering Notes

1) Order List 2 as required.
   Also order the following as required.
2) Order up to two (2) Rectifier Modules for each List 2: P/N 1R48400 (400W) or P/N 1R48800 (800W).
3) Order one (1) List 41, 43, 45, or 47 for each Rectifier Module ordered.
   Each List 40-47 contains one (1) AC Input Line Cord.
4) For any unused Rectifier Module mounting position, order one (1) List 50 Blank Panel.
5) Order Optional External Battery Cables with Anderson Connector for one (1) to two (2) Battery Strings per List 71 or 72.
6) Order a Relay Rack Anchor Kit(s) per List 89.
7) Order Battery Trays per List 93 or List 94.
8) Order Relay Racks per ACCESSORY DESCRIPTIONS section.
14) Order optional 19” to 23” Adapter Bracket Kit for 23” relay rack mounting.
9) Order Distribution Devices per ACCESSORY DESCRIPTIONS section.
10) Order External Battery Disconnect Unit per ACCESSORY DESCRIPTIONS section.
11) Order Battery Cabinets per ACCESSORY DESCRIPTIONS section.
12) Order Spare Anderson Battery Connector per ACCESSORY DESCRIPTIONS section.

Rectifier Module (400W)

Features

- Provides one (1) Model R48-400, Spec. No. 1R48400, 400 watt / 48 volt Rectifier Module.



Restrictions

Each shelf holds up to two (2) Rectifier Modules.

DO NOT install different wattage Rectifier Modules in same shelf.

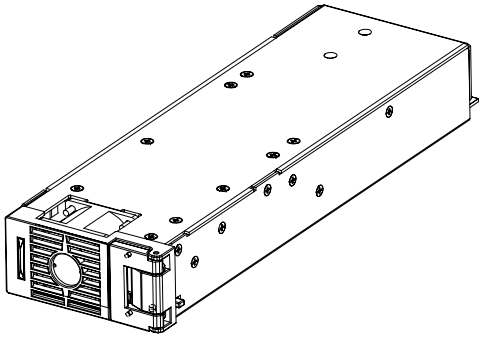
Ordering Notes

1) Order by P/N (1R48400) as required.

Rectifier Module (800W)

Features

- Provides one (1) Model R48-800, Spec. No. 1R48800, 800 watt / 48 volt Rectifier Module.



Restrictions

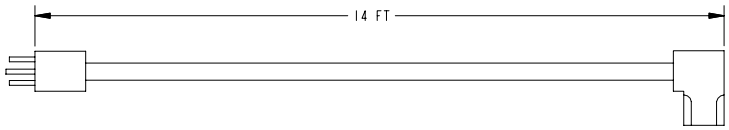
Each shelf holds up to two (2) Rectifier Modules.

DO NOT install different wattage Rectifier Modules in same shelf.

Ordering Notes

1) Order by P/N (1R48800) as required.

List 41: AC Line Cord, P/N 535216 (208/240VAC, 14' Length, IEC 320-C15 Right Angle Plug at Shelf End, NEMA 6-15P Straight Plug at Customer End)



Features

- Provides one (1) 14' long, 16/3 AWG, AC line cord;
  - terminated on one end with an IEC 320-C15 right angle plug which mates with AC input receptacle on the Power/Distribution Shelf,
  - and on the remaining end with a NEMA 6-15P straight plug.

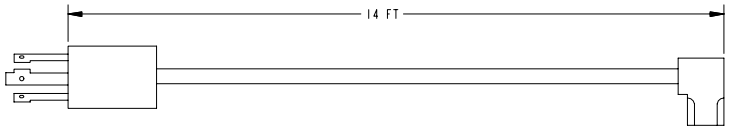
Restrictions

For 208/240 VAC only (rated for 13A at 208/240VAC).

Ordering Notes

1) Order one (1) List 41, 43, 45, or 47 for each Rectifier Module ordered.

List 43: AC Line Cord, P/N 108915 (208/240VAC, 14' Length, IEC 320-C15 Right Angle Plug at Shelf End, NEMA L6-15P Twist-Lock Plug at Customer End)



- Provides one (1) 14' long, 16/3 AWG, AC line cord;
  - terminated on one end with an IEC 320-C15 right angle plug which mates with AC input receptacle on the Power/Distribution Shelf,
  - and on the remaining end with a NEMA L6-15P twist-lock plug.

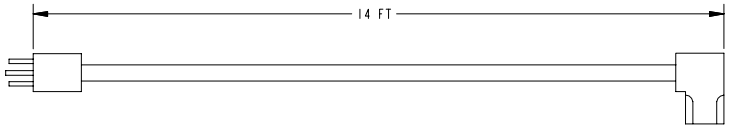
Restrictions

For 208/240 VAC only (rated for 13A at 208/240VAC).

Ordering Notes

1) Order one (1) List 41, 43, 45, or 47 for each Rectifier Module ordered.

List 45: AC Line Cord, P/N 102585 (120VAC, 14' Length, IEC 320-C15 Right Angle Plug at Shelf End, NEMA 5-15P Straight Plug at Customer End)



- Provides one (1) 14' long, 16/3 AWG, AC line cord;
  - terminated on one end with an IEC 320-C15 right angle plug which mates with AC input receptacle on the Power/Distribution Shelf,
  - and on the remaining end with a NEMA 5-15P straight plug.

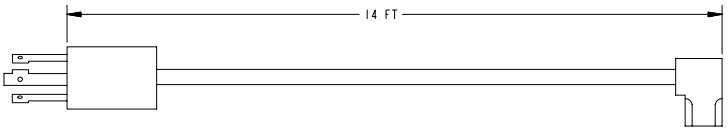
Restrictions

For 120 VAC only (rated for 13A at 125VAC).

Ordering Notes

1) Order one (1) List 41, 43, 45, or 47 for each Rectifier Module ordered.

List 47: AC Line Cord, P/N 535220 (120VAC, 14' Length, IEC 320-C15 Right Angle Plug at Shelf End, NEMA L5-15P Twist-Lock Plug at Customer End)



- Provides one (1) 14' long, 16/3 AWG, AC line cord;
  - terminated on one end with an IEC 320-C15 right angle plug which mates with AC input receptacle on the Power/Distribution Shelf,
  - and on the remaining end with a NEMA L5-15P twist-lock plug.

Restrictions

For 120 VAC only (rated for 13A at 125VAC).

Ordering Notes

1) Order one (1) List 41, 43, 45, or 47 for each Rectifier Module ordered.

List 50: Blank Panel for Empty Rectifier Module Mounting Position, P/N 535128

Features

- Covers one (1) unused Rectifier Module mounting position.

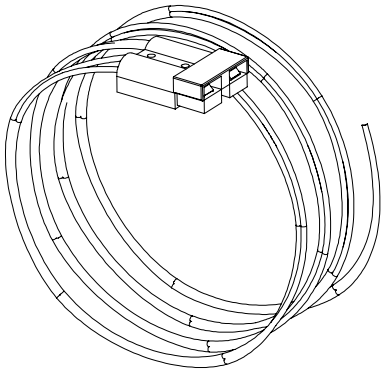
Restrictions

CANNOT BE USED when mounting angles are repositioned for flush front mounting.

Ordering Notes

1) For any unused Rectifier Module mounting position, order one (1) List 50 Blank Panel.

List 71: Optional External Battery Cable Assembly with Anderson Connector for (1) Battery String, P/N 535123



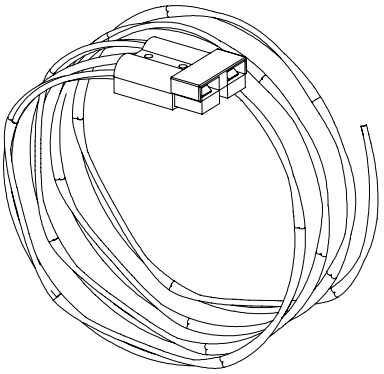
Features

- Provides two (2) 6' long, 10 AWG, battery cables terminated in an Anderson connector for connecting one (1) battery string to the system.
- One end of the assembly connects to the Anderson connector factory wired to the shelf's battery connection points, and the other end contains two (2) un-terminated cables for connection into a customer battery string.

Ordering Notes

1) Order if required.

List 72: Optional External Battery Cable Assembly with Anderson Connector for (2) Battery Strings, P/N 535124



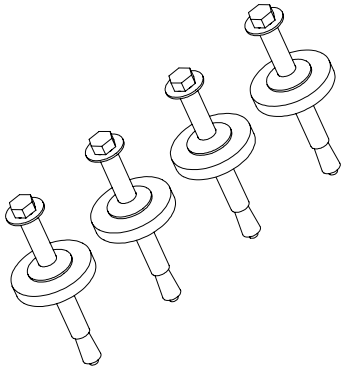
Features

- Provides four (4) 6' long, 10 AWG, battery cables terminated in an Anderson connector for connecting two (2) battery strings to the system.
- One end of the assembly connects to the Anderson connector factory wired to the shelf's battery connection points, and the other end contains four (4) un-terminated cables for connection into customer battery strings.

Ordering Notes

1) Order if required.

List 89: Relay Rack Earthquake Anchor Kit, P/N P0987167



Features

- Provides four (4) sets of hardware for anchoring the relay rack to the floor.

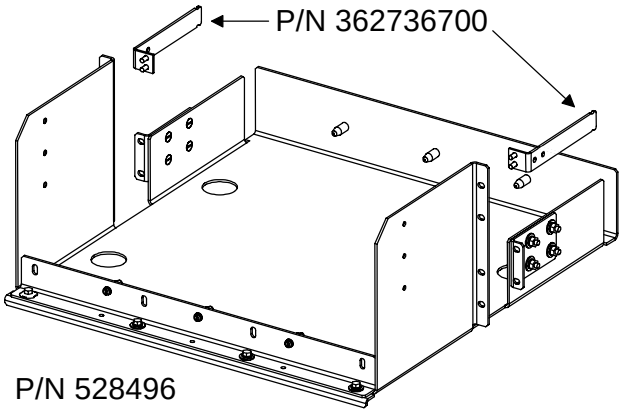
Ordering Notes

1) Order as required.

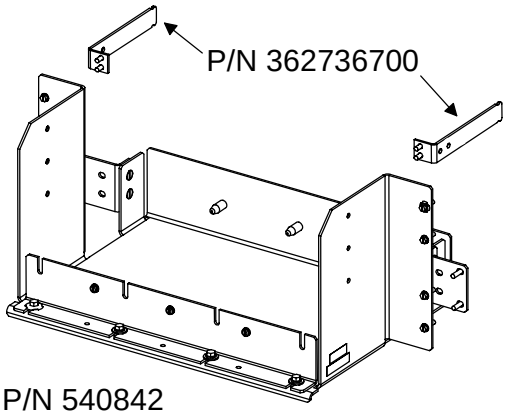
List 93: Battery Tray for 23" Relay Rack

Features

- Provides one battery tray that mounts four (4) 12V front terminal Valve Regulated Lead Acid (VRLA) batteries. Batteries are configured as one (1) 48V string.
- Accepts various VRLA batteries. See **Ordering Notes** below.
- See Overall Dimensions - 23" Battery Tray under *PHYSICAL SIZE INFORMATION* for battery tray dimensions and typical arrangement. Note that two battery trays are available to accommodate the various size batteries listed in the **Ordering Notes** tables.
- Trays can be ordered with or without battery disconnect circuit breakers. When circuit breakers are ordered, one is provided in the -48V lead of each battery string (1 circuit breaker per tray).
- Battery cables are provided terminated at the power system end in an Anderson connector. Battery lugs are provided for the remaining end.



P/N 528496



P/N 540842

Restrictions

For 23" relay racks only.

Maximum number of List 93's per rack is two (2).

A single List 93 must mount at bottom of rack. Multiple List 93's must mount starting at bottom of rack and working upward.

Ordering Notes

1) Order multiples of List 93 for more than one (1) battery tray. See **Restrictions** above.
2) Order one (1) or more P/N 362736700 Cable Bracket(s) as required.
3) Order batteries separately. The following tables list batteries recommended for use with List 93.

Battery Tray P/N 528496						
Manufacturer*	**Model**	**Emerson Network Power P/N**	**Rated 8-Hr. Capacity (Ah)**	**Dimension W x L x H (Inches)**	**Required Tray Spacing**	**Weight (per battery) (lbs)**
GNB Marathon	M12V125FT	--	125	4.90 X 22.00 X 11.15	7U	105
GNB Marathon	M12V155FT	112795	155	4.90 X 22.00 X 11.15	7U	119
Northstar	NSB110FT	--	110	4.92 X 22.05 X 8.94	7U	91.3
Northstar	NSB170FT	--	167	4.92 X 22.05 X 12.60	8U	131
Deka Unigy I	12AVR-150ET	122018	150	4.90 X 22.00 X 11.75	7U	115
C&D	FA 12-150F	FA12150	150	4.92 X 21.97 X 12.70	8U	131
Douglas	DGS12-150F	125453	150	4.90 X 22.00 X 12.70	8U	137
Douglas	DSN12-170F	--	170.8	4.92 X 22.05 X 12.60	8U	129.6

** See Battery Manufacturer Information located at the end of this document.*

Battery Tray P/N 540842						
Manufacturer*	**Model**	**Emerson Network Power P/N**	**Rated 8-Hr. Capacity (Ah)**	**Dimension W x L x H (Inches)**	**Required Tray Spacing**	**Weight (per battery) (lbs)**
GNB Marathon	M12V35FT	--	35	4.21 X 11.02 X 7.44	6U	31
GNB Marathon	M12V50FT	--	47	4.21 X 11.02 X 9.09	7U	40
GNB Marathon	M12V60FT	--	59	4.21 X 11.02 X 10.35	7U	51
Northstar	NSB40FT**	--	38.1	3.80 X 9.80 X 8.20	6U	34
Northstar	NSB60FT**	--	57.9	4.20 X 11.30 X 10.40	7U	49
Douglas	DGS12-25F	--	25	3.94 X 10.80 X 7.60	6U	27
Douglas	DGS12-50F	--	50	3.94 X 10.80 X 11.60	8U	48

** See Battery Manufacturer Information located at the end of this document.*
*** Batteries MUST be equipped with front access terminal option. See Battery Manufacturer for ordering information.*

4) Specify rack spacing of 6U (10.5”), 7U (12.25”), or 8U (14”) between trays and above top tray as required for battery clearance. See table above.

5) Battery lugs are provided as shown in the following table.

Battery Specified	**Battery Lug Kit Part Number (Kit provides two lugs for one tray.)**
GNB Marathon M12V125FT	540989
GNB Marathon M12V155FT	
Northstar NSB110FT	
Northstar NSB170FT	
Deka Unigy I 12AVR-150ET	
C&D FA 12-150F	
Douglas DGS12-150F	
Douglas DSN12-170F	
GNB Marathon M12V35FT	
GNB Marathon M12V50FT	
GNB Marathon M12V60FT	
Northstar NSB40FT	
Northstar NSB60FT	
Douglas DGS12-25F	
Douglas DGS12-50F	

6) Specify with or without battery disconnect circuit breakers. If ordering List 93 with circuit breakers, order one (1) circuit breaker per List 93 from the following table. Also specify breaker mounting on left side of tray, right side of tray, or remote mounting. **Note:** *All List 93 trays in a rack will be furnished with or without battery disconnect circuit breakers as specified for the first tray ordered.*

   Also order P/N 541031 for each battery disconnect circuit breaker ordered. P/N 541031 includes a battery cable and two lugs to connect from the battery disconnect circuit breaker to the batteries.

   Also order Alarm Jumpers P/N 540957 and P/N 535294 as needed per the illustrations in External Alarm Connections located in WIRING ILLUSTRATIONS.

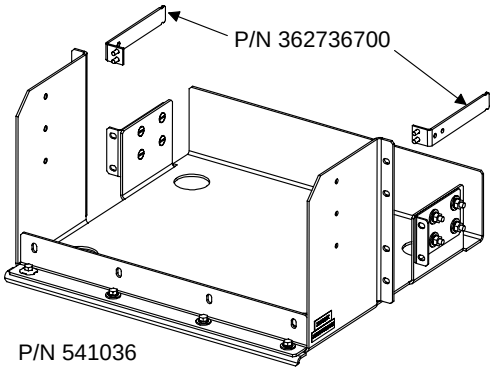
Ampere Rating	P/N Electrical/Mechanical Trip[1] (Black Handle)
1	256690300
3	256690700
5	256691100
10	256691500
15	256691900
20	256692300
25	256692700
30	256693100
35	256693500
40	256693900
50	256694300
60	256694700
70	256695100
75	256695500
100	256695900

Circuit Breaker Alarm Operation:
[1] Provides an alarm during an electrical or manual trip condition.

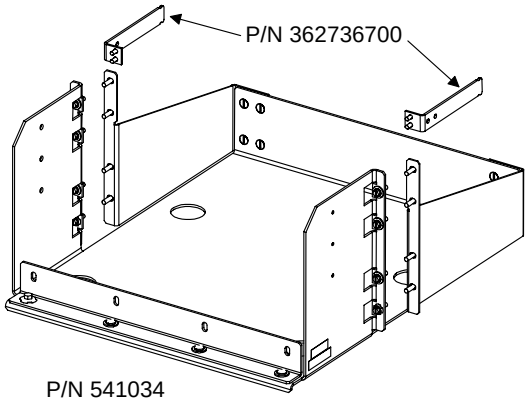
List 94: Battery Tray for 19" Relay Rack

Features

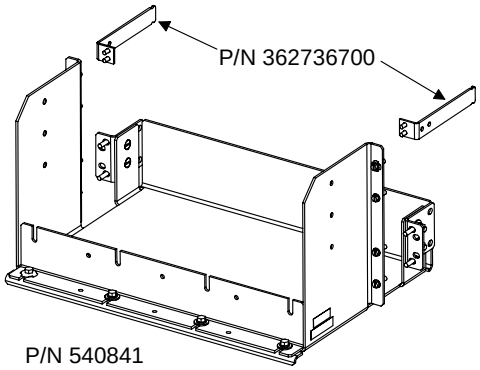
- Provides one battery tray that mounts four (4) 12V front terminal Valve Regulated Lead Acid (VRLA) batteries. Batteries are configured as one (1) 48V string.
- Accepts various VRLA batteries. See **Ordering Notes** below.
- See Overall Dimensions - 19" Battery Tray under *PHYSICAL SIZE INFORMATION* for battery tray dimensions and typical arrangement. Note that three battery trays are available to accommodate the various size batteries listed in the **Ordering Notes** tables.
- Trays can be ordered with or without battery disconnect circuit breakers. When circuit breakers are ordered, one is provided in the -48V lead of each battery string (1 circuit breaker per tray).
- Battery cables are provided terminated at the power system end in an Anderson connector. Battery lugs are provided for the remaining end.



P/N 541036



P/N 541034



P/N 540841

Restrictions

For 19" relay racks only.

Maximum number of List 94's per rack is two (2).

A single List 94 must mount at bottom of rack. Multiple List 94's must mount starting at bottom of rack and working upward.

Ordering Notes

1) Order multiples of List 94 for more than one (1) battery tray. See **Restrictions** above.
2) Order one (1) or more P/N 362736700 Cable Bracket(s) as required.
3) Order batteries separately. The following tables list batteries recommended for use with List 94.

Battery Tray P/N 541036						
Manufacturer*	**Model**	**Emerson Network Power P/N**	**Rated 8-Hr. Capacity (Ah)**	**Dimension W x L x H (Inches)**	**Required Tray Spacing**	**Weight (per battery) (lbs)**
Northstar	NSB90FT	--	90	4.25 X 15.59 X 10.04	7U	70.6
Northstar	NSB100FT	--	100	4.25 X 15.59 X 11.03	7U	78.5
GNB Marathon	M12V90FT	--	90	4.13 X 15.55 X 10.63	7U	70

** See Battery Manufacturer Information located at the end of this document.*

Battery Tray P/N 541034						
Manufacturer*	**Model**	**Emerson Network Power P/N**	**Rated 8-Hr. Capacity (Ah)**	**Dimension W x L x H (Inches)**	**Required Tray Spacing**	**Weight (per battery) (lbs)**
GNB Marathon	M12V105FT	--	105	4.33 X 20.12 X 9.37	7U	79

** See Battery Manufacturer Information located at the end of this document.*

Battery Tray P/N 540841						
Manufacturer*	**Model**	**Emerson Network Power P/N**	**Rated 8-Hr. Capacity (Ah)**	**Dimension W x L x H (Inches)**	**Required Tray Spacing**	**Weight (per battery) (lbs)**
GNB Marathon	M12V35FT	--	35	4.21 X 11.02 X 7.44	6U	31
GNB Marathon	M12V50FT	--	47	4.21 X 11.02 X 9.09	7U	40
GNB Marathon	M12V60FT	--	59	4.21 X 11.02 X 10.35	7U	51
Northstar	NSB40FT**	--	38.1	3.80 X 9.80 X 8.20	6U	34
Northstar	NSB60FT**	--	57.9	4.20 X 11.30 X 10.40	7U	49
Douglas	DGS12-25F	--	25	3.94 X 10.80 X 7.60	6U	27
Douglas	DGS12-50F	--	50	3.94 X 10.80 X 11.60	8U	48

** See Battery Manufacturer Information located at the end of this document.*
*** Batteries MUST be equipped with front access terminal option. See Battery Manufacturer for ordering information.*

4) Specify rack spacing of 6U (10.5”), 7U (12.25”), or 8U (14”) between trays and above top tray as required for battery clearance. See table above.

5) Battery lugs are provided as shown in the following table.

Battery Specified	**Battery Lug Kit Part Number (Kit provides two lugs for one tray.)**
Northstar NSB90FT	540989
Northstar NSB100FT	
GNB Marathon M12V90FT	
GNB Marathon M12V105FT	
GNB Marathon M12V35FT	
GNB Marathon M12V50FT	
GNB Marathon M12V60FT	
Northstar NSB40FT	
Northstar NSB60FT	
Douglas DGS12-25F	
Douglas DGS12-50F	

6) Specify with or without battery disconnect circuit breakers. If ordering List 94 with circuit breakers, order one (1) circuit breaker per List 94 from the following table. Also specify breaker mounting on left side of tray, right side of tray, or remote mounting. **Note:** *All List 94 trays in a rack will be furnished with or without battery disconnect circuit breakers as specified for the first tray ordered.*

   Also order P/N 541031 for each battery disconnect circuit breaker ordered. P/N 541031 includes a battery cable and two lugs to connect from the battery disconnect circuit breaker to the batteries.

   Also order Alarm Jumpers P/N 540957 and P/N 535294 as needed per the illustrations in External Alarm Connections located in WIRING ILLUSTRATIONS.

Ampere Rating	P/N Electrical/Mechanical Trip[1] (Black Handle)
1	256690300
3	256690700
5	256691100
10	256691500
15	256691900
20	256692300
25	256692700
30	256693100
35	256693500
40	256693900
50	256694300
60	256694700
70	256695100
75	256695500
100	256695900

Circuit Breaker Alarm Operation:
[1] Provides an alarm during an electrical or manual trip condition.

ACCESSORY DESCRIPTIONS

Relay Racks

Features

- The following relay racks are available.

Restrictions

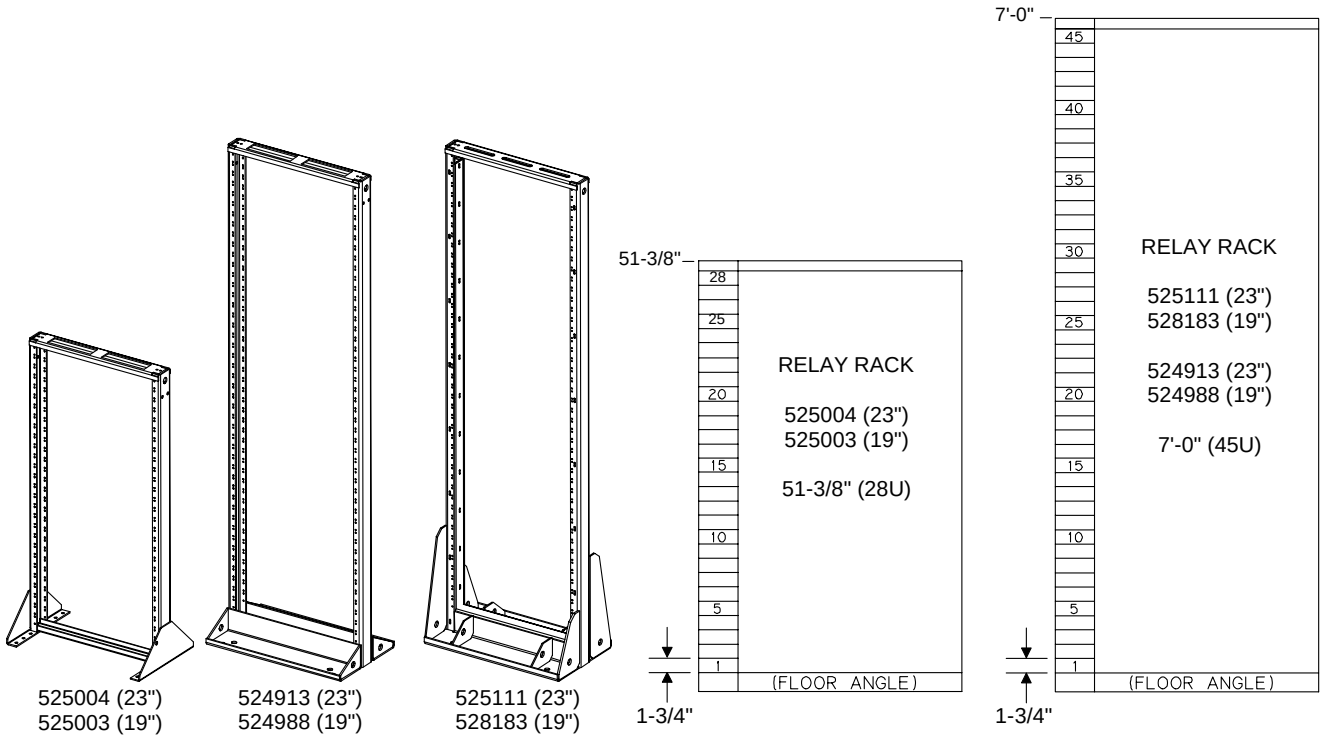
Customer must mount power/distribution shelf in relay rack. If battery trays are ordered, they are factory mounted in the relay rack.

Ordering Notes

1) Order from relay racks listed in Table 1.

P/N	Size	Available Mounting Positions (1U = 1-3/4")	Notes
525003	51-3/8"H x19"W	28U	Welded
525004	51-3/8"H x23"W	28U	Welded
524988	7'0" H x 19"W	45U	Welded
524913	7'0" H x 23"W	45U	Welded
528183	7'0" H x 19"W	45U	Seismic (complies with Bellcore Seismic Zone 4 requirements)
525111	7'0" H x 23"W	45U	Seismic (complies with Bellcore Seismic Zone 4 requirements)

Table 1
Available Relay Racks



Optional 19” to 23” Adapter Bracket Kit, P/N 540993

Features

- Allows for 23” relay rack mounting.

Ordering Notes

1) Order P/N 540993 (which consists of two P/N 540994 brackets and four 12-24 x 1/2” thread forming screws).

Distribution Devices

GMT Load Distribution Fuses

Features

- Ten (10) GMT load distribution fuse positions are provided on the Distribution Unit.

Restrictions

When used for power distribution, load should not exceed 80% of device rating, except 10 and 15 Amp fuses, for which load should not exceed 70% of device rating.

GMT load distribution fuse maximum rating is 15A.

The Distribution Unit has a 35A @ +50°C (+122°F) and 25A @ +65°C (+149°F) maximum capacity.

See also Load Distribution Wiring under WIRING NOTES for additional wiring restrictions.

Ordering Notes

1) Order GMT fuses per Table 2.

Ampere Rating	P/N	Fuse Color
18/100 GMT-A	248610301	--
1/4	248610200	Violet
1/2	248610300	Red
3/4	248610500	Brown
1-1/3	248610700	White
2	248610800	Orange
3	248610900	Blue
5	248611000	Green
7-1/2	248611300	Black-White
10	248611200	Red-White
15	248611500	Red-Blue
Replacement Dummy Fuse	248872600	---
Replacement Safety Fuse Cover	102774	--

Table 2
GMT Fuses

External Battery Disconnect Unit, P/N 535282

Features

- Battery Disconnect Unit with mounting tabs.
- Two 1/4-20 studs w/hardware provided for installation of single hole battery lugs.
- One alarm lead provided.

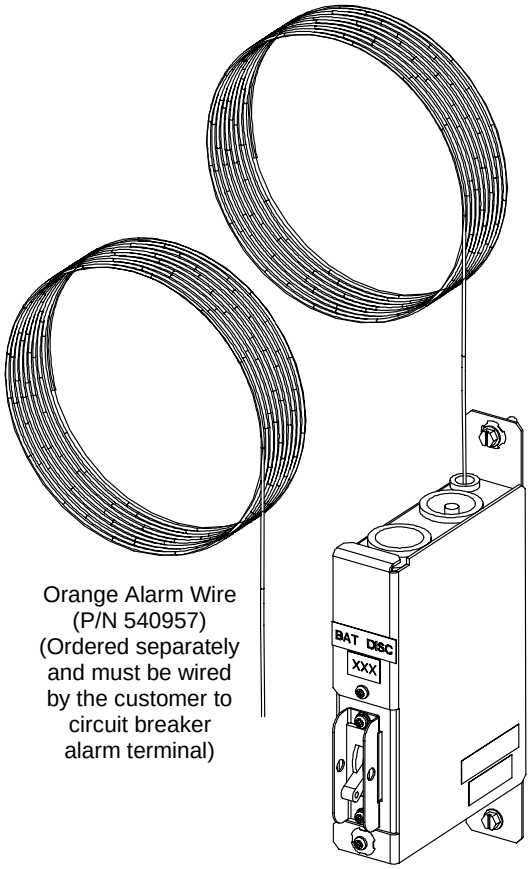
Restrictions

Circuit breakers are ordered separately.

Maximum number of Battery Disconnect Units per system is two (2).

Ordering Notes

1) Order by P/N 535282 as required.
2) Order a circuit breaker for each Battery Disconnect Unit from the following table.
3) Also order P/N 541031 for each battery disconnect circuit breaker ordered. P/N 541031 includes a battery cable and two lugs to connect from the battery disconnect circuit breaker to the batteries.
4) Also order P/N 540957 Alarm Jumper Wire for the 1st Battery Disconnect Unit (for wiring from the Battery Disconnect Circuit Breaker to the Power/Distribution Shelf). If a second Battery Disconnect Unit is ordered, **NO** additional alarm jumper wires are required.



Orange Alarm Wire (P/N 540957) (Ordered separately and must be wired by the customer to circuit breaker alarm terminal)

Ampere Rating	P/N Electrical/Mechanical Trip[1] (Black Handle)	Ampere Rating	P/N Electrical/Mechanical Trip[1] (Black Handle)
1	256690300	35	256693500
3	256690700	40	256693900
5	256691100	50	256694300
10	256691500	60	256694700
15	256691900	70	256695100
20	256692300	75	256695500
25	256692700	100	256695900
30	256693100		

Circuit Breaker Alarm Operation:
[1] Provides an alarm during an electrical or manual trip condition.

Battery Cabinets

Features

- Provides a battery cabinet with batteries as specified in *Ordering Notes*.

Restrictions

Also order the appropriate "Battery Cable" as specified in 2) under *Ordering Notes* which connects between the Power/Distribution Shelf and the Battery Cabinet (note that there is already a cable furnished with the Battery Cabinet which is not used in this application).

Ordering Notes

1) Order from the following table.

Wall Mount Battery Cabinet	
Description	**P/N**
Battery Cabinet (e/w 12 AH Batteries) (Model A8CAB)	58824700006
Battery Cabinet (e/w 7 AH Batteries) (Model A8CAB)	58824700007
12 AH Replacement Batteries	58824700040
7 AH Replacement Batteries	58824700041
19"/23" Rack Mounting Bracket Kit	58824700042
19"/23" Rack or Wall Mount Battery Cabinet	
Description	**P/N**
Battery Cabinet (e/w 12 AH Batteries) (Model V18CAB)	4878-CDN010

2) For Battery Cabinets P/Ns 58824700006 and 58824700007,
also order Battery Cable P/N 541043 (single string)
or 541045 (double string).

For Battery Cabinet P/N 4878-CDN010,
also order Battery Cable P/N 541044 (single string)
or 541046 (double string).

Spare Anderson Battery Connector

Features

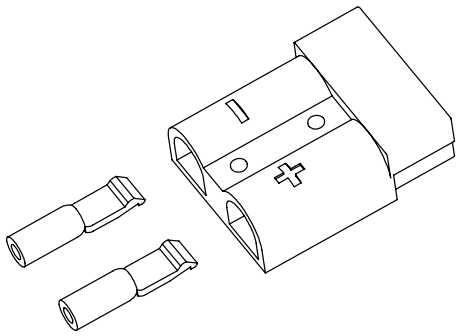
- Includes the components necessary to assemble an Anderson connector onto a battery cable.
  - Anderson Connector P/N 133195 includes a connector housing and two (2) 10 AWG lugs. Allows for the connection of one (1) battery string (both polarities) (1 wire per lug).
  - Anderson Connector P/N 133196 includes a connector housing and two (2) 6 AWG lugs. Allows for the connection of two (2) battery strings (both polarities) (2 wires per lug).

Restrictions

Appropriate battery post mating lugs must be ordered separately.

Ordering Notes

1) Order spare Anderson connector as required.
   P/N 133195 for a single string.
   P/N 133196 for a double string.



P/N 133195 (Anderson P/N 6331G2):
Consists of two (2) lugs (Anderson P/N 5915)
and one (1) Red Connector (Anderson P/N 992G1).
Lugs accept 10/12 AWG wire.

P/N 133196 (Anderson P/N 6331G1):
Consists of two (2) lugs (Anderson P/N 5900)
and one (1) Red Connector (Anderson P/N 992G1).
Lugs accept (2) 10 AWG wires.

Replacement Components

Ordering Notes

1) Refer to the following table.

Item	Part Number
400W Rectifier Module	1R48400
800W Rectifier Module	1R48800
Rectifier Module Fan	133307
Blank Panel for Empty Rectifier Module Mounting Position	Order per List 50
LCU (Local Control Unit)	1M200B
Temperature Probe (3 meters)	540941
Distribution Unit	Non-Customer replaceable, order a new List 1 or List 2.

Wiring Notes

Refer also to the next section, Wiring Illustrations.

Shelf Frame Grounding Wiring

Features

- An M4 frame ground stud with hardware is provided on the rear of the shelf

Restrictions

Recommended frame ground wire size is 6 AWG.

AC Input Branch Circuit Protection and Wiring

Features

- AC input line cords (one per rectifier) are connected to IEC receptacles located on the rear of the shelf.

Restrictions

For correct AC input wire size, order the appropriate AC Input Line Cord List Option (List 41, 43, 45, or 47).

Recommended branch circuit protection is 15 amperes.

External Alarm Wiring

Features

- External alarm leads are connected to a spring/clamp-type terminal block located on the rear of the shelf.

Restrictions

Terminal block wire size capacity is 24 to 12 AWG.

Recommended Wire Size: 22 AWG for Loop Lengths Up to 200 ft.
18-20 AWG for Loop Lengths Over 200 ft.

Load Distribution Wiring

Features

- Load and load return leads are connected to a screw-type terminal block located on the front of the Distribution Unit.

Restrictions

The rating of the distribution device determines the wire size requirements. Refer to the American National Standards Institute (ANSI) approved National Fire Protection Association's (NFPA) National Electrical Code (NEC) and applicable local codes.

Terminal block wire size capacity is 20 to 12 AWG.

Input Battery Wiring

Features

- Battery leads are factory connected to the shelf. These leads are terminated in an Anderson connector.

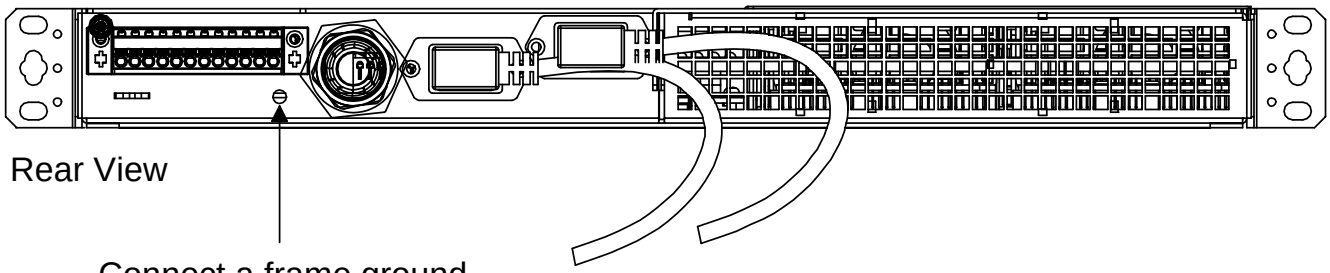
- Additional strings of battery may be connected to the system using the available battery cable kits (see List 71 and List 72).

Restrictions

Battery leads are NOT internally fused.

Wiring Illustrations

Shelf Frame Grounding Connection

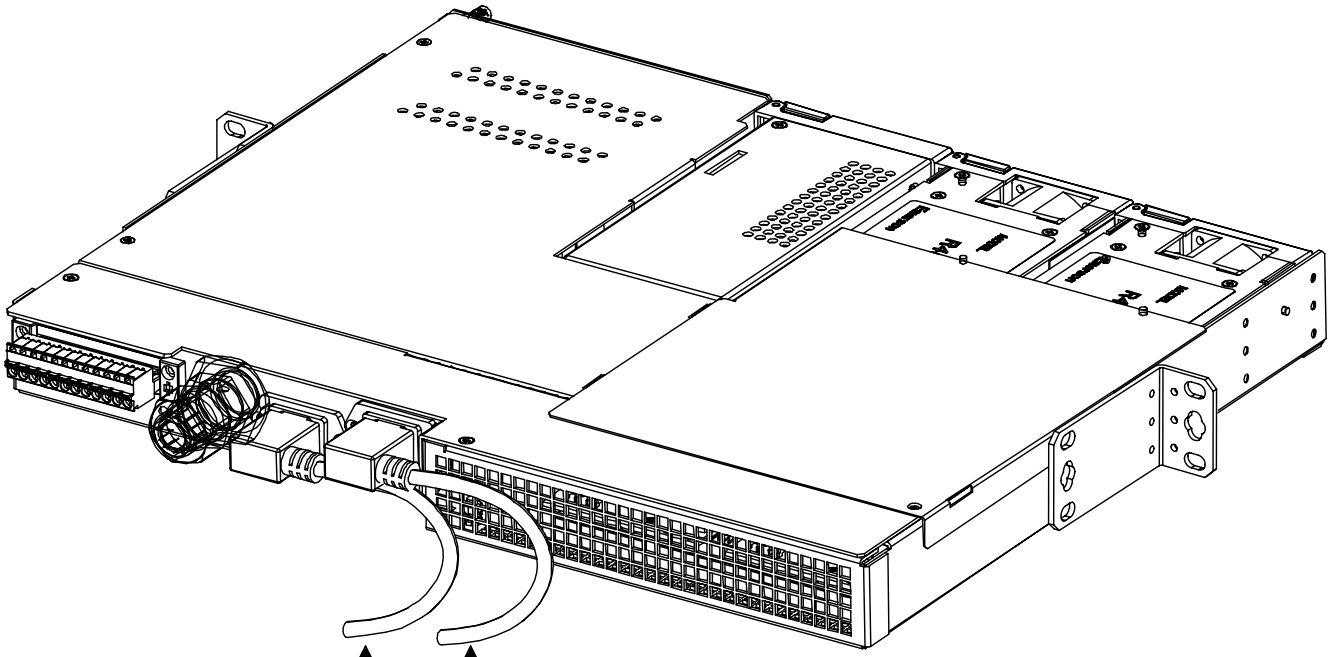


Rear View

Connect a frame ground lead to this stud, if required.

Stud is a Size M4.

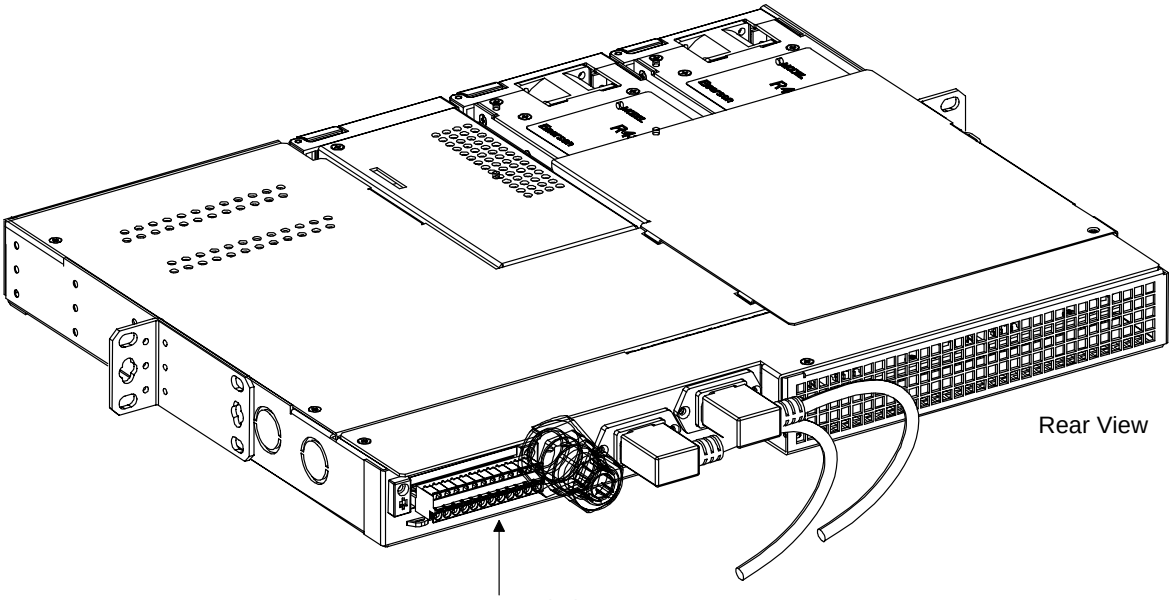
AC Input Connections



Rear View

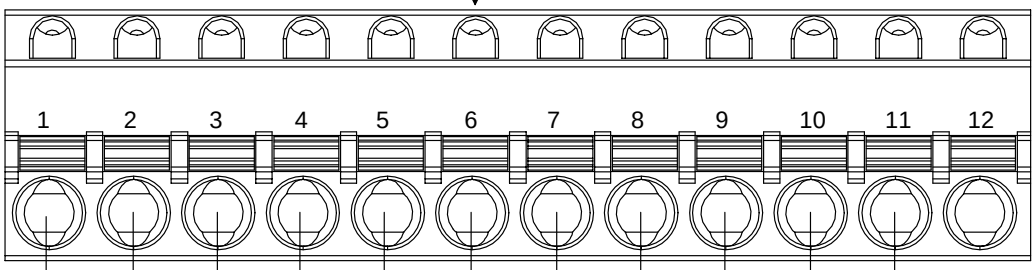
AC input connections are made using the supplied AC input line cords connected here.

External Alarm Connections



Rear View

Connect external alarms
to rear terminal block here.



External Battery Disconnect
Circuit Breaker Alarm Input*

Minor Alarm
When a Minor Alarm occurs;
contacts close between terminals 4 and 5,
and contacts open between terminals 3 and 5.

AC Fail Alarm
When an AC Fail Alarm occurs;
contacts close between terminals 6 and 8,
and contacts open between terminals 7 and 8.

Major Alarm
When a Major Alarm occurs;
contacts close between terminals 10 and 11,
and contacts open between terminals 9 and 11.

Pin 12
is not
connected.

* Pins 1 and 2 are factory shorted. Remove the jumper to connect the external circuit breaker's alarm contacts to these terminals. Connect the circuit breaker's normally open dry contacts to pins 1 and 2. A battery disconnect circuit breaker alarm is activated when the circuit breaker is in the OFF position (the normally open dry contacts are in the open position). Refer to next pages for wiring procedures to the External Battery Disconnect Units or to Battery Disconnect Circuit Breakers located in Battery Trays.

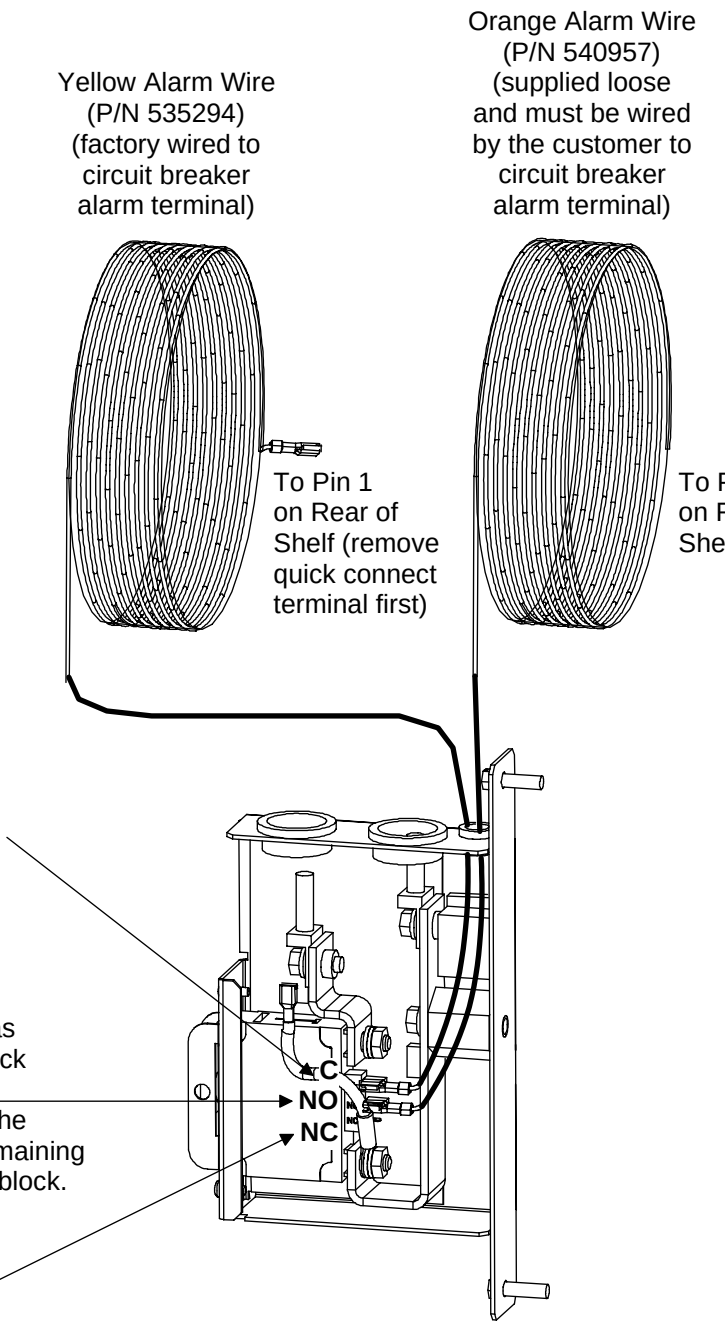
Wiring to a Single External Battery Disconnect Unit

Procedure

1. Disconnect shorting jumper from Pins 1 and 2 on Power/ Distribution Shelf. Connect YELLOW wire exiting top of Battery Disconnect Unit to Pin 1 on rear shelf alarm terminal block (remove quick connect terminal first on shelf end). The YELLOW wire is factory connected to circuit breaker "C (Common)" alarm terminal in the Battery Disconnect Unit. Leave the yellow wire connected.

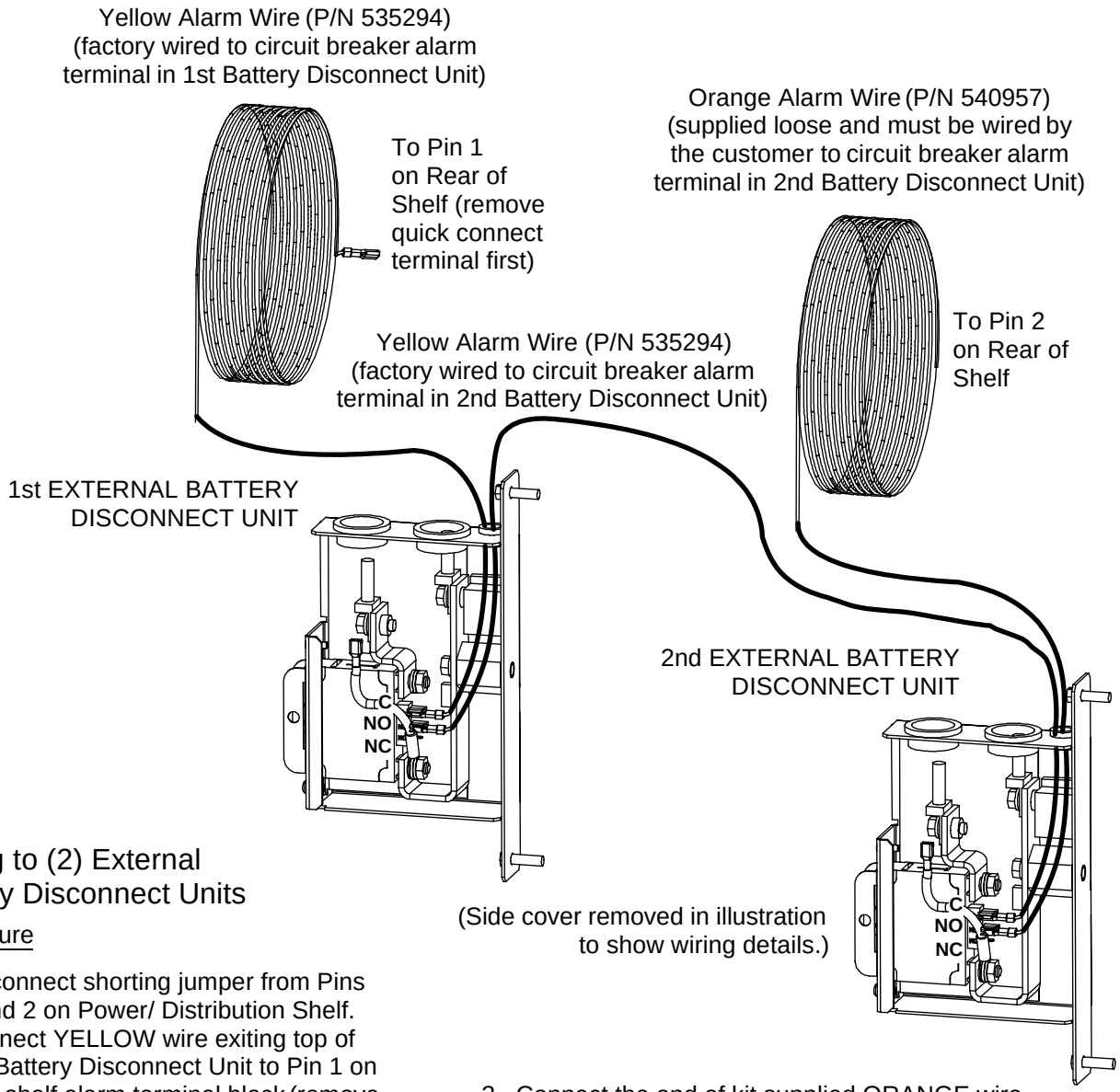
2. Route kit supplied ORANGE wire same as yellow wire. Connect the end with the quick connect terminal to circuit breaker "NO (Normally Open)" alarm terminal in the Battery Disconnect Unit. Connect the remaining end to Pin 2 on rear shelf alarm terminal block.

3. Ensure jumper is NOT connected to circuit breaker "NC (Normally Closed)" alarm terminal. (The jumper is used in other applications.)



EXTERNAL BATTERY DISCONNECT UNIT

(Side cover removed in illustration to show wiring details.)



(Side cover removed in illustration to show wiring details.)

Wiring to (2) External Battery Disconnect Units

Procedure

1. Disconnect shorting jumper from Pins 1 and 2 on Power/ Distribution Shelf. Connect YELLOW wire exiting top of 1st Battery Disconnect Unit to Pin 1 on rear shelf alarm terminal block (remove quick connect terminal first on shelf end). The YELLOW wire is factory connected to circuit breaker "C (Common)" alarm terminal in the 1st Battery Disconnect Unit. Leave the yellow wire connected.

2. Connect YELLOW wire exiting top of 2nd Battery Disconnect Unit to circuit breaker "NO (Normally Open)" alarm terminal in the 1st Battery Disconnect Unit. The YELLOW wire is factory connected to circuit breaker "C (Common)" alarm terminal in the 2nd Battery Disconnect Unit. Leave the yellow wire connected.

3. Connect the end of kit supplied ORANGE wire with the quick connect terminal to circuit breaker "NO (Normally Open)" alarm terminal in the 2nd Battery Disconnect Unit. Connect the remaining end to Pin 2 on rear shelf alarm terminal block.

4. Ensure jumpers are NOT connected to circuit breaker "NC (Normally Closed)" alarm terminal in both Battery Disconnect Units. (The jumper is used in other applications.)

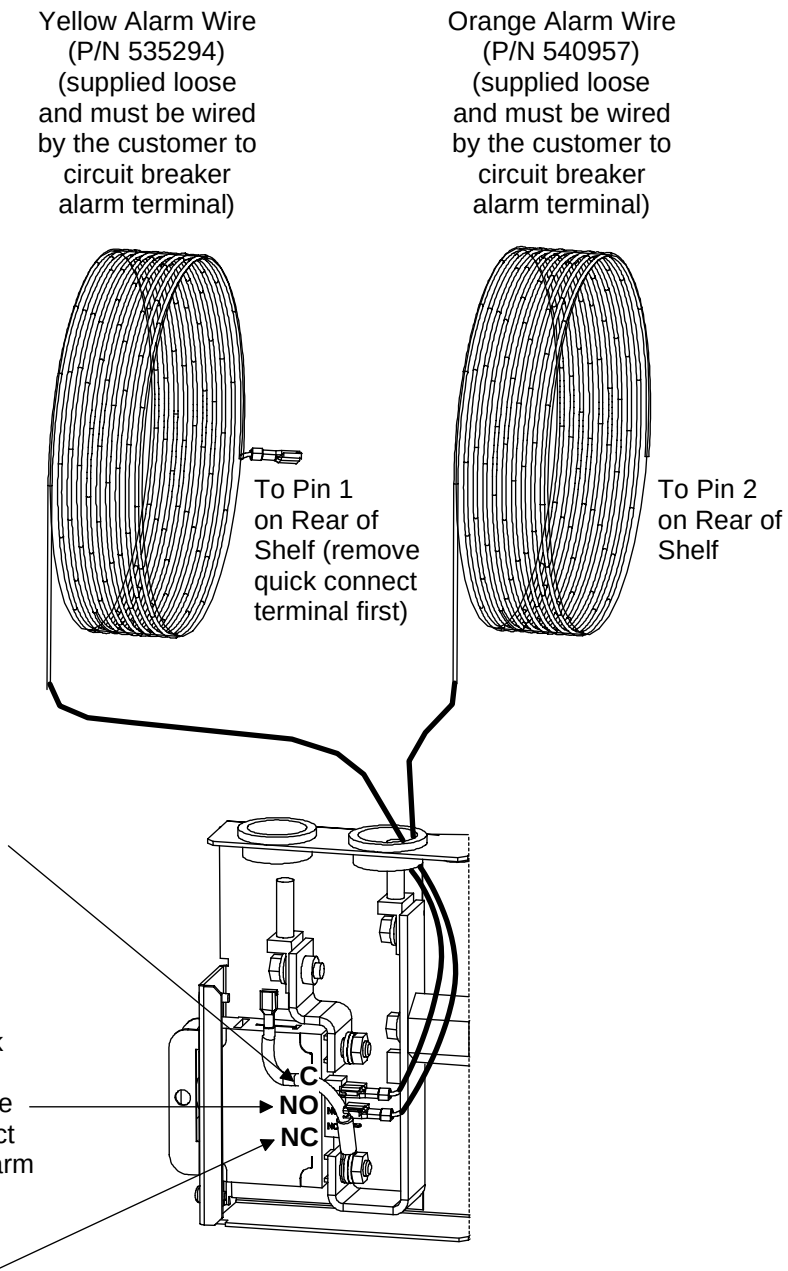
Wiring to a Battery Disconnect Circuit Breaker Located on a Battery Tray

Procedure

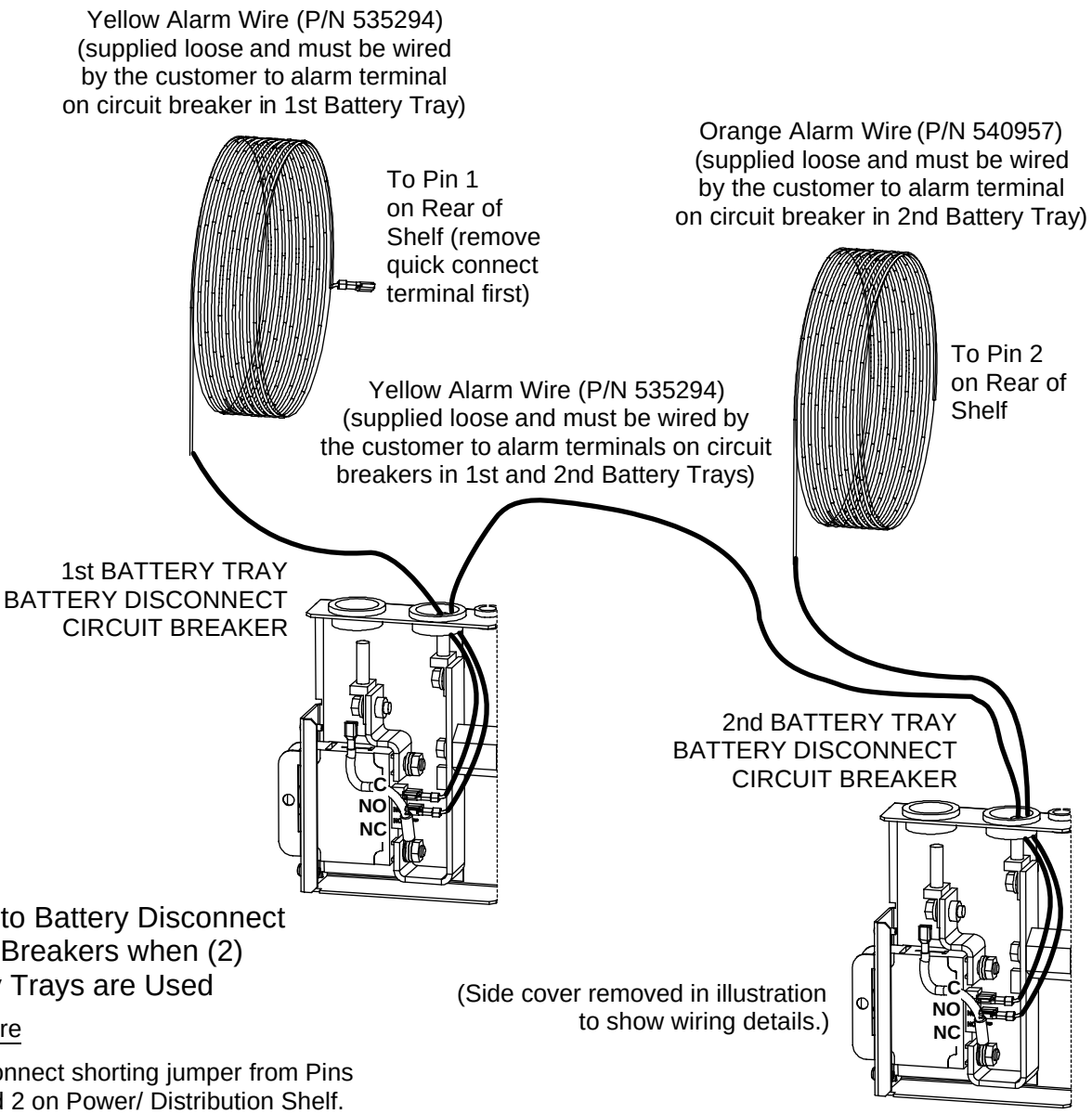
1. Disconnect shorting jumper from Pins 1 and 2 on Power/ Distribution Shelf. Connect one end of kit supplied YELLOW wire to circuit breaker "C (Common)" alarm terminal on the Battery Disconnect Circuit Breaker. Connect the remaining end to Pin 1 on rear shelf alarm terminal block (remove quick connect terminal first on shelf end).

2. Route kit supplied ORANGE wire same as yellow wire. Connect the end with the quick connect terminal to circuit breaker "NO (Normally Open)" alarm terminal on the Battery Disconnect Circuit Breaker. Connect the remaining end to Pin 2 on rear shelf alarm terminal block.

3. Disconnect the jumper that is factory connected to circuit breaker "NC (Normally Closed)" alarm terminal. (The jumper is used in other applications.)



BATTERY TRAY BATTERY DISCONNECT CIRCUIT BREAKER (Side cover removed in illustration to show wiring details.)



Wiring to Battery Disconnect Circuit Breakers when (2) Battery Trays are Used

(Side cover removed in illustration to show wiring details.)

Procedure

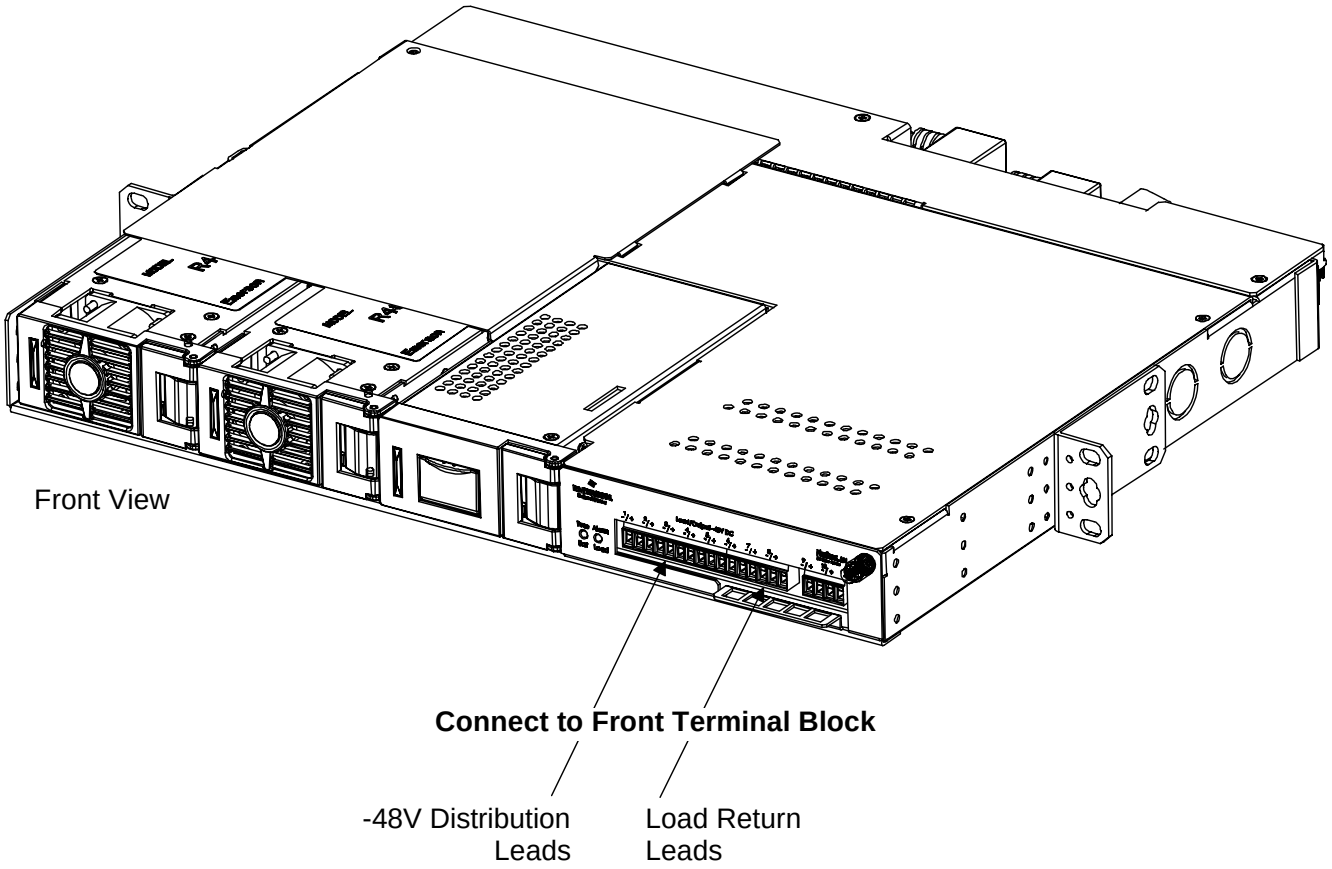
1. Disconnect shorting jumper from Pins 1 and 2 on Power/ Distribution Shelf. Connect one end of kit supplied YELLOW wire to circuit breaker "C (Common)" alarm terminal on the Battery Disconnect Circuit Breaker in the 1st Battery Tray. Connect the remaining end to Pin 1 on rear shelf alarm terminal block (remove quick connect terminal first on shelf end).

2. Connect the end of kit supplied ORANGE wire with the quick connect terminal to circuit breaker "NO (Normally Open)" alarm terminal on the Battery Disconnect Circuit Breaker in the 2nd Battery Tray. Connect the remaining end to Pin 2 on rear shelf alarm terminal block.

3. Connect one end of kit supplied YELLOW wire to circuit breaker "C (Common)" alarm terminal on the Battery Disconnect Circuit Breaker in the 2nd Battery Tray. Connect the remaining end to circuit breaker "NO (Normally Open)" alarm terminal on the Battery Disconnect Circuit Breaker in the 1st Battery Tray.

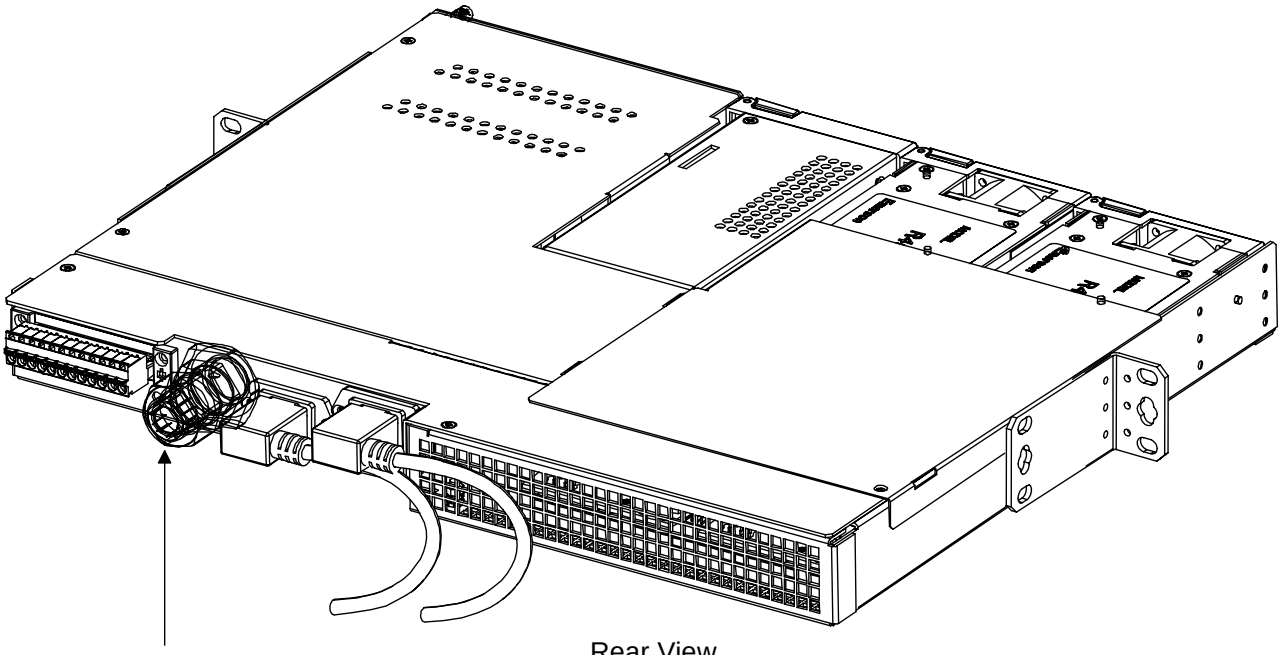
4. Disconnect the jumpers that are factory connected to circuit breakers "NC (Normally Closed)" alarm terminals. (The jumper is used in other applications.)

Load Connections



Fuse Position	Terminal	
	Load (-48V)	Load Return
1	1	2
2	3	4
3	5	6
4	7	8
5	9	10
6	11	12
7	13	14
8	15	16
9	17	18
10	19	20

Battery Connections



Rear View

Connect battery leads to factory installed leads exiting the shelf here. These leads are factory terminated in an Anderson connector. A mating half to this connector is provided for connection to customer battery leads. External battery cables are also available to connect 1 or 2 strings of batteries to the system.

OBSERVE PROPER POLARITY. LEADS AND CONNECTORS ARE MARKED WITH A PLUS AND MINUS SYMBOL OR TEXT.

Minus (-48V Battery)
Plus (Battery Return)

SPECIFICATIONS

1. SYSTEM

1.1 Environmental Ratings

1.1.1 Operating Ambient Temperature Range:

(A) -40°C (-40°F) to +75°C (+167°F) with derating output.

(B) -40°C (-40°F) to +50°C (+122°F) with 800W Rectifier Modules and full power performance.

(C) -40°C (-40°F) to +65°C (+149°F) with 400W Rectifier Modules and full power performance.

(D) Specification Compliant:

(1) -40°C (-40°F) to +50°C (+122°F): 800W (shelf w/ 400W Rectifier Modules).
1600W (shelf w/ 800W Rectifier Modules).

(2) -40°C (-40°F) to +65°C (+149°F): 1000W (shelf w/ 800W Rectifier Modules).

(3) -40°C (-40°F) to +70°C (+158°F): 500W (shelf w/ 400W Rectifier Modules).
500W (shelf w/ 800W Rectifier Modules).

Note: *The Rectifier Modules are able to start at -40°C (-40°F).*

1.1.2 Storage Ambient Temperature Range: -40°C (-40°F) to +75°C (+167°F).

1.1.3 Humidity: This Power System is capable of operating in an ambient relative humidity range of 0% to 90%, non-condensing.

1.1.4 Altitude: 2000 m (6560 ft) at full power (power limited for heights above 2000 m).

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 Craftspersons only.

This product is intended for installation in Network Telecommunication Facilities (CO, vault, hut, or other environmentally controlled electronic equipment enclosure).

Typical industry standards recommend minimum aisle space clearance of 2'6" for the front of the relay rack and 2' for the rear of the relay rack.

Mounting angles factory installed on side of shelf for mounting in a 19” wide relay rack (1-3/4 inch multiple drilling). Adapter brackets are available for mounting in a 23" wide relay rack.

Mounting angles may be re-positioned for flush-front mounting or 5-inch front projection mounting.

1.1.6 Ventilation Requirements: Rectifier and mounting shelf ventilating openings must not be blocked and temperature of air entering rectifiers must not exceed rated Operating Ambient Temperature Range stated above.

1.2 Compliance Information

1.2.1 Surge Protection: Refer to Paragraphs 2.3.6. and 3.3.6.

Note: *This level of protection is a widely used standard for telecommunications power equipment. As with all such equipment, it is the end user's responsibility to provide an adequately sized Surge Suppression Device at the commercial power service entrance of the building that reduces all incoming surges to levels below the classes/categories stated for the equipment.*

1.2.2 Safety Compliance:

(A) This unit meets the requirements of UL 60950, Standard for Information Technology Equipment, and is UL Recognized as a power supply for use in Telephone, Electronic Data Processing, or Information Processing Equipment.

(B) 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.

1.2.3 European Compliance (CE): This product conforms to the EU Low Voltage Directive 73/23/EEC and EMC Directive 89/336/EEC and harmonized standards EN55022 Class B and EN50082-1.

1.2.4 NEBS Compliance: Compliance verified by a Nationally Recognized Testing Laboratory (NRTL) per GR-1089-CORE and GR-63-CORE. Contact Emerson Network Power for NEBS compliance reports.

1.2.5 EMC and Safety:

(A) Complies with the Low-Voltage Directive, 73/23/EEC and the EMC Directive, 89/336/EEC including amendments by the CE Marketing Directive, 93/68/EEC.

EMC		
Emissions		**Test Level**
EN 55022: 1998	Conducted	Class B
	Radiated	Class B
Immunity		
EN 50082-1 EN 50082-2 ETSI EN 300 386	EN 61000-4-2 Electrostatic Discharge	4kV
	EN 61000-4-3 Radiated EM Field	10V/m
	EN 61000-4-4 Electric Fast Transients	1kV / 0.5kV
	EN 61000-4-5 Surge	0.5kV / 1kV
	EN 61000-4-6 Conducted RF Disturbance	3V/m
	EN 61000-3-2 Harmonic Content	Class A
	EN 61000-3-3 Voltage Fluctuation and Flicker	Pass
SAFETY		
EN 60950-1: 2001	Safety of Information Technology Equipment, including Electrical Business Equipment	

(B) Complies with Emissions and Immunity requirements as specified in GR-1089-Core Issue 4.

EMC		
Emissions		**Test Level**
CFR 47 – Part 15; GR-1089 Issue 4	Conducted	Class B
	Radiated	Class B
Immunity		
GR-1089 Issue 4	EN 61000-4-2 Electrostatic Discharge	8kV / 15kV
	EN 61000-4-4 Electric Fast Transients	0.25kV / 0.5kV
	Radiated Immunity	8.5V/m
	Conducted Immunity	89dBuA
	Surge IEEE C62.41	2kV / 6kV

1.3 Standard Features

1.3.1 AC Input Connections: AC input line cords (one per rectifier) are connected to IEC receptacles located on the rear of the unit.

1.3.2 Battery Connections: Battery leads are connected to an Anderson connector exiting the rear of the unit.

1.3.3 Load Connections: Load and load return leads are connected to a screw-type terminal block located on the front of the unit.

1.3.4 Alarm Connections: Alarm leads are connected to a spring/clamp-type terminal block located on the rear of the unit.

1.3.5 Dimensions

(A) Millimeters: 44.4 (Height) X 432 (Width) X 356 (Depth).

(B) Inches: 1.75 (Height) X 17 (Width) X 14 (Depth).

1.3.6 Weight (w/out Rectifier Modules): 4.1 kg (9.04 lbs).

2. RECTIFIER MODULE (MODEL R48-400, SPEC. NO. 1R48400)

2.1 DC Output Ratings

2.1.1 Voltage: Nominal -48.0 VDC, Positive Ground.

(A) Adjustment Range: The output voltage can be set within the range of -48.0 to -56.0 V (in steps of 0.25 V), adjustable via the LCU Controller. The accuracy is ±0.1 V half load. At 3.75A output, the error in output voltage is ≤±100 mV.

(B) Tolerance:

(1) < ± 0.5% at 50% load and in the temperature range of -5°C (+23°F) to +50°C (+122°F).

(2) < ±1% at 50% load and in the temperature range of -5°C (+23°F) to +65°C (+149°F).

(C) Temperature Coefficient (1/°C): Less than ±0.01%.

2.1.2 Full Load Rated Current: 7.5A.

2.1.3 Output Power: 400 W @ Vout >45 VDC.

2.1.4 Output Voltage - Output Current Characteristics: Shown in Figure 1.

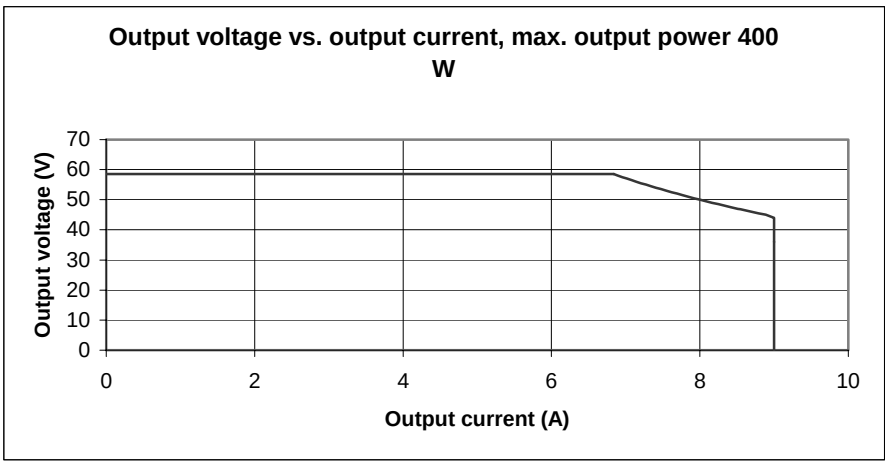


Figure 1
Output Characteristics

2.1.5 Power Derating Based on Voltage: The Rectifier Module power varies with changes in input voltage and output voltage. It uses an advanced power limitation method. The lower input threshold is 104 VAC. The Rectifier Module can provide its maximum rated power (400W) as long as the input voltage is within the range of 104 to 300 VAC. Below 104 VAC, and down to 85 VAC, the Rectifier Module will continue to operate normally but will be in a power derating mode. When operating at 85 VAC, the Rectifier Module can deliver 20% or more of its rated output power. The relationship between the output power and input voltage is illustrated in Figure 2.

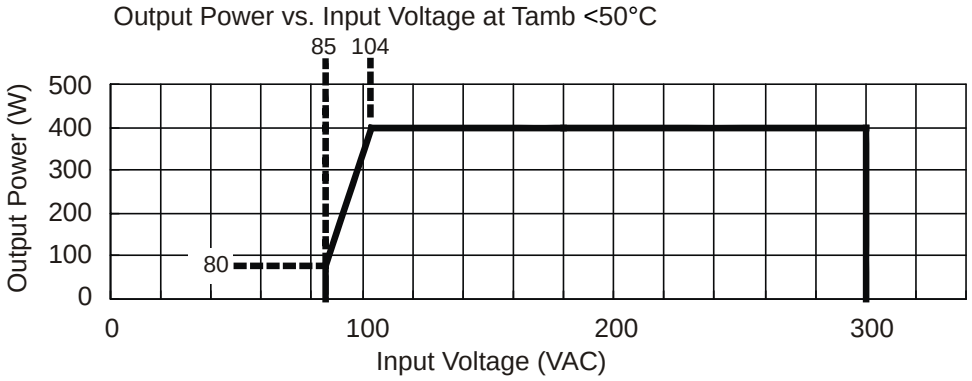


Figure 2
Power Derating Based on Voltage

Note: *As depicted in Figure 2, the output power will derate from 100% (400W) of the rated capacity as the input voltage drops below 104 VAC, and to 20% (80W) of the rated capacity as the input voltage falls to 85 VAC.*

2.1.6 Power Derating Based on Temperature: The Rectifier Module delivers full power when operating at an ambient temperature of +65°C (+149°F) or below. Refer to Figure 3 to view the relationship between the output power and the ambient temperature.

Other power rating values are as follows:

- At an ambient temperature of +70°C (+158°F), the power delivered by the Rectifier Module is 200W.
- At an ambient temperature of +75°C (+167°F), the power delivered by the Rectifier Module is 0W.
- From -40°C (-40°F) to -5°C (+23°F), the Rectifier Module starts.

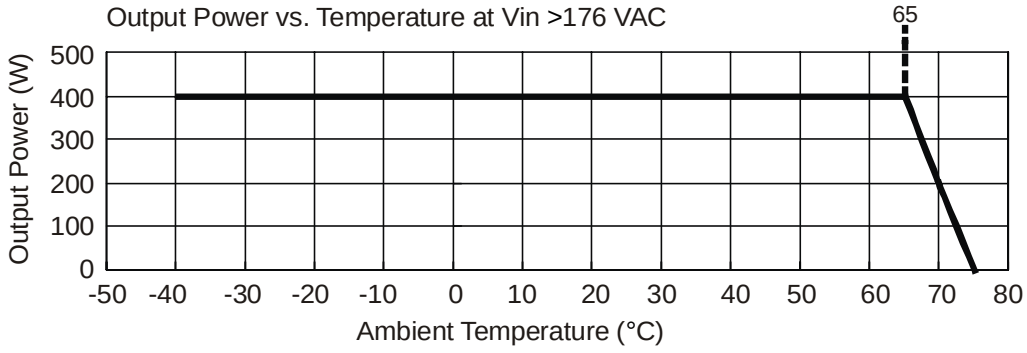


Figure 3
Power Derating Based on Temperature

2.1.7 Regulation

(A) Static Regulation, Including Input Voltage Variation and Temperature Variation: < ± 1.5% at 5-100% load and in the temperature range of -5°C (+23°F) to +50°C (+122°F).

(B) Dynamic Response at Rated Input and Output Voltage: Deviation ≤±5% of output voltage, max 1ms outside static regulation band load changes at 10% to 90% and 90% to 10%. (Telcordia GR-947).

2.1.8 Filtering:

(A) Voice Band Noise: Complies with Telcordia GR-947-CORE.

(1) Output noise according to Telcordia GR-947-CORE is <32 dBrnC at normal input and full load.

(2) Psophometric noise is ≤1 mV.

(B) Wide Band Noise: Complies with Telcordia GR-947-CORE.

(1) Wideband noise emission is <250 mV peak to peak between 0 Hz – 30 MHz, and <100 mV rms in any 3 kHz band 10 – 20 MHz.

2.1.9 Hold Up Time: Rectifier Module hold-up time at nominal input voltage range and with 100% constant power load is >15 ms. The DC-voltage is allowed to decrease from 54 to 42 V during the test. Rectifier Module hold-up time at nominal input voltage range and with 75% constant power load is >20 ms. The DC-voltage is allowed to decrease from 54 to 42 V during the test.

2.2 AC Input Ratings

2.2.1 Voltage: Nominal 120/208/240 volts AC, single phase, 3-wire (L+N+PE or 2L+PE), 50/60 Hz, with an operating range of 100 to 250 volts. Acceptable input frequency range is 45 to 65 Hz.

(A) Permitted Variation: 85 to 300 VAC.

2.2.2 Harmonic Content (THD):

(A) THD <10% at 75% to 100% of rated output power.

(B) THD <25% at loads greater than 40% of rated output power.

(C) THD <40% at loads greater than 10% of rated output power.

2.2.3 Inrush Current: ≤12A.

Note: *Charging of input filter capacitors is not taken into account.*

2.2.4 Maximum Input Current: 3A.

2.2.5 Typical Power Factor: 0.95

Vin: 220VAC.
>0.94 at 60 to 100% of rated load.
>0.88 at >40% of rated load.

2.2.6 Typical Operating Efficiency: Efficiency characteristics are summarized in Table 3.

Main Function	Sub Function/Condition	Requirement, Level
Efficiency, 40% to 100% rated load	Vin: 220VAC, Vout = -54.0 VDC	>86%
Efficiency, >40% rated load	Vin: 220VAC, Vout = -54.0 VDC	>80%
Efficiency, >20% rated load	Vin: 220VAC, Vout = -54.0 VDC	>60%

Table 3
Efficiency

2.3 Environmental Ratings

2.3.1 Operating Ambient Temperature Range: -40°C (-40°F) to +75°C (+167°F).

(A) Full rated output power of 400 W for temperatures -40°C (-40°F) to +65°C (+149°F).

(B) Power limitation for temperatures higher than +65°C (+149°F).

Note: *The Rectifier Module is able to start at -40°C (-40°F).*

2.3.2 Storage Ambient Temperature Range: -40°C (-40°F) to +75°C (+167°F).

2.3.3 Humidity: This Rectifier Module is capable of operating in an ambient relative humidity range of 0% to 90%, non-condensing.

2.3.4 Altitude: 2000 m (6560 ft) at full power (power limited for heights above 2000 m).

2.3.5 Acoustic Noise: ≤55 dB(A), measured at a distance of 0.6 m away from the Rectifier Module.

2.3.6 Surge Protection: Compliance with EN61000-4-5 (2kV Line to Line, 2kV Line to Earth). Capable of withstanding surges per ANSI/IEEE C 62.41 1980 Category B3 across the input terminals.

2.3.7 Heat Dissipation Mode: The fan speed varies in a non-step fashion and is controlled by temperature. The fan runs at full speed when the temperature is higher than +40°C (+104°F).

2.3.8 Insulation Resistance and Dielectric Strength
(at ambient temperature of 25°C ±5°, and relative humidity of 90% non-condensing):

(A) Insulation Resistance (applying a test voltage of 500 VDC):

(1) Between the AC input and the enclosure: ≥5×106 Ω.

(2) Between the AC input and the DC output: ≥5×106 Ω.

(3) Between the DC output and the enclosure: ≥5×10^6 Ω.

(B) Dielectric Strength

(1) Between the AC input and the enclosure, the leakage current is <1 mA with no breakdown within 1 minute of applying a voltage of 2120 VDC.

(2) Between the AC input and the DC output, the leakage current is <1 mA with no breakdown within 1 minute of applying a voltage of 4242 VDC.

(3) Between the DC output and the enclosure, the leakage current is <1 mA with no breakdown within 1 minute of applying a voltage of 707 VDC.

(4) Between the DC output and the ground, the leakage current is <1mA with no breakdown within 1 minute of applying a voltage of 1500 VDC (with the varistor and filter capacitors removed before doing the test).

2.4 Compliance Information

2.4.1 Refer to Paragraph 1.2.

2.5 Standard Features

2.5.1 Fan Fault Protection: An alarm will be generated upon a fan fault. In such cases, the fault indicator (red) on the Rectifier Module front panel will flash and the Rectifier Module will also inhibit its output. Auto-recovery is enabled upon the clearing of the corresponding fault.

2.5.2 Input Protection:

(A) Input Over/Under Voltage Protection: The Rectifier Module will shut down at low or high voltage input; based on the following voltage levels:

(1) Low voltage disable point from 70 to 85V; hysteresis is 10 - 15 VAC for restart.

(2) High voltage disable point from 300 to 315V; hysteresis is 10 - 15 VAC for restart.

(B) Between 85 V and 104 V the output power will be derated linearly based on the input voltage as follows:

(1) At input voltage of 85 V with output >45 V, max output power is 80 W.

(2) At input voltage of 104 V with output >45 V, max output power is 400 W.

2.5.3 Output Protection:

(A) Overload / Reverse Current: The Rectifier Module has a 28A fuse on the negative output DC bus. This fuse is not customer replaceable. The Rectifier Module can be plugged into or pulled out of a shelf while operating, without damage or opening the fuse.

(B) Current Limiting: The Rectifier Module has a current limit function. The Rectifier Module's default current limit point is 9A.

(C) Advanced Current Limit Function: The Rectifier Module has an advanced Current Limit Function. When a short circuit occurs at the Rectifier Module output terminals, the Rectifier Module will keep its output current at a constant value (value that is configurable via the controller). This function effectively protects the Rectifier Module and the equipment connected to the Rectifier Module. When the short circuit fault is cleared, the Rectifier Module will automatically restore back to normal operation.

(D) Over Voltage Shutdown:

(1) Fixed hardware HVSD (High Voltage Shut Down) at -59 V, ±0.5 V.

(2) Software settable HVSD level (via LCU Controller). The LCU sets the HVSD at -59 V, non-adjustable. The software restart hysteresis is 0.5 V, ±0.2 V.

(3) In the case of a second HVSD within 5 minutes (time value configurable via the controller) the unit shall require to be manually restarted. Method of manual re-start: Reset the Rectifier Module through the controller or remove the Rectifier Module from the system and then re-install the Rectifier Module into the system.

2.5.4 Over-Temperature Protection: The over-temperature point of main board is 100°C, and the hysteresis is 5 -10°C.

2.5.5 Active Load Sharing: The Rectifier Module uses advanced digital active load sharing technology that maintains balancing between the Rectifier Modules. The difference between the Rectifier Module output current is less than 0.8A.

2.5.6 Startup Time: The Rectifier Module has two startup modes:

(A) Normal Soft Start Time: Start up time is defined as beginning with the AC being switched on and ending when full output power has been reached. It consists of two time intervals:

the delay period (startup time), and the output voltage ramp up period, as shown in the Figure 4.

(1) During the delay period the output voltage is zero volts.

(2) Start up time (AC on, till full power) is ≤5 seconds.

(3) Output voltage ramp up period t: 50≤ t ≤100 ms (resistive load 400W/50V, 10 to 90% of full power).

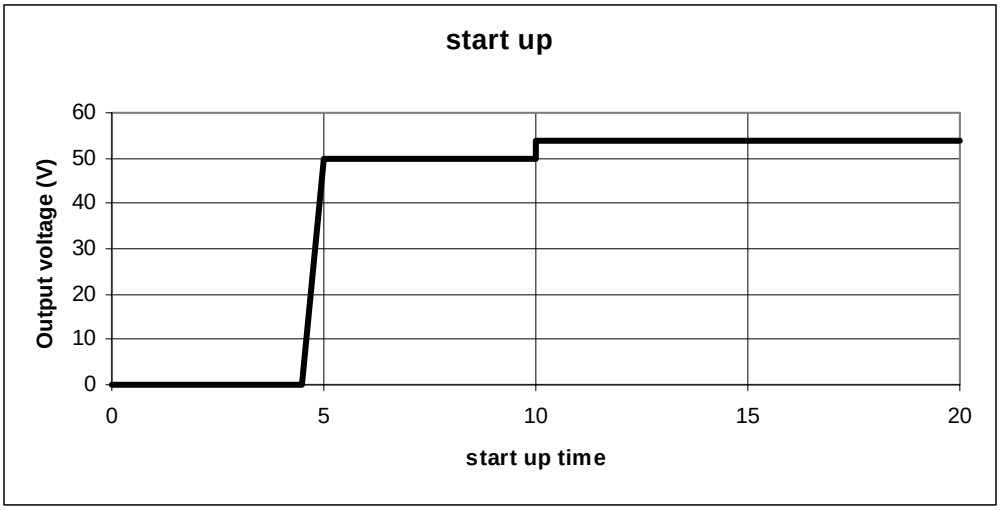


Figure 4
Startup Time

(B) Current Walk-In: The rise time of the Rectifier Module output voltage is >8 seconds at 90% of the rated load, and the maximum time is 10 seconds at 100% of the rated load.

2.5.7 Hot Swappable: The Rectifier Module is designed to be plug-and-play. The Rectifier Module can be inserted or removed from a live DC power system with no damage. When the Rectifier Module is plugged into the system, the system output voltage will not be affected.

2.5.8 Fan Control: When the input voltage is within a normal range, the built-in processor adjusts the fan's speed according to the Rectifier Module ambient and internal temperature, and the higher the temperature, the higher the running speed of fan. The fan runs at full speed when the temperature is higher than 40°C.

2.5.9 Communication Failure: The Rectifier Module's protection indicator (yellow) will flash should it experience a communication failure. The failure information will be reported to the Controller and the Controller will process the failure accordingly. During a communication failure, in order to protect the battery, the Rectifier Module output voltage will automatically adjust to 54.0V. The Rectifier Module will revert to normal operation once normal communication is restored.

2.5.10 Monitoring Function: The Rectifier Module has a built-in advanced DSP that monitors and controls the operation of the Rectifier Module. The DSP also communicates with the Controller in real time through the CAN bus. Table 4 lists the different commands and information exchanged between the Rectifier Module and the Controller.

Commands / signals that can be received by the Rectifier Module from the Controller.	**Information gathered by the Controller from the Rectifier Module.**
• Turn on/off • HVSD reset • Voltage regulation	• Input voltage • Output voltage • Output current • Current limit setting • Temperature • Over voltage setting • On/off status • Fault alarms, such as: HVSD Fan fail • Protection alarms, such as: Input voltage protection Inner DC bus voltage protection High temperature protection • Thermal derating • AC derating • AC fail • Unbalanced output current • Address • Code • Date • SW version • HW version

Table 4
Exchange of Information between Rectifier Module and Controller

2.5.11 Dimensions:

Millimeters: 40 (Height) X 81 (Width) X 285 (Depth).
Inches: 1.6 (Height) X 3.2 (Width) X 11.2 (Depth).

2.5.12 Weight: 1.1 kg (2.43 lbs).

2.5.13 Indicators: Refer to the "Operating Procedures" chapter in the Power System User Instructions (Section 6002) for a complete description.

(A) Power (Green)

(B) Protection (Yellow)

(C) Alarm (Red)

3. RECTIFIER MODULE (MODEL R48-800, SPEC. NO. 1R48800)

3.1 DC Output Ratings

3.1.1 Voltage: Nominal -48.0 VDC, Positive Ground.

(A) Adjustment Range: The output voltage can be set within the range of -48.0 to -56.0 V (in steps of 0.25 V), adjustable via the LCU Controller. The accuracy is ±0.1 V half load. At 7.5A output, the error in output voltage is ≤±100 mV.

(B) Tolerance:

(1) < ± 0.5% at 50% load and in the temperature range of -5°C (+23°F) to +50°C (+122°F).

(2) < ±1% at 50% load and in the temperature range of -5°C (+23°F) to +65°C (+149°F).

(C) Temperature Coefficient (1/°C): Less than ±0.01%.

3.1.2 Full Load Rated Current: 15A.

3.1.3 Output Power: 800 W @ Vout >45 VDC.

3.1.4 Output Voltage - Output Current Characteristics: Shown in Figure 5.

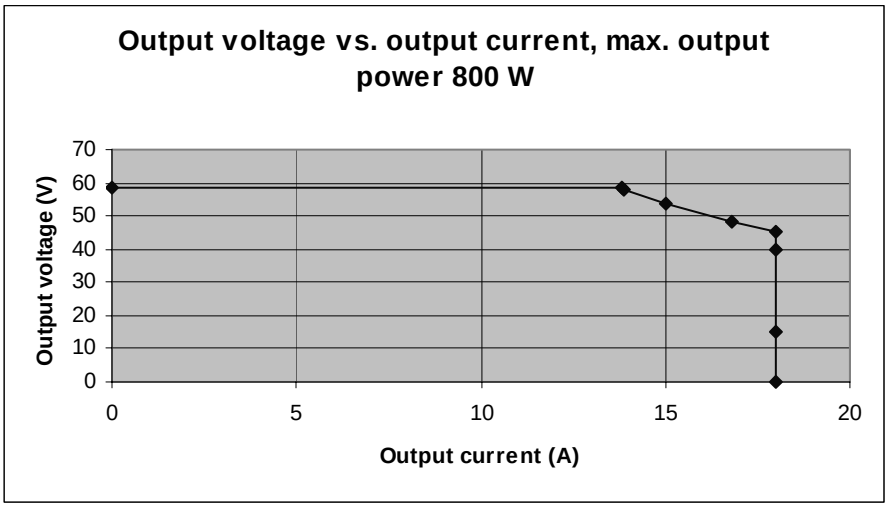


Figure 5
Output Characteristics

3.1.5 Power Derating Based on Voltage: The Rectifier Module power varies with changes in input voltage and output voltage. It uses an advanced power limitation method. The lower input threshold is 176 VAC. The Rectifier Module can provide its maximum rated power (800W) as long as the input voltage is within the range of 176 to 300 VAC. Below 176 VAC, and down to 85 VAC, the Rectifier Module will continue to operate normally but will be in a power derating mode. When operating at 85 VAC, the Rectifier Module can deliver 20% or more of its rated output power. The relationship between the output power and input voltage is illustrated in Figure 6.

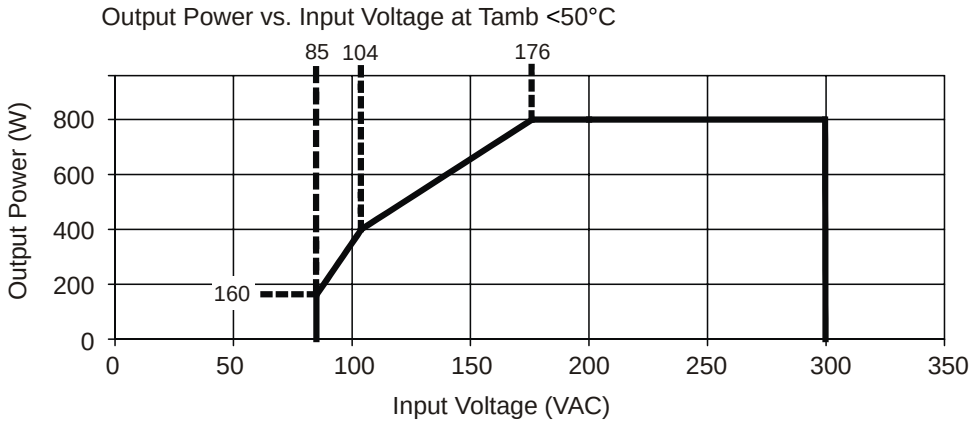


Figure 6
Power Derating Based on Voltage

Note: *As depicted in Figure 6, the output power will derate from 100% (800W) of the rated capacity as the input voltage drops below 176 VAC, down to 50% (400W) of the rated capacity as the input voltage falls to 104 VAC, and to 20% (160W) of the rated capacity as the input voltage falls to 85 VAC.*

3.1.6 Power Derating Based on Temperature: The Rectifier Module delivers full power when operating at an ambient temperature of +50°C (+122°F) or below. Refer to Figure 7 to view the relationship between the output power and the ambient temperature.

Other power rating values are as follows:

- At an ambient temperature of +65°C (+149°F), the power delivered by the Rectifier Module is 500W.
- At an ambient temperature of +75°C (+167°F), the power delivered by the Rectifier Module is 0W.
- From -40°C (-40°F) to -5°C (+23°F), the Rectifier Module starts.

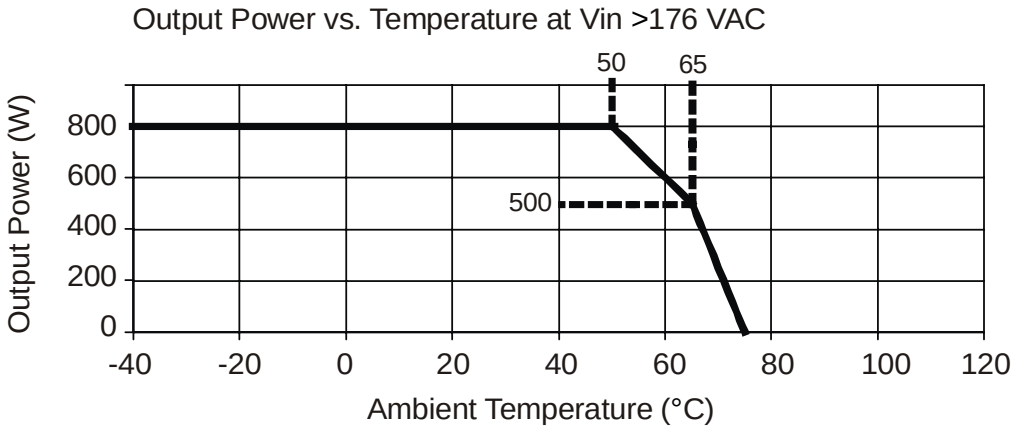


Figure 7
Power Derating Based on Temperature

3.1.7 Regulation:

(A) Static Regulation, Including Input Voltage Variation and Temperature Variation: < ± 1.5% at 5-100% load and in the temperature range of -5°C (+23°F) to +50°C (+122°F).

(B) Dynamic Response at Rated Input and Output Voltage: Deviation ≤±5% of output voltage, max 1ms outside static regulation band load changes at 10% to 90% and 90% to 10%. (Telcordia GR-947).

3.1.8 Filtering:

(A) Voice Band Noise: Complies with Telcordia GR-947-CORE.

(1) Output noise according to Telcordia GR-947-CORE is <32 dBrnC at normal input and full load.

(2) Psophometric noise is ≤1 mV.

(B) Wide Band Noise: Complies with Telcordia GR-947-CORE.

(1) Wideband noise emission is <250 mV peak to peak between 0 Hz – 30 MHz, and <100 mV rms in any 3 kHz band 10 – 20 MHz.

3.1.9 Hold Up Time: Rectifier Module hold-up time at nominal input voltage range and with 100% constant power load is >15 ms. The DC-voltage is allowed to decrease from 54 to 42 V during the test. Rectifier Module hold-up time at nominal input voltage range and with 75% constant power load is >20 ms. The DC-voltage is allowed to decrease from 54 to 42 V during the test.

3.2 AC Input Ratings

3.2.1 Voltage: Nominal 208/240 volts AC, single phase, 3-wire (L+N+PE or 2L+PE), 50/60 Hz, with an operating range of 200 to 240 volts. Acceptable input frequency range is 45 to 65 Hz.

(A) Permitted Variation: 85 to 300 VAC.

3.2.2 Harmonic Content (THD):

(A) THD <5% at loads greater than 75% of rated output power.

(B) THD <10% at loads greater than 40% of rated output power.

(C) THD <35% at loads greater than 10% of rated output power.

(D) THD <40% at loads greater than 5% of rated output power.

3.2.3 Inrush Current: ≤12A.

Note: *Charging of input filter capacitors is not taken into account.*

3.2.4 Maximum Input Current: 6A.

3.2.5 Typical Power Factor: 0.99

0.99 at 100% of rated load.
>0.98 at 60 to 100% of rated load.
>0.95 at >40% of rated load.

3.2.6 Typical Operating Efficiency: Efficiency characteristics are summarized in Table 5.

Main Function	Sub Function/Condition	Requirement, Level
Efficiency, 100% rated load	Vin: 220 VAC, Vout: -54.0 VDC	>91.0%
Efficiency, 40% to 100% rated load, one point	Vin: 220 VAC, Vout: -54.0 VDC	Peak >91.2%
Efficiency, >40% rated load	Vin: 220 VAC, Vout: -54.0 VDC	>84%
Efficiency, >20% rated load	Vin: 220 VAC, Vout: -54.0 VDC	>80%

Table 5
Efficiency

3.3 Environmental Ratings

3.3.1 Operating Ambient Temperature Range: -40°C (-40°F) to +75°C (+167°F).

(A) Full rated output power of 800 W for temperatures -40°C (-40°F) to +50°C (+122°F).

(B) Power limitation for temperatures higher than +50°C (+122°F).

Note: *The Rectifier Module is able to start at -40°C (-40°F).*

3.3.2 Storage Ambient Temperature Range: -40°C (-40°F) to +75°C (+167°F).

3.3.3 Humidity: This Rectifier Module is capable of operating in an ambient relative humidity range of 0% to 90%, non-condensing.

3.3.4 Altitude: 2000 m (6560 ft) at full power (power limited for heights above 2000 m).

3.3.5 Acoustic Noise: ≤55 dB(A), measured at a distance of 0.6 m away from the Rectifier Module.

3.3.6 Surge Protection: Compliance with EN61000-4-5 (2kV Line to Line, 2kV Line to Earth). Capable of withstanding surges per ANSI/IEEE C 62.41 1980 Category B3 across the input terminals.

3.3.7 Heat Dissipation Mode: The fan speed varies in a non-step fashion and is controlled by temperature. The fan runs at full speed when the temperature is higher than +40°C (+104°F).

3.3.8 Insulation Resistance and Dielectric Strength
(at ambient temperature of 25°C ±5°, and relative humidity of 90% non-condensing)

(A) Insulation Resistance (applying a test voltage of 500 VDC):

(1) Between the AC input and the enclosure: ≥5×106 Ω.

(2) Between the AC input and the DC output: ≥5×106 Ω.

(3) Between the DC output and the enclosure: ≥5×10^6 Ω.

(B) Dielectric Strength

(1) Between the AC input and the enclosure, the leakage current is <1 mA with no breakdown within 1 minute of applying a voltage of 2120 VDC.

(2) Between the AC input and the DC output, the leakage current is <1 mA with no breakdown within 1 minute of applying a voltage of 4242 VDC.

(3) Between the DC output and the enclosure, the leakage current is <1 mA with no breakdown within 1 minute of applying a voltage of 707 VDC.

(4) Between the DC output and the ground, the leakage current is <1mA with no breakdown within 1 minute of applying a voltage of 1500 VDC (with the varistor and filter capacitors removed before doing the test).

3.4 Compliance Information

3.4.1 Refer to Paragraph 1.2.

3.5 Standard Features

3.5.1 Fan Fault Protection: An alarm will be generated upon a fan fault. In such cases, the fault indicator (red) on the Rectifier Module front panel will flash and the Rectifier Module will also inhibit its output. Auto-recovery is enabled upon the clearing of the corresponding fault.

3.5.2 Input Protection:

(A) Input Over/Under Voltage Protection: The Rectifier Module will shut down at low or high voltage input; based on the following voltage levels:

(1) Low voltage disable point from 80 V, ±5 V; hysteresis is 10 - 15 VAC for restart.

(2) High voltage disable point from 305 V, ±5 V; hysteresis is 10 - 15 VAC for restart.

(B) Between 85 V and 176 V the output power will be derated linearly based on the input voltage as follows:

(1) At input voltage of 85 V with output >45 V, max output power is 160 W.

(2) At input voltage of 104 V with output >45 V, max output power is 400 W.

(3) At input voltage of 180 V and output >45 V, max output power is 800 W.

3.5.3 Output Protection:

(A) Overload / Reverse Current: The Rectifier Module has a 32A fuse on the negative output DC bus. This fuse is not customer replaceable. The Rectifier Module can be plugged into or pulled out of a shelf while operating, without damage or opening the fuse.

(B) Current Limiting: The Rectifier Module has a current limit function. The Rectifier Module's default current limit point is 9A.

(C) Advanced Current Limit Function: The Rectifier Module has an advanced Current Limit Function. When a short circuit occurs at the Rectifier Module output terminals, the Rectifier Module will keep its output current at a constant value (value that is configurable via the controller). This function effectively protects the Rectifier Module and the equipment connected to the Rectifier Module. When the short circuit fault is cleared, the Rectifier Module will automatically restore back to normal operation.

(D) Over Voltage Shutdown:

(1) Fixed hardware HVSD (High Voltage Shut Down) at -59 V, ±0.5 V.

(2) Software settable HVSD level (via LCU Controller). The LCU sets the HVSD at -59 V, non-adjustable. The software restart hysteresis is 0.5 V, ±0.2 V.

(3) In the case of a second HVSD within 5 minutes (time value configurable via the controller) the unit shall require to be manually restarted. Method of manual re-start: Reset the Rectifier Module through the controller or remove the Rectifier Module from the system and then re-install the Rectifier Module into the system.

3.5.4 Over-Temperature Protection: The over-temperature point of main board is 100°C, and the hysteresis is 5 -10°C.

3.5.5 Active Load Sharing: The Rectifier Module uses advanced digital active load sharing technology that maintains balancing to within 5% (<±5% difference at 800W/400W/50V).

3.5.6 Startup Time: The Rectifier Module has two startup modes:

(A) Normal Soft Start Time: Start up time is defined as beginning with the AC being switched on and ending when full output power has been reached. It consists of two time intervals: the delay period (startup time), and the output voltage ramp up period, as shown in the Figure 8.

(1) During the delay period the output voltage is zero volts.

(2) Start up time (AC on, till full power) is ≤5 seconds.

(3) Output voltage ramp up period t: 50≤ t ≤100 ms (resistive load 800W/400W/50V, 10 to 90% of full power).

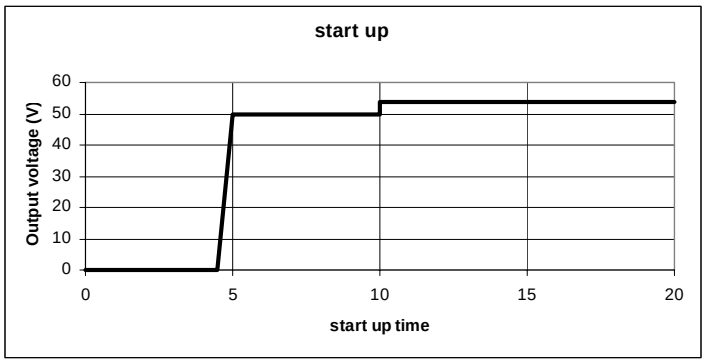


Figure 8
Startup Time

(B) Current Walk-In: The rise time of the Rectifier Module output voltage is >8 seconds at 90% of the rated load, and the maximum time is 10 seconds at 100% of the rated load.

3.5.7 Hot Swappable: The Rectifier Module is designed to be plug-and-play. The Rectifier Module can be inserted or removed from a live DC power system with no damage. When the Rectifier Module is plugged into the system, the system output voltage will not be affected.

3.5.8 Fan Control: When the input voltage is within a normal range, the built-in processor adjusts the fan's speed according to the Rectifier Module ambient and internal temperature, and the higher the temperature, the higher the running speed of fan. The fan runs at full speed when the temperature is higher than 40°C.

3.5.9 Communication Failure: The Rectifier Module's protection indicator (yellow) will flash should it experience a communication failure. The failure information will be reported to the Controller and the Controller will process the failure accordingly. During a communication failure, in order to protect the battery, the Rectifier Module output voltage will automatically adjust to 54.0V. The Rectifier Module will revert to normal operation once normal communication is restored.

3.5.10 Monitoring Function: The Rectifier Module has a built-in advanced DSP that monitors and controls the operation of the Rectifier Module. The DSP also communicates with the Controller in real time through the CAN bus. Table 6 lists the different commands and information exchanged between the Rectifier Module and the Controller.

Commands / signals that can be received by the Rectifier Module from the Controller.	**Information gathered by the Controller from the Rectifier Module.**
• Turn on/off • HVSD reset • Voltage regulation	• Input voltage • Output voltage • Output current • Current limit setting • Temperature • Over voltage setting • On/off status • Fault alarms, such as: HVSD Fan fail • Protection alarms, such as: Input voltage protection Inner DC bus voltage protection High temperature protection • Thermal derating • AC derating • AC fail • Unbalanced output current • Address • Code • Date • SW version • HW version

Table 6
Exchange of Information between Rectifier Module and Controller

3.5.11 Dimensions:

Millimeters: 40 (Height) X 81 (Width) X 285 (Depth).
Inches: 1.6 (Height) X 3.2 (Width) X 11.2 (Depth).

3.5.12 Weight: Under 1.1 kg (2.43 lbs).

3.5.13 Indicators: Refer to the "Operating Procedures" chapter in the Power System User Instructions (Section 6002) for a complete description.

(A) Power (Green)

(B) Protection (Yellow)

(C) Alarm (Red)

4. LCU CONTROLLER (MODEL M200B, SPEC. NO. 1M200B)

4.1 Input Ratings

4.1.1 Input Supply Voltage Range: -19 to -60 VDC, non destructive at -19V to -72V input.

4.1.2 Power Consumption: 3W.

4.2 Environmental Ratings

4.2.1 Operating Temperature Range: -40°C (-40°F) to +75°C (+167°F).

4.2.2 Humidity: Capable of operating in an ambient relative humidity range of 0% to 95%, non-condensing.

4.3 Compliance Information

4.3.1 EMC: EN 300 386:2001 class B, FCC part 15 class B.

4.3.2 Safety: IEC 60950, EN 60950, UL 60950.

4.3.3 Approvals: CE, UL, and NEBS level 3.

4.4 Standard Features

4.4.1 The M200B LCU acquires the signals from the DC distribution unit and communicates with the Rectifier Modules through the CAN bus to provide control signals to these as well as to obtain information from these.

4.4.2 Rectifier Float Charging Control: The LCU controls the float charging voltage of the battery. A User selects (via a front panel DIP switch) the output voltage of each rectifier. The output voltage can be set within the range of -48.0 to -56.0 V (in steps of 0.25 V).

4.4.3 Rectifier High Voltage Shutdown: The LCU controls the rectifiers' software settable HVSD level. Factory set at -59 V, non-adjustable.

4.4.4 Battery Charge Temperature Compensation: The LCU has a temperature compensation function. The compensation voltage is V_0+/-2 V, and the temperature range is from -5°C to +40°C. The temperature compensation curve is illustrated in Figure 9.

Note: *The default center temperature is T_0 = 25°C.*

A User (via a front panel DIP switch) selects the temperature compensation coefficient. The temperature compensation coefficient can be set for 48 mV/°C, 72 mV/°C, or 96 mV/°C. These coefficients are for a complete battery string and translates into single cell coefficients as follows:

48 mV/°C = 2 mV/°C /cell for 24 cells;

72 mV/°C = 3 mV/°C /cell for 24 cells;

96 mV/°C = 4 mV/°C /cell for 24 cells.

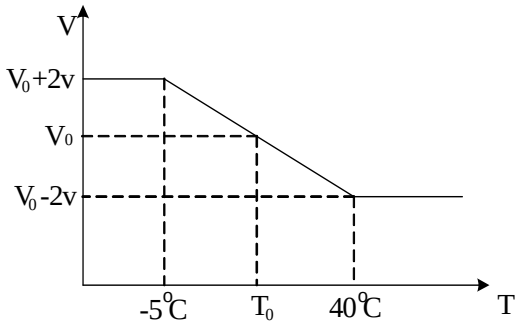


Figure 9
Temperature Compensation Curve

4.4.5 Low Voltage Battery Disconnect and Reconnect: The LCU controls the battery disconnect and reconnect functions according to variations of the DC voltage. Disconnect is factory set at -43 V, and reconnect is factory set at -49 V; non-adjustable.

4.4.6 DC Overvoltage Alarm: Factory set at -58.5 V, non-adjustable.

4.4.7 DC Undervoltage Alarm: Factory set at -45 V, non-adjustable.

4.4.8 Indicators: Refer to the "Operating Procedures" chapter in the Power System User Instructions (Section 6002) for a complete description.

(A) Power (Green)

(B) Minor Alarm (Yellow)

(C) Major Alarm (Red)

4.4.9 Dry Relay Contact Outputs: The LCU provides 3 sets of dry relay contacts used for alarm outputs. Each contact includes a normally open, a normally closed, and a common termination. “Major”, “Power Failure”, and “Minor” alarms causes the corresponding relay contacts to open or close. The conditions which cause the relay to be in the alarm state are the same conditions which illuminate the corresponding local alarm indicator. Refer to the "Operating Procedures" chapter in the Power System User Instructions (Section 6002) for a list of alarm conditions.

- When the “Major” alarm occurs, the normally open contact opens.
- When the “Minor” alarm occurs, the normally open contact opens.
- When the “Power Failure” alarm occurs, the normally open contact closes.

Dry Contact Capacity: 2A at 30 VDC.
0.5A at 125 VAC.
60W (maximum power consumption).

4.4.10 Dimensions: 40.5 mm (H) x 88 mm (W) x 235 mm (D).
1.59” (H) x 3.46” (W) x 9.25” (D).

4.4.11 Weight: 0.76 kg (1.7 lbs).

4.4.12 Rack Space: 1 x 2U.

4.4.13 Standard Installation Method: Hot swappable in a standalone or embedded power plant.

5. DISTRIBUTION UNIT

5.1 Distribution Terminal Block Rating

5.1.1 +50°C (+122°F): 35A, maximum.

5.1.2 +65°C (+149°F): 25A, maximum.

5.2 Battery Connection

5.2.1 8 AWG cables (48” long) factory wired and terminated in an Anderson type connector.

5.3 Standard Features

5.3.1 Provides ten (10) GMT load fuse positions (18/100A to 15A fuses).

5.3.2 Provides front access screw-clamp type load and load return terminals.

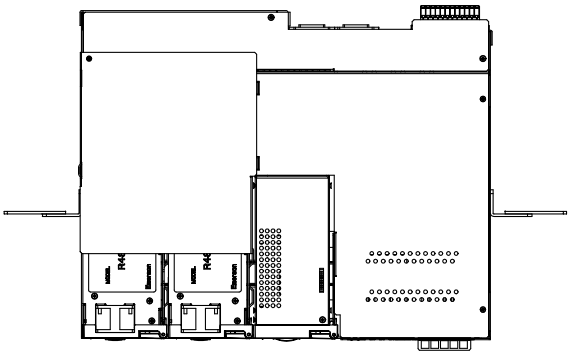
5.3.3 Provides the connections for system battery input.

5.3.4 Equipped with an optional Low Voltage Battery Disconnect (LVBD) contactor.

5.3.5 Provides a load fuse alarm indicator.

PHYSICAL SIZE INFORMATION

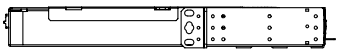
Overall Dimensions - System



Top View

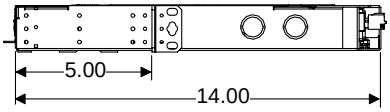
Mounting angles can be positioned for a 5" front projection or front-flush mounting.

Optional 19" to 23" adapter brackets available.

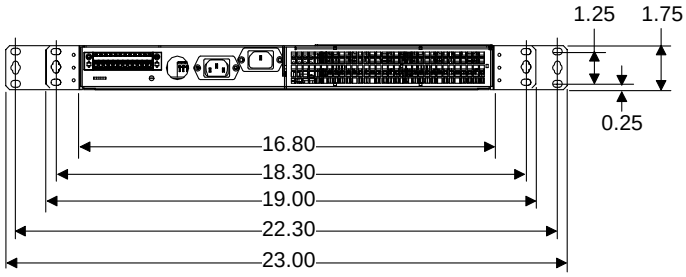


Left Side View

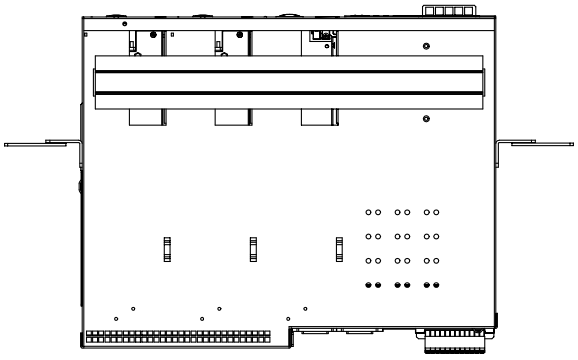
Front View



Right Side View



Rear View



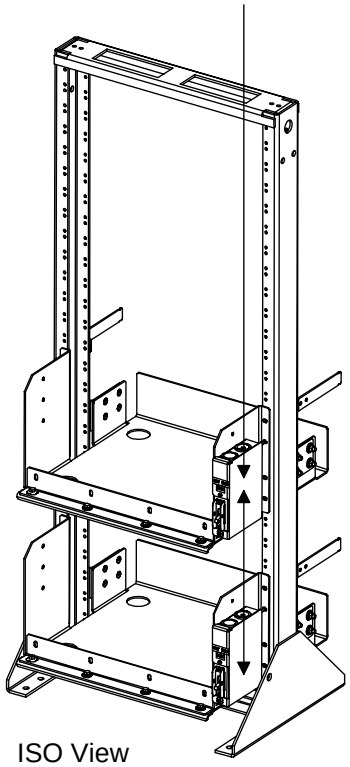
Bottom View

Notes:

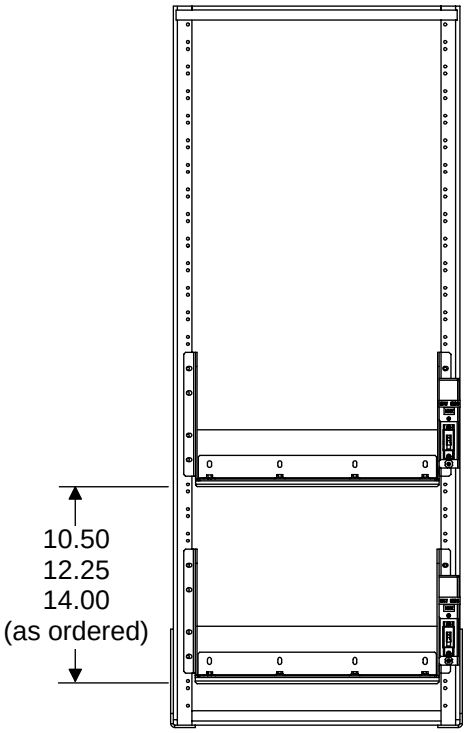
1. All dimensions are in inches, unless otherwise specified.
2. Finish: Gray

Overall Dimensions – 19” Battery Tray

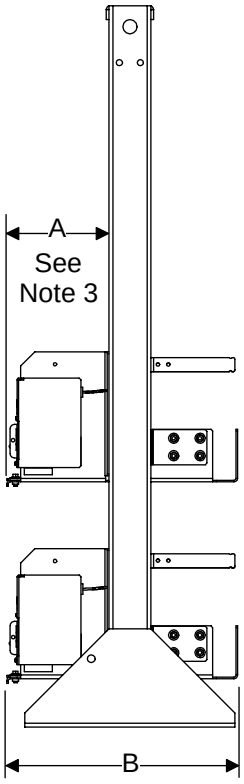
Optional Battery Disconnect Circuit Breakers
(Shown on Right Side, Available on Either Side)



ISO View



Front View



Right Side View

Notes:

1. All dimensions are in inches, unless otherwise specified.
2. P/N 541036 tray shown. P/Ns 541034 and 540841 similar.
3.

Tray P/N	Dimension A	Dimension B
541036	7.03	16.47
541034	7.03	20.95
540841	6.90	12.50

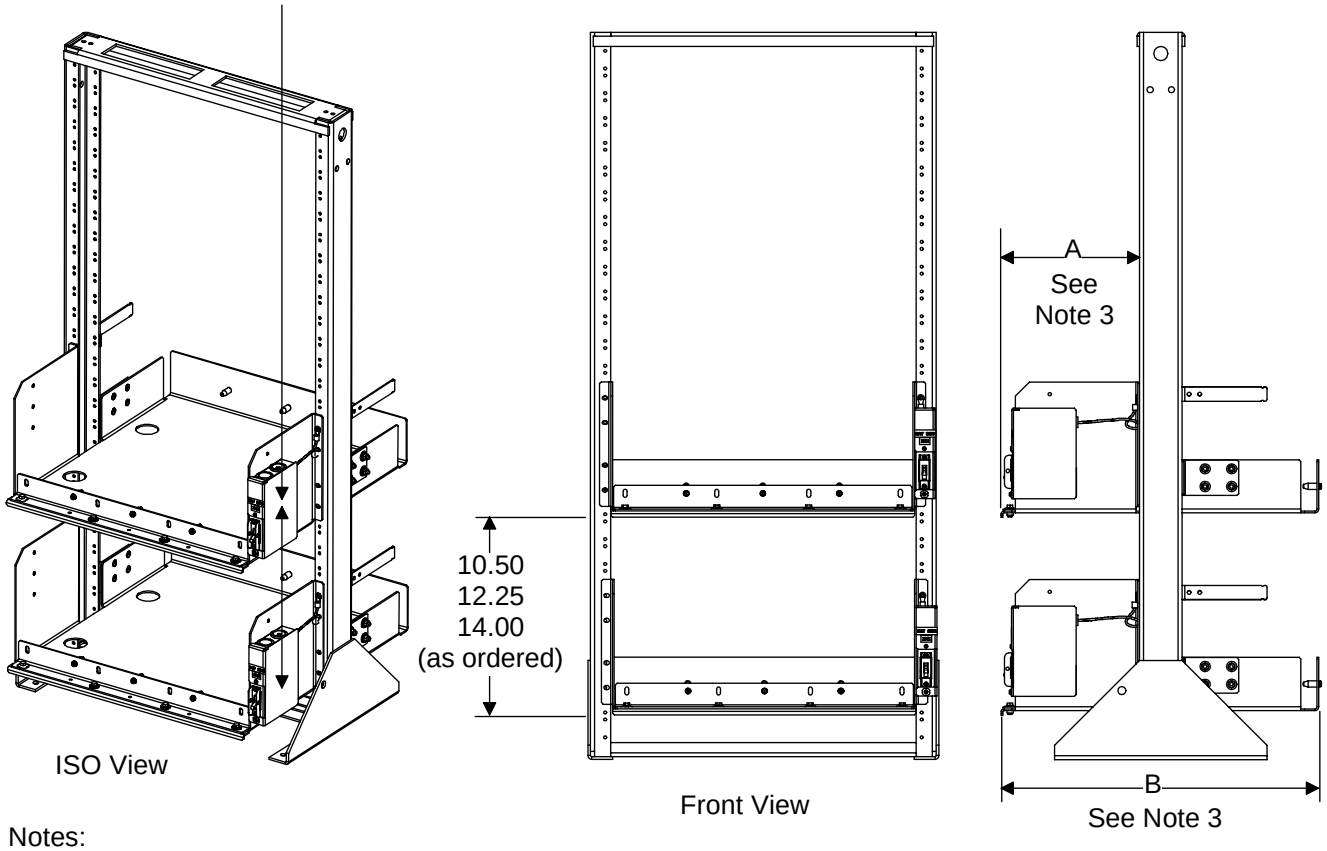
4. Weight in LBS. (per tray, less batteries)

Part No.	With Circuit Breaker Option	Without Circuit Breaker Option
541036	20.5 lbs	18.5 lbs
541034	25.3 lbs	23.3 lbs
540841	18.5 lbs	16.5 lbs

3. Finish: Gray
4. Maximum trays available per rack is two (2).

Overall Dimensions – 23” Battery Tray

Optional Battery Disconnect Circuit Breakers
(Shown on Right Side, Available on Either Side)



ISO View

Front View

Right Side View

Notes:

1. All dimensions are in inches, unless otherwise specified.
2. P/N 528496 tray shown. P/N 540842 similar.
3.

Tray P/N	Dimension A	Dimension B
528496	9.781	24.437
540842	6.90	12.50

4. Weight in LBS. (per tray, less batteries)

Part No.	With Circuit Breaker Option	Without Circuit Breaker Option
528496	33 lbs	29 lbs
540842	20 lbs	18 lbs

3. Finish: Gray
4. Maximum trays available per rack is two (2).

BATTERY MANUFACTURER INFORMATION

Some equipment described in this System Application Guide is designed to accommodate batteries from various manufacturers. The following are referenced in this document.

C&D: C&D Technologies, Inc., Powercom Div., 1400 Union Meeting Road, Blue Bell, PA 19422-0858

Deka®: East Penn Mfg. Co., Inc., Lyon Station, PA 19536-0147

Douglas®: Douglas Battery Mfg. Co., 500 Battery Dr., Winston-Salem, NC 27117-2159

Marathon™: GNB Industrial Power, a Division of Exide Technologies, Princeton, NJ 08543.

Northstar: NorthStar Battery Co. LLC, 4000 Continental Way, Springfield, MO 65803

RELATED DOCUMENTATION

System Installation Instructions:	Section 6001
System User Instructions:	Section 6002

Home

REVISION RECORD

Issue	Change Number (ECO)	Description of Change	Date	Approved
AA	LLP208725	New	09/26/2007	John Jasko
AB	LLP209361	External Alarm Connection Illustration corrected. External Battery Disconnect Unit and Battery Trays now available. 19" to 23" Adapter Brackets added to Accessory Section. Battery Cabinets added to Accessory Section. Specification compliant operating temperature ranges added. EMC and Safety table revised.	02/15/2008	John Jasko
AC	LLP209935	Eight foot long AC line cords (List 40, 42, 44, and 46) removed.	03/03/2008	John Jasko 3/3/2008 3/3/2008

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In Mexico:
Emerson Network Power de Mexico, S.A. de C.V.
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