



NetSure™ 200 A Distribution Fuse Panel Assembly

Installation and User Manual

Specification Number: 563317

Model Number: NSFP200

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Technical Support Site

If you encounter any installation or operational issues with your product, check the pertinent section of this manual to see if the issue can be resolved by following outlined procedures.

Visit <https://www.vertiv.com/en-us/support/> for additional assistance.

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Admonishments Used in this Document



DANGER! Warns of a hazard the reader **will** be exposed to that will **likely** result in death or serious injury if not avoided. (ANSI, OSHA)



WARNING! Warns of a potential hazard the reader **may** be exposed to that **could** result in death or serious injury if not avoided. This admonition is not used for situations that pose a risk only to equipment, software, data, or service. (ANSI)



CAUTION! Warns of a potential hazard the reader **may** be exposed to that **could** result in minor or moderate injury if not avoided. (ANSI, OSHA) This admonition is not used for situations that pose a risk only to equipment, data, or service, even if such use appears to be permitted in some of the applicable standards. (OSHA)



ALERT! Alerts the reader to an action that **must be avoided** in order to protect equipment, software, data, or service. (ISO)



ALERT! Alerts the reader to an action that **must be performed** in order to prevent equipment damage, software corruption, data loss, or service interruption. (ISO)



FIRE SAFETY! Informs the reader of fire safety information, reminders, precautions, or policies, or of the locations of fire-fighting and fire-safety equipment. (ISO)



SAFETY! Informs the reader of general safety information, reminders, precautions, or policies not related to a particular source of hazard or to fire safety. (ISO, ANSI, OSHA)

Important Safety Instructions

Safety Admonishments Definitions

Definitions of the safety admonishments used in this document are listed under “Admonishments Used in this Document” on page iv.

Safety and Regulatory Statements

Refer to Section 4154 (provided with your customer documentation) for Safety and Regulatory Statements.

Déclarations de Sécurité et de Réglementation

Reportez-vous à la Section 4154 (fourni avec les documents de votre client) pour les déclarations de sécurité et de réglementation.

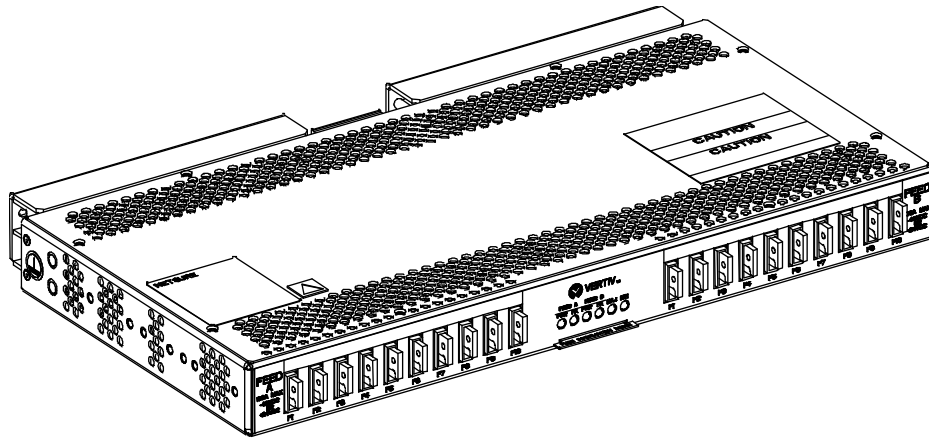
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1 Description

A 1RU high by 19" wide distribution fuse panel with twenty (20) fuse load positions.

Provides...

- +24 VDC or -48 VDC distribution fuse panel.
- Dual (Side A and Side B) load distribution.
- 19" and 23" relay rack mounting options.
- (20) fuse load distribution positions (0.180 A to 20 A), (10) per side.
- Two (2) input connection points, per side.
- Local alarm/status indicators (Feed A Power, Feed B Power, Feed A FA, Feed B FA, Major, and Minor).
- Alarm relay contacts (Major, Minor, A Power Fail, B Power Fail, and FA) for connection to external alarms.
- Resistive battery (+24 Batt FA and -48 Batt FA) for connection to external alarms.



2 Specifications

2.1 Electrical

1. Input / Output Voltage: Nominal +24 VDC or -48 VDC (Feed A and Feed B must be of the same voltage).
2. Maximum Input Current: 100 A per side, 200 A total.
3. Maximum Load Distribution Current:
 - a) 100 A per side, 200 A total at @ +55 °C (+131 °F).
 - b) 80 A per side, 160 A total @ +65 °C (+149 °F).
4. Maximum Fuse Size: 20 A.

5. Local Alarm / Status Indicators:
 - a) Major
 - b) Minor
 - c) Feed A Power
 - d) Feed B Power
 - e) Feed A FA
 - f) Feed B FA
6. External Form-C Alarm Relay Contacts:
 - a) Major (110 VDC maximum, 33 W maximum, 33 W/60 VDC = 0.55 A maximum)
 - b) Minor (110 VDC maximum, 33 W maximum, 33 W/60 VDC = 0.55 A maximum)
 - c) A Power Fail (120 VDC maximum, 60 W maximum, 60 W/60 VDC = 1 A maximum)
 - d) B Power Fail (120 VDC maximum, 60 W maximum, 60 W/60 VDC = 1 A maximum)
 - e) FA (120 VDC maximum, 60 W maximum, 60 W/60 VDC = 1 A maximum)
7. Resistive Battery for External Alarm Circuits:
 - a) +24 Batt FA
 - b) -48 Batt FA

2.2 Environmental

1. Operating Ambient Temperature Range: -40 °C to +65 °C (-40 °F to +149 °F).
2. Storage Ambient Temperature Range: -40 °C to +70 °C (-40 °F to +158 °F).
3. Relative Humidity: Capable of operating in an ambient relative humidity range of 0% to 95%, non-condensing.
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 6562 feet.

2.3 Compliance Information

1. Safety Compliance: This panel is UL Recognized for use in DC Power Distribution Centers for Communications Equipment.
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.
3. GR-3108: GR-3108 Class 2 Compliant.

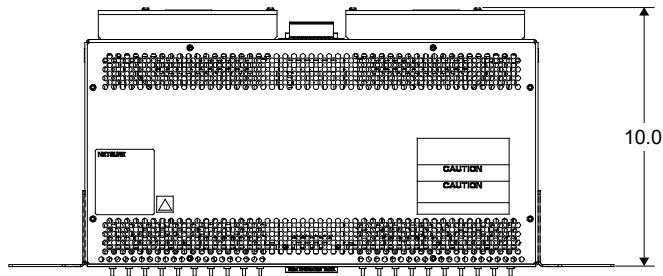
2.4 Dimensions and Weight

See **Figure 2.1**.

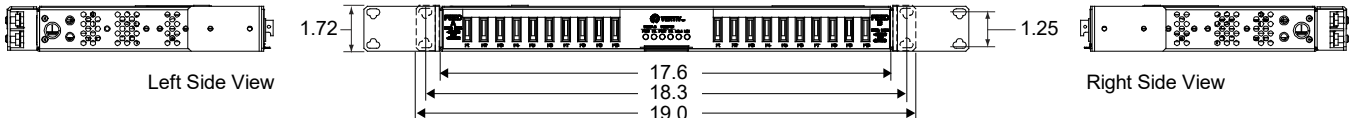
Figure 2.1 Dimensions and Weight

Notes:

1. Dimensions are in inches, unless otherwise specified.
2. Finish: Galvanized Steel.
3. Weight:
Net: 7 lbs.
Shipping: 11 lbs.
4. 19" and 23" mounting brackets furnished.
5. Mounting brackets can be adjusted for flush front mounting or 2", 4" or 5" front projection mounting.

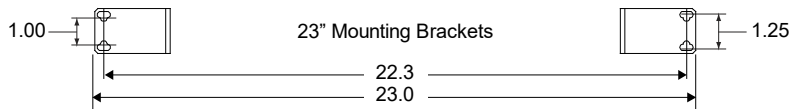


Top View

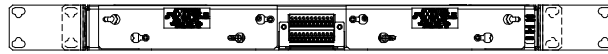


Left Side View

Right Side View



Front View



Rear View

3 Accessories

Order the following by part number as required.

3.1 Load Distribution Fuses

The distribution fuse panel holds up to twenty (20) load distribution fuses, ten (10) per side.

Order fuses as required per **Table 3.1**.

Table 3.1 Fuses

Ampere Rating (A)	Part Number	Body Color Code
0.180	150567	Yellow
0.200	150568	Red/Black
0.250	150569	Violet
0.375	150570	Gray/White
0.500	150571	Red
0.650	150572	Black
0.750	150573	Brown
1.00	150574	Gray
1.33	150575	White
1.50	150576	Yellow/White
2.00	150586	Orange
2.50	150587	Orange/White
3.00	150588	Blue
3.50	150589	Blue/White
4.00	150590	Brown/White
5.00	150591	Green
7.50	150592	White/Black
10.0	150593	White/Red
12.0	150595	Yellow/Green
15.0 (Note 2)	150594	BLUE/RED
20.0 (Note 1)	150596	White/Green
Replacement Safety Fuse Cover	102774	--
Replacement Dummy Fuse	248872600	--

Note 1: To maintain compliance with UL 60950-1, Second Edition, 2011-12-19 (Information Technology Equipment - Safety - Part 1: General Requirements): when the equipment is deployed in the United States the maximum fuse value that can be used in this product is 20 A.

Note 2: To maintain compliance with CSA C22.2 No. 60950-1-07, Second Edition, 2011-12 (Information Technology Equipment - Safety - Part 1: General Requirements): when the equipment is deployed in Canada the maximum fuse value that can be used in this product is 15 A.

3.2 Lugs

Standard Crimp Lugs

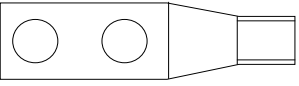
For use on the rear input busbars.

Specify part number from **Table 3.2** for desired lead size.

Maximum single lug size for rear input landing point connections is 2/0 AWG narrow tongue lug P/N 128945.

Table 3.2 Crimp Lug, Two-Hole, 1/4" Bolt Clearance Hole, 5/8" Centers

Lead Size	Part Number
14-10 AWG	245342300
8 AWG	245390200
6 AWG	245346700
4 AWG	245346800
2 AWG	245346900
2 AWG	140541 (Narrow Tongue) (Flex Wire)
2 AWG	150551 (Narrow Tongue) (Standard Wire)
1/0 AWG	150554 (Narrow Tongue) (Flex Wire)
1/0 AWG	150552 (Narrow Tongue) (Standard Wire)
2/0 AWG	128945 (Narrow Tongue) (Standard Wire)



Note: Lugs should be crimped per lug manufacturer's specifications.

4 Installing the Distribution Fuse Panel

4.1 General

The product can be used at +55 °C (+131 °F) with a maximum of 100 A per side / 200 A total with a one (1) inch space provided above the unit.

The product can be used at +65 °C (+149 °F) with a maximum of 80 A per side / 160 A total without a space provided above or below the unit.

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).

4.2 Securing the Distribution Fuse Panel to a Relay Rack or a Cabinet Equipment Rack



DANGER! If the distribution fuse panel is mounted in a relay rack, the relay rack must be securely anchored to the floor before the distribution fuse panel is installed.



NOTE! *Ventilation holes in the distribution fuse panel must not be blocked.*

The distribution fuse panel is designed to mount in a standard 19" or 23" relay rack or equipment rack having 1" or 1-1/4" multiple drillings.

- Two 19" mounting brackets are furnished (adjustable for flush front mounting or 2", 4", or 5" front projection mounting).
- Two 23" mounting brackets are furnished (adjustable for flush front mounting or 2", 4", or 5" front projection mounting).

Refer to **Figure 2.1** on page 3 for overall dimensions.

Procedure

1. Attach the furnished 19" or 23" mounting brackets to the distribution fuse panel. Note that bracket mounting holes are provided on the side of the distribution fuse panel to allow for a flush front mounting or a 2", 4", or 5" front projection mounting. Torque mounting bracket to distribution fuse panel hardware to 11 in-lbs.
2. Position the distribution fuse panel in the relay rack or cabinet equipment rack.
3. Secure the distribution fuse panel to the relay rack or cabinet equipment rack using hardware as shown in **Figure 4.1** (see **Figure 4.1** for recommended torque). Use grounding washers as indicated in **Figure 4.1**.



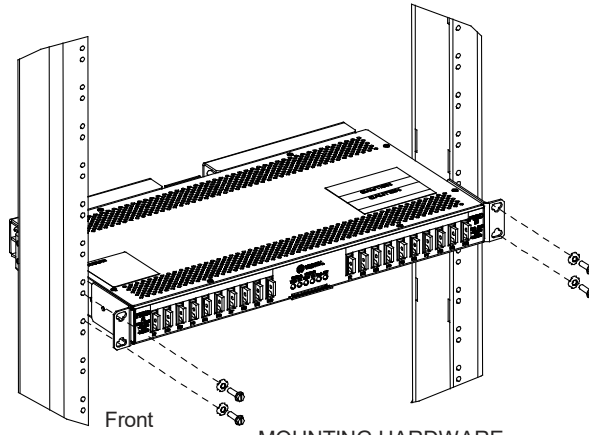
NOTE! *Install (orient) the ground washers so the teeth dig into the mounting angles for a secure ground connection.*



NOTE! *Compliance with Telcordia GR-1089-CORE requires that prior to mounting the system to the equipment rack: All paint must be removed from the front surface of each equipment rack rail where it mates with a shelf-mounting bracket, so that good metal-to-metal contact can be established between the shelf and rack.*

- *The shelf-to-rack mating surfaces must be cleaned.*
- *Electrical anti-oxidizing compound must be applied to the shelf-to-rack mating surfaces.*

Figure 4.1 Mounting the Distribution Fuse Panel in a Relay Rack or a Cabinet Equipment Rack



MOUNTING HARDWARE
12-24 x 3/4" Thread Forming
Hex Head Screw
No. 10/12 Ground Washer
Torque: 65 in-lbs.

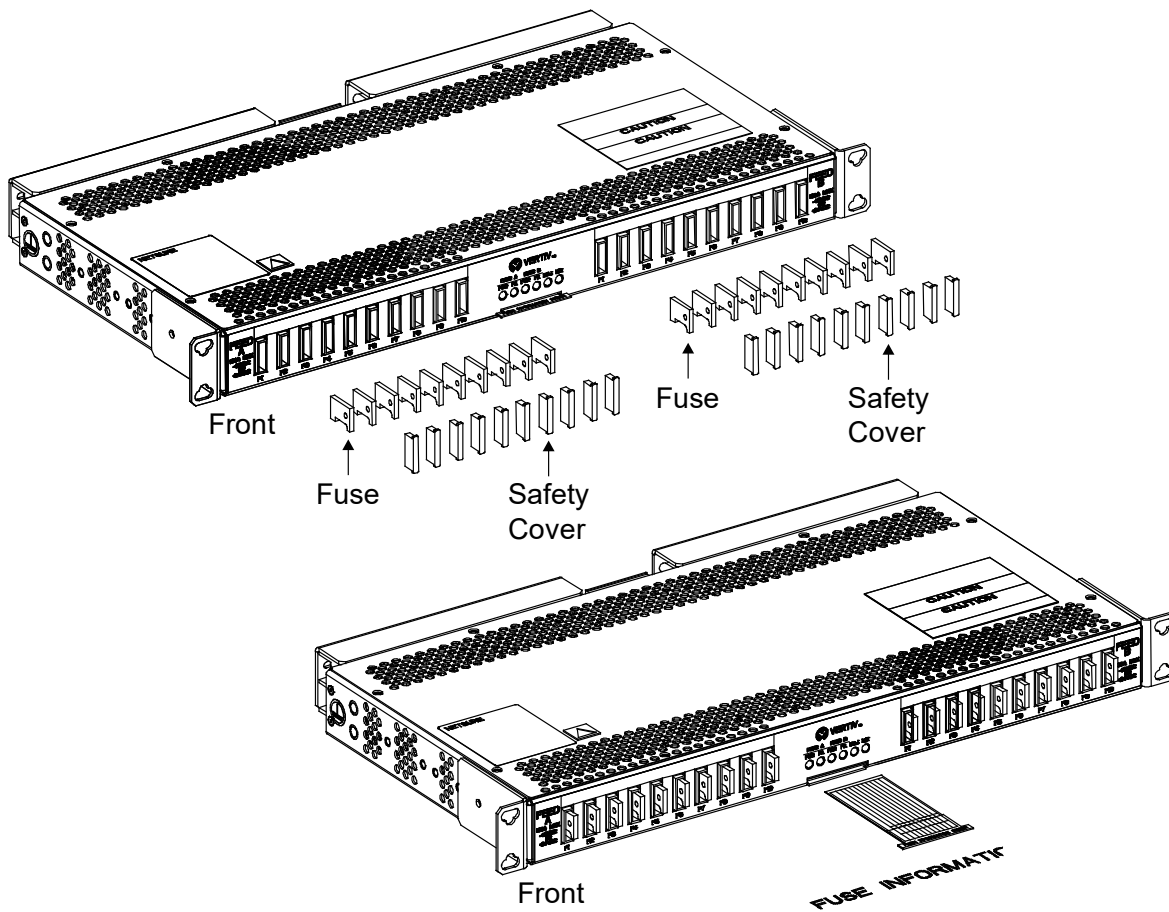
4.3 Installing Load Distribution Fuses

Refer to “Specifications” on page 1 for any temperature, sizing, and spacing restrictions.

Procedure

1. Install correctly sized fuses into the fuseholders located on the front of the distribution fuse panel, as required. If a dummy fuse is installed, first remove the dummy fuse. Install a safety fuse cover over each fuse. Install a dummy fuse in all unused fuse positions. See **Figure 4.2**.
2. Record fuse size, location, and other pertinent information on the pull out label located in a slot on the front of the distribution fuse panel. See **Figure 4.2**.

Figure 4.2 Installing Load Distribution Fuses



Pull out the fuse label and record the fuse size, location, and other pertinent information.

5 Making Electrical Connections

5.1 Important Safety Instructions



DANGER! Adhere to the “Important Safety Instructions” presented at the front of this document.



WARNING! When this panel is used in non-factory integrated systems, external branch circuit protection is required for all input feeds.

5.2 Wiring Considerations

All wiring, branch circuit protection, and grounding should follow the current edition of the American National Standards Institute (ANSI) approved National Fire Protection Association's (NFPA) National Electrical Code (NEC), and applicable local codes. For operation in countries where the NEC is not recognized, follow applicable codes.

5.3 Relay Rack / Cabinet Frame Grounding Connection



NOTE! This applies to the relay rack or cabinet equipment rack the distribution fuse panel is installed in.

For relay rack / cabinet frame 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.

5.4 Distribution Fuse Panel Frame Grounding Connection

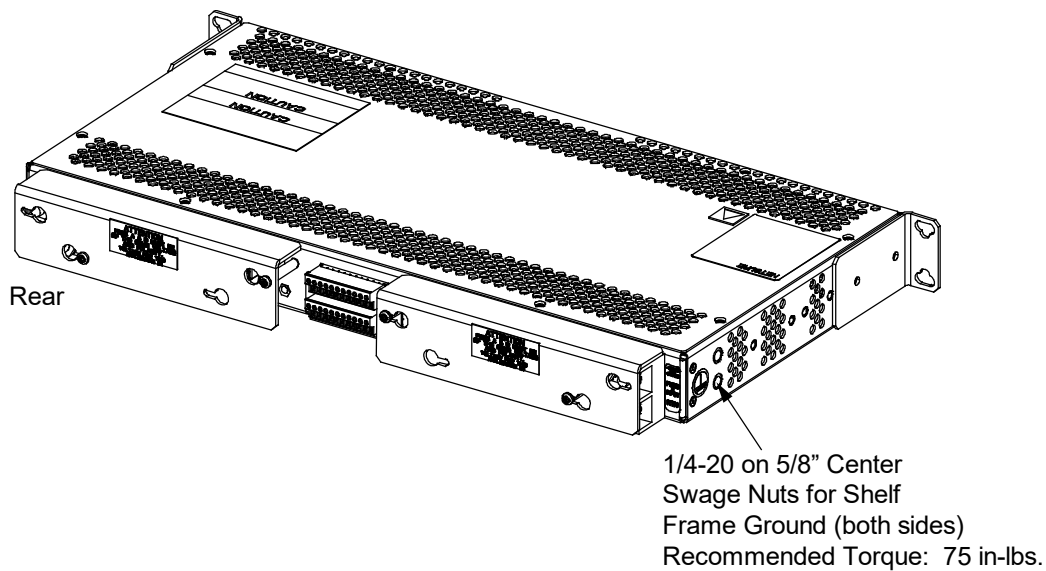
For distribution fuse panel frame grounding requirements, refer to the current edition of the American National Standards Institute (ANSI) approved National Fire Protection Association's (NFPA) National Electrical Code (NEC), applicable local codes, and your specific site requirements.

Procedure

1. The frame grounding connection to the distribution fuse panel is made by using grounding washers with the mounting hardware used to secure the distribution fuse panel to the relay rack or cabinet. Refer to “Securing the Distribution Fuse Panel to a Relay Rack or a Cabinet Equipment Rack” on page 6. Ensure that the relay rack or cabinet is properly grounded.



NOTE! Two (2) 1/4-20 swage nuts on 5/8” centers are provided on each side of the distribution fuse panel for a frame grounding lead. Provide a grounding lead terminated in a two hole lug to one set of these swage nuts, if required. Refer to **Figure 5.1** for location and recommended torque. Refer to **Table 3.2** for available lugs.

Figure 5.1 Distribution Fuse Panel Frame Grounding Connection Points

5.5 External Alarm Connections

External alarm wiring is made to terminal block TB1 located on the center rear of the distribution fuse panel. Refer to **Figure 5.2** for location, wire size range, and recommended torque. A pull out wiring guide is available below terminal block TB1. Note that the top and bottom portions of terminal block TB1 can be separated from the distribution fuse panel to allow easy wiring.

Major Alarm

If terminals 12 and 13 of TB1 are shorted together (such as a relay closure between these terminals); relay contacts open between terminals 14 and 15 of TB1 and relay contacts close between terminals 15 and 16 of TB1. Normal operation provides closed relay contacts between terminals 14 and 15 of TB1 and open relay contacts between terminals 15 and 16 of TB1.

Minor Alarm

If terminals 1 and 2 of TB1 are shorted together (such as a relay closure between these terminals); relay contacts open between terminals 3 and 4 of TB1 and relay contacts close between terminals 4 and 5 of TB1. Normal operation provides closed relay contacts between terminals 3 and 4 of TB1 and open relay contacts between terminals 4 and 5 of TB1.

A Power Fail Alarm

If no power is detected on the distribution fuse panel Side A input, relay contacts open between terminals 18 and 19 of TB1 and relay contacts close between terminals 17 and 18 of TB1. Normal operation (Side A energized) provides closed relay contacts between terminals 18 and 19 of TB1 and open relay contacts between terminals 17 and 18 of TB1.

B Power Fail Alarm

If no power is detected on the distribution fuse panel Side B input, relay contacts open between terminals 21 and 22 of TB1 and relay contacts close between terminals 20 and 21 of TB1. Normal operation (Side B energized) provides closed relay contacts between terminals 21 and 22 of TB1 and open relay contacts between terminals 20 and 21 of TB1.

Fuse Alarm

If a fuse in the distribution fuse panel opens, relay contacts open between terminals 6 and 7 of TB1 and relay contacts close between terminals 7 and 8 of TB1. Normal operation provides closed relay contacts between terminals 6 and 7 of TB1 and open relay contacts between terminals 7 and 8 of TB1.

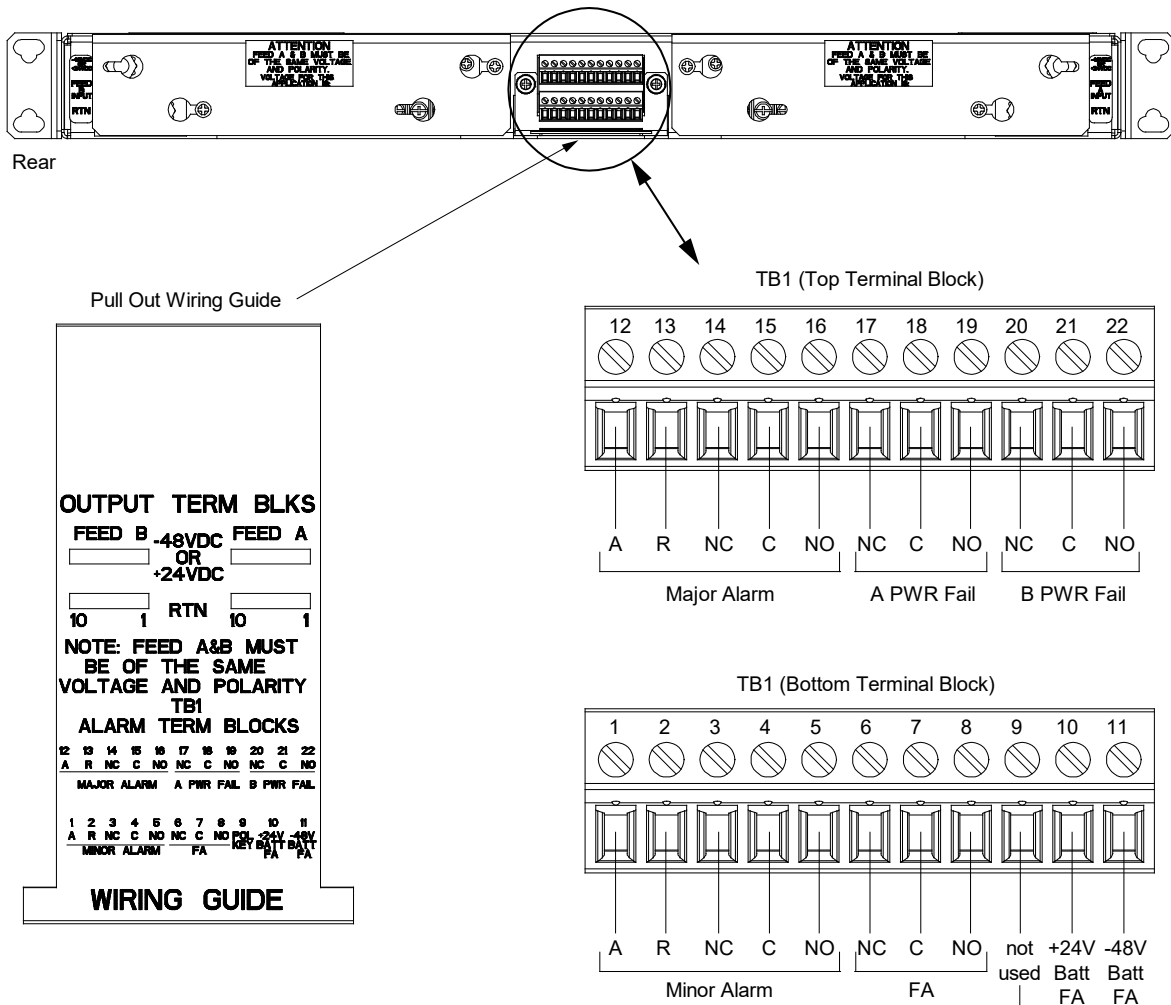
+24V Battery Fuse Alarm (+24 VDC Installation Only)

If a fuse in the distribution fuse panel opens, +24 VDC is provided at terminal 10 of TB1.

-48V Battery Fuse Alarm (-48 VDC Installation Only)

If a fuse in the distribution fuse panel opens, -48 VDC is provided at terminal 11 of TB1.

Figure 5.2 External Alarm Connections



TB1:

Wire Size Capacity: 28 to 16 AWG.
 Recommended Torque: 2.2 in-lbs.
 Relays shown in the deenergized state.
 FA, Minor Alarm, and Major Alarm relays are normally de-energized and energize during an alarm condition.
 A PWR Fail and B PWR Fail relays are normally energized and de-energize during an alarm condition.

Polarization key installed in this position so top removable half and bottom removable half cannot be inter-changed.

5.6 Load Distribution Wiring



WARNING! Observe proper polarity when making load connections. This panel can be used in +24 VDC or -48 VDC applications. Ensure the proper input voltage is applied to the panel.



NOTE! Load cannot exceed 60% of device rating at any ambient temperature.

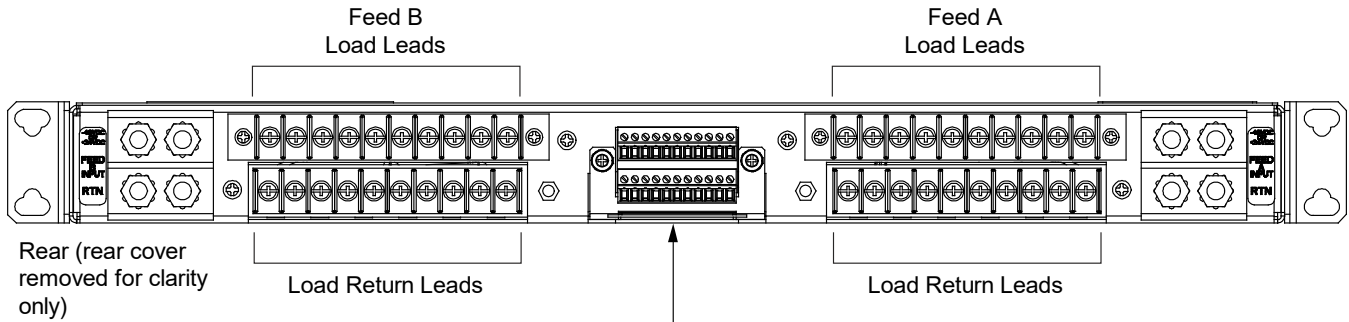
Load and load return leads are connected to screw-type terminal blocks located on the rear of the distribution fuse panel. Refer to **Figure 5.3** for terminal block wire size capacity and recommended torque.

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.

Procedure

1. Remove the rear shields from the distribution fuse panel.
2. Make load connections as required. See **Figure 5.3**.
3. Record fuse size, location, and other pertinent information on the pull out label located in a slot on the front of the distribution fuse panel. See **Figure 4.2**.
4. Replace the rear shields onto the distribution fuse panel.
5. Adhere the appropriate furnished voltage label to the outside of the rear shields as shown in **Figure 5.3**.

Figure 5.3 Load Distribution Wiring



Rear (rear cover removed for clarity only)

WARNING!
Observe proper polarity when making load connections. This panel can be used in +24 VDC or -48 VDC applications. Ensure the proper input voltage is applied to the panel. Feed A and Feed B must be of the same voltage and polarity.

Wire Size Capacity:
22 AWG to 12 AWG.
Recommended Torque:
9 in-lbs.

Pull Out Wiring Guide

OUTPUT TERM BLKS
FEED B -48VDC FEED A

OR

+24VDC

RTN
 10 1 10 1

NOTE: FEED A&B MUST BE OF THE SAME VOLTAGE AND POLARITY

TB1
ALARM TERM BLOCKS

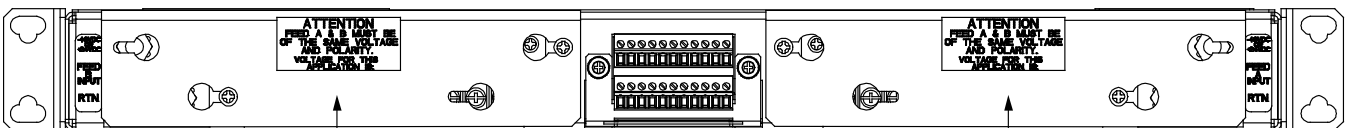
12	13	14	15	16	17	18	19	20	21	22
A	R	NC	C	NO	NC	C	NO	NC	C	NO

MAJOR ALARM A PWR FAIL B PWR FAIL

1	2	3	4	5	6	7	8	9	10	11
A	R	NC	C	NO	NC	C	NO	PO	24V -48V	

MINOR ALARM FA KEY BATT FA

WIRING GUIDE



Rear

Adhere the appropriate furnished label here.

+24V

OR

-48V

Adhere the appropriate furnished label here.

+24V

OR

-48V

5.7 Input Wiring



WARNING! Observe proper polarity when making input connections. Feed A and Feed B must be of the same voltage and polarity.

Input source and input return leads (Side A and Side B) terminated in two-hole lugs are connected to threaded studs located on the rear of the distribution fuse panel (refer to **Figure 5.4**). Refer to **Figure 5.4** also for stud size/spacing and recommended torque.

Input wire size and lug requirements vary depending on power requirements, therefore no specific information is provided for wire size. Refer to **Table 5.1** for recommended wire sizes and lugs at rated maximum assembly load and other various loads. Note that loads should not exceed 60% of capacity; therefore, input wires have been sized for an overcurrent protection device rated at 125% of the expected load. All lugs for customer connections must be ordered separately. See **Table 3.2** for available lugs.



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

Table 5.1 Recommended Input External Branch Circuit Protection, Wire Sizes, and Lug (per side)

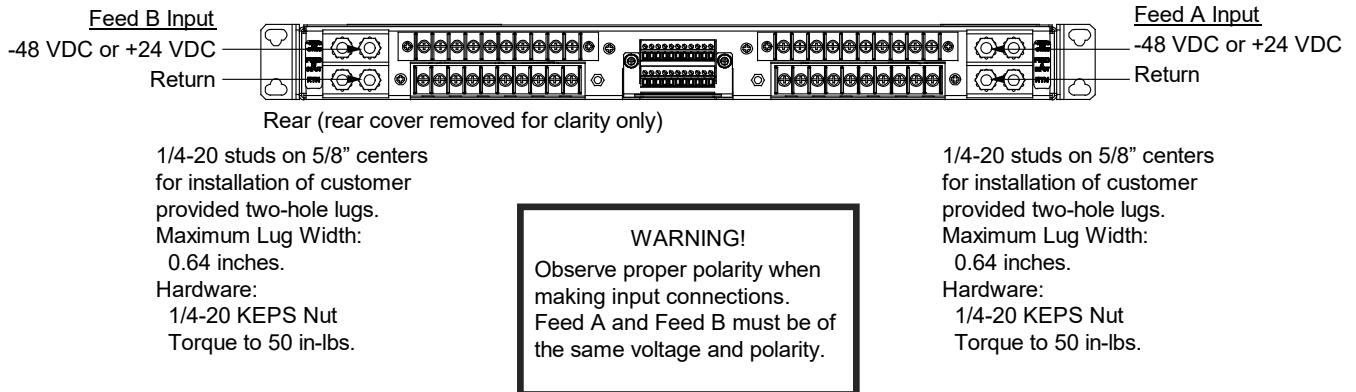
External Overcurrent Protection Device Rating	Ambient Operating Temperature ⁽¹⁾	Loop Length (Ft) 1.0 Voltage Drop ⁽²⁾	Recm 90°C Wire Size (AWG) ⁽¹⁾	Recommended Crimp Lug ⁽³⁾
125 A	55 °C	76	1/0	150552 or 150554
100 A	65 °C	76	1/0	150552 or 150554

- 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 310.15 (B) (16) for copper wire at 90 °C conductor temperature. For operation in countries where the NEC is not recognized, follow applicable codes.
- ² Recommended wire sizes are sufficient to restrict maximum voltage drop to 1.0 volt at rated full load output current of the shelf for the loop lengths shown in this column. Loop length is the sum of the lengths of the positive and negative leads.
- ³ These lugs are two-hole for 1/4" bolt clearance on 5/8" centers. Lugs should be crimped per lug manufacturer's specifications.

Procedure

1. Remove the rear shields from the distribution fuse panel.
2. Make input connections as required. See **Figure 5.4**.
3. Replace the rear shields onto the distribution fuse panel.

Figure 5.4 Input Wiring



6 Initial Startup

Procedure

1. Apply input power to the distribution fuse panel.
2. Ensure no local or external alarms are present.

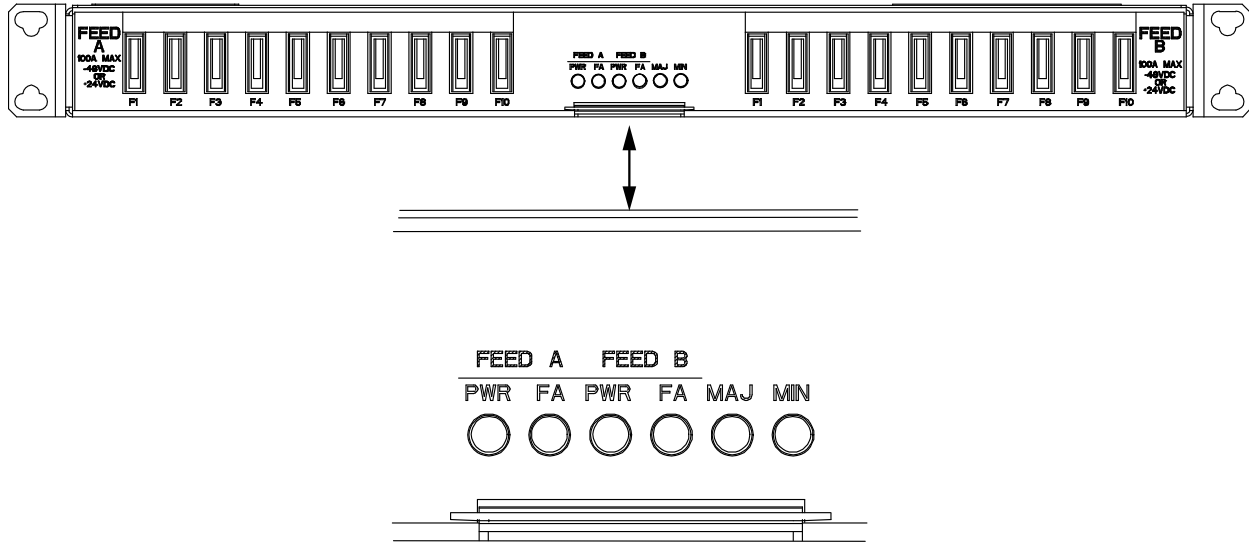
7 Operation

7.1 Local Indicators

Refer to **Figure 7.1** for indicator locations.

- a) Feed A PWR Indicator: When illuminated (green), indicates power is supplied to side A.
- b) Feed B PWR Indicator: When illuminated (green), indicates power is supplied to side B.
- c) Feed A FA Indicator: When illuminated (red), a distribution fuse is open on side A.
- d) Feed B FA Indicator: When illuminated (red), a distribution fuse is open on side B.
- e) MAJ: When illuminated (red), a major alarm is active.
- f) MIN: When illuminated (amber), a minor alarm is active.

Figure 7.1 Local Indicators



8 Troubleshooting and Repair

8.1 Contact Information

Refer to Section 4154 (provided with your customer documentation) for support contact information.

8.2 Replacement Procedures



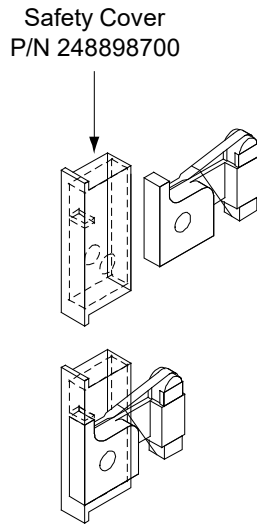
DANGER! Adhere to the “Important Safety Instructions” presented at the front of this document.

8.2.1 Replacing a Distribution Fuse

Replace distribution fuses with the same type and rating. See **Table 3.1** for replacement fuse part numbers and description.

Procedure

1. Refer to **Figure 4.2** on page 8 and replace the fuse. Ensure a safety fuse cover is installed on the fuse as shown in **Figure 8.1**.
2. Verify no alarms are active.

Figure 8.1 Installation of Safety Fuse Cover

8.2.2 Replacing the Alarm Card



WARNING! The alarm card used in this unit contains static-sensitive devices. Read the Static Warning at the front of this document before performing the following procedure.

The following circuit card replacement procedure can be performed with the unit operating.

Refer to **Figure 8.2** as this procedure is performed.

Procedure

1. Performing this procedure may activate external alarms. Do one of the following. If possible, disable these alarms. If these alarms cannot be easily disabled, notify the appropriate personnel to disregard any future alarms associated with this system while the procedure is being performed.

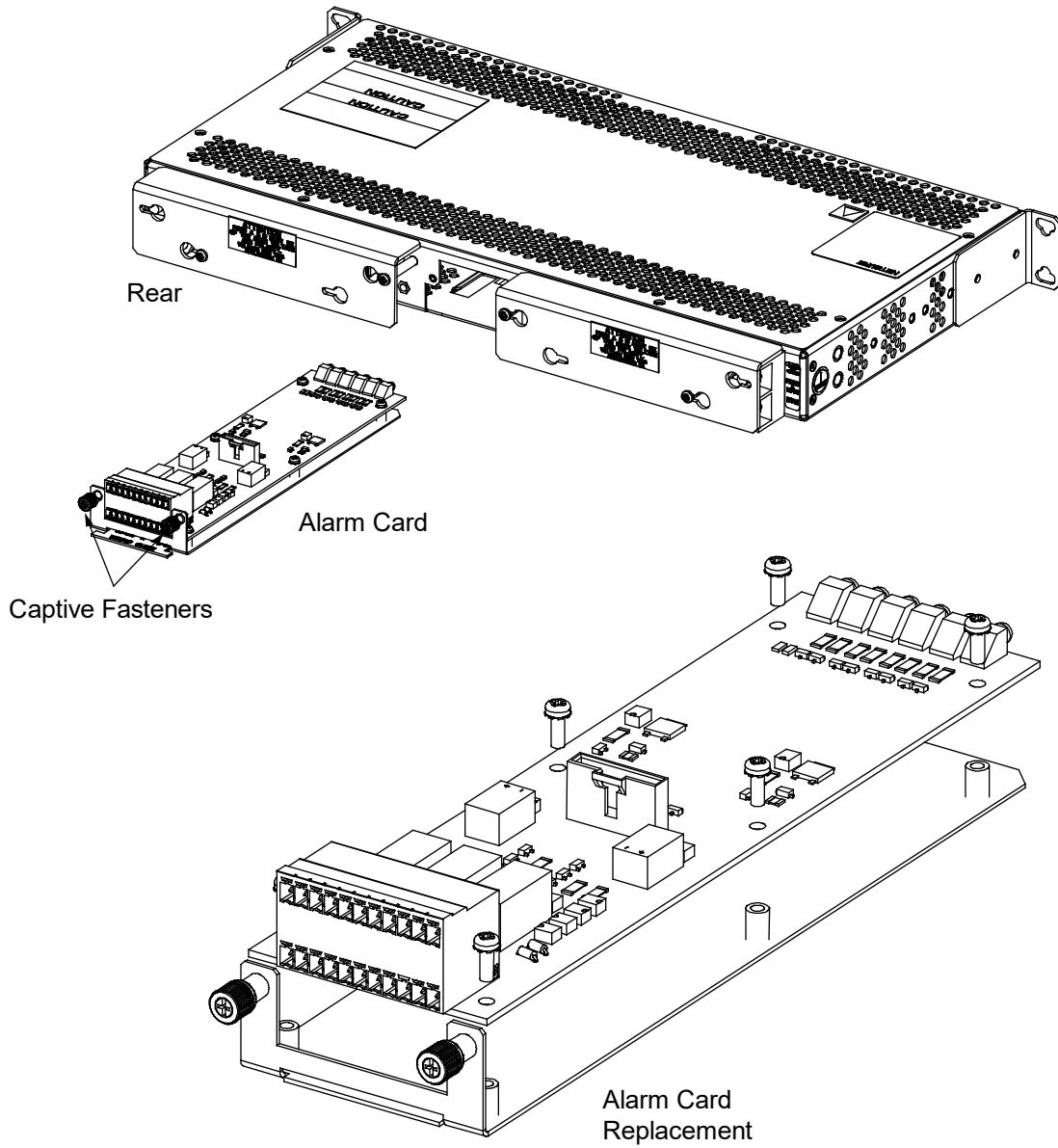


WARNING! Damage to the circuit card may result if the next step is not followed.

2. Connect an approved grounding strap to your wrist. Attach the other end to a suitable ground.
3. Separate the top and bottom removable halves of TB1 from the alarm card.
4. Remove the circuit card assembly from the rear of the unit by loosening the two captive fasteners and pulling the assembly from the unit. Disconnect the internal wiring to the card by unplugging the connector when the circuit card is pulled out about half way.
5. Remove the circuit card by removing the screws securing it.
6. Secure the replacement circuit card using the screws removed in the above step.
7. Replace the circuit card assembly by sliding it into its mounting position and secure with the two captive fasteners. Reconnect the internal wiring to the card by plugging in the connector when the circuit card is inserted about half way.
8. Replace the removable halves of TB1 onto the alarm card. Note that the bottom half has a polarization key installed to distinguish proper placement.

9. Remove the grounding wrist strap.
10. Enable the external alarms, or notify appropriate personnel that this procedure is finished.
11. Ensure that there are no local or remote alarms active on the system.

Figure 8.2 Alarm Card Replacement



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