



NetSure™ -48 VDC Battery Rack System

Installation Manual

Specification Number: 588820100, 588820200

Model Number: 48BA1200-19, 48BA1200-23

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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.

General Safety



DANGER! YOU MUST FOLLOW APPROVED SAFETY PROCEDURES.

Performing the following procedures may expose you to hazards. These procedures should be performed by qualified technicians familiar with the hazards associated with this type of equipment. These hazards may include shock, energy, and/or burns. To avoid these hazards:

- a) The tasks should be performed in the order indicated.
- b) Remove watches, rings, and other metal objects.
- c) Prior to contacting any uninsulated surface or termination, use a voltmeter to verify that no voltage or the expected voltage is present. Check for voltage with both AC and DC voltmeters prior to making contact.
- d) Wear eye protection.
- e) Use certified and well maintained insulated tools. Use double insulated tools appropriately rated for the work to be performed.

Voltages

AC Input Voltages



DANGER! This system operates from AC input voltage capable of producing fatal electrical shock. AC input power must be completely disconnected from the branch circuits wiring used to provide power to the system before any AC electrical connections are made. Follow local lockout/tagout procedures to ensure upstream branch circuit breakers remain de-energized during installation. DO NOT apply AC input power to the system until all electrical connections have been completed and checked.

DC Output and Battery Voltages



DANGER! This system produces DC power and may have a battery source connected to it. Although the DC voltage is not hazardously high, the rectifiers and/or battery can deliver large amounts of current. Exercise extreme caution not to inadvertently contact or have any tool inadvertently contact an output terminal or battery terminal or exposed wire connected to an output terminal or battery terminal. NEVER allow a metal object, such as a tool, to contact more than one termination or battery terminal at a time, or to simultaneously contact a termination or battery terminal and a grounded object. Even a momentary short circuit can cause sparking, explosion, and injury.



DANGER! Follow local lockout/tagout procedures to ensure DC branch circuit protection devices remain de-energized during installation at loads, as required.

Battery

Refer to the battery manufacturer documentation for specific battery safety instructions. The following are general guidelines.



WARNING! Correct polarity must be observed when connecting battery leads.



WARNING! Special safety precautions are required for procedures involving handling, installing, and servicing batteries. Observe all battery safety precautions in this manual and in the battery instruction manual. These precautions should be followed implicitly at all times.



WARNING! A battery can present a risk of electrical shock and high short circuit current. Servicing of batteries should be performed or supervised only by properly trained and qualified personnel knowledgeable about batteries and the required precautions.

The following precautions should be observed when working on batteries:

- Follow the recommended PPE requirements per the SDS for the battery to be used.
- Batteries are an energy source that can produce high amounts of electrical current.
- Remove watches, rings, and other metal objects.
- Eye protection should be worn to prevent injury from accidental electrical arcs.
- Use certified and well maintained insulated tools. Use double insulated tools appropriately rated for the work to be performed. Ensure that wrenches with more than one working end have only one end exposed.
- Do not lay tools or metal parts on top of batteries.
- Verify that no current will flow when the battery is connected or disconnected by opening battery disconnects (if available) or adjusting the system to match battery voltage.
- Risk of explosion if battery is replaced with an incorrect type or if polarity is reversed. Recommended to replace batteries with the same manufacturer and type, or equivalent.
- Dispose of used batteries according to the instructions provided with the batteries. Do not dispose of batteries in a fire. They may explode.
- Batteries may generate explosive gases during normal operation. Systems containing batteries should never be installed in an airtight room or space. Only install in a ventilated environment.
- Batteries may contain sulfuric acid. If battery acid enters your eye, immediately flush your eye with running cold water for at least 15 minutes. Get medical attention immediately. If battery acid contacts skin or clothing, wash immediately with soap and water.
- Do not open or mutilate batteries.
- ALWAYS FOLLOW THE BATTERY MANUFACTURER'S RECOMMENDATIONS AND SAFETY INSTRUCTIONS.



ALERT! Performing maintenance and/or troubleshooting procedures may interrupt power to the loads, if battery reserve is not sufficient.

Personal Protective Equipment (PPE)



DANGER! ARC FLASH AND SHOCK HAZARD.

Appropriate PPE and tools required when working on this equipment. An appropriate flash protection boundary analysis should be done to determine the “hazard/risk” category, and to select proper PPE.



Only authorized and properly trained personnel should be allowed to install, inspect, operate, or maintain the equipment.

Do not work on LIVE parts. If required to work or operate live parts, obtain appropriate Energized Work Permits as required by the local authority, per NFPA 70E “Standard for Electrical Safety in the Workplace”.

Hazardous Voltage



DANGER! HAZARD OF ELECTRICAL SHOCK.

More than one disconnect may be required to de-energize the system before servicing.

Handling Equipment Containing Static Sensitive Components



ALERT! Installation or removal of equipment containing static sensitive components requires careful handling. Before

handling any equipment containing static sensitive components, read and follow the instructions under “Static Warning” on page viii.

Maintenance and Replacement Procedures



CAUTION! When performing any step in procedures that requires removal or installation of hardware, use caution to ensure no hardware is dropped and left inside the unit; otherwise service interruption or equipment damage may occur.



NOTE! When performing any step in procedures that requires removal of existing hardware, retain all hardware for use in subsequent steps, unless otherwise directed.

Static Warning



This equipment contains static sensitive components. The warnings listed below must be observed to prevent damage to these components. Disregarding any of these warnings may result in personal injury or damage to the equipment.

1. Strictly adhere to the procedures provided in this document.
2. Before touching any equipment containing static sensitive components, discharge all static electricity from yourself by wearing a wrist strap grounded through a one megohm resistor. Some wrist straps have a built-in one megohm resistor; no external resistor is necessary. Read and follow wrist strap manufacturer's instructions outlining use of a specific wrist strap.
3. Do not touch traces or components on equipment containing static sensitive components. Handle equipment containing static sensitive components only by the edges that do not have connector pads.
4. After removing equipment containing static sensitive components, place the equipment only on static dissipative surfaces such as conductive foam or ESD bag. Do not use ordinary Styrofoam or ordinary plastic.
5. Store and ship equipment containing static sensitive components only in static shielding containers.
6. If necessary to repair equipment containing static sensitive components, wear an appropriately grounded wrist strap, work on a conductive surface, use a grounded soldering iron, and use grounded test equipment.

1 Installation Acceptance Checklist

Provided below is an Installation Acceptance Checklist. This checklist helps ensure proper installation and initial operation of the system. As the procedures presented in this document are completed, check the appropriate box in this list. If the procedure is not required for your installation site, also check the box in this list to indicate that the procedure was read. When installation is done, ensure that each block in this list has been checked.

- Relay Rack Mounted to Floor
- Relay Rack Grounding Connection Made
- Battery Disconnect Circuit Breakers (if furnished) External Alarm Connections Made
- Battery Connections to Respective Power System Made
- Batteries Installed
- System Started

2 Mounting the Relay Rack

This equipment is intended only for installation in a Restricted Access Location on or above a non-combustible surface.

The installer should be familiar with the installation requirements and techniques to be used in mounting the relay rack to the floor.

Refer to Figure 2.1 or Figure 2.2 for floor mounting hole dimensions.

Refer to Figure 2.3 when using the Optional Relay Rack Isolation Kit.

Figure 2.1 Relay Rack Floor Mounting Hole Dimensions (588820100)

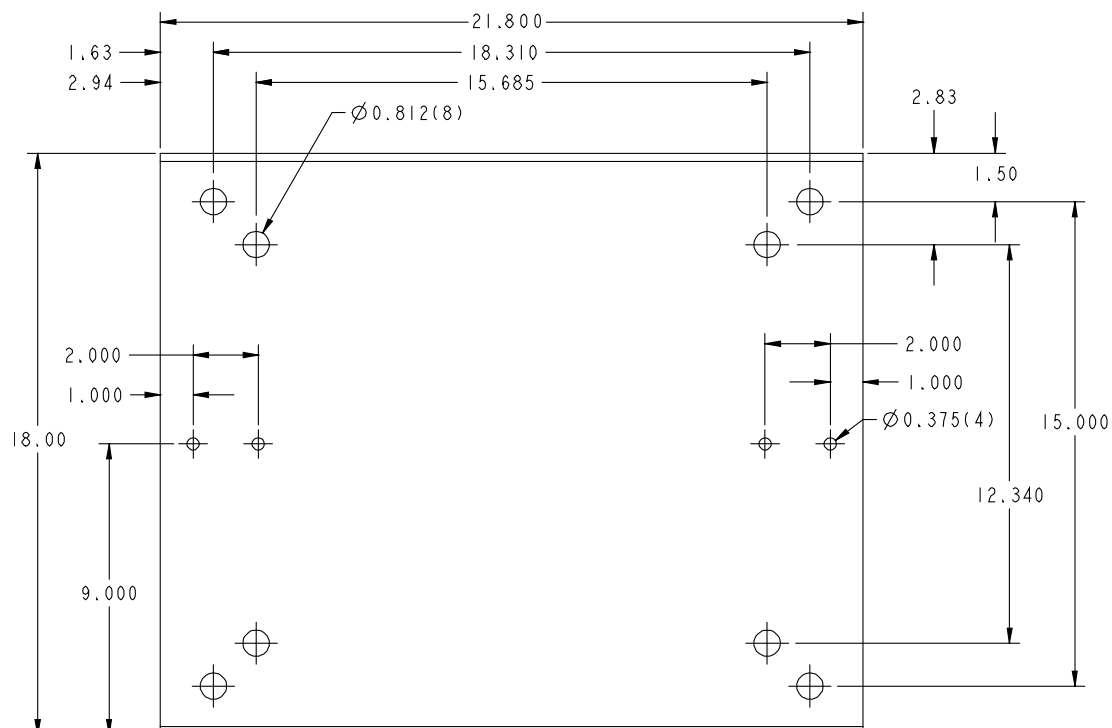


Figure 2.2 Relay Rack Floor Mounting Hole Dimensions (588820200)

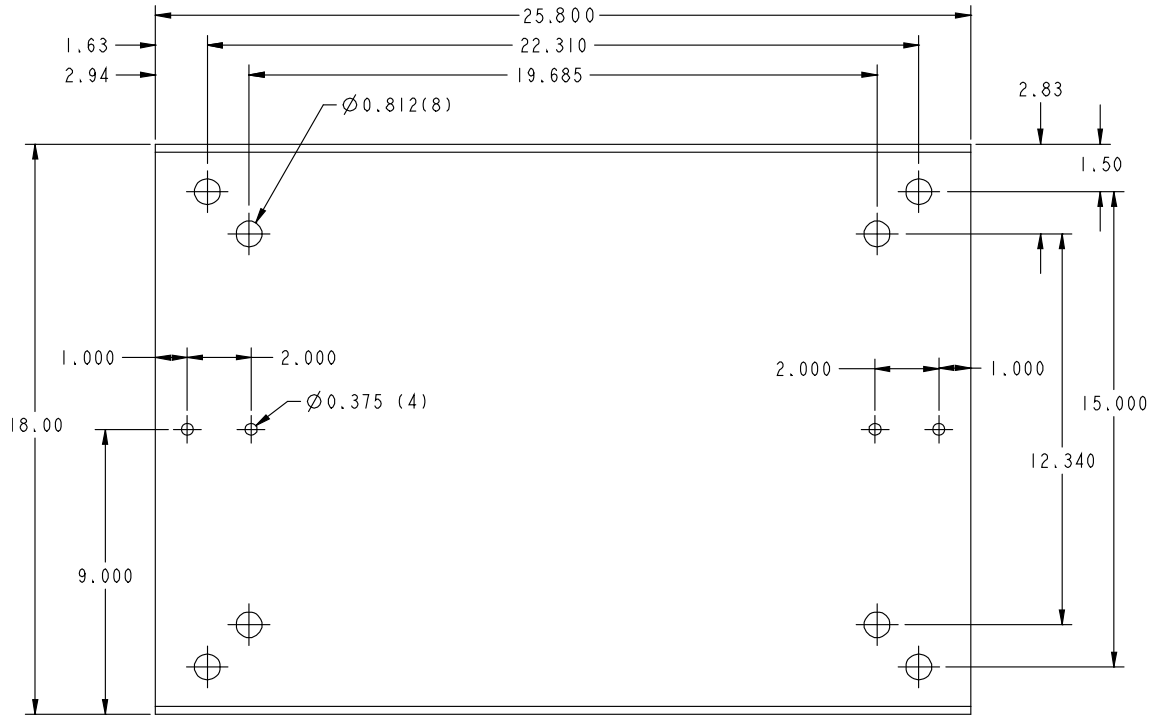
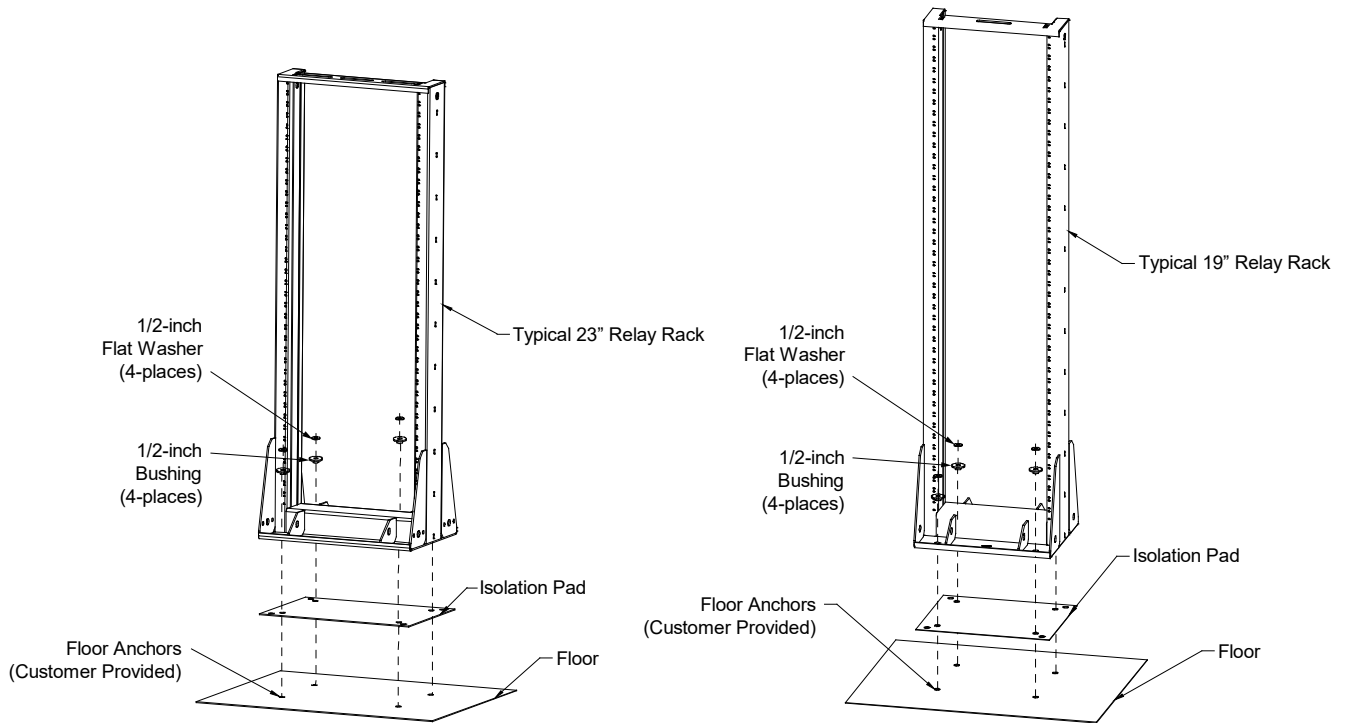


Figure 2.3 Optional Relay Rack Isolation Kit Mounting



3 Making Electrical Connections

3.1 Observe the Following Admonishment



DANGER! Batteries can produce explosive gasses and large amounts of electrical current. Read and follow the Safety Statement at the beginning of this document before proceeding.

3.2 Wiring Considerations

All wiring should follow the current edition of the National Electrical Code and applicable local codes.

3.3 Relay Rack Grounding Connection (Frame Ground)

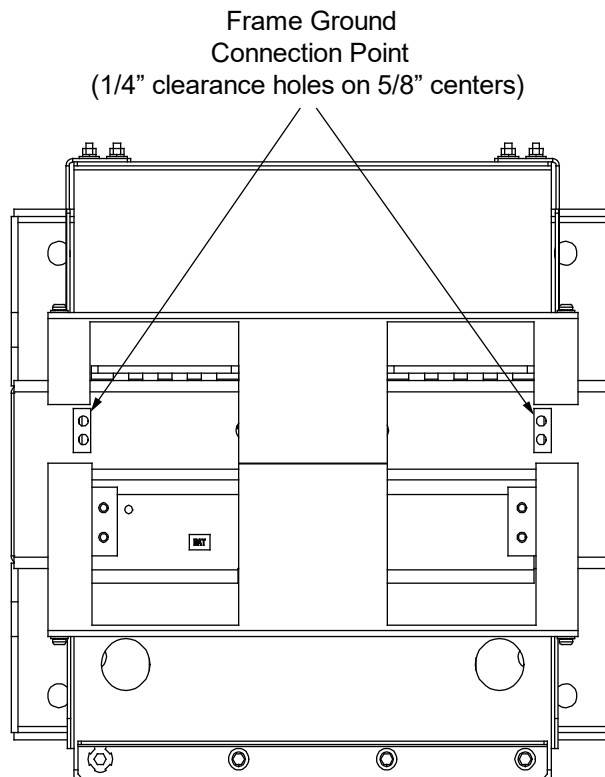
For relay rack grounding requirements, refer to the National Electrical Code, applicable local codes, and your specific site requirements.

Two grounding points are provided on the top of the relay rack. At each location, two 1/4" clearance holes on 5/8" centers are provided for connection into a customer's grounding network. Refer to Figure 3.1 for locations.



NOTE! REMOVE TAPE FROM HOLE LOCATIONS BEFORE INSTALLING LUG.

Figure 3.1 Relay Rack Frame Grounding Connection Points

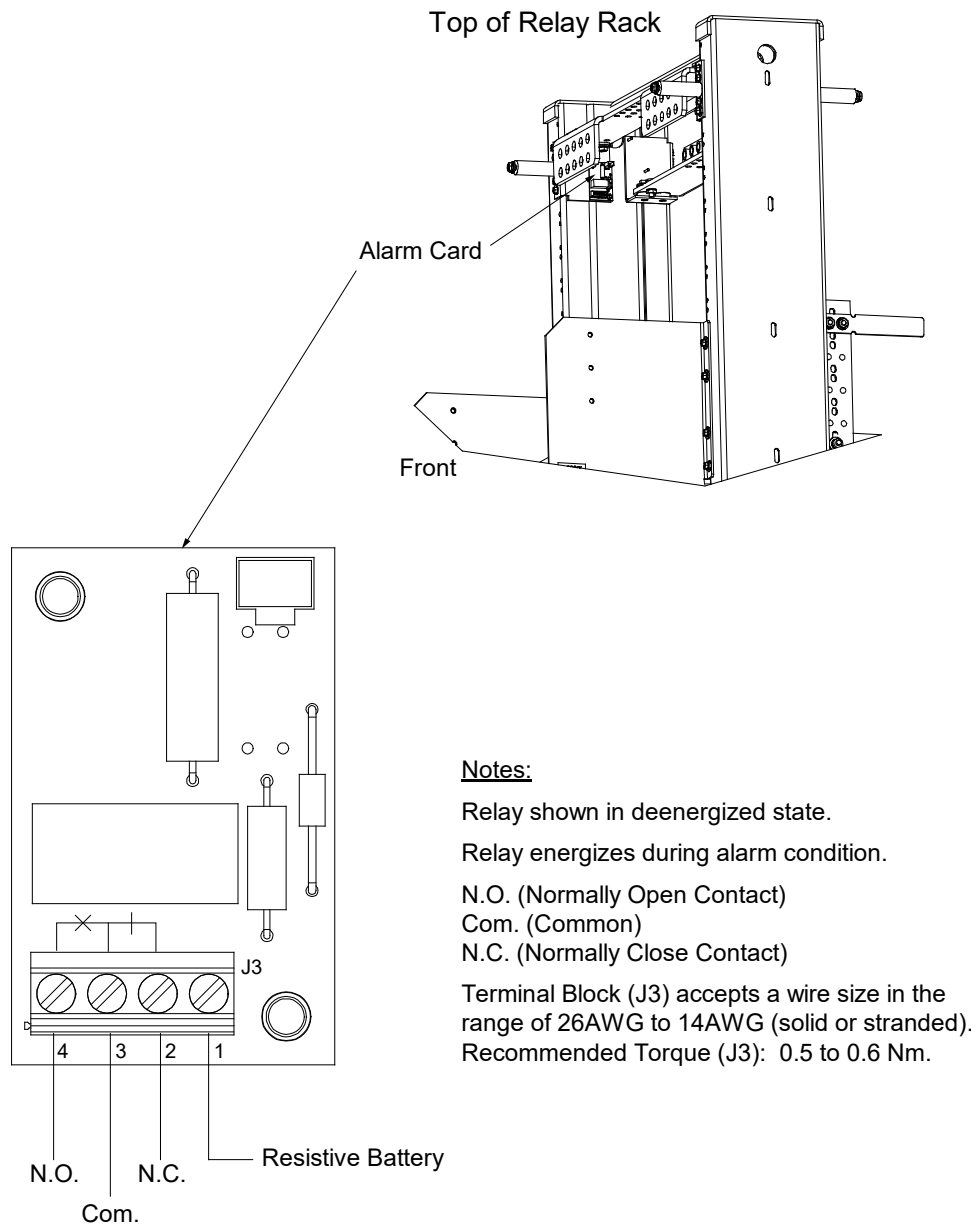


3.4 Battery Disconnect Circuit Breakers (if furnished) External Alarm Connections

If ordered, the battery disconnect circuit breakers are factory wired to an alarm card located at the top of the relay rack. The alarm card provides resistive battery and Form-C relay contacts for connection to external alarm circuits.

If any battery disconnect circuit breaker is in the OFF position, resistive battery is provided at terminal 1 of J3 on the alarm card. Also, relay contacts open between terminals 2 and 3 of J3 and close between terminals 3 and 4 of J3 located on the alarm card. Refer to Figure 3.2.

Figure 3.2 Battery Disconnect Circuit Breaker Alarm Card



3.5 Battery Connections to Respective Power System

Lug-terminated battery conductors must extend from the termination busbars located at the top of the Battery Rack System to the respective power system's battery busbar and battery return busbar. Refer to the documentation provided with the power system for connections to the power system. The termination busbars in the Battery Rack System are provided with 3/8 16 captive fasteners for installation of customer provided two-hole lugs with 1-inch centers. Customer must provide lug mounting bolts, washers, and additional hardware. Refer to Figure 3.3.

Procedure

1. Remove front and rear protective covers.



ALERT! Observe correct polarity when making connections. Reversing polarity may result in damage to batteries, power system, and loads.

2. Connect the positive (+) conductors to the GROUND/RETURN termination busbar.
3. Connect the negative (-) conductors to the -48V Battery (Supply) termination busbar.
4. Torque all connections. Recommended torque is 180 in-lbs when using 3/8" bolts with a Belleville lock washer and 300 in-lbs when using 3/8" bolts with a standard flat washer and lock washer.
5. When connections are complete and verified, reinstall front and rear protective covers.

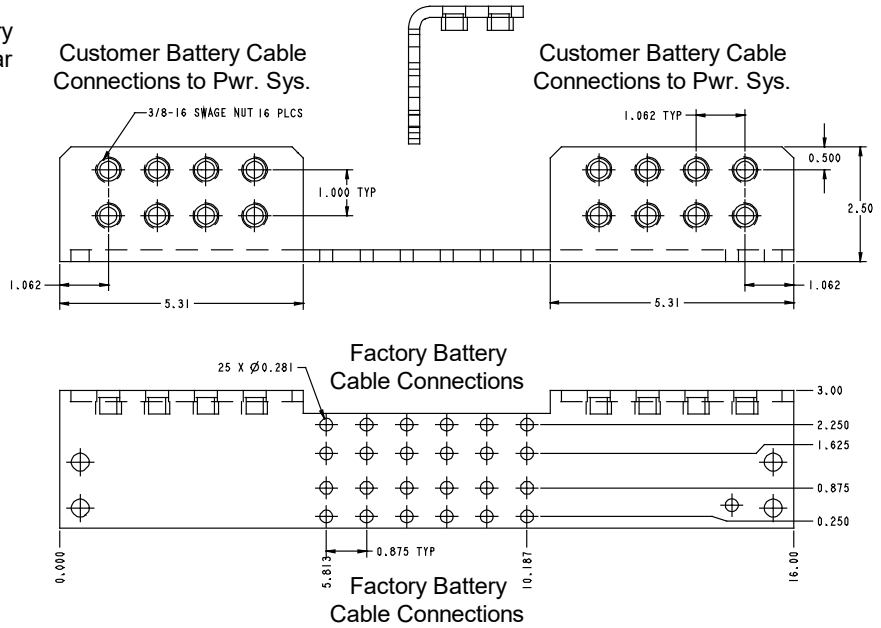
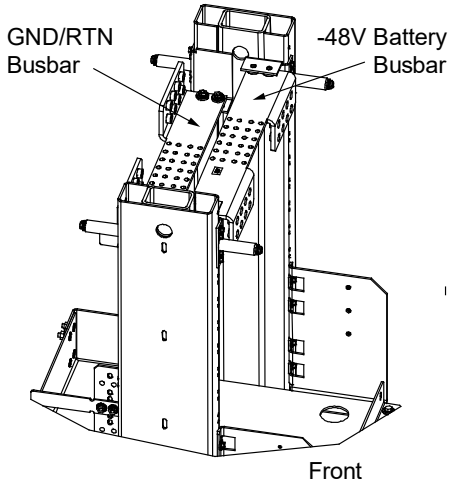
Figure 3.3 Battery Lug Landing Locations and Dimensions

588820100

Top of Relay Rack

(some components removed for clarity)

-48V Battery and GND/RTN Busbars

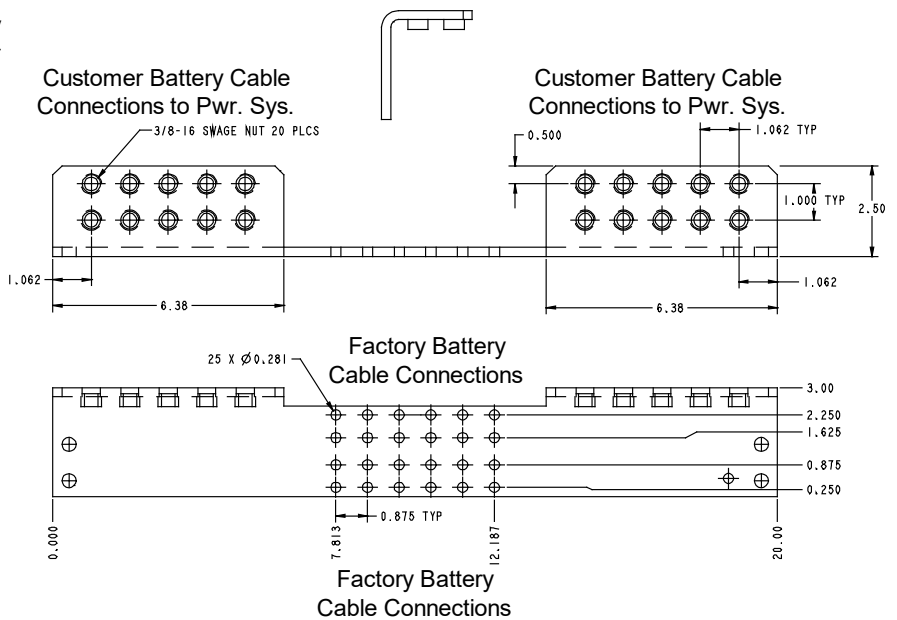
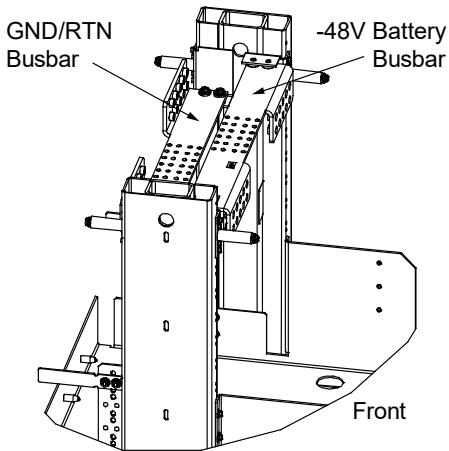


588820200

Top of Relay Rack

(some components removed for clarity)

-48V Battery and GND/RTN Busbars



4 Installing Batteries

4.1 Observe the Following Admonishment



DANGER! Batteries can produce explosive gasses and large amounts of electrical current. Read and follow the Safety Statement at the beginning of this document before proceeding.

4.2 Battery Manufacturer Information

Refer to System Application Guide SAG588820100_SAG588820200 for specifications and manufacturers of the batteries to be installed in this Battery Rack System.

4.3 Installing Batteries into the Battery Shelves

Procedure

1. **If Battery Trays are equipped with Circuit Breakers:** Turn OFF the Battery Disconnect circuit breakers located on all battery trays. Refer to Figure 4.1 or Figure 4.2 for locations.
2. Remove the Battery Retention Bracket as shown in Figure 4.1 or Figure 4.2. To do so, remove the four 1/4-20 x 5/8" bolts and associated washers.
3. Slide batteries into the tray, with the battery terminals toward the front as shown in Figure 4.1 or Figure 4.2. Slide batteries into the tray as far as they will go.



NOTE! The Battery Retention Bracket can be oriented two ways to accommodate batteries of different lengths. A correctly oriented bracket will fit snugly against the batteries.

Spec No. 588820200 Only: If your batteries require the alternate bracket orientation shown in Detail A of Figure 4.2, remove and reinstall the bullet-shaped spacers as shown in Detail A before performing the next step.

4. Reinstall the Battery Retention Bracket. Secure with the hardware removed in a previous step. Refer to Figure 4.1 or Figure 4.2 for washer location.

Spec No. 588820200 Only: The spacers on the bracket should separate the batteries from each other.

5. Connect two links supplied by the battery manufacturer between pairs of battery terminals as shown in Figure 4.1 or Figure 4.2. Use hardware furnished by the battery manufacturer. Torque hardware to battery manufacturer's recommendations.
6. Ensure the battery cable ends in all trays are insulated with sleeving before performing the next step.



DANGER! In multiple-tray installations, when batteries in one tray are connected, the battery cables in all trays will be energized. Remove sleeving from and connect one cable at a time. Do not allow cable end to contact the battery tray or equipment rack.



ALERT! In the next step, observe correct polarity. Connect only cable labeled "+" to battery terminal labeled "+". Likewise, connect only cable labeled "-" to battery terminal labeled "-".

7. Connect the cables found in the battery tray to the respective battery terminals, "+" to "+" and "-" to "-". Observe correct polarity. Refer to Figure 4.1 or Figure 4.2. Torque battery connections to battery manufacturer's recommendations.
8. Repeat steps 1 through 7 for any remaining battery trays.

9. **If Battery Trays Are Equipped With Circuit Breakers:** To connect the batteries to the Power System, turn ON the Battery Disconnect circuit breakers located on all battery trays.

Figure 4.1 Installing Batteries into Battery Shelves (588820100)

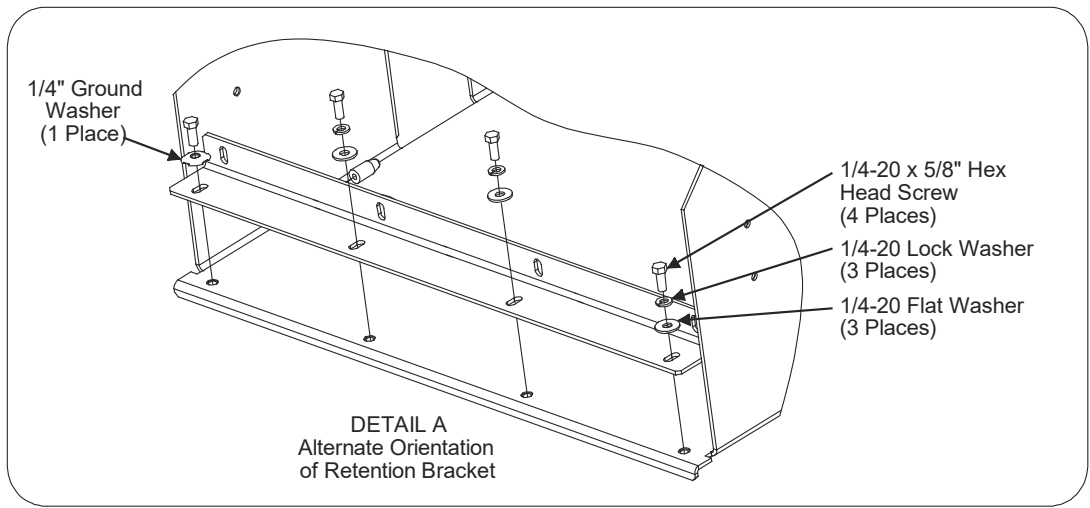
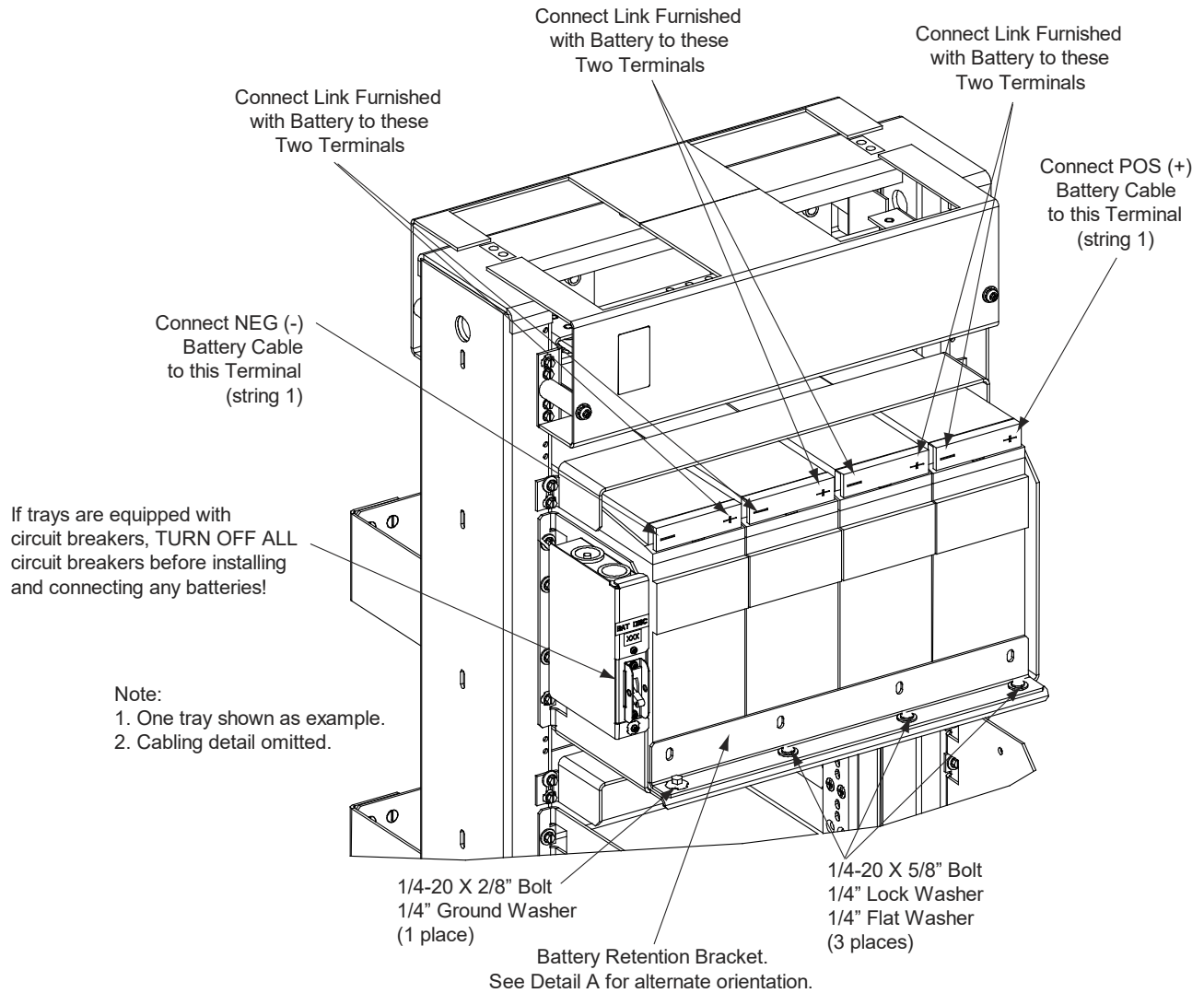
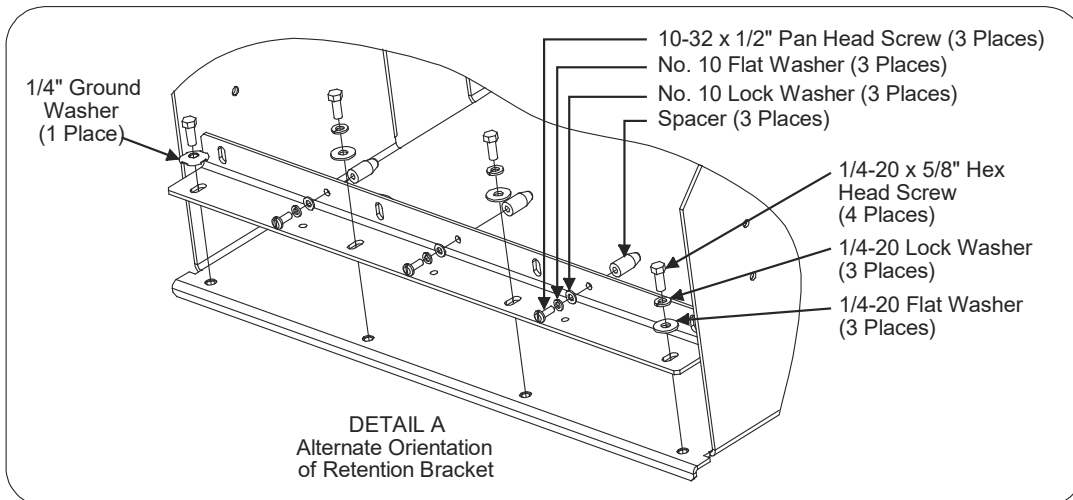
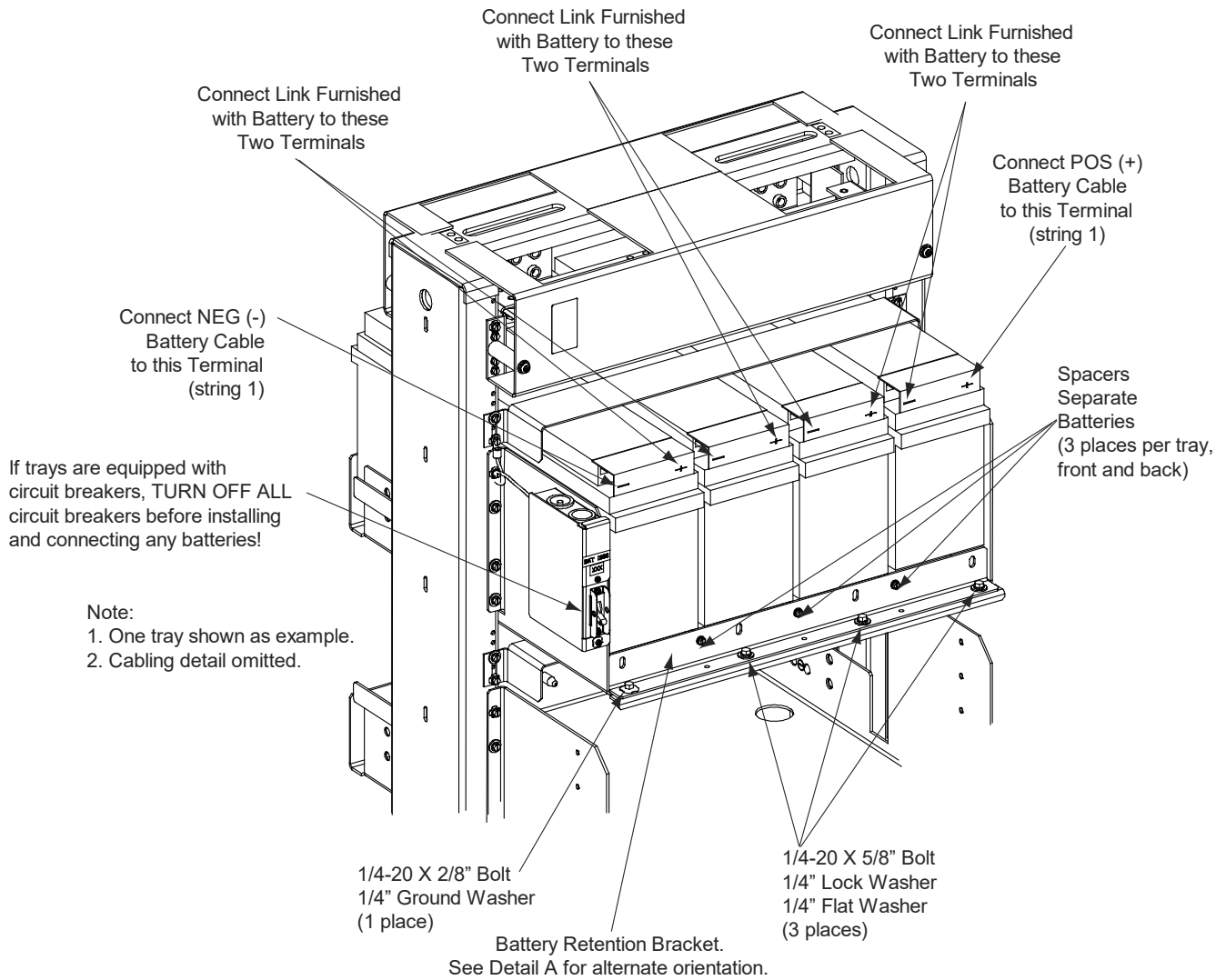


Figure 4.2 Installing Batteries into Battery Shelves (588820200)

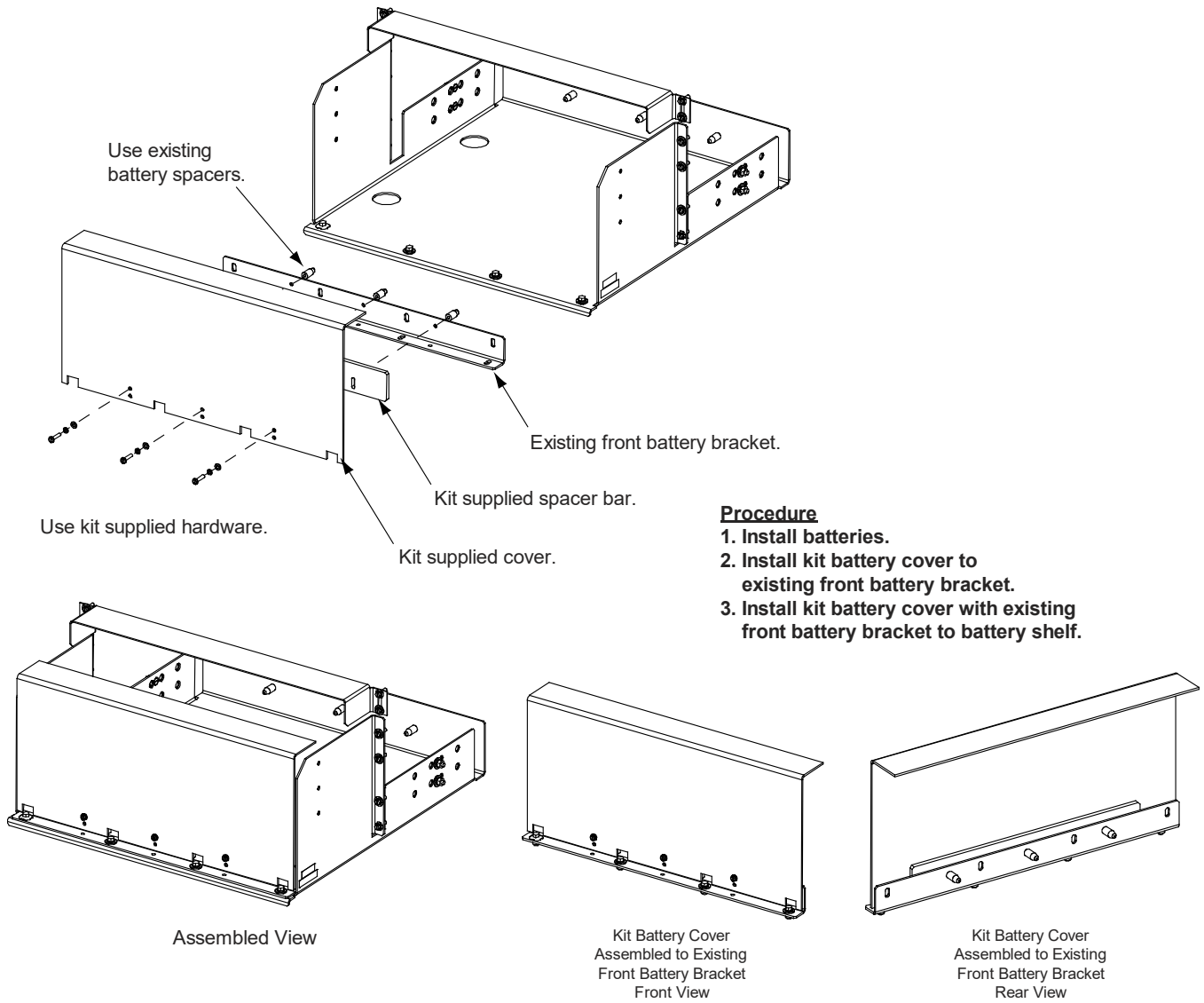


4.4 Installing Optional Front Battery Cover (23" Trays Only)

Procedure

1. Follow the procedure in Figure 4.3.

Figure 4.3 Installing Optional Front Battery Cover

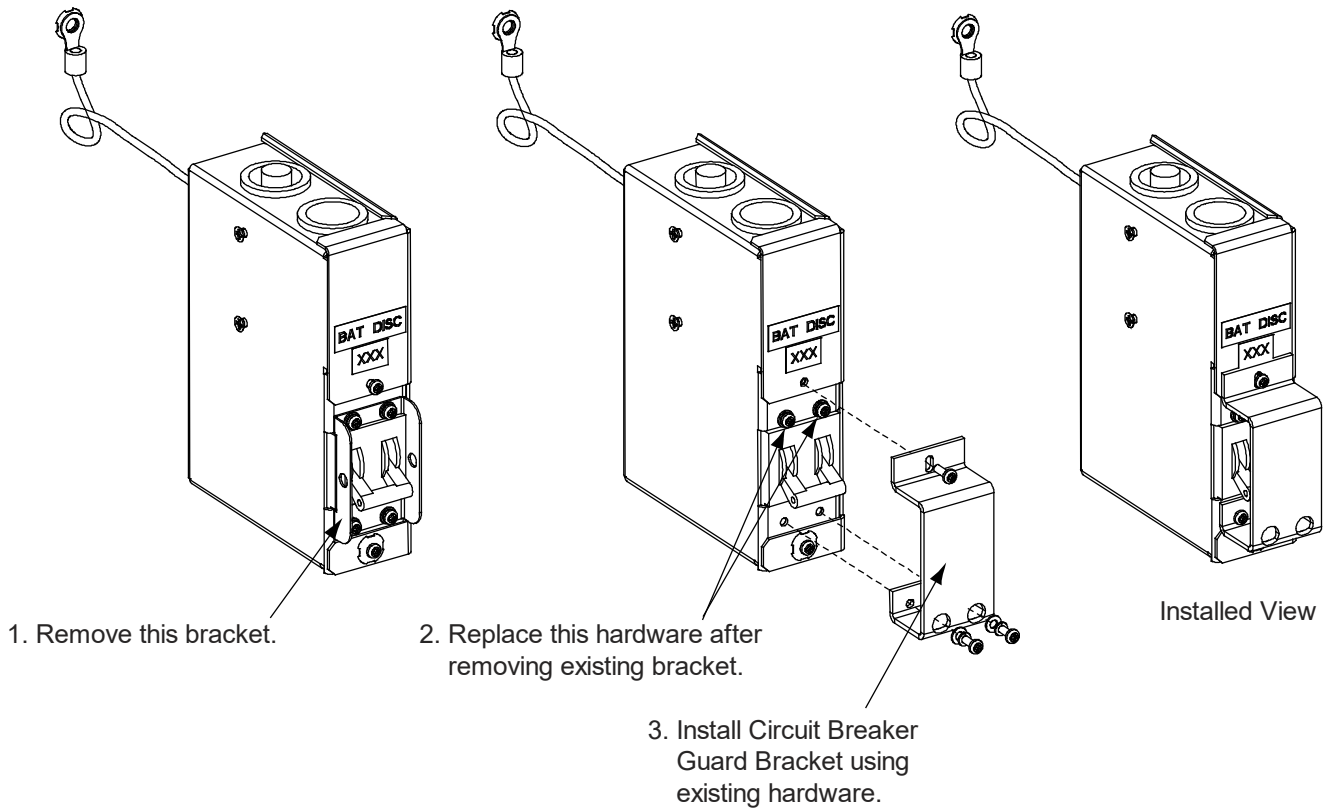


4.5 Installing Optional Circuit Breaker Guard

Procedure

1. Follow the procedure in Figure 4.4.

Figure 4.4 Installing Optional Circuit Breaker Guard



5 Initially Starting the System

- Ensure all furnished protective covers are installed.
- If provided, ensure all battery circuit breakers are placed in the ON position.



NOTE! Circuit breakers are provided with lockout/tagout capability.

- Refer to any Initial Startup procedure in the documentation supplied with the respective power system.

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