



User's Manual



301 Gaddis Boulevard • Dayton, Ohio 45403
U.S. Toll Free 866-261-1191
(937) 253-1191 • Fax: (937) 253-1723
Web site: www.stacoenergy.com

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FIRSTLINE P BATTERY CABINET

SECTION 1

INTRODUCTION

The FirstLine P battery cabinet is used in conjunction with the FirstLine uninterruptible power supply (UPS) to prevent loss of valuable electronic information and minimize equipment downtime. During brownouts, blackouts, and other power interruptions, batteries provide emergency power to safeguard operation.

Figure 1 shows the FirstLine P battery cabinet, which can be outfitted with one or two strings of batteries.

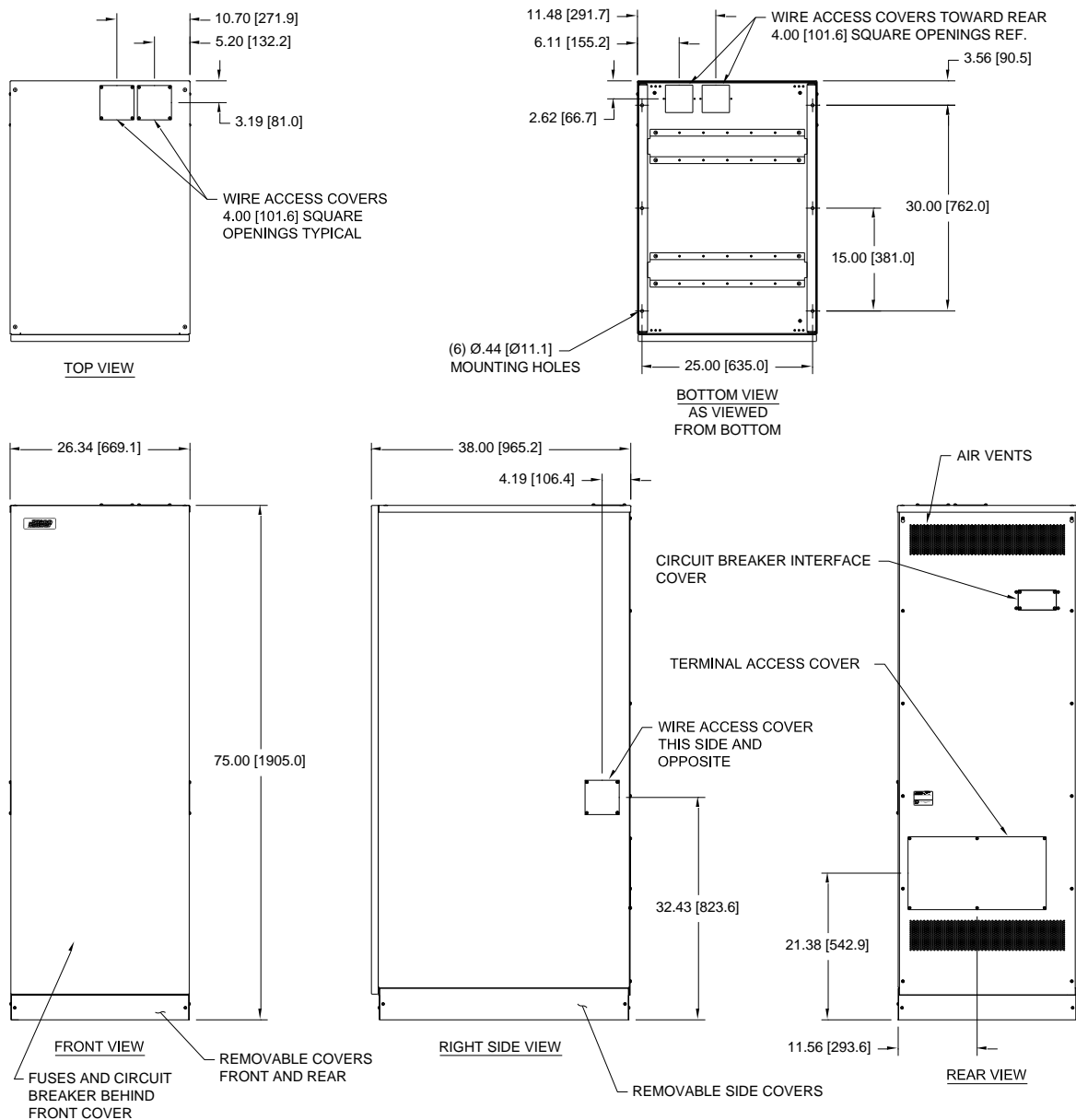


Figure 1 - The FirstLine P Battery Cabinet

FIRSTLINE P BATTERY CABINET

This manual covers Battery Cabinets with the following part numbers:

FLU-BAT-200-1-480-B: Battery Cabinet fused at 200A (suitable for up to 80Kva) 1 battery string, matched to 480V UPS (240 cell system), with breaker.

FLU-BAT-200-2-480-B: Battery Cabinet fused at 200A (suitable for up to 80kVA), 2 battery strings, matched to 480V UPS (240 cell system), with breaker.

FLU-BAT-300-2-480-B: Battery Cabinet fused at 300A (suitable for up to 125kVA), 2 battery strings, matched to 480V UPS (240 cell system), with breaker.

SECTION 2

SAFETY WARNINGS







**IMPORTANT SAFETY INSTRUCTIONS
SAVE THESE INSTRUCTIONS**

This manual contains important instructions that you should follow during installation and maintenance of the Battery Cabinet. Please read all instructions before operating the equipment and save this manual for future reference.

READ AND FOLLOW ALL SAFETY INSTRUCTIONS

- a. **Do not use outdoors.**
- b. **Do not route wiring across or near hot surfaces.**
- c. **Do not install near gas or electric heaters.**
- d. **Use caution when servicing batteries. Battery acid can cause burns to skin and eyes. If acid is spilled on skin or in eyes, flush acid with fresh water and contact a physician immediately.**
- e. **Equipment should be installed where it will not readily be subjected to tampering by unauthorized personnel.**
- f. **The use of accessory equipment not recommended by the manufacturer may cause an unsafe condition.**
- g. **Do not use this equipment for other than intended use.**

Table 1-Symbols

| | |
|---|---------------------------------|
|  | Danger / Risk of Electric Shock |
|  | Caution |
|  | Risk of Explosion |
|  | Note |
|  | Ground Connection |
|  | Electrostatic Sensitive Device |

DANGER



This Battery Cabinet contains LETHAL VOLTAGES. All repairs and service should be performed by AUTHORIZED SERVICE PERSONNEL ONLY. There are NO USER SERVICEABLE PARTS inside the Battery Cabinet.

WARNING



This Battery Cabinet contains its own energy source (batteries). Hazardous voltage may be present even when the battery cabinet is not connected to a power source.

To reduce the risk of fire or electric shock, install this battery cabinet in a temperature and humidity controlled, indoor environment, free of conductive contaminants. Do not operate near water or excessive humidity (95% maximum).

CAUTION



Batteries can present a risk of electrical shock or burn from high short circuit current. Observe proper precautions. Servicing should be performed by qualified service personnel knowledgeable of batteries and required precautions. Keep unauthorized personnel away from batteries.



Risk of explosion if batteries are replaced by an incorrect type. Replace with same type and rating only.

Proper disposal of batteries is required. Refer to your local codes for disposal requirements.

Never dispose of batteries in a fire. Batteries may explode when exposed to flame



This product contains Valve Regulated Sealed Acid Batteries.

These batteries contain lead, a neurotoxin, and sulfuric acid, a corrosive. Additionally, the energy stored in the batteries can present a shock hazard and a burn hazard. Batteries should only be serviced by trained personnel. Appropriate safety precautions must be observed, including eye protection and skin protection. Contact with electrolyte requires flushing with a generous amount of clean water. Seek medical attention immediately following contact with electrolyte. Unwanted batteries must be recycled and should never be discarded.

FIRSTLINE P BATTERY CABINET

The functional lifetime of batteries is significantly affected by the temperature at which they are stored and operated. Ideally, batteries should be used in a 70 F (21 C) environment. For every 15 F (8.3 C) increase in temperature, the life expectancy of a battery will be halved.

Exposure to temperatures in excess of 90 F (32 C) should be limited to no more than 30 days per year. Under no circumstances should the battery be exposed to temperatures over 104 F (40 C) which can lead to thermal runaway, a condition that damages the battery. Thermal runaway can cause batteries to swell. If the battery cases burst, the hazardous contents may be exposed.

MAINTAINING PROPER AMBIENT TEMPERATURE USUALLY REQUIRES INSTALLING THE PRODUCT IN A TEMPERATURE CONTROLLED SPACE. EQUIPMENT ROOMS WITHOUT COOLING SYSTEMS DO NOT GENERALLY MAINTAIN THE PROPER CONDITIONS FOR GOOD BATTERY LIFE.

SECTION 3

BATTERY CABINET SETUP

This SECTION describes:

- Equipment inspection
- Floor loading and clearances
- Removing and replacing the cabinet panels
- Unloading the cabinet(s)

INSPECTING THE EQUIPMENT

If any equipment has been damaged during shipment, keep the shipping and packing materials for the carrier or place of purchase and file a claim for shipping damage. If you discover damage after acceptance, file a claim for concealed damage.

To file a claim for shipping damage or concealed damage: 1) File with the carrier within 15 days of receipt of the equipment, 2) Send a copy of the damage claim within 15 days to your service representative.

FLOOR LOADING

When planning the installation, consider the battery cabinet weight for floor loading. The strength of the installation surface must be adequate for point and distributed loading. The approximate weights are shown in the following table.

Table 2-Model Floor Loadings

| STANDARD MODEL FLOOR LOADING | | |
|-------------------------------------|-----------------------|---|
| MODEL | Maximum Weight | Point Loading |
| FLU-BAT-200-1-480-B | 2100 lbs (953 kg) | 27.5 lb/in ² (1.9 kg/cm ²) |
| FLU-BAT-200-2-480-B | 3700 lbs (1678 kg) | 48.4 lb/in ² (3.4 kg/cm ²) |
| FLU-BAT-300-2-480-B | 3700 lbs (1678 kg) | 48.4 lb/in ² (3.4kg/cm ²) |

CLEARANCES

The following clearances are recommended for the FirstLine P Battery Cabinet.

| | |
|-----------------------|-----------------------------|
| From Front of Cabinet | 36" (91.4 cm) working space |
| From Back of Cabinet | 6" (15.2 cm) |

UNLOADING THE CABINET(S)

The following tools are required for unloading the cabinet(s):

- Wrenches for 3/8" lag bolts.
- Forklift or pallet jack
- Phillips screwdriver

CAUTION



The Battery cabinets are heavy (see Table 2). Unloading the cabinets requires at least two people to safely remove the cabinets from the pallet.

To remove the battery cabinet from the ship pallet:

1. Make sure the forklift is rated for the cabinet weight.
2. Make sure the path traveled has sufficient support for the combined weight of the forklift and the battery cabinet.
3. Make sure forks are at maximum separation.
4. Use a very strong ratchet strap (or similar device) of sufficient strength to tie the upper part of the cabinet to the forklift tower before moving.
5. Keep people out of the fall zone. If the cabinet topples over, stand clear
6. With a Phillip's screwdriver, remove the four kick panels. These will be remounted when the cabinet is in place.
7. Remove all banding, wrapping and foam protection.
8. Remove the six 3/8" lag bolts securing the cabinet to the pallet. (See Figure 2)



Figure 2 - Pallet Mounting Hardware

9. Lift the cabinet with a forklift one to two inches (1"-2" [2.5-5cm]) above the pallet.
10. Slide the pallet completely away from the raised cabinet.

11. Carefully move the cabinet to the desired location and slowly lower the cabinet to the floor or other appropriate flat surface.
12. Remount the four kick panels.

SECTION 4

ELECTRICAL INSTALLATION

The FirstLine P Battery Cabinet has the following power connections:

- 2 pole (positive, negative) terminal block and ground connection for battery power input and output. Each pole has two compression lug holes. One lug goes to the UPS or to the next Battery Cabinet closer to the UPS. The second lug goes to the input of the next Battery Cabinet, if supplied.

WARNING



Only qualified service personnel (such as a licensed electrician) should perform the UPS installation and initial startup. Risk of electrical shock.

WIRING PREPARATION

To begin wiring the UPS:

1. Verify that the electrical connections to the installation site have been properly installed.
2. Wire the FirstLine UPS per the User's Handbook, form number 003-2375
3. Switch off utility power to the distribution point where the UPS is connected. Be absolutely sure there is no power.
4. Removing and replacing the front panel:
 - Pull the bottom of the panel outward until the ball studs unsnap
 - Lift the panel up and off the cabinet.

FIRSTLINE P BATTERY CABINET

To replace the panel:

- Lower the shoulder screws at the top and bottom of the panel into the keyhole slots on the cabinet.



Figure 3 - Shoulder Screw

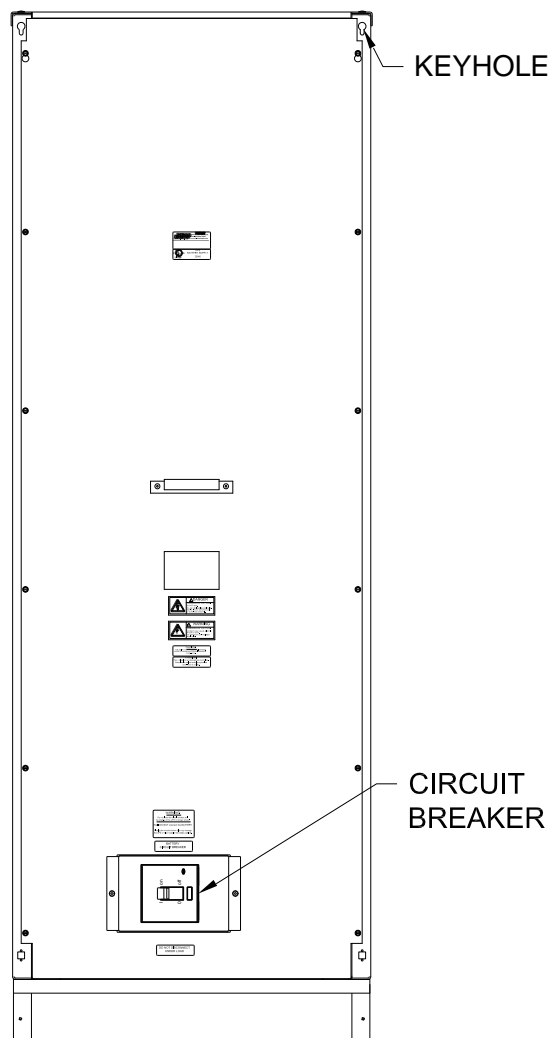


Figure 4 - Battery Cabinet with Front Panel Removed

FIRSTLINE P BATTERY CABINET

5. Switch the circuit breaker to the “Off” position.
6. Remove the front inner panel by loosening the top (2) two screws and removing the lower (10) ten screws. Lift and remove the panel. The panel is connected to the cabinet by a ground wire so it can be moved only a short distance
7. Remove the terminal access cover on the rear of the cabinet by removing the (6) six screws mounting it to the enclosure (see Figure 5).
8. Conduit landing plates are located toward the rear of the cabinet on the top cover, side panels, and base to accommodate bottom wire entry to the cabinet (see Figure 1). Remove plates and drill or punch hole to fit conduit bushing with Greenlee punch or similar device. Make certain that the bushing will be clear in the opening in the base. Mount bushing to plate and tighten to manufacturer’s recommendations. Replace the plates and mount conduit.



The rear panel should not need to be removed at anytime. Removing this panel while the front inner panel is removed may cause the cabinet to become unstable.

CONNECTING TO THE FIRSTLINE BATTERY CABINET

To be performed by authorized service personnel:

1. Check that the circuit breakers are in the “off” or open position.
2. Inspect battery trays for signs of damage. Verify that all terminal connections are sound. The red and black “power pole” connectors should be connected, but the blue connectors and the white connectors on the wires joining the trays in each string should not be connected.

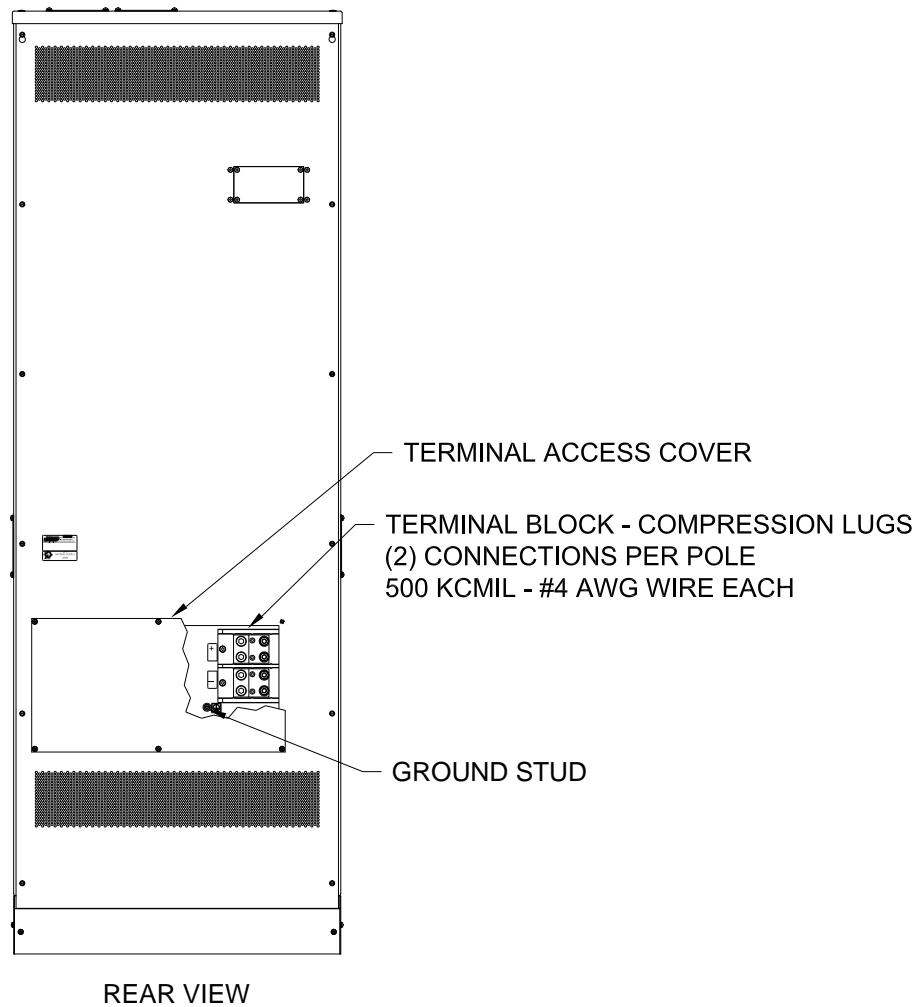


Figure 5 - Power Connections

3. With wire sized per the table below, #6 AWG 75°C copper wire minimum to #2 AWG maximum, connect one wire to the terminal block pole marked positive(+) and one wire to the terminal block pole marked negative (-).
4. Connect the ground wire to the 1/4-20 ground stud with a ring terminal or pressure lug by removing and replacing the top nut and washers only with a 7/16” wrench.

FIRSTLINE P BATTERY CABINET

5. Before working within the UPS cabinet, verify that the UPS has no power applied. Refer to the UPS manual. Repeat procedures 3 and 4 to the FirstLine P UPS Battery connector located in the right side of the UPS. We recommend that the wires be marked as to which is positive (+) and negative (-) to ensure that the wires are not accidentally crossed. See figure 6.
6. If a second battery cabinet is present, repeat the procedure to install wires connecting the terminals on the second cabinet to the unused terminals (of each pole of the terminal block) on the first cabinet.
7. If additional cabinets are present, continue this process until all cabinets are connected.



Never connect the positive to the negative. Severe damage and injury could result.

8. Connect the Circuit Breaker Interface per Section 5 if it is desired to implement the remote emergency power off function.
9. Mate the blue and white connectors. Repeat this procedure for the other battery cabinets, if present.
10. Reinstall the front inner panel and rear terminal access cover on each battery cabinet using the screws provided.
11. The inner panel of the UPS may be reinstalled. Refer to the UPS manual for guidance regarding this procedure.

| Battery Cabinet | Minimum Wire Size | Minimum Ground Wire |
|-----------------|-------------------|---------------------|
| -200 | 4/0 | #6 AWG |
| -300 | 400 kcmil | #4 AWG |

Table 3 – Terminal Tightening Torques

INPUT / OUTPUT TERMINALS

| Wire Size | Torque |
|-------------------|-------------------|
| 4 AWG – 500 kcmil | 375 inch - pounds |

GROUND TERMINALS

| Hardware | Torque |
|------------|--------------------|
| ¼-20 screw | 80-90 inch -pounds |

CIRCUIT BREAKER INTERFACE TERMINALS

| Wire Size | Torque |
|-------------|-------------------|
| # 22-12 AWG | 4.4 inch - pounds |

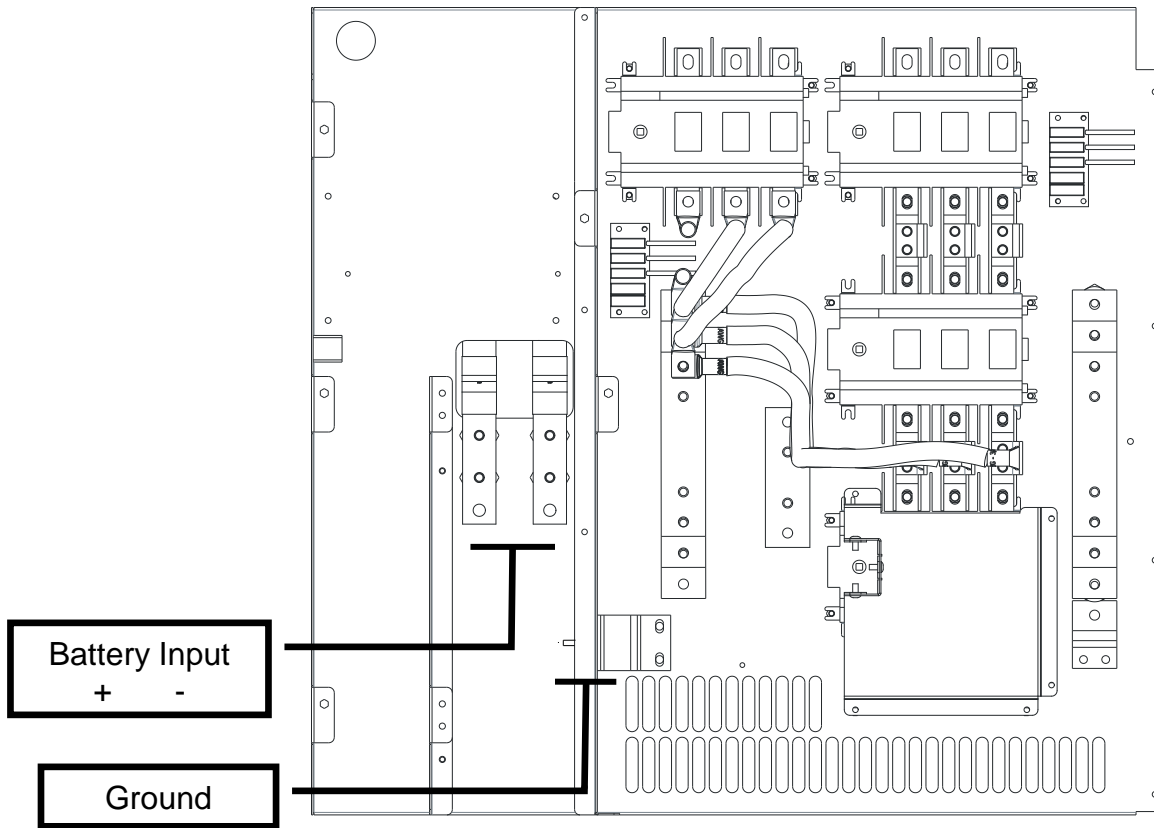


Figure 6 - UPS Connections

SECTION 5

CIRCUIT BREAKER INTERFACE

Figure 7 shows the location of the circuit breaker interface terminal blocks in the Battery Cabinet. To access the terminal blocks, remove the cover by removing the four (4) screws attaching it to the cabinet. Do not remove the four (4) outer screws next to the cover mounting screws.

The circuit breaker interface must be connected to the UPS if it is desired to have the battery cabinet circuit breaker trip when the Remote Emergency Power Off (REPO) signal is applied to the UPS. Additional Battery Cabinets must connect to the pass-through connection provided for this function (see Figure 8).

If it is not desired to have the Battery Cabinet Breaker trip on REPO activation, then these connections can be omitted.

This function requires 3 wires between the battery cabinet and the UPS. The wires can be part of a jacketed cable assembly or they can be three individual wires. Local codes may require that the wires be run in a conduit. In any case, these low voltage signal wires must be kept physically separated from the power wiring between the Battery Cabinet and the UPS.

Refer to the section in the UPS manual "REMOTE COMMANDS, ALARMS AND EPO" for the location of the Terminal Block in the UPS where the Battery Cabinet signals are to be connected. The UPS is factory-fitted with a shorting jumper between terminals 13 and 14. This jumper must be removed for the REPO function to be enabled (See Figure 9).

The terminal blocks TB1 and TB2 are pluggable connectors for ease of wiring. Carefully pull each terminal block loose from the circuit breaker interface board to wire as instructed below and plug them back into place. A small flat screwdriver is required to tighten each wire in place; tighten as specified in table 3.

From TB1 in the Battery Cabinet, connect a wire from terminal 1 to terminal 10 in the UPS. Connect a second wire from TB1 terminal 2 to terminal 13 in the UPS. Connect a third wire from TB1 terminal 3 to terminal 14 in the UPS.

If a second Battery Cabinet is to be connected in parallel with the first, three control wires need to connect TB1 in the second cabinet to TB2 in the first, terminal 1 to terminal 1, terminal 2 to terminal 2, terminal 3 to terminal 3. If additional cabinets are present, this same procedure applies.

Finally, the UPS will not operate unless a normally closed contact is connected across the REPO terminals. This connection can be made anywhere along the chain: across terminals 13 and 14 at the UPS or across terminals 2 and 3 of any Battery Cabinet terminal block TB1 or TB2.

FIRSTLINE P BATTERY CABINET

Usually, this normally closed contact is part of a push-button switch, perhaps a red mushroom type switch next to the exit. If multiple switches are desired, the multiple normally closed contacts must be wired in series such that the operation of any switch causes the connection across the REPO terminals to be opened. Wiring of this switch circuit should be run in metal or metal shielded conduit for maximum protection. Damage to or interference with this circuit can cause the UPS to trip off.

During commissioning of the UPS installation, the REPO system should be tested. Start the UPS. When the UPS display no longer states "Wait: DO NOT connect the BATTERY", close the breaker on each of the battery cabinets. Operate the REPO switch and verify that the UPS shuts down and that all of the battery cabinet breakers trip.

NOTE: Wires to the circuit breaker interface board must not enter the UPS or battery cabinet through the same port as the input/output or battery power wires. Wires to the battery cabinet must enter through the removable cover over the circuit breaker interface board.

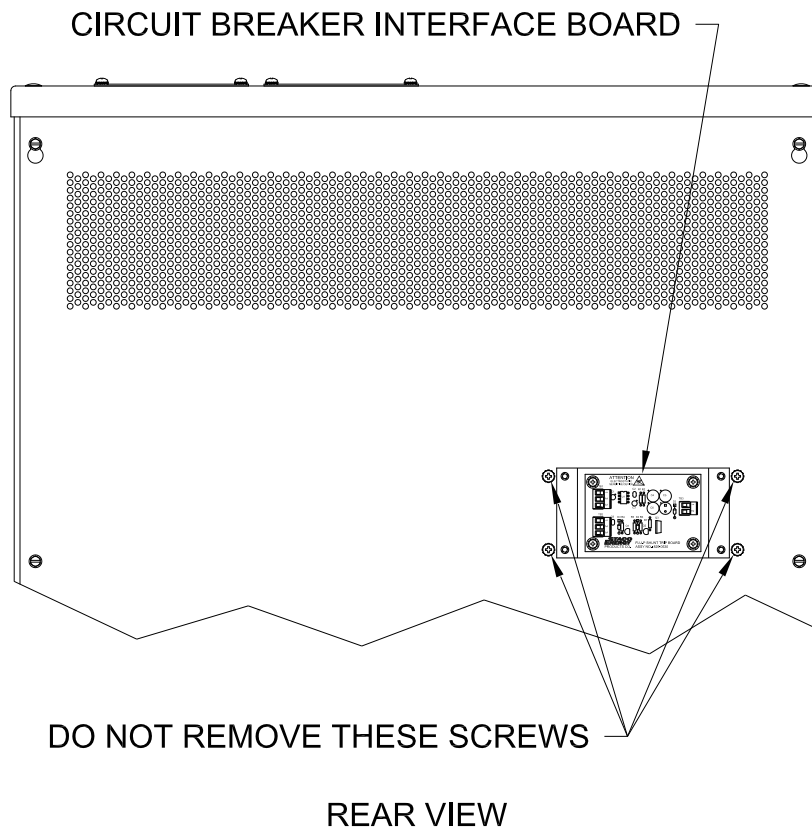


Figure 7 - Circuit Breaker Interface Board Assembly Location

FIRSTLINE P BATTERY CABINET

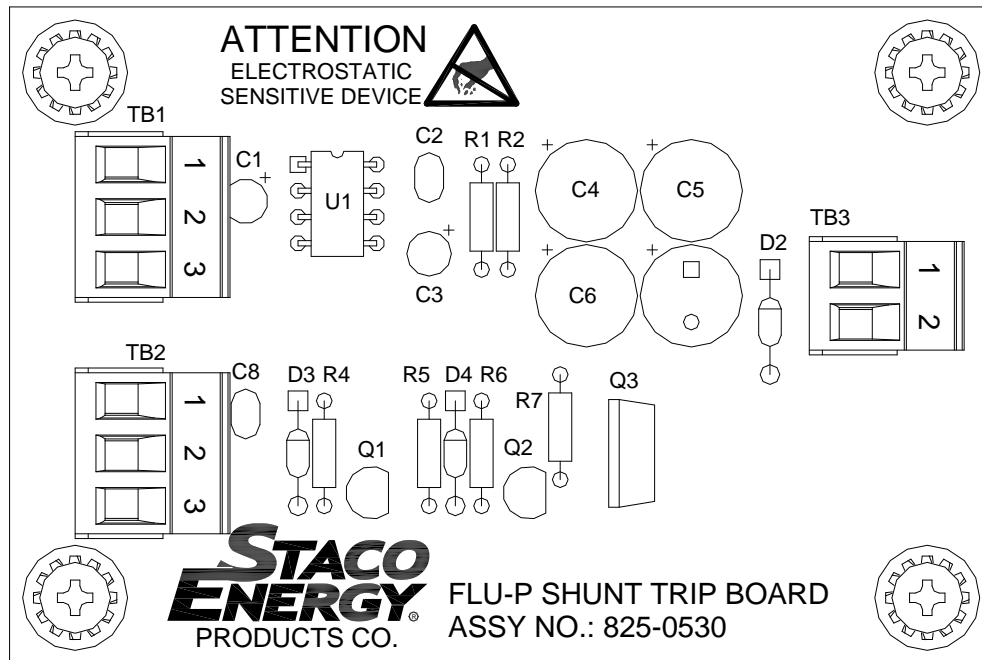


Figure 8 - Circuit Breaker Interface Board Assembly

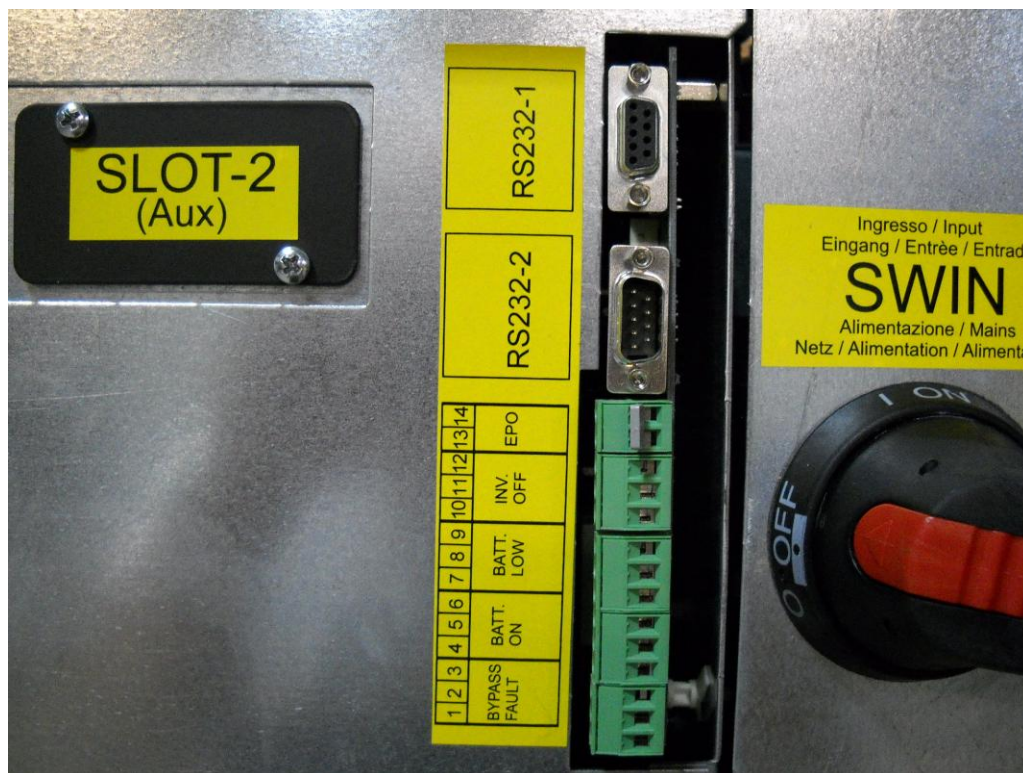


Figure 9 - UPS REPO Connections

SECTION 6

OPERATION

Refer to the UPS manual for operating instructions. Please note that the breaker in the battery cabinet must not be operated until the UPS has started and the display no longer shows the message: "Wait: DO NOT connect the BATTERY". If the breaker has been improperly operated, a qualified service person needs to check for blown fuses or other damage.

If the UPS is stopped (turned off), the breaker may be left in the closed position for a short period of time. The safety circuits in the UPS represent a slight current drain on the battery that can lead to severe depletion of charge, if the battery remains connected to a non-operating UPS. This can lead to battery damage over the course of several days.

It is recommended to disconnect the batteries if the UPS is to remain off for any significant period of time. Also, it is not safe to work within the UPS unless all of the batteries are disconnected.

SECTION 7

BATTERY REMOVAL, INSTALLATION, AND SERVICE

The batteries must only be serviced by authorized service personnel. Always wear eye protection and have eye wash near at hand. Never work on any connections that have not been disconnected from all other sources of voltage. Parallel connected battery cabinets require that all battery strings in all battery cabinets be disconnected before working within any particular cabinet.

Before servicing batteries, the UPS should be turned off, power should be removed from the UPS input, and all battery breakers should be open. If a Maintenance Bypass Switch (MBS) is present, power to the load can be maintained during service. Refer to the instructions for the MBS to put the system in bypass mode before removing power from the UPS.

Before any battery service is attempted, the batteries must be disconnected by unplugging the cables to the battery trays. If it is necessary to remove the cables from the batteries, the connections should be marked in a way that no confusion will exist when it is time to reconnect the cables (see Figure 12). The batteries are mounted in slide out trays that permit access to the battery to battery connections when the trays are withdrawn from the cabinet.



To service the battery trays, they must be removed from the cabinet by a fork lift. The (2) two bus bars at the back of the tray, as shown in figure 10, must be removed before servicing or replacing the batteries.

FIRSTLINE P BATTERY CABINET

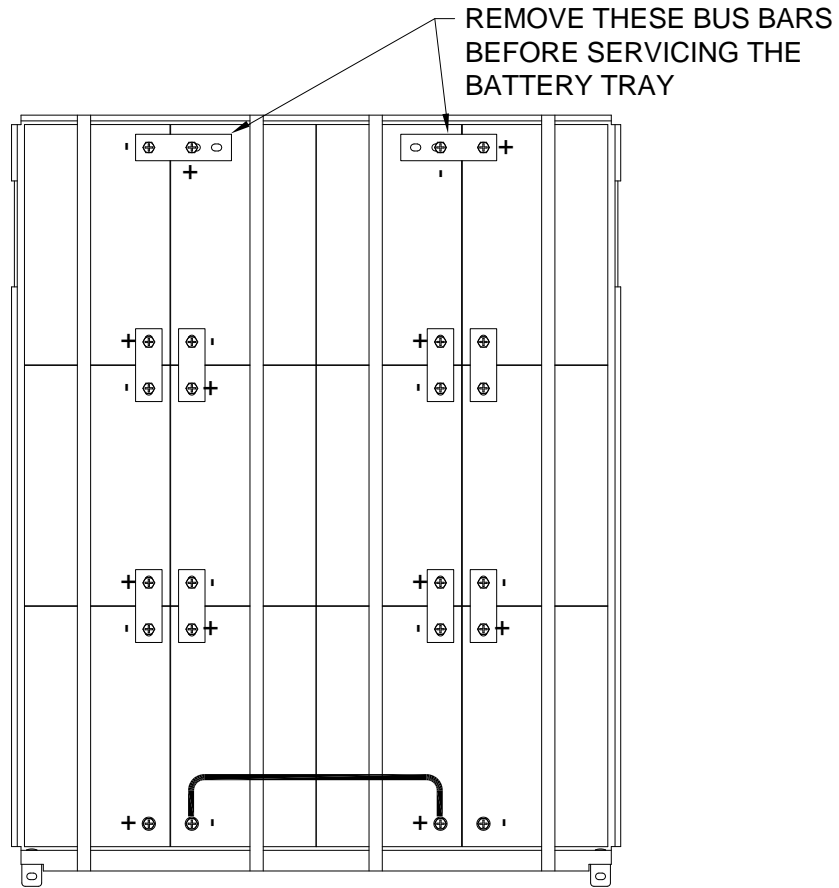


Figure 10 - Battery Tray

FIRSTLINE P BATTERY CABINET

If batteries are being replaced, only use the same manufacturer and battery type and rating as the battery removed. When the bus bars connecting the batteries are removed, be careful to avoid dropping bolts or shifting the bus bars so that they might short across adjacent battery terminals. We recommend using a piece of electrical insulating paper (for example, “Nomex”) as a temporary shield between the bus bars during service.

It is very important that only one tray at a time be extended from the cabinet. If more than one tray is extended, the cabinet can become unstable and topple over.

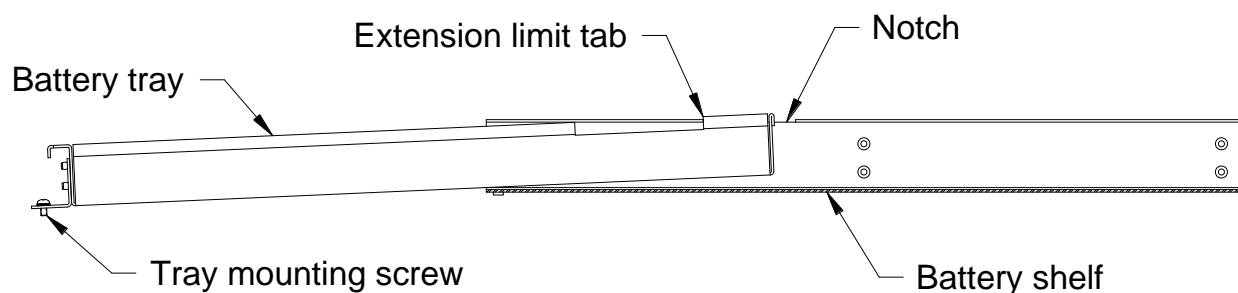
After each tray is installed or serviced, it must be fully inserted and secured using the supplied threaded fasteners before attempting to install or service another tray.

If the trays are to be removed, always remove the highest tray first. The battery trays are very heavy and it will be necessary to use a lifting device to support the trays as they are removed. When the trays are to be reinstalled, use the procedure in the following paragraph.

The battery trays are very heavy and it will be necessary to use a lifting device to support the trays as they are installed. Do not take away the external support until the extension limit tabs on the upper sides of the battery tray are inserted past the notches on the upper edge of the battery shelf (see figure 11). Always install the lowest battery tray first. After it is inserted fully into the support shelf, secure the tray with the supplied threaded fasteners. After all of the trays are reinstalled and secured, reconnect the cables using the markings as a guide.

WARNING

Never connect the two cables from a battery tray or from a battery string (two trays) together as severe damage will occur, resulting in fire and/or injury. Battery connections should only be made by a person wearing eye protection. It is advised that eye wash be available. If there are any doubts about the proper connections, do not proceed.



Cutaway side view of battery tray
batteries not shown for clarity

Figure 11 - Battery Tray Side

FIRSTLINE P BATTERY CABINET

MAINTENANCE

The FirstLine P Battery Cabinet is designed to be virtually user maintenance free, requiring only the occasional wipe with a damp cloth or non-abrasive cleaner.

Spare parts kits are available for the FirstLine Battery Cabinet series, please contact Staco Energy Products Co. service center for details.

For maximum availability of the UPS, the batteries should be replaced as part of a comprehensive preventive maintenance program:

| REPLACEMENT BATTERY | | | |
|----------------------------|---------------------|--------------------|--------------------------|
| Cabinet Model | Manufacturer | Cat. Number | Quantity Required |
| FLU-BAT-200-1-480-B | CSB BATTERY | HRL 12200W | 40 |
| | FIAMM | 12 FLX200 | |
| FLU-BAT-200-2-480-B | CSB BATTERY | HRL 12200W | 80 |
| FLU-BAT-300-2-480-B | FIAMM | 12 FLX 200 | |

| RECOMMENDED REPLACEMENT INTERVALS | |
|--|--------------|
| Batteries | 2 to 5 years |

| OPERATING TEMPERATURE | |
|------------------------------|--------------------|
| Recommended Range | 15-25°C (59-77°F) |
| Maximum Range | 10-40°C (50-104°F) |

This product contains Valve Regulated Sealed Lead Acid Batteries.

These batteries contain lead, a neurotoxin, and sulfuric acid, a corrosive. Additionally, the energy stored in the batteries can present a shock hazard and a burn hazard. Batteries should only be serviced by trained personnel. Appropriate safety precautions must be observed, including eye protection and skin protection. Contact with electrolyte requires flushing with generous amounts of clean water. Seek medical attention immediately following contact with electrolyte. Unwanted batteries must be recycled and should never be discarded.

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The functional lifetime of batteries is significantly affected by the temperature at which they are stored and operated. Ideally, batteries should be used in a 70° F (21° C) environment. For every 15° F (8.3° C) increase in temperature, the life expectancy of a battery will be halved.

Exposure to temperatures in excess of 90° F (32° C) should be limited to no more than 30 days per year. Under no circumstances should the battery be exposed to temperatures over 104° F (40° C) which can lead to thermal runaway, a condition that damages the battery. Thermal runaway can cause batteries to swell. If the battery cases burst, the hazardous contents may be exposed.

Maintaining proper ambient temperature usually requires installing the product in a temperature controlled space. Equipment rooms without cooling systems do not generally maintain the proper conditions for good battery life.

FIRSTLINE P BATTERY CABINET

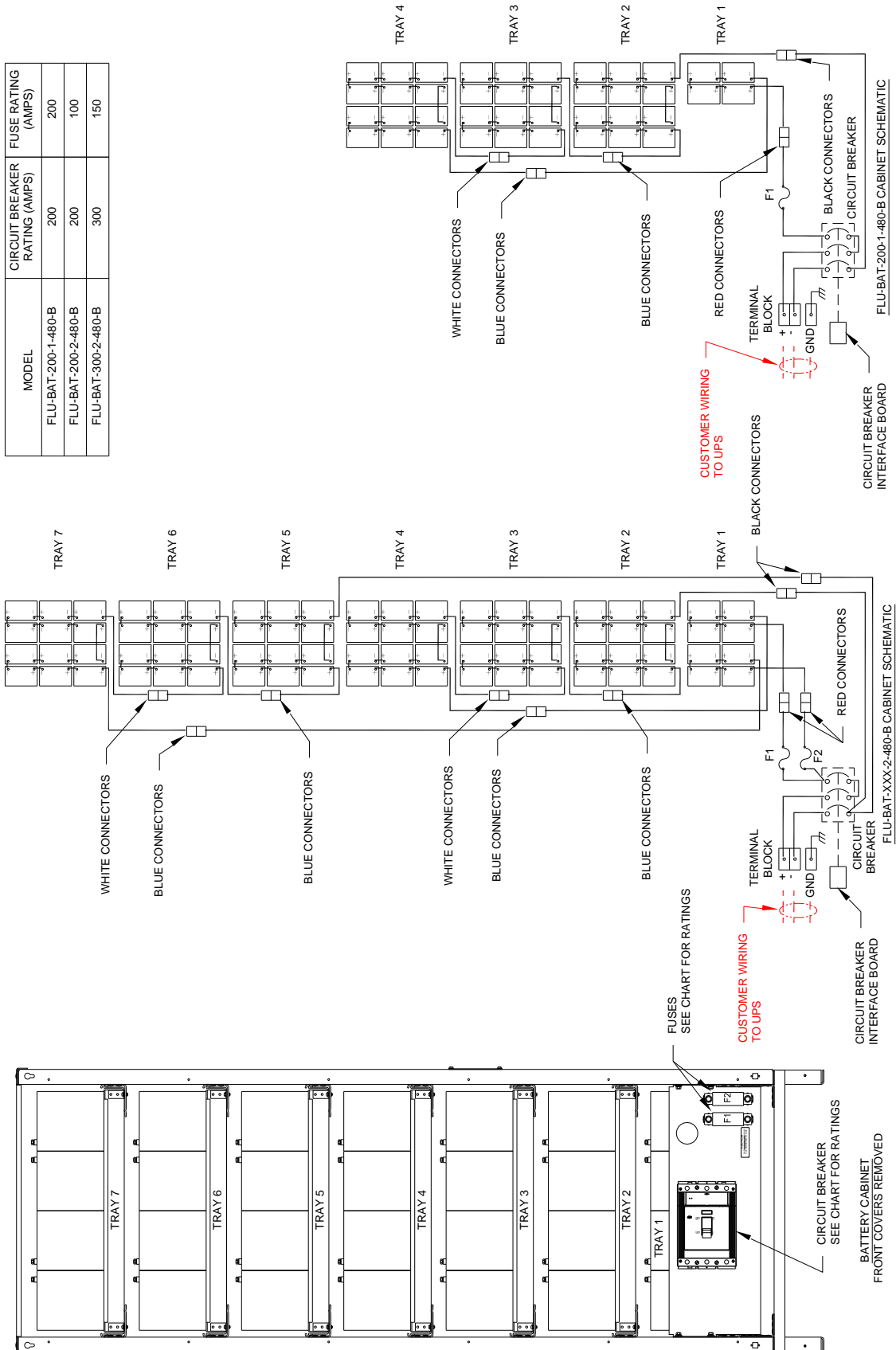


Figure 12 - Cabinets Schematic

