Modular High Capacity Distributed Power System

Models: Cordex CXPS-D 48-2000/4000A
Cordex CXPS-D 48-2500/5000A
Installation & Operation Manual

Part # 9400003-J0
Effective: 11/2011

Your Power Solutions Partner

Modular High Capacity Distributed Power System
Models: Cordex CXPS-D 48-2000/4000A
Cordex CXPS-D 48-2500/5000A

NOTE:

Photographs contained in this manual are for illustrative purposes only. These photographs may not match your installation.

NOTE:

Operator is cautioned to review the drawings and illustrations contained in this manual before proceeding. If there are questions regarding the safe operation of this powering system, contact Alpha Technologies or your nearest Alpha representative.

NOTE:

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1. Safety

SAVE THESE INSTRUCTIONS: This manual contains important safety instructions that must be followed during the installation, servicing, and maintenance of the product. Keep it in a safe place. Review the drawings and illustrations contained in this manual before proceeding. If there are any questions regarding the safe installation or operation of this product, contact Alpha Technologies or the nearest Alpha representative. Save this document for future reference.

1.1 Safety Symbols

To reduce the risk of injury or death, and to ensure the continued safe operation of this product, the following symbols have been placed throughout this manual. Where these symbols appear, use extra care and attention.

The use of ATTENTION indicates specific regulatory/code requirements that may affect the placement of equipment and /or installation procedures.

NOTE:

A NOTE provides additional information to help complete a specific task or procedure. Notes are designated with a checkmark, the word NOTE, and a rule beneath which the information appears

CAUTION!

CAUTION indicates safety information intended to PREVENT DAMAGE to material or equipment. Cautions are designated with a yellow warning triangle, the word CAUTION, and a rule beneath which the information appears.

WARNING!

WARNING presents safety information to PREVENT INJURY OR DEATH to personnel. Warnings are indicated by a shock hazard icon, the word WARNING, and a rule beneath which the information appears.

HOT!

The use of HOT presents safety information to PREVENT BURNS to the technician or user.

1.2 Mechanical Safety

- Keep hands and tools clear of fans. Fans are thermostatically controlled and switch on automatically.
- Power supplies can reach extreme temperatures under load.
- Use caution around sheet metal components and sharp edges.

1.3 Electrical Safety

WARNING!

Hazardous voltages are present at the input of power systems. The DC output from rectifiers and batteries, though not dangerous in voltage, has a high short-circuit current capacity that may cause severe burns and electrical arcing.

- Before working with any live battery or power system, follow these precautions:
  a. Remove all metallic jewelry, such as watches, rings, metal rimmed glasses, or necklaces.
  b. Wear safety glasses with side shields at all times during the installation.
  c. Use OSHA approved insulated hand tools.

WARNING!

Lethal voltages are present within the power system. Always assume that an electrical connection or conductor is energized. Check the circuit with a voltmeter with respect to the grounded portion of the bay (both AC and DC) before performing any installation or removal procedure.

- Do not work alone under hazardous conditions.
- A licensed electrician is required to install permanently wired equipment. Input voltages can range up to 480 Vac. Ensure that the utility power is disconnected and locked out before performing any installation or removal procedure.
- Ensure that no liquids or wet clothes come into contact with internal components.
- Hazardous electrically live parts inside this unit are energized from the batteries even when the AC input power is disconnected.

1.4 Battery Safety

- Servicing and connection of batteries must be performed by, or under the direct supervision of, personnel knowledgeable of batteries and the required safety precautions.
- Always wear eye protection, rubber gloves, and a protective vest when working near batteries. Remove all metallic objects from your hands and neck.
- Use OSHA approved insulated hand tools. Do not rest tools on top of batteries.
- Batteries contain or emit chemicals known to cause cancer and birth defects or other reproductive harm. Battery post terminals and related accessories contain lead and lead compounds. Wash your hands after handling batteries.

WARNING!

Follow battery manufacturer's safety recommendations when working around battery systems. Do not smoke or introduce an open flame when batteries (especially vented batteries) are charging. When charging, batteries vent hydrogen gas, which can explode.

- Batteries are hazardous to the environment and should be disposed at a recycling facility. Consult the battery manufacturer for recommended local authorized recyclers.

2. Introduction

2.1 Scope of the Manual

This instruction manual explains the features, installation, interconnection and startup of both the Alpha CXPS-D 48-2000/4000 Cordex system and the Alpha CXPS-D 48-2500/5000 Cordex system. Images contained in this document are for illustrative purposes only and may not exactly match your installation.

In addition to this manual, the following documentation is part of the documentation package that ships with the Alpha CXPS:

- Cordex Controller (CXC) v2.05 Software manual: part number 0350046-J0
- Alpha Modular Switched Mode Rectifier System: part number 9400000-J0

Product Overview

Alpha power systems provide a distributed power solution for large communications applications— central offices, Mobile Switching Centers, Data Center and Cable Headend facilities (DPCO). The main source of power for the power system is commercial AC power, which is converted to DC by the modular switched mode rectifiers. It is a fully automatic system, which provides float and equalize capability.

These systems have many benefits:

- Designed to be installed close to the connected equipment and to provide a high quantity of small capacity circuits, eliminating BDFBs (Battery Distribution Feeder Bay) and their cabling and installation costs.
- Can also be equipped with a small number of high capacity circuits to feed remote BDFBs to increase the number of distribution points
- High efficiency modular rectifiers reduce operating costs
- Compact front access design reduces floor space footprint (26" x 20")
- Low voltage load or battery disconnect options
- Cordex system controller for configuration, monitoring and control of the entire DC power system from its central panel and graphics display. Other controller features include: event data storage, alarm generation, group rectifier configuration and remote access.

Each bay combines rectifiers, battery termination and distribution. Figure 1 shows a single bay 2500 A system. A dual-bay kit with inter-bay copper buses and cabling, links two bays to double capacity, breakers and termination.

Rectifier Shelves

Up to five rectifier shelves are wired out to the AC source provided by the customer. Each shelf can accommodate six Cordex 4 kW or two Cordex 12 kW rectifier modules.

Distribution Modules

A Cordex system controller is mounted in the door of a distribution module in the primary bay. An optional shunt multiplexer (MUX) panel (with CAN interface) can be used to monitor up to 16 channels (e.g. shunts). TPL fuse and AM breaker options are available.

2.2 Options

The system offers several advanced features with add-on options. These options can be included by the customer at time of ordering or can be added in the future; e.g. additional Cordex rectifiers.

2.3 Additional Alpha Products

To complement your power system you may require additional products that can be ordered separately; such as:

Fusible Battery Disconnect Panel – provides a fusible battery disconnect contactor with a control circuit to enable remote low voltage disconnect (LVD) and reset-able emergency power off (EPO). There are status indicators for the auto discotnnect, manual disconnect and remote disconnect features.

3. Product Description

Figure 1 shows a single bay 2500 A system. The following sections describe the following components:

- Rectifier shelves
- Distribution and Termination
- Alarms and Indicators
- Cordex controller

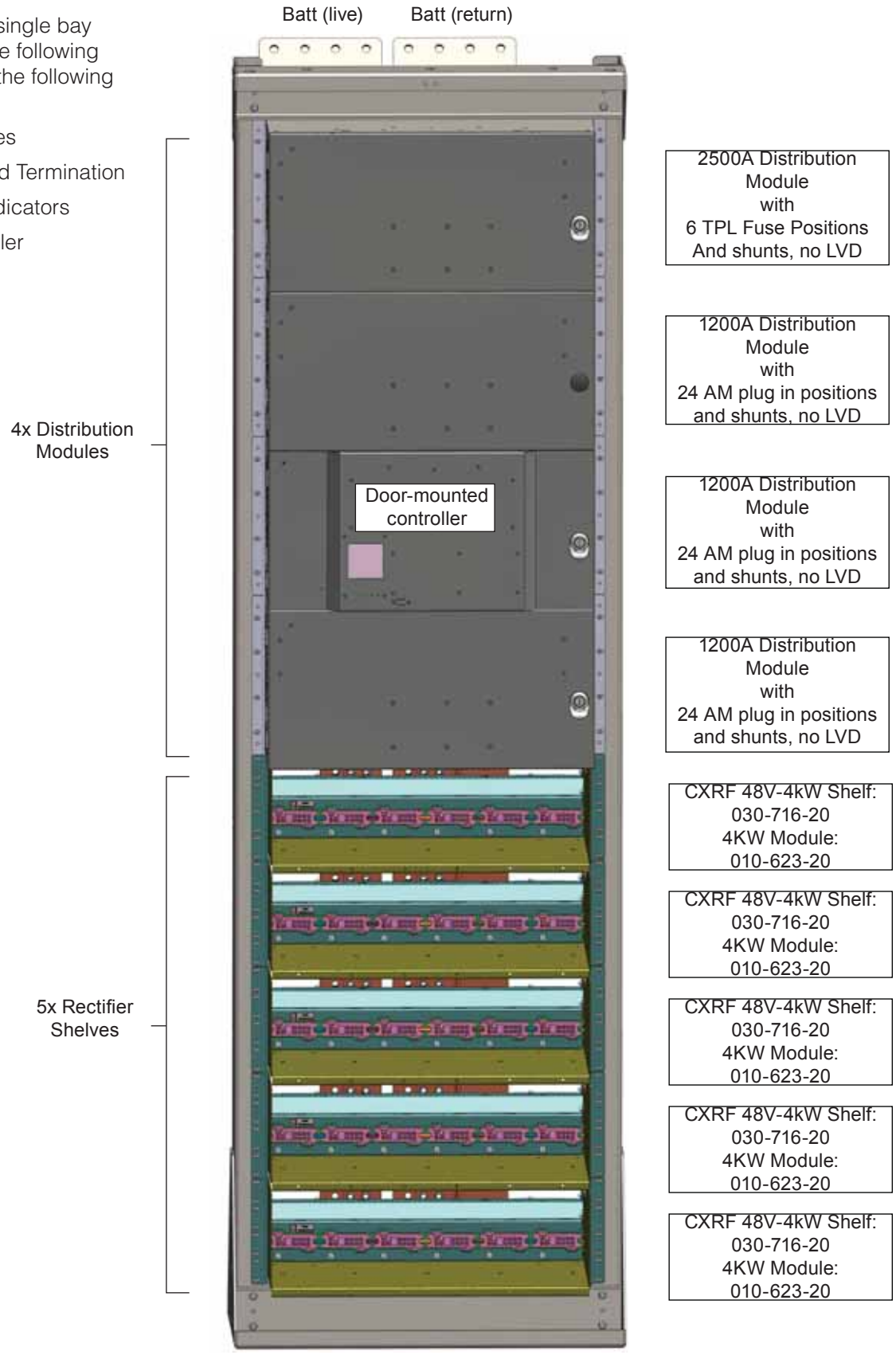


Figure 1 — Example of a single bay configuration, 2500 A system

3.1 Cordex Rectifier Shelves

Each bay can contain up to five Cordex shelves that hold up to six individual rectifier modules.

3.1.1 AC Termination Wiring

The individual Cordex rectifier shelves are wired to the customer-provided AC termination panel. The AC input is routed through a 1" knockout for direct connection to the rectifier shelf with appropriately sized wire according to the local electrical codes.

Each shelf requires two AC input circuits. The required input voltage varies depends on the rectifier shelf option chosen at the time of ordering—see Table A for details.

3.1.2 Cordex Rectifier Modules (Purchased Separately)

See the Cordex rectifier shelf manual included with the system documentation package for detailed information.

The CXC controller provides central control of the rectifiers' output level, load sharing, temperature compensation and alarm reports. A CAN bus cable is wired or daisy-chained to each rectifier shelf for communication with the Alpha CXC System Controller.

Table A — Electrical specifications for modular, mid and high capacity power systems

Model	CXPS-D 2000	CXPS-D 2500
Maximum Output Power	96 kW	120 kW
Maximum Current	2000 A	2500 A
Input AC to 4.0 kW Rectifier Shelves (per feed)		
48-4.0 kW/ 12 kW Shelf	360-480 Vac, 3 PH – 3 wire + N + Protective Earth (PE)/ **22-15A** 208-240 Vac, 3 PH - 3 wire + PE/ **39-30A**	
Frequency range	45 ~ 65 Hz, (±0.5 Hz)	
Recommended Feeder Breaker Three Phase:	30 A, #10 AWG Wye connection 4W 50 A, #6 AWG Delta connection 3W	

3.1.3 Rectifier Alarms and LEDs

Rectifier status, such as Mains OK, Minor and Major alarms, display on the rectifier front panel.

- When a Rectifier Major alarm is present, the module has shut down due to a critical fault.
- A Rectifier Minor alarm indicates the module has a noncritical alarm, however, it has not shut down.

See the Cordex rectifier manual included with the system documentation package for detailed information.

3.1.4 DC Charge Buses

Each rectifier bay has two vertical charge bars—one that connects all of the positive terminals and one that connects all of the negative terminals of the rectifier shelves (Figure 2). These bus bars are rated for the maximum current supplied by the rectifier shelves.

The return charge bar connects to the battery return bar located at the top of the bay.

The -48V vertical charge bar connects to the live battery bus bar located at the top of the bay.

3.1.5 Rectifiers

The rectifier modules are "hot swappable" allowing for quick replacement and easy maintenance of the system. (They can be inserted or removed from the shelf without removing AC power or shutting down the entire system.)

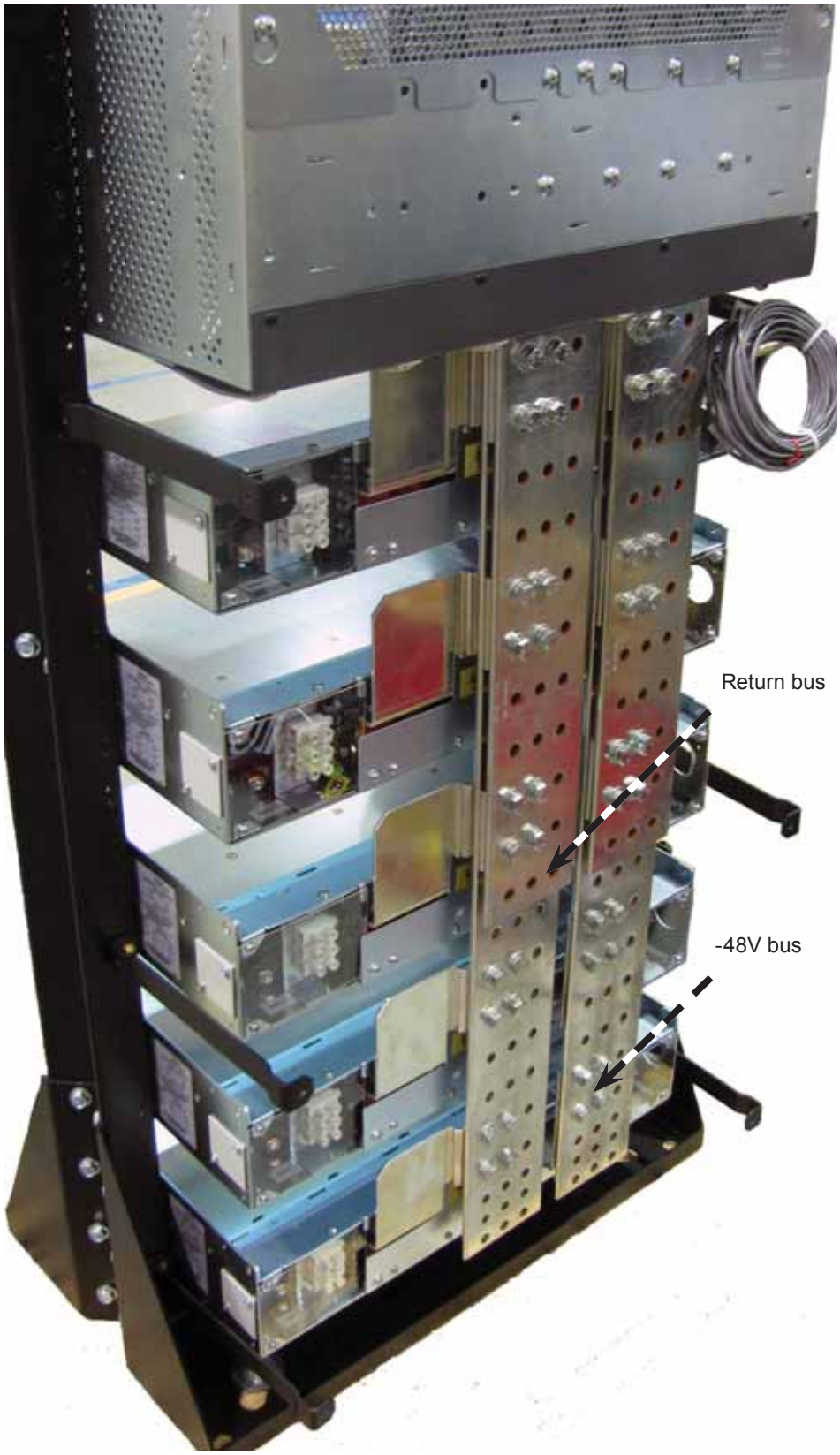


Figure 2 — Rear view showing DC charge buses (covers removed)

3.2 Distribution and Termination

3.2.1 Distribution Modules

The fuse/circuit breaker distribution modules feature high capacity, modularity, and simplified installation. These features provide effective secondary load distribution and protection for multiple -48V DC feeds up to 600 amps.

Each module can contain one of the following configurations:

- 2 banks of 12 plug-in AM breakers
- 2 banks of TPL fuses
- 1 bank of 12 plug-in AM breakers and 1 bank of TPL fuses

Each bay can have, at most, four distribution modules with a total current capacity of 2500A. Table B lists component options across all four distribution modules.

Figure 3 shows a combination of two modules with two banks of circuit breakers and two modules with two banks of TPL fuses.

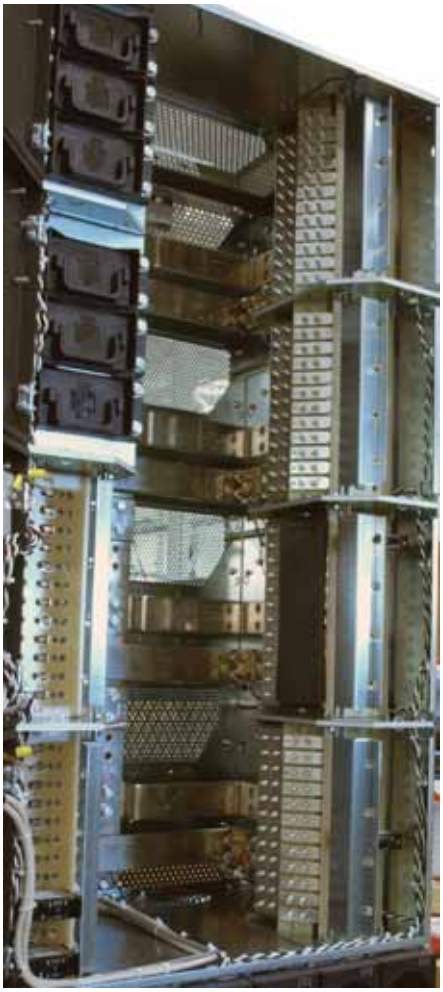


Figure 3 — DC distribution modules

NOTE:

TPL fuses require an external return bus bar. See section 3.4.1.

Table B — Modular distribution components and termination

Component	Type	Description/Connection
Fuses	GMT:	Up to 10 positions, up to 15A (max)
	TPL, high capacity:	Up to 6 positions, 800A max
	TPL, low capacity:	Up to 24 positions, 300A max
	TLS/TPS plug-in bullet:	Up to 96 positions, 125A max
Breakers	AM plug-in bullet:	up to 96 positions 1 pole, max 100A 2 pole, 125A to 150A 3 pole, 175A to 250A
Output termination	GMT Fuse:	0.34 to 2.5 mm^2 (14 to 22AWG)
	TPL fuse, high capacity:	2 hole 3/8" diameter on 1" centers, dual cable landing, 2x 750 MCM
	TPL fuse, low capacity:	2 hole 3/8" diameter on 1" centers, 1x 350 MCM
	TLS/TPS/AM breaker	1 pole and 2 pole: 1/4" diameter on 5/8" centers 3 pole: 3/8" diameter on 1" centers
Module/Bank Capacity	TLS/TPS/AM breaker	1200A/ 2x 600A per bank
	TPL fuse	2500A/ 2x 1800A
	TPL fuse/ AM breaker	2400A/ 1x 1800A plus 1x 600A

3.2.2 Safety Features

Insulating shield

Each distribution bay has a insulating shield to the front of the bus bars. This shield prevents casual touching of the bus bars with cable lugs and tools while working inside the distribution module. It also maintains separation between the cables and the bus bars.

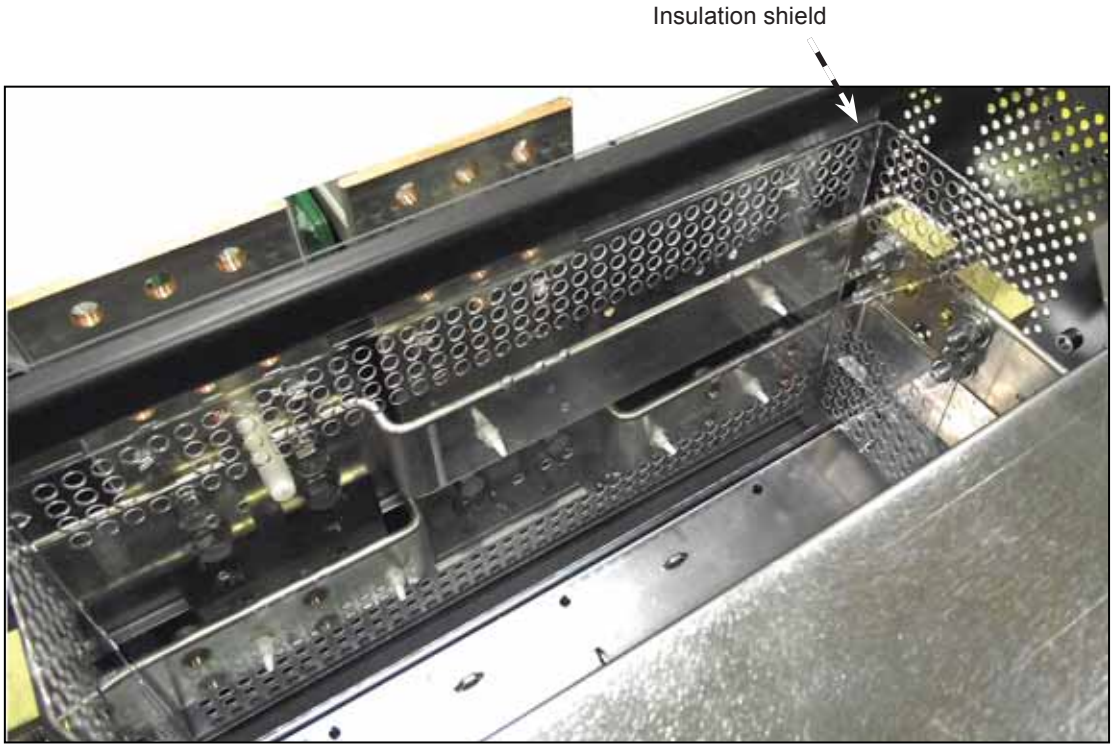


Figure 4 — Distribution module installation shield

Circuit Breaker Guard

The pivoting circuit breaker guard, with a circuit designation strip, prevents accidental tripping of a breaker.

3.3 DC Inter-bay Copper

The inter-bay bus bar is available in 2500 A nominal sizing. All inter-bay bus work is contained within the system racks.

Hot Bay Expansion

An additional bay can be added to the system while online without shutting down the DC plant. Review Section "1. Safety" on page 7 before undertaking this procedure.

3.3.1 DC Return Bus Bar

Each power system bay has two vertical distribution buses sized to carry the required current (see Figure 2):

The DC inter-bay return bar runs horizontally across the back of the rectifier shelves interconnecting the vertical return distribution buses in each bay. The return bus bar is the termination point for load returns, battery returns, rectifier positive, and site reference ground.

3.3.2 -48 V Bus Bar

The -48 Vdc inter-bay bar also runs horizontally across the back of the rectifier shelves interconnecting the vertical -48 Vdc distribution buses in each bay.

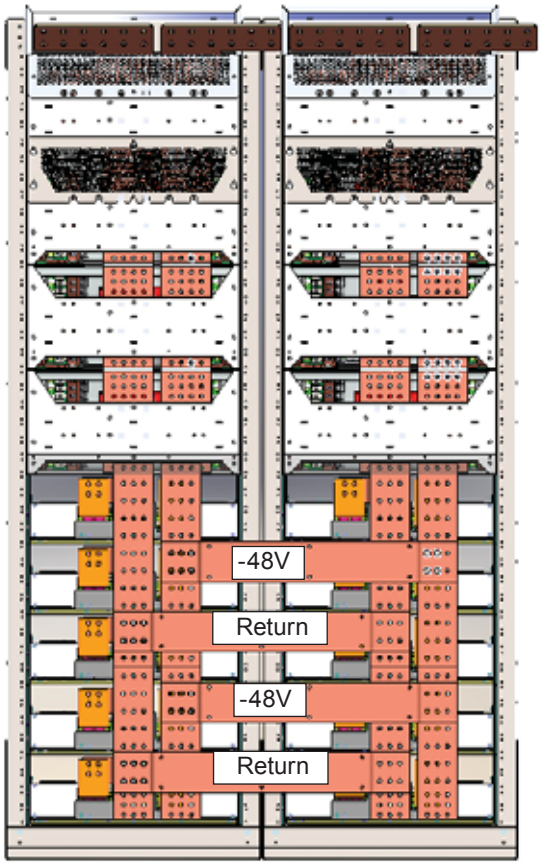


Figure 5 — Inter-bay DC connections (rear view)

3.4 Battery Terminations

There are 6 battery termination points (1/2" on 1 3/4" centers and 3/8" on 1" centers) per polarity on each power system bay (12 termination points if connections are made both front and back).

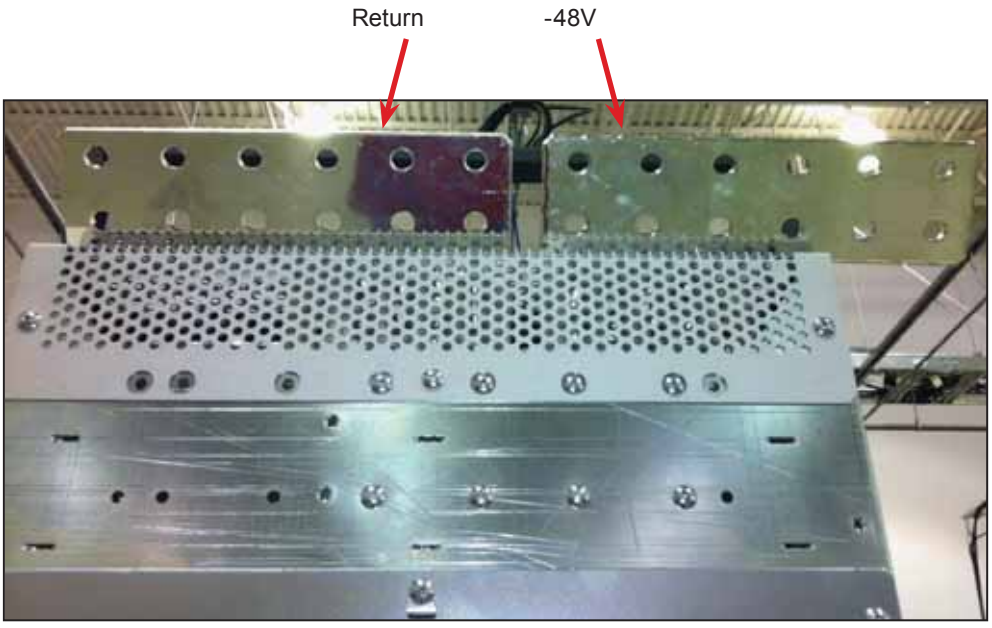


Figure 6 — Battery termination (rear view)

3.4.1 Remote Battery Return Bar (Optional)

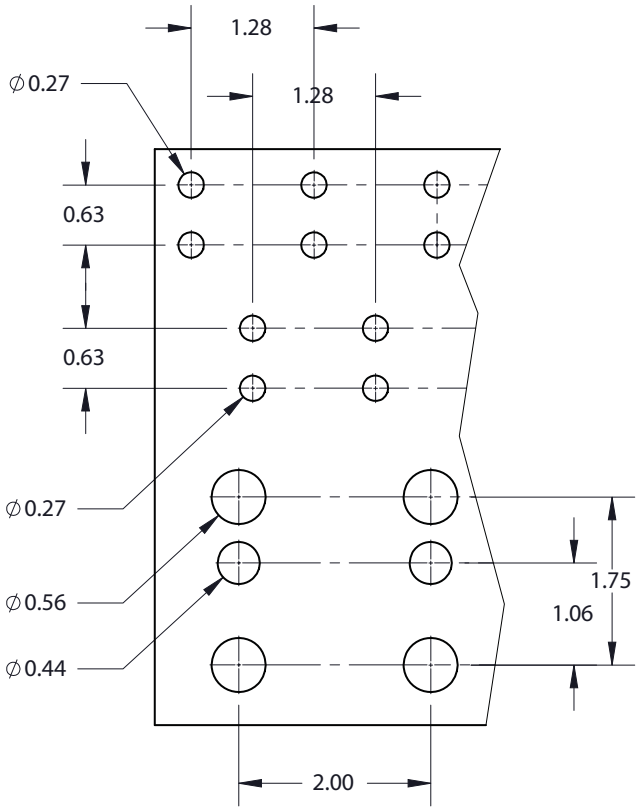
A remote battery return bar is required to facilitate termination of a high quantity of large cables. The kit contains all parts shown in Figure 7 and mounts to a customer supplied auxiliary frame (2" x 9/16").

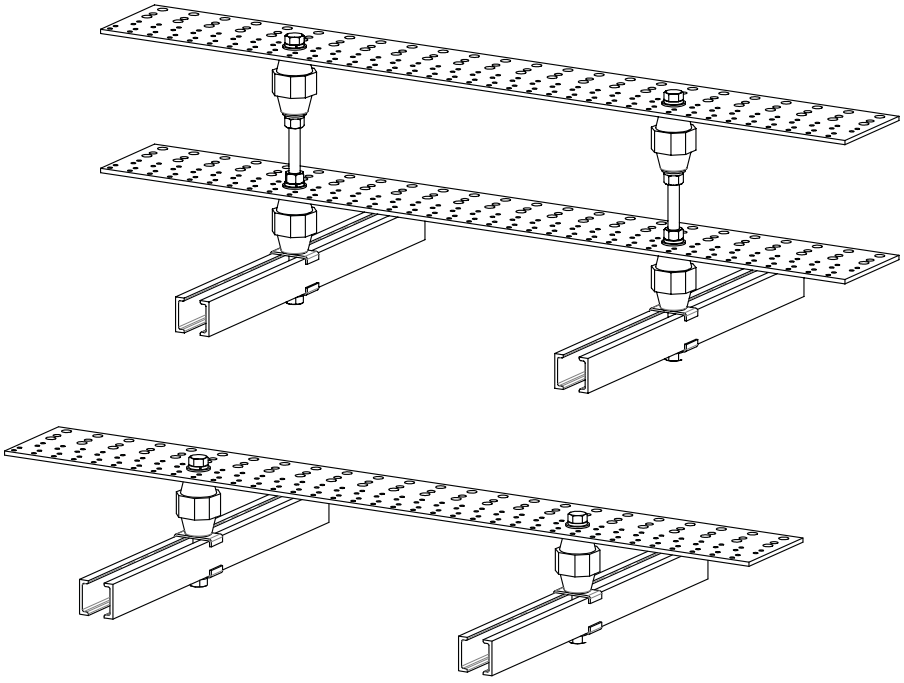
Lug Spacing

See Figure 8 for exact dimensions.

Small: 72 sets 1/4" on 5/8" ctrs

Large: 24 sets 3/8" on 1" ctrs or
24 sets 1/2" on 1 ¾" ctrs





Dual bars can be stacked or installed separately.

Figure 7 — Remote battery return bar: customer connections, dual and single bars shown

3.5 Distribution Shunts

Each TPL fuse or breaker bank can be connected to the distribution bus through an optional 800 A / 25 mV shunt. See Figure 8 and Figure 9.

The individual shunt currents can be viewed on the CXC to monitor load/ battery balance. If the system has more than four shunts, then installation of the shunt multiplexer panel option is required to increase the number of observable shunt currents at the CXC to 16. Shunts and TPL fuses may be used for battery protection (programming required).

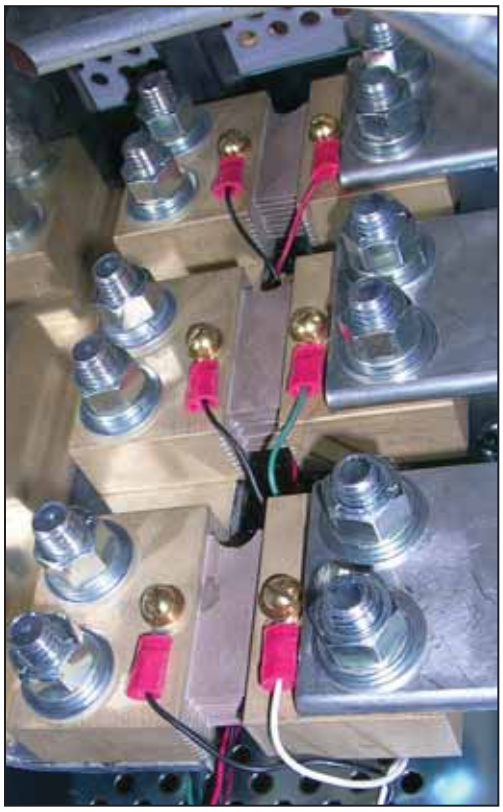


Figure 8 — TPL shunts

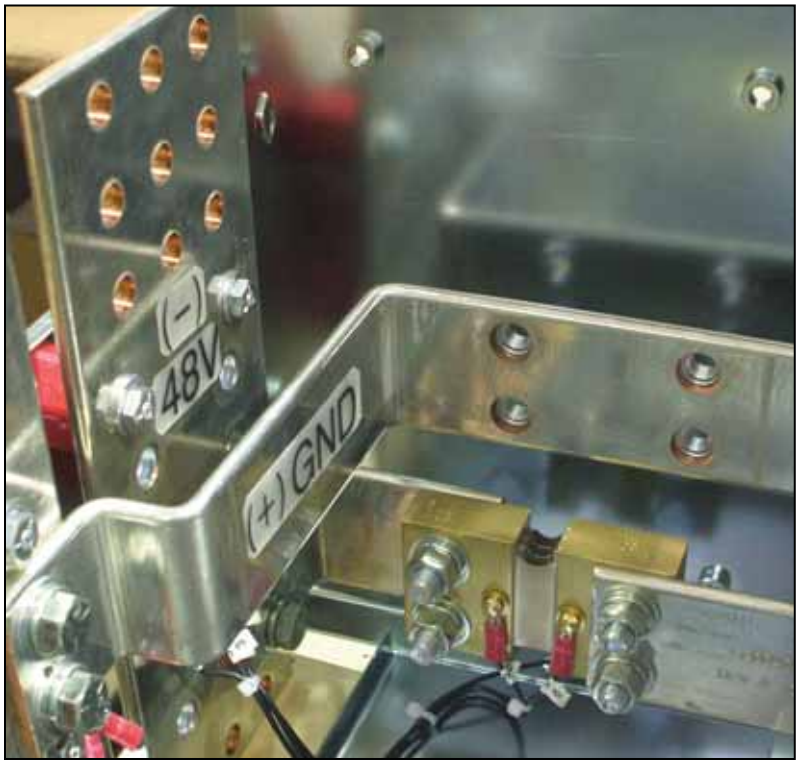


Figure 9 — Breaker bank shunt (one per bank)

3.5.1 Shunt Multiplexer Panel

The Cordex controller can monitor up to four current input channels, such as load currents and battery charge currents. When the number of current inputs is more than four, an optional shunt multiplexer panel monitors the individual branch load currents within the distribution modules of the individual bay and sends the current measurements to the CXC for data logging and display.

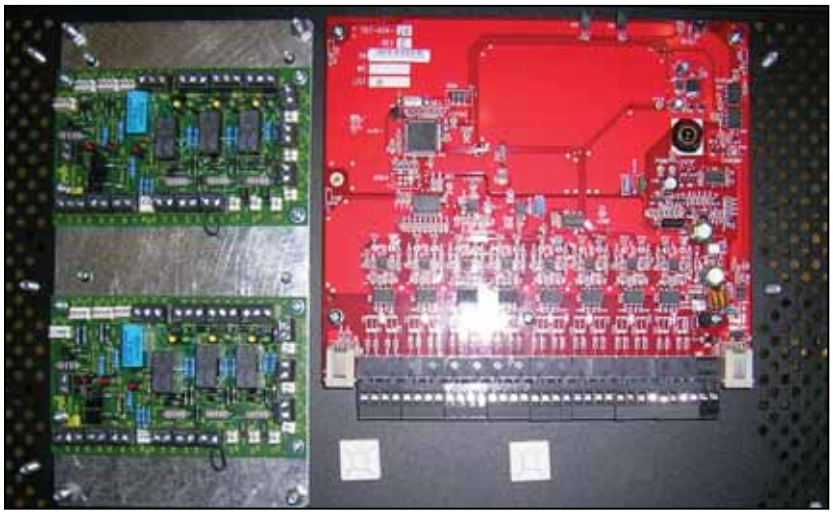


Figure 10 — Shunt mux panel mounted on the inside door of the top distribution module

3.6 Low Voltage Load Disconnect

The Low Voltage Load Disconnect (LVLD or LVD) feature controls a high capacity contactor that disconnects the load during extremely low voltage conditions. The system loads are automatically reconnected once AC is restored and battery voltage has risen above a preset value.

The parameters for LVD activation and control are set in the **Controls > Configure Controls** menu in the CXC controller. Refer to the section titled "*Controls*" in the controller software manual.

Each TPL fuse circuit in a given distribution bay, can have its own LVD. Figure 11 shows the LVDs in a distribution module with two banks of TPL fuses.

An LVD is also an option for a bank of breakers in a distribution module.

LVDs can also be configured as Low Voltage Battery Disconnects (LVBD).

LVD Override

Activation of all LVDs, by the controller, is through Relay 1 (LVD 1).

To manually override the LVDs, position the LVD Override switch to OVERRIDE. This switch is mounted inside the door of the distribution module with the controller—see Figure 12.

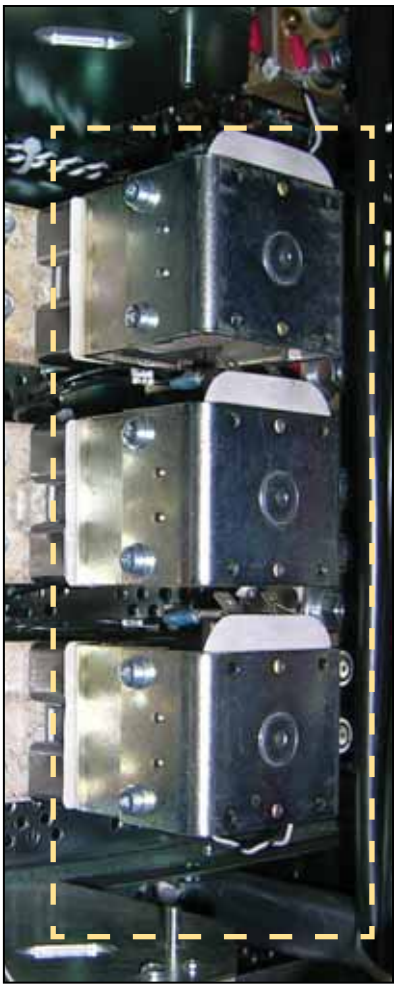


Figure 11 — LVD circuits

NOTE:

Setting the LVD Override switch to OVERRIDE generates an alarm on the CXC. See the "Digital Alarms" section under "Configure Alarms" in the controller software manual.

3.7 Distribution Panel Alarms

Fuse and breaker alarms occur when one or more fuse or breaker has opened.

Breaker alarms are paralleled from each breaker bank to a single alarm which is displayed on the inside panel of the distribution module. The TPL fuse fail alarms, also paralleled, display as a single alarm.

Each breaker/fuse panel is equipped with one alarm which is wired to the system controller.

NOTE:

Use the dip switch, inside the door, to disable TPL fuse alarms for unused TPL fuse positions.

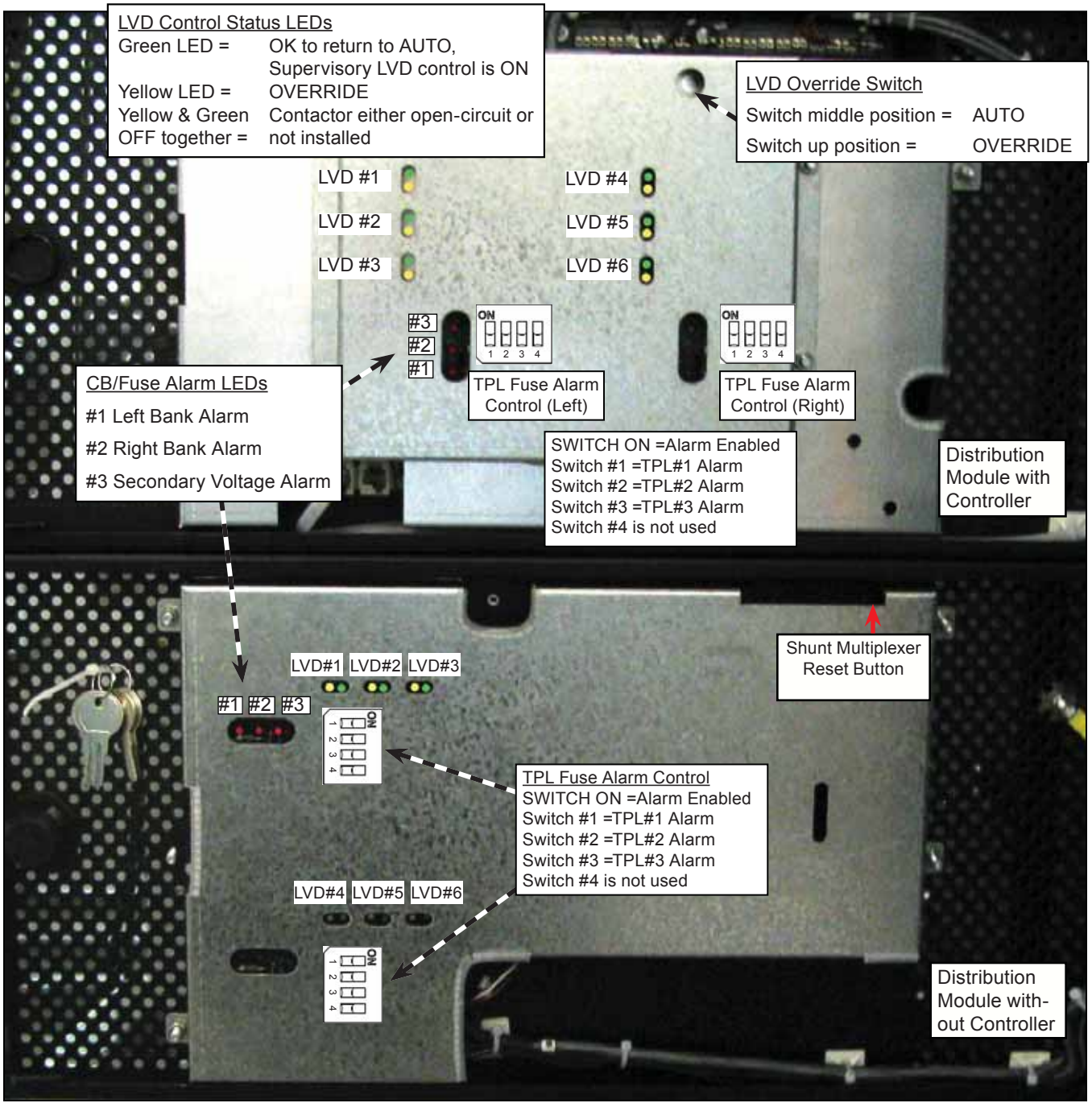


Figure 12 — CB/fuse alarm LEDs and LVD control

3.8 External Low Voltage Battery Disconnect (purchased separately)

The LVBD contactors, installed in the external battery disconnect panels, are placed in series with the batteries. This product provides automatic disconnect of the system batteries after a prolonged power failure when the batteries have been fully discharged.

The batteries are automatically reconnected once AC is restored. Control is performed by the CXC and is triggered by the battery voltage. Cordex System Controller

3.9 Cordex System Controller

A Cordex system controller (CXCP), mounted in one of the distribution modules, provides easy access to controls and display status. The CXCP features include the following:

- Direct communication with the Cordex rectifiers
- Battery temperature compensation charging
- Battery performance diagnostics
- Local and remote communications
- User definable alarms— a user can configure specific alarms through a programmable algorithm.
- Daily logging of power system events and system statistics
- Lithium battery backup to retain time and date settings if power is lost

See the CXC Software Manual, shipped with your order, for detailed information.

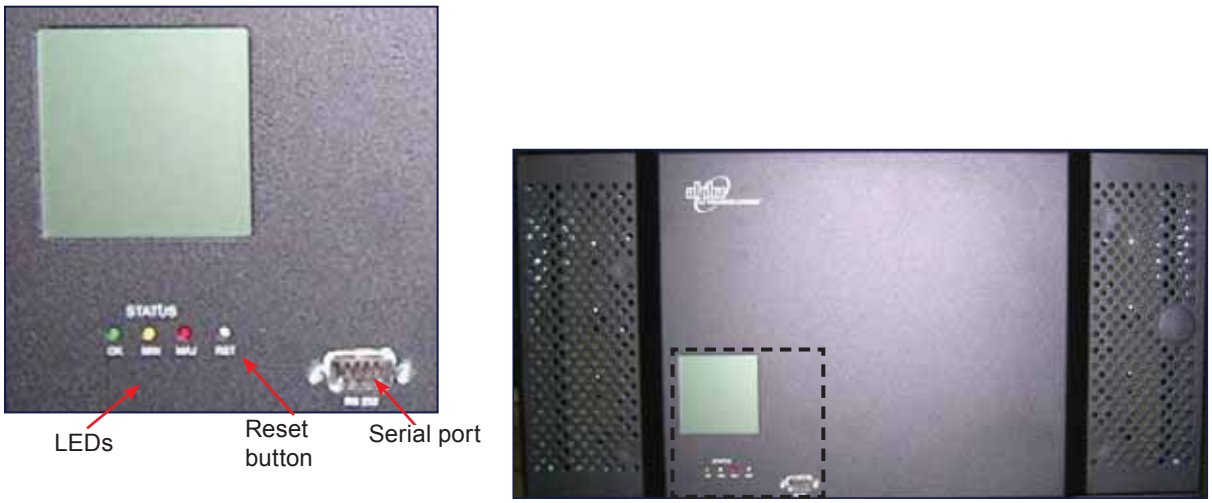


Figure 13 — CXCP controller mounted in a distribution module

3.9.1 Control Cards

The control cards are mounted inside the door of the controller distribution module (Figure 14).

The CXCP can accommodate up to eight digital input channels. These channels can monitor digital alarm/control signals from rectifiers, converters and other types of equipment. Some of these channels are pre-assigned to monitor specific signals. See the Software manual for more information.

Each CXCP contains eight standard and eight optional Form C alarm output relays to extend alarms and control external apparatus. Each internally generated alarm or control signal may be mapped to any one of the 16 relays, or, several signals may be mapped to just one relay or none at all.

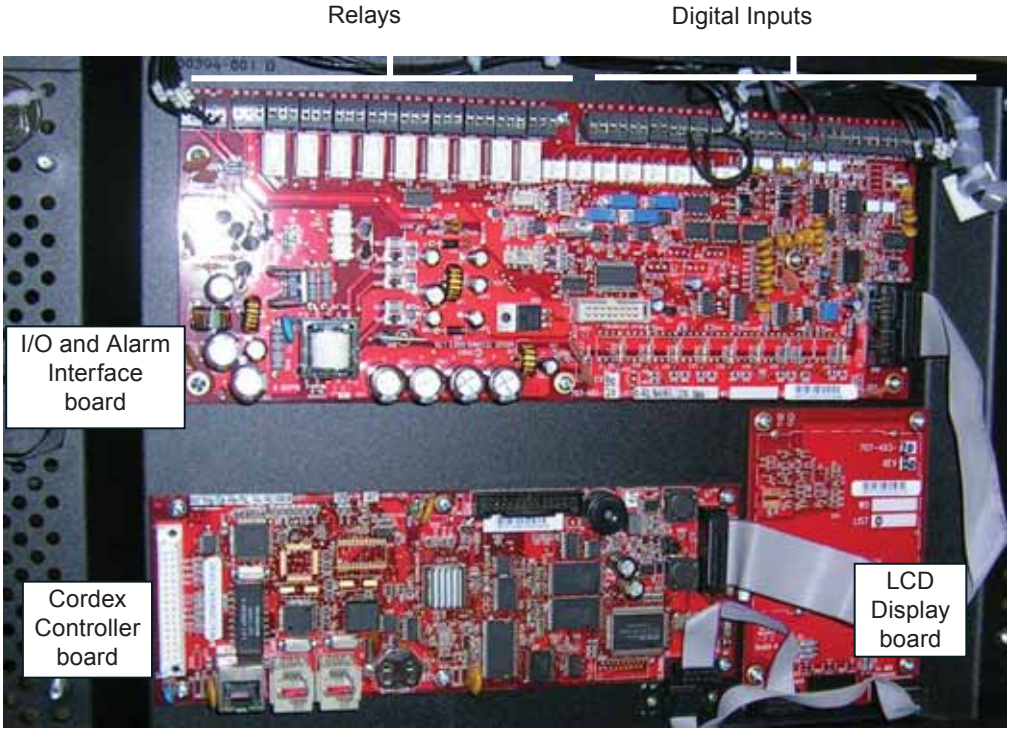


Figure 14 — Control cards

3.9.2 Front Panel LEDs

Three LEDs are located on the front panel: one green, one yellow, and one red. These LEDs are used to display the alarm status of the power system, controller progress and status during startup, and file transfers.

Alarm conditions

Only one LED light is illuminated at a time during alarm conditions. Each LED light corresponds to a specific alarm. A built-in audio speaker sounds an intermittent tone during active alarms.

Illuminated LED	Alarm
Green	OK, no alarms
Yellow	Minor alarm, no major alarms
Red	Major alarm

Progress and status indication

The LED lights are also used in the following situations:

- Base unit validation—all three LEDs illuminate
- File transfer—red LED illuminates

3.9.3 Front Panel Reset Button

Use the controller LCD to select the RESET menu item before pressing the reset button. Refer to the software manual for details.

Pressing the reset button, on the front panel, restarts the CXC microprocessor. It takes approximately 15 seconds before the display reappears after pressing the reset button (Figure 13).

3.9.4 Network connection and remote communications

The Cordex system can be set up, monitored, and tested via an Ethernet 10/100 Base-T serial data connection. The controller includes a web server that provides easy set up and monitoring over an Internet connection to a web browser.

Craft port

Local access to the CXC is possible through a front panel RS-232 serial port (Figure 13), using a null modem cable. The communication protocol supports a web interface (Microsoft® Internet Explorer 6 or greater). The remote screen display is an enhanced version of the CXC front panel display.

Ethernet port

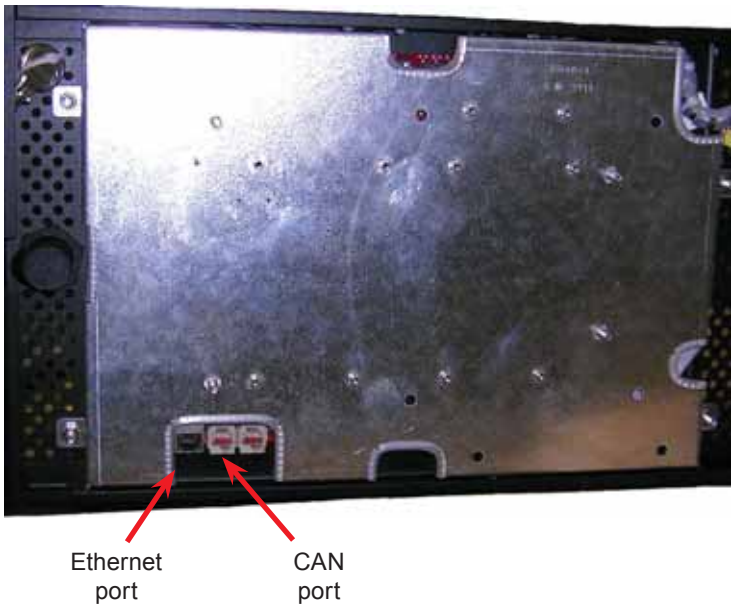
An Ethernet port is located inside the front panel. This port is designed to connect the controller to a user supplied TCP/IP network. Use a standard RJ-45 jack with a standard network cable.

The Ethernet port can be used for local access, for example to a laptop computer. Use a standard network crossover cable for the connection.

Internal CAN Bus

A CAN bus is used to transmit all alarm and control functions between the controller and expansion distribution bays.

A single CAN Serial port, for communications with other distribution modules is located inside the front panel next to the Ethernet port.



4. Pre-Installation Preparation

4.1 Site Selection

The power system must be mounted in a clean and dry environment.

Consider both the floor loading and the physical space required for a single bay CXPS power system and the batteries:

- Dimensions for one bay (refer to drawing #0250005-06):
  - » mm.....2133H x 660W x 482D
  - » Inches....84H x 26W x 19D
- Avoid areas that may be subjected to hot air exhaust from nearby equipment.
- Provide adequate space for safe and proper circulation of installation and maintenance personnel:
  - » Top: clearance required for cables
  - » Rear: 3ft (1m) during installation; after installation. a bay can be moved closer to a wall provided ~12" clearance is maintained for ventilation
  - » Front: 3ft (1m)
  - » Sides: Allow ~6in (15cm) additional space ion the live side of the power system for the live battery return bar at the top of the bay (Figure 15).

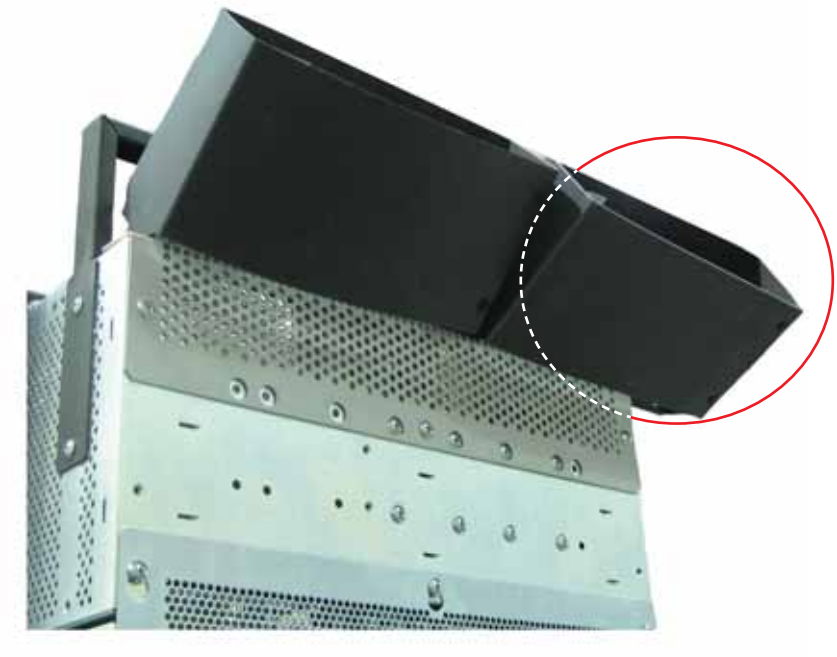


Figure 15 — Battery terminations shown with protective covers

4.1.1 Floor Plan Layout

Sufficient free space must be provided at the front and rear of the power system to meet the cooling requirements of the rectifiers in the power system and to allow easy access to the power system components.

Consider the following before selecting a location for the CXPS power system

- Structure of building able to support the additional weight
- Enough space to meet requirements for access
- Enough space to meet cooling requirements of the rectifiers
- Adequate space to do the install
- Route that equipment will take through the building to reach the site
- Check and record distances to load
- Check and record distances to AC power source
- Check and record distances to batteries/DC power source
- Understand the full load on the DC system
- Window for working hours and other similar restrictions
- How much and what kind of prep work can be done in advance
    - » Reinforce floors
    - » Install distribution panels
    - » Install cable racks
    - » Run wiring
    - » Minimize cable lengths (cost)
    - » Minimize cable flow and congestion

4.1.2 Installation component requirements

Supplied

- Internal DC cables

Not Supplied

- Concrete and metal grating mounting hardware
- AC electrical conduit, cable and fittings
- External DC conduit, cable and fittings
- Auxilary frame (2" x 9/16") for external battery return busbar kit

4.2 Tools and Test Equipment

Insulated tools are essential for a DC power system installation. Use the following list as a guide:

- Electric drill with hammer action
- Digital voltmeter equipped with test leads
- Lap top computer with Internet Explorer 8 for communication with the Cordex Controller (not required for initial installation and test)
- Various crimping tools and dies, to match lugs used in installation
- Torque wrench:1/4" drive, 0-150 in-lb for battery post connections
- Torque wrench: 3/8" drive, 0-100 ft-lb for system connections
- Insulating canvases as required (2' x 2', 1' x 1', 3' x 3', etc.)
- Cutters and wire strippers (#14 to #22 AWG) [2.5 – 34 mm^2]
- Insulated hand tools listed below:

    Combination wrenches

    Ratchet and socket set

    Various screwdrivers

    Electricians knife

    Fine tipped slot screwdriver (“tweaker”)

    Cable cutters

4.3 Floor Loading

4.3.1 Concrete floors (for reference only)

Concrete floor installation requiring seismic compliance requires approval by the appropriate engineering discipline, i.e., civil, structural etc. The thickness of the concrete should be evaluated to ensure that its weight carrying capabilities meet the requirements.

Check the building floor plans for the presence of pipes, conduits, beams or any other obstructions in the concrete slab that could interfere with the drilling.

Figure 17 shows the dimensions and bolt locations of a single bay. An anchoring kit is provided with hardware for the slots

4.4 Unpacking the Equipment

Product is shipped upright bolted to a pallet or horizontally in a wooden crate. Packaging assemblies and methods are tested to International Safe Transit Association standards.

Rectifiers and batteries are shipped on individual pallets.

Check For Damage

Prior to unpacking the batteries, power system or components, perform a visual inspection and note any damage. Unpack the equipment and inspect the exterior for damage. If any damage is observed contact the carrier immediately.

Continue the inspection for any internal damage. In the unlikely event of internal damage, please inform the carrier and contact Alpha Technologies for advice on the consequence of any damage.

General Receipt of Shipment

Consult the packing slip and power plant bill of materials to verify that you have the correct number of bays per your order.

The inventory included with your shipment is dependant upon the options you have ordered. The options are clearly marked on the labels on the shipping containers.

Rectifiers (Purchased Separately)

Consult the packing slip to verify that you have the correct number of rectifiers per your order.

Miscellaneous Small Parts

Review the packing slip and bill of material to determine the part number of the “configuration kits” included with your plant;

Review the bill of materials (per the configuration kits that you determined above) to verify all the small parts are included.

The part number is stamped on each piece of copper bar. Inspect these and match the items with your bill of materials.

External Return Bus Bar (Purchased Separately)

Consult the packing slip to verify that you have the correct parts.

Battery Disconnect (Purchased Separately)

Consult the packing slip to verify that you have the correct number of battery disconnect units if applicable.

Batteries (Purchased Separately)

Verify that you have the correct number of batteries if applicable. Refer to the packing list.

Verify that you have all the necessary parts per your order for proper assembly.

Call Alpha Technologies if you have any questions before you proceed: 1-888-462-7487

5. Installation

The power system must be mounted in a clean and dry environment. Provide sufficient free space at the front and rear of the power system to meet the cooling requirements of the rectifiers in the power system and to allow easy access to the power system components.

5.1 Floor drilling for standard anchoring

The anchoring kit and procedures in this section are for a sesimic installation, but apply equally well to a non-seismic installation.

5.1.1 Drilling the holes for the anchor bolts

1. If you are installing more than one bay, snap a chalk line on the floor to align the bays for mounting.
2. Use a rebar locator to plan for the anchor positions.
3. Refer to Figure 17 (drawing 0300047-06) to mark the four anchor hole positions for standard anchoring or eight anchor hole positions for seismic anchoring.

   Figure 16 shows the preferred location for the anchor holes within the slots.

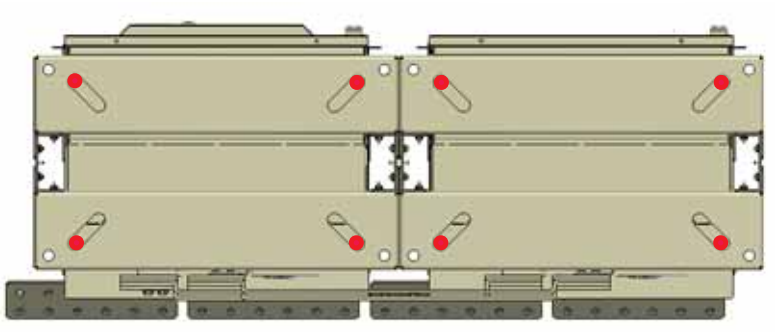


Figure 16 — Mounting holes (two frame system shown)

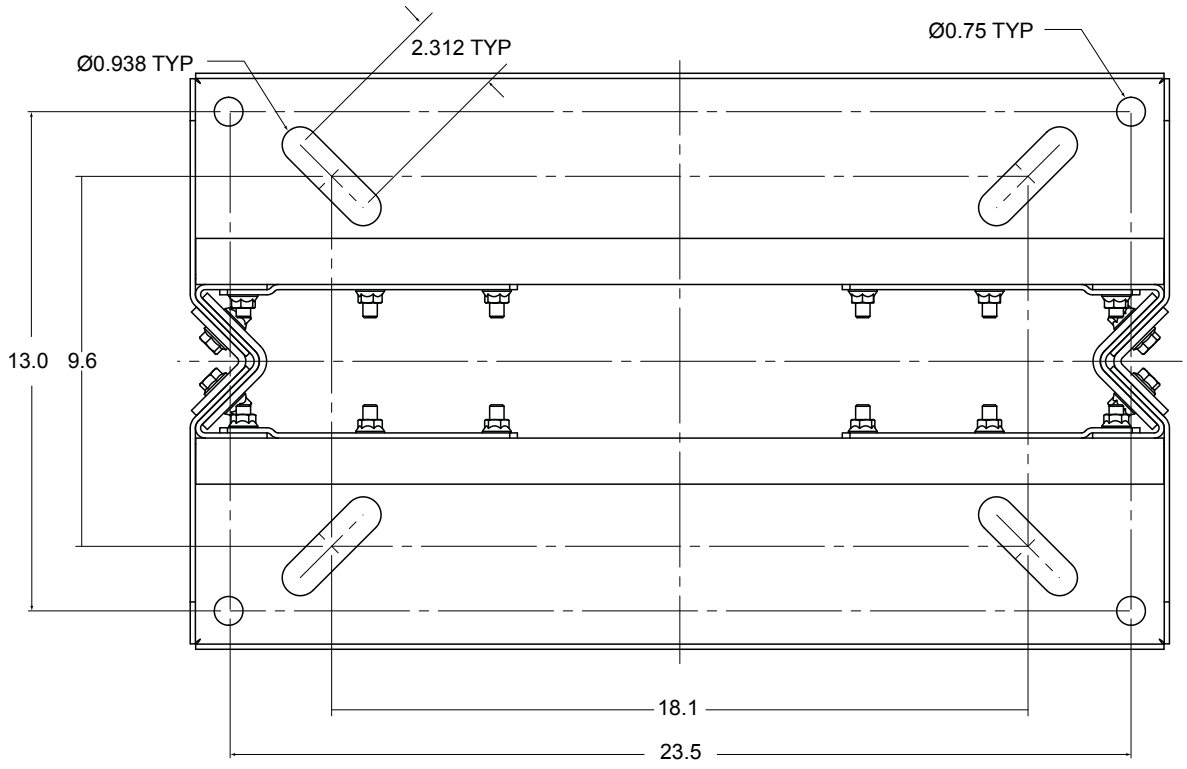


Figure 17 — Template for anchoring bolts

5.1.2 Setting the Anchors

First, review manufacturer's instructions before setting the anchor.

1. Drop the anchor into the drilled hole.
2. Insert the anchor setting tool and hit it with a hammer to expand the anchor until the collar of the setting tool rests against the shoulder of the anchor.

5.2 Placing and Securing the Bays

5.2.1 Securing the bays to the floor

NOTE:

When installing two or more adjacent frames, install the inter-bay copper DC links per section 5.4 before completing the final torquing of the anchor bolts.

NOTE:

It is extremely important that the frame be properly shimmed in order to prevent any frame distortion.

1. Place the frame in position over the anchoring holes (and the isolation pad if applicable).
2. Install the anchoring hardware for each anchor FINGER TIGHT.
3. Check that the bay is level front-to-back and side-to-side.
4. Add shims as needed under one or two of the corners of the bay, placing the shims as close as possible to the bolts. To place a shim, take just enough weight off the bay to slide the shim into place.
5. Allow the full weight of the bay to rest on the shims, and then check the level again.
6. If installing two or more adjacent frames, install the inter-bay DC links per section 5.4.
7. Once the bay is level, tighten all bolts to the appropriate torque (see "Table E — Recommended torque values" on page 40.

5.3 Securing Adjacent Bays

Bolt each pair of bays together with the rack joining kits, included in your shipment. Use one kit at the top and one at the bottom.

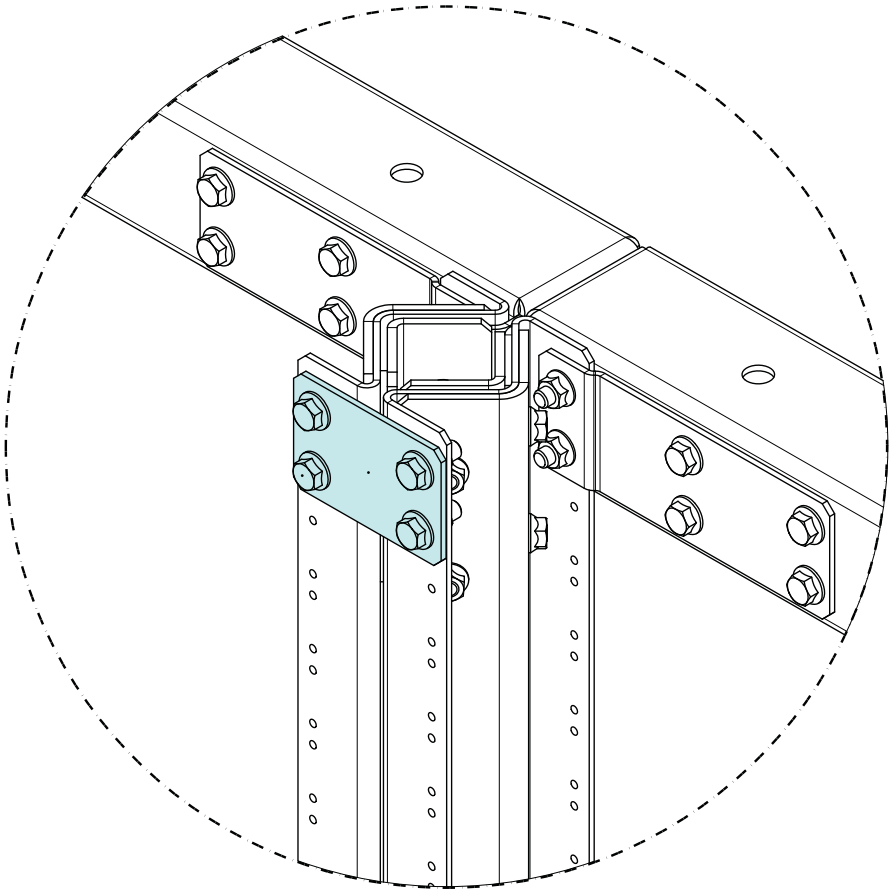


Figure 18 — Joining the racks of adjacent bays (top join shown)

5.4 Installing the Inter-bay DC Bus Work and Cabling

The inter-bay DC bus work ships as a kit that is sized according to the number of rectifiers and current demand of the load.

NOTE:
It may be necessary to slightly move the bays in order to perform the final alignment for the connection points in the following procedure. In a new installation, the frame anchors should not have been set completely as per instructions in section 5.2.1. When adding a new frame to a working system, it may be necessary to loosen the floor anchors in the existing frame to permit final alignment.

5.4.1 Remove rear covers/brackets

This procedure is written for the addition of an adjacent bay to the right (from the rear) of the existing bay. Adapt for your configuration.

1. Remove the Kydex rear covers of both bays. (Save all screws for reinstallation of covers.)
2. Remove the middle, cover-support bracket (Figure 19) on the adjacent edges of EACH bay to make room for the inter-bay bus work.

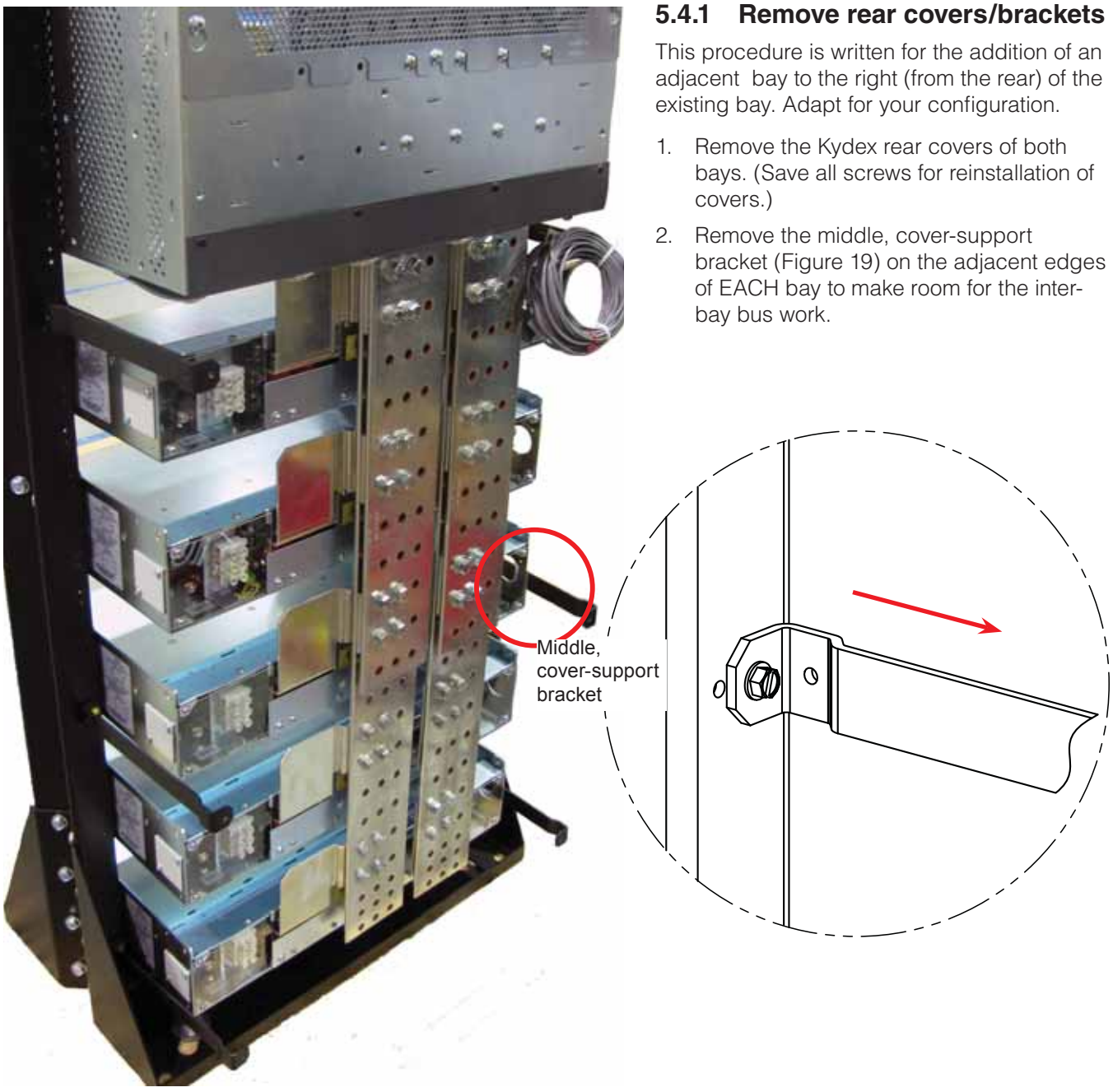


Figure 19 — Removal of middle, cover-support bracket

Install inter-bay bus bars top to bottom

Two people are required to perform this procedure.

NOTE:

Be aware there is a copper piece sandwiched between the vertical bus bars and held in place with the same bolts you are about to remove.

1. Start with the top -48V bar in the primary bay.
2. Remove 2 bolts.
3. Remove the metal sandwiched between the two vertical bus bars along with the last 2 bolts.
4. Repeat the preceding steps on the extension bay.
5. Place the inter-bay bus bar so the bolt holes line up with the bolt holes in the vertical bus bars.
6. Replace the 8 bolts and 2 metal sandwich pieces.
7. Once assembled, torque all bolts to 360 in/lbs.
8. Repeat the procedure for the remaining three inter-bay buses, continuing from top to bottom. Figure 20 shows the completed bus work.
9. If this is a multi-bay installation or if it was necessary to loosen the floor anchors, proceed with final setting of floor anchors.

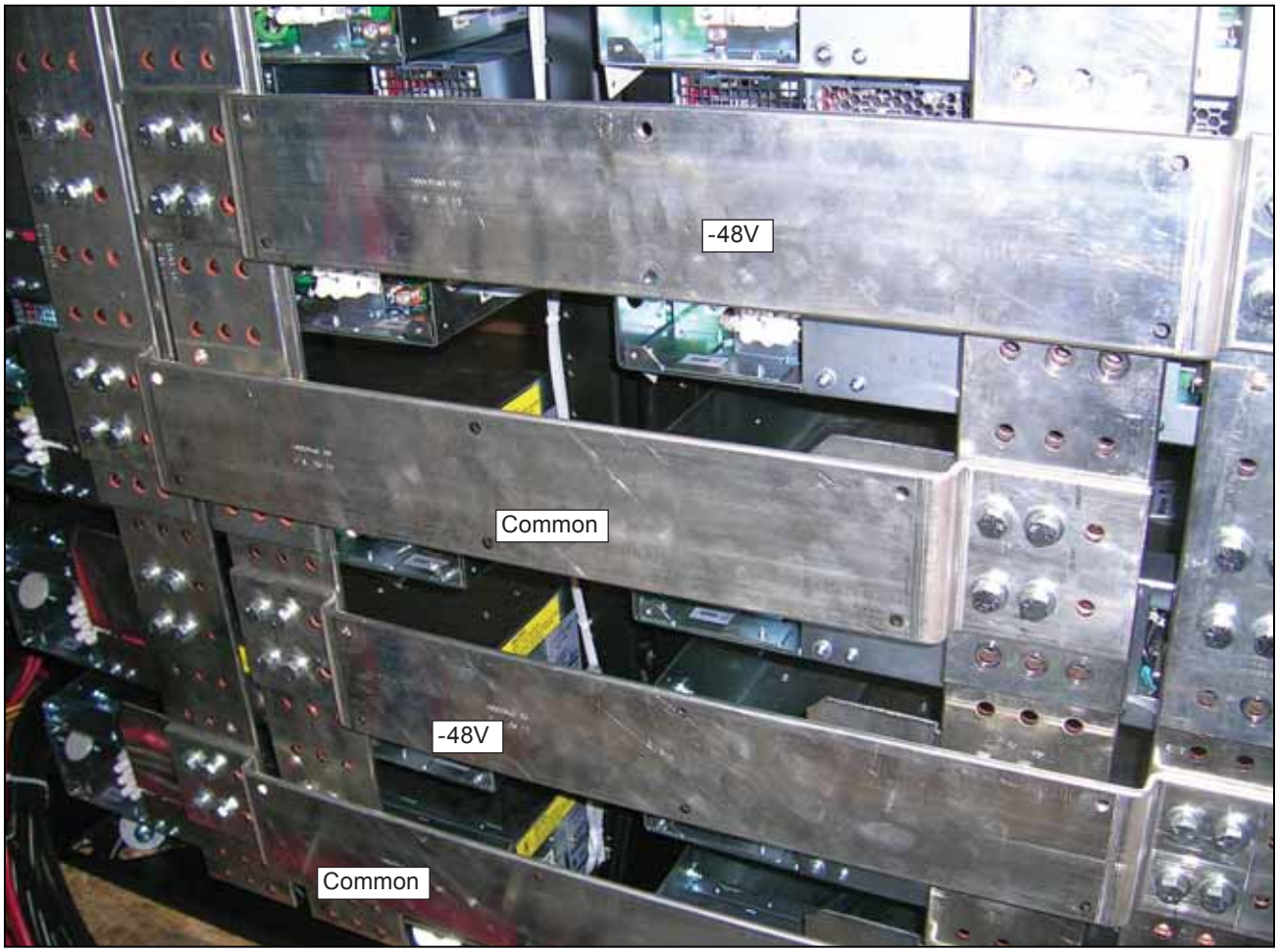


Figure 20 — Inter-bay bus work

5.4.2 Installing the Inter-bay Cables

A new expansion bay arrives with the CAN bus and signal cables ready for connection to the existing bay.

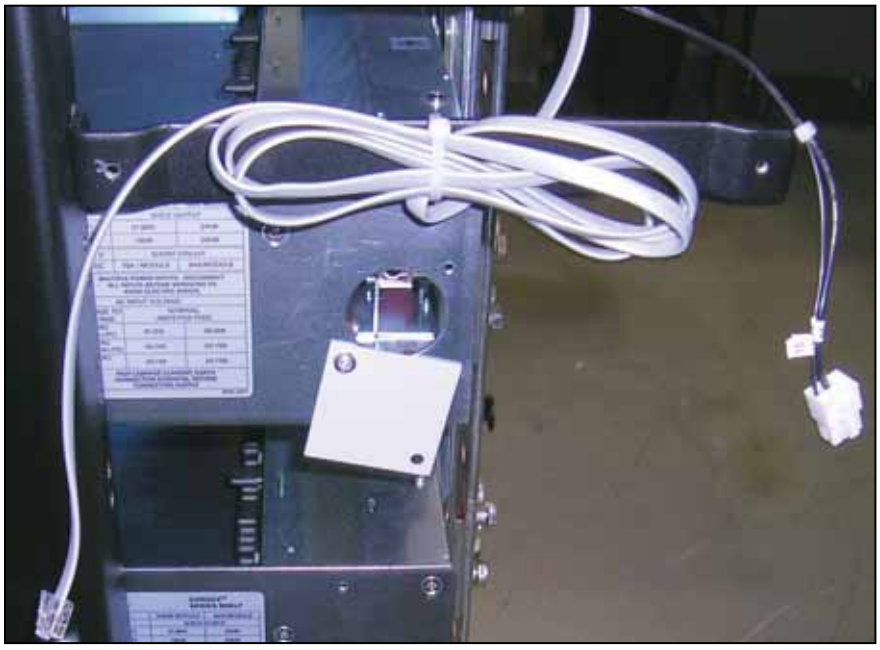


Figure 21 — Inter-bay cables

Inter-Bay Signal Cables

1. Locate the connector ends of the wiring harnesses in the existing bay and the expansion bay.
2. Join the two connectors together.
3. Tie-wrap the connector cable to the shelf as shown in Figure 21.

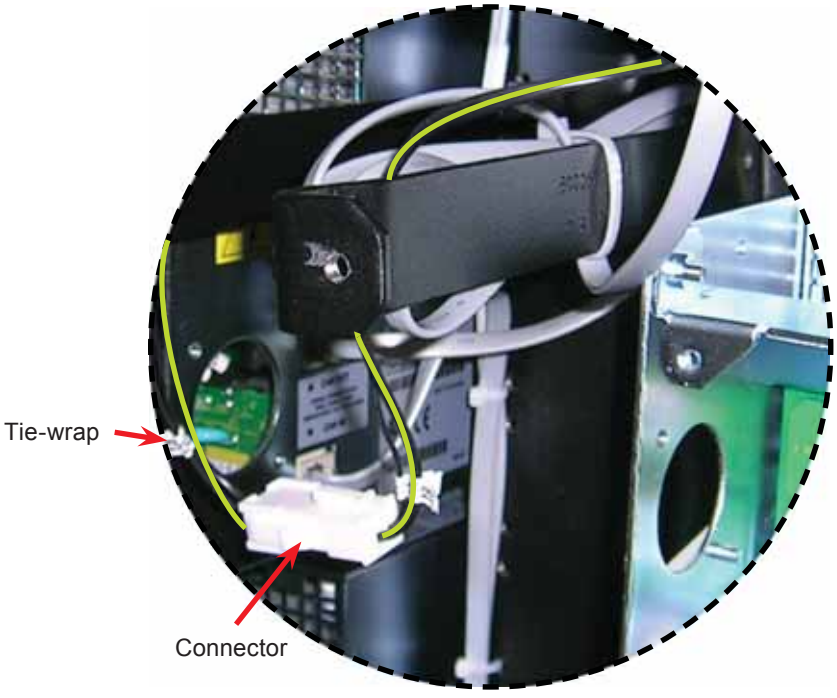


Figure 22 — Inter-bay signal cable connectors

Inter-bay CAN Bus Cable

The CAN bus provides a communication path between the controller and rectifiers. In a single bay, the CAN bus cabling is daisy-chained from the shunt mux, if installed, to the bottom rectifier shelf. The cable is then daisy-chained from the bottom shelf, to higher shelves, in sequence. At the last shelf, termination is enabled—see Figure 18.

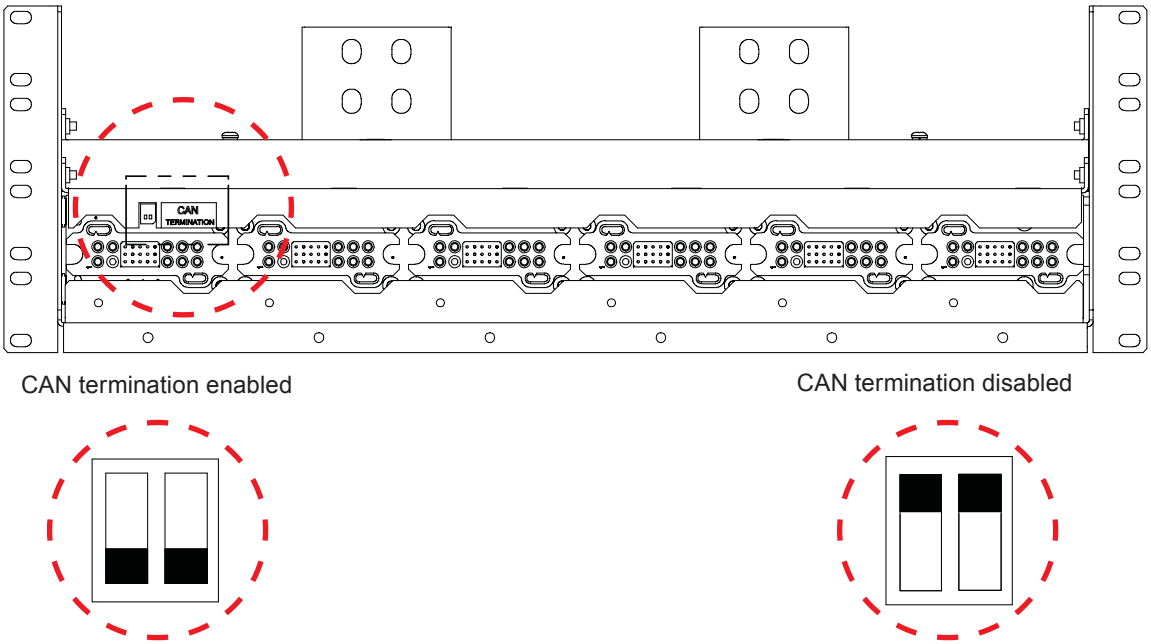


Figure 23 — CAN bus termination

NOTE:

If your system has redundant rectifiers, it is recommended to power off the left most rectifier in the top shelf of the existing bay during this procedure.

1. Remove the left most rectifier in the top shelf of the existing bay. (Refer to the Rectifier Shelf manual for the removal and re-insertion procedure.)
2. Flip the DIP switches from Termination Enabled to Termination Disabled—see Figure 18.
3. Replace the rectifier.
4. Connect the CAN bus cable to the CAN OUT connector of the top rectifier shelf of the expansion bay.

Figure 24 — CAN OUT connection

5.4.3 Cutting and reinstalling rear Kydex covers

Before reinstalling the covers, trim the sides to clear the inter-bay bus bars:

1. Use wire cutters to cut through the second row of holes on the adjacent sides of the Kydex covers.
2. Replace the covers and attach them to the cover support brackets (see Figure 19).
3. Join the covers together with the plastic pins and the Kydex strip shown in Figure 25.

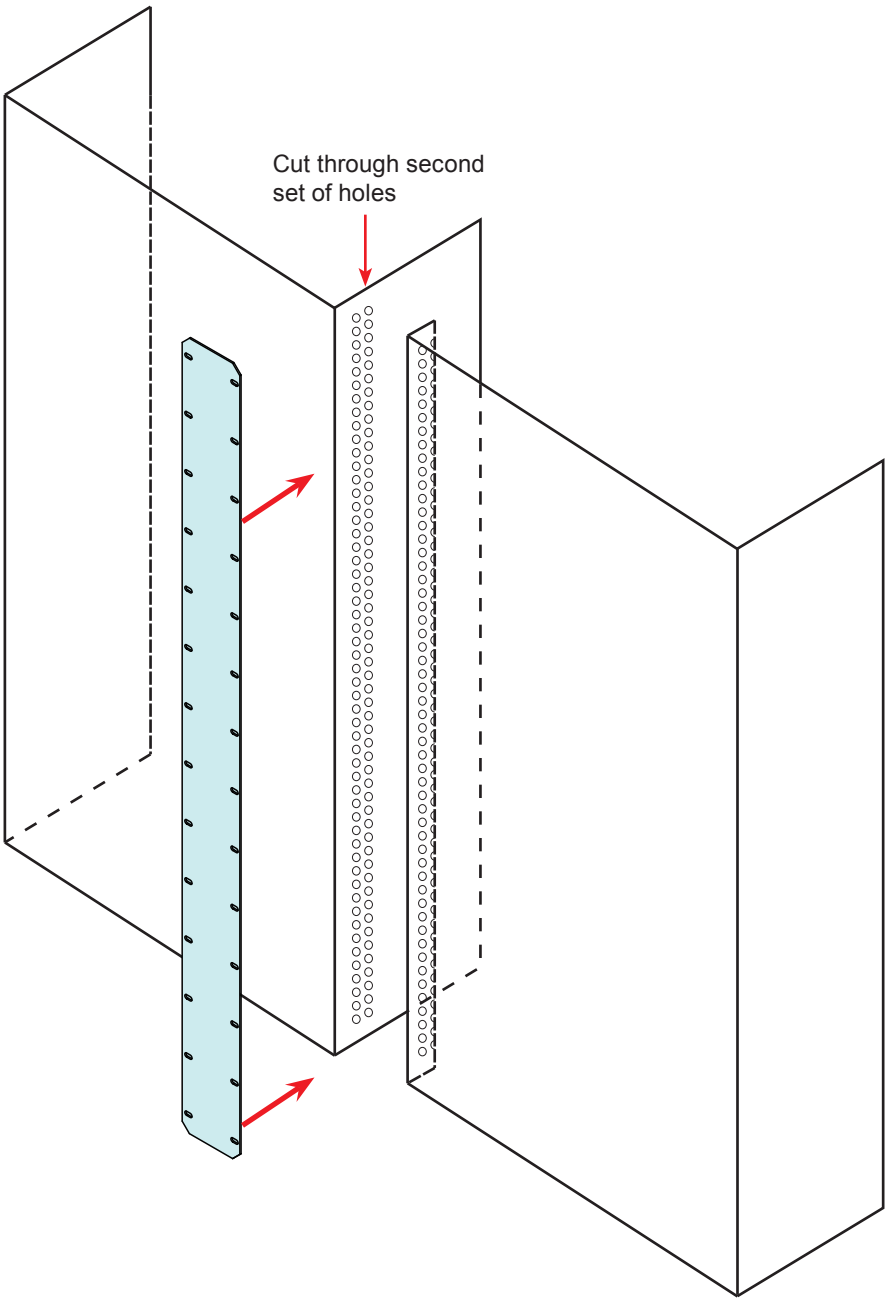


Figure 25 — Re-installation of rear Kydex covers

5.5 Mounting the External Battery Return Bus Bar

NOTE:

TPL fuses require an external return bus bar.

An expandable external battery return bus bar kit (part number 7400250-001) is provided with each power system to make the battery return connections for the loads and to serve as the common connecting points for the positive side of the bays and the batteries.

Each bar has a 2500A capacity.

1. Before joining ground bar components together, ensure that all contact surfaces on the busbars are clean and coated with a thin coat of NO-OX-ID “A” compound (or approved equivalent).
2. Assemble and mount the kit on a customer supplied auxiliary framing superstructure away from the system.

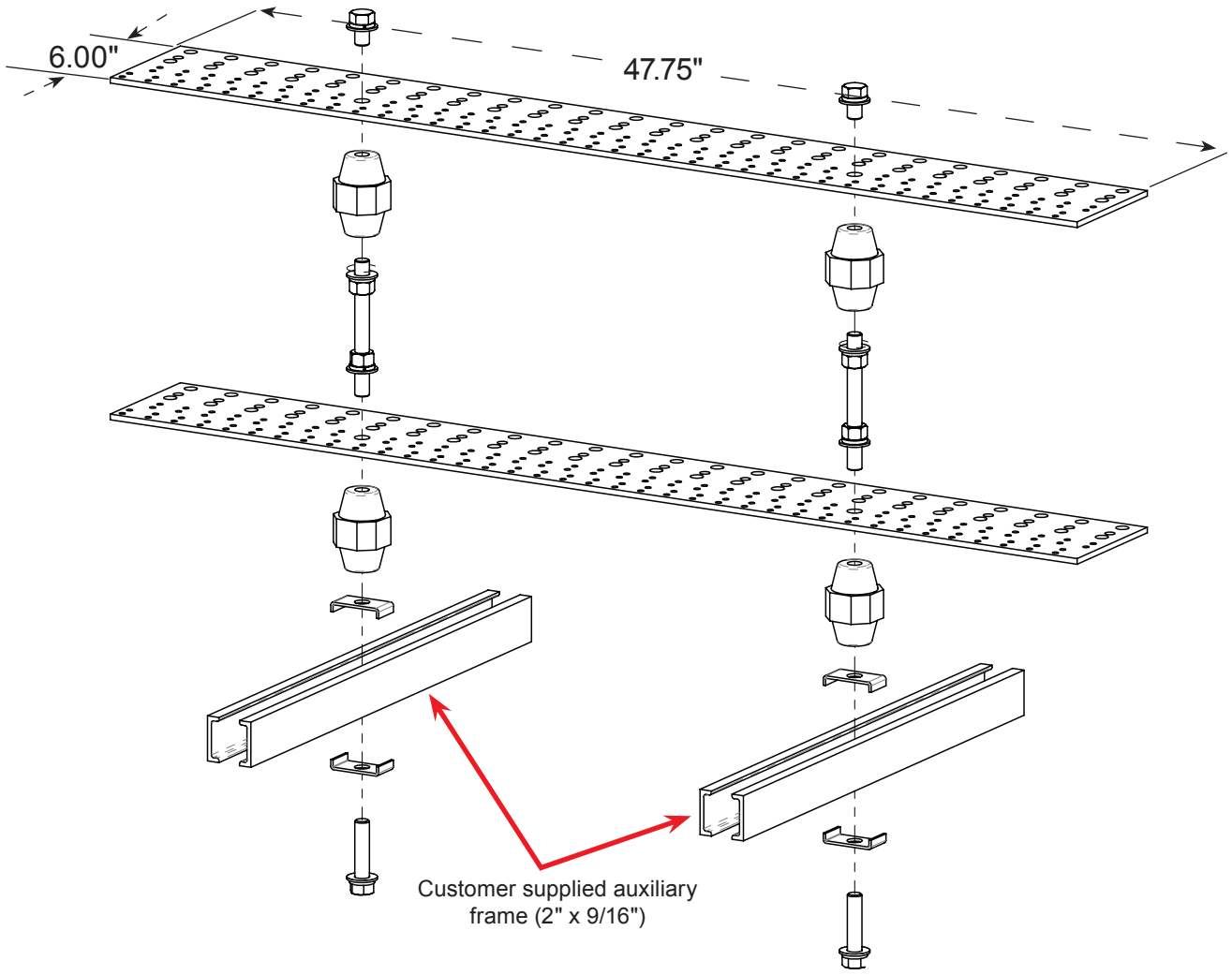


Figure 26 — External battery return bus bar kit (2 bars shown)

5.6 Battery Installation

This information is provided as a guideline and is not meant to imply that batteries are part of this power system.

WARNING!

Follow battery manufacturer's safety recommendations when working around battery systems and review the safety instructions provided in this manual.

Figure 27 — Battery installation

5.6.1 Preparation/Mounting

Batteries should be located in a temperature-controlled environment. The temperature should be regulated at approx. 25°C (77°F). Significantly lower temperatures reduce performance and higher temperatures decrease life expectancy.

Before assembly, clean cells (where applicable) as per the battery manufacturer's recommendations. First neutralize any acid with a baking soda and water solution. Then wipe the cells with clean water.

5.6.2 Installation of External Batteries

Verify that all battery breakers, DC circuit breakers, and fuses on the distribution panels are either in the OFF position or removed.

Use a corrosion-inhibiting agent such as NO-OX or NCP-2 on all battery terminal connections.

1. Assemble battery rack (if required) and the cells or mono-blocks as per the installation instructions supplied with the batteries.
2. Ensure that the battery output cabling will reach the [+] and [–] terminals of the series battery string and that the batteries are oriented correctly for easy installation of the inter-unit "series" connectors.
3. Remove any no-oxide "A" grease from battery terminals.
4. Burnish terminal posts with a non-metallic brush, polishing pad or 3M-type scotch pad.
5. Apply a light coating of no-oxide "A" grease to the terminal posts.
6. If lead plated inter-unit connectors are used, they should also be burnished and no-oxide "A" grease applied as above. Install the inter-unit connectors.
7. After all battery connections are completed, torque per battery specifications (typically 100 in-lbs).
8. See system startup procedure before connecting batteries online.

5.6.3 Temperature Probe for Monitoring Battery Temperature

1. Connect CXC temperature probes from CXC to battery termination post negative, if applicable. Pick a good location at mid-height on one or more battery string that will provide a good average temperature reading; i.e., away from heating or cooling sources.

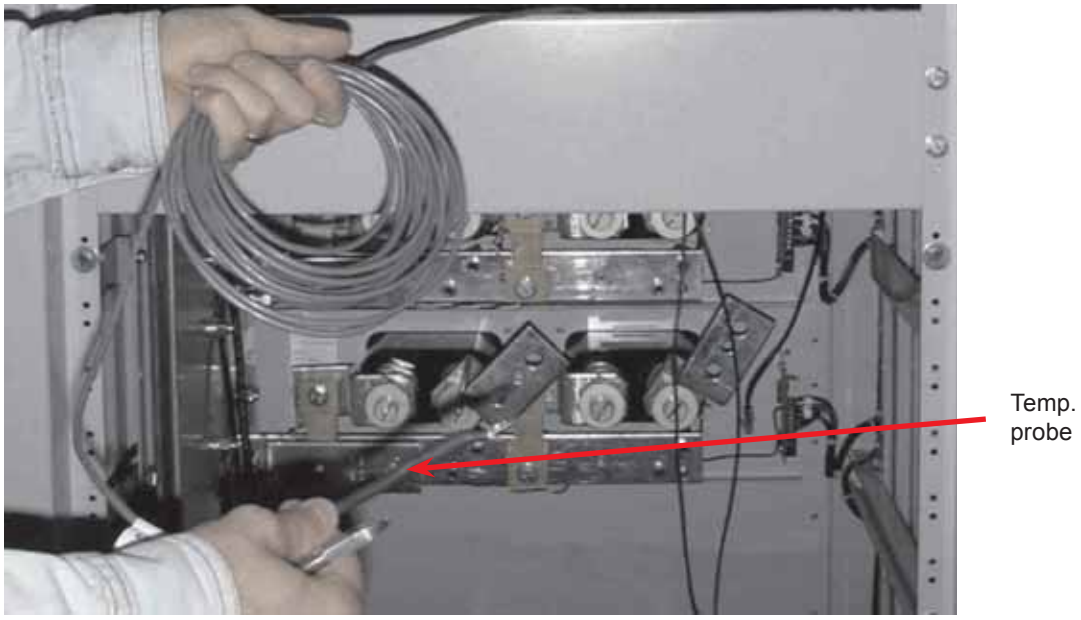


Figure 28 — Temperature probe

After assembly, number the batteries and take “as received” readings, including specific gravity, cell voltage, and temperature. Designate one cell as the pilot cell. This is usually the cell with either the lowest specific gravity or voltage. Refer to the manufacturer's literature for guidelines. See the following table for typical maintenance report:

Company: _____ Date: _____

Address: _____

Battery location and/or number:_____

No. of cells: _____ Type: _____ Date new: _____

Date installed: _____ Float voltage: _____ Ambient temp.: _____

Table C — Typical VRLA battery maintenance report

Cell #	Serial #	Voltage	Specific	Ohms	Mhos	Observations

Remarks and recommendations: _____

_____

_____

Readings taken by: _____

6. Installation - AC, DC and Grounding Cables

This section provides cabling details and notes on cable sizing for DC applications with respect to the Alpha CXPS-D 48 Power System.

- Only qualified personnel should install and connect the power components within the Alpha power system.
- All wiring must be in accordance with applicable electrical codes.
- A low voltage disconnect (LVBD) should be provided with the battery system.
- Electrical codes require that conductors carrying AC current be installed separately from conductors carrying DC current and signals.

6.1 Installation Notes

6.1.1 Installer Responsibility

The system arrives pre-wired, and the installer is responsible for connecting the following:

- Utility input to the system
- Battery strings
- System to the load
- Chassis and battery return to the reference ground

6.1.2 Calculating Output Wire Size Requirements

Although DC power wiring and cabling in telecommunication applications tend to exceed electrical code requirements, mostly due to the voltage drop requirements, all applicable electrical code(s) take precedence over the guidelines and procedures in the present chapter, wherever applicable.

Wire size is calculated by first determining the appropriate maximum voltage drop requirement. Use the formula below to calculate the circular mil area (CMA) wire size requirement. Determine the size and number of conductors required to satisfy the CMA requirement.

$$CMA = (A \times LF \times K) / AVD$$

A = Ultimate drain in amps

LF = Conductor loop feet

K = 11.1 constant factor for commercial (TW type) copper wire

AVD = Allowable voltage drop

Check again that the ampacity rating of the cable meets the requirement for the installation application. Consult local electrical codes (NEC, CEC, etc.) for guidelines. If required, increase the size of the cable to meet the code.

Refer to Table D for cable size equivalents.

Table D — Cable size equivalents (AWG to Metric)			
Cable size (see notes 1 and 2)	**Circular mils**	**Square millimeters**	**Equivalent metric cable**
20 AWG	1020	0.519	1
18 AWG	1624	0.8232	1
16 AWG	2583	1.309	1.5
14 AWG	4107	2.081	2.5
12 AWG	6530	3.309	4
10 AWG	10380	5.261	6
8 AWG	16510	8.368	10
6 AWG	26250	13.30	16
4 AWG	41740	21.15	25
2 AWG	66370	33.63	35
0 AWG (or 1/0)	105600	53.48	50 or 70
00 AWG (or 2/0)	133100	67.42	70
0000 AWG (or 4/0)	211600	107.2	120
313 MCM (or kcmil)	313600	159	150 or 185
350 MCM (or kcmil)	350000	177.36	185
373 MCM (or kcmil)	373700	189	185 or 240
500 MCM (or kcmil)	500000	253.36	300
535 MCM (or kcmil)	535300	271	300
750 MCM (or kcmil)	750000	380.00	400
777 MCM (or kcmil)	777700	394	400

t

6.1.3 Recommended Torque Values

Recommended torque values for connection to the power system:

- Clear hole connections (nut and bolt)
- PEM studs
- PEM threaded inserts
- Thread formed connections (in copper bus bar)

Table E — Recommended torque values	
1/4"	8 ft-lbs
3/8"	20 ft-lbs
1/2"	75 ft-lbs

Grade 5 rating is required for these torque values.

6.1.4 Cabling Layout

The cabling at the time of installation is straightforward.

- The AC cables for the rectifiers connect to the shelves on both sides, and are brought down from the top of the frame to the rectifier shelves.
- The battery cables and the external battery return bar connect to the bay at the top rear.
- The load cables to the distribution modules enter the bay through the top.
- The load return cables connect to external battery return bar
- All signaling wires (for example, alarms from the CXC Controller) interfacing with the outside world exit the frame through the top.

6.2 AC Supply for the Rectifiers

To ease future access issues, connect the AC circuits to all rectifier shelves at the time of initial installation.

NOTE:

Verify NO rectifiers are installed in the rectifier bays at this time.

6.2.1 Standard AC

Refer to Table A on page 11 for AC input options.

Terminate flex conduit at rectifier shelves—one connection each side.

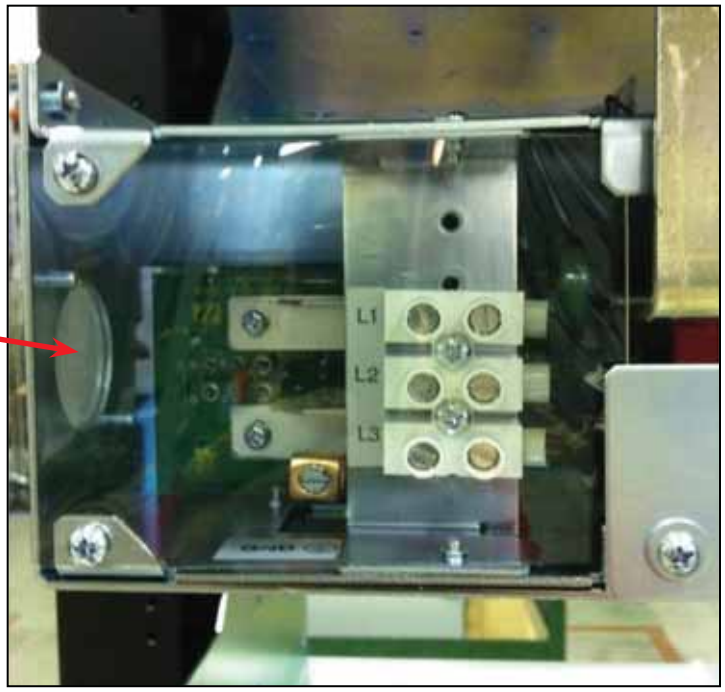


Figure 29 — Shelf AC connection (208Vac, 3 phase, 3-wire shown with rear cover removed)

6.3 Connecting the Frame and Reference Grounds

CAUTION!

The grounding methods described in this section are generic. Follow local requirements and electrical code.

NOTE: This power system is suitable for installation as part of a Common Bonding Network (CBN) and is intended to be used in a DC-C configuration (common DC return).

A true single point ground system means that everything is referenced to a single point that is tied to the external earth ground system. In reality each component and external source is effectively bonded to a single point, which is then effectively bonded to the facility or site external ground system.

6.3.1 Connecting the power plant battery return reference lead

1. Connect the isolated power system battery return bus (BRB) of the primary bay to the building master ground bus (MGB) or floor ground bus (FGB) in larger buildings (Figure 30). This acts as a system reference and a low impedance ground path for surges, transients, noise, etc. The MGB or FGB should have a direct low impedance path to the building grounding system.
2. Size the cable between the power system and the MGB or FGB so that there is sufficient ampacity to clear the largest fuse or breaker on the power system, excluding the battery protection fuse or circuit breaker—750 MCM is recommended. This is the minimum requirement for these high capacity plants. Other factors, including length of cable and special grounding requirements of the load, must be factored in. The insulated cable should be equipped with two-hole crimp type lugs and should not have any tight bends or kinks.

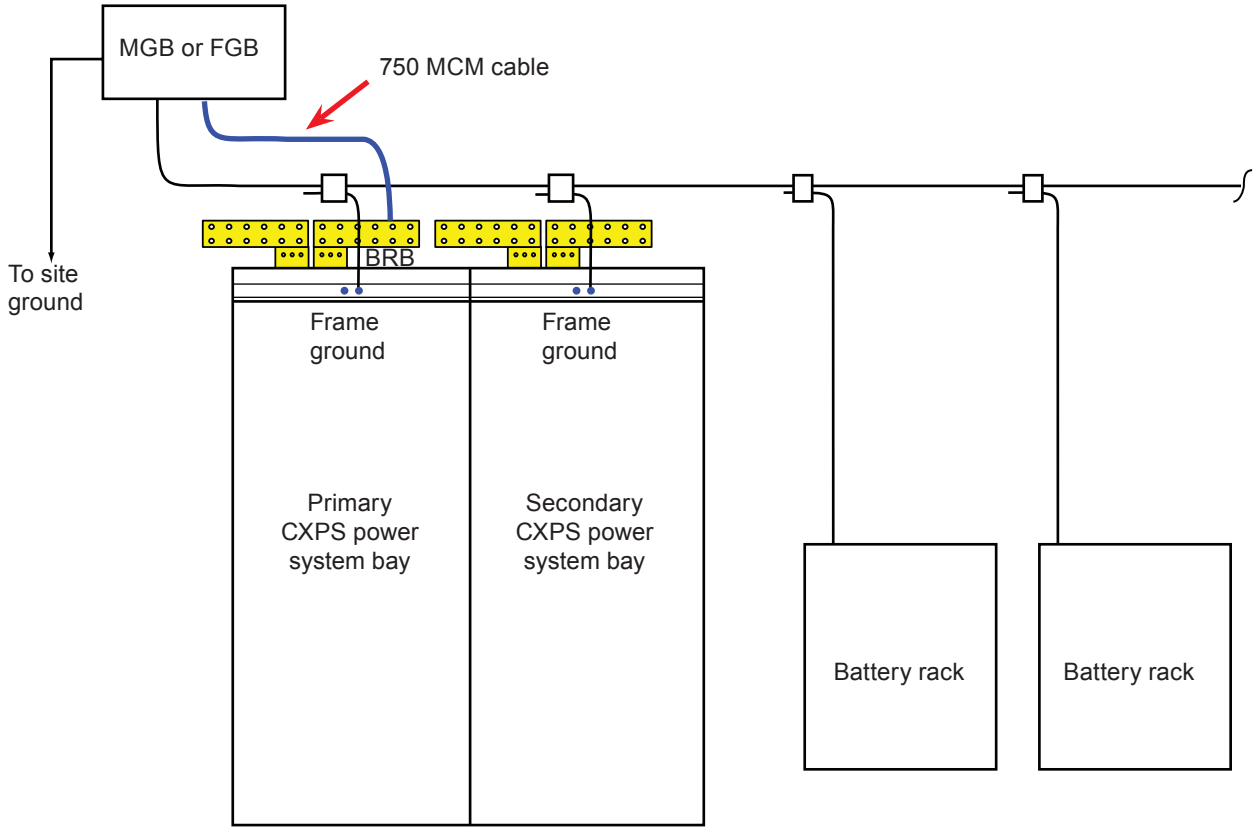


Figure 30 — Frame and reference returns (front view)

6.3.2 Connecting the power plant frame ground

The power plant frame must also be connected to the MGB or FGB—see Figure 30. This is done for personnel safety and to meet many telco-grounding requirements. Cable should be #6 AWG (16mm) for small to medium size power plants and #2/0 for large plants (> 800A).

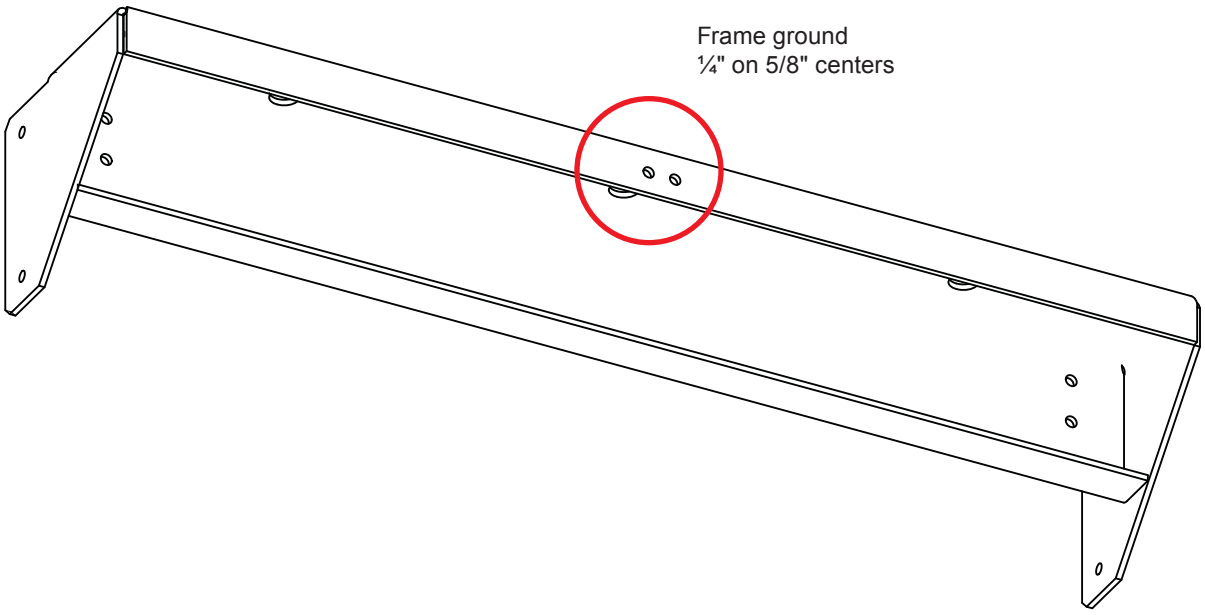


Figure 31 — Frame reference ground (top of bay)

6.4 External Battery Return Bar Wiring (Optional)

Connect the external battery return bar(s) to the associated bay's battery return bus as shown in Figure 32.

NOTE:

The return side of TPL fuse holders must connect directly to the external return bus bar.

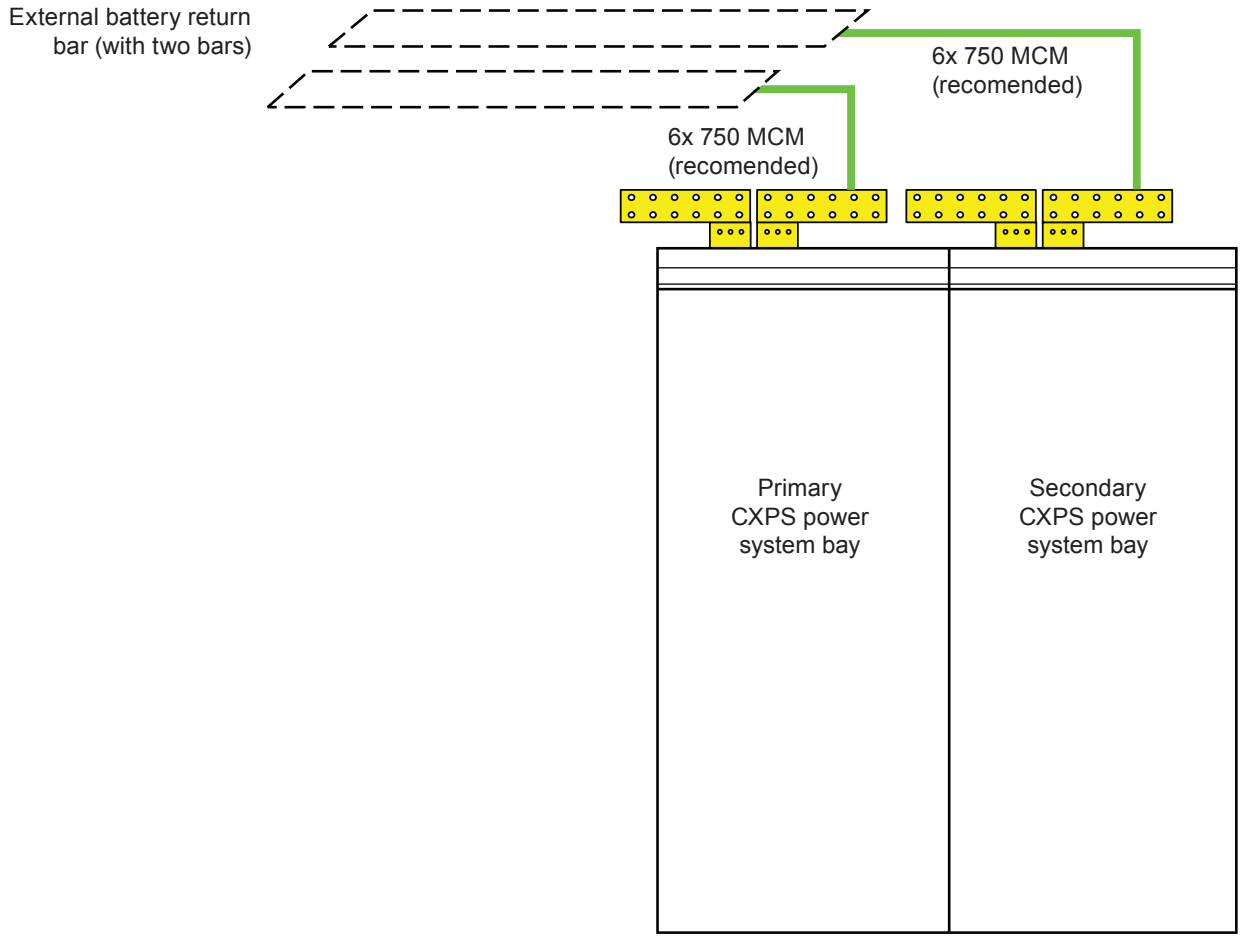


Figure 32 — Remote battery return bar wiring (shown for two bays)

6.5 Battery Connections

Battery cables should be sized for a 0.25 V drop from battery to the power system at full load including anticipated growth. The cables should also meet ampacity requirements.

6.5.1 Battery Return Connections

Procedure:

1. Connect the battery return cables to an external battery return bus bar, if installed, (Figure 33) or to the return bus bar termination on the bay:

External Battery Return Bus Bar (Figure 33)	Battery Return Termination on the Bay (Figure 34)
• 24 sets of 1/2" holes on 1¾" centers • 24 sets of 3/8" holes on 1" centers • 72 sets of 1/4" holes on 3/8" centers	• 6 sets of 1/2" on 1 3/4" centers and/or 3/8" on 1" centers (12 if connected to both sides of the bar)

2. In a two-bay system, balance battery and load returns evenly between the two bays.

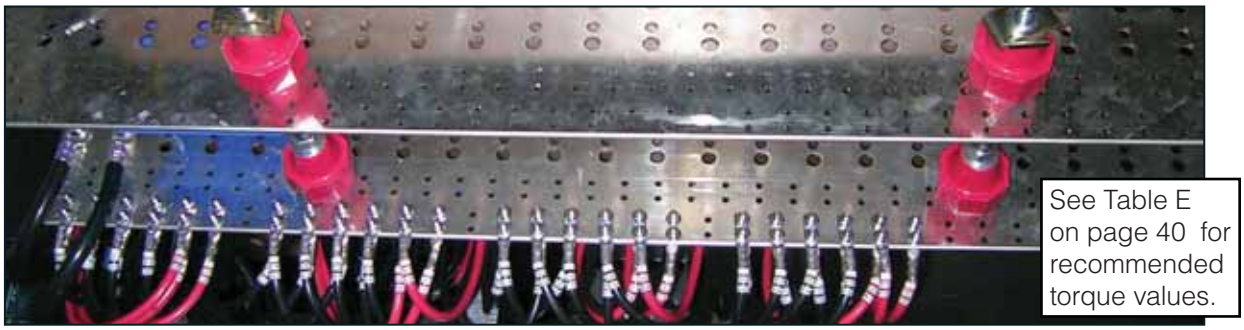


Figure 33 — External battery return bus bar (dual level shown)

6.5.2 -48V Battery Cables

CAUTION!

Do NOT make final connection to battery live. Insulate and leave disconnected or remove the battery fuses. Switch battery contactors off (if used).

1. Connect directly to the -48V bus bar at the left top of the power system bay.
2. In a two-bay system, balance the quantity of batteries evenly between the two systems.

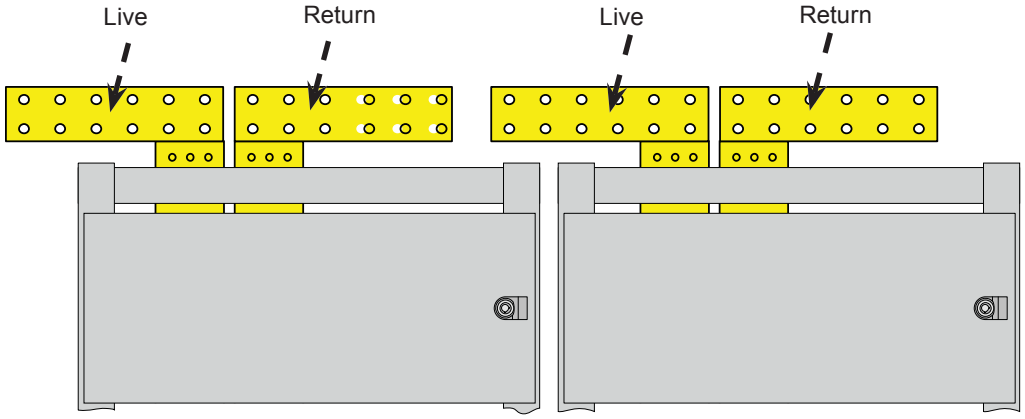


Figure 34 — Battery terminations on the bay (front view)

6.6 Connecting DC Load Cables to Breaker Circuitry

Refer to guidelines supplied with the load equipment. Distribution cables are typically sized to provide a 0.5 V loop drop at full load as well as meeting ampacity requirements of the protection fuse or circuit breaker.

6.6.1 Before You Begin:

1. Cut cables to length and terminate with a two-hole lug:
    - » TPL fuse connection—3/8" diameter on 1" center
    - » AM breaker— 1/4" diameter on 5/8" center
2. Identify each cable with a label that indicates its location within the distribution modules.
3. Remove the top Kydex cover.

6.6.2 Load Cables to Breakers

1. Route the load cables through the top distribution module.
2. Remove the protective negative terminal cover (Figure 36).
3. If using 2-pole or 3-pole breakers (Figure 35), remove the Insulating materials between adjacent breakers connections.

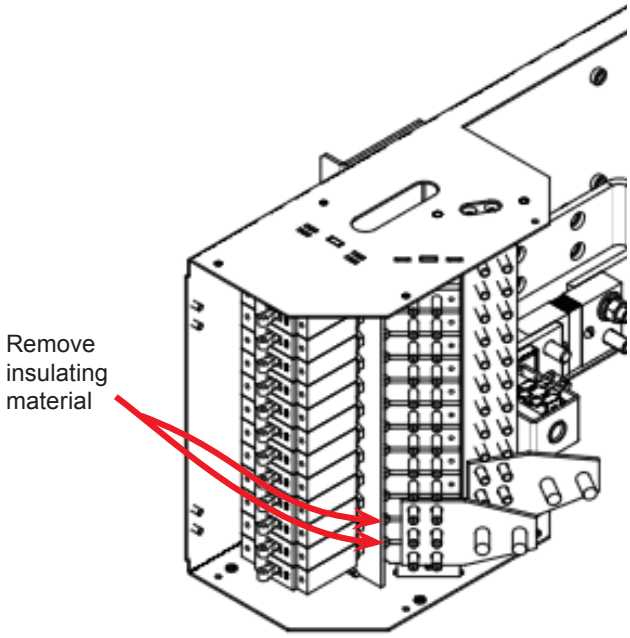


Figure 35 — Preparation for 2-pole and 3-pole breakers

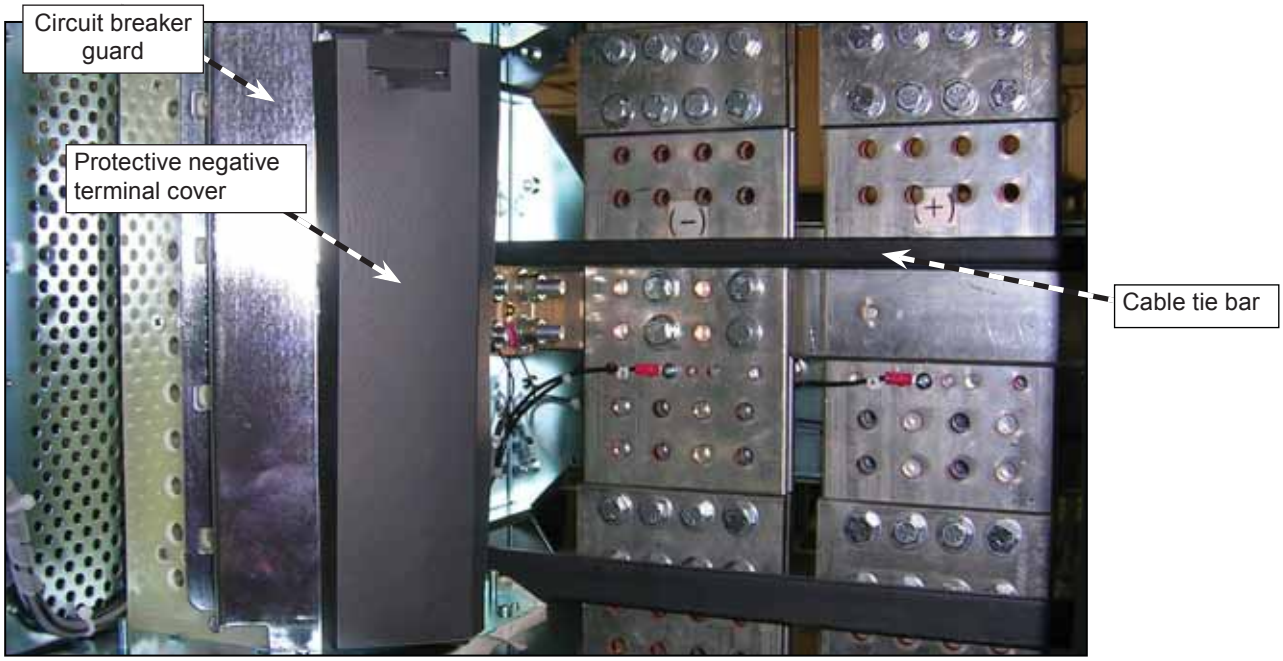


Figure 36 — Breaker distribution module before load cables are installed

4. Connect the load return cables to the (+) side of the bottom breaker (Figure 37) or to the external battery return bus bar (Figure 33).
5. Connect the -48V load cables to the circuit breaker bank starting with the bottom position.
6. Tie cables to the cable tie bars at the back of the power system (Figure 36 shows the location).
7. Add additional circuits going from bottom to top tying in the additional layers on top of the previous layers.

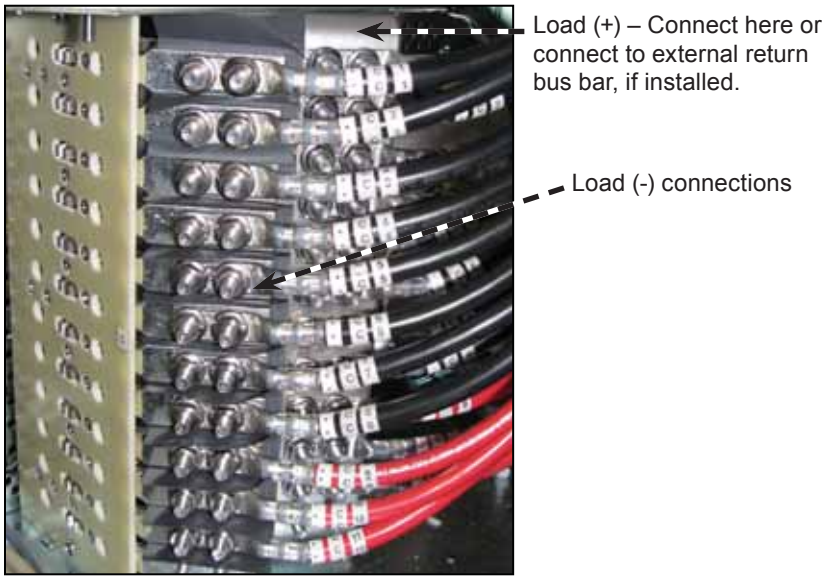


Figure 37 — Breaker load cable and return connections

6.7 Connecting Load Cables to TPL Circuitry

High Capacity

Connect TPL fuse holders to the load and the external return bus bar with up to 2x 750 MCM wire.

Low Capacity

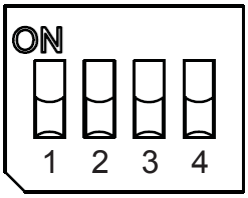
Connect TPL fuse holders to the load and the external return bus bar with up to 350 MCM wire.

Figure 38 — High capacity TPL fuse wiring (shown with 2x 750 MCM wire)

6.7.1 TPL Fuse Alarm Control

The alarm board mounted on the inside front door of each distribution module has a DIP switch for disabling alarms from unused TPL fuse locations. From the factory all switched are set to ON.

1. Disable TPL fuse alarms for unused TPL fuse positions. (Use the dip switch inside the distribution module door —see Figure 12.)



SWITCH ON =Alarm Enabled

Switch #1 =TPL#1 Alarm
Switch #2 =TPL#2 Alarm
Switch #3 =TPL#3 Alarm
Switch #4 is not used

6.8 Final installation steps

6.8.1 Tie Wraps

Neatly group cables with tie wraps as shown in Figure 39.

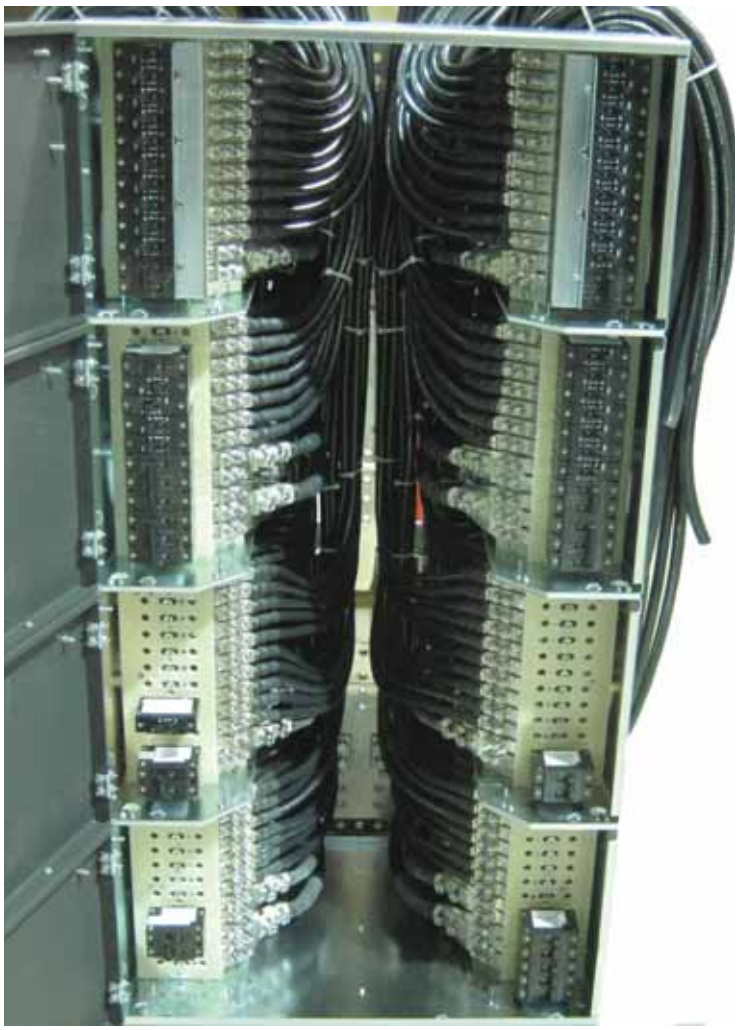


Figure 39 — Final load cable arrangement

6.8.3 Top Cover(s)

Cut between the holes with side cutters to make a large enough entryway for the required cables. Figure 41 shows a small hole cut in the cover.

Make a straight cut to the back edge of the cover, so the cover can be fitted around the cables when replacing it at the end of the installation.

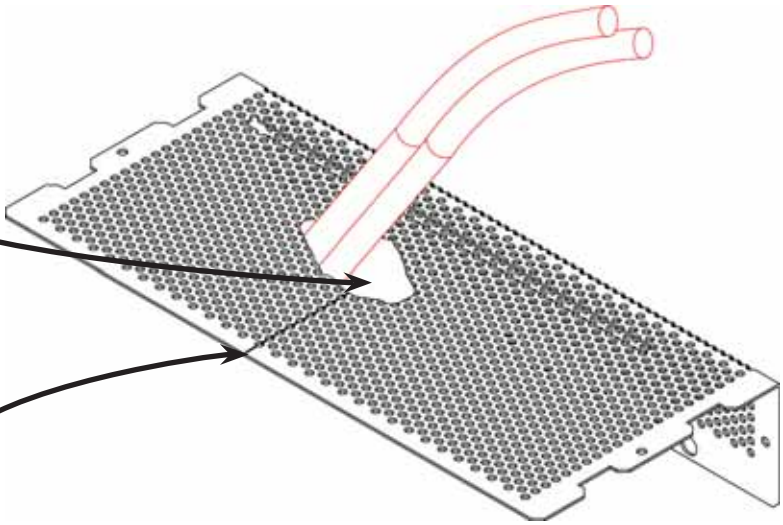


Figure 40 — Top Kydex cover with cuts for cable entry

Reinstall the top cover.

6.8.2 Installing the battery cable insulation covers

Insulation cover kits are included with the initial shipment of the equipment—two kits for each bay.

STEP 1

1. Start from the rear left and wrap an insulating cover around the cables and bus bar (Refer to Figure 41 and Figure 42).
2. Secure with the plastic pins.

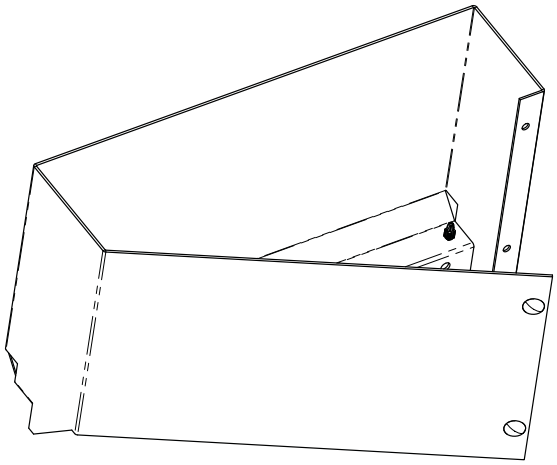


Figure 41 — Insulation cover (rear view)

STEP 2

Repeat on the right busbar and cables.

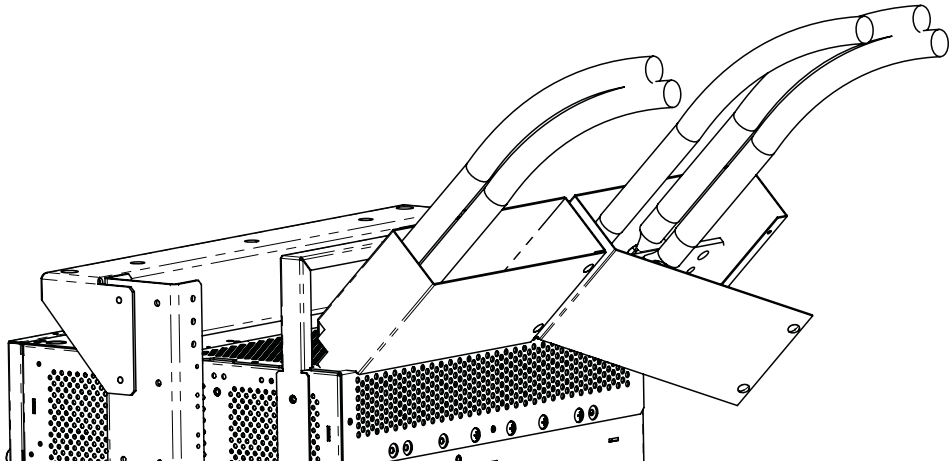


Figure 42 — Insulation covers in place

STEP 3

Secure the covers to the top of the bay with the plastic screws as shown in Figure 43.

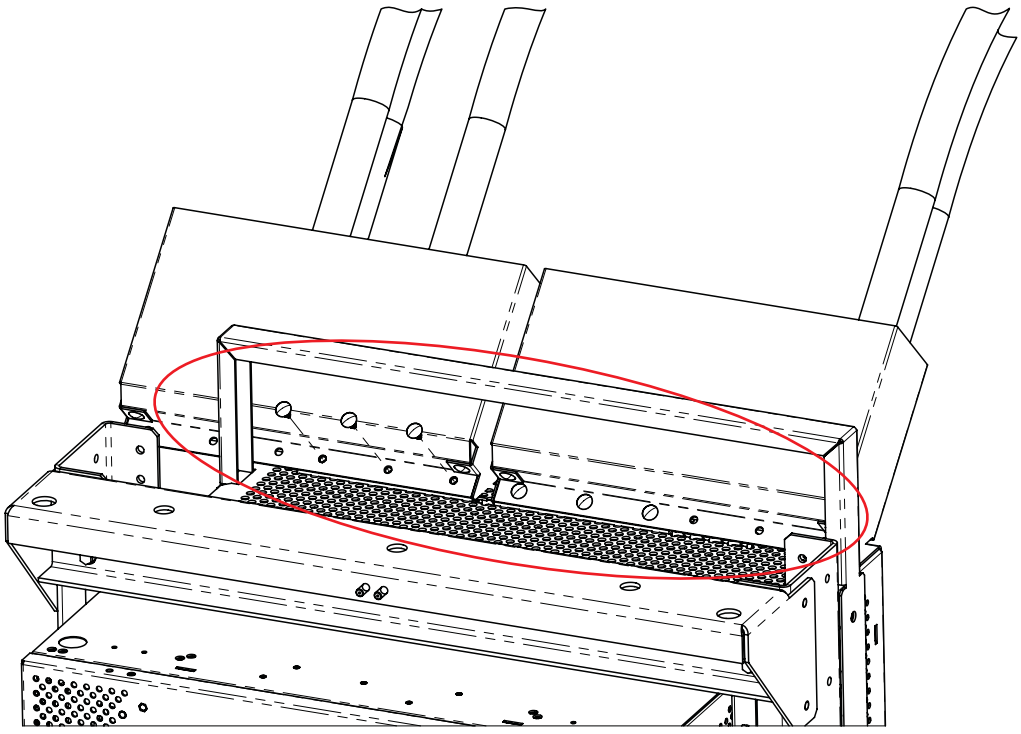


Figure 43 — Securing Insulation covers to bay

6.9 External Alarm Wiring

If using the alarm outputs from the CXCP relays, route the signal cable as shown in Figure 44 ,exiting through the knockout in the top distribution module. Refer to the controller software manual to set up the alarms.

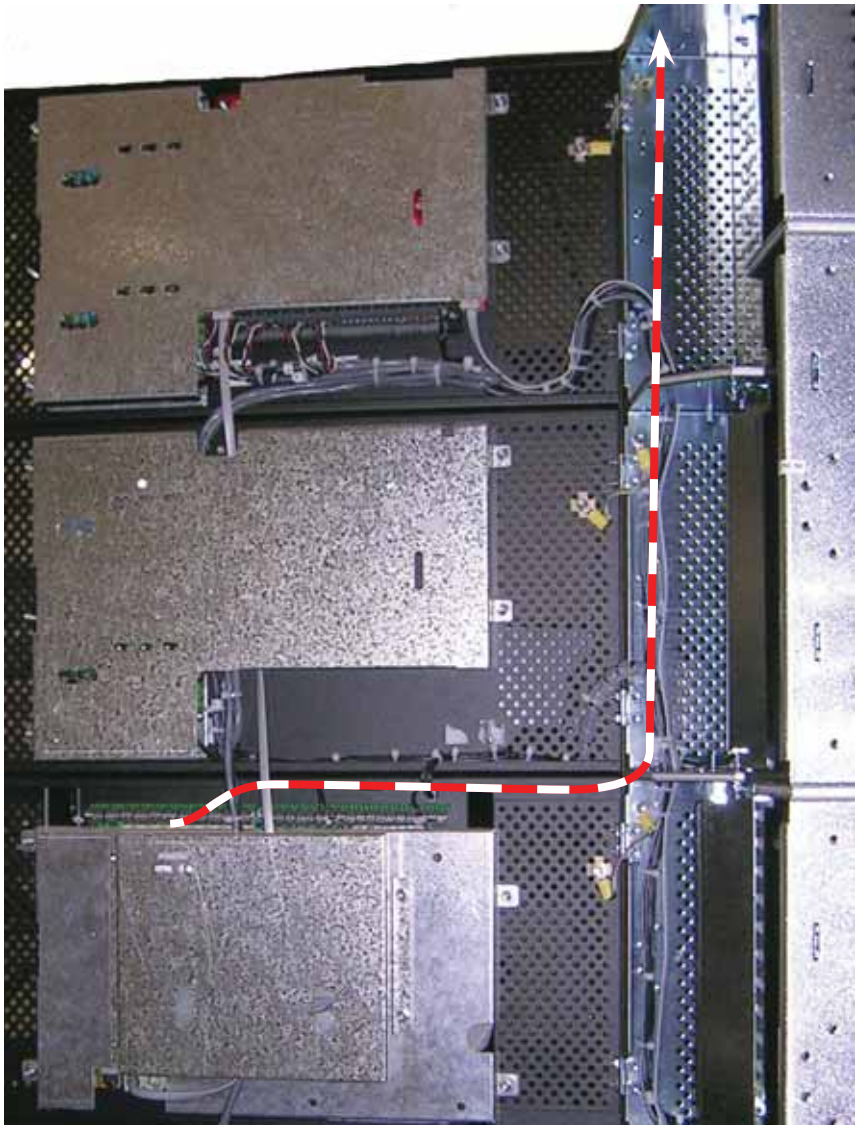


Figure 44 — Route of external signal wiring

WARNING!

To prevent electrical hazards such as short circuits, ensure that the system is free of debris such as metal filings, screws, etc., after the installation is complete.

7. System Startup

Visually inspect the installation thoroughly. After completing the system installation and power system wiring, perform the following startup and test procedure to ensure proper operation:

7.1 Check System Connections

1. Make sure that the AC input power is switched off, the batteries are disconnected, and all the power modules are removed from the shelf.
2. Triple-check the polarity of all connections.

7.2 Verify AC and Power the Rectifier Shelf

1. Install one power module.
2. Verify that the AC input voltage is correct and switch on the corresponding feeder breaker. The power module OK LED will illuminate after a preset start delay.

7.3 Check Battery Polarity and Connect

1. Use a voltmeter to verify that the battery polarity is correct. Ensure that no cells or batteries are reversed.
2. Connect the batteries or switch on the battery circuits.
3. Install the remaining power modules.

NOTE:

In two bay systems, evenly distribute the rectifiers between the two bays, as well as, load circuits and batteries.

4. In the adjustments menu of the CXC, set the float and equalize voltages to the levels specified by the battery manufacturer.

7.4 Final Configuration and Test

1. Configure other system parameters as required—changing the low and high voltage AC and DC warning and cutout limits, for example.
2. At this point there should be no alarms present. Investigate and correct any alarm issues.
3. Test the functionality of various alarms and controls as follows:

Alarm	Test
Minor alarm	Pull one rectifier (leave in the shelf) and then reinsert to clear the alarm.
Major alarm	Pull two rectifiers (leave in the shelf) and then reinsert to clear the alarm
AC Fail alarm	Turn off all AC breakers and run on batteries.
Supervisory Fail	At the controller, tap the Home icon at the lower left of the “home” page and select **Reset** from the pop-up menu.

4. Perform a system load test using a resistive load box.
5. Turn off the AC input breaker to perform a full load test from DC power.
6. Enable the temperature compensation (temp comp) feature in the batteries menu. Program the settings for slope and breakpoints (upper and lower) according to the specific batteries used.

8. Test and Commissioning Overview

8.1 System

All Alpha power system components undergo thorough factory testing. All levels/alarms are set to predetermined values as detailed in their individual component manuals except where custom levels are specified. Good installation practice is to check the operation of all features and alarms and to set the power system levels in accordance with the specific requirements of your system.

The individual system component manuals detail the methodology for testing and calibration of all components.

8.2 Battery

After installation of batteries it is usually necessary to “initial charge” the batteries to ensure proper operation and to eliminate plate sulfation. Follow guidelines supplied with the battery and record initial charge readings; i.e. specific gravity, cell voltage, charge current and temperature.

Battery warranty may be void if batteries are not initially charged following the manufacture's guidelines – with proper records maintained.

Some VRLA batteries do not require initial charging, if placed on charge within 3-6 months of manufacture, check with the manufacturer.

After the equalization period battery voltage should be reduced to the recommended float level.

Once the batteries have been initial charged it is suggested to perform a short duration high rate discharge test on the batteries to verify the connections on the batteries and also to verify that there are no open or failed cells. Cell voltages should be monitored during this process:

- Discharge for 15 minutes at the C/8 rate.
- Record cell voltages every 5 minutes.
- Check for overheating connections.

8.3 Documentation

Complete all necessary documentation; i.e., battery reports, DC wiring lists, AC distribution tables, floor plans, etc. Tag wires, fill out identification strips, and identify circuit breakers.

9. Maintenance

Although very little maintenance is required with Alpha systems, routine checks and adjustments are recommended to ensure optimum system performance. Qualified service personnel should do the repairs.

The following table lists a few maintenance procedures for this system. These procedures should be performed at least once a year.

WARNING!

Use extreme care when working inside the unit while the system is energized. Do not make contact with live components or parts.

Circuit cards, including RAM chips, can be damaged by static electricity. Always wear a grounded wrist strap when handling or installing circuit cards.

Ensure redundant modules or batteries are used to eliminate the threat of service interruptions while performing maintenance on the system's alarms and control settings.

Table F — Sample maintenance log

Procedure	Date Completed
Clean ventilation openings.	
Inspect all system connections. Re-torque if necessary.	
Verify alarm/control settings.	
Verify alarm relay operation.	

9.1 Rectifiers

It is recommended that every five years MOV surge suppressors are replaced (especially in areas of high lightning activity).

See Cordex rectifier manual for general maintenance information.

9.2 Controller Lithium Battery Replacement

NOTE:

Replace the battery within 30 seconds to prevent loss of date and time.

A removable lithium battery is located near the back and to the right of the motherboard. The battery life is rated up to three years, but replace earlier if the panel does not maintain date and time during power interruption.

WARNING!

Exercise extreme caution and do not touch any connected equipment.

To replace the lithium battery, shut down the CXC, remove the rear cover, and pull battery out carefully. Ensure that the new battery is the same as the one being replaced.

9.3 Batteries

It is recommended that checks are made every six months for battery voltage, conductance, temperature, impedance, connections, etc.

See battery manufacturer's manual for general maintenance information.

10. Acronyms and Definitions

AC	Alternating current
ANSI	American National Standards Institute
AWG	American Wire Gauge
BRB	Battery return bus
BTU	British thermal unit
CAN	Controller area network
CEC	Canadian Electrical Code
CSA	Canadian Standards Association
CX	Cordex™ series; e.g., CXC for Cordex System Controller
DC	Direct current
DHCP	Dynamic Host Configuration Protocol
EIA	Electronic Industries Alliance
EMC	Electromagnetic compatibility
EMI	Electromagnetic interference
ERM	Electromagnetic Compatibility and Radio Spectrum Matters
ESD	Electrostatic Discharge
FCC	Federal Communications Commission (for the USA)
GSM	Group Speciale Mobile (global system for mobile communications)
HVSD	High voltage shutdown
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IP	Internet Protocol
LED	Light emitting diode
LVD	Low voltage disconnect
MIL	One thousandth of an inch; used in expressing wire cross sectional area
MOV	Metal oxide varistor
MTBF	Mean time between failures
NC	Normally closed
NEC	National Electrical Code (for the USA)
NO	Normally open
OSHA	Occupational Safety & Health Administration
OVP	Over voltage protection
RAM	Random access memory
RU	Rack unit (1.75”)
TCP/IP	Transmission Control Protocol / Internet Protocol
THD	Total harmonic distortion
UL	Underwriters Laboratories
VRLA	Valve regulated lead acid

11. Warranty

Alpha Technologies Ltd. warrants all equipment manufactured by it to be free from defects in parts and labor, for a period of two years from the date of shipment from the factory. The warranty provides for repairing, replacing or issuing credit (at Alpha's discretion) for any equipment manufactured by it and returned by the customer to the factory or other authorized location during the warranty period. There are limitations to this warranty coverage. The warranty does not provide to the customer or other parties any remedies other than the above. It does not provide coverage for any loss of profits, loss of use, costs for removal or installation of defective equipment, damages or consequential damages based upon equipment failure during or after the warranty period. No other obligations are expressed or implied. Warranty also does not cover damage or equipment failure due to cause(s) external to the unit including, but not limited to, environmental conditions, water damage, power surges or any other external influence.

The customer is responsible for all shipping and handling charges. Where products are covered under warranty Alpha will pay the cost of shipping the repaired or replacement unit back to the customer.

11.1 Battery Warranty

Note that battery warranty terms and conditions vary by battery and by intended use. The most common battery warranty provided by Alpha is a two year full replacement warranty with a pro-rated warranty for the following three years. Pro rated warranty provides a credit applicable toward the purchase of new batteries from Alpha. The credit is calculated as the purchase price multiplied by the percentage of the battery life that was not available (in months). Battery warranty coverage is lost where the battery charge is not maintained for 6 months. Contact your Alpha sales representative or the Technical Support team at the above number to understand your entitlements under Battery Warranty.

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