CXPS-HX 48–2500 Distributed Power System

Installation & Operation Manual

Part # 0913000-J0

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member of The Group™

Your Power Solutions Partner

CXPS-HX 48–2500
Distributed Power System

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.

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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 General Safety

WARNING!

This system is designed to be installed in a restricted access location that is inaccessible to the general public.

1.3 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.

1.4 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 enclosure (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.

WARNING!

High leakage current, earth connection essential before connecting the supply.

1.5 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 Product Overview

The CXPS-HX System (Figure 1) provides high capacity DC power for large communication network applications. This system combines the capabilities of tiered distribution, advanced microprocessor based supervision, and modular rectifiers in a single integrated bay. Two bays can easily be linked together and share a central controller to double the system capacity.

The Cordex Distributed Power System is cost effective due to the internal copper buswork, and is delivered ready to assemble with factory tested components. No overhead bus work is required. An optional external return bus is available. Cable access is from the top and load connections are terminated from the side or rear of the bay. Hot swappable Cordex power modules provide safe and easy installation and maintenance.

Unlike other midsize power plants, the CXPS-HX can accept both three phase and single phase rectifiers in combination with a variety of distribution configurations, making it ideal for deployment in new small switching center, data center or office expansion applications.

2.2 Part Numbers and List Options

The system offers several advanced features with add-on list options. These list options can be included by the customer at time of ordering or can be added in the future; e.g., additional Cordex rectifiers. For more information, see the ordering guide on the Alpha website.

Figure 1 — CXPS-HX Distributed Power System

3. Specifications

Table A — Specifications for CXPS-HX 48–2000/2500 Power System					
Electrical					
AC Input Voltage					
No. of AC Feeds	**Nominal Voltage (Vac)**	**Recommended Breaker (A)**	**Connection Type**	**Recommended Wire Size (AWG)**	**Knockout Dimension (in)**
CXPS-HX-48-2000 (4kW, 4 rectifier shelves) with AC distribution panel					
4	208	100	3W + PE	2	2.0 (1.5 KO)
	277/480	50	3W + N + PE	6	1.5 (1.25 KO)
8	208	50	3W + PE	6	1.5 (1.25 KO)
	277/480	30	3W + N + PE	8	1.5 (1.25 KO)
CXPS-HX-48-2500 (4kW, 5 rectifier shelves) with AC distribution panel					
5	208	100	3W + PE	2	2.0 (1.5 KO)
	277/480	50	3W + N + PE	6	1.5 (1.25 KO)
10	208	50	3W + PE	6	1.5 (1.25 KO)
	277/480	30	3W + N + PE	8	1.5 (1.25 KO)
CXPS-HX-48-2500 (4kW, 5 rectifier shelves) with direct feed to rectifiers and no AC distribution panel					
10 (3Ø)	208	50	3W + PE	6	N/A
	277/480	30	3W + N + PE	8	N/A
30 (1Ø)	208-277	30	60Hz, (1Ø)	8	N/A
CXPS-HX-48-2000 (12kW/480, 4 rectifier shelves) with AC distribution panel					
4	480	50	3W + N + PE	6	1.5 (1.25 KO)
8	480	30	3W + N + PE	8	1.5 (1.25 KO)
CXPS-HX-48-2500 (12kW/480, 5 rectifier shelves) with AC distribution panel					
5	480	50	3W + PE	6	1.5 (1.25 KO)
10	480	30	3W + N + PE	8	1.5 (1.25 KO)
CXPS-HX-48-2500 (12kW/480, 5 rectifier shelves) with direct feed to rectifiers and no AC distribution panel					
10 (3Ø)	480	30	3W+PE	8	1.5(1.25KO)

Table B — Distribution Panels			
Panel Type	**Quantity/Rating**	**Capacity**	**Max Rating per Panel**
TPL Fuses	61 to 800A	Up to 4 positions/ panel	2000A
TPS/TLS fuses	Up to 125A, 18 per panel	Up to 18 positions/ panel	600A
Bolt-in high capacity breakers	1 pole up to 250A 2 pole 275 to 400A 3 pole 450 to 700A 4 pole 650 to 800A 5 pole 850 to 1000A 6 pole 1050 to 1200A	Up to 12 poles/ panel	2000A
Plug-in bullet breakers	1 pole up to 125A 2 pole 150 to 200A 3 pole 225 to 300A	Up to 18 positions/ panel	600A

Table B — Distribution Panels			
Panel Type	**Quantity/Rating**	**Capacity**	**Max Rating per Panel**
Output Termination			
TPL Fuses	2 hole 1/2" dia. on 1 3/4" centers or 2 hole 3/8" dia. on 1" centers Allows for dual cable landing back to back		
TPS/TLS/AM breaker	2 hole 1/4" dia. on 5/8" centers		

Mechanical	
Enclosure	1.095 mm (14 gauge) steel
Mounting	Standard 23" relay rack (flush rack mount) in box bay
Dimensions H x W x D	Cm: 213H x 71W x 71D Inches: 84H x 28W x 28D
Environmental	
Temperature	0 to + 40°C (32 to 104°F)
Relative humidity	0 to 95% RH non-condensing
Elevation	-500 to 2800 m (-1640 to 9186 ft)

Table C — Specifications for Related Components	
Cordex HP 48-4kW rectifier	
See 4kW datasheet on the Alpha website for more detailed information.	
Cordex HP 12kW/480, 3P rectifier	
See the 12kW datasheet on the Alpha website for more detailed information.	
System level alarms/controls	
Alarms/control parameters are user-programmable through built-in digital supervisory unit. See Cordex datasheet for detailed information on alarms and controls.	
Indicators	LCD with touch screen System OK (green LED) System minor alarm (yellow LED) System major alarm (red LED)
Load disconnect	-48Vdc, 600A contactor per plug-in bullet panel -48Vdc, 2000A contactor per TPL fuse or high capacity breaker panel
Alarm connections	0.34 to 2.5 mm^2 (14 to 22AWG)
Smart peripheral modules	
Shunt multiplexer	16 shunts per module (up to 2 modules per kit)
Remote hot bar	
Mounting	2" Auxiliary framing (customer supplied)
Termination	With 2 kits: 130 sets of 1/2-13 holes on 1-3/4" centers OR 130 sets of 3/8-16 holes on 1" centers
Unit capacity per base kit	5000A per kit
Ultimate capacity	2 kit limit (10,000A)

Table C — Specifications for Related Components	
Remote return bar	
Mounting	2" Auxiliary framing (customer supplied)
Termination	With 4 kits: 266 sets of 1/2-13 holes on 1-3/4" centers OR 266 sets of 3/8-16 holes on 1" centers
Unit capacity per base kit	2500A per kit
Ultimate capacity	4 kit limit (10,000A)
Agency compliance	
CSA	CSA C22.2 No. 60950-1-07
UL	UL 60950-1, Second Edition
EMC	FCC CFR47 Part 15 Class A; ICES-003
NEBS	Level 3

4. Product Description

The CXPS-HX is a high capacity power system that combines both power and distribution efficiently into a single standard box bay configuration.

Basic power system

- Each 2500A bay combines rectifiers, battery termination and distribution
- Up to five single phase or three phase rectifier shelves for AC input, 208 to 240Vac or 480Vac
- System distribution section consists of up to three distribution tiers
- System controller

Expandable

- Dual bay kit links two 2500A bays to share a central controller and double the system capacity.

4.1 Power Section

4.1.1 AC Termination Wiring

NOTE:

An external surge protection device is not required. The rectifiers are protected by internal MOVs.

The required input voltage depends on the rectifier options chosen at the time of ordering. Refer to the specifications in Section 3 on page 8.

An optional AC distribution assembly at the top of each power bay provides front access AC overhead termination.

4.1.2 Cordex System Controller

The Cordex system controller (CXC), mounted in the primary power bay, provides easy access to controls and display status. The CXC provides comprehensive setup, control, monitoring and communication for Alpha DC power systems.

CXC features include the following:

- Designed to communicate directly with Cordex rectifiers
- Includes battery temperature compensation charging
- Battery performance diagnostics
- Provides local and remote communications
- User definable alarms
- Daily logging of power system events and system statistics
- Active low voltage disconnect

See the CXC Installation and Software manual that shipped with your order for detailed information.

4.1.3 Cordex Rectifier Shelves

A 2500 A power distribution bay has 5 rectifier shelves and a 2000A power distribution bay has 4 rectifier shelves. Each rectifier shelf can hold up to six Cordex 4 kW rectifier modules or two 12kW/480 rectifier modules.

A Cordex 4.0kW rectifier supplies a nominal output of 74A at 54Vdc and the 12kW/480 rectifier supplies 222A at 54Vdc nominal. Rectifier specifications are included in the Cordex rectifier manual included with the system documentation package.

The 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.

4.1.4 Rectifier Modules

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 3 — 4.0kW Rectifier Front panel LEDs

Figure 2 — 12kW/480 (3-phase) Rectifier front panel LEDs

4.2.1 Rectifier Alarms and LEDs

Rectifier status, such as Mains OK, Minor and Major alarms, display on the rectifier front panel. See the Cordex rectifier shelf manual included with the system documentation package for detailed information.

- A rectifier Major alarm indicates the module has shut down due to a critical fault.
- A rectifier Minor alarm indicates the module has a noncritical alarm, but it has not shut down.

4.2 Distribution Section

The power systems are designed for high capacity distribution applications. Each distribution section can be equipped with a variety of different fuse/CB panel combinations as shown in Table D and Figure 4.

Table D — Distribution Options per Section

Panel Type	Number of Positions per Section
TPL Fuses:	4 fuse positions per panel Up to a maximum of 3* fuse panels per bay
Plug-in TLS/TPS fuses:	18 fuse positions per panel Up to a maximum of 6** fuse panels per bay
Bolt-in high capacity breakers	12 breaker poles per panel Up to a maximum of 3* fuse panels per bay
Plug-in bullet breakers	18 breaker poles per panel Up to a maximum of 6** fuse panels per bay

*Up to a maximum of 2 panels per bay with the AC distribution option.
**Up to a maximum of 4 panels per bay with the AC distribution option.

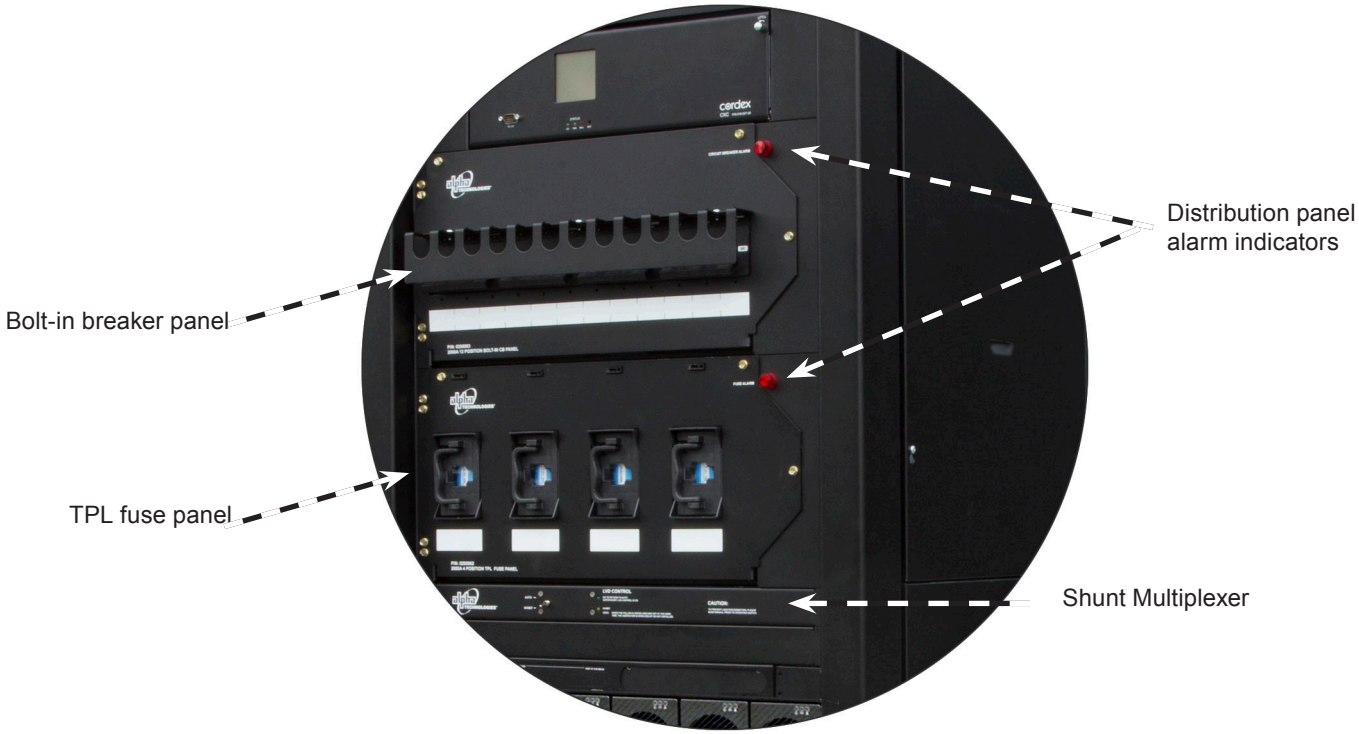


Figure 4 — Example of distribution panels

4.2.4 Distribution Panel Alarms

Fuse/Breaker alarms occur when one or more fuse or breaker has opened. The alarm for each fuse or breaker is daisy-chained back to the main system controller.

Indication is provided by a red lamp on each distribution panel (Figure 4).

When a secondary bay is installed, the alarm is wired to the controller on the primary bay.

4.2.2 Distribution Shunts

Each distribution panel has shunts (Figure 5) sized according to the breaker or fuse size.

A shunt multiplexer panel monitors the individual branch load currents and sends the current measurements to the CXC for data logging and display.

When a secondary bay is installed the shunt multiplexer is connected to the primary bay.

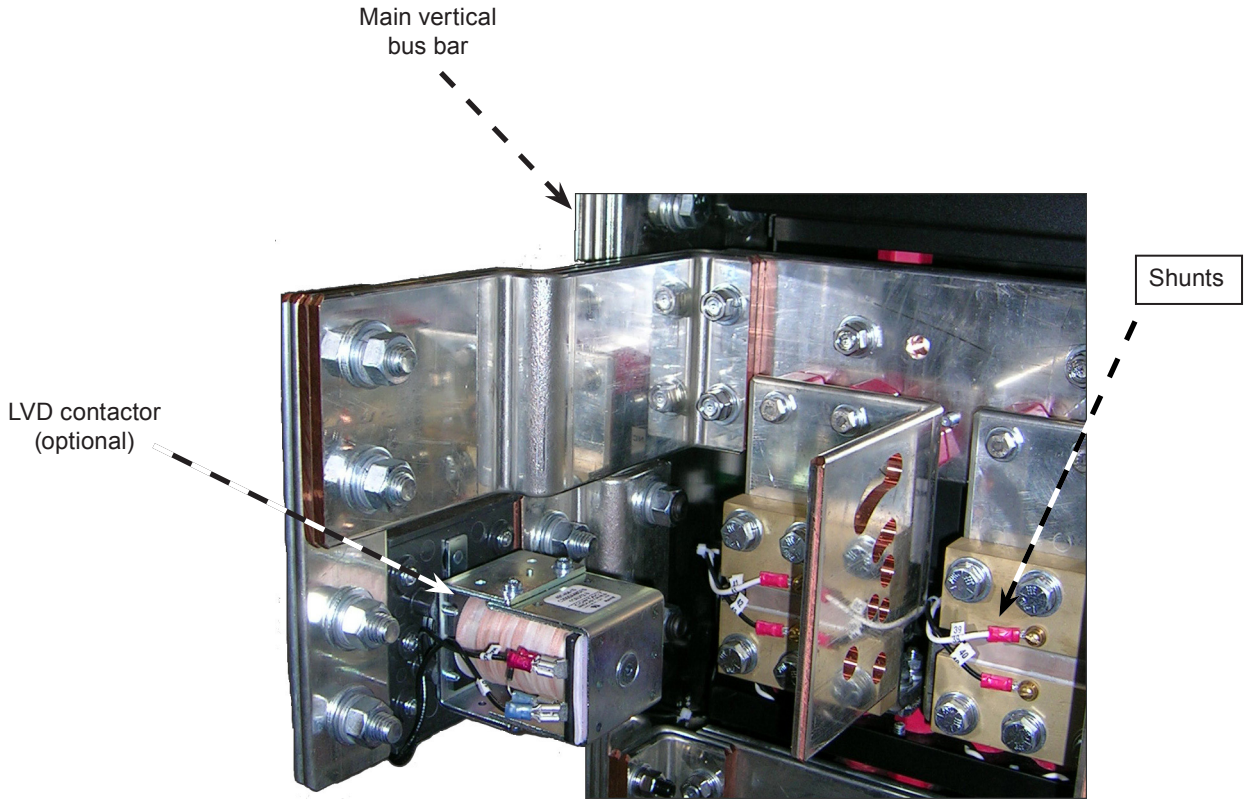


Figure 5 — Distribution shunts

4.2.3 Low Voltage Load Disconnect (LVLD) Option

The LVLD feature provides automatic disconnect of the system loads after a prolonged power failure when the batteries have been fully discharged. Contactors are installed in series with the load.

The system loads are automatically reconnected once AC is restored and battery voltage has risen above a preset value. Control is performed by the CXC and is triggered by the battery voltage.

Each distribution panel can be ordered with its own disconnect contactor (see Figure 5). Contactor ratings are 2000A for TPL/bolt in breaker and 600A for plug-in bullet panel.

Systems with LVLDs are equipped with a manual override switch. The purpose of this switch is to allow the user to manually bypass the CXC control of the LVLDs during maintenance procedures or during software upgrades, etc.

The CXC will record an alarm when the switch is placed in the Inhibit position.

4.3 Cordex System Controller

A Cordex system controller, mounted in the primary power section, provides easy access to controls and display status. The CXC provides comprehensive setup, control, monitoring and communication for Alpha DC power systems.

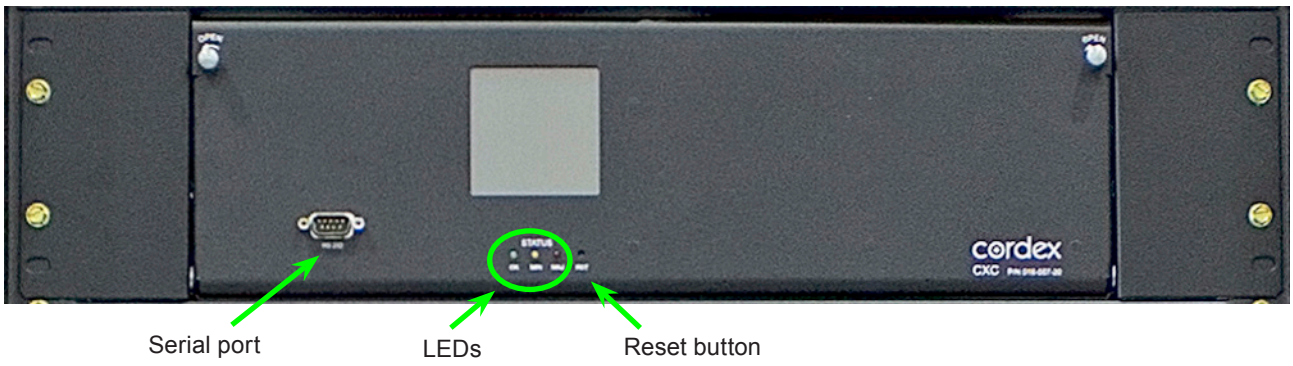


Figure 6 — CXCP controller mounted in the power section

4.3.1 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. An LCD message display provides details of all major and minor 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

4.3.2 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 6).

4.3.3 Programmable Alarms

In addition to preset major and minor alarms, specific alarms can be configured through a programmable algorithm. An LCD message display provides details of all major and minor alarms.

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

4.3.4 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 6); using a null modem cable. The communication protocol supports a web interface (Microsoft® Internet Explorer) with a remote screen display that 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 cross-over cable for the connection.

Internal CAN Bus

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

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

4.4 Cordex HP Controller (CXC HP)

The Cordex™ HP (CXC HP) controller provides centralized setup, control and monitoring of power systems. This ranges from simple monitoring and threshold alarms for temperature, voltage and current, to advanced battery charging and diagnostic features.

The controller supports dual Ethernet ports and a 4.3” LCD screen to allow simultaneous network, LCD and local laptop access to the controller including both web and SNMP interfaces.

The CXC HP supports to dual CAN ports to allow up to 256 power and/or ADIO modules to be controlled and monitored. The controller uses external analog and digital input and output (ADIO) peripherals to monitor electrical signals (temperature, voltage, temperature) and generate electrical signals through relays.

The most commonly used ADIO peripheral is the L-ADIO for low voltage systems which includes:

- 8 digital inputs
- 4 voltage sensors
- 4 temperature sensors
- 4 current sensors
- 12 Form C relay outputs

4.4.1 Controller Features

The CXC HP has the following features:

- Front touchscreen: full color LCD touchscreen display, to access controls and menu items by using fingertip touch or a stylus.
- Home button: provides the ability to go directly back to the home screen from any menu.
- Front panel reset: for emergency use only to restart the CXC HP if the unit touch screen or home button are not responding.
- Front panel LEDs: for alarms, progress and status indication.
- Audio speaker: built-in audio tones during active alarms, and can be disabled if required.
- Ethernet: dual ports 10/100 BaseT Ethernet connection on both the front and rear of the controller for remote or local communication.

Figure 7 — Cordex CXC HP Controller

- USB: dual ports on both the front and rear of the controller for upgrades and file management via a standard USB flash drive.
- CAN: dual independent CAN bus ports for communication with the Alpha Cordex™ and AMPS family of products, which allows for a greater number of devices.
- Real-time clock with field replaceable lithium battery: allows for timestamps on alarms and events.
- System fail alarm/relay: which activates when there is a major internal failure. During such a condition the unit attempts to reset.

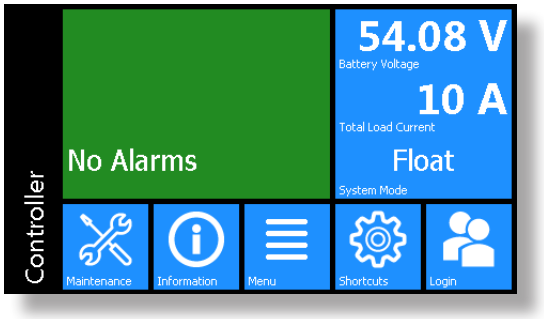


Figure 8 — LCD Color Touchscreen Display

4.5 External Peripherals

4.5.1 L-ADIO

The L-ADIO is the standard analog and digital I/O peripheral for low voltage (<60Vdc) systems. The L-ADIO communicates on CAN bus to the controller and provides user access to I/O management via the CXC HP controller.

Figure 9 — L-ADIO I/O Peripheral

Analog Inputs

Four voltage inputs, V1 – V4, are provided for a variety of voltage monitoring requirements. The input channels can measure a signal between -60Vdc to +60Vdc.

Four current input channels, I1 – I4, provide monitoring of current; e.g., discharge (load) and charge (battery). The CXC HP is capable of monitoring standard shunts of 25, 50 and 100mV as well as application specifications of up to 250mV. The shunt current rating can be configured via the controller and is set by default to 800A 25mV. The input range for this signal is -250mV to +250mV.

Four temperature input channels, T1 – T4, provide monitoring of temperature probes (thermistors). These are typically used for either ambient temperature, or for battery post monitoring to enable battery temperature compensation. The temperature sensor is provided by Alpha in various lengths. The input range for this signal is 0V to 5V and is powered internally from the L-ADIO.

Digital Inputs

The L-ADIO can accommodate up to eight digital input channels, D1 – D8. Each channel responds to a zero or system voltage potential at the input to activate or deactivate the appropriate condition.

These channels can monitor digital alarm/control signals from rectifiers, converters and many other types of equipment.

An additional digital input, “EXT” is reserved for monitoring an external LVD override.

Alarm and Control Output Relays

Each L-ADIO contains twelve Form C alarm output relays to extend alarms and to control external apparatus. Each internally generated alarm or control signal may be mapped to any one of the 12 relays, several signals may be mapped to just one relay or none at all.

LED Indication

Each L-ADIO contains three LEDs for peripheral status indication.

LVD – Yellow = LVD Override Engaged

Power – Blue = Power present to device

Comms – Green = L-ADIO has been acquired by CXC HP

Front Panel Reset Button

A reset button is located on the front panel. It takes approximately 15 seconds before the unit is reacquired after pressing the reset button.

During a reset condition, the L-ADIO will keep relays in their last known state to prevent false alarm notifications and possible changing system LVD states.

CAUTION – Pressing the reset button will cause the L-ADIO to lose communication with the controller.

LVD Override

An LVD Override button is provided to keep any relays assigned to LVD function in a static state. The override function should be used whenever performing controller maintenance such as test relay functions, or when replacing a CXC HP controller.

To engage the LVD override function, press and hold the button for three seconds. A yellow indicator LED will signal that the override is engaged. To restore back to normal LVD operation, press and hold the LVD button again for three seconds.

4.5.2 6I-ADIO

The 6I-ADIO is an analog input peripheral providing six isolated shunt inputs. The 6I-ADIO communicated on CAN bus to the CXC HP controller and provides access to shunt inputs via the controller.

Figure 10 — 6I-ADIO Power Module

4.6 Redundant Input Power Module

The redundant input power module (RIPM) provides multiple power inputs to power the CXC HP controller and any I/O peripherals such as the L-ADIO. The unit enables users to wire system power into the control devices from multiple locations (e.g., on battery and load side of LVD's or A and B power system(s)) and provides Diode-or protection between power inputs.

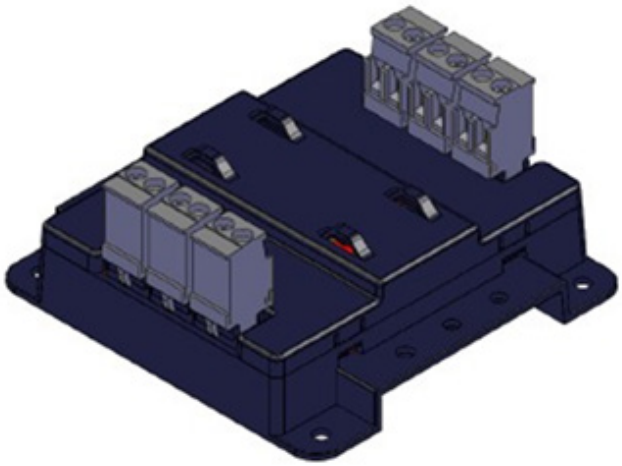


Figure 12 — Redundant input power module

4.7 Shelf /Bay ID

The CXC HP Shelf/Bay ID peripheral enables users to identify individual 12kW/480 (3-phase) rectifier modules by their specific bay and shelf location within the system. This peripheral is an independent module which broadcasts information directly to the rectifier modules. 12kW/480 rectifiers can then communicate the specific bay, shelf, and slot identification back to the master CXC HP controller. The controller's LCD screen and web interface provide details on the physical location via each module within the system.

The Shelf/Bay ID peripheral only requires the user to manually select the Bay ID from the front panel. Shelf location is determined by factory installed internal system wiring, and the 12kW/480 rectifiers determine their slot position automatically within a shelf.

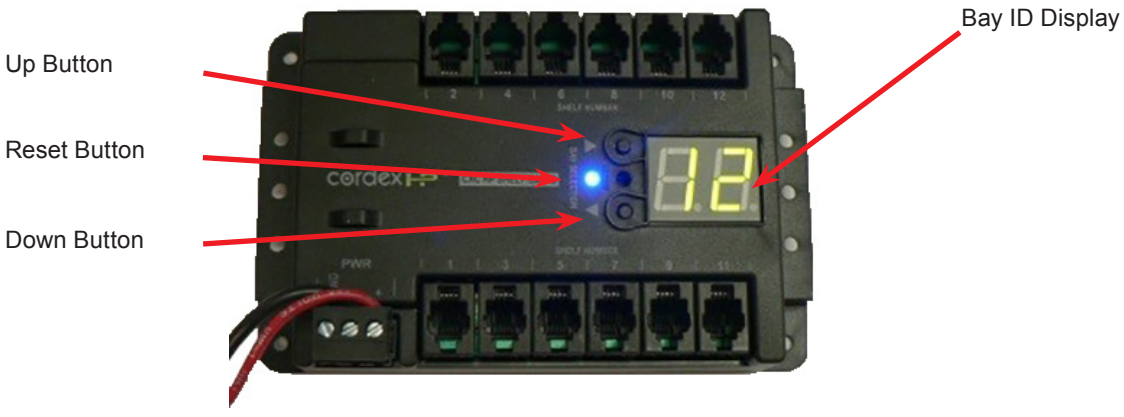


Figure 11 — Shelf/Bay ID

5. Pre-Installation Preparation

NOTE:

This power system is suitable for installation in Network Telecommunication facilities and locations where the NEC applies.

5.1 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 the CXPS-HX power system and the batteries:

- Dimensions for one bay:
  - » mm: 2133H x 711W x 711D
  - » inches: 84H x 28W x 28D
- 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.
  - » Rear: 3ft (1m)
  - » Front: 3ft (1m)
  - » Sides: no clearance required
  - » Top: clearance required for cables and external return bar (optional)

5.1.1 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-HX 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

5.1.2 Installation component requirements

Supplied

- Internal DC cables

Not Supplied

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

5.2 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
- Computer with Internet Explorer 8 (or higher) for communication with the 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 mm2]
- Insulated hand tools listed below:

    Combination wrenches

    Ratchet and socket set

    Various screwdrivers

    Electricians knife

    Fine tipped slot screwdriver (“tweaker”)

    Cable cutters

5.3 Floor Loading

5.3.1 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 13 shows the dimensions and bolt locations of a single bay. An anchoring kit is provided with hardware for the slots as well as the four additional bolt holes required for seismic.

5.4 Unpacking the Equipment

Alpha is committed to providing products and services that meet our customers' needs and expectations in a sustainable manner, while complying with all relevant regulatory requirements. As such Alpha strives to follow our quality and environmental objectives from product supply and development through to the packaging for our products Packaging assemblies and methods are tested to International Safe Transit Association standards. Rectifiers and batteries are shipped on individual pallets and are packaged according to the manufacturer's guidelines.

Almost all of Alpha's packaging material is from sustainable resources and or is recyclable. See the following table for the material and its environmental codes.

						
Cardboard	**Polyethylene Terephthalate**	**Low Density Polyethylene**	**Polystyrene**	**Steel**	**Aluminum**	**Wood**
Packing boxes Caps	Flexible film Packaging	Bubble wrap Shrink wrap Plastic bags	Foam	Strapping on pallets	Strapping on pallets	Pallets Lumber

5.4.1 Returns for Service

Save the original shipping container. If the product needs to be returned for service, it should be packaged in its original shipping container. If the original container is unavailable, make sure that the product is packed with at least three inches of shock-absorbing material to prevent shipping damage. Alpha Technologies is not responsible for damage caused by improper packaging of returned products.

5.5 Check for Damage

Prior to unpacking the product, note any damage to the shipping container. Unpack the product 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, inform the carrier and contact Alpha Technologies for advice on the impact of any damage.

5.6 General Receipt of Shipment

The inventory included with your shipment is dependant upon the options you have ordered. The options are clearly marked on the shipping container labels and bill of materials.

Remote Return Bars (Purchased Separately)

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

External Return Hot Bars

Consult the packing slip to verify that you have the correct number of external return hot bars per your order. Consult the packing slip and power system bill of materials to verify that you have the correct number of racks per your order.

Rectifiers (Purchased Separately)

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

Miscellaneous Small Parts

Review the packing slip and bill of materials to determine the part number of the "configuration kits" included with your system. Review the bill of materials to verify that all the small parts are included.

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.

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

6. Frame Installation

NOTE:

No rectifiers should be installed at this time. Do not install rectifiers until told to do so later in the installation procedure.

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.

6.1 Floor Drilling for Standard Anchoring

NOTE:

Earthquake anchoring is the type used in earthquake areas up to Zone 4. The CXPS-HX power system frame is earthquake qualified when properly anchored to a 3000 psi (2.11 kg per sq. mm) concrete floor.

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

6.1.1 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 13 and mark the anchor hole positions. This diagram also shows the preferred location for the anchor holes within the slots.

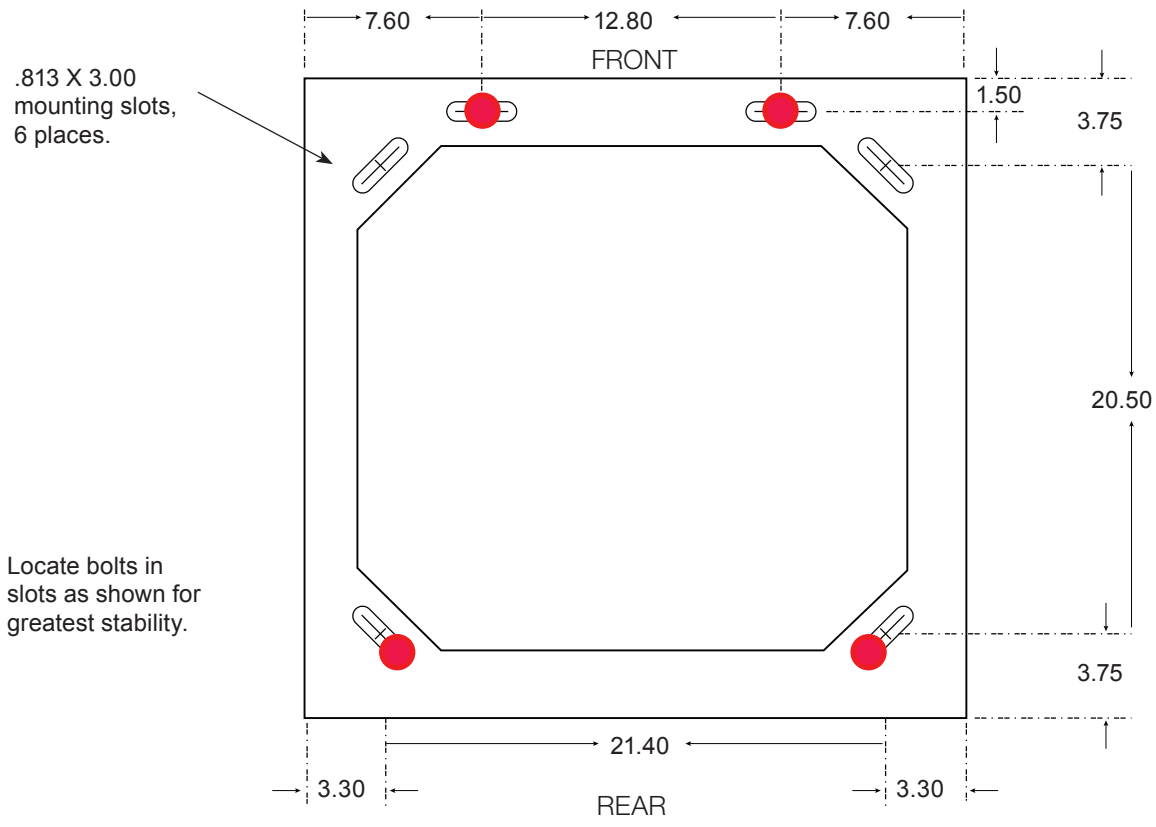


Figure 13 — Base dimensions and mounting holes (single bay)

6.1.2 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.

6.2 Placing and Securing the Bay

6.2.1 Securing the Bay to the Floor

NOTE:

It is extremely important that the bay be properly shimmed in order to prevent any frame distortion. If the floor is not level, shims may be required.

1. Place the bay in position over the anchoring holes (and the isolation pad if applicable).
2. Install the anchoring hardware for each anchor FINGERTIGHT.
3. Check that the bay is level front-to-back and side-to-side. Install shims if necessary.
4. Once the bay is level, tighten all bolts to the appropriate torque.

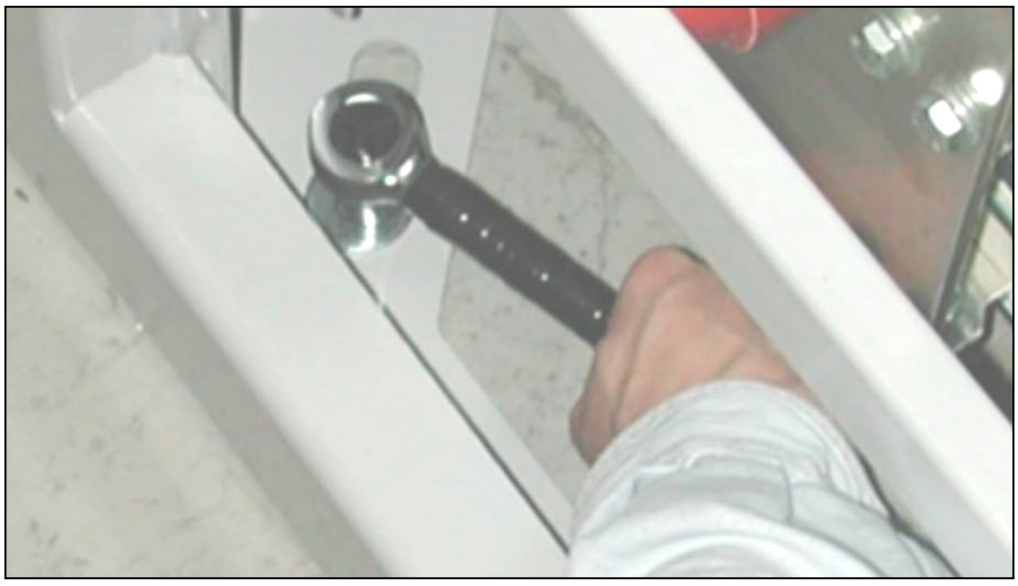


Figure 14 — Securing power system bay to concrete floor

6.2.2 LVBDs (purchased separately)

If battery disconnect contactors are used:

1. Connect a secondary power source to the CXC.
2. Connect battery disconnect panels to the CXC battery fuse alarm input and LVBD control.

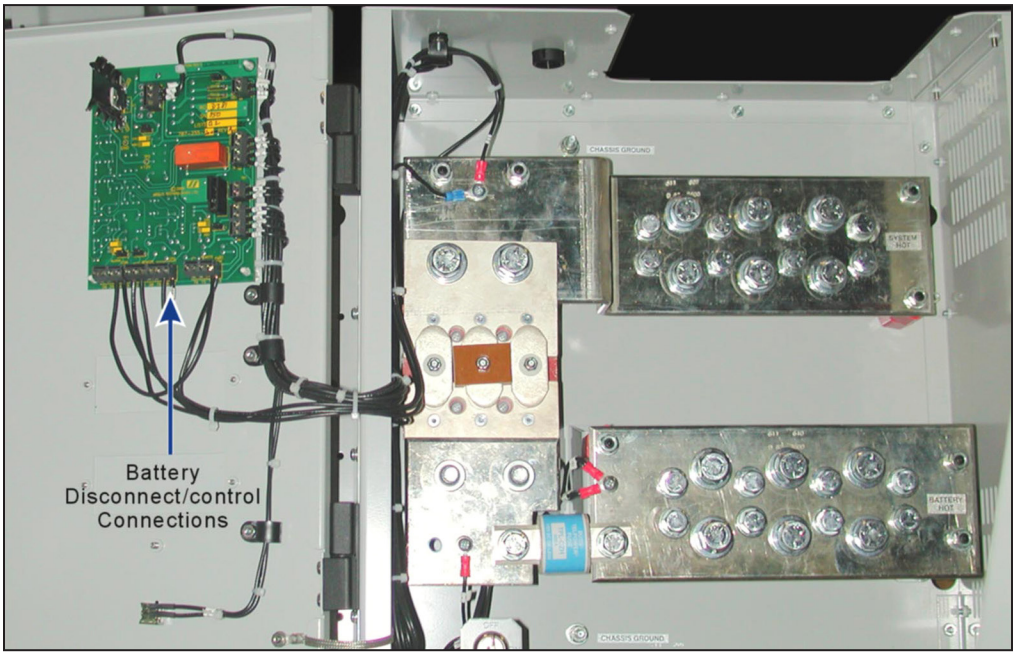


Figure 15 — Battery disconnect (purchased separately) connections

6.3 Tandem System Busbar Installation

When installing a tandem system (secondary bay) the side panels of the bay need to be removed, and then the tandem busbars can be slid from the sides and bolted onto the rear busbars.

For full details refer to drawing 0250014-770 at the end of this manual.

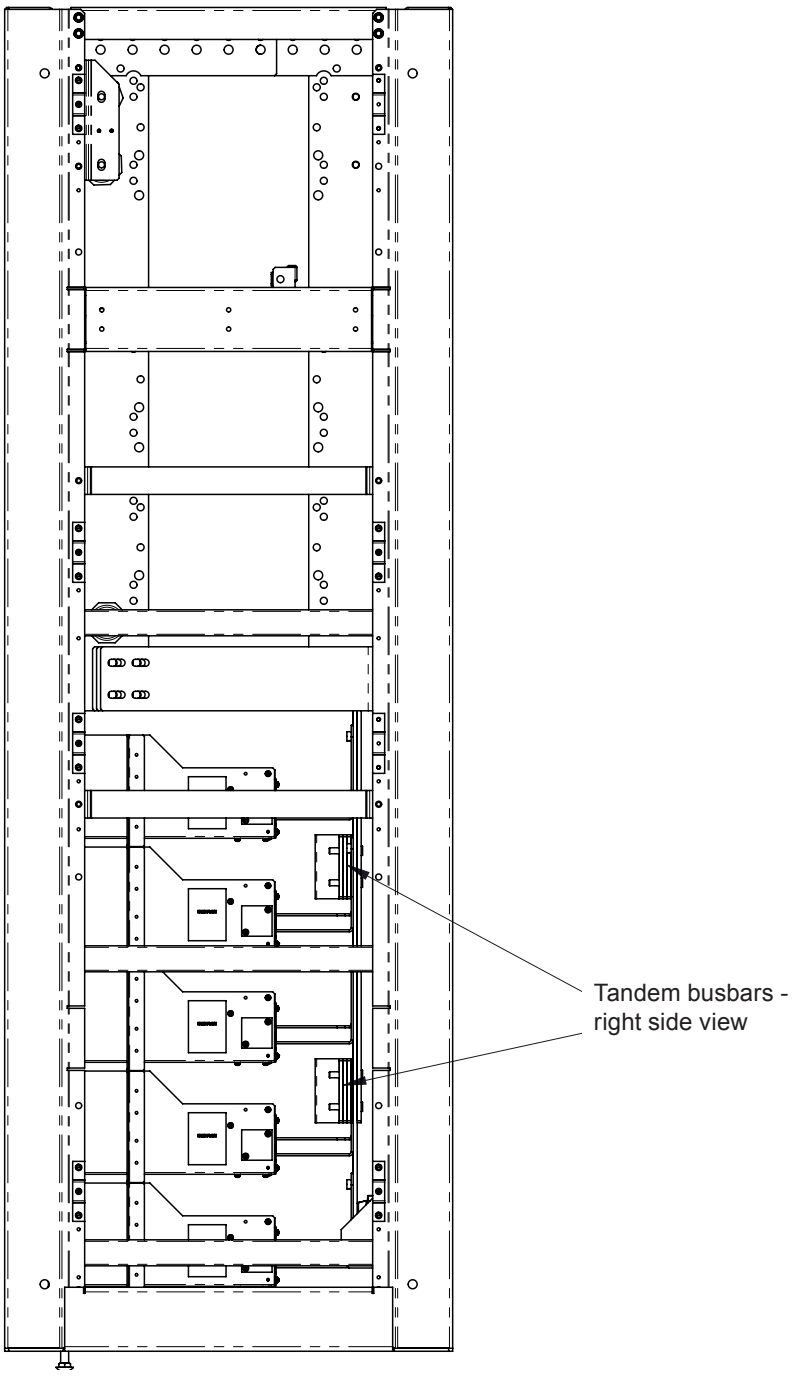


Figure 16 — Tandem system busbar installation, bay shown with panels removed

6.4 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 17 — Battery installation

6.4.1 Preparation/Mounting

Batteries should be located in a temperature-controlled environment. The temperature should be regulated at approximately 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.

6.4.2 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.

6.4.3 Temperature Probe for Monitoring Battery Temperature

1. Locate the battery temperature probes coiled up in the power section of the bay.
2. Connect CXC temperature probes from CXC to battery termination post negative.
3. Pick a location at mid-height on one or more battery strings, which will provide a good average temperature reading; i.e., away from heating or cooling sources.

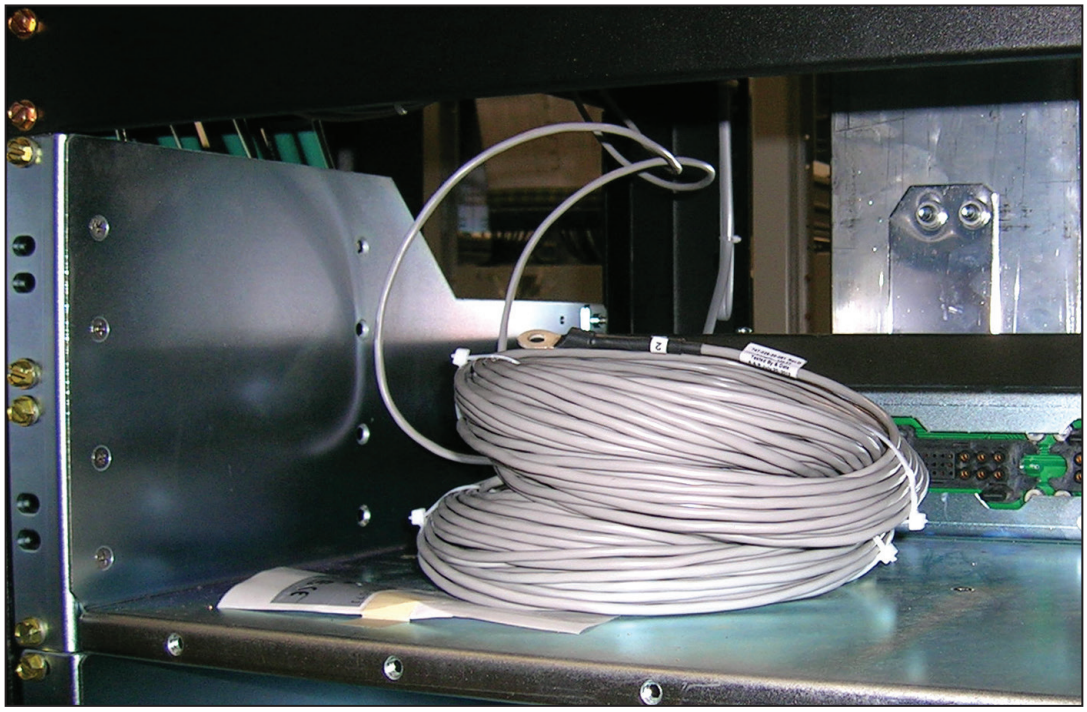


Figure 18 — Battery temperature probes

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 E — Typical VRLA battery maintenance report

Cell #	Serial #	Voltage	Specific	Ohms	Mhos	Observations

Remarks and recommendations: _____

_____

_____

Readings taken by: _____

7. 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-HX 48V high capacity distributed 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.
- Use of an LVBD is recommended to automatically disconnect the batteries after a complete discharge to prevent possible permanent damage to the batteries.
- Electrical codes require that conductors carrying AC current be installed separately from conductors carrying DC current and signals.

7.1 Installation Notes

7.1.1 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

All signaling wires (for example, alarms from the CXC Controller) interfacing with the outside world exit the frame through the top or bottom.

7.1.2 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 F for cable size equivalents.

Table F — 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

7.1.3 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 G — Recommended torque values	
1/4"	8.8 ft-lbs
3/8"	32.5 ft-lbs
1/2"	73 ft-lbs

Grade 5 rated hardware is required for these torque values.

7.2 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).

Internal battery return bus

Connect the power system internal battery return bus (BRB) to the building master ground bus (MGB) or floor ground bus (FGB) in larger buildings. 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.

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. Other factors, including length of cable and special grounding requirements of the load, must be factored in. Use two-hole crimp type lugs and insulated cable that does not have any tight bends or kinks.

Optional external battery return bar

Unless specifically instructed otherwise, the battery return reference (BRR) lead is usually connected at the external battery return bus bar shown in Figure 19.

Frame ground

Connect a cable (typically a 2/0 cable) between the frame of each bay and MGB or FGB. This electrical continuity requirement can be met by the use of thread-forming type unit mounting screws and star washers that remove any paint or non-conductive coatings and establish metal-to-metal contact.

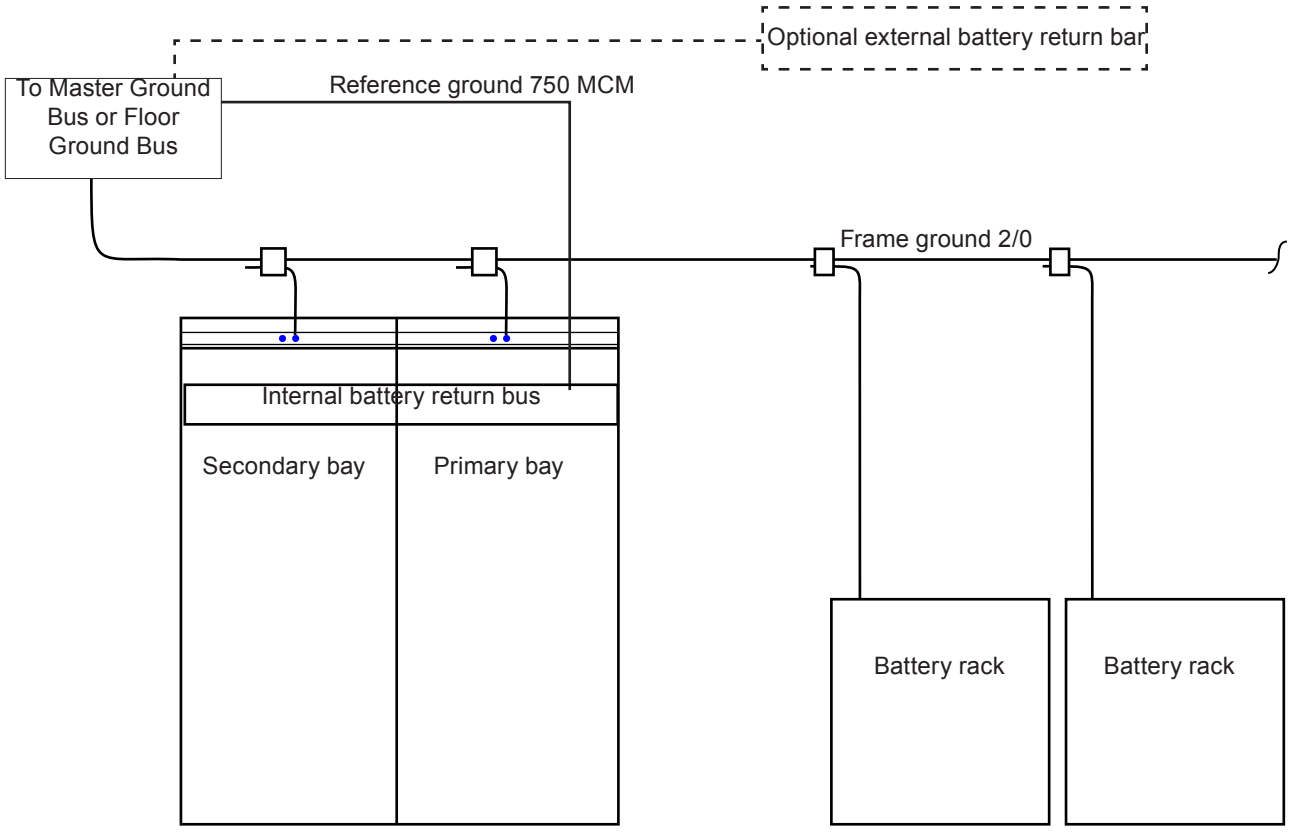


Figure 19 — Battery return busbars, frame ground and battery return reference

7.3 AC Supply for the Rectifiers

Rectifiers can be wired through an optional AC distribution panel, which is internally wired to the individual rectifier shelves, or directly to each rectifier shelf.

For both options refer to the AC Input specification in Section 3 on page 8.

NOTE:

The recommendations for input breakers and wire sizes in Table A are for reference only. A registered professional engineer must review and approve or modify these recommendations in compliance with applicable national and local electrical and building codes.

7.3.1 Wiring the AC Distribution Panel

WARNING!

Verify no rectifiers are installed in the power bay at this time.

NOTE:

Wire one side at a time with only one door open. Working with both doors open may make it difficult to close both doors when the wiring is complete.

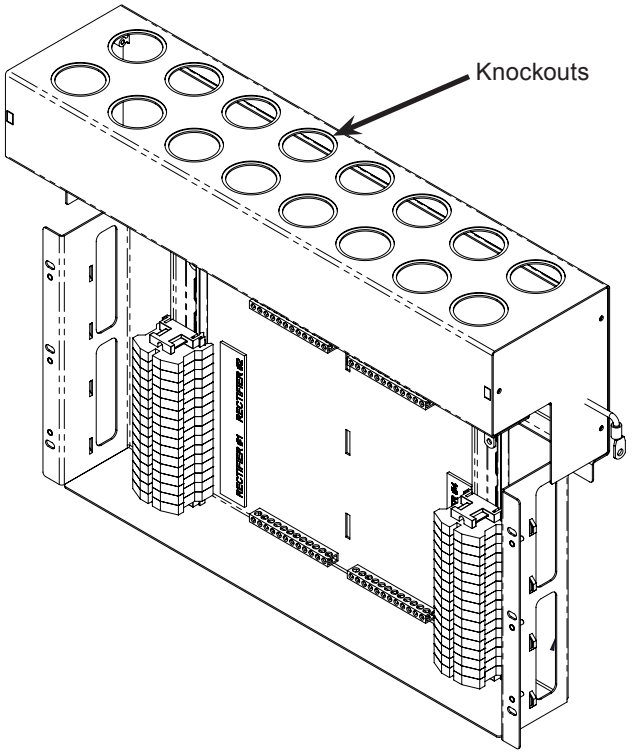


Figure 20 — AC panel 5-feed, 3-wire 208Vac shown

NOTE:

Verify that AC breakers are off and locked out at the AC Input Panel.

Wire one side at a time with only one door open

1. Bring AC wires through the knockouts in the top of the assembly.
2. Connect to the terminal blocks as shown in Figure 21. (Also clearly labeled on the panel.)
3. Neatly group cables with tie wraps.

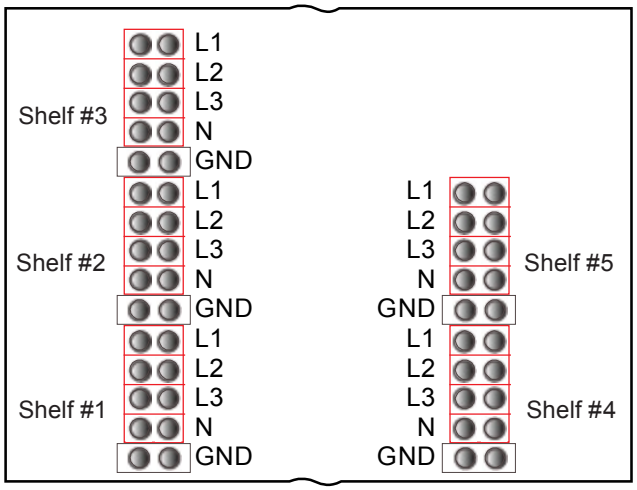


Figure 21 — Terminal blocks for 5-feed, 3-wire 208Vac input

7.4 Distribution

7.4.1 External Battery Return Bar Wiring

Connect the external battery return bar(s) to the associated power bay positive return detail as shown in Figure 22..

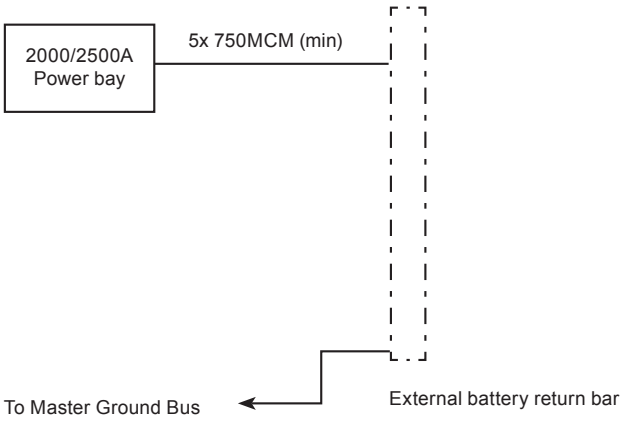


Figure 22 — External battery return bar wiring

7.4.2 Battery Return and Load Return 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).

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.

Connect the battery return cables and the load return cables to the common return bus or (see drawings 0250014-771-04, 0250014-701-04 and 0250014-741-04) or to the external battery return bus bar if that option is in place (drawing 0380214-F0.

Both bus bars are designed for the following connection options:

- 1/2" holes on 1-3/4" centers
- 3/8" holes on 1" centers

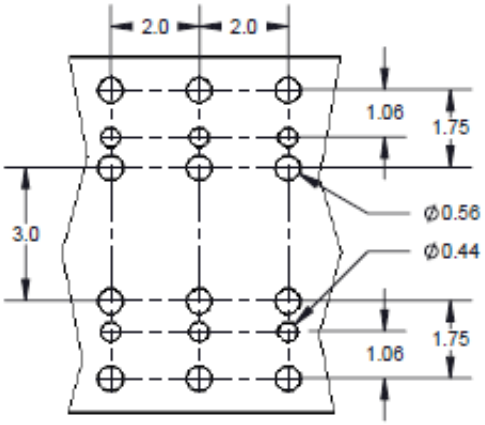


Figure 23 — Customer connections spacing

7.5 DC Connections

7.5.1 DC Landing Hot and Battery Landing without Top AC Termination Panel

There are a total of 6 positions (12 cables back-to-back) to land the battery 'hot' cables. The dimensions for the holes are 1/2" on 1.75" centers and 3/8" on 1" centers.

NOTE:

Start at the front-most corner and move towards the back as shown in Figure 23.

There are a total of 4 positions (8 cables back-to-back) to land the DC return cables. The dimensions for holes are 1/2" on 1.75" centers and 3/8" on 1" centers.

NOTE:

While landing the DC return cables, start installing from the rear-most holes and move your way towards the front as shown in the figure below.

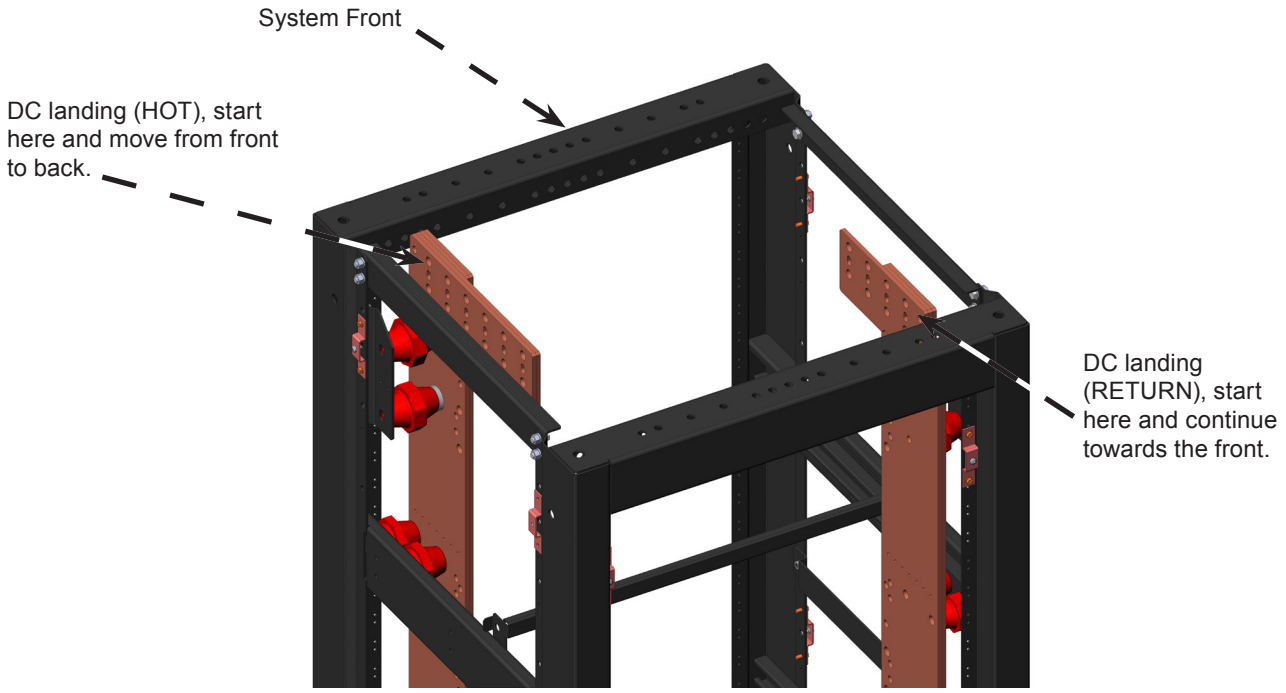


Figure 24 — DC connection without AC panel option

7.5.2 DC Landing Return and Battery Landing with Top AC Termination Panel

There are a 5 total positions (10 cables back-to-back) to land the battery 'hot' cables when the AC panel is used. When an AC panel is installed, the left most holes do not go all the way through and only the back 4 are accessible. See the figure below. The dimensions for holes are 1/2" on 1.75" centers and 3/8" on 1" centers.

NOTE:

Start at the front-most corner and move towards the back as shown in the figure below.

There are a total of 4 positions (8 cables back-to-back) to land the DC return cables. The dimensions for holes are 1/2" on 1.75" centers and 3/8" on 1" centers.

NOTE:

While landing the DC return cables, start installing from the rear-most holes and move your way towards the front as shown in the figure below.

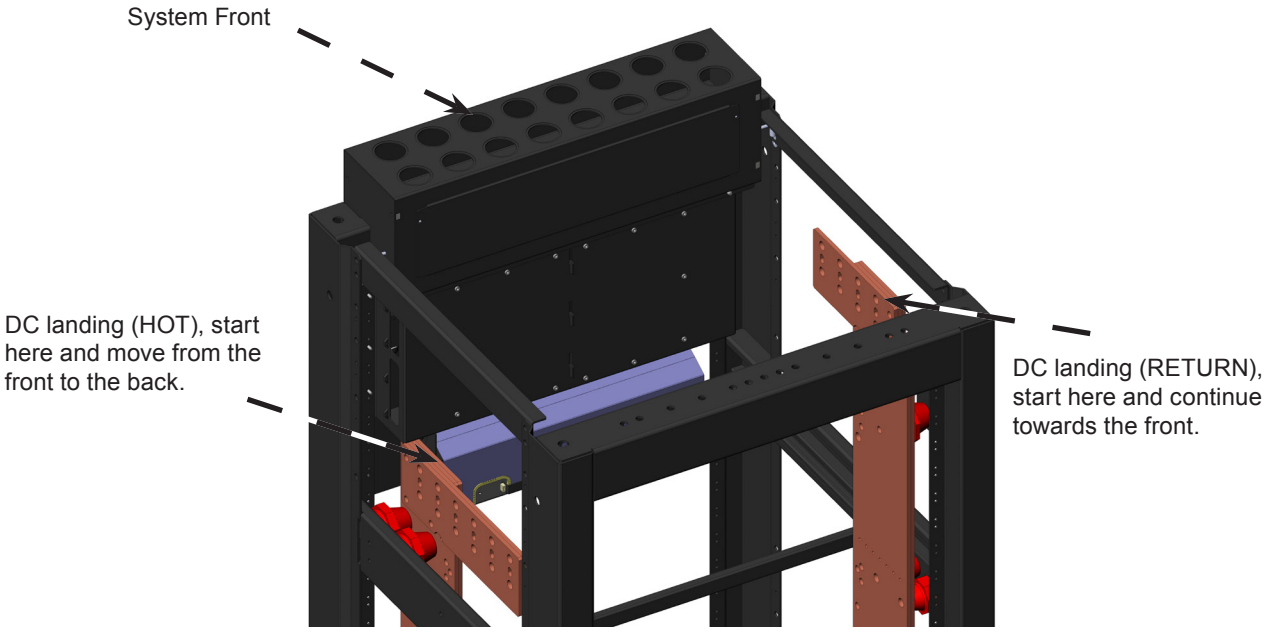


Figure 25 — DC connection with AC panel option

7.5.3 Internal Return Bar

The internal return bar eliminates the need to mount external bars to land the DC return cables. These are 30x 1/4" holes on 5/8" centers, 40x 3/8" holes on 1" centers and 10x 1/2" holes on 1.75" centers.

Start landing the DC return cables on the vertical riser first.

In addition there are 4x 3/8" holes on 1 3/4" centers on the vertical riser bar.

Once the 4 positions on the vertical riser are populated, start to land cables on the internal return bar.

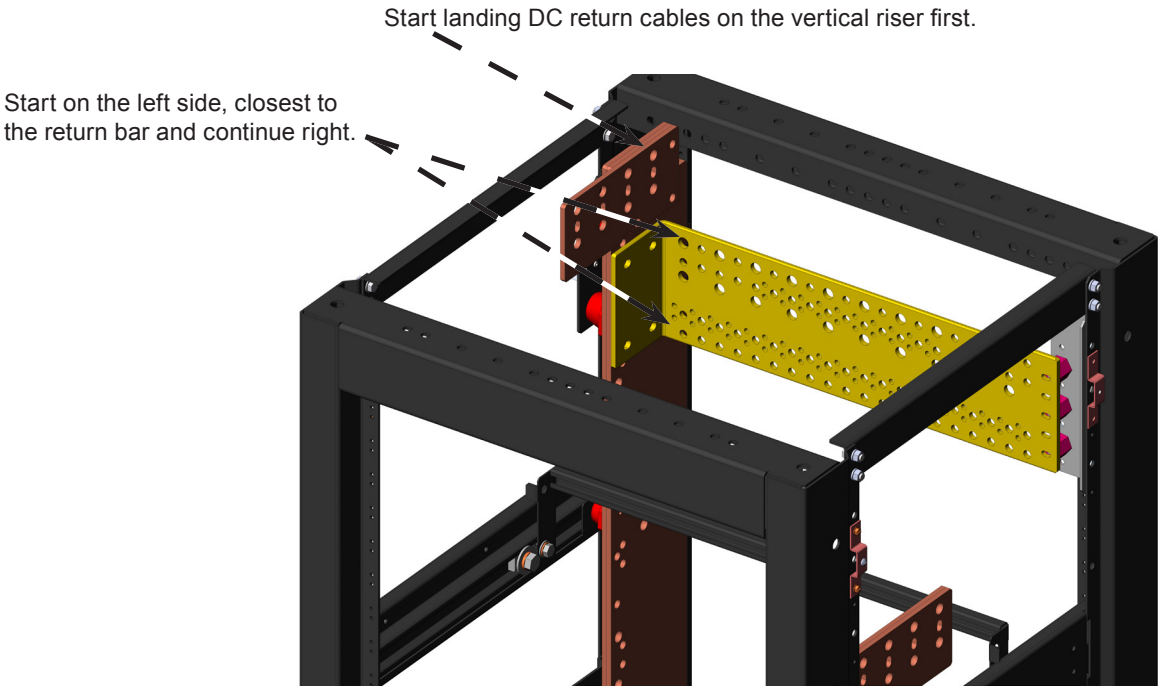


Figure 27 — Internal return bar

7.5.4 Mounting the External Remote Return Bar (optional)

The external return bar kit is an option for return connections for the loads. It serves as the common connecting point for the positive side of the power section and the batteries.

The CXPS-HX Remote Return Bar Kit, Base (0380214-001) has a capacity of 2500A per kit. Adder kists can be installed onto the base kit to increase its total capacity. A maximum of 1 base kit and 3 adder kits can be installed to provide a system with the total capacity of 10,000A. The kits can be ordered with or without optional covers.

1. Before joining return 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. Follow the instructions included with the kit (0380214-F0), to assemble and mount the kit on a customer-supplied auxiliary framing superstructure away from the system.

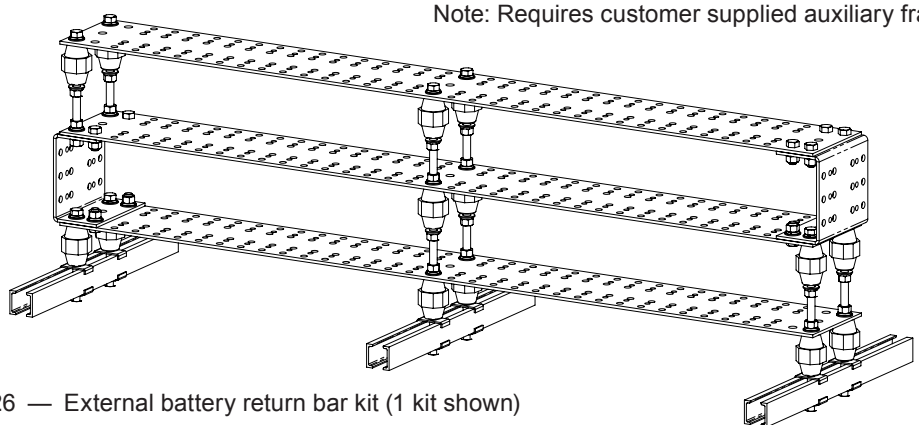


Figure 26 — External battery return bar kit (1 kit shown)

7.5.5 Mounting the External Remote Hot Bar

The external remote hot bar kit option provides a central location to land all the 'hot' cables from the power plant and the batteries.

The CXPS-HX Remote Hot Bar Kit, Base (0380213-001) has a capacity of 5000A per kit. An adder kit can be installed on the existing base kit which increases the total system capacity to 10,000A. The kits can be ordered with or without optional covers.

1. Before joining bus 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. Follow the instructions included with kit# 0380213-F0 to assemble and mount the bus bar on a customer-supplied auxiliary framing superstructure away from the system.

Note: Requires customer supplied auxiliary frame (2" x 9/16")

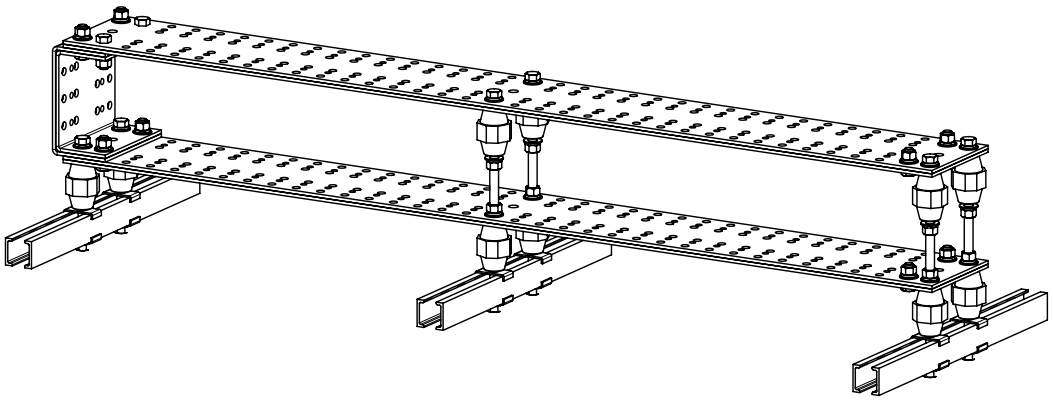


Figure 28 — External hot bar (2 kits shown)

7.5.6 Landing Cables on External Return and External Hot Bar

When landing cables on the bus bar for both optional external return bar and for the external hot bar follow the instructions in Figure 28. For full details refer to drawings included with the kit.

7.5.7 Return/Hot Bar to Loads Wiring

Always start system and load wiring from the same side. When wiring the system always space the input and output cables evenly across the entire length of the bar to ensure the load current is evenly distributed.

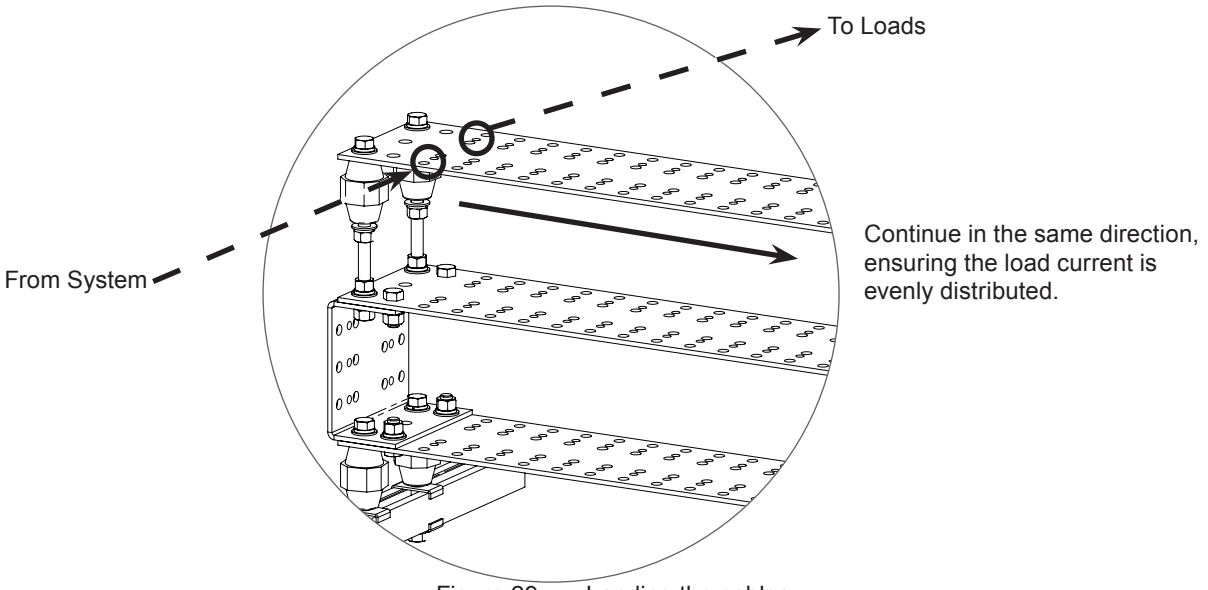


Figure 29 — Landing the cables

7.5.8 -48V Battery Cables

Connect directly to the -48V bus bar at the top of the rack (see "Figure 23 — Customer connections spacing" on page 36 and "Figure 24 — DC connection without AC panel option" on page 37) or the external hot bar ("Figure 27 — Internal return bar" on page 39).

7.5.9 DC Cables Between the Power System and the Loads

Refer to guidelines supplied with the load equipment. Typically distribution cables are 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.

Procedure:

1. Cut cables to length cable and terminate with a two-hole lug.
2. Identify each cable with a label that indicates its location within the distribution modules.
3. Connect the load returns to the overhead bus bar in the area of the distribution bay.
4. Neatly group cables with tie wraps.

7.5.10 External Alarms

All applicable alarms should be connected to the local alarm-sending unit from the power system. The CXC system controller provides form “C” relay contacts for interconnection.

8. 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:

8.1 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.

8.2 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.

8.3 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.
4. In the adjustments menu of the controller, set the battery parameters: float and equalize voltages to the capacity, Peukert exponent, open circuit voltage levels specified by the battery manufacturer.

8.4 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:

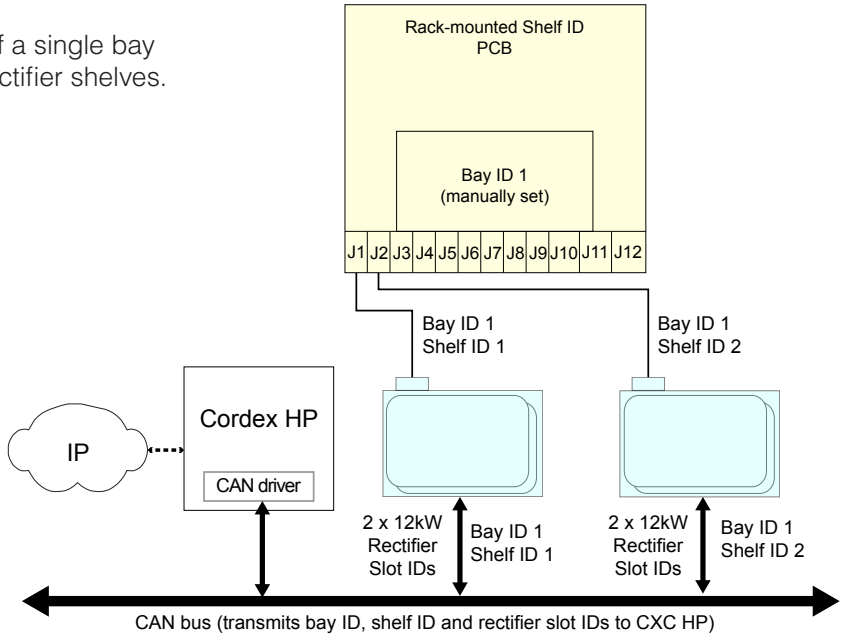
Alarm	Test
Minor alarm	Pull one rectifier (leave in the shelf) and then reinsert to clear the alarm.
Major alarm	Pull two rectifiers (leave in the shelf) and then reinsert to clear the alarm
AC Fail alarm	Turn off all AC breakers and run on batteries.
Supervisory Fail	At the controller, tap the Home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

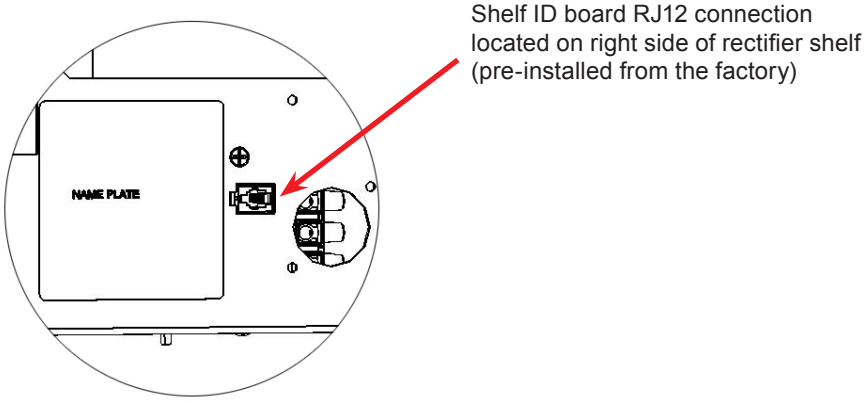
4. Perform a system load test using a resistive load box.
5. Turn off the AC input breaker to perform a full load test from DC power.
6. Enable the temperature compensation (temp comp) feature in the batteries menu. Program the settings for slope and breakpoints (upper and lower) according to the specific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

8.5 Shelf ID Connection

The shelf/bay ID/ comes factory installed. If shelves are installed in more than one bay, then set the Bay ID sequentially on each Shelf ID board.

Example of a single bay with two rectifier shelves.





9. Test and Commissioning Overview

9.1 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.

9.2 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.

9.3 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.

10. 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 H — 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.	

10.1 Rectifiers

It is recommended that every five years MOV surge suppressors are replaced (especially in areas of high lightning activity). See rectifier manual for general maintenance information.

10.2 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.

10.3 Controller Lithium Battery Replacement

NOTE:

CXC - replace the battery within 30 seconds to prevent loss of date and time.

CXC HP - If you remove the battery while the controller is not powered, the time and date will reset. If you remove the battery while the controller is powered, the date and time are maintained.

A removable lithium battery is located near the back-right of the motherboard for the CXC controller or via the front panel tilt-down tray on the top of the CXC HP. The battery life is rated up to three years, but replace earlier if the panel does not maintain date and time during power interruption. Both controllers have a different method for battery replacement.

WARNING!

Exercise extreme caution and do not touch any connected equipment.

CXC - 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. Replace observing the correct polarity, turn the controller back on.

CXC HP - Depress the two front latches and tilt the front panel forward and down. Remove the battery from the slot and replace with the same type of battery observing the correct polarity.

11. 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

12. Warranty and Service Information

12.1 Technical Support

In Canada and the USA, call toll free 1-888-462-7487

Customers outside Canada and the USA, call +1-604-436-5547.

12.2 Warranty Statement

For full information details review Alpha's online Warranty Statement at http://www.alpha.ca/warranty.

12.3 Limited Hardware Warranty

Alpha warrants that for a period of two (2) years from the date of shipment its products shall be free from defects under normal authorized use consistent with the product specifications and Alpha's instructions, unless otherwise specified in the product manual, in which case, the terms of the manual will take precedence

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.

12.4 Battery Warranty

Note that battery warranty terms and conditions vary by battery and by intended use. Contact your Alpha sales representative or the Technical Support team at the above number to understand your entitlements under Battery Warranty.

12.5 Warranty Claims

Any claim under this Limited Warranty must be made in writing to Alpha BEFORE sending material back. Alpha will provide Product return instructions upon approval of return request. A Service Repair Order (SRO) and / or Return Authorization (RA) number will be issued ensuring that your service needs are handled promptly and efficiently. Claims must be made online at: http://www.alpha.ca/web2/service-and-support.

12.6 Service Centers

For a list of international service centers, refer to the Alpha website:

http://www.alpha.ca/web2/services-and-support

13. Certification

About CSA and NRTL

CSA (Canadian Standards Association also known as CSA International) was established in 1919 as an independent testing laboratory in Canada. CSA received its recognition as an NRTL (Nationally Recognized Testing Laboratory) in 1992 from OSHA (Occupational Safety and Health Administration) in the United States of America (Docket No. NRTL-2-92). This was expanded and renewed in 1997, 1999, and 2001. The specific notifications were posted on OSHA's official website as follows:

- Federal Register #: 59:40602 - 40609 [08/09/1994]
- Federal Register #: 64:60240 - 60241 [11/04/1999]
- Federal Register #: 66:35271 - 35278 [07/03/2001]

When these marks appear with the indicator "C and US" or "NRTL/C" it means that the product is certified for both the US and Canadian markets, to the applicable US and Canadian standards. (1)

Alpha rectifier and power system products, bearing the aforementioned CSA marks, are certified to CSA C22.2 No. 60950-1 (2nd Ed) and UL 60950-1 (2nd Ed). Alpha UPS products, bearing the aforementioned CSA marks, are certified to CSA C22.2 No. 107.3 and UL 1778.

As part of the reciprocal, US/Canada agreement regarding testing laboratories, the Standards Council of Canada (Canada's national accreditation body) granted Underwriters Laboratories (UL) authority to certify products for sale in Canada. (2)

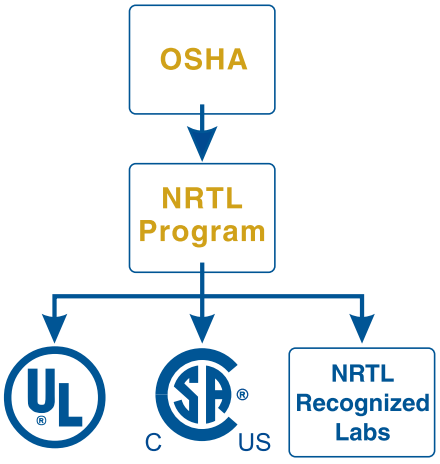
Only Underwriters Laboratories may grant a licence for the use of this mark, which indicates compliance with both Canadian and US requirements. (3)

NRTLs capabilities

NRTLs are third party organizations recognized by OSHA, US Department of Labor, under the NRTL program.

The testing and certifications are based on product safety standards developed by US based standards developing organizations and are often issued by the American National Standards Institute (ANSI). (4)

The NRTL determines that a product meets the requirements of an appropriate consensus-based product safety standard either by successfully testing the product itself, or by verifying that a contract laboratory has done so, and the NRTL certifies that the product meets the requirements of the product safety standard. (4)



Governance of NRTL

The NRTL Program is both national and international in scope with foreign labs permitted.

(1) www.csagroup.org
(2) www.scc.ca
(3) www.ulc.ca
(4) www.osha.gov

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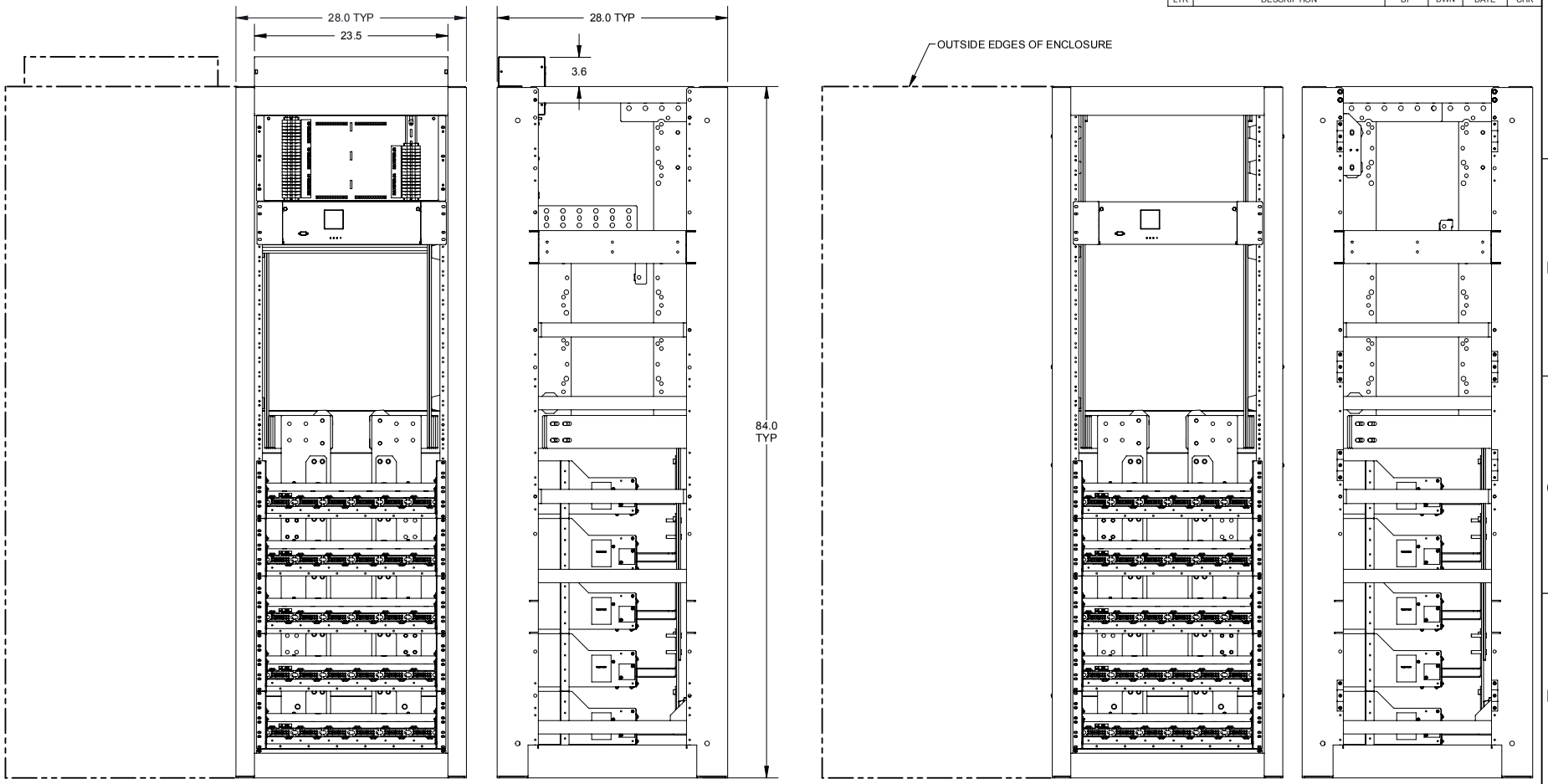

ADDITIONAL CXPS-HX BAY FOR TANDEM SYSTEMS (CAN BE MOUNTED ON EITHER SIDE)

FRONT VIEW CXPS-HX WITH AC PANEL

SIDE VIEW CXPS-HX WITH AC PANEL

ADDITIONAL CXPS-HX BAY FOR TANDEM SYSTEMS (CAN BE MOUNTED ON EITHER SIDE)

FRONT VIEW CXPS-HX WITHOUT AC PANEL

SIDE VIEW CXPS-HX WITHOUT AC PANEL

NOTES UNLESS OTHERWISE SPECIFIED:

1. PRODUCT TO BE FABRICATED ACCORDING TO ATL PRODUCTION STANDARD 0700001

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X.X	±0.040
X.XX	±0.020
X.XXX	±0.010
ANGULAR:	±1°
INTERPRET DIM AND TOL PER ASME Y14.5-1994	
THIRD ANGLE PROJECTION	

APPROVALS		DATE
DRAWN	S. BIENKO	NOV-21-13
CHECKED	K. LAM	NOV-21-13

TITLE: CXPS-HX OUTLINE DRAWING

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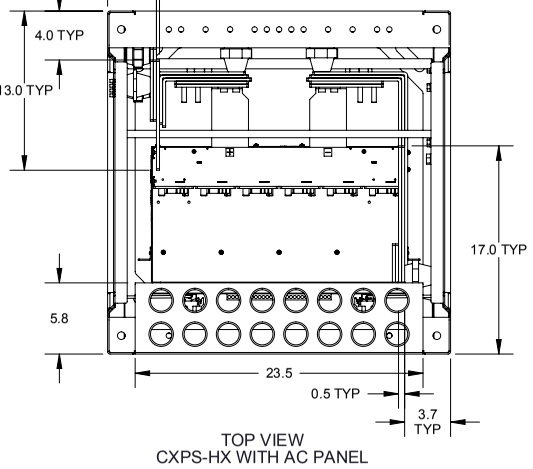
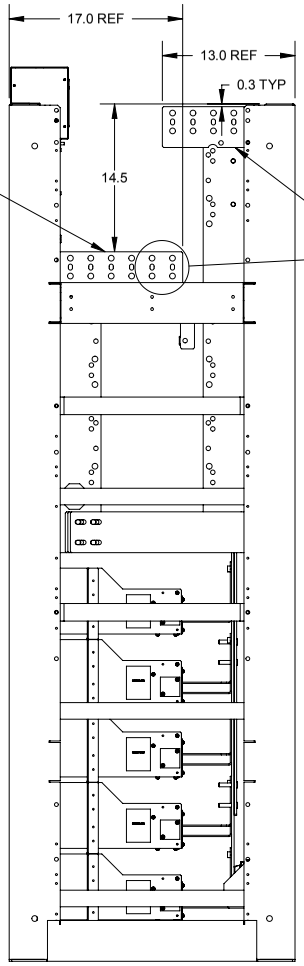
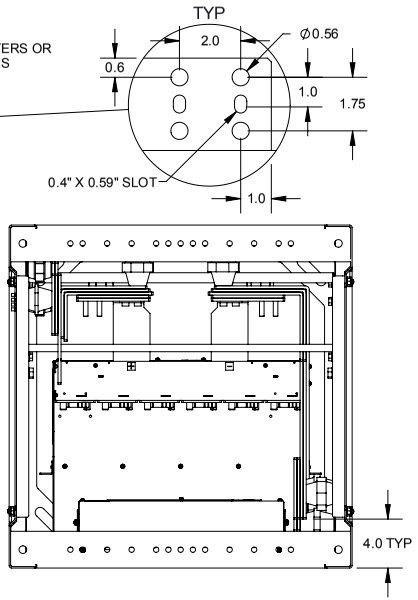


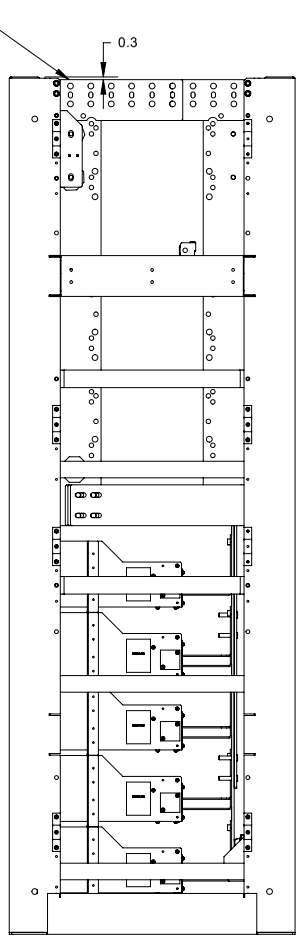
TOP VIEW
CXPS-HX WITH AC PANEL



SIDE VIEW
CXPS-HX WITH AC PANEL



TOP VIEW
CXPS-HX WITHOUT AC PANEL



SIDE VIEW
CXPS-HX WITHOUT AC PANEL

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X.XXX	±0.010
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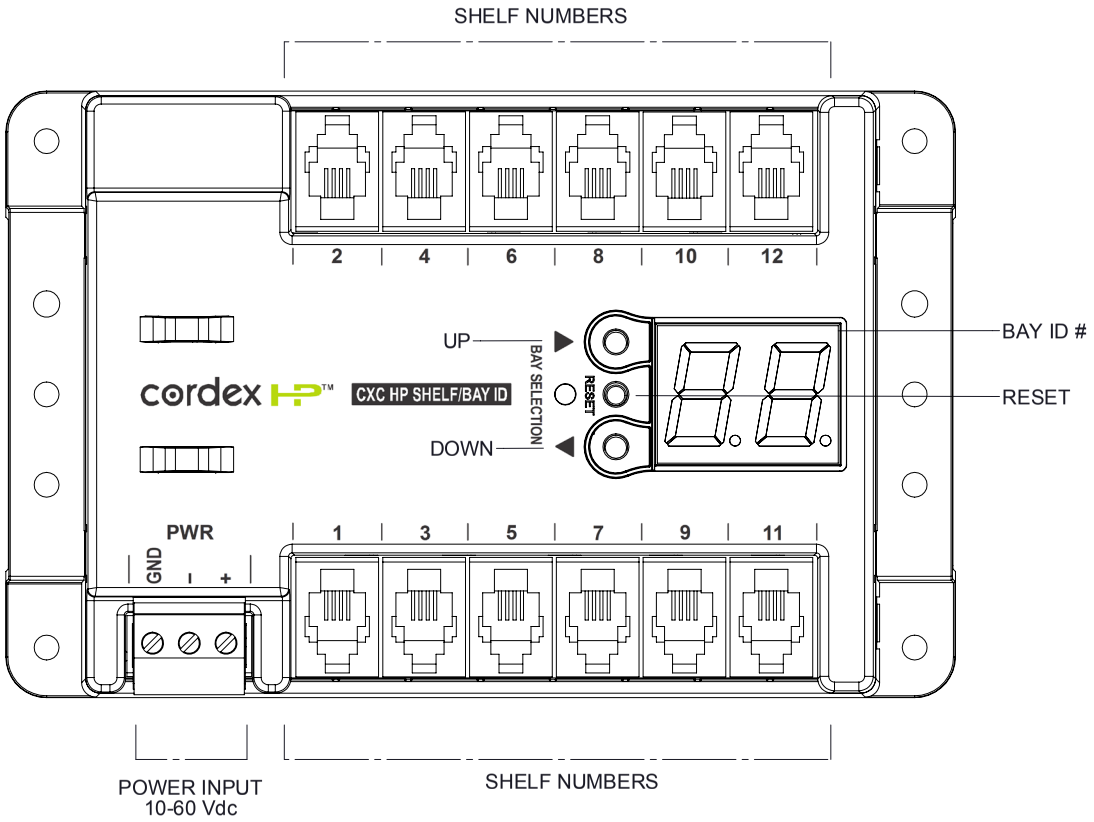

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APPROVALS		DATE
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CHECKED	FV	2/18/2014

TITLE: SHELF BAY/ID, CXC HP,CUSTOMER CONNECTIONS

SIZE	DWG NO.	REV
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