CXPS-FR3 Power System

Technical Guide: 9400018-J0

Effective: 01/2019

Alpha Technologies Ltd.

CXPS-FR3 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.

NOTE:

Alpha shall not be held liable for any damage or injury involving its enclosures, power supplies, generators, batteries, or other hardware if used or operated in any manner or subject to any condition inconsistent with its intended purpose, or if installed or operated in an unapproved manner, or improperly maintained.

For technical support, contact Alpha Technologies:

Canada and USA: **1-888-462-7487**
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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.

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 Warnings and Cautions

WARNING!

You must read and understand the following warnings before installing the enclosure and its component. Failure to do so could result in personal injury or death.

- Read and follow all instructions included in this manual.
- Only trained personnel are qualified to install or replace this equipment and its components.
- Use proper lifting techniques whenever handling equipment, parts, or batteries.

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. Do not rest tools on top of batteries.

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.
- The enclosure which contains the DC or AC power system must remain locked at all times, except when authorized service personnel are present.
- Always assume electrical connections or conductors are live. Turn off all circuit breakers and double-check with a voltmeter before performing installation or maintenance.
- Place a warning label on the utility panel to warn emergency personnel that a reserve battery source is present which will power the loads in a power outage condition or if the AC disconnect breaker is turned off.
- At high ambient temperature conditions, the internal temperature can be hot so use caution when touching the equipment.

1.4 Battery Safety

- Never transport an enclosure with batteries installed. Batteries must ONLY be installed after the enclosure has been securely set in place at its permanent installation location. Transporting the unit with batteries installed may cause a short circuit, fire, explosion, and/or damage to the battery pack, enclosure and installed equipment.
- Servicing and connection of batteries must be performed by, or under the direct supervision of, personnel knowledgeable of batteries and the required safety precautions.
- 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

The Alpha Technologies CXPS-FR3 is a standalone rectifier bay that can be used to upgrade inefficient and aging Ferroresonant rectifiers. As a drop-in replacement for RL400 and PECO II 400 rectifiers, the FR3 repurposes existing AC and DC cabling which minimizes installation time and avoids costly replacements.

For decades, Ferroresonant rectifiers have powered traditional telecom central offices. However, as Ferros age and begin to fail, it is becoming difficult to find parts as well as qualified technicians to diagnose and repair the problems. These maintenance issues can result in lower network reliability. These issues, coupled with the Ferros' relative operational inefficiencies, are driving operators to upgrade their systems to modern, high efficiency switch mode rectifiers.

Alpha provides the ideal 'like for like' retrofit solution, with minimal installation time and disruption to the office. The interfaces to the FR3 have been engineered in such a fashion that the existing AC and DC infrastructure feeding the Ferroresonant plants can be reused. The building block for the FR3 is Alpha's highly reliable Cordex HP 12.0kW and 4.0kW rectifiers.

Unlike other solutions in the market, the FR3 design enables operators to add up to 50% more power capacity or recover floor space savings. In addition, the wrap-around bay design deflects heat flow upwards, allowing operators to install batteries directly behind the bay.

The bay also comes equipped with Alpha's powerful CXC HP controller, which can further modernize the power plant with advanced control and monitoring features. The built-in web server provides the user alternate setup via local or remote IP access. The integrated logging feature allows the capture of data from multiple inputs for AC/DC voltages, load/battery current, and cell voltage/temperature. Features such as 'Power Save' help improve overall system efficiency by reducing operational losses.

- Ferroresonant rectifier retrofit solution for RL400 and PECO II 400 rectifiers
- Significant CAPEX savings by maintaining existing AC and DC cabling infrastructure
- Unique solution providing up to 50% capacity growth or floor space savings without changes to existing infrastructure
- Fully integrated solution including in-bay system controller
- Wrap-around bay design directs heat exhaust via the top, allowing batteries to be placed directly behind the bay

Figure 1 — CXPS-FR3

3. Specifications

<table>
<tr><th colspan="4">Table A — CXPS-FR3 Specifications</th></tr>
<tr><th colspan="4">Electrical</th></tr>
<tr><td></td><td>Single</td><td>800A B2B & S2S</td><td>1200A B2B & S2S</td></tr>
<tr><td>AC Voltage</td><td>208Vac 3 Phase
480Vac 3 Phase</td><td>208Vac 3 Phase
480Vac 3 Phase</td><td>480Vac 3 Phase</td></tr>
<tr><td>AC Feeder Breaker</td><td>208Vac: 1x 100A Breaker
480Vac: 1x 50A Breaker</td><td>208Vac: 2x 100A Breaker
480Vac: 2x 50A Breaker</td><td>480Vac: 2x 60A Breaker</td></tr>
<tr><td>AC Feeder Wire Size</td><td>208Vac: 2AWG
480Vac: 6AWG</td><td>208Vac: 2AWG
480Vac: 6AWG</td><td>480Vac: 6AWG</td></tr>
<tr><td>In Bay Rectifier AC Breakers (internally wired) (optional)</td><td>Total: 2x AC Breakers
480Vac: 1 CB/Module
208Vac: 1 CB/3 Modules</td><td>Total: 4x AC Breakers
480Vac: 1 CB/Module
208Vac: 1 CB/3 Modules</td><td>Total: 6x AC Breakers
480Vac: 1 CB/Module</td></tr>
<tr><td>Bay DC Output Capacity</td><td>440A</td><td>880A</td><td>1320A</td></tr>
<tr><th colspan="4">Mechanical</th></tr>
<tr><td></td><td>Lorain</td><td colspan="2">PECO</td></tr>
<tr><td>Dimensions</td><td>1829H x 610W x 447D mm
(72H x 24W x 17.6D in)

B2B
1829H x 610W x 897D mm
(72H x 24W x 35.3D in)

SBS
1829H x 1219W x 447D mm
(72H x 48W x 17.6D in)</td><td colspan="2">2134H x 658W x 447D mm
(84H x 25.9W x 17.6D in)

B2B
2134H x 658W x 762D mm
(84H x 25.9W x 30D in)

SBS
2134H x 1318W x 447D mm
(84H x 51.9W x 17.6D in)</td></tr>
<tr><td>Weight</td><td colspan="3">≤520lbs (236kg) Excluding rectifier modules</td></tr>
<tr><td>AC Cable Landing</td><td colspan="3">2/0 to #14 AWG</td></tr>
<tr><td>DC Cable Landing</td><td colspan="3">Up to 3x 3/8" holes on 1" center, 2 hole lugs or 2x 1/2" holes on 1 3/4" center, 2 hole lugs; maximum lug tongue width 1 1/4"</td></tr>
<tr><th colspan="4">Related Components</th></tr>
<tr><td>Controller</td><td colspan="3">CXC-HP**</td></tr>
<tr><td>Peripherals</td><td colspan="3">L-ADIO**
Option for up to 18 current monitoring channels (3 x 6i Shunt mux)</td></tr>
<tr><th colspan="4">Environmental</th></tr>
<tr><td>Temperature</td><td colspan="3">0 to 40°C (32 to 122°F)</td></tr>
<tr><td>Humidity</td><td colspan="3">0 to 90% RH (non-condensing)</td></tr>
<tr><td>Elevation</td><td colspan="3">-100 to 2000m (-330 to 6500ft)</td></tr>
<tr><th colspan="4">Agency Compliance</th></tr>
<tr><td>Safety</td><td colspan="3">CSA C22.2 No. 60950</td></tr>
<tr><td>NEBS</td><td colspan="3">NEBS L3 Certified</td></tr>
<tr><td colspan="4">**Supplemental or expansion bays do not have the controller and the L-ADIO</td></tr>
</table>

4. Features

The CXPS-FR3 power system is available in various configurations. Refer to ordering guide for a complete list of configurations and accessories.

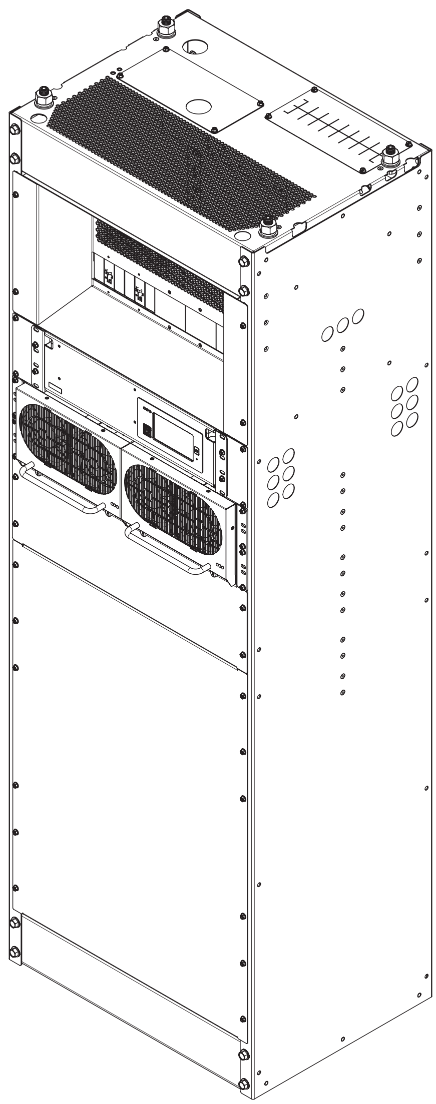


Figure 2 — CXPS-FR3 Lorain replacement

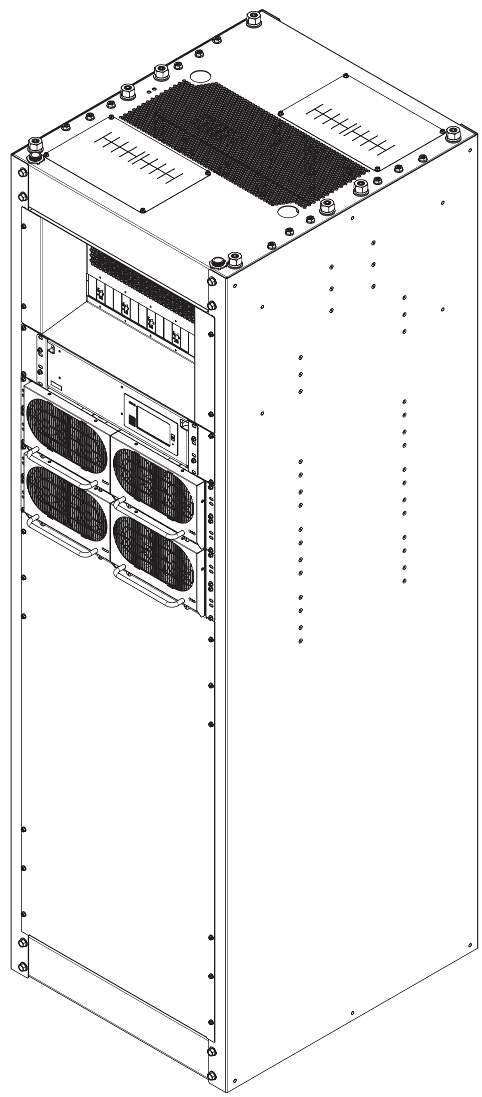
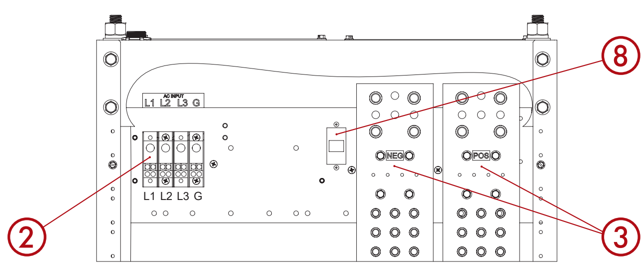


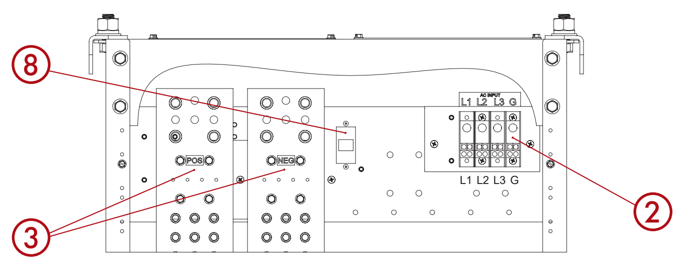
Figure 3 — CXPS-FR3 PECO II replacement

4.1 CXPS-FR3 400A Single Configuration

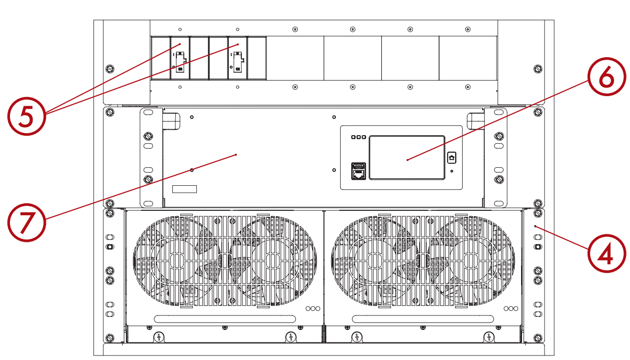
1. Replaces one 400A Lorain or PECO II rectifier.
2. One System AC input terminal block, rated 600V / 175A, accepts #2/0 – #14 AWG cable.
    - 480Vac system: Recommend 50A 480Vac 3-pole feeder breaker, #6 AWG wire.
    - 208Vac system: Recommend 100A 208Vac 3-pole feeder breaker, #2 AWG wire.
3. One pair of 1/4" x 4" 48Vdc output busbars with:
    - two landings that accept 1/2" holes on 1-3/4" center 2 hole lugs or,
    - three landings that accept 3/8" holes on 1" center 2 hole lugs.
4. One rectifier shelf available in either 208Vac (4kW rectifier) or 480Vac (12kW rectifier).
5. Two 3-pole rectifier module AC disconnect breakers (optional):
    - 480Vac system: 1 AC breaker per rectifier.
    - 208Vac system: 1 AC breaker per three rectifiers.
6. One system controller (primary bay). Refer to section 4.5 for controller features.
7. One I/O module (primary bay). Refer to section 4.6 for I/O module features.
8. One CAN OUT communication port (primary bay) or one CAN IN and one CAN OUT communication port (supplemental bay). See section 7.8 for inter-bay CAN communication.



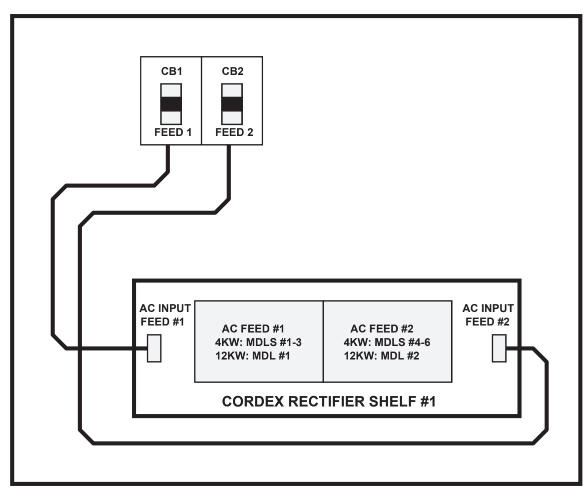
Main bay AC/DC connections for Lorain replacement



Main bay AC/DC connections for PECO II replacement



Primary bay components (12kW rectifier shown)

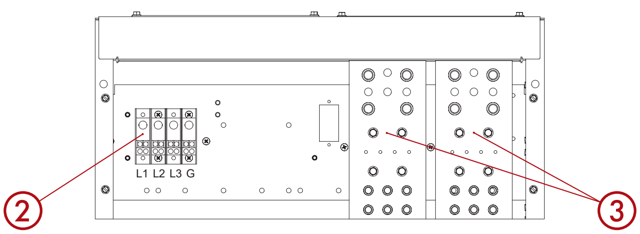


System breaker/Module internal wiring

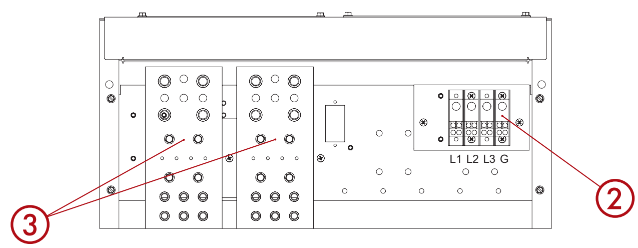
Figure 4 — CXPS-FR3 400A System Components and AC/DC Connections

4.2 CXPS-FR3 800A Back to Back And Side by Side Configuration

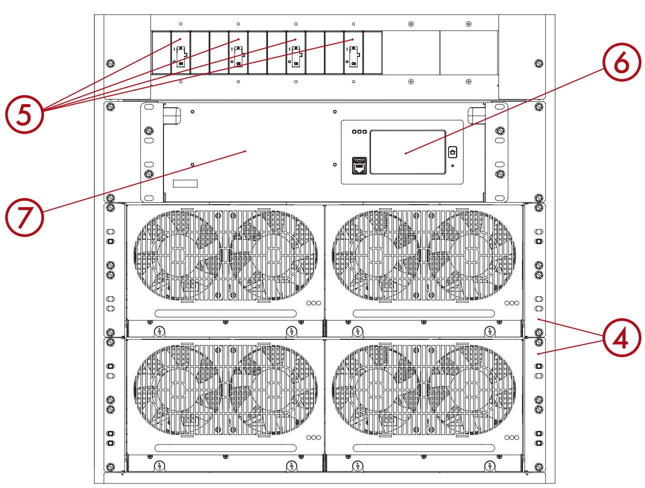
1. Replaces two 400A Lorain or PECO II rectifiers.
2. Two system AC input terminal blocks, rated 600V / 175A that accept #2/0 – #14 AWG cable.
   - 480Vac system: Recommend 50A 480Vac 3-pole feeder breaker per input, #6 AWG wire.
   - 208Vac system: Recommend 100A 208Vac 3-pole feeder breaker per input, #2 AWG wire.
3. Two pairs of 1/4" x 4" 48Vdc output busbars with:
   - two landings that accept 1/2" holes on 1-3/4” center 2 hole lugs or,
   - three landings that accept 3/8" holes on 1" center 2 hole lugs.
4. Two rectifier shelves available in either 208Vac (4kW rectifier) or 480Vac (12kW rectifier).
5. Four 3-pole rectifier module AC disconnect breakers (optional).
   - 480Vac system: 1 AC breaker per rectifier.
   - 208Vac system: 1 AC breaker per three rectifiers.
6. One system controller (primary bay). Refer to section 4.5 for controller features.
7. One I/O module (primary bay). Refer to section 4.6 for I/O module features.
8. One CAN OUT communication port (primary bay) or one CAN IN and one CAN OUT communication port (supplemental bay). See section 7.8 for inter-bay CAN communication.
9. Bay back extension or side extension that houses one set of the AC and DC connection points as listed above (in addition to those located in the main bay).



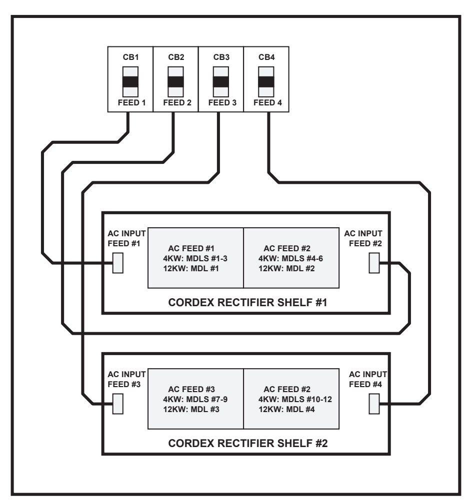
Bay extension AC/DC connections for Lorain replacement (main bay AC/DC connections are the same as the 400A configuration)



Bay extension AC / DC connections for PECO II replacement (main bay AC/DC connections are the same as the 400A configuration)



Primary bay components (12kW rectifier shown)

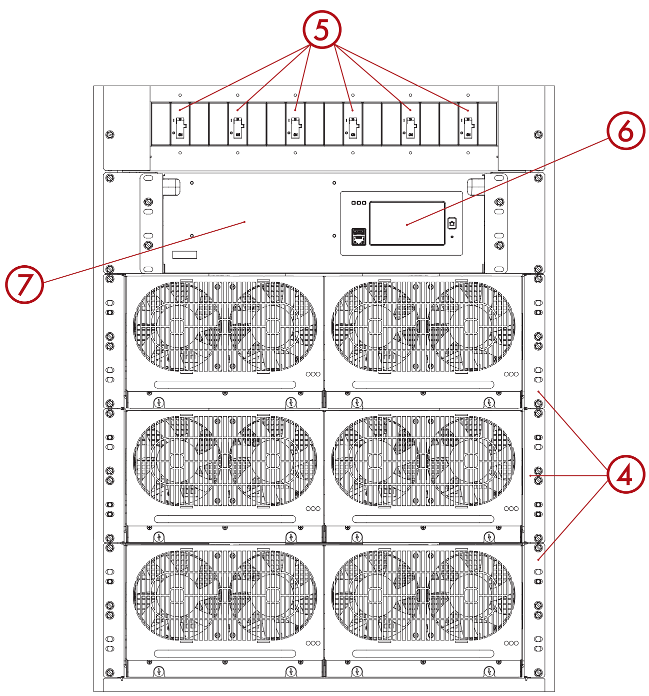


System breaker/Module internal wiring

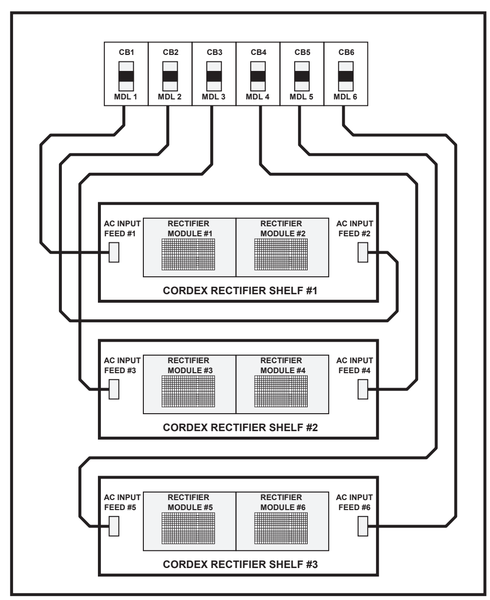
Figure 5 — CXPS-FR3 800A System Components and AC / DC Connections.

4.3 CXPS-FR3 1200A Back to Back And Side by Side Configuration

1. Replaces three 400A Lorain or PECO II rectifiers
2. Two system AC input terminal blocks, rated 600V / 175A that accept #2/0 – #14 AWG cable.
   - Recommend 60A 480Vac 3-pole feeder breaker per input, #6 AWG wire.
3. Two pairs of 1/4" x 4" 48Vdc output busbars with:
   - two landings that accept 1/2" holes on 1-3/4" center 2 hole lugs or,
   - 3/8" holes on 1" center 2 hole lugs.
4. Three rectifier shelves 480Vac (12kW rectifier).
5. Six 3-pole rectifier module AC disconnect breakers (one breaker per rectifier) (optional).
6. One system controller (primary bay). Refer to section 4.5 for controller features.
7. One I/O module (primary bay). Refer to section 4.6 for I/O module features.
8. One CAN OUT communication port (primary bay) or one CAN IN and one CAN OUT communication port (supplemental bay). See section 7.8 for inter-bay CAN communication.
9. Main bay back extension or side extension that houses one set of the AC and DC connection points as listed above (in addition to those located in the main bay).
10. AC / DC connection points are identical to 800A configurations.



Primary bay components



System breaker/Module internal wiring

Figure 6 — CXPS-FR3 1200A System Components and Internal AC Wiring.

4.4 CXPS-FR3 System Expansion

Supplemental CXPS-FR3 bays available in the same configurations as the primary bay can be added to further increase system ampacity. A supplemental bay contains the same components as a primary bay except the system controller. Inter-bay communication cables connect the rectifiers in supplemental bays to the primary bay controller. Refer to section 7 for further wiring details.

4.5 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 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, current) 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

4.5.1 Controller Features

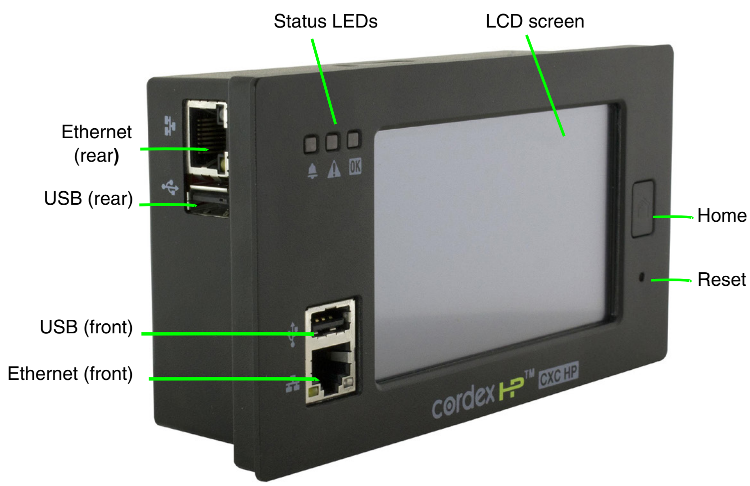


Figure 7 — Cordex CXC HP Controller

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.
- 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.

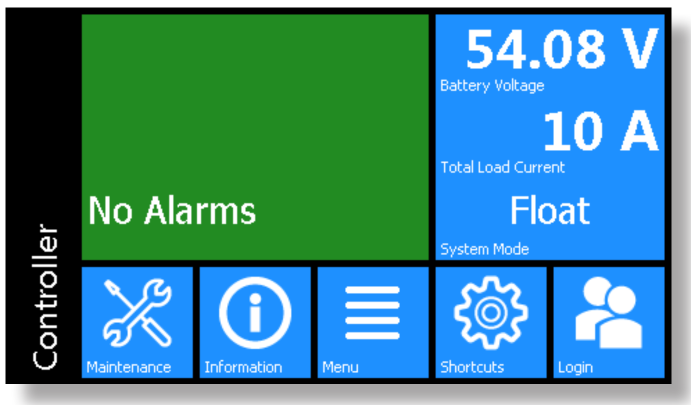


Figure 8 — LCD Color Touchscreen Display

4.6 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.

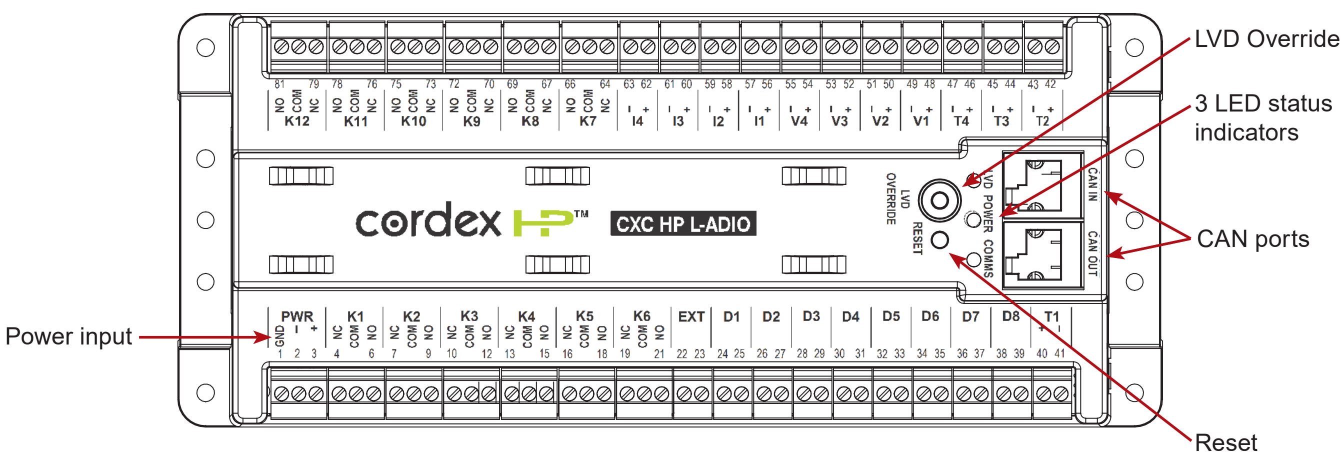


Figure 9 — L-ADIO I/O Peripheral

4.6.1 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.

4.6.2 6I-ADIO (Optional)

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

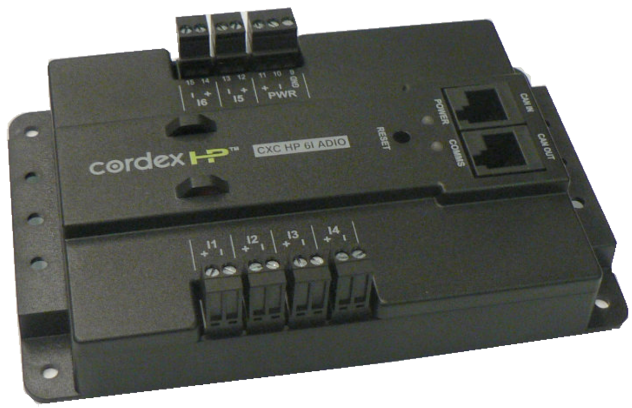


Figure 10 — 6I-ADIO Power Module

4.7 Cordex HP 4.0kW Rectifiers

4.7.1 Rectifier Features

- High performance 83.3A rectifier for 48V telecom applications
- High power density 4RU compact design delivering up to 24kW per 23" shelf
- Power limiting and wide range AC input for global installation requirements

Figure 11 — Cordex HP 4.0kW Rectifier

4.7.2 LED status

The three LEDs on the rectifier front panel indicate status (see Figure 11):

- AC Input Voltage present (1)
- DC Output Voltage present (2)
- Rectifier Alarm (3)

4.8 Cordex HP 12kW Rectifiers

4.8.1 Rectifier Features

- High performance compact 220A rectifier for 48Vdc telecom application
- Simple configurations providing 24kW in a compact 4RU shelf
- True 3-phase 3-wire 480Vac input

Figure 12 — 12kW 480Vac (3-phase) Rectifier

4.8.2 LED Status

The three LEDs on the rectifier front panel indicate status (see Figure 12)

- AC Input Voltage present (1)
- DC Output Voltage present (2)
- Rectifier Alarm (3)

5. Site Evaluation and Pre-Installation

The Alpha CXPS-FR3 power system is designed to use the existing floor mounting hardware and AC input and DC output cables for Lorain or PECO II 400A rectifiers. Alpha recommends to check the integrity of the mounting surface/hardware and cabling before proceeding. Replace any hardware and cables that appear to be compromised with appropriate agency approved equivalent.

NOTE:

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

5.1 Installation Component Requirements

Not Supplied: External AC and DC cables and fittings, floor anchors.

5.2 Tools and Equipment

Insulated tools are essential. Use the following list as a guide:

3/16” Allen style wrench for AC connections

Torque wrench: 3/8" drive, 0-100 ft-lb for DC connections

Electric drill with hammer action

Digital voltmeter equipped with test leads

Laptop with IE 11

Various crimping tools and dies to match lugs used in installation

Heat gun

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 as follows:

- Combination wrenches
- Ratchet and socket set
- Various screwdrivers
- Electricians knife and cable cutters

5.3 Packing Materials

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.

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.

20 PAP/PCB	01 PET	04 PE-LD	06 PS	40 FE	41 ALU	50 NW
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

5.3.1 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.

5.4 Check for Damage

Before 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.

5.5 General Receipt of Shipment

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

5.6 Rectifiers (Purchased Separately)

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

5.7 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.

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

6. Installation

The CXPS-FR3 must be mounted in a clean and dry environment. Provide sufficient free space at the front of the system to allow for unrestricted air flow to the rectifier intakes and provide easy access. **No clearance is required for the sides or back of the system for cooling**. The CXPS-FR3 has the same mechanical footprint and uses the existing mounting anchor hardware for either Lorain or PECO II rectifiers.

NOTE:

Earthquake anchoring is the type used in earthquake areas up to Zone 4. The CXPS-FR3 system is earthquake qualified when properly anchored to a 3000 psi (2.11 kg per sq. mm) concrete floor.

6.1 CXPS-FR3 Lorain Replacement Installation

1. Remove the existing Lorain rectifier(s).
2. Inspect and replace the anchoring hardware if necessary.
3. Use a 5/16" nut driver to remove the lower front panel of the CXPS-FR3 to access the mounting holes in the base of the frame. See Figure 13.
4. Position the CXPS-FR3 over the anchoring hardware. Note: overhead busbar support hardware installed on the top of the bay may need to be removed in order to clear the overhead bars prior to positioning the bay.
5. Install the anchoring hardware including the provided seismic washers finger tight for each anchor.
6. Ensure the CXPS-FR3 is level front-to-back and side-to-side. Install shims if necessary.
7. Once the CXPS-FR3 is level, tighten all hardware to the appropriate torque, see Table B.

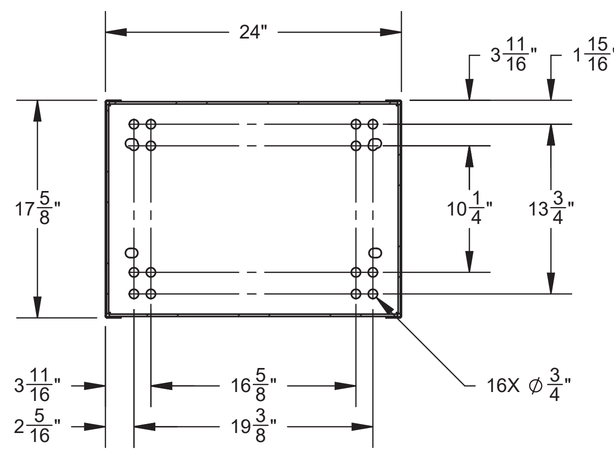


Figure 14 — CXPS-FR3 Lorain Floor Mounting Single or SBS

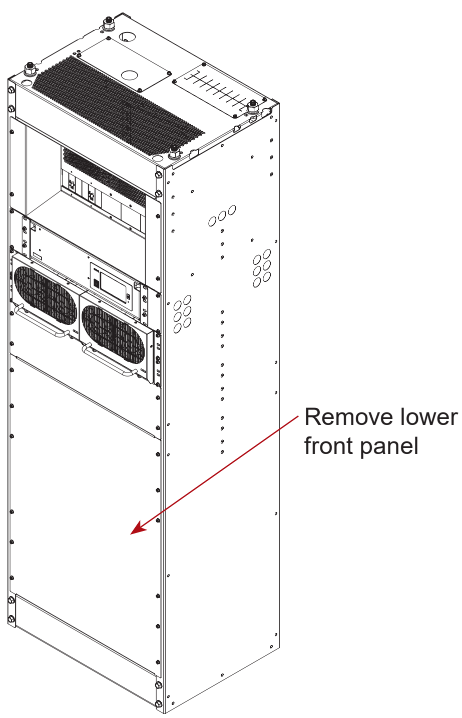


Figure 13 — Accessing Base Mounting Holes Lorain

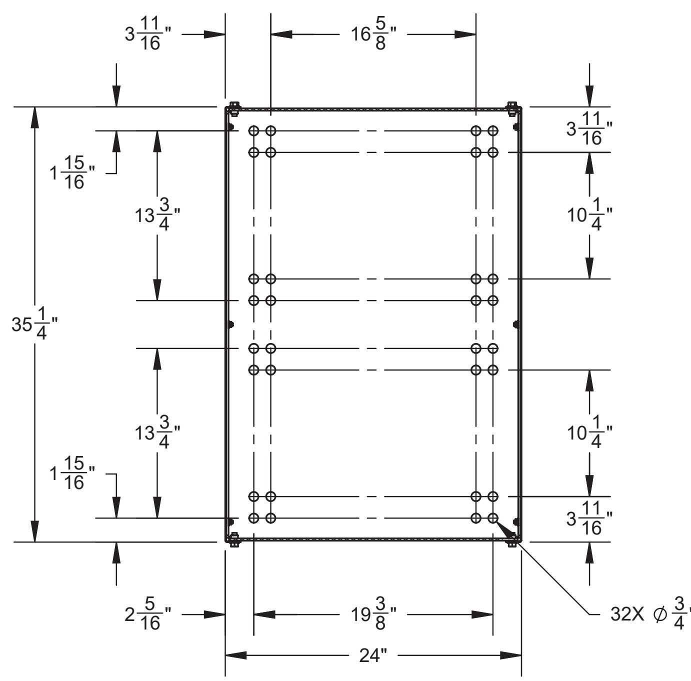


Figure 15 — CXPS-FR3 Lorain Floor Mounting B2B

6.2 CXPS-FR3 PECO II Replacement Installation

1. Remove the existing PECO II rectifier(s).
2. Inspect and replace the anchoring hardware if necessary.
3. Use a 5/16th nut driver to remove the lower front panel of the CXPS-FR3 to access the mounting holes in the base of the frame. See Figure 18.
4. Position the CXPS-FR3 over the anchoring hardware. Note: overhead bus bar support hardware installed on the top of the bay may need to be removed in order to clear the overhead bars prior to positioning the bay.
5. Install the anchoring hardware finger tight for each anchor.
6. Ensure the CXPS-FR3 is level front-to-back and side-to-side. Install shims if necessary.
7. Once the CXPS-FR3 is level, tighten all hardware to the appropriate torque as shown in Table B.

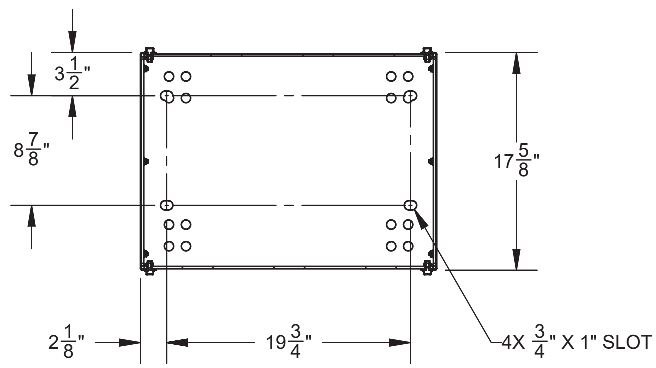


Figure 16 — CXPS-FR3 PECO II Floor Mounting Single or SBS

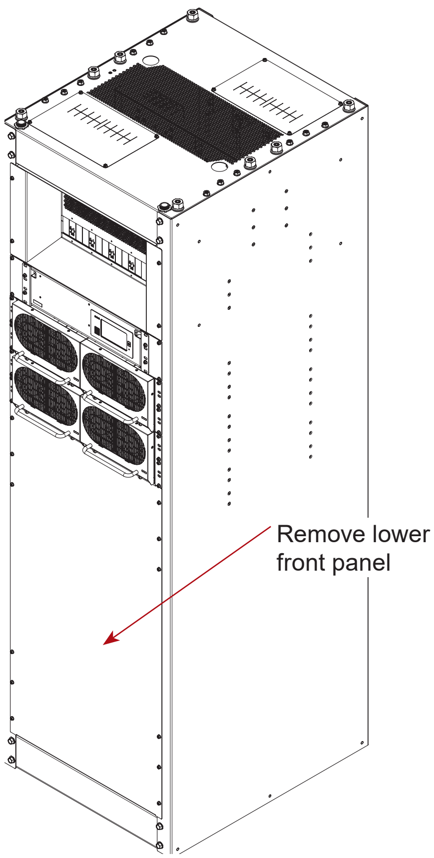


Figure 18 — Accessing Base Mounting Holes PECO II

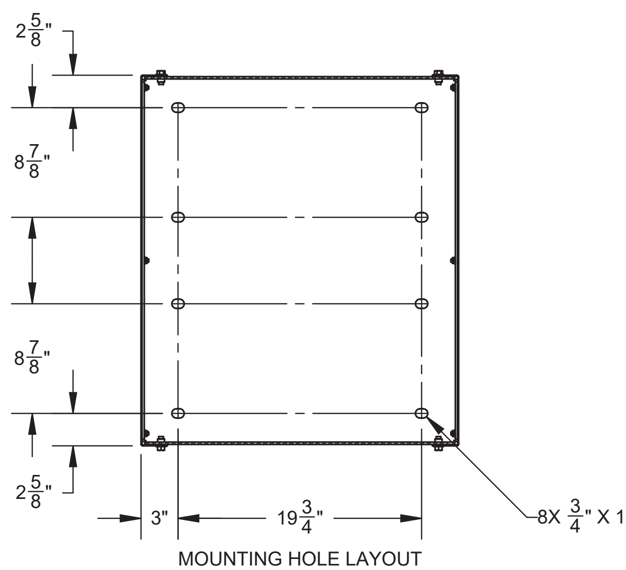


Figure 17 — CXPS-FR3 PECO II Floor Mounting B2B

6.3 CXPS-FR3 Supplemental Bay Installation

Supplemental CXPS-FR3 bays are available in the same configurations as the primary bay, and can be added to further increase system ampacity. The supplemental bays are designed to slide in next to each other and the mounting procedure is the same as for a primary bay. Note: overhead busbar support hardware on the top of the bay may need to be removed in order to clear the overhead bars prior to positioning the bay.

7. Wiring

The CXPS-FR3 is designed to use the existing Ferro AC input and DC output wiring. Alpha recommends to inspect the integrity of the existing cables and replace if necessary with agency approved equivalent.

WARNING!

Before starting, read the safety section of this manual. Verify AC power is OFF and AC panel feeder breakers are locked out and tagged.

Locations for the AC and DC connections will vary depending on the type of Ferro rectifier to be replaced. The terminal blocks for the AC input connections and DC output busbars are factory configured to be in the exact same location as the Lorain or PECO II rectifiers. Refer to the following figures for electrical connection locations.

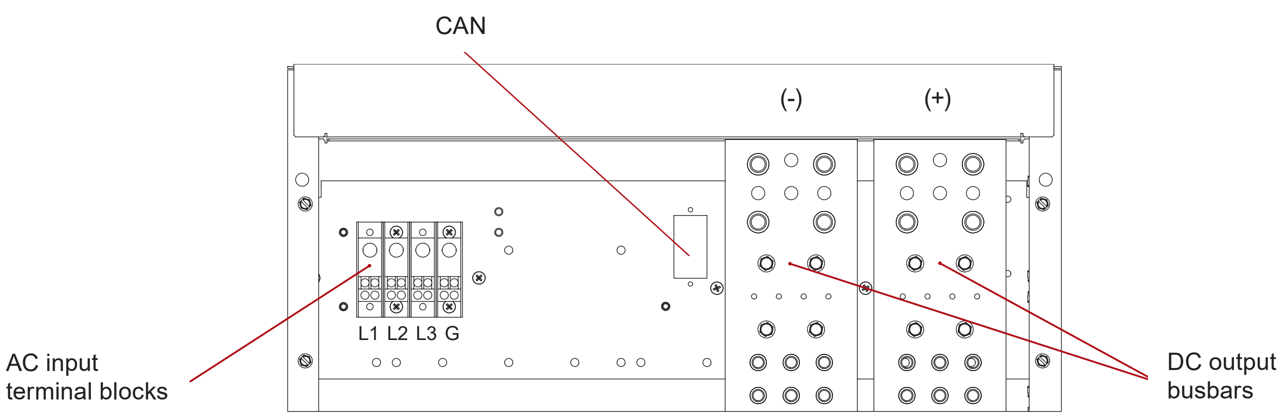


Figure 19 — CXPS-FR3 Lorain Configuration AC/DC Connections

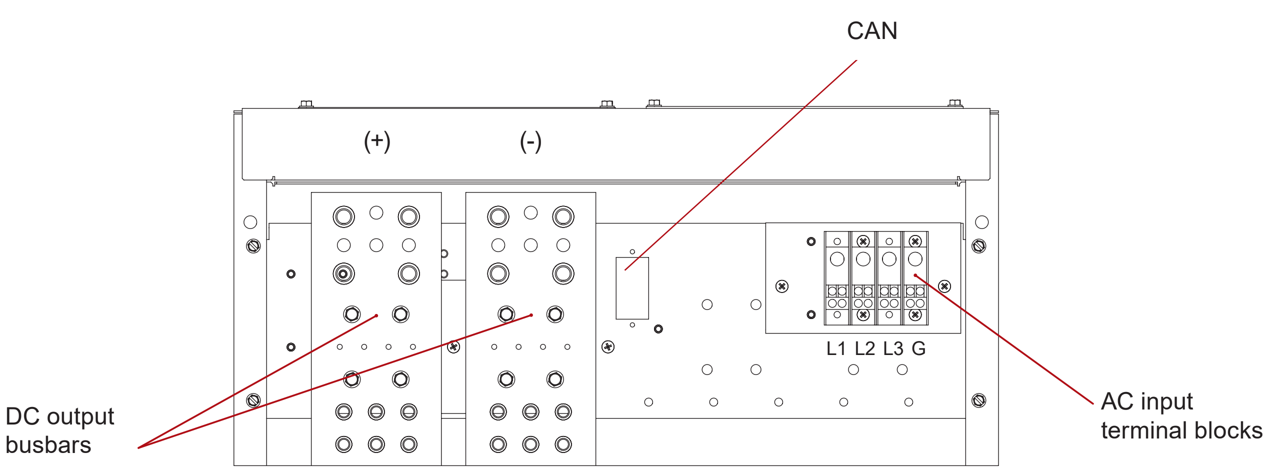


Figure 20 — CXPS-FR3 PECO II Configuration AC/DC Connections

7.1 Accessing AC and DC Connections

1. Remove the four panel retaining screws of the front breaker cover using a 5/16" nut driver to remove the panel.
2. Set the front panel and hardware aside.

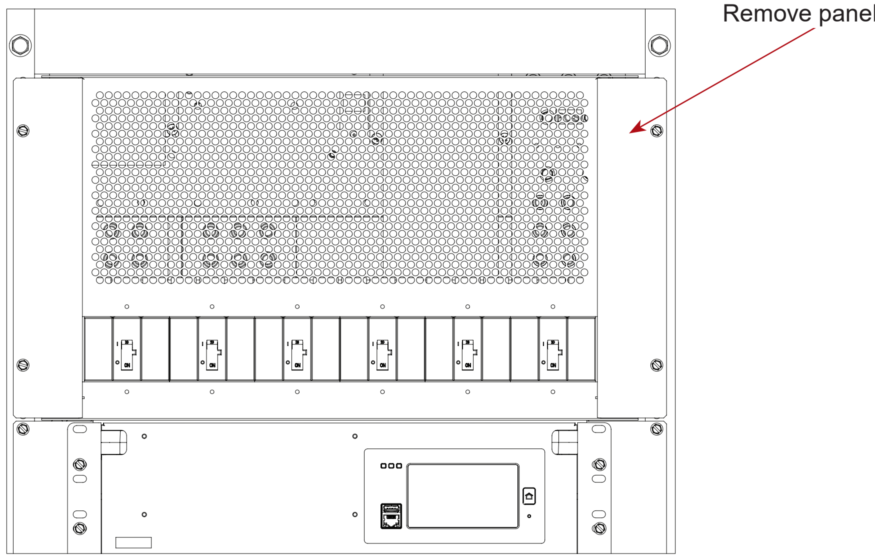


Figure 21 — Main Bay Front Breaker Panel Removal

3. For back to back or side by side systems, also remove the panel retaining screws for the access panel on main bay rear or side respectively.
4. Set the panel and hardware aside.

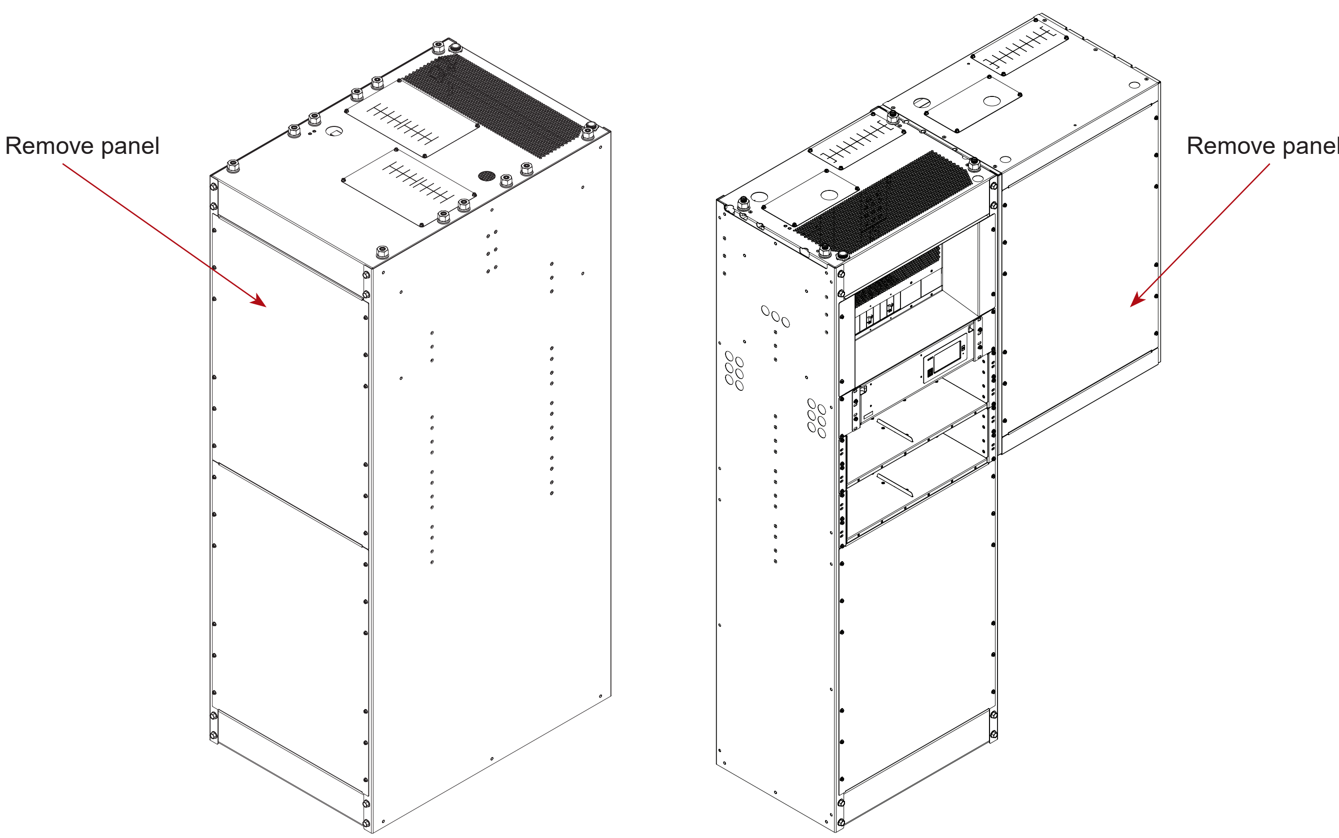


Figure 22 — Main Bay Back and Side Panel Removal

7.2 Recommended Torque Values

Table B lists the recommended torque values for connection to the power system with the following hardware:

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

Grade 5 rated hardware is required for these torque values.

Table B — Recommended Torque Values	
1/4"	8.8 ft-lbs
3/8"	32.5 ft-lbs
1/2"	73 ft-lbs

7.3 Frame Ground

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).

The existing frame ground cable from the site MGB may be connected either to the top exterior of the system or to studs located beside the internal AC input terminal block. Both bonding points accept a ¼" hole on 5/8" center lug.

Top exterior connection:

1. Locate the masked area on the top of the system. See Figure 23.
2. Use two supplied ¼-20 x ½" hex head bolts to secure the frame ground cable lug.
3. Torque hardware to appropriate value as shown in Table B.

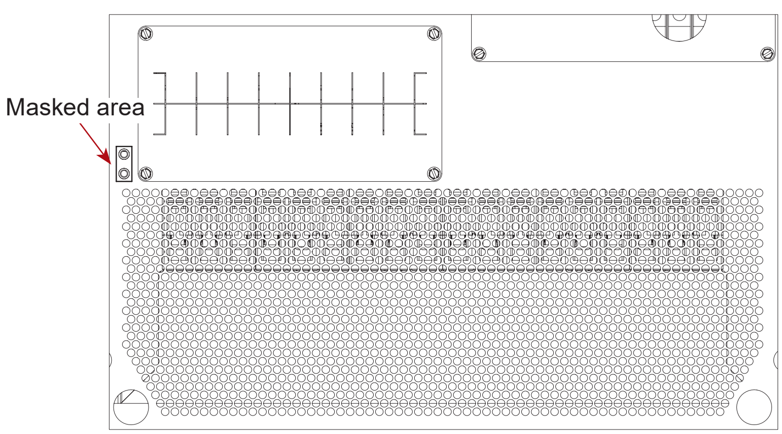


Figure 23 — Top Exterior Frame Ground Connection

Internal connection:

1. Locate the two 1/4" – 20 studs in the masked area next to the AC input terminal block. See Figure 24.
2. Use the supplied hardware to secure the cable lug.
3. Torque hardware to appropriate value as shown in Table B.

7.4 AC Connections

1. Loosen but do not remove the AC cover screws on either side of the AC input connection terminal block then slide the cover up to remove.
2. Use a 3/16” Allen wrench to loosen the exposed AC input terminal block connection screws.
3. Locate the hole sized for a 1-1/4" trade size fitting directly above the AC connection terminal block. See Figure 24.
4. Route the existing AC cables through the hole.
5. Remove lugs on existing AC wiring if necessary.
6. Strip L1, L2, L3 and Earth wire ends ½” and insert into corresponding AC terminal block locations. Torque connections to 120 in-lbs.
7. Secure knock out fitting and replace the AC terminal block cover.
8. For back to back or side by side configurations, repeat above for the second AC input terminal block located in the main bay back extension or side extension.

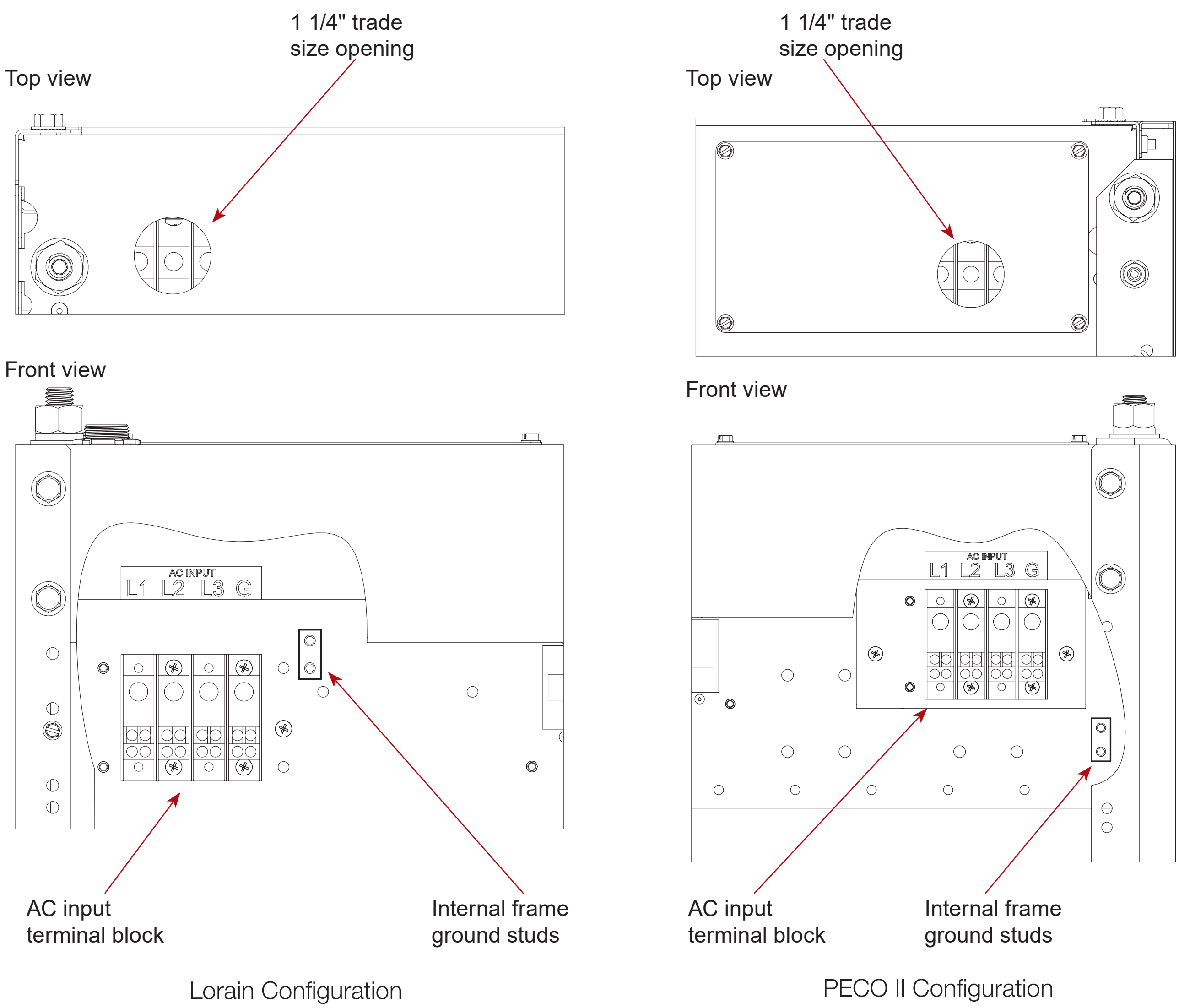


Figure 24 — AC and Frame Ground Connections

7.5 DC Connections

NOTE:

For 1200A systems, additional cabling, or upsize in cable gauge, may be required to cover the additional ampacity from each section of the bay. Ensure all cables are the same gauge. It is also important to note, the captive nuts are added only to the ½" on 1 ¾" holes and not on the 3/8" on 1" center holes.

1. Loosen but do not remove the DC cover screws on either side of the NEG busbar then slide the cover up to remove.
2. The output bar landings will accept lugs with either 3/8" holes on 1" centers or 1/2" holes on 1-3/4" centers. The 1/2" holes on 1-3/4" center landings have captive nuts installed for easy lug installation.
3. Route the existing DC cables down from the overhead busbars through the DC cable pass through to the system POS / NEG busbars. See Figure 25.
4. Secure the DC Return (+) cables to the POS bar landings using supplied hardware.
5. Torque connections to appropriate value as shown in Table B.
6. Secure the DC (-) cables to the NEG bar landings using supplied hardware.
7. Torque connections to appropriate value as shown in Table B.

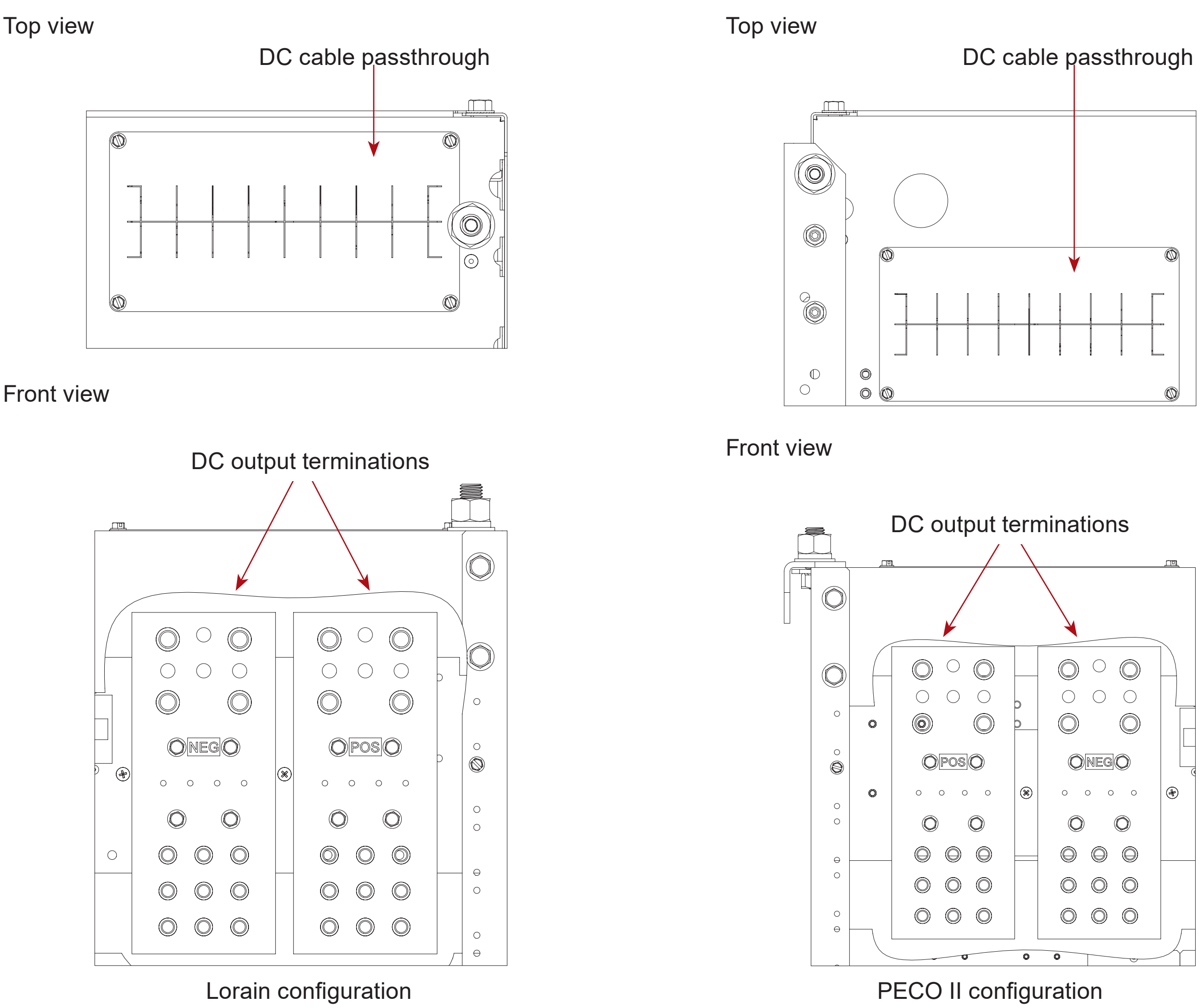


Figure 25 — DC Output Bars

NOTE:

If the overhead bus is energized by the batteries, the system controller will power on and alarms will be present as soon as the initial DC (-) cable is connected. Disregard alarms during this period.

8. For 1200A systems, either upsize the wire gauge or connect additional cables to the third landing on each of the system output busbars. Route up to the overhead bars and cut to same length as existing cables.
9. Remove the cut cables from the system output bars and terminate the cut ends with the proper lugs and heat shrink. Reconnect cables to the system and overhead busbars.
10. Torque connections to appropriate value as shown in Table B.
11. Replace the DC cover over the NEG busbar.
12. For back to back or side by side configurations, repeat above for the second set of DC output bars located in the main bay back extension or side extension.
13. For installations where supplemental bays are to be installed, plug the inter-bay CAN cable provided with the bay, into the CAN OUT jack in the primary bay. Route the cable through the DC cable pass through. The cable will connect to the supplemental bay (see section 7.8 for inter-bay communications).

7.6 Signal Wire Routing

I/O signal wires should be routed through the conduits that extend from either of the top corners of the bay down into the controller and I/O compartment. Note: It is not necessary to remove any panels to perform this procedure.

1. Flip the controller assembly door down to expose the controller compartment conduit openings, located on either side of the compartment.
2. Feed signal wires through the conduit openings located at the top front corners of the bay. See Figure 26.
3. Route wires down through the conduit that terminates on the interior side of the controller compartment.
4. Make connections to the I/O module.

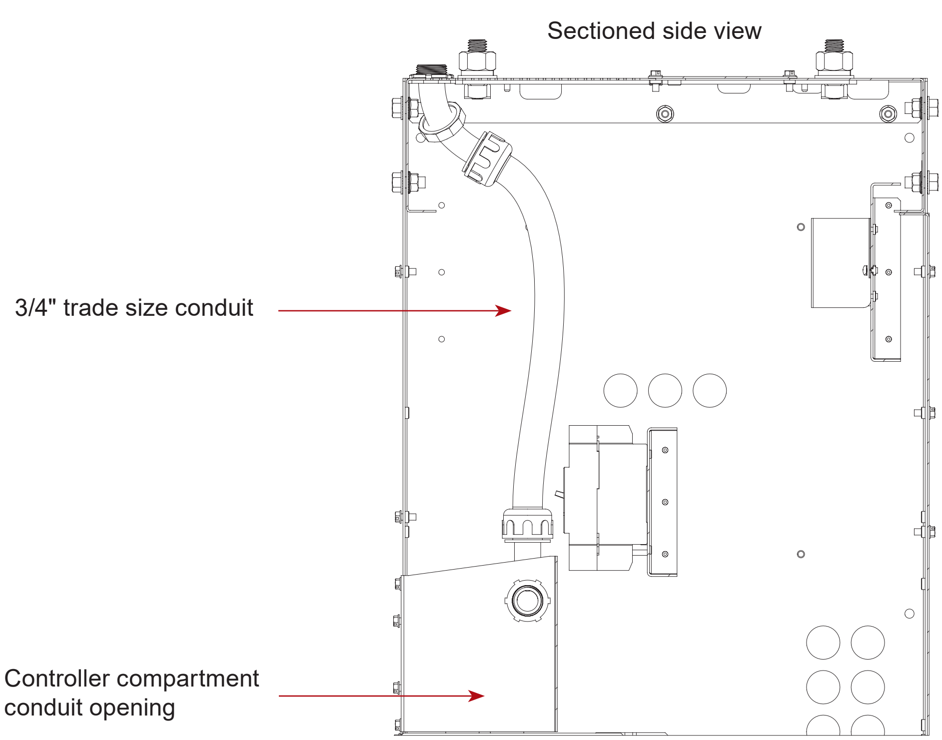


Figure 26 — Signal Wire Conduit

7.7 Signal Wiring

1. Use the Form C relay contacts on the L-ADIO to extend various alarm or control signals to an external site monitor.
2. Use 0.129 mm² (#26 AWG) or larger wire.
3. Bundle signal wires together and route through the conduit to the top of the bay.

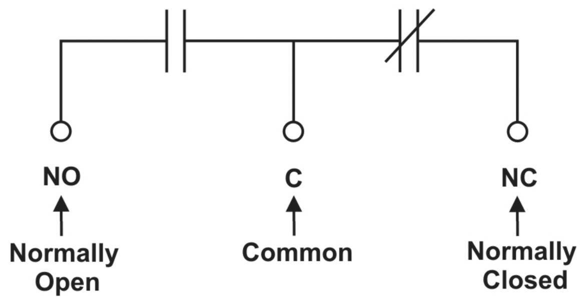


Figure 27 — Relay Connections, Not Energized State

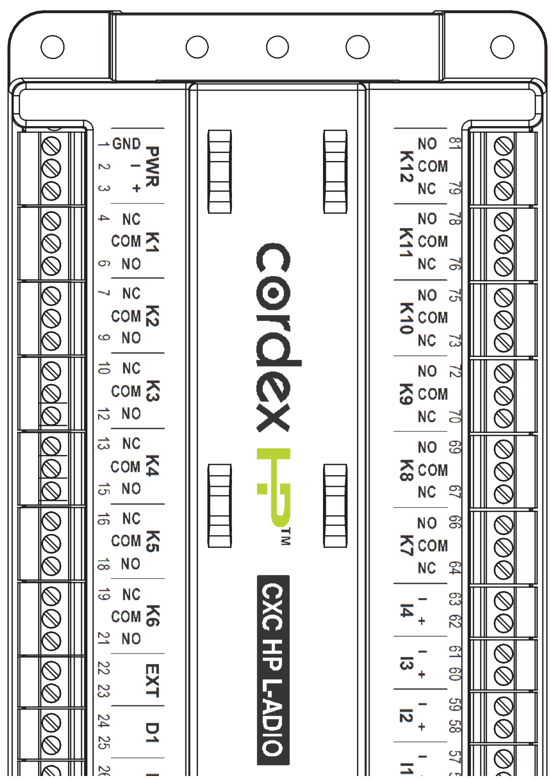


Figure 28 — Alarm Relay Pinouts

7.7.1 Relays

Relays can be programmed to be energized or not energized during an alarm condition (see Figure 27 and the controller software manual). Relays can be reassigned in the Relays table. From the controller's main dashboard go to **Modules >ADIOs> L-ADIO**. For more information refer to the ADIO maintenance section of the controller software manual.

7.7.2 Analog Inputs

WARNING!

Ensure that the correct polarity is used for all input cable terminations.

The analog input channels are used to monitor various types of electrical signals. Some of the analog channels are reserved for specific signals, while others are designated as general-purpose inputs, which accommodate various types of analog signals. The input cables should be bundled together and routed through the bay conduit.

CAUTION!

To reduce risk of fire, use only 0.129 mm^2 (#26 AWG) or larger wire.

7.7.3 Digital Inputs

The digital input channels are used to monitor various alarm and control signals. All input channels are voltage activated and accept a bipolar (negative or positive) DC signal directly.

7.7.4 Connection Method

Typical Alpha systems use the "reset with Hot and trigger with Ground" (common) connection. The digital input is wired in such a way that Hot is wired directly into one of the input terminals. For example, negative input for -48V systems. The other input terminal is wired to the Ground (common) of the system through a dry contact relay usually located on the equipment requiring monitoring. This method allows the digital input to receive or not receive a Ground signal on an alarm.

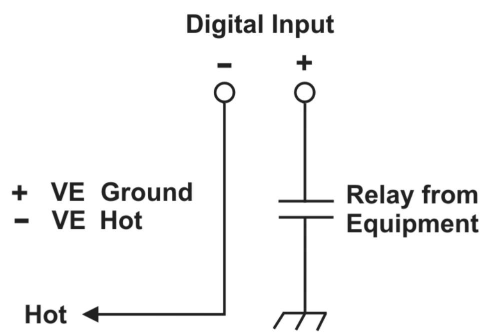


Figure 29 — Digital Input Connection Method

7.7.5 Programming the Digital Input

The digital input channels can be programmed for "active high" or "active low." Active high indicates "alarm on the presence of a ground signal" and active low indicates "alarm on the removal of a ground signal." See controller software manual for detailed instruction on programming.

Table C — Voltage level definitions for digital inputs

Voltage Range (Vdc)	Voltage Level (Vdc) Considered As "0" (Off)	Voltage Level (Vdc) Considered As "1" (On)
-60 to +60V (system voltage setting)	-1 to +1V	(-60 to -5V) or (+5 to +60V)

7.8 Inter-bay CAN Communications

NOTE:

This section applies only to systems with supplemental bays.

The CAN bus provides a communication path between the controller and rectifiers. In a primary bay, the CAN bus cabling is internally daisy-chained from the controller sequentially down from the top to the bottom rectifier shelf. From the last shelf, a CAN cable is extended back up to a CAN OUT jack located at the top of the primary bay. The jack has an end CAN termination plug installed at the factory. The termination plug must always be installed in the last bay in the daisy chain. In a supplemental bay, the internal CAN bus cabling is similar to that of a primary bay except that the connection from the controller in a primary bay to the top rectifier shelf is replaced with a CAN IN jack. Follow this procedure to install an inter-bay CAN bus cable between primary / supplemental bays or supplemental / supplemental bays.

1. Remove the front breaker panel in the supplemental bay.
2. Locate the CAN IN / CAN OUT jack.
3. Refer to Figure 30. Route the inter-bay cable previously installed from the primary bay (section 7.5,) through the DC cable pass through in the supplemental bay.
4. Plug the inter-bay cable into the CAN IN jack of the supplemental bay.
5. If there is more than one supplemental bay, continue to daisy-chain inter-bay cables from CAN OUT of the bay to CAN IN of the next bay.
6. Plug the end CAN termination into the CAN OUT jack of the last supplemental bay in the chain.

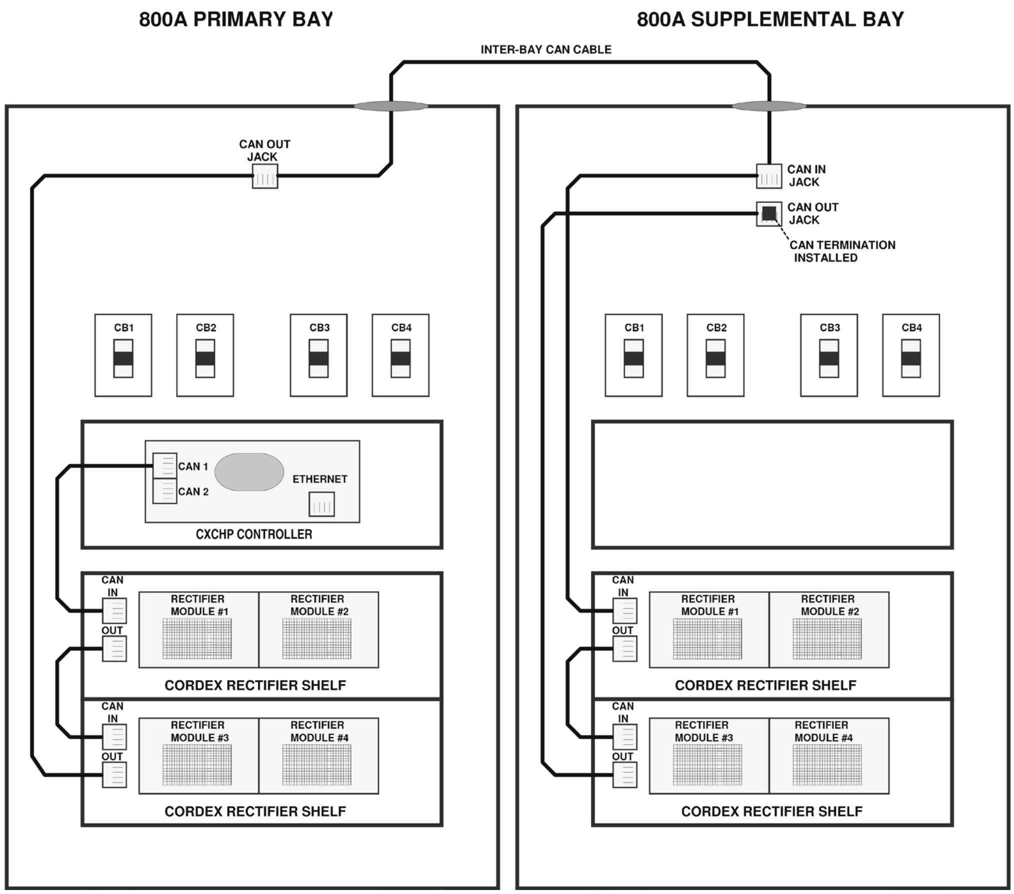


Figure 30 — Inter-bay CAN Communications

8. System Startup

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

1. Visually inspect the installation thoroughly.
2. Verify:
   - AC input power is OFF.
   - All breakers are switched OFF.
   - All power modules are removed from the shelves.
3. Verify correct polarity of all connections using a ohmmeter.
4. Install one rectifier module into the front left-most position using the side of the shelf as a guide:
   - Slide the module into the rear connector inside the shelf.
   - Apply pressure on the module handle to engage the rear connector in the shelf receptacle.
   - Tighten the screw(s) on the bottom of the faceplate to secure the module in the shelf.
5. If the overhead bus is energized by the batteries, the red LED on the power module will illuminate indicating DC power is present.
6. Verify that the AC input voltage is correct. Switch the main feeder breaker in the external AC utility panel ON.
7. If installed, switch the feeder breaker in the CXPS-FR3 system corresponding to the installed rectifier module ON.
8. The power module green LED will illuminate after a preset start delay.
9. Install the remaining power modules and switch corresponding feeder breakers ON (if installed).
10. Configure the battery parameters according to the battery manufacturer's recommendations. For detailed instructions on how to configure the batteries, see the CXC HP Software manual.

9. Accessory Installation

8.1 Shunt Input Module Kit (18 Shunt)

A CXPS-FR3 primary bay includes a standard ADIO module capable of monitoring up to four shunts. Installation of the Shunt Input Module kit expands this monitoring capability to include an additional 18 shunts. Shunt Input Module kits are installed in either the rear or side of primary or supplemental bays. Refer to Figure 32 for an example system with one 18 shunt input module kit installed in a primary bay and another installed in a supplemental bay.

Install the kit as follows:

1. Remove the access panel on the main bay back or side extension.
2. Mount the kit to the bay wall studs at location shown in Figure 31 using the supplied hardware.

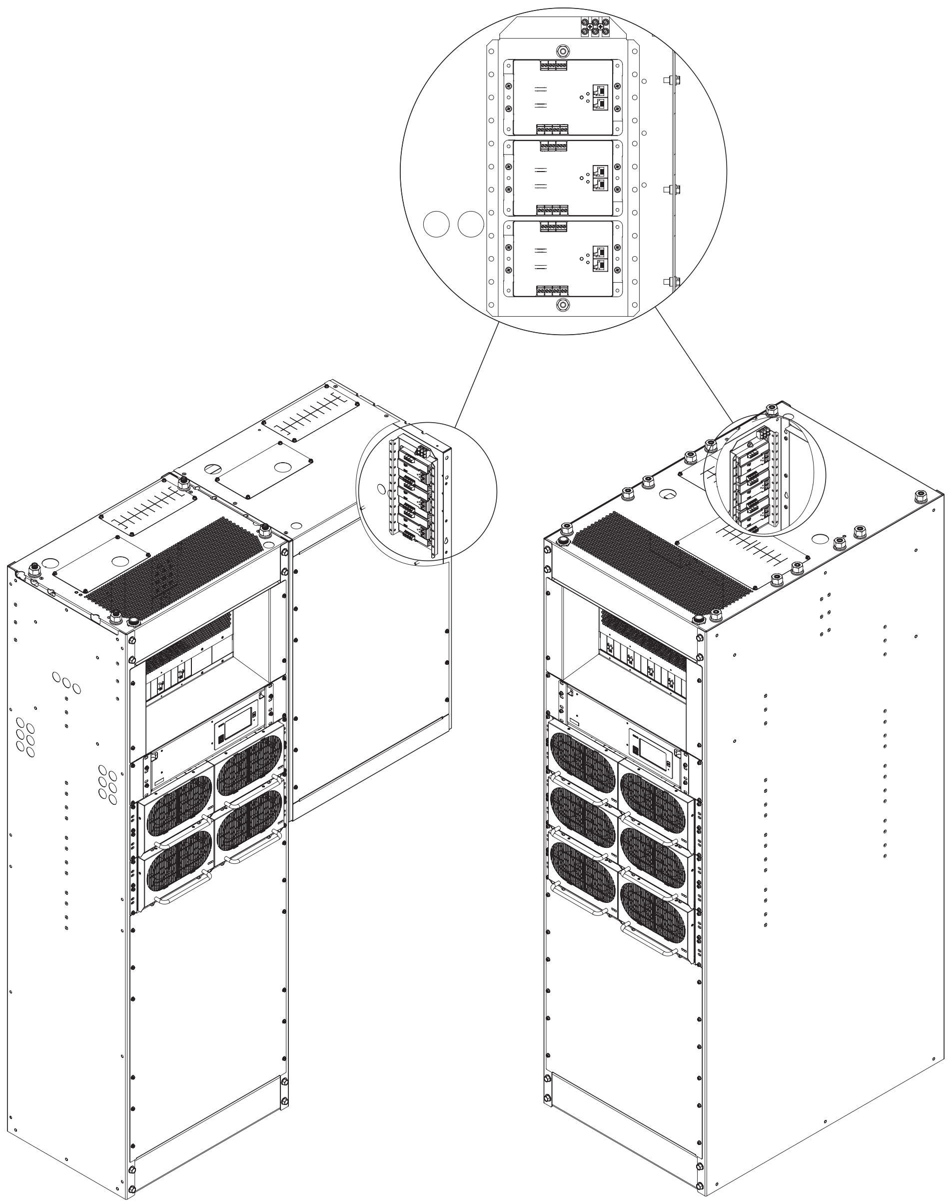


Figure 31 — Shunt Input Module Kit Installation in SBS or B2B Configurations

3. Connect the kit green/yellow ground wire to the wall stud. Place the supplied internal/external tooth washer on the stud followed by the wire terminal and supplied nut.

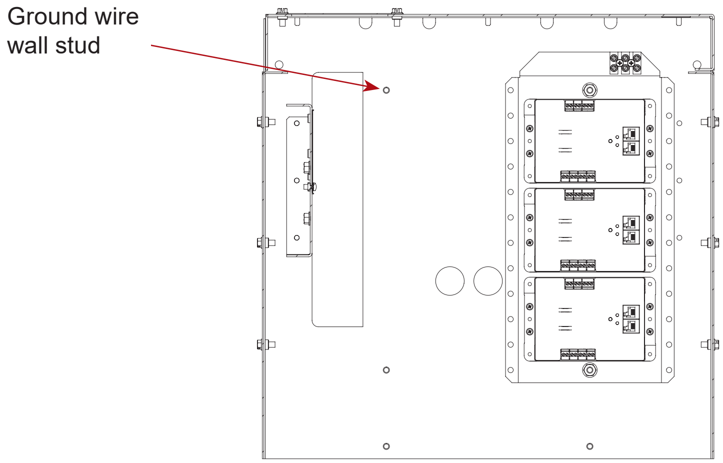


Figure 33 — Shunt Input Module Mounting

4. Connect the kit red (+) and black (-) power wires to the extension DC output bars #10-32 tapped holes using the supplied screws. Observe correct polarity.
5. Plug the supplied CAN cable into the CAN IN port of the upper shunt module in the kit assembly.
6. Route the cable up through the top DC cable pass through in the extension and down through the main bay DC cable pass through.
7. Remove the CAN termination plug located in the CAN OUT port of the main bay CAN OUT jack.
8. Plug the kit CAN cable into the CAN OUT jack in the main bay.
9. Plug the CAN termination plug into the CAN OUT port of the lower shunt module in the kit assembly.
10. For multiple kits, daisy chain the CAN cables from the CAN OUT port of the lower shunt module in the kit assembly to the CAN IN jack of the next bay.
11. Ensure the CAN termination is installed in the CAN OUT port of the last shunt module or CAN OUT jack in the chain.
12. See the CXC HP software manual for detailed instructions on how to configure the shunt input modules.

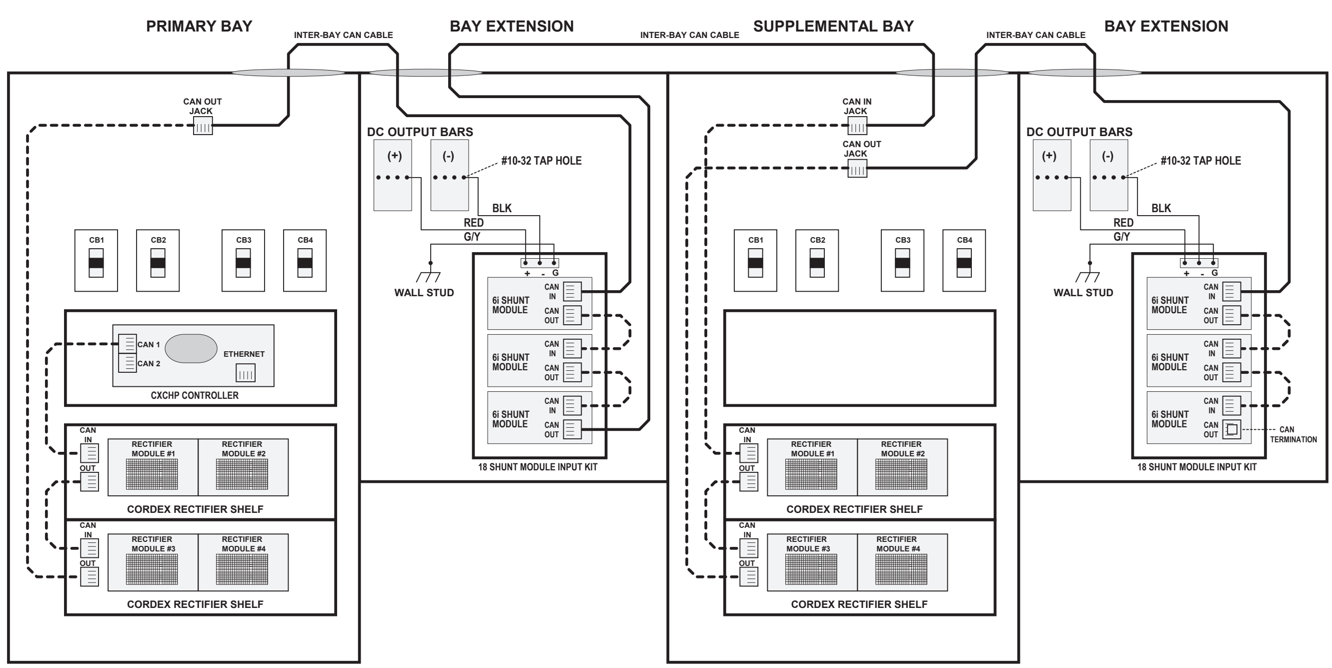


Figure 32 — System with Shunt Input Module Kits

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.

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

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 D — 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.	

11. Warranty Statement and Service Information

11.1 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.

11.2 Warranty Statement

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

11.3 Product 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, 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.

11.4 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.

11.5 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: www.alpha.ca.

11.6 Service Information

For a list of international service centers, refer to the Alpha website: www.alpha.ca

12. Acronyms and Definitions

AC	Alternating current
ANSI	American National Standards Institute
AWG	American Wire Gauge
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

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:

C US

- 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)

C US

Alpha rectifier and power system products, bearing the aforementioned CSA marks, are certified to CSA C22.2 No. 60950-01 and UL 60950-01. Alpha UPS products, bearing the aforementioned CSA marks, are certified to CSA C22.2 No. 107.3 and UL 1778.

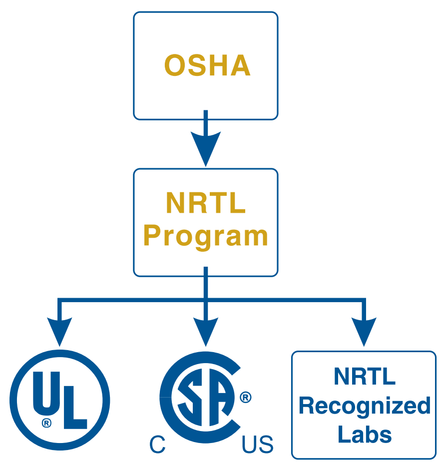
As part of the reciprocal, US/Canada agreement regarding testing laboratories, the Standards Council of Canada (Canada's national accreditation body) granted Underwriters Laboratories (UL) authority to certify products for sale in Canada. (2)

NRTL/C

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

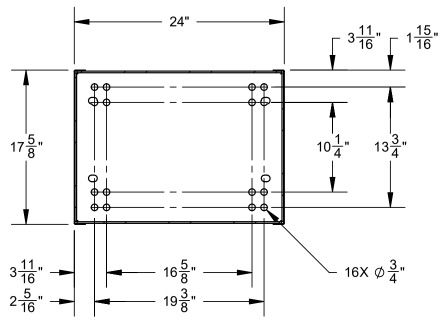
The NRTL Program is both national and international in scope with foreign labs permitted.

(1)www.csagroup.org

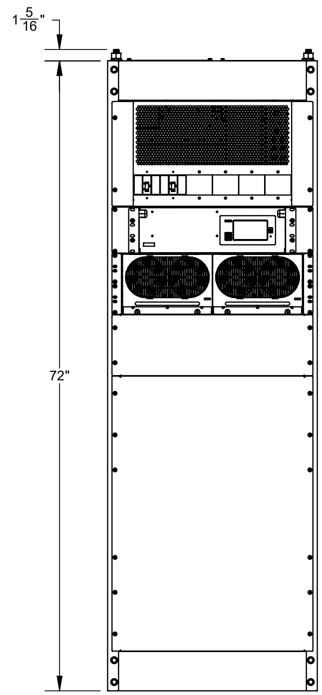
(2) www.scc.ca
(3) www.ulc.ca
(4) www.osha.gov

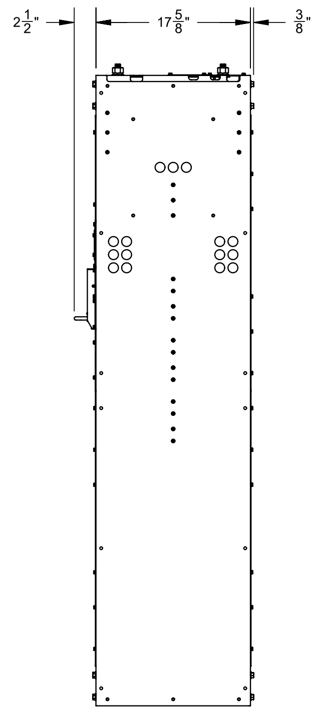
DO NOT SCALE DRAWING

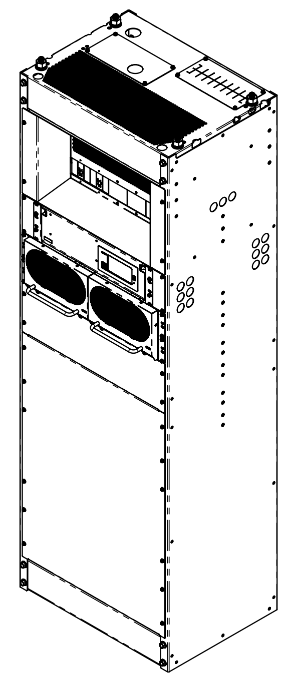
REVISIONS				
LTR	DESCRIPTION	DWN	DATE	CHK
B	CHANGED MOUNTING LAYOUT VIEW	RP	11/24/2017	JK
C	ADDED PECO MOUNTING HOLES TO BASE	RP	1/25/2018	JK
D	MODEL CLEAN-UP	RP	7/23/2018	JK
E	ADDED SHEET 3	RP	8/10/2018	JK



MOUNTING HOLE PATTERN







UNLESS OTHERWISE SPECIFIED
DIM ARE IN INCHES
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

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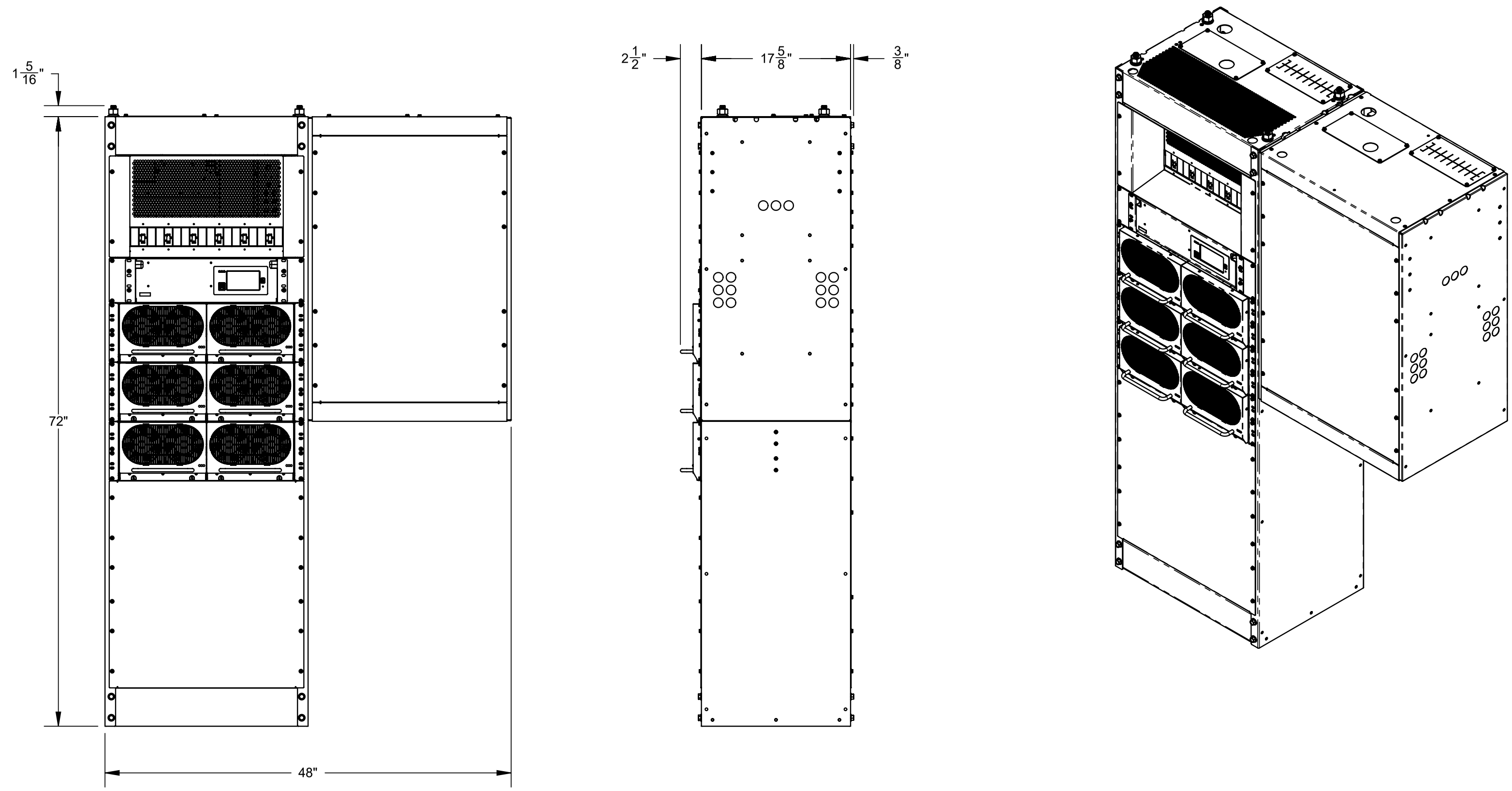
APPROVALS		DATE
DRAWN	RP	6/8/2017
CHECKED	JK	6/8/2017

TITLE: CXPS-FR3
LORAIN 480VAC

SIZE | DWG NO. 0920001-06 | REV E

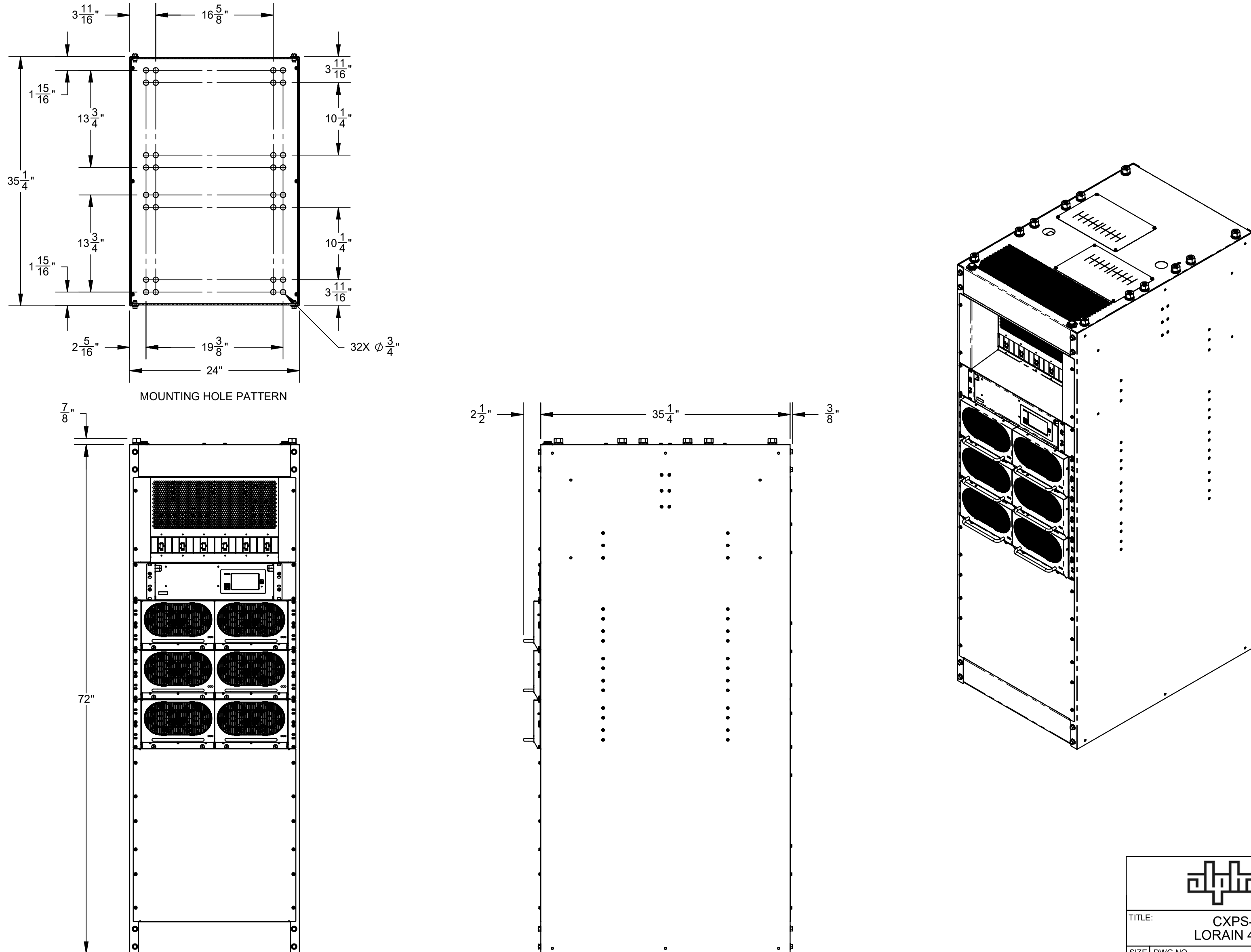
SCALE: 1:14 | SHEET 1 OF 3

DO NOT SCALE DRAWING



TITLE:	CXPS-FR3 LORAIN 480VAC
SIZE / DWG NO.	0920001-06
REV	E
SCALE:	1:14
SHEET	2 OF 3

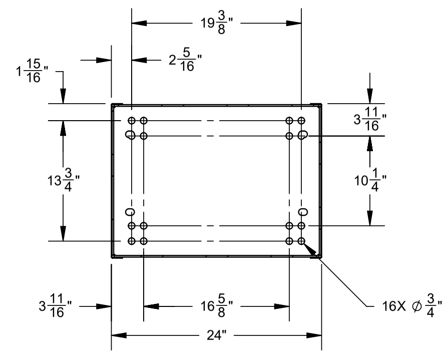
DO NOT SCALE DRAWING



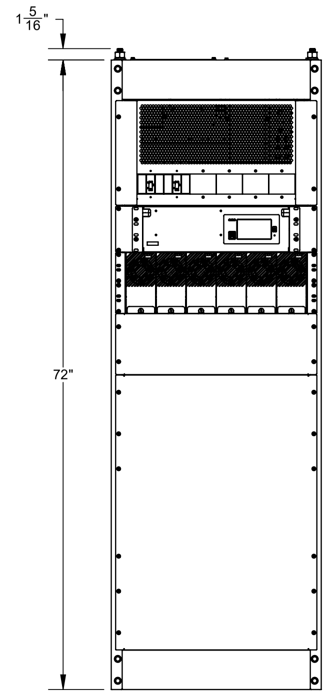
TITLE:	CXPS-FR3 LORAIN 480VAC		
SIZE B	DWG NO. 0920001-06		REV E
SCALE: 1:14		SHEET	3 OF 3

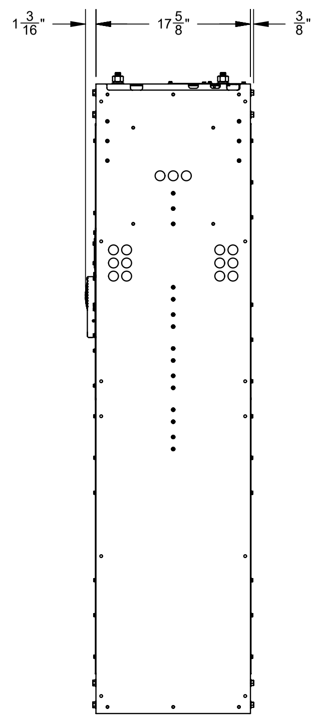
DO NOT SCALE DRAWING

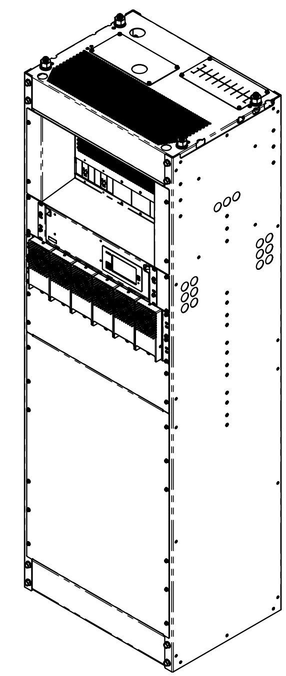
REVISIONS				
LTR	DESCRIPTION	DWN	DATE	CHK
B	CHANGED MOUNTING LAYOUT VIEW	RP	11/24/2017	JK
C	ADDED PECO MOUNTING HOLES TO BASE	RP	1/25/2018	JK
D	MODEL CLEAN-UP	RP	7/23/2018	JK
E	ADDED SHEET 3	RP	8/20/2018	JK



MOUNTING HOLE LAYOUT

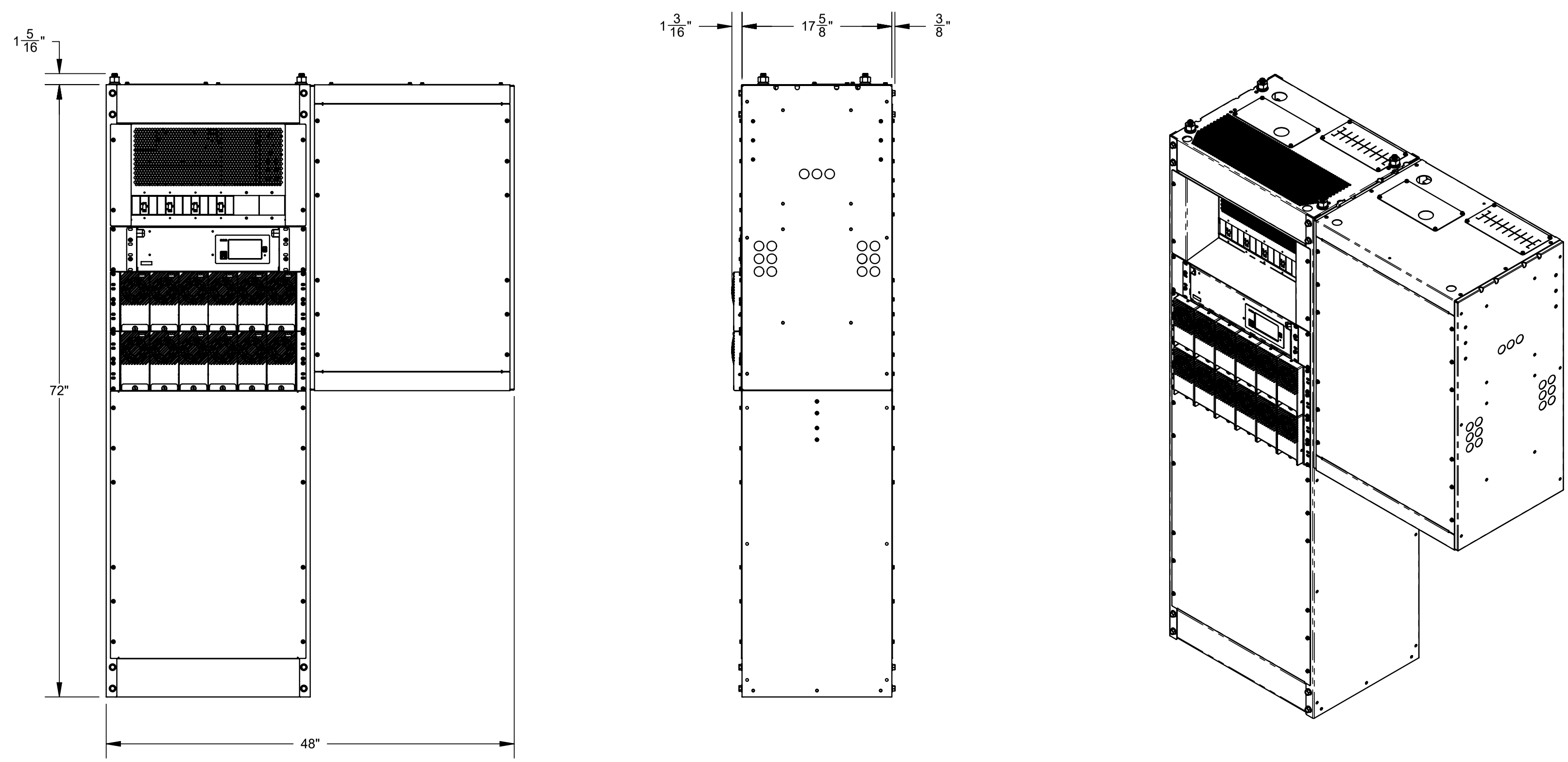






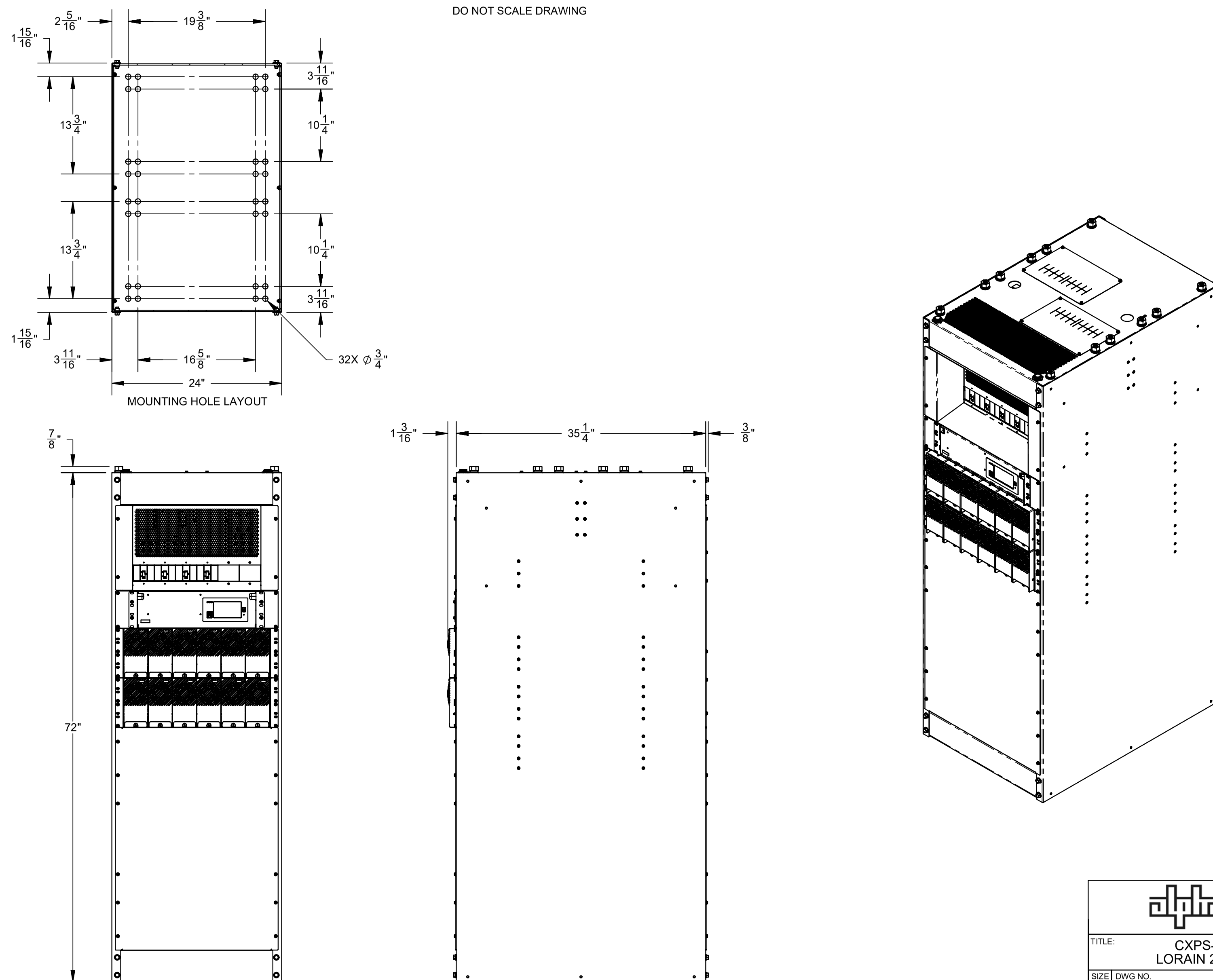
UNLESS OTHERWISE SPECIFIED DIM ARE IN INCHES X.X ±0.040 X.XX ±0.020 X.XXX ±0.010 ANGULAR: ±1° INTERPRET DIM AND TOL PER ASME Y14.5-1994 THIRD ANGLE PROJECTION	THESE DESIGNS AND SPECIFICATIONS ARE CONFIDENTIAL, REMAIN THE PROPERTY OF ALPHA TECHNOLOGIES LTD., AND SHALL NOT BE COPIED OR USED WITHOUT ITS WRITTEN CONSENT APPROVALS / DATE DRAWN RP 6/8/2017 CHECKED JK 6/8/2017 © ALPHA TECHNOLOGIES LTD	alpha TITLE: CXPS-FR3 LORAIN 208VAC SIZE B DWG NO. 0920002-06 REV E SCALE: 1:14 SHEET 1 OF 3

DO NOT SCALE DRAWING



TITLE:	CXPS-FR3 LORAIN 208VAC		
SIZE B	DWG NO. 0920002-06		REV E
SCALE: 1:14	SHEET 2 OF 3		

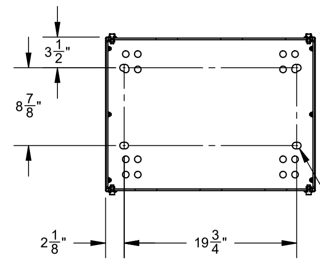
DO NOT SCALE DRAWING



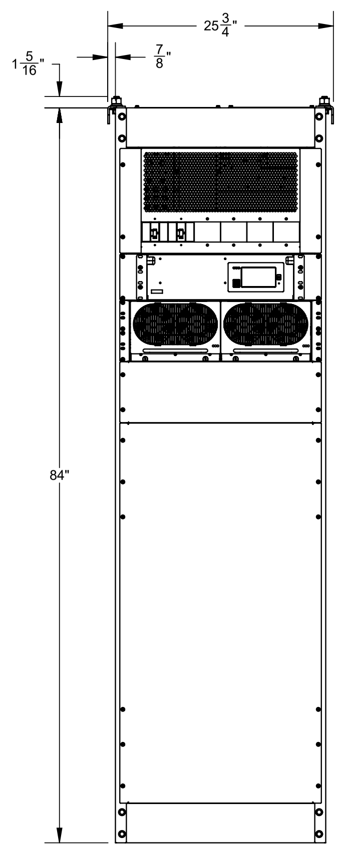
TITLE:	CXPS-FR3 LORAIN 208VAC
SIZE B	DWG NO. 0920002-06 — REV E
SCALE: 1:14	SHEET 3 OF 3

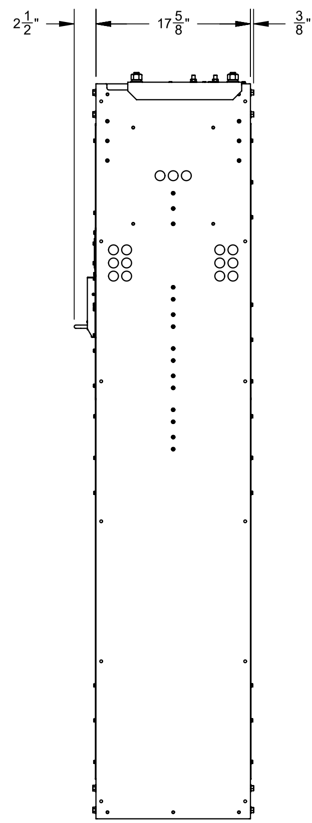
DO NOT SCALE DRAWING

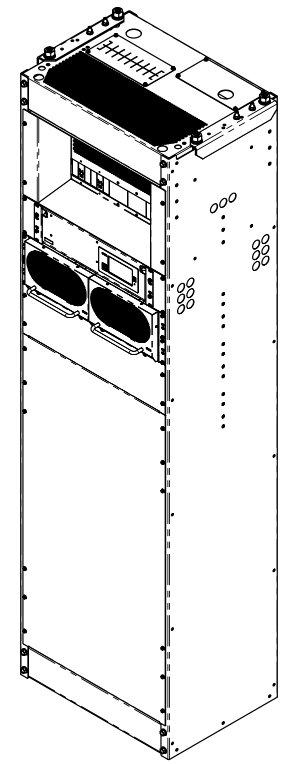
REVISIONS				
LTR	DESCRIPTION	DWN	DATE	CHK
B	CHANGED MOUNTING LAYOUT VIEW	RP	11/24/2017	JK
C	REMOVED PLINTH	RP	1/25/2018	JK
D	ADDED SHEET3	RP	7/19/2018	JK



MOUNTING HOLE LAYOUT

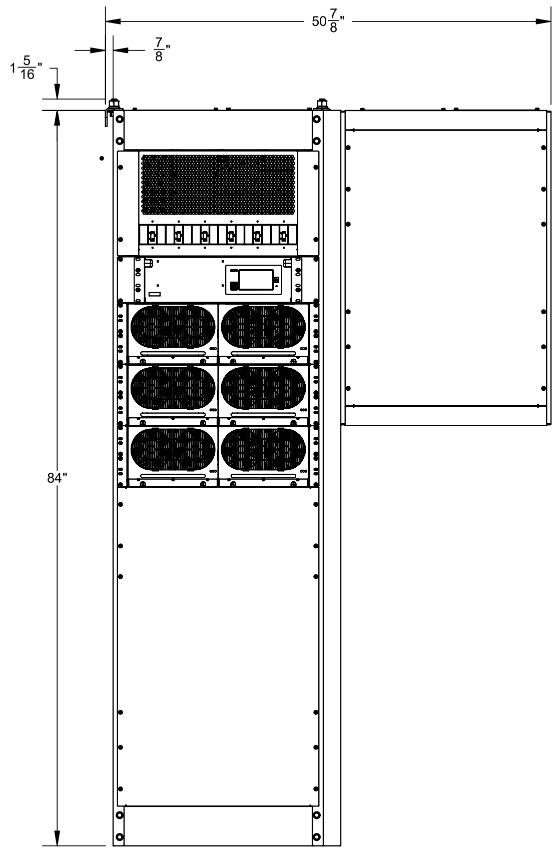


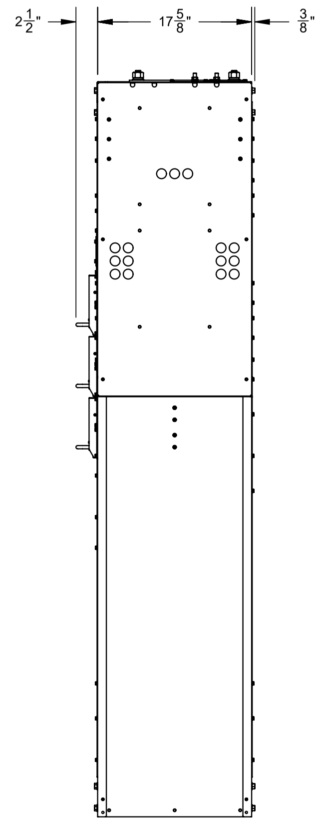


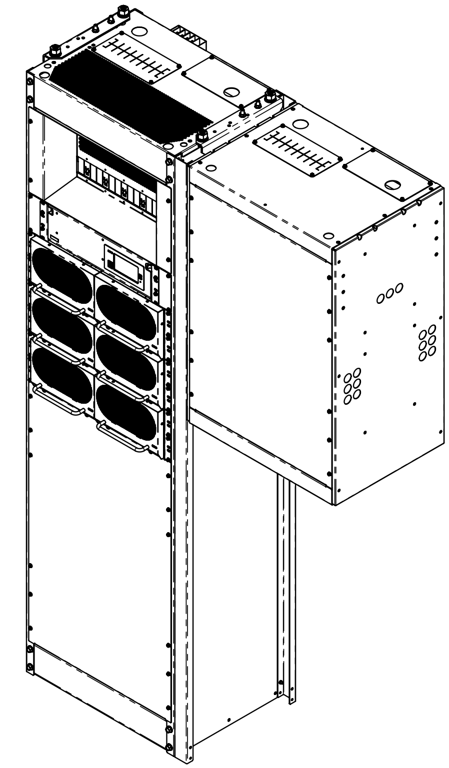


UNLESS OTHERWISE SPECIFIED DIM ARE IN INCHES X.X ±0.040 X.XX ±0.020 X.XXX ±0.010 ANGULAR: ±1° INTERPRET DIM AND TOL PER ASME Y14.5-1994	THESE DESIGNS AND SPECIFICATIONS ARE CONFIDENTIAL, REMAIN THE PROPERTY OF ALPHA TECHNOLOGIES LTD., AND SHALL NOT BE COPIED OR USED WITHOUT ITS WRITTEN CONSENT	ALPHA TECHNOLOGIES™
THIRD ANGLE PROJECTION	APPROVALS / DATE DRAWN RP 6/8/2017 CHECKED JK 6/8/2017	TITLE: CXPS-FR3 PECO 480VAC
	© ALPHA TECHNOLOGIES LTD	SIZE B · DWG NO. 0920003-06 · REV D SCALE: 1:14 · SHEET 1 OF 3

DO NOT SCALE DRAWING

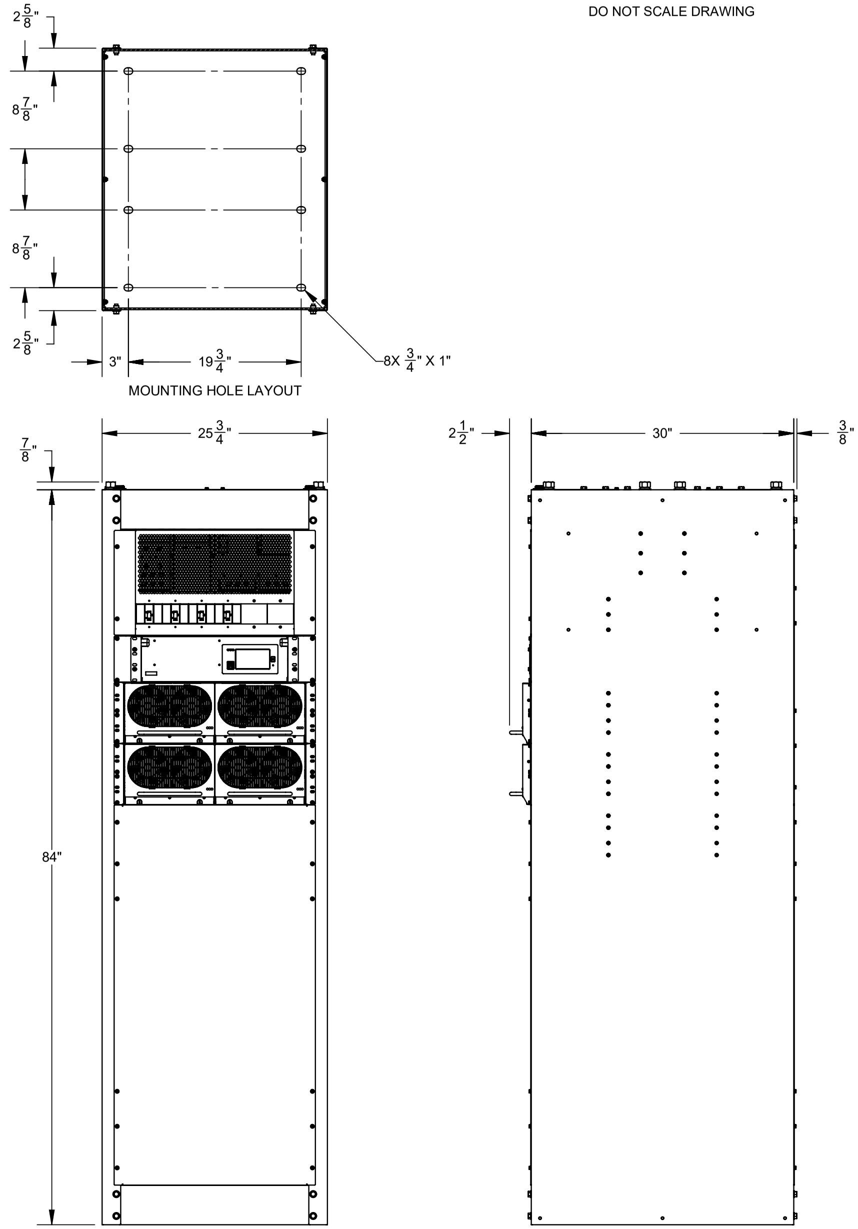


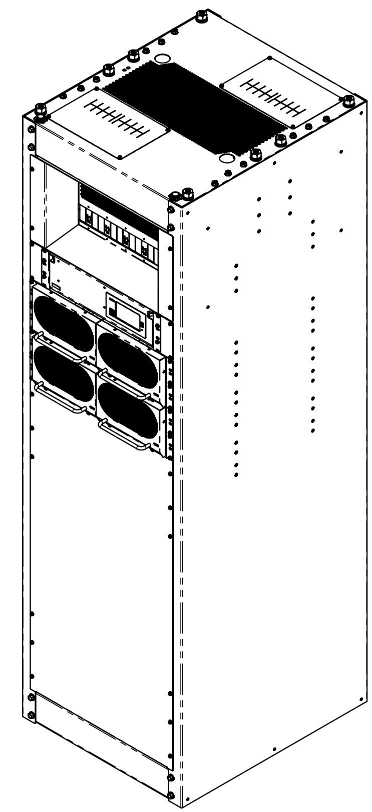




TITLE:	CXPS-FR3 PECO 480VAC		
SIZE B	DWG NO. 0920003-06		REV D
SCALE: 1:14	SHEET 2 OF 3		

DO NOT SCALE DRAWING





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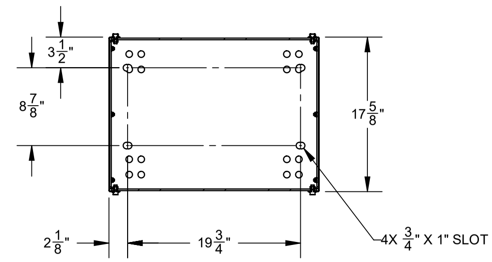
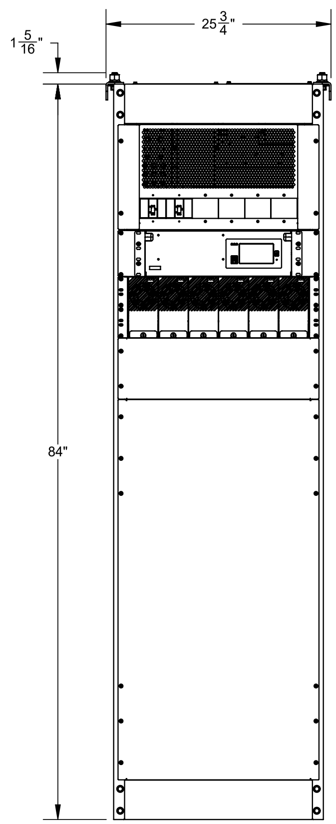
TITLE:	CXPS-FR3 PECO 480VAC	
SIZE B	DWG NO. 0920003-06	REV D
SCALE: 1:14	SHEET 3 OF 3	

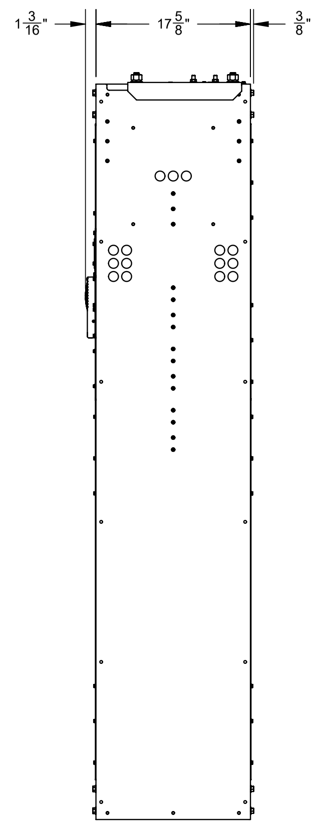
DO NOT SCALE DRAWING

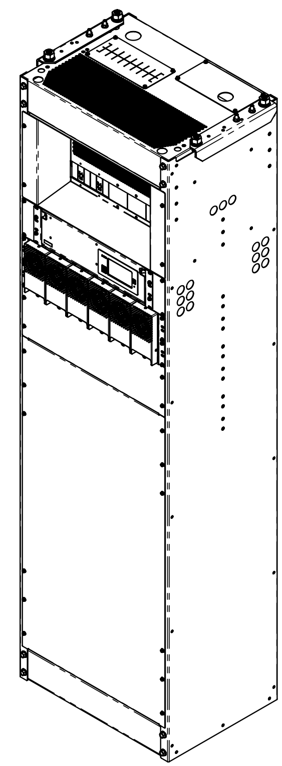
REVISIONS				
LTR	DESCRIPTION	DWN	DATE	CHK
B	CHANGED MOUNTING LAYOUT VIEW	RP	11/27/2017	JK
C	REMOVED PLINTH	RP	1/26/2018	JK
D	ADDED SHEET3	RP	7/23/2018	JK



MOUNTING HOLE LAYOUT







UNLESS OTHERWISE SPECIFIED DIM ARE IN INCHES	
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	

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APPROVALS		DATE
DRAWN	RP	6/8/2017
CHECKED	JK	6/8/2017

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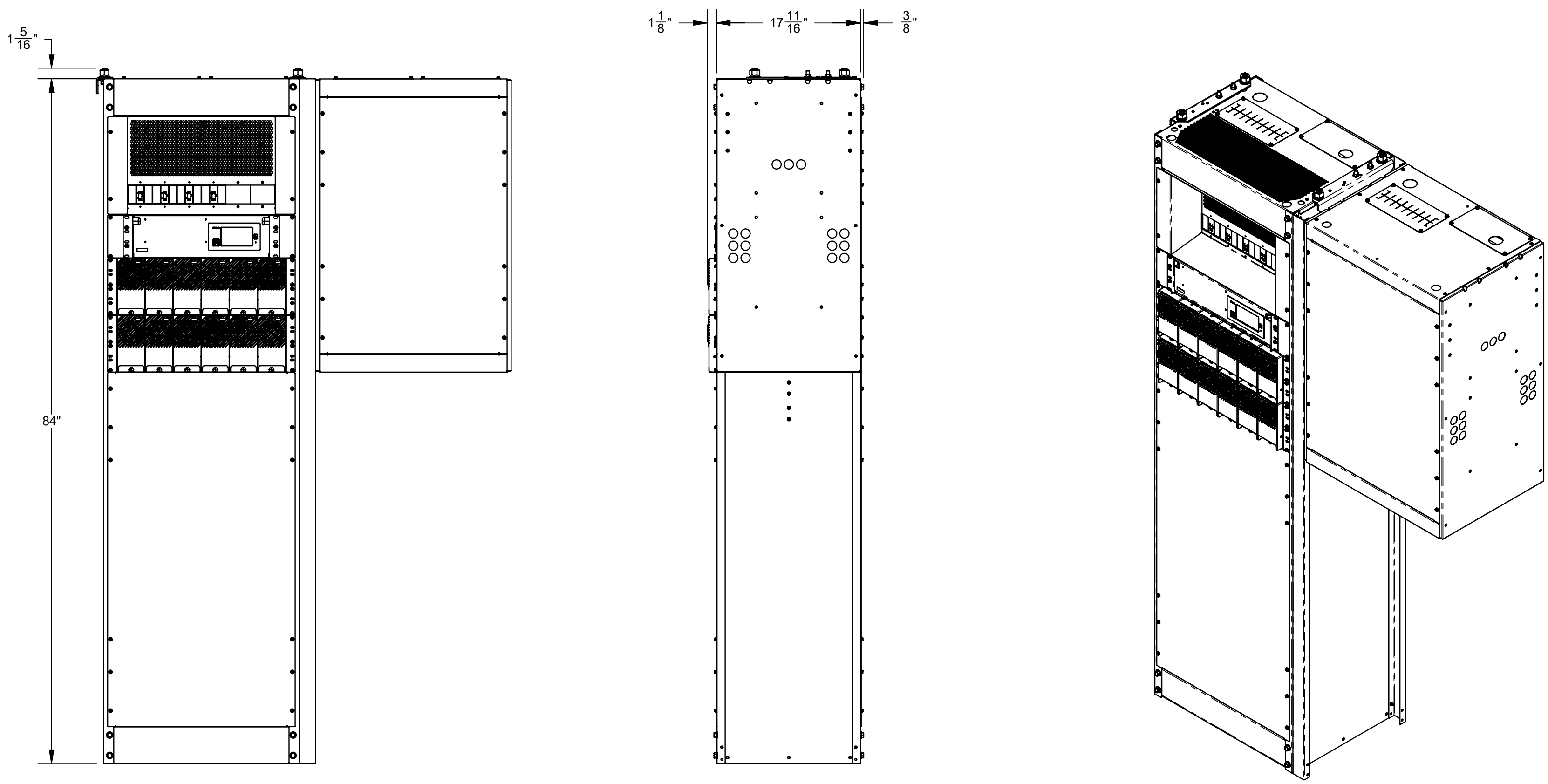
TITLE: CXPS-FR3 PECO 208VAC

SIZE: B | DWG NO. 0920004-06 | REV: D

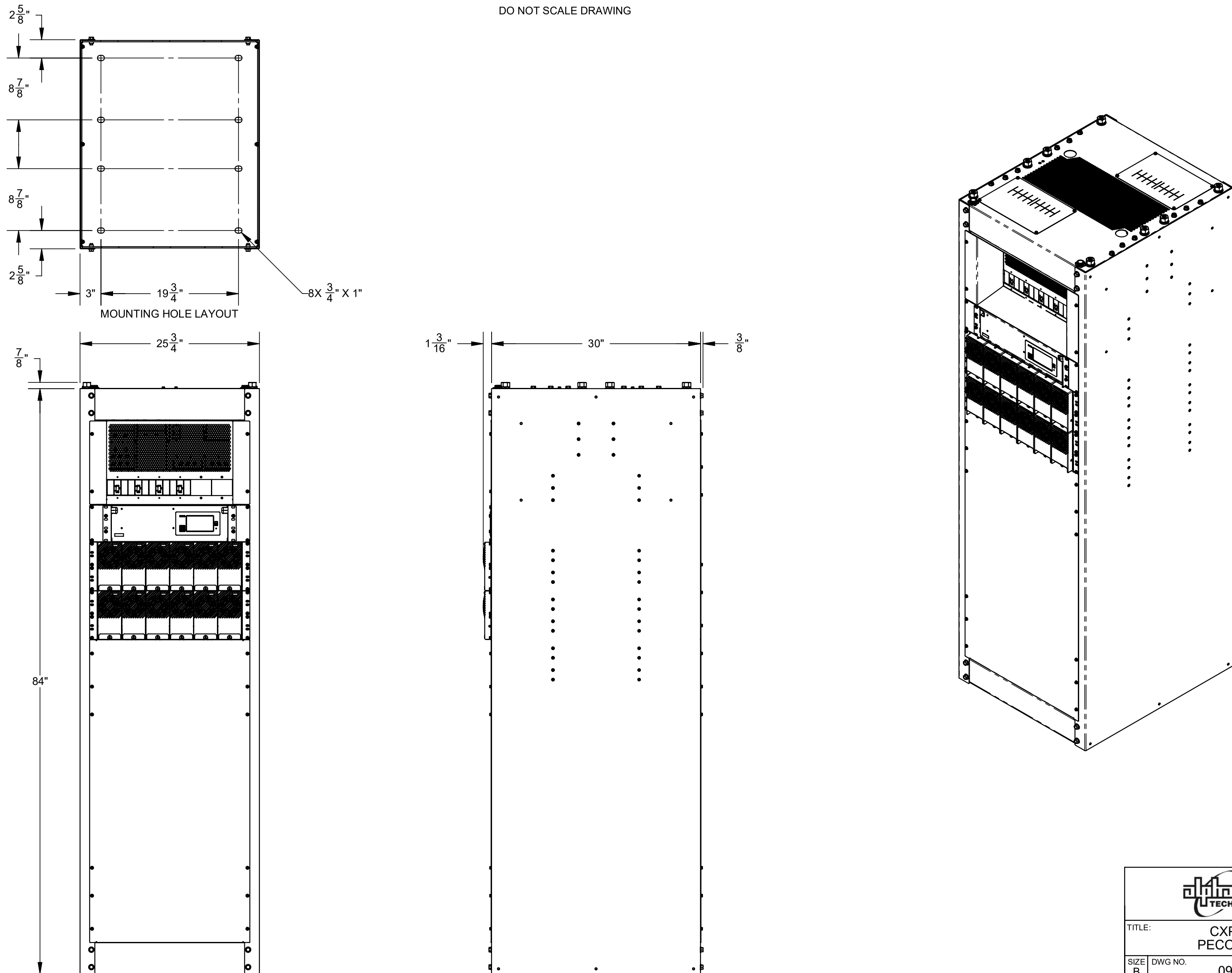
SCALE: 1:14 | SHEET 1 OF 3

DO NOT SCALE DRAWING



TECHNOLOGIES™

TITLE:	CXPS-FR3 PECO 208VAC	
SIZE B	DWG NO. 0920004-06	REV D
SCALE: 1:14	SHEET	2 OF 3



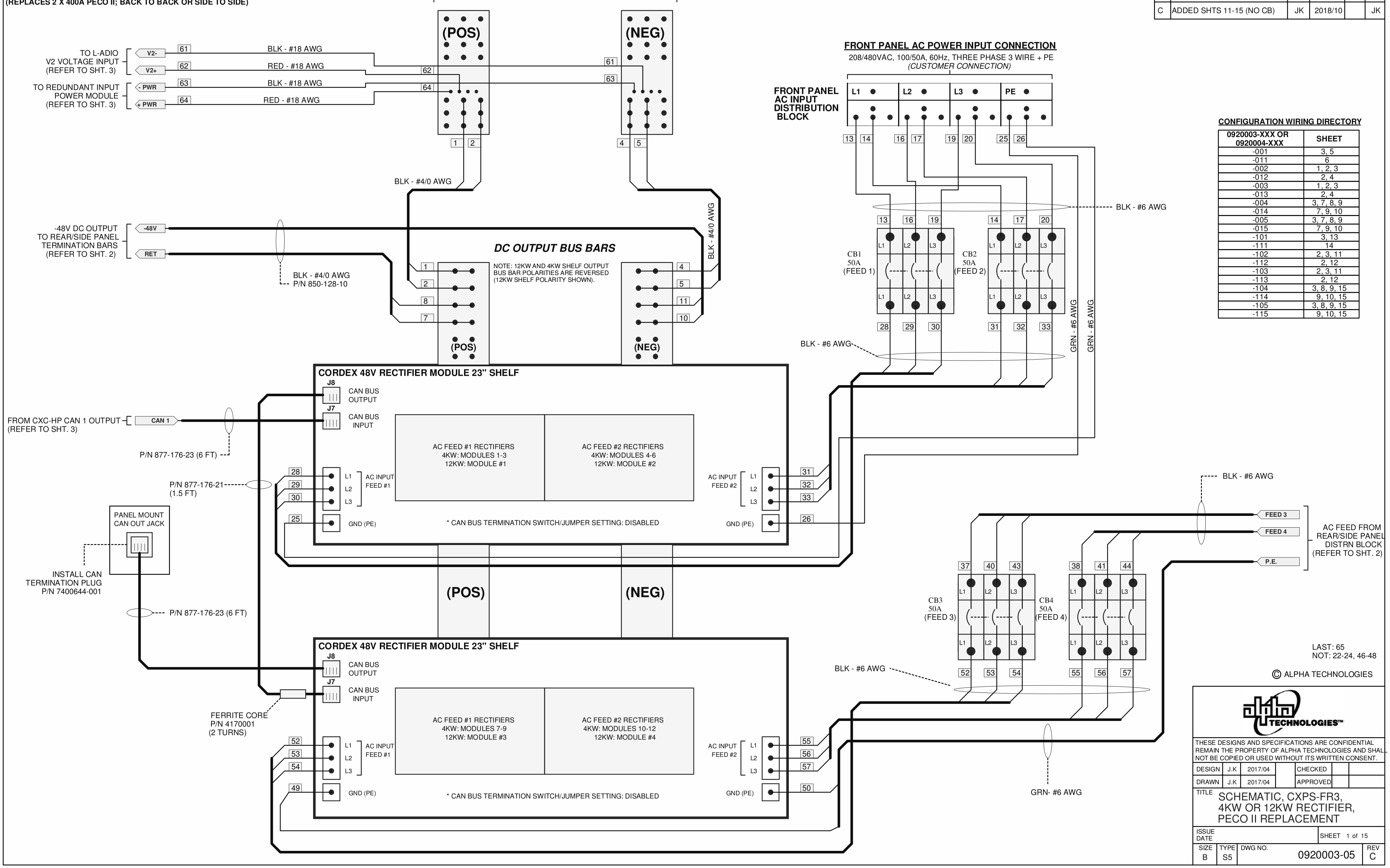
TITLE: CXPS-FR3 PECO 208VAC

SIZE	DWG NO.	REV
B	0920004-06	D
SCALE: 1:14	SHEET 3 OF 3	

208/480VAC, 2 SHELF PRIMARY BAY E/W HP CONTROLLER
SIDE BY SIDE OR BACK TO BACK WIRING

CONFIGURATIONS: -002, -003
(REPLACES 2 X 400A PECO II; BACK TO BACK OR SIDE TO SIDE)

REVISIONS					
LTR	DESCRIPTION	DRW	DATE	CHK	APP
B	ADDED CXC CHASSIS GND	JK	2018/04		JK
C	ADDED SHTS 11-15 (NO CB)	JK	2018/10		JK



CONFIGURATION WIRING DIRECTORY

0920003-XXX OR 0920004-XXX	SHEET
-001	3, 5
-011	6
-002	1, 2, 3
-012	2, 4
-003	1, 2, 3
-013	2, 4
-004	3, 7, 8, 9
-014	7, 9, 10
-005	3, 7, 8, 9
-015	7, 9, 10
-101	3, 13
-111	14
-102	2, 3, 11
-112	2, 12
-103	2, 3, 11
-113	2, 12
-104	3, 8, 9, 15
-114	9, 10, 15
-105	3, 8, 9, 15
-115	9, 10, 15

LAST: 65
NOT: 22-24, 46-48

ALPHA TECHNOLOGIES™

DESIGN	J.K	2017/04	CHECKED	
DRAWN	J.K	2017/04	APPROVED	

TITLE SCHEMATIC, CXPS-FR3, 4KW OR 12KW RECTIFIER, PECO II REPLACEMENT

ISSUE DATE			SHEET 1 of 15	
SIZE B	TYPE S5	DWG NO.	0920003-05	REV C

208/480VAC, 2 SHELF SIDE/REAR PANEL WIRING CONNECTIONS

(FOR SIDE TO SIDE OR BACK TO BACK PRIMARY AND SECONDARY BAYS)

CONFIGURATIONS: -002, -003, -012, -013, -102, -103, -112, -113

CONFIGURATION WIRING DIRECTORY

0920003-XXX OR 0920004-XXX	SHEET
-001	3, 5
-011	6
-002	1, 2, 3
-012	2, 4
-003	1, 2, 3
-013	2, 4
-004	3, 7, 8, 9
-014	7, 9, 10
-005	3, 7, 8, 9
-015	7, 9, 10
-101	3, 13
-111	14
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-112	2, 12
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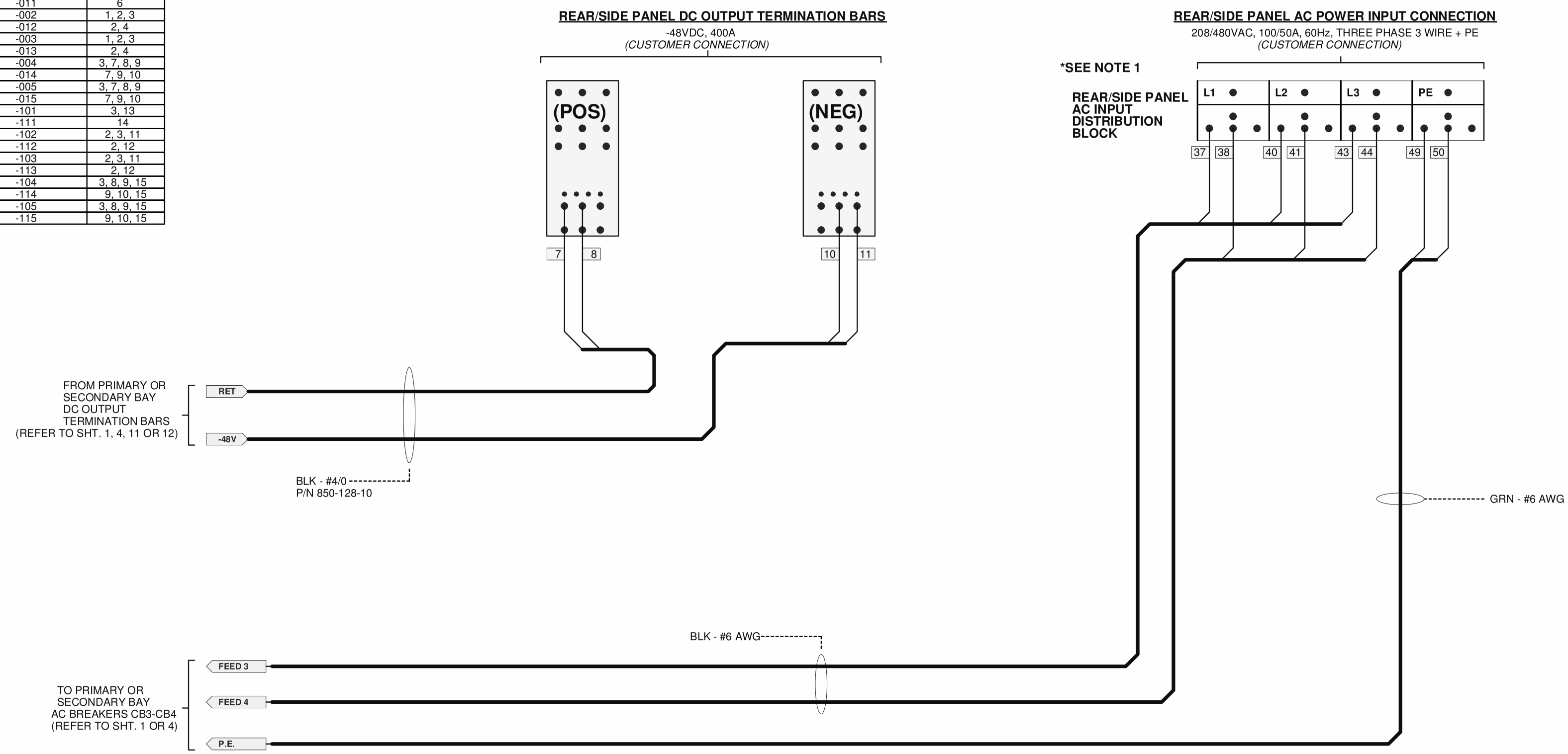
-114	9, 10, 15
-105	3, 8, 9, 15
-115	9, 10, 15



NOTES:

1. AC DISTRIBUTION BLOCK AND WIRING SHOWN IS FOR SYSTEMS WITH BREAKERS
   REFER TO SHEETS 11, 12 OR 15 FOR AC WIRING FOR SYSTEMS WITHOUT BREAKERS.

ALPHA TECHNOLOGIES™

TITLE	SCHEMATIC, CXPS-FR3, 4KW OR 12KW RECTIFIER, PECO II REPLACEMENT		
ISSUE DATE		SHEET 2 of 15	
SIZE B	TYPE S5	DWG NO. 0920003-05	REV C

PRIMARY BAY CONTROLLER & I/O WIRING:

CONFIGURATIONS: -001, -002, -003, -004, -005, -101, -102, -103, -104, -105

CONFIGURATION WIRING DIRECTORY

0920003-XXX OR 0920004-XXX	SHEET
-001	3, 5
-011	6
-002	1, 2, 3
-012	2, 4
-003	1, 2, 3
-013	2, 4
-004	3, 7, 8, 9
-014	7, 9, 10
-005	3, 7, 8, 9
-015	7, 9, 10
-101	3, 13
-111	14
-102	2, 3, 11
-112	2, 12
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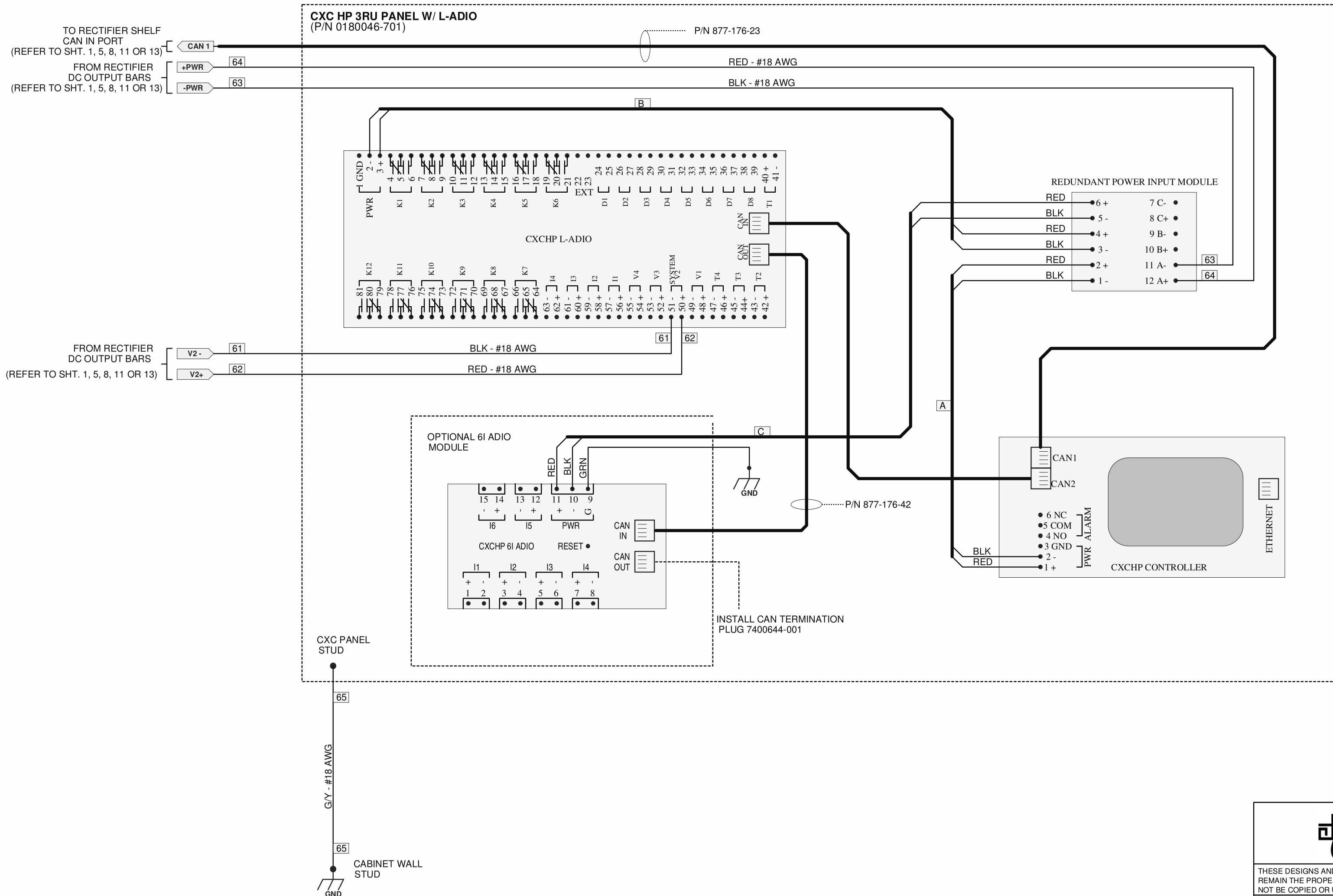

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TITLE	SCHEMATIC, CXPS-FR3, 4KW OR 12KW RECTIFIER, PECO II REPLACEMENT
ISSUE DATE	SHEET 3 of 15
SIZE B / TYPE S5 / DWG NO. 0920003-05	REV C

208/480VAC, 2 SHELF SECONDARY BAY W/O HP CONTROLLER
SIDE BY SIDE OR BACK TO BACK WIRING

CONFIGURATIONS: -012, -013
(REPLACES 2 X 400A PECO II; BACK TO BACK OR SIDE BY SIDE)

CONFIGURATION WIRING DIRECTORY

0920003-XXX OR 0920004-XXX	SHEET
-001	3, 5
-011	6
-002	1, 2, 3
-012	2, 4
-003	1, 2, 3
-013	2, 4
-004	3, 7, 8, 9
-014	7, 9, 10
-005	3, 7, 8, 9
-015	7, 9, 10
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-102	2, 3, 11
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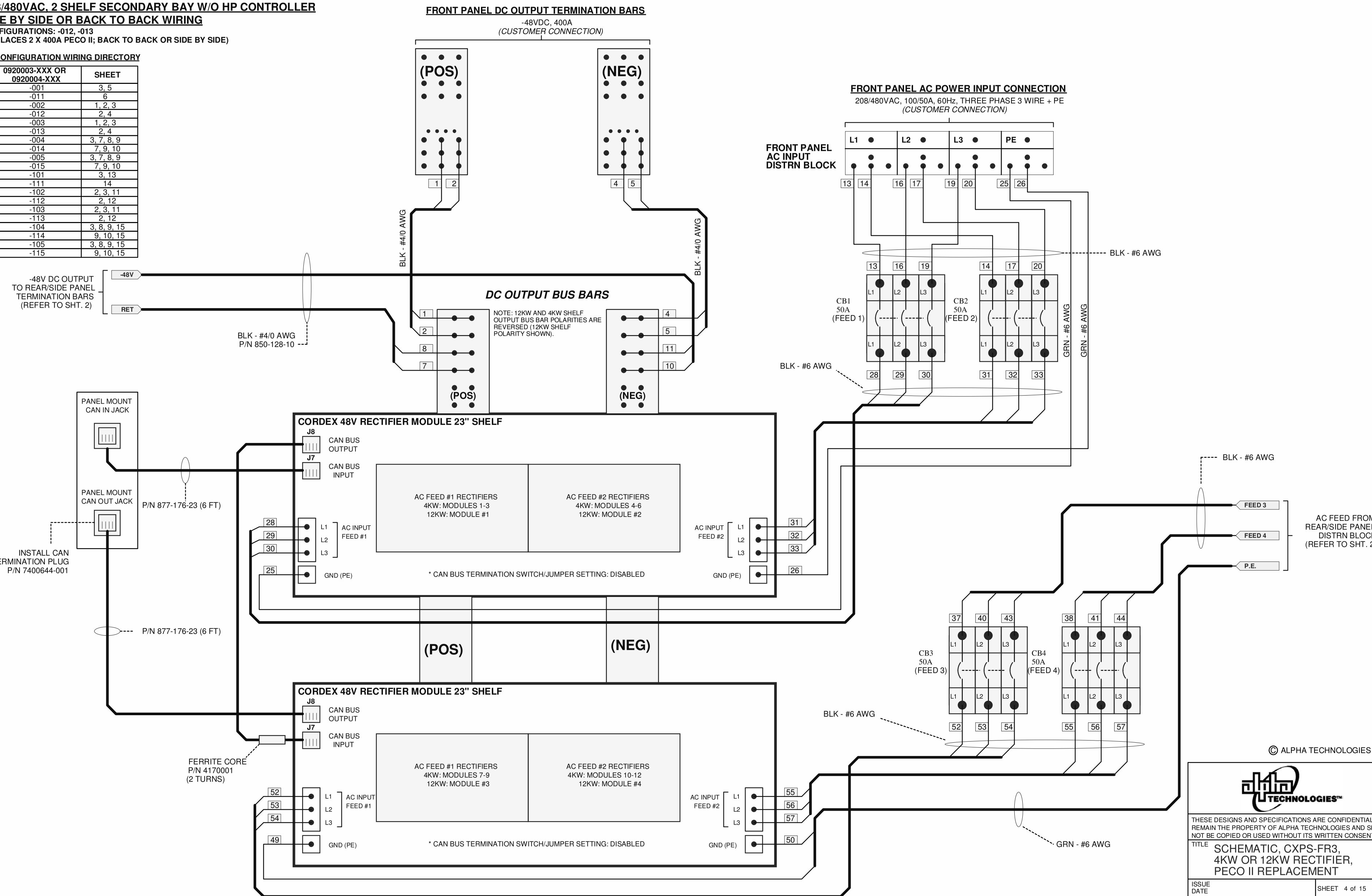
-115	9, 10, 15



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TITLE SCHEMATIC, CXPS-FR3, 4KW OR 12KW RECTIFIER, PECO II REPLACEMENT

ISSUE DATE

SIZE	TYPE	DWG NO.	REV
B	S5	0920003-05	C

208/480VAC, 1 SHELF SINGLE BAY E/W HP CONTROLLER

CONFIGURATIONS: -001
(REPLACES 1 X 400A PECO II)

CONFIGURATION WIRING DIRECTORY

0920003-XXX OR 0920004-XXX	SHEET
-001	3, 5
-011	6
-002	1, 2, 3
-012	2, 4
-003	1, 2, 3
-013	2, 4
-004	3, 7, 8, 9
-014	7, 9, 10
-005	3, 7, 8, 9
-015	7, 9, 10
-101	3, 13
-111	14
-102	2, 3, 11
-112	2, 12
-103	2, 3, 11
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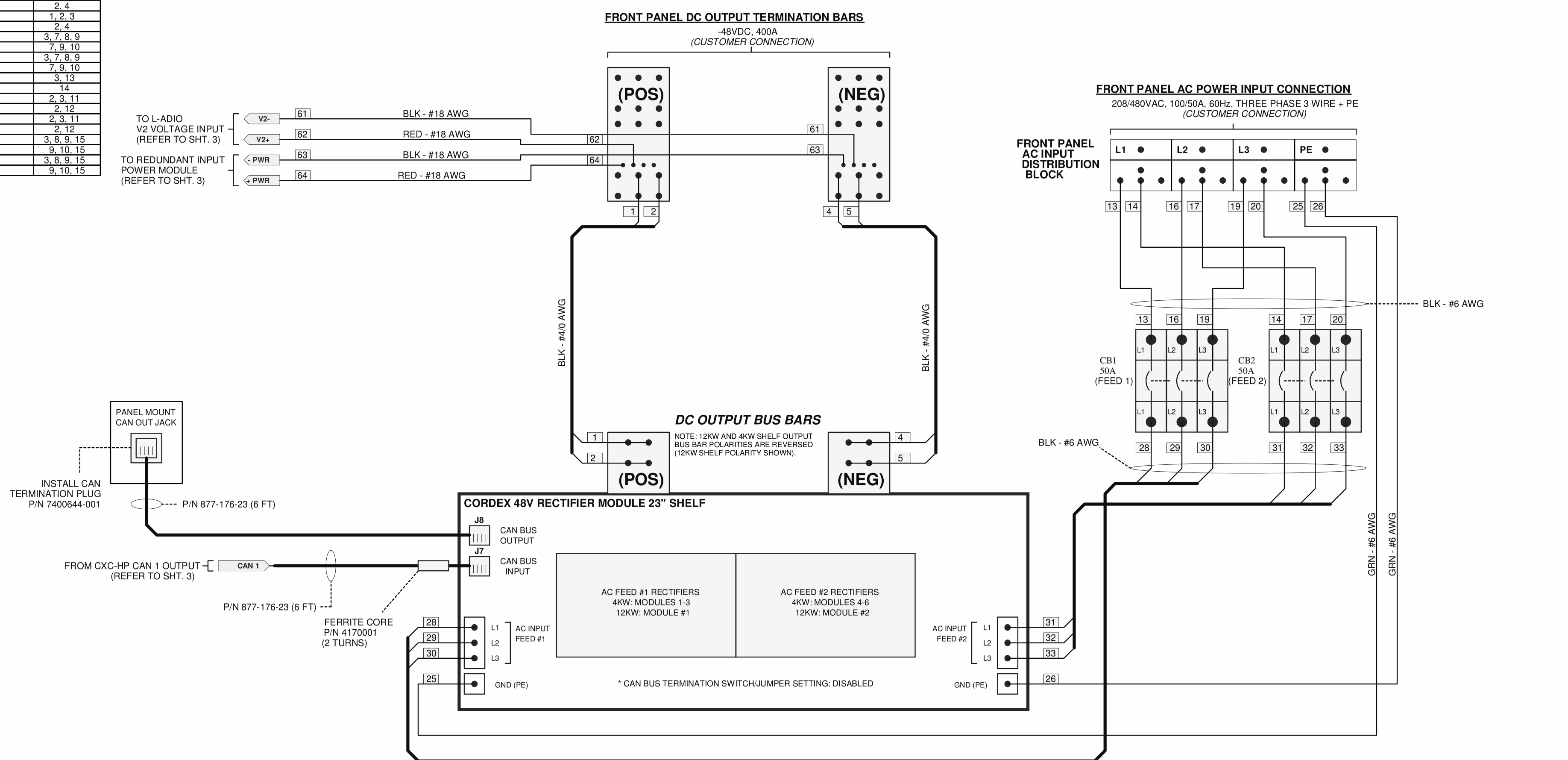
-104	3, 8, 9, 15
-114	9, 10, 15
-105	3, 8, 9, 15
-115	9, 10, 15



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TITLE SCHEMATIC, CXPS-FR3, 4KW OR 12KW RECTIFIER, PECO II REPLACEMENT

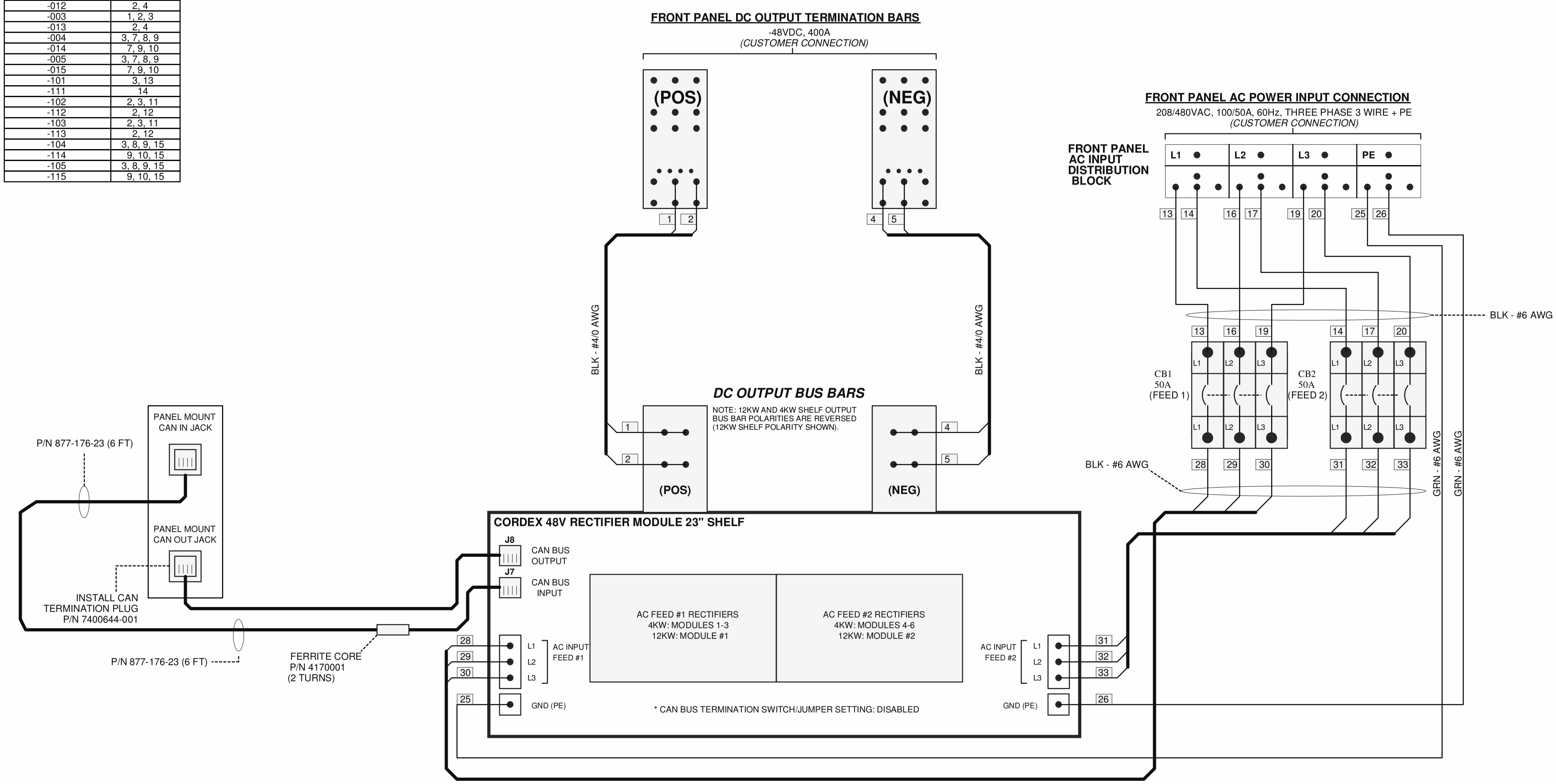
ISSUE DATE		SHEET 5 of 15	
SIZE B	TYPE S5	DWG NO. 0920003-05	REV C

208/480VAC, 1 SHELF SINGLE SECONDARY BAY W/O HP CONTROLLER

CONFIGURATIONS: -011
(REPLACES 1 X 400A PECO II)

CONFIGURATION WIRING DIRECTORY

0920003-XXX OR 0920004-XXX	SHEET
-001	3, 5
-011	6
-002	1, 2, 3
-012	2, 4
-003	1, 2, 3
-013	2, 4
-004	3, 7, 8, 9
-014	7, 9, 10
-005	3, 7, 8, 9
-015	7, 9, 10
-101	3, 13
-111	14
-102	2, 3, 11
-112	2, 12
-103	2, 3, 11
-113	2, 12
-104	3, 8, 9, 15
-114	9, 10, 15
-105	3, 8, 9, 15
-115	9, 10, 15



ALPHA TECHNOLOGIES™

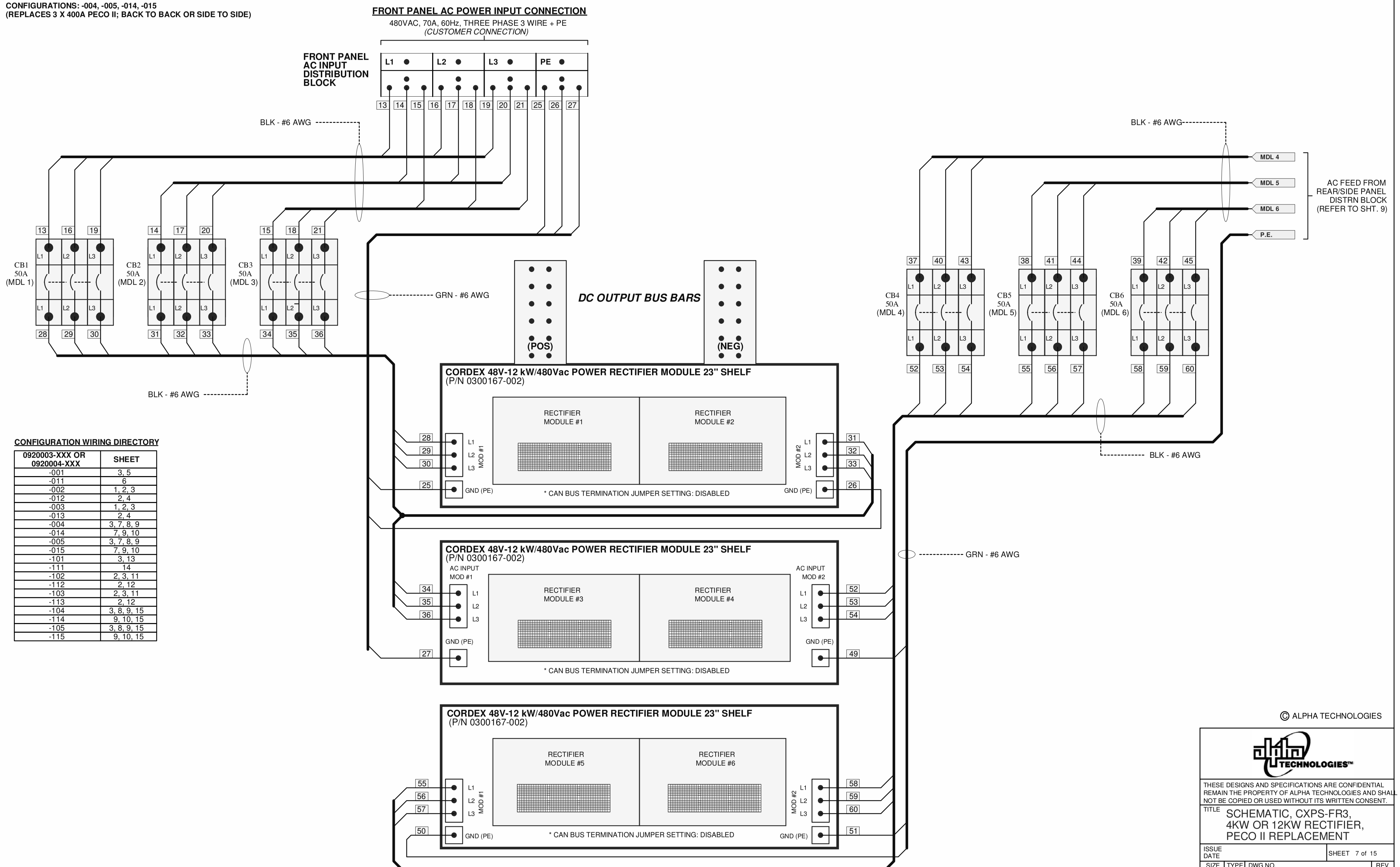
TITLE SCHEMATIC, CXPS-FR3, 4KW OR 12KW RECTIFIER, PECO II REPLACEMENT

ISSUE DATE | SHEET 6 of 15

SIZE	TYPE	DWG NO.	REV
B	S5	0920003-05	C

480VAC, 3 SHELF PRIMARY OR SECONDARY BAY SIDE BY SIDE OR BACK TO BACK AC WIRING

CONFIGURATIONS: -004, -005, -014, -015
(REPLACES 3 X 400A PECO II; BACK TO BACK OR SIDE TO SIDE)



CONFIGURATION WIRING DIRECTORY

0920003-XXX OR 0920004-XXX	SHEET
-001	3, 5
-011	6
-002	1, 2, 3
-012	2, 4
-003	1, 2, 3
-013	2, 4
-004	3, 7, 8, 9
-014	7, 9, 10
-005	3, 7, 8, 9
-015	7, 9, 10
-101	3, 13
-111	14
-102	2, 3, 11
-112	2, 12
-103	2, 3, 11
-113	2, 12
-104	3, 8, 9, 15
-114	9, 10, 15
-105	3, 8, 9, 15
-115	9, 10, 15

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TITLE SCHEMATIC, CXPS-FR3, 4KW OR 12KW RECTIFIER, PECO II REPLACEMENT

ISSUE DATE | SHEET 7 of 15

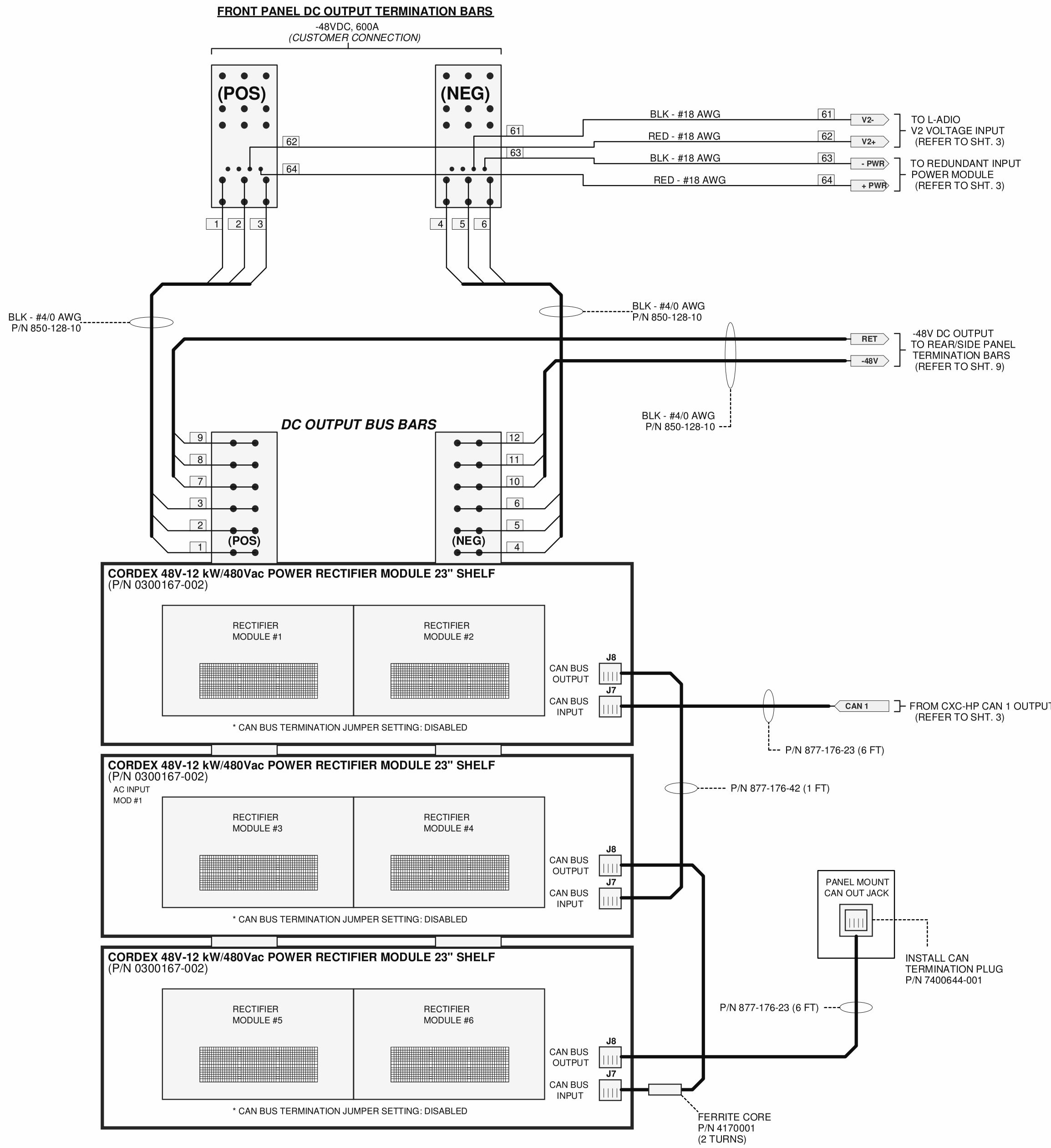
SIZE B | TYPE S5 | DWG NO. 0920003-05 | REV C

480VAC, 3 SHELF PRIMARY BAY
SIDE BY SIDE OR BACK TO BACK DC WIRING

CONFIGURATIONS: -004, -005, -104, -105
(REPLACES 3 X 400A PECO II; BACK TO BACK OR SIDE TO SIDE)

CONFIGURATION WIRING DIRECTORY

0920003-XXX OR 0920004-XXX	SHEET
-001	3, 5
-011	6
-002	1, 2, 3
-012	2, 4
-003	1, 2, 3
-013	2, 4
-004	3, 7, 8, 9
-014	7, 9, 10
-005	3, 7, 8, 9
-015	7, 9, 10
-101	3, 13
-111	14
-102	2, 3, 11
-112	2, 12
-103	2, 3, 11
-113	2, 12
-104	3, 8, 9, 15
-114	9, 10, 15
-105	3, 8, 9, 15
-115	9, 10, 15



ALPHA TECHNOLOGIES™

TITLE SCHEMATIC, CXPS-FR3, 4KW OR 12KW RECTIFIER, PECO II REPLACEMENT

ISSUE DATE		SHEET 8 of 15	
SIZE B	TYPE S5	DWG NO. 0920003-05	REV C

480VAC, 3 SHELF REAR/SIDE PANEL WIRING CONNECTIONS
(FOR SIDE TO SIDE OR BACK TO BACK PRIMARY AND SECONDARY BAYS)
CONFIGURATIONS: -004, -005, -014, -015, -104, -105, -114, -115

CONFIGURATION WIRING DIRECTORY

0920003-XXX OR 0920004-XXX	SHEET
-001	3, 5
-011	6
-002	1, 2, 3
-012	2, 4
-003	1, 2, 3
-013	2, 4
-004	3, 7, 8, 9
-014	7, 9, 10
-005	3, 7, 8, 9
-015	7, 9, 10
-101	3, 13
-111	14
-102	2, 3, 11
-112	2, 12
-103	2, 3, 11
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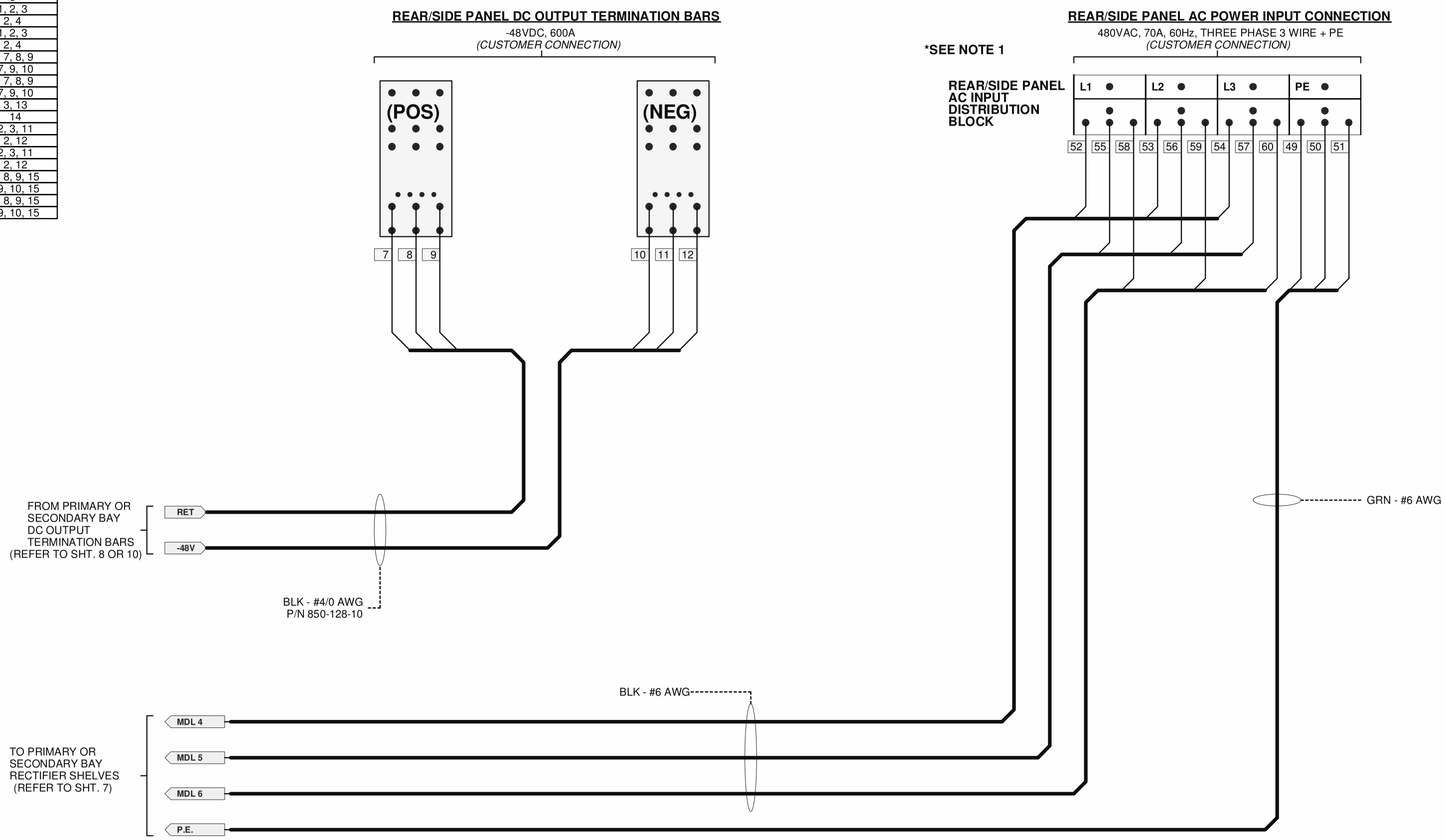
-114	9, 10, 15
-105	3, 8, 9, 15
-115	9, 10, 15



TITLE SCHEMATIC, CXPS-FR3, 4KW OR 12KW RECTIFIER, PECO II REPLACEMENT

ISSUE DATE

SIZE B | TYPE S5 | DWG NO. 0920003-05 | REV C

NOTES:

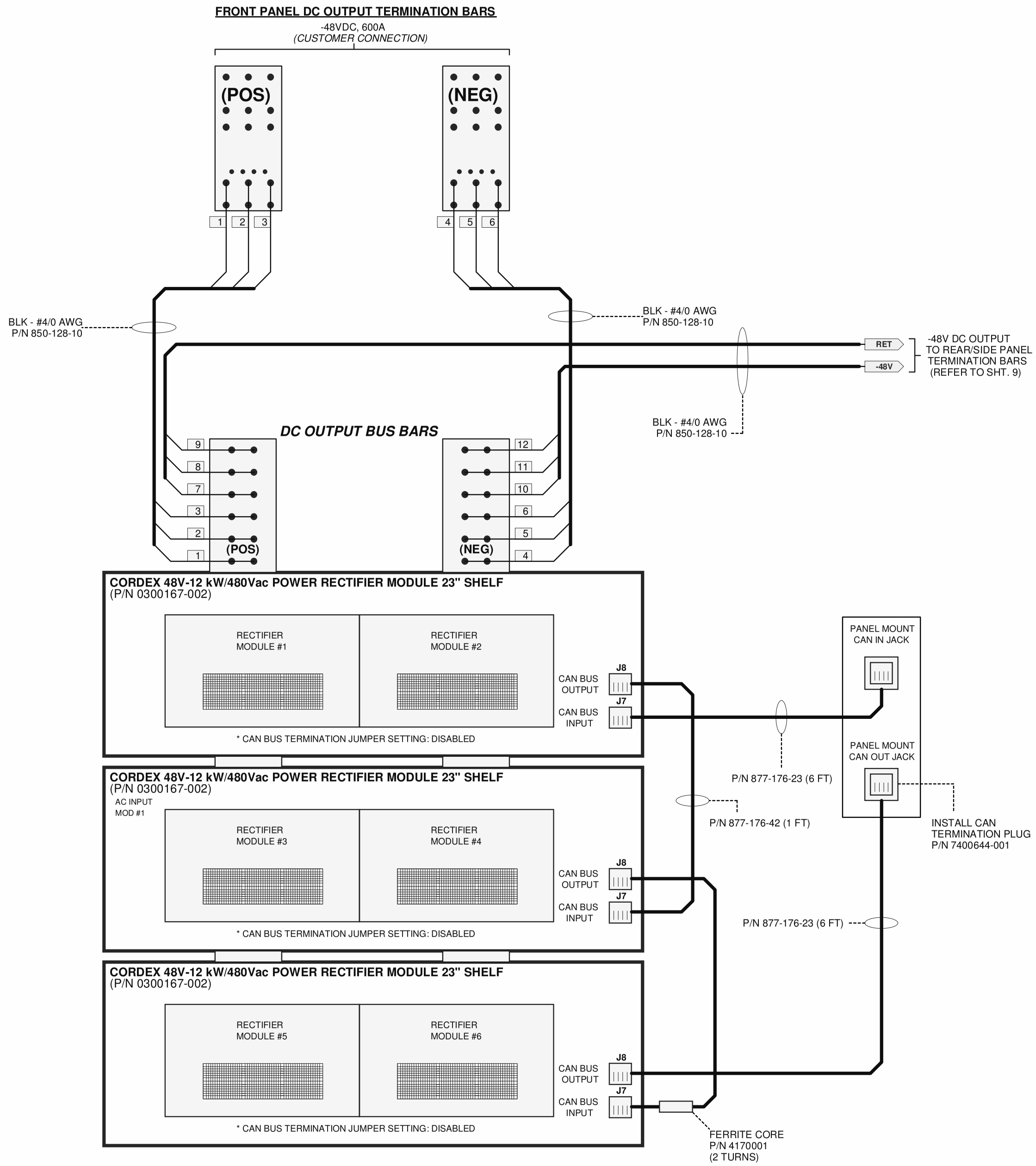
1. AC DISTRIBUTION BLOCK AND WIRING SHOWN IS FOR SYSTEMS WITH BREAKERS
   REFER TO SHEETS 11, 12 OR 15 FOR AC WIRING FOR SYSTEMS WITHOUT BREAKERS.

480VAC, 3 SHELF SECONDARY BAY W/O HP CONTROLLER
SIDE BY SIDE OR BACK TO BACK DC WIRING

CONFIGURATIONS: -014, -015, -114, -115

CONFIGURATION WIRING DIRECTORY

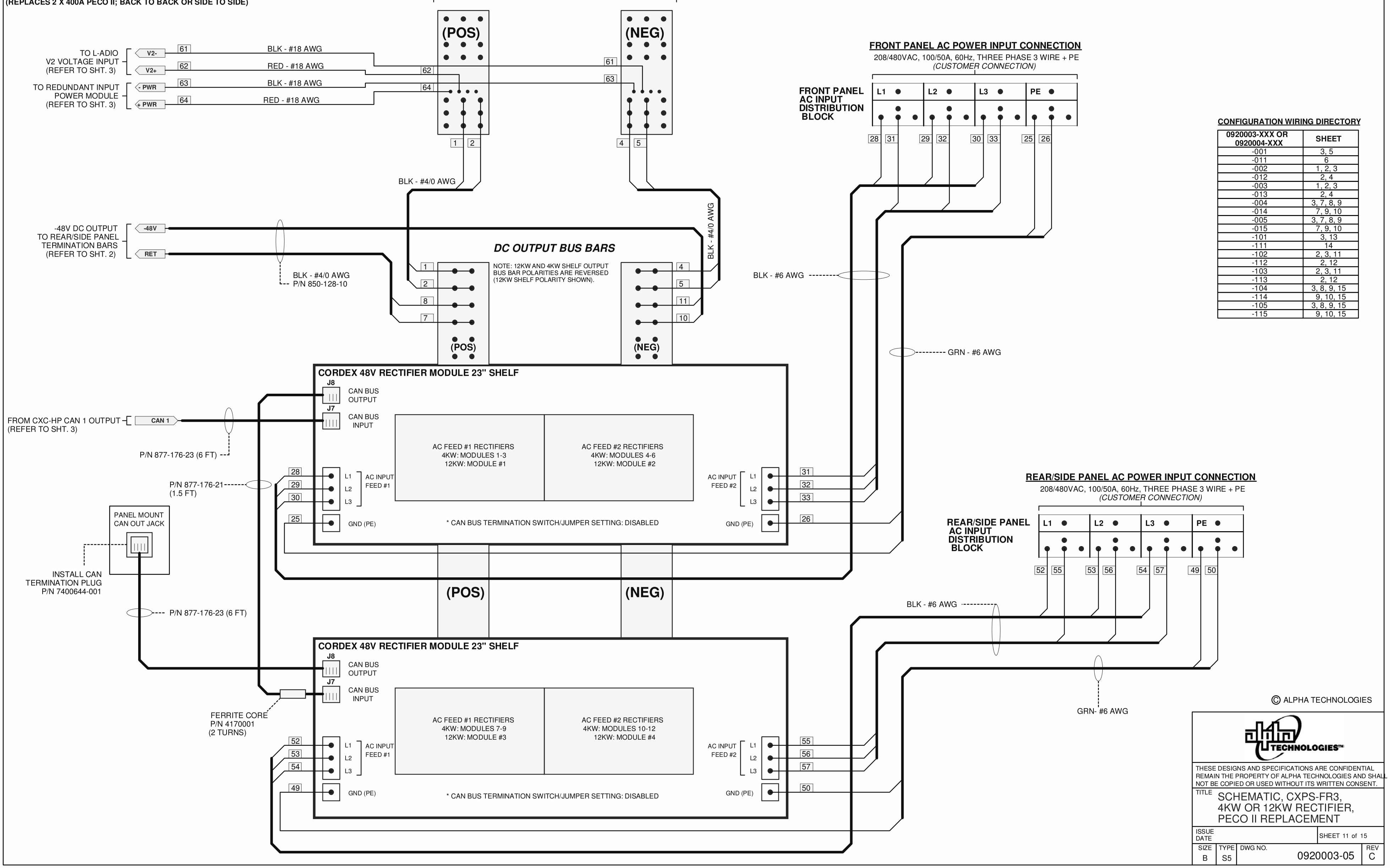
0920003-XXX OR 0920004-XXX	SHEET
-001	3, 5
-011	6
-002	1, 2, 3
-012	2, 4
-003	1, 2, 3
-013	2, 4
-004	3, 7, 8, 9
-014	7, 9, 10
-005	3, 7, 8, 9
-015	7, 9, 10
-101	3, 13
-111	14
-102	2, 3, 11
-112	2, 12
-103	2, 3, 11
-113	2, 12
-104	3, 8, 9, 15
-114	9, 10, 15
-105	3, 8, 9, 15
-115	9, 10, 15



TITLE	SCHEMATIC, CXPS-FR3, 4KW OR 12KW RECTIFIER, PECO II REPLACEMENT		
ISSUE DATE		SHEET 10 of 15	
SIZE B	TYPE S5	DWG NO. 0920003-05	REV C

208/480VAC, 2 SHELF PRIMARY BAY E/W HP CONTROLLER, NO CB
SIDE BY SIDE OR BACK TO BACK WIRING

CONFIGURATIONS: -102, -103
(REPLACES 2 X 400A PECO II; BACK TO BACK OR SIDE TO SIDE)

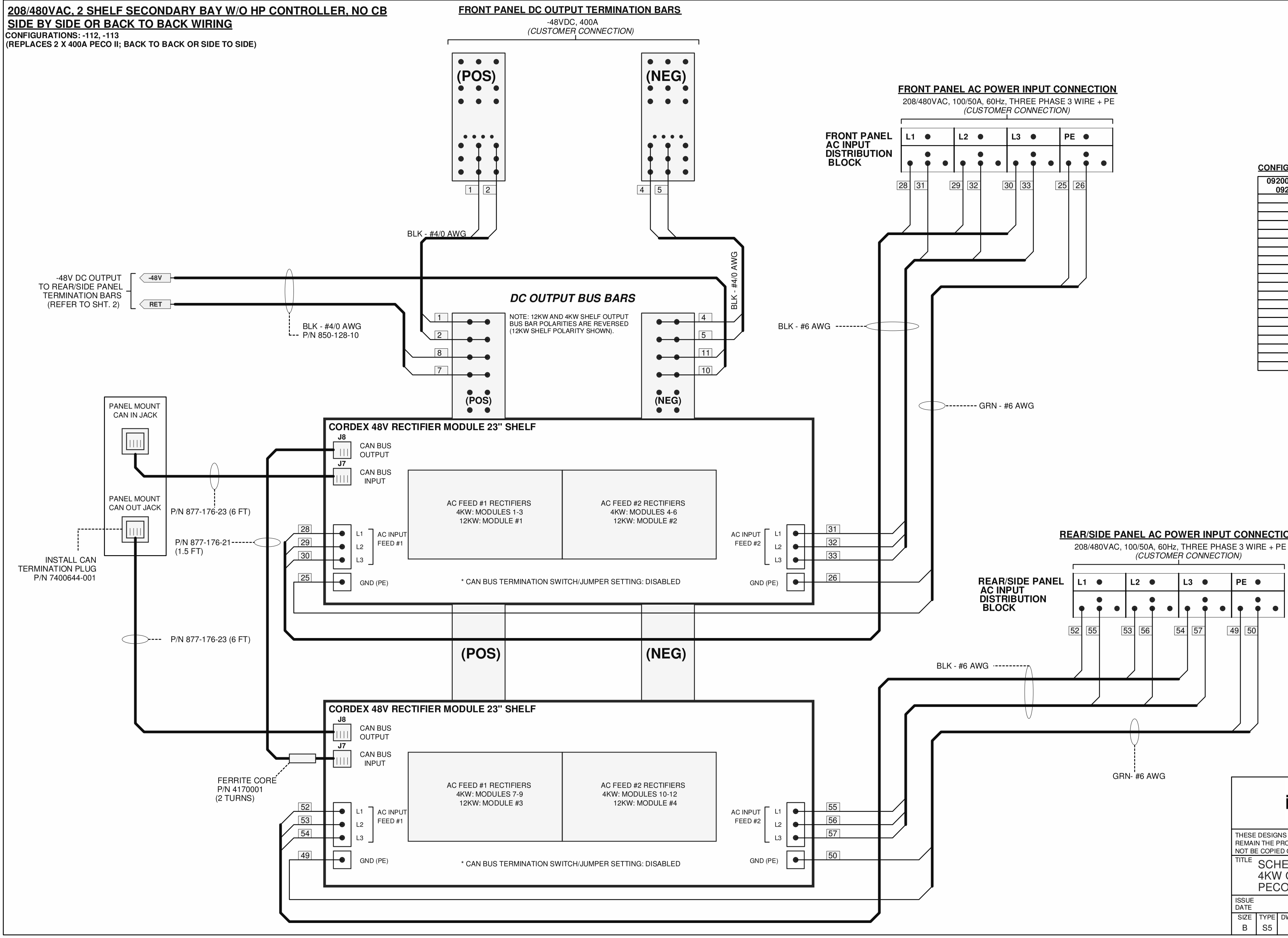


CONFIGURATION WIRING DIRECTORY

0920003-XXX OR 0920004-XXX	SHEET
-001	3, 5
-011	6
-002	1, 2, 3
-012	2, 4
-003	1, 2, 3
-013	2, 4
-004	3, 7, 8, 9
-014	7, 9, 10
-005	3, 7, 8, 9
-015	7, 9, 10
-101	3, 13
-111	14
-102	2, 3, 11
-112	2, 12
-103	2, 3, 11
-113	2, 12
-104	3, 8, 9, 15
-114	9, 10, 15
-105	3, 8, 9, 15
-115	9, 10, 15

208/480VAC, 2 SHELF SECONDARY BAY W/O HP CONTROLLER, NO CB
SIDE BY SIDE OR BACK TO BACK WIRING

CONFIGURATIONS: -112, -113
(REPLACES 2 X 400A PECO II; BACK TO BACK OR SIDE TO SIDE)



CONFIGURATION WIRING DIRECTORY

0920003-XXX OR 0920004-XXX	SHEET
-001	3, 5
-011	6
-002	1, 2, 3
-012	2, 4
-003	1, 2, 3
-013	2, 4
-004	3, 7, 8, 9
-014	7, 9, 10
-005	3, 7, 8, 9
-015	7, 9, 10
-101	3, 13
-111	14
-102	2, 3, 11
-112	2, 12
-103	2, 3, 11
-113	2, 12
-104	3, 8, 9, 15
-114	9, 10, 15
-105	3, 8, 9, 15
-115	9, 10, 15

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TITLE: SCHEMATIC, CXPS-FR3, 4KW OR 12KW RECTIFIER, PECO II REPLACEMENT

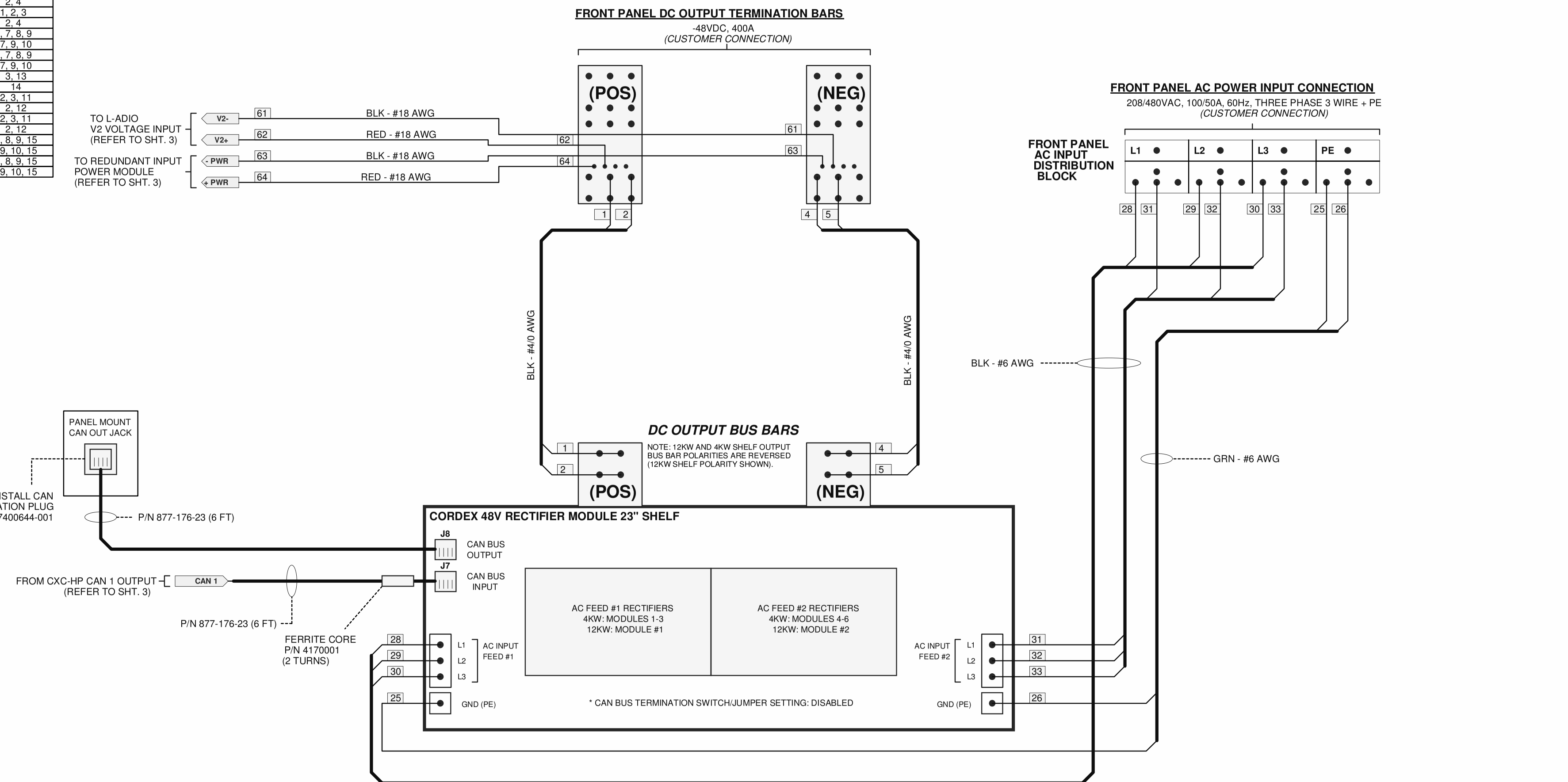
ISSUE DATE		SHEET 12 of 15	
SIZE B	TYPE S5	DWG NO. 0920003-05	REV C

208/480VAC, 1 SHELF SINGLE BAY E/W HP CONTROLLER, NO CB

CONFIGURATIONS: -101
(REPLACES 1 X 400A PECO II)

CONFIGURATION WIRING DIRECTORY

0920003-XXX OR 0920004-XXX	SHEET
-001	3, 5
-011	6
-002	1, 2, 3
-012	2, 4
-003	1, 2, 3
-013	2, 4
-004	3, 7, 8, 9
-014	7, 9, 10
-005	3, 7, 8, 9
-015	7, 9, 10
-101	3, 13
-111	14
-102	2, 3, 11
-112	2, 12
-103	2, 3, 11
-113	2, 12
-104	3, 8, 9, 15
-114	9, 10, 15
-105	3, 8, 9, 15
-115	9, 10, 15



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TITLE	SCHEMATIC, CXPS-FR3, 4KW OR 12KW RECTIFIER, PECO II REPLACEMENT		
ISSUE DATE		SHEET 13 of 15	
SIZE B	TYPE S5	DWG NO. 0920003-05	REV C

208/480VAC, 1 SHELF SINGLE BAY W/O HP CONTROLLER, NO CB

CONFIGURATIONS: -111
(REPLACES 1 X 400A PECO II)

CONFIGURATION WIRING DIRECTORY

0920003-XXX OR 0920004-XXX	SHEET
-001	3, 5
-011	6
-002	1, 2, 3
-012	2, 4
-003	1, 2, 3
-013	2, 4
-004	3, 7, 8, 9
-014	7, 9, 10
-005	3, 7, 8, 9
-015	7, 9, 10
-101	3, 13
-111	14
-102	2, 3, 11
-112	2, 12
-103	2, 3, 11
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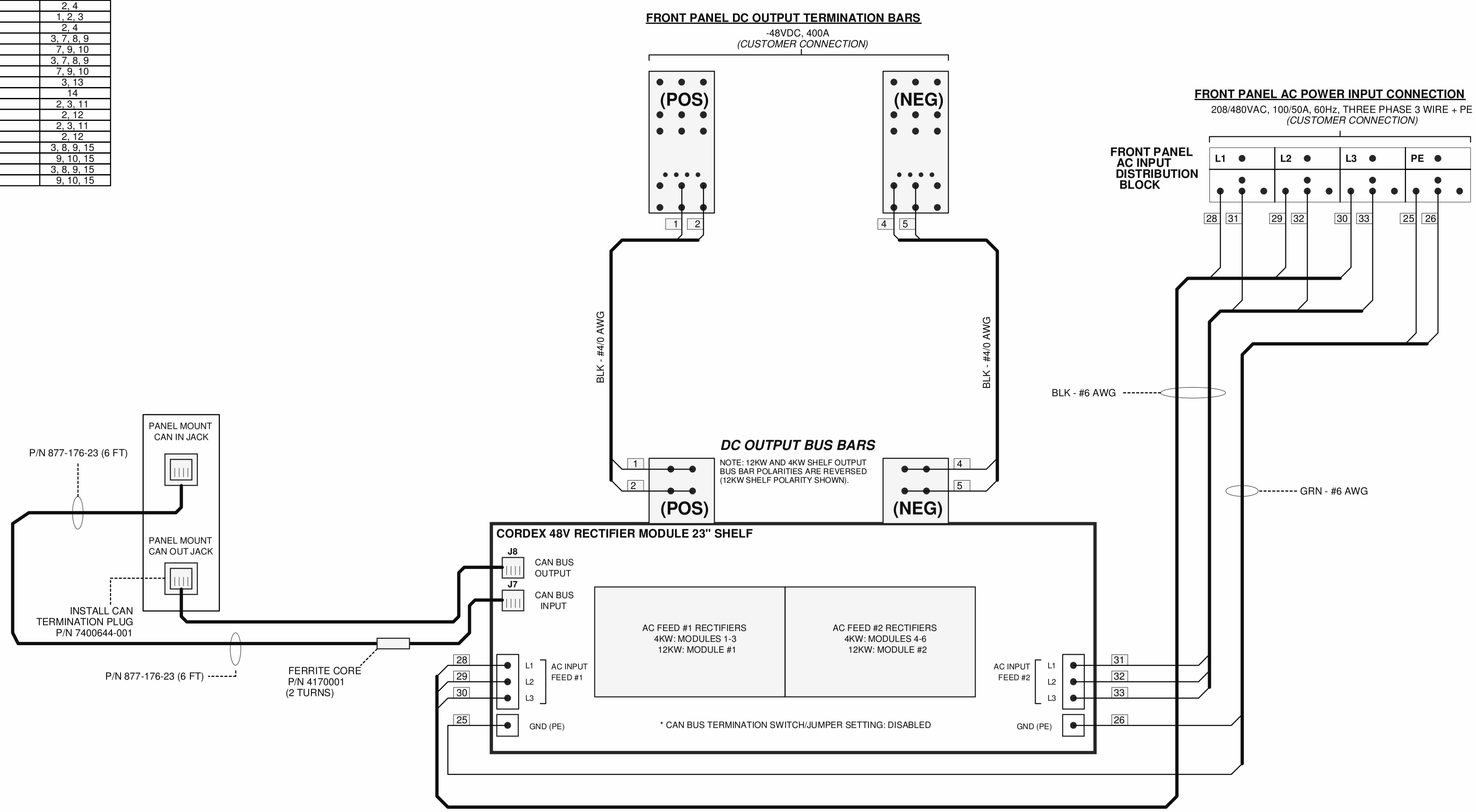
-104	3, 8, 9, 15
-114	9, 10, 15
-105	3, 8, 9, 15
-115	9, 10, 15



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TITLE	SCHEMATIC, CXPS-FR3, 4KW OR 12KW RECTIFIER, PECO II REPLACEMENT		
ISSUE DATE		SHEET 14 of 15	
SIZE B	TYPE S5	DWG NO. 0920003-05	REV C

480VAC, 3 SHELF PRIMARY OR SECONDARY BAY, NO CB
SIDE BY SIDE OR BACK TO BACK AC WIRING

CONFIGURATIONS: -004, -005, -014, -015, -104, -105, -114, -115

CONFIGURATION WIRING DIRECTORY

0920003-XXX OR 0920004-XXX	SHEET
-001	3, 5
-011	6
-002	1, 2, 3
-012	2, 4
-003	1, 2, 3
-013	2, 4
-004	3, 7, 8, 9
-014	7, 9, 10
-005	3, 7, 8, 9
-015	7, 9, 10
-101	3, 13
-111	14
-102	2, 3, 11
-112	2, 12
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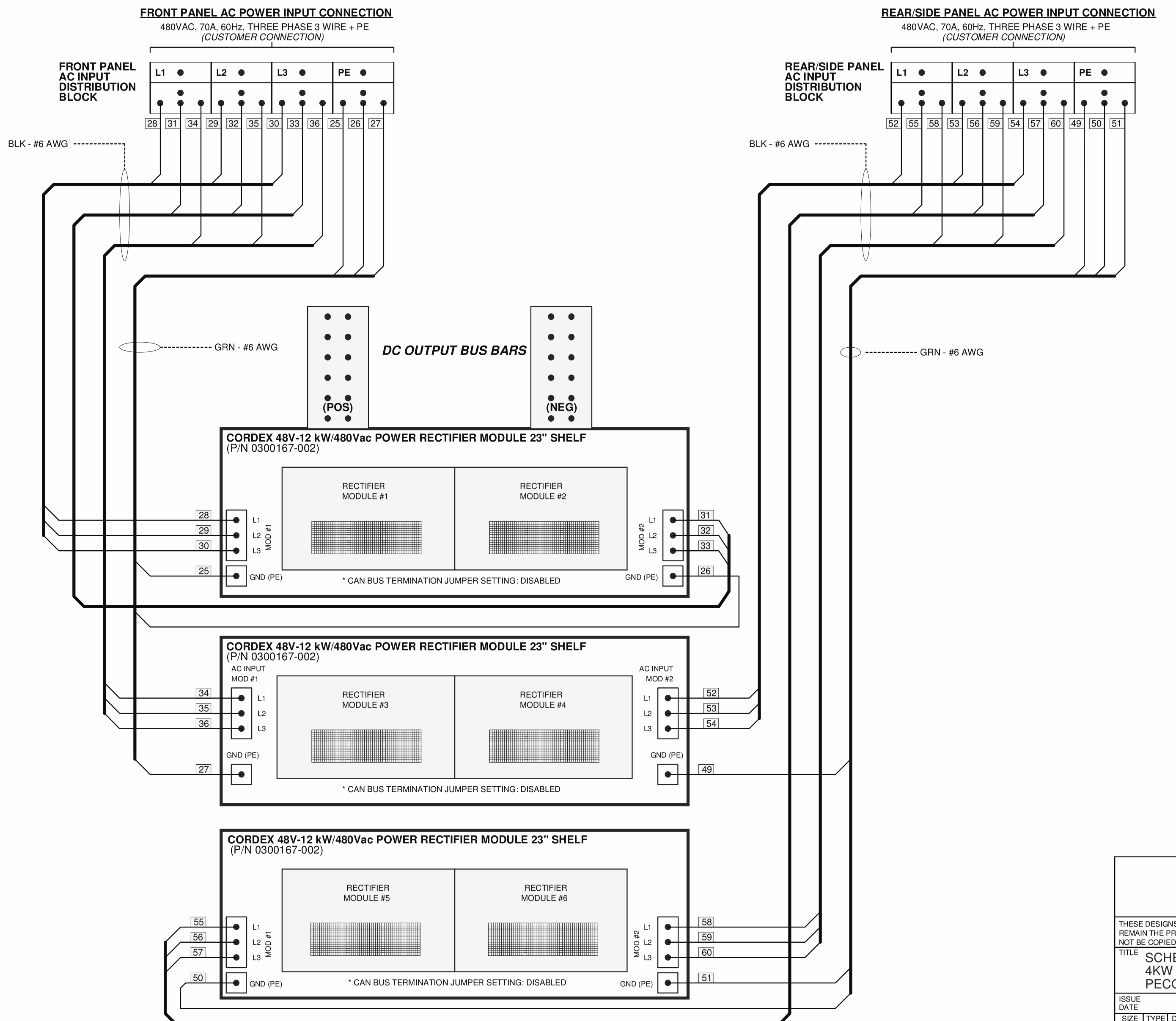
-114	9, 10, 15
-105	3, 8, 9, 15
-115	9, 10, 15



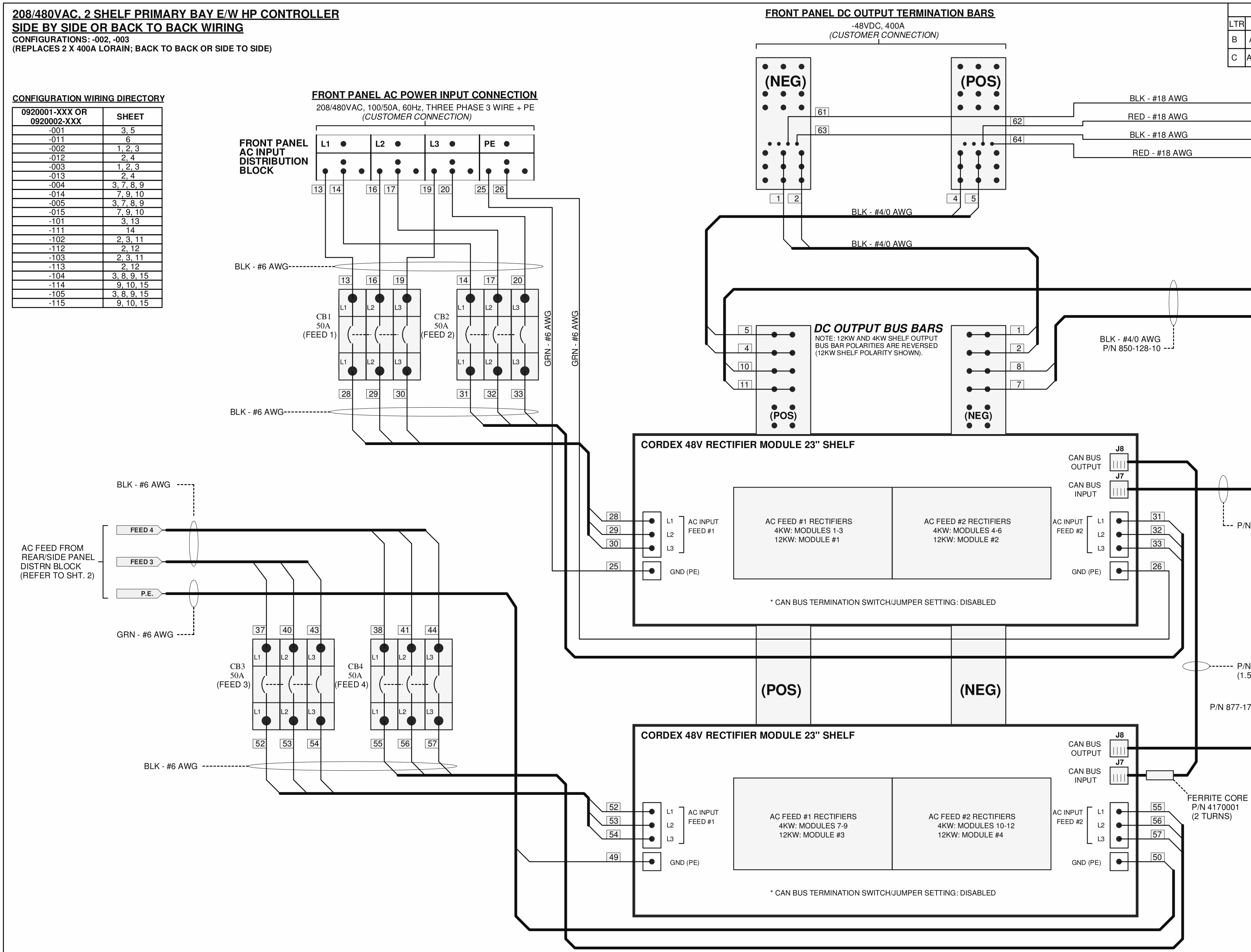
TITLE	SCHEMATIC, CXPS-FR3, 4KW OR 12KW RECTIFIER, PECO II REPLACEMENT
ISSUE DATE	SHEET 15 of 15
SIZE B, TYPE S5	DWG NO. 0920003-05, REV C

208/480VAC, 2 SHELF PRIMARY BAY E/W HP CONTROLLER
SIDE BY SIDE OR BACK TO BACK WIRING

CONFIGURATIONS: -002, -003
(REPLACES 2 X 400A LORAIN; BACK TO BACK OR SIDE TO SIDE)

CONFIGURATION WIRING DIRECTORY

0920001-XXX OR 0920002-XXX	SHEET
-001	3, 5
-011	6
-002	1, 2, 3
-012	2, 4
-003	1, 2, 3
-013	2, 4
-004	3, 7, 8, 9
-014	7, 9, 10
-005	3, 7, 8, 9
-015	7, 9, 10
-101	3, 13
-111	14
-102	2, 3, 11
-112	2, 12
-103	2, 3, 11
-113	2, 12
-104	3, 8, 9, 15
-114	9, 10, 15
-105	3, 8, 9, 15
-115	9, 10, 15



REVISIONS

LTR	DESCRIPTION	DRW	DATE	CHK	APP
B	ADDED CXC CHASSIS GND	JK	2018/04		JK
C	ADDED SHTS 11-15 (NO CB)	JK	2018/10		JK

LAST: 65
NOT: 22-24, 46-48

DESIGN	J.K	2017/04	CHECKED	
DRAWN	J.K	2017/04	APPROVED	

TITLE SCHEMATIC, CXPS-FR3, 4KW OR 12KW RECTIFIER, LORAIN REPLACEMENT

ISSUE DATE | SHEET 1 of 15

SIZE B | TYPE S5 | DWG NO. 0920001-05 | REV C

208/480VAC, 2 SHELF SIDE/REAR PANEL WIRING CONNECTIONS
(FOR SIDE TO SIDE OR BACK TO BACK PRIMARY AND SECONDARY BAYS)

CONFIGURATIONS: -002, -003, -012, -013, -102, -103, -112, -113

CONFIGURATION WIRING DIRECTORY

0920001-XXX OR 0920002-XXX	SHEET
-001	3, 5
-011	6
-002	1, 2, 3
-012	2, 4
-003	1, 2, 3
-013	2, 4
-004	3, 7, 8, 9
-014	7, 9, 10
-005	3, 7, 8, 9
-015	7, 9, 10
-101	3, 13
-111	14
-102	2, 3, 11
-112	2, 12
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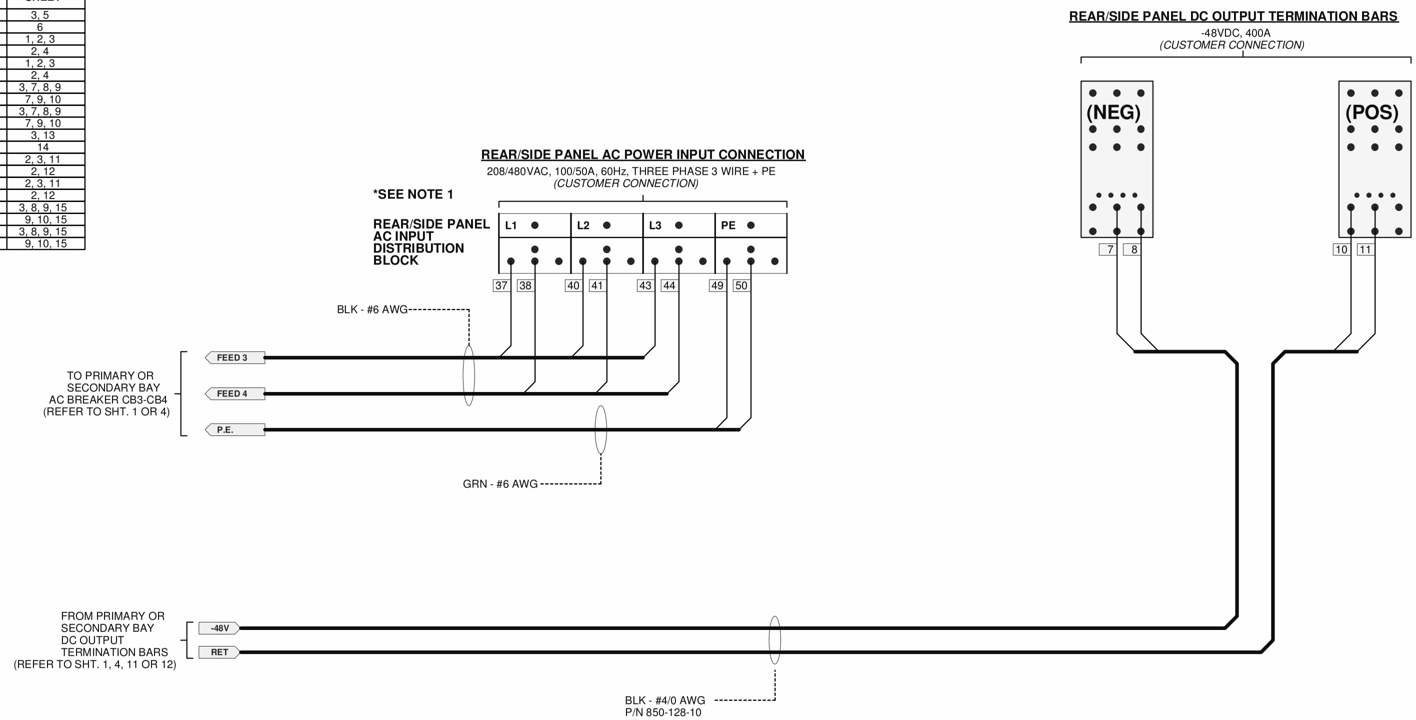
-115	9, 10, 15



NOTES:

1. AC DISTRIBUTION BLOCK AND WIRING SHOWN IS FOR SYSTEMS WITH BREAKERS
   REFER TO SHEETS 11, 12 OR 15 FOR AC WIRING FOR SYSTEMS WITHOUT BREAKERS.

TITLE	SCHEMATIC, CXPS-FR3, 4KW OR 12KW RECTIFIER, LORAIN REPLACEMENT		
ISSUE DATE		SHEET 2 of 15	
SIZE B	TYPE S5	DWG NO. 0920001-05	REV C

PRIMARY BAY CONTROLLER & I/O WIRING:

CONFIGURATIONS: -001, -002, -003, -004, -005, -101, -102, -103, -104, -105

CONFIGURATION WIRING DIRECTORY

0920001-XXX OR 0920002-XXX	SHEET
-001	3, 5
-011	6
-002	1, 2, 3
-012	2, 4
-003	1, 2, 3
-013	2, 4
-004	3, 7, 8, 9
-014	7, 9, 10
-005	3, 7, 8, 9
-015	7, 9, 10
-101	3, 13
-111	14
-102	2, 3, 11
-112	2, 12
-103	2, 3, 11
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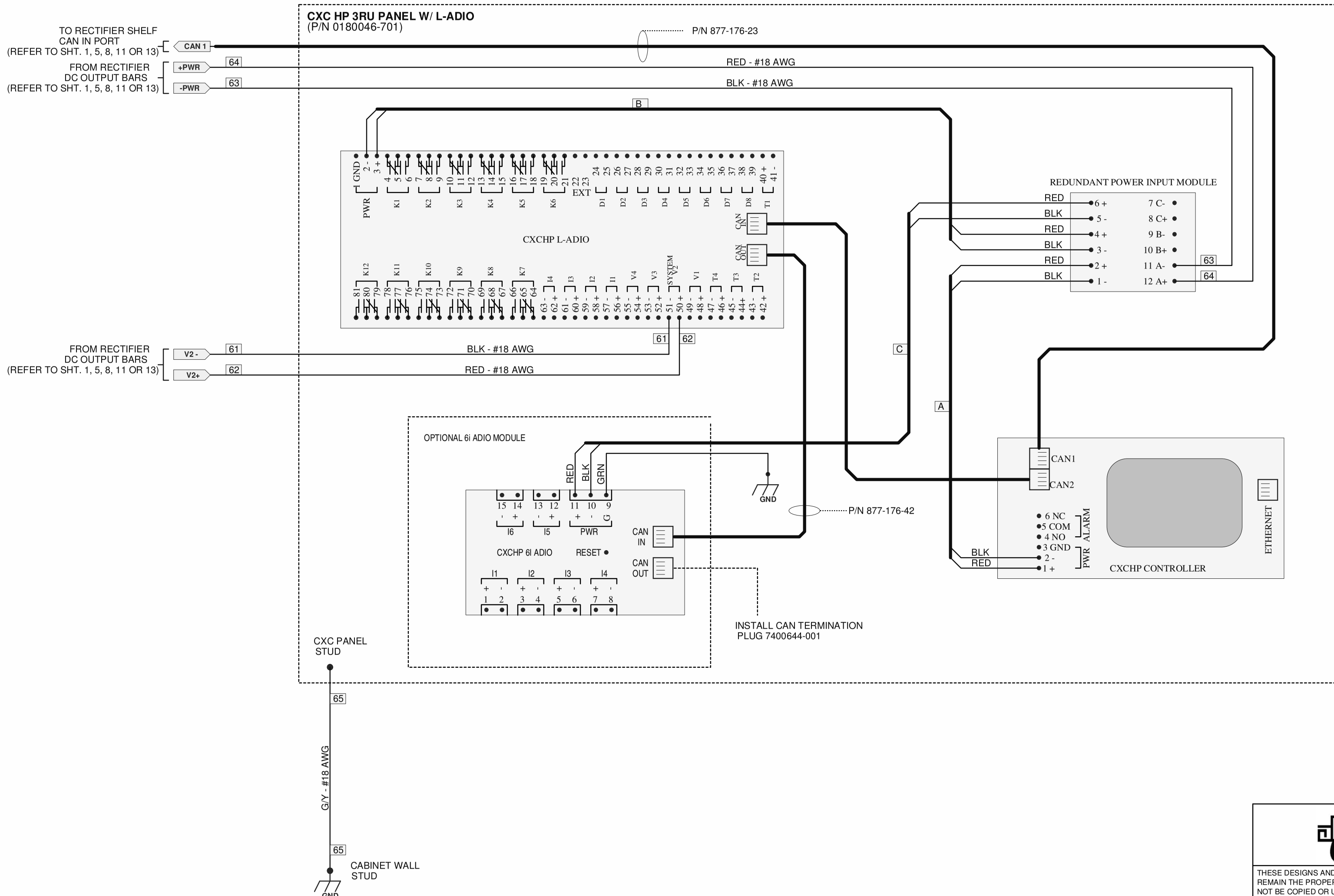
-104	3, 8, 9, 15
-114	9, 10, 15
-105	3, 8, 9, 15
-115	9, 10, 15



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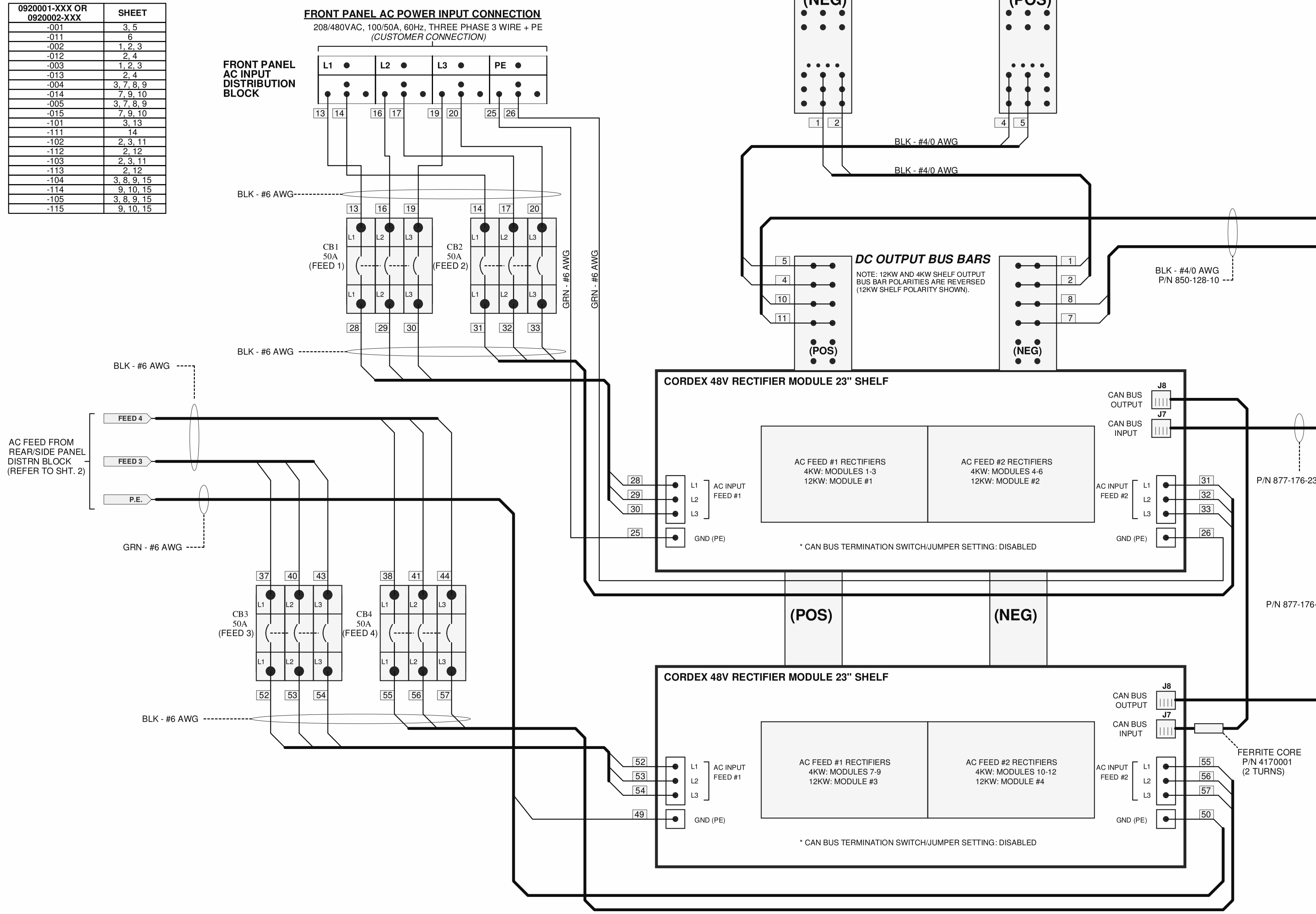
TITLE	SCHEMATIC, CXPS-FR3, 4KW OR 12KW RECTIFIER, LORAIN REPLACEMENT		
ISSUE DATE		SHEET 3 of 15	
SIZE B	TYPE S5	DWG NO. 0920001-05	REV C

208/480VAC, 2 SHELF SECONDARY BAY W/O HP CONTROLLER
SIDE BY SIDE OR BACK TO BACK WIRING

CONFIGURATIONS: -012, -013
(REPLACES 2 X 400A LORAIN; BACK TO BACK OR SIDE BY SIDE)

CONFIGURATION WIRING DIRECTORY

0920001-XXX OR 0920002-XXX	SHEET
-001	3, 5
-011	6
-002	1, 2, 3
-012	2, 4
-003	1, 2, 3
-013	2, 4
-004	3, 7, 8, 9
-014	7, 9, 10
-005	3, 7, 8, 9
-015	7, 9, 10
-101	3, 13
-111	14
-102	2, 3, 11
-112	2, 12
-103	2, 3, 11
-113	2, 12
-104	3, 8, 9, 15
-114	9, 10, 15
-105	3, 8, 9, 15
-115	9, 10, 15



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TITLE SCHEMATIC, CXPS-FR3, 4KW OR 12KW RECTIFIER, LORAIN REPLACEMENT

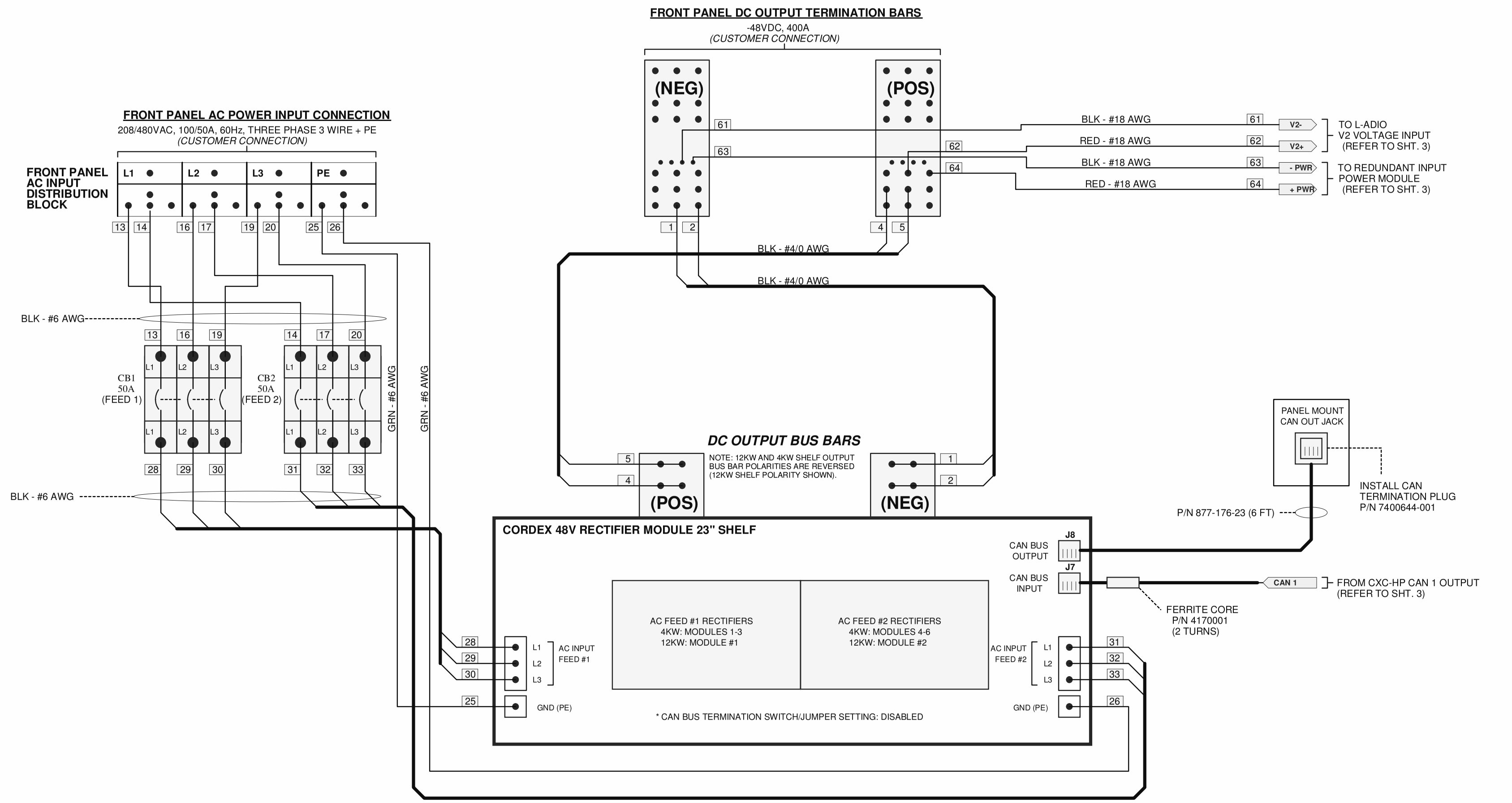
ISSUE DATE		SHEET 4 of 15	
SIZE B	TYPE S5	DWG NO. 0920001-05	REV C

208/480VAC, 1 SHELF SINGLE BAY E/W HP CONTROLLER

CONFIGURATIONS: -001
(REPLACES 1 X 400A LORAIN)

CONFIGURATION WIRING DIRECTORY

0920001-XXX OR 0920002-XXX	SHEET
-001	3, 5
-011	6
-002	1, 2, 3
-012	2, 4
-003	1, 2, 3
-013	2, 4
-004	3, 7, 8, 9
-014	7, 9, 10
-005	3, 7, 8, 9
-015	7, 9, 10
-101	3, 13
-111	14
-102	2, 3, 11
-112	2, 12
-103	2, 3, 11
-113	2, 12
-104	3, 8, 9, 15
-114	9, 10, 15
-105	3, 8, 9, 15
-115	9, 10, 15



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TITLE SCHEMATIC, CXPS-FR3, 4KW OR 12KW RECTIFIER, LORAIN REPLACEMENT

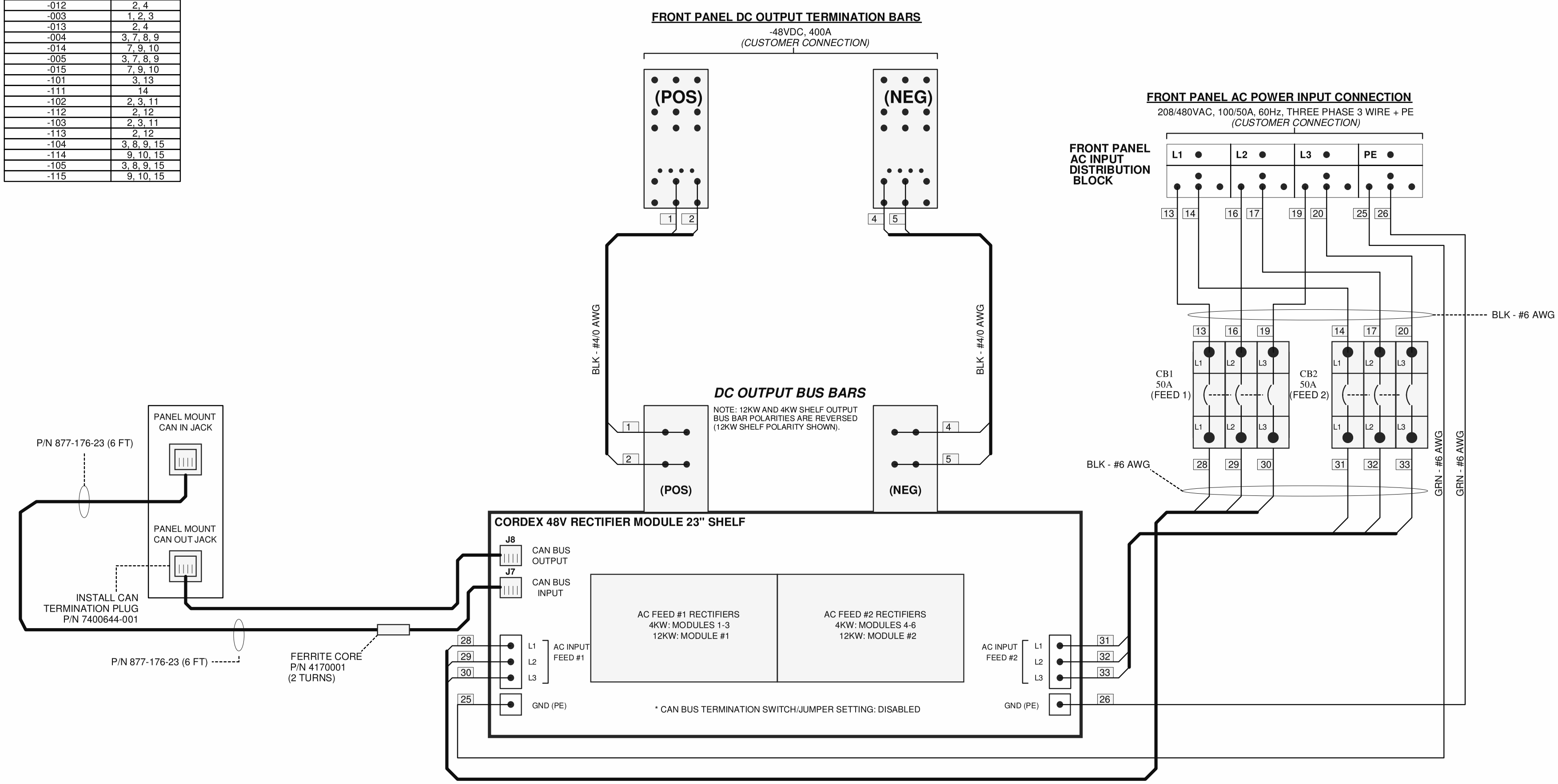
ISSUE DATE			SHEET 5 of 15	
SIZE B	TYPE S5	DWG NO.	0920001-05	REV C

208/480VAC, 1 SHELF SINGLE SECONDARY BAY W/O HP CONTROLLER

CONFIGURATIONS: -011
(REPLACES 1 X 400A PECO II)

CONFIGURATION WIRING DIRECTORY

0920003-XXX OR 0920004-XXX	SHEET
-001	3, 5
-011	6
-002	1, 2, 3
-012	2, 4
-003	1, 2, 3
-013	2, 4
-004	3, 7, 8, 9
-014	7, 9, 10
-005	3, 7, 8, 9
-015	7, 9, 10
-101	3, 13
-111	14
-102	2, 3, 11
-112	2, 12
-103	2, 3, 11
-113	2, 12
-104	3, 8, 9, 15
-114	9, 10, 15
-105	3, 8, 9, 15
-115	9, 10, 15



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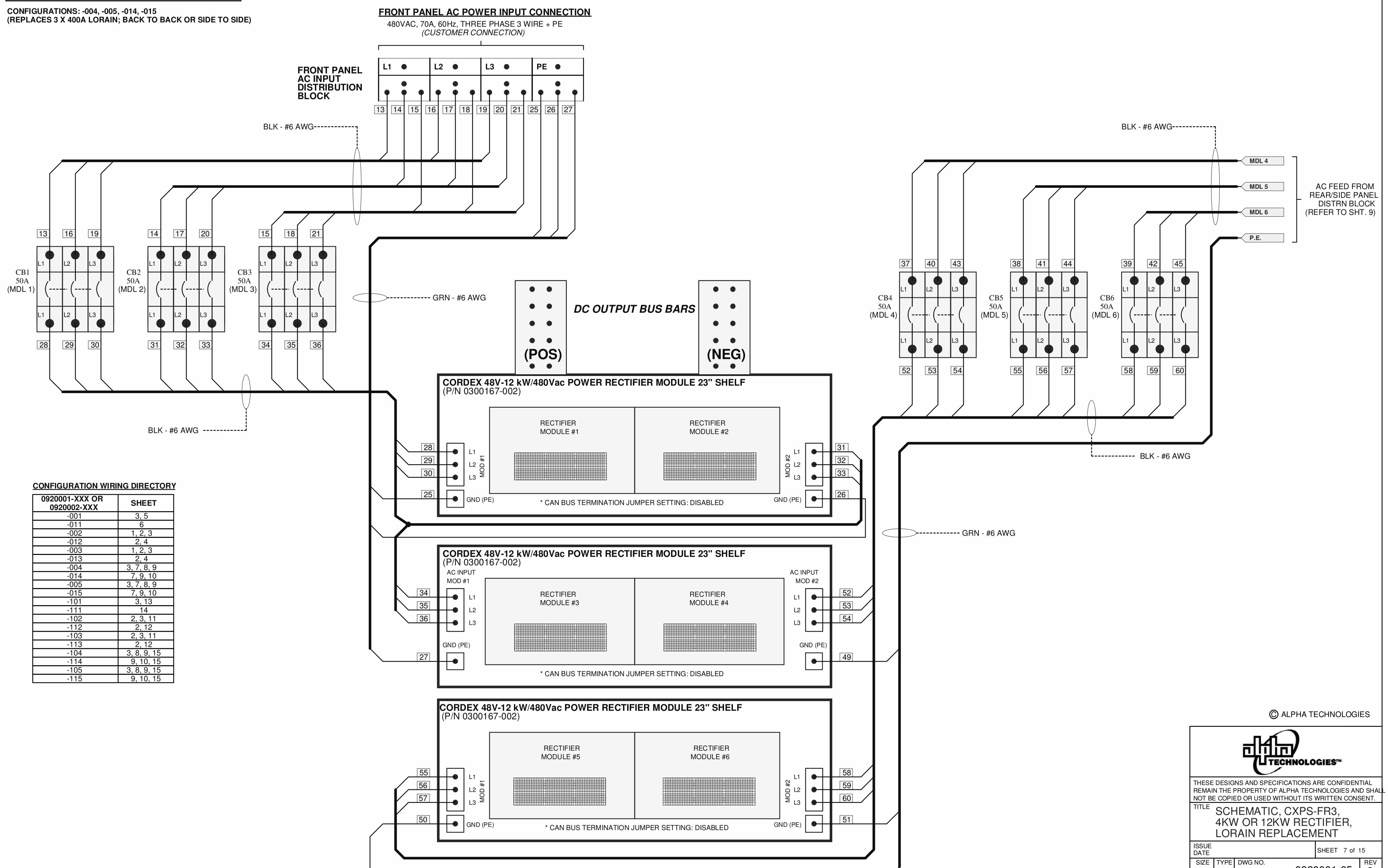
TITLE SCHEMATIC, CXPS-FR3, 4KW OR 12KW RECTIFIER, PECO II REPLACEMENT

ISSUE DATE

SIZE	TYPE	DWG NO.	REV
B	S5	0920003-05	C

480VAC, 3 SHELF PRIMARY OR SECONDARY BAY SIDE BY SIDE OR BACK TO BACK AC WIRING

CONFIGURATIONS: -004, -005, -014, -015
(REPLACES 3 X 400A LORAIN; BACK TO BACK OR SIDE TO SIDE)



CONFIGURATION WIRING DIRECTORY

0920001-XXX OR 0920002-XXX	SHEET
-001	3, 5
-011	6
-002	1, 2, 3
-012	2, 4
-003	1, 2, 3
-013	2, 4
-004	3, 7, 8, 9
-014	7, 9, 10
-005	3, 7, 8, 9
-015	7, 9, 10
-101	3, 13
-111	14
-102	2, 3, 11
-112	2, 12
-103	2, 3, 11
-113	2, 12
-104	3, 8, 9, 15
-114	9, 10, 15
-105	3, 8, 9, 15
-115	9, 10, 15

TITLE: SCHEMATIC, CXPS-FR3, 4KW OR 12KW RECTIFIER, LORAIN REPLACEMENT

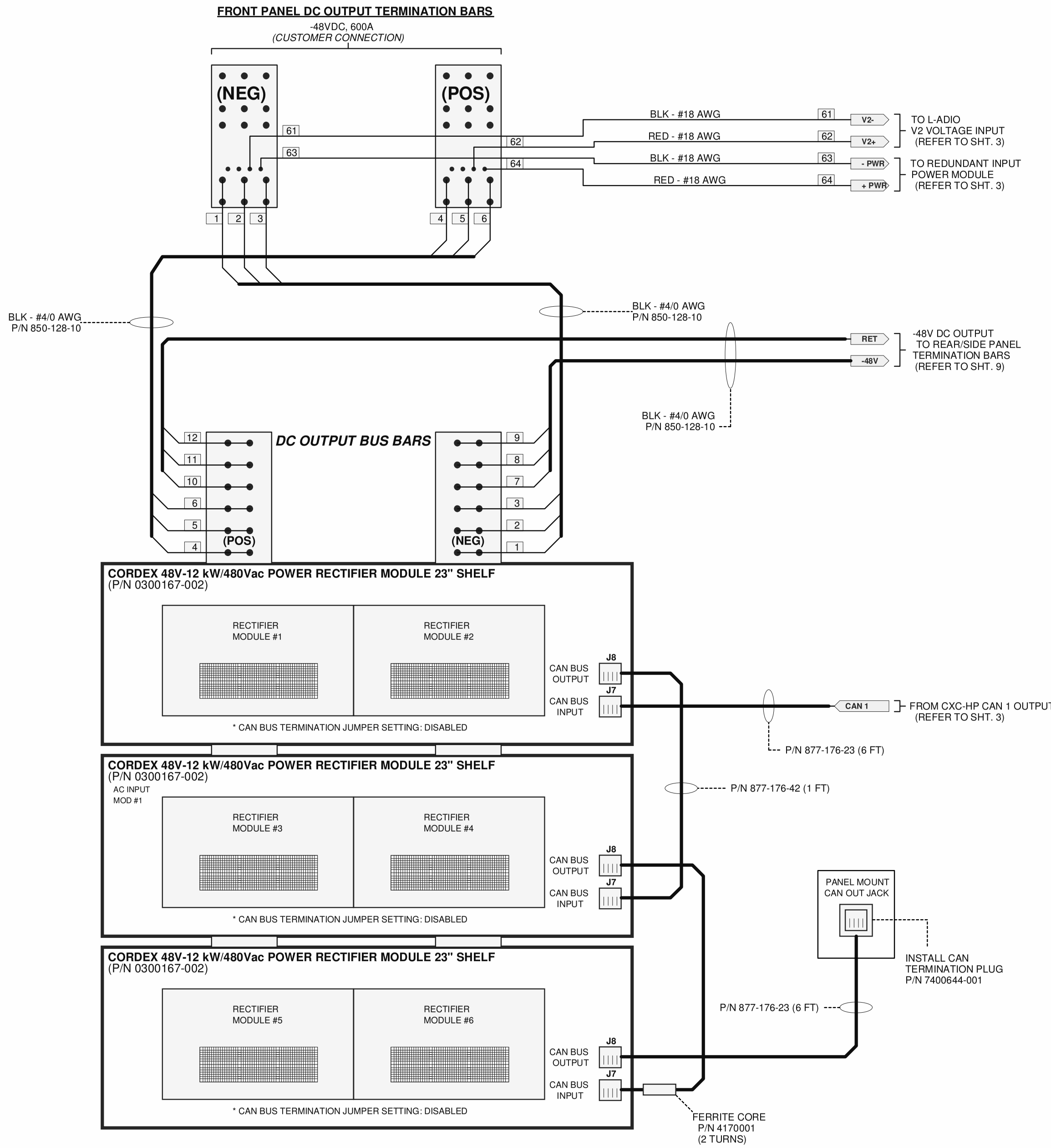
ISSUE DATE		SHEET 7 of 15	
SIZE B	TYPE S5	DWG NO. 0920001-05	REV C

480VAC, 3 SHELF PRIMARY BAY
SIDE BY SIDE OR BACK TO BACK DC WIRING

CONFIGURATIONS: -004, -005, -104, -105
(REPLACES 3 X 400A LORAIN; BACK TO BACK OR SIDE TO SIDE)

CONFIGURATION WIRING DIRECTORY

0920001-XXX OR 0920002-XXX	SHEET
-001	3, 5
-011	6
-002	1, 2, 3
-012	2, 4
-003	1, 2, 3
-013	2, 4
-004	3, 7, 8, 9
-014	7, 9, 10
-005	3, 7, 8, 9
-015	7, 9, 10
-101	3, 13
-111	14
-102	2, 3, 11
-112	2, 12
-103	2, 3, 11
-113	2, 12
-104	3, 8, 9, 15
-114	9, 10, 15
-105	3, 8, 9, 15
-115	9, 10, 15



TITLE: SCHEMATIC, CXPS-FR3, 4KW OR 12KW RECTIFIER, LORAIN REPLACEMENT

ISSUE DATE

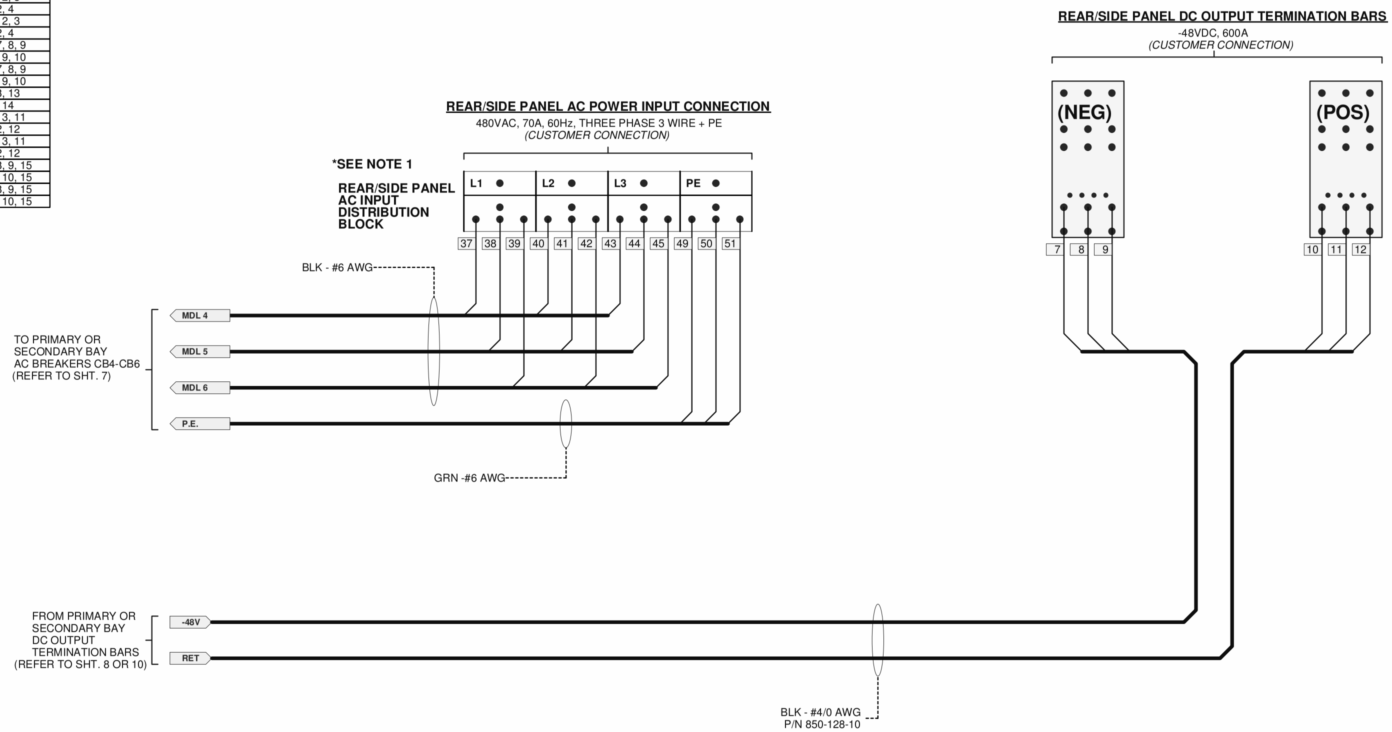
SIZE: B | TYPE: S5 | DWG NO. 0920001-05 | REV: C

480VAC, 3 SHELF REAR/SIDE PANEL WIRING CONNECTIONS
(FOR SIDE TO SIDE OR BACK TO BACK PRIMARY AND SECONDARY BAYS)

CONFIGURATIONS: -004, -005, -014, -015, -104, -105, -114, -115

CONFIGURATION WIRING DIRECTORY

0920001-XXX OR 0920002-XXX	SHEET
-001	3, 5
-011	6
-002	1, 2, 3
-012	2, 4
-003	1, 2, 3
-013	2, 4
-004	3, 7, 8, 9
-014	7, 9, 10
-005	3, 7, 8, 9
-015	7, 9, 10
-101	3, 13
-111	14
-102	2, 3, 11
-112	2, 12
-103	2, 3, 11
-113	2, 12
-104	3, 8, 9, 15
-114	9, 10, 15
-105	3, 8, 9, 15
-115	9, 10, 15



NOTES:

1. AC DISTRIBUTION BLOCK AND WIRING SHOWN IS FOR SYSTEMS WITH BREAKERS
   REFER TO SHEETS 11-15 FOR AC WIRING FOR SYSTEMS WITHOUT BREAKERS.

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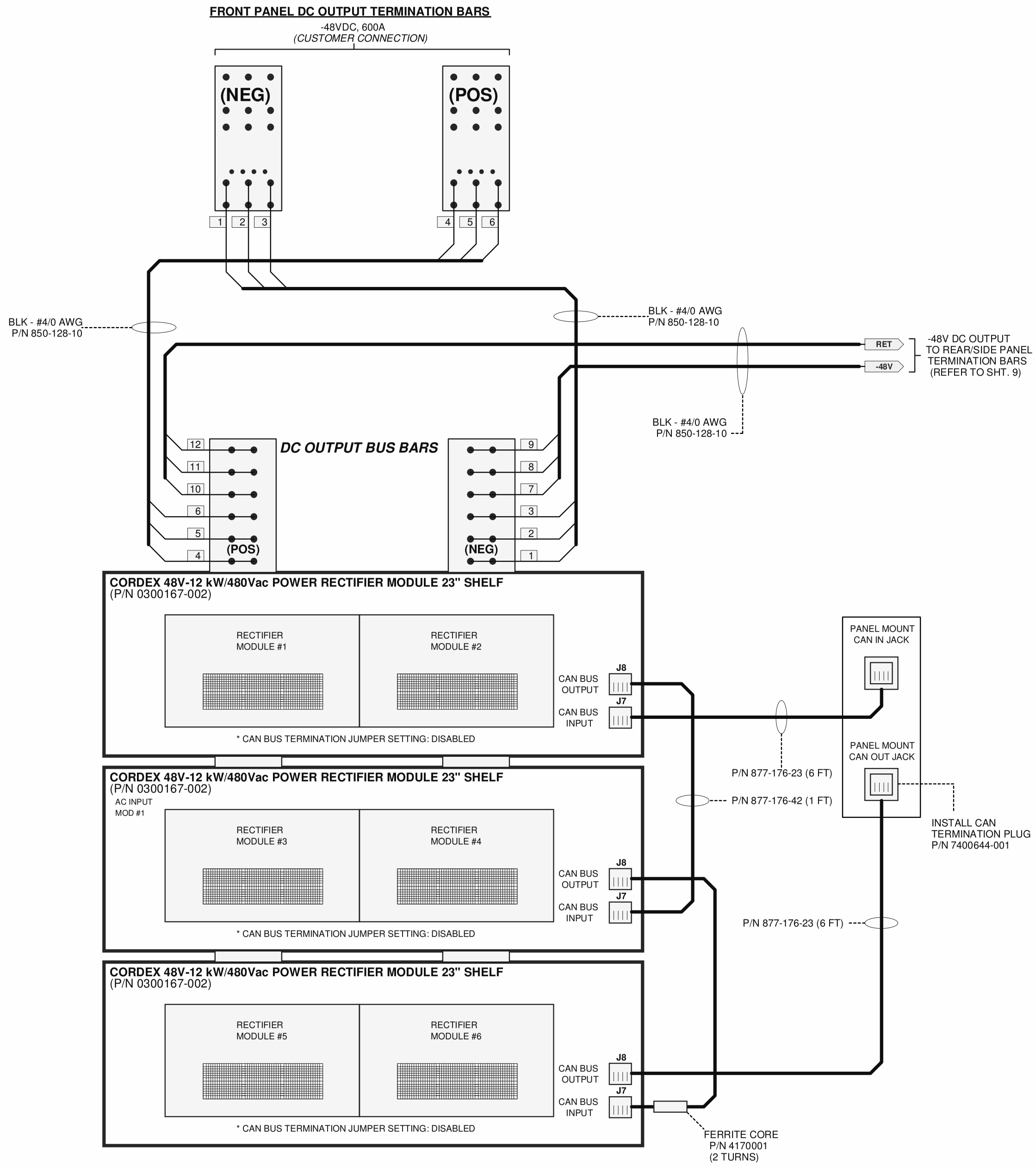
TITLE	SCHEMATIC, CXPS-FR3, 4KW OR 12KW RECTIFIER, LORAIN REPLACEMENT		
ISSUE DATE		SHEET 9 of 15	
SIZE B	TYPE S5	DWG NO. 0920001-05	REV C

480VAC, 3 SHELF SECONDARY BAY W/O HP CONTROLLER
SIDE BY SIDE OR BACK TO BACK DC WIRING

CONFIGURATIONS: -014, -015, -114, -115
(REPLACES 3 X 400A LORAIN; BACK TO BACK OR SIDE TO SIDE)

CONFIGURATION WIRING DIRECTORY

0920001-XXX OR 0920002-XXX	SHEET
-001	3, 5
-011	6
-002	1, 2, 3
-012	2, 4
-003	1, 2, 3
-013	2, 4
-004	3, 7, 8, 9
-014	7, 9, 10
-005	3, 7, 8, 9
-015	7, 9, 10
-101	3, 13
-111	14
-102	2, 3, 11
-112	2, 12
-103	2, 3, 11
-113	2, 12
-104	3, 8, 9, 15
-114	9, 10, 15
-105	3, 8, 9, 15
-115	9, 10, 15



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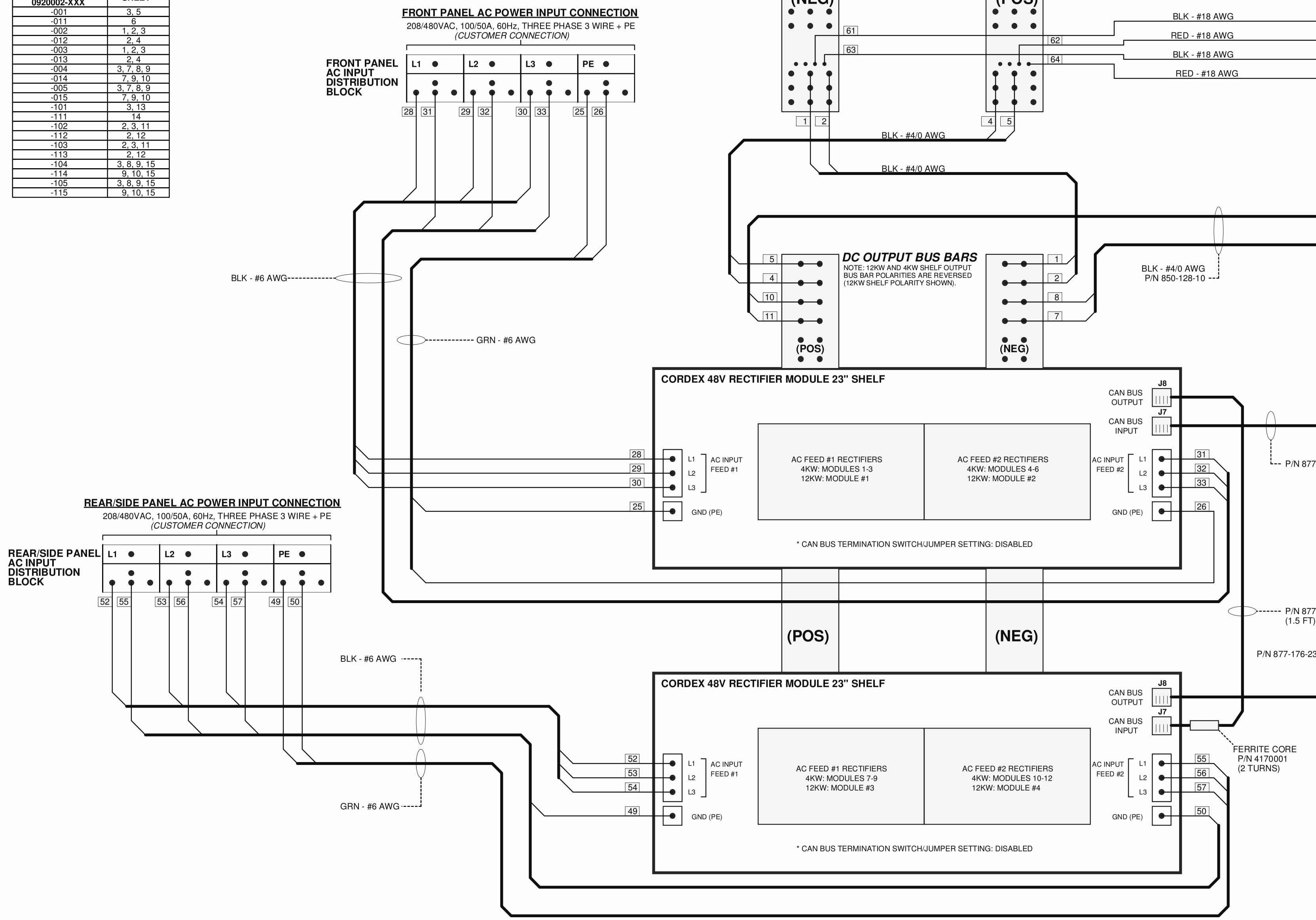
TITLE	SCHEMATIC, CXPS-FR3, 4KW OR 12KW RECTIFIER, LORAIN REPLACEMENT		
ISSUE DATE		SHEET 10 of 15	
SIZE B	TYPE S5	DWG NO. 0920001-05	REV C

208/480VAC, 2 SHELF PRIMARY BAY E/W HP CONTROLLER, NO CB
SIDE BY SIDE OR BACK TO BACK WIRING

CONFIGURATIONS: -102, -103

CONFIGURATION WIRING DIRECTORY

0920001-XXX OR 0920002-XXX	SHEET
-001	3, 5
-011	6
-002	1, 2, 3
-012	2, 4
-003	1, 2, 3
-013	2, 4
-004	3, 7, 8, 9
-014	7, 9, 10
-005	3, 7, 8, 9
-015	7, 9, 10
-101	3, 13
-111	14
-102	2, 3, 11
-112	2, 12
-103	2, 3, 11
-113	2, 12
-104	3, 8, 9, 15
-114	9, 10, 15
-105	3, 8, 9, 15
-115	9, 10, 15



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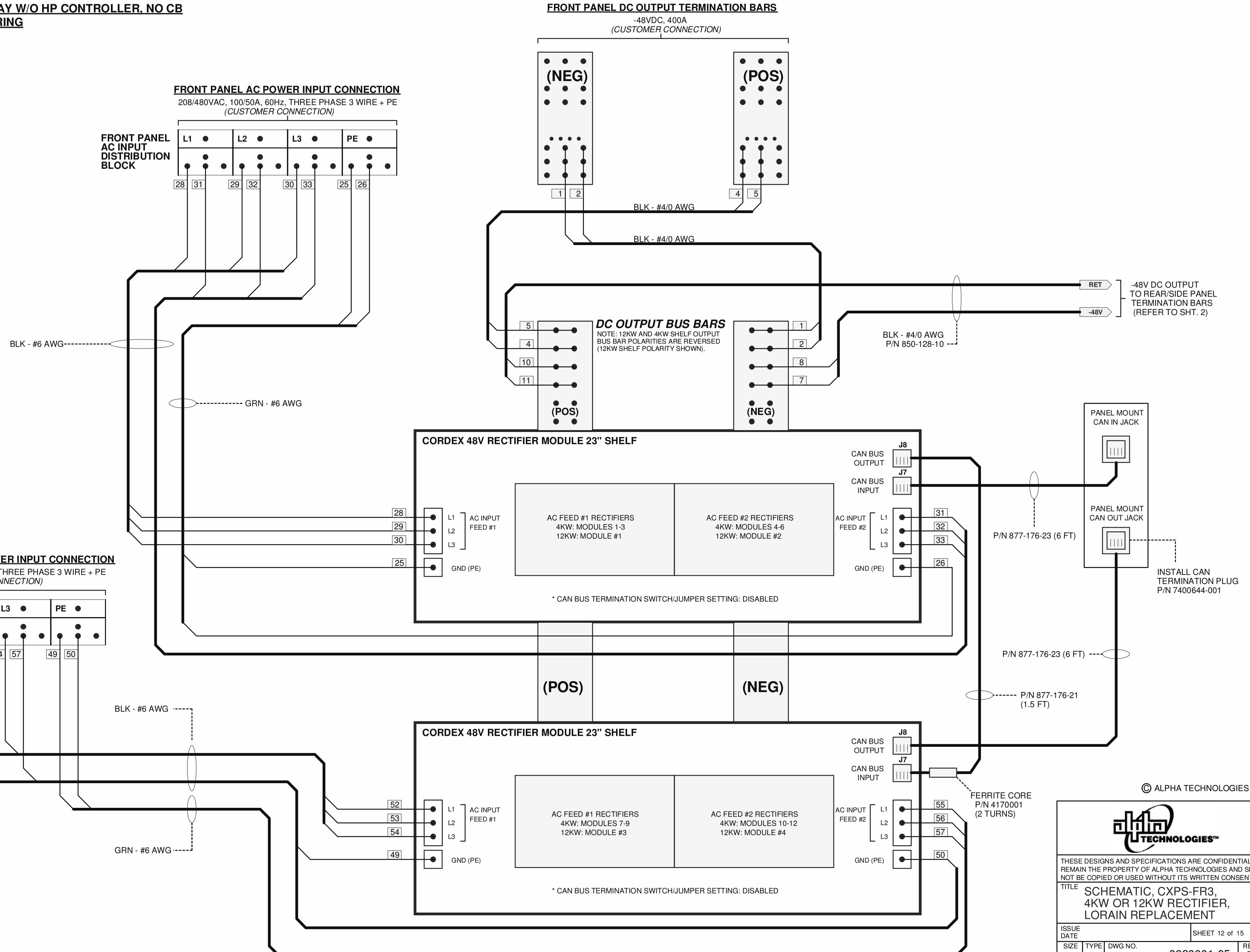
TITLE	SCHEMATIC, CXPS-FR3, 4KW OR 12KW RECTIFIER, LORAIN REPLACEMENT		
ISSUE DATE		SHEET 11 of 15	
SIZE B	TYPE S5	DWG NO. 0920001-05	REV C

208/480VAC, 2 SHELF SECONDARY BAY W/O HP CONTROLLER, NO CB
SIDE BY SIDE OR BACK TO BACK WIRING

CONFIGURATIONS: -112, -113

CONFIGURATION WIRING DIRECTORY

0920001-XXX OR 0920002-XXX	SHEET
-001	3, 5
-011	6
-002	1, 2, 3
-012	2, 4
-003	1, 2, 3
-013	2, 4
-004	3, 7, 8, 9
-014	7, 9, 10
-005	3, 7, 8, 9
-015	7, 9, 10
-101	3, 13
-111	14
-102	2, 3, 11
-112	2, 12
-103	2, 3, 11
-113	2, 12
-104	3, 8, 9, 15
-114	9, 10, 15
-105	3, 8, 9, 15
-115	9, 10, 15



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TITLE: SCHEMATIC, CXPS-FR3, 4KW OR 12KW RECTIFIER, LORAIN REPLACEMENT

ISSUE DATE

SHEET 12 of 15

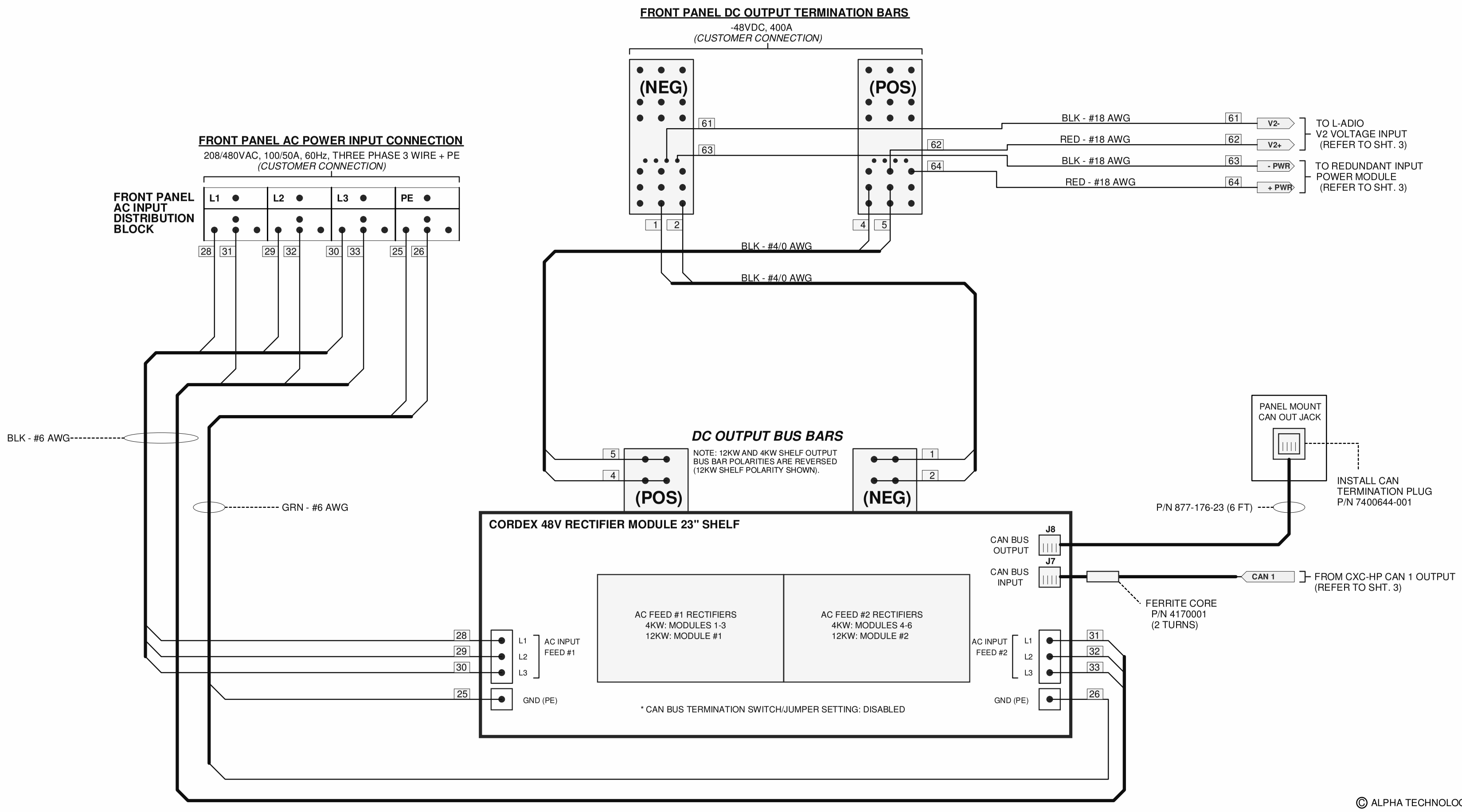
SIZE: B | TYPE: S5 | DWG NO.: 0920001-05 | REV: C

208/480VAC, 1 SHELF SINGLE BAY E/W HP CONTROLLER

CONFIGURATIONS: -101
(REPLACES 1 X 400A LORAIN)

CONFIGURATION WIRING DIRECTORY

0920001-XXX OR 0920002-XXX	SHEET
-001	3, 5
-011	6
-002	1, 2, 3
-012	2, 4
-003	1, 2, 3
-013	2, 4
-004	3, 7, 8, 9
-014	7, 9, 10
-005	3, 7, 8, 9
-015	7, 9, 10
-101	3, 13
-111	14
-102	2, 3, 11
-112	2, 12
-103	2, 3, 11
-113	2, 12
-104	3, 8, 9, 15
-114	9, 10, 15
-105	3, 8, 9, 15
-115	9, 10, 15



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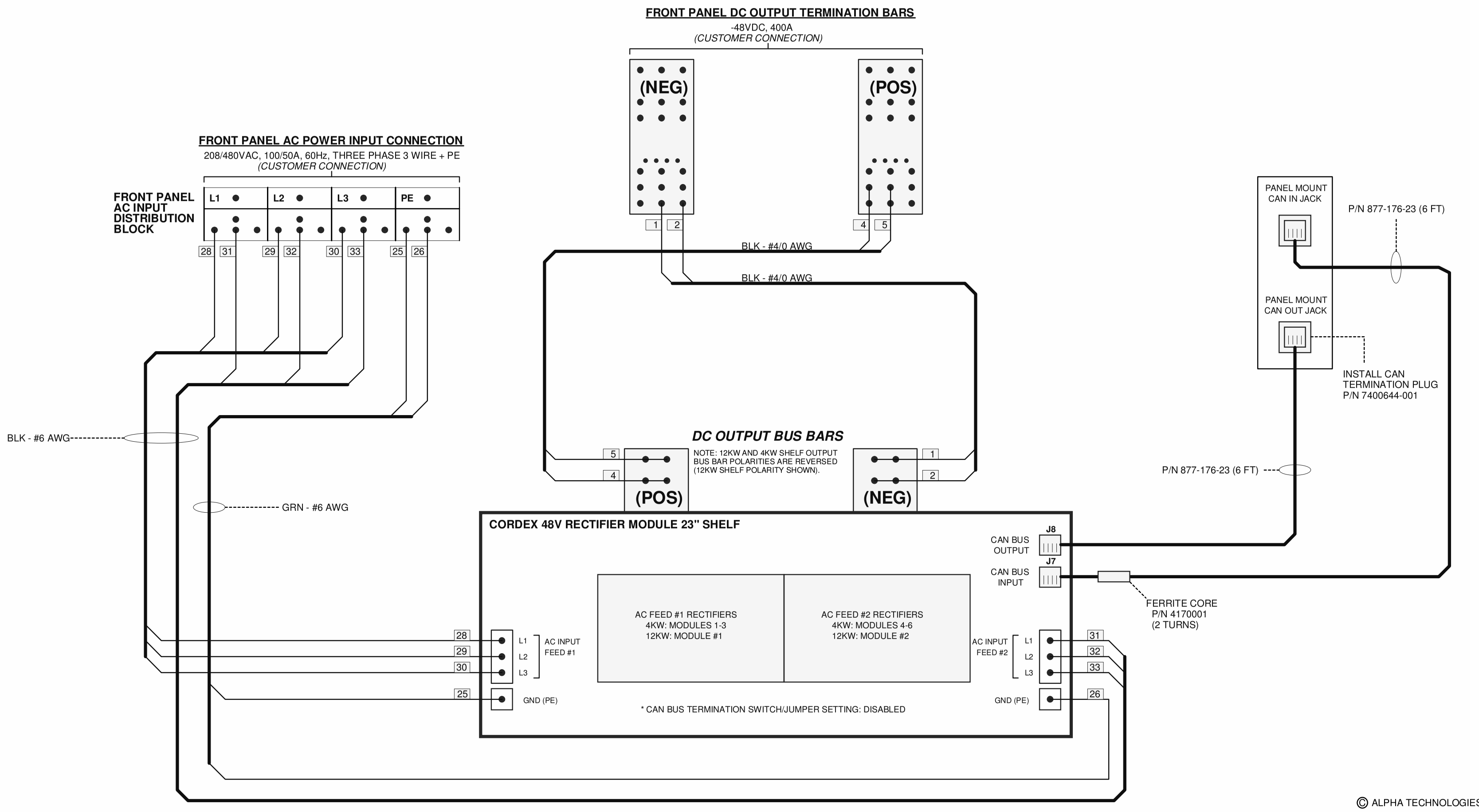
TITLE	SCHEMATIC, CXPS-FR3, 4KW OR 12KW RECTIFIER, LORAIN REPLACEMENT		
ISSUE DATE		SHEET 13 of 15	
SIZE B	TYPE S5	DWG NO. 0920001-05	REV B

208/480VAC, 1 SHELF SINGLE SECONDARY BAY W/O HP CONTROLLER, NO CB

CONFIGURATIONS: -111
(REPLACES 1 X 400A LORAIN)

CONFIGURATION WIRING DIRECTORY

0920001-XXX OR 0920002-XXX	SHEET
-001	3, 5
-011	6
-002	1, 2, 3
-012	2, 4
-003	1, 2, 3
-013	2, 4
-004	3, 7, 8, 9
-014	7, 9, 10
-005	3, 7, 8, 9
-015	7, 9, 10
-101	3, 13
-111	14
-102	2, 3, 11
-112	2, 12
-103	2, 3, 11
-113	2, 12
-104	3, 8, 9, 15
-114	9, 10, 15
-105	3, 8, 9, 15
-115	9, 10, 15



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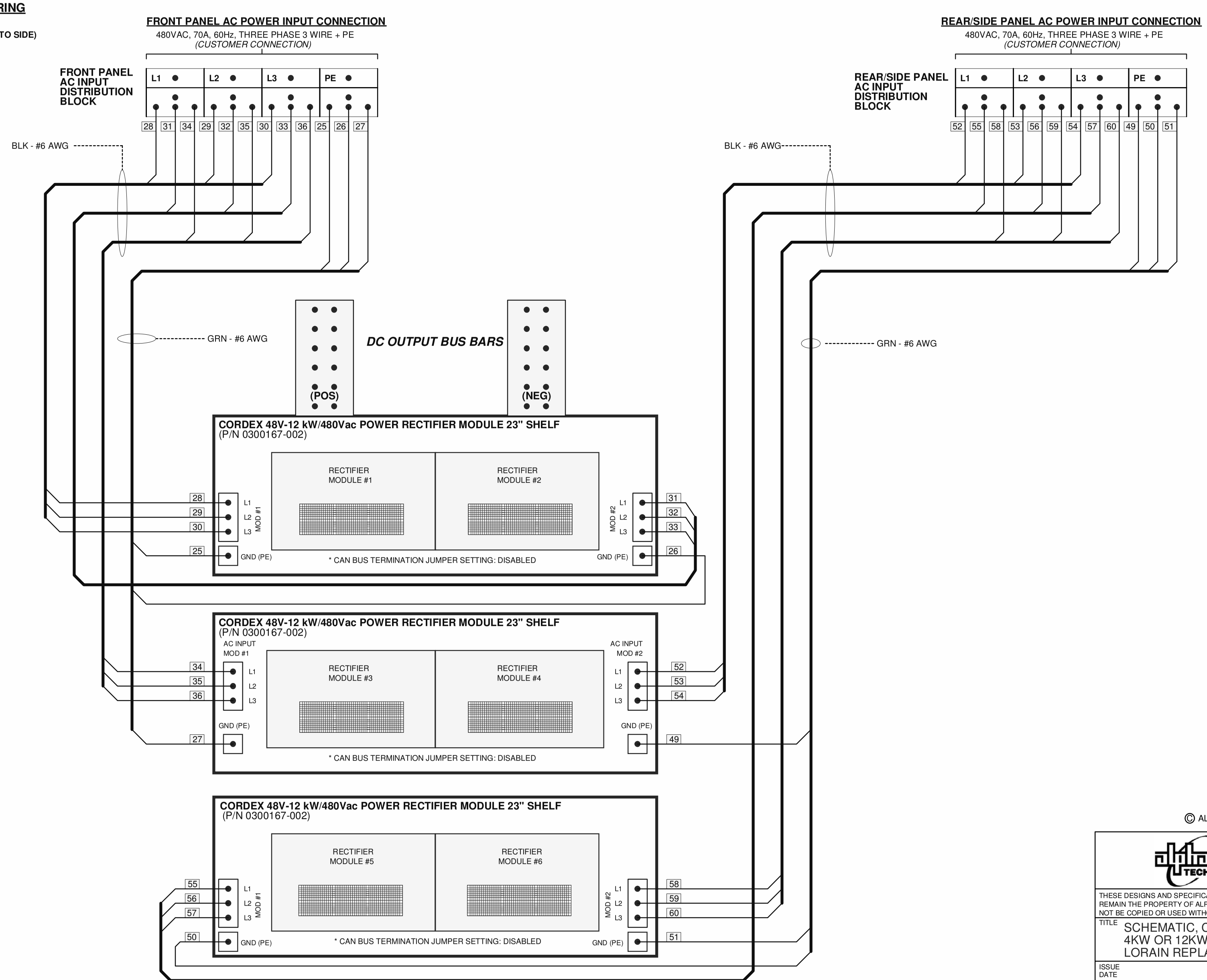
TITLE	SCHEMATIC, CXPS-FR3, 4KW OR 12KW RECTIFIER, LORAIN REPLACEMENT		
ISSUE DATE		SHEET 14 of 15	
SIZE B	TYPE S5	DWG NO. 0920001-05	REV C

480VAC, 3 SHELF PRIMARY OR SECONDARY BAY, NO CB
SIDE BY SIDE OR BACK TO BACK AC WIRING

CONFIGURATIONS: -104, -105, -114, -115
(REPLACES 3 X 400A LORAIN; BACK TO BACK OR SIDE TO SIDE)

CONFIGURATION WIRING DIRECTORY

0920001-XXX OR 0920002-XXX	SHEET
-001	3, 5
-011	6
-002	1, 2, 3
-012	2, 4
-003	1, 2, 3
-013	2, 4
-004	3, 7, 8, 9
-014	7, 9, 10
-005	3, 7, 8, 9
-015	7, 9, 10
-101	3, 13
-111	14
-102	2, 3, 11
-112	2, 12
-103	2, 3, 11
-113	2, 12
-104	3, 8, 9, 15
-114	9, 10, 15
-105	3, 8, 9, 15
-115	9, 10, 15



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TITLE	SCHEMATIC, CXPS-FR3, 4KW OR 12KW RECTIFIER, LORAIN REPLACEMENT
ISSUE DATE	SHEET 15 of 15
SIZE B / TYPE S5 / DWG NO. 0920001-05	REV C

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