



Public Safety Solutions PS41-2730-CXRF

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Read this document carefully.

Learn how to protect your equipment from damage and fully understand its functions.

Public Safety Solutions

Alpha[®] PS41-2730-CXRF

UL 2524 Certified Backup Power System



NOTICE

For the latest version of software, firmware, and product documentation, visit the Alpha[®] website, www.alpha.com or www.alpha.ca.



NOTICE

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



NOTICE

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



NOTICE

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Contents

| | |
|--|----|
| 1. Safety..... | 6 |
| 1.1 Safety symbols..... | 6 |
| 1.2 General warning and cautions..... | 6 |
| 1.3 Electrical safety..... | 7 |
| 1.4 Battery safety..... | 7 |
| 2. Introduction..... | 8 |
| 2.1 Product overview..... | 8 |
| 3. Specifications | 9 |
| 4. Features | 10 |
| 4.1 Cordex® HP 1.2 kW 48 Vdc front access power system shelf | 10 |
| 4.2 Alarms, controls, and communications..... | 11 |
| 4.3 Battery storage and retainer | 12 |
| 4.4 Enclosure security | 12 |
| 4.5 Power enclosure system – options, components, and parts..... | 12 |
| 5. Inspection | 13 |
| 5.1 Packing materials..... | 13 |
| 5.2 Returns for service | 13 |
| 5.3 Check for damage | 13 |
| 5.4 General receipt of shipment | 13 |
| 5.5 Miscellaneous small parts..... | 13 |
| 6. Site evaluation and pre-installation..... | 14 |
| 6.1 Site selection | 14 |
| 6.2 Tools required..... | 14 |
| 7. Installation..... | 15 |
| 7.1 Safety precautions | 15 |
| 7.2 Plinth mounting for concrete floor | 15 |
| 8. Wiring | 18 |
| 8.1 Grounding the enclosure..... | 18 |
| 8.2 I/O wiring into power enclosure system..... | 18 |

- 8.3 Installation with Cordex® HP 48 V-1.2 kW rectifier system..... 21
- 9. Maintenance..... 23
 - 9.1 Battery maintenance report 24
- 10. Battery calculations..... 25
 - 10.1 Battery calculation for the Cordex® HP 48 V-1.2 kW rectifier system..... 25
- 11. Acronyms and definitions 26

Figures

| | |
|---|----|
| Figure 1: Alpha® PS41-2730-CXRF interior view with two battery trays and power system shelf | 8 |
| Figure 2: Cordex® HP 48 V-1.2 kW front access power system shelf | 10 |
| Figure 3: Cordex® CXCM1 HP system controller | 10 |
| Figure 4: Attaching an EOLR to the dry contacts of the public safety system..... | 11 |
| Figure 5: Alpha® PS41-2730-CXRF system with two battery trays and front retainer | 12 |
| Figure 6: Plinth template for mounting bolts | 15 |
| Figure 7: Battery tray screws | 16 |
| Figure 8: Mounting the enclosure to the plinth | 16 |
| Figure 9: Securing the enclosure to the plinth..... | 17 |
| Figure 10: Enclosure MGB and chassis ground..... | 18 |
| Figure 11: Rear cable entry locations..... | 19 |
| Figure 12: GMT fuse distribution module | 21 |

1. Safety

Save these instructions

This document 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 document before proceeding. If there are any questions regarding the safe installation or operation of this product, contact Alpha Technologies Ltd. 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 document. Where these symbols appear, use extra care and attention.



WARNING

Risk of serious injury or death

Equipment in operation poses a potential electrical hazard which could result in serious injury or death to personnel. This hazard may continue even when power is disconnected.



CAUTION

Cautions indicate the potential for injury to personnel.



CAUTION

Risk of burns

A device in operation can reach temperature levels which could cause burns.



ATTENTION

The use of attention indicates specific regulatory or code requirements that may affect the placement of equipment or installation procedures. Follow the prescribed procedures to avoid equipment damage or service interruption.



GROUNDING

This symbol indicates the location or terminal intended for the connection to protective earth. An enclosure that is not properly connected to protective earth presents an electrical hazard. Only a licensed electrician can connect AC power and protective earth to the enclosure.



NOTICE

A notice provides additional information to help complete a specific task or procedure or general information about the product.

1.2 General warning 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 document.
- 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, though not dangerous in voltage, has a high short-circuit current capacity that can cause severe burns and electrical arcing.

Before working with any live battery or power system, follow these precautions:

- Remove all metallic jewelry, such as watches, rings, metal rimmed glasses, or necklaces.
- Wear safety glasses with side shields at all times during the installation.
- 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 240 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 along with customer installed radios 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

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



WARNING

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

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

2. Introduction

2.1 Product overview

The Alpha® PS41-2730-CXRF is a charger and battery backup system ideal for sites with BDA systems installed to improve emergency radio communication per UL 2524. The Alpha® PS41-2730-CXRF enclosure is integrated with a Cordex® HP 48 V-1.2 kW rectifier shelf resulting in a fully featured 48 Vdc front access power system in a compact form factor.

This enclosure is designed to protect its internal backup power system in accordance with NFPA 1221 and UL 2524 standard requirements.



Figure 1: Alpha® PS41-2730-CXRF interior view with two battery trays and power system shelf

3. Specifications

| Table A — Alpha® PS41-2730-CXRF specifications | |
|--|--|
| Electrical | |
| AC input | 120 V / 208-240 V, 15 A maximum, 60 Hz, 1 PH |
| Battery voltage | 48 Vdc (nominal) |
| DC output | 48 Vdc (nominal), 2.4 kW maximum |
| Trouble relay outputs (three total) | |
| Dry contact voltage, Vdc | 48 Vdc |
| Dry contact current, A resistive | 1 A |
| Recommended AC input breaker | 20 A |
| Mechanical | |
| Dimensions (H × W × D) | 1051 mm × 701 mm × 775 mm (41.4 in. × 27.6 in. × 30.5 in.) |
| System weight (without battery) | 52 kg (115 lb) |
| Mounting | <ul style="list-style-type: none"> • Ground mount • Plinth mount |
| Construction | High strength corrosion resistant aluminum |
| Finish | Polyester powder coat, red |
| Door prop | 1/4 inch aluminum rod, two positions |
| Door latch | Three point latch with L-handle for padlock |
| Environmental | |
| Operating temperature | 0 to 40°C (32 to 104°F) for indoor installations |
| Storage temperature | -40 to 85°C (-40 to 185°F) |
| Cabinet rating | UL 508A Enclosure Type 4 |
| Agency compliance | |
| System rating | UL 2524 |



ATTENTION

Only use accessories (such as grommets or fittings) with the proper Type 4 rating or better during field installation.

4. Features

4.1 Cordex® HP 1.2 kW 48 Vdc front access power system shelf

The Cordex® HP 1.2 kW 48 Vdc front access power system is a high performance, compact power system designed for converting an AC input to 48 Vdc. The front access feature allows for easy access when installed in space restricted enclosures. The system is comprised of:

- Controller shelf I/O
- Cordex® CXCM1 HP system controller
- Up to four hot-swappable Cordex® HP 48 V-1.2 kW switched mode rectifier modules
- Two battery breakers and two load breakers
- 10-position GMT fuse block

For more information, see the [Cordex® 48V-1.2kW Rectifier Shelf System User Guide: 010-619-J0](#)



Figure 2: Cordex® HP 48 V-1.2 kW front access power system shelf

4.1.1 Cordex® CXCM1 HP system controller (integrated)

The compact Cordex® CXCM1 HP system controller is integrated with Cordex® HP 1.2 kW rectifier systems and includes the complete feature set and hardware performance. The controller includes a local USB port for local firmware upgrades as well as full backup and restore capabilities. The local OLED display also provides features such as local monitoring and configuration management and the ability to display systems signals for the power system connected to the controller. The controller offers customizable data logs and performance monitoring.

For more information, see the [Cordex® CXC HP Controller Software manual: 0350058-J0](#)



Figure 3: Cordex® CXCM1 HP system controller

4.2 Alarms, controls, and communications

4.2.1 Standard alarm function description

Form C dry contacts are available for standard annunciation of the following conditions:

- Low battery alarm
- Charger fail alarm
- AC fail alarm

Connections to these alarms are shown in [Table C](#) for Cordex® HP 48 V-1.2 kW power systems.

These alarms must be taken to and monitored by a dedicated alarm or annunciator panel in accordance with UL 2524, NFPA 1221, or local regulations.



NOTICE

Ensure that the alarm panel or the annunciator panel is terminated with an end of line resistor (EOLR) of proper resistance to be monitored by the control panel.

When attaching an EOLR to the dry contacts of the Alpha® Public Safety System, ensure that the UL listed resistor is connected to the dry contacts via pigtail connections using UL listed marrettes.

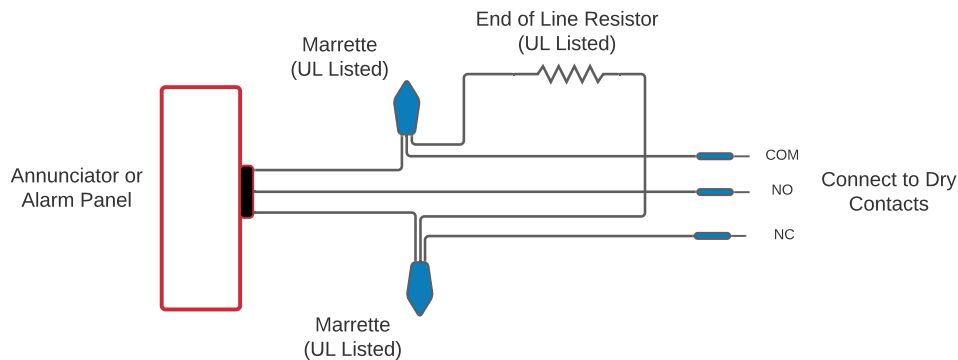


Figure 4: Attaching an EOLR to the dry contacts of the public safety system

4.2.2 Battery test and estimated state of health

This feature will lower the voltage of the rectifiers and allow the battery to discharge into the load for a period of time. The output of the battery is monitored and logged by the system and the data is used to estimate the state of health of the battery. The controller will monitor both the batteries and the rectifiers to ensure the load is not put at risk by the test procedure.

4.2.3 Temperature compensation



NOTICE

Do not splice the temperature probe leads to a conductor larger than 0.75 mm² (18 AWG).

The temperature compensation feature will adjust the output float/equalize voltage of the rectifier to protect against thermal runaway and reduce life degradation due to heat.

Each system is equipped with temperature probes to support the function and must be installed on the battery at time of commissioning.

4.2.4 Communication

- Ethernet: 10/100 BASE-T Ethernet connection on the front of the controller for local communication.
- Web based user interface for local or remote via a 10/100 BASE-T Ethernet connection.
- Email notification.
- SNMP communications protocol

4.3 Battery storage and retainer

The Alpha® PS41-2730-CXRF enclosure can support one or two strings of VRLA batteries on two battery trays. One or two trays are supplied and are equipped with a battery wiring harness and a front retainer.

Battery tray dimensions W × D: 520.7 mm × 594.4 mm (20.5 in. × 23.4 in.)

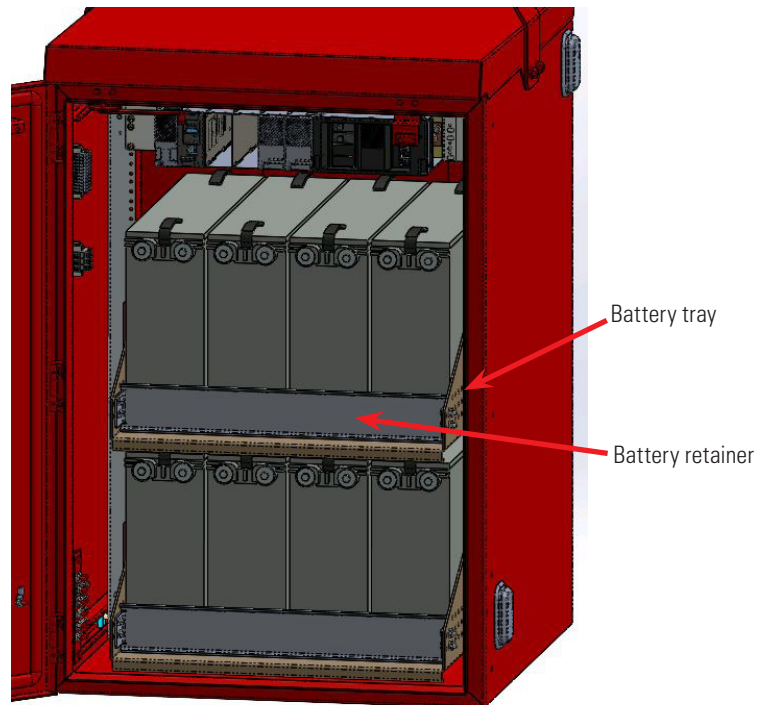


Figure 5: Alpha® PS41-2730-CXRF system with two battery trays and front retainer

4.4 Enclosure security

The front door can be secured with a separate padlock installed on the door handle. Install a padlock on the enclosure door after installation to prevent unauthorized access to the system.

4.5 Power enclosure system – options, components, and parts

| Table B — Part numbers | |
|--|----------------|
| DC power system option | |
| CXRF 48 V-1.2 kW, 1 battery tray | 0570191-101 |
| CXRF 48 V-1.2 kW, 2 battery trays | 0570192-101 |
| Accessories | |
| Plinth mount kit (height: 12.1 cm; 4.75 in.) | 0370231-002 |
| Spare parts | |
| Battery breaker, 1 P/60 A, series trip | 470-346-10 |
| Fuse, 10 A, GMT | 460-069-10 |
| Fuse, 5 A, GMT | 460-084-10 |
| Cordex® HP 48 V-1.2 kW rectifier module | 010-619-20-041 |

5. Inspection

5.1 Packing materials

EnerSys 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 EnerSys 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 EnerSys packaging material is from sustainable resources and or is recyclable.

5.2 Returns for service



NOTICE

EnerSys is not responsible for damage caused by improper packaging of returned products.

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.

5.3 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 EnerSys for advice on the impact of any damage.

5.4 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.

5.5 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. Contact Alpha Technologies Ltd. if you have any questions before you proceed.

6. Site evaluation and pre-installation

6.1 Site selection

Consider the following before selecting a mounting location:

- The Alpha® PS41-2730-CXRF enclosure is designed for front access only.
- Avoid areas that may be subjected to hot air exhaust from nearby equipment.
- The enclosure should not be installed in direct sunlight.
- Find out if your intended area is subjected to architectural controls or environmental restrictions.
- Avoid areas that are prone to flooding.

The Alpha® PS41-2730-CXRF indoor backup power system has been designed for the following mounting option:
Plinth, mounted on a concrete slab, floor, or similar surface.



NOTICE

The Alpha® PS41-2730-CXRF backup power system is designed for indoor use only.

6.2 Tools required

Various insulated tools are essential for the installation. Use this list as a guide:

- Battery lifting apparatus (if required)
- Electric drill with hammer action, 1/2 inch capacity
- Various crimping tools and dies to match lugs used in installation
- Load bank of sufficient capacity to load largest rectifier to its current limit
- Digital voltmeter equipped with test leads
- Cable cutters
- Cutters and wire strippers 2.5 to 0.34 mm² (14 to 22 AWG)
- Torque wrench: 1/4 inch drive, 0 to 17 Nm (0 to 150 in-lb)
- Torque wrench: 3/8 inch drive, 0 to 136 Nm (0 to 100 ft-lb)
- Insulating canvases as required
- Various insulated hand tools including:
 - Combination wrenches
 - Ratchet and socket set
 - Various screwdrivers
 - Electricians knife
- Battery safety spill kit (required for wet cells only)

7. Installation

Only qualified personnel should install and connect the power components within the Alpha® power system. For the battery installation, refer primarily to the manufacturer's documentation.

7.1 Safety precautions

Refer to the [Safety](#) section near the beginning of this document.

7.2 Plinth mounting for concrete floor

7.2.1 Mounting the plinth to the concrete floor

A fully equipped power system with two shelves of batteries weighs approximately 345 kg (760 lb). The mounting site must be built in accordance with local building practices and codes.

Concrete pad installation requiring seismic compliance requires approval by the appropriate engineering discipline, for example, civil or structural. Cast-in-place or pre-cast concrete slabs can be used.

Use the template in [Figure 6](#) to place the anchor bolts. Follow the specific recommendations from the fastener manufacturer to ensure that the securing device achieves its full structural capacity.

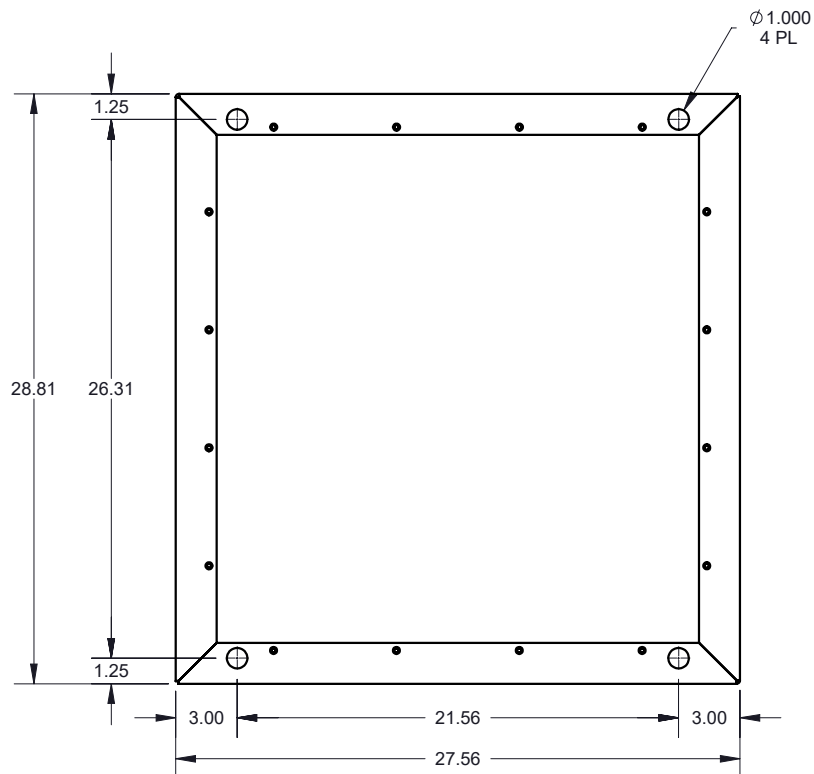


Figure 6: Plinth template for mounting bolts

1. Place the plinth in position over the anchor holes.
2. If used, place the vapor barrier material on the mounting surface.
3. Mount the plinth box onto the four installed mounting bolts on the concrete floor.
4. Secure the plinth with four 3/8 inch hex nuts, flat and lock washers (to be supplied by the installer).
5. Check that the plinth is level from front-to-back and from side-to-side.
6. Add shims as needed under one or two of the corners of the plinth, placing the shims as close as possible to the bolts.

- Once the plinth is level, tighten all bolts to the appropriate torque.

| Recommended bolt torque values | |
|--------------------------------|----------------------|
| 1/4 inch | 11.93 Nm (8.8 ft-lb) |
| 3/8 inch | 44.1 Nm (32.5 ft-lb) |
| 1/2 inch | 98.9 Nm (73 ft-lb) |

7.2.2 Unpacking the power system



CAUTION

Do not hoist/lift the enclosure with batteries installed.

- Remove the protective covering from the system. The doors are designed to be locked with a padlock and are secured with tie-wraps for shipping. Cut the tie-wraps and open the doors.
- Inspect the packing slip to verify that you have received all the equipment that you ordered.
 - All documentation is packed inside the equipment compartment.
 - Inspect all moving parts, hardware, connectors, and other equipment.

Report any damage to the shipper and Alpha Technologies Ltd.

7.2.3 Mounting the enclosure to the plinth

- Unstrap the enclosure from the shipping pallet.
- Remove the bottom battery tray to access the mounting holes at the edges of the enclosure—eight screws per side as shown in [Figure 7](#).
- Use a mallet or hammer and slotted screwdriver to remove the 16 mounting hole knockouts at the base of the enclosure. [Figure 8](#) shows the location of all 16 mounting holes.
- Lift the enclosure onto the plinth.
- Secure the enclosure to the plinth with the 16 M6 × 16 screws and rubber washers included with the plinth.
- Replace the battery tray.



Figure 7: Battery tray screws



Figure 8: Mounting the enclosure to the plinth

7.2.4 Securing the enclosure to the plinth

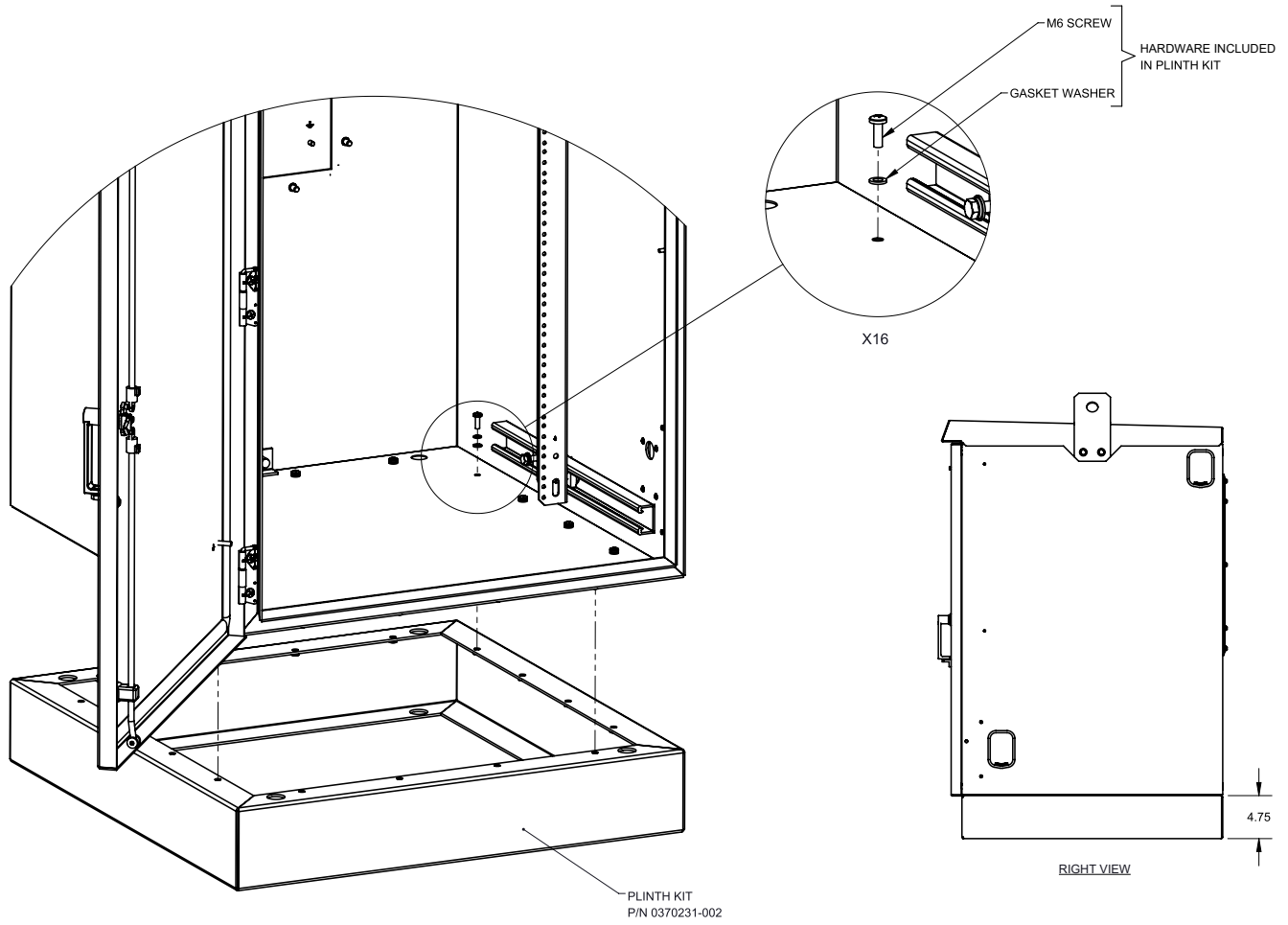


Figure 9: Securing the enclosure to the plinth

8. Wiring

Only qualified personnel should install and connect the power components within the Alpha® power system. For the battery installation, refer primarily to the manufacturer's documentation.

8.1 Grounding the enclosure



WARNING

An enclosure that is not properly grounded presents an electrical hazard.

A proper grounding system that meets or exceeds the specifications of the equipment must be designed and installed prior to or in conjunction with the construction of the mounting slab or floor. The ground system must be bonded to the enclosure to ensure a "common" or "single-point" ground. Refer to local building codes.

1. Locate the enclosure master ground bar (MGB) at the left front sidewall of the enclosure.



GROUNDING

Chassis ground is connected to the enclosure frame and is terminated at the master ground bar (MGB) within the enclosure.

2. With enclosure securely mounted, select an appropriate location on the enclosure wall for the site ground wire entry. Make a suitable clearance hole and use fittings rated Type 4 or better to maintain enclosure integrity rating.
3. Connect the site ground wire to the bottom position (1/4 holes on 5/8 inch centers) of the enclosure MGB.



Figure 10: Enclosure MGB and chassis ground

8.2 I/O wiring into power enclosure system



NOTICE

Power limited and non-power limited wiring must enter the enclosure through separate conduit entrances. All power limited conductors must be separated by a minimum of 6.35 mm (0.25 in.) from all non-power limited conductors. The maximum length of the input/output wiring shall be no longer than 30 m (98.5 ft).

With the enclosure securely mounted, drill holes as needed for cord grips or conduit fittings (installer supplied). Avoid drill shavings from contacting any power components inside the system. You will require a minimum of the following cables entering or exiting the enclosure:

- AC input power cable (non-power limited)
- DC output cable (non-power limited)
- Alarm/network cable (power limited)
 - Ethernet port (power limited)

Wiring must be routed and secured away from sharp projections, corners, and internal components. Use fittings rated UL Type 4 or better to maintain enclosure integrity. Refer to outline drawing for recommended drilling locations.

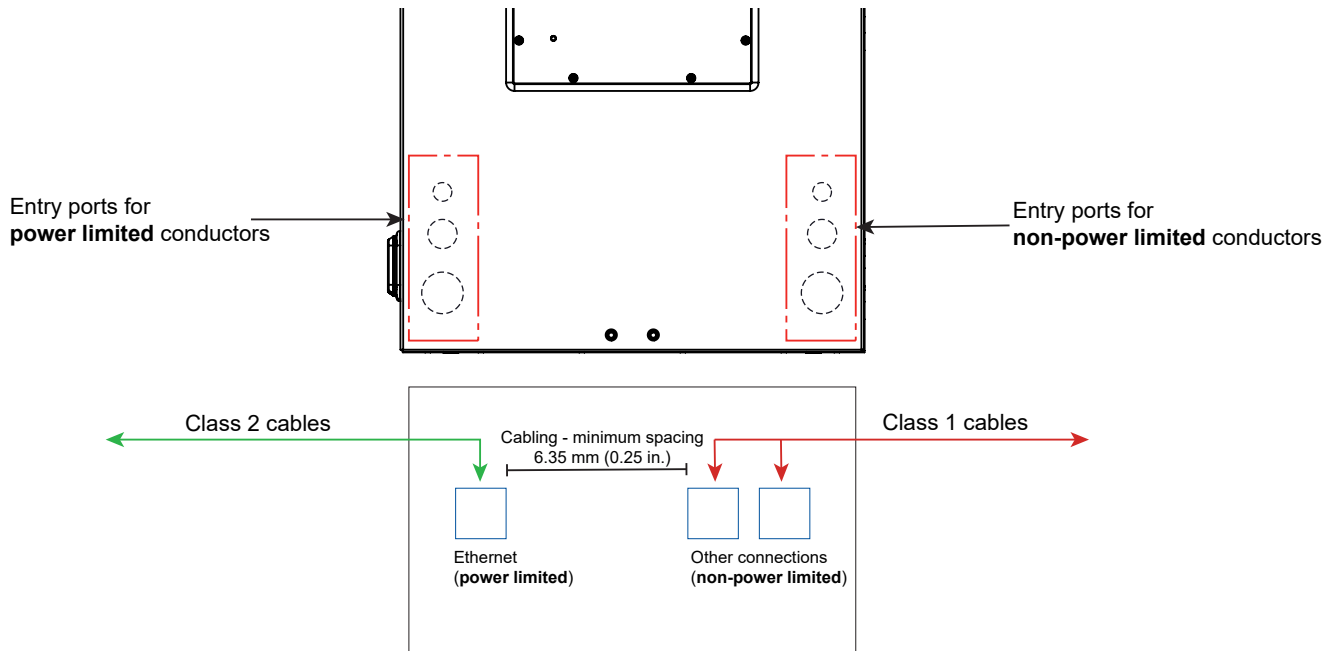


Figure 11: Rear cable entry locations

8.2.1 Power enclosure alarm wiring block

The alarm wiring block, located on the left side wall of the enclosure, uses screw-in DIN-rail mounted terminal blocks. Connect designated alarm outputs to the local alarm-sending unit or device using appropriate wire with gauge sizes from 0.2 to 2.5 mm² (22 to 12 AWG). Strip the wires 8 mm (0.32 in.) before connecting to the terminal block.



ATTENTION

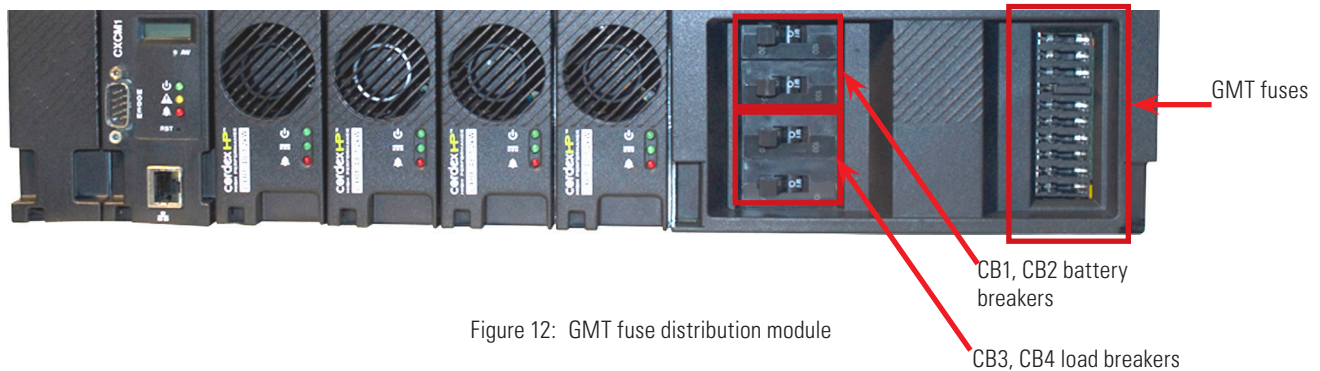
This product incorporates field-programmable software. In order for the product to comply with the requirements in the Standard UL 2524, certain programming features or options must be limited to specific values or not used at all as indicated.

| Pin | Description |
|-----|----------------------------------|
| 1 | Enclosure intrusion alarm (N.O.) |
| 2 | Enclosure intrusion alarm (COM) |
| 3 | Enclosure intrusion alarm (N.C.) |
| 4 | Low battery alarm (N.O.) |
| 5 | Low battery alarm (COM) |
| 6 | Low battery alarm (N.C.) |
| 7 | Charger fail alarm (N.O.) |
| 8 | Charger fail alarm (COM) |
| 9 | Charger fail alarm (N.C.) |
| 10 | AC fail alarm (N.O.) |
| 11 | AC fail alarm (COM) |
| 12 | AC fail alarm (N.C.) |

8.3 Installation with Cordex® HP 48 V-1.2 kW rectifier system

8.3.1 DC power output

The DC cable connections to the system are made to the integrated distribution module located on the right side of the shelf.



8.3.2 Battery installation

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



WARNING

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



WARNING

Verify that all battery cables are disconnected.

1. Clean the batteries cells according to the battery manufacturer's recommendations. First neutralize any acid with a baking soda and water solution, rinse the batteries with clean water, and then wipe them dry.
2. Apply a corrosion-inhibiting agent, such as NO-OX-ID "A", on all battery terminal connections.
3. Ensure that the battery output cabling can reach the positive [+] and negative [-] terminals of the series battery string and that the batteries are oriented correctly for easy installation of the inter-unit "series" connectors.
4. Remove any NO-OX-ID "A" grease from battery terminals.
5. Burnish the terminal posts with a non-metallic brush, polishing pad, or a 3M Company Scotch Brite® scouring pad.
6. Apply a light coating of NO-OX-ID "A" grease to the terminal posts after cleaning.
7. If lead plated inter-unit connectors are used, they should also be burnished and NO-OX-ID "A" grease applied.
8. Lift each battery onto the front edge of the battery tray, and then slide the battery onto the tray.
9. Connect the battery temperature probe to the negative terminal in the middle of an installed battery string. The battery temperature probe shall not be spliced to a conductor larger than 0.75 mm² (18 AWG).
10. Install the inter-unit connectors.
11. Connect battery cables to terminals with the correct torque settings as per the battery manufacturer's specifications (typically 11.3 Nm; 100 in-lb).
12. Install the battery brace to the battery shelf.

Refer to the system startup procedure before reconnecting the battery cables.

**ATTENTION**

Torque the battery terminals according to the manufacturer's specifications on the battery nameplate or data sheet.

8.3.3 System startup

1. Remove all power modules from the shelf.
2. Ensure that the AC input power circuit breaker feeding the power enclosure system is turned off at the main AC loadcenter (customer furnished).
3. Ensure battery breakers are off on the rectifier shelf.
4. Install one power module.
5. Verify feeder AC input voltage is correct and turn on the corresponding AC input feeder breakers. The power module OK LED should illuminate after a preset start delay.
6. Verify correct battery polarity at connectors on all battery cables using a voltmeter.
7. Install remaining power modules.
8. Before leaving the site, ensure the enclosure door is shut and locked by installing and locking a padlock through the rotating handle and fixed cam.

9. Maintenance

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

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



WARNING

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



ATTENTION

Circuit cards, including semi-conductor devices, can be damaged by static electricity. Always wear a grounded wrist strap when handling or installing circuit cards.



ATTENTION

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 and rinse out the enclosure filters. | |
| Inspect all system connections. Re-torque if necessary. | |
| Verify alarm/control settings. | |

9.1 Battery maintenance report

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

| | | |
|------------------------------|----------------|----------------------|
| Company: | Date: | |
| Address: | | |
| Battery location and number: | | |
| Number of cells: | Type: | Date new: |
| Date installed: | Float voltage: | Ambient temperature: |

Table E — Typical VRLA battery maintenance report

| Cell number | Serial number | Voltage | Specific | Ohms | Mhos | Observations |
|-------------|---------------|---------|----------|------|------|--------------|
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| Remarks and recommendations: |
| Readings taken by: |

10. Battery calculations

The maximum battery and electrical specifications are provided for the systems. The following calculations provide an example of a maximum configuration.

To increase the capacity of a battery bank, additional battery strings may be connected in parallel. Each additional string will increase the overall capacity of the battery bank. Two battery strings in parallel of 110 Ah will provide 220 Ah at the C10 rate or 22 amps for 10 hours. Each battery is still providing 11 amps at the 10-hour rate, and therefore the discharge rating of the battery is maintained.

This calculation may be used to select applicable equivalent or smaller battery products as needed for specific site requirements.

| | |
|-----------------------|--|
| I_{dc} | System load at 48 Vdc |
| T | Run time requirement |
| 1.2 | Design life factor required by UL 2524 |
| V_{dc} | Battery bus voltage |
| V_{pc} | End voltage per cell (use for reference on data sheet) |

10.1 Battery calculation for the Cordex[®] HP 48 V-1.2 kW rectifier system

The following example shows how to calculate and select a battery to support the maximum load.

10.1.1 Calculate the load on the battery

A system with a system load of 10 amps at 48 Vdc needs to support 12 hours of run time. Battery bus voltage is 48 Vdc.

$$\text{Battery discharge current} = (I_{ac} \times 48) / V_{dc}$$

$$\text{Battery discharge current} = (10 \times 48) / 48$$

$$\text{Battery discharge current} = 10 \text{ A}$$

10.1.2 Calculate the required battery size

Multiply the battery discharge current of 10 amps by 12 hours and by the design life factor of 1.2.

$$\text{Amp hours} = I \times T \times 1.2$$

$$\text{Amp hours} = 10 \times 12 \times 1.2$$

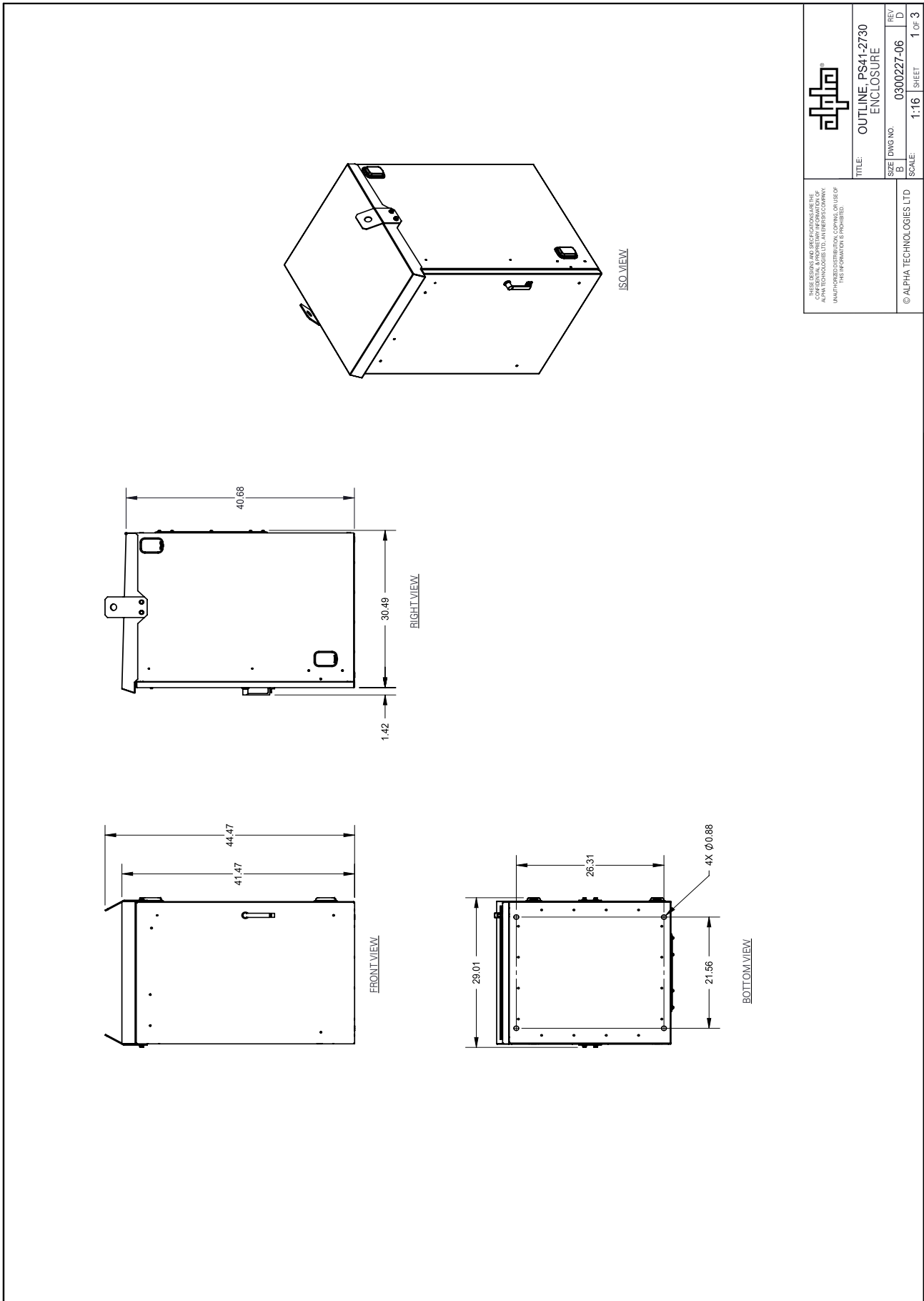
$$\text{Amp hours} = 144 \text{ Ah}$$

10.1.3 Battery selection

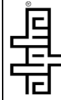
Refer to the manufacturer's data sheet and select a battery. The battery must use the discharge curve on the data sheet for the 10-hour or 12-hour rate for a 12-hour run time calculation at an End Cell voltage of 1.75 volts per cell. For 24-hour applications you can use a 20-hour or the 10-hour rate.

11. Acronyms and definitions

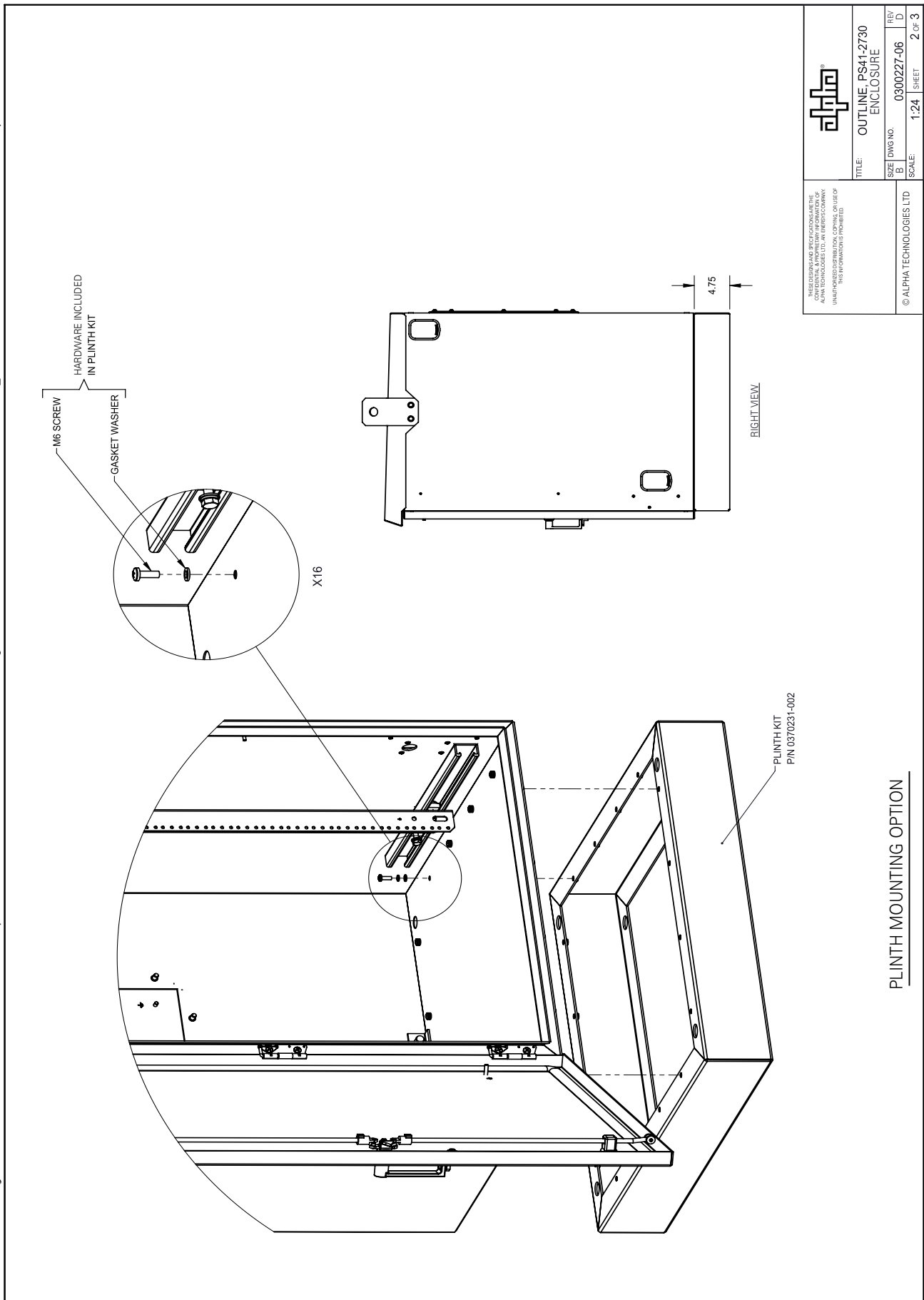
| | |
|---------------|---|
| AC | Alternating current |
| ANSI® | American National Standards Institute |
| AWG | American Wire Gauge |
| BTU | British thermal unit |
| CAN | Controller area network |
| CEC | Canadian Electrical Code |
| CPH | Central power hub |
| CSA® | Canadian Standards Association |
| CX | Cordex® series; CXC for Cordex CXC 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 US) |
| GFCI | Ground fault circuit interrupter |
| HVSD | High voltage shutdown |
| IEC | International Electrotechnical Commission |
| IEEE® | The Institute of Electrical and Electronics Engineers, Inc. |
| IP | Internet Protocol |
| LED | Light emitting diode |
| LVD | Low voltage disconnect |
| LVBD | Low voltage battery 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 US) |
| NFPA® | National Fire Protection Association, Inc. |
| NO | Normally open |
| OSHA | Occupational Safety & Health Administration |
| OSP | Outside Plant |
| OVP | Over voltage protection |
| RU | Rack unit (44.45 mm; 1.75 in.) |
| TCP/IP | Transmission Control Protocol / Internet Protocol |
| THD | Total harmonic distortion |
| TVSS | Transient Voltage Surge Suppressor |
| UL® | Underwriters Laboratories |
| UATS | Universal Automatic Transfer Switch |
| VRLA | Valve regulated lead acid |



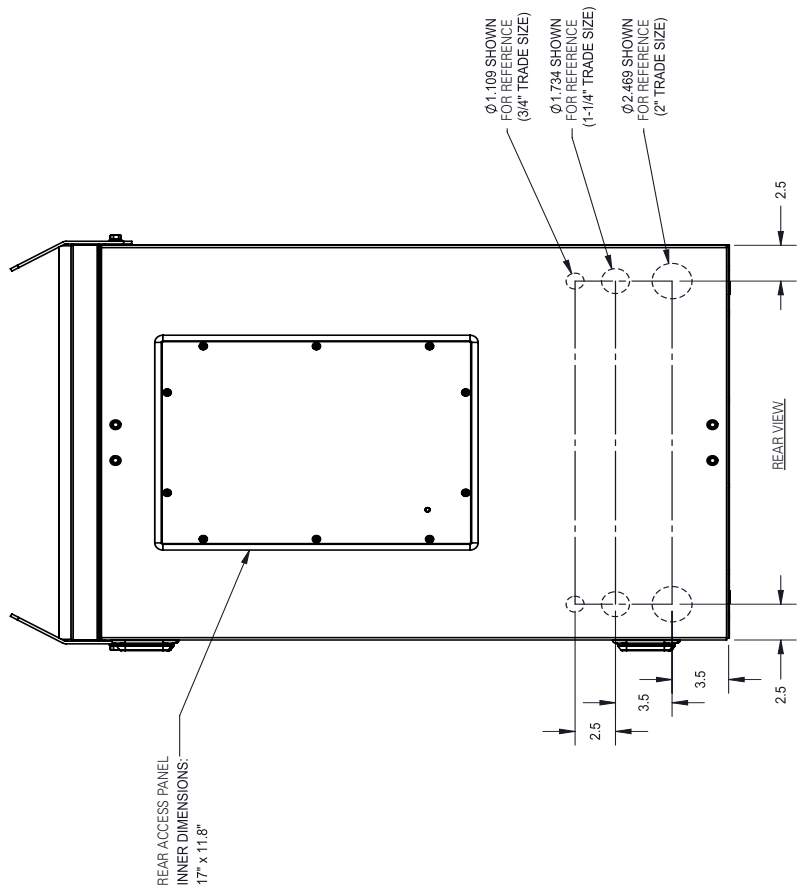
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PLINTH MOUNTING OPTION



RECOMMENDED WIRE ENTRY LOCATIONS ON REAR WALL

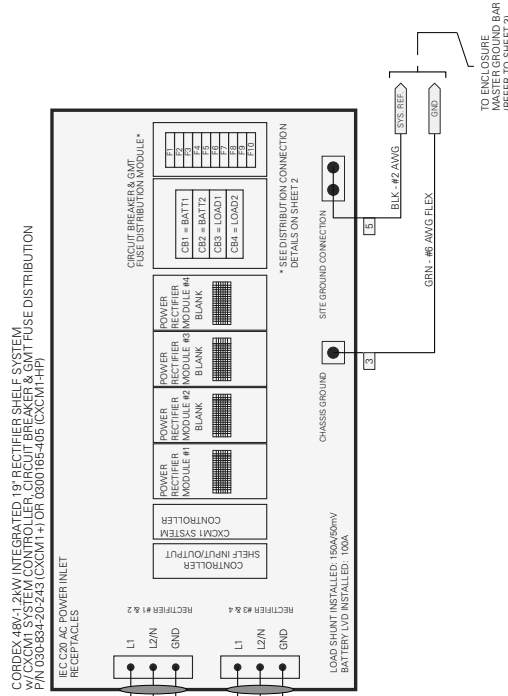
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2. LOCATE SUITABLE LOCATION ON REAR WALL AND DRILL CLEARANCE HOLE SIZE APPROPRIATE FOR CONDUIT FITTING.
3. WIRING WITHIN THE ENCLOSURE SHOULD BE ROUTED AROUND THE PERIMETER OF THE ENCLOSURE.
4. FIELD WIRING MUST COMPLY WITH LOCAL ELECTRICAL CODES.

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| ENCLOSURE | | WIRING SCHEMATIC, PS41-2730 | |
| SIZE | SCALE | REV | D |
| AWG | B | 0570191-05 | 1 |
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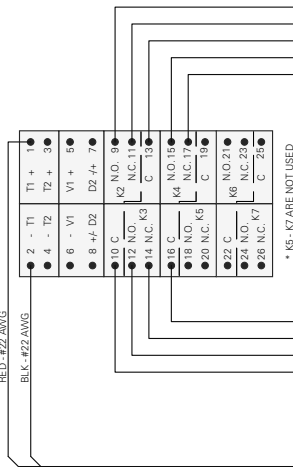
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 4. FIELD WIRING MUST COMPLY WITH LOCAL ELECTRICAL CODES.

CORDEX 48-1.2kW RECTIFIER SHELF BREAKER AND FUSE DISTRIBUTION & CXCM1 SYSTEM CONTROLLER INPUT/OUTPUT WIRING:

CORDEX 48V/1.2kW INTEGRATED 19" POWER RECTIFIER MODULE SHELF SYSTEM w/ CXCM1 SYSTEM CONTROLLER, 2 LOAD & 2 BATT BREAKER POS. BATTERY LVD AND 10 POS GMT FUSE DISTRIBUTION

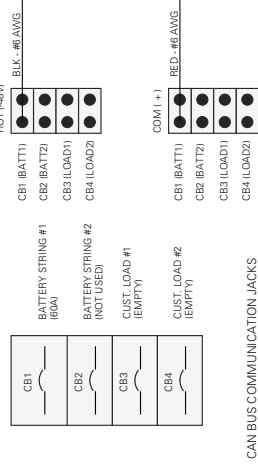
CXCM1 I/O SIGNAL TERMINAL BLOCK

CXCM1 I/O SIGNAL TERMINAL BLOCK

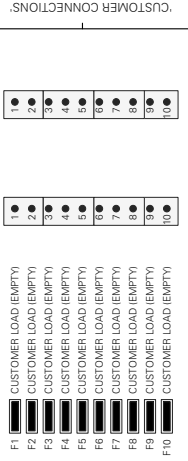


CIRCUIT BREAKER & FUSE DISTRIBUTION DC OUTPUT POWER CONNECTIONS:

LOAD & BATTERY BREAKER OUTPUT POWER TERMINALS



LOAD GMT FUSE OUTPUT POWER TERMINAL BLOCKS



PN 8701180001 TO BATTERY STRING (REFER TO SHEET 7)

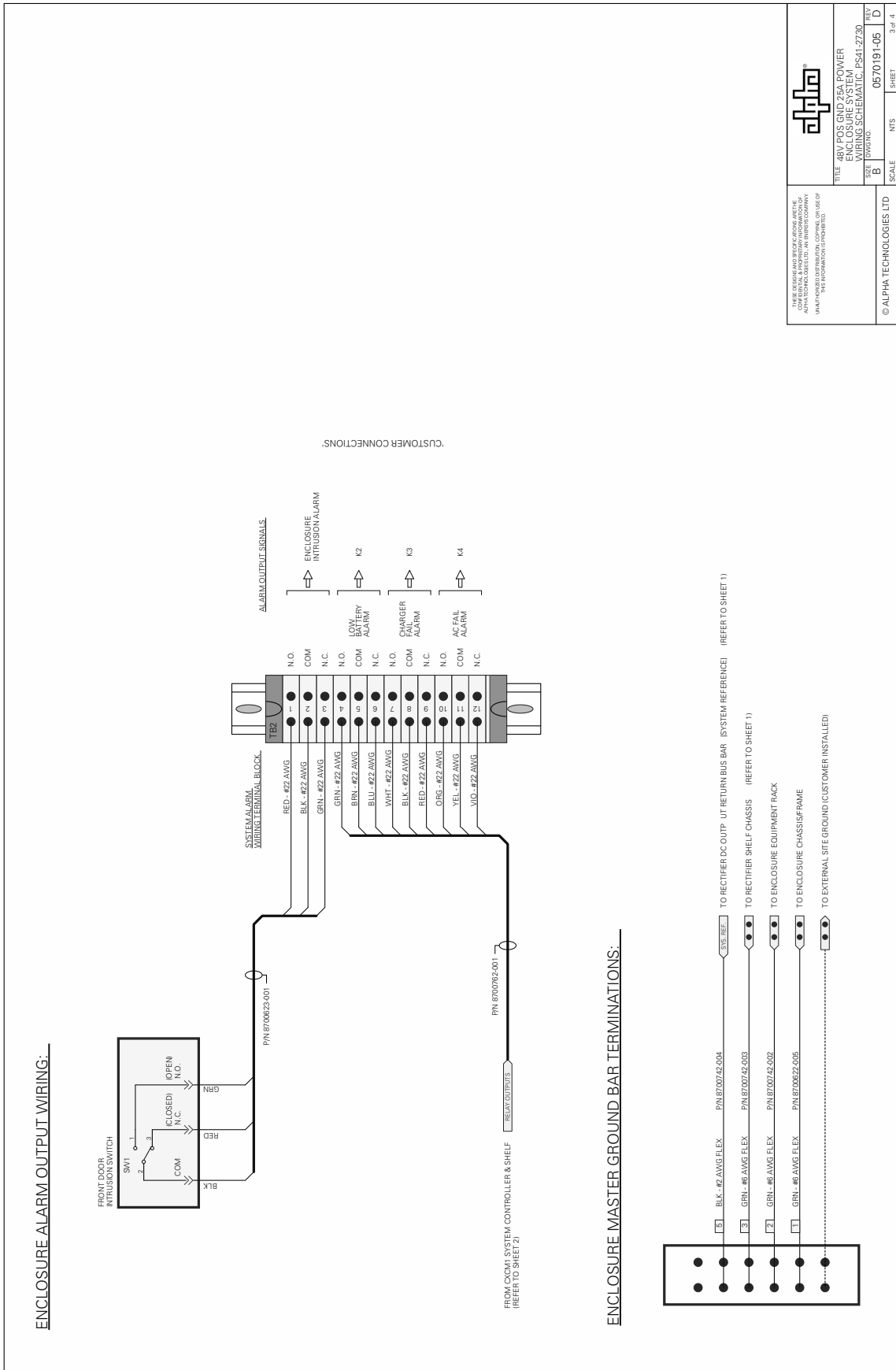
PN 8700782001 TO ALARM OUTPUT SIGNALS (REFER TO SHEET 3)

PN 7470292001 BOTTOM BATTERY TEMPERATURE SENSOR PROBE (ATTACH PROBE TO -VE TERMINAL IN MIDDLE OF BATTERY STRING)



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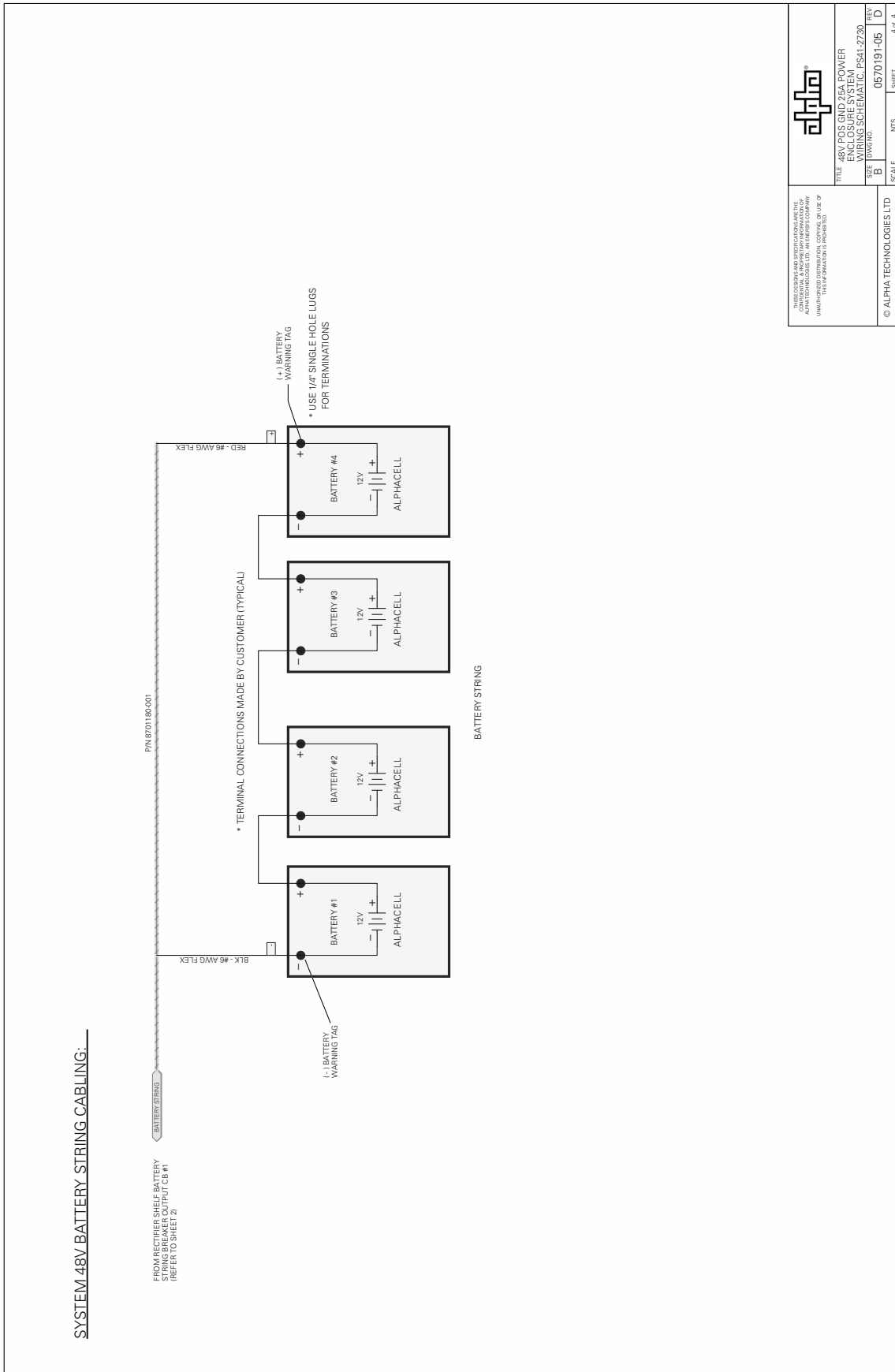
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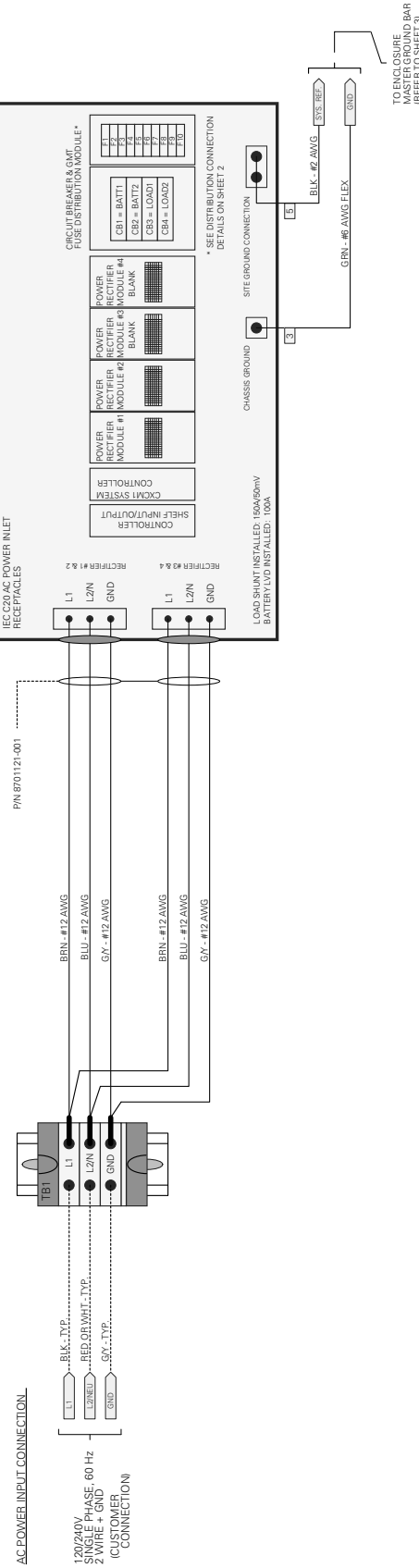
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| DATE | BY |
| 05/01/05 | D |
| SCALE | SHEET |
| N/S | 4 of 4 |
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 W/ CXCM1 SYSTEM CONTROLLER, CIRCUIT BREAKER & GMT FUSE DISTRIBUTION
 P/N 030-834-20-243 (CXCM1+) OR 0300166-405 (CXCM1-HP)



TO END USER MASTER GROUND BAR (REFER TO SHEET 3)

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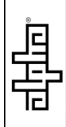
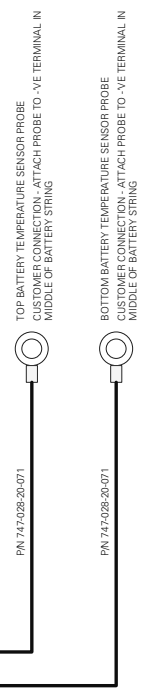
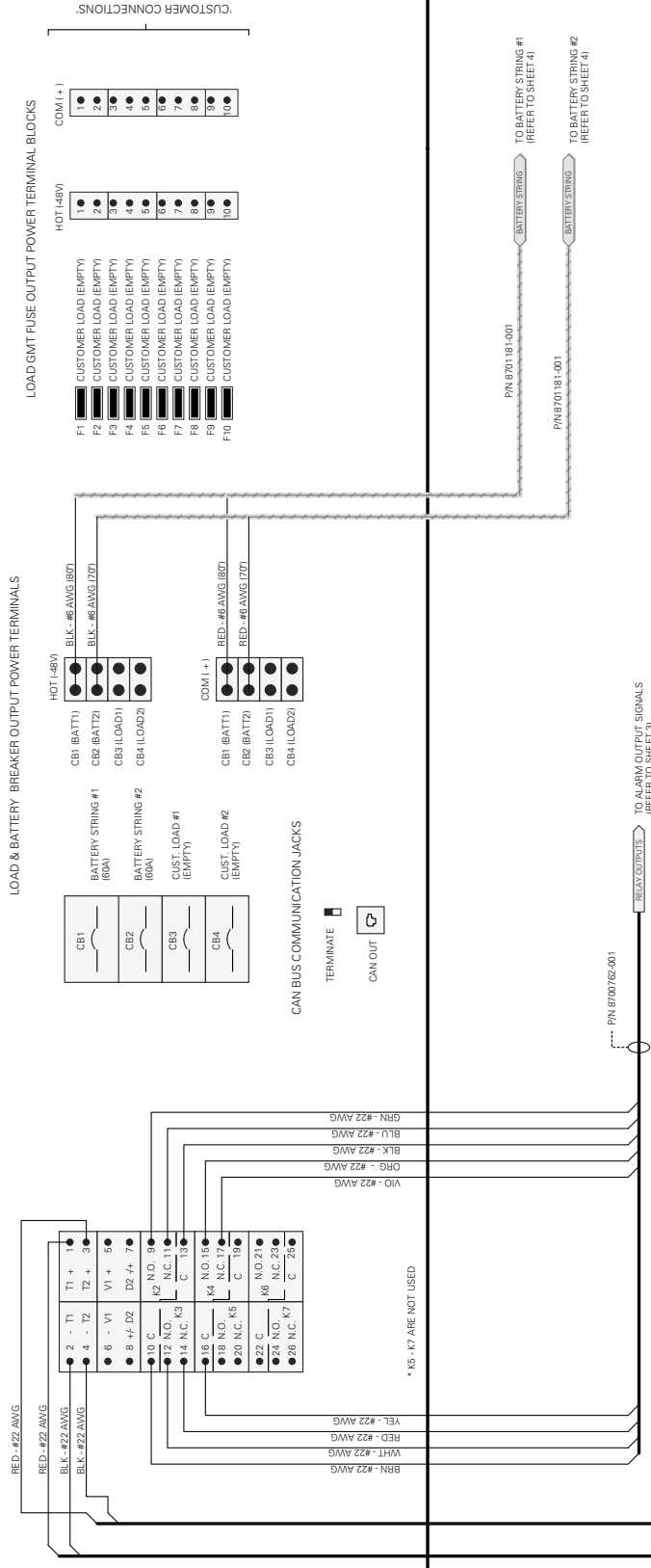
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CXCM1 SYSTEM CONTROLLER & SHELF I/O CONNECTIONS:

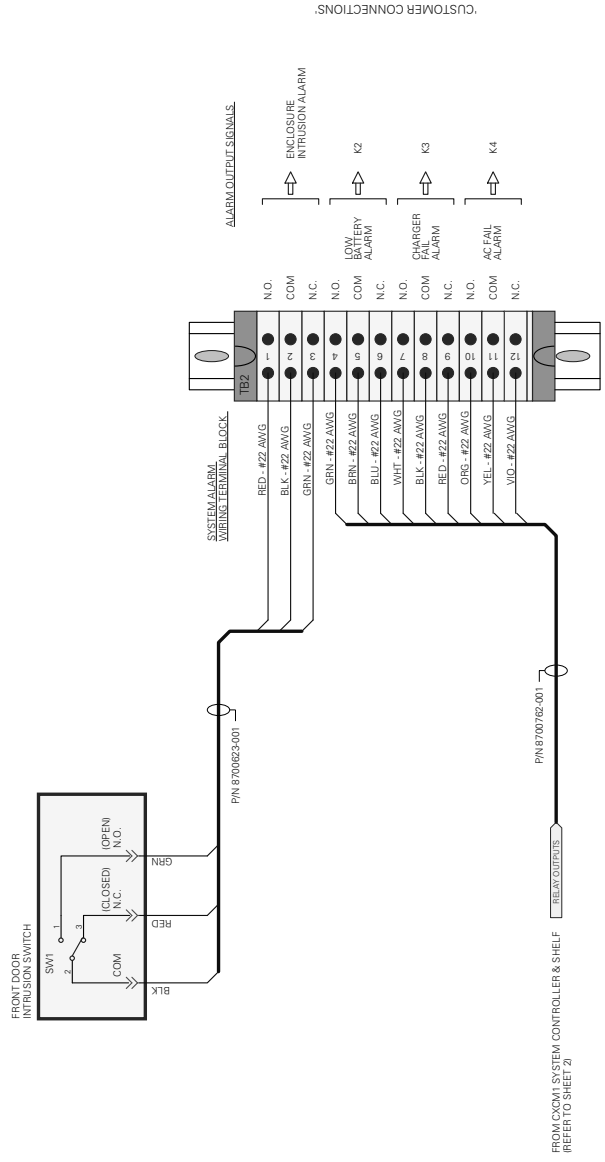
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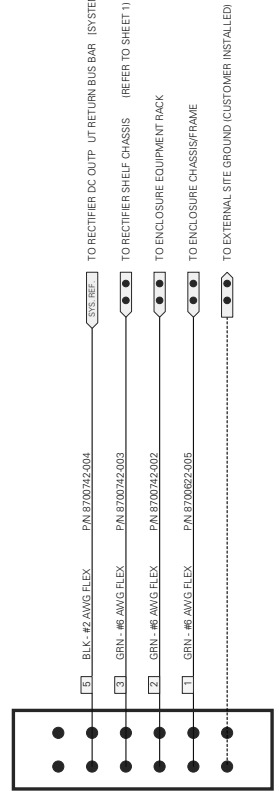
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| SIZE: B | DWG NO: 0570192-05 | REV: D |
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ENCLOSURE ALARM OUTPUT WIRING:



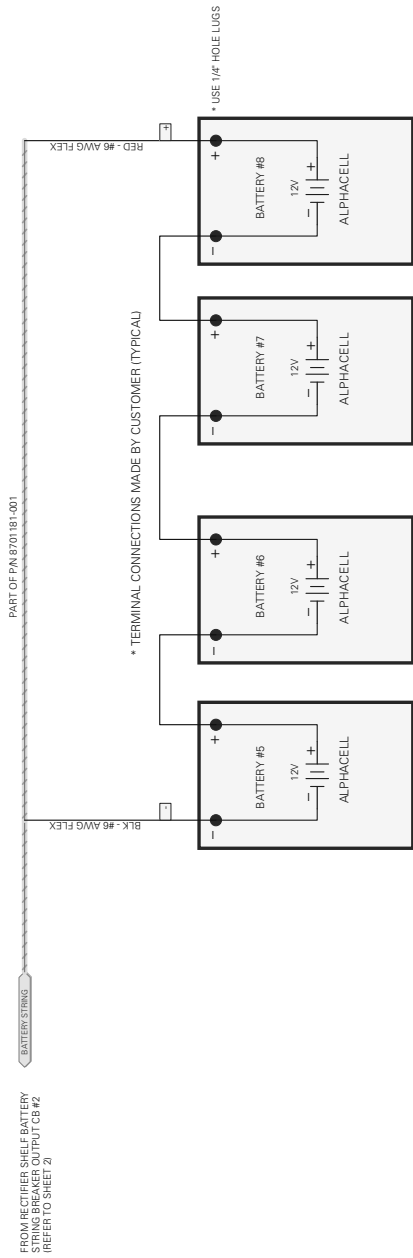
CUSTOMER CONNECTIONS

ENCLOSURE MASTER GROUND BAR TERMINATIONS:

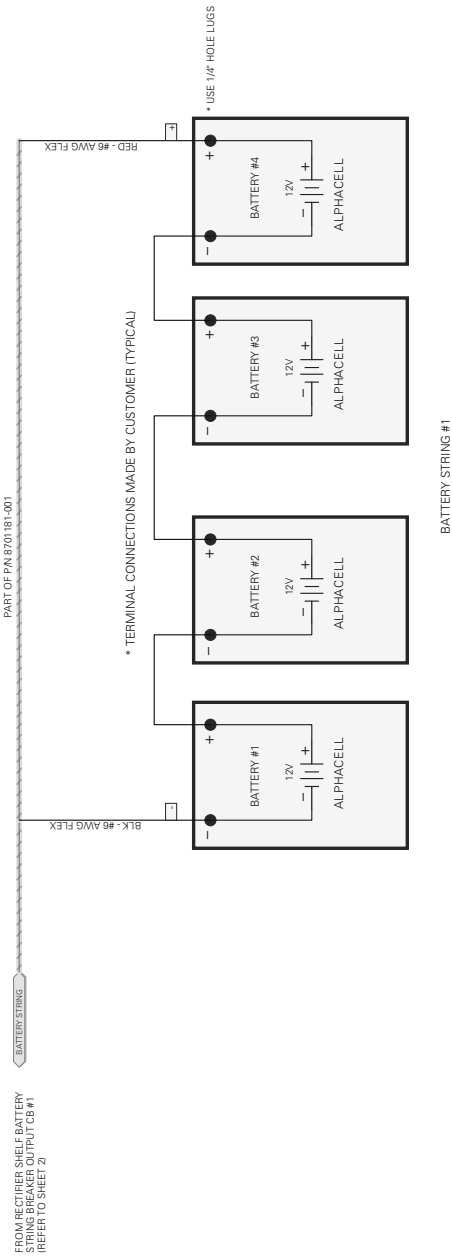


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SYSTEM 48V BATTERY STRING CABLING:

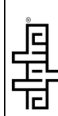


BATTERY STRING #2



BATTERY STRING #1

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