Public Safety Enclosure PS27-2220

Technical Guide: 9400019-J0

Effective: 07/2018

Alpha Technologies Ltd.

PS27-2220
Public Safety Backup Power Enclosure Series

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:

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International: **+1-604-436-5547**

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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 and/or energy levels can be 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 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 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. Overview

2.1 Introduction

The Alpha PS27-2220 is a NEMA Type 4 public safety indoor enclosure. The PS27-2220 can be configured to support the following power system configurations:

- AC power system with battery tray
- DC power system with battery tray

The NEMA Type 4 rated enclosure is designed to protect its internal backup power system in accordance with NFPA 1221 standard requirements.

Figure 1 — Alpha PS27-2220 Interior View

3. Specifications

Table A — Specifications PS27-2220		
Electrical		
PSU 400-24	**AC Input:** **DC Output:**	120/240V, 4.0A maximum, 60Hz, 1PH 20 - 30V (24V nominal), 14A maximum
PSU 650-48	**AC Input:** **DC Output:**	120/240V, 4.7A maximum, 60Hz, 1PH 42 - 58V (48V nominal), 13.5A maximum
FXM 350-24	**AC Input:** **DC Input:** **AC Output:**	120V, 5.7A maximum, 60Hz, 1PH (UPS) 120V, 30A maximum, 60Hz, (UATS) – optional 24V, 1x string, 110Ahr (internal batteries) or 24V, 2x strings, 220Ahr (internal batteries) 120V, 350VA/W maximum (UPS) 120V, 15A, 60 Hz (UATS, 5-15R) - optional 24V, 260VA/W maximum (UPS)
Recommended AC input breaker:		15A
Mechanical		
Dimensions (H x W x D):		636mm x 559mm x 448mm (25.03in x 22.00in x 19.23in)
Enclosure Weight (empty):		43.5kg (96lbs)
Mounting:		Ground with Plinth
Construction:		High strength corrosion resistant aluminum
Finish:		Polyester powder coat
Equipment rails:		19"
Door prop:		1/4" aluminum rod, two positions
Door latch:		Compression latches, padlockable
Installation access:		Full front access
Environmental		
Operating temperature:		-0 to 40°C (32 to 104°F)
Storage temperature:		-40 to 85°C (-40 to 185°F)
Agency Compliance		
Enclosure rating:		NEMA Type 4 (UL50e)
CSA:		C22.2 No. 60950
NFPA:		Meets applicable NFPA 1221 requirementments

4. Features

4.1 AC and DC Power Options

The following power options are available with the PS27-2220

- FXM 350-24 – 24V, 350W Uninteruptable Power Supply (UPS) Module
- Cordex PSU 400-24 – 24V, 400W Power Supply Unit
- Cordex PSU 650-48 – 48V, 650W Power Supply Unit

4.1.1 Cordex PSU

- Clean and reliable DC power supply for critical loads available in two options: 24V/400W or 48V/650W
- Internet ready and remotely accessible for complete and cost effective system and site monitoring
- Advanced battery charging, monitoring and testing to ensure sufficient reserve power availability and prolonged battery life
- Configurable platform with I/Os for site monitoring, user-definable alarms, data logging and control
- Extended temperature range for installation in harsh outdoor environments
- Wide AC input operating range for worldwide installation requirements

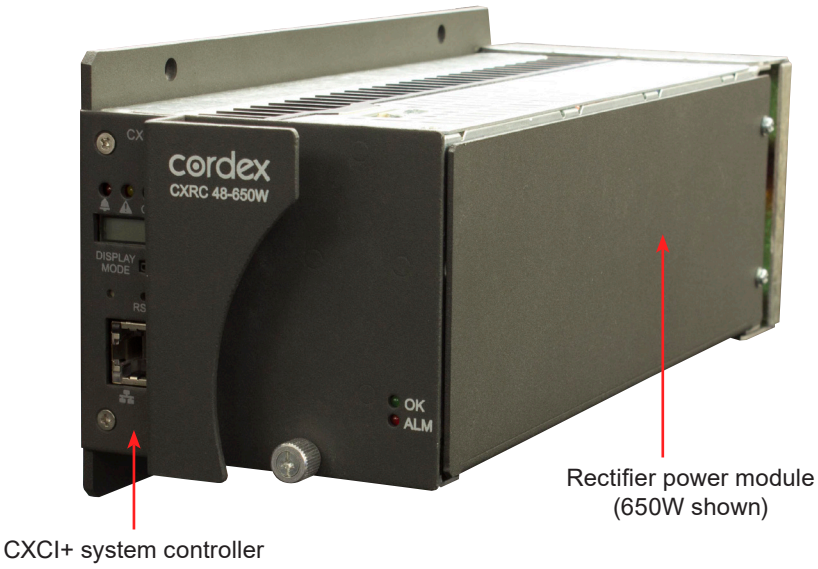


Figure 2 — Cordex PSU Shelf System with Integrated CXCI+ System Controller

4.1.2 FXM 350 UPS

The Alpha FXM uninterruptible power supply (UPS) module provide clean, reliable power control and management as part of a complete UPS solution. Temperature compensated battery charging protects batteries from overcharging at extreme temperatures, extending battery life. Event and alarm logging with time and date stamping simplifies and accelerates troubleshooting.

Figure 3 — Alpha FXM 350 UPS

4.1.3 UATS (FXM 350 UPS Option)

The Universal Automatic Transfer Switch (UATS) is an optional add-on switching unit specifically designed for the FXM UPS family (FXM 350). These switching units provide power and/or bypass capacity (automatic or manual) so that the operator can safely disconnect the UPS from line or generator power for easy removal and servicing.

In bypass mode, the loads are directly connected to the line or generator power without any conditioning. Depending on the use of one and/or the other, the UATS allows the use of up to 3 different back-up sources (line, batteries and generator). Refer to the UATS Installation Manual (Alpha P/N 020-165-B0) for details.

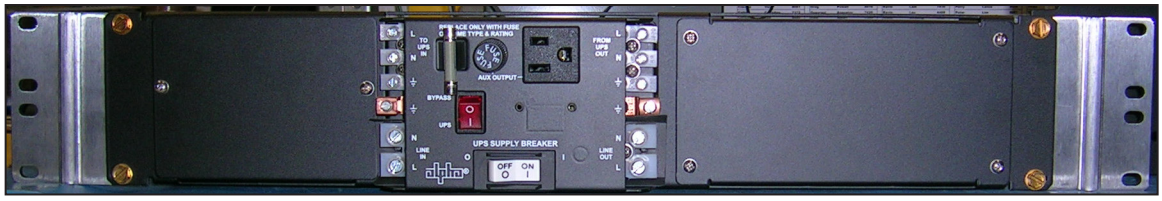


Figure 4 — Universal Automatic Transfer Switch

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: Triggered when the battery is discharged below 1.75vpc.
- Charger Fail: This alarm will be triggered on an AC fail and the failure of 1 or more rectifier modules in the system.
- AC Fail: The input line has dropped below the Low VAC or is above the High VAC settings of the power system.

4.2.2 Customer Configured Alarms

Alarms are user programmable via the web interface. Please reference applicable power equipment manual(s) for instructions.

4.2.3 Battery Test and Estimated State of Health (Cordex PSU 400/PSU 650)

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 battery. The system controller will monitor both the batteries and the rectifiers to ensure that the load is not put at risk by the test procedure. Refer to the Cordex HP Software manual for further information on set up and enabling of this function.

4.2.4 Temperature Compensation

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 and enabled at time of commissioning.

The Public Safety System design is shipped with default settings for float and temperature compensation for Alpha-Cell GXL-FT batteries.

4.2.5 Event and Data Logs (Cordex PSU 400/PSU 650)

The Event log table keeps a record of changes to the state of the system to help with troubleshooting.

4.2.6 Communication

- Ethernet: 10/100Base-T Ethernet connection on both the front and rear (PSU only) of the controller for remote or local communication.
- Web based User Interface for local or remote via an Ethernet 10/100Base-T Ethernet Connection.
- Email notification. Integrators guide and protocol available online.
- SNMP Communications protocol. Integrators guide and protocol available online.
- MODBUS Integrators. Integrators guide and protocol available online (Cordex PSU 400/PSU 650).

4.3 Battery Storage

The PS27-2220 enclosure can support one string (for 48V systems), or two strings (for 24V systems) of VRLA batteries on the battery tray. The tray will accommodate up to four (recommended) AlphaCell 195 GXL-FT (110Ah) sized VRLA batteries.

Figure 5 — Battery Tray

4.4 Enclosure Venting

The system has been evaluated for hydrogen gas venting using AlphaCell 195 GXL-FT VRLA batteries.

Figure 6 — NEMA Type 4 Enclosure Vent

4.5 Security

Opening the front door activates a panel switch which is wired directly to the enclosure alarm terminal block. An enclosure intrusion alarm detection can be extended to a monitoring device using the Form C dry contacts found on the terminal block. The door open/intrusion alarm can be disabled by pulling out the switch plunger (defeat position) during servicing.

The front door can be secured with a separate padlock installed on each latch collar as required.

4.6 Power Enclosure System – Options, Components and Parts

Alpha Standard Part Numbers	
AC Power System Option	
FXM 350-24	0570214-001
DC Power System Options	
PSU 650-48-GMT	0570190-001
PSU 400-24-GMT	0570196-001
Accessories	
UATS (Universal Automatic Transfer Switch)	0370498-001
Plinth Mounting, 8" high	740-760-23
Alpha Spare Part Numbers	
Fuse, 20A, 1/4" x 1-1/4"	4600003
Fuse, 2A, GMT	460-083-10
Fuse, 5A, GMT	460-084-10
Power Module, PSU 650W	010-570-20-041
Power Module, PSU 400W	010-582-20-040

5. Site Evaluation and Pre-Installation

5.1 Site Selection

Consider the following before selecting a mounting location:

- The Alpha PS27-2220 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 PS27-2220 indoor power enclosure has been designed for the following mounting option:

- Plinth, mounted on a concrete slab, floor, or similar surface. (Alpha kit P/N: 740-760-23)

5.2 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" 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 (#14 to #22 AWG) [2.5 to 0.34 mm^2]
- Torque wrench: 1/4" drive, 0 - 150 in-lb.
- Torque wrench: 3/8" drive, 0 - 100 ft-lb.
- Insulating canvases as required (2' x 2', 1' x 1', 3' x 3', etc.)
- Various insulated hand tools including:
    - Combination wrenches
    - Ratchet and socket set
    - Various screwdrivers
    - Electricians knife
- Battery safety spill kit (required for wet cells only):
    - Protective clothing
    - Face shield
    - Gloves
    - Baking soda
    - Eye wash equipment

6. 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 manual.

6.1 Safety Precautions

Refer to the Safety section near the front of this manual.

6.2 Plinth Mounting for Concrete Floor (Alpha Kit P/N: 740-760-23)

6.2.1 Mounting the Plinth to the Concrete Floor

This mounting option assumes that a concrete floor is available at the installation site. Figure 7 provides the location of the four bottom plinth mounting holes.

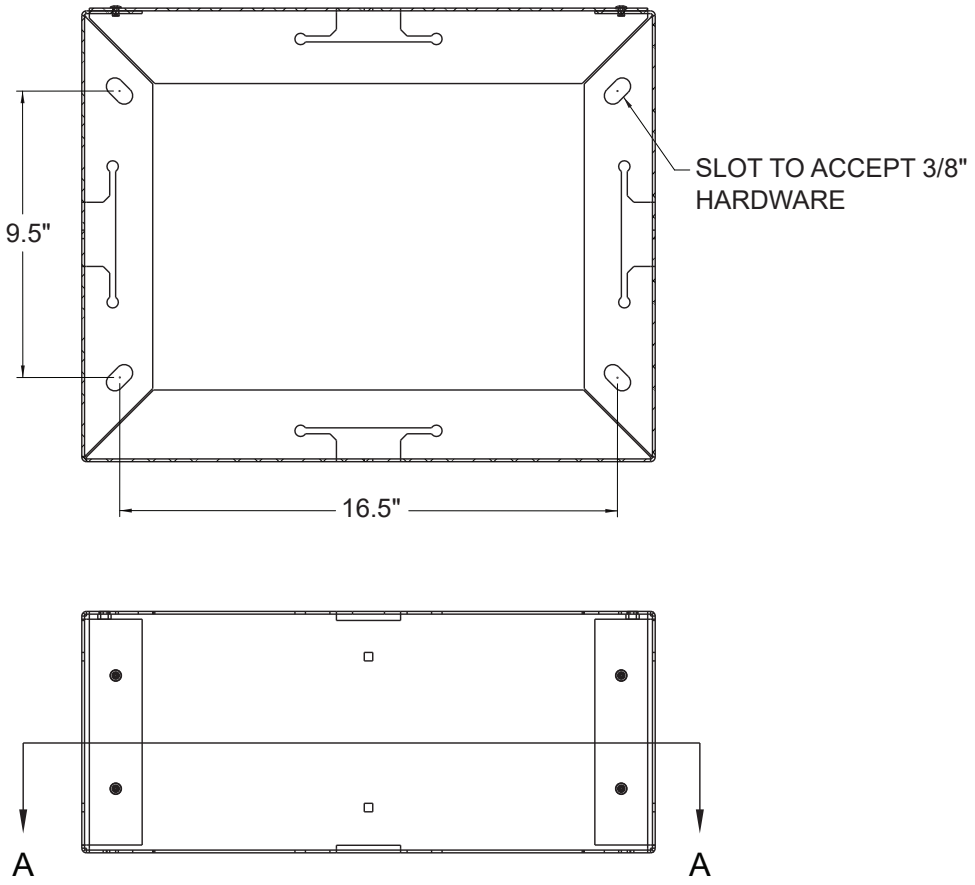


Figure 7 — Plinth Template for Mounting Bolts

1. Remove the plinth from the inside of the PS27-2220 enclosure or from its shipping container.
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" 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.

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

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

6.2.2 Mounting the Enclosure to the Plinth

1. Unstrap and unbox the PS27-2220 enclosure from the shipping pallet.
2. Remove the battery tray to access the bottom of the enclosure. There are two retaining screws per side as shown in Figure 8.

Figure 8 — Battery Tray Retaining Screw Locations

3. With at least two installation personnel, lift and position the enclosure on its rear side. Use cardboard or similar material to protect the enclosure surface from any damage.
4. On the bottom of the enclosure, locate the four outer mounting hole locations denoted by centerpunch marks as shown in Figure 9. Drill out 0.281" diameter holes in each location for the 1/4" bolts installed in the next step.

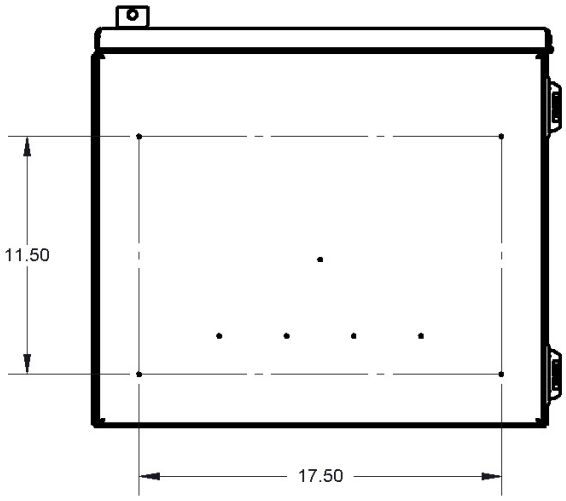


Figure 9 — Enclosure/Plinth Mounting Hole Locations

5. With at least two installation personnel, lift and position the enclosure onto the plinth.
6. Secure the enclosure to the plinth with the supplied 1/4" hardware. Torque bolts to 65in-lb (7N-m). See Figure 10.
7. Reinstall the battery tray.

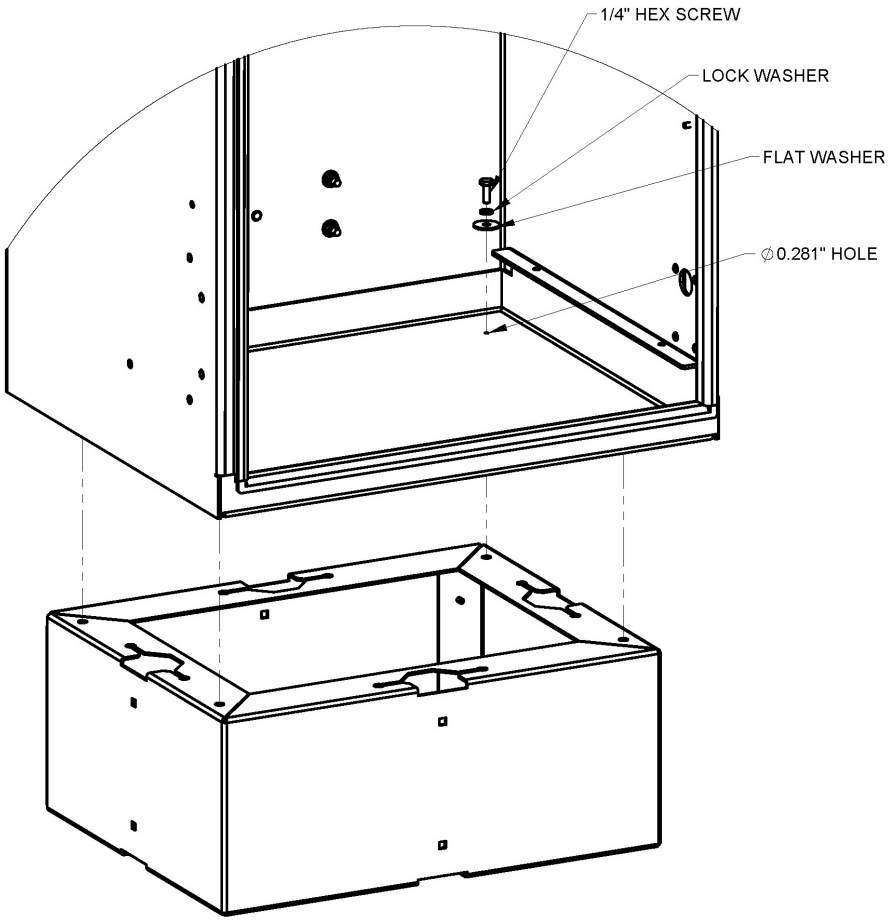


Figure 10 — Securing Enclosure to the Plinth

7. 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 manual.

7.1 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/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.

NOTE:

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 NEMA Type 4 or better to maintain enclosure integrity rating.
3. Connect the site ground wire to any unused position (#12 – #4 AWG) on the enclosure master ground bar (MGB).

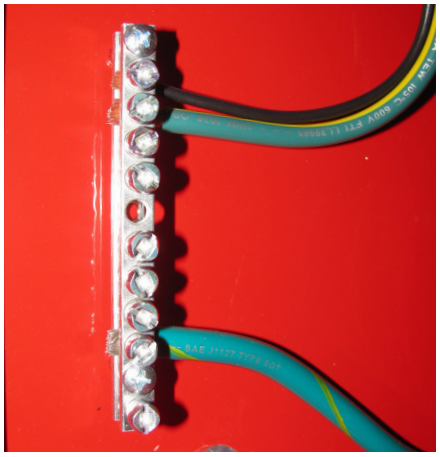


Figure 11 — Enclosure MGB and Chassis Ground

7.2 Input/Output Wiring into Power Enclosure System

With enclosure securely mounted, select an appropriate location on an enclosure wall for system input and output wire entry. Use fittings rated NEMA Type 4 or better to maintain enclosure integrity rating.

7.3 Installation with Cordex PSU 400 or PSU 650

7.3.1 DC Power Output

The DC load cable connections to the system are made to the GMT fuse distribution panel module located on the left side of the power enclosure system equipment rack.

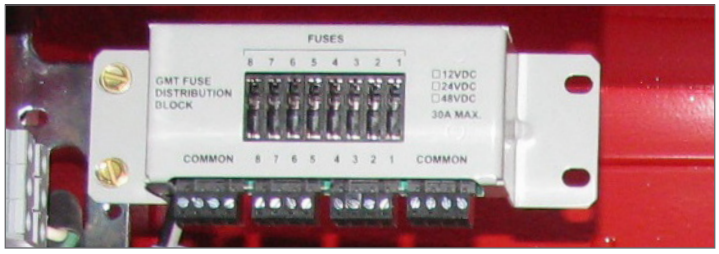


Figure 12 — GMT Fuse Distribution Module

7.3.2 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 manual.

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 [+] and [–] 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 3M 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 as above.
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.**
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 100 in-lbs).

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

7.3.3 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 literature for guidelines. See the following table for typical maintenance report:

Company: _____ Date: _____

Address: _____

Battery location and/or number:_____

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

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

Table B — Typical VRLA battery maintenance report

Cell #	Serial #	Voltage	Specific	Ohms	Mhos	Observations

Remarks and recommendations: _____

_____

_____

Readings taken by: _____

7.3.4 Power Enclosure Alarm Wiring Block

The alarm wiring block, located on the left side wall of the enclosure, uses Weidmuller type DIN rail mounted terminal blocks. Connect designated alarm outputs to the local alarm-sending unit/device using appropriate wire with gauge sizes from #26 to #12 AWG (0.13 to 3.31 mm^2).

Table C — Alarms for PSU 400/PSU 650 DC Option

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.)
#13	GMT Fuse Distribution Alarm (N.O.)
#14	GMT Fuse Distribution Alarm (COM)
#15	GMT Fuse Distribution Alarm (N.C.)

Table D — Alarms for FXM UPS System Option

Pin	Description
#1	Enclosure Intrusion Alarm (N.O.)
#2	Enclosure Intrusion Alarm (COM)
#3	Enclosure Intrusion Alarm (N.C.)
Relay Assignments on FXM 350 UPS	
C3	Low Battery Capacity Alarm (N.O.)
	Low Battery Capacity Alarm (COM)
	Low Battery Capacity Alarm (N.C.)
C4	Charger Fail Alarm (N.O.)
	Charger Fail Alarm (COM)
	Charger Fail Alarm (N.C.)
C5	AC Fail Alarm (N.O.)
	AC Fail Alarm (COM)
	AC Fail Alarm (N.C.)

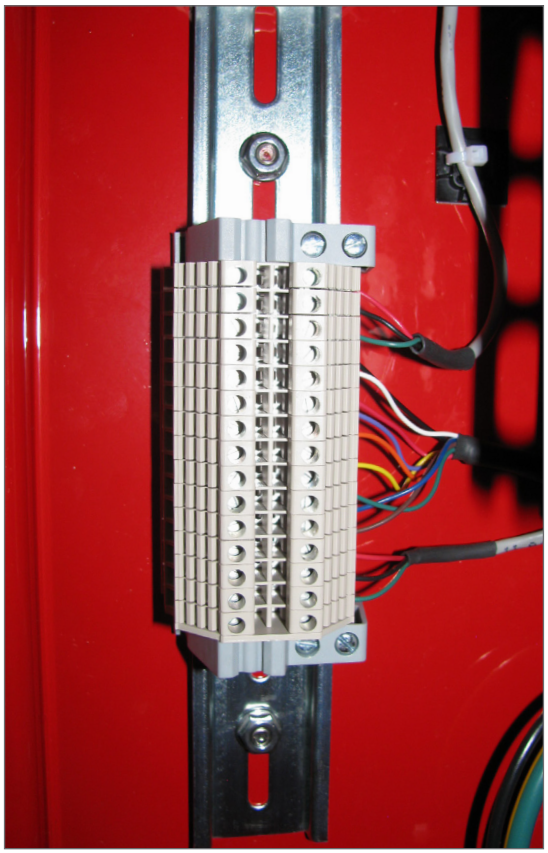


Figure 13 — Enclosure Alarm Wiring Block (for PSU models)

7.3.5 System Startup

1. Ensure that the AC input power circuit breaker feeding the power enclosure system is turned off at the main AC load center (customer furnished).
2. Ensure that all battery string cable Anderson connectors are disconnected.
3. Using a voltmeter, verify that AC input power supply voltage is correct, then turn on AC load center input feeder circuit breaker to the power up enclosure system.
4. The PSU power module OK LED should turn on after a preset start-up delay.
5. Verify correct battery polarity at connectors on all battery cables using a voltmeter.
6. Connect battery string cables, as required, to the output of the PSU unit via the Anderson battery connectors provided.

7.4 Installation with an FXM 350 UPS

WARNING!

The Alpha FXM is intended for permanent AC connection only.

The Alpha FXM must be correctly grounded for proper operation. Older facilities may have inadequate electrical grounding. Inspection must be performed by a qualified electrician before installation to ensure that grounding meets the local electrical code.

The utility line attached to the Alpha FXM input MUST be protected by a circuit breaker certified for this use in accordance with the local electrical code. The UPS must be connected only to a dedicated branch circuit.

The UPS equipment that is powered by this service panel requires the neutral to be permanently bonded to the ground. Always disconnect the batteries before servicing the circuit breaker panel.

The input and output lines to and from the Alpha FXM MUST have disconnect devices attached.

The Alpha FXM is suitable for installations in network telecommunication facilities and locations where the National Electrical Code applies.

Grounding: The Alpha FXM is suitable both for installation as part of a common bonding network (CBN) and an isolated bonding network.

For installations above 1400m (4500ft) elevation, additional cooling may be needed to reduce the operating temperature of the Alpha FXM. The maximum allowable operating temperature must be reduced by 2°C (3.5 °F) for every 300m (1000ft) above 1400m (4500ft).

7.4.1 Electromagnetic Compatibility (EMC) Requirements

Observe the following EMC requirements when setting up the Alpha FXM and its internal equipment:

- All AC mains and external supply conductors must be enclosed in a metal conduit or raceway when specified by local, national, and/or other applicable government codes and regulations.
- The customer facilities must provide suitable surge protection.

7.4.2 Mounting the Alpha FXM 350 UPS in the PS27-2220 Enclosure

WARNING!

The Alpha FXM is heavy, up to 8.62 kg (19 lb). Use proper lifting techniques. The lifting and moving should be done by at least two people to avoid injury.

1. Attach the mounting brackets to each side of the FXM UPS with the screws with toothed washers provided with the brackets to ensure adequate grounding between the FXM UPS chassis and the rack.
2. Mount the Alpha FXM 350 UPS to the equipment rack in the PS27-2220 enclosure.

7.4.3 Wiring the Alpha FXM 350 UPS

WARNING!

Make sure the AC line power is off. Switch off all circuit breakers on the Alpha FXM 350 UPS before making any electrical connections.

If stranded wires are used to connect the input and output terminal blocks, ferrules or equivalent crimping terminals must be used.

Procedure

1. If used, connect the following ports (refer to the Alpha FXM 350 UPS manual Alpha P/N 017-241-B0 for more detail):
   - Ethernet port
   - RS-232 port
   - Dry contacts
   - User inputs
2. Connect the load equipment power cable to the Alpha FXM 350 UPS Output terminal block (see Figure below).
3. Connect the utility line power to the Alpha FXM 350 UPS AC Input terminal block (see Figure below).

WARNING!

Before proceeding, verify that the individual AC power cable wires are properly connected to their respective line, neutral and ground terminal connections on the input and output terminal blocks to prevent accidental shock or electrocution.

Figure 14 — Connecting AC Power Input and Output Load Cables

7.4.4 Wiring the Alpha FXM 350 UPS with UATS option

1. Connect the **TO UPS IN** power cable from the UATS to the FXM 350 UPS AC Input terminal block, matching line, neutral and ground wires to their respective terminal labels.
2. Connect the **FROM UPS OUT** power cable from the UATS to the FXM 350 UPS AC Output terminal block, matching line, neutral and ground wires to their respective terminal labels.
3. Torque all connections to 1.4 N-m (12 lb-in).

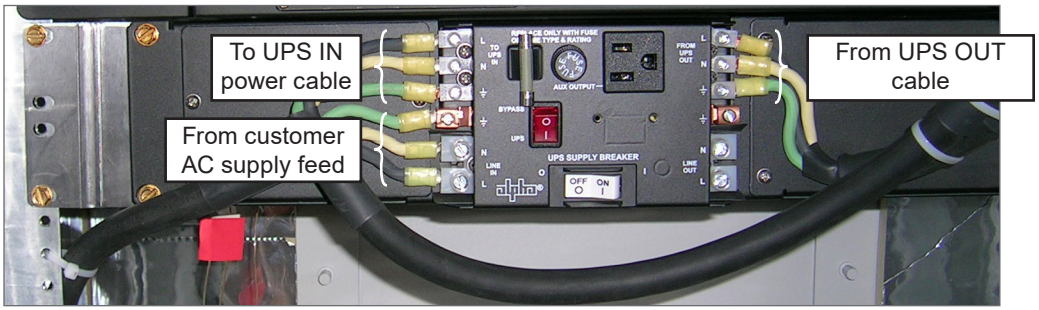


Figure 15 — UATS AC Power Connection Wiring

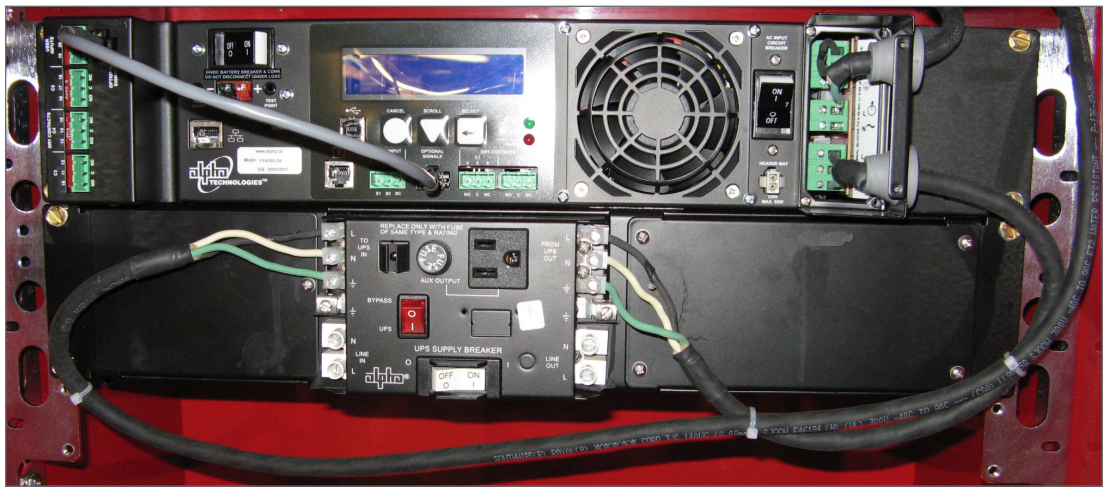


Figure 16 — FXM 350 UPS AC Power Connection Wiring from UATS

7.4.5 Wiring the External Batteries

- Use new batteries when installing a new unit. Verify that all batteries are the same type with identical date codes.
- The battery return connection is to be treated as an Isolated DC return (DC-I) as defined in GR-1089-CORE.

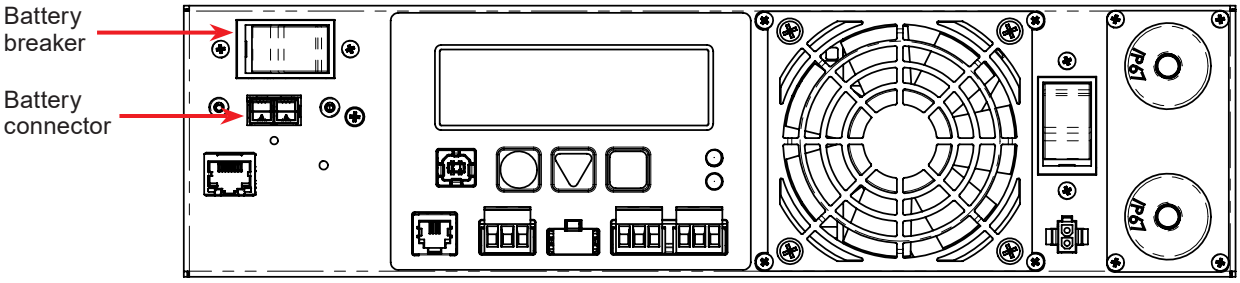


Figure 17 — FXM 350 Front Panel

1. Number the batteries from 1 to 4 with labels or tape.
2. Coat the battery terminals with a corrosion inhibitor.
3. Connect the batteries as shown in Figure 18. If the in-line fuse is used, install it as shown.
4. Connect the black battery cable to the negative terminal of the battery string, and the red battery cable to the positive terminal of the battery string.
5. When the batteries are wired together, measure the voltage at the battery connection terminals. It should read between 21 and 27V.
6. Note the polarity and ensure that it is correct.
7. Ensure that the Battery breaker on the FXM 350 UPS is OFF.
8. Connect the external batteries to the Battery connector on the FXM 350 UPS—see Figure 17.
9. Route the sensor end of the battery temperature cable to the batteries.
10. Attach the battery temperature sensor to the body of the battery, about 2 to 3" (5 to 7.5cm) from the base of the battery.
11. If multiple battery strings are used, repeat steps 1 to 4 as required.

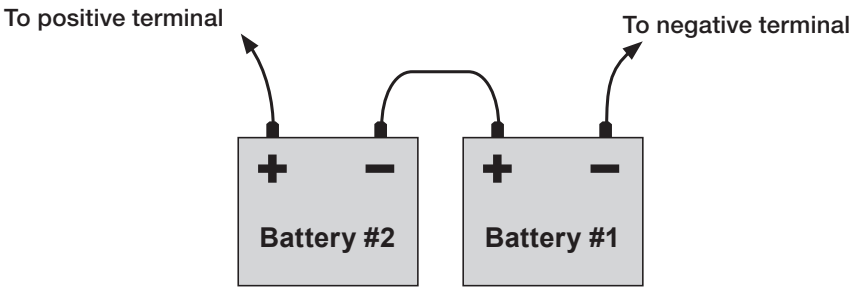


Figure 18 — FXM 350 UPS External Battery Wiring for 24 Vdc String

CAUTION!

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

7.4.6 Start-up and Operation

Refer to the FXM350 UPS Installation and Operation manual, (Alpha P/N 017-241-B0).

8. Maintenance

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

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

WARNING!

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

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

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

Table E — 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.	
Verify alarm relay operation.	

9. Warranty Statement and Service Information

9.1 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.

9.2 Warranty Statement

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

9.3 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.

9.4 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.

9.5 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.

9.6 Service Information

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

10. 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)
GFCI	Ground fault circuit interrupter
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
OSP	OutSide Plant
OVP	Over voltage protection
RU	Rack unit (1.75”)
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

11. Certification

About CSA and NRTL

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

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

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

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

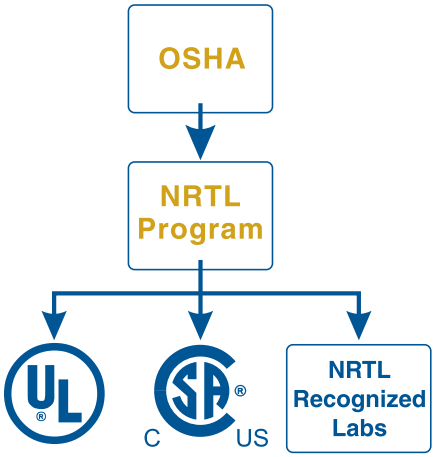
Only Underwriters Laboratories may grant a licence for the use of this mark, which indicates compliance with both Canadian and US requirements. (3)

NRTLs capabilities

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

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

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



Governance of NRTL

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

(1)www.csagroup.org

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

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REVISIONS				
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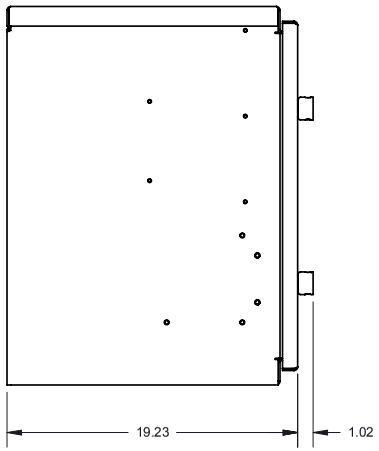

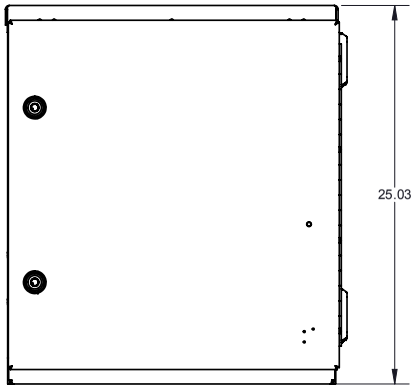

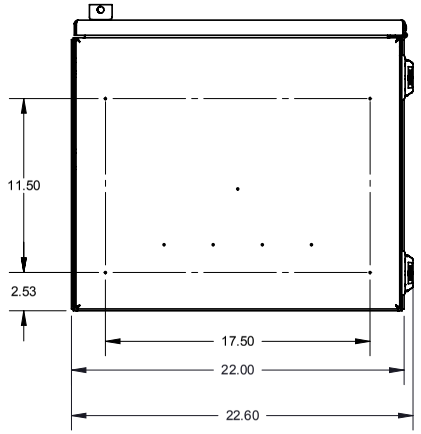

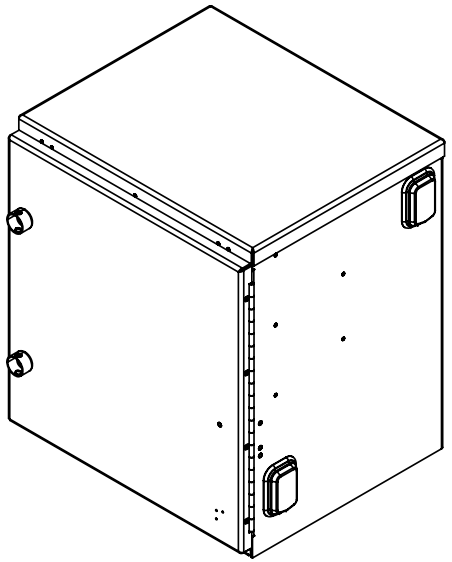

UNLESS OTHERWISE SPECIFIED DIM ARE IN INCHES
X.X ±0.040
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ANGULAR: ±1°
INTERPRET DIM AND TOL PER ASME Y14.5-1994
THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	JM	JUN-25-18
CHECKED	JL	JUN-25-18

ALPHA TECHNOLOGIES™

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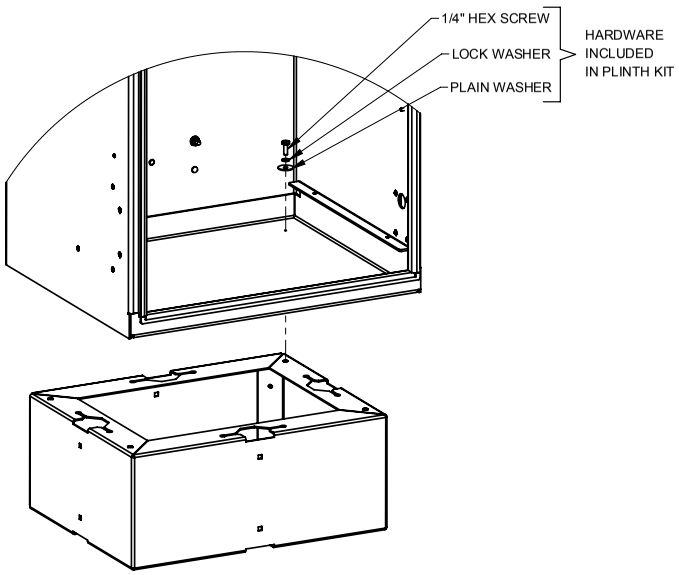

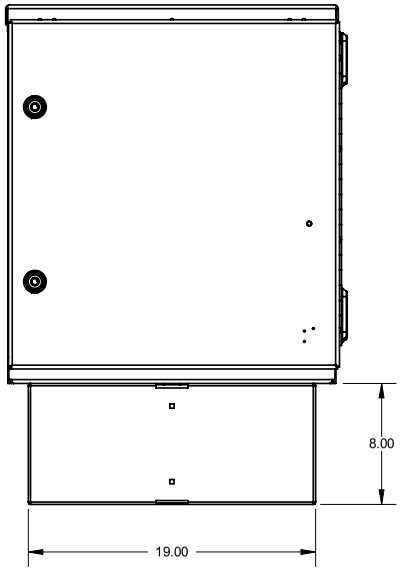

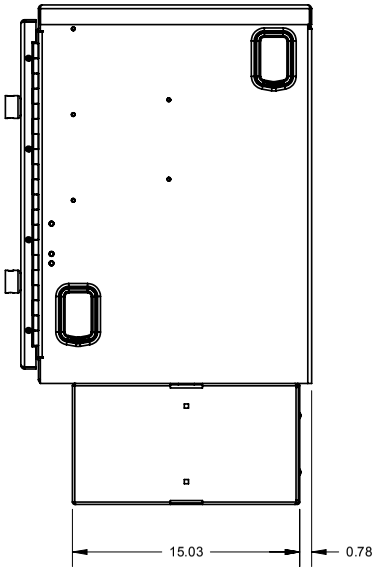

PLINTH MOUNTING OPTION

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FXM350 UPS MODULE AC POWER, BATTERY STRING, TEMPERATURE PROBE, ENCLOSURE INTRUSION & TEMPERATURE ALARM WIRING:

REVISIONS				
LTR	DESCRIPTION	DRW	DATE	CHK
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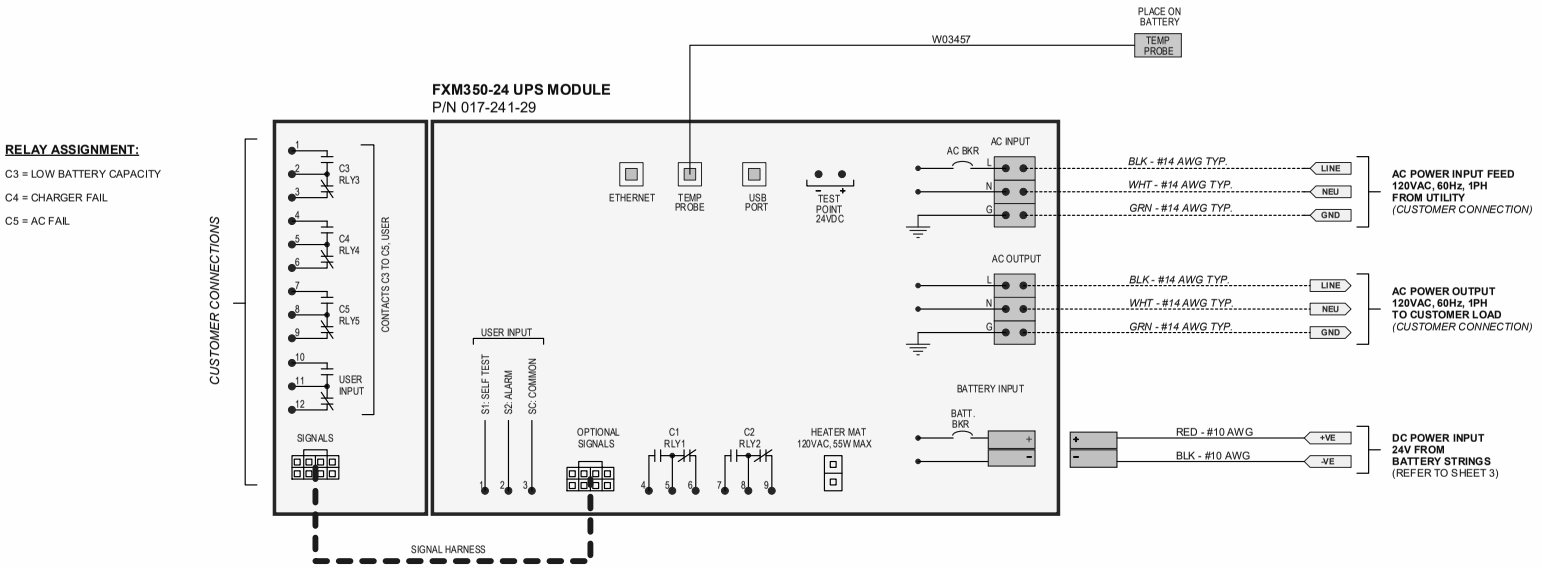
C	ADDED FUSES TO BAT STRING	JL	2018-05-28	JJ



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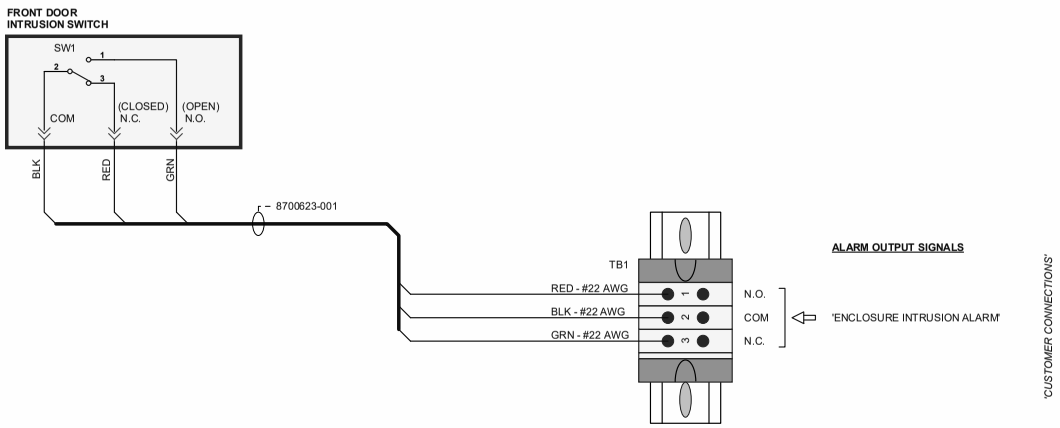

APPROVALS		DATE
DRAWN	JL	OCT-2017
CHECKED	JJ	JUL-2017

ALPHA TECHNOLOGIES™

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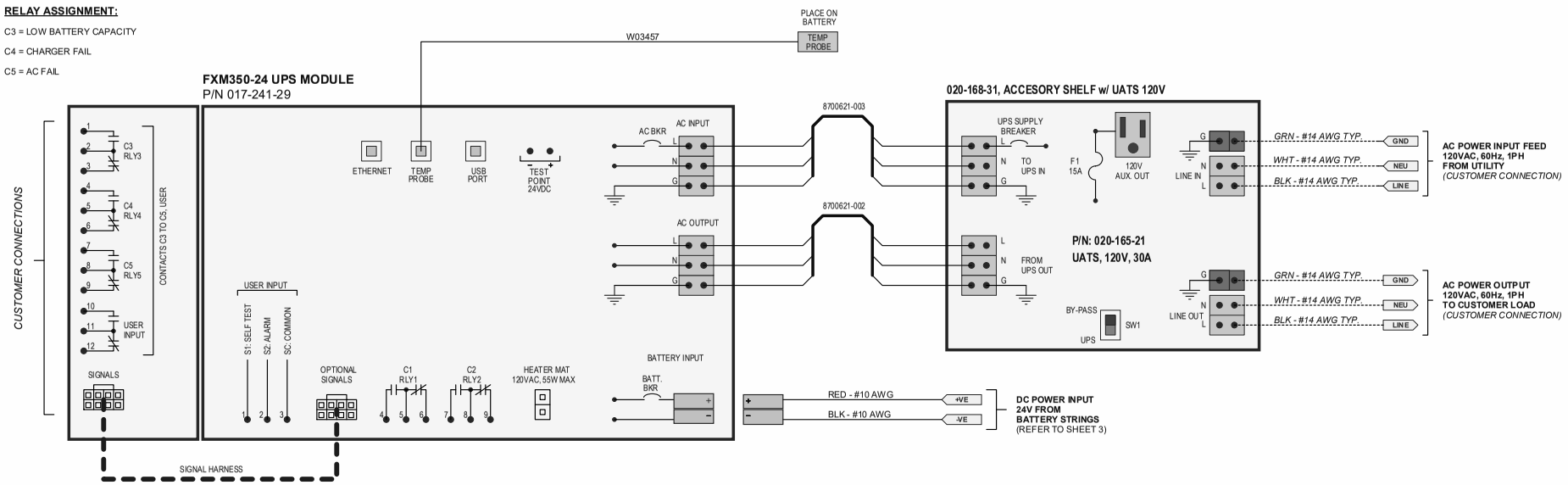
SIZE	DWG NO.	REV
B	0570214-05	C

SCALE NTS SHEET 1 of 3

FXM350 UPS MODULE AC POWER W/ UATS, BATTERY STRING, TEMPERATURE PROBE, ENCLOSURE INTRUSION & TEMPERATURE ALARM WIRING:



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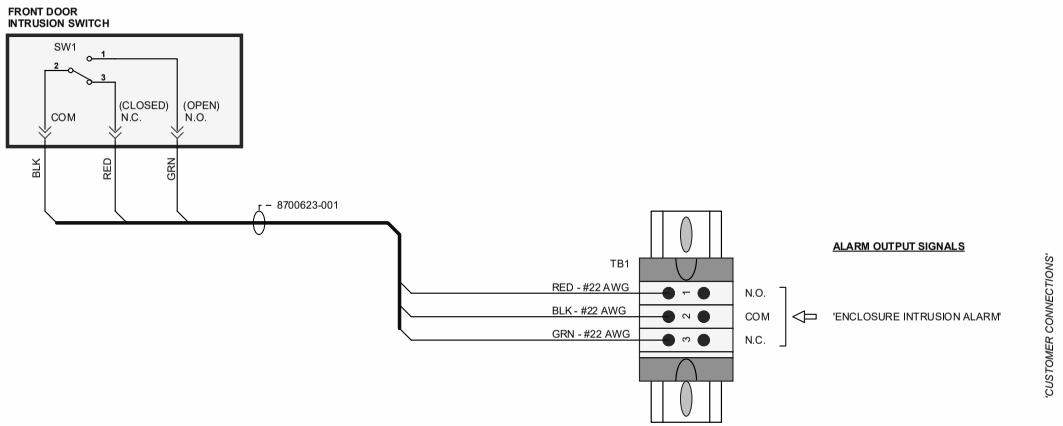

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SIZE B	DWG NO. 0570214-05	REV C
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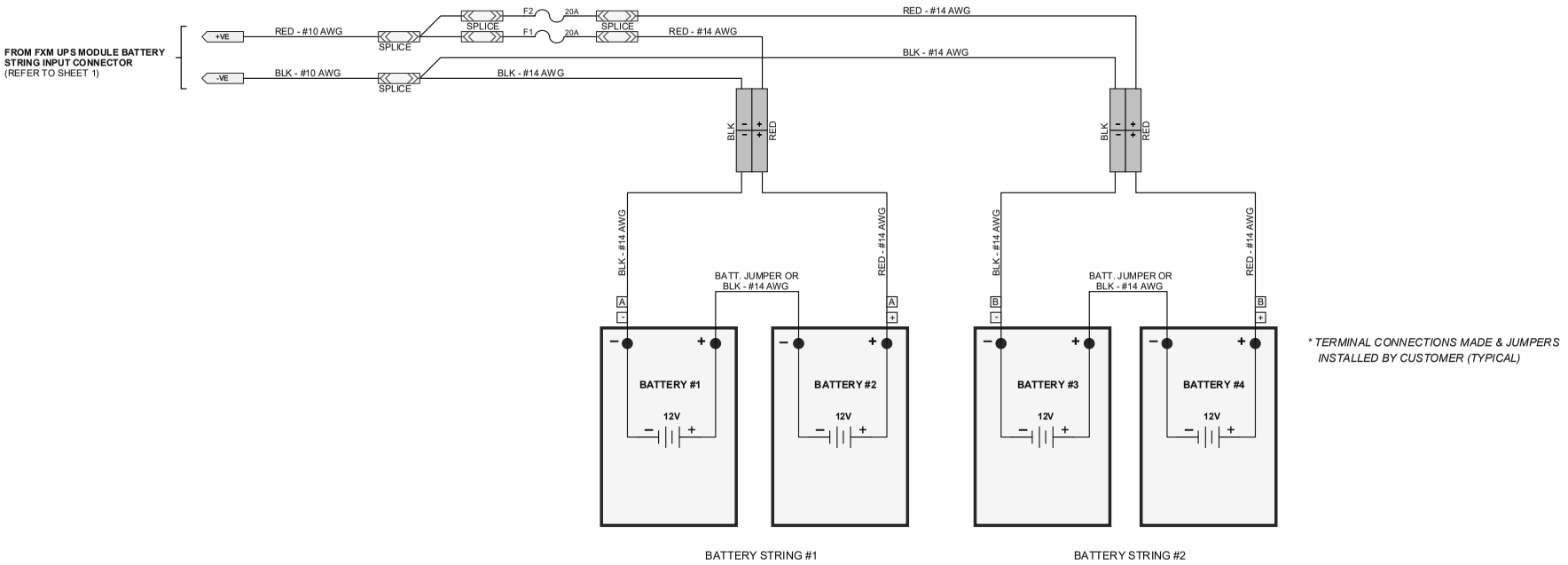

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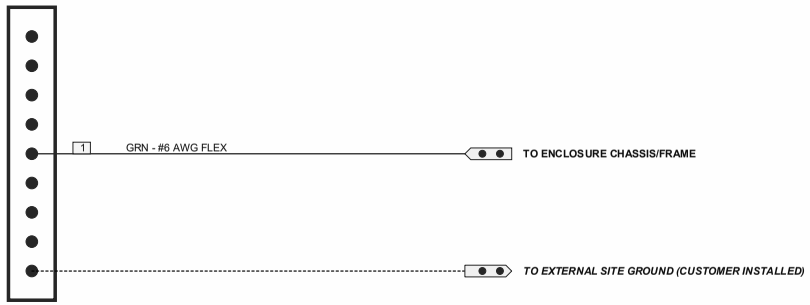

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SCALE: NTS	SHEET: 3 of 3	

CORDEX PSU24-400W RECTIFIER SHELF AND GMT FUSE DISTRIBUTION WIRING:

REVISIONS				
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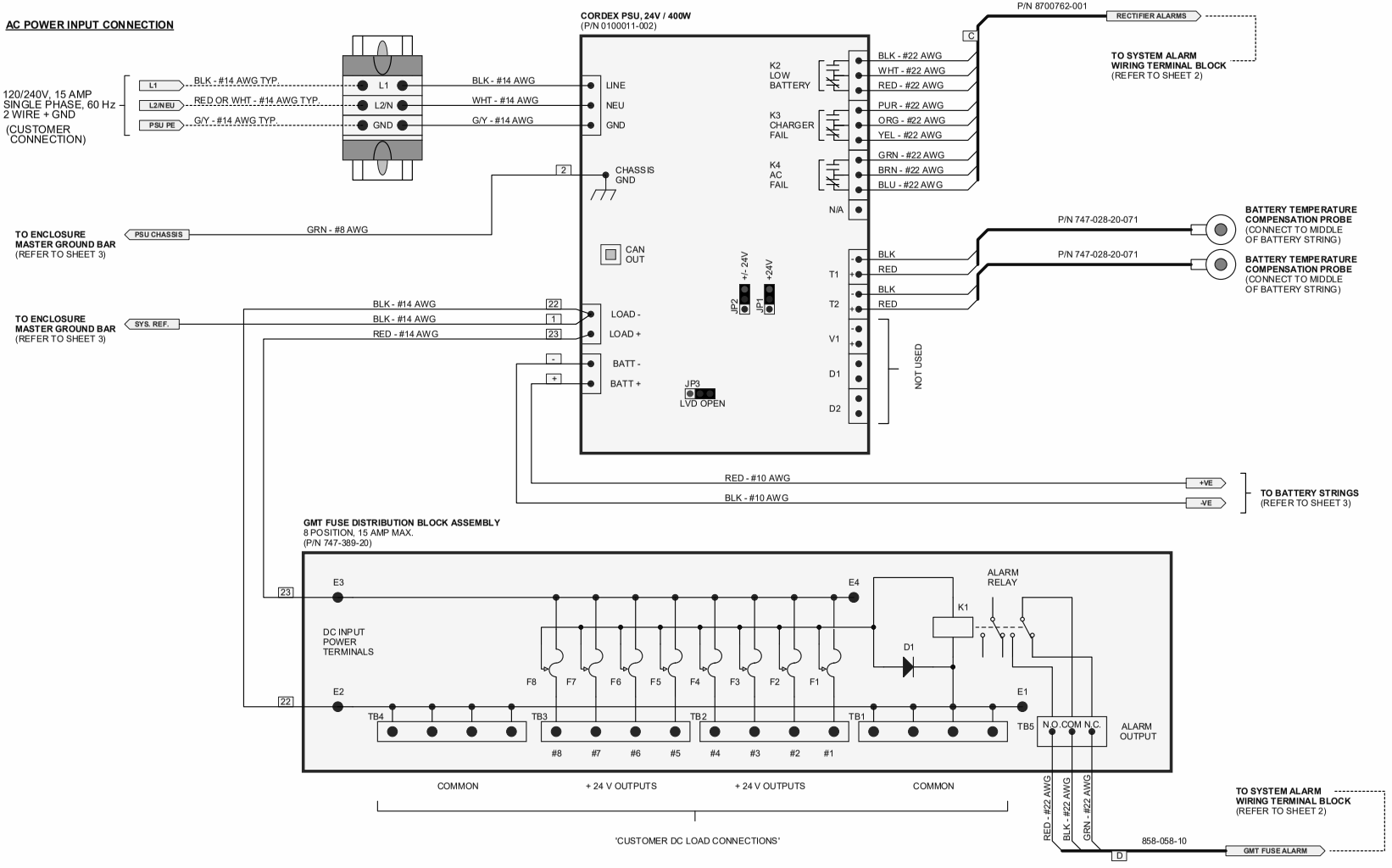

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DRAWN	JL	APR-2018
CHECKED	JJ	APR-2018

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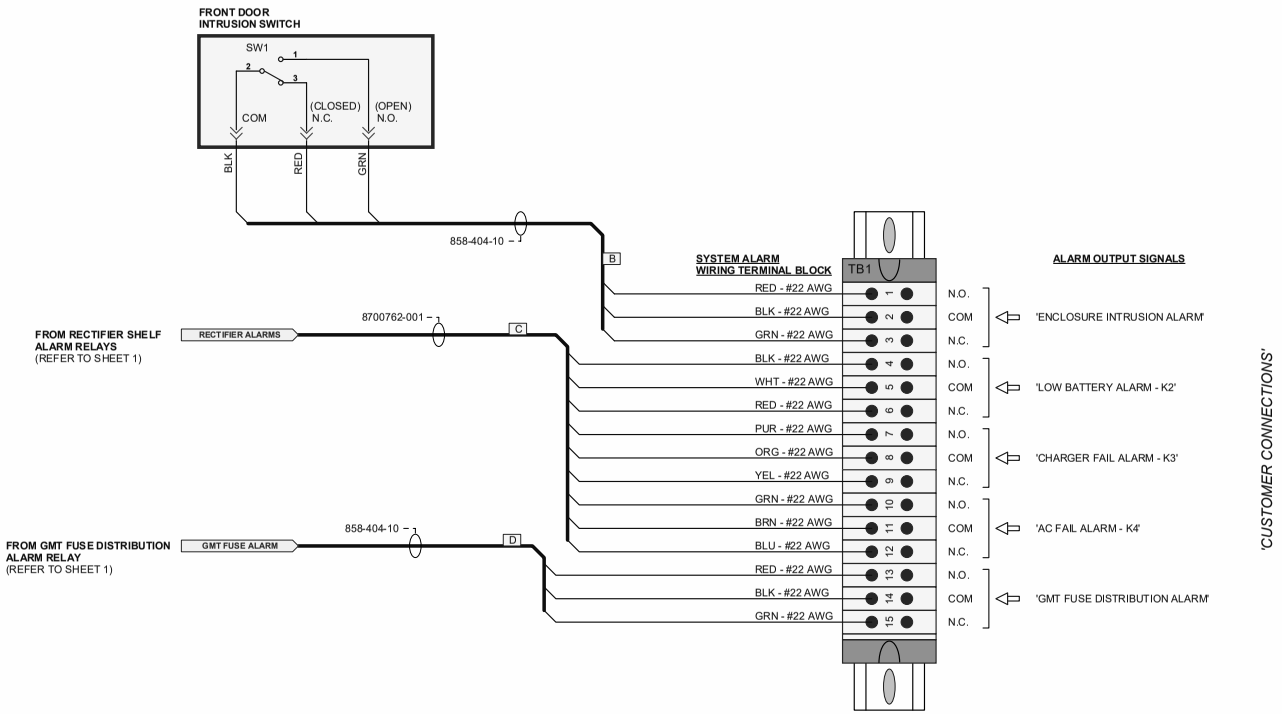
SIZE	DWG NO.	REV
B	0570196-05	A

SCALE: NTS SHEET: 1 of 3

ENCLOSURE SYSTEM SENSOR INPUT & ALARM OUTPUT WIRING:



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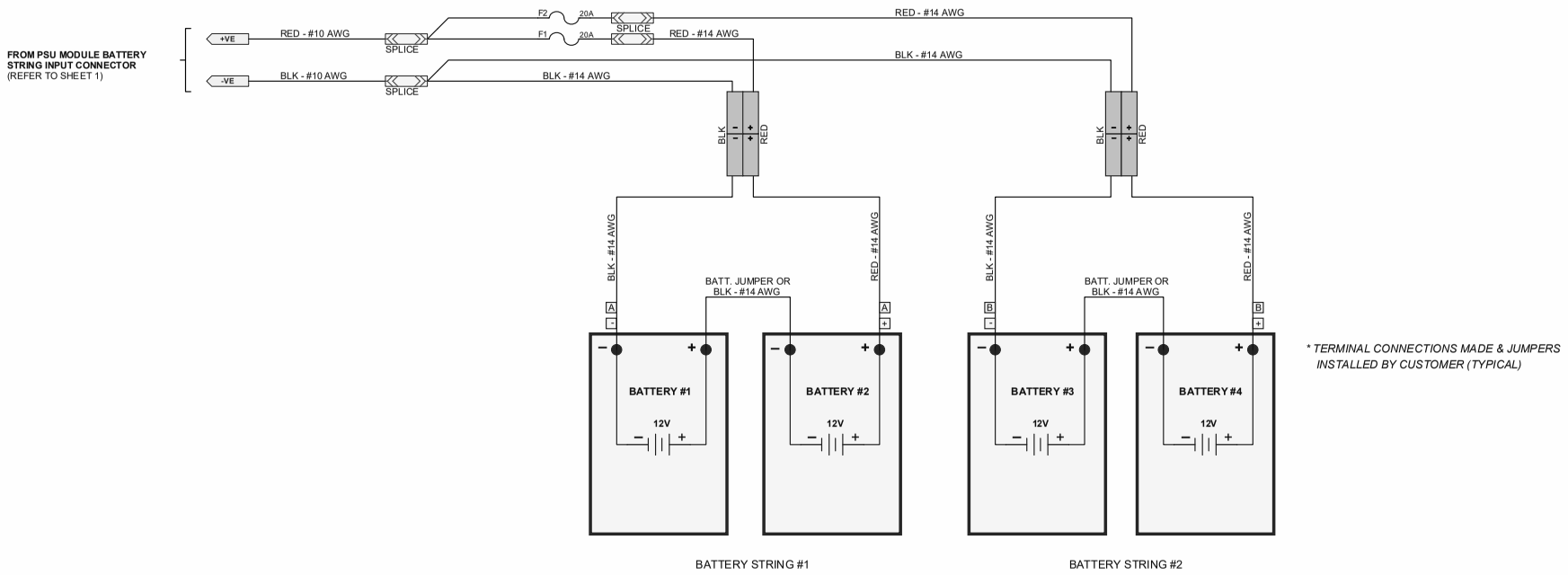

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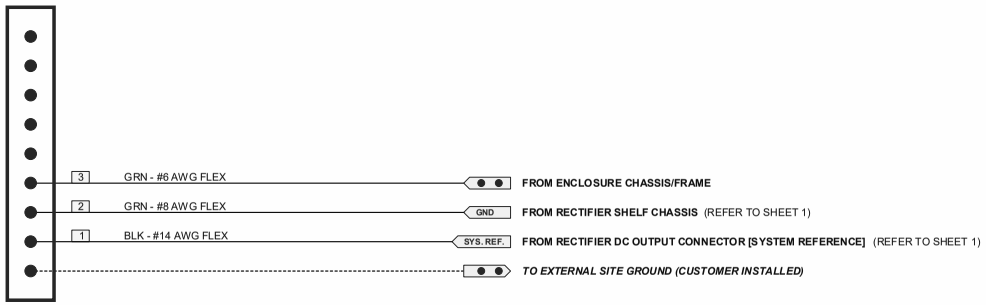

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SIZE B	DWG NO. 0570196-05	REV A
SCALE NTS	SHEET 3 of 3	

CORDEX PSU48-650W RECTIFIER SHELF AND GMT FUSE DISTRIBUTION WIRING:

REVISIONS				
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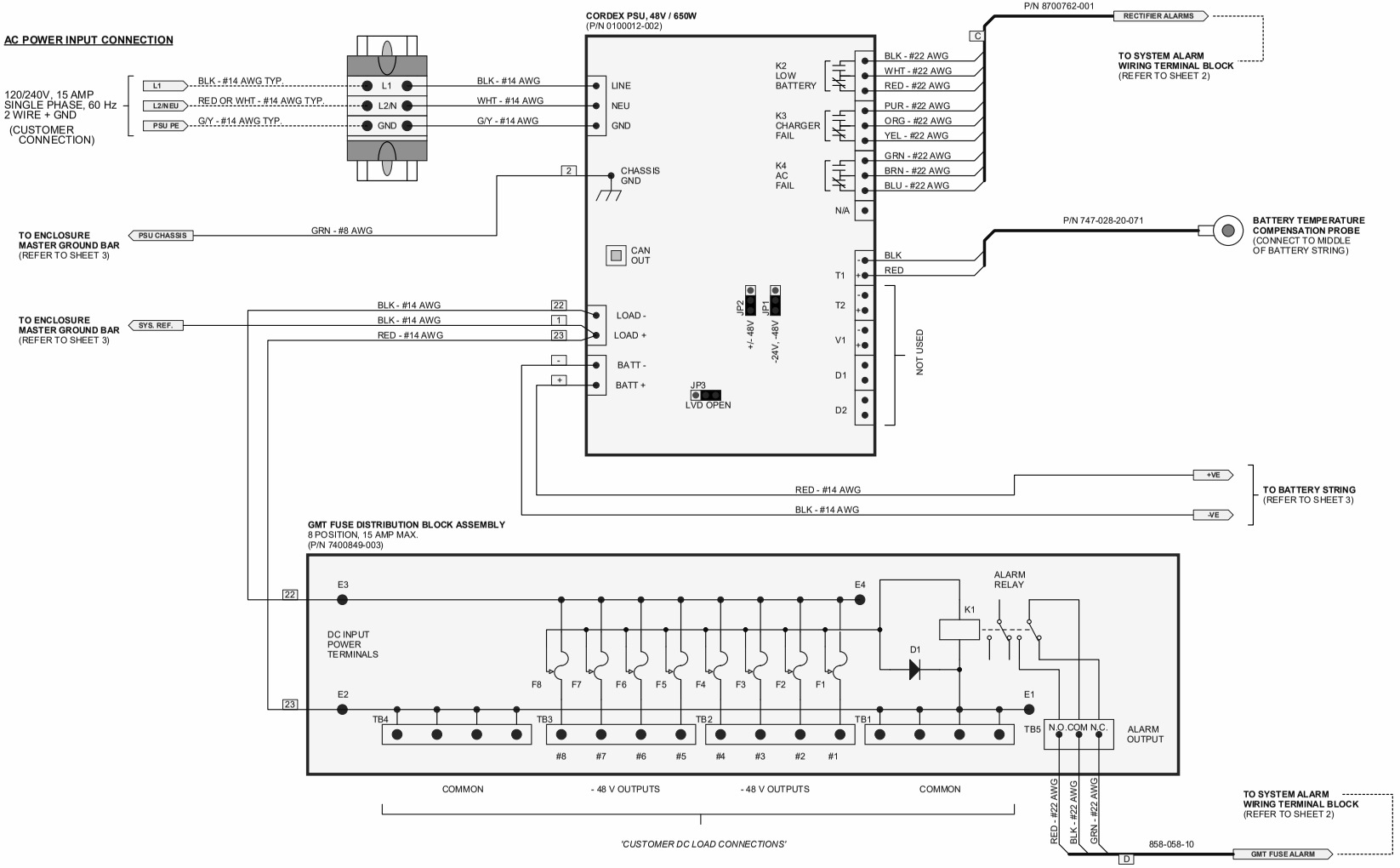

APPROVALS		DATE
DRAWN	JL	MAR-2018
CHECKED	JJ	MAR-2018

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SCALE: NTS SHEET: 1 of 3

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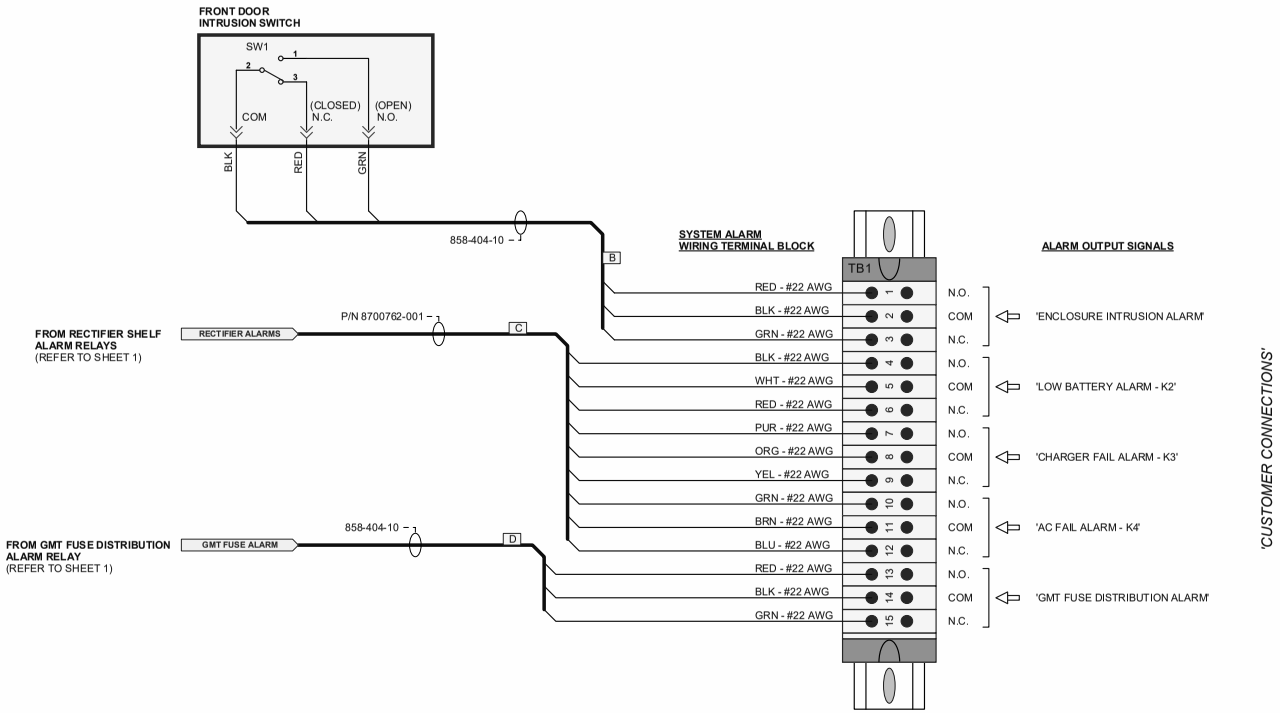

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SCALE NTS	SHEET 2 of 3	

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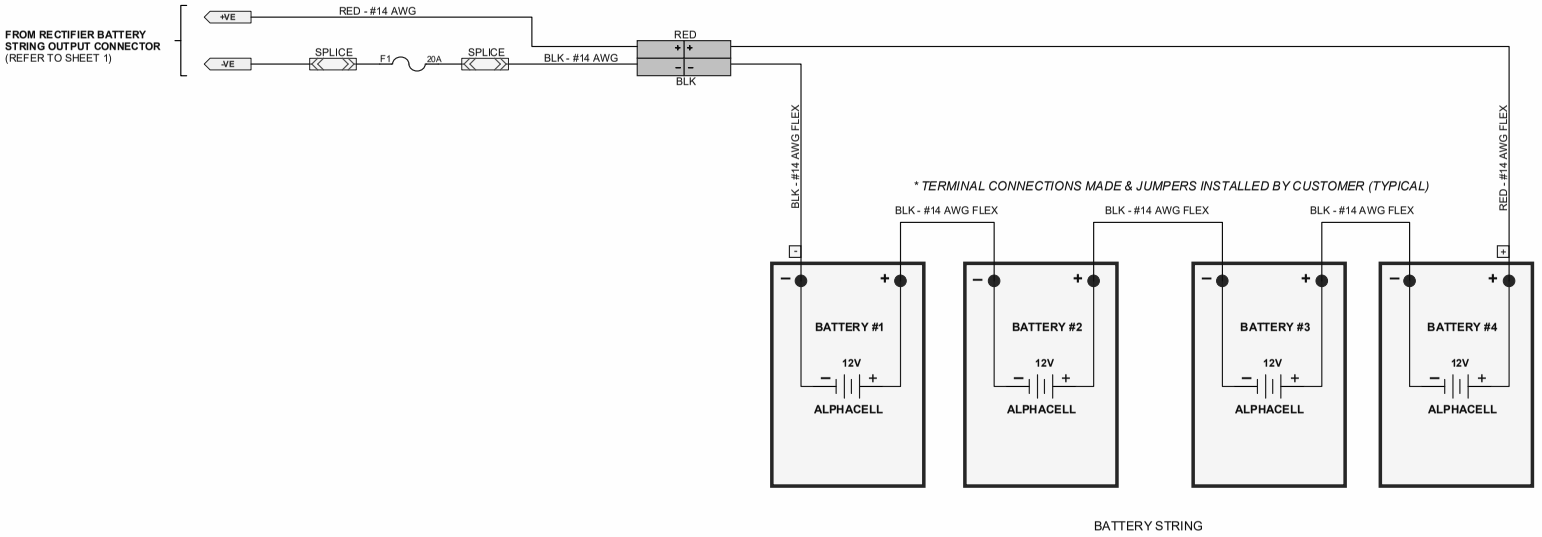

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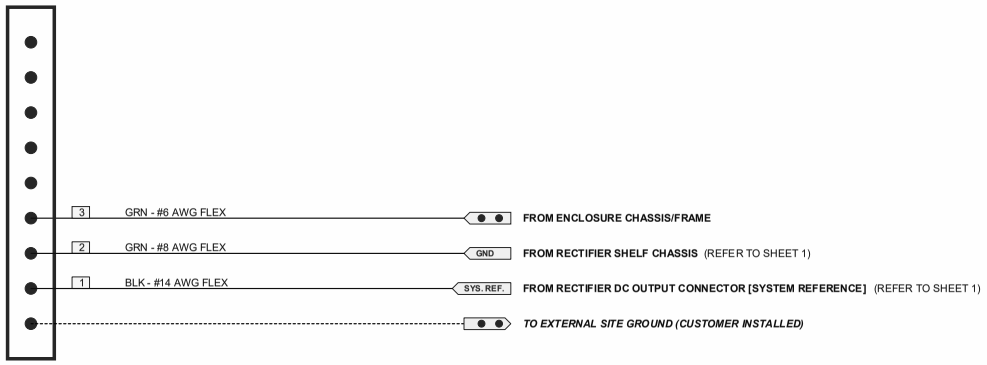

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SIZE B	DWG NO. 0570190-05	REV B
SCALE NTS	SHEET 3 of 3	

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México D.F. C.P.03810, México
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Toll Free: +01 800 0082 886
www.alphapower.mx

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Bengaluru – 560100, Karnataka, India.
Tel: +91 80 4123 0299
www.navsemi.com

Alpha Technologies Ltd.

member of The Group™

9400019-J0 (07/2018)