

# PWE/PME Series

Pole and Ground-mount Enclosures



## PWE/PME Series Technical Manual

*Effective: October 2015*

*Power* Alpha Technologies ®

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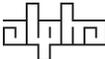
# PWE/PME Technical Manual

031-161-B0-005, Rev. F2

Effective Date: October 2015

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**NOTE:**

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



**NOTE:**

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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, please contact Alpha Technologies or your nearest Alpha representative.



**NOTE:**

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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 not consistent with its intended purpose, or installed or operated in an unapproved manner, or improperly maintained. Alpha pole-mount enclosure systems are designed for static applications.

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# Safety Notes

Review the drawings and illustrations contained in this manual before proceeding. If there are any questions regarding the safe installation or operation of this product, contact Alpha Technologies or the nearest Alpha representative. Save this document for future reference.

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.

## **ATTENTION:**

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



## **NOTE:**

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A NOTE provide additional information to help complete a specific task or procedure.



## **CAUTION!**

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The use of CAUTION indicates safety information intended to PREVENT DAMAGE to material or equipment.



## **WARNING!**

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WARNING presents safety information to PREVENT INJURY OR DEATH to the technician or user.

# Battery Maintenance Guidelines

The battery maintenance instructions listed below are for reference only. Battery manufacturer's instructions for transportation, installation, storage or maintenance take precedence over these instructions.

- To prevent damage, inspect batteries every 3 months for:
  - **Signs of battery cracking, leaking or swelling.** The battery should be replaced immediately by authorized personnel using a battery of the identical type and rating.
  - **Signs of battery cable damage.** Battery cable should be replaced immediately by authorized personnel using replacement parts specified by vendor.
  - **Loose battery connection hardware.** Refer to battery manufacturer's documentation for the correct torque and connection hardware for the application.
- Apply battery manufacturer's specified antioxidant compound on all exposed connections.
- Verify battery terminals and/or exposed connection hardware is not within 2 inches of a conductive surface. Reposition batteries as necessary to maintain adequate clearance.
- Clean up any electrolyte (battery emission) in accordance with all federal, state, and local regulations or codes.
- Proper venting of the enclosure is recommended. Follow the Battery Manufacturer's approved transportation and storage instructions.
- Always replace batteries with those of an identical type and rating. Never install old or untested batteries.
- Do not charge batteries in a sealed container. Each individual battery should have at least 0.5 inches of space between it and all surrounding surfaces to allow for convection cooling.
- All battery compartments must have adequate ventilation to prevent an accumulation of potentially dangerous gas.

## Recycling and Disposal Instructions

Spent or damaged batteries are considered environmentally unsafe. Always recycle used batteries or dispose of the batteries in accordance with all federal, state and local regulations.

## Electrical Safety

- Lethal voltages are present within the power supply and electrical boxes. Never assume that an electrical connection or conductor is not energized. Check the circuit with a volt meter with respect to the grounded portion of the enclosure (both AC and DC) prior to any installation or removal procedure.
- Always use the buddy system when working under hazardous conditions.
- A licensed electrician is required to install permanently wired equipment.
- Input voltages can range up to 240Vac. Ensure that utility power is disabled before beginning installation or removal.
- Ensure no liquids or wet clothes contact internal components.
- Hazardous electrically live parts inside this unit are energized from batteries even when the AC input power is disconnected.

## Mechanical Safety

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

# Battery Safety Notes



## WARNING!

Lead-acid batteries contain dangerous voltages, currents and corrosive material. Battery installation, maintenance, service and replacement must be performed only by authorized personnel.

## Chemical Hazards

Any gelled or liquid emissions from a valve-regulated lead-acid (VRLA) battery contain dilute sulfuric acid, which is harmful to the skin and eyes. Emissions are electrolytic, and are electrically conductive and corrosive.

### *To avoid injury:*

- Servicing and connection of batteries shall 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 hands and neck.
- Batteries produce explosive gases. Keep all open flames and sparks away from batteries.
- Use tools with insulated handles, do not rest any tools on top of batteries.
- Batteries contain or emit chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Battery post terminals and related accessories contain lead and lead compounds. Wash hands after handling (California Proposition 65).
- Wear protective clothing (insulated gloves, eye protection, etc.) whenever installing, maintaining, servicing, or replacing batteries.
- If any battery emission contacts the skin, wash immediately and thoroughly with water. Follow your company's approved chemical exposure procedures.
- Neutralize any spilled battery emission with the special solution contained in an approved spill kit or with a solution of one pound Bicarbonate of soda to one gallon of water. Report chemical spills using your company's spill reporting structure and seek medical attention if necessary.
- All battery compartments must have adequate ventilation to prevent an accumulation of potentially dangerous gas.
- Prior to handling the batteries, touch a grounded metal object to dissipate any static charge that may have developed on your body.
- Never use uninsulated tools or other conductive materials when installing, maintaining, servicing or replacing batteries.
- Use special caution when connecting or adjusting battery cabling. An improperly connected battery cable or an unconnected battery cable can make contact with an unintended surface that can result in arcing, fire, or possible explosion.

# 1.0 Introduction

PWE/PME Series enclosures support distributed powering architectures in pole and ground-mount broadband applications. Ideal for use in all climates, each enclosure comes with a removable lockable door and easy opening lid. Standard features include a high-magnetic circuit breaker, duplex AC receptacle, and service power inserter.

## Key Features:

- Engineered for broadband powering applications
- All aluminum welded construction and durable powdercoat finish
- Agency certified to meet applicable industry standards
- Internal or external SUSE rated service entrance options
- Optional Battery Integration Tray (BIT) (PWE 3/6 only)
- Portable generator cabling access door



Fig. 1-1, PWE-6 Enclosure with BIT

1.0 Introduction, continued

1.1 PWE/PME Series Enclosures

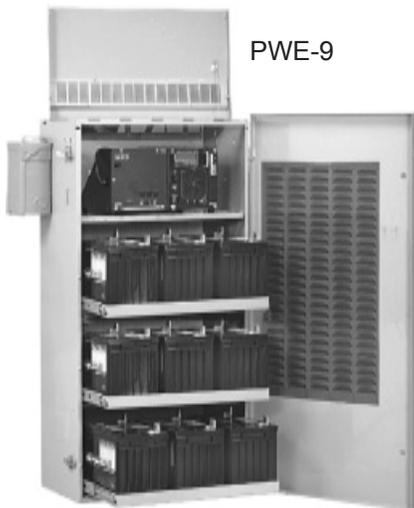
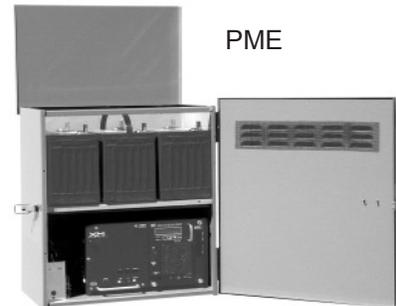
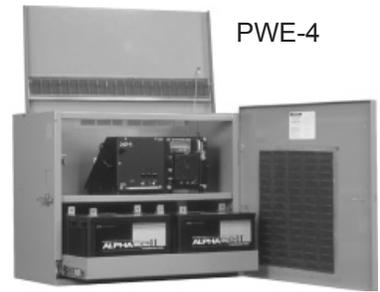
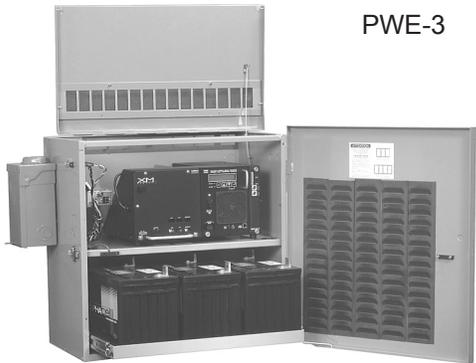


Fig. 1-2, PWE/PME Series Enclosures

## 1.0 Introduction, continued

### 1.2 PWE Enclosure Diagram



**NOTE:**

If the SPI is mounted in the location at the top of the enclosure, the SPI must be mounted vertically to allow space for other hardware.

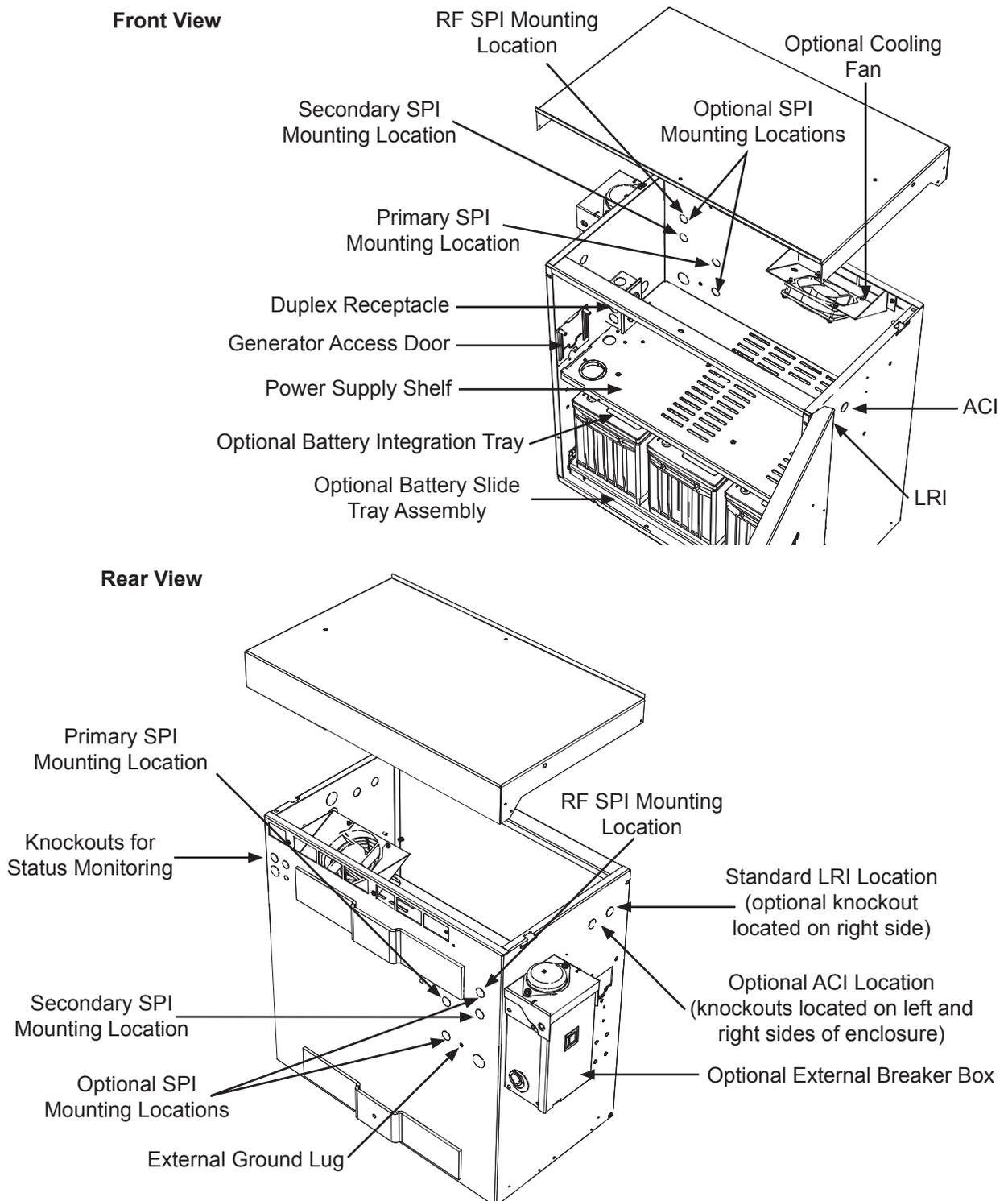


Fig. 1-3, PWE-3 Enclosure (configurations may vary)

## 1.0 Introduction, continued

### 1.3 Optional Features

Feature	Description
AC Indicator (ACI)	The ACI verifies voltage output with a green light. Located next to the LRI lamp on the outside of PWE/PME Series enclosures, it is easily monitored from the ground. Because of its longer life, Alpha recommends the ACI-LL (long life) LED over the incandescent light bulb design. 60V and 90V models are available.
Battery Heater Mat (BHM)	The BHM is AC line operated and turns on at 40°F. It increases battery capacity in cold environments. Battery heater mats are available in 120Vac and 240Vac versions.
Battery Mat Option (BMO)	The battery mat option provides additional battery cooling properties.
Battery Retaining Bar (BRB)	The BRB provides additional security against batteries falling out of the enclosure.
External Coax Raceway (ECR)	The ECR conceals and protects the coaxial cables outside the PWE-9 and PWE-D36 when ground-mounted. It is used in conjunction with the available pedestal mount, and is easily removed by unscrewing one wing-nut.
Enclosure Cooling Fan (ECF)	The ECF is a thermostat-controlled cooling system for PWE Series enclosures. Alpha recommends this option in extremely high-temperature environments. The fan automatically turns on at 140°F/60°C and off at 110°F/43°C. Replace the fan fuse with a 1/4" X 1-1/4" (6.4mm x 31.8mm), 5A, 250V fuse only (Alpha P/N 460-025-10).
Lightning Arrester-P+ (LA-P+)	The LA-P+ provides protection against voltage spikes caused by lightning and other power disturbances. It consists of three Metal Oxide Varistors (MOV), and is plugged directly into the enclosure's convenience outlet. The LA-P+ eliminates the need for hard-wired MOVs. Use the LA-P+ 120 in 120Vac applications, and the LA-P+ 240 in 240Vac applications.
Local Remote Indicator (LRI)	The LRI is a red lamp which indicates when the power supply is running in Standby Mode. A major alarm causes the lamp to flash, indicating service is required. Located on the outside of PWE/PME Series enclosures, it is easily monitored from the ground.
Module Retaining Cable (MRC)	The MRC attaches the XM Series 2 power supply to the PWE Series enclosure wall, preventing it from being knocked off of its shelf.
15A and 25A Service Power Inserters (SPI)	A Service Power Inserter is required in all enclosures. The primary function of the SPI is to provide a connection point between the Alpha power supply and the cable load. Additionally, the SPI can bypass the power supply with a Service Power Supply. A 15A SPI is standard on PWE/PME Series enclosures. The SPI-25 (25A) is for use with higher output current power supplies.
Solar Shield Kit (SSK)	The Solar Shield Kit maintains a cooler environment within the PWE-8 enclosure, prolonging the life of the batteries and the power supply. By protecting the enclosure's skin, the shield reduces the amount of solar radiation absorbed by the enclosure (Note: For PWE-8 enclosure only).
Storm Hood Kit (SHK)	The SHK offers protection against dirt and snow ingress. Alpha recommends the use of the ECF (Enclosure Cooling Fan) in enclosures equipped with the SHK.
Tamper Switch (TMPR SW)	The Tamper Switch is a magnetic door switch that connects to status monitoring equipment. Tamper Switches are available either as normally open (NO) or normally closed (NC) and set off an alarm if triggered.
Coax Surge Protector	Provides surge suppression for power supply.
External Generator Connector	Allows a permanent generator connection point.
Battery Slide Tray	Option allows access to battery cabling without removing batteries.
PWE High Security Device (PHSD)	The PHSD is constructed of high grade stainless steel to provide physical security, corrosion resistance, and a strong visible deterrence. The PHSD is compatible with Alpha's PWE enclosures including; PWE 3, 6, and 9.
Ladder Bracket	The ladder bracket option (Alpha P/N 745-095-21) easily attaches to all Alpha PWE Series enclosures and does not require a pole attachment point. The Ladder Bracket provides safe access for technicians servicing power supplies and batteries without the use of a bucket truck.
AlphaGEM	The AlphaGEM Generator Expansion Module is temporarily installed to provide backup power during extended outage periods. See the AlphaGEM Installation Instructions, Alpha P/N 745-872-C0.
BE-PWE	The BE-PWE expands battery backup capacity for PWE-3 enclosures. See the BE-PWE Technical Manual, Alpha P/N 033-077-C0.

## 1.0 Introduction, continued

### 1.4 The Battery Integration Tray

The optional Battery Integration Tray (BIT) eliminates the need for battery slide trays, and allows batteries to be individually installed or removed in PWE-3/6 enclosures. Each battery is connected directly to the BIT using modular 50A connectors.

The BIT further improves wire management by pre-terminating connections for status monitoring voltage sense leads and for the AlphaGuard battery balancer. This eliminates the need to stack multiple wire terminations on each battery terminal, vastly simplifying battery replacement. Battery preventative maintenance is virtually eliminated when the BIT is used in conjunction with the new AlphaCell threaded-insert batteries, which do not have to be re-torqued.

#### Key Features:

- Improves enclosure wire management and reduces clutter
- Eliminates the need for sliding battery trays
- Reduces battery preventive maintenance costs
- Pre-wired for status monitoring and AlphaGuard, eliminating stacked leads
- Allows direct connection to the AlphaGen DC portable generator
- Factory installed option in PWE-3/6 enclosures



Fig. 1-4, Battery Integration Tray (BIT)

## 1.0 Introduction, continued

### 1.5 PWE Battery Tray Latch Operation (optional)

As an added safety precaution, the PWE series features a latch to hold the optional battery slide trays securely in place, in both open and closed positions. The latch automatically locks in place when the tray is pushed back in.

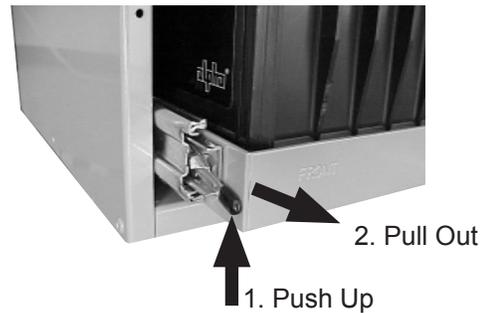


The maximum weight of the battery slide tray is indicated by the color of the cap on the latch:  
Black: max. 72lbs (32.7kg) (legacy enclosures); red: max. 82lbs (37.2kg) (standard for future enclosures).

#### Opening the PWE Battery Slide Tray:

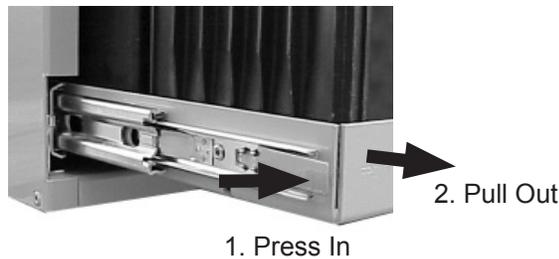


PWE Tray Latch Location



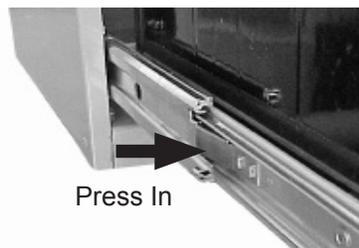
To open, push latch up and pull tray out. Tray automatically locks into "open" position.

#### Opening the PWE-4 and PWE-8 Trays:



To open, press tray latch in and pull tray out. Tray automatically locks in the "open" position.

#### Closing the Tray on all PWE models:



To unlock and close tray, press lock in toward tray and push tray closed.

When returned to the "closed" position, tray automatically locks back into place.

Fig. 1-5, Opening the PWE Battery Slide Trays

## 1.0 Introduction, continued

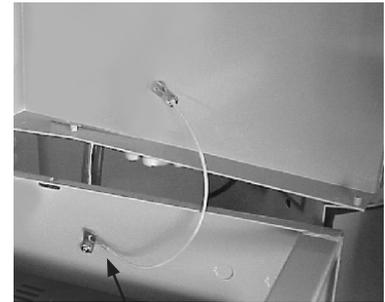
### 1.6 PWE Lid Removal



1. Pull Out



2. Pull Up



The lid can be completely removed by disconnecting retention strap

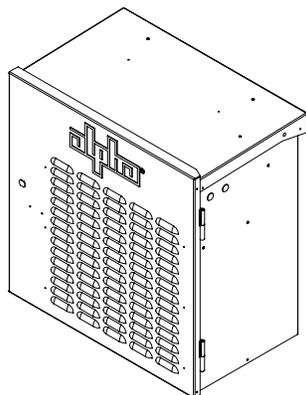
Fig. 1-6, PWE Lid Removal

### 1.7 PWE/PME Enclosure Specifications

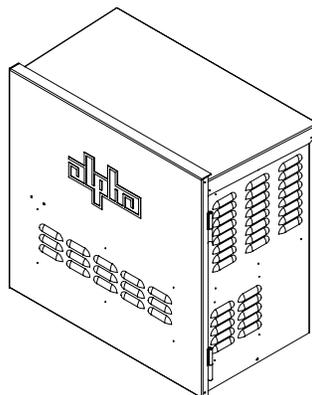
Model	Dimensions (W x H x D) (in/mm)	Shipping Weight (lb/kg)	Battery Capacity	Approx. Full System Weight (lb/kg)
PWE-3	24.25" x 24.5" x 14" / 616 x 622 x 356	38/17.2	3	349/158.3
PWE-4	30.25" x 24.75" x 16" / 768 x 629 x 406	59/26.8	4	445/201.8
PWE-6	24.25" x 36.75" x 14" / 616 x 933 x 356	56/25.4	6	594/269.4
PWE-8	30.25" x 36.88" x 16" / 768 x 937 x 406	90/40.8	8	780/353.8
PWE-9	24.25" x 47" x 14" / 616 x 1194 x 356	70/31.8	9	750/340.2
PWE-D36	24.25" x 47" x 14" / 616 x 1194 x 356	65/29.5	6	600/272.2
PME	22.25" x 24.5" x 14" / 565 x 622 x 356	34/15.4	3	344/156

Table 1-1, PME/PWE Enclosure Specifications

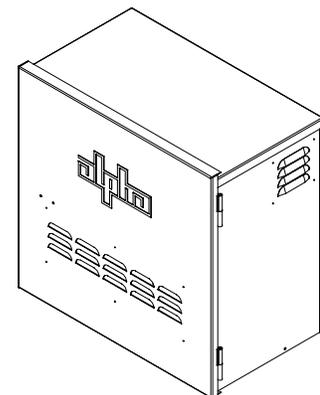
### 1.8 PWE Legacy Models



New PWE (Since April, 2002)



Type II PWE



Type I PWE

## 2.0 Installation



### CAUTION!

- Never transport the unit with installed batteries. Doing so can cause injury or damage to the enclosure and installed equipment. Install the batteries after you transport the unit to the site and secure it to the pole.
- Alpha recommends that you position the enclosure on the opposite side of the pole from traffic. This reduces the danger of falling equipment in the event that a pole is struck by an automobile.
- Mounting bolts must completely penetrate the wooden pole. Secure the bolts from the back with a large washer and nut.
- System installation at  $>5^\circ$  angle not recommended.
- In case the unit is mounted off plumb, Alpha recommends the Battery Retaining Bar (p/n 744-346-20)

### ATTENTION:

The majority of poles belong to the local utility. Before you install an enclosure have both the location and mounting method approved by the utility. Because most codes require the enclosure to be located at a minimum height from the ground, always verify local height restrictions before you proceed.

## 2.1 Pole-mounting

### 2.1.1 Wooden Pole

#### Tools and Materials Required (customer supplied):

- Two (three for PWE-8, 9, D36) 5/8" (16mm) diameter machine bolts, length to suit pole
- Two 5/8" (16mm) diameter zinc plated flat washers
- Two 5/8" (16mm) diameter hex nuts (UNC thread)
- Auger or drill for boring 11/16" (17.5mm) diameter holes in the wooden pole
- Mallet or hammer
- Assorted sockets
- Tape measure
- Three-foot level

#### Procedure:

1. Unpack the enclosure and galvanized brackets.
2. Mark the position for the upper bracket on the utility pole. From the installation side of the pole, and using a three-foot level to verify level, drill a 11/16" (17.5mm) hole completely through the pole.
3. Mark the location of the hole(s) for the lower bracket(s). For three-bracket enclosures, use the one-piece, 3-point bracket as a template. Spacing between the holes is as follows:

Enclosure	Distance (on center) (in/mm)
PWE-3 and PME	18/457.2
PWE-4	15/381
PWE-6	30/762
PWE-8, PWE-9, PWE-D36 (three holes)	15 (30 total)/ 381 (762 total)

4. Using the three-foot level to verify drill angle, drill the 11/16" (17.5mm) hole or holes for the lower bracket or brackets from the installation side of the pole.



### NOTE:

Drill all holes from the enclosure side of the pole to ensure proper spacing.

## 2.0 Installation, continued

### 2.1 Pole-mounting, continued

#### 2.1.1 Wooden Pole, continued

5. Secure the brackets to the pole using the 5/8" (16mm) machine bolts, washers, and nuts.
6. Lift the enclosure onto the brackets. It might be necessary to rock and pull the enclosure to properly seat it on the brackets.
7. Secure the enclosure to the brackets using the 3/8" x 3/4" (10mm x 19mm) hex bolts.
8. Make sure all nuts and bolts are fully tightened and the flanges of the brackets seat in the wood.
9. The enclosure is now ready for the utility connection, power module, and batteries.

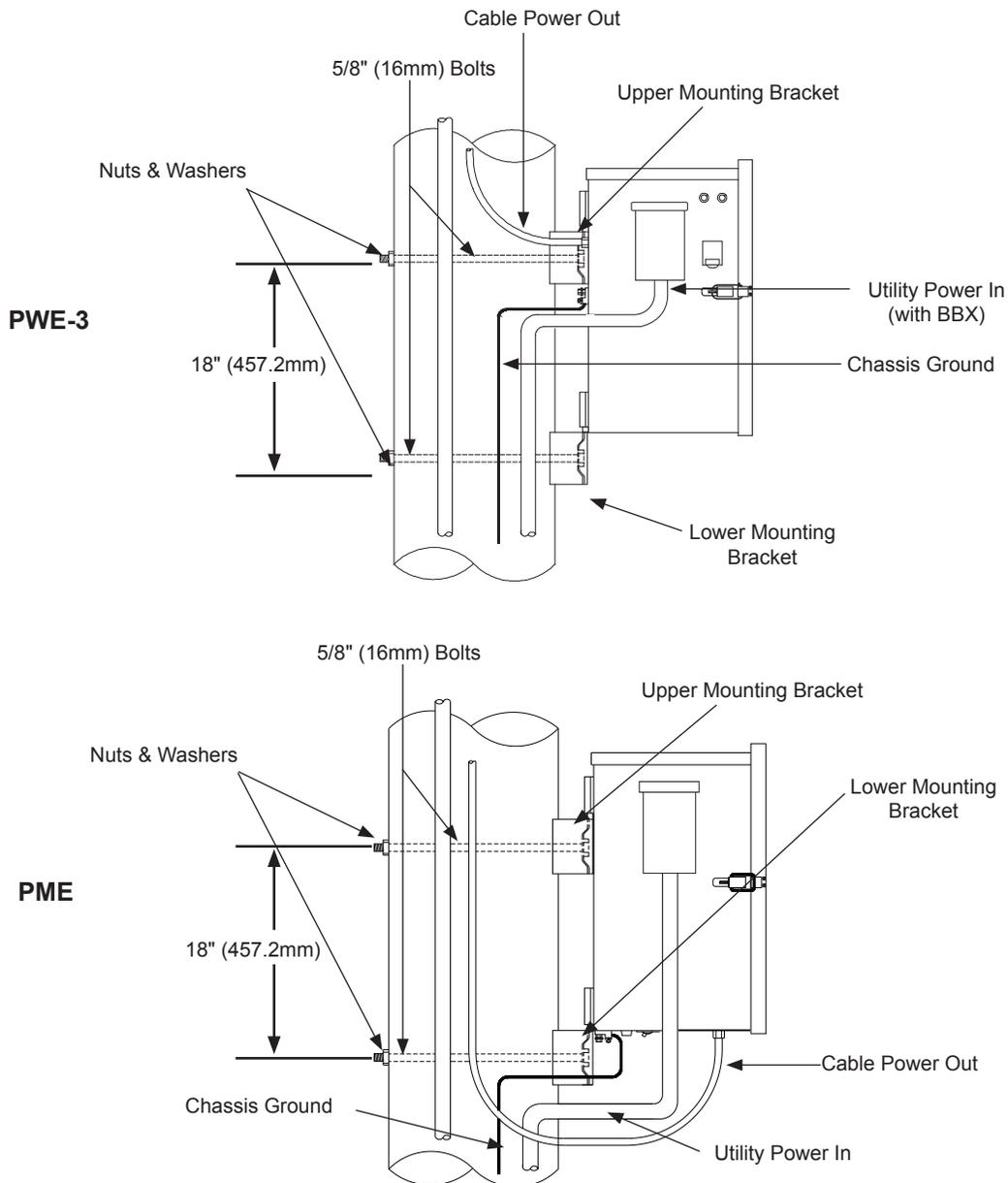


Fig. 2-1, PWE/PME Series Wooden Pole Mounting

## 2.0 Installation, continued

### 2.1 Pole-mounting, continued

#### 2.1.2 Concrete or Steel Pole

**Tools and Materials Required (customer supplied):**

- Stainless steel banding (or equivalent), rated to support loaded enclosure and sized for pole diameter
- Assorted sockets

**Procedure:**

1. Unpack the enclosure and galvanized brackets; turn the enclosure facedown on a soft surface.
2. Slide a bracket up through the enclosure's lower mounting bracket. The bracket's flanges must face away from the enclosure. Secure the lower mounting bracket using the 3/8" x 3/4" (10mm x 19mm) hex bolt included.
3. Position the upper mounting bracket on the pole and secure using banding.
4. Lift the enclosure onto the upper mounting bracket and pull downward to properly seat it. Center the enclosure on the pole.
5. Secure the lower mounting bracket on the pole using banding. Spacing between banding is as follows:

<b>Enclosure</b>	<b>Distance (on center) (in/mm)</b>
PWE-3 and PME	18/457.2
PWE-4	15/381
PWE-6	30/762
PWE-8, PWE-9, PWE-D36 (three straps)	15 (30 total)/ 381 (762 total)

6. The enclosure is now ready for the utility connection, power module, and batteries.

**2.0 Installation, continued**

**2.1 Pole-mounting, continued**

**2.1.2 Concrete or Steel Poles, continued**

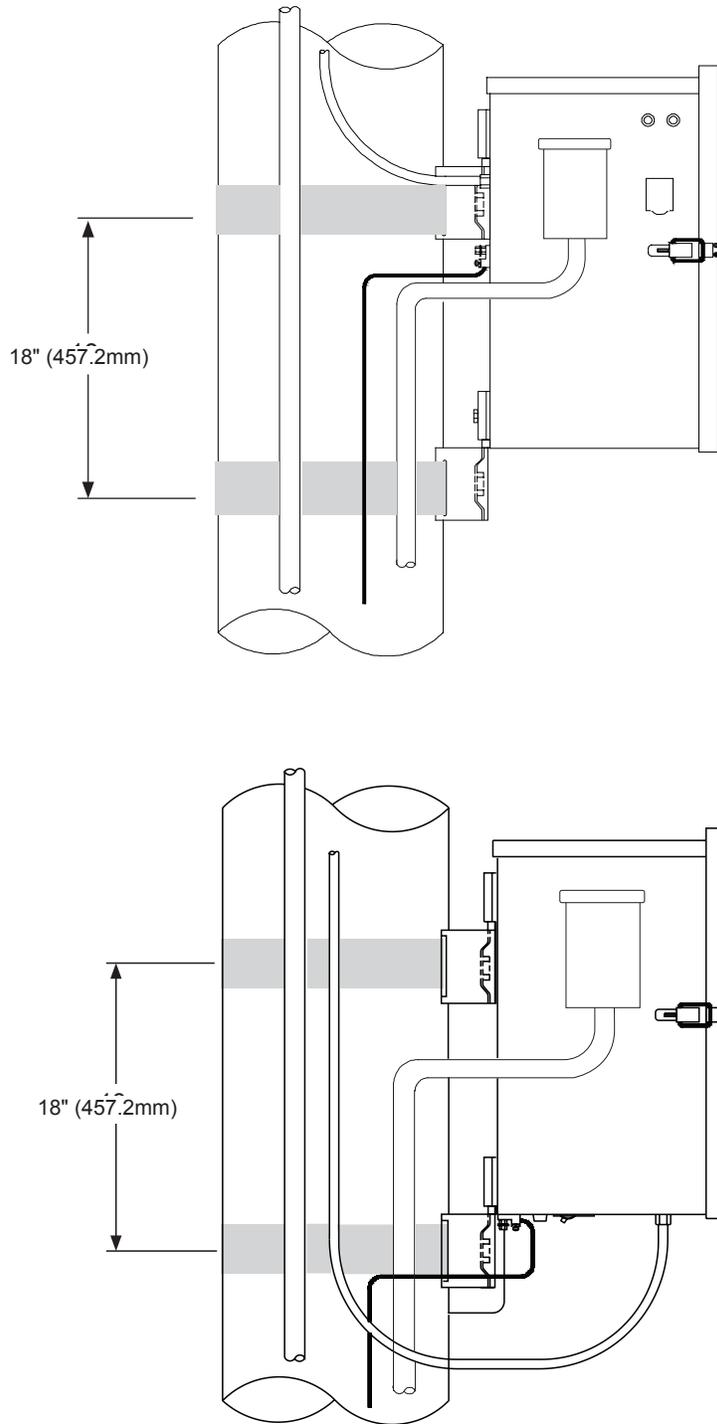


Fig. 2-2, PWE/PME Series Steel or Concrete Pole-mounting

## 2.0 Installation, continued

### 2.1 Pole-mounting, continued

#### 2.1.3 Enclosure Grounding: Pole-mount

 **NOTE:** Alpha recommends using the grounding method illustrated below. The grounding method may vary depending on local codes and other site-specific characteristics.

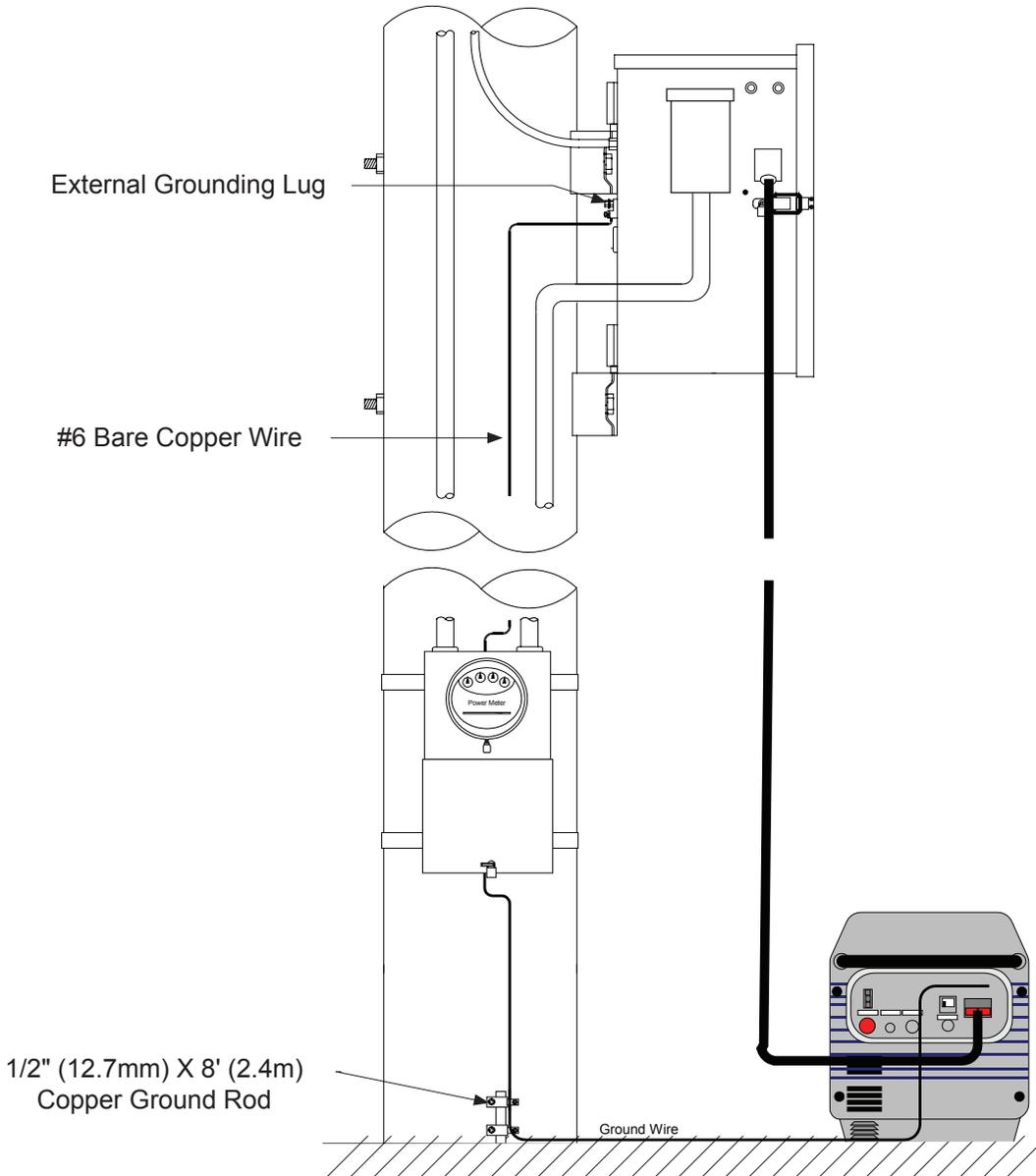


Fig. 2-3, Enclosure Grounding for Pole-mount Configuration  
(with generator backup)

## 2.0 Installation, continued

### 2.2 Ground-mount Installation: PWE-4, PWE-8, PWE-9, PWE-D36



#### CAUTION!

Never transport the unit with installed batteries. Doing so can cause injury to the installer, or damage the enclosure and equipment. Install the batteries after you transport the unit to the site and secure it to the pad.

#### ATTENTION:

It is the responsibility of the installer to meet the requirements of all applicable national and local codes. Alpha Technologies assumes no responsibility or liability for failure of the installer to comply with the requirements of all applicable local and national codes.

#### 2.2.1 Pre-Installation

Before choosing a location and beginning installation, consider the following:

- Provide adequate room for service personnel to remove the doors for battery installation and removal.
- Wherever possible, select a site that is above the 100-year flood plain and away from residences.
- Locate in the shade to minimize the effects of solar loading.
- Locate in an area with good airflow.
- Locate away from sprinkler systems or other sources of forced water.
- Locate out of the prevailing wind to minimize the buildup of snow or accumulation of wind-borne dust.
- Avoid locating the enclosure where it will be an obstruction or will inhibit visibility.
- Evaluate the soil conditions for suitability for the installation of the grounding system applicable to your particular installation.
- Is utility power cabling run to and terminated at the site?



#### NOTE:

The appropriate grounding method for a particular location depends on soil type, available space, local codes, NEC (National Electric Code), and other site-specific characteristics.

## 2.0 Installation, continued

### 2.2 Ground-mount Installation: PWE-4, PWE-8, PWE-9, PWE-D36, continued

#### 2.2.1 Pre-Installation, continued

Alpha Technologies, Inc. cannot anticipate all the ways a vehicle could threaten an installed system or the specific type of protection that is appropriate for a particular location. The following installation drawing for Alpha's Standby Power systems are general recommendations and not intended to be a specific guideline for protecting the equipment. The numbers of bollard posts (or other protection devices) depend upon equipment locations.

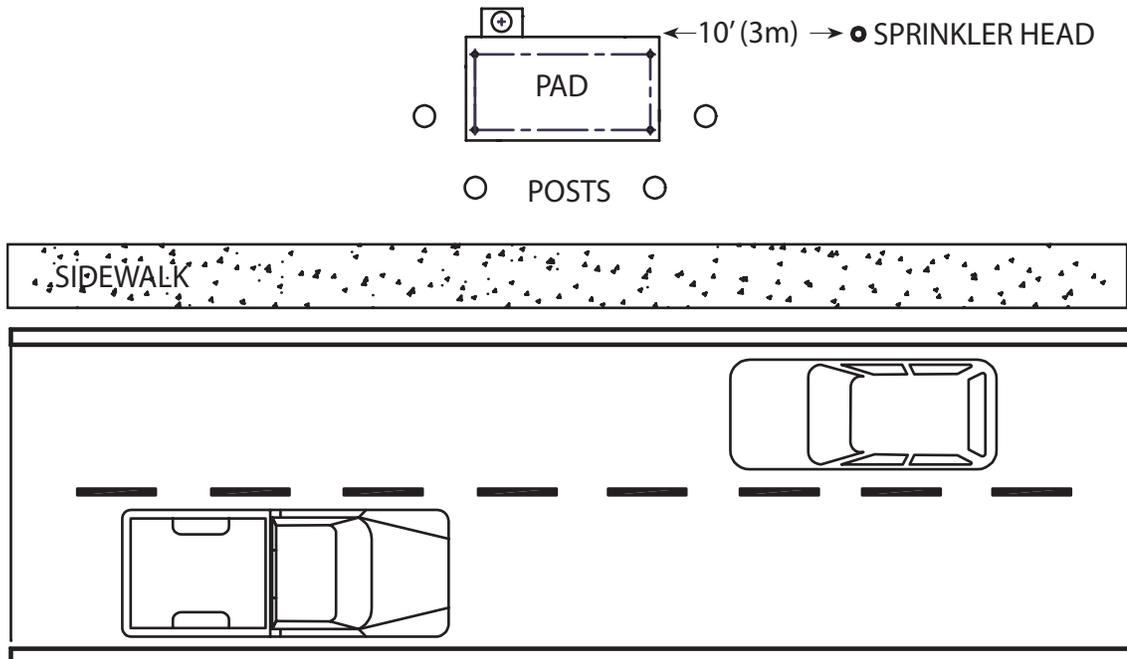


Fig. 2-4, Ground-mount Positioning and Safety

## 2.0 Installation, continued

### 2.2 Ground-mount Installation: PWE-4, PWE-8, PWE-9, PWE-D36, continued

#### 2.2.2 Enclosure Grounding: Ground-mount

##### NOTE:

- Alpha generally recommends using the grounding method illustrated below. However, the grounding method appropriate for a particular site depends on local codes, the NEC (National Electric Code), and other site-specific characteristics.
- Alpha Technologies recommends 5 ohms minimum ground resistance between enclosure and ground rods, in accordance with IEEE 1100-1999 Powering and Grounding Electronic Equipment.
- Alpha Technologies assumes no responsibility or liability for failure of the installer to comply with the requirements of all applicable local and national codes. Where allowed, exothermic welding may be used as an alternative to Burndy clamps and connectors.

##### CAUTION!

Corrosion-proof, twenty-five-year connections suitable for direct burial must be used.

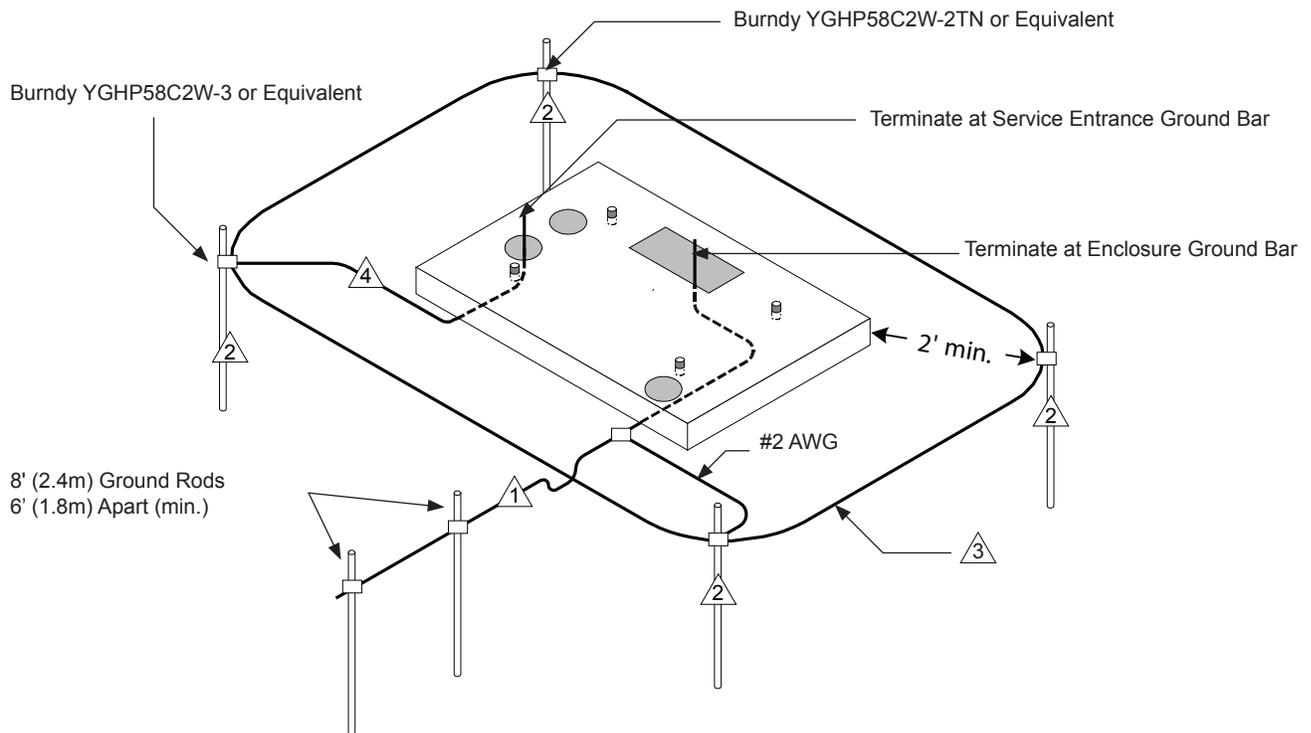


Fig. 2-5, Suggested Grounding Method

##### Service Grounding (required)

- 1 #6 bare copper wire from service entrance ground bar, with two 1/2" X 8' (12.7mm x 2.4m) copper ground rods, driven at least six feet (1.8 meters) apart.

##### Lightning Protection (optional)

- 2 Four 1/2" X 8' (12.7mm x 2.4m) copper ground rods, driven at least two feet from pad.
- 3 #6 bare copper wire loop, at least 30" (762mm) below grade, and terminated at each ground rod.
- 4 #6 bare copper wire from loop to enclosure ground bar in service entrance.

## 2.0 Installation, continued

### 2.2 Ground-mount Installation PWE-4, PWE-8, PWE-9, PWE-D36, continued

#### 2.2.3 Ground-mount Installation, PWE-3, PWE-9 and PWE-D36

##### NOTE:

PWE-9 and PWE-D36 enclosures require a pedestal mount kit and Coax Raceway for ground installation. Pedestal kit part number: 745-400-20 (gray); 745-400-21 (white). Coax Raceway part number: 604-432-B1 (gray); 604-432-C3 (white).

##### **Tools and Materials Required (customer supplied):**

- Four 1/2" (12mm) anchor bolts (Hilti-style recommended)
- Four 1/2" (12mm) stainless steel washers
- 2' X 3' (.6m x .9m) continuous vapor barrier (e.g. 30 lb. felt, neoprene pond liner, or a heavy grade tar paper)
- Hammer drill
- 1/2" (12mm) drill bit
- 1/2" (12mm) wrench
- Metal punch
- Mallet or hammer
- Torque wrench
- Tape measure

##### CAUTION!

A 25+ year continuous vapor barrier must be placed between the pedestal and the pad to prevent moisture ingress and corrosion caused by metal-to-concrete contact.

##### **Procedure:**

1. Place the vapor barrier material on concrete pad.
2. Using the pedestal as a template, mark the vapor barrier material in the locations of the four anchor bolts holes.
3. Drill 1/2" (12mm) holes through the vapor barrier and into the pad at the four marked anchor points.
4. Position the pedestal over holes and insert anchor bolts. Torque the anchor bolts to bolt manufacturer specifications. If Hilti-style bolts are used, torque until head pops.
5. On the enclosure, remove the four 3/8" (9.5mm) diameter knock-outs located beneath the lower battery shelf.
6. Lift the enclosure onto the pedestal. Slide the lower battery tray to the fully extended and locked position. Align the four enclosure mounting holes with the mounting holes on the top of the pedestal. Secure the enclosure to the pedestal using the provided 1/4" (19mm) hardware. Torque to 75 in-lbs (8.5 Nm).
7. Trim away excess vapor barrier material.
8. The enclosure is now ready for the utility connection, power module, and batteries.

## 2.0 Installation, continued

### 2.2 Ground-mounting PWE-4, PWE-8, PWE-9, PWE-D36, continued

#### 2.2.3 PWE-9 and PWE-D36 Ground-mount Installation, continued

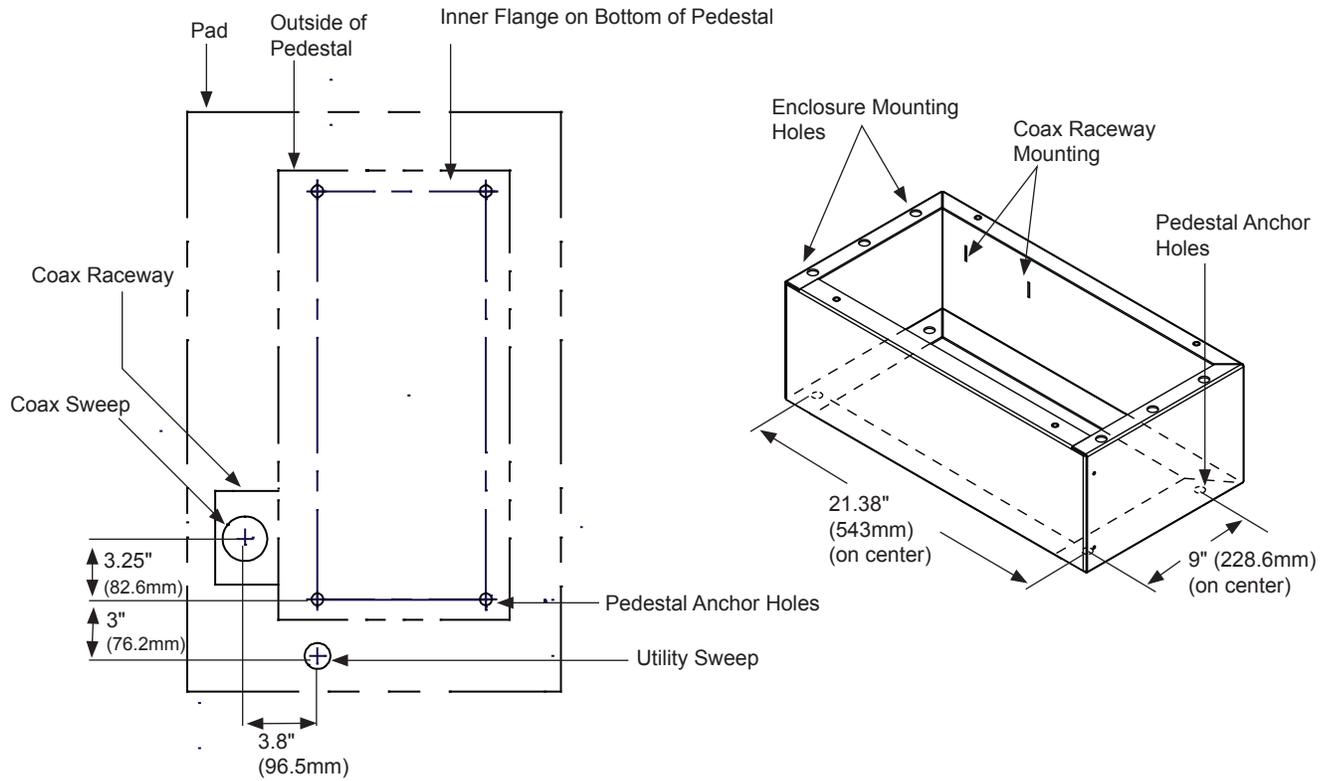


Fig. 2-6, PWE-3, PWE-6, PWE-9, and PWE-D36 Enclosure Pedestal

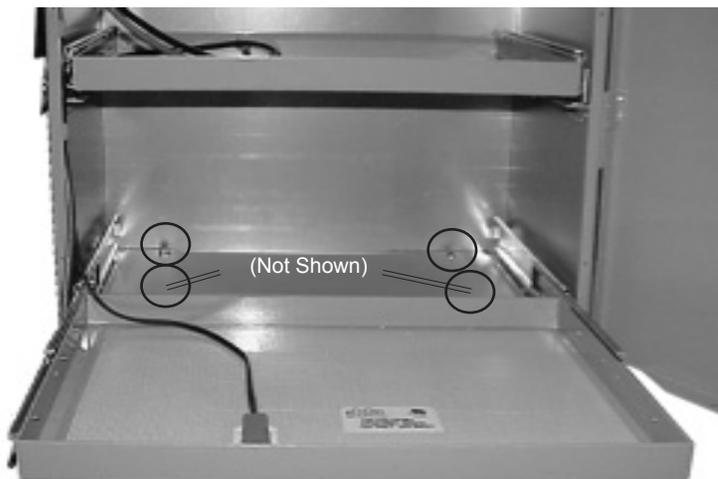


Fig. 2-7, Location of (4) Knockouts for Enclosure-to-Pedestal Mounting  
(Note: two locations are not shown in picture)

## 2.0 Installation, continued

### 2.2 Ground-mount Installation, PWE-4, PWE-8, PWE-9, PWE-D36, continued

#### 2.2.4 PWE-4 and PWE-8 Ground-mount Installation

 **NOTE:**

PWE-4 and PWE-8 enclosures require a ground mount kit for ground installation. Alpha P/N 745-067-20. This kit only fits enclosures manufactured after April 2002. See Fig. 2-11 to identify compatible enclosures.

**Tools and Materials Required (customer supplied):**

- Four 1/2" (12mm) anchor bolts (Hilti style recommended)
- Four 1/2" (12mm) stainless steel washers
- Hammer drill
- 1/2" (12mm) drill bit
- 1/2" (12mm) wrench
- Metal punch
- Mallet or hammer
- Torque wrench
- Tape measure

**Procedure:**

1. Turn the enclosure face down on a soft, non-abrasive surface. Remove the six knock-outs on bottom of enclosure using a hammer and a metal punch.

 **CAUTION!**

Metal from knockouts must be removed from the enclosure before installing batteries or electronics.

2. Secure the mounting brackets to the enclosure with the six bolts provided. Insert the bolts from inside the enclosure. Use the holes in the battery tray to access the front bolt locations (See Fig. 2-8). Tighten the bolts to 240 in-lbs (27.1 Nm).
3. Use the enclosure with mounting brackets installed as a template and mark the four anchor bolt locations on the pad.
4. Drill the holes for the four anchor bolts in the pad.
5. Mount the enclosure to the pad using the 1/2" (12mm) anchor bolts and washers. Torque bolts to manufacturer's specifications. If Hilti style bolts are used, torque until head pops.
6. The enclosure is now ready for the utility connection, power supply, and batteries.

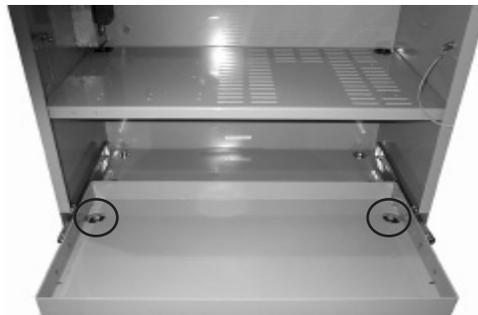


Fig. 2-8, Access Holes for Front Bracket Mounting Locations

## 2.0 Installation, continued

### 2.2 Ground-mount Installation, PWE-4, PWE-8, PWE-9, PWE-D36, continued

#### 2.2.4 PWE-4 and PWE-8 Ground-mount Installation, continued

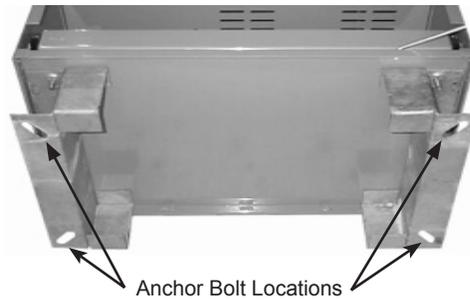


Fig. 2-9, Ground-mounting Brackets, Installed

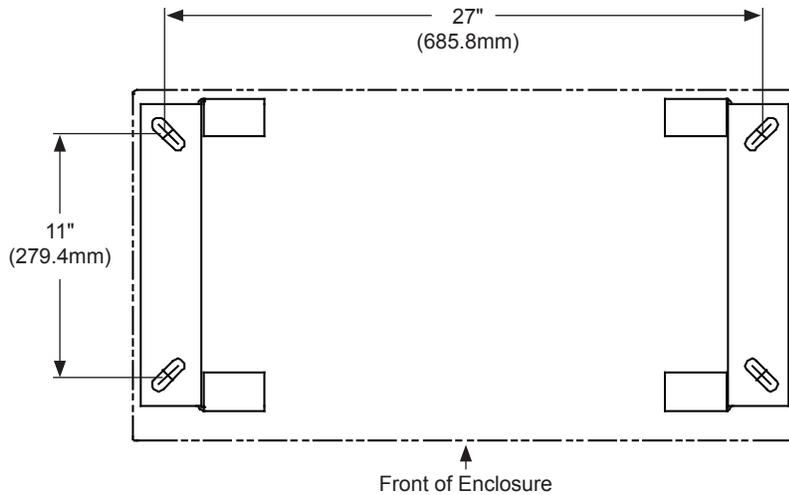


Fig. 2-10, Enclosure Ground-mount Footprint



#### NOTE:

This kit is only compatible with enclosures manufactured after April 2002.

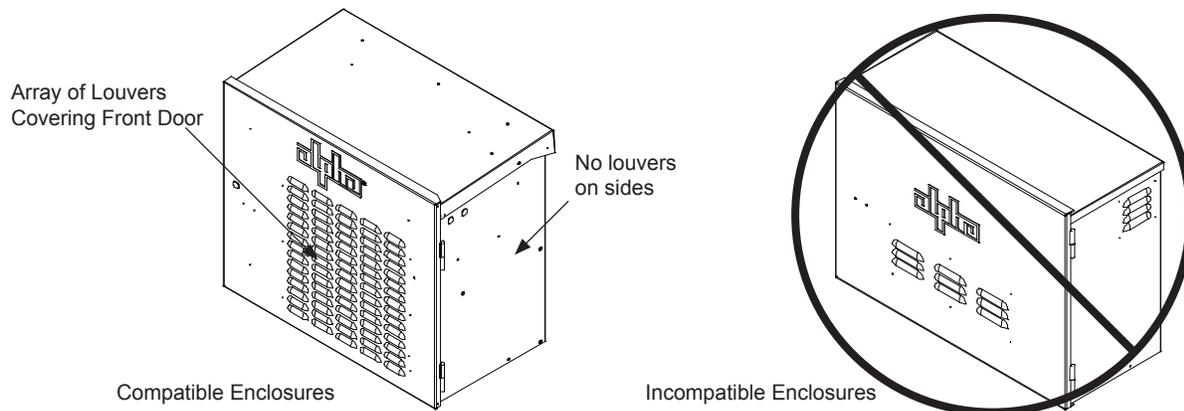


Fig. 2-11, Enclosures Manufactured Before and After April 2002.

## 2.0 Installation, continued

### 2.3 Connecting Utility Power



#### WARNING!

ONLY qualified personal should connect the utility power. Power must be connected in compliance with local electrical codes, and common safety practices must be observed.

#### ATTENTION:

- Connection to utility power must be approved by the local utility before installing the power supply.
- UL and NEC require that a service disconnect switch (UL listed) be provided by the installer and be connected between the power source and the Alpha power supply.
- Connection to the power supply must include an appropriate service entrance weather head.

Utility power enters the enclosures through a 1-1/8" (28.6mm) opening in the bottom of the PME series, and in the rear of the PWE series, or through an optional breaker box. The enclosures accept a standard electrical fitting.

A "high-magnetic" trip circuit breaker must be used in order to accommodate the high-inrush currents normally associated with the start-up of ferroresonant transformers (400A, no-trip, first-half cycle). Do not replace this circuit breaker with a conventional service entrance circuit breaker. Alpha recommends Square D circuit breakers for 120V installations, and HACR (heating and air-conditioning) breakers for 240V installations. Alpha Technologies offers a high-magnetic Square D circuit breaker and a BBX option (a UL Listed service entrance). Contact your local sales representative for more information.

Description	Alpha Part Number	Square D Part Number
240V Installation — HACR (15A)	470-224-10	QO215
120V Installation — High-Magnetic (20A)	470-017-10	QO120HM
120V Installation — High-Magnetic (15A)	470-013-10	QO115HM
BBX — External Service Disconnect	020-085-10	QO2-4L70RB
BBX — External Service Disconnect	020-141-10	QO8-16L100RB

Table 2-1, Service Entrance Circuit Breaker Requirements



#### NOTE:

Alpha recommends 12AWG wiring to accommodate a 90V power supply.

## 2.0 Installation, continued

### 2.3 Connecting Utility Power, continued

In most cases, the following configurations qualify for service entrance use. However, conflicting codes may apply. Always contact your local utility to verify that the wiring conforms to applicable codes.

<b>240Vac Service</b> (XM2-915 240 Power Supply; XM Series 2 922-48 for PWE-4 and PWE-8)	Enclosures used with the XM Series 2, model 915-240 or 922-48, are equipped with a 240Vac duplex receptacle to provide power to the power supply and peripheral equipment. This NEMA 6-15R receptacle is protected by a 2-pole, common-trip, 15A circuit breaker located inside the service entrance. Wiring is typically 14AWG, per NEC code. A grounding clamp is located on the enclosure facilitates dedicated grounding.
<b>120Vac 20A Service</b> (XM2-915 120 Power Supply)	Enclosures used with the XM Series 2, model 915-120, are equipped with a 120Vac duplex receptacle to provide power to the power supply and peripheral equipment. This NEMA 5-20R receptacle is protected by a 2-pole, common-trip, 20A circuit breaker located inside the service entrance. Wiring is typically 12AWG, per NEC code. A grounding clamp is located on the enclosure facilitates dedicated grounding.
<b>120Vac 15A Service</b> (XM2-615 120 Power Supply)	Enclosures used with the XM Series 2, model 615, are equipped with a 120Vac duplex receptacle to provide power to the power supply and peripheral equipment. This NEMA 5-15R receptacle is protected by a single-pole, 15A, High-Magnetic circuit breaker located inside the service entrance. Wiring is typically 14AWG, per NEC code. A grounding clamp is located on the enclosure facilitates dedicated grounding.

## 2.0 Installation, continued

### 2.3 Connecting Utility Power, continued

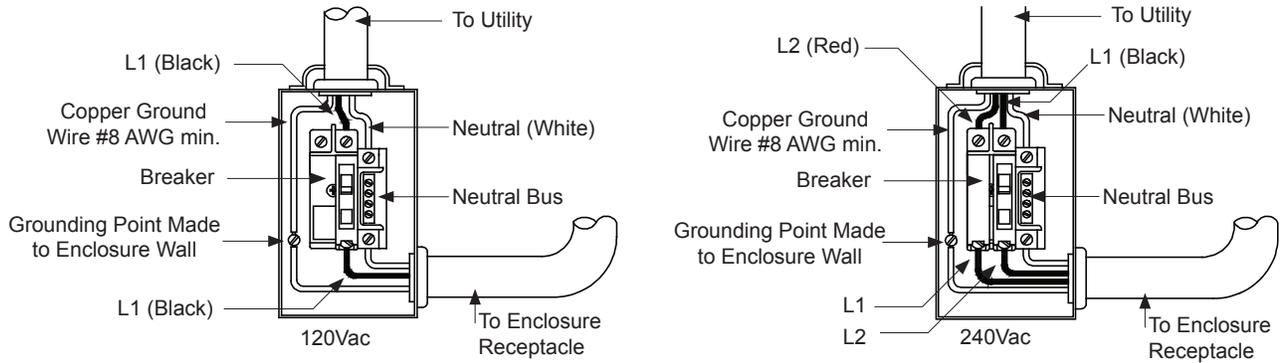


Fig. 2-12, Typical Service Entrance Wiring

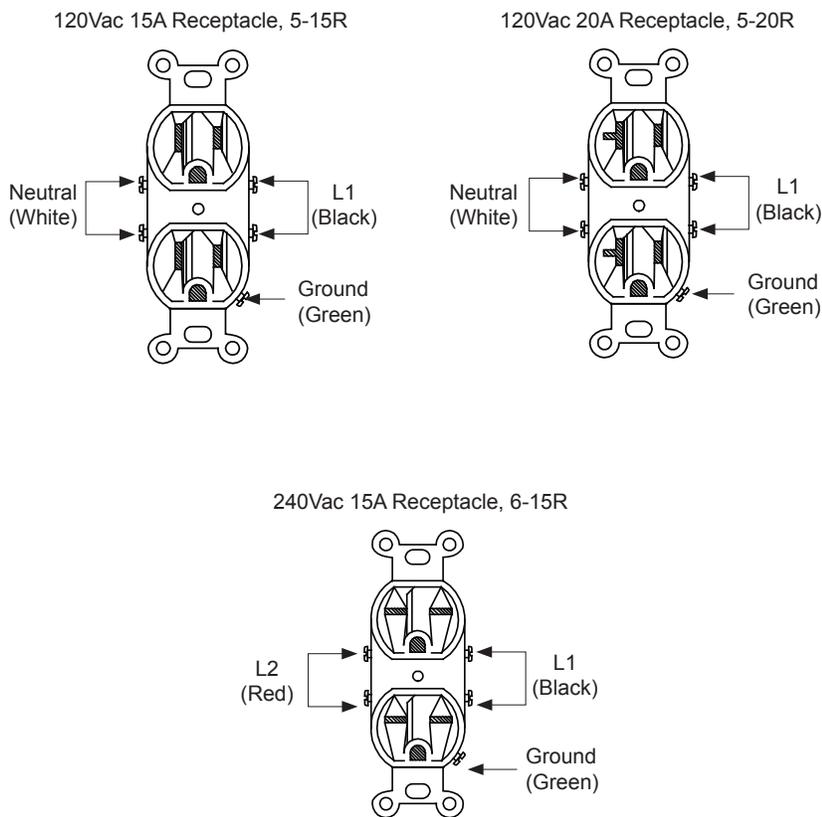


Fig. 2-13, Typical Receptacle Wiring

## 2.0 Installation, continued

### 2.3 Connecting Utility Power, continued

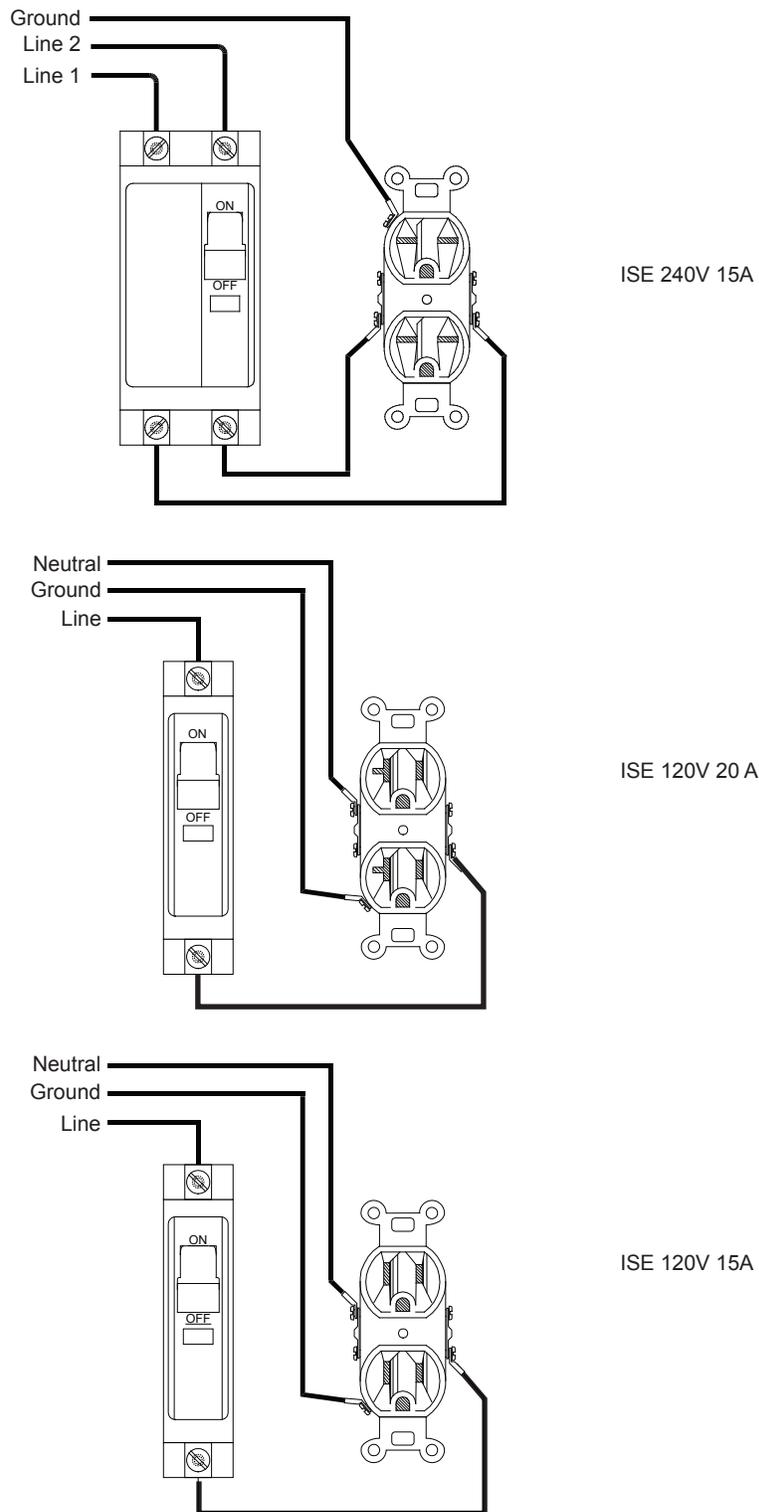


Fig. 2-14, Typical ISE (Internal Service Entrance) Receptacle Wiring

2.0 Installation, continued

2.3 Connecting the Utility Power, continued

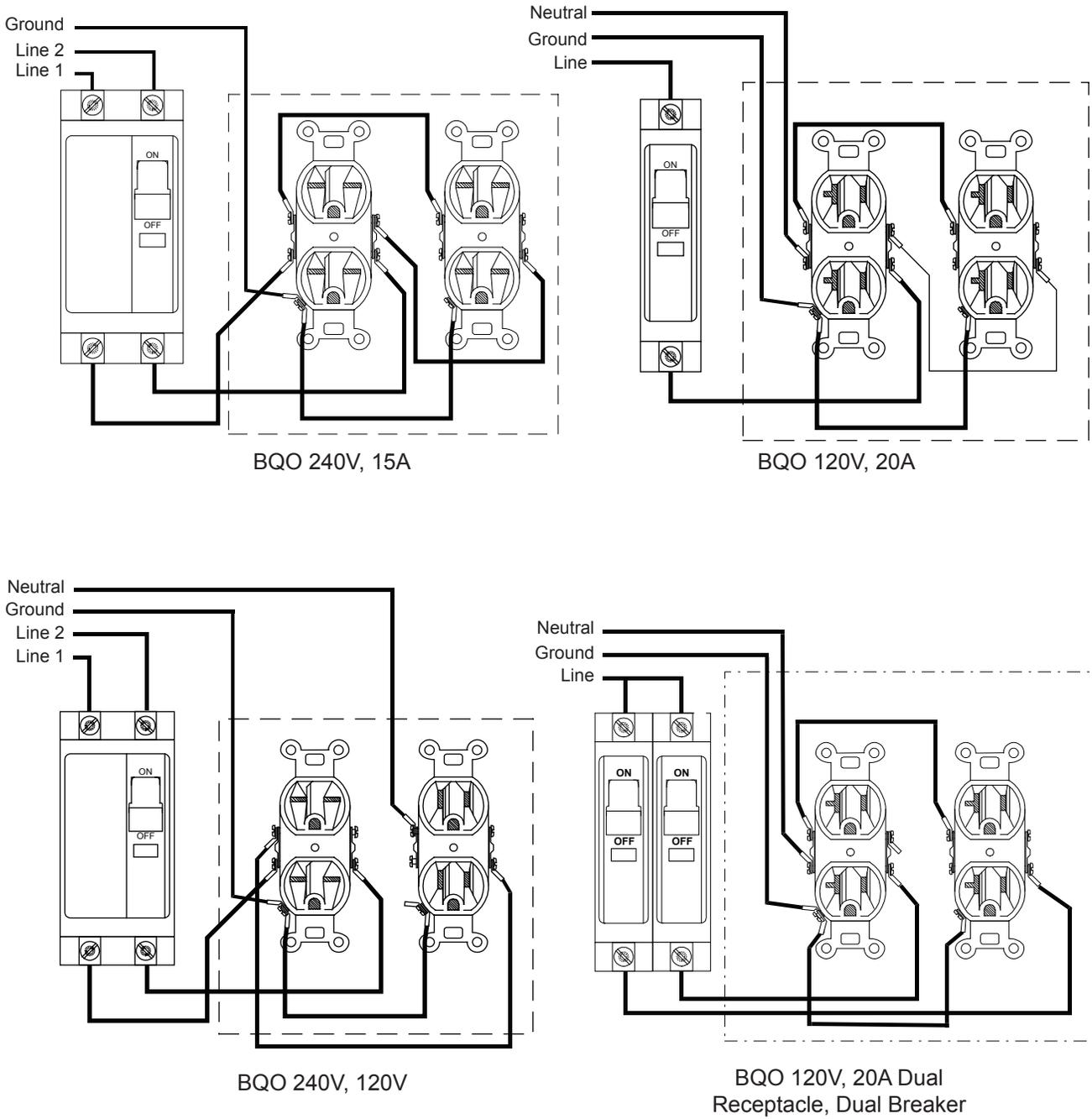


Fig. 2-15, Typical BQO (Breaker Quad Option) Receptacle Wiring

## 2.0 Installation, continued

### 2.3 Connecting the Utility Power, continued

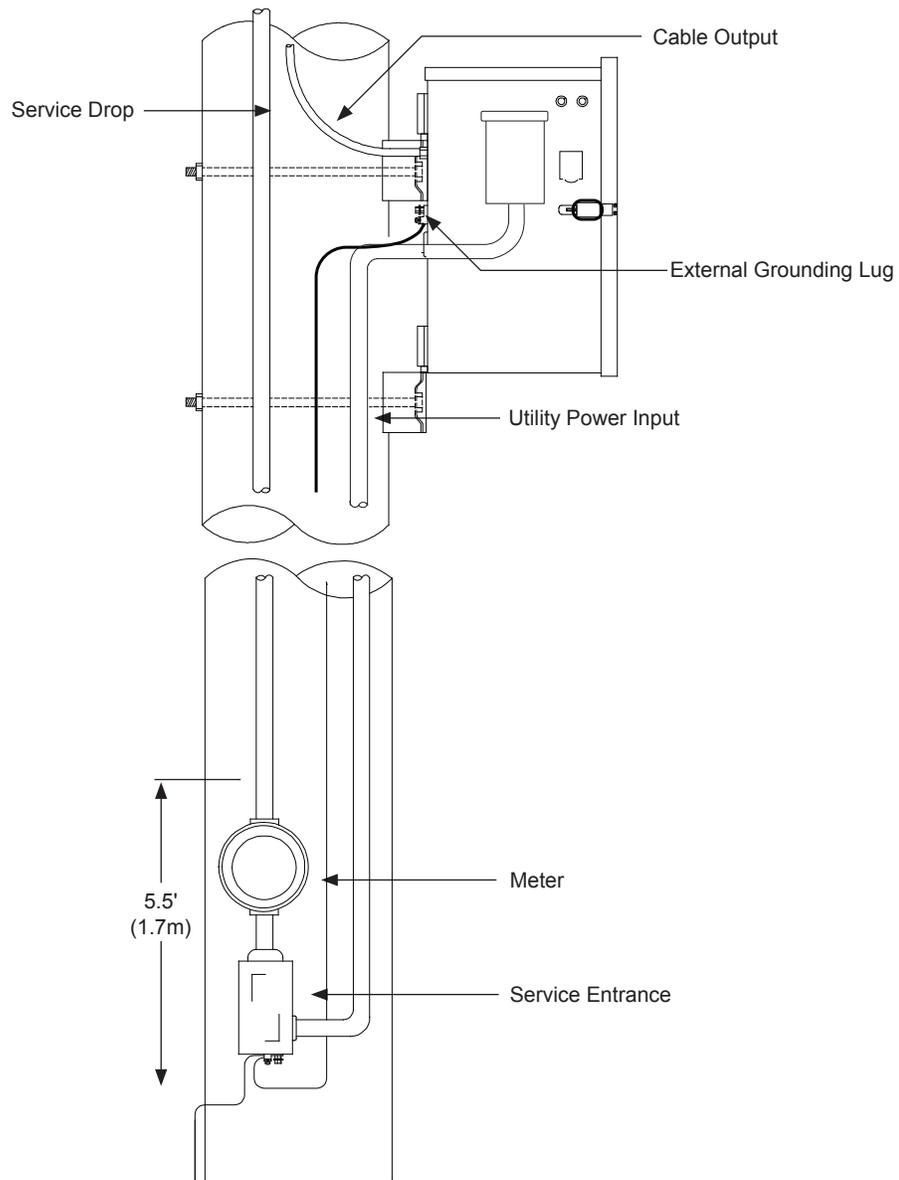


Fig. 2-16, PWE Pole-mount Configuration

#### NOTE:

Alpha offers a Meter Convenience Assembly (MCA) as a cost-effective alternative to building an assembly on-site. The MCA is a factory-configured, pole-mount meter and service disconnect with integral bracket that makes installation simple and consistent.

Product Description	Part Number
FBX (20A fuse kit included)	745-126-20
100A BBX	745-126-21
70A BBX	745-126-22
Alternate Meter (e.g. Universal Meter Base)	Contact Alpha Representative



2.0 Installation, continued

2.3 Connecting Utility Power, continued

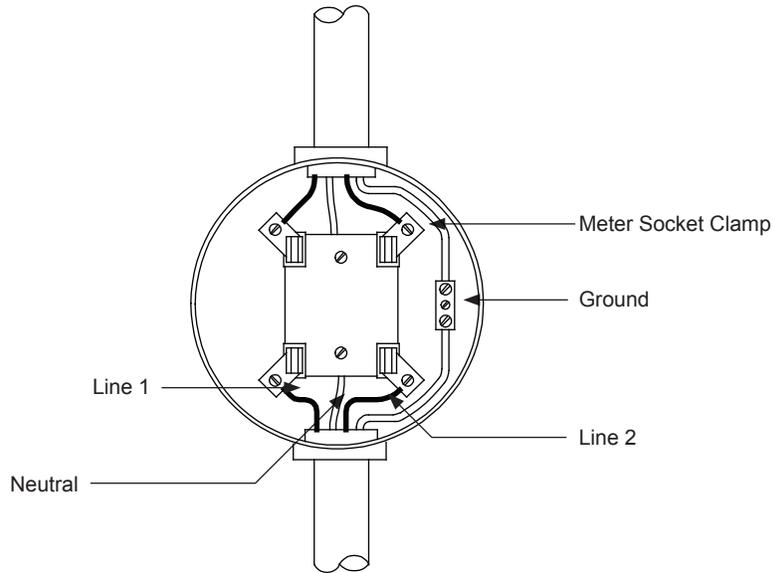


Fig. 2-17, Meter Wiring

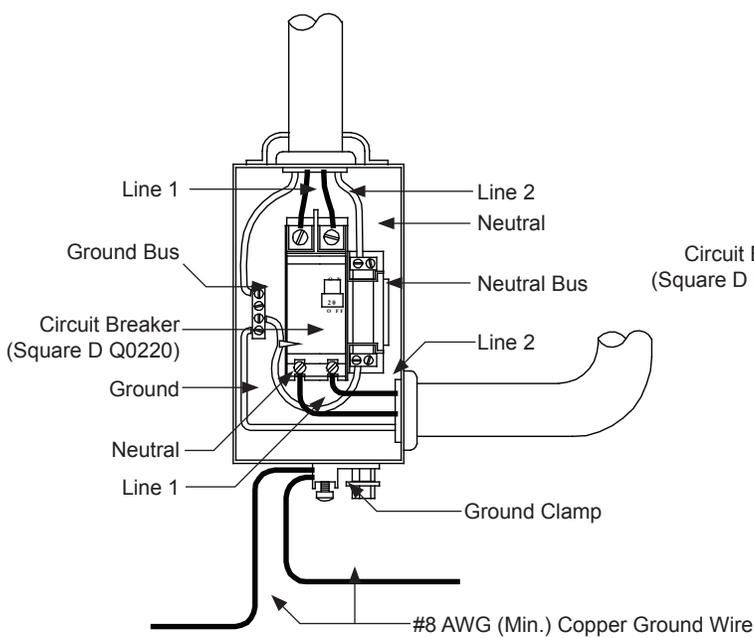


Fig. 2-18, 240Vac CSA Service Entrance Wiring

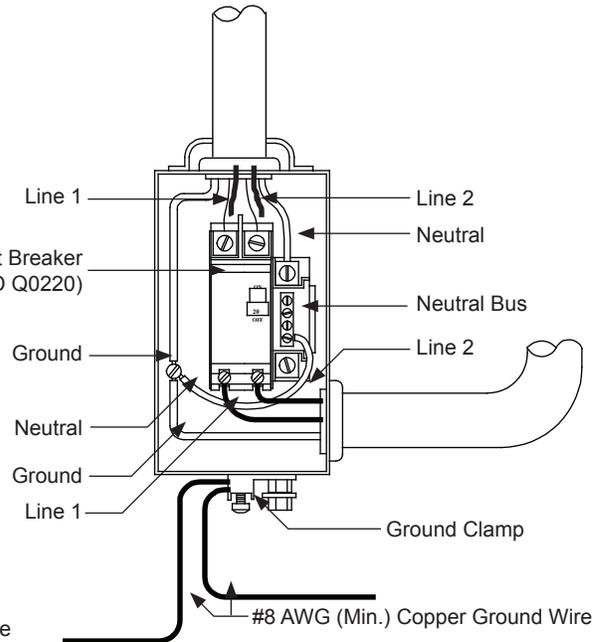


Fig. 2-19, 240Vac UL Service Entrance Wiring

## 2.0 Installation, continued

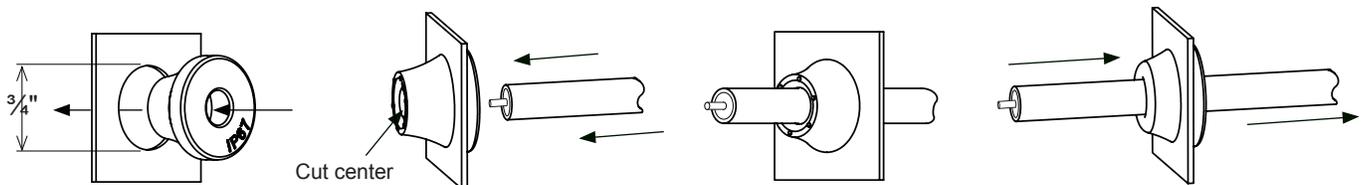
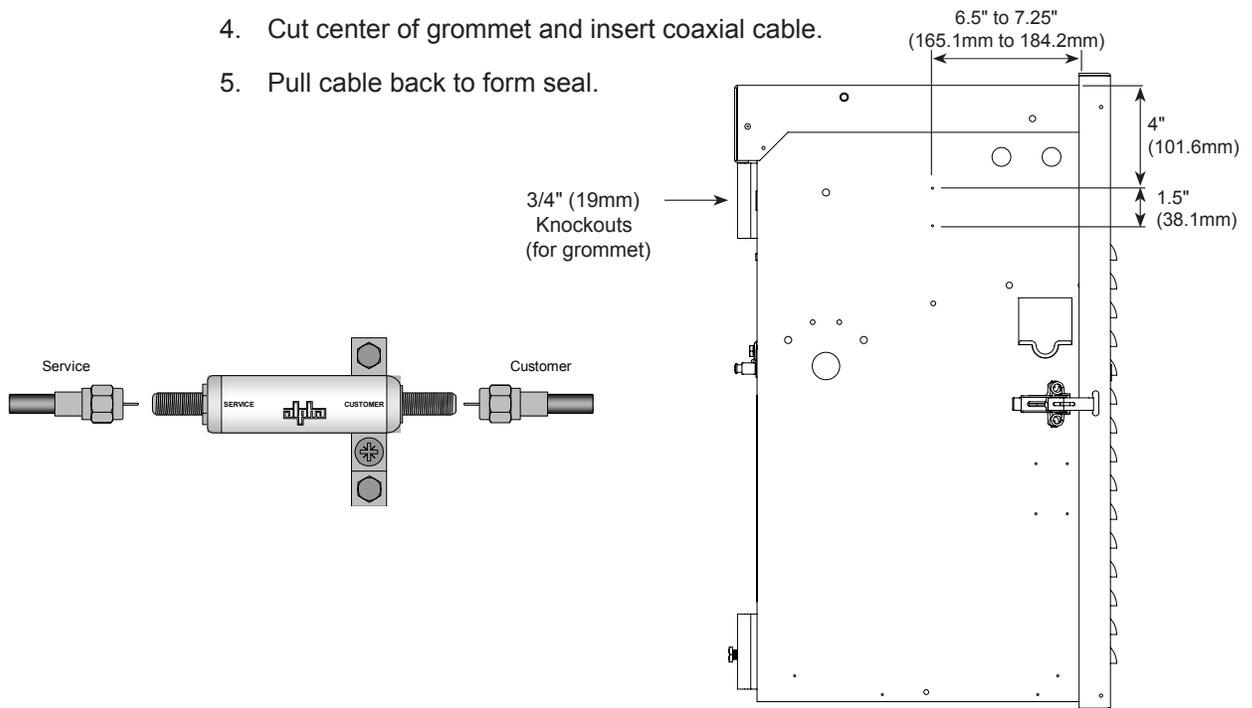
### 2.4 Connecting the Coaxial Cable

#### 2.4.1 Coaxial Cable Surge Protector Installation Instructions

Alpha recommends using coaxial surge suppression for enclosure protection. The Coax Surge Protector with Ground Block (Alpha P/N 745-910-21) includes 75 ohm surge suppressor, mounting hardware, and waterproofing grommet.

##### Required Tools:

- Drill with 3/16" (4.8mm) bit. For older enclosures a 3/4" (19mm) bit is also needed.
  - Phillips screwdriver
  - 3/8" (9.5mm) socket and driver
1. Drill two 3/16" (4.8mm) holes 1 1/2" (38.1mm) apart (indicated locations are recommended). Newer enclosures have center punch marks on the left and right side of the enclosure.
  2. Attach the surge protector to the inside of the enclosure wall with provided hardware. For proper grounding, ensure the included star washers come in contact with the enclosure wall.
  3. On newer enclosures, knock out one of the 3/4" (19mm) knockouts located in the upper rear of the enclosure. On older enclosures, drill a 3/4" (19mm) hole in desired location. Press the grommet into the hole from the outside of the enclosure.
  4. Cut center of grommet and insert coaxial cable.
  5. Pull cable back to form seal.



## 2.0 Installation, continued

### 2.4 Connecting the Coaxial Cable, continued

#### 2.4.2 Connecting the Service Power Inserter (SPI)



### WARNING!

Disconnect all power sources from the SPI (Service Power Inserter) before removing its cover. Verify that the SPI is disconnected from both the utility power and the power supply before beginning procedure.

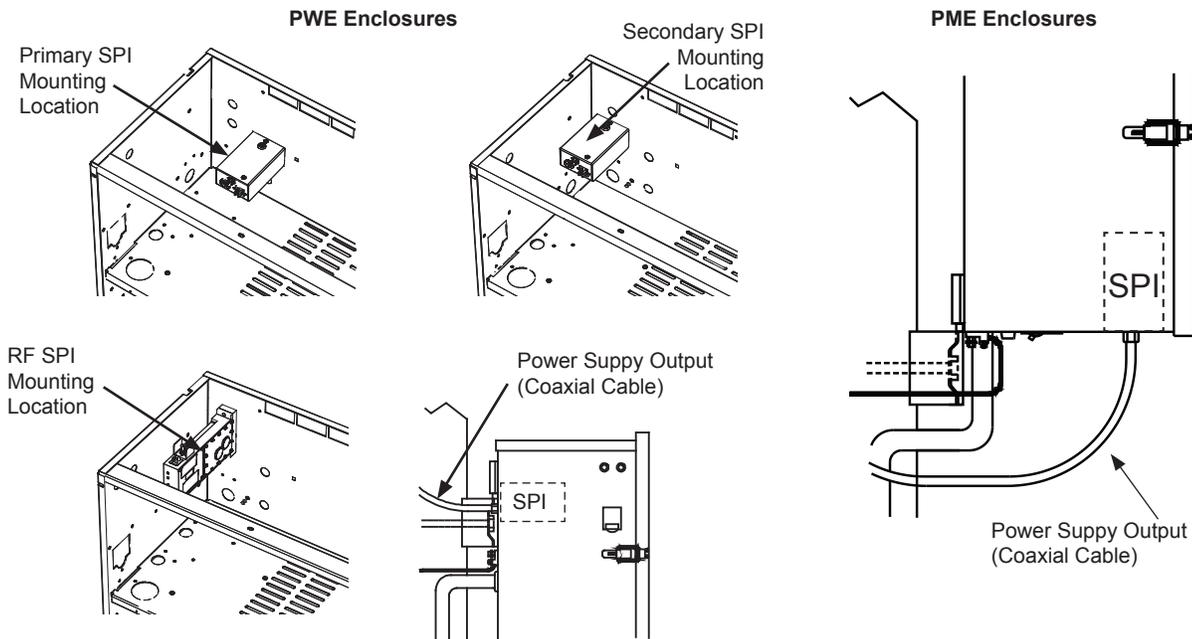


Fig. 2-20, SPI Mounting Locations

#### Procedure:

1. Disconnect the SPI from all power sources.
2. Remove the two screws securing the cover to the SPI chassis. Remove the cover, exposing the circuit board and seizure screw assembly.

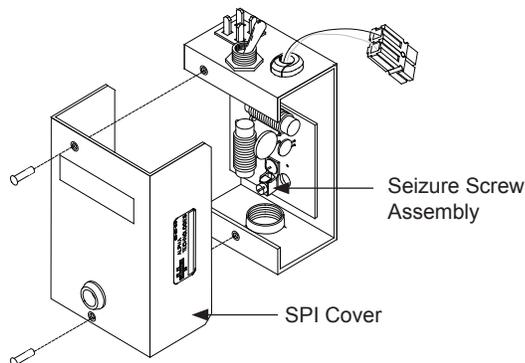


Fig. 2-21, SPI

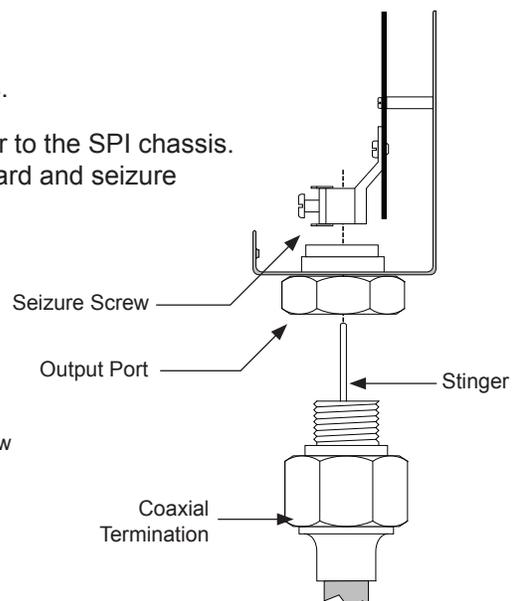


Fig. 2-22, SPI (side view)

## 2.0 Installation, continued

3. Screw the Coaxial Termination into Output Port on bottom of SPI, inserting the stinger into the seizure screw assembly.
4. Tighten seizure screw to 35 in-lbs (4 Nm).



### CAUTION!

To prevent arcing and failure of the unit, insert the coaxial cable completely into the seizure screw assembly and tightened the seizure screw to 35 inch-pounds (4 Nm).

5. Replace SPI cover and reinstall screws.
6. Verify switch on top of SPI is on the ON position.

## 2.5 Battery Installation

### 2.5.1 Battery Date Code Usage and Identification

Every battery contains a DATE CODE. This code is usually located near the positive (+) terminal, and must be recorded in the maintenance log. If you use batteries other than those installed by Alpha, consult the batteries' manufacturer's documentation for date code type and placement.



### NOTE:

The date code scheme and location varies depending on the age of the battery used.

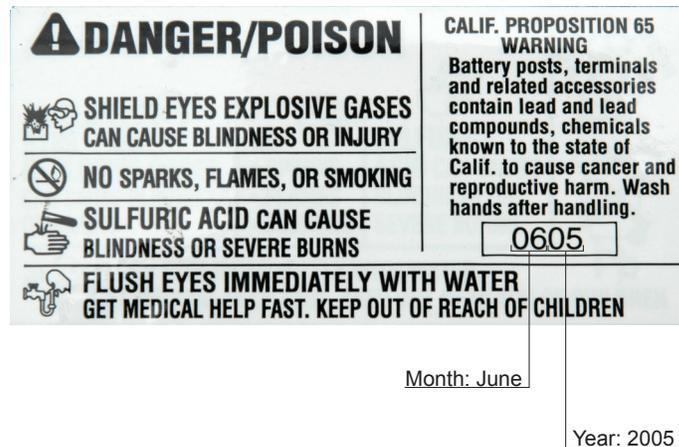


Fig. 2-23, Battery Date Code

## 2.0 Installation, continued

### 2.5 Battery Installation, continued

#### 2.5.2 Battery Installation Procedure



#### WARNING!

To prevent arcing, never allow live battery cables to make contact with the enclosure. Disconnect battery leads, or wrap the cable lugs with electrical tape.



#### CAUTION!

Threaded insert terminals require the use of 3/4" (19mm) bolts. The use of 1" (25.4mm) bolts will seriously damage the battery. The only exception is the terminal with the large spacer for the in-line fuse link. See section 2.5.5 for details.



#### NOTE:

In battery configurations made up of multiple battery strings, Alpha strongly recommends the use of in-line fuses.

#### Procedure:

1. Place the batteries on the enclosure's battery slide tray or battery shelf. The correct arrangement of the batteries on the tray or shelves varies between enclosure models. See the Figs. 2-26 through 2-31 for the correct battery arrangement for each model. Leave a minimum of one inch of ventilation space between the batteries.
2. To make identification and record keeping easier, number and label the batteries. Record each battery's number and date code in the power supply maintenance log.
3. Using the battery arrangement diagrams as a reference, connect the batteries in series to achieve 36Vdc or 48Vdc. Refer to the diagrams for the location of the optional in-line fuses. Torque terminal connections according to battery recommendations (see battery label for AlphaCell batteries).
4. Check the polarity and voltage of the battery cable connector with a voltmeter to verify correct connections. Do Not connect the battery string or strings to the power supply at this time.
5. The power supply battery charger collects battery temperature compensation information with a Remote Temperature Sensor (RTS) attached to one of the batteries. Refer to the diagrams to determine which battery to attach the RTS to. Attach the RTS about 1/3 of the way up from the battery's base with a strong adhesive tape. Route the RTS connector into the power supply compartment. Do Not connect the RTS to the power supply at this time.



#### CAUTION!

Recheck the polarity and voltage of the battery cable connector before proceeding. Connecting the battery string or strings to the power supply with incorrect polarity will cause a short-circuit, and possible equipment damage.

6. Route the battery cable connector into the power supply compartment. Do Not connect to the batteries to the power supply at this time.

## 2.0 Installation, continued

### 2.5 Battery Installation, continued

#### 2.5.3 Connecting the Battery Integration Tray (PWE 3/6 Only)

1. Connect the battery cable kits (Alpha P/N 875-690-20) to each battery, and to matching connector on the Battery Integration Tray (BIT). Torque to the battery manufacturer's specification (for AlphaCell batteries see battery label).



2. If applicable, secure the batteries with the optional Battery Retaining Bar (BRB) (Alpha P/N 744-346-20). The BRB mounts in factory installed spring clips.

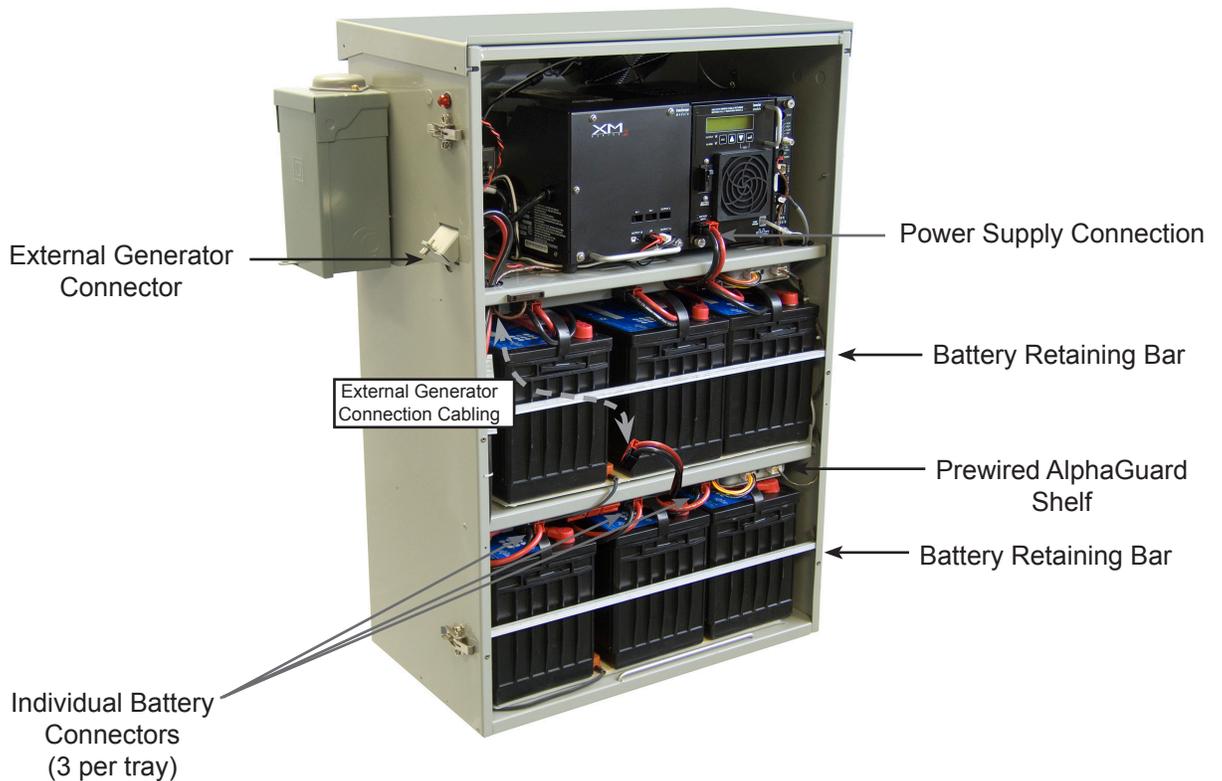


Fig. 2-24, Battery Integration Tray Connections

## 2.0 Installation, continued

### 2.5 Battery Installation, continued

#### 2.5.4 Battery Terminal Connections

 **NOTE:**

- Various types of batteries with different mounting styles and hardware may be shipped with the system. ALWAYS refer to the battery manufacturer's specifications for correct mounting hardware and torque requirements. Use only the hardware and torque recommended by the battery manufacturer.
- There are two types of battery terminals: the newer, threaded insert terminals, and the older, flag terminals. The following drawings and pictures are for illustrative purposes only.

#### Threaded Insert Terminals

 **CAUTION!**

Threaded insert terminals require the use of 3/4" (19mm) bolts. The use of 1" (25.4mm) bolts will seriously damage the battery. The only exception is the terminal with the large spacer for the in-line fuse link.

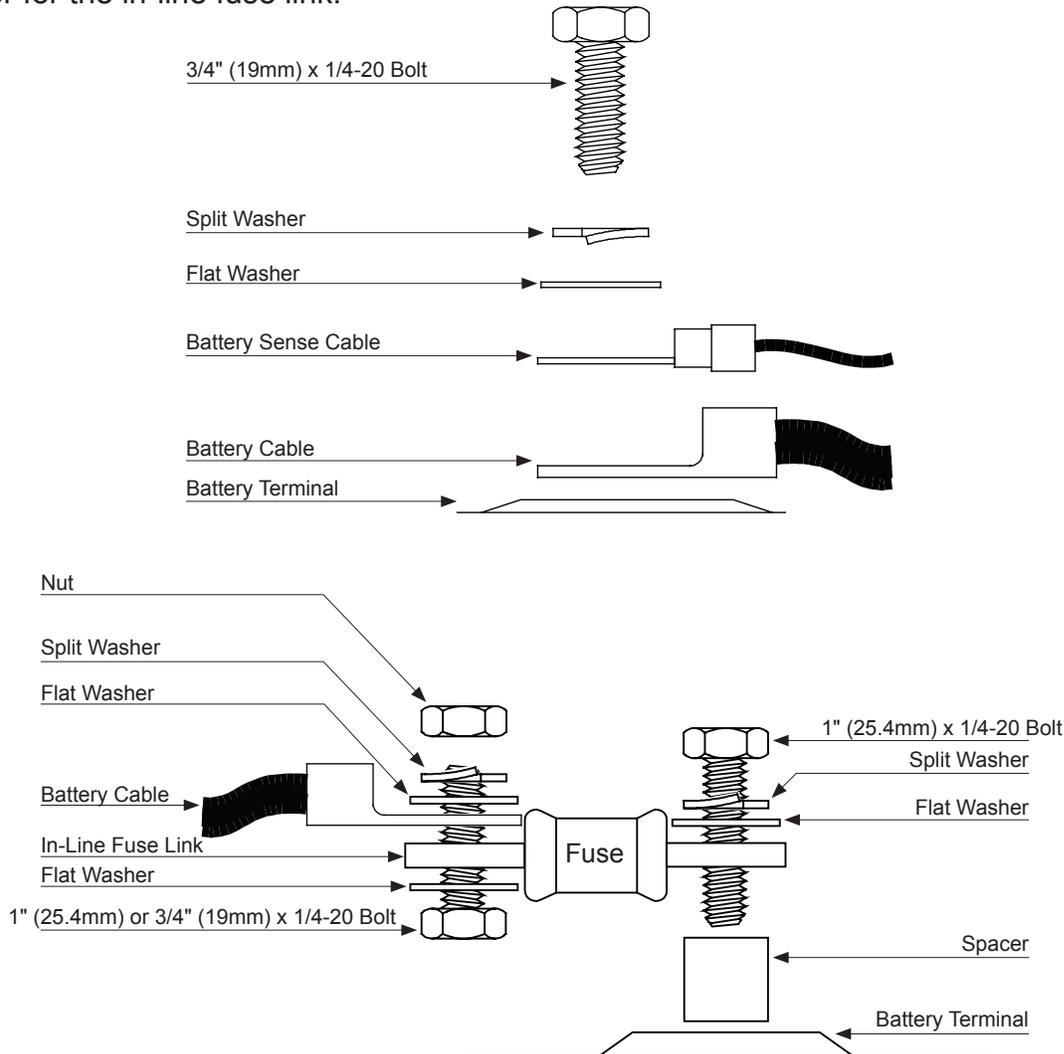


Fig. 2-25, Threaded Insert Battery Terminal Connections

## 2.0 Installation, continued

### 2.5 Battery Installation, continued

#### 2.5.4 Battery Terminal Connections, continued

##### Flag Terminals

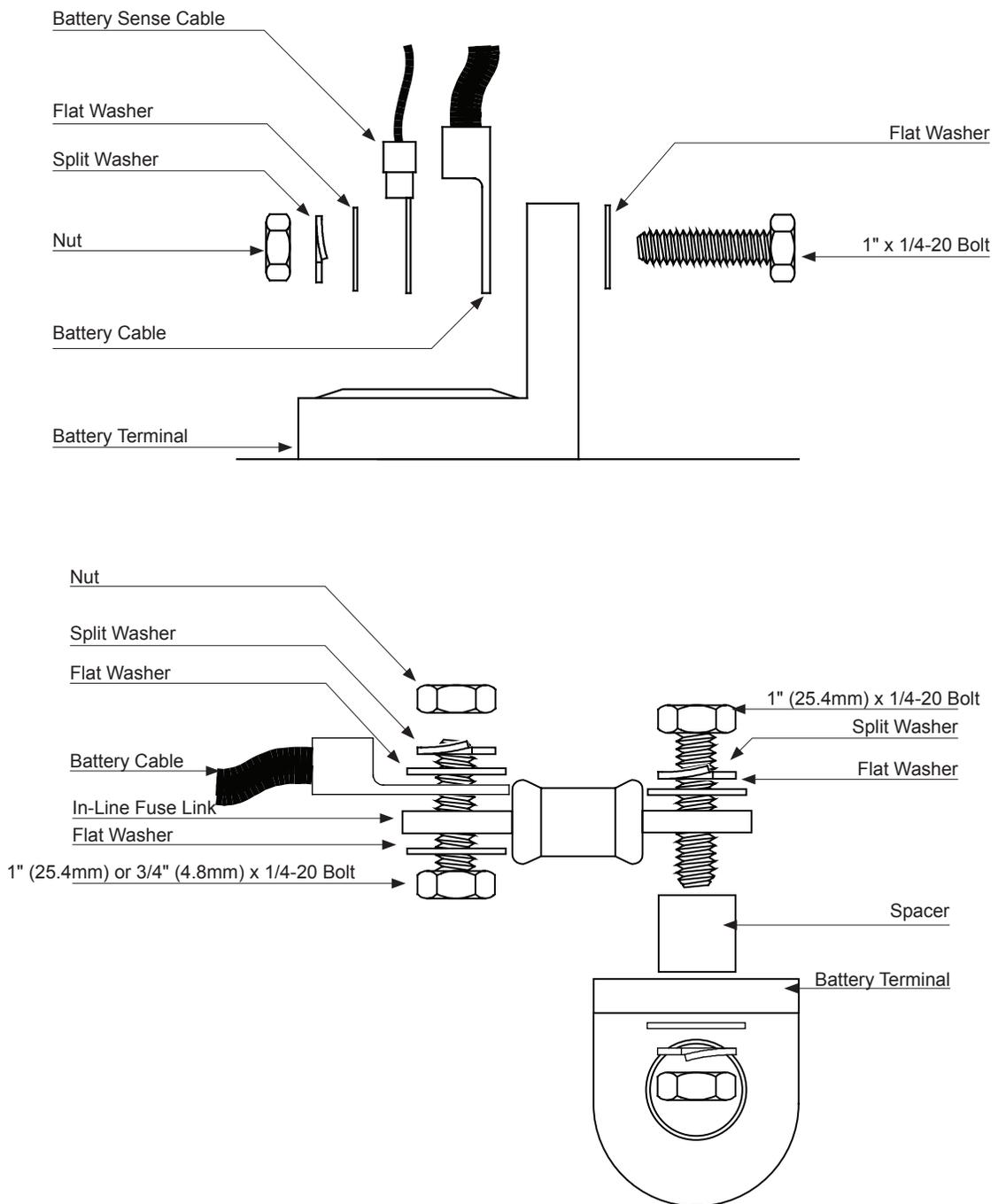


Fig. 2-26, Flag Battery Terminal Connections

## 2.0 Installation, continued

### 2.5 Battery Installation, continued

#### 2.5.5 Battery Wiring Diagrams

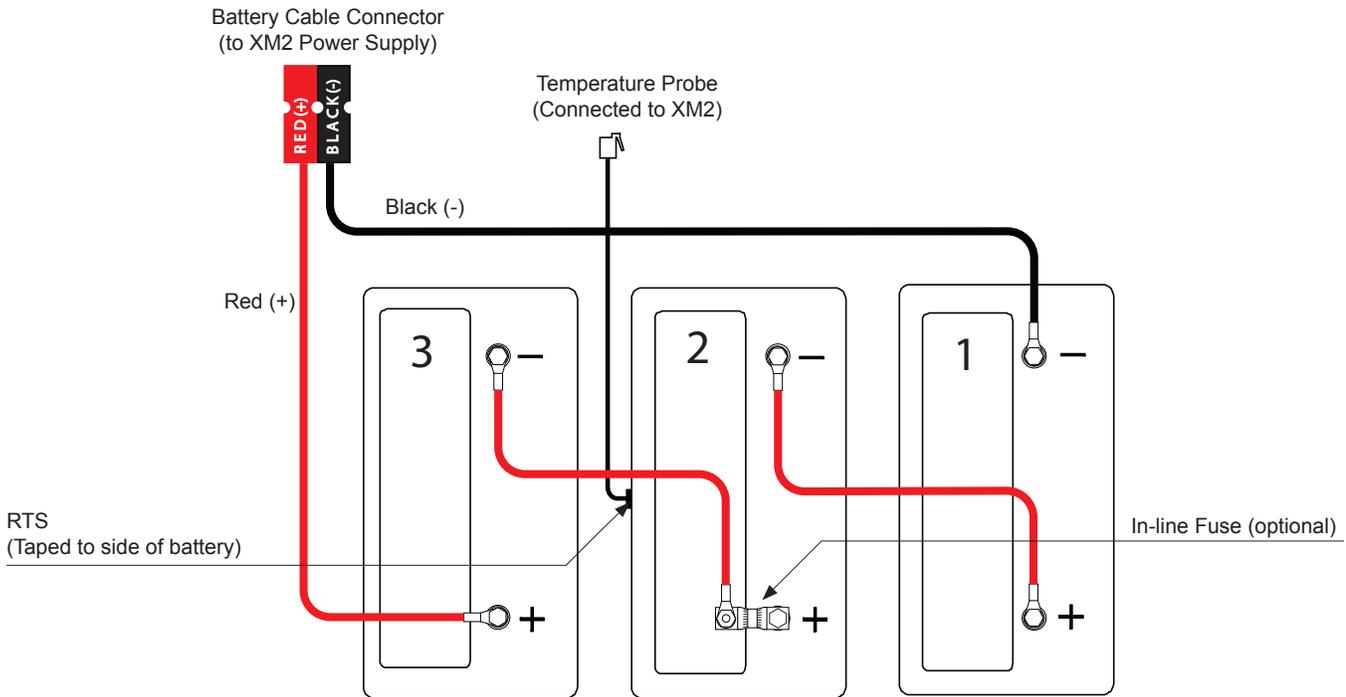


Fig. 2-27, PWE-3 (without BIT) and PME Battery Wiring Diagram

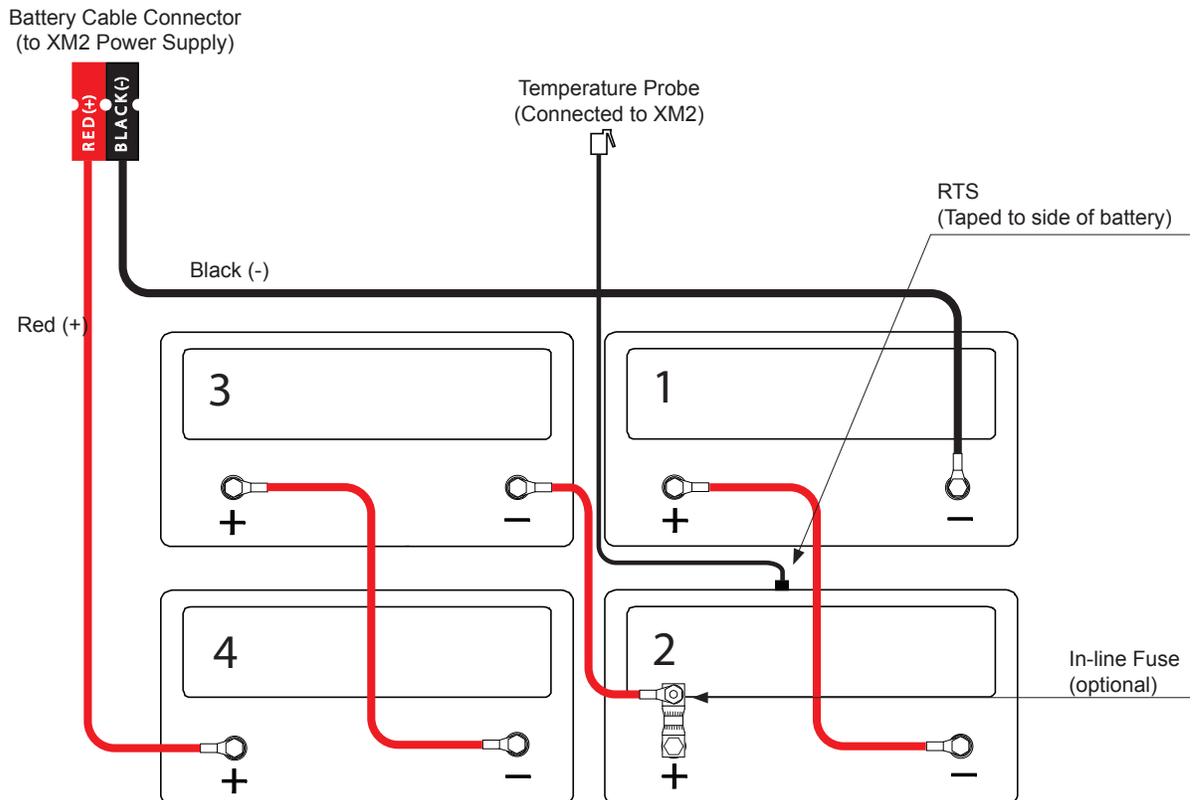


Fig. 2-28, PWE-4 Battery Wiring Diagram

## 2.0 Installation, continued

### 2.5 Battery Installation, continued

#### 2.5.5 Battery Wiring Diagrams, continued



CAUTION!

If using the optional slide tray, zip-tie the negative black wire to the center battery interconnection cable. This will prevent the wire interfering with slide tray closure.

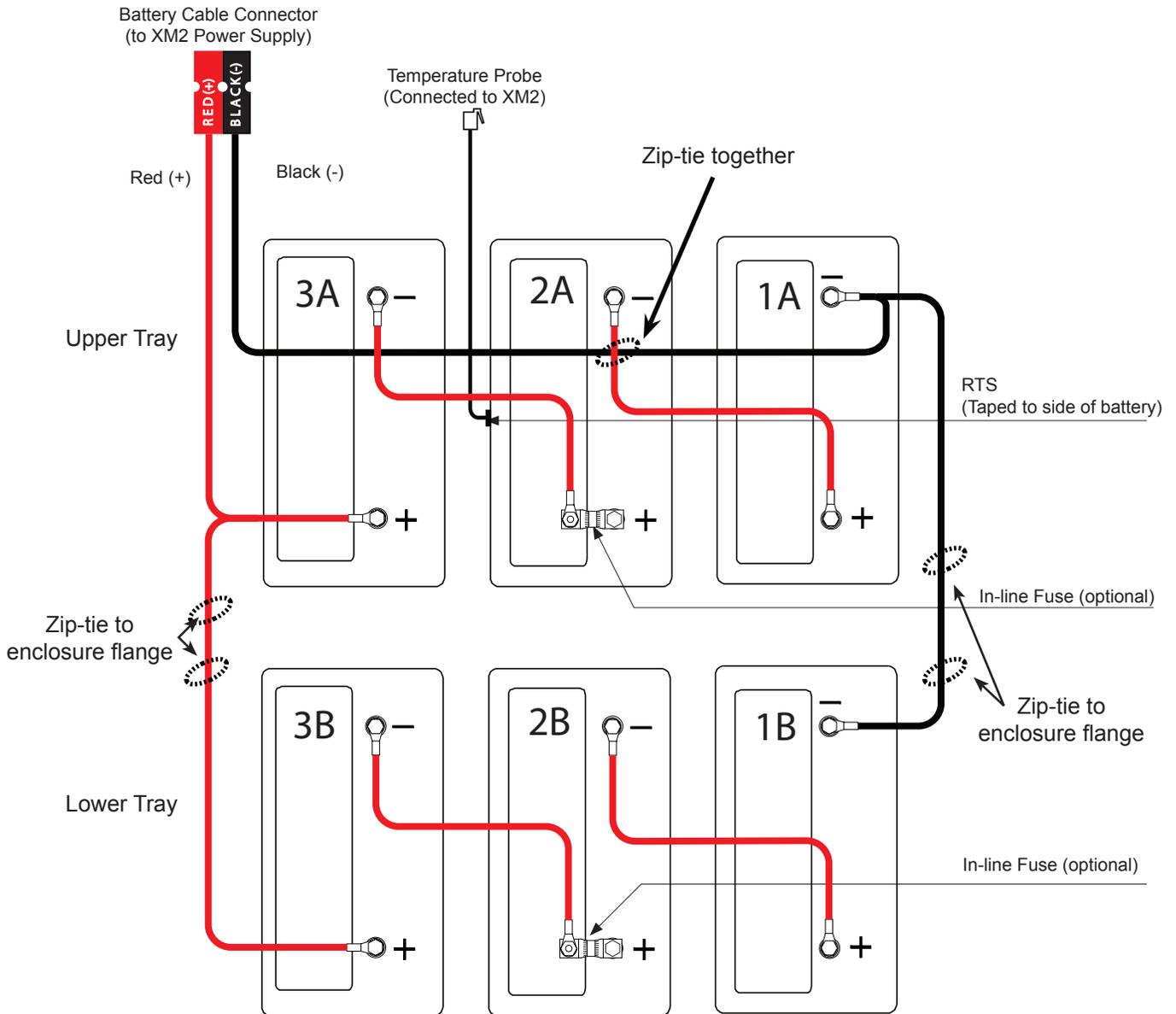


Fig. 2-29, PWE-6 Battery Wiring Diagram (without BIT)

## 2.0 Installation, continued

### 2.5 Battery Installation, continued

#### 2.5.5 Battery Wiring Diagrams, continued

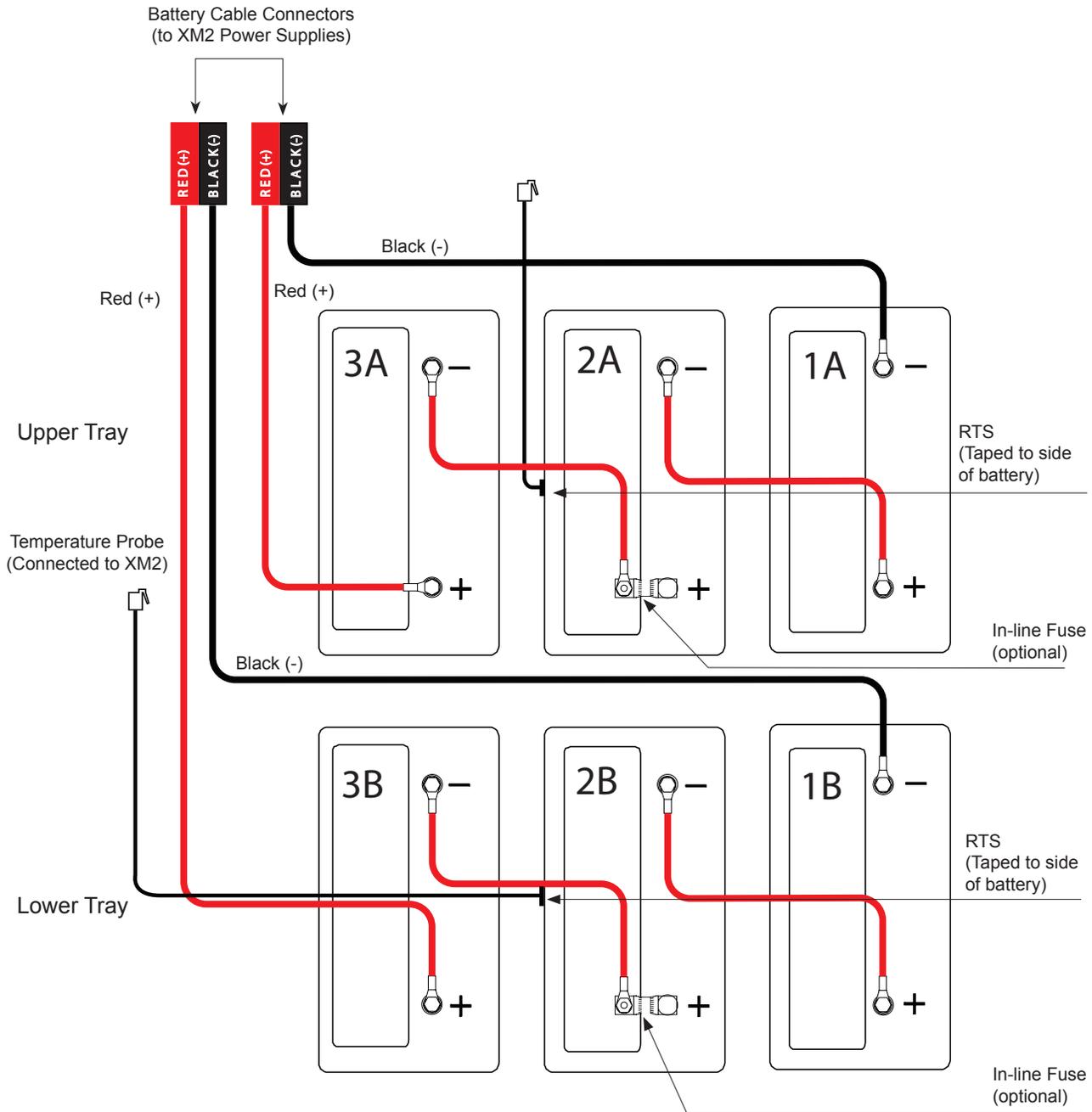


Fig. 2-30 PWE-D36 Battery Wiring Diagram

## 2.0 Installation, continued

### 2.5 Battery Installation, continued

#### 2.5.5 Battery Wiring Diagrams, continued

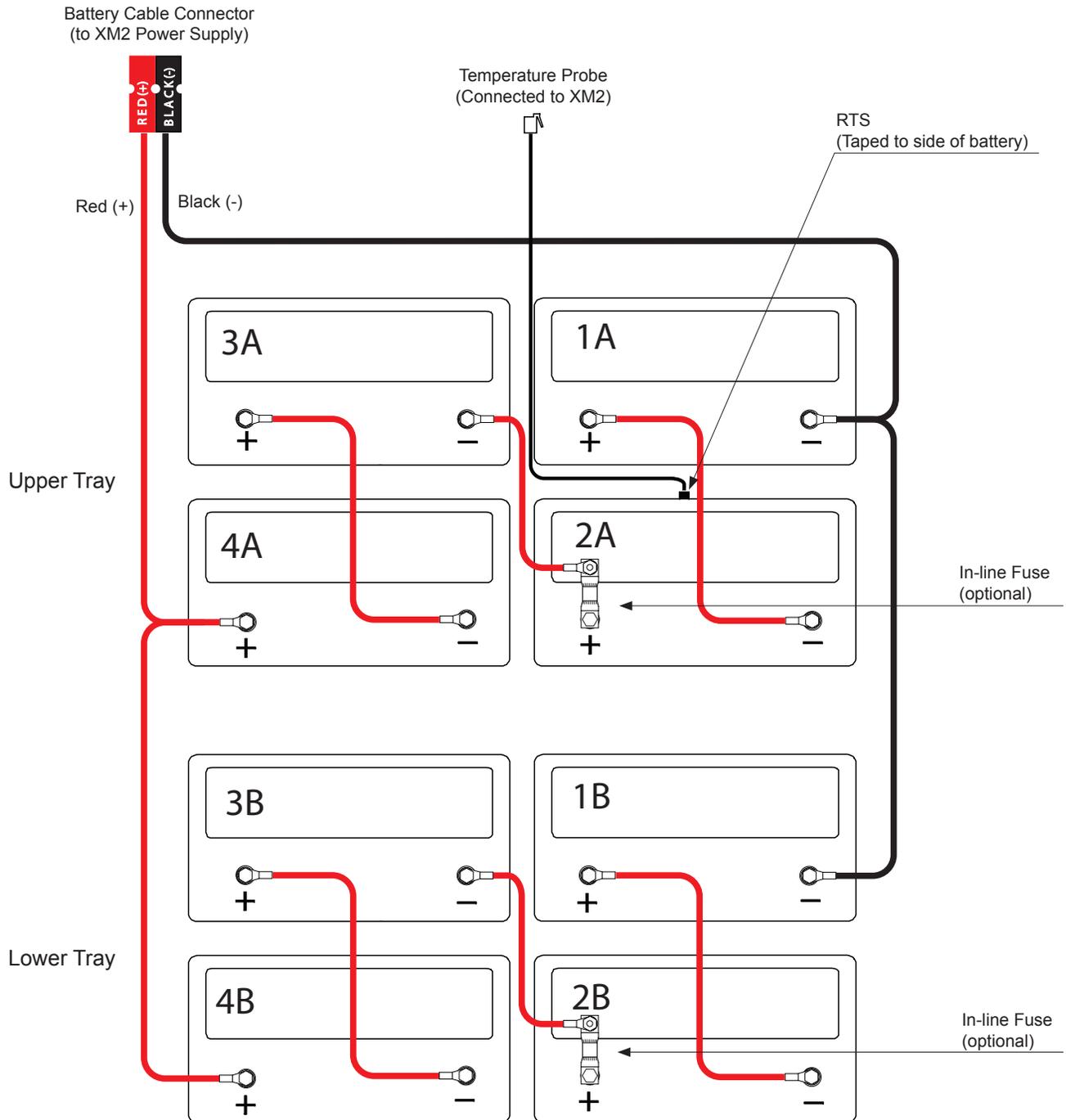


Fig. 2-31, PWE-8 Battery Wiring Diagram

## 2.0 Installation, continued

### 2.5 Battery Installation, continued

#### 2.5.5 Battery Wiring Diagrams, continued

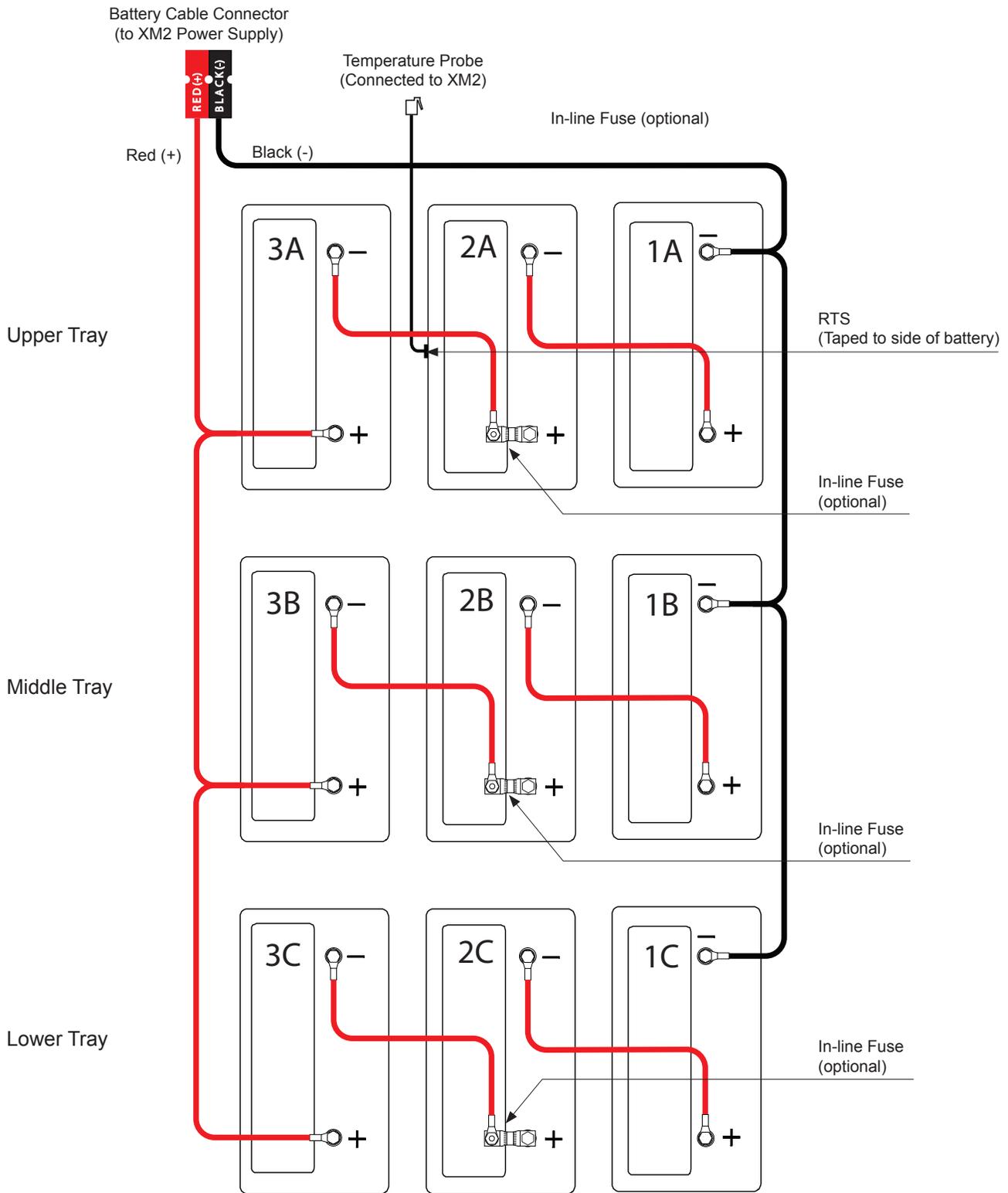


Fig. 2-32, PWE-9 Battery Wiring Diagram

## 2.0 Installation, continued

### 2.6 Installing the XM Series 2 Power Supply

#### Installation Procedure:

1. Before installation, inspect the power supply for damage or loose connectors.
2. Place the XM Series 2 Power Supply in the lower-right compartment of PME enclosures, or the upper-right compartment of PWE enclosures.
3. Switch the BATTERY BREAKER on the front of the power supply OFF. This prevents the inverter from starting when the batteries are first connected to the power supply. See Fig. 2-32.



#### CAUTION!

Check the polarity and voltage of the battery cable connector with a voltmeter before proceeding. Connecting the battery string or strings to the power supply with incorrect polarity may cause a short-circuit, and possible equipment damage. Check all battery connections for proper installation. For complete battery installation procedures, see the “Battery Installation” section in this manual.

4. After verifying that the batteries, battery connections, and battery cables are connected properly, plug the battery cable connector from the battery string or BIT into the power supply’s BATTERY INPUT connector. The connector is keyed and color-coded to fit in only one direction. See Fig. 2-32.
5. Plug the Remote Temperature Sensor into the TEMP PROBE connector located on the Inverter Module assembly on the front of the power supply. See Fig. 2-32.
6. If applicable, plug the optional Local/Remote Indicator lamp (LRI) cable into the LRI connector. See Fig. 2-32.
7. If you are installing a Tamper Switch (TMPR SW), plug it into the 2-pin TMPR connector, and plug the transponder cable into the transponder TMPR connection. See Fig. 2-32.
8. Plug the connector from the SPI into the power supply’s OUTPUT 1A. If the enclosure has the optional AC Indicator (ACI) lamp, plug the connector from the SPI into the ACI and the connector from the lamp into the power supply’s OUTPUT 1A. If the PIM option is installed, connect a second SPI to OUTPUT 2. Make sure that the SPIs “ALT/ON” switch is in the ON position. See Fig. 2-32.
9. If the installation includes a Module Retaining Cable option, attach the end of the cable to the hole provided at the top, rear, center of the enclosure. Thread the cable through the power supply handle and clip it back on itself.
10. The installation is complete. Do Not apply AC power to the power supply or switch the Inverter Module’s BATTERY BREAKER ON. Refer to the power supply Operator’s Manual for Start-up and Test procedures.

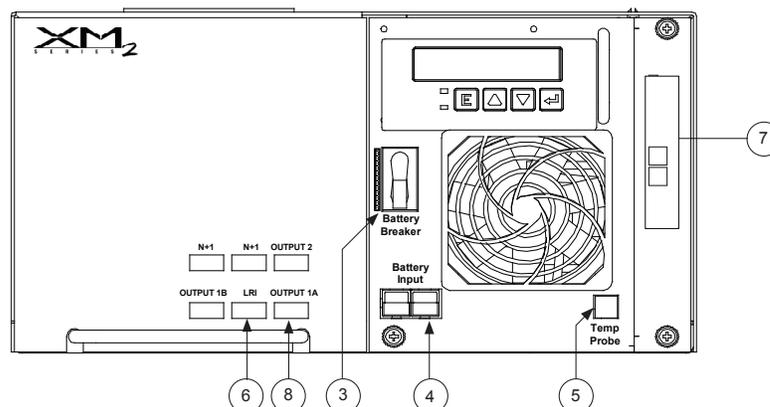


Fig. 2-33, XM Series 2 Power Supply

## 2.0 Installation, continued

### 2.7 Cooling Fan Installation

#### NOTE:

- This procedure requires a service power supply (for example, an APP 9015S or APP 9022S) to maintain power to the cable plant while fan is being installed.
- The fan kit for PWE-3, 4, 6, and 8 enclosures includes a fan assembly with a single fan. The PWE-9 and PWE-D36 enclosures' kit includes a double fan assembly. The installation and wiring procedures, however, are identical.

#### Tools Required:

- Phillips Screwdriver

#### Installation Procedure:

1. Attach the fan assembly to the two pre-drilled holes located in the upper, right, rear of the enclosure using the two #6-32 x 3/8" (9.5mm) Phillips screws provided. Make sure to orient the fan assembly so that the exposed fan is up and the fan guard is down, as shown. Screw the screws in from the outside of the enclosure.
2. Plug one end of the fan's Y cable into the SPI wire. Plug other end of the Y cable into the power supply's OUTPUT 1A.
3. Position thermostat away from power supply, as shown.

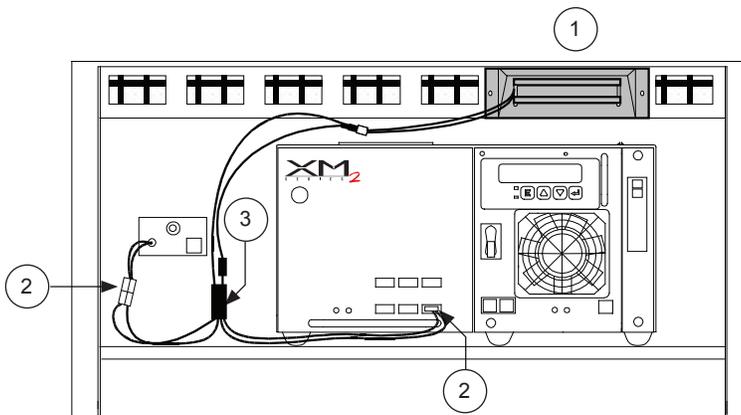
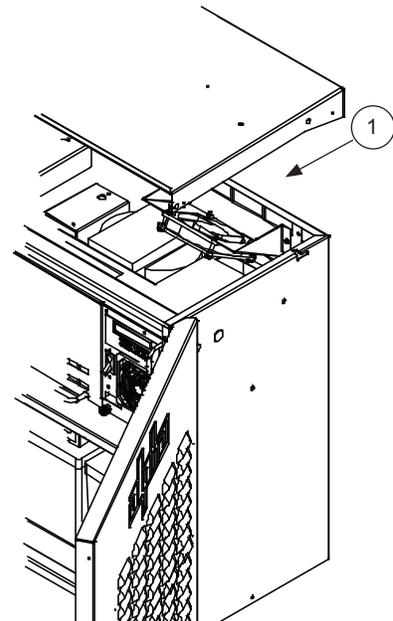
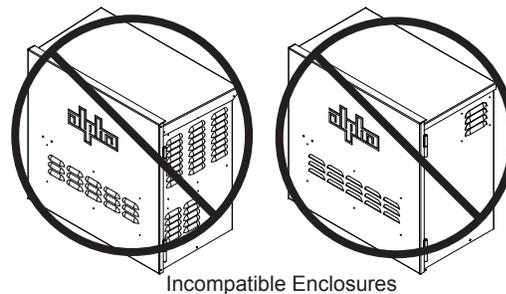
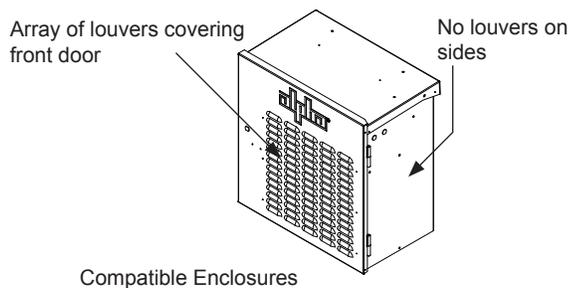


Fig. 2-34, Cooling Fan Kit Installed



#### NOTE:

This kit fits only PWE Series enclosures manufactured after April 2002.



## 2.0 Installation, continued

### 2.8 PWE-8 Solar Shield Installation

#### Tools Required:

- Drill
- 3/16" (4.8mm) or #12 drill bit
- Phillips screwdriver



#### CAUTION!

Drill only in the five locations indicated below. Center punches marked with a "⊙" (6 places) below are reserved for the storm hood kit.

#### Installation Procedure:

1. Drill 3/16" (4.8mm) through-holes in the door at the locations shown (5 places).
2. Install the solar shield to the door, using the screws provided: #8-32 x 3/8" (9.5mm) with square cone washer.
3. Drill 3/16" (4.8mm) through-holes in the sides of the enclosure in the locations shown (7 places total).
4. Install the small shield on the left side and the large shield on the right using the screws provided.

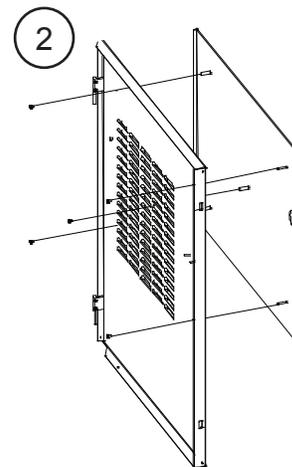
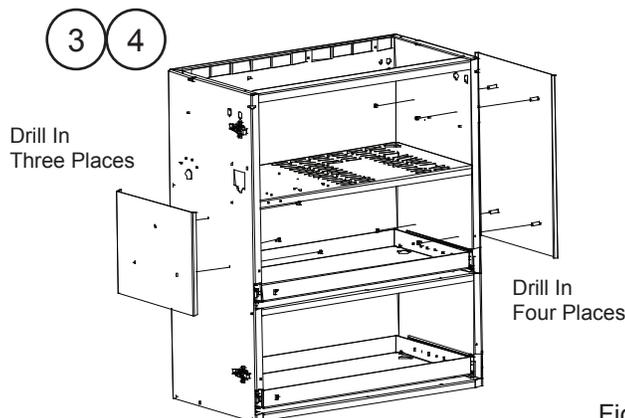
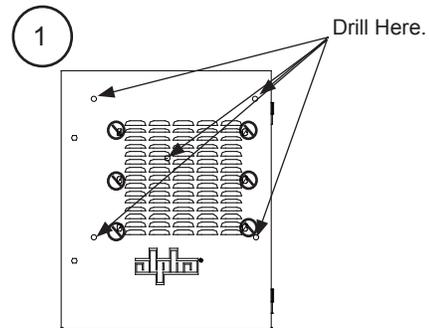
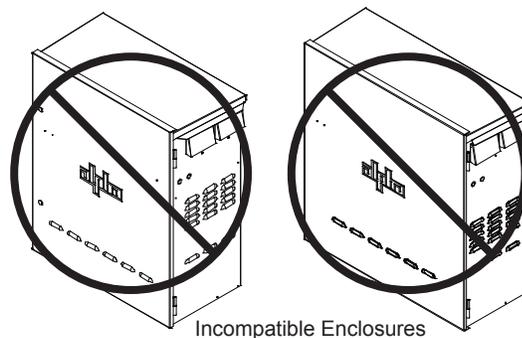
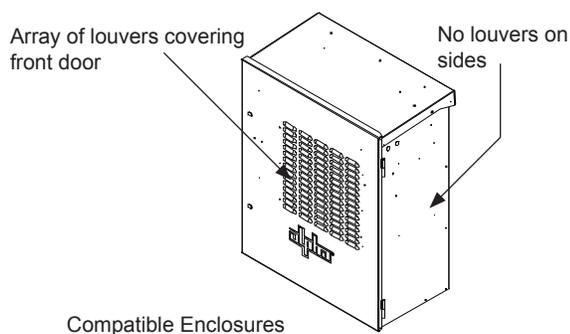


Fig. 2-35, PWE-8 Solar Shield Installation



#### NOTE:

This kit fits only PWE-8 enclosures manufactured after April 2002.



## 2.0 Installation, continued

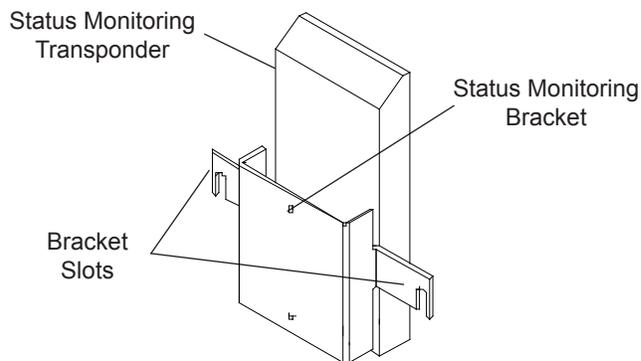
### 2.9 Status Monitoring Transponder Bracket Installation Instructions

#### Tools and Materials Required:

- #10-32 nuts and flat washers
- 3/8" (9.5mm) socket wrench or nut driver

#### Installation Procedure:

1. Position status monitoring bracket over status monitor, and align bracket slots with PEM studs (located on enclosure).



2. After bracket and status monitor are in position, apply flat washers and #10-32 nuts to PEM studs. Tighten using 3/8" (9.5mm) socket wrench or nut driver.

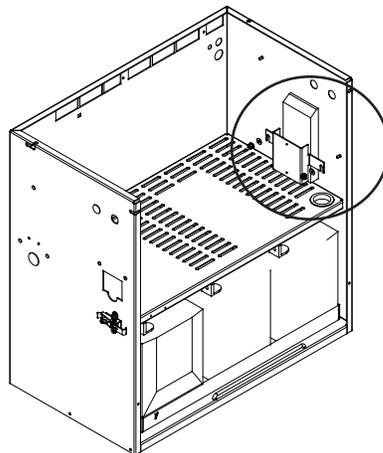


Fig. 2-36, Status Monitoring Bracket Location in PWE Series Enclosure

## 3.0 Pole-mount Enclosure Maintenance

Preventive Maintenance should be performed every three to six months.

### Inspect the Pole-mount Enclosure

Perform a complete inspection of the Pole-mount Enclosure. Look for signs of rust and corrosion, paying particular attention to the battery trays. Clean any rust or corrosion immediately.

### Inspect the Mounting Brackets and Hardware

Carefully inspect the mounting bracket and mounting hardware. Look for signs of unusual wear and loose hardware. Correct all mounting hardware failures immediately.

### Check Battery Terminals and Connecting Wires

Care of the batteries is a critical step in any maintenance program. In addition to voltage checks, visually inspect the batteries for signs of cracking, leaking, or swelling. To aid in quick identification, and tracking of voltages in the maintenance log, number the batteries inside the enclosure using labels or masking tape. Batteries are temperature sensitive and susceptible to overcharging and undercharging. Since batteries behave differently in the winter than in the summer, Alpha's battery chargers automatically compensate for changes in temperature by adjusting float and accept charge voltages. See the power supply's technical manual for complete preventive maintenance instructions.

Check each battery terminal and connection. Verify the posts are clean and the crimped connectors are tight. Torque terminal connections to the manufacturer's recommendation. If there is an inline fuse in the battery cable, check the fuse holder and fuse. Verify the terminals are properly protected with an approved battery terminal corrosion inhibitor such as NCP-2. Record date of maintenance in the maintenance log.

### Check Battery Open Circuit Voltage

Switch the power supply's BATTERY BREAKER to the OFF position. Disconnect the battery connector from the Inverter Module and measure the individual voltage across each battery. The difference between any battery in the string must not be greater than 0.3Vdc. Defective or marginal batteries must be replaced with an identical type of battery. Record the unloaded battery voltages in the maintenance log.



#### NOTE:

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When the power supply's BATTERY BREAKER is turned OFF, or the batteries are not connected, backup power is not available.

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