

an EnerSys® company

Alpha[®] PWE/PME Series Enclosures Technical Manual

Effective: February 2025



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 the system, contact Alpha Technologies Services, Inc. or the nearest Alpha® product sales 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.



WARNING! GENERAL HAZARD

GENERAL HAZARD WARNING provides safety information to PREVENT INJURY OR DEATH to the technician or user.



WARNING! ELECTRICAL HAZARD

ELECTRICAL HAZARD WARNING provides electrical safety information to PREVENT INJURY OR DEATH to the technician or user.



WARNING! FUMES HAZARD

FUMES HAZARD WARNING provides fumes safety information to PREVENT INJURY OR DEATH to the technician or user.



WARNING! FIRE HAZARD

FIRE HAZARD WARNING provides flammability safety information to PREVENT INJURY OR DEATH to the technician or user.

There may be multiple warnings associated with the call out. Example:



WARNING! ELECTRICAL & FIRE HAZARD

This WARNING provides safety information for both Electrical AND Fire Hazards.



CAUTION!

CAUTION provides safety information intended to PREVENT DAMAGE to material or equipment.



NOTICE:

NOTICE provides additional information to help complete a specific task or procedure.

ATTENTION:

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

Alpha® PWE/PME Series Enclosures

Technical Manual 031-161-B0-005, Rev. G1

Effective Date: February 2025

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Disclaimer

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

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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 is installed or operated in an unapproved manner or improperly maintained.

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PWE/PME Enclosure Safety Notes

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WARNING! GENERAL HAZARD

- Only authorized and trained personnel should maintain or service the enclosure.
- Always lock the enclosure after servicing.
- Read and follow all installation, equipment grounding, usage, and service instructions for this product and products used in conjunction with it.
- Servicing and connection of batteries shall be performed by, or under the direct supervision of, personnel knowledgeable of batteries and the required safety precautions.
- Use proper lifting techniques whenever handling enclosure, equipment, parts, or 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 spill using your company's spill reporting structure and seek medical attention if necessary.
- Use caution around sheet metal components and sharp edges.

WARNING! ELECTRICAL HAZARD

- Removal all conductive jewelry or personal equipment prior to servicing equipment, parts, connectors, wiring, or batteries.
- Batteries contain dangerous voltage and corrosive material. Only authorized and trained personnel should install, maintain, or service the batteries.
- Always use insulated tools to install, maintain, or service batteries.
- Use special caution when connecting or adjusting battery cabling. An improperly connected battery cable or an unconnected battery cable can result in arcing, fire, or possible explosion.

WARNING! FUMES HAZARD

- Avoid any contact with gelled or liquid emissions from valve-regulated lead-acid (VRLA) batteries. Emissions contain dilute sulfuric acid that is harmful to the skin and eyes. Emissions are electrolytic, and are electrically conductive and are corrosive. Follow the chemical hazards notes if contact occurs.
- All battery compartments must have adequate ventilation to prevent an accumulation of potentially dangerous gas.
- 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).



WARNING! FIRE HAZARD

- Batteries produce explosive gases. Do not smoke or introduce sparks in the vicinity of batteries.
- Power supplies can reach extreme temperature under load.



- Always verify that ALL equipment is rated for both the input and output voltages of the current application and is in proper working condition.
- To prevent damage, inspect batteries every 3 months.

ATTENTION:

- Prior to installation, contact local utilities, building maintenance departments, and cable/piping locator services to ensure that installation does not interfere with existing utility cables or piping
- Installer must check local codes regarding the placement of equipment with flammable material installed on utility equipment.
- 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.

1.0 Introduction

Alpha[®] 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 powder coat finish
- Agency certified to meet applicable industry standards
- Internal or external suitable for service entrance (SUSE) rated service entrance options
- Optional battery integration tray (BIT) (PWE 3/6 only)
- Portable generator cabling access door



Fig. 1-1, PWE-3 Enclosure

1.1 PWE Enclosure Diagram

NOTICE:

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. 1-2, PWE-3 Enclosure (configurations may vary)

1.2 Optional Features

For additional information such as part numbers, contact Alpha's customer service line.

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, 90V, and a lower intensity ACI model 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 120 VAC and 240 VAC versions.
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" × 1-1/4" (6.4 mm × 31.8 mm), 5A, 250 V fuse only (<i>Alpha p/n 460-025-10</i>).
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 120 VAC applications, and the LA-P+ 240 in 240 VAC 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.
Module Retaining Bolt (MRB)	The MRB attaches the XM3 [™] power supply to the PWE series enclosure wall, preventing it from being knocked off of its shelf.
20A and 25A Service Power Inserters (SPI)	An SPI 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.
SPI-RF	For use with the embedded transponder to put the RF communications onto the power cable feeding the cable plant.
Solar Shield Kit (SSK)	The SSK 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 enclosure cooling fan (ECF) 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.
External Security Bar (ESB)	The ESB is constructed of high grade stainless steel to provide physical security, corrosion resistance, and a strong visible deterrence. The ESB is compatible with Alpha® PWE enclosures including; PWE 3, 6, and 9.
Ladder Bracket	The ladder bracket option (<i>Alpha p/n 745-095-21</i>) 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, <i>Alpha p/n 745-872-C0</i> .
BE-PWE	The BE-PWE expands battery backup capacity for PWE-3 enclosures. See the BE-PWE Technical Manual, <i>Alpha p/n 033-077-C0</i> .

1.3 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 75A 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
- Factory installed option in PWE-3/6 enclosures



Fig. 1-3, Battery Integration Tray (BIT)

1.4 PWE Enclosure 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. 72 lb (32.7 kg) per battery (216 lb/98.1 kg total); legacy enclosures
- Red: max. 82 lb (37.2 kg) per battery (246 lb/111.6 kg total); standard for future enclosures

Opening the PWE Enclosure Battery Slide Tray:



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





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

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

Closing the Tray on all PWE Enclosure 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, 1-4, Opening the PWE Battery Slide Trays

1.5 PWE Enclosure Lid Removal



Fig, 1-5, PWE Enclosure Lid Removal

1.6 PWE/PME Enclosure Specifications

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

Table 1-1, PME/PWE Enclosure Specifications

1.7 PWE Enclosure Legacy Models



PWE (October 2009)



Type II PWE



Type I PWE

2.0 Installation

- 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° 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" (16 mm) diameter machine bolts, length to suit pole
- Two 5/8" (16 mm) diameter zinc plated flat washers
- Two 5/8" (16 mm) diameter hex nuts (UNC thread)
- Auger or drill for boring 11/16" (17.5 mm) 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" (17.5 mm) 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)		
PWE-3 and PME	18 in / 457.2 mm		
PWE-4	15 in / 381 mm		
PWE-6	30 in / 762 mm		
PWE-8, PWE-9, PWE-D36 (three holes)	15 in (30 in total) / 381 mm (762 mm total)		

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

<u>NOTICE:</u>

2.0 Installation, continued

- 5. Secure the brackets to the pole using the 5/8" (16 mm) 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 $3/8" \times 3/4"$ (10 mm \times 19 mm) 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

2.1.2 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 $3/8" \times 3/4"$ (10 mm \times 19 mm) 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:

Enclosure	Distance (on center)
PWE-3 and PME	18 in / 457.2 mm
PWE-4	15 in / 381 mm
PWE-6	30 in / 762 mm
PWE-8, PWE-9,	15 in (20 in total) / 281 mm (762 mm total)
PWE-D36 (three straps)	

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



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

2.1.3 Enclosure Grounding: Pole-mount

NOTICE:

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)

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

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 Services, Inc. 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?

NOTICE:

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

2.0 Installation, continued

Alpha Technologies Services, 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® 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

2.2.2 Enclosure Grounding: Ground-mount

<u>NOTICE:</u>

- Alpha Technologies Services, Inc. recommends using the grounding method illustrated on the next page. The grounding method for a particular site will be dependant upon soil type, available space, local codes, National Electric Safety Code (NESC[®]), NEC[®], and other site-specific characteristics.
- Alpha[®] recommends less than 25 ohm ground resistance in the grounding system in accordance with NESC[®] Section 9 and NEC[®] Article 250, 820 Part IV.
- Alpha[®] recommends that if there are other electrical services in the area of any part of the enclosure or grounding system shown below that you contact your local code authority on possible 20' (6.0 m) bonding conductor requirements for connecting the different grounding systems.
- Alpha[®] assumes no responsibility or liability for failure of the installer to comply with the requirements of applicable local and national codes. Where allowed, exothermic welding may be used as an alternative to Burndy[®] clamps and connectors.



Fig. 2-5, Suggested Grounding

Service Grounding - If connecting to buildings or structures with an existing ground system, see 800.100 (b) Informational Note Figure 800.100(B)(1) in the NEC[®] code for grounding and bonding. Contact your local AHJ and utility for guidance.

Service Grounding (required) if service is being installed - 800.100 (b)



Two $1/2" \times 8'$ copper ground rods located 6 feet apart.

#6 bare copper wire from service neutral / ground bar to ground rods.

Enclosure Grounding (required) if no service is being installed - 800.100 (b)



Two $1/2" \times 8'$ copper ground rods located 6 feet apart.

#6 bare copper wire from enclosure / ground bar to ground rod located 6 feet apart from any service grounding.

If a nearby service ground is being connected to the enclosure ground bar rod, a #2 bare copper wire must bond the ground rods (or #2 bare wire if optional lightning protection below is used) where they are closest.

Lightning Protection Ground Ring (optional) – 250.52 (a)(4) Grounding Electrodes



 $1/2" \times 8'$ copper ground rod, four places, located about 2 feet (typical) from the corners of the pad.

#2 bare copper wire loop terminated to each ground rod and buried below grade 2 to 12 inches. Corrosion-proof connections (25+ year life span) and hardware suitable for direct burial MUST be used.



#6 bare copper wire from loop to enclosure bar.

2.2.3 Ground-mount Installation: PWE-3, PWE-9 and PWE-D36 Enclosures

<u>NOTICE:</u>

PWE-9 and PWE-D36 enclosures require a pedestal mount kit and coax raceway for ground installation. Pedestal kit p/n: 745-400-20 (gray); 745-400-21 (white). Coax raceway p/n: 604-432-B1 (gray); 604-432-C3 (white).

Tools and Materials Required (customer supplied):

- Four 1/2" (12 mm) anchor bolts (Hilti® style recommended)
- Four 1/2" (12 mm) stainless steel washers
- 2' × 3' (0.6 m × 0.9 m) continuous vapor barrier (e.g. 30 lb felt, neoprene pond liner, or a heavy grade tar paper)
- Hammer drill
- 1/2" (12 mm) drill bit
- 1/2" (12 mm) wrench
- Metal punch
- Mallet or hammer
- Torque wrench
- Tape measure



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" (12 mm) 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" (9.5 mm) 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" (19 mm) hardware. Torque to 75 in-lb (8.5 Nm).
- 7. Trim away excess vapor barrier material.
- 8. The enclosure is now ready for the utility connection, power module, and batteries.



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)

2.2.4 Ground-mount Installation: PWE-4 and PWE-8 Enclosures

✓ NOTICE:

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. 2-12, Typical Service Entrance Wiring to identify compatible enclosures.

Tools and Materials Required (customer supplied):

- Four 1/2" (12 mm) anchor bolts (Hilti® style recommended)
- Four 1/2" (12 mm) stainless steel washers
- Hammer drill
- 1/2" (12 mm) drill bit
- 1/2" (12 mm) 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.

- 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. 2-9, Ground-mounting Brackets, Installed). Tighten the bolts to 240 in-lb (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" (12 mm) 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



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



Fig. 2-10, Enclosure Ground-mount Footprint

NOTICE:

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



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

2.3 Connecting Utility Power

4

WARNING! ELECTRICAL HAZARD

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" (28.6 mm) opening in the bottom of the PME series enclosure, and in the rear of the PWE series enclosure, 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 heating and air-conditioning) breakers for 240V installations. Alpha Technologies Services, Inc. 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

<u>// NOTICE:</u>

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

2.0 Installation, 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.

Type of Service	Power Supply	Description
240VAC Service	XM2-915 240 power supply XM™ series 2 922-48 for PWE-4 and PWE-8 XM™ series 3, model 918D or	Enclosures used with the XM [™] series 2, model 915-240 or 922-48, and XM [™] series 3, models 918D or 918 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 #14 AWG, per NEC [®] code. A grounding clamp is located on the enclosure facilitates dedicated
	918P	grounding.
120VAC 20A Service	XM2-915 120 power supply XM™ series 3, models 918 and 915	Enclosures used with the XM [™] series 2, model 915-120, and XM [™] series 3, models 918 and 915 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 #12 AWG, per NEC [®] code. A grounding clamp is located on the enclosure facilitates dedicated grounding.
120VAC 15A Service	XM2-615 120 power supply XM™ series 2 models 910 and below	Enclosures used with the XM [™] series 2, models 910 and below 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 #14 AWG, per NEC [®] code. A grounding clamp is located on the enclosure facilitates dedicated grounding.









Fig. 2-13, Typical Receptacle Wiring



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



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



Fig. 2-16, PWE Pole-mount Configuration

NOTICE:

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 with test bypass blocks 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	
FBX with Universal Meter Base 745-126-23		
Alternate Meter (e.g. Universal Meter Base)	Contact Alpha Representative	





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" (4.8 mm) bit. For older enclosures a 3/4" (19 mm) bit is also needed.
- Phillips screwdriver
- 3/8" (9.5 mm) socket and driver •
- Drill two 3/16" (4.8 mm) holes 11/2" (38.1 mm) apart (indicated locations are recommended). Newer enclosures have 1. center punch marks on the left and right side of the enclosure.
- Attach the surge protector to the inside of the enclosure wall with provided hardware. For proper grounding, ensure 2. the included star washers come in contact with the enclosure wall.
- З. On newer enclosures, knock out one of the 3/4" (19 mm) knockouts located in the upper rear of the enclosure. On older enclosures, drill a 3/4" (19 mm) hole in desired location. Press the grommet into the hole from the outside of the enclosure.
- Cut center of grommet and insert coaxial cable. 4.
- 5. Pull cable back to form seal.



Fig. 2-20, Coaxial Cable Installation

2.4.2 Connecting the Service Power Inserter (SPI)



WARNING! ELECTRICAL HAZARD

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



Fig. 2-21, 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.



- 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-lb (4 Nm).



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 in-lb (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.



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

A DANGER/POISON SHIELD EYES EXPLOSIVE GASES CAN CAUSE BLINDNESS OR INJURY	CALIF. PROPOSITION 65 WARNING Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the state of Calif. to cause cancer and reproductive harm. Wash hands after handling.	
SULFURIC ACID CAN CAUSE BLINDNESS OR SEVERE BURNS		
FLUSH EYES IMMEDIATELY WIT GET MEDICAL HELP FAST. KEEP OUT O	H WATER F Reach of	CHILDREN
M	onth: June	
		Year: 2005

Fig. 2-24, Battery Date Code

2.5.2 Battery Installation Procedure

WARNING! Electrical Hazard

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" (19 mm) bolts. The use of 1" (25.4 mm) 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 Battery Wiring Diagrams** for details.



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

Procedure:

- 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 Fig. 2-27 through 2-32 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) or precision temperature sensor (PTS) ring lug attached to one of the batteries. Refer to the diagrams to determine which battery to attach the RTS/PTS to. For older power supplies that use an RTS, attach the RTS about 1/3 of the way up from the battery's base with a strong adhesive tape. For the XM3™ power supply using a PTS ring lug, attach it to the battery terminal as shown in the following diagrams. Route the RTS/PTS connector into the power supply compartment. DO NOT connect the RTS/PTS 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.

2.5.3 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. 2-25, Battery Integration Tray Connections

2.5.4 Battery Terminal Connections

NOTICE:

- 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" (19 mm) bolts. The use of 1" (25.4 mm) 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 Battery Wiring Diagrams** for details. **NOTE:** The ring lugged PTS is installed the same was as the battery sense cable and the temperature probe is inserted into the XM3[™] power supply. If you're using older power supply, tape the RTS to the side of the battery.



Fig. 2-26, Threaded Insert Battery Terminal Connections

2.5.5 Battery Wiring Diagrams



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



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



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 Enclosure Battery Wiring Diagram (Without BIT)



Fig. 2-30 PWE-D36 Enclosure Battery Wiring Diagram



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



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

2.6 Installing the XM3[™] Power Supply

NOTICE:

Before applying power, verify power supply rating is matched to AC input utility. Verify a low-resistance ground is installed in accordance with your local electrical regulatory authority.



CAUTION!

Batteries are an important part of the power supply. Properly install and test all batteries, battery connections and battery cables before you connect them to the power supply.

Installation Procedure:

1. Route the Local/Remote Indicator (LRI) cable down through the opening in the left side of the shelf and back up through the opening in the right side of the shelf and connect.



For existing LRI installations, use LRI adapter kit, p/n 875-952-20.

- 2. After wiring battery cable kit, battery sense cables and PTS as shown in **Section 2.5 Battery Installation**, verify DC breaker is OFF, then connect battery cable to inverter module.
- 3. Connect the Smart AlphaGuard[™] (SAG) wire harness to Smart AlphaGuard[™] port.
- 4. Connect precision temperature sensor to the inverter module.
- 5. Connect transponder, RF Input cable, and the tamper switch (if installed). Refer to **DOCSIS® Status Monitor Front Panel Connections** for communication module connections.
- 6. For new installations, skip to step 10.
- 7. For upgrading existing sites, install service power supply (see service power supply documents) and remove existing power supply.
- 8. Thoroughly inspect output connectors for abnormal heating or damaged housing; replace if necessary.
- 9. Verify SPI (16) switch is in "ALT" position.
- 10. Connect the SPI (network load) to the Output 1 connector.
- 11. Connect the second isolated load / auxiliary load (i.e., fan) to the Output 2 connector.
- 12. Turn on AC breaker (located on enclosure) and verify correct (per unit's nameplate voltage) utility voltage at outlet; if correct, plug in line cord to the utility outlet. For XM3-918D-HP models, the utility voltage may not match the nameplate voltage when switching between 120V and 240V.
- 13. Turn battery breaker ON. For XM3-918D-HP models, select the Input Voltage Setting by pressing ENTR.
- 14. Toggle SPI switch to ON.
- 15. Verify no alarms are present after power up initiation (it may take up to 60 seconds for alarms to clear; APPs alarms may take longer). Alarms may be verified on the LCD display or Alarm LED.





- 16. If alarms do not clear after 60 seconds, press the menu key with **ALM** indicated above it to see the ACTIVE ALARM list for the selected key.
- 17. Press UP or DOWN to select the alarm of interest.
- 18. Press ENTR to select the alarm and display diagnostic information. Press ESC to return to the alarm list.
- 19. Enter Battery Type (or parameters) and number of battery strings. Battery type entries can be made on the LCD.
- 20. Enter the battery DATE code and the MHOs (conductance) readings. Battery date and MHOs entries can be made on the LCD (see Section Fig. 2-34, Enter Battery Date Code and Section Fig. 2-35, Enter Battery MHOs Reading).



Fig. 2-34, Enter Battery Date Code



Fig. 2-35, Enter Battery MHOs Reading

NOTICE:

Battery MHOs and Date Code can only be set after DOCSIS[®] transponder has registered with CMTS. Please wait 3 minutes after power up to enter battery MHOs measurements.

21. Once the unit is running on line voltage, perform a self test by pressing and holding the test button for 1-2 seconds with a pen (or similar object). Wait for self test completion before proceeding (see the XM3-HP™ Broadband UPS Technical Manual (p/n: 017-882-B0-001) Section 3.1.1, Self Test Operation).

NOTICE:

If the unit is operating from batteries, the self test will not initiate. Check input breaker and input line cord.

- 22. Perform standby test by shutting off utility breaker and verifying unit goes into standby and supports the load.
- 23. Re-apply AC power and verify unit goes to Line Mode.



NOTICE:

Two output connectors will be present on the side of the front panel whether or not the optional Alpha[®] dual output controller (AlphaDOC) is installed. If an AlphaDOC card is not installed, the output voltage (Output 1) will be present on both connectors as the connectors are wired in parallel by means of an internal split ("Y") wiring harness. If an optional AlphaDOC card is installed, the split wiring harness is replaced with individual wiring for Output 1 and Output 2 (Secondary loads to be connected to Output 2).

NOTICE:

The default language is set to English. Unless the XM3[™] power supply is ordered preset to another language, the language can be changed through the **PWR CNFG** (Power Configuration) menu. Pressing the **PWR** (Power) softkey while in the OPERATION NORMAL screen opens the Power Info Menu display (the first letter of the top line will blink indicating it is the active line; shown in orange). Pressing ENTR from this screen opens the PWR CNFG menu. Scroll down to the SELECT LANGUAGE menu to set to the desired language, see Figure 2-36.



Fig. 2-36, Select Language in PWR CNFG Menu

2.7 Cooling Fan Installation

NOTICE:

- 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
- Service power supply

Installation Procedure:

- 1. Connect an energized service power supply such as the APP 9015S or APP 9022S to the service power inserter's (SPI) ALT connector. Set the SPI switch to the ALT position.
- 2. Turn off the power supply by setting the battery breaker to OFF, and unplug the AC line cord.
- 3. Attach the fan assembly to the two pre-drilled holes located in the upper, right, rear of the enclosure using the two #6-32 × 3/8" (9.5 mm) 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.
- 4. 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 2.
- 5. Position thermostat away from power supply, as shown.
- 6. Plug back in the AC line cord and turn the battery breaker to ON. Disconnect service power supply from SPI and switch SPI to ON.



Compatible Enclosures



Fig. 2-37, Cooling Fan Kit Installed

No louvers on sides

Incompatible Enclosures 031-161-B0-005, Rev. G1 (02/2025)

PWE-8 Enclosure Solar Shield Installation 2.8

Tools Required:

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



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

Installation Procedure:

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









Incompatible Enclosures

Pole-mount Enclosure Maintenance 3.0

Preventive maintenance should be performed at least once per year. Some operators may choose to increase the frequency at which maintenance is done.

NOTICE:

Maintenance should be performed in accordance with SCTE 205 2001 Outside Plant Power Recommended Preventive Maintenance Procedure.

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.

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 for any dirt or debris build up and clean/ vacuum as necessary.

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® 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 in-line 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.



NOTICE:

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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