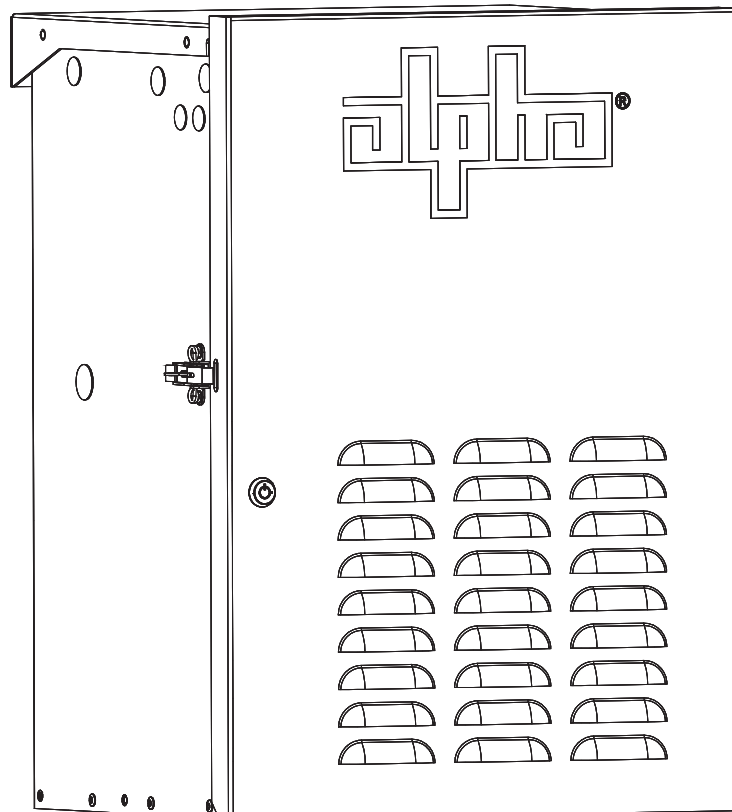




Node Power Supply Enclosure Installation Manual

Effective: November 2018



Safety Notes

Alpha considers customer safety and satisfaction its most important priority. To reduce the risk of injury or death and to ensure continual safe operation of this product, certain information is presented differently in this manual. Alpha tries to adhere to ANSI Z535 and encourages special attention and care to information presented in the following manner:



WARNING! GENERAL HAZARD

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



WARNING! LASER RADIATION

LASER RADIATION WARNING provides safety information with respect to laser radiation and optical fibers.



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 AND 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.

The following sections contain important safety information that must be followed during the installation and maintenance of the equipment and batteries. Read all of the instructions before installing or operating the equipment, and save this manual for future reference.

Node Power Supply Enclosure

Installation Manual

031-295-B0-001, Rev. B

Effective November 2018

Alpha Technologies, Inc.

Introduction

This manual describes the Node Power Supply Enclosure (NPS) and relevant installation information and is intended for the installers of the enclosure. The installers must be familiar with enclosure installation as well as system grounding and the safety issues related to lasers and fiber optic cabling.

Audience

This guide is intended for experienced installers familiar with the mechanical and electrical requirements of fiber optic systems and qualified, licensed installation personnel. Review the support documentation on the website to become familiar with the features and functions of the equipment in this system before proceeding. Failure to install and/or use this equipment as instructed in the system documents can result in damage to the equipment. This system is only serviceable by qualified personnel.

Trademark Information

Alpha® is a registered trademark of Alpha Technologies.

Revision History - P/N 031-295-B0-001		
Version	Date	Description of Changes and New Features
A	04 / 2009	Initial Release of Document
B	11/2018	The document format has been updated to match current style. Specification and battery runtime tables have been amended. References (text, graphics) to XM2 Power Supplies have been replaced with XM3. Updated cooling fan connectivity illustration. Added part number for right angle power cord at various locations throughout the manual. Updated battery termination illustrations.

Disclaimer

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

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.

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.

Contact Information

Sales information and customer service in USA (7AM to 5PM, Pacific Time) 1 800 322 5742
Complete technical support in USA (7AM to 5PM, Pacific Time or 24/7 emergency support) 1 800 863 3364
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Website www.alpha.com

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Important Safety Instructions

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 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, notifications have been placed throughout this manual. Where these notifications appear, use extra care and attention.

ATTENTION:

Alpha Technologies' products are subject to change through continual improvement processes. Therefore, specifications or design layouts may vary slightly from the descriptions included in this manual. Updates to the manual are issued when changes affect form, fit or function.

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.

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 240 VAC. 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.

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.

Battery Safety Notes



WARNING! GENERAL HAZARD

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

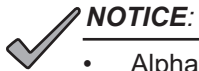
Chemical Hazards

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:

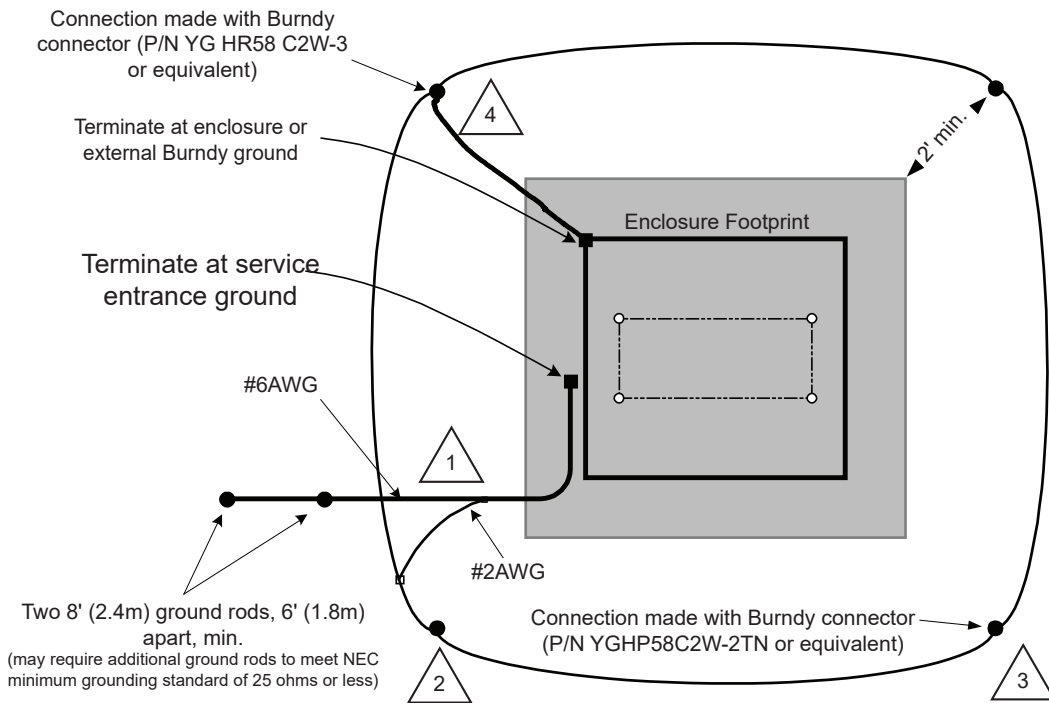
- Servicing and connection of batteries shall be performed by, or under the direct supervision of, personnel knowledgeable of batteries and the required safety precautions.
- Always wear eye protection, rubber gloves, and a protective vest when working near batteries. Remove all metallic objects from 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 spill 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.

Grounding and Earth Connection Notes



NOTICE:

- Alpha Technologies recommends using the grounding method illustrated below. The grounding method for a particular site will be dependant upon soil type, available space, local codes, NESC (National Electric Safety Code), NEC (National Electric Code), 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' (6.0m) bonding conductor requirements for connecting the different grounding systems.
- Alpha Technologies 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.



Service Grounding (required)

- 1** #6 bare copper wire from Service Neutral / Ground Bar with 2 ground rods located 6' (1.8m) apart. If system ground resistance is greater than 25 ohms consult with local code authority for a suitable grounding system.

Lightning Protection (optional)

- 2** 1/2" x 8' (13mm x 2.4m) copper ground rod, four places, driven about 2' (0.6m) (typical) from the corners of the pad.
- 3** #6 bare copper wire loop terminated to each ground rod and buried below grade 30" (.762m) (min). Corrosion-proof connections (25+ year life-span), and hardware suitable for direct burial MUST be used.
- 4** #6 bare copper wire from loop to the enclosure.

1.0 Overview

1.1 Node Power Supply (NPS) Enclosures

The NPS enclosures are equipped with AC service entrances, AC distribution and are supported with a wide range of accessories, including Alpha's XM3 power supply, AlphaCell™ 100XTV batteries and HPL-FT front terminal batteries providing extended standby runtime and life. An optional Fan Kit is available for the NPS enclosure (see Section 2.9, Cooling Fan Kit Installation).

The NPS is specifically designed for indoor or outdoor installations requiring lower power, a smaller footprint and embedded DOCSIS® or proprietary status monitoring capability. The NPS is available in pole-, rack-, wall- or floor-mount configurations. The NPS is an ideal solution for back-up power where traditional equipment is too large and bulky.



Fig. 1-1, Node Power Supply Enclosures, pole-mount, rack-mount, and wall-mount configurations

1.0 Overview, continued

1.2 Specifications

Models	NPS-R	NPS-W1	NPS-W2	NPS-F	NPS-P
Configurations					
Installation	Indoor	Indoor	Outdoor	Indoor	Outdoor
Description	19" and 23" Rack Mount	Wall mount	Wall mount	Floor mount	Pole Mount
Mechanical					
Dimensions H x W x D (in/mm)	24.85 x 17 x 14.1 / 631 x 432 x 358	24.85 x 17 x 14.1 / 631 x 432 x 358	24.85 x 17 x 14.1 / 631 x 432 x 358	24.85 x 17 x 14.1 / 631 x 432 x 358	24.85 x 17 x 14.1 / 631 x 432 x 358
Weight (lb/kg)	39 / 17.7	39 / 17.7	39 / 17.7	39 / 17.7	39 / 17.7
Specifications					
Material:	Exterior powder-coated aluminum				
Vent Screen:	Stainless mesh (required for outdoor applications; optional for indoor configurations) with .005" x .005" / .12mm x .12mm opening size to minimize snow, water and dust ingress				
Door and Lid Seal:	Poron gasketing				
Hardware:	Stainless steel				
Color:	Gray (Custom colors available)				
Tamper Switch:	Optional				
Battery Slide Tray (100XTV Batteries only):	Optional				
Safety Ground:	Adjacent to AC outlets (Optional stainless steel ground stud)				
Lid:	Removable				
Door:	Hinged removable				
Pole:	Galvanized steel brackets for wood, and concrete pole mount and wall mount				

Table 1-1, Enclosure Specifications

1.0 Overview, continued

1.3 Battery Runtime

XM2-300HP 12V (Configured for 60V output)

Power Supply Input Voltage		120V 60Hz					
Output Load (A)		1	2	3	4	5	
Battery Type	100XTV	Runtime (minutes, approximate)*	591	290	181	125	93
	150XTV (1 Battery)		860	415	259	180	134
	150XTV (2 Batteries)		1218	617	397	283	215
	3.5HP		1132	559	354	250	188
	4.0HP		1251	607	386	276	213
Power Supply Input Voltage		230V 50Hz					
Output Load (A)		1	2	3	4	5	
Battery Type	100XTV	Runtime (minutes, approximate)*	599	294	185	129	96
	150XTV (1 Battery)		872	421	264	185	138
	150XTV (2 Batteries)		1840	910	583	415	315
	3.5HP		1148	566	361	256	193
	4.0HP		1269	615	394	283	218

* Actual runtimes are a function of battery life, equipment loading and environmental conditions.

XM2-300HP 12V (Configured for 90V output)

Power Supply Input Voltage		120V 60Hz			
Output Load (A)		1	2	3	
Battery Type	100XTV	Runtime (minutes, approximate)*	393	182	110
	150XTV (1 Battery)		566	261	158
	150XTV (2 Batteries)		1211	576	358
	3.5HP		754	356	220
	4.0HP		826	389	246

* Actual runtimes are a function of battery life, equipment loading and environmental conditions.

Table 1-2, XM2-300HP Battery Runtime

1.0 Overview, continued

XM3-910HP 36V (Configured for 90V output)

Power Supply Input Voltage		120V 60Hz										
Output Load (A)			1	2	3	4	5	6	7	8	9	10
Battery Type	18V4 (1 String)	Runtime (minutes, approximate)*	1021	580	397	295	234	191	160	137	119	104
	100XTV (1 String)		1021	580	397	295	234	191	160	137	119	104
Power Supply Input Voltage		230V 50Hz										
Output Load (A)			1	2	3	4	5	6	7	8	9	10
Battery Type	18V4 (1 String)	Runtime (minutes, approximate)*	1021	579	398	298	234	191	160	137	119	104
	100XTV (1 String)		1021	579	398	298	234	191	160	137	119	104

* Actual runtimes are a function of battery life, equipment loading and environmental conditions.

Table 1-3, XM3-910HP 36V Battery Runtime (Configured for 90V Output)

XM3-615HP 36V (Configured for 60V output)

Power Supply Input Voltage		120V 60Hz															
Output Load (A)			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Battery Type	18V4 (1 String)	Runtime (minutes, approximate)*	1183	753	548	425	345	288	246	214	188	167	149	135	123	112	103
	100XTV (1 String)		1183	753	548	425	345	288	246	214	188	167	149	135	123	112	103
Power Supply Input Voltage		240V 60Hz															
Output Load (A)			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Battery Type	18V4 (1 String)	Runtime (minutes, approximate)*	1168	743	545	423	345	287	246	213	187	166	149	134	122	112	103
	100XTV (1 String)		1168	743	545	423	345	287	246	213	187	166	149	134	122	112	103
Power Supply Input Voltage		230V 50Hz															
Output Load (A)			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Battery Type	18V4 (1 String)	Runtime (minutes, approximate)*	1384	831	589	449	360	299	252	218	191	169	151	136	123	112	103
	100XTV (1 String)		1384	831	589	449	360	299	252	218	191	169	151	136	123	112	103

* Actual runtimes are a function of battery life, equipment loading and environmental conditions.

Table 1-4, XM3-615HP 36V Battery Runtime (Configured for 60V Output)

1.0 Overview, continued

1.4 Parts List

Enclosure Components	
Description	Part Number
Enclosure Assembly, NPS	031-295-20

Installation Components	
Description	Part Number
Pole Mount Kit, Wooden Pole	746-032-20
Pole Mount Brackets, Wooden poles	744-670-20
Pole Mount Kit, Steel/Concrete poles	746-032-20
Brackets, pole mount, concrete/steel poles	591-557-20
Kit, Wall installation	746-034-20
Kit, Rack mounting	746-033-20
Kit, Indoor cover	746-036-20
Kit, Battery Cable, 36Vdc	746-038-20

Optional Components	
Description	Part Number
LA-P-120T	162-046-10
Surge Protector, 75 Ohm FF w/ground	162-028-10
Line Cord (Indoor version only)	874-540-38
Kit, optional Inline Fuse	746-039-20
Sliding tray, Battery (100XTV Batteries only)	746-030-20
AlphaGuard CMT-3SC 36V	012-306-20

Table 1-5, Parts List

2.0 Installation

2.1 Pole-mounted Configuration

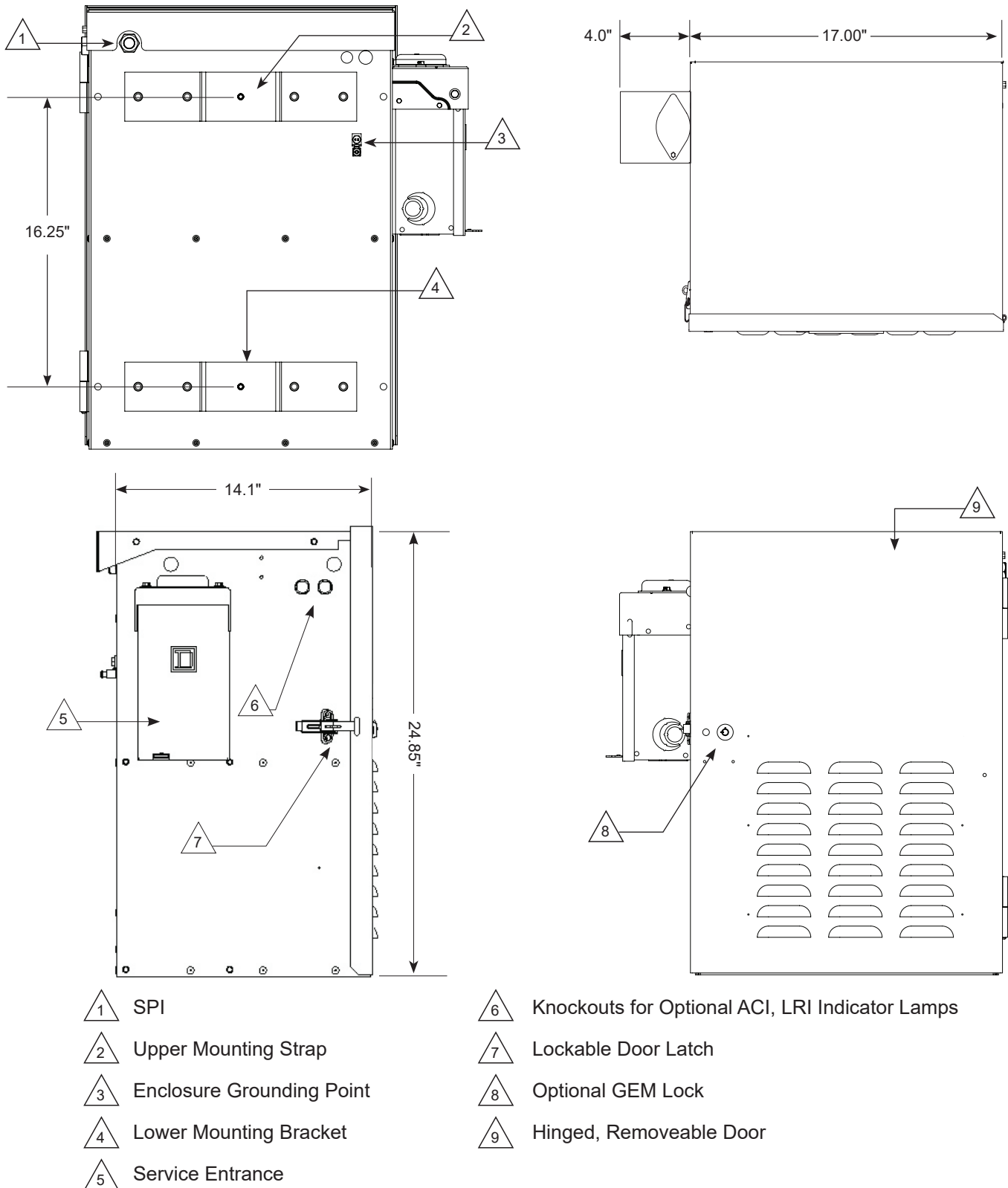


Fig. 2-1, Dimensions and Features

2.0 Installation, continued

2.1.1 Installation on Wooden Pole



CAUTION!

Never transport the unit with batteries installed. Transporting the unit with installed batteries may cause injury to installer and/or damage to enclosure and installed equipment. Install batteries after transporting the unit to the installation site and securing it to the pole.



CAUTION!

Alpha recommends positioning enclosure on the opposite side of the pole from oncoming traffic. This can reduce the danger caused by falling equipment in the event that a pole is struck by an automobile. Mounting bolts must go completely through the wooden pole. Secure the bolts from the back with a large washer and nut.

ATTENTION:

The majority of poles are the property of the local Utility. Before installing an enclosure, the location and method of mounting must be approved by the Utility. Most codes require the base of the enclosure to be located a minimum height from the ground. Always verify height restrictions before proceeding.

Verify the following items are present before installation:

Pole-mounting kit (Alpha p/n 746-032-20) qty. 1

Pole-mounting brackets (Alpha p/n 744-670-20) qty 2

Procedure:

Materials: (Customer supplied)

- Two 5/8-16 machine bolts, length to suit pole
- Two flat washers for 5/8" bolts
- Two helical split lock washers for 5/8" bolts
- Two 5/8-16 hex nuts

Tools: (Customer supplied)

- Auger or drill for boring 3/4" diameter holes in the wooden pole
- Mallet or hammer
- Assorted socket wrenches

1. Unpack the enclosure and galvanized brackets; turn the enclosure facedown on a soft surface.
2. Slide a bracket into the enclosure's lower mounting strap. The bracket's flanges must face away from the enclosure. Secure the bracket to the mounting strap using a supplied 3/8" x 3/4" hex bolt. This prepositions the lower mounting bracket, enabling the installer to accurately locate the placement of the lower mounting hole.
3. Mark the position for the upper mounting bracket on the utility pole. Drill a 3/4" hole completely through the pole. Secure the bracket to the pole with a 5/8" machine bolt, washer, lock washer and nut. Do not fully tighten the bolt at this time.
4. Position the enclosure on the upper mounting bracket. It may be necessary to slightly rock the enclosure and pull downward to properly seat it on the bracket. Center the enclosure on the pole.
5. Mark the hole for the lower mounting bracket. Lift the enclosure off the top bracket and drill the lower hole. Spacing between holes for enclosures is 16.25" on center.
6. Slide the enclosure back into place over the top bracket. Align the lower bracket with the hole and secure it with a 5/8" machine bolt, washer, lock washer and nut. Tighten both brackets until the flanges seat into the wood.
7. The enclosure is now ready for the utility connection (per Section 2.5, Connecting Utility Power), power module, batteries and nodes.

2.0 Installation, continued

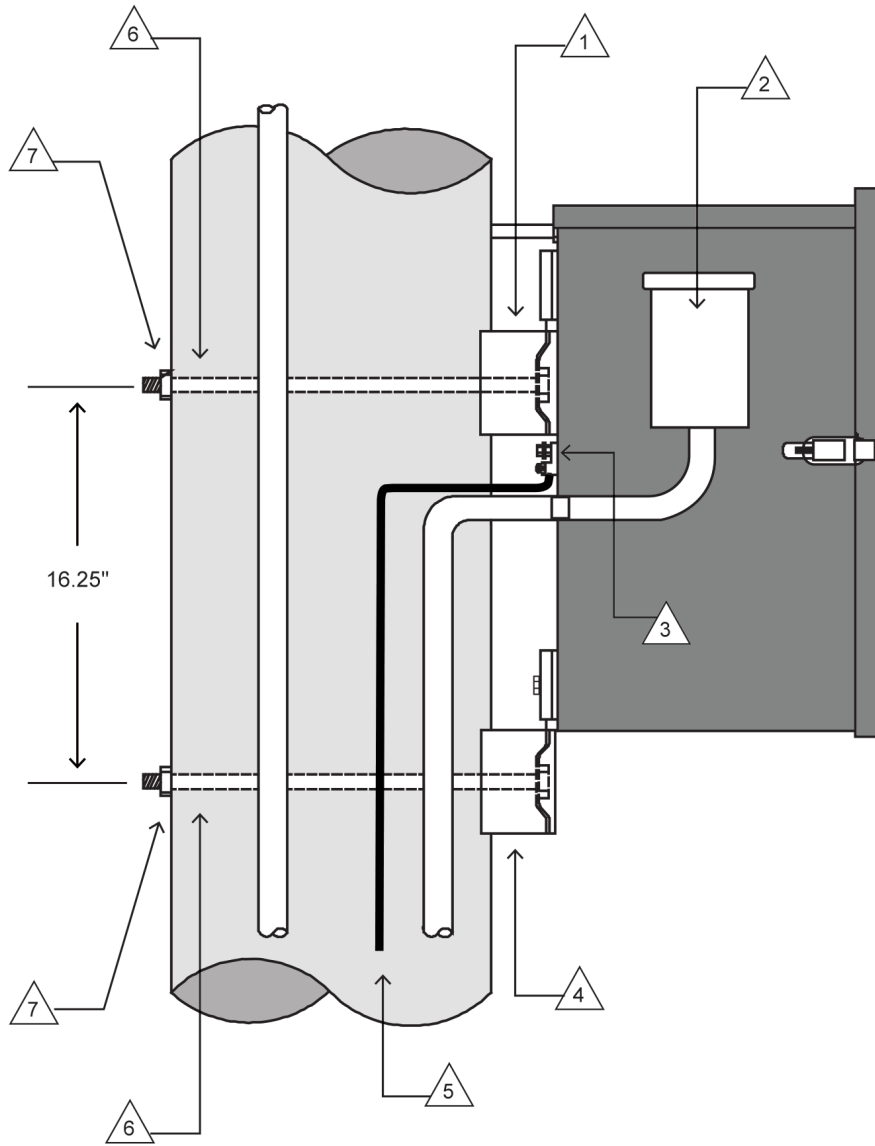


Fig. 2-2, Wooden Pole Installation

- | | |
|-------------------------------|--|
| △ 1 Upper Mounting Bracket | △ 5 #8 AWG (minimum) Copper Ground Wire to 8' Ground Rod |
| △ 2 Service Entrance | △ 6 5/8" Through Bolt (2 places) |
| △ 3 Enclosure Grounding Point | △ 7 Nut, Lock Washer and Washer (2 places) |
| △ 4 Lower Mounting Bracket | |

2.0 Installation, continued

2.1.2 Installation on Steel/Concrete Pole



CAUTION!

Never transport the unit with batteries installed. Transporting the unit with installed batteries may cause injury to installer and/or damage to enclosure and installed equipment. Install batteries after transporting the unit to the installation site and securing it to the pole.



CAUTION!

Alpha recommends positioning enclosure on the opposite side of the pole from oncoming traffic. This can reduce the danger caused by falling equipment in the event that a pole is struck by an automobile. Mounting bolts must go completely through the wooden pole. Secure the bolts from the back with a large washer and nut.

ATTENTION:

The majority of poles are the property of the local Utility. Before installing an enclosure, the location and method of mounting must be approved by the Utility. Most codes require the base of the enclosure to be located a minimum height from the ground. Always verify height restrictions before proceeding.

Verify the following items are present before installation:

- Pole mounting kit (Alpha p/n 746-032-20) qty. 1
- Pole mounting bracket kit (Alpha p/n 591-557-20) qty. 1 (contains 2 brackets)

Materials:

Two customer-supplied stainless steel banding (or equivalent), rated to support loaded enclosure and sized for pole diameter.

Tools:

Assorted socket wrenches

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 strap(s). The bracket's flanges must face away from the enclosure. Secure the bracket to the mounting strap using a supplied 3/8" x 3/4" hex bolt. This prepositions the lower mounting bracket, enabling the installer to accurately locate the placement of the lower mounting hole.
3. Position the Upper mounting bracket on the pole and secure using a pole strap.
4. Position the enclosure on the upper mounting bracket. It may be necessary to slightly rock the enclosure and pull downward to properly seat it on the bracket. Center the enclosure on the pole.
5. Secure the Lower mounting bracket on the pole using a pole strap. Spacing between mounting straps for enclosures is 16.25" on center.
6. The enclosure is now ready for the utility connection (per Section 2.5, Connecting Utility Power), power module, batteries and nodes.

2.0 Installation, continued

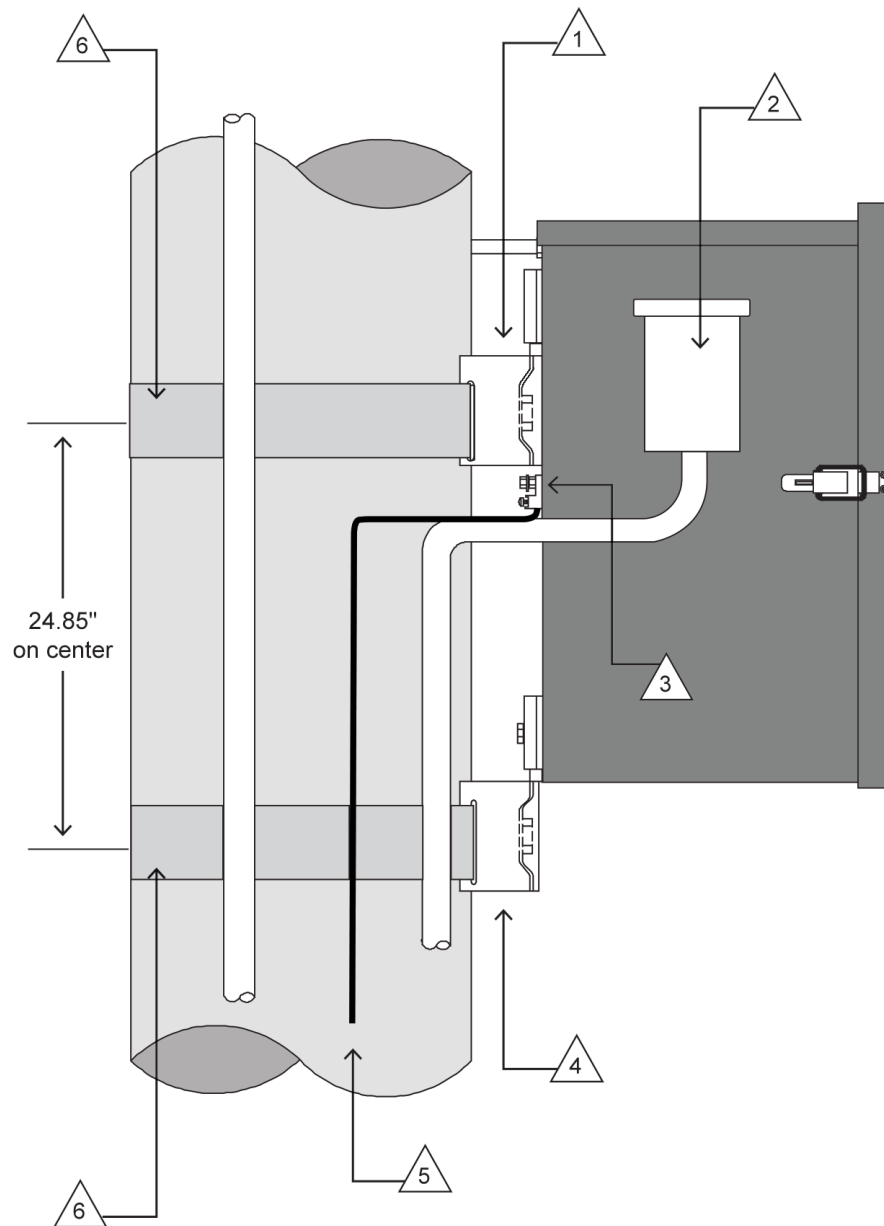


Fig. 2-3, Steel/Concrete Pole Installation

- | | |
|-----------------------------|--|
| ① Upper Mounting Bracket | ④ Lower Mounting Bracket |
| ② Service Entrance | ⑤ #8 AWG (minimum) Copper Ground Wire to 8' Ground Rod |
| ③ Enclosure Grounding Point | ⑥ Customer-supplied Mounting Strap (2 places) |

2.0 Installation, continued

2.2 Rack-mounted Configuration

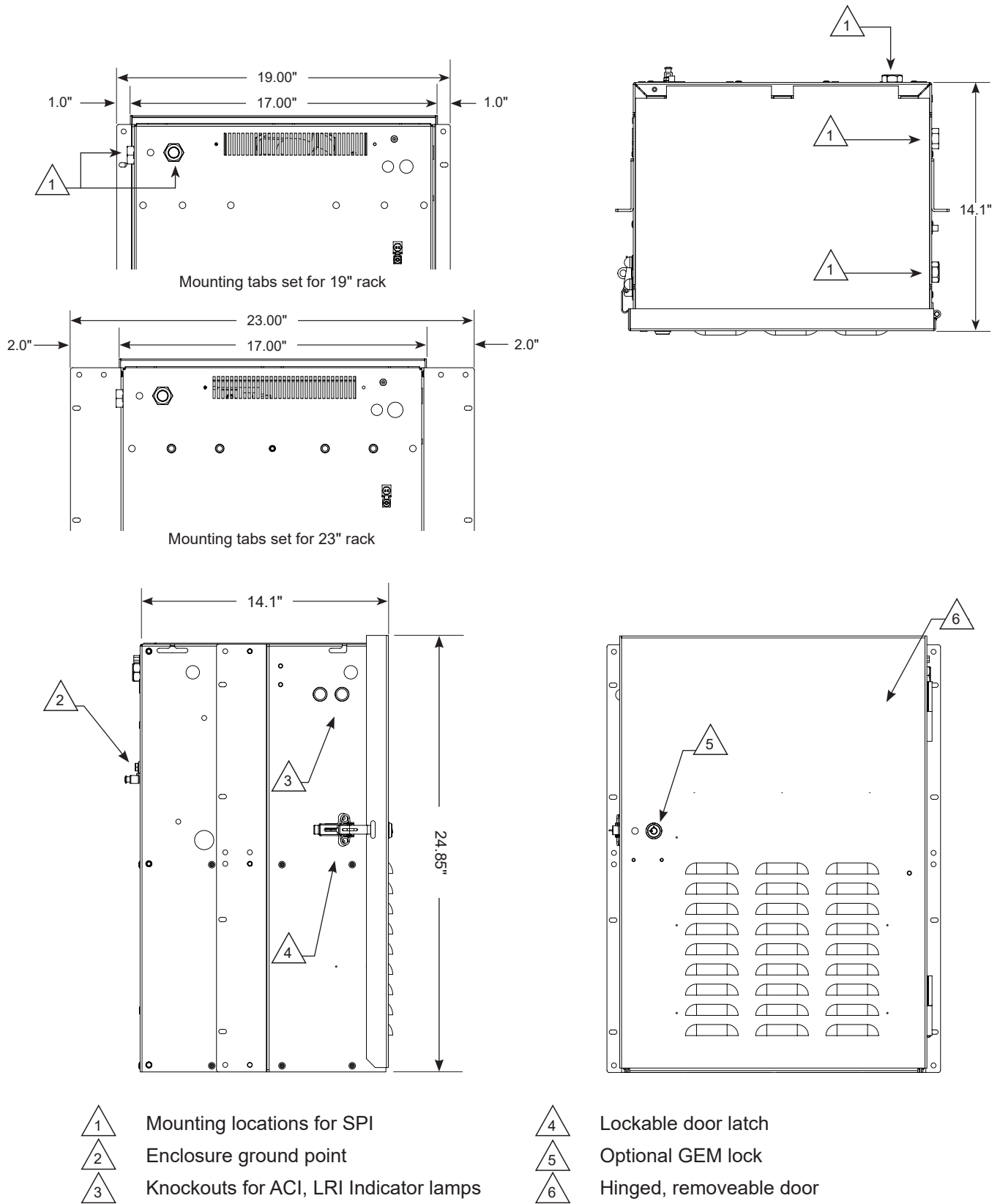


Fig. 2-4, Dimensions, Rack-mounted NPS Enclosure

2.0 Installation, continued

2.2.1 Installation Procedure

Tools required:

- 3/8" wrench and socket
- Torque wrench (for 36 in-lbs spec.)

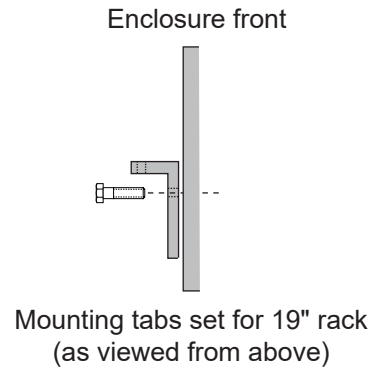
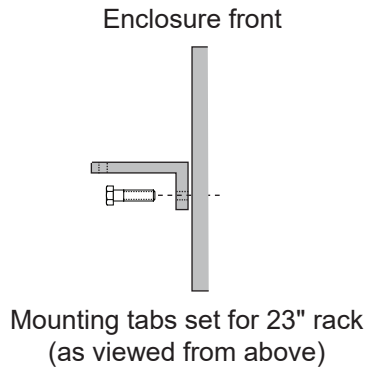
Verify the following are on hand:

- Kit, Cover, Indoor (Alpha p/n 746-036-20)
- Kit, Rack mounting (Alpha p/n 746-033-20)
- Customer-supplied mounting hardware

Verify the equipment rack is securely bolted to the floor and in areas of seismic activity, the mounting method should meet Zone-4 seismic standards or better.

Verify the batteries to be installed in the system are fully charged prior to installation.

1. Remove lid and door from enclosure. Set aside.
2. Orient the rack mounting tabs as shown below to fit the equipment rack and attach rack mounting tabs to sides of enclosure (1/4-20 hardware) tighten to 36 in-lbs.
3. While one installer lifts and holds the empty enclosure in place, start the mounting hardware (1/4-20 bolts, 6 places) in the corresponding holes in the rack. Tighten to 36 in-lbs.



CAUTION!

The populated cabinet will weigh approximately 240 lbs [109kg]. Use all eight mounting bolts (4 per mounting tab) to securely hold the enclosure in place.

2.0 Installation, continued

2.3 Wall-mounted Configuration

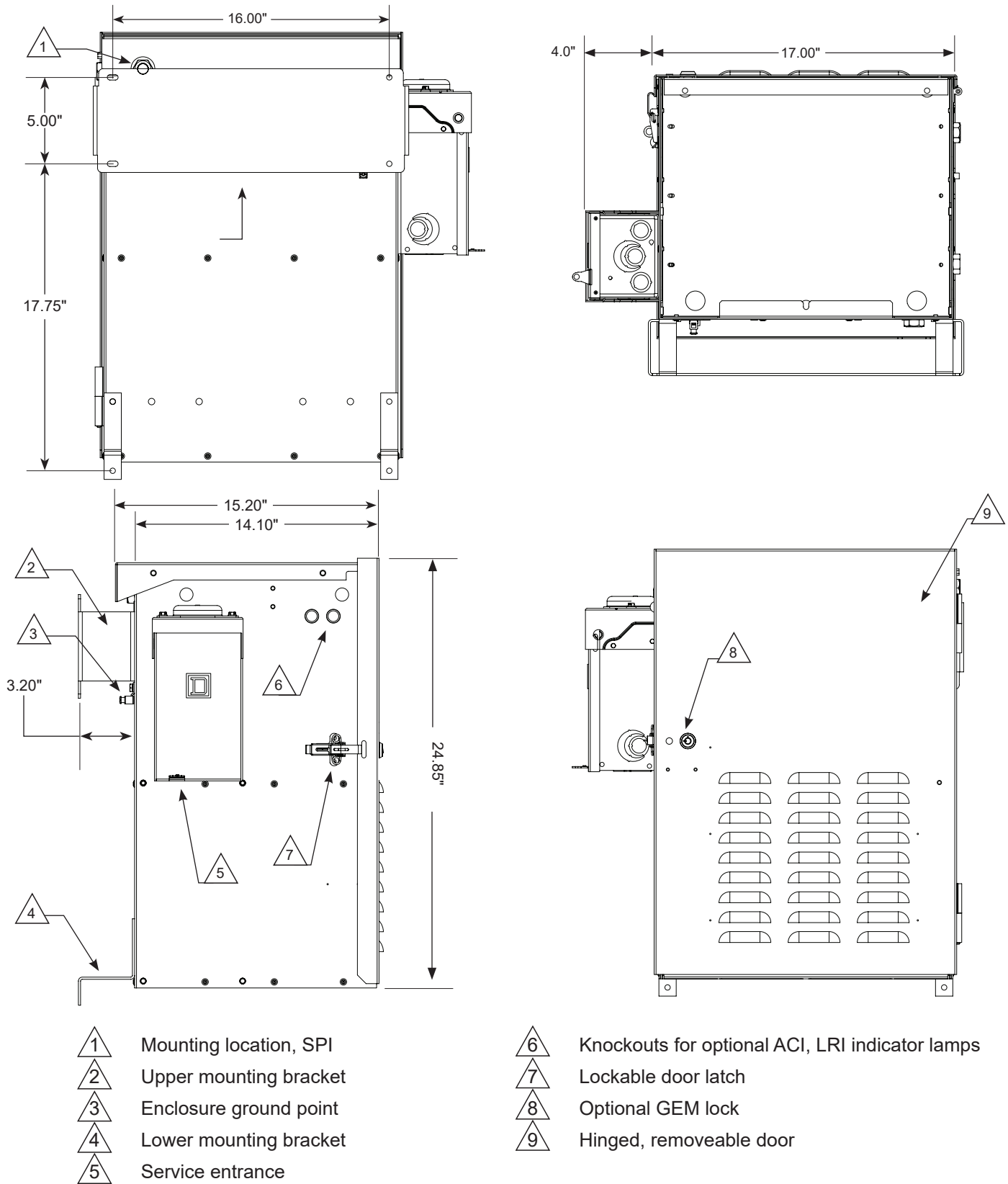


Fig. 2-5, Dimensions, Wall-mounted NPS Enclosure

2.0 Installation, continued

2.3.1 Installation

Verify the following are on hand before installation:

- Kit, Mounting, Wall (Alpha p/n 746-034-20)
- Customer-supplied mounting hardware

Tools required:

- 3/8" wrench and socket
- Stud finder
- Level
- Hand drill with 5/32" bit



CAUTION!

The populated cabinet will weigh approximately 240 lbs [109kg]. Direct mounting to wall studs is required.

1. Remove the lid and door of the enclosure and set aside.
2. Use stud finder to locate centers of two studs and mark.
3. Hold upper bracket to located centers and mark the two lower holes at this time.
4. Drill 4 5/32" pilot holes at the marks.
5. Use 4 3/4" x 2-3/4" lagbolts to fasten the bracket to the wall.
6. Attach the lower mounting brackets to the enclosure.
7. Attach the enclosure to the upper mounting bracket.
8. Mark the holes (on stud center) for the lower mounting brackets and drill 5/32" pilot holes.
9. Use the 1/4" x 1-1/2" lagbolts to secure lower brackets to the wall.
10. Installation complete. The enclosure is now ready for utility wiring and installation of equipment.

2.0 Installation, continued

2.4 Floor-mounted Configuration

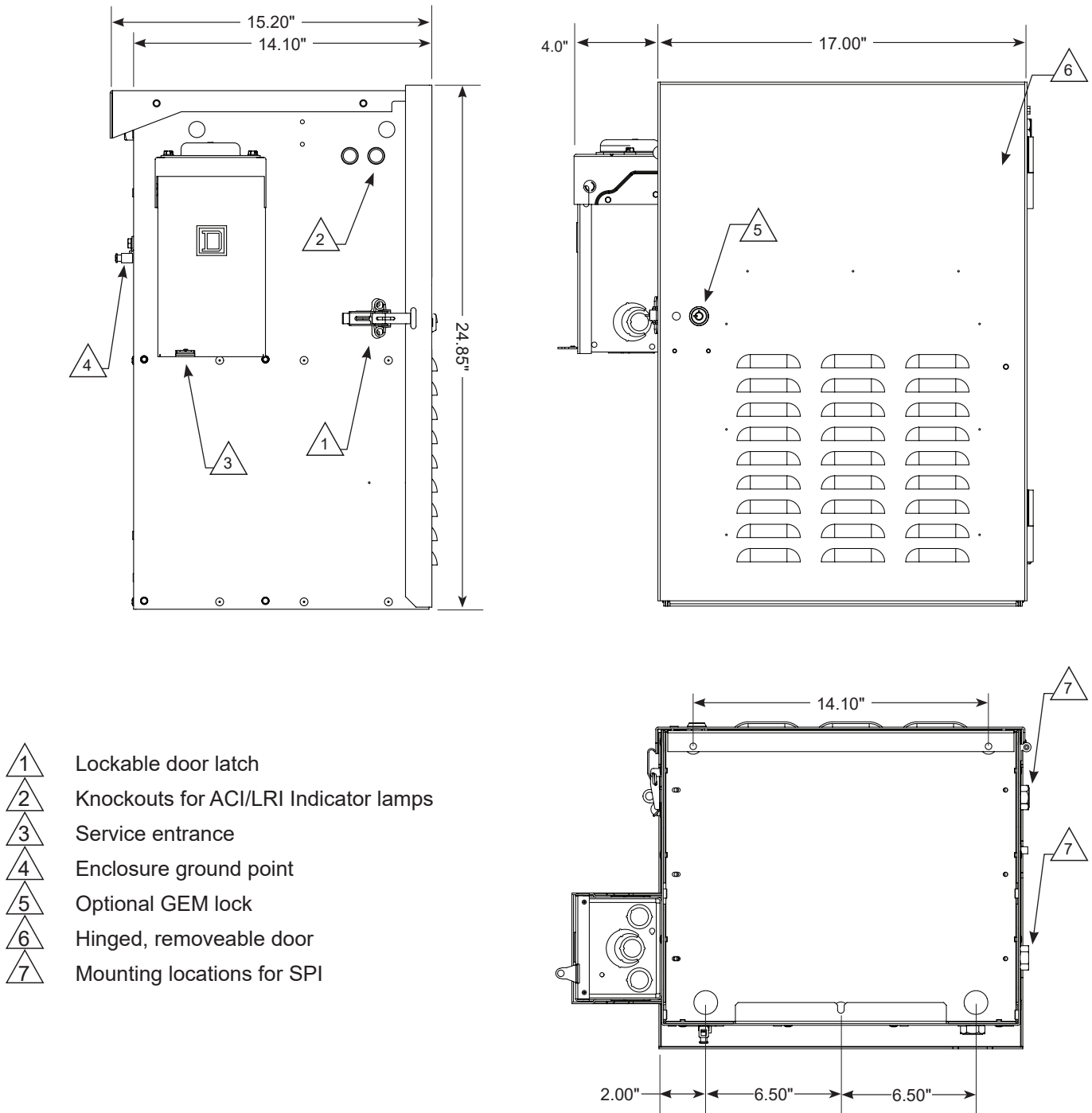


Fig. 2-6, Dimensions, Floor-mounted NPS Enclosure

2.0 Installation, continued

2.4.1 Installation

Tools required for floor-mounting configuration:

- Masonry drill and bit
- Vacuum for dust removal
- Qty 3, 1/2" x 1-1/2" Masonry anchor bolts
- Hand drill with 5/32" bit

Concrete surface installation:

1. Position the enclosure and use as template to mark drilling locations of 3 mounting holes.
2. Drill holes for anchor bolts, (remove dust as necessary) and install inserts.
3. Position empty cabinet over inserts.
4. Secure cabinet with bolts, lock washers and flat washers.

2.5 Connecting the Utility Power



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 enclosure through an 0.875" knockout on the side or rear of the NPS. The enclosure accepts 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

2.0 Installation, continued



NOTICE:

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

2.5.1 Service Power

ATTENTION:

Connecting to utility power must be performed by qualified service personnel in compliance with local electrical codes and common safety practices. Connection to utility power must be approved by the local utility before installing the power supply.

UL and NEC require that a UL-listed service disconnect switch be installed between the power source and the power supply. Connection to the power supply must include an appropriate service entrance to the weatherhead.



NOTICE:

Utility power enters the enclosure through a 70A rainproof SUSE-rated breaker box.

The service entrance is wired as shown in the diagram below.

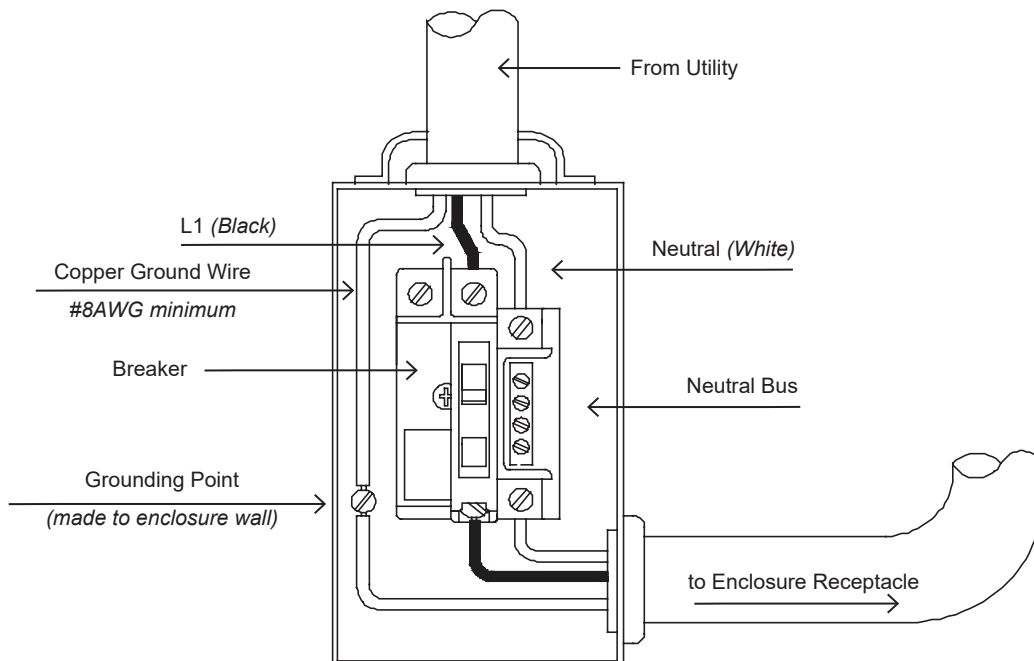


Fig. 2-7, 120Vac Service Entrance Wiring

2.0 Installation, continued

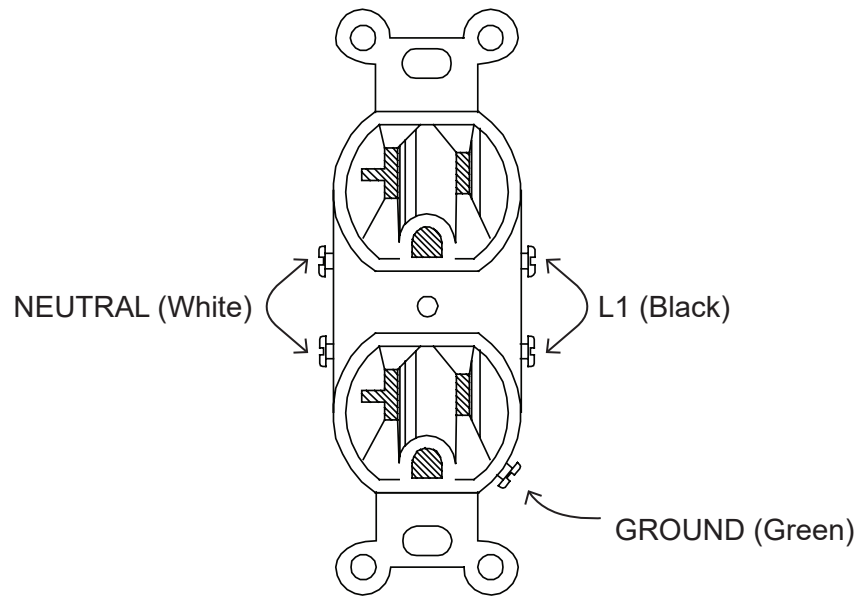


Fig. 2-8, 520-R Receptacle Wiring

2.0 Installation, continued

2.6 Connecting the Coaxial Cable

2.6.1 Coaxial Cable Surge Protector Installation Instructions

Alpha recommends using coaxial surge suppression for enclosure protection. The Coaxial Surge Protector (Alpha p/n 162-028-10) includes 75 ohm surge suppressor, and mounting hardware. As shown below, the Surge Protector can be mounted in either of two locations on the cabinet.

Required Tools:

- Phillips screwdriver
 - 3/8" socket and driver
 - Hammer
 - Punch
1. Remove one of the 3/8" knockouts located in the upper rear (or right side) of the enclosure with a hammer and punch.
 2. Attach the surge protector to the inside of the enclosure wall with the provided hardware. The "Customer" connection will protrude from the enclosure.
 3. Verify the star washers included in the kit are firmly in contact with the enclosure wall for proper grounding.

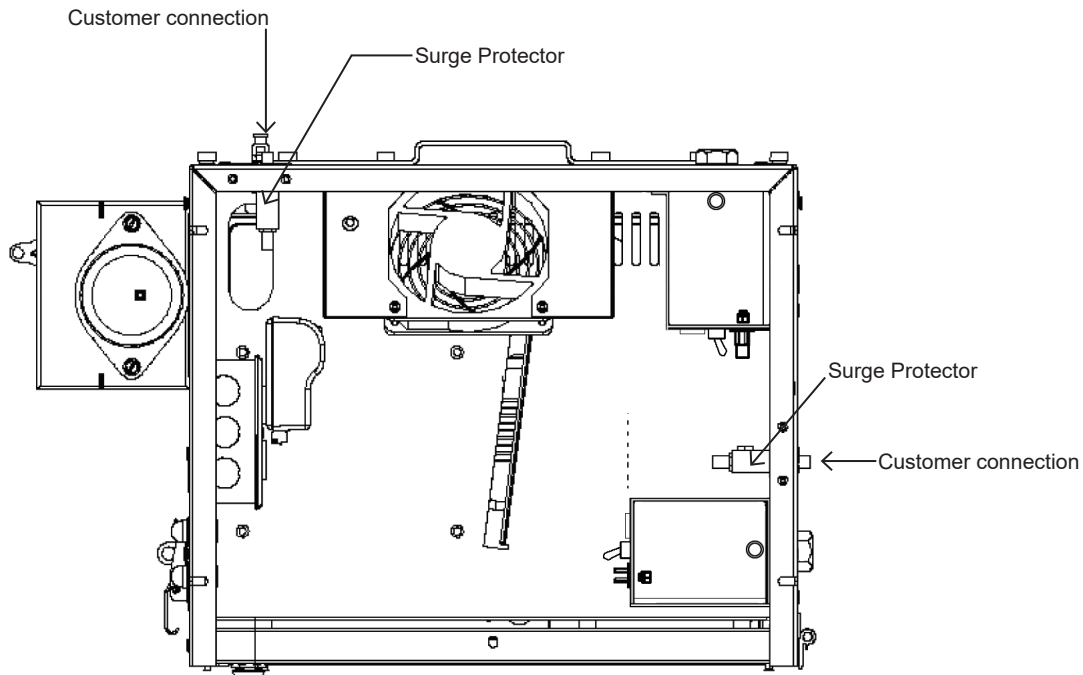


Fig. 2-9, Surge Protector mounting locations

2.0 Installation, continued

2.6.2 Connecting the Service Power Inserter (SPI)



WARNING! ELECTRICAL HAZARD

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.

The standard SPI (Alpha p/n 020-019-31) can be mounted in any of three locations as shown in the illustrations below. Three knockouts (one at the rear of the enclosure and two on the side) are available for this version of the SPI allowing greater flexibility with regard to the installation of the coaxial cable.

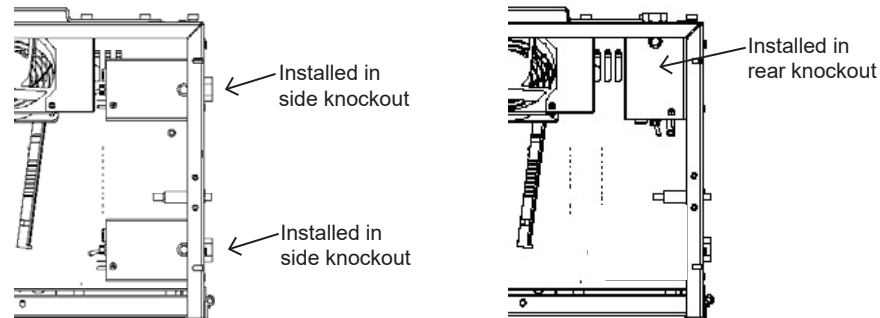


Fig. 2-10, Mounting locations for the standard SPI

Installation Procedure:

1. Use the hammer and punch to remove the 3/4" knockout from either front or rear location on the right side (as viewed from the front) or the right rear corner of the enclosure.
2. Use a 1" wrench to remove the output port fitting from the SPI.
3. Position the SPI inside the enclosure and fix in place by reattaching the output port fitting to the body of the SPI. Tighten to 130 in-lbs.
4. Disconnect the SPI from all power sources.
5. If needed, remove the cover, exposing the circuit board and seizure screw assembly.
6. Loosen the seizure screw.
7. Screw the Coaxial Termination into Output Port at the rear of the SPI, inserting the stinger into the seizure screw assembly.
8. To prevent arcing and failure of the unit, tighten seizure screw to 35 in-lbs.
9. Replace cover and reinstall screws.
10. Verify switch on front of SPI is on the ON position.

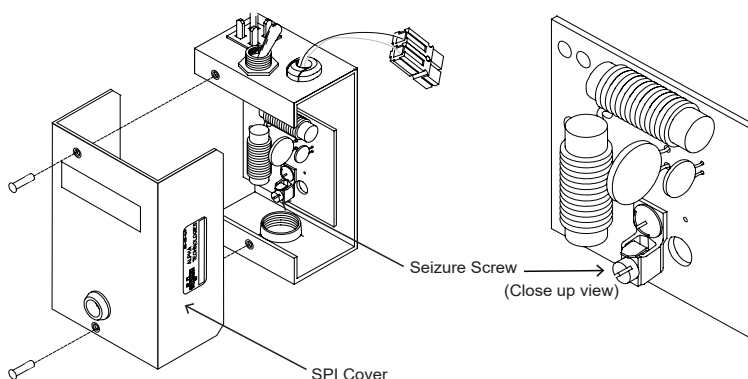


Fig. 2-11, Cover Removal

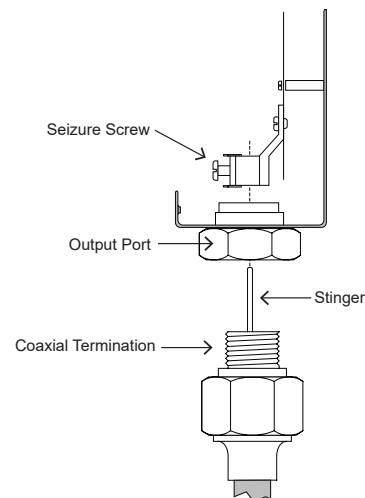


Fig. 2-12, Coaxial Cable Connection

2.0 Installation, continued

2.6.3 Connecting the Service Power Inserter-RF (SPI-RF)

The SPI-RF (Alpha p/n 021-080-20 for the XM2, XM3) (Alpha p/n 021-080-21 for the XM2-300HP) can be mounted in either of the two locations as shown below.

Tools required:

- Hammer
- Punch
- 1" wrench

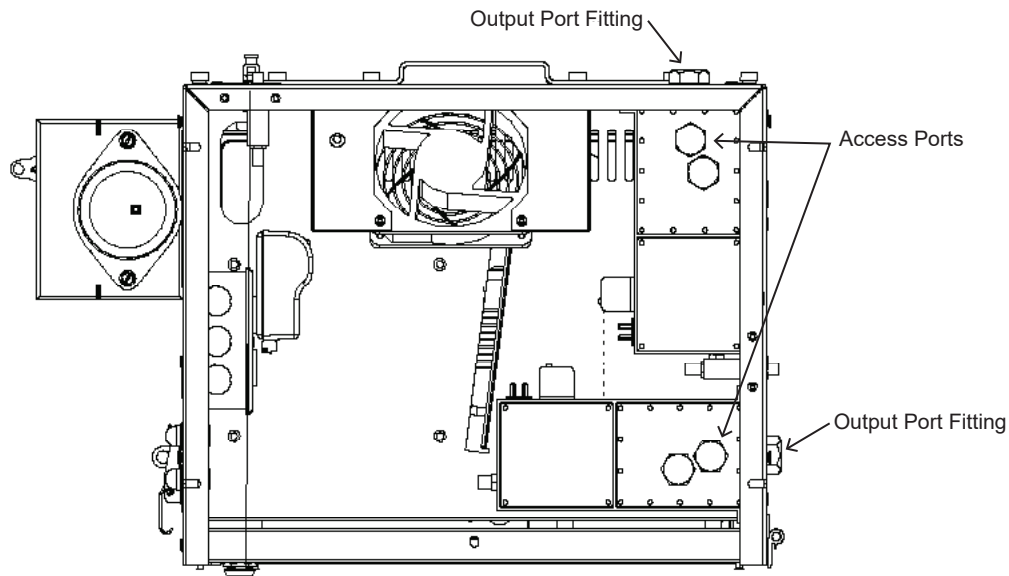


Fig. 2-13, Mounting locations for the SPI-RF

Installation Procedure:

1. Use the hammer and punch to remove the 3/4" knockout from either the right side (as viewed from the front) or the right rear corner of the enclosure.
2. Use a 1" wrench to remove the output port fitting from the SPI-RF.
3. Position the SPI-RF inside the enclosure and fix in place by reattaching the output port fitting to the body of the SPI-RF.
4. Disconnect the SPI-RF from all power sources.
5. Remove the access port cover, exposing the circuit board and seizure screw assembly.
6. Loosen the seizure screw.
7. Screw the Coaxial Termination into Output Port at the rear of the SPI-RF, inserting the stinger into the seizure screw assembly.
8. Tighten seizure screw to 35 in-lbs.
9. Replace access port cover and reinstall screws.
10. Verify switch on top of SPI-RF is on the ON position.

2.0 Installation, continued

2.7 Battery Installation



WARNING! ELECTRICAL HAZARD

Battery systems represent a risk of electrical shock and high short circuit currents.

The following precautions must be observed when maintaining batteries:

- Remove all personal metal objects (watches, rings, etc.).
- Use insulated tools.
- Wear eye protection and rubber gloves.
- Observe circuit polarities.
- Do not make or break live circuits.
- Do not lay metal tools and hardware on top of the batteries.

The batteries are enclosed in cabinets with limited access. Again, extreme caution must be exercised when maintaining and collecting data on the battery system.

Battery Identification

Each battery contains a DATE CODE usually located on a sticker between the battery posts. This date code must be recorded in the battery's maintenance log. If batteries other than those installed by Alpha are used, consult the battery's documentation for date code type and placement.

Battery Date Code located in this box
(1218 = DEC. 2018)

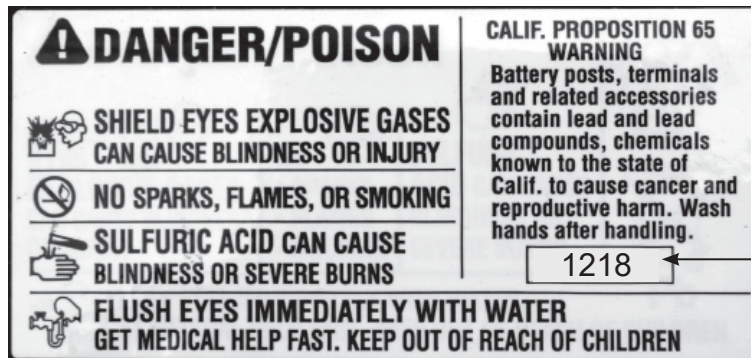


Fig. 2-14, Battery Identification Label

2.0 Installation, continued

2.7.1 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" bolts. The use of 1" bolts will seriously damage the battery. The only exception is the terminal with the large spacer for the in-line fuse link.



NOTICE:

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. Refer to Fig. 2-16 for correct battery arrangement. Position the batteries to allow maximum 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 diagram as a reference, connect the batteries in series to achieve 36Vdc. 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). Refer to the diagrams and follow the instructions below that best matches your configuration:
 - **XM3** – Attach the PTS on the negative terminal of the #2 battery string.
 - **XM2-300HP** – Attach the DRTS (Dual Remote Temperature Probe) to the negative terminal of the battery.
 - **XM2** – 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.
6. After attaching the sensor to the battery, DO NOT connect the RTS/PTS to the power supply at this time.
7. Route the battery cable connector into the power supply compartment. DO NOT connect to the batteries 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.

2.0 Installation, continued

2.7.2 Battery Wiring Diagram

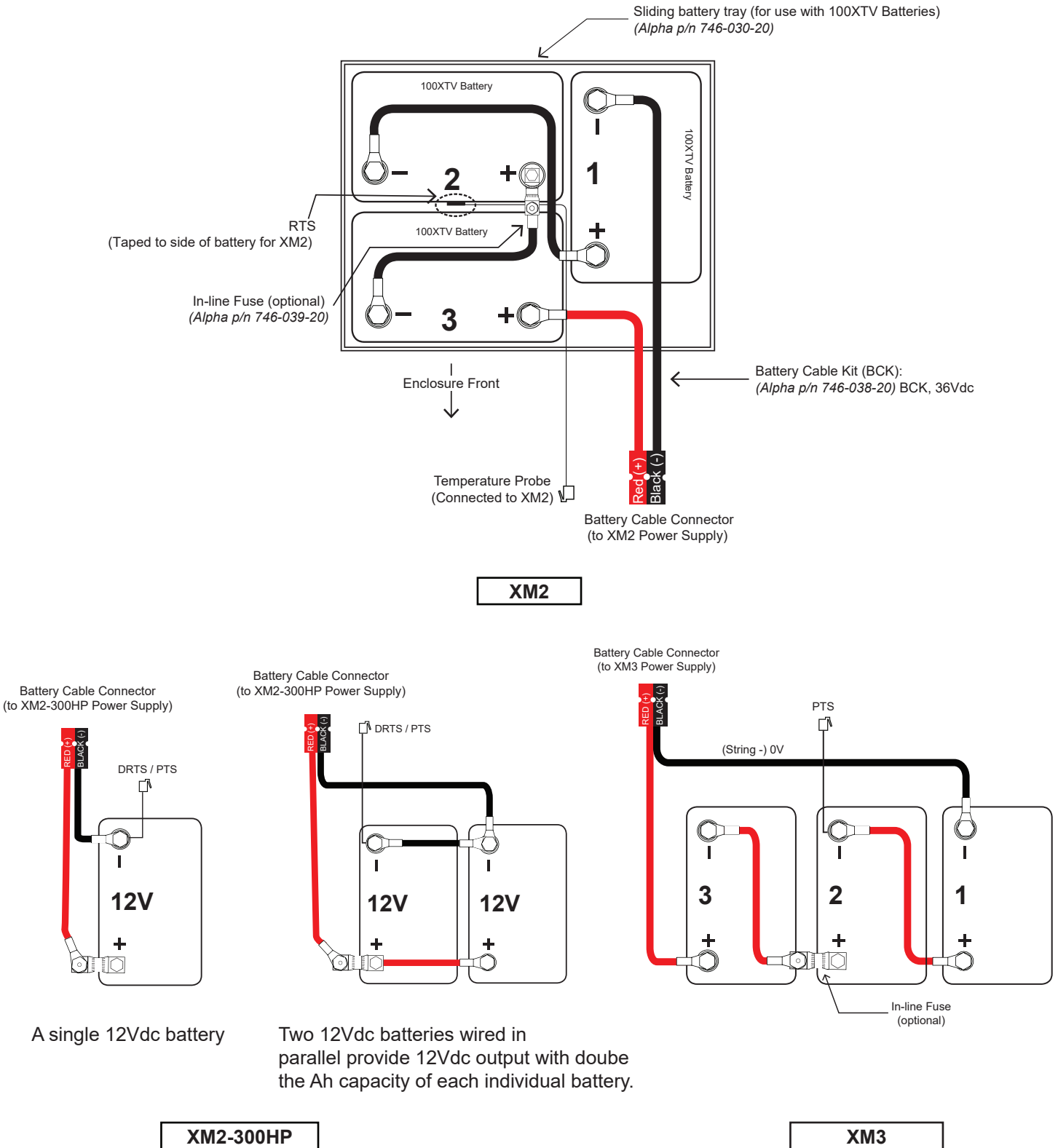


Fig. 2-15, NPS Battery Wiring Diagram

2.0 Installation, continued

2.7.3 Battery Terminal Connections

 **NOTICE:**

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

 **CAUTION!**

Different batteries have different requirements. Threaded insert terminals require the use of specific bolts. The use of 1" bolts will seriously damage the battery. The only exception is the terminal with the large spacer for the in-line fuse link. Please refer to the battery manufacturer's threaded terminal requirements.

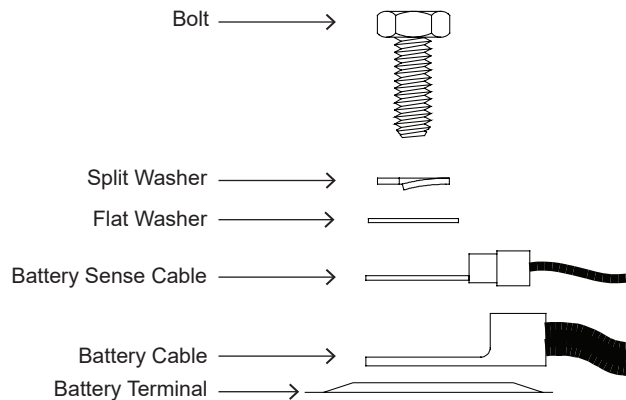



Fig. 2-16, Hardware stack-up, Threaded Battery Insert

 **NOTICE:**

Use the hardware supplied with the battery. The use of 1" bolts will seriously damage the battery. The only exception is the terminal with the large spacer for the in-line fuse link.

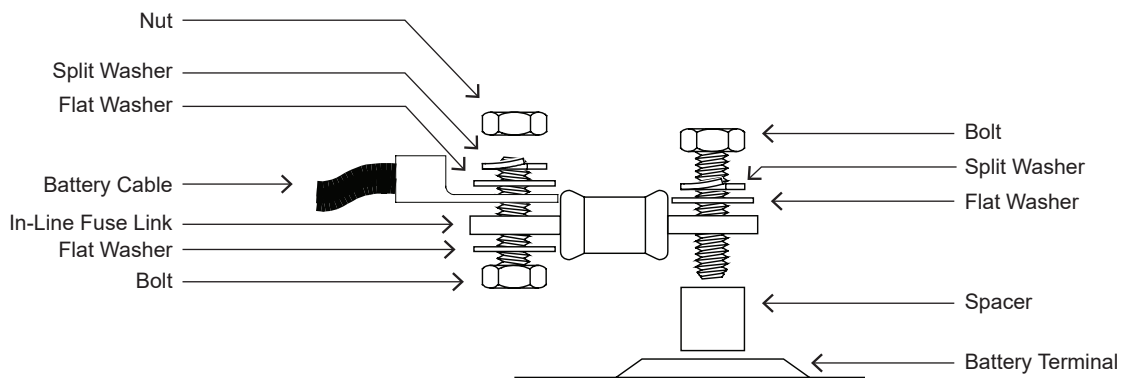
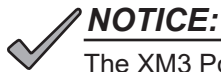


Fig. 2-17, Hardware stack-up, Threaded Battery Insert with Optional In-line use

2.0 Installation, continued

2.8 Installing the XM3 Power Supply



NOTICE:

The XM3 Power Supply requires a right angle plug. If the power supply did not come with one, order part number 876-025-19.

Installation Procedure:

1. Before installation, inspect the power supply for damage or loose connectors.
2. Place the XM3 Power Supply on the equipment (top) shelf of the enclosure.
3. Switch the BATTERY BREAKER **1** on the front of the power supply OFF. This prevents the inverter from starting when the batteries are first connected to the power supply.



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 into the power supply's BATTERY INPUT connector **2**. The connector is keyed and color-coded to fit in only one direction.
5. Plug the Remote Temperature Sensor into the TEMP PROBE **3** connector located on the Inverter Module assembly on the front of the power supply.
6. If applicable, plug the optional Local/Remote Indicator lamp (LRI) cable into the LRI connector **4**.
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 **5**.
8. Plug the connector from the SPI into the power supply's OUTPUT 1 **6**. 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 1. If the PIM option is installed, connect a second SPI to OUTPUT 2 **7**. Make sure that the SPI "ALT/ON" switch is in the ON position.
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 XM3 Series Power Supply Technical Manual (*Alpha p/n 017-882-B0*) for Start-up and Test procedures.

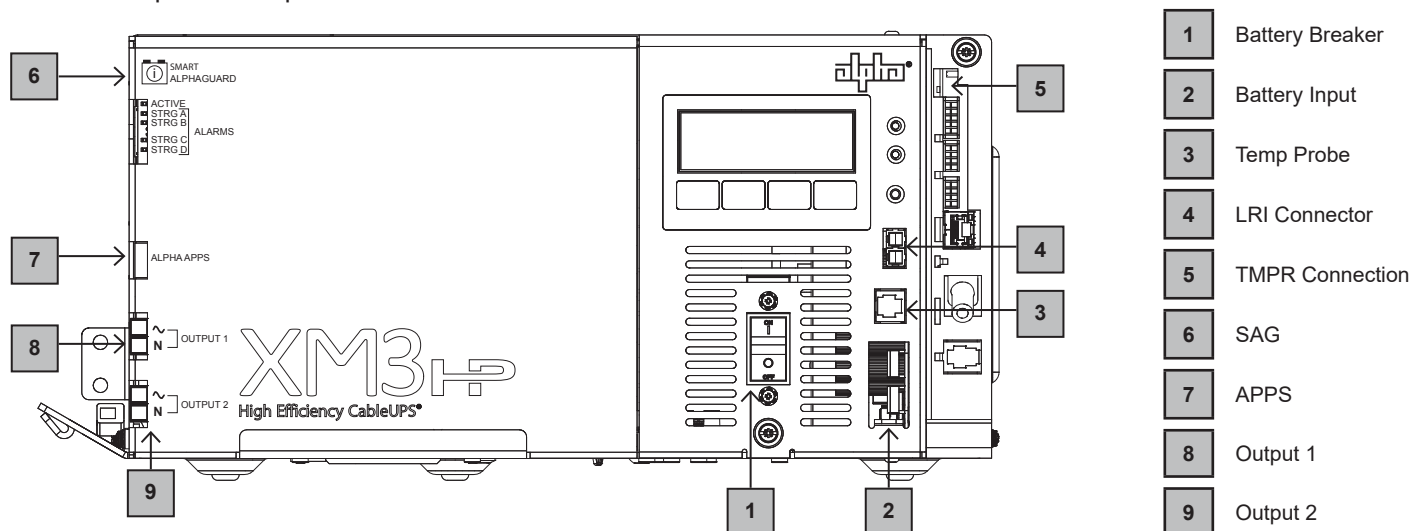


Fig. 2-18, XM3 Power Supply

2.0 Installation, continued

2.9 Cooling Fan Kit Installation



NOTICE:

This procedure requires a service power supply such as the APP 9015S or APP 9022S (*Alpha p/n 016-537-B0-002*) to maintain power to the cable plant while fan is being installed.

Tools Required:

- Phillips Screwdriver
- Drill and bit for #6 screws

Installation Procedure: To install the optional NPS Fan Kit (*Alpha p/n 745-101-20*):

- 1 Open enclosure door and remove the enclosure lid.
- 2 Drill out holes on both sides of mesh.
- 3 Insert the fan through the top enclosure.
- 4 Attach the fan assembly to the two holes using the two #6-32 x 3/8" Phillips screws provided. 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.
- 5 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 connector.

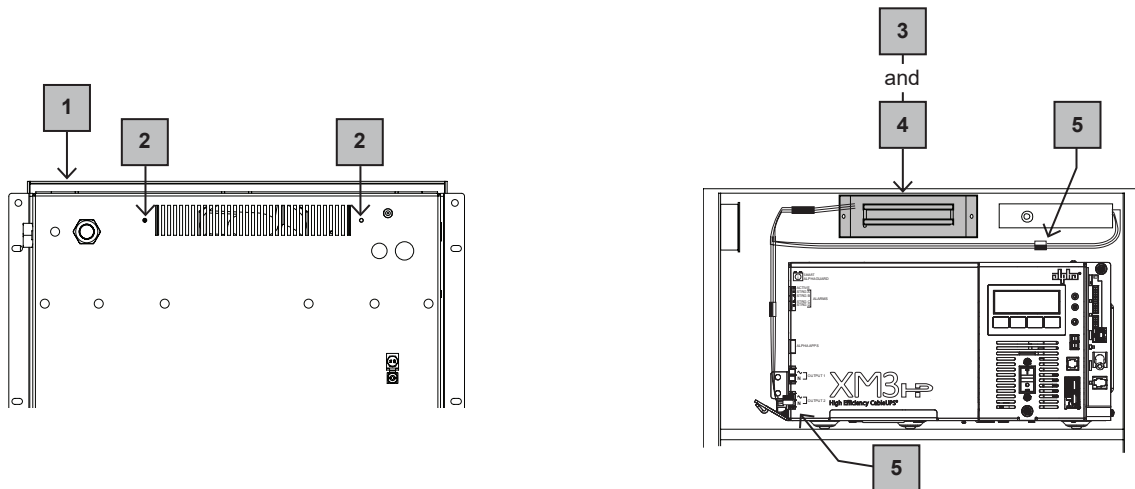


Fig. 2-19, Cooling fan installation configuration

2.10 Cooling Fan Kit Removal

To remove the fan kit, follow the procedure below:

1. Open enclosure door and remove the enclosure lid.
2. Verify power is removed from fan circuit.
3. From inside the enclosure, remove the two #2 Phillips-head screws.
4. Remove the fan housing.
5. Disconnect the two Faston® connectors from the fan.
6. Replace lid and close door.

3.0 Populating the Cabinet and Turn-up Checklist

- Verify utility connections are correct. (Section 2.5, Connecting Utility Power)
- Verify power supply is installed.
- Verify batteries are wired according to the diagram on the enclosure door, and that the hardware is tightened to the manufacturer's specifications.
- Verify the SPI, tamper switch and communications modules are connected. (Section 2.8, Installing the XM3 Power Supply)
- Verify lid and door are installed.
- Verify utility power is connected.
- Verify battery string is connected to the XM3 Power Supply.
- Turn on battery breaker.
- Battery alarm is clear.

After completing the checklist, the unit is ready to be placed into service.

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