FBE2322 Enclosure System

Technical Manual

Effective: December, 2012

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Power

Alpha Technologies

Power

FBE2322 Enclosure
Technical Manual

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Safety Notes

Review the drawings and illustrations contained in this manual before proceeding. If there are any questions regarding the safe installation or operation of 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, the following symbols have been placed throughout this manual. Where these symbols appear, use extra care and attention.

ATTENTION:

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

NOTE:

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

CAUTION!

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

WARNING!

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

Battery Maintenance Guidelines

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

- To prevent damage, inspect batteries every 3 months for:

  Signs of battery cracking, leaking or swelling. The battery should be replaced immediately by authorized personnel using a battery of the identical type and rating.

  Signs of battery cable damage. Battery cable should be replaced immediately by Authorized Personnel using replacement parts specified by vendor.

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

Recycling and Disposal Instructions

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

Electrical Safety

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

Mechanical Safety

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

Battery Safety Notes

WARNING!

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

Chemical Hazards

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

To avoid injury:

- Servicing and connection of batteries shall be performed by, or under the direct supervision of, personnel knowledgeable of batteries and the required safety precautions.
- Always wear eye protection, rubber gloves, and a protective vest when working near batteries. Remove all metallic objects from hands and neck.
- Batteries produce explosive gases. Keep all open flames and sparks away from batteries.
- Use tools with insulated handles, do not rest any tools on top of batteries.
- Batteries contain or emit chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Battery post terminals and related accessories contain lead and lead compounds. Wash hands after handling (California Proposition 65).
- Wear protective clothing (insulated gloves, eye protection, etc.) whenever installing, maintaining, servicing, or replacing batteries.
- If any battery emission contacts the skin, wash immediately and thoroughly with water. Follow your company's approved chemical exposure procedures.
- Neutralize any spilled battery emission with the special solution contained in an approved spill kit or with a solution of one pound Bicarbonate of soda to one gallon of water. Report chemical 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.

1.0 Introduction

1.1 FBE2322 Enclosure System Overview

The FBE2322 is engineered to provide modular solutions for customer backhaul enclosure demands. The various configurations offer wall, H-frame, pole, or ground mount options. Thermal management features include convection cooling, fan, heat exchanger, or air conditioning, as well as an optional emergency ventilation system for certain configurations. The FBE2322 delivers secure accessibility with expansion capability even in multiple carrier scenarios.

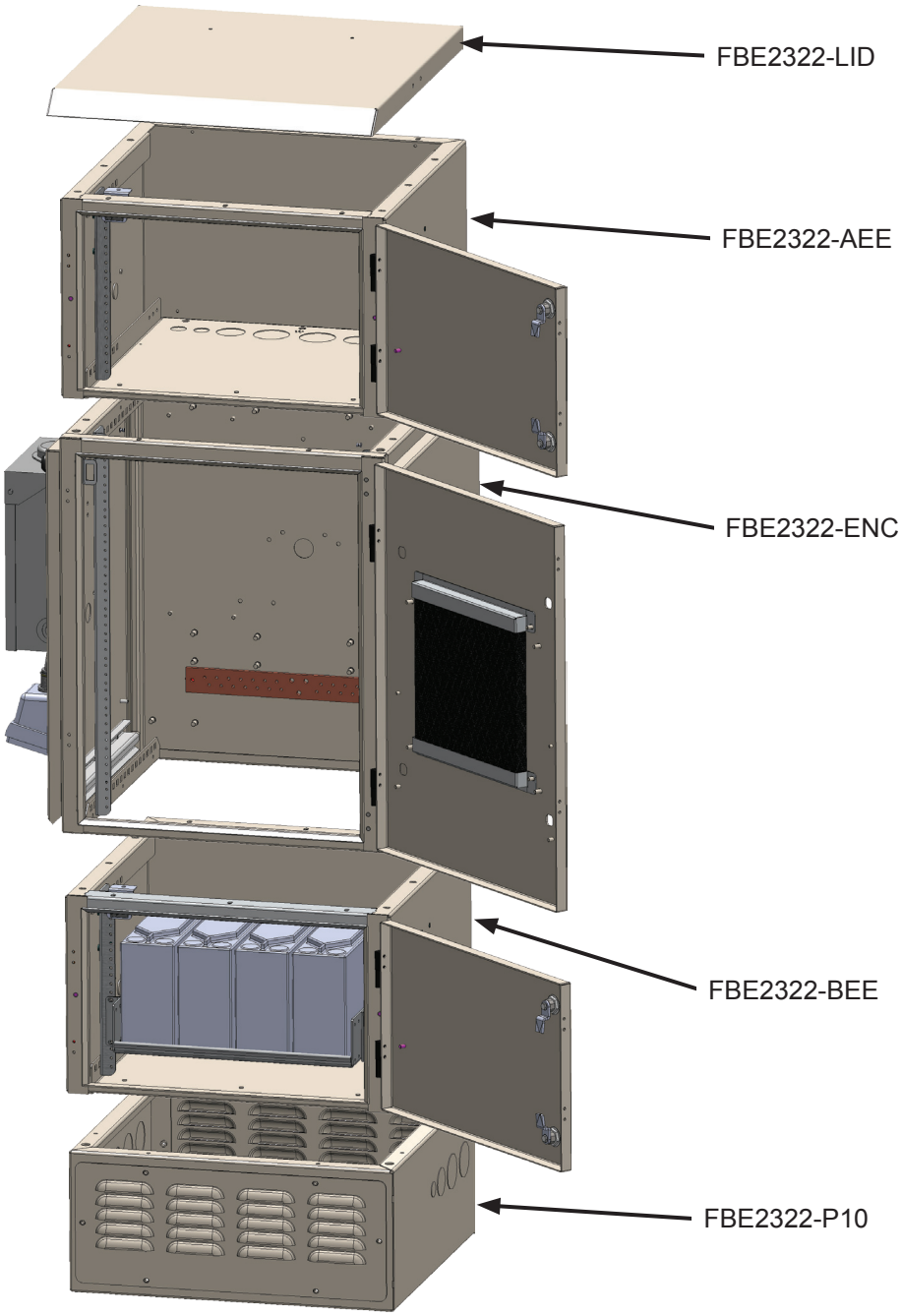


Fig. 1-1, FBE2322 Enclosure System Components

1.0 Introduction, continued

1.2 FBE2322 Specifications

FBE2322 Material			
Material		.100" Aluminum	
Exterior Finish		Powdercoated	
Exterior hardware		Stainless Steel	
Interior hardware		Stainless Steel and/or Zinc plated	
Mechanical			
Enclosure External Mounting Options		Ground, Pole or H-Frame/Wall Bracket	
FBE2322-ENC Enclosure	Internal Mounting:	Adjustable (front to back) 19" equipment rack w/ 15RU.	
	Door(s):	Front Left or Right hinged, with quarter-turn Telecom-grade locks.	
	Access Panels:	Left and Right with quarter-turn Telecom-grade locks.	
	Knockouts:	Baseplate (optional): 2 x 2", 2 x 1.5", 4 x 0.75"	
FBE2322-AEE Enclosure	Internal Mounting:	Adjustable (front to back) 19" equipment rack w/ 7RU.	
	Door(s):	Front Left or Right Hinged, with quarter-turn Telecom-grade lock.	
	Knockouts:	Left and Right side: 2 x 2", 1 x 1.5", 1 x 0.75", Baseplate (optional): 2 x 2", 2 x 1.5", 4 x 0.75"	
FBE2322-BEE Enclosure	Internal Space:	20.2" W x 19.85" D x 12.25" H battery storage	
	Door(s):	Front Left or Right Hinged, with quarter-turn Telecom-grade lock	
	Knockouts:	Left and Right side: 2 x 2", 1 x 1.5", 1 x 0.75", Baseplate: 2 x 2", 2 x 1.5", 4 x 0.75"	
FBE2322-P10	Access Panels:	Vented Front and Back	
	Knockouts:	Left and Right side: 2 x 2", 1 x 1.5", 1 x 0.75"	
Safety			
Agency Standards		CAN/US	UL/CSA 60950-01-07; UL/CSA 60950-22-07
		Cabinet	NEMA Type 3R

Table 1-1, FBE2322 Enclosure Specifications

FBE2322 Battery Specifications				
	70HPL-FT	115HPL-FT	220HPL-FT	SBS B14F
Weight (lb/kg)	27.9/15.3	46.2/22.2	78.5/36	42/19.1
Height (in/mm)	8.21/209	10.3/263	11.3/287	10.4/264
Width (in/mm)*	3.81/97	4.2/108	4.24/108	3.8/97
Depth (in/mm)*	9.84/250	11.3/287	15.59/396	11.9/303
Terminals	M8 x 1.25-14mm	M8 x 1.25-14mm	M8 x 1.25-14mm	M6 M
Torque (in-lbs/Nm)	71/8	71/8	71/8	44/5
Operating Temperature Range Discharge °C (°F)	-40°C to 60°C (-40°F to 140°F)	-40°C to 60°C (-40°F to 140°F)	-40°C to 60°C (-40°F to 140°F)	
Heat Resistant	High	High	High	
Capacity	42Ah at 20hrs (to 1.75VPC) @ 25°C/77°F	62Ah at 20hrs (to 1.75VPC) @ 25°C/77°F	107Ah at 20hrs (to 1.75VPC) @ 25°C/77°F	62Ah at 10hrs (to 1.80VPC) @ 20°C/68°F
Charge (with temp compensation)(°F)	-40°C to 60°C (-40°F to 140°F)	-40°C to 60°C (-40°F to 140°F)	-40°C to 60°C (-40°F to 140°F)	
Float Charging Voltage @ 25°C/77°F (VDC)	13.5 to 13.6	13.5 to 13.6	13.5 to 13.6	

(*) – Dimensions at battery base.

Table 1-2, FBE2322 Battery Specifications

1.0 Introduction, continued

1.2 FBE2322 Specifications

FBE2322 Cooling Specifications			
Fan Cooling			
General Description		Two, variable speed, temperature controlled fans.	
Airflow Capacity (per Fan)		118CFM	
Input Power (Volts/Watts)		24 or 48Vdc/20 Watts for 2 Fans	
Control Features		Dual Fan PCBA w/ Red and Green LED Display	
Operation Range (Temp°C/%Speed)		25–45°C/50–100%	
Alarms		Form C dry contact alarm Condenser High Temp. (76.7°C/170°F) Filter Maintenance	
AC Air Conditioner			
Capacity	Cooling	IQ1000V – 1,000 BTUH @ 55°C (131°F) ambient IQ2400VXS – 2400 BTUH @ 55°C (131°F) ambient	
	Heating	400W	
Maximum Operating Temperature		55°C (131° F)	
Electrical		IQ1000V –3.1A @ 120VAC/60HZ maximum IQ2400VXS – 7.5A @ 120VAC/60HZ maximum	
High Enclosure Temperature Alarm*		45°C (113°F)	
Low Enclosure Temperature Alarm*		0°C (32°F)	
Audible Alarm Default Setting*		OFF	
Digital Display Default Setting*		°C	
Filter Maintenance Alarm Setting*		Disabled	
High Condenser Temperature Alarm*		76.7°C (170°F)	
Heat Exchanger			
Specification		040-025-12-001	040-025-13-001
Nominal Voltage (Vdc)		24	48
FLA (Full Load Amps)		3.5	1.75
Cooling Capacity		30.6W/°C (17W/°F) Cooling @ 65°C (149°F) Ambient Temperature	
Operating Temperature Range		-40°C–70°C	
Maximum Temperature		65°C	
Internal Fan Operating Range		Off below 5°C; Minimum Speed @ 10°C; Variable to Max. Speed @ 20°C~30°C	
Internal Fan Operating Range		Off below 15°C; Minimum Speed @ 20°C; Variable to Max. Speed @ 30°C~45°C	
High Temperature Alarm		70°C	
Low Temperature Alarm		-50°C	

(*) – Alpha default settings may differ from ICEQube default settings.

Table 1-3, FBE2322 Cooling Specifications

1.0 Introduction, continued

1.3 FBE2322 Component Exterior Dimensions

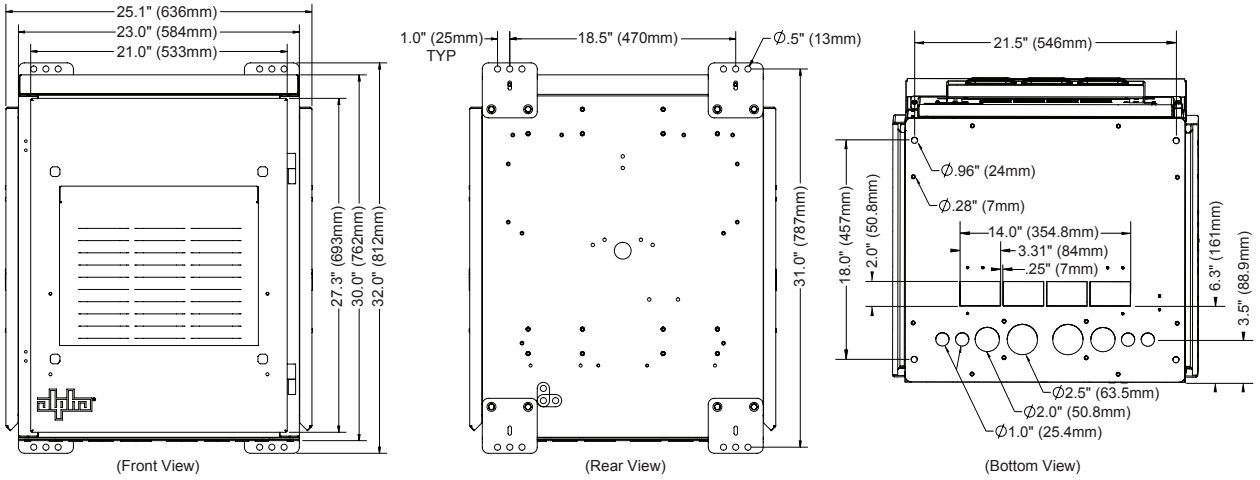


Fig. 1-2, FBE2322-ENC Base Cabinet Exterior Dimensions

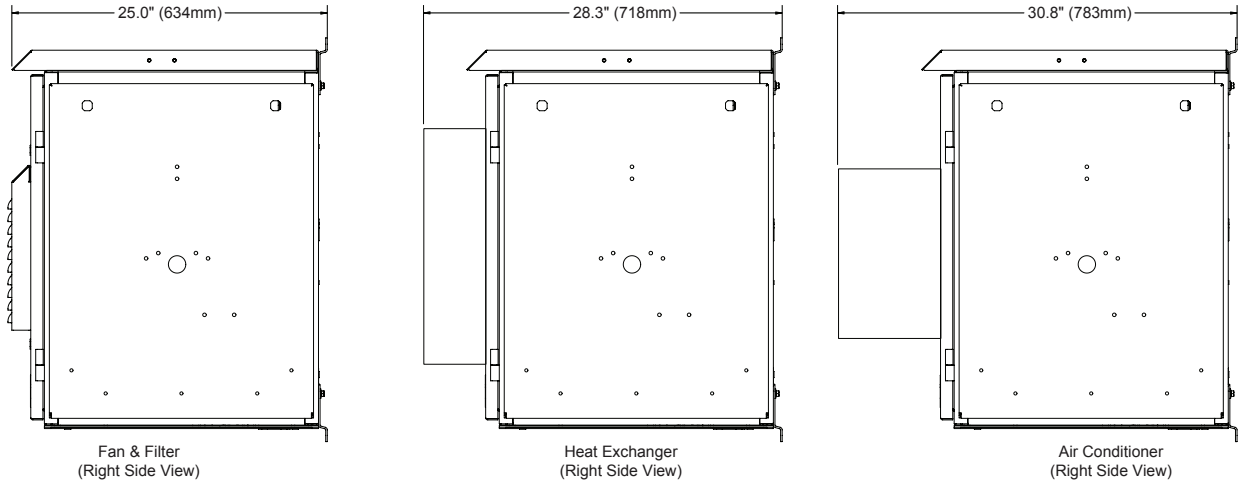


Fig. 1-3, FBE2322-ENC Environmental Control Options Side Dimensions

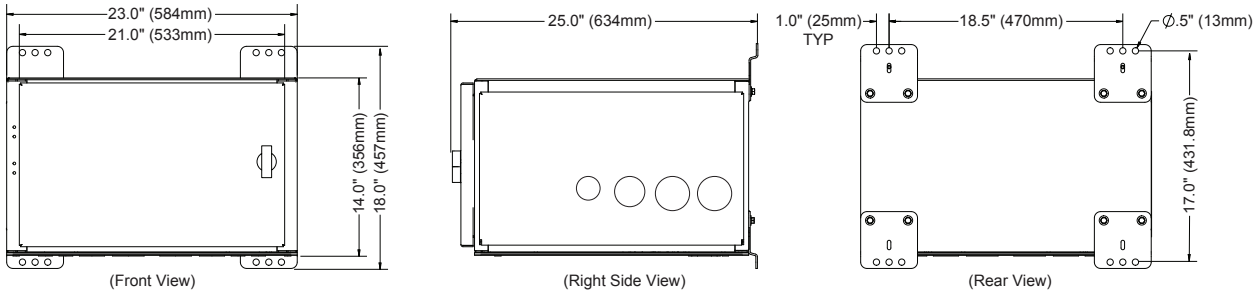


Fig. 1-4, FBE2322-AEE/BEE Auxiliary Equipment/Battery Expansion Enclosure Exterior Dimensions

1.0 Introduction, continued

1.3 FBE2322 Component Exterior Dimensions, continued

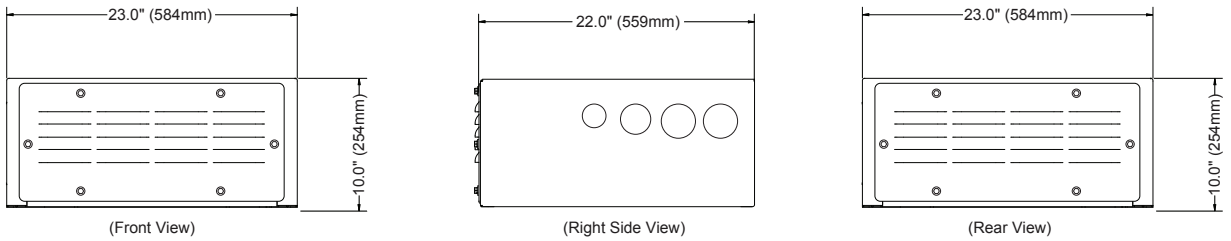


Fig. 1-5, FBE2322-P10 10" Pedestal Exterior Dimensions

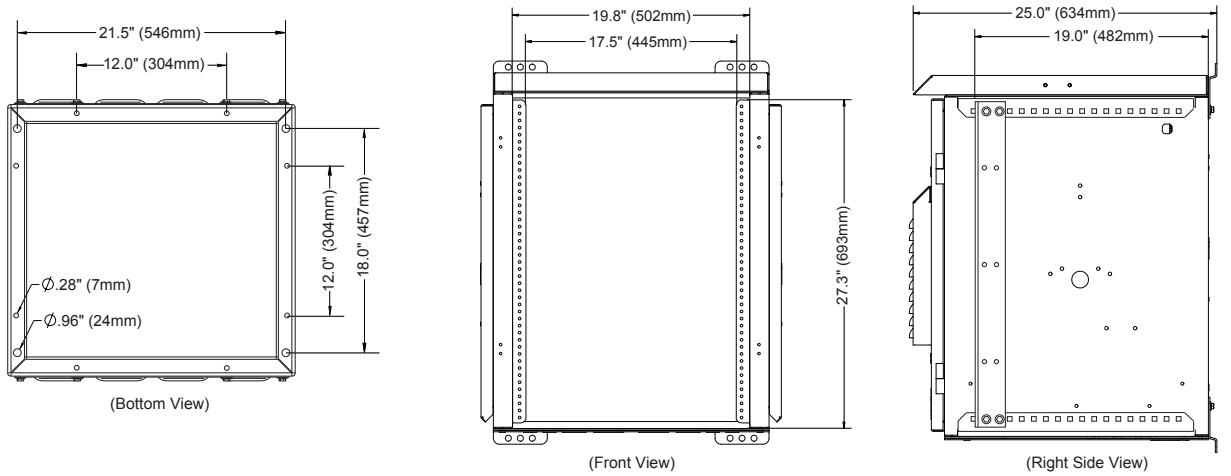


Fig. 1-6, FBE2322-ENC Footprint and Interior Cabinet Dimensions

1.4 FBE2322 Enclosure System Shipping

Each enclosure system may ship differently because of its modular design. Ensure that all components are received and in proper order. Certain hardware (i.e. mounting brackets, lifting ears, etc.) may be reoriented to facilitate packing and shipping demands (see Figure 1-7).

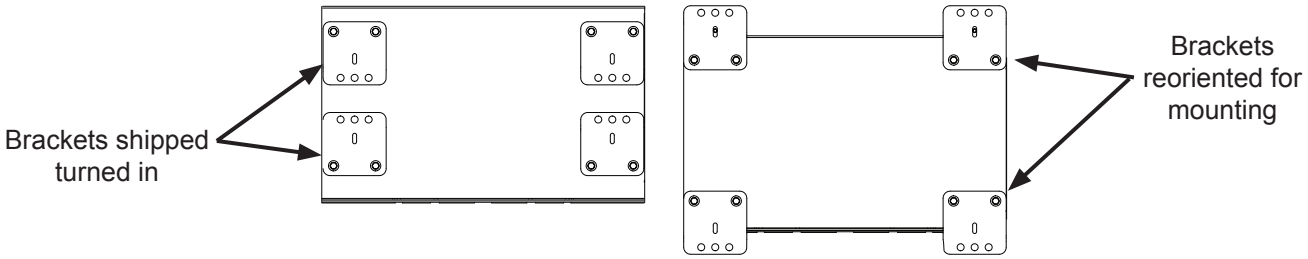


Fig. 1-7, FBE2322-AEE Example of Hardware Position for Shipping - Rear View

1.5 FBE2322 Parts Tables

Table 1-4 provides parts information for the FBE2322 Enclosure System. This material is for reference only. All configurations must be approved by Alpha Engineering.

FBE Cabinet Parts	
Part Name	Part Number
FBE2322 Base Cabinet	031-314-20
Enclosure Base Plate	606-188-F2-001
Enclosure Base Plate w/ Emergency Exhaust Ports	746-181-20
Enclosure Lid	746-183-20
Enclosure Side Door	746-179-20
Enclosure Door Latch 1/4 Turn Knob	746-095-20
Enclosure Door Latch 1/4 Turn Knob Hex w/CP	746-095-21
Hex w/CP Door Latch Key	745-306-21
FBE Mounting Options	
Part Name	Part Number
FBE Mounting Kit 10" Pedestal	746 -194-20
FBE Mounting Kit Pole Mount	746-205-20
FBE Mounting Kit Wall Mount/H-Frame	746-206-20
FBE Pole Mount Bracket Concrete	591-557-20
FBE Pole Mount Bracket Wood	744-670-20
FBE Power/Equipment Options	
Part Name	Part Number
100A AC Service Load Center	745-266-23
70A BBX w/o CB	746-162-20
AC Gen Inlet Assembly 30A	745-264-20
120V/15A. GFCI Kit	746-213-20
Air Conditioner 120Vac/15A Receptacle Kit	746-214-20
Auxiliary 120Vac/20A Receptacle Kit	746-215-20
Surge Protector Kit ISA 120/240	745-946-20
Tamper Switch Kit 3 Door	746-064-22
Lifting Ears Kit FBE2322	746-204-20
FBE Ground Bars	
Part Name	Part Number
12 Position, 1/4" 2-Hole, 5/8" Ct, Isolated Buss Bar	745-235-24
12 Position, 1/4" 2-Hole, 5/8" Ct, Grounded Buss Bar	745-235-25
4 Position, 1/4" 2-Hole, 5/8" Ct, Ground Bar	746-093-21
15 Position, (14)1/4" 2-Hole, 5/8" Ct; (1)3/8" 2-Hole, 1" Ct, Ground Bar	746-188-20

Table 1-4, FBE2322 Parts Table

1.5 FBE2322 Parts Tables, continued

FBE Enclosure Cooling	
Part Name	Part Number
Ice Qube IQI000V 120Vac 60Hz Alarm	040-020-10-001
Ice Qube IQ2400VXS 120Vac 60Hz Alarm	040-021-10-001
48Vdc Fan Panel	746- 184-20
24Vdc Fan Panel	746-184-21
120Vac Fan Panel	746-184-22
24Vdc Heat Exchanger	040-025-12-001
48Vdc Heat Exchanger	040-025-13-001
Insulation Kit 1" (For Air Conditioner Configurations)	746-201-20
48Vdc Fan Control Board	746-098-20
24Vdc Fan Control Board	746 -098-21
48Vdc Overtemp Exhaustl Kit	746-224-20
24Vdc Overtemp Exhaust Kit	746-224-21

Cordex Assembly Parts	
Part Name	Part Number
Cordex Assembly	030-834-20-A002
Cordex Power Module 48-1.2kW	010-619-20-A001

Cordex Plug-in Breakers w/ Auxiliary Switch	Part Number	Cordex Plug-in Breakers w/ Auxiliary Switch	Part Number
1 Amp	470-300-10-A000	40 Amp	470-309-10-A000
3 Amp	470-301-10-A000	45 Amp	470-310-10-A000
5 Amp	470-302-10-A000	50 Amp	470-311-10-A000
10 Amp	470-303-10-A000	60 Amp	470-312-10-A000
15 Amp	470-304-10-A000	70 Amp	470-313-10-A000
20 Amp	470-305-10-A000	80 Amp	470-314-10-A000
25 Amp	470-306-10-A000	90 Amp	470-315-10-A000
30 Amp	470-307-10-A000	100 Amp	470-316-10-A000
35 Amp	470-308-10-A000		

FBE GMT Fuse Options			
Part Name	Part Number	Part Name	Part Number
GMT Fuse 1/2 AMP	460-004-10	GMT Fuse 4 AMP	460-085-10
GMT Fuse 1 AMP	460-006-10	GMT Fuse 5 AMP	460-084-10
GMT Fuse 1-1/3 AMP	460-081-10	GMT Fuse 7-1/2 AMP	460-105-10
GMT Fuse 2 AMP	460-083-10	GMT Fuse 10 AMP	460-069-10
GMT Fuse 3 AMP	460-013-10	GMT Fuse 15 AMP	460-150-10

FBE Battery Accessories	
Part Name	Part Number
Battery Cable Kit #6AWG/100A Fuse	746-164-20
Battery Tray 19", Rack Mount Kit	746-200-20
Fuse, 100A	460-191-10

Table 1-4, FBE2322 Parts Table, continued

2.0 Installation

2.1 FBE2322 Enclosure Installation Overview

Installation requirements may differ for each configuration or customer specific application. The following instructions provide guidelines for the most common enclosure configuration installations. Always follow local codes and ordinances when designing and implementing your backhaul enclosure plans. Table 2-1 provides installation options for standard configurations. Consult your sales representative for installation information if your configuration does not appear below.

FBE2322 Enclosure System Installation Options			
Standard Configurations	H-Frame Mount	Pole Mount	Ground Mount
FBE-AEE	x	x	
FBE-ENC	x	x	
FBE-ENC w/ Batteries	x	x	
FBE ENC-BEE	x	x	
FBE-AEE-ENC-BEE-P10	x*		x
FBE-ENC-BEE-BEE-P10	x*		x
FBE-AEE-AEE-ENC-P10	x*		x

(*) - Installed without P10 plinth base.

Table 2-1, FBE2322 Enclosure System Installation Options

NOTE:

For ground mount configurations, do NOT exceed a maximum height of 72" (1.8m).

2.2 Site Selection

- Where possible, select a site above the 100-year flood plain and away from houses.
- Place in a shaded location to minimize the effects of solar loading.
- Locate in an area where airflow can be maximized.
- Avoid locating the enclosure where it is an obstruction and would inhibit visibility.
- Locate the enclosure away from sprinkler systems or other sources of forced water.
- Locate the enclosure out of the prevailing wind to minimize the buildup of snow or the accumulation of wind-borne dust.
- Ensure soil conditions are suitable for the the appropriate grounding system installation.
- Ensure cabling has been run and terminated at the site.
- Decide whether the enclosure will be placed on a precast concrete pad or on a pad poured on site.
- Contact a cable locating service, the local utility, and adjacent building supervisors to ensure installation location and cable routing does not interfere with existing utility connections.

ATTENTION:

Ensure that all enclosure installations are installed per local, state, and federal codes and regulations. Local, state, and federal codes and regulations supersede information provided in this manual.

2.3 Enclosure Lifting (Optional)

WARNING!

Follow all rules and guidelines for safe lifting operation.

Secure the lifting straps/cable to the lifting ears. The length of the cable/strap between the lifting ears and the hook (A) is at least twice the distance (B) between the lifting ears (see Fig. 2-1).

NOTE:

Remove the lifting ears after installation. The ears are made of steel and may rust over time.

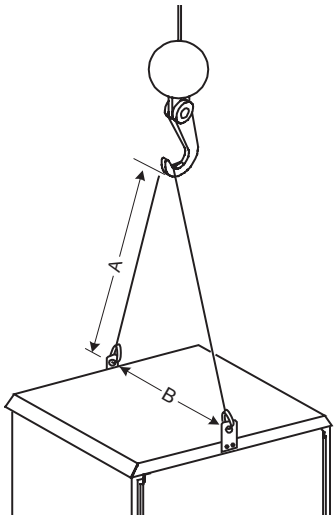


Fig. 2-1, Enclosure Lifting Arrangement

2.4 Enclosure Installation, H-Frame/Wall Bracket Mounting

H-Frame mounting brackets ship attached to your enclosure. They may be mounted in reverse for convenience during shipping.

CAUTION!

- Never transport the unit with installed batteries. Doing so can cause injury or damage to the enclosure and installed equipment. Install the batteries after you transport the unit to the site and secure it to the H-frame.
- Alpha recommends that you position the enclosure on the H-frame in an area that restricts unauthorized access.
- System installation at >5º angle from pole-axis is not recommended.

The size of the H-Frame and physical space needed for your enclosure will be determined by its configuration. For FBE2322-ENC mounting dimensions, see Fig. 2-2. For other enclosure dimensions, see Section 1.3. Place the enclosure to provide sufficient space for maintenance access (see Fig. 2-3).

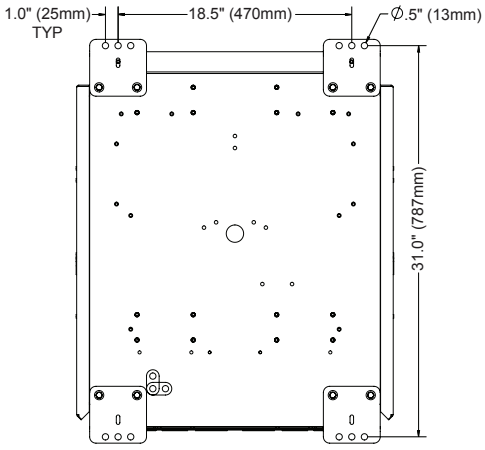


Fig. 2-2, Enclosure Mounting Dimensions

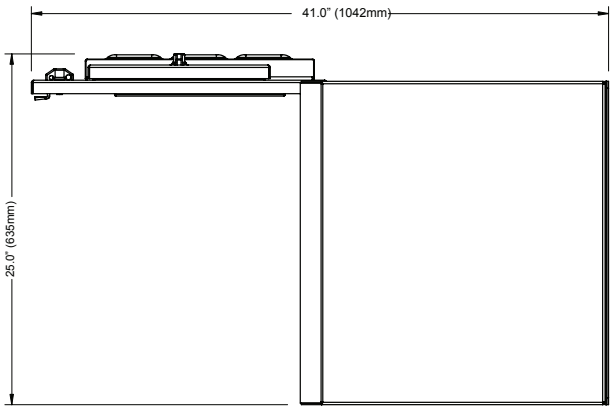


Fig. 2-3, Enclosure w/ Open Door Dimensions

2.4 Enclosure Installation, H-Frame Mounting continued

Most codes require the base of the enclosure to be located a minimum height from the ground. Always verify mounting height requirements before proceeding.

Recommended Customer Supplied Tools and Materials:

- Ratchet with 5/8” (19mm) socket
- Level
- Four 7/16-14 x 1" (M12 x 25mm) hex head stainless steel bolts
- Eight 7/16" stainless steel flat washers
- Four 7/16"-14 (M12) lock washers
- Four 7/16"-14 (M12) hex nuts
- Structural slotted channel with mounting hardware

Procedure:

1. The FBE2322 Enclosures may ship with mounting brackets turned inward for convenience during shipping. Remove the bracket mounting hardware and remount the brackets turned outward (see Section 1.4).
2. Position the enclosure on an H-frame of structural slotted channels 17" apart (for FBE2322-AEE) on center (see Fig. 2-4).
3. Loosely attach the enclosure to the structural slotted channel using (4) 7/16"-14 x 1" (M12 x 25) hex head stainless steel bolts, (8) 7/16" (M12) lock washers, (4) 7/16" stainless steel flat washers, and (4) 7/16"-14 (M12) hex nuts (see Fig. 2-5).
4. Using a level, ensure that the enclosure is parallel to the ground, and final tighten all mounting hardware.
5. The enclosure is now ready for grounding (see Page 26) and equipment installation.

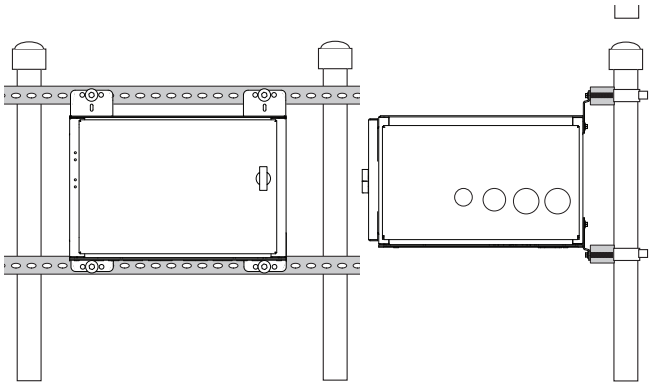


Fig. 2-4, FBE2322-AEE H-Frame Mounting Example.

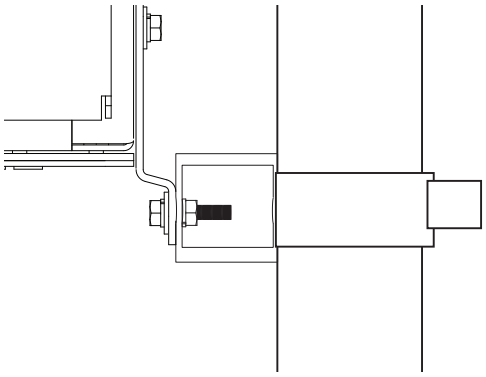


Fig. 2-5, FBE2322-AEE H-Frame Mounting Hardware Detail.

NOTE:

The optional lifting ears may be used to raise and position the empty enclosure. Lifting ears may ship reversed.

2.5 Enclosure Installation, Pole Mounting

CAUTION!

- Never transport the unit with installed batteries. Doing so can cause injury or damage to the enclosure and installed equipment. Install the batteries after you transport the unit to the site and secure it to the pole.
- Alpha recommends that you position the enclosure on the opposite side of the pole from traffic. This reduces the danger of falling equipment in the event that a pole is struck by an automobile.
- Mounting bolts must completely penetrate the wooden pole. Secure the bolts from the back with a large washer and nut.
- Enclosure installation at >5º angle from pole-axis is not recommended.
- Different configurations may require more or less pole mounting bolts/strapping than indicated in the instructions below. Always use the same number mounting hardware assemblies as the total enclosure mounting brackets for any configuration.

ATTENTION:

The majority of poles belong to the local utility. Before installing 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 proceeding.

2.5.1 Wooden Pole

Tools and Materials Required (customer supplied):

- Two 5/8" (16mm) diameter machine bolts, length to suit pole
- Four 5/8" (16mm) split lock (helical spring) washers, zinc plated or better
- Two 5/8" (16mm) threaded hex nuts (UNC thread)
- Auger or drill for boring 11/16" (17.5mm) diameter holes in the wooden pole
- Mallet or hammer
- Assorted sockets
- Tape measure
- Three-foot level

Enclosure Pole Mount Bracket Distances	
Enclosure	Distance (on center) (in/mm)
FBE2322-ENC	18/457.2
FBE2322-AEE	8/203.2
FBE2322-BEE	8/203.2

Table 2-2, Enclosure Pole Mounting Dimensions

Procedure:

1. Unpack the enclosure and galvanized brackets.
2. Mark the position for the upper bracket on the utility pole. Using a three-foot level to verify the drill is level, drill a 11/16" (17.5mm) hole completely through the pole from the installation side.
3. Mark the location of the hole for the lower bracket the appropriate distance below the upper bracket hole (see Table 2-2 for distances).
4. Using the three-foot level to verify drill angle, drill the 11/16" (17.5mm) hole or holes for the lower bracket from the installation side of the pole.

NOTE:

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

2.5 Enclosure Installation, Pole Mounting, continued

2.5.1 Wooden Pole, continued

5. Secure the brackets to the pole using the 5/8" (16mm) machine bolts, washers, and nuts.
6. Lift the enclosure onto the brackets. It might be necessary to rock and pull the enclosure to properly seat it on the brackets.
7. Secure the enclosure to the brackets using the 3/8"x 3/4" 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 grounding (see Page 26) and equipment installation.

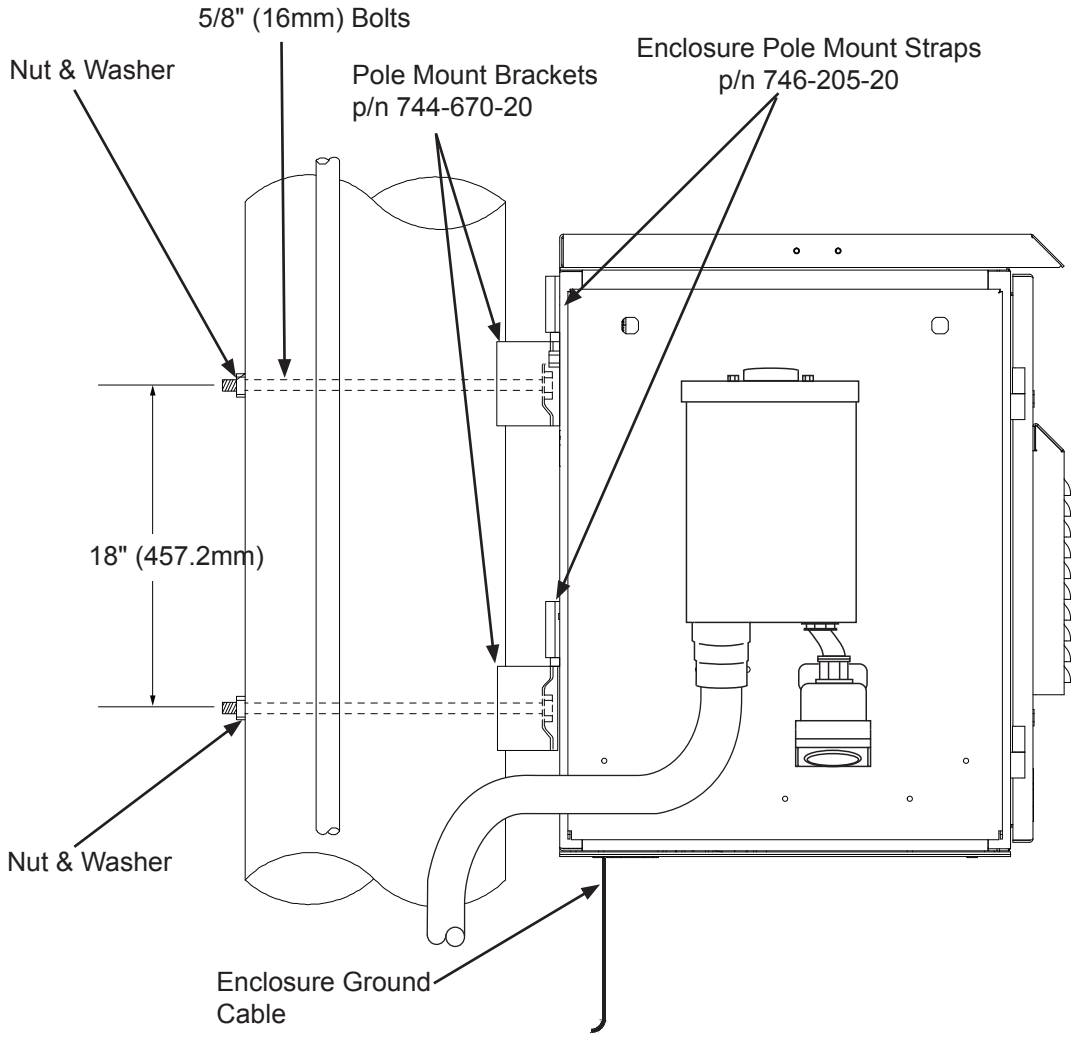


Fig. 2-6, FBE2322 Series Wooden Pole Mounting

2.5 Enclosure Installation, Pole Mounting, continued

2.5.2 Concrete or Steel Pole

Tools and Materials Required (customer supplied):

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

Procedure:

1. Unpack the enclosure and galvanized brackets; turn the enclosure facedown on a soft surface.
2. Slide a bracket up through the enclosure's lower mounting bracket. The bracket's flanges must face away from the enclosure. Secure the lower mounting bracket using the 3/8" x 3/4" 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 18"/457mm.
6. The enclosure is now ready for grounding (see Page 26) and equipment installation.

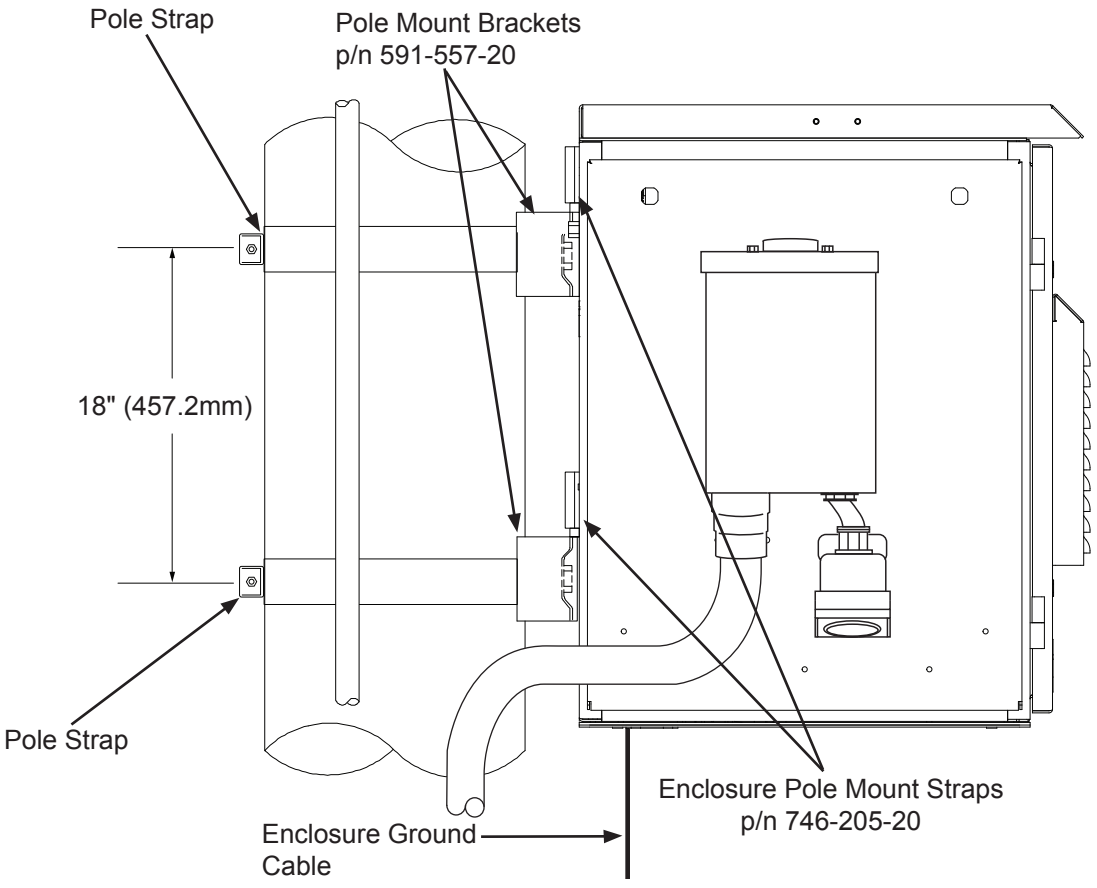


Fig. 2-7, FBE2322 Series Concrete or Steel Pole Mounting

2.6 Ground-mount Installation

CAUTION!

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

ATTENTION:

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

ATTENTION:

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

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

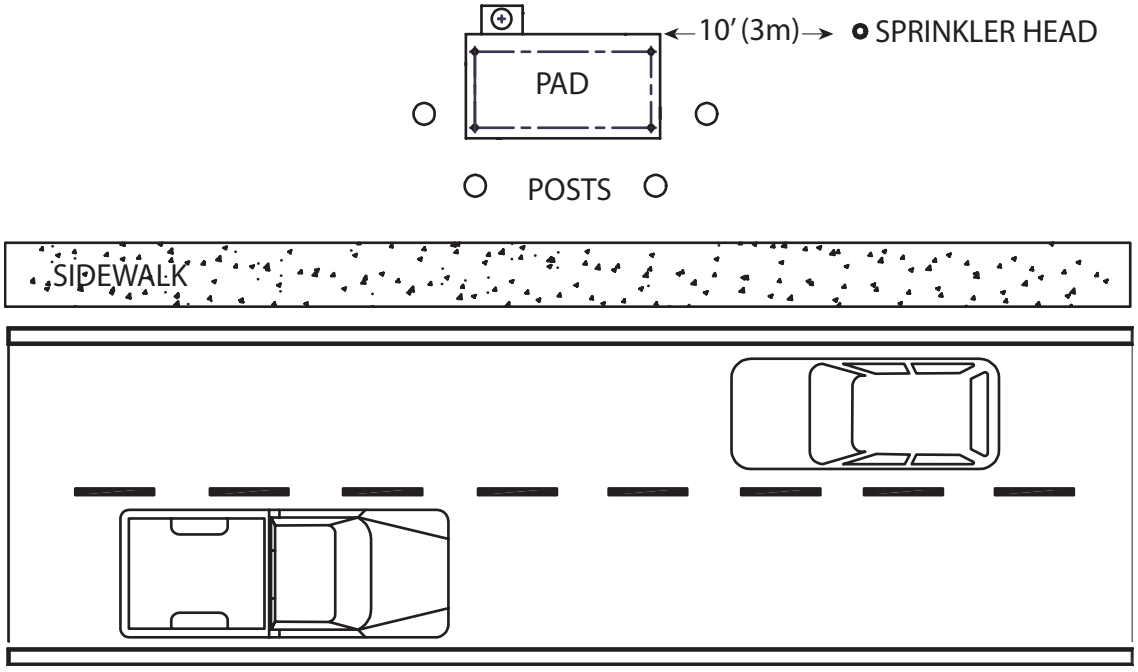


Fig. 2-8, Ground-mount Positioning and Safety Example

2.6 Ground-mount Installation, continued

Typically, Alpha Technologies recommends using precast polymer mounting pads. The size of the mounting pad is determined by the size of the enclosure. Precast pads provide proper enclosure support and easy installation. They also provide knockouts for coax and service sweep openings and pre-installed threaded inserts for enclosure attachments.

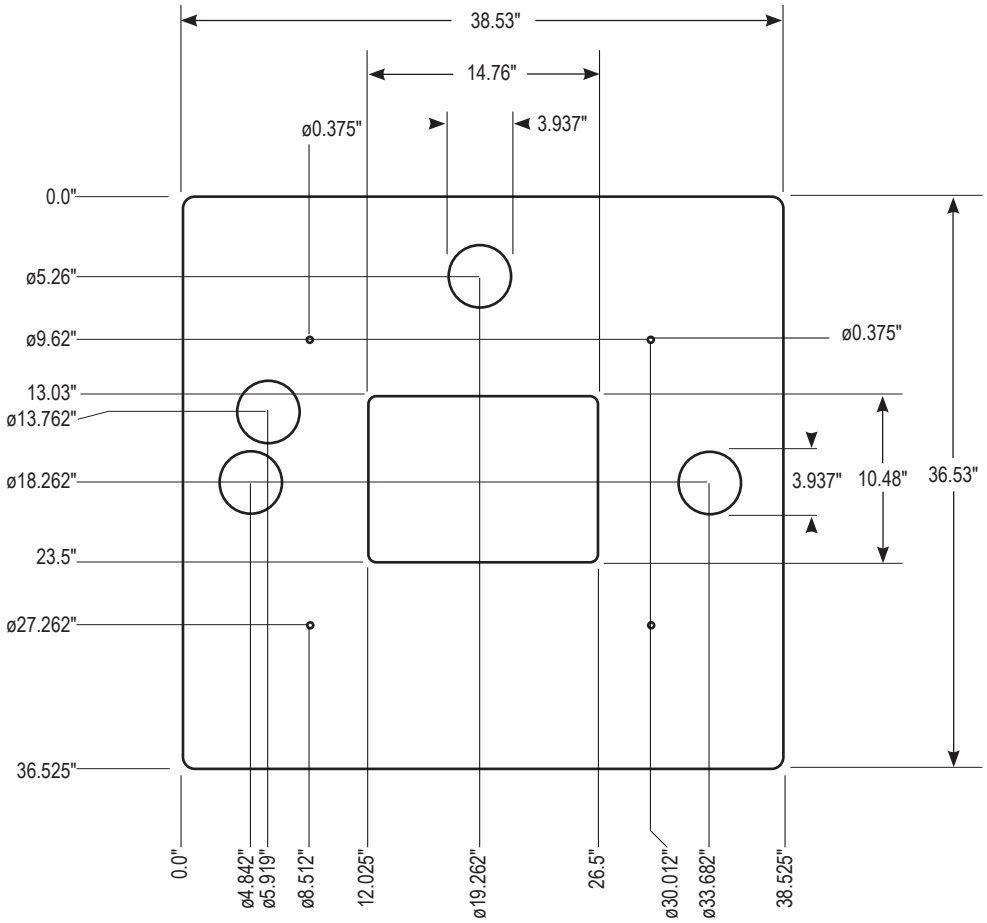
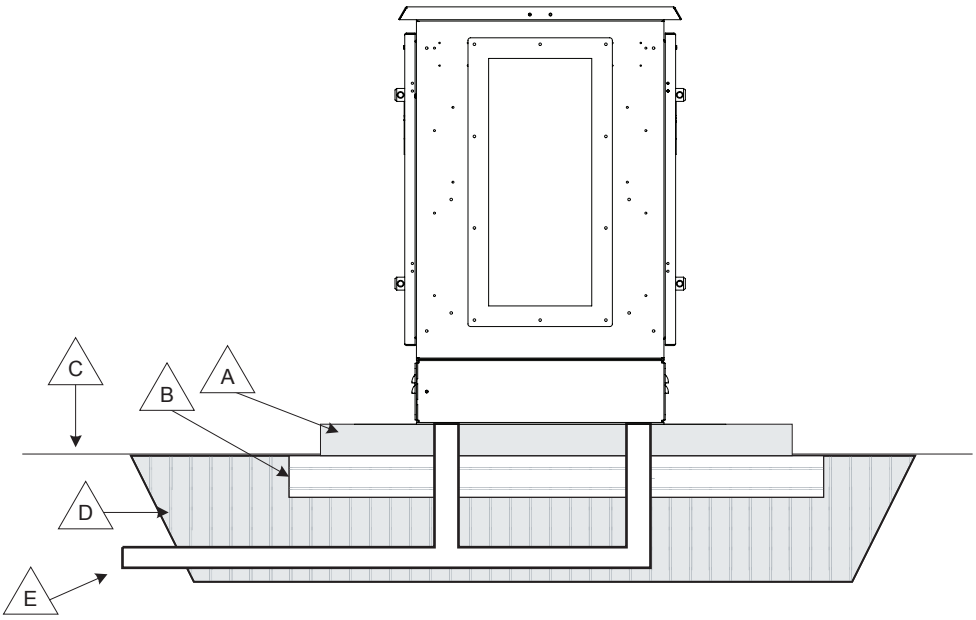


Fig. 2-9, FBE2322 Precast Polymer Pad Dimensions

2.6 Ground-mount Installation, continued

The illustration below shows a representative view of the installation site.



A Precast Polymer Pad

B Compacted Gravel (12" depth recommended)

C Level Grade

D Area of Backfilled Soil

E Trench for Sweep *(sweep can enter at back and/or front of cabinet)*

Fig. 2-10, Representative Site Arrangement

NOTE:

Verify the conduit is trimmed to an appropriate height to accommodate the use of the plinth.

2.6 Ground-mount Installation, continued

Before installation verify the following:

- All necessary grounding rods and materials are in place.
- Utility power is on site in accordance with the NEC (National Electric Code).
- Review and comply with all local safety practices for working with high-voltage systems.
- All necessary permits and permissions are granted.
- The lifting/transport path is free of obstructions.

To perform the installation procedures, have the following tools and materials on hand:

- Crane to lift enclosure from shipping pallet and place on pedestal (optional).
- Key to enclosure doors (p/n 745-306-21–Hex Key Kit).
- Torque wrench with insulated handle and 9/16" socket.
- Standard ratchet for 9/16" socket.

CAUTION!

The enclosure MUST be loosened from the pallet BEFORE lifting the enclosure from the truck and placing it on the pad. Damage such as broken welds, corrosion, etc., resulting from improper installation are not covered under warranty.

WARNING!

Enclosures may be top heavy and could tip if not properly supported. Always support the enclosure while removing fasteners or strapping before lifting it from the pallet.

Installation Procedure:

1. Remove the strap or fasteners securing the enclosure to the pallet.
3. For the lifting option, attach the lifting straps/cable to the lifting ears attached to the top of the enclosure (see Section 2.3 for more lifting information).
4. Verify all cabling passing through the enclosure is bundled and maintained within the cutout area.
5. Position the enclosure above the pad and slowly lower it into position over the pad's 3/8" anchor, J-bolts or threaded inserts.
6. Secure the enclosure using stainless flat washers, lock washers and 3/8" nuts (or bolts for precast pad) at each mounting location and torque to 50ft-lbs.
7. When installation is complete, remove the lifting ears.

NOTE:

To prevent damage, enclosures must be mounted flush with a smooth surface and not over-torqued. The enclosure must be bolted down to a completely flat surface. If the concrete pad is uneven or has bumps, cracks, or other imperfections, the installer is responsible for correcting these defects prior to installing the enclosure.

2.7 Enclosure Grounding

NOTE:

Alpha Technologies recommends using the grounding method illustrated below. The grounding method for a particular site is dependant upon soil type, available space, local codes, NEC (National Electric Code), and other site-specific characteristics.

ATTENTION:

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

Site Service Grounding (Minimum Requirement)

Low-impedance earth protection from enclosure to earth potential (lightning/transient protection) is provided by #6 bare copper wire connecting enclosure ground point and site grounding system. The site grounding system, at a minimum, must be comprised of 2 ground rods 1/2" diameter x 8' in length driven into the ground at least 6' apart.

Lightning Protection Ground Ring

1. 1/2" X 8' copper ground rods, driven at least two feet from pad
2. #6 bare copper wire ring, at least 30" below grade, and terminated at each ground rod
3. #6 bare copper wire from ring to enclosure ground point

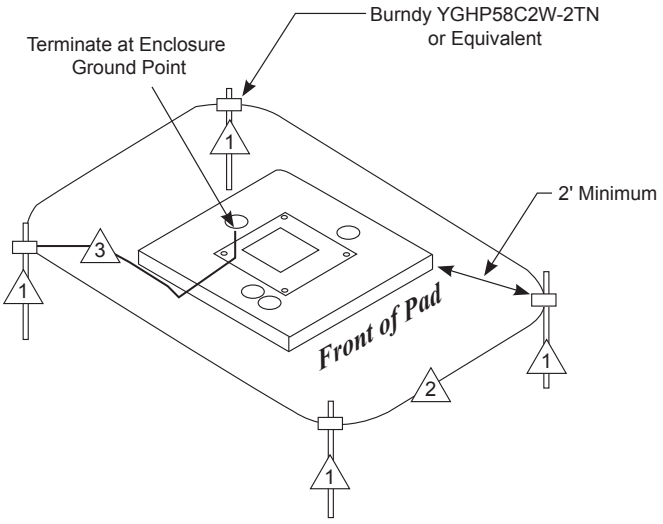


Fig. 2-11, Lightning Protection Ground Ring (Recommended Installation)

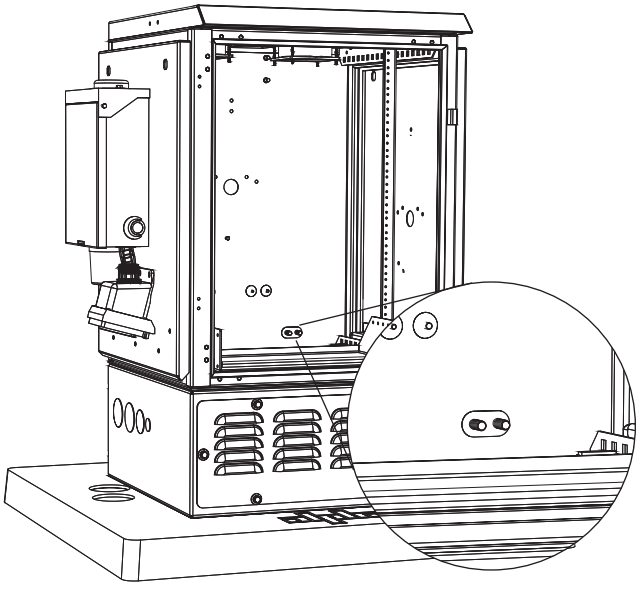


Fig. 2-12, 3/8" 2-Hole, 1" Ct, Enclosure Ground Mount Location

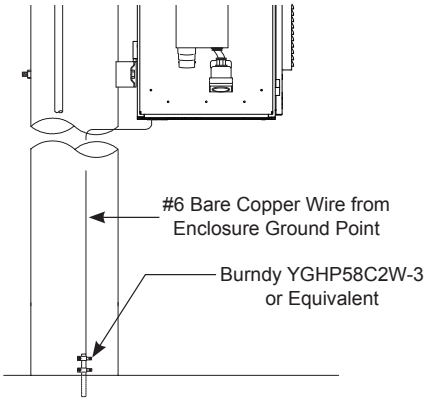


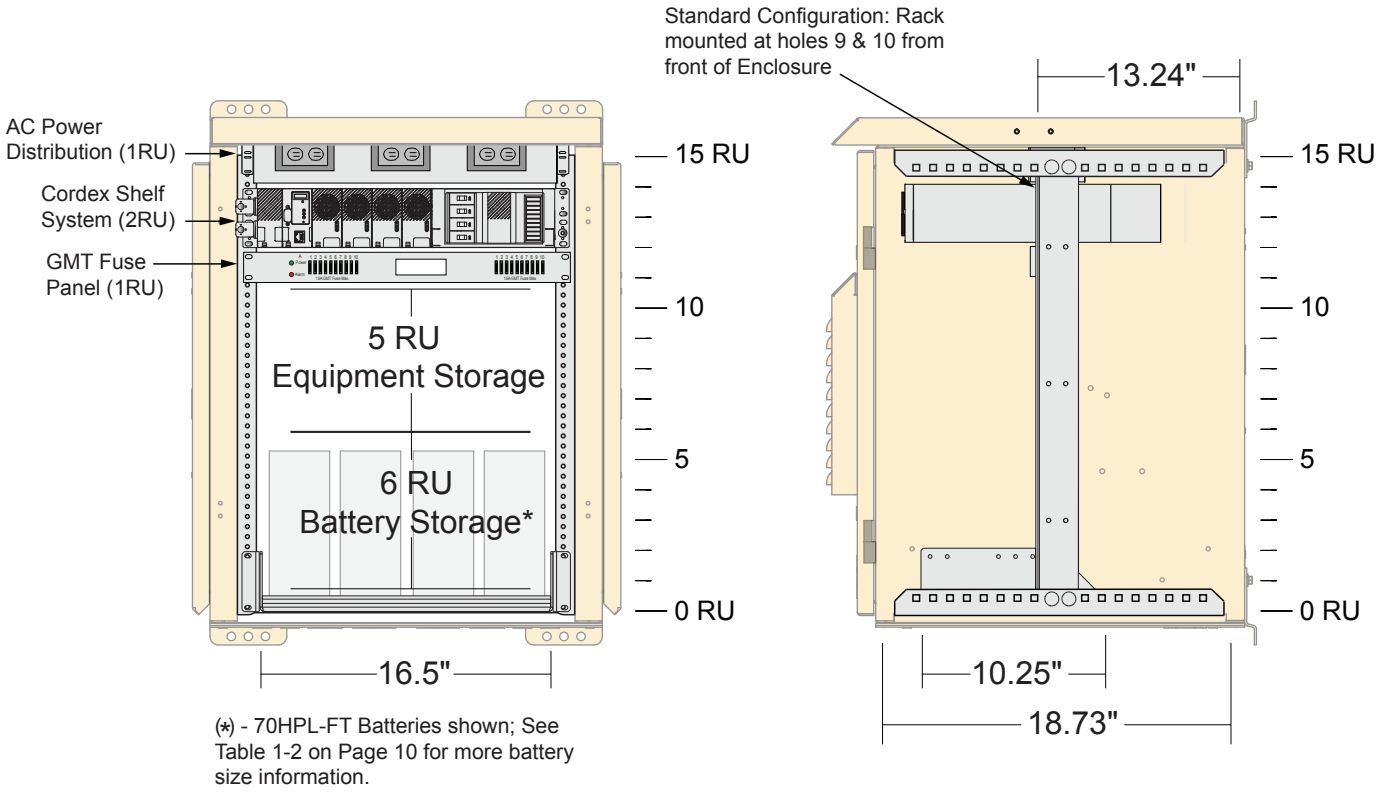
Fig. 2-13, Pole Mount Lightning Protection (Recommended Installation)

2.8 Equipment Installation, FBE2322-ENC

The FBE2322 Enclosure system's modular design and flexibility allow for a wide variety equipment installation options. A standard configuration example is shown below. Consult an Alpha Applications Engineer for more details about approved configurations.

Standard Configuration Cordex with Battery Tray in Base Cabinet Example:

- AC Power Distribution Shelf
- Cordex™ CXRF-HP 48-1.2kW 19" Front Access Shelf System
  - Configured for 120Vac input
  - Provides 12.5A @ 48VDC, N+1
  - Fully equipped shelf provides 2.4kW (12.5A max @ 48V)
  - 2RU shelf
  - Heat dissipation <154 BTU/hr, per rectifier module
- Telect Dual Feed 60A GMT fuse panel, 10A/10B position -48VDC
- 5 RU of additional Equipment storage
- 6 RU of battery storage with FBE2322-ENC standalone.



(*) - 70HPL-FT Batteries shown; See Table 1-2 on Page 10 for more battery size information.

Fig. 2-14, FBE2322-ENC Standard Equipment Configuration Example

NOTE:

Rack height is shown in Rack Units (RU); 1 RU = 1.75".

NOTE:

For wiring diagrams and alarm information, see Alpha p/n 031-314-08 Wire Diagram FBE2322 System. Consult an Alpha Applications Engineer for further information about enclosure configurations.

2.9 Equipment Installation, FBE2322-ENCBEE

The FBE2322 Enclosure system capabilities may be expanded by adding additional enclosure sub-units. A standard configuration example for that scenario is shown below. A standard configuration example is shown below. Consult an Alpha Applications Engineer for more details about approved configurations.

Standard Configuration Cordex in Base Cabinet with additional Battery Enclosure Example:

- AC Power Distribution Shelf
- Cordex™ CXRF-HP 48-1.2kW 19" Front Access Shelf System
  - Configured for 120Vac input
  - Provides 12.5A @ 48VDC, N+1
  - Fully equipped shelf provides 2.4kW (12.5A max @ 48V)
  - 2RU shelf
  - Heat dissipation <154 BTU/hr, per rectifier module
- Telect Dual Feed 60A GMT fuse panel, 10A/10B position -48VDC
- 10 RU of additional equipment space, or
- BEE provides 12.25" for battery storage

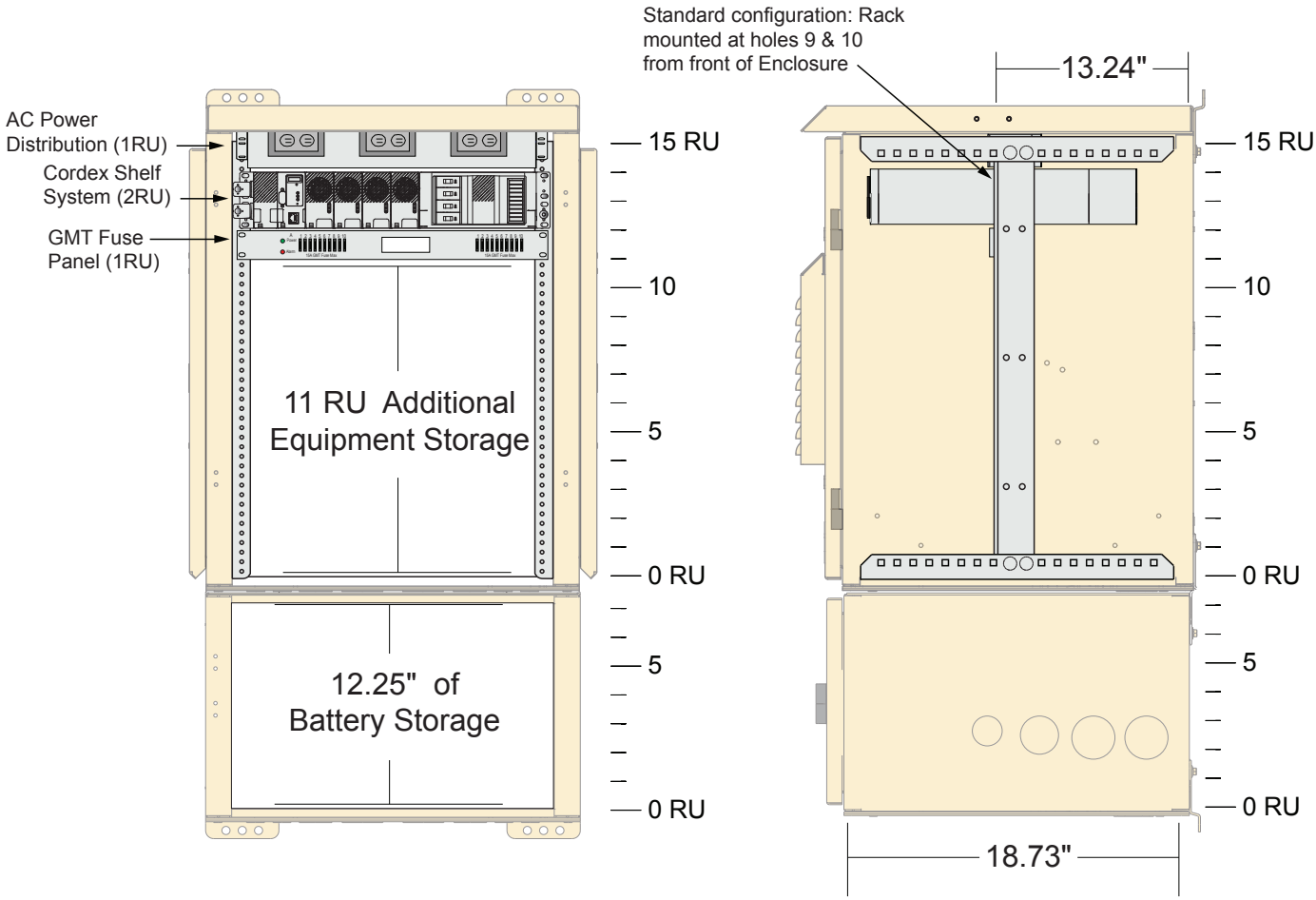


Fig. 2-15, FBE2322-ENCBEE Stanrdard Equipment Configuration Example

2.10 Battery Installation

WARNING!

Electrical shock can injure or kill. Remove any metallic personal items (rings, watches, etc.) before working with batteries. Always use insulated tools. Only qualified personnel should install batteries.

The FBE2322 Enclosure system allows for battery storage in the FBE2322-ENC. The following batteries will fit in the FBE2322-ENC with the installed 19" battery shelf:

- Enersys SBS B14F
- NorthStar HPL70
- NorthStar HPL115-FT
- NorthStar HPL220-FT*

For expanded equipment applications the FBE2322-BEE may be integrated with the enclosure system or installed as a stand-alone unit. Up to 4 batteries may be installed in the BEE enclosure. Always follow manufacturer's specifications for battery spacing. For Battery Specifications see Page 10.

(*) - NorthStar HPL220-FT only available with the FBE-BEE enclosure.

Standard Battery Configuration:

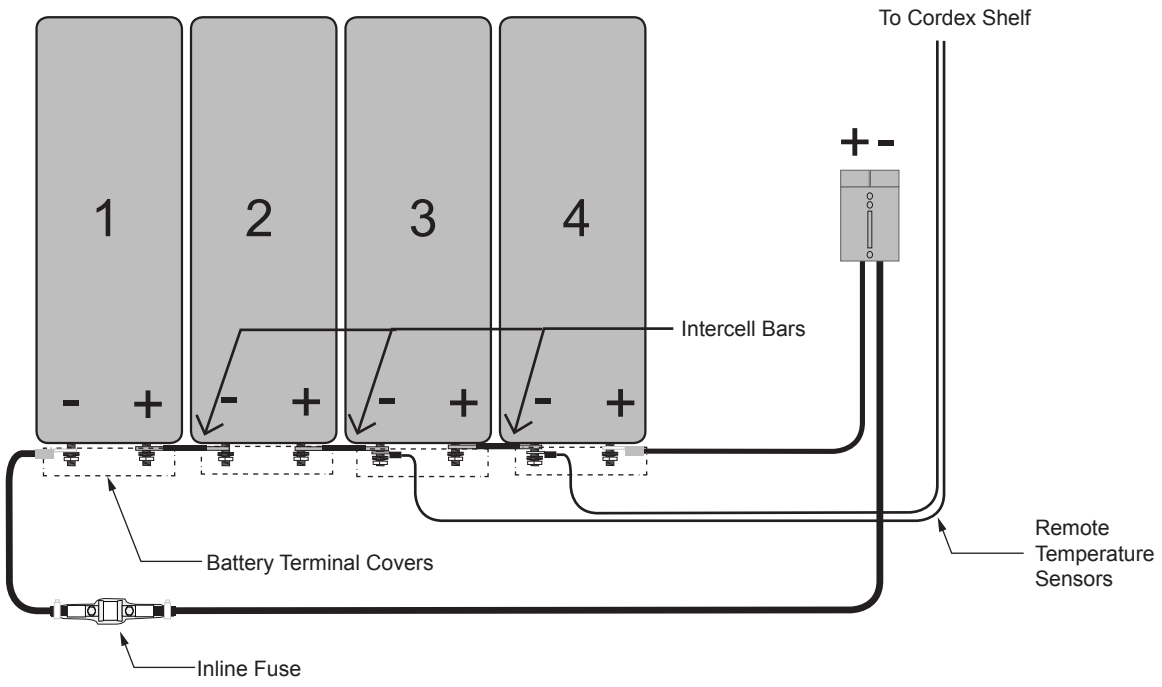


Fig. 2-16, Example of Battery Installation

2.10 Battery Installation, continued

Battery Wiring Procedure:

1. Place batteries in the enclosure with manufacturer's specified spacing between each battery.
2. Remove and save Battery Terminal Covers.
3. Connect adjacent batteries with Intercell Bar, see Fig. 2-17. Where applicable install the Remote Temperature Sensor.

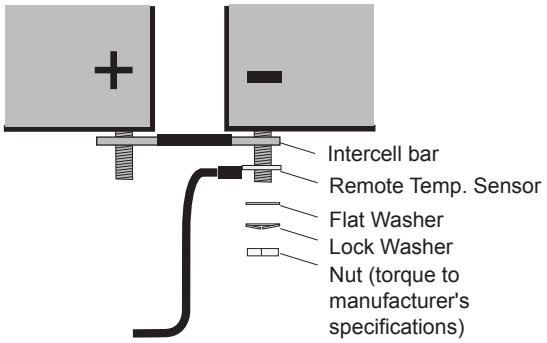


Fig. 2-17, Example of Battery Stack Up

4. Where applicable, install the Inline Fuse, (see Fig. 2-18).

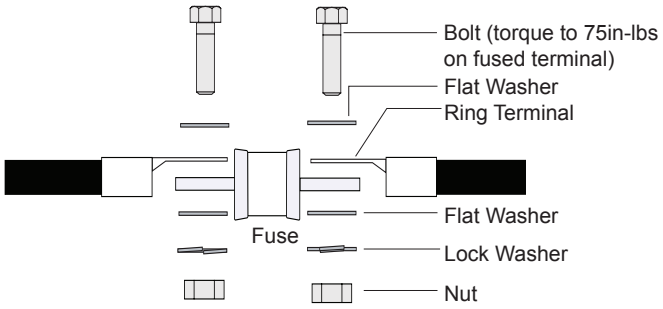


Fig. 2-18, Inline Fuse Stack Up

5. Replace Battery Terminal Covers.
6. Make final connections to equipment per manufacturer's recommendations.
7. Battery installation is now complete (see Fig. 2-19 for example).

Fig. 2-19, Example of Completed Battery Installation

NOTE:

For further information for battery connections and wiring, see Alpha p/n 031-314-08 Wire Diagram FBE2322 System.

3.0 Environmental Control Systems

3.1 FBE2322 Enclosure Environmental Control Overview

The FBE2322 Enclosure system has four integrated environmental control systems and an alternative emergency backup system. The following options are available:

- Convection Cooling
- Fan & Filter Cooling
- AC Air Conditioning
- Heat Exchanger
- Emergency Fan (Optional for Air Conditioning/Heat Exchanger units)

The following sections provide further information for each environmental control option. For more information about environmental systems not addressed in this manual, contact your Alpha sales representative.

3.2 FBE2322 Fan & Filter Cooling

FBE2322 Fan Control Boards:

- 48VDC, DL Fan Control, 25-45C,W/SD, RMB (Alpha p/n 704-696-21)
- 24VDC, DL Fan Control, 25-45C,W/SD, FBE (Alpha p/n 704-696-31)

General operation:

Fans are off below 25ºC. Fans turn on at 25ºC and increases from 50% to 100% full speed with increased enclosure temp from 25ºC to 45ºC. Over temp alarm is 55ºC. (Temp Tolerance +/- 2.5ºC).

Features:

- Two 118 CFM fans are powered by a variable speed temperature control. Fans turn off below 25ºC. Fans turn on at 25ºC and increase from 50% to 100% full speed with increased enclosure temperature from 25ºC to 45ºC.
- Dual Fan Control PCBA has a green LED to indicate proper function, a red LED to indicate an alarm condition and a push button test feature. When the button is pushed the fans will momentarily ramp up to full speed and the alarm condition will be indicated. After this test sequence the fans will go back to normal speed and the alarm will clear with green LED indicated.
- 24 or 48VDC input power.
- 5A fuse or circuit breaker is required (Not provided unless configured with Cordex shelf or GMT fuse panel options).
- Maximum power draw for two fans is 20W.
- One form C dry contact alarm, open on alarm (Fan fail or 55ºC over temp, or LVD).
- Low Voltage Disconnect (LVD) input below 42VDC will shut off fans.

NOTE:

Cooling system alarm can be an indication that filters need to be cleaned or that fans may need to be replaced. It can also indicate that the battery buss is low or the cooling system circuit breaker is off.

3.0 Environmental Control Systems, continued

3.3 FBE2322 AC Air Conditioner

Theory of Operation:

The FBE2322 Enclosure AC Air Conditioner is an ICEQube1000V/ICEQube2400VXS. The air conditioner is powered by a 120Vac 15A receptacle inside the enclosure. The ICEQube1000V draws 3.1A, and the ICEQube2400VXS draws 7.1A.

The controller is located on the inside of the door and the digital display shows internal temp. The external condenser fan turns on with the compressor when unit calls for cooling. There is a factory default off cycle time delay of 3 ½ minutes on the compressor and condenser fan.

For more information see ICEQube Operation and Installation Manual. The air conditioner will maintain enclosure temperature in cooling mode at the 25°C set point as long as cooling capacity is not exceeded. In heating mode, the unit will maintain 10°C using a heating element mounted in the internal fan return air stream. See Table 3-1 for Factory Default settings and Fig. 3-1 for control panel description.

NOTE:

The internal evaporator fan runs continuously.

FBE2322 AC Air Conditioner	
Alpha Factory Default Settings	
Cooling System ON Temperature	25°C (77°F)
Heating System ON Temperature	10°C (50°F)
High Enclosure Temperature Alarm	45°C (113°F)
Low Enclosure Temperature Alarm	0°C (32°F)
Audible Alarm	OFF
Digital Display Temperature Units	°C
Filter Maintenance Alarm	Disabled
High Condenser Temperature Alarm (not adjustable)	76.7°C (170°F)

Table 3-1, FBE2322 AC Air Conditioner Specifications

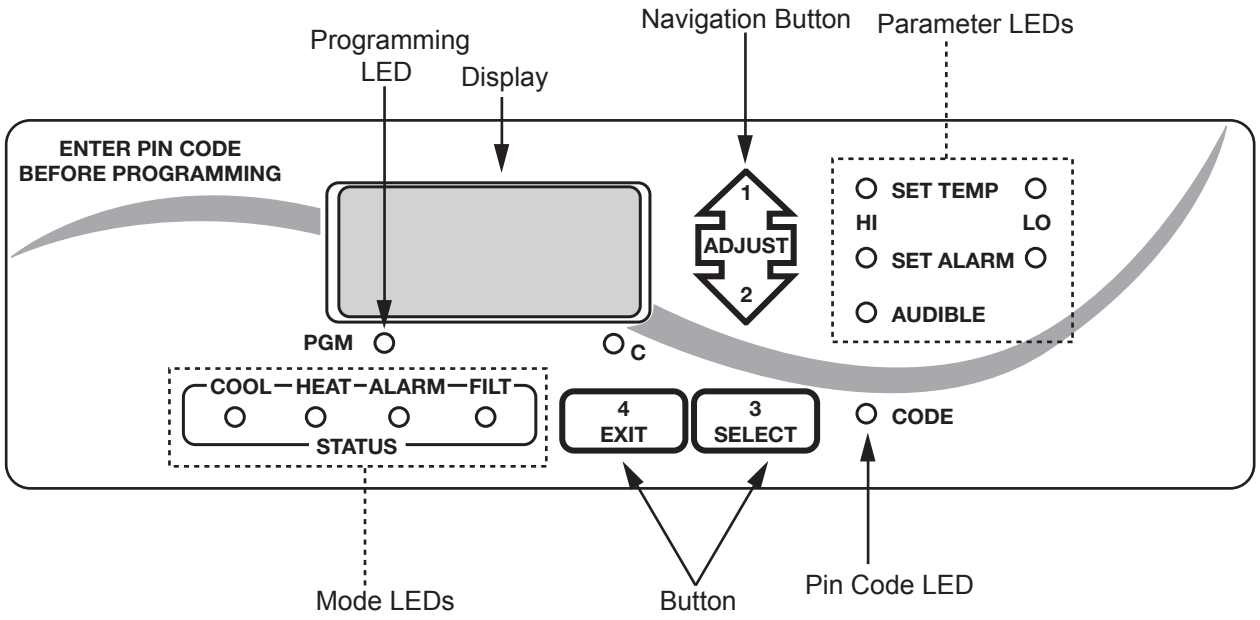


Fig. 3-1, ICEQube AC Air Conditioner Control Panel

3.0 Environmental Control Systems, continued

3.4 FBE2322 Heat Exchanger

General Operation:

The heat exchanger moves the heated cabinet air into a network of closed loop vents that are in close contact with closed loop vents with ambient air passing through them. This process transfers heat out of the cabinet maintaining a constant internal temperature.

Features:

- Programmable variable speed DC fan controller with self-test.
- Internal fan: Off below 5ºC. On at 10ºC min speed; Variable to max speed between 20ºC to 35ºC.
- External Fan: Off below 15ºC. On at 20C min speed; Variable to max speed between 30ºC to 45ºC.
- High Temp alarm: 70ºC.
- Low Temp Alarm: -50ºC.
- Fan fail: Alarm contact loop open on alarm.

3.5 FBE2322 Emergency Fan

General Operation

When the primary cooling system cannot maintain adequate enclosure temperature, the emergency fan thermostat closes energizing the emergency fan relay. This activates the form C dry contact alarm. The high temperature alarm activates, the emergency air dampers open and the emergency fans turn on. Fan air pressure pushes open the discharge air check valves and an electronic solenoid opens the air intake damper.

Features:

- Two 118 CFM fans are powered by a variable speed temperature control. Fans turn off below 25ºC. Fans turn on at 25ºC and increase from 50% to 100% full speed with increased enclosure temperature from 25ºC to 45ºC.
- Dual Fan Control PCBA has a green LED to indicate proper function, a red LED to indicate an alarm condition and a push button test feature. During the test fans momentarily ramp up to full speed and the alarm condition will be indicated. After this test sequence the fans will return to normal speed and the alarm will clear with green LED indicated. Emergency fan solenoid does not have low voltage disconnect (LVD) protection.
- One form C dry contact alarm, open on alarm.

Emergency Fan System Power Requirement:

- 24 or 48VDC input power.
- 3A fuse or circuit breaker is required (not provided unless configured with Cordex shelf or GMT fuse panel options).
- 20awg input power leads provided (see wire labels for correct voltage and polarity).
- Maximum power draw 36W.

4.0 Maintenance

4.1 FBE2322 Enclosure Maintenance

Monthly, visually inspect the enclosure for any mechanical damage that may allow insect or rodent ingress into the enclosure. Ensure fasteners and hinges are tightened and in a state of good repair (free from rust, damage, etc.). Inspect insect screens for damage and replace if necessary. Clear away any windblown dust or insect debris from inside the cabinets. Inspect and maintain batteries per the manufacturer's recommendations.

Annually ensure that all electrical components are operable and in good repair. Repair or replace any component that shows excessive sign of wear or breakdown per the manufacturer's recommendations.

4.2 FBE2322 Environmental Control Maintenance

4.2.1 FBE2322 Air Filter Replacement

For fan cooled applications, the system has directional filters that should be inspected for cleaning or replacement every six months depending on time of year or environment. Clean the filters by back flushing with water in the direction indicated on the filter and reinstall the filter. Filter placement is directional.

4.2.2 FBE2322 Heat Exchanger

The filterless design of the Heat Exchanger provides long-term low maintenance operation. Occasional cleaning of the vent openings may be necessary to clear insects or windblown debris. If further maintenance is required please Contact Alpha Technical Support.

4.2.3 FBE2322 AC Air Conditioner

Ambient Air Filter: It is recommended that the ambient air filter be inspected and cleaned regularly, at least every 3 to 6 months, or more frequently depending upon ambient conditions. Refer to the ICEQube Maintenance Manual for detailed information about maintaining the Ambient Air Filter.

Condensate Management System: The condensate management system should be checked periodically for scale, sludge and debris that may cause the drip outlet to clog. Maintenance of the condensate management system will require removal of electrical power from the Ice Qube system. Unplug the AC power cord from the 120Vac 15A receptacle within the enclosure and ensure that the ICEQube system is disconnected from power. Follow all instructions in the ICEQube Manual for cleaning the Condensate Management System before reconnecting the air conditioner to the power receptacle.

Alpha mounts the Air Conditioner Filter bracket for security. Using pin-in-hex screws and orienting the filter bracket opening toward the enclosure door prevents unauthorized removal of the filter. See page 36 for instructions on changing the filter and/or reorient the bracket for convenience.

4.0 Maintenance, continued

4.2 FBE2322 Environmental Control Maintenance, continued

4.2.2 FBE2322 AC Air Conditioner, continued

Tools Required:

- 5/32" Hex w/ Pin Driver, Alpha p/n 964-027-10

Changing Filter/Filter Bracket Procedure:

1. Remove the (4) hex w/ pin security fasteners (see Fig. 4-1).
2. If reinstalling for security, replace the filter and reinstall the fasteners removed in Step 1. If enclosure is within a secure location the filter bracket may be reinstalled for convenient filter replacement. Proceed to Step 3.

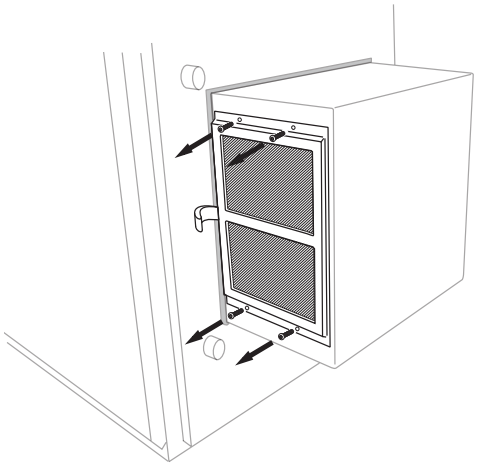


Fig. 4-1, Removing Security Fasteners

3. Rotate filter bracket so filter slides out away from the door (see Fig. 4-2).

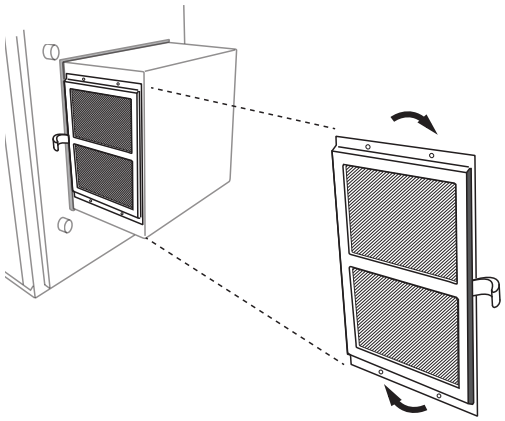


Fig. 4-2, Rotating the Filter Bracket

4. Reinstall fastners removed in Step 1 (see Fig. 4-3).
5. The filter bracket has now been reinstalled so the filter may be replaced without tools.

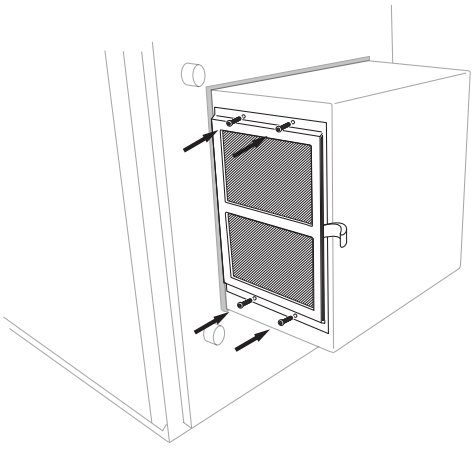


Fig. 4-3, Reinstalling the Filter Bracket

4.0 Maintenance, continued

4.2 FBE2322 Environmental Control Maintenance, continued

4.2.2 FBE2322 AC Air Conditioner, continued

Changing Filter/Filter Bracket Procedure, continued:

6. Remove the filter by pulling the filter tab. Replace filter, see Fig. 4-4.

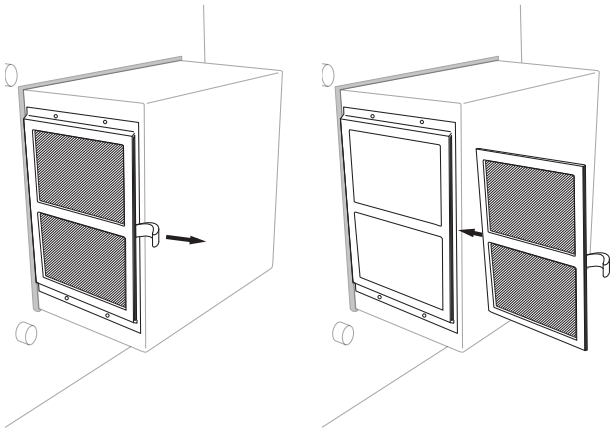


Fig. 4-4, Removing and Reinstalling the Filter

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