

Radium MiniBay

Power



Enclosure Installation Manual Radium MiniBay

Effective: June 2006

Alpha Technologies

Alpha Technologies ®

Power

Radium MiniBay Enclosure Installation Manual

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NOTE:

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



NOTE:

Operator is cautioned to review the drawings and illustrations contained in this manual before proceeding. If there are questions regarding the safe operation of this powering system, please contact Alpha Technologies or your nearest Alpha representative.



NOTE:

Alpha shall not be held liable for any damage or injury involving its enclosures, power supplies, generators, batteries, or other hardware if used or operated in any manner or subject to any condition not consistent with its intended purpose, or is installed or operated in an unapproved manner, or improperly maintained.

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

Symbols in this Manual

ATTENTION:

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



NOTE:

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



CAUTION!

A CAUTION presents safety information to PREVENT DAMAGED EQUIPMENT.



WARNING!

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

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.

General Safety Precautions



CAUTION!

This enclosure and its associated hardware (power supply, batteries, cabling) may contain equipment, batteries or parts that have hazardous voltage or currents.

To avoid injury:

- This enclosure and its associated hardware must be serviced only by authorized personnel.
- Enclosure must remain locked at all times, except when authorized service personnel are present.
- Remove all conductive jewelry or personal equipment prior to servicing equipment, parts, connectors, wiring, or batteries.
- Read and follow all installation, equipment grounding, usage, and service instructions included in this manual.
- Use proper lifting techniques whenever handling enclosure, equipment, parts, or batteries.
- Batteries contain dangerous voltages, currents and corrosive material. Battery installation, maintenance, service and replacement must be performed by authorized personnel only.
- Never use uninsulated tools or other conductive materials when installing, maintaining, servicing or replacing batteries.
- Use special caution when connecting or adjusting battery cabling. Battery cables that are either improperly or unconnected can result in arcing, a fire, or possible explosion.
- A battery that shows signs of cracking, leaking or swelling must be replaced immediately by authorized personnel using a battery of identical type and rating.
- Avoid any contact with gelled or liquid emissions from a valve-regulated lead-acid (VRLA) battery. Emissions contain dilute sulfuric acid which is harmful to the skin and eyes. Emissions are electrolytic, which are electrically conductive and are corrosive. Follow the Chemical Hazards notes if contact occurs.
- Do not smoke or introduce sparks in the vicinity of a battery.
- Under certain overcharging conditions, lead-acid batteries can vent a mixture of hydrogen gas that is explosive. Proper venting of the enclosure is required.
- Follow the battery manufacturer's approved transportation and storage instructions.



CAUTION!

Enclosure, equipment or parts may be damaged or cause damage if used or installed improperly.

To avoid damage:

- Prior to installation, verify that the AC input voltage to the enclosure and its equipment match with respect to voltage and frequency.
- Prior to installation, verify that the output voltage from the enclosure or its equipment match the voltage requirements of the connected equipment (load).
- Prior to installation, verify that the enclosure's utility service panel is equipped with a properly rated circuit breaker for use with the equipment inside. Refer to manufacturer's recommendations.
- Review and upgrade utility service panel circuit breaker requirements whenever the equipment within the enclosure is changed.
- Prior to installation, contact local utilities, local building maintenance departments, and cable/piping locator services to ensure that installation will not interfere with existing utility or building cables/piping.
- Do not exceed the output rating of equipment. Verify load requirements prior and during connection process.
- Prior to handling the batteries, touch a grounded metal object to dissipate any static charge that may have developed in your body.

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

To avoid injury:

- Always wear eye protection, rubber gloves, and a protective vest when working near batteries. Remove all metallic objects from hands and neck.
- Servicing and connection of batteries shall be performed by, or under the direct supervision of, personnel knowledgeable of batteries and the required safety precautions.
- All 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, which are electrically conductive and corrosive.
- Batteries produce explosive gases. Keep all open flames and sparks away from batteries.
- Use tools with insulated handles, do not place 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.
- 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.
- 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.
- A battery showing signs of cracking, leaking, or swelling should be replaced immediately by Authorized Personnel using a battery of identical type and rating.
- Under extreme overcharging conditions, lead-acid batteries can vent a mixture of hydrogen gas which is explosive.
- All battery compartments must have adequate ventilation to prevent accumulation of potentially dangerous gas. Ventilation should prevent trapped hydrogen gas pockets from exceeding a one percent concentration as per regulation 70E of the National Fire Protection Agency (NFPA).

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.
 - **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 two 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 from the MiniBay.

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.

1.0 Overview and Specifications

The MiniBay’s modular design allows the flexible configuration necessary to meet a wide range of applications, including traditional and advanced hybrid fiber coax (HFC), FTTx fiber deep, Wi-Max networks, wireless outdoor base stations, wireless IP access, and bulk power.

The MiniBay is comprised of a set of CSA listed assemblies that allow new agency approved configurations to be rapidly constructed. The equipment section can be configured to 19" or 23" wide rack units (RU), consisting of 23 RU in the front and 23 RU in the rear. An optional “swing rack” provides 17 RU of additional equipment space.

Thermal management options include conformal-coated fans with electrostatic filters, heat exchangers, and two high efficiency air conditioning systems.

Each battery storage unit is isolated from the equipment section and can house a variety of battery types, including a 48V string of GNB M12V155FT batteries that can support a 19.4A load for 8 hours. A second battery storage module can be added to provide additional capacity or redundancy.

The MiniBay integrates Alpha’s comprehensive line of power solutions for today’s complex communications powering requirements, including the Cordex series of high efficiency hot swappable switch mode 48VDC rectifiers and the AlphaGen series of telephony grade DC generators.



NOTE:

For MiniBay wiring diagrams and alarm information, see *Radium MiniBay System Schematics*, Alpha P/N 044-001-C2.

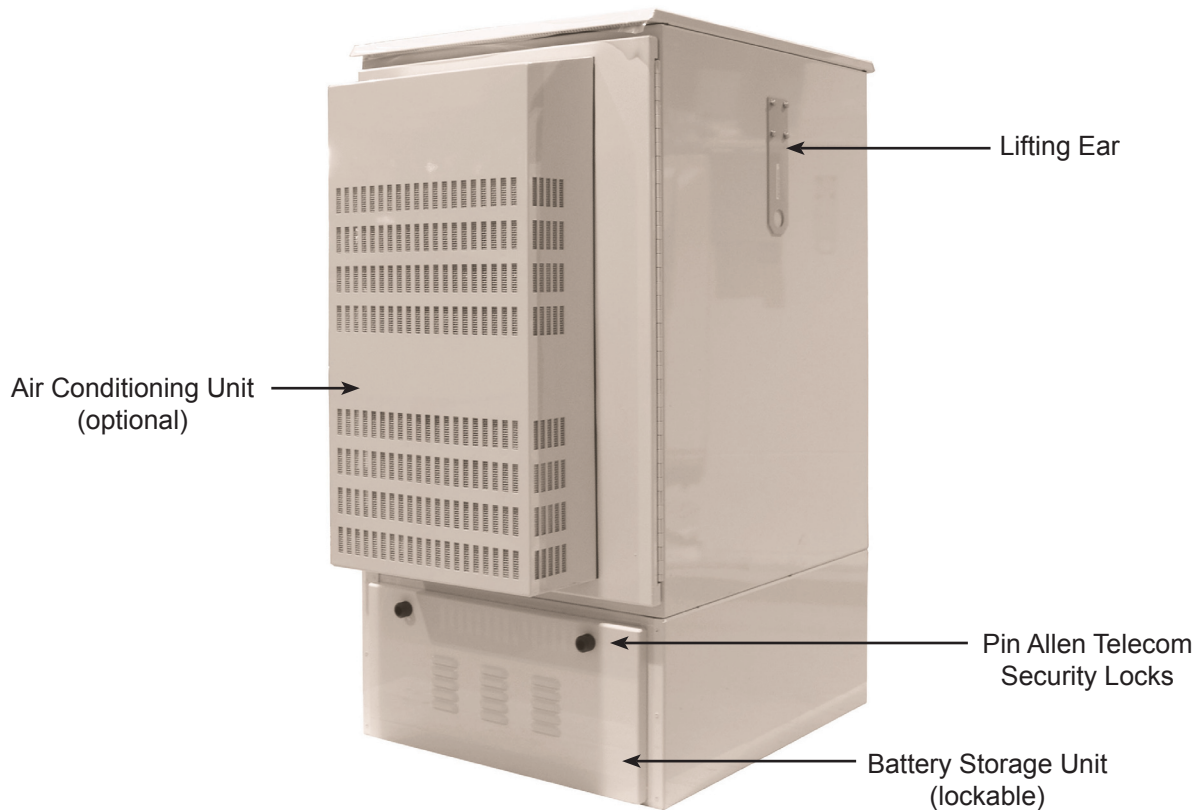


Fig. 1-1, MiniBay Cabinet

1.0 Overview and Specifications, continued

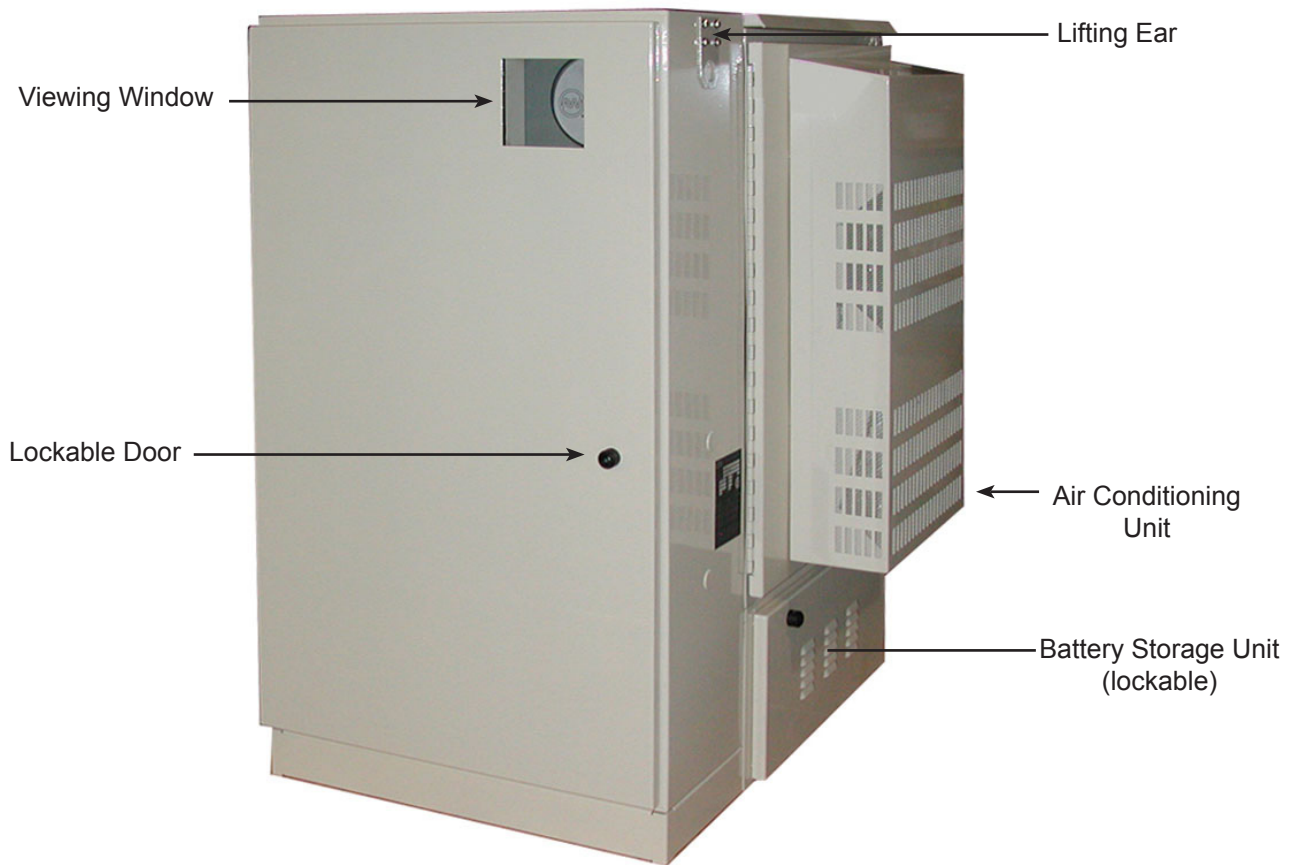


Fig. 1-2, Typical MiniBay Cabinet Configuration, with Side Chamber

1.0 Overview and Specifications, continued

MiniBay configured with the following options:

Side Chamber (*designed to NEMA 4X specifications*)
60A Internal AC Service (Square D QO Series)
EUSERC Meter Base (*240VAC with Test Bypass Blocks*)
Fusible Service Entrance Disconnect (*100,000 AIC rating*)
Side Chamber Door Viewing Window
TVSS (Transient Voltage Surge Suppression) Module
Cable Entry Seals
Master Ground Bar
Telcom 3-point Door Latch
Door Activated Light and Tamper Switch

Also shown on this unit:

3,000 BTU DC Air Conditioner
Battery Storage Unit
Pin Allen Telecom Locks

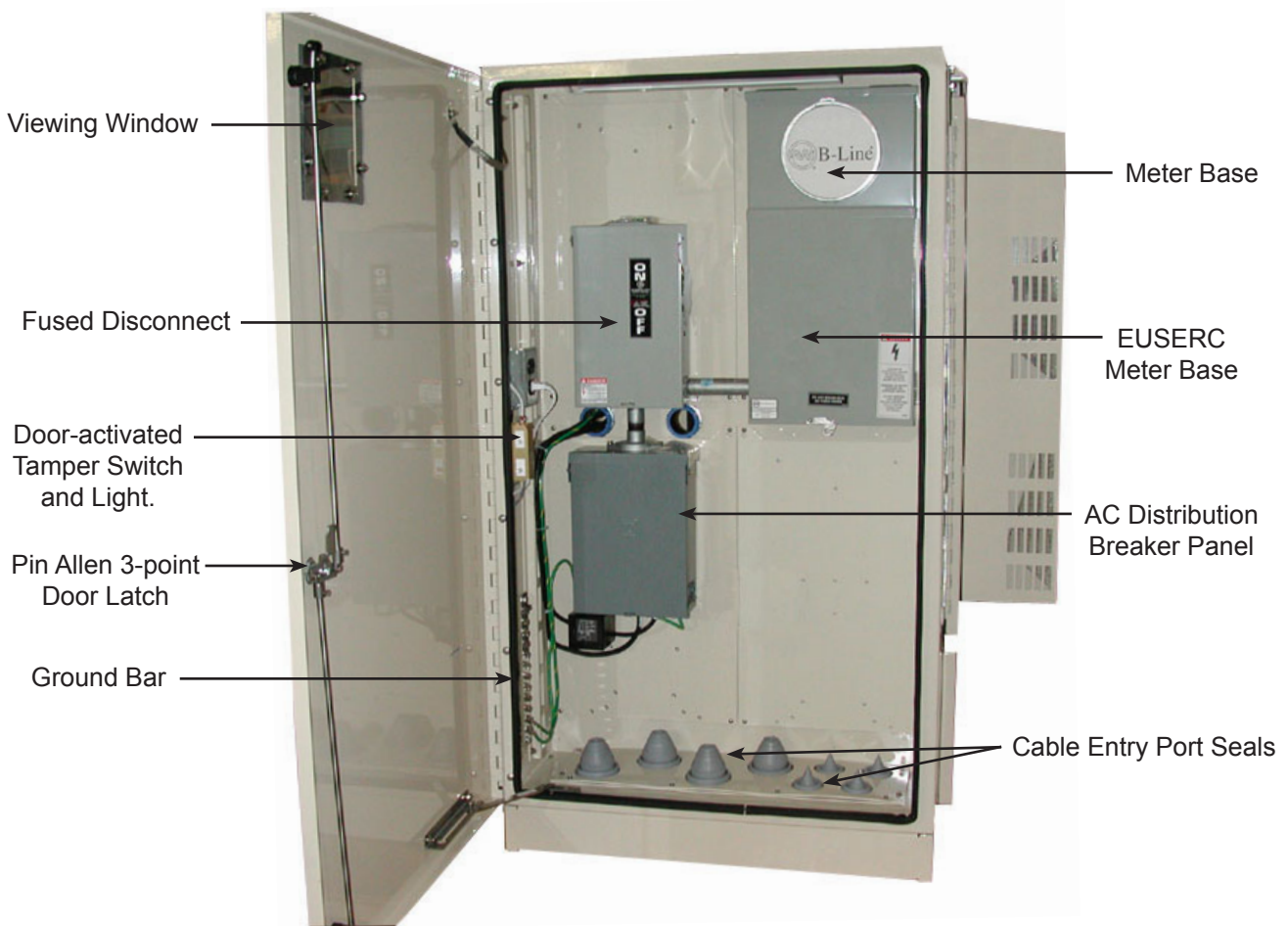
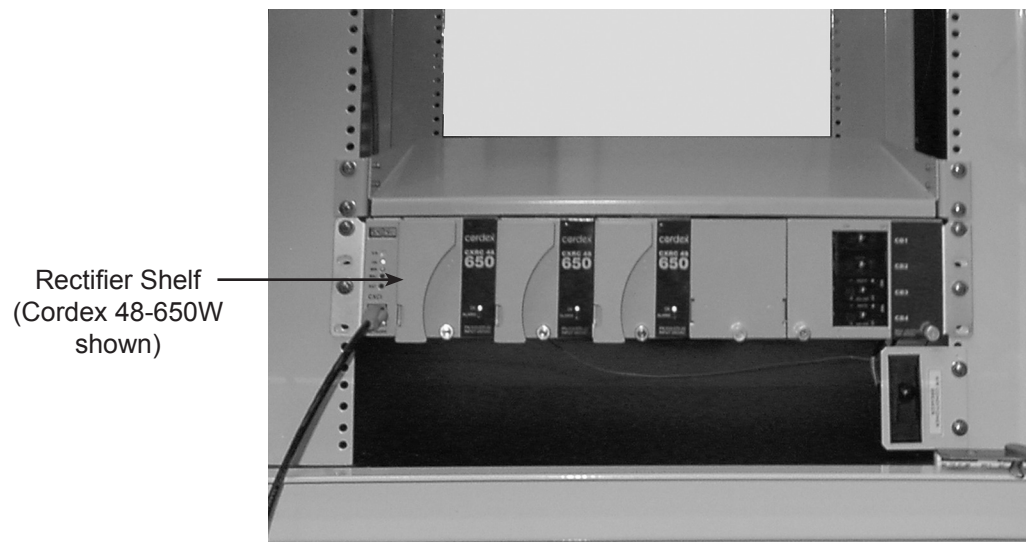
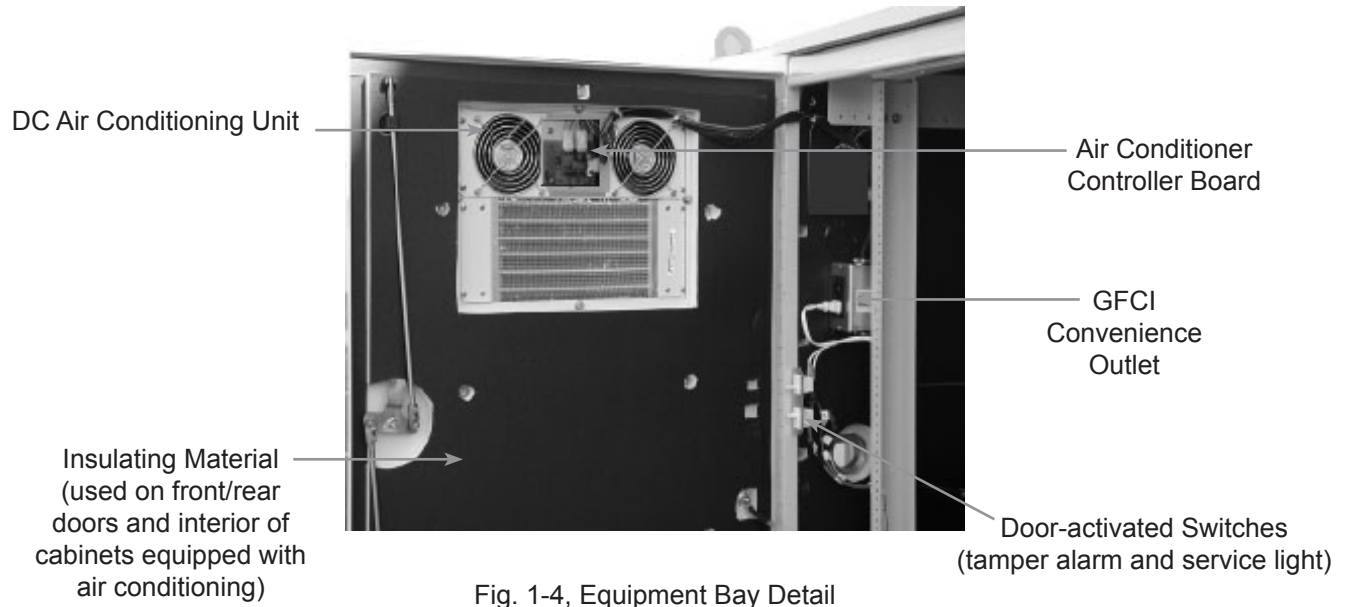


Fig. 1-3, Interior View of the MiniBay Side Chamber

1.0 Overview and Specifications, continued



1.0 Overview and Specifications, continued

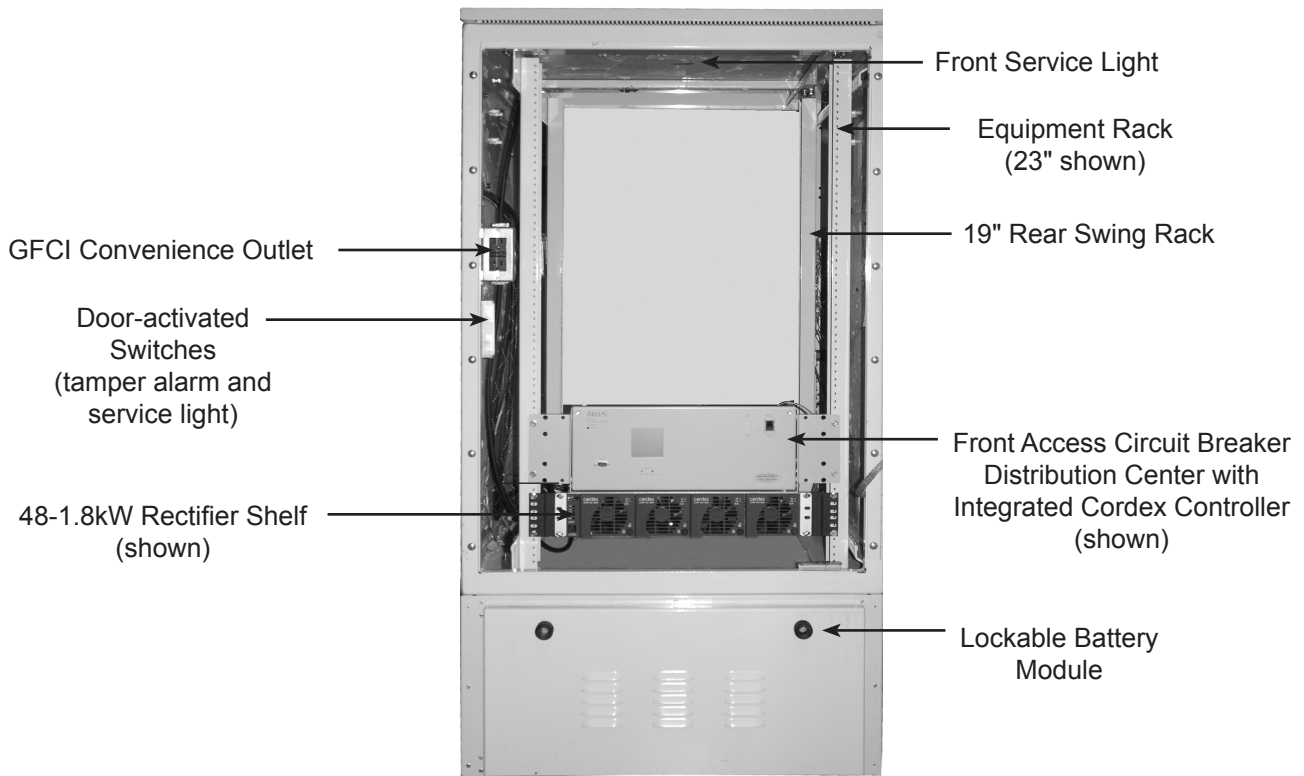


Fig. 1-6, Equipment Bay, Front View

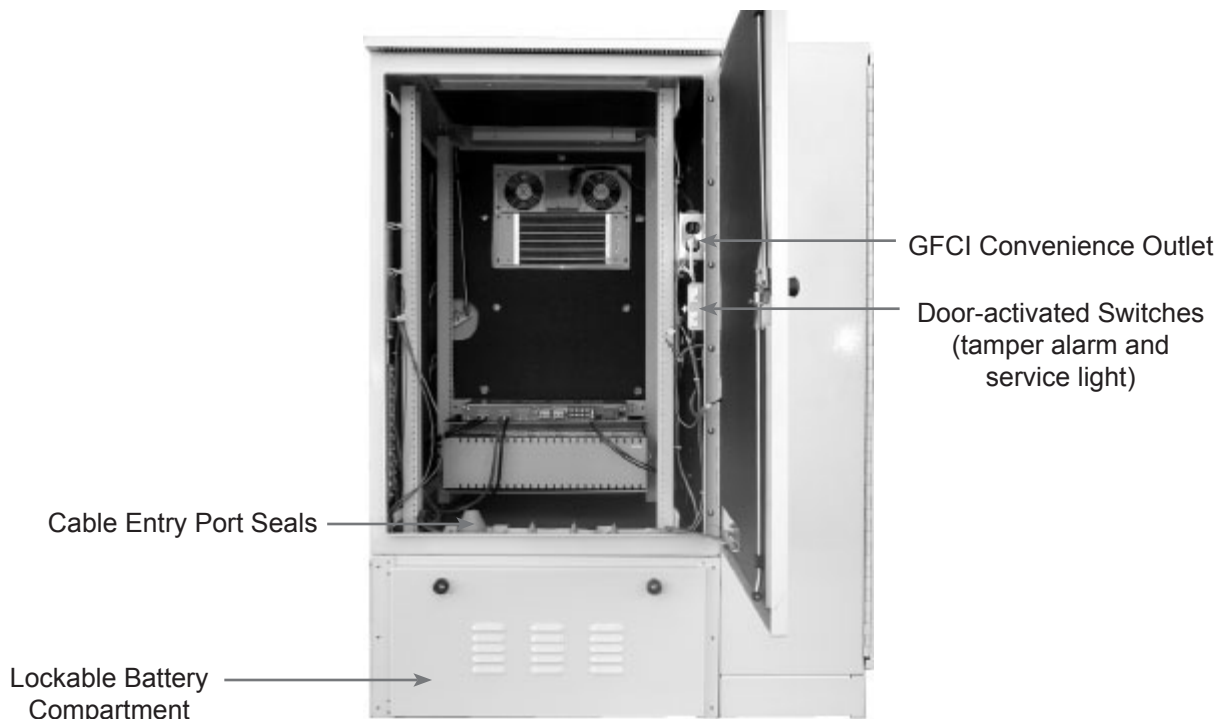


Fig. 1-7, Equipment Bay, Rear View

1.0 Overview and Specifications, continued

1.1 Standard Cordex Configurations

The Radium MiniBay may be equipped with Cordex 48-650W, 48-1kW, or 48-1.8kW AC/DC rectifiers. Previous models were equipped with RSM 48/10 AC/DC rectifiers. Due to customer requirements, the following illustrations may not resemble your model exactly.

RMB DC Power & Distribution Standard Configuration #1

- Cordex 48-650W 19" shelf with two rectifier modules with load LVD
- Provides 13.5A @ 48VDC, N+1
- Fully equipped shelf provides 2.6kW (54A @ 48VDC), N+0
- 2RU shelf needs 1RU above and below, convection cooled
- Heat dissipation <221 BTU/hr, per rectifier module
- Comnet GMT fuse panel, 10A/10B position -48VDC

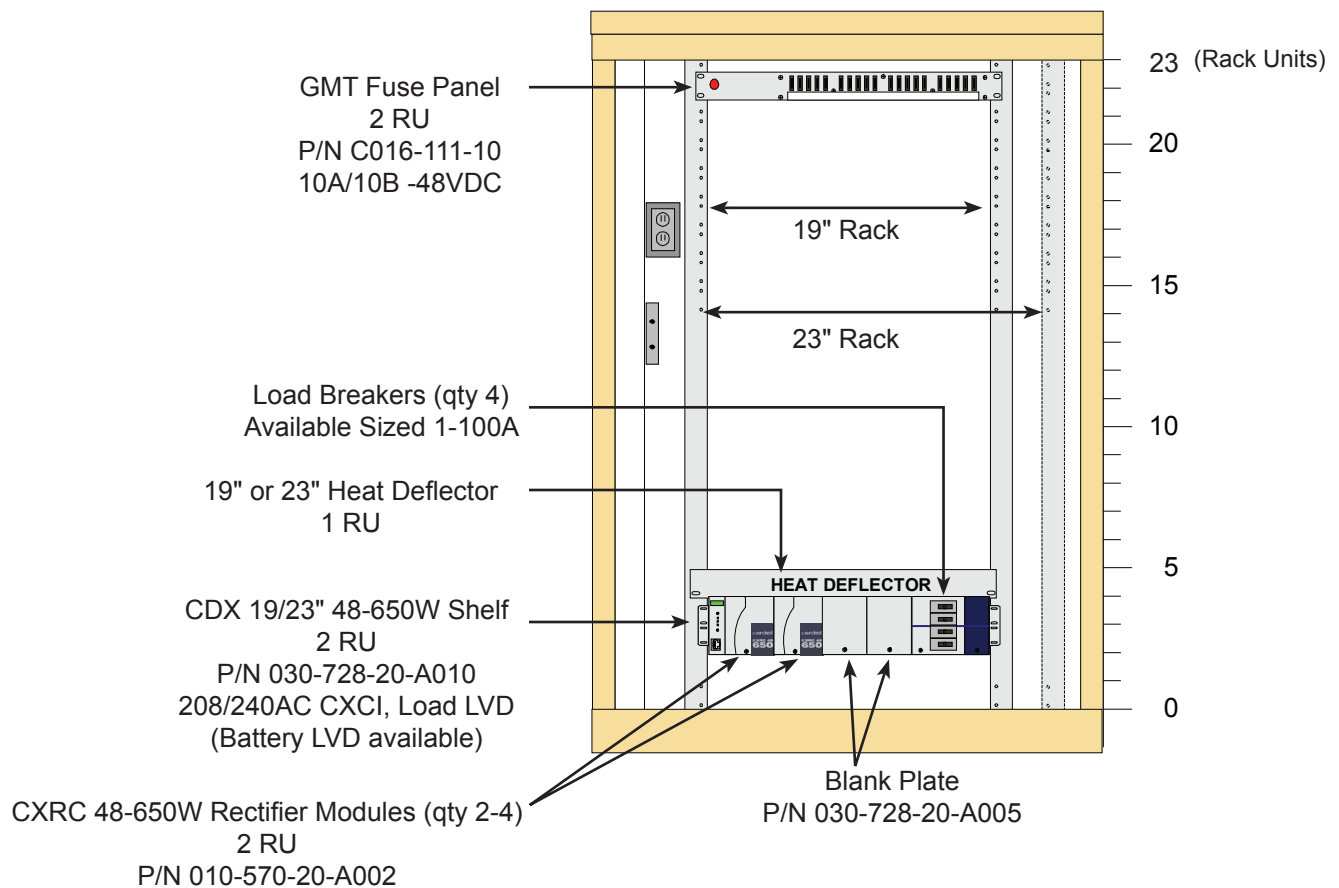


Fig. 1-8, Radium MiniBay Standard Configuration #1



NOTE:

For units equipped with a Battery LVD, a manual reset of the battery contactor is required after the low voltage disconnect has been tripped, if there is no resumption of AC power, and DC power is applied to the unit using an alternate power source (DC generator).

1.0 Overview and Specifications, continued

1.1 Standard Cordex Configurations, continued

RMB DC Power & Distribution Standard Configuration #2

- Cordex 1.8kW 19" Shelf, with two Cordex 48-1.8kW rectifier modules
- Provides 37.5A @ 48VDC, N+1
- Fully equipped shelf provides 7.2kW (150A @ 48VDC), N+0
- 2 RU shelf, fan cooled
- Heat dissipation <350 BTU/hr, per rectifier module
- 584 Distribution Center with Cordex Controller, load LVD, eight load breakers, and shunt

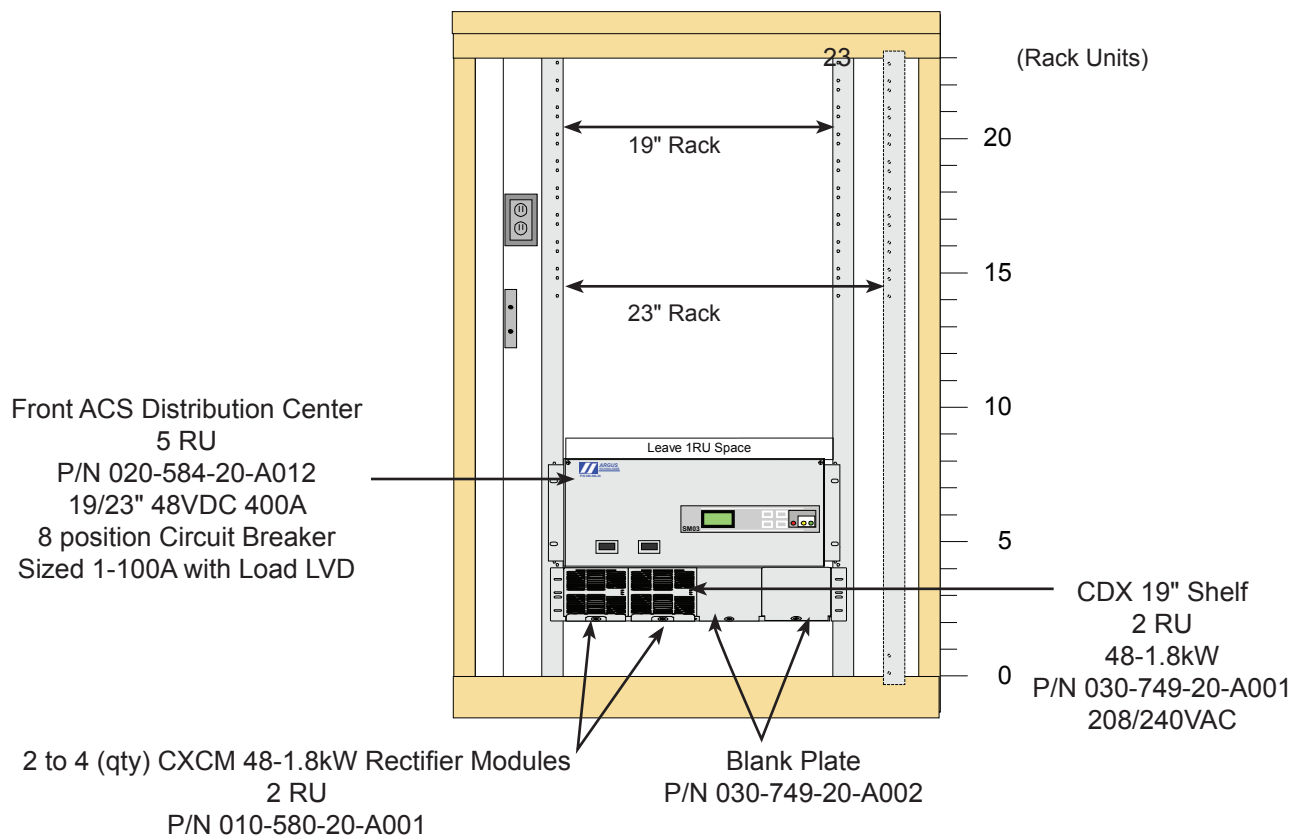


Fig. 1-9, Radium MiniBay Standard Configuration #2

1.0 Overview and Specifications, continued

1.1 Standard Cordex Configurations, continued

 **NOTE:**

Rack height is shown in Rack Units (RU). One RU is equal to 1.75 inches.

Equipment Rack Front View

Equipment Rack Side View

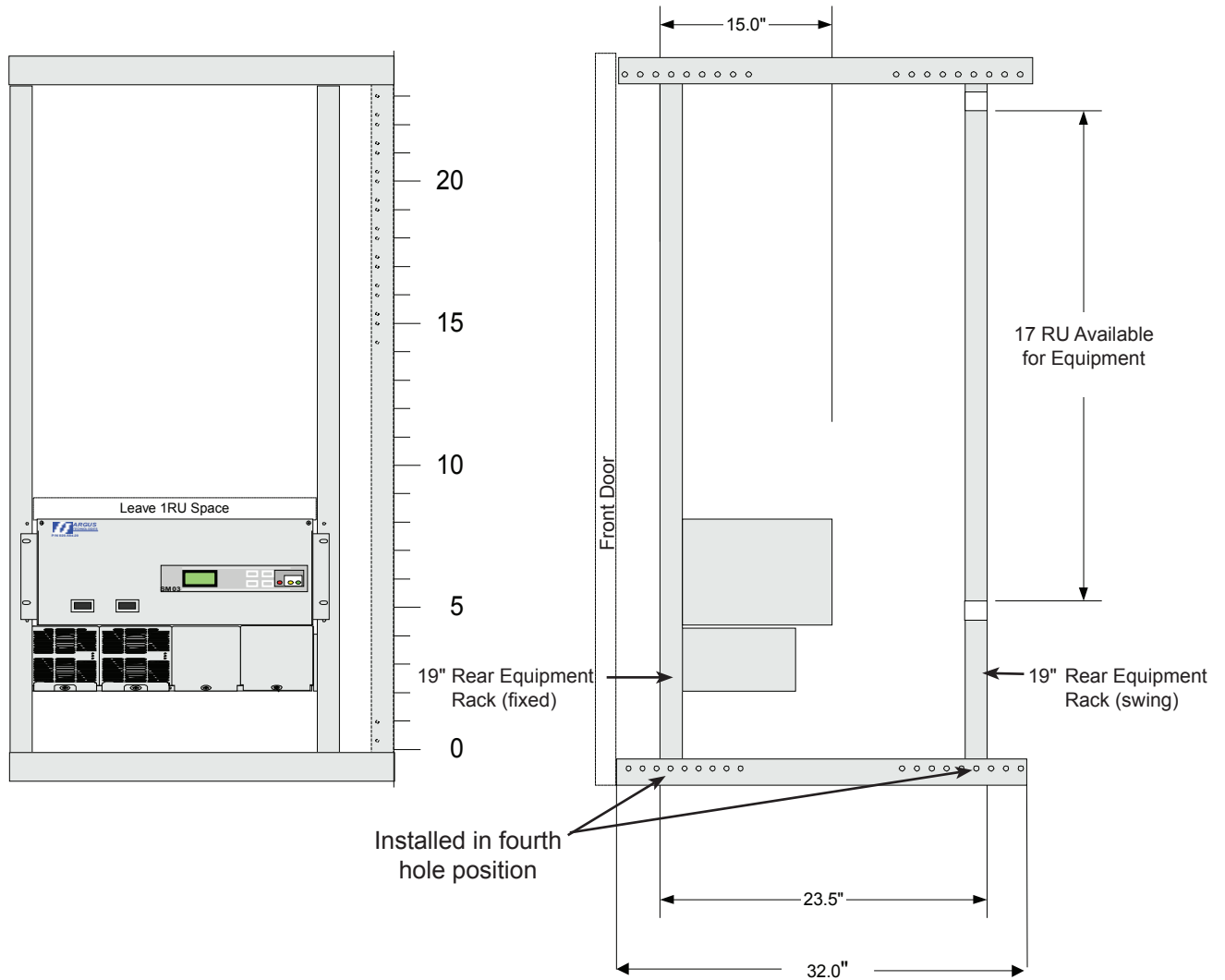


Fig. 1-10, Radium MiniBay Equipment Rack View

 **NOTE:**

For wiring diagrams and alarm information, see *Radium MiniBay System Schematics*, Alpha P/N 044-001-05. Contact Alpha Application Engineering for information on Cordex configurations.

1.0 Overview and Specifications, continued

1.2 Enclosure Specifications

| | |
|--|--|
| Equipment Enclosure | Weight: 195 lbs (88.5kg) |
| 19" or 23" wide Fixed Relay Rack tapped or with Tinnerman nuts | Dimensions (in/mm): 44H x 30W x 32D (1067 x 762 x 813) |
| 19" Swing Rack (tapped only) | Material: High Strength Corrosion Resistant Aluminum Finish: Almond Color Powdercoat Finish |
| Battery Storage Unit | Weight (without batteries): 130 lbs (59kg) |
| Slide Tray, Alpha P/N 033-083-20, will hold four GNB M12V155FT batteries | Dimensions (in/mm): 14.0H x 30W x 32D (356 x 762 x 813) |
| Fixed Tray, Alpha P/N 033-083-23, will hold three Avestor batteries. | |
| Riser Module | Weight: 102 lbs (46.3kg) |
| 14" Riser Alpha P/N 033-083-21 | Dimensions (in/mm): |
| 7" Skirt/Riser Alpha P/N 033-084-20 | 14H x 30W x 32D (356 x 762 x 813) |
| 7" C-channel Riser Alpha P/N 745-650-20 | |
| Side Chamber SC1 | Weight: 100 lbs (45.4kg) |
| | Dimensions (in/mm): 72H x 32W x 12D (813 x 1829 x 305) |
| Side Chamber SC2 | Weight: 89 lbs (40.4kg) |
| | Dimensions (in/mm): 58H x 32W x 12D (813 x 1321 x 305) |

1.3 MiniBay Accessories

| | |
|--|----------------|
| Precast Polymer Concrete Pad for Single Radium MiniBay | P/N 641-110-10 |
| Precast Polymer Concrete Pad for Single Radium MiniBay + Side Chamber | P/N 641-114-10 |
| Pour-in-place Pad Template | P/N 604-039-N1 |
| Pour-in-place Pad Template Tie-bars (spacers for 2 template kits) | P/N 745-332-20 |
| Pour-in-place Side Chamber Template | P/N 745-333-20 |
| Vapor Barrier for MiniBay (die cut template matches MiniBay) | P/N 564-990-10 |
| SRG PROT, 5-pin, Gas Tube, 3B1E | P/N 162-016-10 |
| Touch-up Spray Paint, Almond | P/N 972-056-10 |
| Pad Mounting Hardware Kit (4 Hilti KBII sleeve anchors 1/2 x 3-3/4) | P/N 745-592-21 |
| Pad Mounting Hardware (4 Hilti HSLG M12/0 *60 heavy duty sleeve anchors) requires 12mm metric drill Kit for Zone 4 | P/N 745-592-20 |

1.0 Overview and Specifications, continued

1.4 Enclosure Cooling Options



NOTE:

Consultation with Alpha Applications Engineering is required. Provisions must be made for adequate air flow in the cabinet, equipment total heat dissipation load inside the cabinet, equipment min/max operating temperatures, equipment over-temp fail safe shutdown capability, environmental outdoor design conditions, and battery back up run times.

Fan Filter Cooling Door, 48VDC, right or left hinged: Alpha P/N 745-204-20 (R) or 745-204-21 (L)

- Cooling capacity 1000W dissipated with 15°C rise over ambient.
- Two 150 CFM fans with variable speed temperature control and low voltage disconnect, hysteresis fixed at 42VDC.
- Inline 5A fuse.
- Fans run continuously below 25°C at 40% speed. Fans increase from 40% to 100% with increased enclosure temperature from 25°C to 55°C.
- Form C dry contact alarm, fan fail, open on alarm.
- Maximum power draw 32W.

Fan Filter Cooling Door, 120VAC, right or left hinged: Alpha 745-204-25 (R) or 745-204-24 (L)

- Cooling capacity 750W dissipated with 15°C rise over ambient.
- Two 115 CFM fans are powered from the included line cord with designated inline 5A fuse and bimetal thermostat control (Alpha P/N 875-075-20).
- Fixed thermostat set point, close at 29°C and open at 19°C.
- Included adjustable enclosure over-temp alarm (Alpha P/N 745-338-20).
- Form C dry contact, open on alarm. Factory setting is 40°C.
- Maximum power draw 30W.

Heat Exchanger Door, 48VDC, right or left hinged: Alpha P/N 745-204-45 (R) or 745-204-46 (L)

- Cooling capacity 690W dissipated with 15°C rise over ambient.
- Variable speed fan temperature control and low voltage disconnect. Fans off below 23°C. Fans turn on at 25°C and run from 25% to 100% with increased enclosure temperature from 25°C to 45°C.
- Two Form C dry contact alarms (Minor: Fan fail, open on alarm and Major: Enclosure over-temp fixed at 60°C, open on alarm).
- Maximum power draw 120W.

Heat Exchanger Cooling Door, 120VAC, right or left hinged: Alpha P/N 745-204-40 (R) or 745-204-41 (L)

- Cooling capacity 690W dissipated with 15°C rise over ambient
- Heat exchanger fans are powered from included line cord with designated inline 5A fuse and bimetal thermostat control (Alpha P/N 875-075-20)
- Fixed thermostat set point, close at 29°C and open at 19°C
- Included adjustable enclosure over-temp alarm (Alpha P/N 745-338-20). Form C dry contact, open on alarm. Factory setting is 40°C.
- Maximum power draw 115W.

1.0 Overview and Specifications, continued

1.4 Enclosure Cooling Options, continued

Air Conditioner Door, 48VDC, right or left hinged: Alpha P/N 745-204-50 (R) or 745-204-51 (L)

- Cooling capacity 878W dissipated at 43°C outdoor ambient and maximum internal ambient temperature of 40°C.
- Variable speed compressor temperature control and low voltage disconnect.
- Adjustable enclosure temperature set point jumper, factory set to 25°C.
- Two Form C dry contact alarms (Minor: High condensing temp and/or enclosure over-temp, open on alarm and Major: cooling system failed, open on alarm). See DC air conditioner operation section for details.
- Maximum power draw 500W.

Air Conditioner Door, 24VDC, right or left hinged: Alpha P/N 745-204-52 (R) or 745-204-53 (L)

- Cooling Capacity 878W dissipated at 43°C outdoor ambient and maximum internal ambient temperature of 40°C.
- Variable speed compressor temperature control and low voltage disconnect. Adjustable enclosure temperature set point jumper factory set to 25°C.
- Two Form C dry contact alarms (Minor: High condensing temp and/or enclosure over-temp, open on alarm and Major: cooling system failed, open on alarm). See DC air conditioner operation section for more details.
- Maximum power draw 500W.

Air Conditioner Door, 240VAC, right or left hinged: Alpha P/N 745-204-58 (R) or 745-204-59 (L)

- Cooling capacity 1464W dissipated at 43°C outdoor ambient and maximum internal ambient of 40°C.
- Digital display with programmable set points.
- Included adjustable enclosure over-temp alarm (Alpha P/N 745-338-20).
- Form C dry contact, open on alarm. Factory setting is 40°C. See AC air conditioner operation section for more details.
- Maximum power draw 989W.

1.5 Enclosure Heating Options

Heater, 450W, 48VDC: Alpha P/N 745-588-22 or 745-588-21

- PCBA thermistor temperature control and low voltage disconnect.
- Heater turns on when enclosure temperature drops below 6°C.
- Functional test button.
- Model 745-588-22 includes 20A circuit breaker.
- Model 745-588-21 does not include circuit breaker, but has a piggyback connector that allows it to share input power from the DC air conditioner 20A circuit breaker.

Heater, 450W, 120VAC: Alpha P/N 745-589-21

Line cord with bimetal thermostat control. Thermostat set point is fixed to close at 4°C and open at 15°C. Plugs into GFCI outlet.

1.0 Overview and Specifications, continued

1.6 Storage Unit Cooling Options

Fan, 120VAC: Alpha P/N 745-214-21

One 64CFM fan powered from 875-075-20 line cord with designated in-line 5A fuse and bimetal thermostat control. Thermostat set point is fixed to close at 29°C and open at 19°C.

Fan, 48VDC: Alpha P/N 745-214-20

- One 110CFM fan, turns off below 25°C. Turns on at 25°C and increases from 40% to 100% full speed with increased enclosure temperature from 25°C to 45°C.
- Form C dry contact alarm, fan fail, open on alarm.

Fan, 24VDC, Alpha P/N 745-214-22

- One 110CFM fan, turns off below 25°C. Turns on at 25°C and increases from 40% to 100% full speed with increased enclosure temp from 25°C to 45°C.
- Form C dry contact alarm, fan fail, open on alarm.

1.0 Overview and Specifications, continued

1.7 Battery Storage Unit Battery Options

The Battery Storage Unit (slide tray), Alpha P/N 033-083-20, and Battery Storage Unit (fixed tray), Alpha P/N 033-031-21, accommodates four of the following battery types:

- C&D TEL 12-45
- C&D TEL 12-70
- AlphaCell 85GXL-HP
- AlphaCell 165GXL
- AlphaCell 185GXL
- AlphaCell 195GXL-3FTG
- AlphaCell 225AGM-3FTA
- C&D TEL 12-105F
- GNB Marathon M12V155FT
- AlphaCell SMU12V 155F

The Battery Storage Unit (fixed tray) also accommodates three Avestor SE48S63 48VDC batteries.



Fig. 1-11, Battery Storage Unit

The MiniBay equipment enclosure can house a maximum of four batteries on the floor of enclosure when the fan filtered cooling door or roof vent option is used. The roof vent must have a minimum of four .375" vent holes to provide adequate hydrogen venting (Alpha P/N 745-669-20 or equivalent). The following batteries may be used in the battery compartment or equipment enclosure:

- C&D TEL 12-45
- C&D TEL 12-70
- AlphaCell 85GXL-HP
- AlphaCell 195GXL-3FTG
- AlphaCell 225AGM-3FTA

2.0 DC Air Conditioner

2.1 Overview and Theory of Operation

The MiniBay DC Air Conditioner comes in 24V and 48V models and uses a brushless compressor and variable speed controller. A temperature control board varies capacity by varying compressor speed depending on the enclosure internal setpoint temperature. The compressor runs between 50% and 100% of full speed depending on the load and enclosure set point temperature. When the temperature drops more than 4°C below the set point, the compressor and condenser fans shut off. The evaporator fans run continuously regardless of the set point to maintain an even temperature inside the enclosure.

Theory of Operation:

1. Low pressure gas is drawn into the compressor.
2. The high pressure gas is sent through a condenser where air is blown over it, cooling the gas into a liquid.
3. The high pressure liquid passes through an expansion valve, where the liquid is allowed to expand and boil off into a gas. As the gas expands, it cools.
4. The cool saturated low pressure gas is sent through the evaporator. Warm interior air is blown over the evaporator and back into the interior, several degrees cooler.
5. The low pressure gas is then drawn into the compressor, where the cycle starts over.

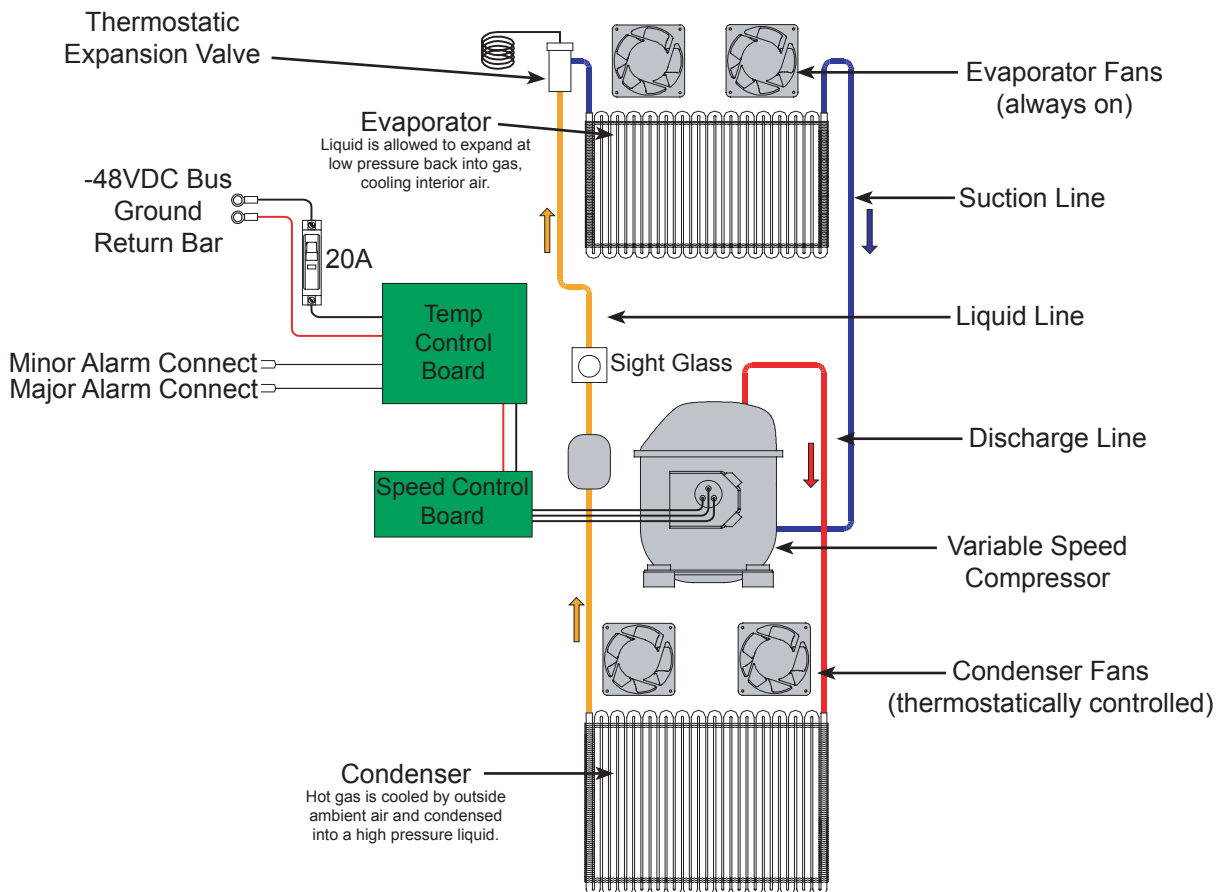
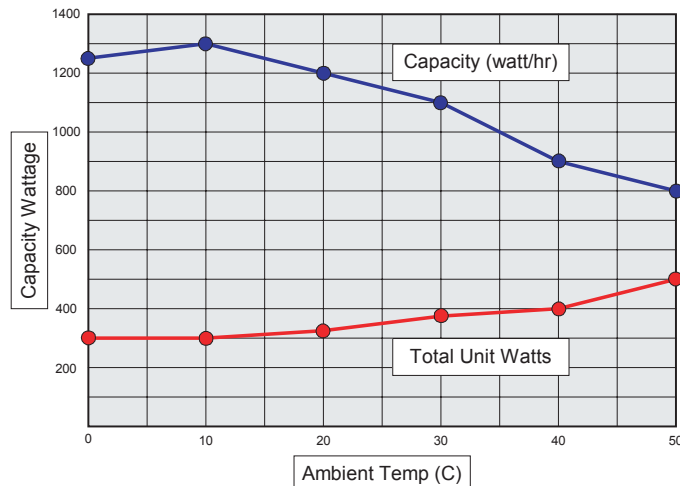


Fig. 2-1, DC Air Conditioner Basic Block Diagram

2.0 DC Air Conditioner, continued

2.2 DC Air Conditioner Specifications

| | |
|---------------------------------|---|
| Capacity: | 3,000 BTU @ 110°F (43°C) See chart below |
| External Amb. Operating Range: | -40°C (-104°F) to +50°C (+122°F) RH 13% |
| Max Internal Amb. Temperature: | +40°C (+104°F) RH 25% |
| Maximum Internal Hysteresis: | 10°C (50°F) |
| Maximum Operational Power Draw: | 500W ±10% (see chart) |
| DC Operation @ 48VDC: | 42VDC to 60VDC range with LVD fixed at 42V circuit breaker, magnetic short delay 15A |
| DC Operation @ 24VDC: | 21VDC to 30VDC range with LVD fixed at 21V circuit breaker, magnetic short delay 30A |
| Cooling System Control: | Low current DC or dry contact on/off |
| Major Alarm: | Compressor/controller system fail |
| Minor alarm: | High condensing temperature, Low evaporator temperature, Enclosure over-temp |
| Refrigerant Type: | R134a |
| Fan Life: | >50,000 Hours |
| Color: | Almond semigloss (other colors available) |
| External Dimensions (in/mm): | 19.50 W x 38.25 H x 7.50 D (495 x 972 x 191) |
| Agency: | CSA |
| Enclosure Rating: | IP55 - Weather tight hose directed spray |
| Noise Level: | 60 dBA at one meter |
| Materials: | Corrosion and salt-fog resistant (including fans) |



NOTE:

The chart above table illustrates air conditioner capacity under controlled conditions. A safety factor should be used depending on cabinet insulation and outside air filtration. To calculate capacity in BTUs at a given outdoor ambient temperature multiply 3.413 x (capacity watt/hr).

2.0 DC Air Conditioner, continued

2.3 Temperature Control Board

The temperature control board monitors the compressor, condenser fan, and alarm control. Its remote temperature sensors monitor compressor discharge and evaporator suction line temperature. A board-mounted temperature sensor monitors enclosure temperature. An optional remote temperature sensor can monitor a specific area in the enclosure. The board incorporates a low-voltage shutdown fixed at 42V for the 48VDC air conditioner, and 21V for the 24VDC air conditioner.

A temperature sensor on the discharge line of the compressor regulates the condenser fans. At low outdoor ambient temperatures, the condenser fans cycle on or off to maintain pressure across the expansion valve.

A temperature sensor on the suction line exiting the evaporator monitors low evaporator temperature, which can result from blocked evaporator air flow or faulty evaporator fans. This condition sends out a minor alarm and shuts down the compressor until the suction lines warm up again.

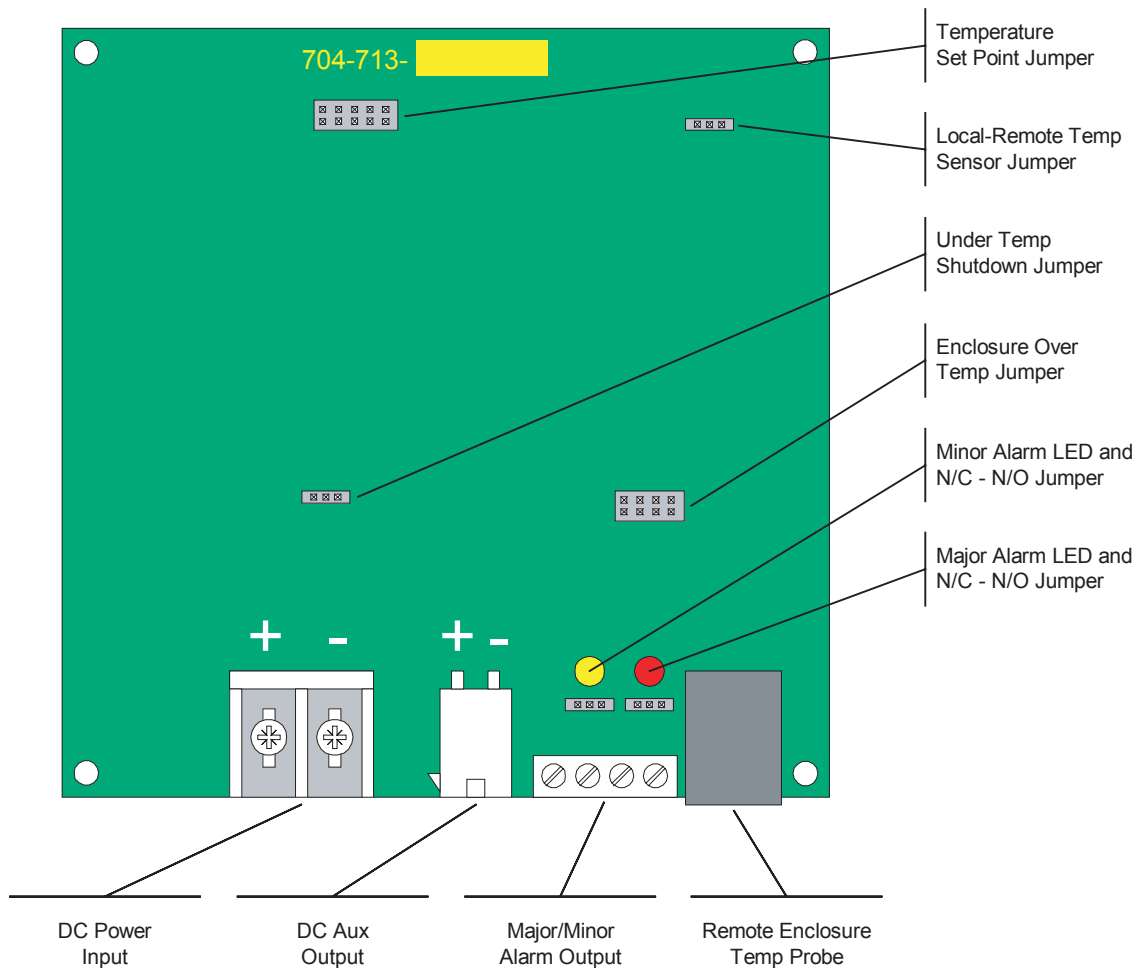


Fig. 2-2, Temperature Control Board

2.0 DC Air Conditioner, continued

2.3 Temperature Control Board, continued

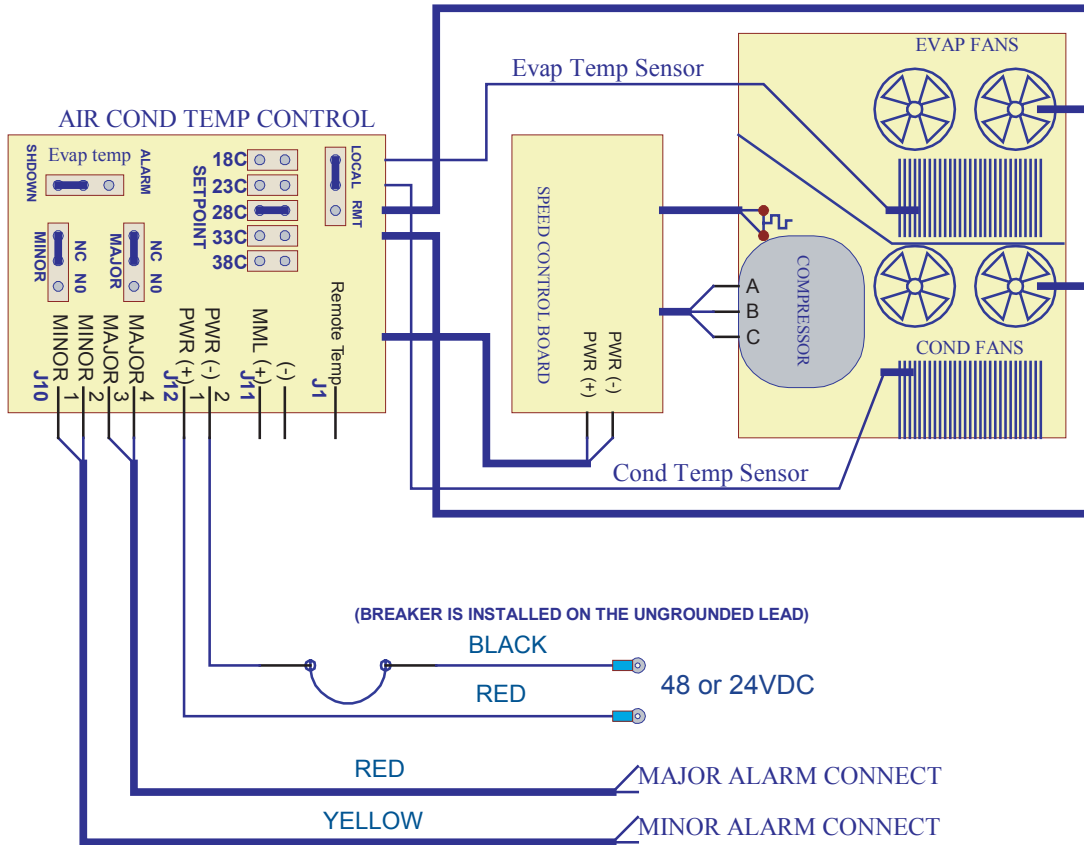


Fig. 2-3, Wiring Diagram

2.0 DC Air Conditioner, continued

2.4 Air Conditioner Installation and Removal

Allow 20 minutes for completion of procedure.

Tools required: 7/16" deep-well socket and ratchet handle

Removal:

1. Disconnect power to the air conditioner.
2. Disconnect input and alarm wires from the control board (see Fig. 2-2).
3. From the inside of the door, remove the 5 bolts (labeled S below) holding the shroud to the door. Remove the shroud. Remove grounding lug.
4. While another installer supports the air conditioner on the outside of the door, remove the 10 remaining bolts (labeled A below). Remove the air conditioner.
5. Reverse order for installation. Replace PORON washers if they are damaged (Alpha P/N 684-020-10).

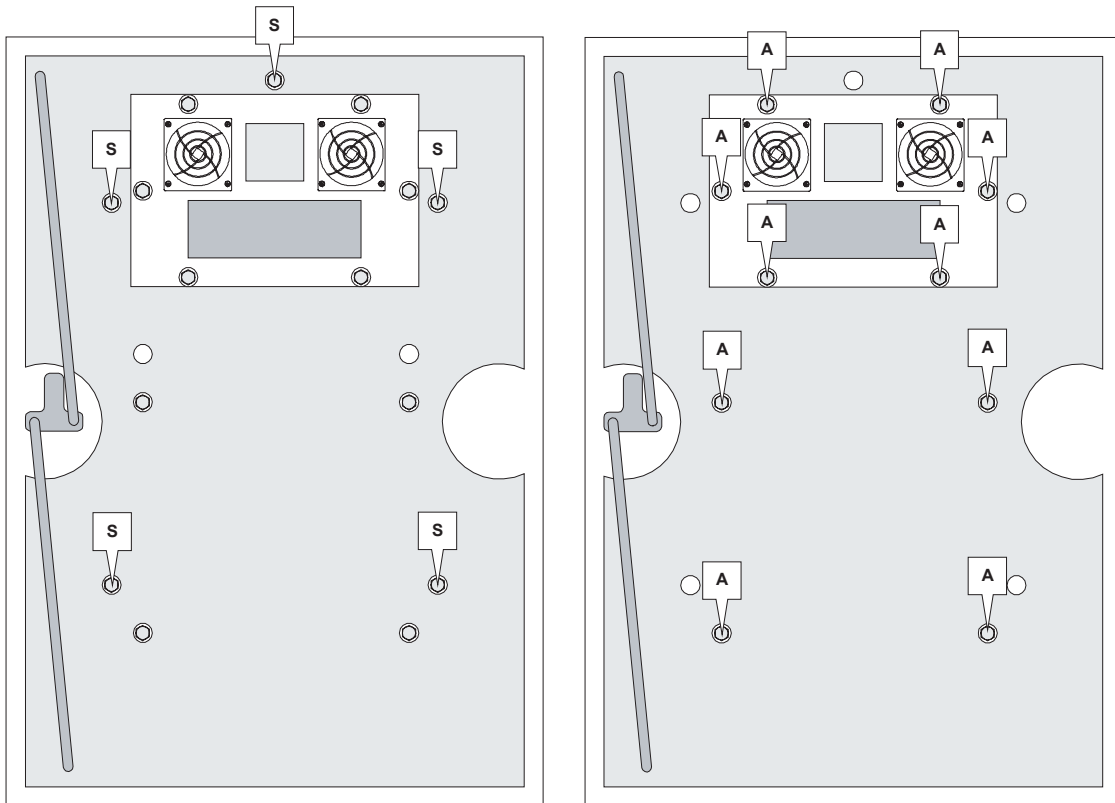


Fig. 2-4, Shroud and Air Conditioner Bolts

2.0 DC Air Conditioner, continued

2.5 48/24VDC Power Connection

Allow 20 minutes for completion of procedure.

Tools required: Assorted wrenches and screwdrivers

1. Install circuit breaker mounting plate in a convenient location near the 48/24VDC source (see Fig. 2-5 below). Leave circuit breaker IN THE OFF POSITION.
2. Connect black wire leading from circuit breaker to the 48/24VDC Bus.
3. Connect the red wire to the ground/return bar.

The air conditioner can be positively or negatively grounded. The overcurrent protection must be placed in the 'Hot' lead.

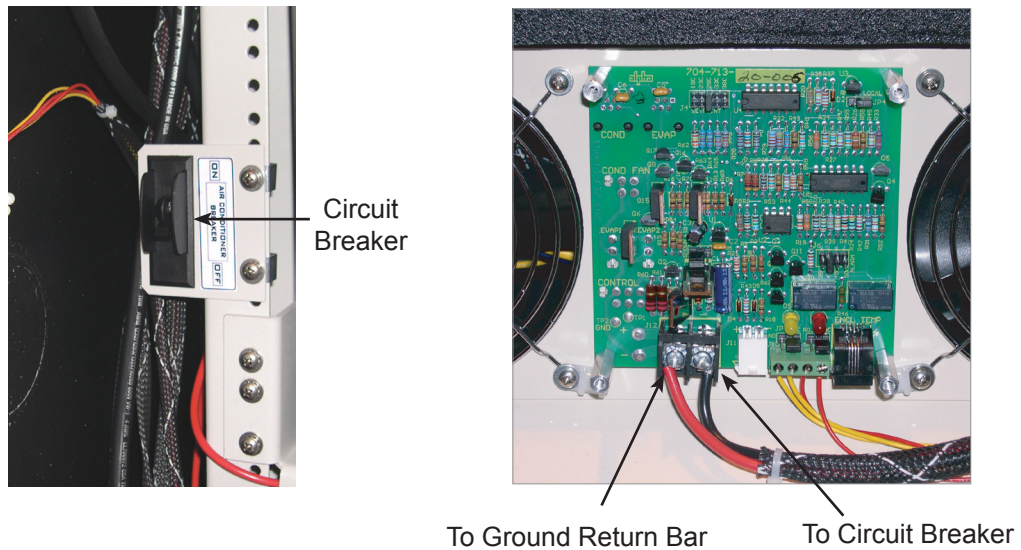


Fig. 2-5, Power Connections

2.0 DC Air Conditioner, continued

2.6 Alarm Connector

1. Set major and minor alarm jumpers to the desired position.
2. Connect yellow wire (minor) and red wire (major) to status monitoring device.

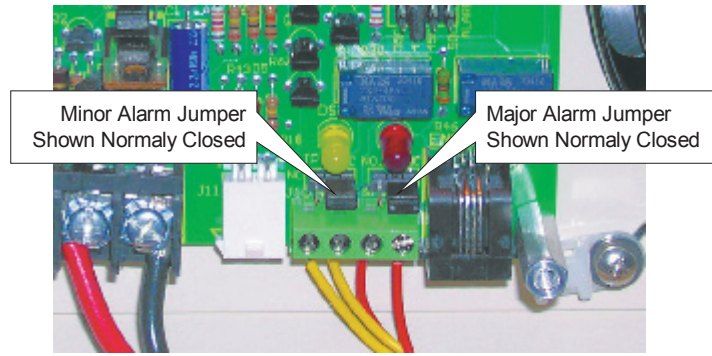


Fig. 2-6, Alarm Connections

2.7 Function Test

1. Set the 48VDC Circuit Breaker to the ON position.
2. Remove SETPOINT jumper and verify fans are running. Compressor will start after 10 second delay.
3. Replace SETPOINT jumper and verify AC unit shuts down.

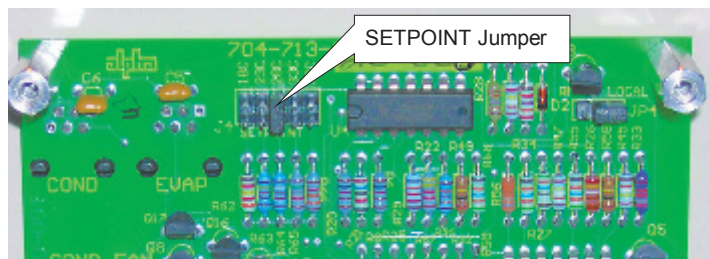


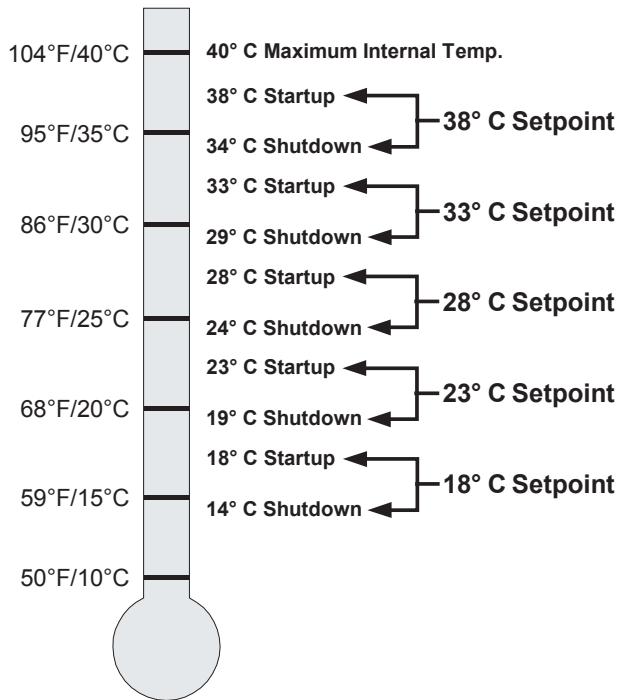
Fig. 2-7, Setpoint Jumper

2.0 DC Air Conditioner, continued

2.8 Jumpers

Enclosure Temperature Setpoint Jumper

Determines what temperature the system will maintain inside the enclosure. The diagram below details the start and shutdown temperatures for each setting.



Remote Temperature Sensor Jumper

Determines where the control card gets its temperature information. In the LOCAL position the card receives temperature information from its onboard temperature sensor. In the RMT position, temperature information is received from an optional Remote Temperature Sensor that can be placed anywhere in the enclosure.

Major and Minor Alarm Jumpers

Determines the state of the alarm relays in the non-alarm state. In the NO position, the non-alarm state is OPEN. In the NC position, the non-alarm state is CLOSED.



NOTE:

See Fig. 2-2 for jumper locations.

2.0 DC Air Conditioner, continued

2.9 DC Air Conditioner Preventative Maintenance

A preventative maintenance check should be conducted on initial startup, and on a yearly basis thereafter.

1. Check that the evaporator fans, located on the inside of the door, run continuously.
2. Remove temp setpoint jumper. Make sure the compressor comes on after 10 seconds.
3. Check for proper function of the outdoor condenser fans (located under the shroud on the outside of the door). The outdoor condenser fans are controlled by the temperature of the outdoor condenser coil. These fans should cycle on and off, or run continuously when the setpoint jumper is removed. They may not turn on unless outdoor ambient is above 70°F (21°C). As the outdoor condenser coil heats up, first one fan and then the other cycles on. If the unit is hot already, the fans turn on simultaneously, when the setpoint jumper is removed. After ten seconds the compressor will turn on.
4. Using a DC clamp-on ampere probe, check the input current to the air conditioner while the compressor is running. The 48VDC air conditioner should draw between 6A and 10.4A (10.4 FLA, Full Load Amps), for normal operation. The 24VDC air conditioner should draw between 12A and 20.8A (20.8 FLA).
5. Replace setpoint jumper when functional check is complete.
6. Visually inspect the outdoor condenser coil with a flashlight. It should look clean and clear of debris. If there is excess dirt build up, turn off circuit breaker, remove shroud and clean it with soft brush or compressed air (be careful not to damage fins).
7. With a flashlight, visually inspect that the condensate drain is working and clear of debris. There should be no excess water build up in the pan below the inside evaporator coil. The evaporator coil should be offset far enough so water drips into the drain pan below, and does not bead up on the edge of the door.
8. To complete the check, replace the setpoint jumper and all guards. Turn the circuit breaker on.

2.0 DC Air Conditioner, continued

2.10 DC Air Conditioner Trouble Shooting

ATTENTION:

Contact Alpha Technical Service to determine proper diagnosis. [See page 3](#) for contact information.

1. Check that wire connections and input voltage are correct.
2. Check the evaporator and condenser thermostat wires are not reversed. These are on the inside of the evaporator box and look like telephone jacks. The evaporator sensor is attached to the suction line inside the evaporator box. The condenser sensor goes to the outside and attaches to the discharge line. Look on the front of the PCBA for silkscreen connector label "EVAP" and "COND". If these are reversed the condenser fans will not turn on, and the circuit breaker will trip.
3. When the breaker is turned on, both evaporator fans should run continuously.
4. Verify the compressor comes on 10 seconds after pulling the setpoint jumper.
5. Watch the sight glass for bubbles. Bubbles should go to clear liquid after about a minute. If there are no bubbles or liquid flow, or the moisture indicator shows wet and the bubbles don't clear, there is low or no charge. This is not field serviceable, and the unit should be replaced.
6. Check the discharge line to see if it is warming up. Both condenser fans should come on (first one, then the other) when discharge line is above 104°F (40°C).
7. If unit control board indicates a yellow LED minor alarm, check for plugged outdoor condenser or bad condenser fan.
8. If the unit control board indicates a red LED major alarm, the compressor may be over heated or overloaded, or there is a bad three-phase connection to the compressor. Check for a plugged outdoor condenser, or compressor overload.
9. Using a DC clamp-on ampere probe, check the input current to the air conditioner while the compressor is running. The 48VDC air conditioner should draw between 6A and 10.4A (10.4 FLA, Full Load Amps), for normal operation. The 24VDC air conditioner should draw between 12A and 20.8A (20.8 FLA).
10. Check the Delta-T across the evaporator coil. It should be between 9°F and 18°F (5°C and 10°C).
11. The unit is overloaded if the FLA is too high and evaporator Delta-T is 9°F (5°C).
 - Check heat dissipation load inside the cabinet.
 - Check blocked condenser or bad condenser fans.
12. Check the suction line entering the compressor. It should be getting cooler. If it is not getting colder, and the sight glass looks full or clear, there may be a refrigerant blockage at the TX valve screen (this is not field serviceable). Replace the unit and send it back for evaluation and repair. To protect the unit from damage during shipping, use proper packing to keep the unit in an upright vertical position.

2.0 DC Air Conditioner, continued

2.11 DC Air Conditioner Parts List

| Part Number | Description |
|-------------|---|
| 745-289-20 | 48VDC, 3000BTU replacement air conditioner assembly for Radium MiniBay |
| 745-355-20 | 48VDC, 150CFM outdoor condenser fan with sealed connectors (qty 2 per unit) |
| 500-074-10 | 48VDC, 126CFM Inside Evaporator fan (qty 2 per unit) |
| 704-713-20 | 48VDC, temperature control PCBA. |
| 745-356-20 | 48VDC, controller inside fan assembly (contains 2 evaporator fans, temperature control board, variable speed controller) |
| 745-289-40 | 24VDC, 3000BTU replacement air conditioner assembly for Radium MiniBay |
| 745-355-40 | 24VDC, 150CFM outdoor condenser fan with sealed connectors (qty 2 per unit) |
| 500-087-10 | 24VDC, 126CFM inside evaporator fan (qty 2 per unit) |
| 704-713-21 | 24VDC, temperature control PCBA. |
| 745-356-40 | 24VDC, controller inside fan assembly (contains 2 evaporator fans, temperature control board, variable speed controller) |

3.0 AC Air Conditioner

IceQube AC Air Conditioner Overview, Basic Theory of Refrigeration:

1. The compressor pump draws in and compresses cool, low-pressure gas into a high pressure gas. Compression raises the boiling point of the gas.
2. The hotter, high-pressure gas passes through a coil called a *condenser*. A fan blows air over the coil which cools the gas into a liquid.
3. This high-pressure liquid passes through an expansion valve, where the liquid expands to boil off as a gas. As the gas expands, it absorbs heat.
4. The cool low-pressure gas is sent through another set of coils called an *evaporator* or *heat exchanger*. Warm interior air is blown over the coil and back into the interior, several degrees cooler.
5. The low-pressure gas is then drawn into the compressor, where the cycle starts over. The air conditioning system is actually three systems, which function simultaneously to maintain environmentally friendly conditions for your equipment within the enclosure: The closed-loop cold air system, warm air system, and vapor-compression refrigeration system.

The closed-loop cold air system circulates cold air from the cooling system to the electronics enclosure. This air captures the heat and humidity within the enclosure and carries it through the heat exchanger, the part of the vapor-compression system that removes the heat/humidity.

The vapor-compression refrigeration system is run by an efficient rotary compressor which circulates NON-CFC refrigerant to transfer heat from the heat exchanger (evaporator) in the closed-loop air stream to a condenser located in the warm air system. Heat from the enclosure transfers from the warm air heat exchanger and dissipates to the ambient.

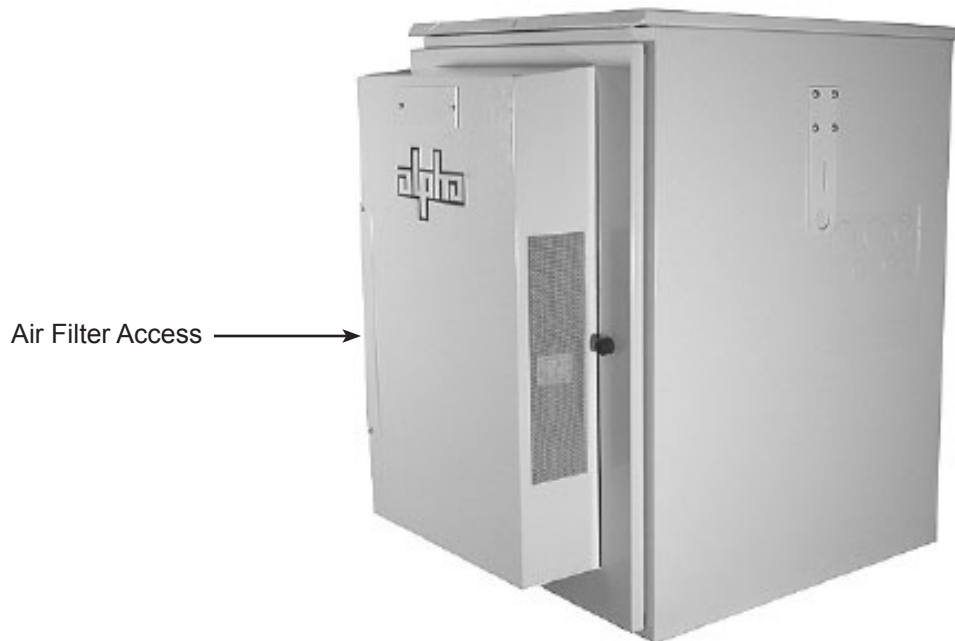


Fig. 3-1, AC Air Conditioner

3.0 AC Air Conditioner, continued

3.1 Verifying Default Settings for the IceQube Air Conditioner

Procedure:

1. Remove IceQube controller's access panel on the enclosure door shroud (2 screws).
2. Turn on the AC power.
3. Record the displayed temperature information.
4. Check the STATUS LEDs (On/Off/Blink):
 - COOL - On if temperature is above 70°F
 - HEAT - On if temperature is below 32°F
 - ALM - Contact Alpha
 - FILT - Turn off filter alarm (if on) and clean filter if needed
5. To enter programming mode, enter the default PIN code in sequence on the front panel display. The code must be entered with less than 2 seconds between keystrokes.
 - ADJUST up arrow (1)
 - ADJUST down arrow (2)
 - SELECT (3)
 - EXIT (4)
6. The programming LEDs flashes, and a pattern of boxes appears in the digital display to indicate program mode has been entered. If no selection is made within one minute, the system returns to normal operating mode.
7. To verify or adjust the AC default parameters use the ADJUST up and down arrows. Press SELECT to accept the current setting and cycle to the next.
8. Pressing the EXIT button saves setting changes and returns the unit to normal operating mode.

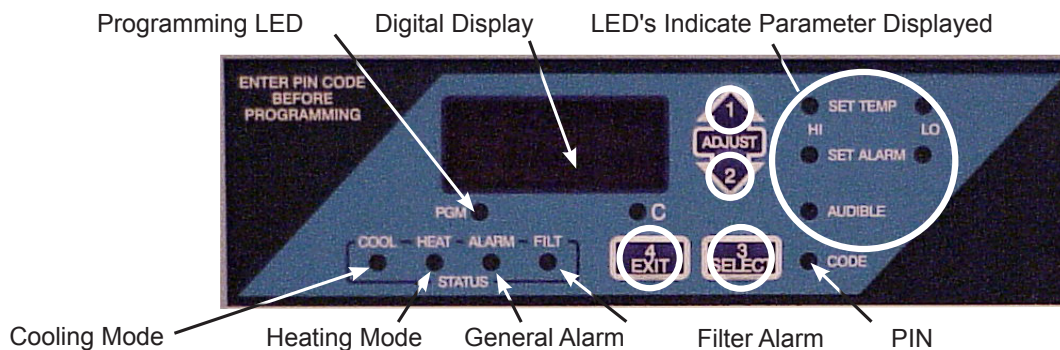


Fig. 3-2, AC Air Front Panel Display

| Default Settings | |
|---------------------|------------------------------------|
| Parameter | Default Setting |
| HI Temp set point: | 72°F |
| LO Temp set point: | Set to lowest limit (approx. 40°F) |
| HI Alarm set point: | 100°F |
| LO Alarm set point: | Set to lowest limit (approx. 33°F) |
| ALL: | ON |
| AUD: | OFF |
| -F-: | Do not change |
| PIN: | Do not change |
| FIL: | 0.0 Days |
| Add: | 0.0 |

3.0, AC Air Conditioner, continued

3.2 AC Air Conditioner Specifications

| Specifications | |
|-------------------------------|--|
| Capacity | 5000 BTUH (sensible) @ 43°C ambient |
| Maximum Operating Temperature | 125° F |
| Electrical | 8.7A @ 120VAC/60HZ maximum 4.3A @ 230VAC/60HZ maximum 4.8A @ 220VAC/50HZ maximum UL/CUL recognized per UL50-File#SA12062 CE Compliant |
| Microprocessor Controller | Displays temperature in Fahrenheit and Celsius Programmable heating and cooling set points Standard on/off differential 7° Fahrenheit Programmable high/low temperature alarms Condenser air filter maintenance indicator Security programming access code Integral EMI / RFI protection 24VAC input power Operating status indicators for cooling, heating and alarm conditions |
| Refrigeration System | Efficient, long lasting rotary compressor Coil construction: Aluminum fin with copper tube Solid core 4 stage filter drier Pressure balancing refrigerant flow control HCFC refrigerant 22, Chlorodifluoromethane |
| Evaporator Fan | Lustran ABS 633 housing and squirrel cage Life lubricated ball bearing system .05 HP shaded pole therm. protected motor Maximum 247 CFM free air @120VAC/60HZ |
| Condenser Fan | Lustran ABS 633 housing and squirrel cage Life lubricated ball bearing system .05 HP shaded pole thermal protected motor Maximum 247 CFM free air @120VAC/60HZ |

3.0 AC Air Conditioner, continued

3.3 AC Air Conditioner Condensate Hose Mounting

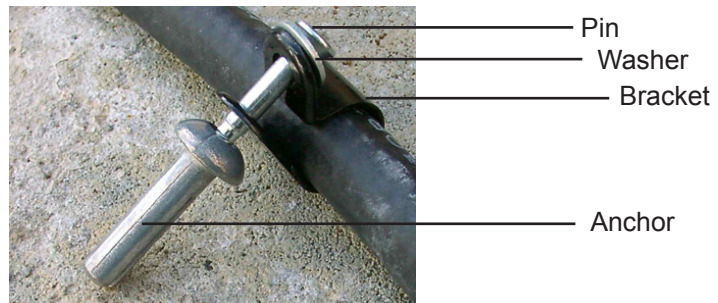
The MiniBay AC air conditioner comes with a condensate hose that must be secured to the mounting pad. The hose may be run out the front or back of the pad, and should extend three inches from the edge.

Tools Required:

- Rotary Hammer Drill with 1/4" bit
- Hammer

Procedure:

1. Locate the hose hardware kit (packaged with the battery cable kits).
2. Extend the hose out in the desired direction and position brackets.
3. Locate the anchor holes so the hose does not interfere with the door opening. Drill two holes for the anchors into the pad.
4. Place anchors in anchor holes.
5. Run the pins through the brackets and hammer into the anchors.
6. Trim the hose to approximately three inches over the edge of the pad.



NOTE:

The condensate hose should have a minimum two-inch bend radius and should not kink when the door is opened. Check the hose every six months for blockage or disconnection.

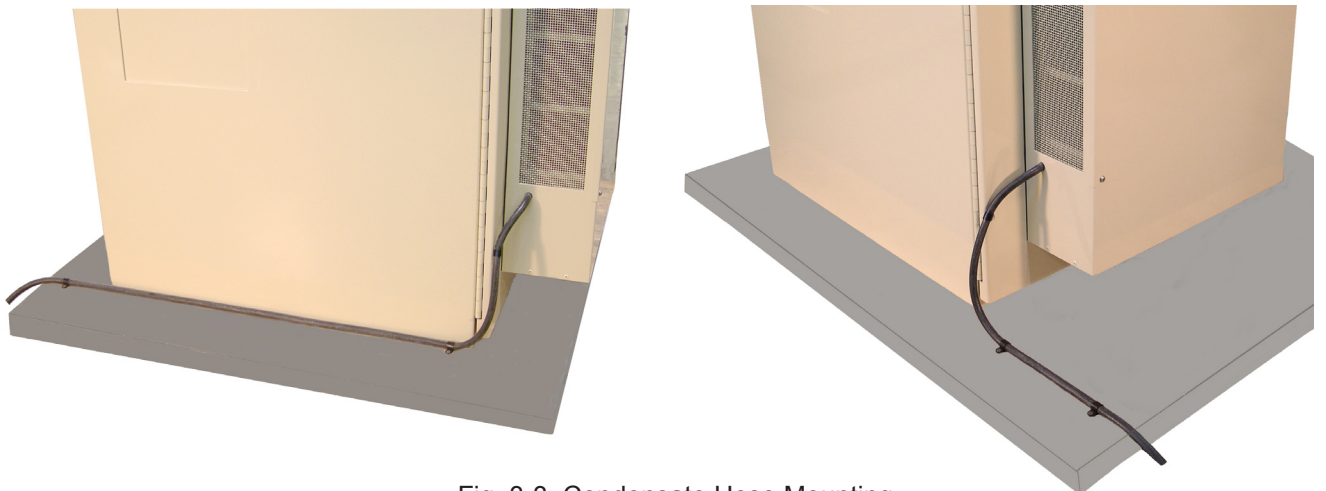


Fig. 3-3, Condensate Hose Mounting

3.0 AC Air Conditioner, continued

3.4 AC Air Conditioner Preventative Maintenance

Inspect the systems filters for replacement or cleaning every six months, depending on time of year or environment. Clean the filters by back flushing with water in the direction indicated and reinstall the filter. See [page 3](#) for contact information.



NOTE:

Some environments may require more frequent inspections to maintain optimum airflow.

3.5 AC Air Conditioner Troubleshooting

Contact Alpha Technologies Technical Support for troubleshooting procedures and warranty issues. See [page 3](#) for contact information.

3.6 Replacement or Spare 5000 AC Air Conditioner

Ice Cube 5000BTU AC Air Conditioner configured for Minibay:

KT,AIR COND,5K BTU/HR,230VAC,60HZ,RAD-MB, Alpha P/N 745-636-20

The IceQube Manual can be found on line at <http://www.iceqube.com/pdf/manual.pdf>

4.0 Site Preparation

4.1 Site Selection

Considerations:

- 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.
- Evaluate the soil conditions for suitability for the installation of the required grounding system applicable to your particular installation.
- Ensure cabling has been run and terminated at the site.
- Will the enclosure be placed on a precast concrete pad or on a pad poured on site?
- An enclosure with both front and rear doors is required for batteries with terminals located on top. Allow for at least 36" of front and rear clearance so the door(s) may be opened adequately for servicing.
- 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.

 **NOTE:**

Prior to paving the pad or placing cables and conduit, familiarize yourself with the location of the conduit seals. The pad should include a rectangular sweep opening filled with drain rock to allow cables and conduit to be maneuvered into position to enter the seals.



Fig. 4-1, Conduit Seal Location

4.0 Site Preparation, continued

4.2 Precast Pads

The type of enclosure mounting pad is determined by the size of the enclosure (single bay, single bay with side chamber, dual bay, dual bay with single side chamber, and dual bay with dual side chambers). Typically, Alpha Technologies recommends using precast polymer mounting pads. These pads are designed for proper cabinet support and ease of installation. Drilling areas for openings are indicated for coax and service sweeps, and pre-installed threaded inserts for enclosure attachment.

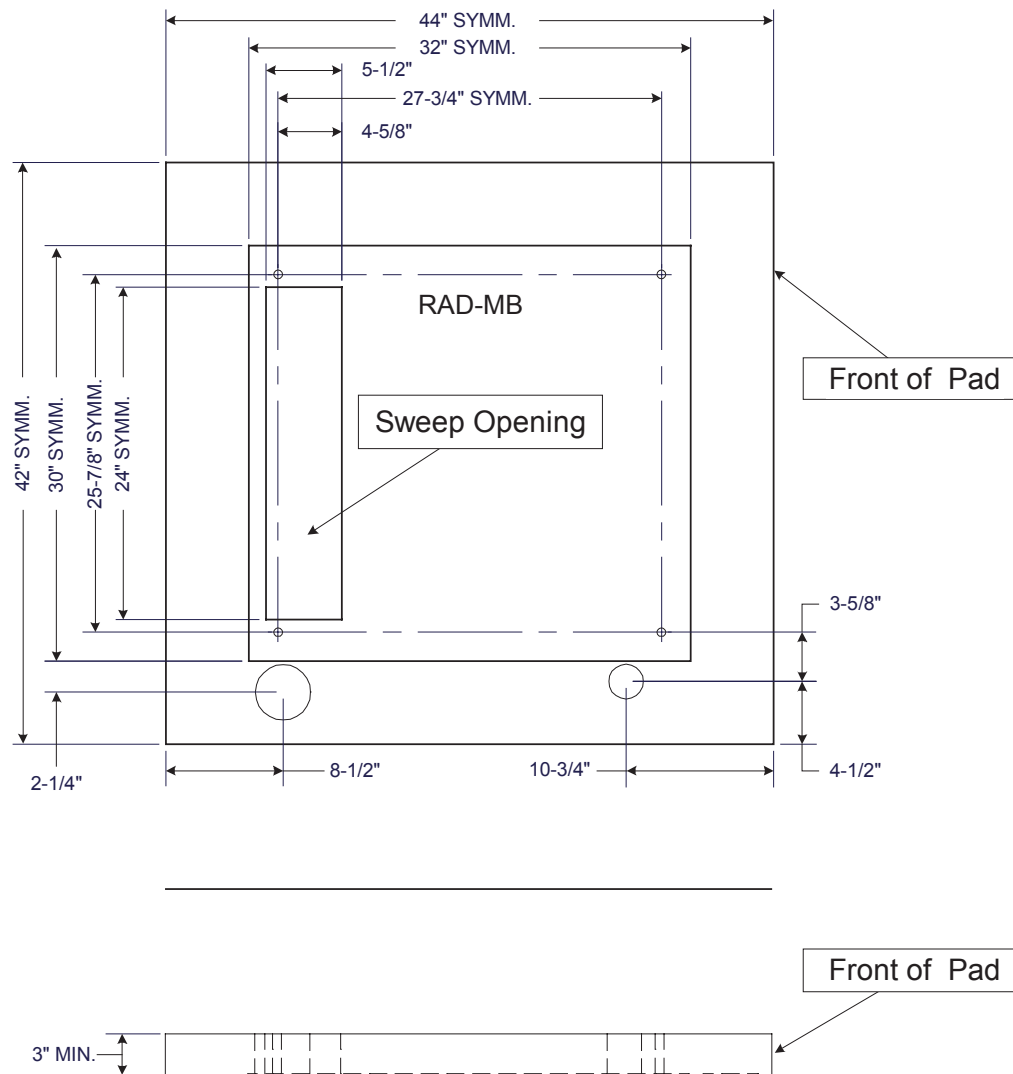


Fig. 4-2, Precast Pad Dimensions for Single Enclosure
(P/N 641-110-10)

4.0 Site Preparation, continued

4.2 Precast Pads , continued

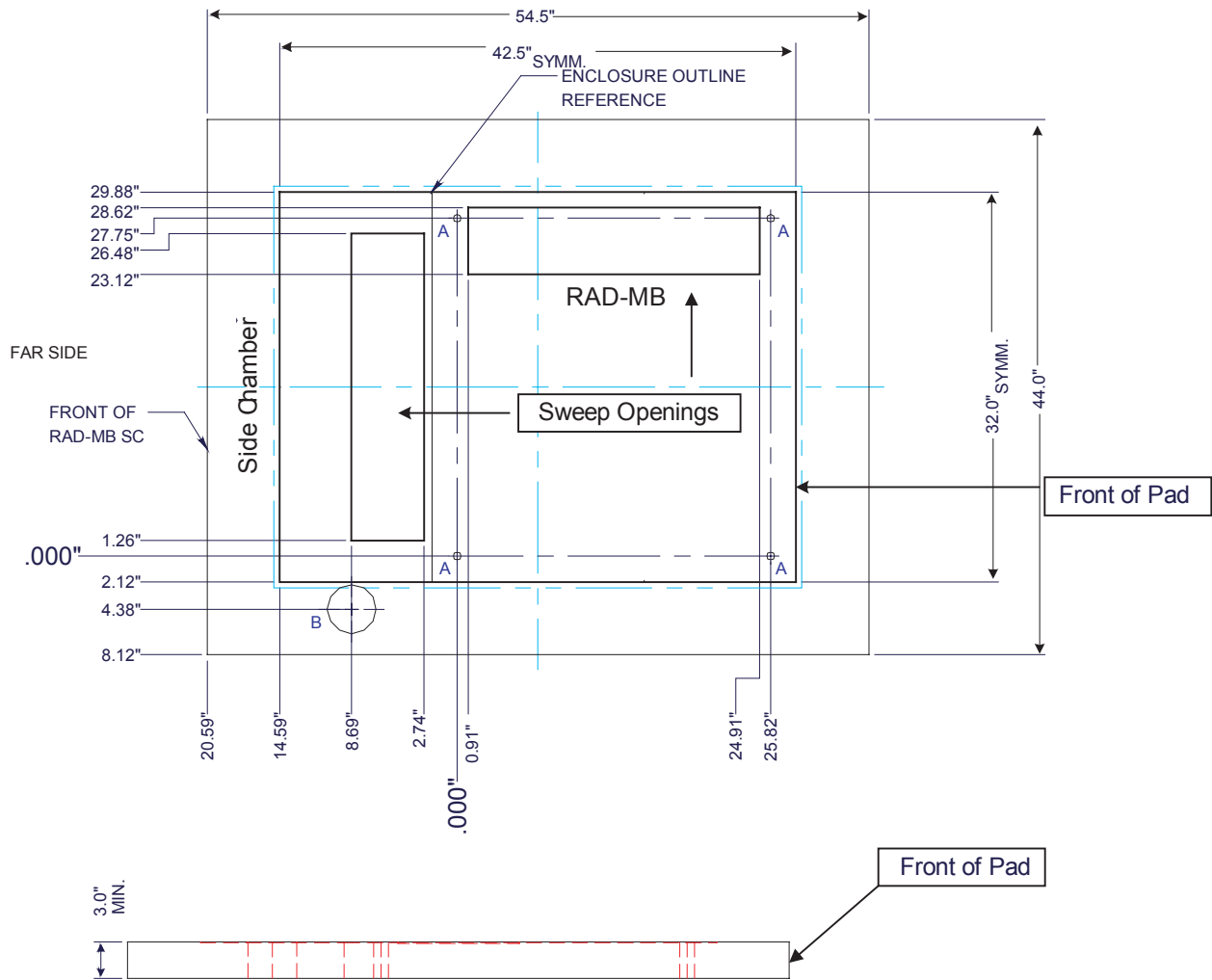



Fig. 4-3, Precast Pad Dimensions for Single Enclosure with Side Chamber (P/N 641-114-10)

4.0 Site Preparation, continued

4.3 Pour-in-place Concrete Pads

Pad Frame Templates

 **NOTE:** The illustrations below show the overall size of the pad frame template for a single MiniBay enclosure. The actual outer dimensions of the pad will be determined by the customer's requirements. When placing the pad, allow at least 36 inches of clearance for the front and rear doors to open fully.

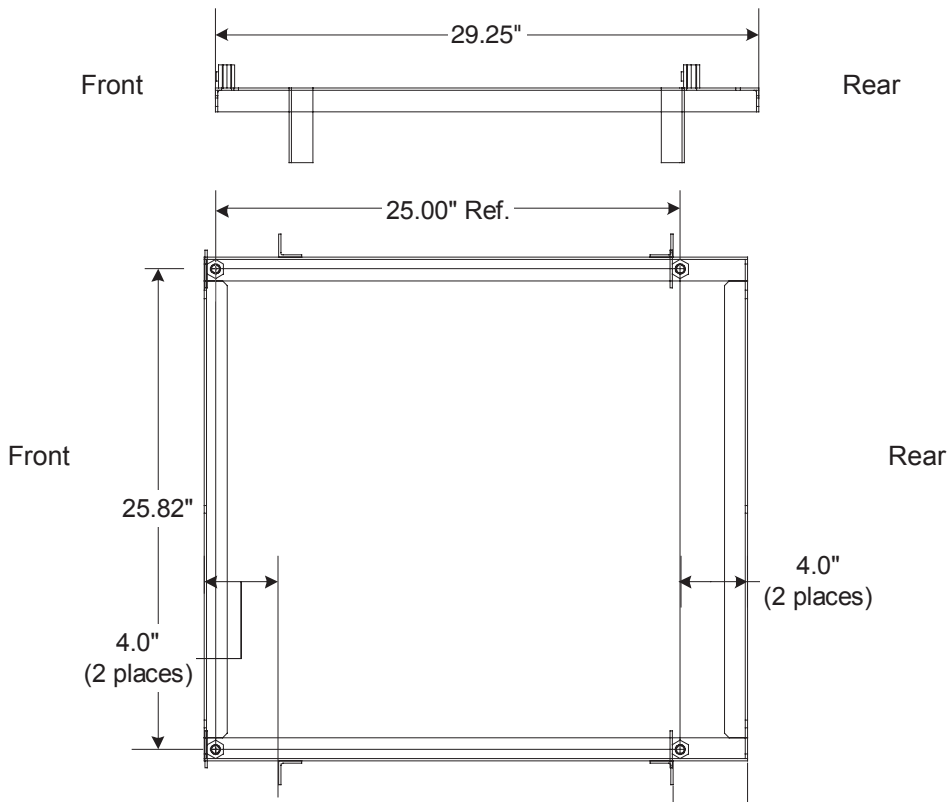


Fig. 4-4, Pad Frame Template for Single MiniBay Cabinet

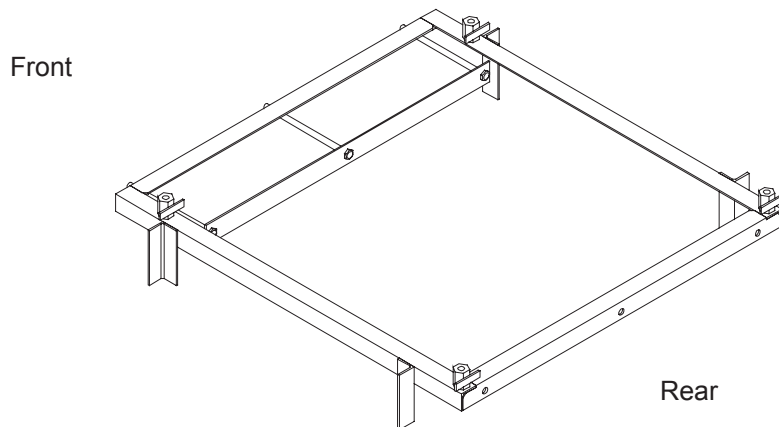


Fig. 4-5, Isometric View, Pad Frame Template, Single MiniBay (P/N 604-039-N1)

4.0 Site Preparation, continued

4.3 Pour-in-place Concrete Pads, continued

Pad Frame Templates

The illustration below shows the various components of the optional modular pour-in-place pad template for a dual-cabinet application. Use template to easily and accurately locate the open area for the AC service and TSC conduit as well as the threaded inserts to which the cabinet is attached.

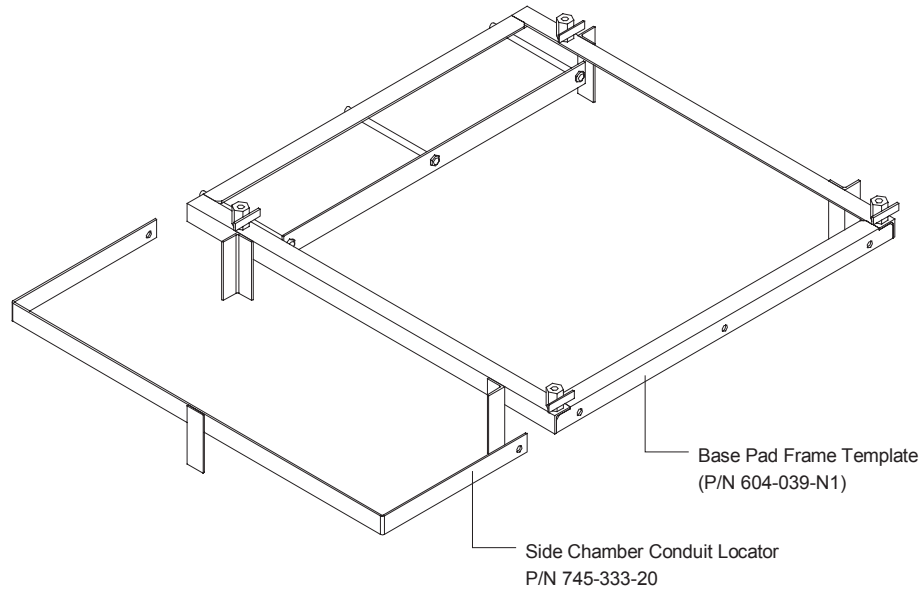


Fig. 4-6, Isometric View, Pad Frame Template, Single MiniBay with Side Chamber

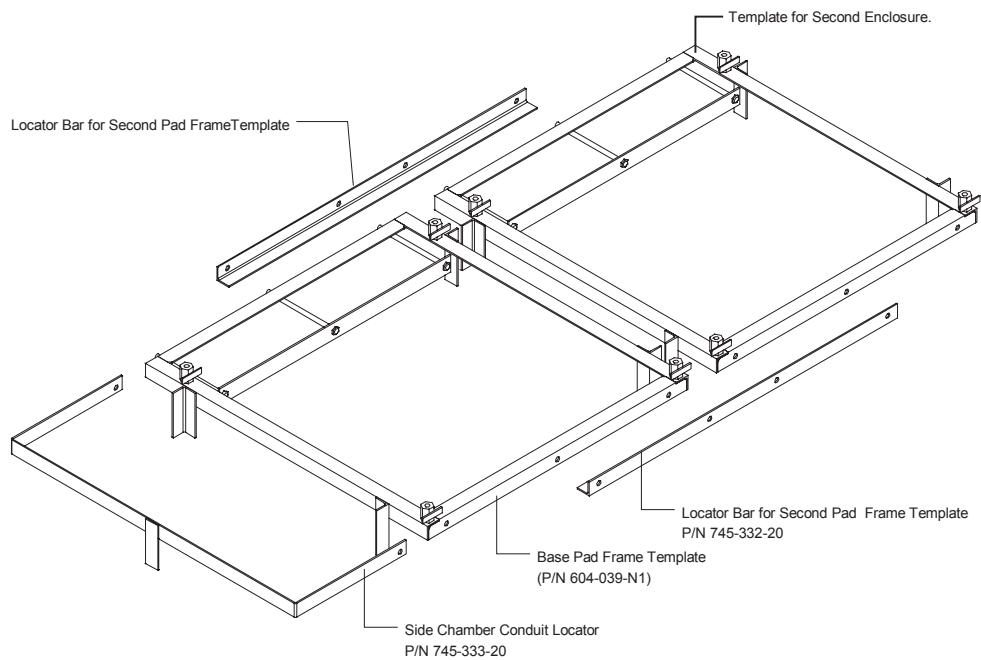


Fig. 4-7, Isometric View, Pad Frame Template, Dual MiniBay with Side Chamber

4.0 Site Preparation, continued

4.3 Pour-in-Place Concrete Pads, continued

Pad Frame Templates

Figure 4-7 (below) provides the necessary dimensions to layout and pour a concrete pad on site.

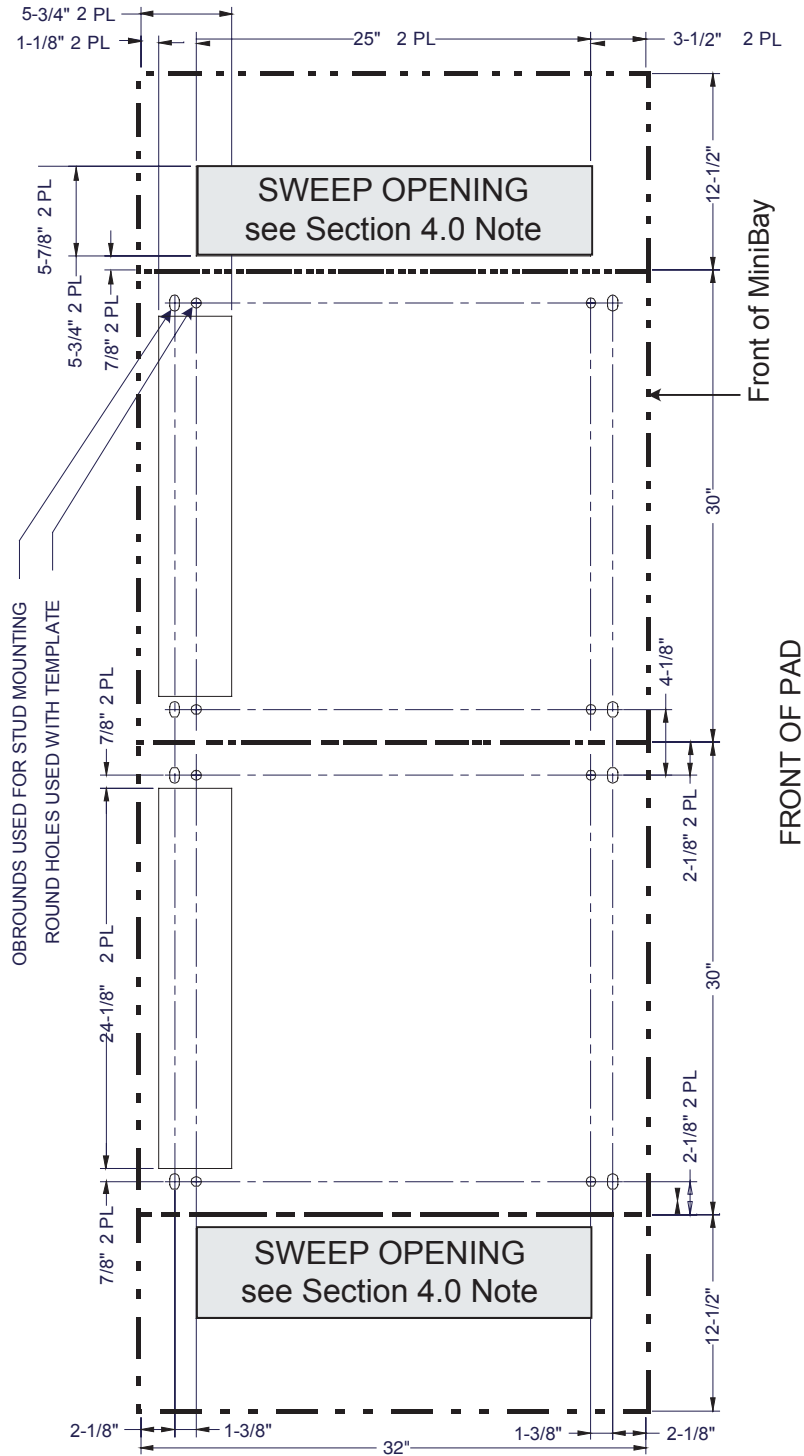


Fig. 4-8, Footprint of Dual Enclosure, Dual Side Chamber System (dimensions in inches)

4.0 Site Preparation, continued

4.4 Site Configuration

Figure 4-9 (below) shows the cable conduit route into the side chamber.

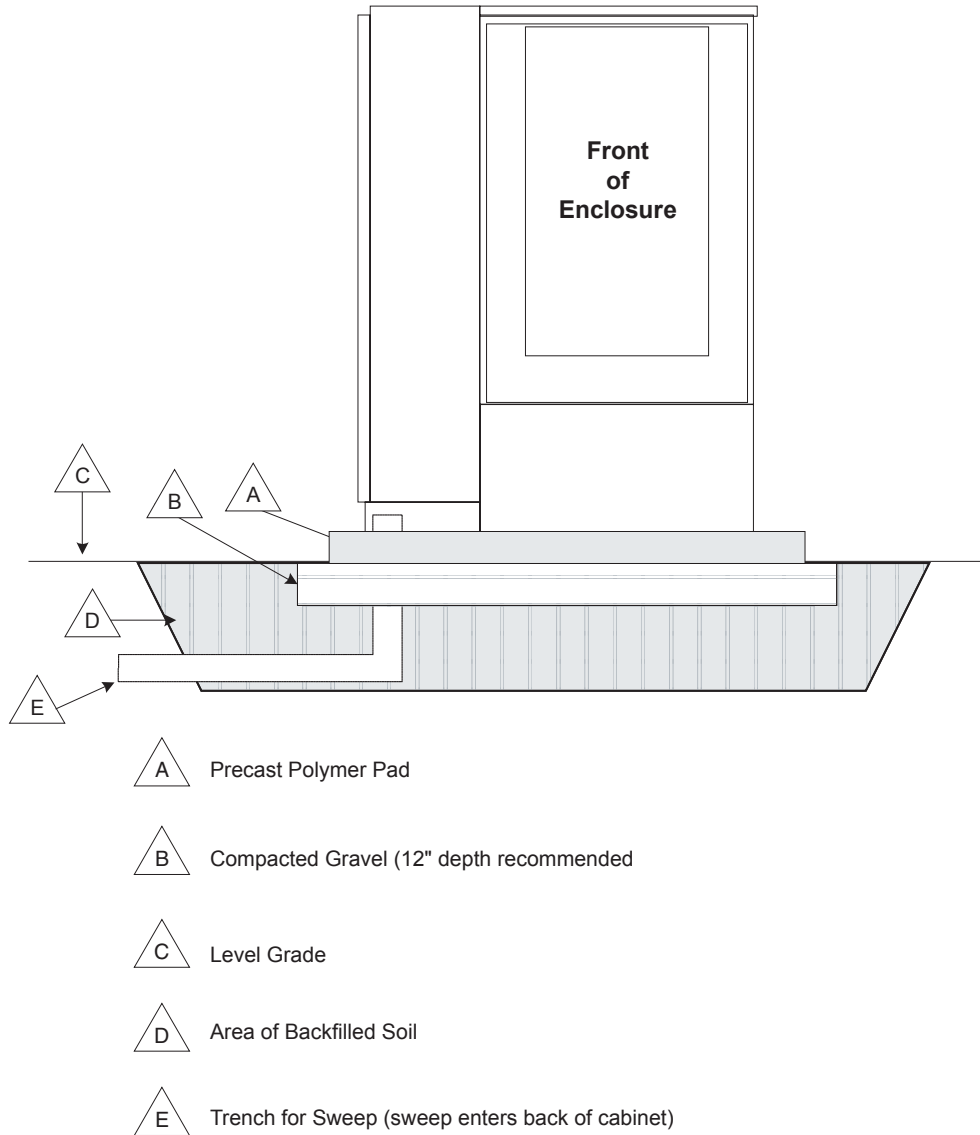


Fig. 4-9, Typical Site Arrangement, (cabinet with optional side chamber)

 **NOTE:**

Verify the conduit is trimmed 1" to 2" above the pad surface (for side chamber), or 1" to 4" for riser.

4.0 Site Preparation, continued

4.4 Site Configuration, continued

Figure 4-10 (below) shows the cable conduit route into the back of the enclosure.

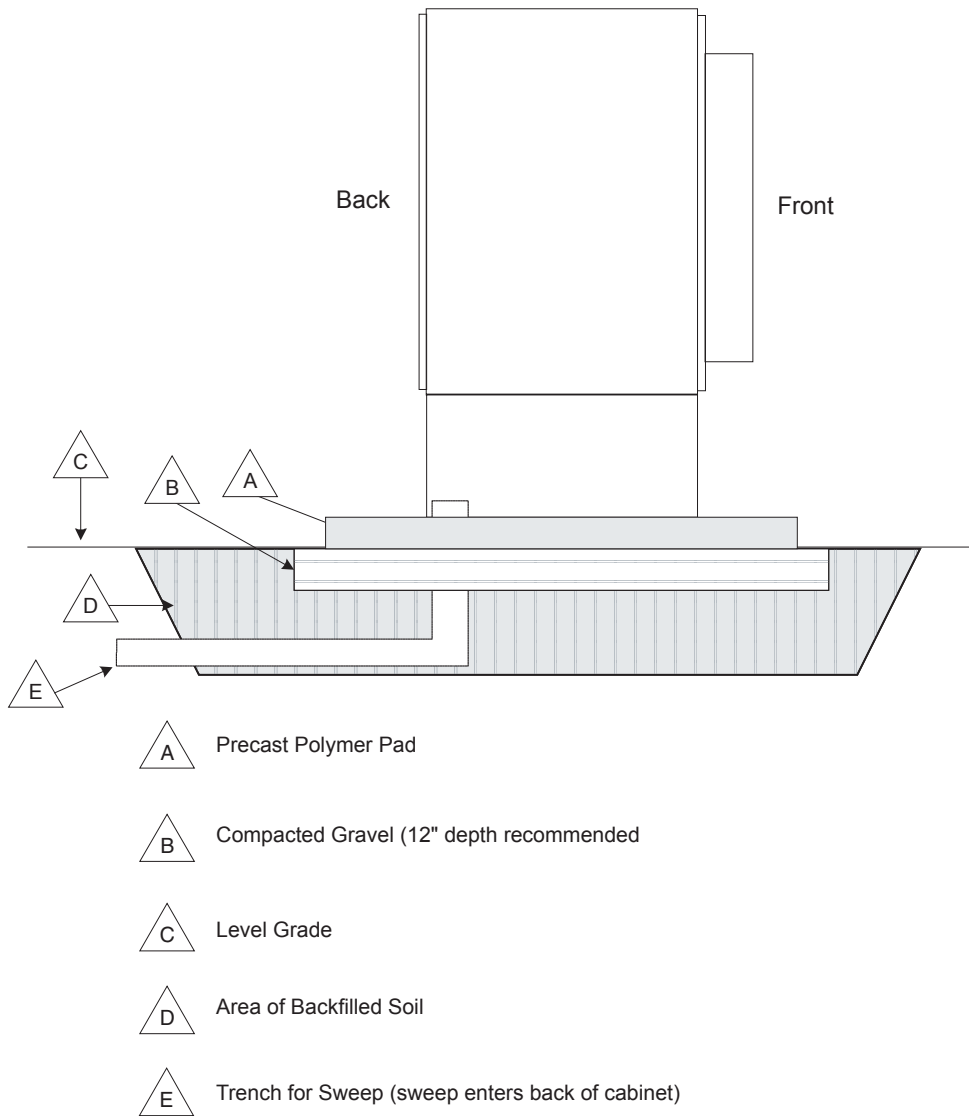



Fig. 4-10, Typical Site Arrangement, (stand-alone cabinet)

 **NOTE:** Verify the conduit is trimmed 1" to 2" above the pad surface (for side chamber), or 1" to 4" for riser.

4.0 Site Preparation, continued

4.5 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.



NOTE:

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

Lightning Protection (Optional)

- 1/2" x 8' copper ground rod, four places, driven about 2 feet (typical) from the corners of the pad.
- #2 bare copper wire loop terminated to each ground rod and buried a minimum of 30 inches below grade. Corrosion-proof connections (25+ year life-span) and hardware suitable for direct burial MUST be used.
- #2 bare copper wire from loop to the enclosure.
- When the electrical supply is a primary service (not a secondary or feeder service) a #2 bare copper wire must bond the lightning protection loop to the Grounding Electrode Conductor where they are closest.
- Service Grounding (required), #6 bare copper wire from Service Neutral/Ground Bar with 2 ground rods located 6' apart.

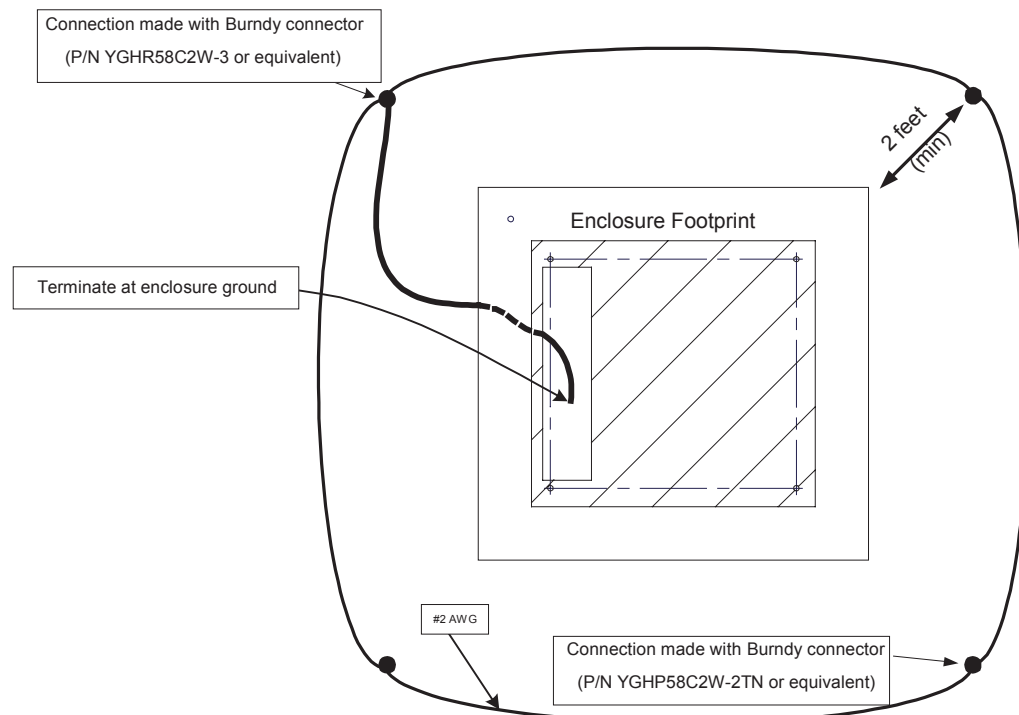


Fig. 4-11, Suggested Grounding

5.0 Installation

This section describes the procedures for installing the enclosure and preparing it for turn-up and test. The procedures are comprised of the following steps:

- Cabinet installation
- Battery installation and connection
- Utility power connection

Before installation verify the following:

- All necessary grounding rods and materials are in place.
- Utility power is onsite in accordance with 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, the installer(s) needs to have the following tools and materials on hand:

- Crane to lift enclosure from shipping pallet and place on pedestal
- Key to enclosure doors (P/N 964-022-10 — Pin Allen type)
- Digital RMS voltmeter
- Torque wrench with insulated handle and 7/16" socket
- 7/16" box-end wrench
- NO-OX or other suitable corrosion inhibiting agent
- Battery Cabling Kit
- Silicone sealant (GE RTV123)



CAUTION!

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

5.0 Installation, continued

5.1 Lifting

The enclosure is shipped from Alpha Technologies bolted to a wooden pallet. Follow the procedure below for lifting and positioning the unit.



NOTE:

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

Installation Procedure:

1. Unbolt the enclosure from the pallet. The bolts fastening the enclosure to the pallet are located in the feet of the rack/rail assembly. They can be reached through the front and rear doors of the enclosure or battery module (if applicable).
2. Remove the side chamber cable entry port seal plate (if equipped).
3. Position the 25-year vapor barrier material over the concrete pad, and make all necessary cutouts.



WARNING!

Do not allow personnel to walk beneath the suspended unit during the lifting operation. Use steel-toe work shoe protection. Use “hard hats” at all times during this procedure.



CAUTION!

Do not lift the enclosure with the batteries in place.

4. Attach the lifting chain to the lifting ears located in the top of the enclosure. Verify the adjustable chain links are tightened securely. Also verify the length of the cable between the lifting ears and the lifting hook ($2d$) is at least twice the distance (d) between the lifting ears, and that the lifting angle of the chain is greater than or equal to 60 degrees.

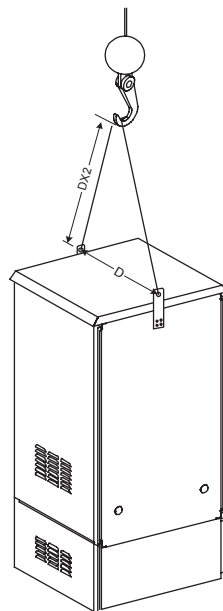


Fig. 5-1, Enclosure Lifting Arrangement
(without side chamber)

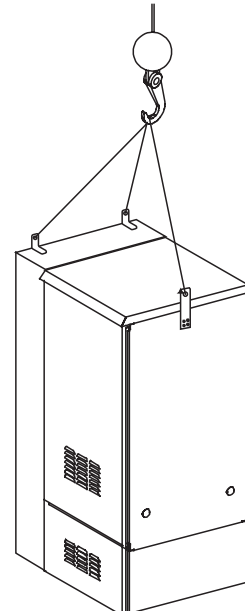


Fig. 5-2, Enclosure Lifting Arrangement
(with optional side chamber in place)

5.0 Installation, continued

5.1 Lifting, continued

 **NOTE:**

Verify the length of the cable between the lifting ears and the lifting hook is at least twice the distance between the lifting plates and that the lifting angle of the chain is greater than or equal to 60 degrees.

5. Lift the enclosure off of the truck using a winch capable of supporting approximately 500 lb. (227kg).
6. Verify all cabling passing through the enclosure is bundled and maintained within the cutout area.
7. Position the enclosure above the concrete pad and slowly lower it into position over the pad's 1/2" anchor or J-bolts. A 25+ year vapor barrier **MUST** be used between the concrete and enclosure base to inhibit moisture ingress and corrosion caused by metal-to-concrete contact. The vapor barrier material (such as 30 lb felt, neoprene pond liner, or heavy grade tar paper) should initially extend at least 6" in all directions around the perimeter of the enclosure. After the enclosure is in place, the material should be trimmed close to the enclosure, using the appropriate knife or cutting tool.
8. Secure the enclosure using stainless flat washers, lock washers and 1/2" nuts at each mounting bolt.

 **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. Do not caulk the enclosure bottom. Caulking can lead to condensation inside the enclosure.

9. Trim sealing cones to proper diameter for a tight fit around cables and reassemble seal plate assembly.
10. Use suitable cable clamps or ties to secure cables to "ladder bar" (see below).

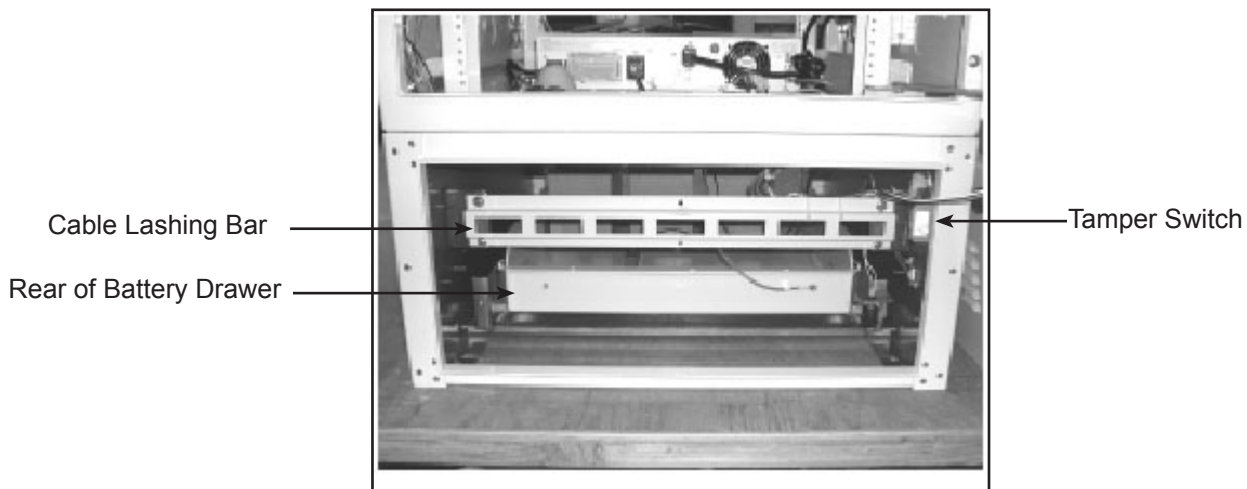


Fig. 5-3, Rear View of Enclosure (showing lashing bar)

5.0 Installation, continued

5.2 Special Instructions for Double-wide Installation

When installing two MiniBay enclosures side-by-side, the units should be lifted independently as shown in section 5.1. Position the first unit and remove the lifting ears. Apply gasket material supplied in gasket kit, Alpha P/N 745-361-20. The gasket material should be in place before positioning the second unit in order to maintain 3R rainproof integrity (see Fig. 5-4). When the gasket is in place, position the units together and secure together (8 places) using the supplied hardware.

Tools Required: 9/16" open-end wrench
9/16" socket and driver

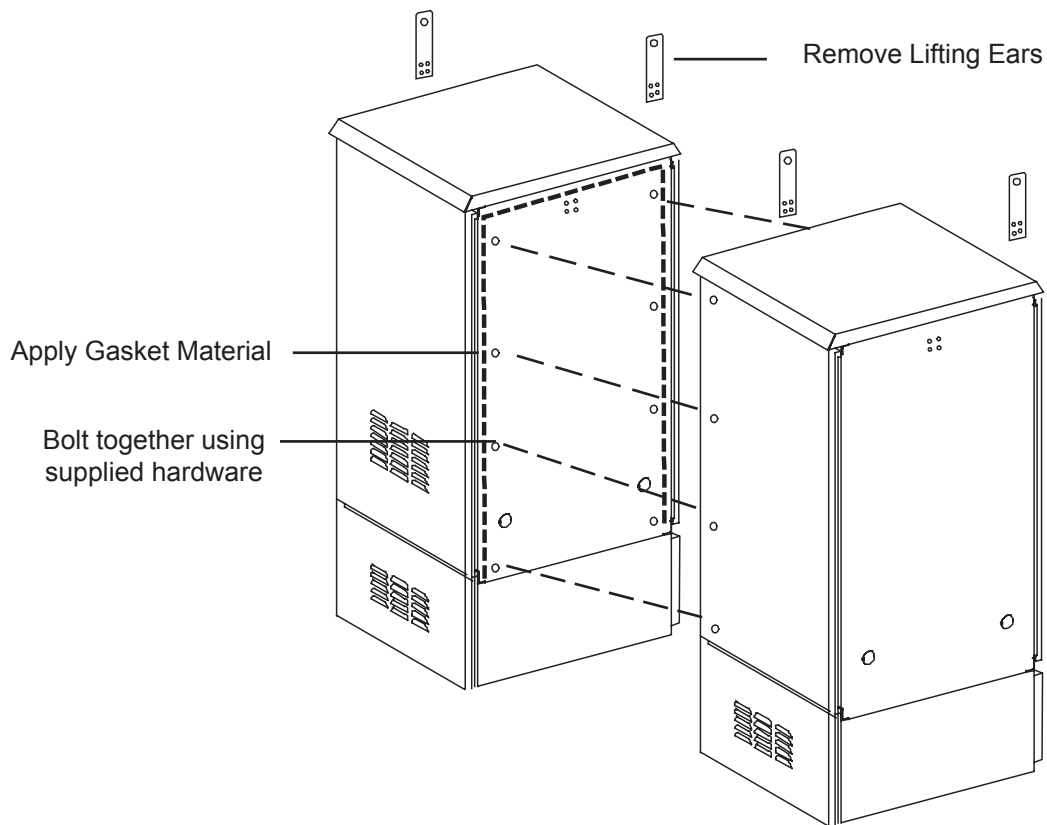


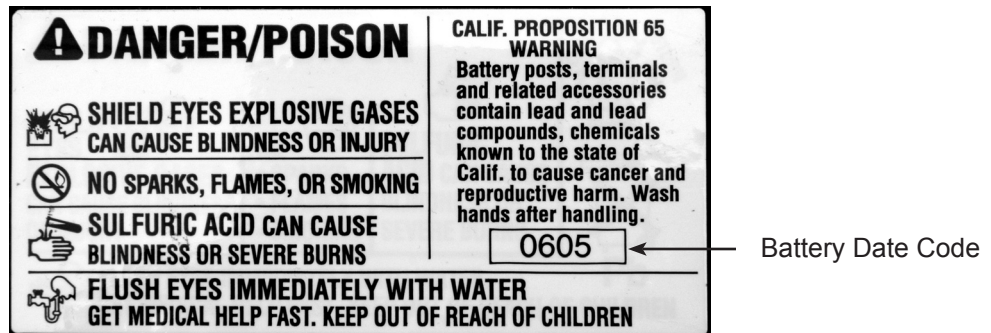
Fig. 5-4, Dual Enclosure Installation

5.0 Installation, continued

5.3 Battery Connection

Battery Identification

Each battery contains a DATE CODE usually located on a sticker near the center of the battery or stamped in white ink near the POS terminal. 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 manufacturers' documentation for date code type and placement.



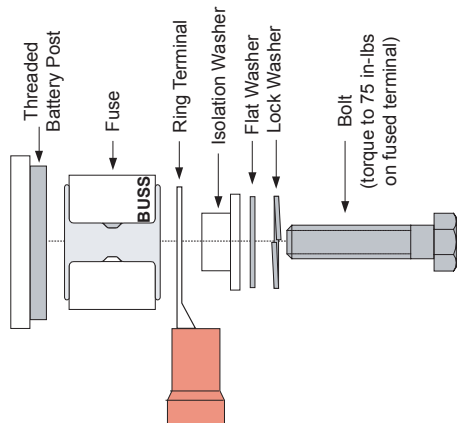
Connections for AlphaCell Batteries

Battery Terminal Connections:

Refer to the accompanying Battery Cable Kit (BCK) instructions for battery wiring arrangement and terminal assembly procedures. During maintenance procedures, refer to the manufacturers' specifications for the maintenance torque requirements.

Mounting hardware requirements may vary with battery manufacturers. Use only the hardware recommended by your particular battery manufacturer.

Battery Mounted Fuse Stackup For TEL 12-105, GNB M12V155, and SMU 12-155



Inline Fuse Stackup For AlphaCell-FT

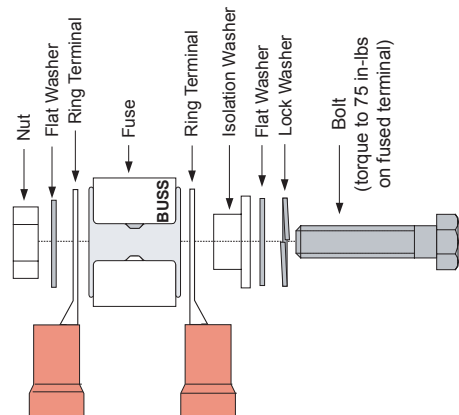


Fig. 5-5, Battery Terminal Connection

5.0 Installation, continued

5.4 Connecting to Utility Power

ATTENTION:

Verify electrical codes prior to installation. Codes may vary and contain specific conduit and wire sizes for connection to the load center. Connection to utility power must be approved by the local utility before installing the power supply.

Connection Procedure:

1. Locate the service entrance panel on the enclosure. Remove the cover to access the circuit breaker assembly. If this service panel is to be used as the primary service entrance, neutral must be bonded to ground by installing the green ground screw (provided) in the hole in the neutral bus.
2. Remove the knockout located in the service entrance to accept the conduit.
3. Install the conduit nipple into the service entrance via the knockout and secure it using the appropriate threaded conduit locknut.
4. Locate the two screw terminals (L1 and L2) on the service circuit breaker.
5. Connect one of the incoming Black #6AWG wires to L1 (left terminal). Connect the remaining Black (or Red) #6AWG wire to L2 (right terminal).

NOTE:

If the wire at L2 is black, place red tape (or label) on it.

NOTE:

The enclosure is equipped with a Square D, rainproof load center box (SUSE rated). The service entrance is equipped for a 120/240VAC, split phase, 3-wire with ground source.

6. Connect the #6AWG White wire to the neutral (N) bus lug located to the top right of the circuit breaker assembly.
7. Connect the #2AWG stranded copper ground wire (Earth Ground) to the ground and neutral bus located to the right side of the circuit breaker assembly.
8. Notify the electrical inspector to approve the service entrance wiring. Once approved, contact the local power utility for electrical service.

5.0 Installation, continued

5.4 Connecting to Utility Power, continued

Enclosure as Service Entrance

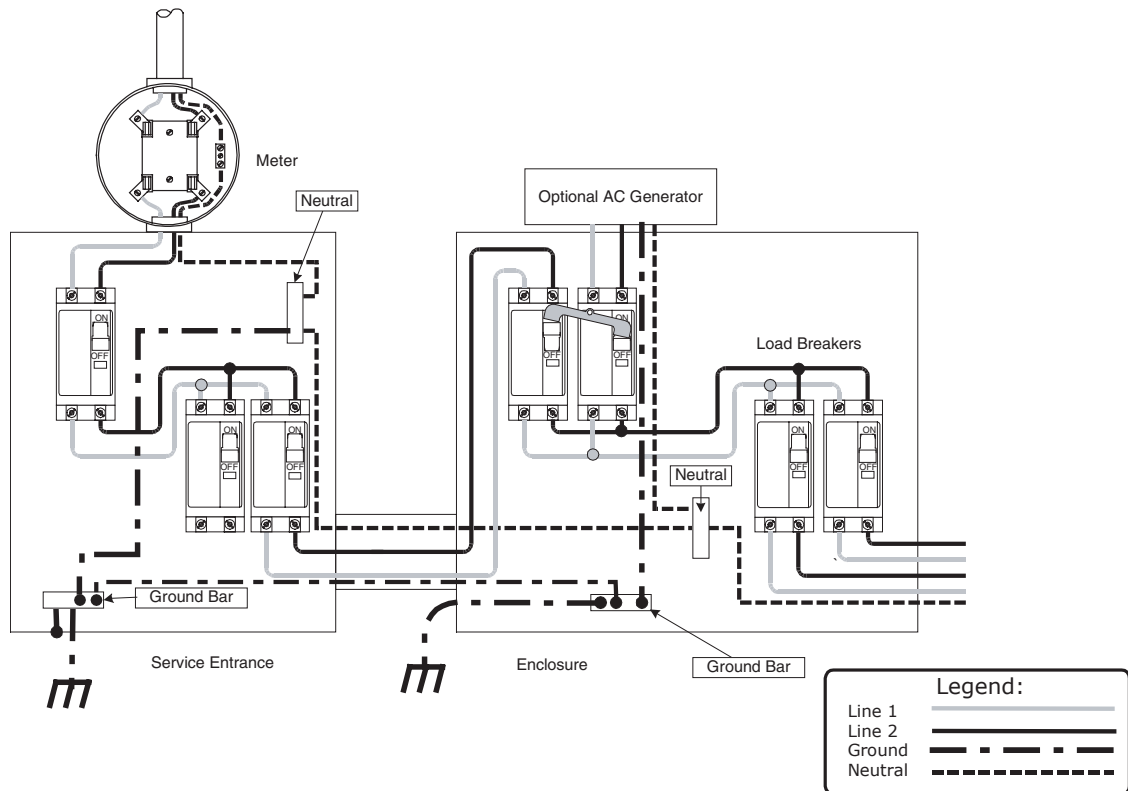
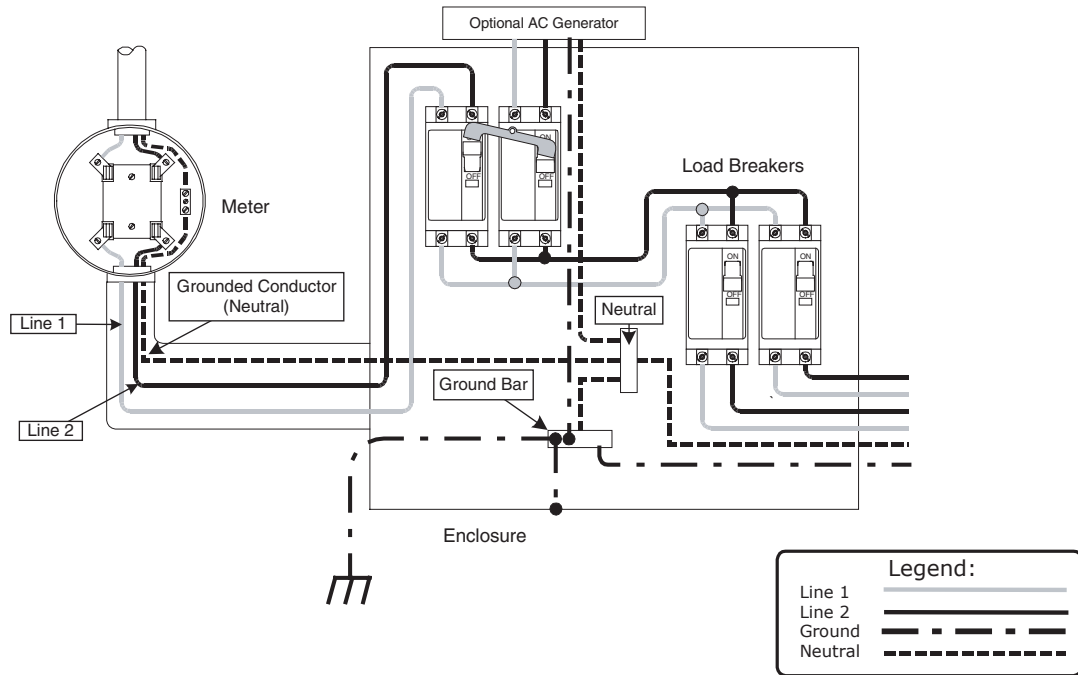


Fig. 5-6, Service Entrance Wiring

Appendix A

CSA Marks



CSA International (CSA) was established in 1919 as an independent testing laboratory in Canada. In 1994, OSHA granted CSA Nationally Recognized Testing Laboratory (NRTL) status in the United States of America. This was extended in 1999. When these marks appear with the indicator “C and US” or “NRTL/C” it means that the product is certified for both the U.S. and Canadian markets to the applicable U.S. and Canadian standards.(1)

Argus Rectifier and Power System products bearing the CSA NRTL/C Mark are certified to CSA C22.2 No. 950 and UL 1950.



As part of the reciprocal U.S./Canada agreement regarding testing laboratories, Standards Council granted Underwriters Laboratories (UL) authority to certify products manufactured in the U.S. for sale in Canada.

Only Underwriters Laboratories may grant a license for the use of this mark which indicates compliance with both Canadian and U.S. requirements. (2)



Go to: <http://www.osha.gov> for more information.

What are NRTLs and what do they do?

NRTL's are third party organizations recognized by OSHA, U.S. Department of Labor under the NRTL Program.

The testing and certifications are based on product safety standards developed by the U.S.-based standards developing organizations and often issued by ANSI.(3)

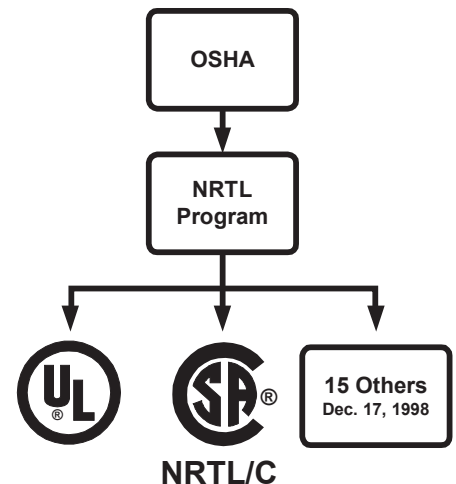
The NRTL determines that a product meets the requirements of an appropriate consensus based product safety standard either by successfully testing the product itself, or by verifying that a contract laboratory has done so. The NRTL certifies that the product meets the requirements of the product safety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

When was the NRTL started, and who governs it?

In 1983, in a suit brought on by an independent testing laboratory, OSHA was court ordered to remove specific references to UL (Underwriters Laboratories) and FRMC (Factory Mutual Research Corporation).

In 1988, OSHA revised its regulations to remove those references and the NRTL program was established.

The NRTL program is both national and international in scope with foreign labs permitted. As of Dec. 17, 1998, 17 recognized labs were permitted, with pending applications from 21 other labs.(5)



References:

Information presented has been developed from the official web sites of the respective organizations. Specific references are as follows:

- (1) www.csa-international.org/english/product_services/index_cert.htm
- (2) www.ul.com/mark/ulmark.htm
- (3) www.osha-slc.gov/dts/optca/nrtl/slide02.html
- (4) www.osha-slc.gov/dts/optca/nrtl/slide04.html
- (5) www.osha-slc.gov/dts/optca/nrtl/slide18.html

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