



La Marche Manufacturing Company
www.lamarchemfg.com

LME

Outdoor Modular Enclosure



Installation and Operation Manual

This manual is subject to change without notice. You may obtain the newest version of the manual at www.lamarchemfg.com

Important Safety Instructions

Before using this equipment read all manuals and other documents related to this battery enclosure and other equipment connected to this battery enclosure. **SAVE THESE INSTRUCTIONS** – This manual contains important safety and operating instructions for the LME enclosure. If a replacement copy of a manual is needed, it can be found at www.lamarchemfg.com. Failure to observe these safety precautions may result in personal injury or damage to equipment.

Electrical Safety



WARNING: Hazardous Voltages are present at the input of power systems. The output from chargers and from batteries may be low in voltage, but can have a very high current capacity that may cause severe or even fatal injury.

When working with any live battery or power system, follow these precautions:

- Never work alone on any live power system; someone should always be close enough to come to your aid.
- Remove personal metal items such as rings, bracelets, necklaces, and watches.
- Wear complete eye protection (with side shields) and clothing protection.
- Always wear gloves and use insulated hand tools.



WARNING: Lethal Voltages are present within the power system. Parts inside the enclosure may still be energized even when the enclosure has been disconnected from the AC input power. Check with a meter before proceeding. Do not touch any uninsulated parts. Failure to observe this and the safety warnings may lead to bodily injury and property damage. This enclosure is only to be installed or serviced by trained and qualified personnel.

- A licensed electrician should be used in the installation of any enclosure, battery, or charger.
- The equipment must be provided with a readily accessible disconnect device as part of site preparation.
- Always disconnect the enclosure from the supply, batteries, and loads before performing maintenance, replacing parts, or cleaning.
- Always assume that an electrical connection is live and check the connection relative to ground.
- The product has multiple power inputs. Before servicing, Disconnect all inputs to reduce the risk of energy hazards.
- Grounding and circuit continuity is vital for safe operation of the equipment. Never operate the equipment with grounding/bonding conductor disconnected.
- For continued protection against risk of fire, all fuses used in this product must be replaced only with fuses of the same type and rating.
- Be sure that neither liquids nor any wet material come in contact with any internal components.
- Do not operate this enclosure outside the input and output ratings listed on the enclosure nameplate.
- Do not use this enclosure for any purpose not described in the operation manual.
- Never touch non-insulated wiring or terminals carrying direct current or ringing current, and never leave this wiring exposed. Protect and tape non-insulated wiring and terminals to avoid risk of fire, electrical shock, and injury to personnel.
- To reduce the risk of an electrical shock, do not disassemble the product. Opening and removing covers and/or circuit boards may expose you to dangerous voltages or other risks. Incorrect reassembly can cause electrical shock when the unit is subsequently used.



WARNING: Condensation may cause a short circuit! Sudden changes in the weather may lead to the formation of condensation on components. Operating the unit when condensation moisture is present can destroy the unit. Units which show signs of condensation must be dried before installation.

Mechanical Safety

- This enclosure or parts of the enclosure may get very hot during normal operation, use care when working nearby.
- Do not expose inside equipment to rain or snow. Always install in a clean, dry location.



WARNING: Lightning Strikes! Lightning strikes are possible during stormy weather and could result in death or severe injury. Do not work on the installation or on the power supply lines or power equipment enclosure during stormy weather.

- Do not operate equipment if it has received a sharp blow, been dropped, or otherwise damaged in any way.
- Do not disassemble this enclosure. Incorrect re-assembly may result in a risk of electric shock or fire.
- Never push objects of any kind into the product through slots, as they may touch dangerous voltage points or short-out parts that could result in a fire or an electrical short.
- Never spill liquids of any kind on the product.
- Slots and openings in the product are provided for ventilation. To protect it from overheating, these openings must not be blocked or covered. The product should not be placed in a built-in installation unless proper ventilation is provided.

Battery Safety



WARNING: Follow all of the battery manufacturer's safety recommendations when working with or around battery systems. DO NOT smoke or introduce a spark or open flame in the vicinity of a battery. Some batteries generate explosive gases during normal battery operation.

- To reduce risk of arc, connect and disconnect the battery only when the unit is off.
- If it is necessary to remove battery connections, always remove the grounded terminal from the battery first.



WARNING: Electrocution Hazard. The power supply lines to the enclosure battery elements are energized. Short circuits can cause burns to the face and hands. Open the load disconnect switch in the distribution box to completely de-energize the network element.

- Never install battery wiring during a lightning storm.
- Never install battery connections in wet locations.
- Never touch non-insulated battery wiring or terminals.
- Remove personal metal items such as rings, bracelets, necklaces, and watches.
- Always wear rubber gloves, safety glasses, and a rubber lined vest/apron when working near a battery.
- Have plenty of fresh water and soap nearby in case the battery electrolyte contacts skin, clothing, or eyes.
- If the battery electrolyte contacts skin or clothing, wash immediately with soap and water.
- If the electrolyte enters the eye, immediately flood the eye with running cold water for at least ten (10) minutes and seek medical attention immediately.
- Do not drop or place any materials on a battery. A spark or short-circuit could cause an explosion.
- Use caution when installing or modifying battery cables.

Enclosure Location

- Allow at least 6 inches of free air on all vented surfaces for proper cooling.
- Allow sufficient clearance to open the front and back panels for servicing.
- Do not operate this enclosure in a closed-in area or restrict ventilation in any way.
- Allow enclosure doors to fully open.
- Refer to figure 7 for recommended mounting dimensions.
- Refer to figure 9 for recommended clearances for installation and maintenance.
- It is recommended to use heavy-duty, seismic rated (if applicable), expansion anchor bolts for securing the enclosure to a concrete pad. Refer to **Error! Reference source not found.** And **Error! Reference source not found.**
- The equipment is intended for installation in restricted access locations where access is controlled or where access can only be gained by service personnel with a key or tool. Access to this equipment is restricted to qualified service personnel only.

Check for Damages

Prior to unpacking the product, note any damage to the shipping container and take pictures. Unpack the product and inspect the exterior and interior of product for damage. If any damage is observed, take pictures and contact the carrier immediately to file a damage claim. Contact La Marche Mfg. for a Return Material Authorization number to have the charger sent back for evaluation and repair.



CAUTION: Failure to properly file a claim for shipping damages, or provide a copy of the claim to La Marche, may void warranty service for any physical damages reported for repair.

Returns for Service

Save the original shipping container. If the product needs to be returned for service, it should be packaged in its original shipping container. If the original container is damaged/unavailable, make sure the product is packed with at least three inches of shock-absorbing material to prevent shipping damage. *La Marche Mfg. is not responsible for damage caused by improper packaging of returned products.*

Inspection Checklist

- Enclosure exterior and interior is not marred or dented.
- There are no visibly damaged components.
- All internal components are secure.
- Printed circuit boards are firmly seated.
- All hardware and connections are tight.
- All wire terminations are secure.
- All items on packing list have been included.

Handling

Equipment can be very heavy with uneven distribution of weight. Use adequate manpower or equipment for handling. Until the equipment is securely mounted, care must be used to prevent equipment from being accidentally tipped over or dropped.

Ordering Replacement Parts

Contact La Marche Mfg. to place an order for spare or replacement parts. To order replacement parts; please provide the model and serial number of the product, the part needed and the quantity required.

Packaging Collection and Recycling

Packaging collection recovery requirements: Countries, states, localities, or other jurisdictions may require that systems be established for the return and/or collection of packaging waste from the consumer, other final user, or from the waste stream. Additionally, reuse, recovery and/or recycling targets for the return and/or collection of the packaging waste may be established.

Recycling and Disposal

This product contains materials such as heavy metals that require appropriate handling in recycling and/or disposal.

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Model Scope/General Description

La Marche multiple entry NEMA 3R enclosure allows for easy access for installation. This environmentally controlled battery enclosure can accommodate a wide range of battery sizes prolonging battery life. Modular Enclosure design allows for future expansion.

This NEMA 3R Battery Enclosure is designed to maintain safe levels of released hydrogen through two methods of ventilation. One method is a thermostatically controlled ventilation fan that's also controlled either by a timer or a hydrogen sensor. The other method is a passive ventilation feature that's inherited in the design of the enclosure.

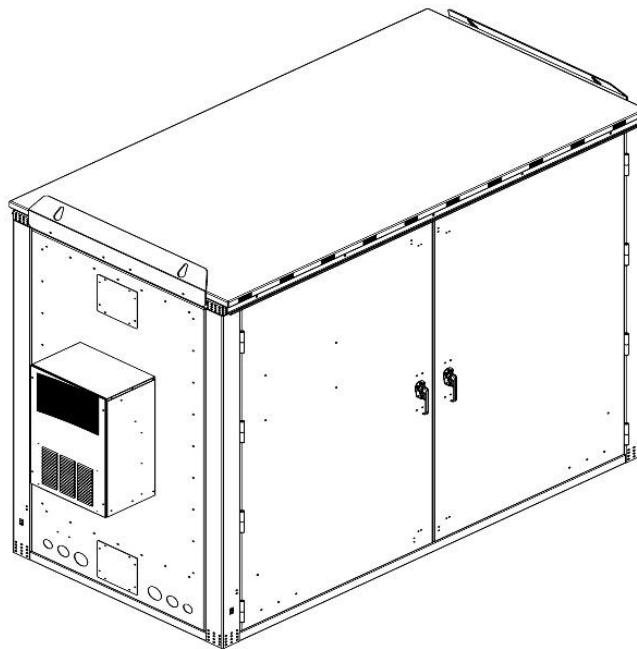


Figure 1 - General overview of the one-bay LME Enclosure.

Optional Accessories Included in the Enclosure

This enclosure may have been outfitted with a number of optional accessories or option packages. To determine the options included (if any) refer to the cover page of the manual package. If the manual package that is included with the enclosure is no longer available, contact La Marche and provide the model or serial number of the enclosure to receive a list of the included accessories.

Certifications and Compliance

This enclosure has been designed to meet NEMA 3R standard, which ensures protection against rain, sleet, snow and splashing water. The LME is not UL listed, but constructed under category 508A standards.

Features of the Enclosure

This enclosure displays the following features:

- NEMA 3R - Protects Against Rain, Sleet, Snow and Splashing Water
- Powder Coated Aluminum Steel Enclosure
- Solar Shield Roof
- Indoor / Outdoor
- Insulated Roof, Panels and Doors with R12 Insulation Material
- Multi-Point Latching System for each Door
- 20 Amps, 120 VAC GFCI Power Outlet
- Lifting Brackets
- Exhaust Fan with Programmable Timer
- Air Flow Sensor (with alarm contacts)
- Grounding Terminal
- Removable Doors
- Eye Wash Station
- Internal Lighting
- Complies with Zone 4 Seismic Requirements

Optional features include:

- 2,000 or 4,000 BTU/Hr. HVAC for Extreme Temperatures
- Stainless Steel Enclosure
- Hydrogen Sensor
- Battery Racks
- Battery Spill Containment
- Battery Charger
- Breaker Panel
- Heat Exchanger*
- Heater Panel*

** Can be replaced for HVAC system.*

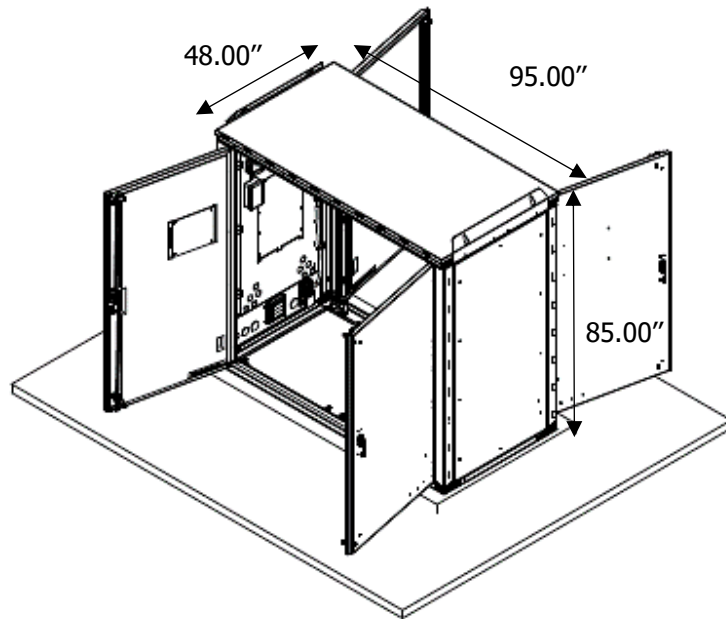


Figure 2 - Drawing of the general appearance of the one-bay enclosure.

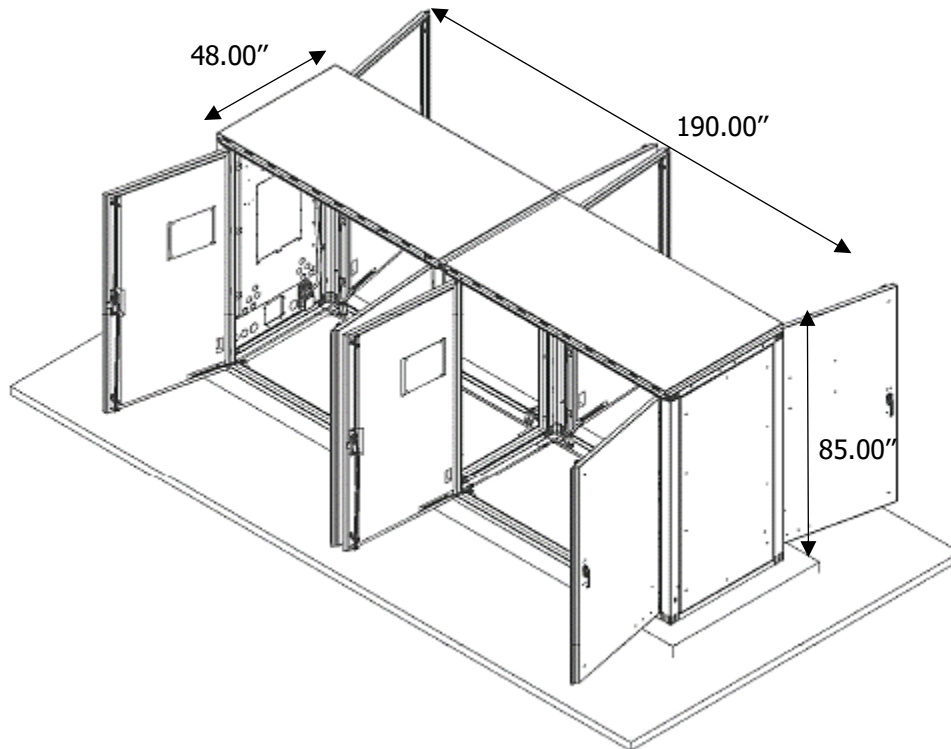


Figure 3 - Drawing of the general appearance of the two-bay enclosure.

1 Equipment Handling

1.1 Moving the LME

After careful inspection and upon verification that the LME is undamaged, identify the enclosure style and weight of the LME enclosure. Refer to the table below for dimensions and weight. Also included is the dimensions and weight of the LME on the pallet as a reference; see Figure below.

Table 1 - General specifications of the enclosure by model.

Model	Dimensions (H x W x D)	Weight	Number of Doors
LME-N3R-9548	85.00" x 95.00" x 48.00"	1,400 lbs.	4
LME-N3R-19048	85.00" x 190.00" x 48.00"	2,800 lbs.	8

NOTE: Above-mentioned dimensions are specified for an empty enclosure, with all standard options. These dimensions DO NOT include any Air Conditioner units. Above-mentioned weights include a one 2,000 BTU Air Conditioner unit and are specified for an empty enclosure, with all standard options.

LME enclosure on Pallet (One-Bay)

- Shipping Dimensions - 60.00" W x 120.00" L x 94.50" H
- Shipping Weight - Single/Dual HVAC – 1,400 lbs. / 1,525 lbs.

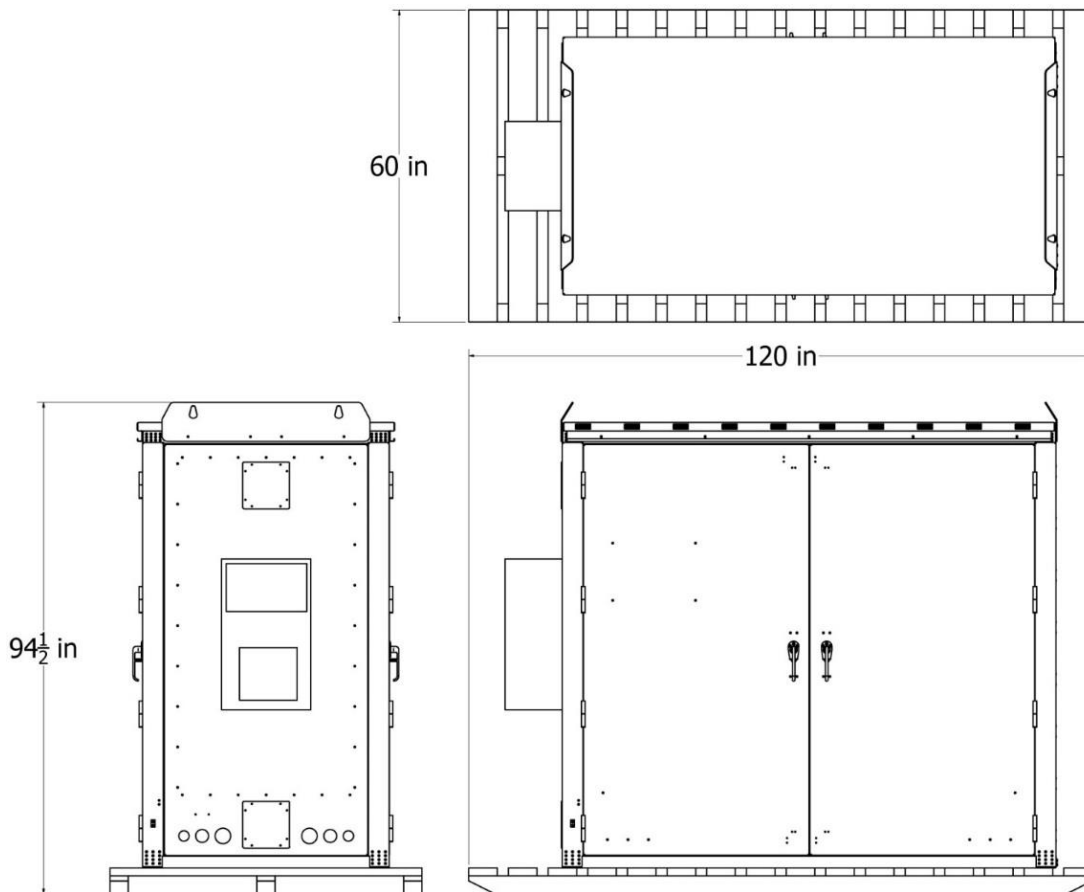


Figure 4 - LME Enclosure on the shipping pallet.

NOTE: These are SHIPPING WEIGHTS and DIMENSIONS including the pallet and packing materials, not site location and planning dimensions.

1.2 Craning the LME

The option to use a crane to move and install the LME is included. Removable lifting brackets are installed. Strapping channel areas and recommendations for the LME Enclosure Spreader bars will help stabilize the cabinet when lifting. Use Figures 5 and 6 for craning and lifting brackets location.

WARNING: Tip risk! This unit has a high center of gravity. Unsecured enclosure can tip over if not secured properly, causing injury to personnel. Do not detach cabinet from provided shipping pallet prior to hoisting. Lift the cabinet with a suitable lifting device. The enclosure is front side heavy and has the potential to tip over if removed from the pallet prior to lifting.

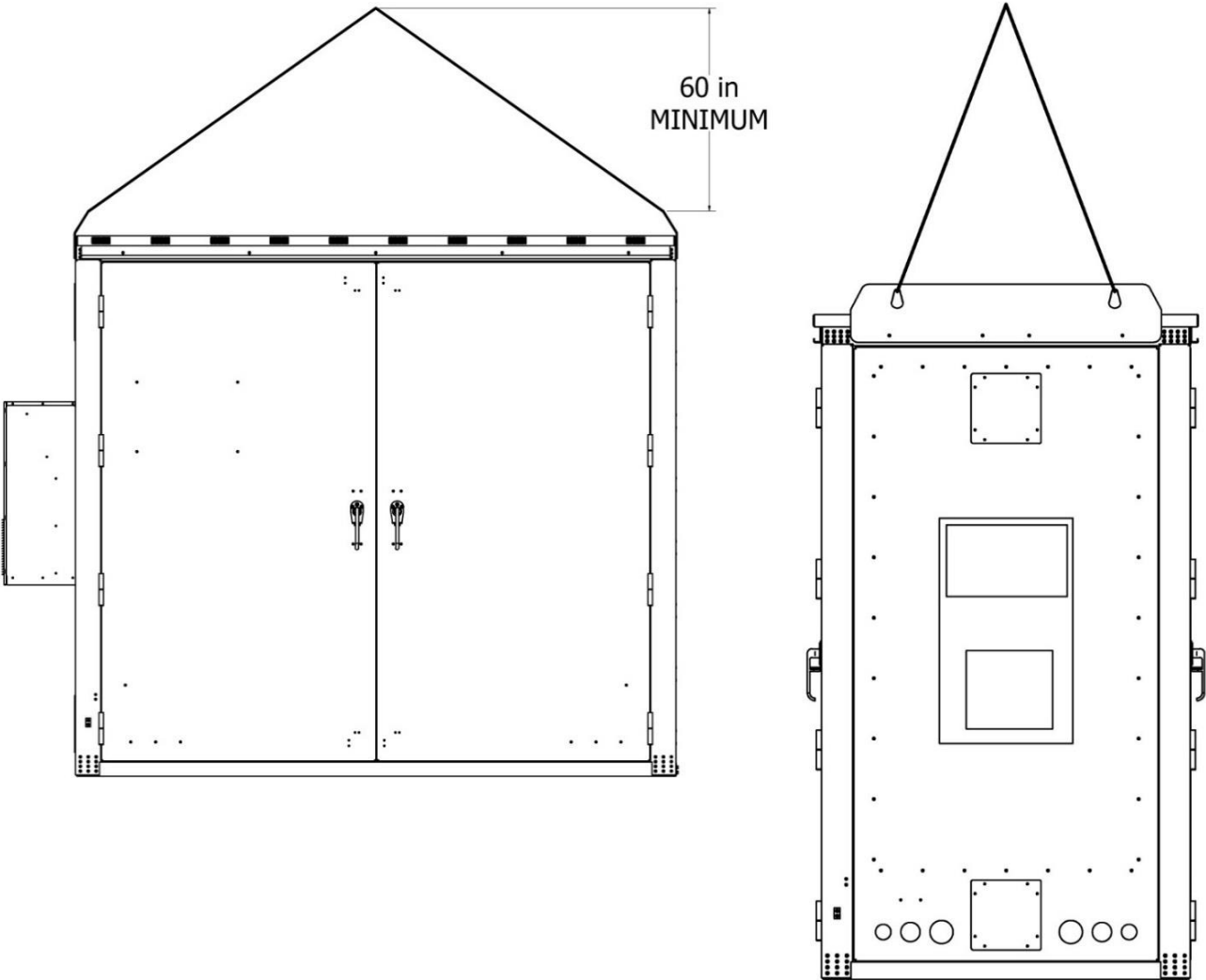


Figure 5 - Moving and Craning the Enclosure.

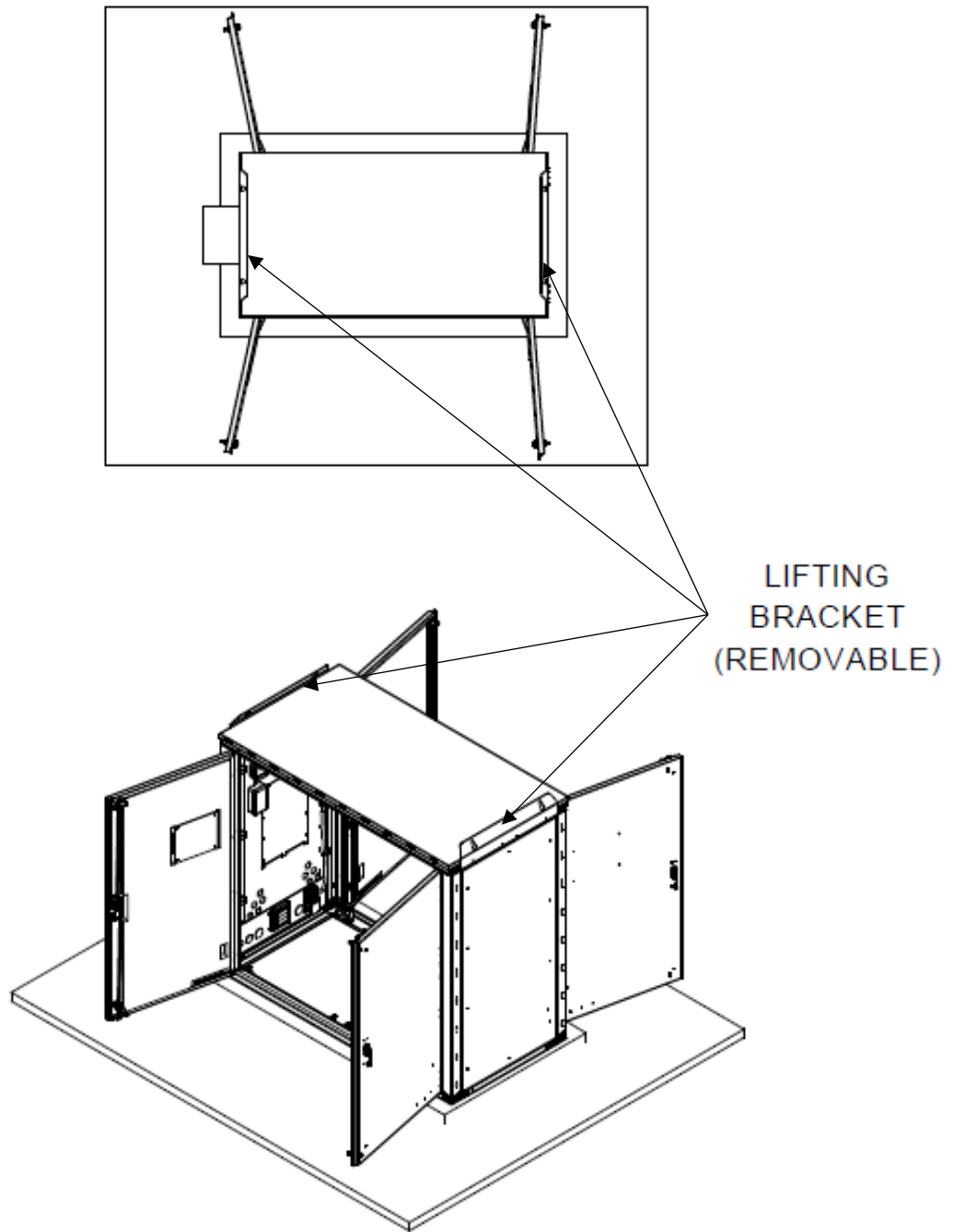


Figure 6 - Location of the removable mounting brackets.

NOTE: Make sure the lifting means used are rated for the weight and size of the enclosure.

2 Installation

This section contains information on the environmental requirements, the site requirements, cabinet clearances and anchor footprint and the location of the anchor holes.

The installation procedures are different for each version of the LME enclosure, and it is important that the order for the correct model be followed. Before installing the enclosure, ensure you are following the procedures for the correct version.

2.1 Installing the LME

When installing the LME enclosure, consider the size and weight of the enclosure. Refer to Table 1 - General specifications of the enclosure by model, to verify the weight of the enclosure. The location chosen for the enclosure should be within an ambient temperature range of -40°F to 122°F (-20°C to 50°C) with a non-condensing relative humidity no higher than 95%. The following sections will go into further details on the requirements needing to be met before installing the LME.

2.1.1 Basic Site Preparation Requirements and Cabinet Footprints

Environmental Requirements

- Operating temperature -40°F to $+131^{\circ}\text{F}$ (standard, limited time)
- Extended operating temperature -40°F to $+122^{\circ}\text{F}$ (extended)
- Relative humidity 5 to 100% (non-condensing but not to exceed 0.024 kg water/kg of dry air)

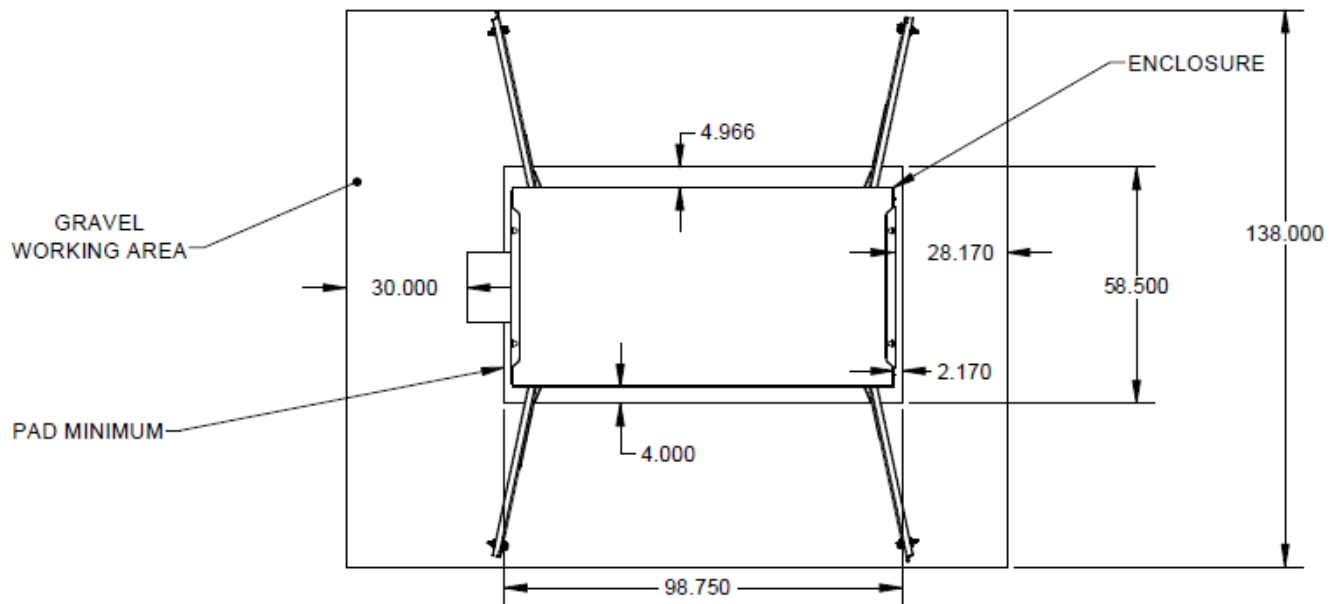


Figure 7 - Recommended clearances and minimum foundation footprint for one-bay enclosures.

Site Requirements

The following general requirements must be met before the installation of the LME enclosure can begin:

- Adequate clearance must be provided for front service access, including door opening swing, if applicable. After installation the enclosure does not need to be accessed from the sides or rear.
- AC electric service must be installed as described in section 4.0 Wiring.
- Grounding system must be installed as described in section 2.2 Grounding.
- Minimum 3/4 -inch conduit for grounding
- Cabinet anchor holes must be drilled.

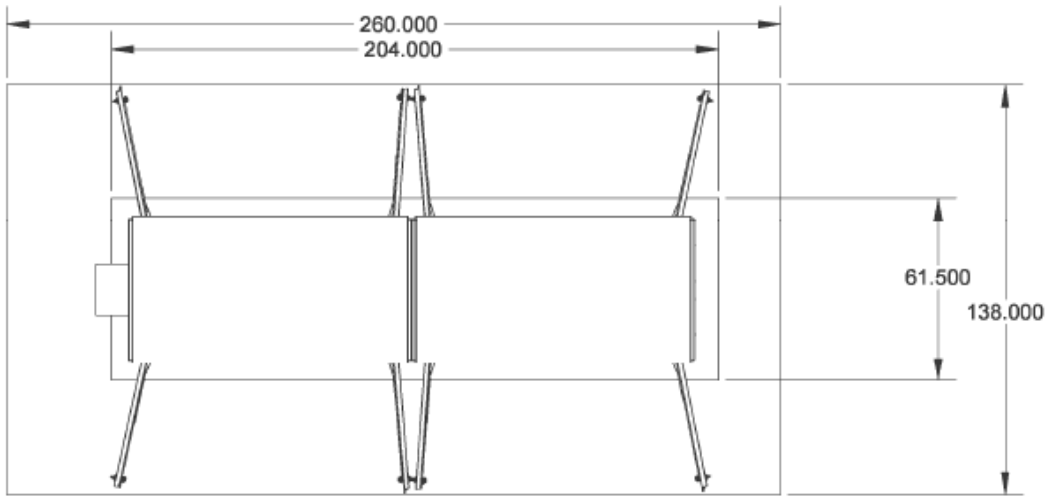


Figure 8 - Recommended clearances and minimum foundation footprint for two-bay enclosures.

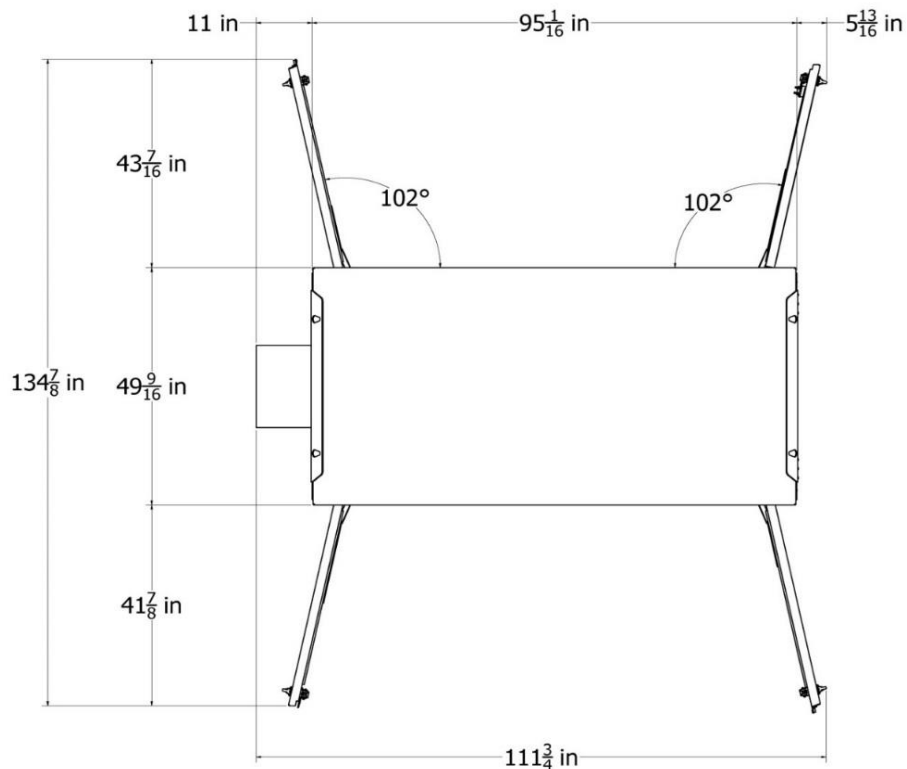


Figure 9 - LME enclosure overall site clearance dimensions.

Conduit Requirements

Please refer to template (plan) and elevation drawings later in this section for location details of internal AC electrical boxes.

The figure on the following page provides specifications for the required conduits, and its connection to the LME enclosure.

Concrete Pad Requirements

The concrete pad must be supplied as part of site preparation and must meet the following requirements:

- Minimum pressure = 175 kg/cm² (2500 psi)
- Minimum thickness = 4.5 in.
- The surface of the concrete pad must comply with national and local building codes.
- The concrete pad must be able to support the maximum weight of the enclosure.
- The concrete pad must be able to allow drilling of up to .50" hardware anchor holes to secure the cabinets to the pad for seismic zone 3-4.
- The concrete pad must be level. The top surface must be flat within $\pm 1/4$ -inch total variation.

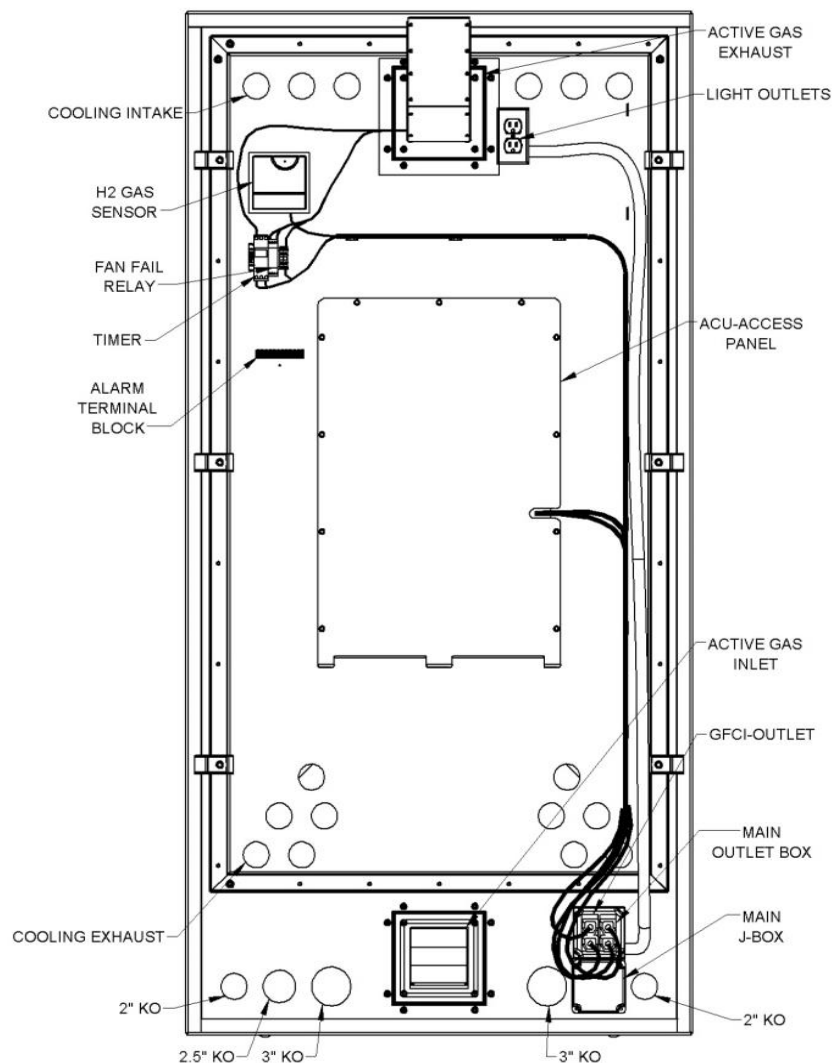


Figure 10 - LME enclosure left-side conduit input locations.

It is highly recommended that all hardware be attached to the pad (with threads protruding upwards for nut attachment) before the enclosure is placed onto the pad. The nature of the design of the LME enclosure makes drilling and installing hardware through the bottom of the enclosure into a concrete pad extremely difficult and likely conceal any damage to the concrete during installation.

4. Foam rubber gasket needs to be applied to the bottom of the enclosure in accordance with the image and instructions below.

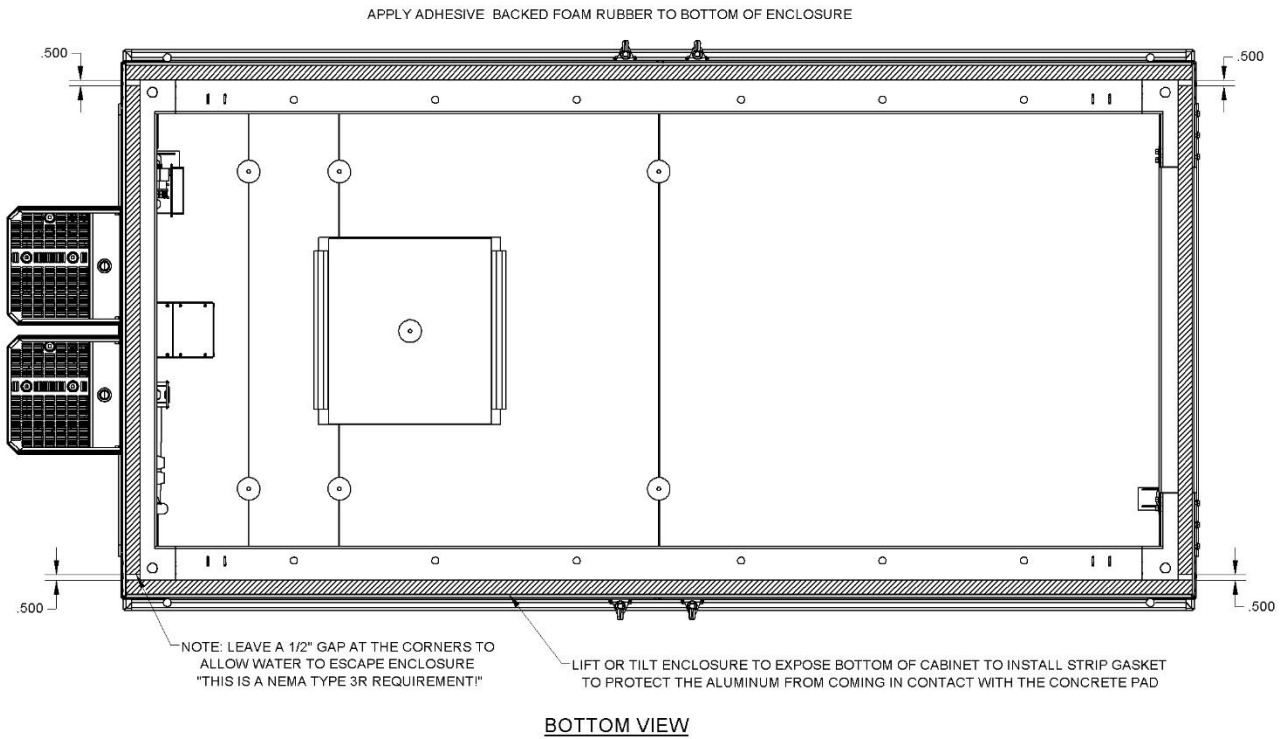


Figure 12 - LME Enclosure bottom gasket layout.

Internal Effective Area

Refer to the following image for details on the effective area on the Pad for battery Rack mounting and spill containment.

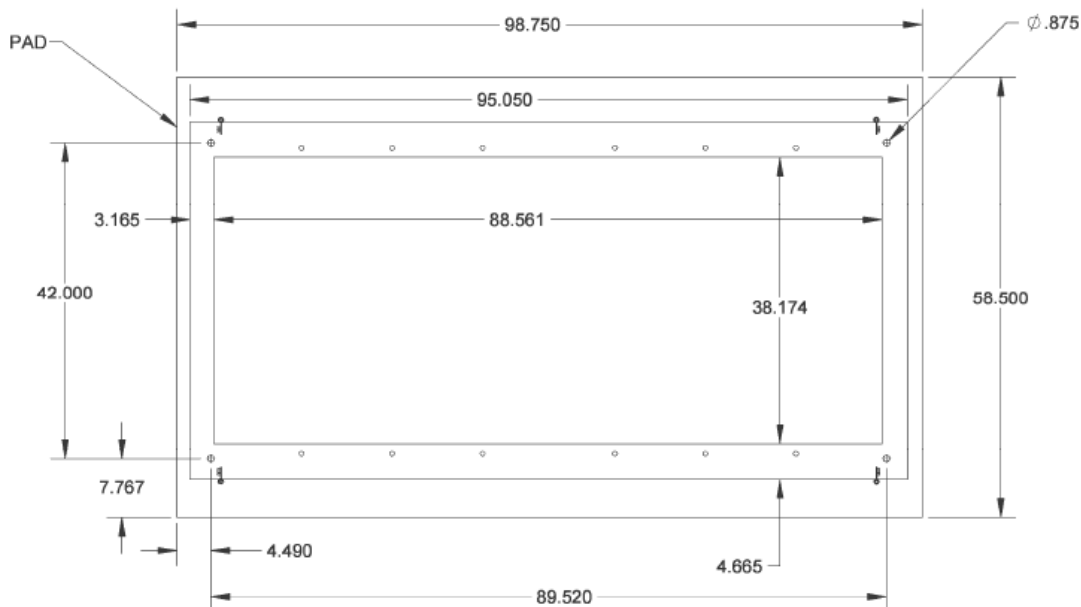


Figure 13 - Specifications of the internal effective area.

2.1.3 LME Installation Procedure

The LME enclosure attaches to the site surface through the main enclosure, with mounting hardware passing through the bottom of the enclosure.

Do NOT transport nor lift the LME enclosure with batteries installed into the enclosure. They are to be installed AFTER the enclosure is lifted and secured on site. Remove batteries if they have already been placed into the enclosure for initial testing and/or integration.

1. Verify the site mounting hardware on service input with the enclosure drawings in this section of the manual. Ensure the site mounting location is clear of any and all debris and only items contained in the template drawing are contained within the area the enclosure will be located. There is no "slop factor" for mounting the LME enclosure and the enclosure cannot be properly placed on site if it is not prepared exactly as noted in the template drawing for the individual model. Take corrective action for any variation of the site pad vs. any inconsistencies.
2. Remove all front, rear, and side base ring access plates. A bit is included with the enclosure for the security hardware.
3. Feed all lifting straps through the lifting strap areas of the enclosure and locate any spreader bars as needed. Refer to drawing diagrams on previous page for locations. Remove bolts to pallet from enclosure base through small access openings. DO NOT lift the enclosure while attached to the pallet, nor attempt to remove the pallet while elevated.

4. While every effort has been made to place the strap feeding slots appropriately, due to the location and weight of the air conditioners on the enclosure's front doors, the cabinet can easily lose its center of gravity during lifting. In addition to the side to side strapping locations, the enclosure MUST be secured in some front to rear fashion to avoid destabilization during lifting. The crane operator is responsible to specify the appropriate grade of straps for the given weight of the enclosure. Refer to shipping and lifting section (1.1 Moving the LME and 1.2 Craning the LME) for more info.
5. Crane lift the enclosure onto the hardware protruding from the slab/beam resting location. This is an exact fit placement, so care must be taken, and the enclosure guided exactly onto the hardware.
6. Using the appropriate 1/2-13 hardware, secure the enclosure to the mounting surface at the open access points, open front doors and secure remaining points. It is important that the enclosure be properly secured to the mounting surface using the appropriate hardware torqued and locked to maintain the integrity of the site. If all 12 mounting points are not fully and completely secured, safety and zoning noncompliance issues will occur. La Marche Mfg. Co. accepts no liability for failure to secure the enclosure to the site mounting surfaces and any and all damages and citations issued as a result.
7. Complete all external input connections
 - A. Connect AC power input through side - ensure that the power feed is off and dead before attempting connection. Under NO circumstances should an active live wire feed be connected to the LME enclosure.
 - B. Check all input conduit locations and make sure all have been properly sealed.
8. After AC power connection has been made, perform one last verification that ALL connections to external sources have been made and secured, then activate the power feed to the enclosure by flipping the main breaker to the "ON" position. Check that all breakers for all equipment are flipped to the "ON" position.
9. Check operation of all enclosure equipment.
 - A. Check that Air Conditioner(s) are on and working properly.
 - B. Check outlets and light(s) (if applicable)
 - C. Check and test wired communications and all alarm sources with any data NOC or network monitoring systems, if applicable.
 - D. Test smoke alarm and hydrogen detector, per individual vendor procedures. (If applicable)
10. Attach all access plates to the enclosure using provided security hardware. Use ALL hardware and mounting holes provided - the LME enclosure is designed as a closed loop environment and ANY unclosed and/or unsealed holes will compromise the integrity and operating performance of the enclosure. Spot check all connections and seals, including around the doors after closing, before leaving the site.

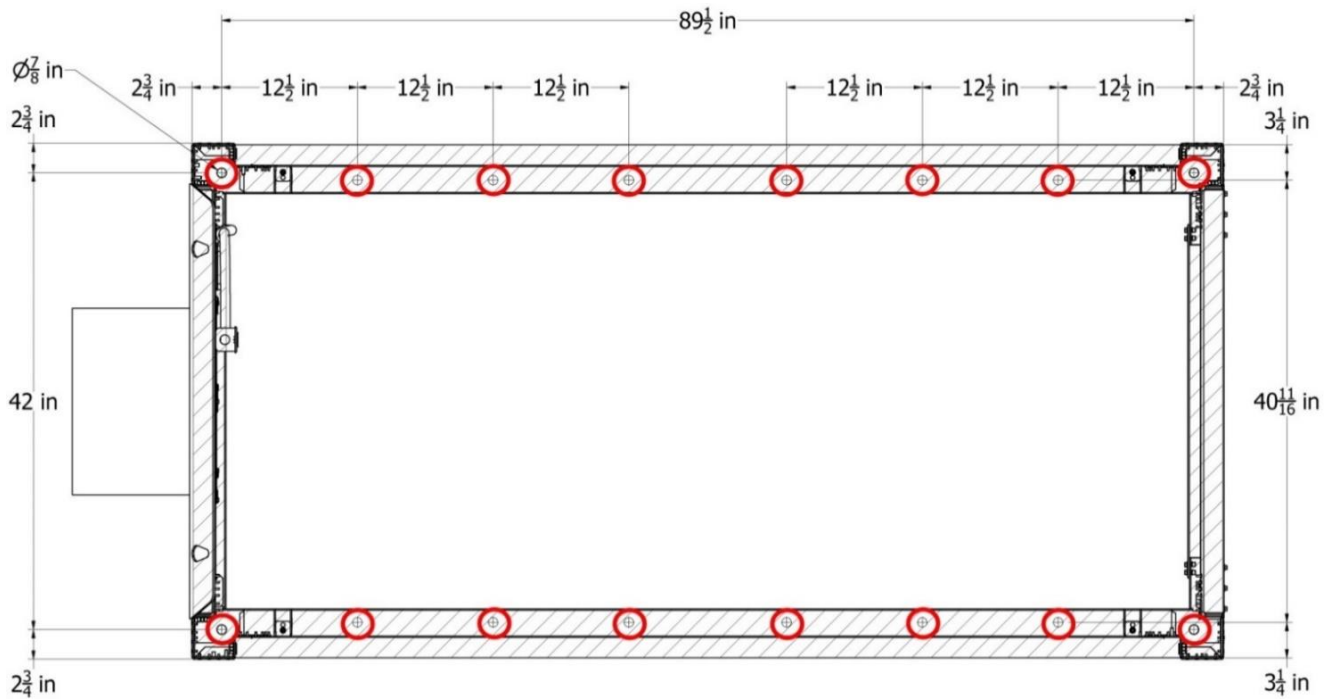


Figure 14 - Location of the mounting points of the LME enclosure.

2.1.4 Two-Bay Enclosure

The LME enclosure allows for future expansion by combining two cabinets together. This section contains the required preparing kits, how to uninstall the end blank panel of the primary enclosure, how to remove the lower frame, how to apply gasket for expansion and, finally, covers the expansion placement.

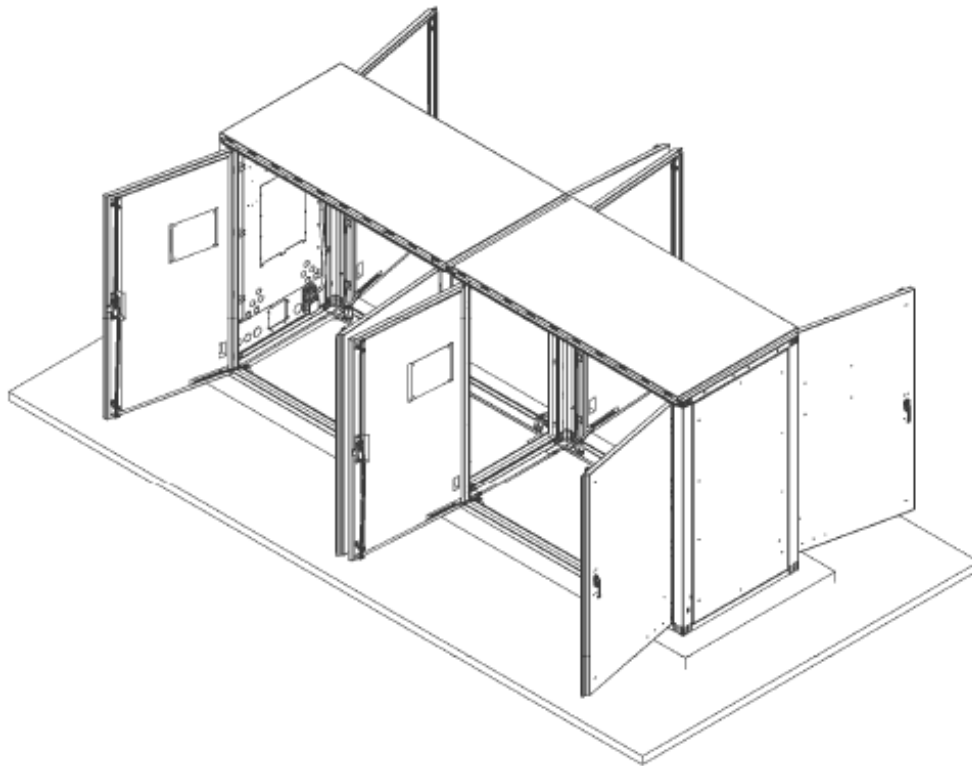


Figure 15 - Concept drawing of an enclosure with expansion.

Preparing Kits

Required Kits: The following kits are needed:

Hardware Kit - Nuts, Bolts, and Washers to join the expansion enclosure to the main enclosure.

Gasket Kit - Strip gasket to seal out the elements and keep equipment and batteries safe from the elements.

Anchor Kit - Second full enclosure, anchors the second frame to the pad.

Uninstalling End Blank Panel

To uninstall the end blank panel of the enclosure you should have a safe place to store the end panel and fasteners. From the inside on the enclosure find the clamping toggles attaching the outer panel to the frame.

Note: *Panel Ground Lead may need to be disconnected.*

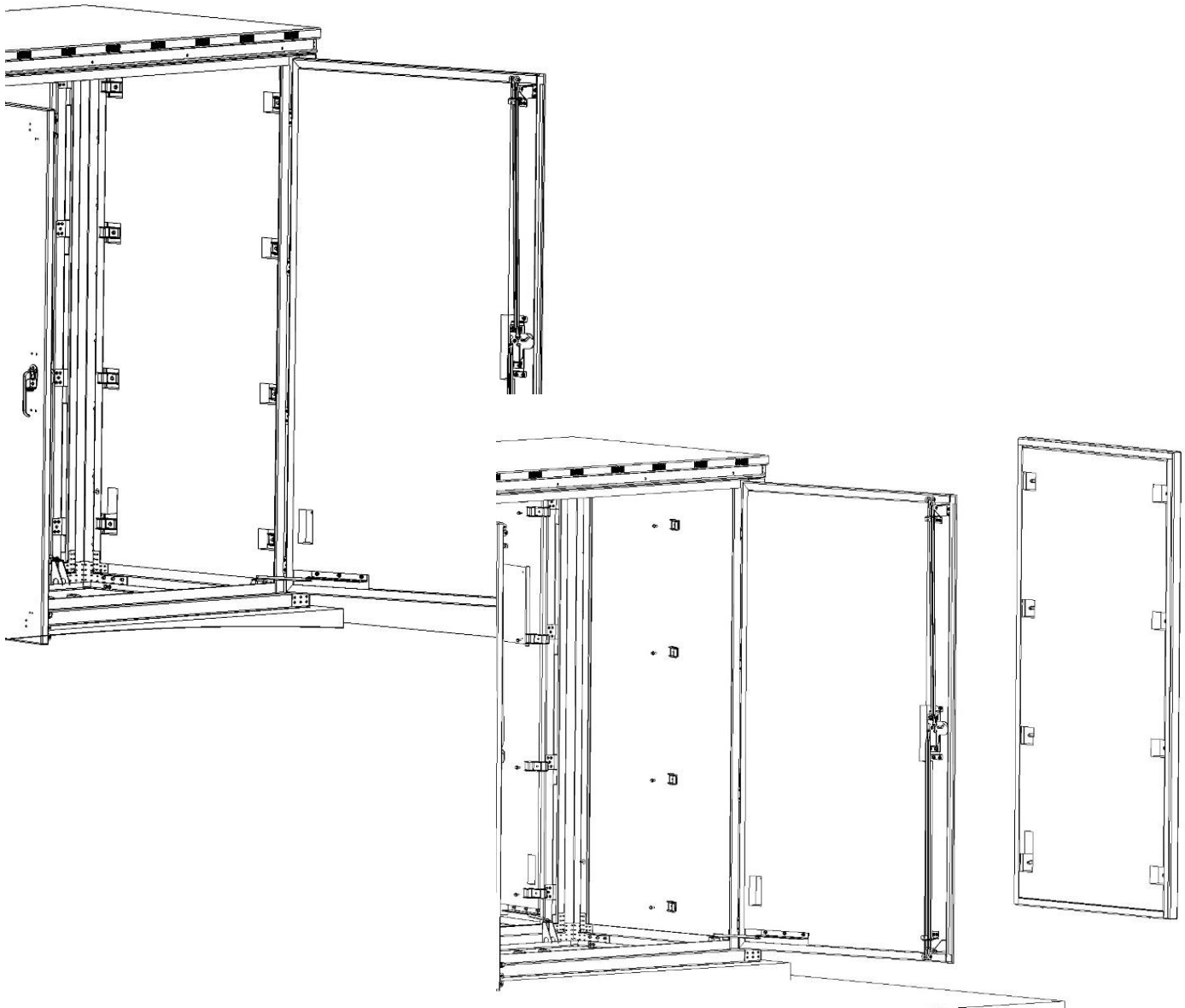


Figure 16 - Uninstalling end blank panel.

Removing Lower Frame

1. Remove discard gasket from lower rail at least 4 inches from each end to expose rivets.

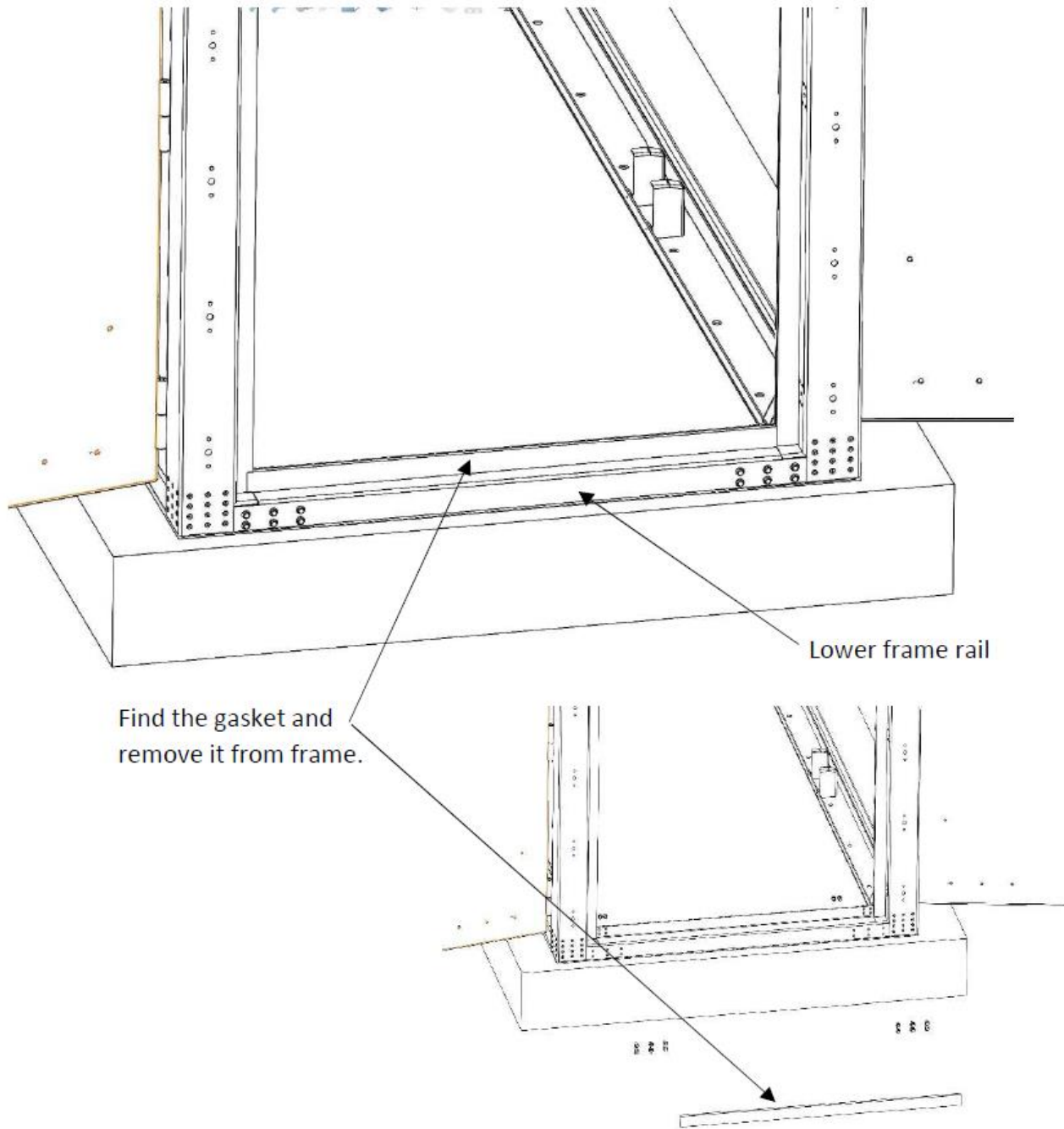


Figure 17 - Removing lower frame.

2. Find the bolts holding lower frame rail to the frame. Remove these outside and inside.

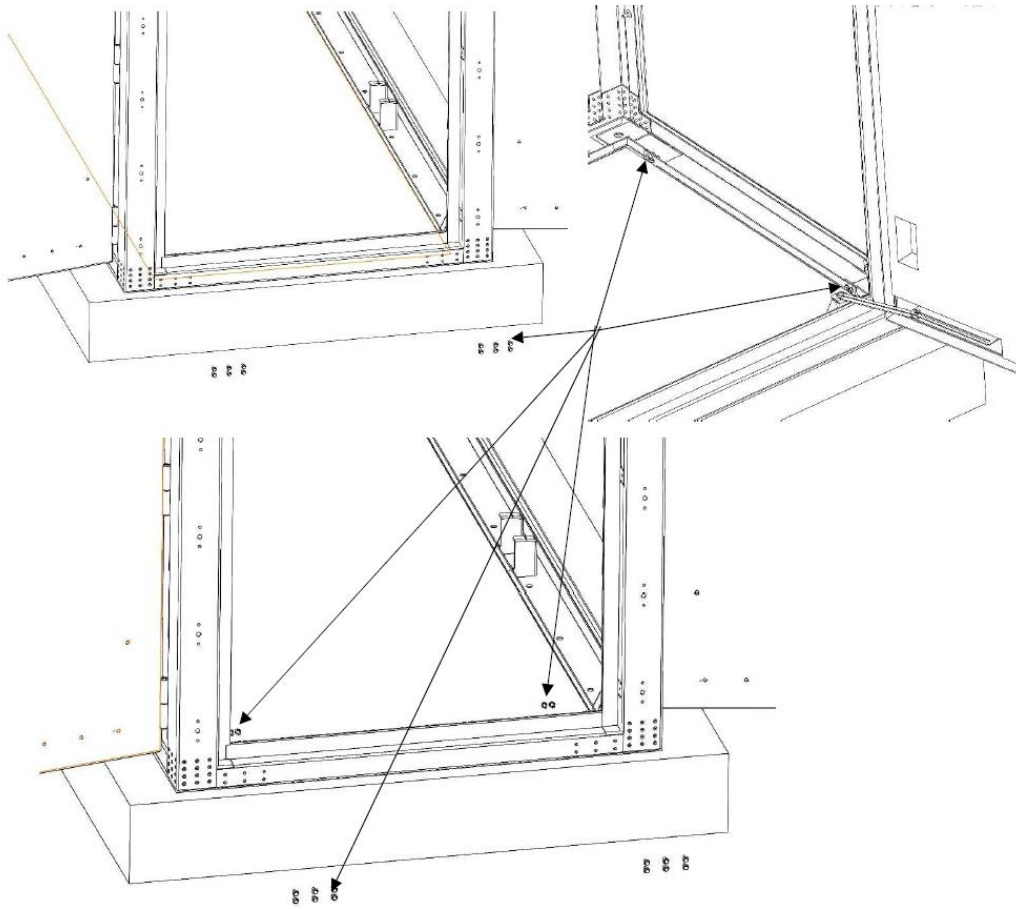


Figure 18 - Removing inside and outside bolts.

3. After bolts are removed, use a # 19 or #20 Drill Bit to drill out rivets. {Once the rivets are removed the lower frame can be removed.

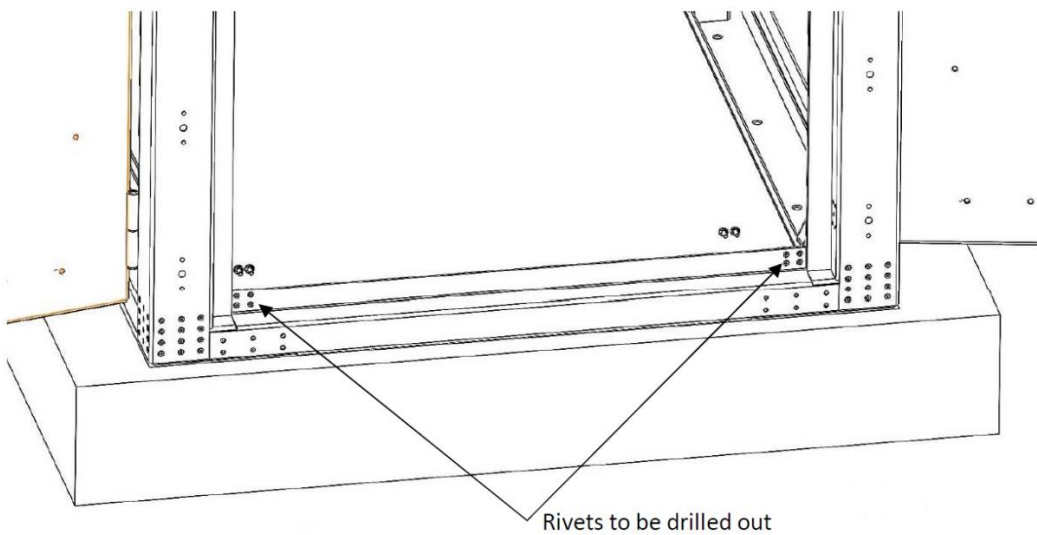


Figure 19 - Drilling out the rivets.

Applying Gasket for Expansion

1. Use a screwdriver, small chisel, or punch to knock-out center blanks to bolt frames together.

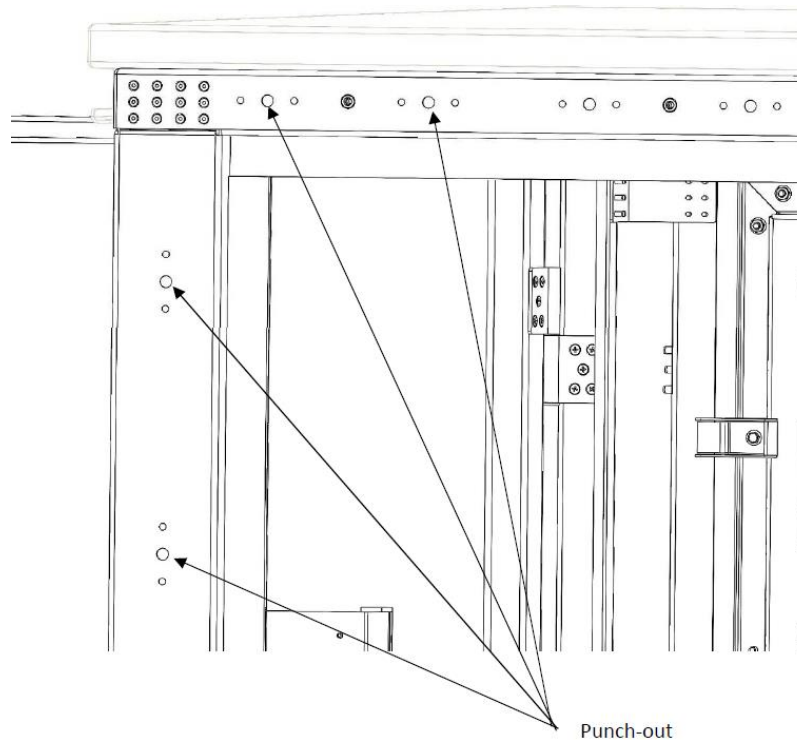


Figure 20 - Knocking-out the blanks.

2. Place gasket around the outside of the bolt holes on main frame. Place second layer of gasket on the inside of bolt pattern of main frame. Gaps shown for instruction only, not gaps should be allowed in gasket installation. A small amount of RTV is permissible to close gaps if needed.

Note: Corner method of gasket as shown.

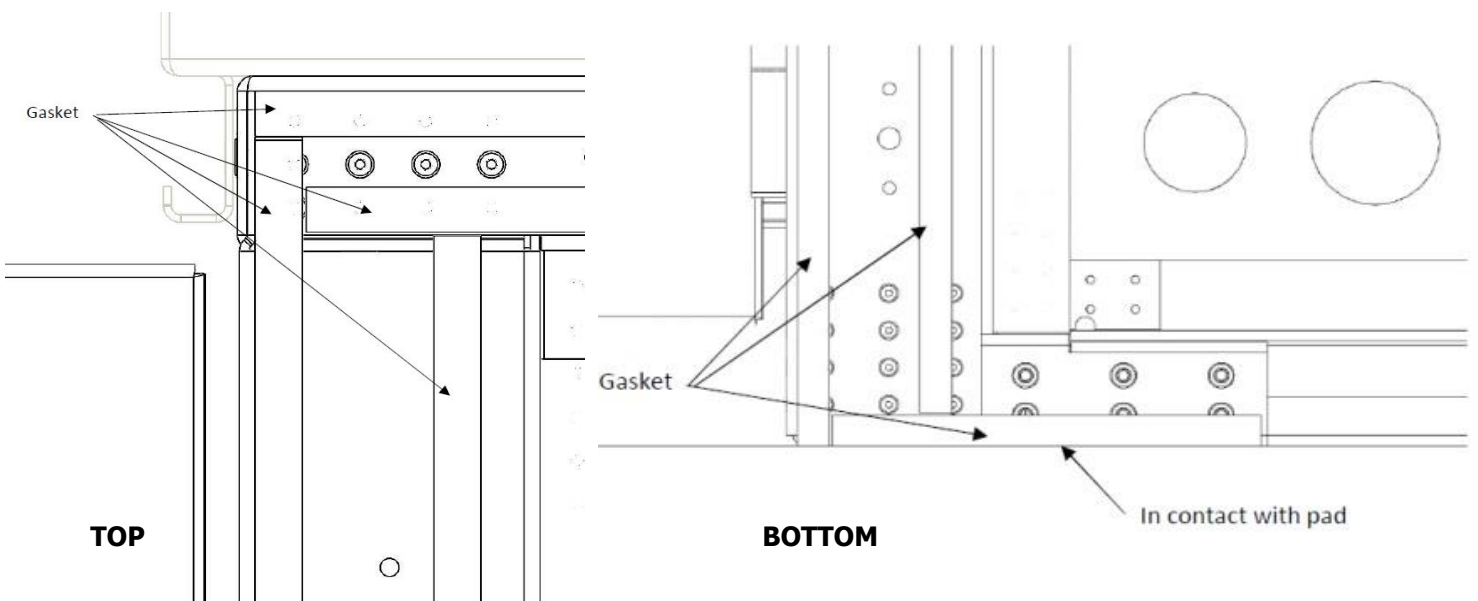


Figure 21 - Placing the gasket.

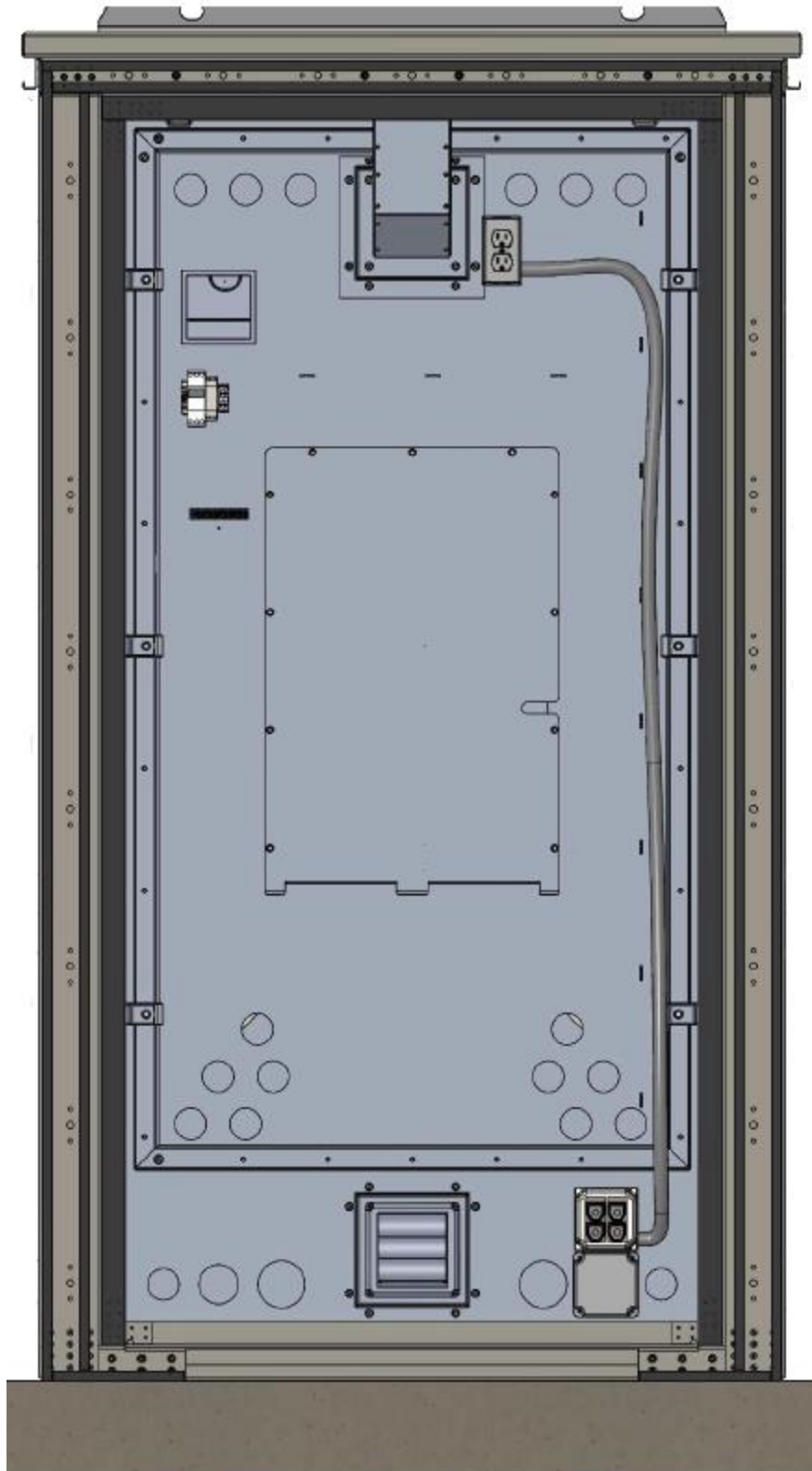


Figure 22 - Full gasket application view.

Expansion Placement

Carefully place the second cabinet frame next to the main frame enclosure. Align the frames to bolt together using the supplied flange bolts and flange nuts. Take care in this as these portions of insulation may need to be replaced into the voids created to gain access. Use aluminum tape to ensure insulation is properly replaced.

Note: To gain access to the top row of mounting holes, the insulation may need to be cut away to allow access on both sides.

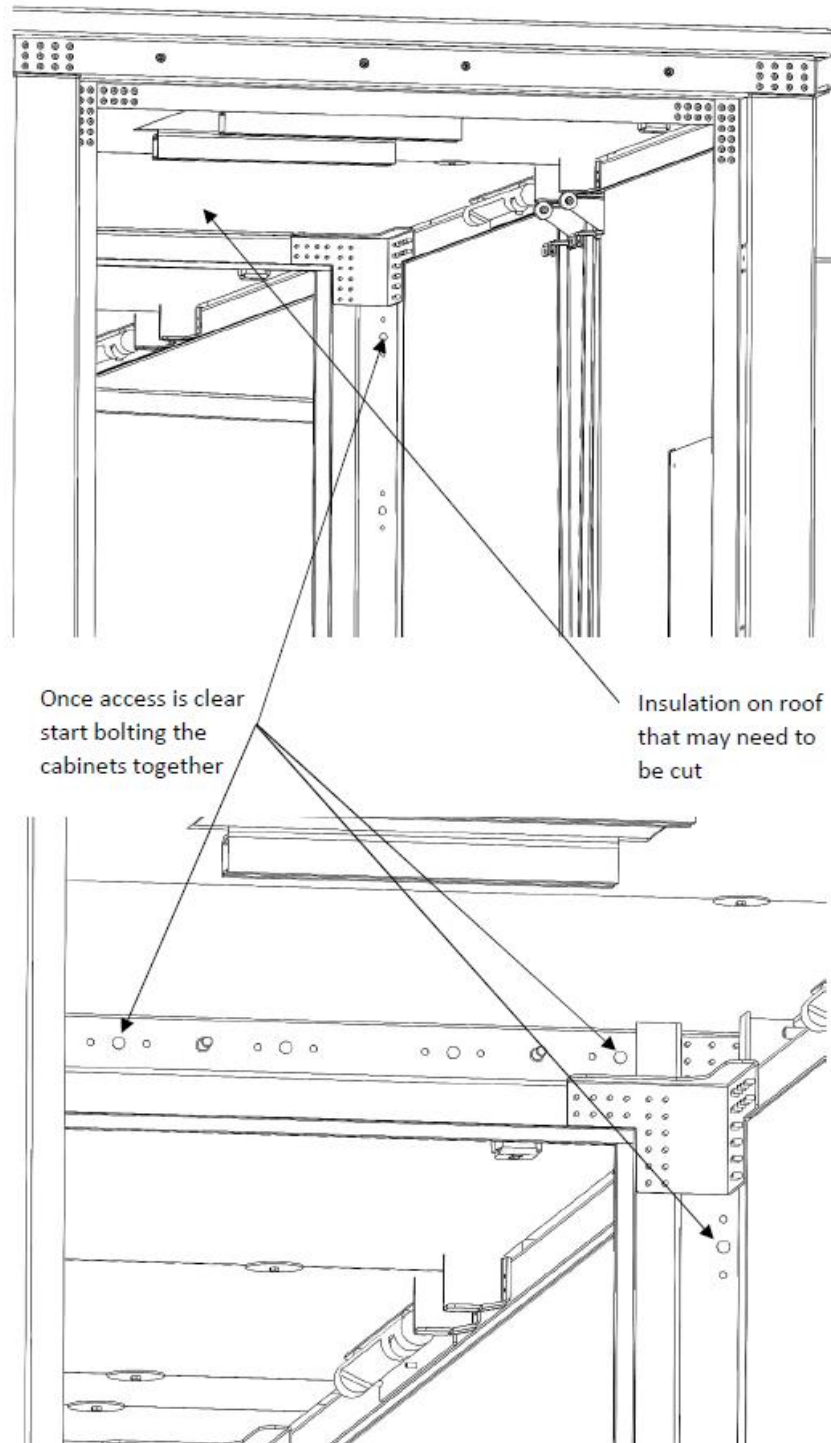


Figure 23 - Placing the expansion.

Note: *Drilling Anchor locations for second enclosure may require the slight movement of the enclosure to gain access to the marked holes after the bolted enclosure set is tightened. This is to ensure the seal between the enclosures will contact the gasket stand-off buttons and reduce stress in the assembly.*

If needed to move the expansion enclosure after marking the pad for drilling do so carefully as the pad gasket can be damaged if enclosure is dragged over the concrete. Repeat enclosure to enclosure bolting process before anchoring to pad. Anchoring Specifications, page 10.

Reverse the end panel removal to install the end panel to the expansion frame (Uninstalling End Blank Panel, pg. 15)

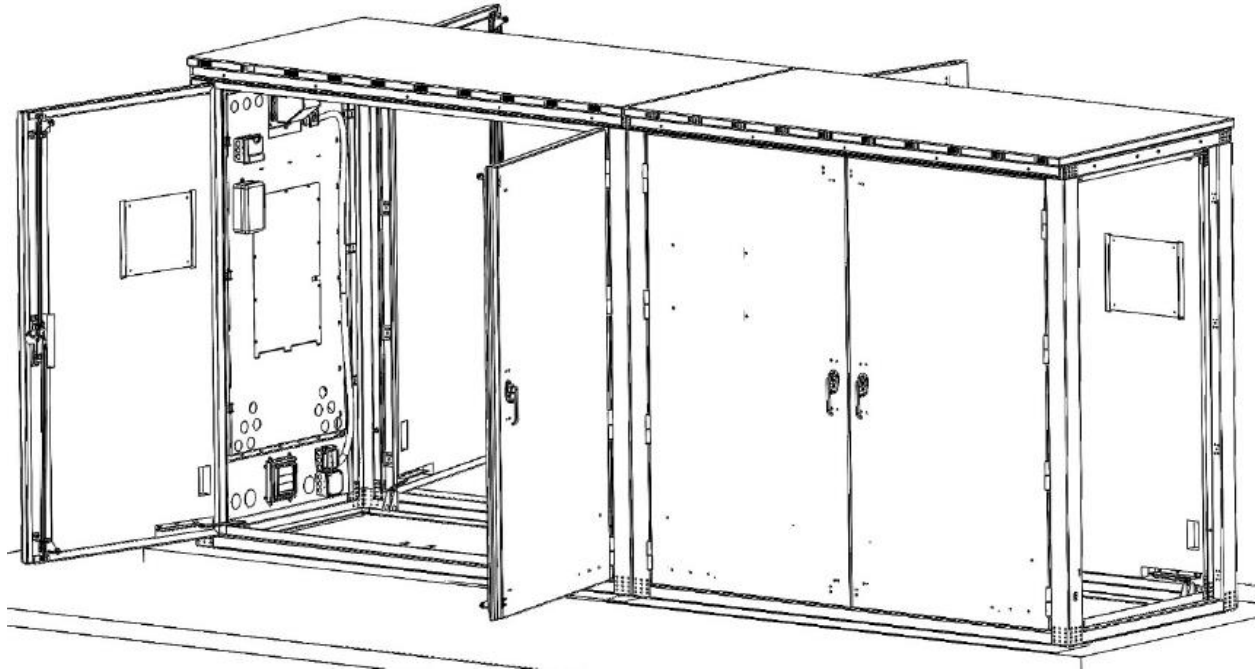


Figure 24 - Final product of a double-bay enclosure.

2.2 AC Connections

This section provides layout configuration information and AC power wiring configurations for the La Marche enclosure.



WARNING: All electrical work must be performed by authorized and trained personnel, following all local and national codes.

Power Source

The base enclosure has the following power options:

- Integrated power (internal AC wiring).
- Associated DC breaker/disconnect enclosure.

The AC power for the LME enclosure is provided from an external source of 120-240V, single phase.

AC Power Configuration Options

The following diagram shows the default AC power configuration it also shows a power configuration for the Enclosure with 1 McLean T-29 4k Air Conditioners (110VAC), Fan option with a fan failure alarm.

Digital Timer Configuration

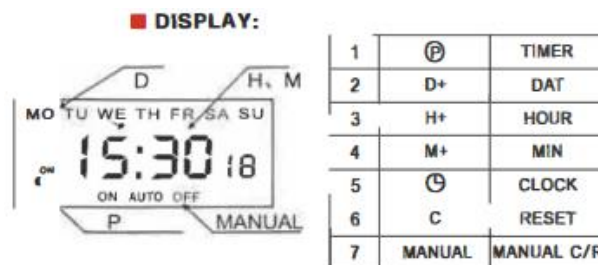


Figure 25 - Overview of the digital timer display.

Table 2 - Operating instructions for the digital timer.

■ **Operating instruction:**

1. To start switch: press reset Key. At the first time, if you want to the present time, please press "🕒" On Board, then press D+, H+, M+ to adjust the number to the present time.
2. Enter into programming as follows:

Step	Key	Programming
1	Press Ⓟ	Setting1 ON time (display 1 on)
2	Press H+/M+	Setting hours and minutes
3	Press D+	To select same every day, or different time each day
4	Press Ⓟ	Setting 1 off time (display 1 off)
5	Press H+/M+	Setting hours and minutes turn off time
6	Press D+	If you want the same every day, you need not press this key
7	Repeat step2-6	Set 2-16 on/off time
8	Press 🕒	End

If you do not require 16 settings, press "🕒" to the end.

Electrical Diagram

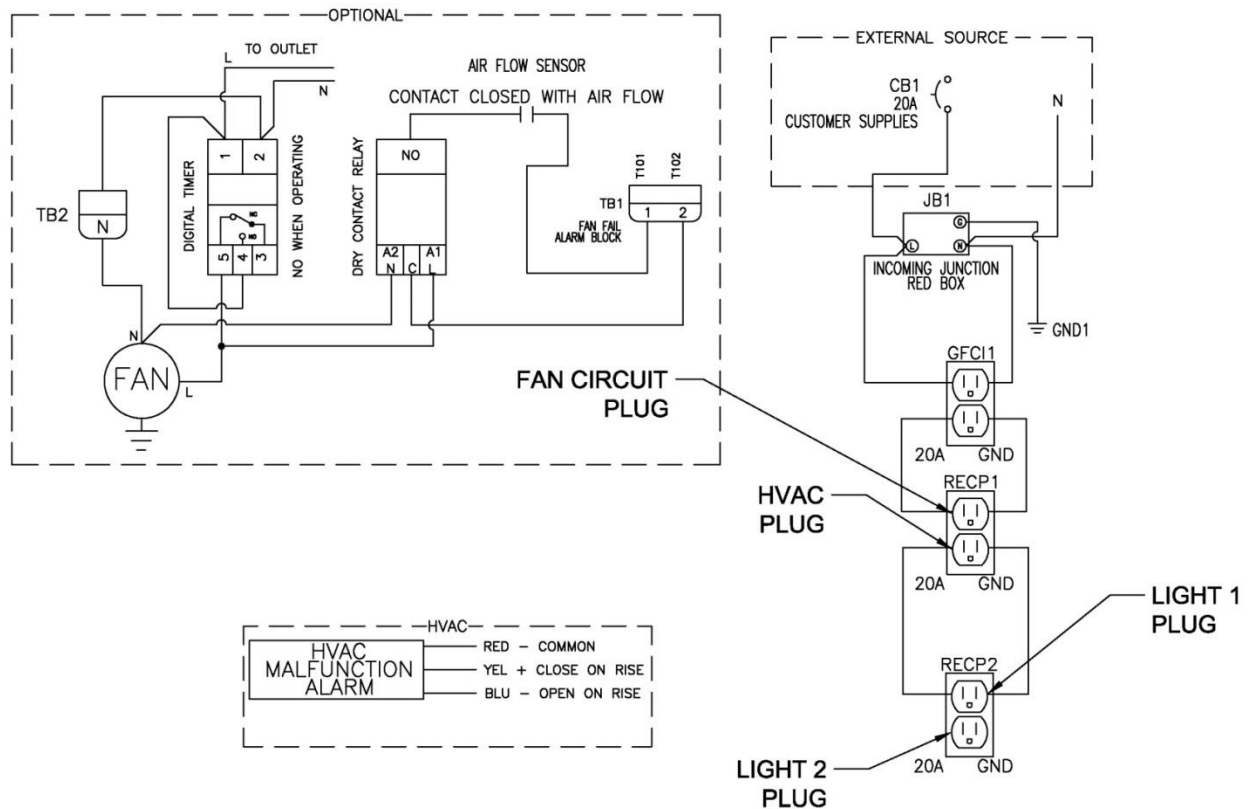


Figure 26 - LME enclosure default power configuration.

Power Requirements

General Requirements

This section describes the AC power requirements for LME enclosure at the site. AC power must also be provided for any additional AC powered equipment present at the site. As part of site preparation, the site must be equipped with the appropriate AC service panel board, or AC branch circuit load center for supplying power to all AC equipment at the site. All AC power wiring, distribution, and ancillary protection equipment must be installed during site preparation and be ready for connection to the LME enclosure.

CAUTION: All AC wiring and surge protection must be installed in accordance with the National Electric Code (NFPA-70) and local electrical codes.

Power Options

The LME enclosure will be equipped with batteries. The enclosure has provisions designed for potential hydrogen buildup displacement.

Power Consumption

This section provides specific power requirements for the LME enclosure.

AC requirements - The LME enclosure comes equipped and prewired with a 20A GFCI and duplex receptacle. An additional setup is installed for the redundant HVAC option. Each GFCI/duplex requires it on individual circuit breaker. This single phase branch circuit needs to be supplied from an external service panel.

AC Input Conduit

The AC power enters the LME enclosure on the left side of the cabinet with either flexible liquid-tight or rigid steel conduit. Flexible conduit can only be used as permitted by local codes. The external AC conduit is not supplied with the cabinet and must be procured prior to the cabinet installation, and install as part of site preparation, including the flexible conduit portion and the fittings for attachment to the cabinet.

Please note and conform to all local codes.

Circuit breaker rating - The HVAC, electrical outlets, lights, and optional fan kit require a 20A breaker.

AC Line wire size – from external source.
Ground wire size - #2AWG minimum.

2.3 Grounding Connections

This section describes grounding information and lighting protection requirements for the Enclosure.



WARNING: All electrical work must be performed by authorized and trained personnel, following all local and national codes. Always connect an adequate earth ground lead to the terminal marked as ground.

For safety, La Marche recommends using NEC for proper grounding methods. Use the following ground wiring sizing table as a reference only.

Table 3 - Ground Wire Size Minimum Requirements.

Breaker Size/ Fuse Size - Amps	AWG Minimum Wire Size Requirement for Customer Connection (mm ²)	AWG Minimum Wire Size for Equipment Grounding (mm ²)
3	#14 (2.5)	#14 (2.5)
5	#14 (2.5)	#14 (2.5)
10	#14 (2.5)	#14 (2.5)
15	#14 (2.5)	#14 (2.5)
20	#12 (4)	#12 (4)
25	#10 (6)	#12 (4)
30	#10 (6)	#10 (6)
40	#8 (10)	#10 (6)
50	#8 (10)	#10 (6)
60	#6 (16)	#10 (6)
70	#6 (16)	#8 (10)
80	#4 (25)	#8 (10)
90	#4 (25)	#8 (10)
100	#4 (25)	#8 (10)
125	#2 (35)	#6 (16)
150	#1 (50)	#6 (16)
175	#1/0 (55)	#6 (16)
200	#2/0 (70)	#6 (16)
250	#4/0 (120)	#4 (25)
300	250 MCM (150)	#4 (25)
400	400 MCM (240)	#2 (35)
500	600 MCM (400)	#2 (35)

(All wires specified in the table are rated at 90 °C or 194 °F)

NOTE: These are recommended sizes per La Marche Standards. The National Electrical Code (NEC) and Local Wiring Codes must be followed.

Grounding the Enclosure

This La Marche enclosure is equipped both with internal and external grounding locations. Refer to Figure 27 - External Ground Points Location. And Figure 28 - Internal Ground Points Location.

The LME enclosure site is supplied with an integrated (multi-point) grounding system, located on the left lower external corner of the enclosure. Any of these points can be used to ground the enclosure using a 2 hole, 1/4" stud, with 5/8" spacing. The enclosure must be properly grounded by a low impedance path to earth per specifications in page 27, Outdoor Grounding System. The enclosure equipment is susceptible to lightning surges due to its association with towers and antennas. The grounding conductors must be as straight and short as possible. There should be no sharp bends or loops in grounding conductors.

CAUTION - The equipment and enclosure warranties can be voided if the guidelines detailed in the National Electric Code (NFPA 70), Standard for Installation of Lightning Protection System (NFPA 780, latest edition) are not followed.

NOTE: All grounding system material (cable, connectors, buses, etc.) must be of high-quality materials that resist deterioration and require little or no maintenance.

Commercial AC power facilities are susceptible to lightning surges and must be properly protected. Appropriate and adequate surge protection devices have already been specified, included, and installed with the LME enclosure and connected directly to the grounding electrode system.

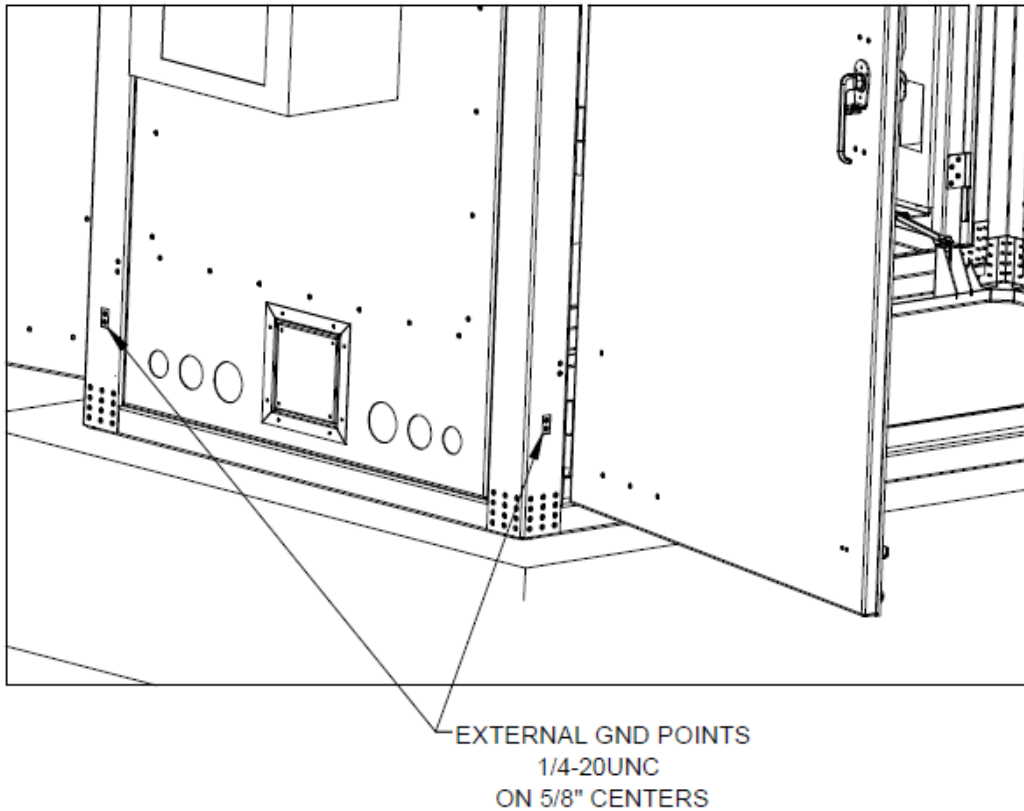


Figure 27 - External Ground Points Location.

Outdoor Grounding System

LME enclosure sites must be equipped with a grounding system (that is, buried ring ground, copper clad rod, electrolytic rods, metallic water pipe, etc.). The site grounding, including all cabinets and antenna cable shields, must be bonded to the grounding electrode system.

The grounding electrode system shall be installed as part of site preparation with a sufficient number of pigtails.

All metallic objects within 6 ft. of the grounded equipment must be bonded to the grounding electrode system.

Buried ground conductors must be, at a minimum, #2 AWG copper wire.

Exterior ground conductors must be, at a minimum, #2 AWG either solid, bare, tinned copper or stranded, insulated (outdoor insulation to be sunlight-resistant) copper cable.

Exothermic weld is recommended for grounding connections where practical. All below-grade connections must be exothermically welded.

Compression type, two-hole (0.625-inch center) lugs or double crimp "C" taps are acceptable for above-ground connections. The contact area where connections are made shall be prepared to a bare bright finish, and be coated with an anti-oxidation material before connections are made.

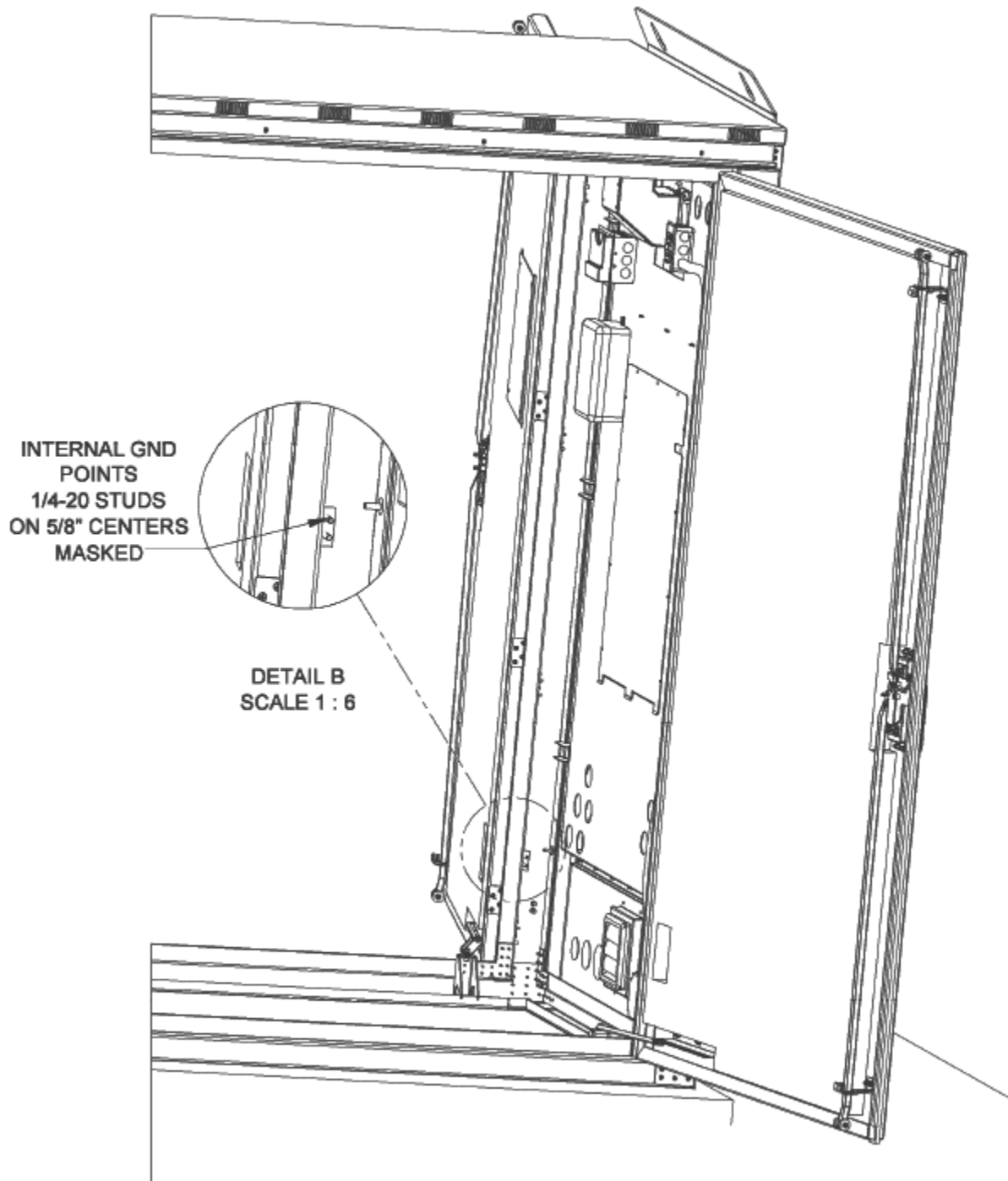


Figure 28 - Internal Ground Points Location.

IEEE 1100-2005 recommends a maximum of 5 ohms resistance from the enclosure to the ground.

3 Operation

3.1 Start-Up Procedure



WARNING: All electrical work must be performed by authorized and trained personnel, following all local and national codes. All equipment is shipped from the factory fully checked and adjusted based on the model number. Do not make any adjustments unless the equipment has been powered up and the settings have been determined to be incorrect. Check with battery manufacturer for recommended settings.

Before attempting to start up the enclosure, check and verify that all connections are correct. Check that all terminations and contacts are tightened securely. Check that the nameplate matches your request and make sure internal equipment has not suffered any damage during transportation.

1. Close the AC breaker protecting the enclosure. LEDs from different electrical equipment should flash.
2. Follow each of the manufacturer's instructions manuals to start up all electrical equipment.
3. Make sure all equipment and enclosure works as intended.

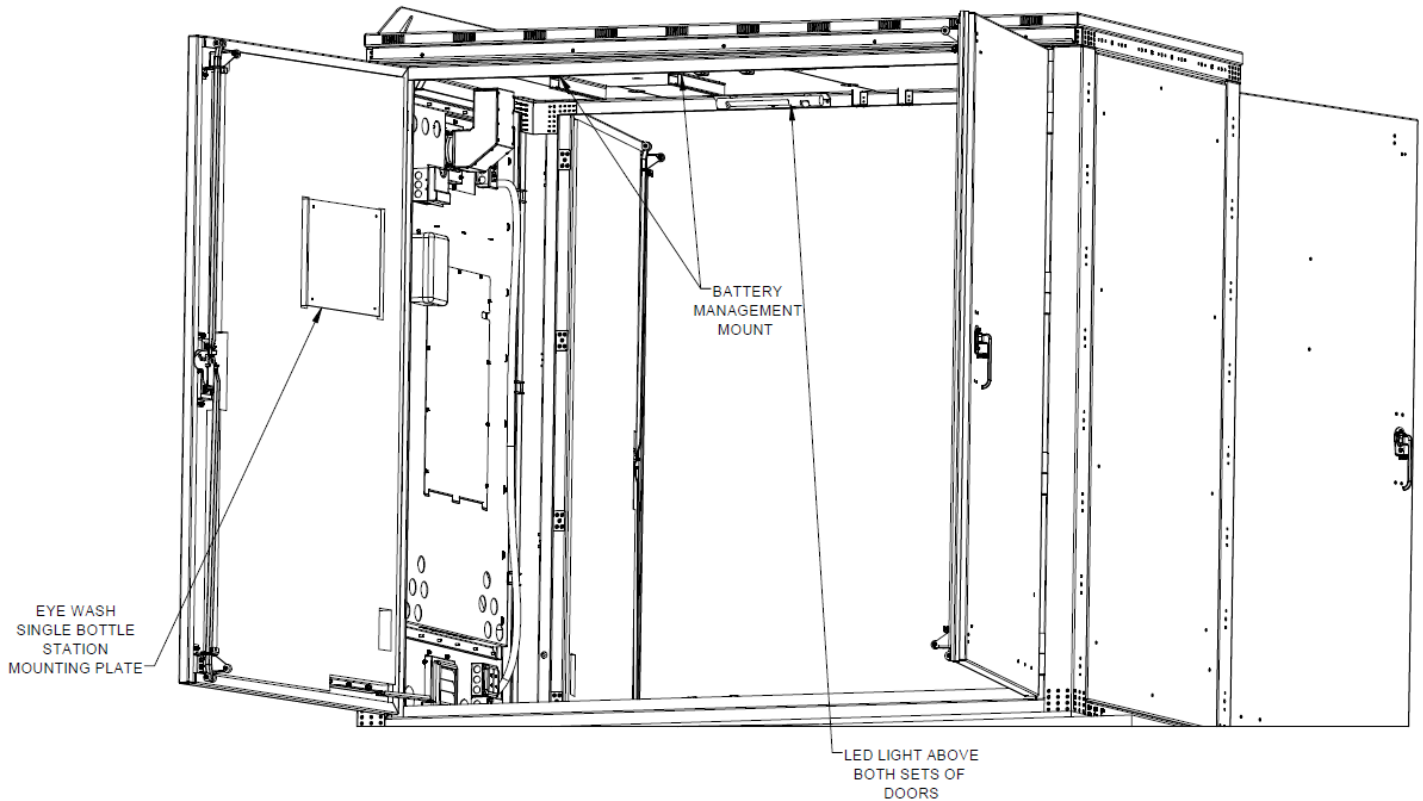


Figure 29 - Location of the lights within the enclosure.

3.2 Accessories

Exhaust Fan

The vent fan comes a timer to schedule periodic operation to extract gases formed by batteries. Refer to Appendix B.

Access Plates

Inspect all access plates and doors. Make sure that all plates are secured tightly in place and all fasteners are completely sealed. Check all gaskets on doors and plate points for any water intrusion, if there is any and the plate is otherwise tightly secured, the gasket will need to be replaced at the plate. Once the enclosure is in place, there is no need to remove any side or rear access plates. They are only used for access during installation of the equipment and enclosure and should only be removed to address leak and gasket issues.

Smoke Alarm – (if applicable)

The smoke alarm is located on the underside of the top left access plate - this plate needs to be removed to access the smoke alarm. Test smoke alarm per manufacturer specifications and instructions. The smoke alarm is DC powered, so there is no battery to service or replace. If the unit fails testing, it will need to be completely replaced. Ensure the mounting access plate is properly replaced and secured after testing.

Hydrogen Alarm – (if applicable)

The hydrogen alarm is located on the underside of the top left access plate with the smoke alarm - this plate needs to be removed to access the smoke alarm. The hydrogen alarm warns of any buildup of potentially dangerous hydrogen within the enclosure. As this may present a dangerous explosive situation, it is imperative to ensure that the detector is functional at all times. Test the hydrogen alarm per manufacturer specifications and instructions. The hydrogen alarm is DC powered, so there is no battery to service or replace. If the unit fails testing, it will need to be completely replaced. Ensure the mounting access plate is properly replaced and secured after testing.

HVAC Unit

The HVAC unit is factory preset. Refer to the Appendix A.1: CA2219C 2K BTU HVAC Manual or Appendix A.2: CA2319B 4K BTU HVAC Manual, depending on the HVAC unit provided with your enclosure.

Table 4 - Default for HVAC unit.

HVAC	
Cooling Set Point	80 °F / 27 °C
Heating Set Point	55 °F / 13 °C

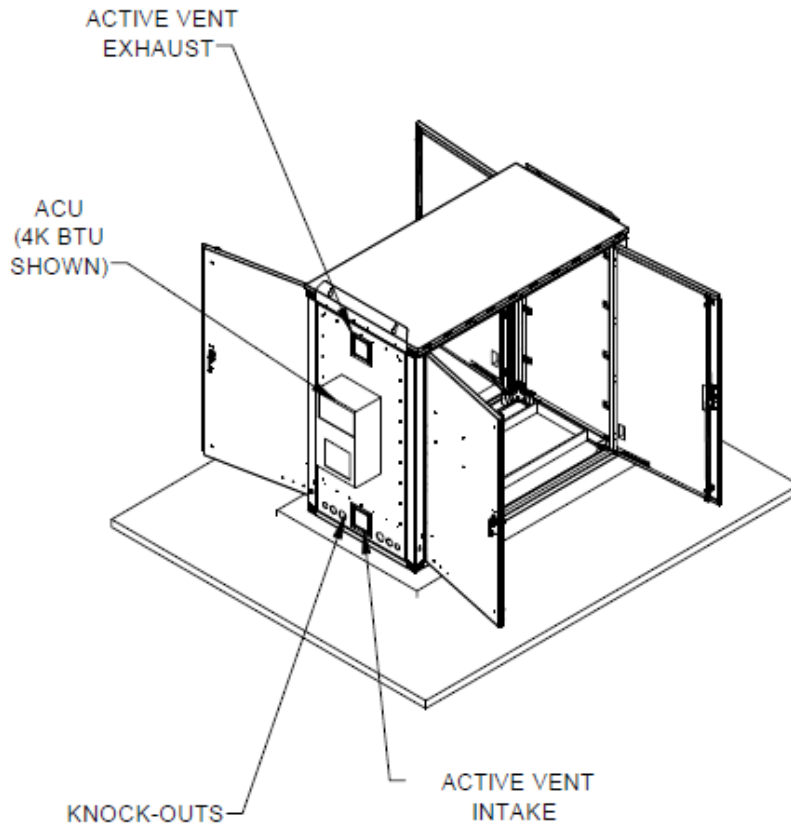


Figure 30 - Location of the HVAC unit.

Battery Ventilation

Lead acid batteries will produce gas emissions. Outgassing is the result of a battery under charge. The higher the voltage under re-charge, the greater the outgassing. It is important that every battery is ventilated in the proper manner recommended by the battery manufacturer.

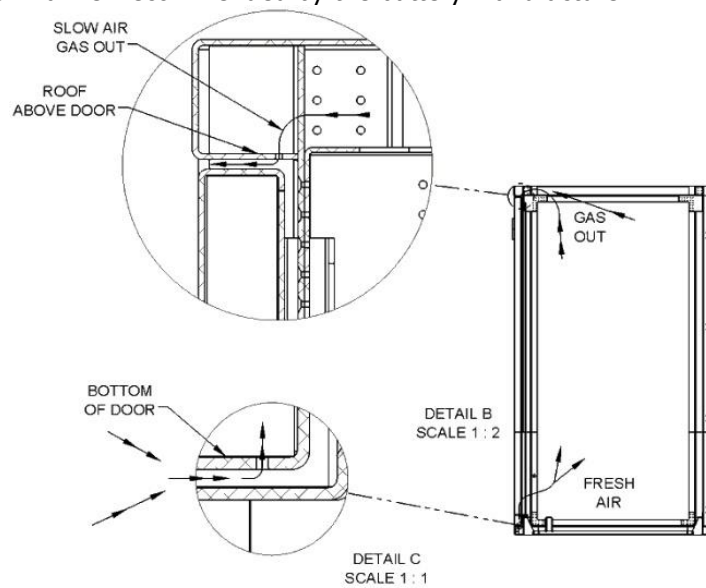


Figure 31 - Detail of the passive ventilation system.

ACU Access and installation

The following instructions are designed to assist in accessing and installing single/dual ACU units on the LME enclosure.

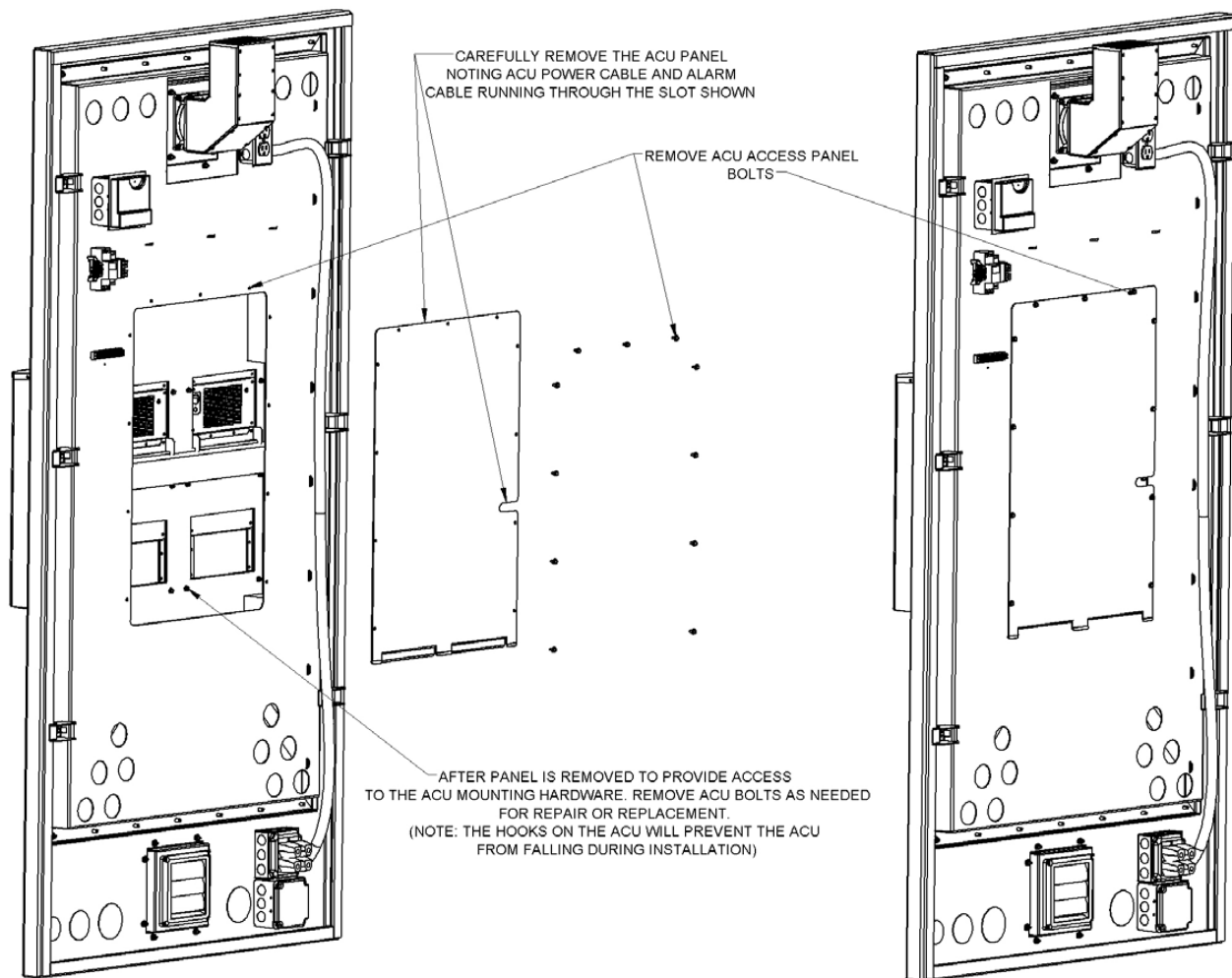


Figure 32 - ACU access and installation.

Safety

Always wear eye protection, rubber gloves and a protective vest when working near batteries. Remove all metallic objects from hands, wrists and neck.

Batteries contain dangerous voltages, current and corrosive material. Battery maintenance, service, replacement must be performed by authorized personnel only. Use special caution when connecting or adjusting battery cables. An improperly connected battery cable can result in arcing, fire or possibly explosion.

Care should be taken to avoid damaging ventilation plugs at top of cabinet. Batteries contain or emit chemicals known to cause cancer and birth defects or other reproductive harm. Battery post terminals and related accessories contain lead and lead compounds. Battery cables must be dressed to avoid damage.

3 Point Locking System

The LME enclosure doors are operated and sealed by a TTI custom 3-point locking system, customized for each specific enclosure in the series. Compatible replacement parts are not available through any other source. All of the enclosure doors 3-point mechanism is operated by turning the handle. The door will not close if the handle is turned to the closed position.

Locks

The door handles on the LME enclosure provide a spot for a standard keyed padlock or combination lock provided and installed by the end user. Please note that La Marche Mfg. does not include, nor do they possess any keys for any locks or locking mechanisms on any LME enclosure. Access and replacement of the door handle free standing locks must be made with the carrier owner of the individual site.

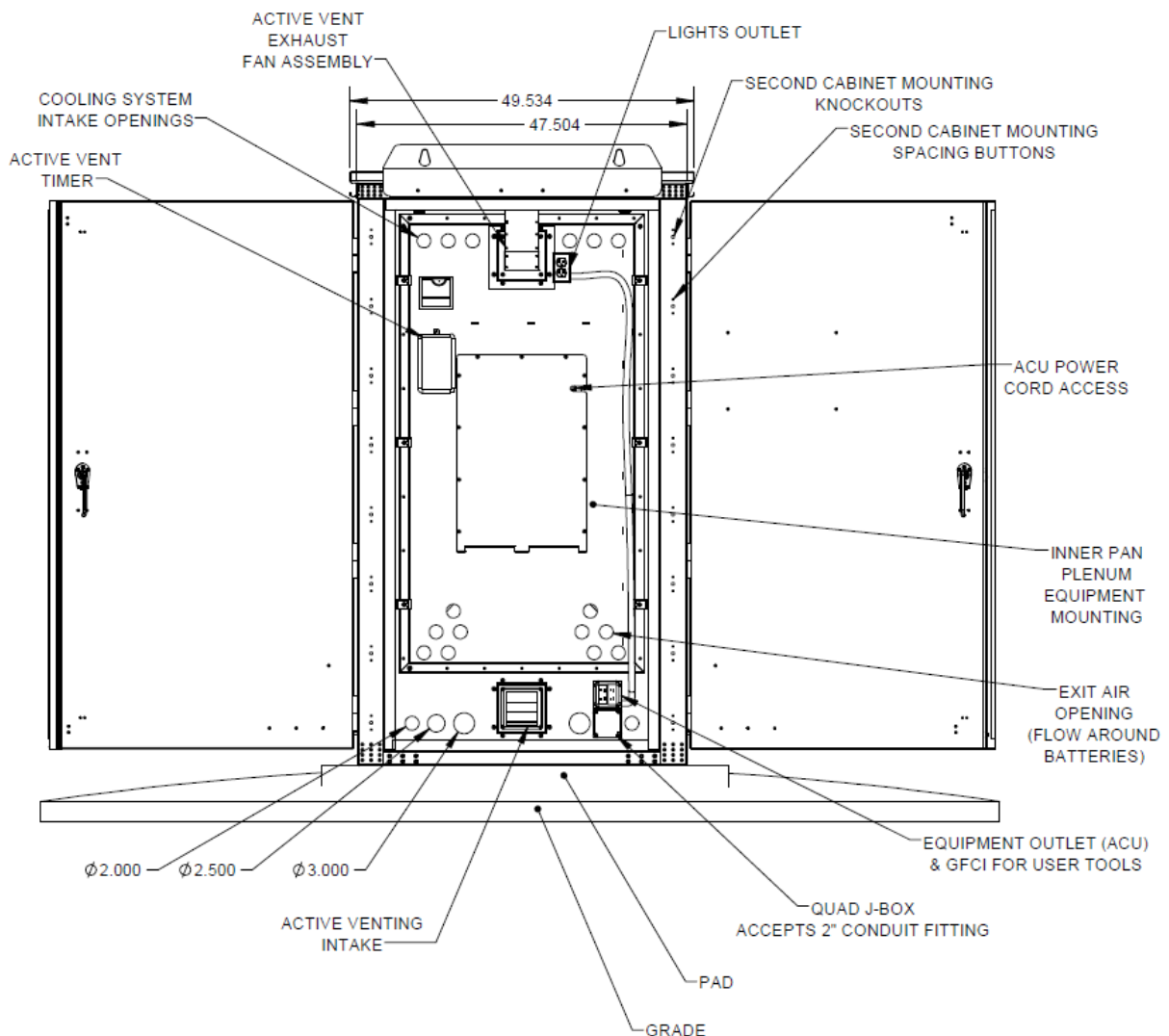


Figure 33 - Side view from the inside of the enclosure.

Auto-Engaging Door Stop

LME Enclosures use a custom designed auto engaging doorstop. When the enclosure door is opened and reaches a degree of 90-130 degrees, the stop will engage and lock the door into place, preventing it from closing or opening further. To disengage the doorstop, lift up on the arm and release the slide nut for the locking slot.

Laptop Shelf (optional)

The LME enclosure has a laptop shelf located on the door. To operate, lift shelf up from bottom and rotate it into the open position. Shelf sits at an approximate angle of 80 degrees when locked into place.

Door Microswitch Bracket

The doors of the enclosure are equipped with intrusion alarm microswitch brackets to indicate when the door has been opened. To temporarily bypass the alarm, pull out the microswitch plunger. The switch will automatically reengage when the door is closed.

Emergency Eye/Face Wash

The following instructions are for the emergency eye/face wash station within the LME enclosure. Make yourself familiar with the location of the eyewash station and the instructions located on the eyewash station placard.

Chemicals within the batteries are toxic and require an eyewash station. Safe work conditions and personal protection equipment (PPE) should be used to prevent injuries. A regular maintenance schedule should be followed to ensure the eyewash station is properly filled and solution is within the expiration date.

If an injury does occur, the eyewash station is located within the enclosure. 911 should be dialed immediately! Keep your eyes closed and your head down. Once at the station, hold your eyelids open while the water flows over the eyeballs. Roll your eyes all around so the water touches all of the surfaces and gets under the lids. Wash both eyes even if you think you only contaminated one. Remove contact lenses during the flushing. Consider wearing safety glasses instead of contact lenses when working with corrosive chemicals. Contacts may hold chemicals against the eye and cause further damage.

Don't try to dislodge objects from your eye. Don't rub your eyes. Continue flushing your eyes for 15 minutes or until emergency responders arrive and instruct you otherwise. Eyewashes are first aid only. Seek medical attention for every eye injury.



Figure 34 - Eye/Face Wash Station.

4 Service

All work inside the enclosure should be performed by qualified personnel. La Marche Mfg. is not responsible for any damages caused by an unqualified technician.



Before working inside the enclosure, ensure the AC power is off at the main breaker box and the battery has been removed from the enclosure's DC output terminals. Verify that no voltage is present by using a voltmeter.

4.1 Performing Routine Maintenance

Although minimal maintenance is required with La Marche Mfg. products, **yearly** routine checks are recommended to ensure optimum system performance. Below are instructions and checks which may be performed for maintaining the LME.

General Maintenance

- Remove dust and debris from interior of unit.
- Verify all connections are tight.
- Perform a visual inspection on all internal components.
- Spot check all external areas of the enclosure and verify all painted areas are covered. Do not use and corrosive or solvent based cleaners on the paint as these will deteriorate the integrity of the paint and/or remove it.

Access plates

- Inspect all access plates and doors.
- Make sure that all plates are secured tightly in place and all fasteners are completely sealed.
- Check all gaskets on doors and plate points for any water intrusion, if there is any and the plate is otherwise tightly secured, the gasket will need to be replaced at the plate.
- Once the enclosure is in place, there is no need to remove any side or rear access plates.
- They are only used for access during installation of the equipment and enclosure and should only be removed to address leak and gasket issues.

Air Conditioner

- Check/clean Air Conditioner external intake filter (located on the lower front of the McLean model)

Smoke Alarm – (if applicable)

The smoke alarm is located on the underside of the top left access plate - this plate needs to be removed to access the smoke alarm. Test smoke alarm per manufacturer specifications and instructions. The smoke alarm is DC powered, so there is no battery to service or replace. If the unit fails testing, it will need to be completely replaced. Ensure the mounting access plate is properly replaced and secured after testing.

Hydrogen Alarm – (if applicable)

The hydrogen alarm is located on the underside of the top left access plate with the smoke alarm - this plate needs to be removed to access the smoke alarm.

The hydrogen alarm warns of any buildup of potentially dangerous hydrogen within the enclosure.

As this may present a dangerous explosive situation, it is imperative to ensure that the detector is functional at all times.

Test the hydrogen alarm per manufacturer specifications and instructions. The hydrogen alarm is DC powered, so there is no battery to service or replace. If the unit fails testing, it will need to be completely replaced. Ensure the mounting access plate is properly replaced and secured after testing.

Service and Technical Support

If you require assistance with the installation or operation of the enclosure, or if you need product repair under warranty, contact La Marche Mfg. at:

La Marche Phone Number: (847) 299-1188

24-hour **Emergency** Number: (847) 296-8939

<https://www.lamarchemfg.com/contact-us>

Ordering Replacement Parts

Contact La Marche to place an order for spare or replacement parts. To order replacement parts; please provide the model and serial number of the product, the part needed and the quantity required.

Appendix A.1: CA2219C 2K BTU HVAC Manual



INSTALLATION AND MAINTENANCE MANUAL FOR AN, AS, AND AT SERIES AIR CONDITIONING UNITS



**Air Conditioners with Capacity of
1,000 to 19,000 BTU/HR Nominal**

115VAC & 208/230VAC Models



* A more recent revision may be available at www.voltairesys.com or the QR Code in the top right corner of every page.



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1. IMPORTANT INFORMATION TO REVIEW PRIOR TO INSTALLATION, OPERATION AND MAINTENANCE

- **READ THE ENTIRE MANUAL PRIOR TO INSTALLING AND MAINTAINING** the VoltAire Systems Air Conditioners. Do not install or perform maintenance on the air conditioner if you do not understand all of the instructions. Contact VoltAire Systems at (407) 378-7482 with any questions or concerns.
- The air conditioner should be fully inspected on initial delivery. Open the packaging completely at the time of initial delivery and verify there is no hidden or concealed damage. Shipping damage, including concealed damage, is not covered under warranty.
- **WARNING: IMPROPER INSTALLATION AND OPERATION MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR LOSS OF LIFE.** The air conditioner shall only be installed and serviced by a certified professional in strict accordance with the requirements within this manual, in accordance with all local/state/federal codes, and per industry standards. Remove power from the unit during maintenance and installation, as line voltage may be dangerous, hazardous and lethal.
- In the event of a conflict, code requirements shall take precedence over the instructions provided within this manual. The installer shall be aware of all code requirements and shall comply fully.
- Use care when transporting and lifting the air conditioner. The unit should be maintained in the upright position at all times. If the unit has been mistakenly laid on its side stand the unit up and wait at least 24 hours before applying power.
- **WARNING: WEAR PROPER PERSONAL PROTECTION EQUIPMENT, INCLUDING BUT NOT LIMITED TO SAFETY GLASSES, GOGGLES, AND GLOVES. EDGES MAY BE SHARP.**
- A field provided time delay fuse or breaker must be provided by the installer with the power supply circuit serving the air conditioner. The installer shall size this fuse / breaker and wire in accordance with all applicable codes. Verify wire terminals and voltage prior to plugging into the Air Conditioner, otherwise you may damage the electrical components.
- **IMPORTANT NOTE:** Valve service ports are provided with rubber gasketed caps that are used to fully seal the service ports. If the caps are removed for service, they must be put back following service to prevent any potential leakage through the valves.
- These instructions should be retained by the owner and/or with the unit.



2. PARTS SHIPPED LOOSE AND TOOLS/MATERIALS PROVIDED BY THE INSTALLER

Materials shipped loose in addition to this manual are as follows:

a) Mounting Gasket Field Kit

UNIT	PART NUMBER
AN01 / AS01	B6F0094VAA
AN02 / AS02	B6F0034LAA
AT04 / AT06	B6F0004LAA
AT08 / AT10 / AS10 / AT12 / AS12	B6F0005LAA
AT19	B6F0095VAA
AN04 / AS04	B6F0035LAA

b) M6x25 Mounting Bolts

Unit	Quantity
AN01* / AS01*	3
AN02 / AS02	6
AT04 / AT06	10
AT08 / AT10 / AS10 / AT12 / AS12	12
AT19	18
AN04 and AS04	10

* Quantity 2 of M6x25 Threaded Studs in addition to associated hardware are provided in order to assist with hanging of unit

Required Tools and Materials provided by Installer:

- Fuse and/or breaker
- Exterior rated silicone sealant
- Phillips head screw driver
- T25 Security Torx (Allen head screw driver for AS models)
- M6 HEX head screw driver
- Torque wrench
- Personal Protection Equipment
- Wire-Stripper



3. PRODUCT DESCRIPTION

VoltAire Systems AN, AS, and AT Series Air Conditioning Units are designed for high efficiency and high performance heat management of electronic enclosures or equipment. This product is an active thermal management system with an internal refrigerant system and is designed for electronic environments. The units covered by this manual are intended for Industrial Process only. These products are designed to function according to the data label found on the units.

Figure 1 shows the side of the AC unit and its intake and exhaust points for both the interior and exterior airflow path. Exterior air enters the unit at the bottom, side, or bottom-front and discharges air through the condenser coil at the top-front of the unit. The interior air enters through the top-back of the unit and discharges conditioned air through the evaporator coil on the bottom-back of the unit. Airflow on the interior/evaporator side can be actively heated with an optional electric heater.

The unit is controlled with a control board (see corresponding controls manual addendum) that provides an easy to use interface to: operate a Test Mode for startup and diagnosis, configure operating parameters for temperature and alarm set points, provide anti-short cycling, monitor operating pressure(s), provide visual alarms and diagnosis, and provide a HVAC trouble/temperature alarm dry contact output.

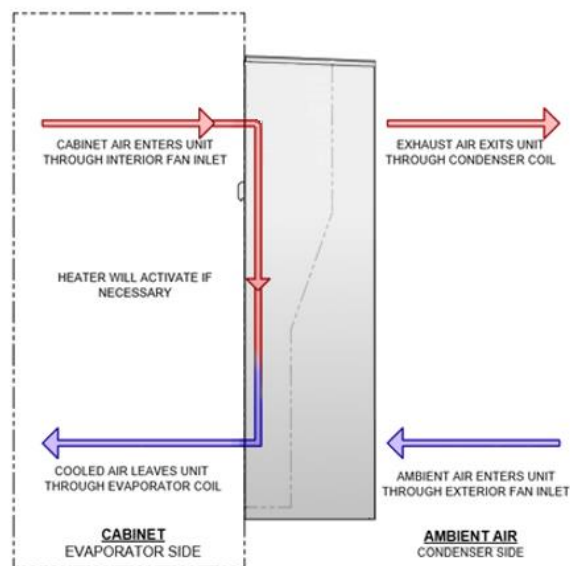


Figure 1 – Airflow



4. GENERAL PRODUCT DATA

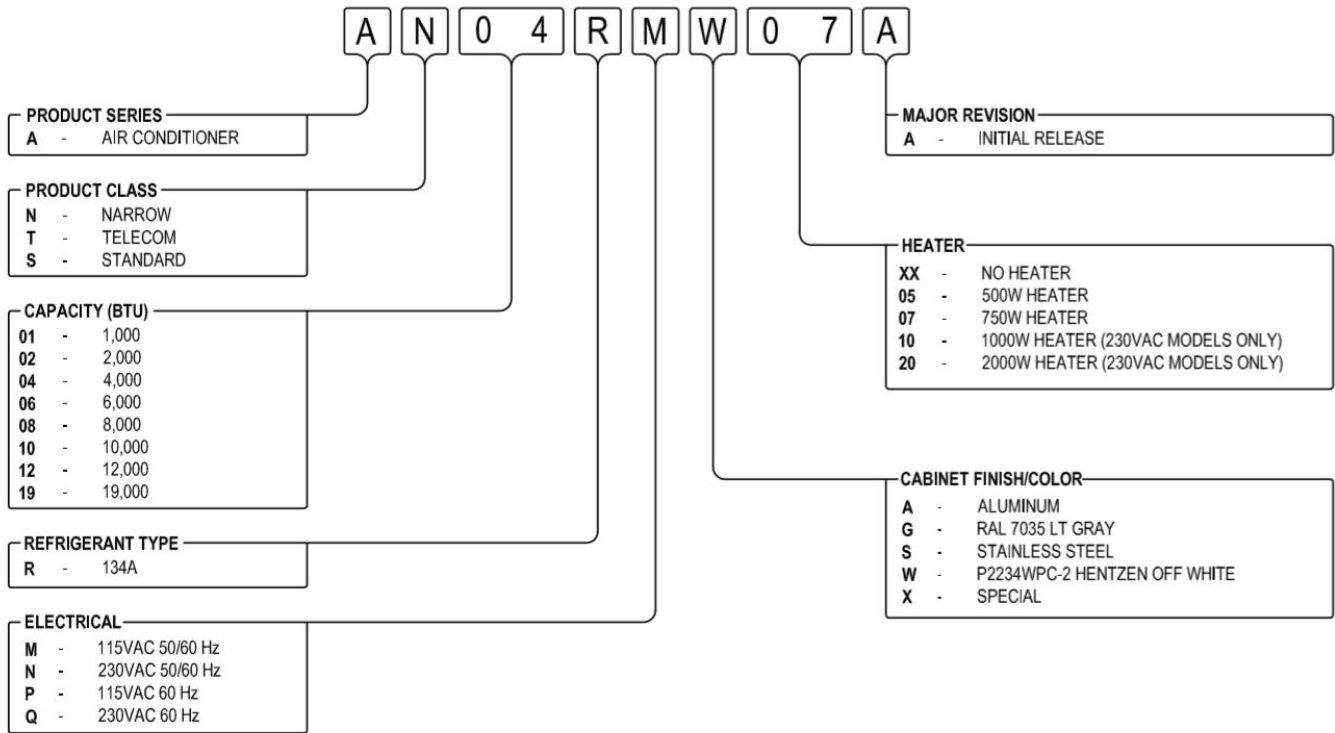


Figure 2 – Model Nomenclature



MODEL NUMBER (__ is SERIES AN, AS, or AT)	NOMINAL CAPACITY ¹ (BTU/HR SENSIBLE)	RATED VOLTAGE (SGL Ø AC 50/60HZ)	MINIMUM CIRCUIT AMPACITY (AMPS)	MAX BREAKER / FUSE SIZE / MOCP (AMPS)	WEIGHT (lbs.)	NOMINAL SIZE W x H x D (in.)
__01RM	1,000	115	3.8	10	AN/AS: 30.0	AN/AS: 10.0 x 15.8 x 7.7
__01RN		208/230	2.3	10		
__02RM	2,000 ²	115	6.4	10	AN/AS: 36.8	AN/AS: 10.4 x 20.4 x 10.4
__02RN		208/230	3.8	10		
__04RP	4,000	115 (60HZ Only)	15.9	25	AT: 74.7	AT: 17.4 x 29.6 x 12.9 AN/AS: 14.1 x 30.0 x 12.3
__04RQ		208/230 (60HZ Only)	5.3	10	AN/AS: 65.6	
__06RM	6,000	115	10.2	15	AT: 74.7	AT: 17.4 x 29.6 x 12.9
__06RQ		208/230 (60Hz Only)	5.3	10		
__08RM	8,000	115	16.4	25	AT: 94.6	AT: 16.1 x 43.6 x 12.2
__08RN		208/230	8.7	15		
__10RN	10,000	208/230	10.1	15	AT/AS: 94.6	AT/AS: 16.1 x 43.6 x 12.2
__12RN	12,000	208/230	12.7	15	AT/AS: 96.9	AT/AS: 16.1 x 43.6 x 12.2
__19RN	19,000	208/230	24.5	35	AT: 200	AT: 21.6 x 53.0 x 17.0

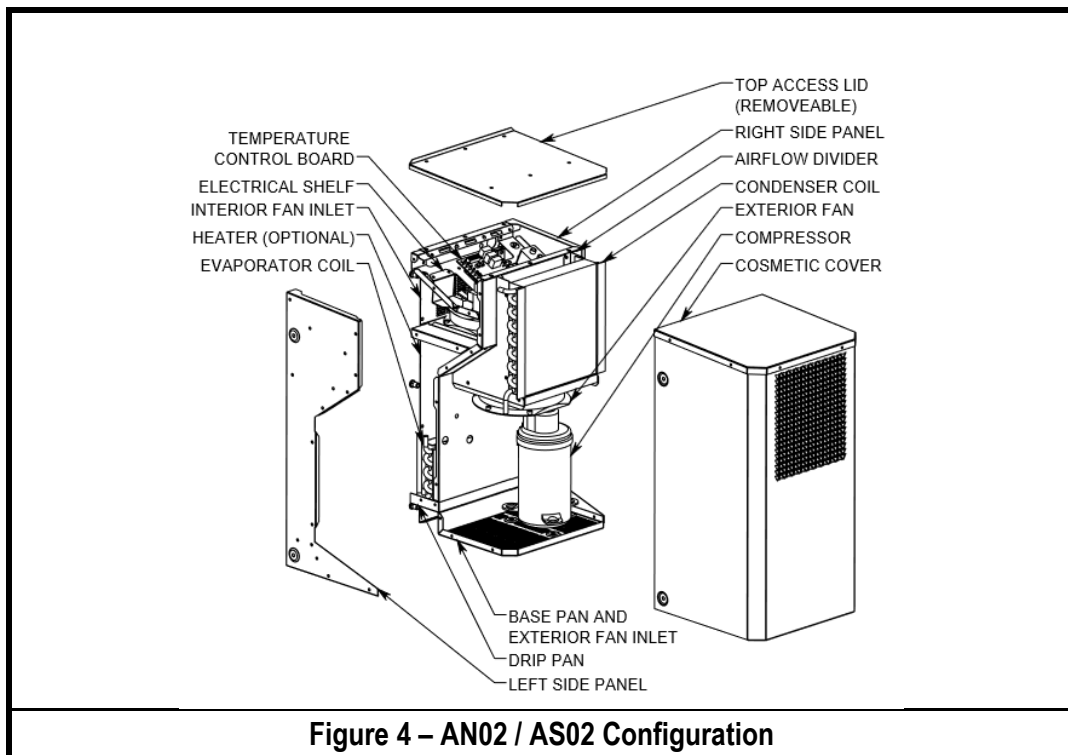
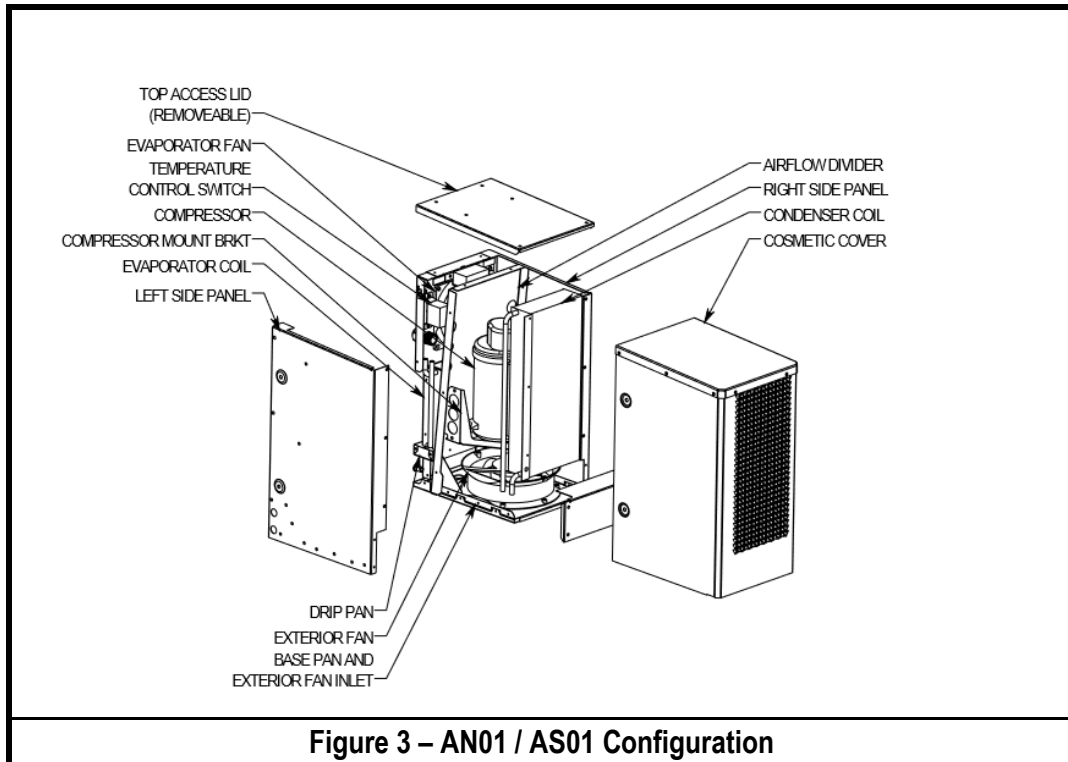
¹ Capacity is nominal based upon free airflow without restrictions; Locating the air conditioner where airflow is restricted may reduce capacity; Nominal capacity is at exterior temperature of 131°F (55°C) and interior temperature of 131°F (55°C)

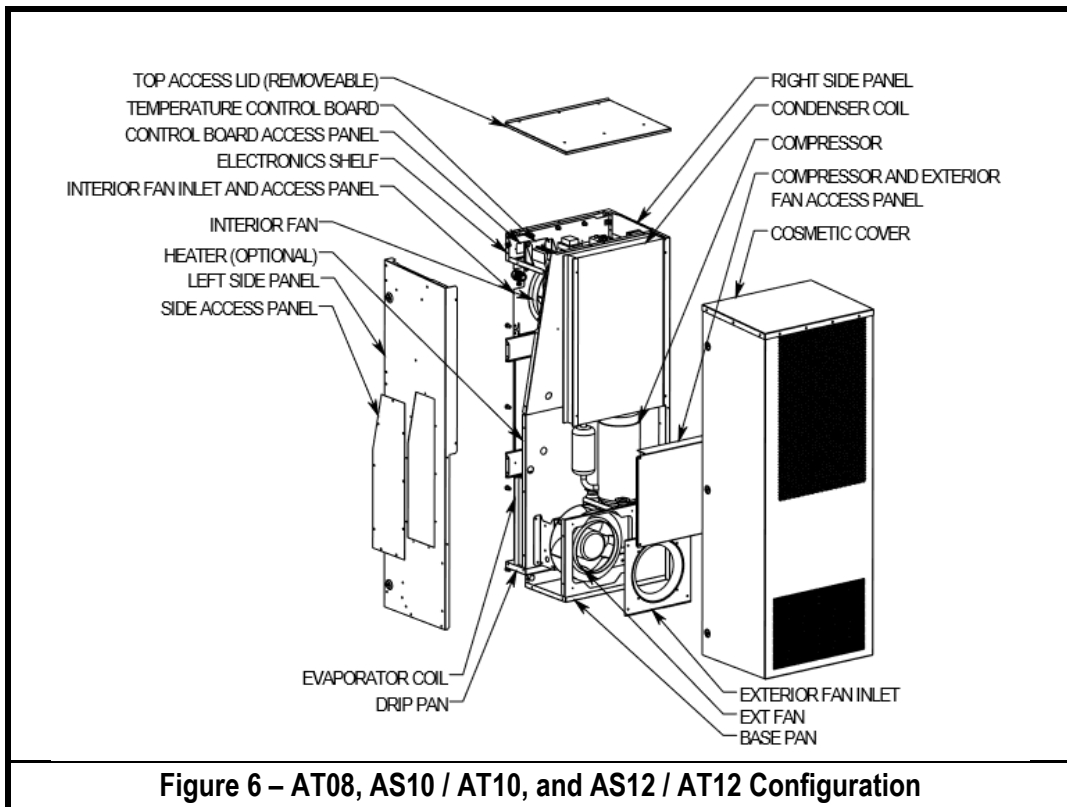
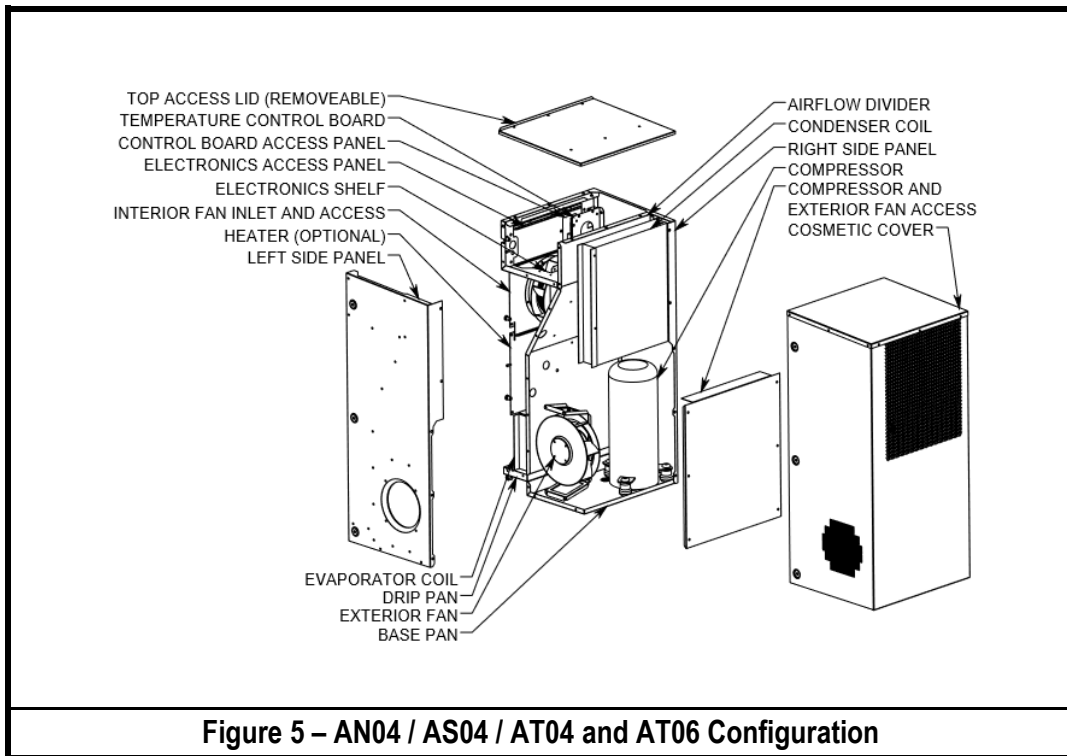
² Capacity at exterior temperature of 122°F (50°C) and interior temperature of 122°F (50°C)

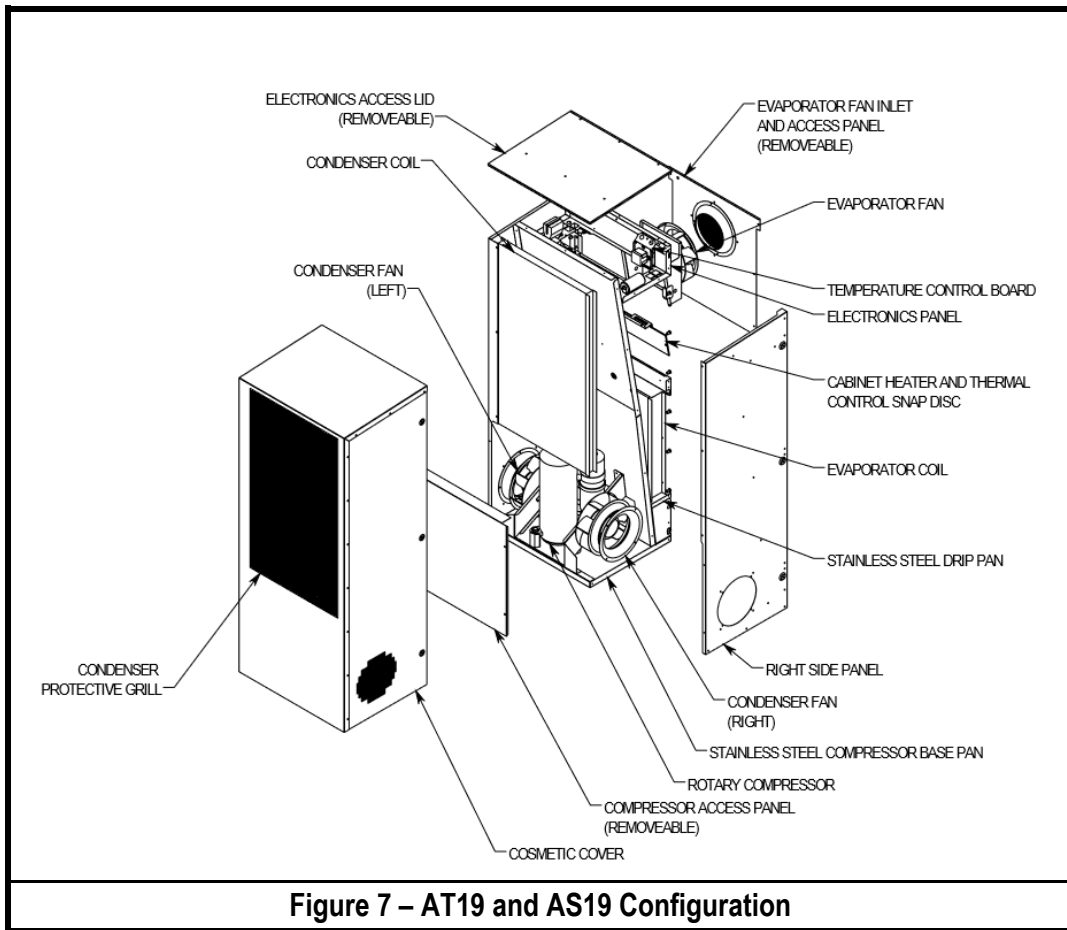
Table 1 – General Product Specifications



PRODUCT CONFIGURATIONS

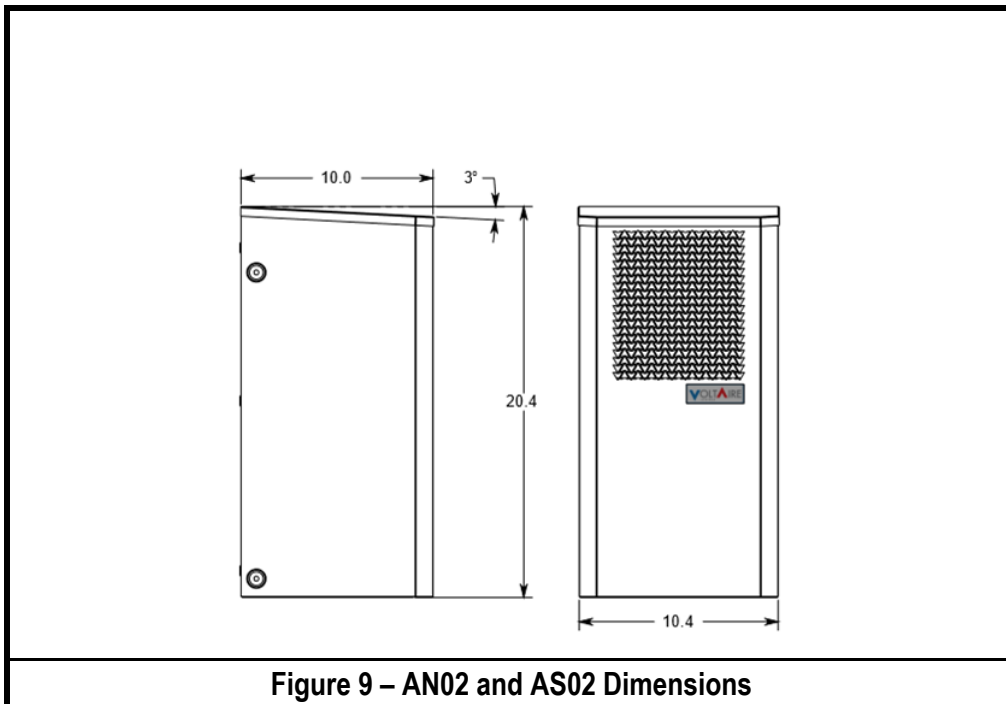
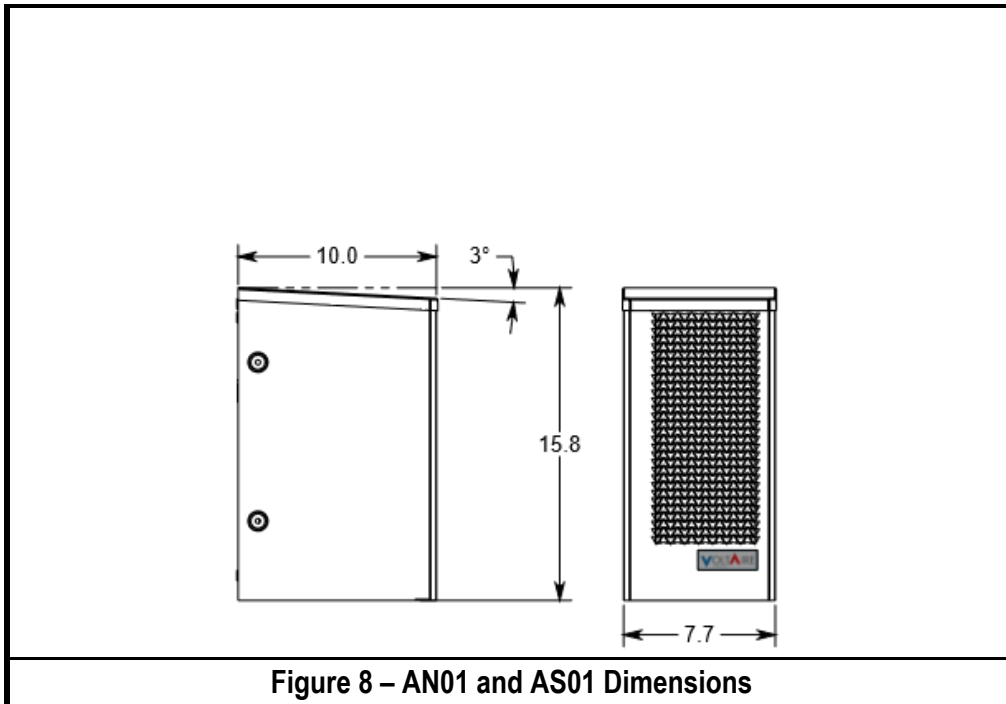


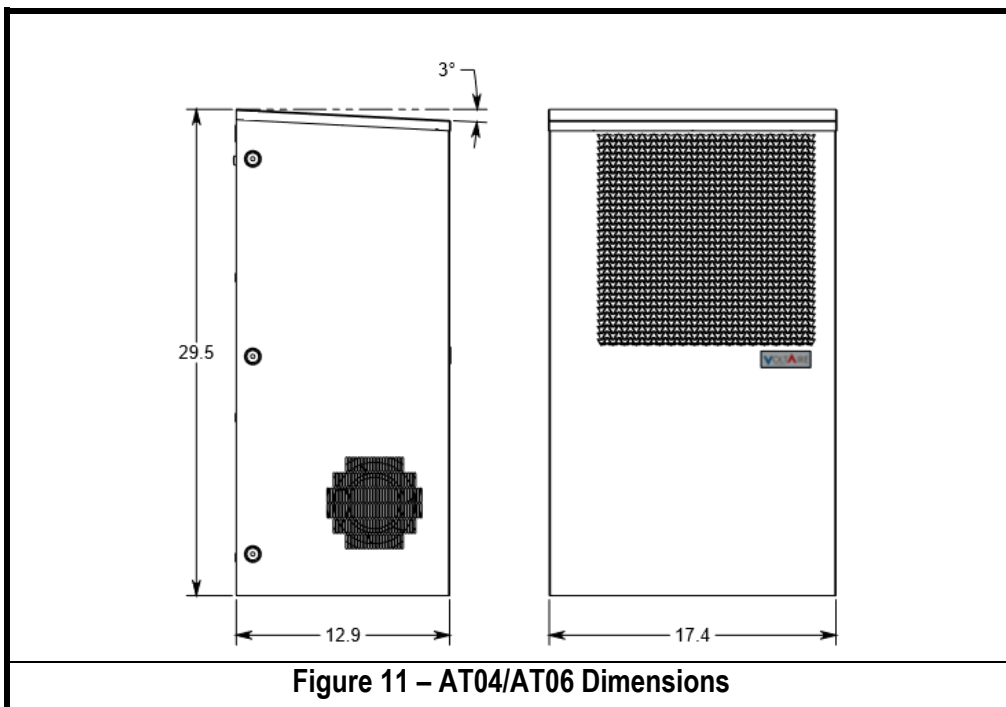
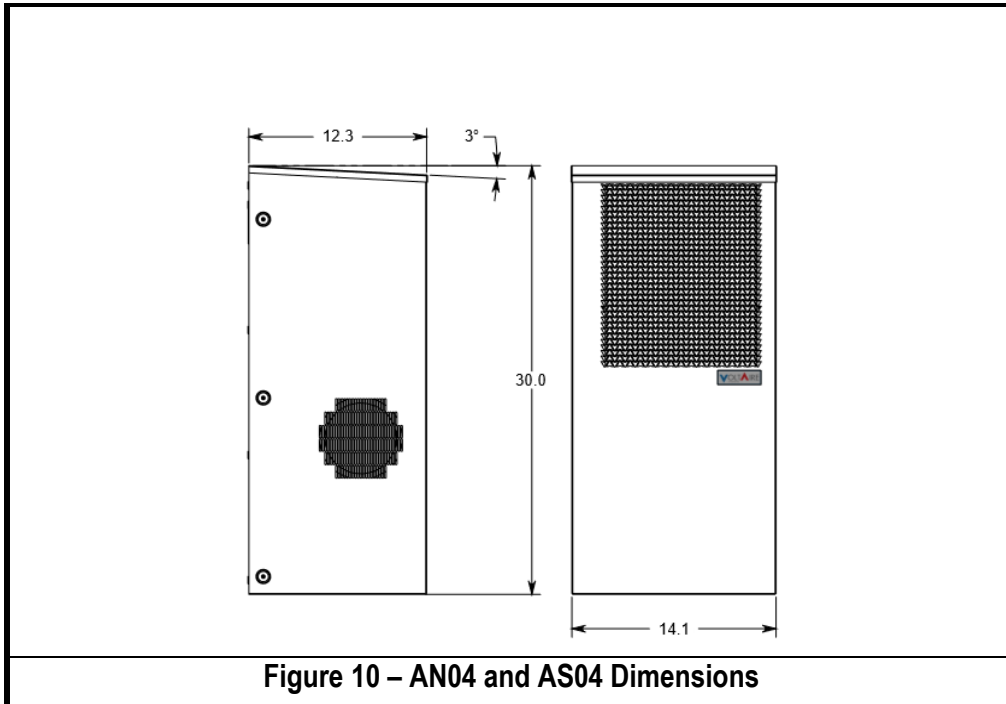






PRODUCT DIMENSIONS





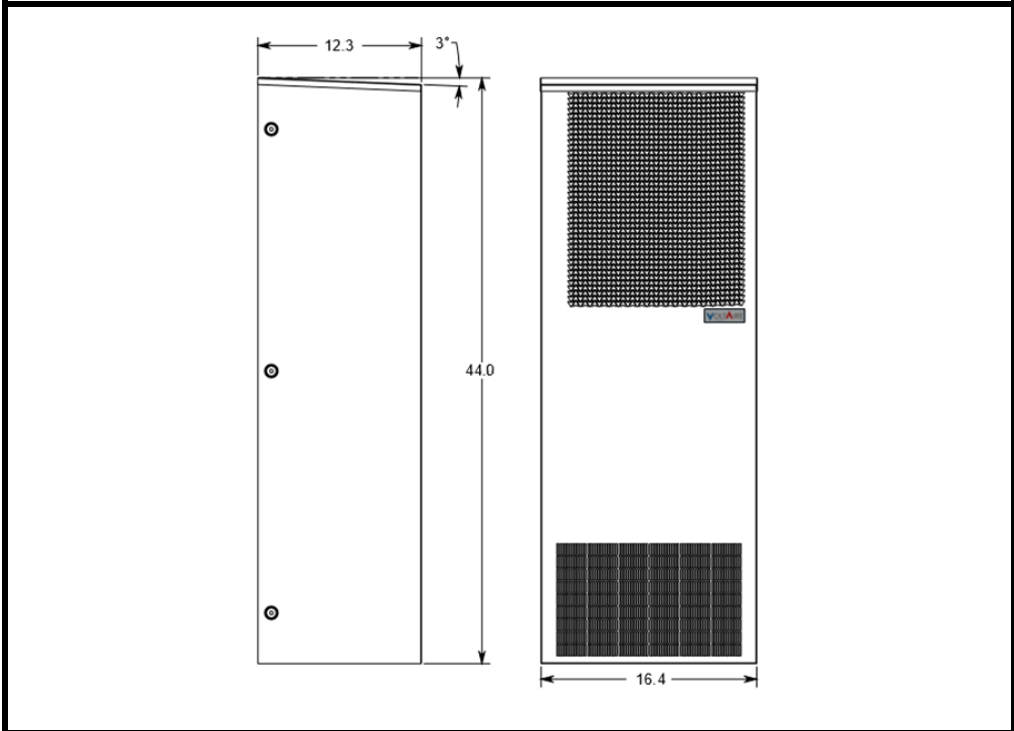


Figure 12 - AT08/AT10/AT12 and AS10/12 Dimensions

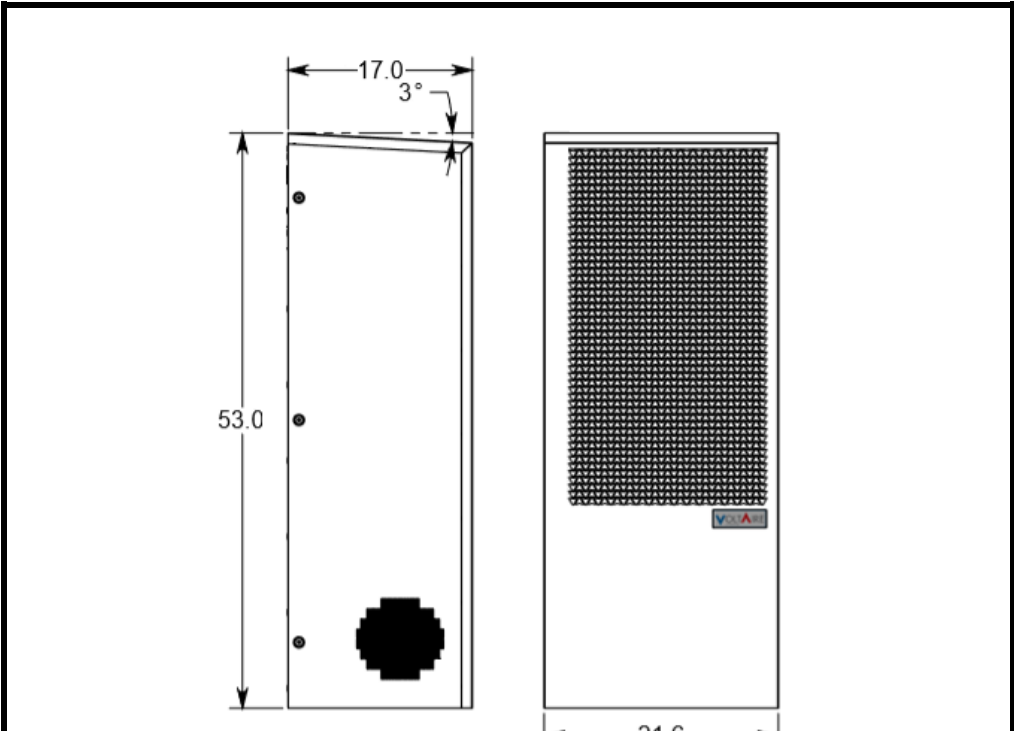


Figure 13 - AT19 and AS19 Dimensions



5. INSTALLATION INSTRUCTIONS

WARNING: REVIEW THIS MANUAL COMPLETELY PRIOR TO BEGINNING INSTALLATION, OR SERVICE. FAILURE TO DO SO MAY RESULT IN IMPROPER OPERATION, UNIT DAMAGE, AND/OR PERSONAL/BODILY HARM.

The unit may be installed on any flat vertical surface. Do not install the unit in a horizontal position and verify the unit is level. The unit should be located on a cabinet or equipment such that airflow is not restricted by obstructions of the interior or exterior airflow path, as obstruction of airflow will reduce capacity of the unit and may cause unit failure.

Using the cutout templates shown below in Figures 14 through 18, prepare the wall for the interior intake and discharge openings and fastener locations. Clean the mounting surface to remove any dust, grease, and/or debris, including removing any metal burrs resulting from metal cutting.

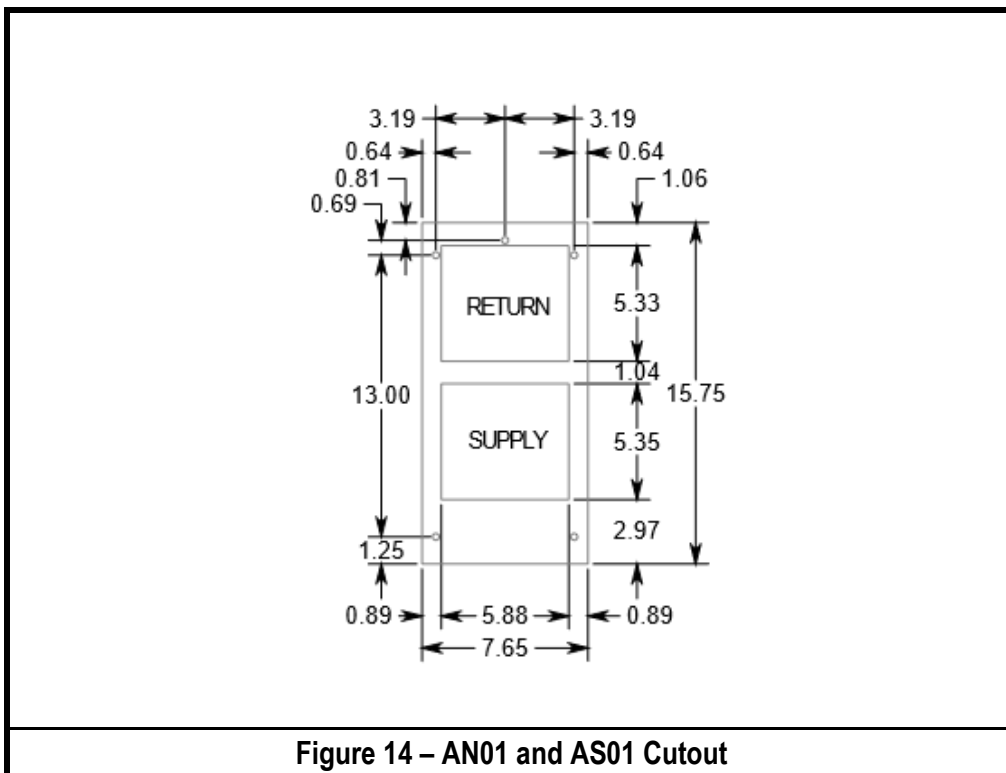


Figure 14 – AN01 and AS01 Cutout

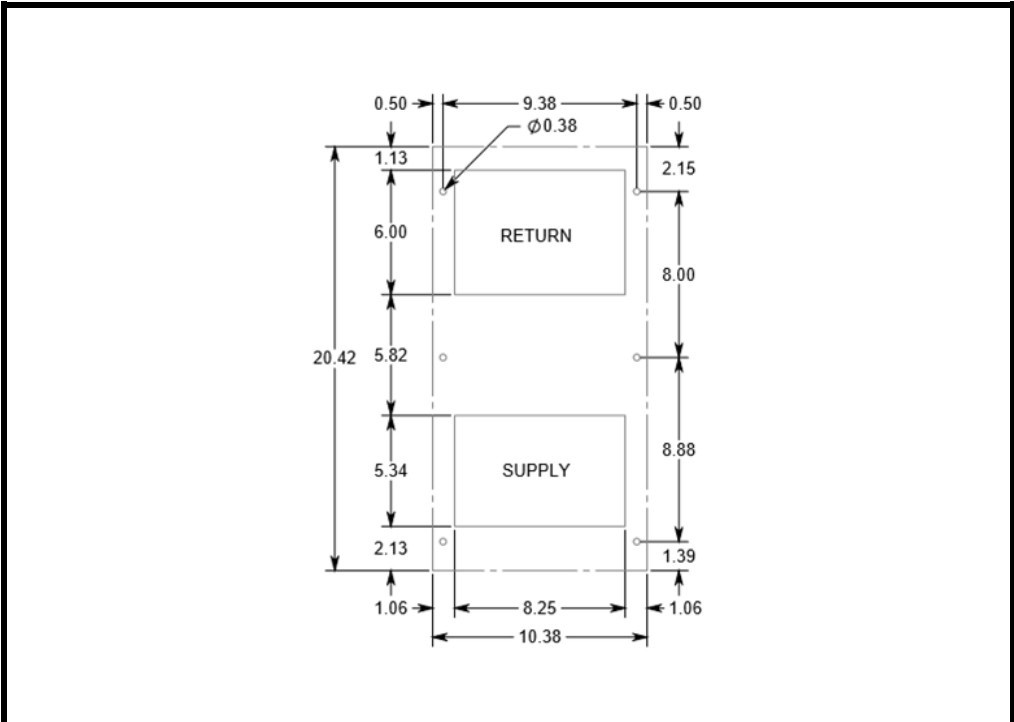


Figure 15 – AN02 and AS02 Cutout

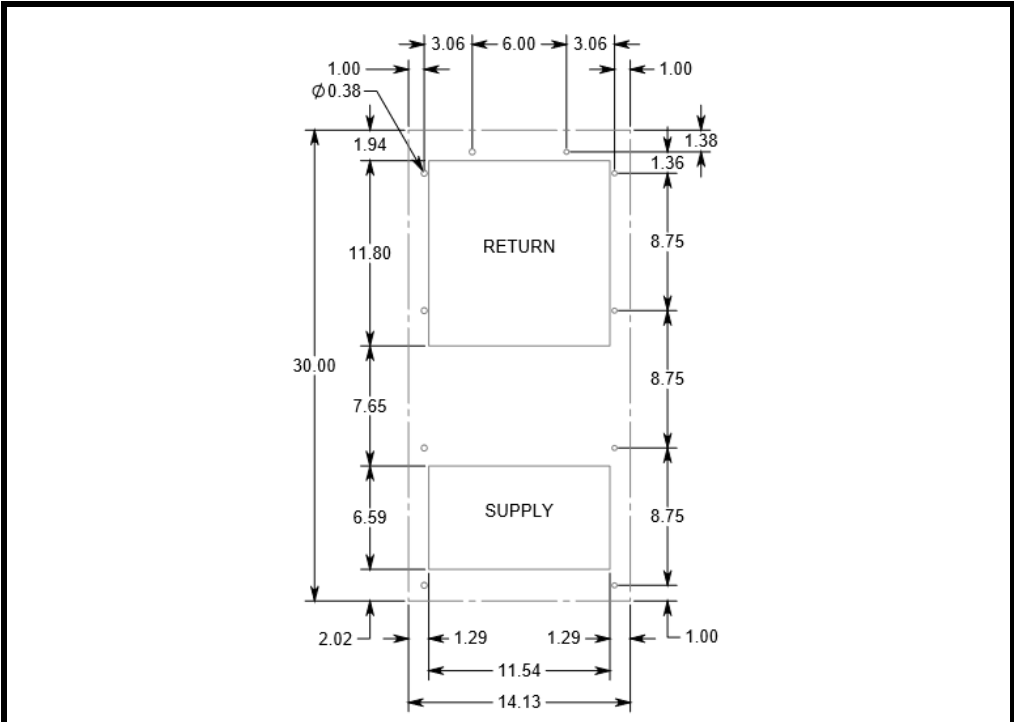


Figure 16 – AN04 and AS04 Cutout

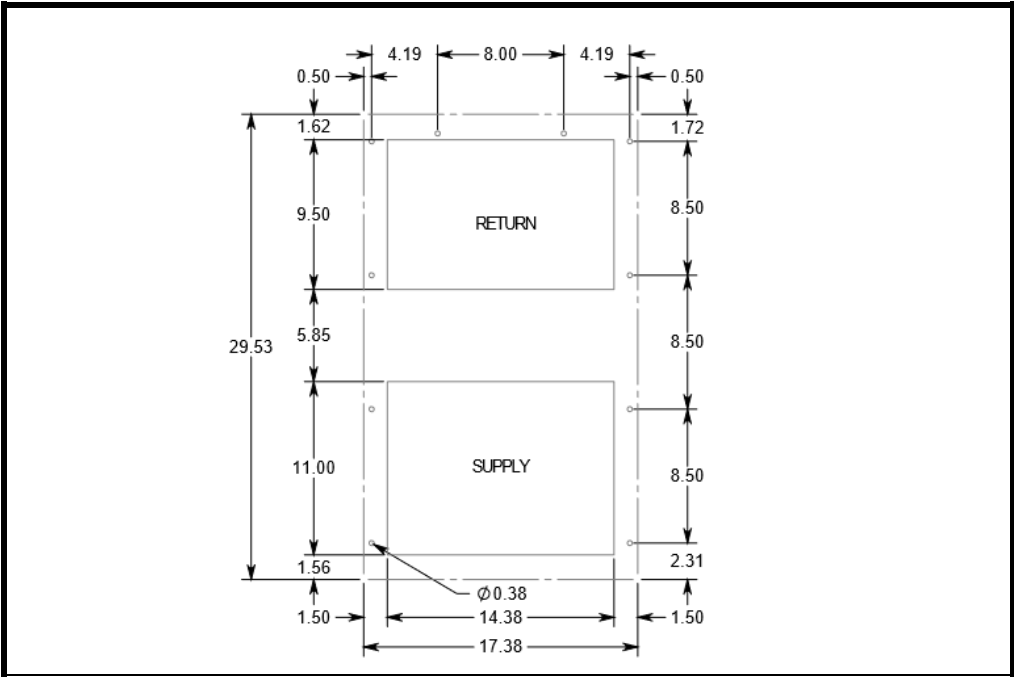


Figure 17 – AT04 and AT06 Cutout

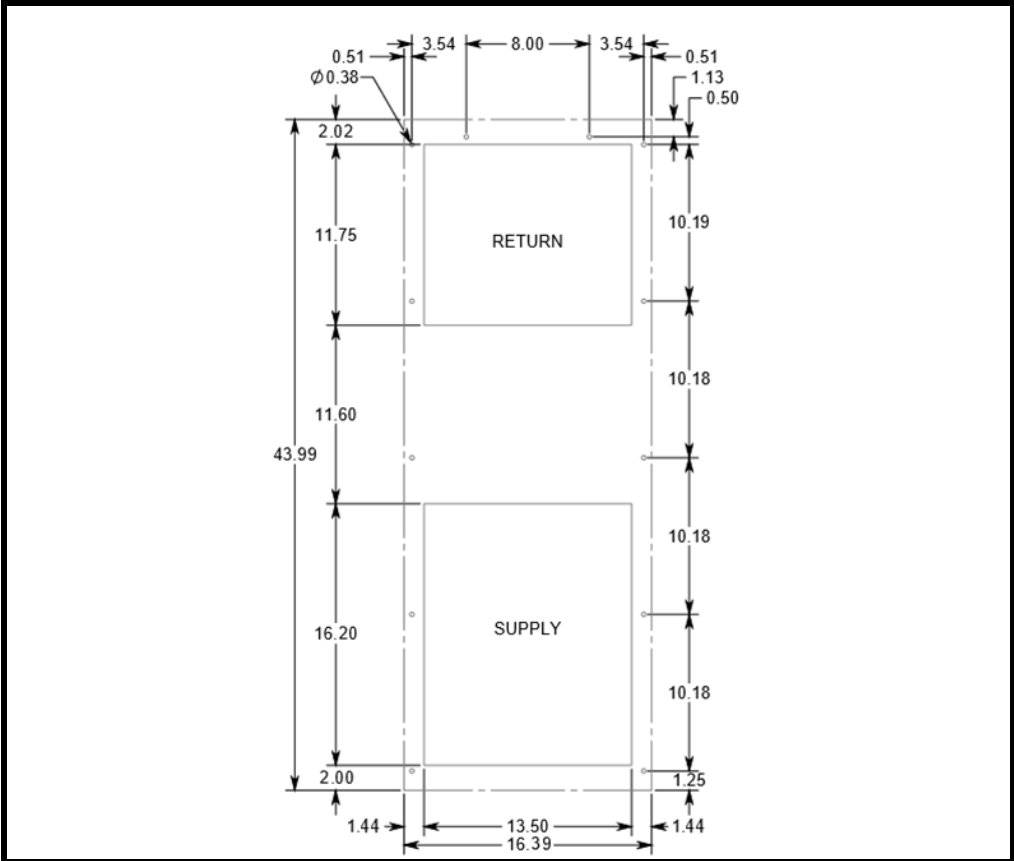


Figure 18 – AT08/AT10/AT12 and AS10/12 Cutout

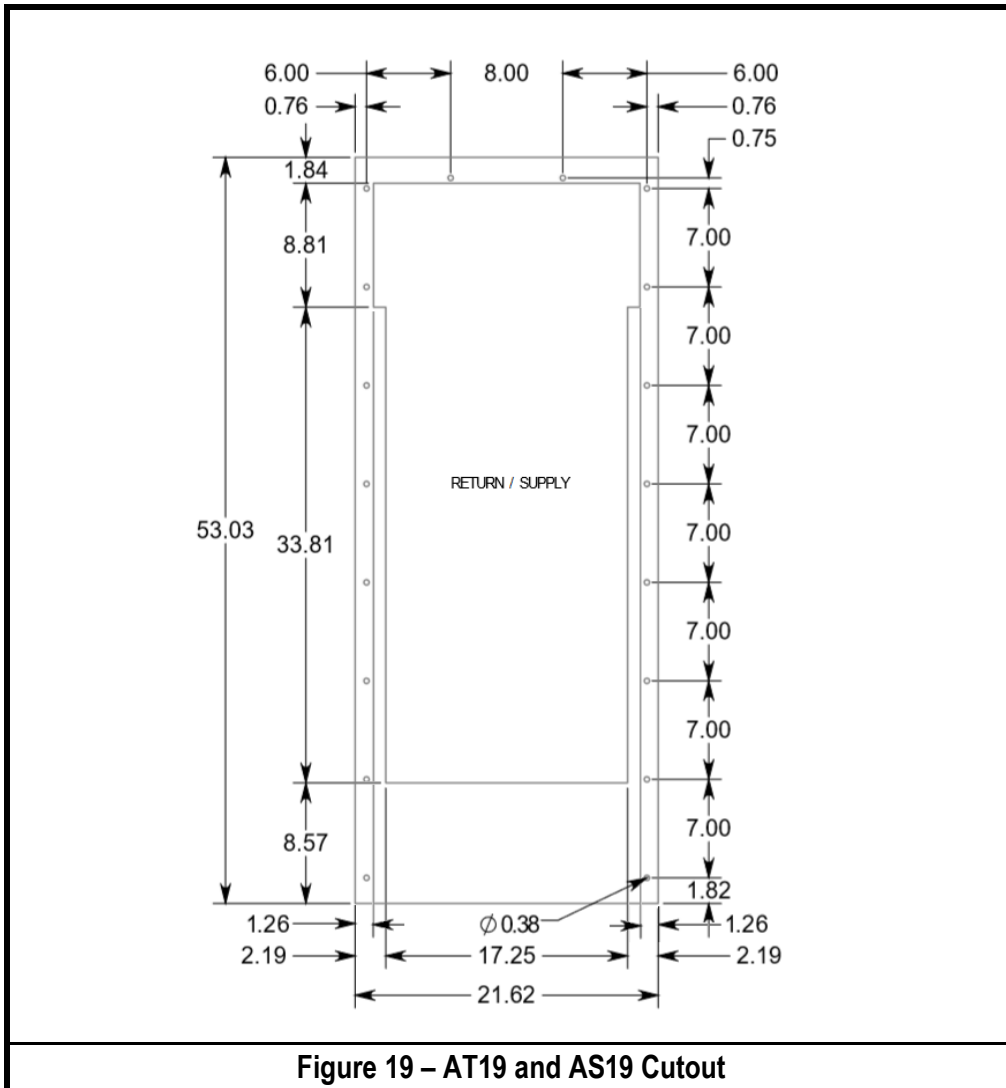


Figure 19 – AT19 and AS19 Cutout



A typical example of the gasket application is shown on an installation in Figure 20. The supplied gasket is compressed between the cabinet and the air conditioning unit to prevent external water from entering the cabinet through the supply and return openings as seen in Figures 14 through 19. Clean any dust or debris from the designated gasket area shown in Figure 21 to ensure that the gasket properly adheres to the unit. Using the provided gasket kit, place the gasket on the back of the AC Unit immediately abutting the mounting hole locations. The gasket should run across the width of the top of the unit, down both sides, with two cross pieces underneath the mounting hooks and the evaporator coil. Be sure to utilize the longer of the two shorter lengths for the top of the unit. This will maximize protection against water. Ensure there are no gaps in the gasket and verify the top has no gap to ensure proper protection of rain or water.

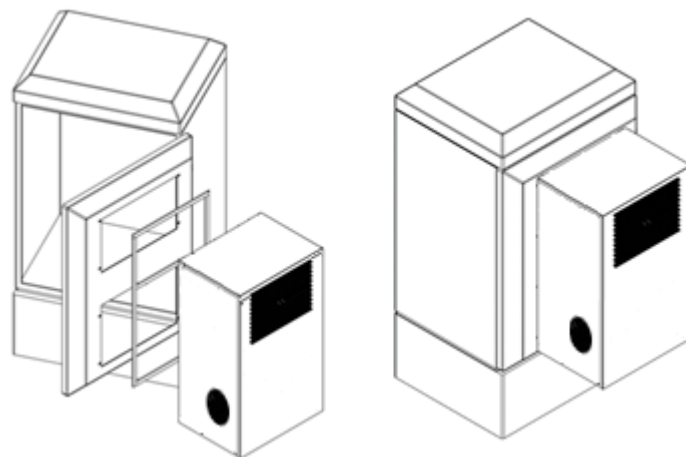


Figure 20 – Gasket Application

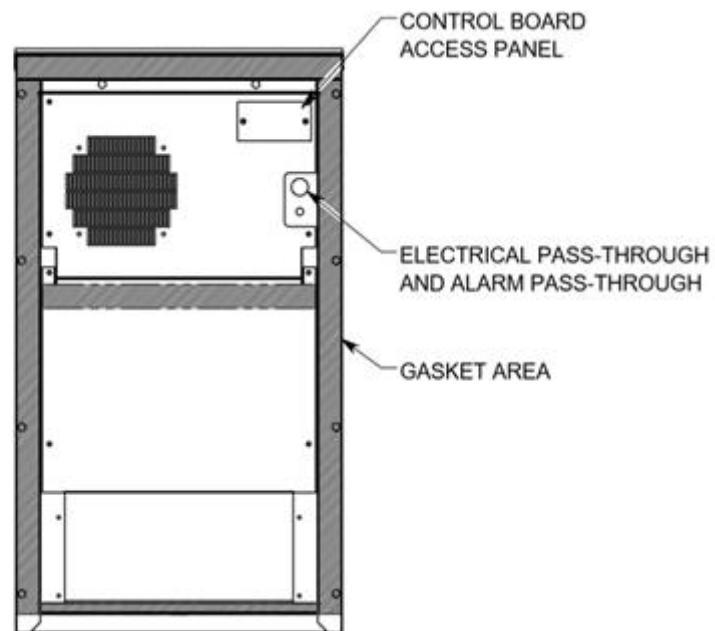


FIGURE 21 – Gasket Area



Remove the cover from the unit using a security T25 Torx driver (AT/AN) or Allen driver (AS). The unit is equipped with a set of mounting tabs to assist with temporary hanging during installation. Utilize the mounting tabs to place the unit in the proper location at the base of the upper cutout. Install the M6x25 bolts (quantities vary by model) at each of the mounting locations. Install the M6 nuts and washers on the M6 studs. Tighten the M6 mounting bolts/nuts on the M6 studs to 50 in-lbs torque. Do not over tighten.

From the exterior, inspect the gasket to verify the gasket is tight and there are no visible leakage points. Using a field supplied sealant, seal around all four sides of the AC Unit. Note that the AC Unit is generally maintainable without removal from the cabinet/equipment. Therefore, use a liberal amount of sealant. If top access is required for maintenance purposes, sealant may be removed along the top edge to gain access but new sealant shall be reapplied following the maintenance service.

The evaporator drain pan is provided with a 0.40" outside diameter drain. The drain is located on the positive side of the fan, therefore a trap is not required for positive drainage. If desired, this drain may be trapped by the installer using a field supplied hose or piping.

For AN01/AS01, AN02/AS02, AN04/AS04, AT04-06, AT08, AT/AS10, and AT/AS12 units with an exposed hose barb: connect the supplied drip tube to the hose barb underneath the unit and secure with the hose clamp.

For AT19 units for units with an internal hose barb: remove the compressor access cover (shown in Figure 7) to expose the condenser side. Pass the pre-installed drip tube through the embossed hole in the base pan. Replace the access panel.

Attach the cosmetic cover using the original Torx security or Allen screws.

Install the field supplied fuse and/or breaker per all local/state/national codes, with electrical service rated per the size indicated in Table 1. Prior to starting the unit verify correct operating voltage, with operating voltage required to be within 10% of rated voltage. For nominal 208/230V units, the 24VAC transformer has two taps, 208V and 240V. The unit is shipped with the tapped at 240V, however adjust the transformer tap accordingly to the 208V tap if site voltage is lower than 220V. Failure to adjust the tap, if required, may result in improper operation.

Using the cord and plug provided with the unit, provide electric service to the unit with an electrical receptacle. Installation of the AC Unit is complete with the exception of testing the operation using the TEST Mode function of the controller. Please see the corresponding controller manual for additional information.



6. RECOMMENDED / PREVENTATIVE MAINTENANCE

Although the VoltAire Systems Air Conditioners are designed to require minimal maintenance, it is recommended that the units be inspected periodically for proper operation. The frequency of maintenance is a function of the site conditions, such that dirtier sites may require more frequent maintenance to clean coils and/or filters. The following items can be reviewed during other routine maintenance of the cabinet/equipment:

- Verify operation of the interior and exterior fans. Use the control board test mode to verify operation of the compressor, heater (if applicable), and fans.
- Verify that the unit is sealed properly. The field sealing of the unit to the cabinet/equipment should be inspected to ensure proper sealing.
- Interior/evaporator and Exterior/condenser coil should be cleaned using a commercial available non-acidic HVAC coil cleaner.
- Clean the exterior condenser filter (optional item), if applicable

Table 2 can be used to assist in service / maintenance scheduling.

Maintenance Schedule			
	Maintenance Item	Quarterly / Semiannually	Yearly
1	Check for filter blockage (If Applicable)	✓*	
2	Condenser Coil Cleaning (Remove debris / blockages)	✓*	
3	Functionality Check (Test Mode)		✓
4	Fan rotation Check (Verify fans spin without issues)		✓
5	Evaporator Coil Cleaning (Remove debris / blockages)		✓
6	Cabinet Cleaning		✓
7	Condensate Drain Pipe (Clean and clear any blockage)		✓

* Time may vary based on location conditions of installed unit. Monthly may be necessary for extraordinarily dirty sites.

Table 2 – Maintenance Schedule



7. TROUBLESHOOTING GUIDE

WARNING: ELECTRICAL SHOCK HAZARD. DISCONNECT POWER FOR SERVICING. FAILURE TO DO SO COULD RESULT IN ELECTRICAL SHOCK OR DEATH.

CAUTION: ELECTRICAL AND REFRIGERATION SERVICE AND TROUBLESHOOTING SHOULD ONLY BE CONDUCTED BY CERTIFIED HVAC TECHNICIANS. TECHNICIANS SHALL FOLLOW ALL INDUSTRY STANDARDS FOR SAFETY. THE COMPONENTS IN THE UNIT ARE STANDARD INDUSTRY COMPONENTS, AND TOGETHER WITH THE INFORMATION PROVIDED WITHIN THIS MANUAL, THE TECHNICIAN SHALL USE STANDARD ELECTRICAL AND REFRIGERATION TROUBLESHOOTING, DIAGNOSIS AND REPAIR PROCEDURES. PLEASE NOTE THAT UNIT MAY CONTAIN CUT HAZARDS/SHARP EDGES AND GLOVES SHALL BE USED TO AVOID SHARP EDGES AND INJURY.

IMPORTANT: REVIEW THE MANUAL IN ITS ENTIRETY PRIOR TO SERVICING OR MAINTAINING THE EQUIPMENT.

PROBLEM	POTENTIAL CAUSE	SOLUTION
Unit or components not powering on	No or improper supply voltage	Check power source voltage (shall be within +/- 10% of unit rating) and verify electrical connections at all terminals. Verify transformer voltage tap is set properly at either 208V or 240V and adjust as necessary as described within this manual.
	Control board not working	Remove power from the unit and check/verify all terminals are fully connected at control board, transformer, relays, contactor, and capacitors. Verify 24V supply power across control board R and C terminal on control board. Use Test Mode to verify proper operation of each component as described within this manual.
	Evaporator side entering air temperature less than 68F.	Verify functionality using the test mode.
Unit not reaching cooling capacity or satisfying heat load in cabinet	Dirty condenser or evaporator coil or exterior filter (optional feature)	Remove blockage by cleaning condenser/evaporator coil thoroughly with commercially available coil cleaner. Acidic based coil cleaner shall <u>NOT</u> be used. Clean exterior filter, if applicable.
	Bent fins on coil	Use coil comb to straighten out fins.
	Loss of refrigerant	Locate leak, repair or replace components, and recharge unit to initial specified charge specification by removing all charge, pumping down refrigerant circuit to remove moisture, verify caps on service ports, and weighing charge in with new R134A refrigerant.
	Verify free and clear airflow at both coils	Verify that airflow is not blocked or obstructed at evaporator and condenser coils. Adjust or divert air, and/or relocate equipment in cabinet that is obstructing airflow.
	Refrigeration metering device malfunction	TXV or capillary tube may be restricted or malfunctioning. See loss of refrigerant above then verify pressure and / or temperature drop and replace if malfunctioning.
	Unit undersized for load	Check heat load of cabinet and verify proper unit sizing.



Evaporator/indoor coil ice buildup	Insufficient heat load	Reduce control board Hysteresis (HYS) to cycle compressor off more quickly and/or increase cooling set point to reduce run time. Unit possibly oversized and may need to be replaced with lower capacity unit.
	Insufficient interior airflow due to dirty evaporator coil	Remove blockage by cleaning evaporator coil thoroughly with commercially available coil cleaner. Acidic based coil cleaner shall <u>NOT</u> be used.
	Unit may be low on refrigerant	Locate leak and repair, and/or replace components, and recharge unit to initial specified charge specification by removing all charge, pumping down refrigerant circuit to remove moisture, and weighing charge in with new R134A refrigerant.
Fan failure	Bad capacitor	Check capacitance of capacitor and replace capacitor if operating outside of specified range.
	Verify operation of low ambient/head pressure control pressure switch	Condenser fan is powered through a head pressure control relay that closes at approx. 200psi and opens at approx. 110psi. Verify switch is closed at normal operating pressures. Replace switch if permanently open.
	Verify operation of temperature switch (AT19 Only)	Condenser fan 2 is powered through a temperature switch relay. If condenser side temperature is below designated setpoint, switch opens and fan will not energize.
Compressor fails to run after startup or unit is operating with low and/or high pressure or compressor drawing abnormally high amps.	Bad run/start capacitor	Check capacitance of capacitors and replace capacitor(s) if operating outside of specified range.
	High pressure switch operation	Switch should be closed with standard operating pressure (or below). Replace bad switch.
	Low pressure switch operation (optional feature)	Switch should be closed with standard operating pressure (or above). Note that control board bypasses switch for 2 minutes after compressor start. Replace bad switch.
	Bad contactor	Verify voltage at contactor and replace contactor if not operating properly.
	Restricted liquid line filter drier	Verify proper pressure drop across liquid line filter drier, and replace if necessary.
	Start relay failure	Verify proper start relay operation and replace as necessary.
	Bad thermal overload switch	Replace overload switch.
Tripped breaker and/or fuse (both field supplied)	Undersized breaker/fuse	Replace with properly sized breaker/fuse and/or wire.
	Short in system	Locate and eliminate short.
	Unit drawing high amps on startup.	Check compressor windings and compressor startup components.
Water in enclosure	Evaporator drain clogged	Remove blockage and clean drain pipe.
	Enclosure not sealed	Properly seal off enclosure to prevent humidity entering unit.
	Mounting gasket damaged	Replace mounting gasket or replace sealant around unit.
FOR ADDITIONAL TECHNICAL SUPPORT, PLEASE CONTACT VOLTAIRE SYSTEMS AT (407) 378-7482.		

Table 3 – Troubleshooting



8. SPARE PARTS

Refer to www.voltaresys.com or the QR code in the top right corner of the page

9. WARRANTY

VOLTAIRE SYSTEMS THERMAL UNITS NON-TRANSFERABLE STANDARD LIMITED WARRANTY, DISCLAIMERS, AND LIMITATIONS OF LIABILITY

**(Applies to All Heat Exchangers, Pressurization Units,
Fan Units, and Air Conditioners)**

The VoltAire Systems, LLC ("VoltAire") Non-Transferable Limited Warranty ("Limited Warranty") is applicable for 12 months following the shipment of the product to the original purchaser ("Purchaser") defined as the "Warranty Period". VoltAire warrants to the original purchaser during the Warranty Period that all materials and workmanship are free of defects of quality and operation that would impair the usefulness of the original air conditioner, fan unit, pressurization unit or heat exchanger (collectively herein referred to as "Product") during the Warranty Period. This Limited Warranty is for all components of the Product, except filters, when installed and operated under the following conditions:

- A. In strict accordance with the Product's Installation and Operation Manual, as may be revised from time to time with the latest version available at www.voltaresys.com.
- B. Maximum voltage variation no greater than plus or minus 10% of nameplate nominal rating.
- C. Maximum frequency variation no greater than plus or minus 3 Hz. of nameplate nominal rating.
- D. Must not exceed minimum and maximum stated temperatures on the nameplate.
- E. Not to exceed (BTU/Hr.) rating, including any heat sink, as indicated on the nameplate.
- F. Installed per all local, State and Federal legal requirements.
- G. The unit must not be restarted for a period of five (5) minutes after intentional or accidental shut-off of a compressor. (This does not apply to heat exchanger or filter fan.)

The Limited Warranty is void and not applicable if:

- A. The Product is installed improperly
- B. The Product is not maintained properly, including prolonged operation with dirty filters or coils
- C. The Product is modified, abused and/or tampered
- D. The Product is applied in an incorrect manner, including operation within a corrosive atmosphere (including but not limited to coastal applications)
- E. The Product is used with the incorrect refrigerant (air conditioners)
- F. The Product is damaged and/or inoperable due to accidents or events beyond the reasonable control of VoltAire and Acts of God
- G. The Product is repaired with parts not provided by VoltAire
- H. The Product is installed and operated outside the United States, Mexico, and/or Canada.



Damage during freight is not included with this Limited Warranty. The Purchaser must insure the Product is installed by a competent, professional, qualified contractor, following all local, state, and national legal requirements and industry standards. The Purchaser must provide adequate maintenance (e.g. filter changes, coil cleanings).

The Limited Warranty covers the Product for the Purchaser only during the Warranty Period, and the Limited Warranty does not include any labor, freight, and/or consequential damages or loss. Upon Notification by the Purchaser, VoltAire solely reserves the right to either, as Purchaser's sole remedy:

- Ship replacement parts to the Purchaser for the Purchaser's infield replacement of the part. Infield replacement will require the Purchaser to provide a purchase order to VoltAire for the standard cost of the part and after infield replacement return the original part to VoltAire with freight cost by Purchaser. Within fourteen (14) days of receipt of the returned part VoltAire will review and analyze the returned part. If the part is found to be defective by VoltAire a credit will be issued to the Purchaser. Parts returned to VoltAire and found not to be defective will result in no credit applied to Purchaser's account and the Purchaser will be required to pay for the replacement part.
- Or, request the return of the Product for evaluation. Return of the Product must be preceded by the issuance of a VoltAire Return Merchandise Authorization (RMA). The RMA will require that shipping costs be paid by the Purchaser to return the Product to VoltAire. Within fourteen (14) days of receipt of the returned Product VoltAire will review and analyze the Product. If the Product is determined by VoltAire to be defective, VoltAire may repair or replace the Product, and will ship the Product to the Purchaser for the Purchaser's installation in the field with no labor costs reimbursed by VoltAire. If the Product is determined by VoltAire to NOT be defective, the Purchaser will be notified and a Purchase Order must be issued in the amount required for the Product to be packaged and returned to the Purchaser.

DISCLAIMERS AND LIMITATIONS OF LIABILITY:

THIS LIMITED WARRANTY CONSTITUTES THE ENTIRE WARRANTY FOR THE VOLTAIRE PRODUCT AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS AND IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY AND WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE. THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF.

VOLTAIRE IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY NATURE WHATSOEVER, INCLUDING, BUT NOT LIMITED TO, LOST PROFITS, ATTORNEYS FEES, AND LOSS OF USE DAMAGES.

VOLTAIRE EXCLUDES ALL LIABILITY FOR OR ARISING FROM ANY NEGLIGENCE ON ITS PART OR ON THE PART OF ANY OF ITS EMPLOYEES, AGENTS, OR REPRESENTATIVES IN RESPECT TO THE MANUFACTURE OR SUPPLY OF GOODS, INCLUDING THE PRODUCT, OR THE PROVISION OF SERVICES RELATING TO THE GOODS, INCLUDING THE PRODUCT.

THIS LIMITED WARRANTY, DISCLAIMER, AND LIMITATION OF LIABILITY SHALL SUPERSEDE ANY TERMS OF PURCHASE PROVIDED BY THE PURCHASER AT THE TIME OF THE PURCHASE, AND THE LIMITATION OF LIABILITY SHALL SURVIVE FROM THE DATE OF THE PURCHASE TO THE DATE OF DISCONTINUED USE. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OF CONSEQUENTIAL DAMAGES MAY NOT APPLY.

Appendix A.2: CA2319B 4K BTU HVAC Manual



TEMPERATURE CONTROL BOARD OPERATION MANUAL FOR AN, AS, AND AT SERIES AIR CONDITIONING UNITS



**Air Conditioners with Capacity of
2,000 to 19,000 BTU/HR Nominal**

48VDC, 115VAC & 208/230VAC Models





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4. Cooling Setpoint and Hysteresis	Page 6
5. Heating and Deadband Set Points	Page 7
6. Temperature Alarm Setpoint and LED Alarm Status	Page 7
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11. Fan Operation	Page 10
12. Initial Startup – Compressor Delay	Page 10



IMPORTANT NOTE: INSTALLER AND MAINTENANCE PERSONNEL SHALL REVIEW THIS MANUAL THOROUGHLY PRIOR TO INSTALLATION, STARTUP, AND MAINTENANCE. FAILURE TO DO SO MAY RESULT IN IMPROPER OPERATION, UNIT DAMAGE, AND/OR PERSONAL/BODILY HARM.

ETHERNET CONTROLLED UNITS: IF A ETHERNET CONTROLLER IS USED PLEASE REFERENCE THE ETHERNET CONTROLLER ADDENDUM THE STANDARD TEMPERATURE CONTROL BOARD REFERENCED BELOW IS NOT INCLUDED IN ETHERNET MODELS

1. CONTROL BOARD FUNCTIONALITY AND OVERVIEW (NON-ETHERNET MODELS)

The AN, AS, and AT series air conditioners include an electronic control board that provides monitoring of temperature and system operation with a simple and easy to use interface to allow the installer or maintenance technician to easily startup, operate, and diagnose/troubleshoot the unit. As shown in Figure 1, the control board is easily accessible from the upper interior cutout of the unit by removing the control board access panel. The key features of the control board are shown in Figure 2.

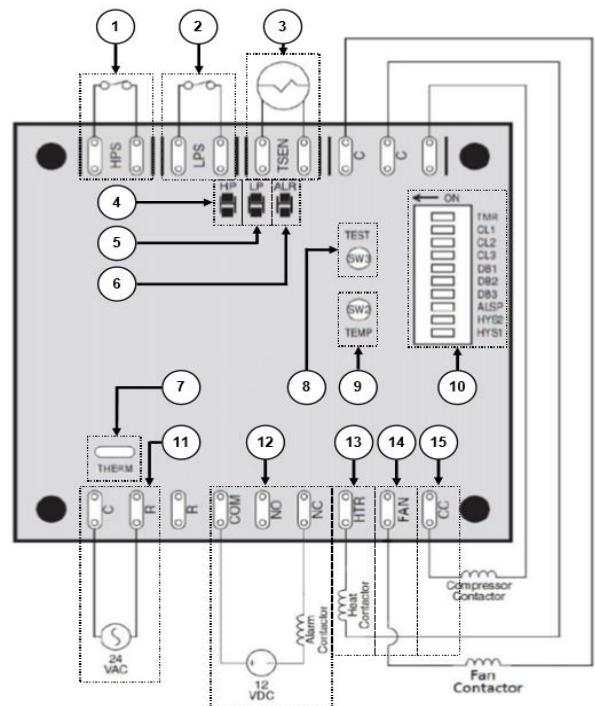


Figure 1 – Control Board Access

Important Note: On some previous models and/or special models the control board may be located elsewhere, such as via an access panel on the exterior of the unit.



ITEM NO.	DESCRIPTION
1	High pressure sensor input
2	Low pressure sensor input (Not Used)
3	Remote temperature sensor input
4	High pressure status (HP)
5	Low pressure status (LP)
6	Alarm (ALR)
7	On board temperature sensor
8	Test button (TEST)
9	Temperature Display (TEMP)
10	Setpoint DIP Switches
11	24VAC / VDC power terminals
12	Alarm (dry contacts NO/NC/COM*)
13	Heating Output
14	Fan output with Compressor Contactor
15	Compressor Contactor



* Alarm Dry Contact is rated at 2A @ 12VDC, 1A @ 30VDC, 3A @ 125VAC, 2A @ 250VAC

Figure 2 – Control Board Overview

The controller provides control of cooling and heating (if the optional heater is included) with auto-change over between heating and cooling mode. The board includes adjustable DIP switches to allow user configuration of desired temperature alarming, as well as providing testing and diagnosis functions. The board monitors temperature utilizing an onboard temperature sensor and remote sensor (installed as standard option), and the board temperature display function provides for temperature sensor reading verification for diagnostic purposes. The remote temperature sensor is connected to board and located within the interior cabinet section near the interior fan. The board uses the remote temperature sensor for all operations. The onboard sensor is provided as a backup only with no effect on operation if the remote sensor is attached and functioning properly. The remote temperature sensor is installed within the interior fan section of the unit, however the remote temperature sensor includes a 6' long lead wire and may be relocated outside of the unit, if deemed necessary by the installer or service technician. Be careful **NOT** to install the sensor in an area that is not properly conditioned by the unit (e.g. rear of cabinet obstructed by equipment resulting in insufficient airflow and conditioning), as that may result in the unit freezing and/or resulting in equipment damage.

In addition to monitoring temperature for alarming purposes, the controller utilizes an input from the high pressure switch. The pressure sensor is provided to prevent permanent damage of the system due to system failure or lack of maintenance, as well as to provide a trouble alarm (LED status lights and alarm output). The pressure sensor monitoring and effect on sequence of operations is further discussed on Page 8



2. DIP SWITCH SETTINGS

The ten (10) DIP switches allow users to configure the controller for proper temperature and alarming. DIP switches are either ON (left position) or OFF (right position), as outlined below:

DIP Switch	DESCRIPTION	ON (LEFT)	OFF (RIGHT)	DEFAULT
TMR	5 MINUTE NO-TIMER MODE	NO-TIMER MODE ACTIVE	TIMER ACTIVE	Off
CL1	COOLING SETPOINT SWITCH 1	SEE TABLE 3 FOR COOLING SETPOINTS (DEFAULT COOLING SETPOINT – 81F)		Off
CL2	COOLING SETPOINT SWITCH 2			On
CL3	COOLING SETPOINT SWITCH 3			On
DB1	DEADBAND SWITCH 1	SEE TABLE 5 FOR DEADBAND (HEATING SETPOINT = COOLING SETPOINT MINUS DEADBAND) (DEFAULT DEADBAND 30F RESULTING IN DEFAULT HEATING SETPOINT OF 51F)		Off
DB2	DEADBAND SWITCH 2			On
DB3	DEADBAND SWITCH 3			On
ALSP	ALARM SETPOINT DIFFERENTIAL	4° DIFFERENTIAL	8° DIFFERENTIAL	Off
HYS1	COOLING HYSTERESIS SWITCH 1	SEE TABLE 4 FOR HYSTERESIS SETTINGS (DEFAULT IS 3 DEGREES BELOW COOLING SETPOINT)		On
HYS2	COOLING HYSTERESIS SWITCH 2			On

Table 1 – Control Board DIP Switches

NOTE: It should be anticipated that operating conditions change from location to location and the board may require installer/user adjustment to achieve the desired operating conditions. Installer and/or user to adjust board settings (cooling setpoints, deadband, hysteresis) based upon load conditions to minimize frequency of on-off cycles while maintaining max. and min. temperatures required for the cabinet/enclosure.

3. NO-TIMER MODE

The NO-TIMER MODE allows an installer or maintenance technician to bypass all delays provided internally to the board (e.g. 5 min. anti-short cycling cooling delay). This switch may be used immediately after initial startup or cycling of power, or after the termination of a cooling or heating command. NO-TIMER MODE is active for 5 minutes after the NO-TIMER MODE is toggled from OFF to ON. During NO-TIMER MODE all timed delays will be ignored. However, to protect the compressor, a low or high pressure event will immediately terminate NO-TIMER MODE and the board will be locked out for cooling operation in order to protect the refrigeration circuit.

If the NO-TIMER MODE switch is left ON and power is cycled, the board will not permit a NO-TIMER MODE until after the switch is toggled OFF and back ON.



4. COOLING SETPOINT AND HYSTERESIS

Cooling setpoint is based upon CL1/CL2/CL3 positions as shown below in Table 2. The board will energize cooling operation immediately upon the temperature sensor reading a temperature 1°F above the cooling setpoint, as long as the board is not in a cooling delay (5 minutes). The cooling operation will terminate when the temperature sensor reads a temperature equal to the setpoint less the hysteresis, with the hysteresis settings shown below in Table 3.

The hysteresis is the differential below the cooling setpoint when the unit will stop cooling operations. The Hysteresis is set per Table 3. As an example, if the cooling setpoint is 81° and the Hysteresis is set to 3°, the cooling operation will begin at 82° (Cooling Setpoint + 1°) and will terminate cooling operations at 78° (81° - 3°).

The cooling delay is used to prevent short cycling, which may cause premature unit failure. The 5 minute cooling delay is active upon initial startup, power cycling, and following the termination of the previous cooling operation. This delay may be temporarily bypassed, as discussed above with NO-TIMER MODE.

COOLING SETPOINT			
CL1	CL2	CL3	SETPOINT
ON	ON	ON	93
ON	ON	OFF	90
ON	OFF	ON	87
ON	OFF	OFF	84
OFF	ON	ON	81
OFF	ON	OFF	78
OFF	OFF	ON	75
OFF	OFF	OFF	72

Table 2 – Cooling Setpoint Settings

NOTE: Initial cooling operation in no or low load conditions may result in delayed cooling. This delay while the compressor is operating may be 3-6 minutes and the condenser fan 1 may not be operating during this time due to the low ambient control/head pressure. Condenser fan 2 (if applicable) will continue to run unless the thermal switch option is installed and ambient temperature is below setpoint.

COOLING HYSTERESIS		
HYS1	HYS2	HYSTERESIS
ON	ON	3
ON	OFF	6
OFF	ON	9
OFF	OFF	12

Table 3 – Offset From Cooling Setpoint Settings



5. HEATING AND DEADBAND SETPOINTS

Heating setpoint is set based upon the deadband DIP switch settings. Heating setpoint is equal to the cooling setpoint minus the deadband. The deadband DIP switch settings are identified below in Table 4. The board will energize heating operation immediately upon the temperature sensor reading a temperature 1°F below the heating setpoint (Cooling Setpoint minus Deadband), as long as the board is not in a 2 minute heating delay during initial startup or following the previous heating operation. Heating operation will stop when the temperature is 2°F above the heating setpoint. A 2 minute heating delay is active upon initial startup, power cycling, and following the termination of the previous heating operation. This delay may be temporarily bypassed, as discussed above with NO-TIMER MODE.

DEADBAND SETPOINT			
DB1	DB2	DB3	DEADBAND
ON	ON	ON	6
ON	ON	OFF	12
ON	OFF	ON	18
ON	OFF	OFF	24
OFF	ON	ON	30
OFF	ON	OFF	36
OFF	OFF	ON	42
OFF	OFF	OFF	48

Table 4 – Deadband Setpoint Settings

6. TEMPERATURE ALARM SETPOINT AND ALARM LED LIGHT STATUS

The temperature alarm setpoint operates for both cooling and heating, and is based upon the alarm differential from setpoint, with DIP switch settings below in Table 5 provided for alarm differential. For cooling, this alarm setpoint is the cooling setpoint plus the alarm differential. For heating the alarm setpoint is the heating setpoint less the alarm differential. A ten (10) minute delay is used to prevent nuisance temperature alarms. If the board measures a temperature above/below the temperature alarm setpoint for 10 minutes, the board will activate the alarm output as further discussed below.

ALARM DIFFERENTIAL	
ALSP	Alarm Differential from Cooling/Heating Setpoint
ON	4°
OFF	8°

Table 5 – Alarm Differential from Cooling



As with the alarm output, the TEMP LED will be solid red during an active temperature alarm. The board will continue to operate with all functions for cooling and/or heating during a temperature alarm. If the temperature alarm clears, the alarm output will be deactivated and the TEMP LED will flash for a period of 100 hours. A subsequent temperature alarm, if any, will repeat the process with the same sequence. The active temperature alarm LED and alarm output may be cleared by cycling power to the unit.

If a heater is not installed in the unit, it is recommended that the deadband be set to 48 to help prevent alarming for low temperature. Alternative to or in addition to, the installer may install a relay to the heater output terminal on the control board to eliminate the low temperature alarm output.

7. HIGH/LOW PRESSURE OPERATIONS/MONITORING AND PRESSURE ALARM LIGHT STATUS

High pressure sensors are standard on all AN, AS, and AT series air conditioners. Low pressure sensors are optional and if not included, a jumper will be placed on the board across the two low pressure input terminals to bypass the monitoring of low pressure.

The high pressure and low pressure switches are continuously monitored during an active cooling operation. If either pressure switch opens identifying either low or high pressure, the unit will immediately shut down for a soft lockout and the respective pressure LED (HP or LP) will flash. The unit will not start cooling operation if the high pressure switch is open during initial start or following a soft lockout. If the low pressure switch is open during initial start or following a soft lockout the unit will begin cooling operations for a two (2) minute low pressure bypass period, and if the low pressure switch remains open, the unit will terminate cooling operation.

A five (5) minute soft lockout period follows a termination of cooling operation due to a pressure switch opening. During a soft lockout the board will not energize cooling operation. Upon the termination of the soft lockout period the board will attempt to restart the cooling operation and repeat the process. If the board experiences three (3) pressure soft lockouts within a 90 minute period the board will provide an alarm output and enter a hard lockout. A hard lockout will not permit cooling operation and a may only be cleared by cycling power to the unit.

Important Note: The pressure switches are NOT monitored during the 5 minute cooling delay. The NO-TIMER MODE may be used to bypass the 5 minute delay to quickly determine if a switch is open. However be advised that the board will immediately process a hard lockout with a single pressure switch failure while in NO-TIMER MODE. This diagnostic process allows quick verification of pressure switch status while protecting the compressor against repeated starts.

The LED lights for high pressure (HP) and low pressure (LP) provide a visual indication of status. A solid light indicates an active hard lockout of the respective switch whereas a flashing light reflects a soft lockout had occurred within the previous 100 hours. Cycling power to the unit will reset the LED lights.



8. TEMPERATURE DISPLAY MODE

The Temperature Display (TEMP) button may be pressed for at least 1 second at any time to display the current temperature at the active temperature sensor, with the TEMP LED used to flash display the current temperature in degrees F. During temperature display any active LEDs reflecting HP/LP/TEMP alarm status will be temporarily suppressed. Following a 1.5 second delay, TEMP LED will flash with a long period flash reflecting the current temperature's 10's place digit (one long flash for every 10 degrees), and after another short delay, the LED will begin short flashes representing the 1's place digit (One short flash for every 1 degree). If the High-Pressure Alarm LED is solid red during the temperature display sequence, then the resulting temperature is negative. Upon completion of the displayed temperature, the HP/LP/TEMP LED Alarm status will return to their pre-Temperature Display alarm state, if any.

Temperature Display Example: Seven (7) Long Period Flash: $7 \times 10 = 70$
 Three (3) Short Period Flash: $3 \times 1 = 3$
 Temperature Read at Sensor = $70 + 3 = 73^{\circ}\text{F}$

9. TEST MODE

The Test Mode is available to allow the installer or service technician to test operation of each component of the system. To enter test mode, press the TEST button for at least 1 second to begin the following test sequence.

Test Sequence:

- From 0-60 seconds: Cooling Operation
- From 61-90 seconds: Heating Operation (if optional heater is installed)
- From 91-100 seconds: Low-Pressure Alarm LED is on
- From 101-110 seconds: High-Pressure Alarm LED is on
- From 111-120 seconds: High/Low Temperature Alarm LED is on
- From 91-120 seconds: Alarm Output is energized

Important Note: Condenser fan 1 will begin operation once the high pressure equals the +/- 200 psi cut-in pressure of the low ambient control pressure switch. Subject to testing in extreme/low temperature conditions (e.g. below 0°F) or in low or no load conditions, the outdoor condenser fan may not energize during the 60 second Cooling Operation test period. In these extreme conditions the cooling operation will need to be tested using a standard cooling operation, with the technician having available the NO-TIMER MODE to bypass the 5 minute delay. If condenser fan 2 (if applicable) is using the temperature switch, disconnect from switch and jumper the connection in order to bypass the delay.



10. ALARM OUTPUT

Dry contacts rated at 2A @ 12VDC, 1A @ 30VDC, 3A @ 125VAC, and 2A @ 250VAC are provided to allow connection to an alarm monitoring system. The output is designed to be fail safe, such that the alarm output relay is energized when no alarm is present thus providing an alarm output in the event that the board loses power. As referenced above, the alarm output is active for a high or low temperature event (following a 10 minute delay) and/or for a hard lockout of a pressure switch.

11. FAN OPERATION

The internal fan is energized only when the control board provides a command for cooling or heating. If the user prefers continuous fan operation, the line voltage fan blue wire from the fan to the fan relay may be relocated to the continuous power side of the compressor contactor. This continuous interior fan adjustment is noted on the wiring diagram. Disconnect power to the unit prior to making this wiring change.

12. INITIAL STARTUP – COMPRESSOR DELAY

Initial cooling operation in no or low load conditions may result in delayed cooling. This delay while the compressor is operating may be 3-6 minutes and the condenser fan may not be operating during this time due to the low ambient control/head pressure switch. Condenser fan 2 (if applicable) will run unless the thermal switch option is installed and the ambient temperature is below setpoint.

Appendix B: TM615 Time Switch Instruction Manual

TM-615 WEEKLY PROGRAMMABLE TIMER



■ DIN Rail Installation:

Advanced pre-setting one week before
 Digital electronic time switch with daily programs
 Repeat programs with 16 on/off setting; and manual over-ride
 Lithium battery power reserve
 Auto time error correction ± 60 sec, weekly

■ Technical Data:

Voltage rating: AC 240V 50/60Hz
 Voltage limit: AC 180V~250V
 Hysteresis: ≤ 1 sec/day (25°C)
 ON/OFF operation: 16 ON & 16OFF
 Power consumption: 2VA(max)
 Display: LCD
 Service life: Mechanical 10^7
 Electrically 10^8
 Minimum interval: 1 minute
 Weight: approx 120g

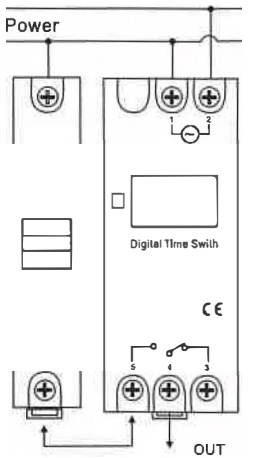
Count down: 1 sec-99min 56sec
 Pulse: 1 sec-59min 59sec
 Load capacity: resistive load: 16A/250V AC
 Lagging load: 10A/250Vac
 lamp load: 2000W
 Switching contact: 1 changeover switch
 Power reserve: 3 years (Lithium battery)
 Ambient temperature: -10~+40°C
 Ambient humidity: 35~85%RH

■ DISPLAY:



1	Ⓟ	TIMER
2	D+	DAT
3	H+	HOURL
4	M+	MIN
5	🕒	CLOCK
6	C	RESET
7	MANUAL	MANUAL C/R

■ Connection Diagram:



■ Operating instruction:

- To start switch: press reset Key. At the first time, if you want to the present time, please press "🕒" On Board, then press D+, H+, M+ to adjust the number to the present time.
- Enter into programming as follows:

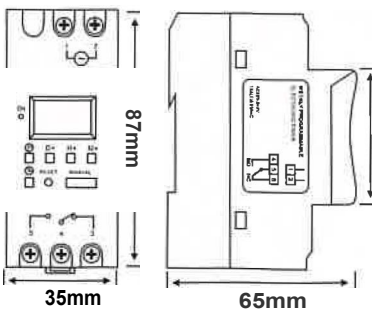
Step	Key	Programming
1	Press Ⓟ	Setting 1 ON time (display 1 on)
2	Press H+/M+	Setting hours and minutes
3	Press D+	To select same every day, or different time each day
4	Press Ⓟ	Setting 1 off time (display 1 off)
5	Press H+/M+	Setting hours and minutes turn off time
6	Press D+	If you want the same every day, you need not press this key
7	Repeat step 2-6	Set 2-16 on/off time
8	Press 🕒	End

If you do not require 16 settings, press "🕒" to the end.

■ Note:

- Time setting should according to the time sequence, couldn't be set crossly
- System with quit automatically if there's no operating within 10 seconds and no data is saved.
- Function 3,4,5 can not be used simultaneously.

■ Dimensions:



Appendix C: Enclosure Selection Guide

The effective area within a one-bay enclosure for battery rack mounting is 88.56" x 38.17" (Figure 13 - Specifications of the internal effective area.), whereas the effective area within a one-bay enclosure for battery rack mounting is 177.12" x 28.81".

Below is a list of some common battery brands and how their racks fit within the La Marche LME Enclosure.

Table 5 - Battery sizing matrix for 48 V.

BATTERY	Batt. Type	Max. Rack Length	LM Enclosure
C&D	KCR-(5 - 11)	6'	Single Bay
	KCR-(13 - 15)	7'6"	Double Bay
BAE-OPZs- Single Cell	(2 - 5) OPzS	6'	Single Bay
	(6 - 8) OPzS	9'	Double Bay
BAE-OPZs- Multi-Cell 12V/Jar	12 V (1 - 3) OPzS	3'	Single Bay
BAE-OPZs- Multi-cell 6V/Jar	6V (3 -6) OPzS	6'	Single Bay
Energys ESG Single Cell	ESG-(15 - 25)	11'	Double Bay
Energys EC Single Cell	EC-(5 - 9)M	6'	Single Bay
	EC-(11 - 21)M	11'	Double Bay
Energys ESG Multi-Cell	2ESG-(05 - 11)	6'	Single Bay
Energys 3CC Multi-Cell	3CC-(5 - 9)M	5'	Single Bay

Table 6 - Battery sizing matrix for 125 V.

BATTERY	Batt. Type	Max. Rack Length	LM Enclosure
C&D	KCR-(5 - 21)	13'	Double Bay
	LCR-(13 - 25)	14'	Double Bay
BAE-OPZs- Single Cell	(2 - 8) OPzS	14'	Double Bay
BAE-OPZs- Multi-Cell 12V/Jar	12 V (1 - 2) OPzS	5'	Single Bay
	12 V 3 OPzS	7'	Double Bay
BAE-OPZs- Multi-Cell 6V/Jar	6V (3 -6) OPzS	13'	Double Bay
Energys ESG Single Cell	ESG-(19 - 25)	14'	Double Bay
Energys EC Single Cell	EC-(5 - 21)M	14'	Double Bay
Energys ESG Multi-Cell	2ESG-(05 - 11)	13'	Double Bay
Energys 3CC Multi-Cell	3CC-(5 - 9)M	11'	Double Bay

Appendix D: Manufacturer's Warranty

All La Marche Manufacturing Co. equipment has been thoroughly tested and found to be in proper operating condition upon shipment from the factory and is warranted to be free from any defect in workmanship and material that may develop within five (5) years from date of purchase.

Any part or parts of the equipment (except fuses, DC connectors and other wear-related items) that prove defective within a five (5) year period shall be replaced without charge providing such defect, in our opinion, is due to faulty material or workmanship and not caused by tampering, abuse, misapplication or improper installation.

Should a piece of equipment require repair during the warranty period, the equipment can be returned to the La Marche factory to have the inspection, parts replacements and testing performed by factory personnel. Should it be necessary to return a piece of equipment or parts to the factory, the customer or sales representative must obtain authorization from the factory. If upon inspection at the factory, the defect was due to faulty material or workmanship, all repairs will be made at no cost to the customer during the first three years. Transportation charges or duties shall be borne by purchaser.

In accepting delivery of the equipment, the purchaser assumes full responsibility for proper installation, installation adjustments and service arrangements. Should minor adjustments be required, the local La Marche sales representative should be contacted to provide this service only.

All sales are final. Only standard La Marche chargers will be considered for return. A 25% restocking fee is charged when return is factory authorized. Special chargers are not returnable.

In no event shall La Marche Manufacturing Co. have any liability for consequential damages, or loss, damage or expense directly or indirectly arising from the use of the products, or any inability to use them either separately or in combination with other equipment or materials, or from any other cause. In addition, any alterations of equipment made by anyone other than La Marche Manufacturing Co. renders this warranty null and void.

La Marche Manufacturing Co. reserves the right to make revisions in current production of equipment, and assumes no obligation to incorporate these revisions in earlier models.

The failure of La Marche Manufacturing Co. to object to provisions contained in customers' purchase orders or other communications shall not be deemed a waiver of the terms or conditions hereof, nor acceptance of such provisions.

The above warranty is exclusive, supersedes and is in lieu of all other warranties, expressed or implied, including any implied warranty of merchantability or fitness. No person, agent or dealer is authorized to give any warranties on behalf of the Manufacturer, nor to assume for the Manufacturer any other liability in connection with any of its products unless made in writing and signed by an official of the manufacturer.

Appendix E: Document Control and Revision History

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