

Charles Universal Broadband Enclosure

CUBE-BB48E2QVx

General Description and Installation

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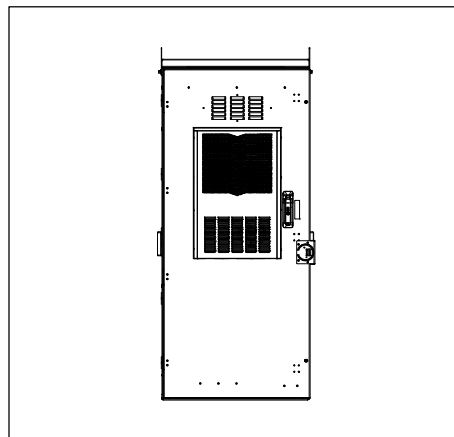


Figure 1 Front View of the CUBE

1. GENERAL INTRODUCTION

1.1. Document Purpose

This document provides general information for the CUBE-BB48E2QVA and CUBE-BB48E2QV1 of the Charles Industries' Universal Broadband Enclosure (CUBE) product line. These two models are identical except the QV1 now has R513A refrigerant instead of R134A in the HVAC system. Figure 1 shows a closed front view of the enclosure.

-NOTE-

Hereafter, the Charles Universal Broadband Enclosure CUBE-BB48E2QVA and CUBE-BB48E2QV1 will be referred to as the "CUBE."

1.2. Product Purpose

The CUBE is a battery backup unit that houses multiple strings of -48VDC customer supplied VRLA batteries.

1.3. Product Mounting and Location

This enclosure is suitable for outside plant-type (OSP) locations and those that may require NEC compliance. The outdoor, weather-resistant CUBE is to be mounted on a pad or platform. The installer connects the CUBE to a -48VDC power supply housed in a separate enclosure. Detailed mounting and installation information is covered in Section 3.

2. PRODUCT DESCRIPTION

The CUBE is a battery backup enclosure that supports up to five strings of customer supplied VRLA batteries. It is equipped with a 2000BTU DC powered HVAC system. Each battery string is controlled by a disconnect breaker.

All images in this document show the BB48E2QVA model. The BB48E2QVR model is identical except that the front door opens on the right side instead of the left. Figure 2 shows the CUBE dimensions. Figure 3 shows the main components of the CUBE.

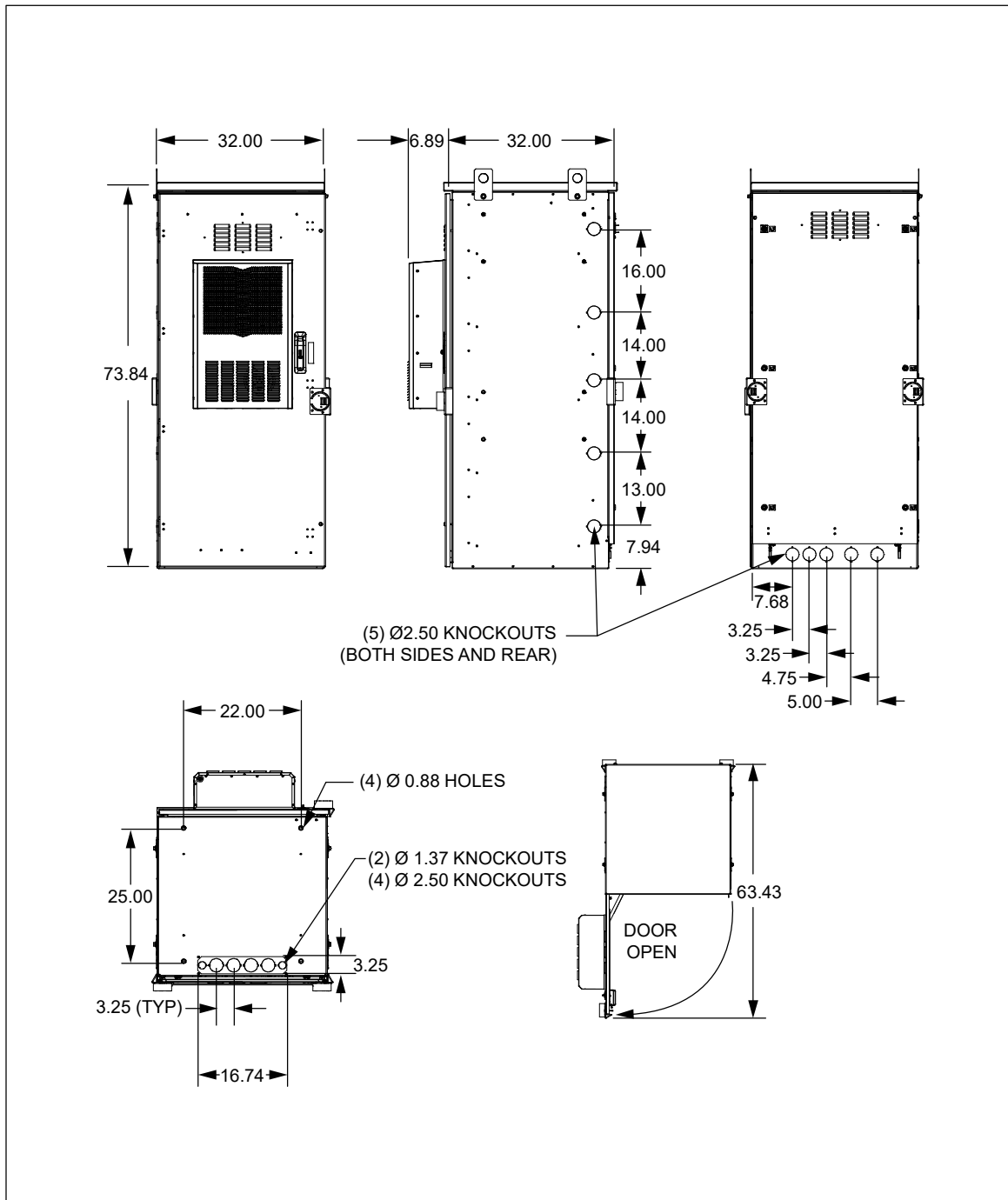


Figure 2 CUBE Dimensions (in inches)

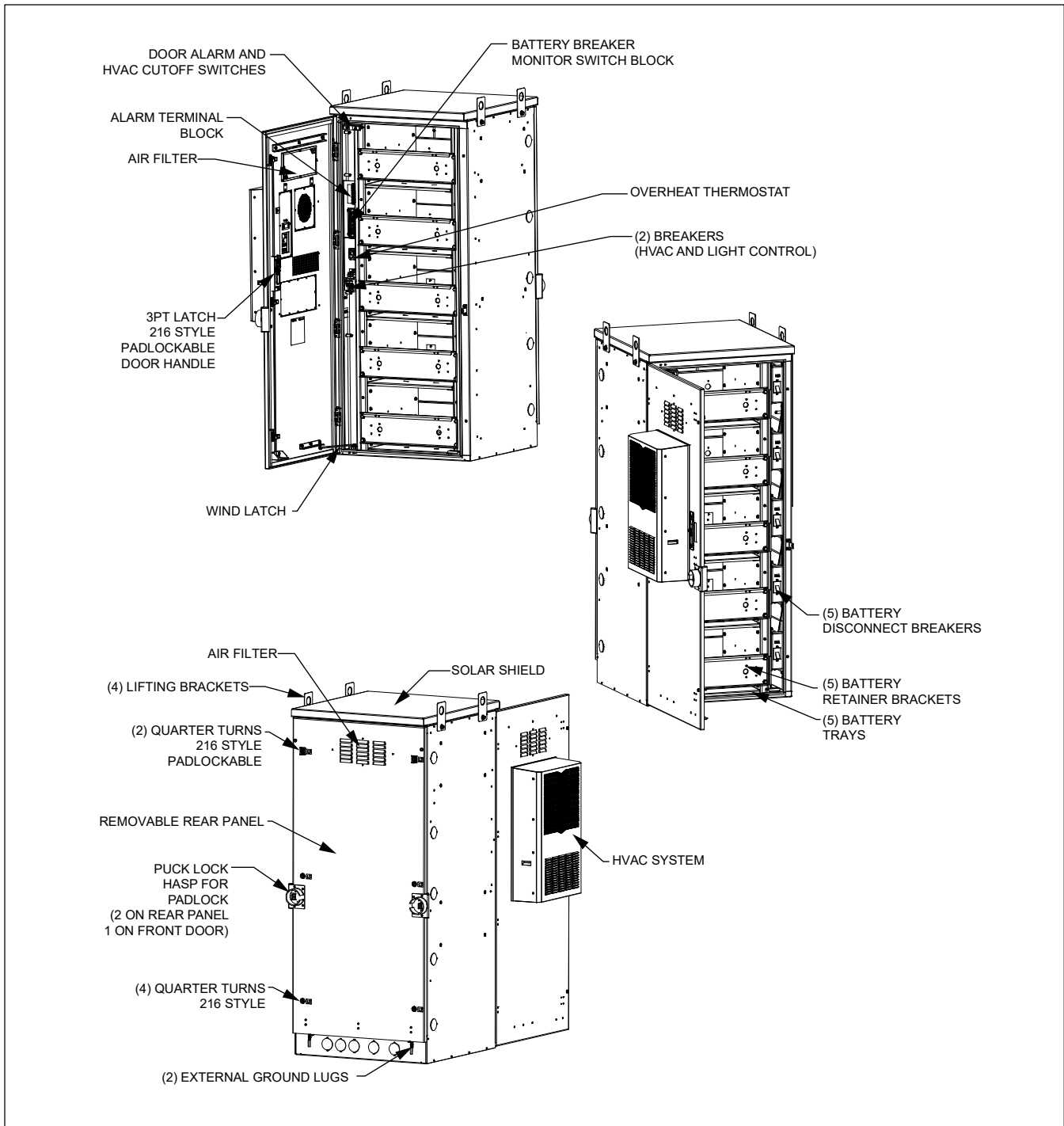


Figure 3 CUBE Components

3. INSTALLATION

3.1. Inspecting the Product

The CUBE is shipped mounted upright on a skid. Remove the bolts, unpack the unit, and dispose of the packaging material.

-INSPECTION NOTE-

Visually inspect the unit for damages prior to installation. If the equipment was damaged in transit, immediately report the extent of the damage to the transportation company.

3.2. Following and Using Safety Precautions

Read the following site and safety tips, cautions, and warnings, then proceed with the paragraphs that follow.

- For installation, follow all National Electrical Codes (NEC) ANSI/NFPA 70, local, environmental, workplace, and company codes, safety procedures, and practices.
- Minimum spacing between the accessories and components and the housing for ITE equipment shall be maintained for safe operation of the equipment when installed in accordance with NEC ANSI/NFPA 70.
- Read all instructions, warnings and cautions on the equipment and in the documentation shipped with the product.
- Always connect ground connections first.
- Do not place this product on weak or unstable surfaces which may allow the product to fall, resulting in potentially serious damage(s) to persons or product.
- Only authorized trained personnel shall install the CUBE.
- In windy conditions, be sure to engage the door latches to secure the door in a stationary position.

3.3. Obtaining Tools and Equipment

Obtain the following recommended or needed items for installing the CUBE.

- Sufficient length and quantities of fiber cable (or pigtails)
- Cable scoring, opening, and cutting tools for cable sheathing, shields, wrappings, strength members and buffer tubes
- Wire strippers
- Crimpers
- Cable, tube, wire, and fiber cleaning materials
- Protective and/or insulated work gloves
- Safety glasses
- Tape measure
- Marking utensil
- #6 ground wire or rod and earth ground materials
- Bond strap (optional, from cable bond clamp to bond post)
- Any exterior cable strain relief, per company practice
- Slotted, hex, and Phillips screwdrivers
- Torque wrench
- Assorted cable ties, clips, or fasteners (optional)
- Can wrench (216 type tool)
- Derrick for lifting
- Level

3.4. Preparing the Installation Site

Observe the following site preparation recommendations.

- Leave adequate horizontal and vertical space between multiple installations to allow for proper cable access, as well as enough room around the enclosure to open the door(s).
- The site must meet minimal personnel and equipment safety requirements.
- The distance from the cable entry point should be consistent with local installation practices.
- The pad or platform must be able to support the weight of the CUBE.
- Run all fiber and copper facilities to the site.

3.5. Lifting the CUBE


See Table 1 for CUBE weight. Charles recommends the following procedure for lifting the CUBE.

3.5.1. Required Equipment

- One derrick (crane) capable of lifting the CUBE
- Spreader bars
- Four lifting slings or chains with each having a 2,500 lbs. capacity
- Connecting links to attach slings to the CUBE's lifting brackets
- 75-ft. long tagline rope

Insert the lifting sling connecting links securely through each of the lifting brackets as shown in Figure 4.

3.5.2. Warnings and Specific Safety Precautions

| | | |
|---|----------------|---|
|  | WARNING | <p>Improper hoisting equipment and unsafe lifting procedures can result in serious injury or death</p> <p>Because of the added risk of injury or damage, do not lift enclosures with batteries installed.</p> |
|---|----------------|---|

Observe the following local safety procedures when performing the tasks in this section.

- Keep the CUBE away from any power lines.
- Keep bystanders away from the work operations at all times.
- Only trained operators shall operate the crane for lifting and setting the CUBE.
- Do not suspend loads over people or equipment.
- All persons working with hoisting equipment shall wear standard safety gear according to local practices including safety helmets and steel-toed shoes.
- Do not operate the hoisting equipment until all stabilizer are extended and in firm contact with the ground or adequate support structure.
- Do not attempt to retract or extend the stabilizers while a load is suspended.

3.6. Mounting the CUBE

The CUBE can be mounted on a new or existing concrete or composite pad. A gasket for placing the CUBE on a concrete pad is affixed to the bottom of the CUBE. If the gasket becomes damaged during installation, order a replacement under part number 80-006668-A. Ensure that the unit is level.

An optional mounting plinth is available for this cabinet. Order part number 97-PLNTHPMBBCAB.

3.6.1. Torque Requirements

Torque all hardware as shown below (unless otherwise noted). These values apply to SAE Grade 1 & 2 Low Carbon Steel, ASTM A307 Low Carbon Steel, and Stainless Steel Grade 18-8.

| Thread Size | In-lbs | Ft-lbs |
|-------------|---------|---------|
| 4-40 | 4±10% | |
| 6-32 | 8±10% | |
| 8-32 | 16±10% | |
| 10-32 | 26±10% | |
| 12-24 | 50±10% | |
| 1/4-20/M6 | 60±5% | 5±5% |
| 5/16-18 | 125±5% | 10.4±5% |
| 3/8-16 | 180±5% | 15.0±5% |
| 1/2-13 | 500±2% | 41.7±2% |
| 5/8-11 | 1000±1% | 83.3±1% |

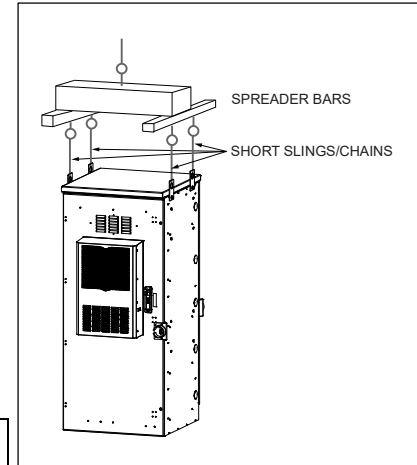



Figure 4 Lifting the CUBE

3.6.2. Constructing a New Pad

- Use only concrete for new pad construction. Do not use substitute materials since they lack the rigidity for CUBE placement.
- Observe local building practices for pad construction. Charles recommends that the pad should extend a minimum of 8" beyond the CUBE base on all sides.
- Use a minimum of 6" of sand or gravel as a base for the pad for leveling purposes.
- Figure 5 shows the required conduit openings and mounting hole dimensions for entering/mounting the bottom of the CUBE. Use these dimensions when designing the pad.

| | | |
|---|-----------------------|--|
|  | <p>WARNING</p> | <p>When pad mounting, the compression strength of the pad must be at least 4000 psi as determined by ASTM C39 test of compression strength of concrete cylinders.</p> <p>The slump of the concrete shall be 2" to 4" as determined by ASTM C143 test method.</p> |
|---|-----------------------|--|

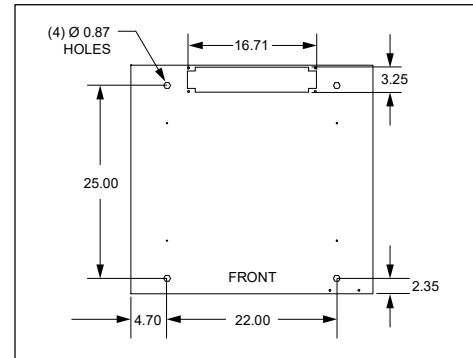


Figure 5
Mounting Hole Dimensions (in inches)

3.6.3. Mounting the CUBE on a Pad

Four customer supplied, corrosion resistant, 1/2"-13 hex head bolts with anchors are required for mounting the CUBE to the concrete pad. Use the following steps to mount the CUBE to a pad.

1. Layout, drill, and set the 1/2" anchors per manufacturer's recommendations. The embedment depth is not to exceed 3.5".
2. Clean any debris from the concrete pad.
1. Open the cabinet door to allow access to mounting holes.
2. Ensure that the CUBE is parallel to the pad surface as it is placed onto the pad and that it aligns with the holes in the pad. Dress the cable/conduit so that it aligns with the CUBE openings as it is lowered onto the pad.
3. Place the CUBE on the pad. Loosen the slings so that all the weight is on the pad. Check that the CUBE is properly aligned.
4. Secure the CUBE to the pad using the 1/2"-13 hex head bolts. Tighten all bolts securely.
5. To secure the CUBE to a steel grate platform, install 1/2" corrosion-resistant Grade 5 steel hardware through the cabinet and platform grate. Ensure that the bolts are long enough to extend past the nut on the bottom side of the platform grate. For all mounting applications, each bolted joint should have a minimum Ø1 inch fender washer on the inside of the cabinet (and underside of the platform grate for platform mounting) with a lock washer. The washer on the underside of the platform must be large enough to cover both adjacent bearing bars as shown in Figure 7.
6. Once the CUBE is secured, remove the slings and tagline. Close the cabinet door.

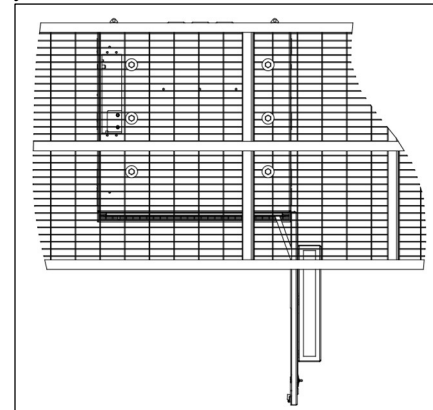


Figure 7 **Installing on a Platform**

3.8.1. Ground Connection

External ground lugs are available on the rear of the CUBE for connecting a site ground wire.

3.8.2. Battery Connection

| | | |
|---|----------------|---|
|  | WARNING | Always turn off battery breakers prior to servicing batteries. |
|---|----------------|---|

Verify the polarity of the cables prior to terminating them to the batteries. Ensure the battery terminations are properly insulated to avoid shorting prior to terminating to the batteries.

1. Switch off the battery breakers located next to the battery trays.
2. Remove the battery retainer bracket by removing the hardware.
3. If replacing batteries, disconnect battery cables from terminals and loosen the battery retaining strap(s).
4. Remove the interconnecting straps from the batteries. Remove batteries.
5. Carefully position the new batteries on the battery tray. Connect the interconnecting straps to each battery string.
6. Connect the battery cables to the appropriate terminals.
7. Secure the battery retaining straps and reinstall the battery retainer brackets using hardware from step 2.
8. Secure the battery cables to the front of the retainer bracket.
 - Use lacing cord or cable ties suitable for 4/0 cable, 0.800 O.D.
 - Ensure that the bending radius is at least 5x the cable diameter (e.g. 4/0 battery cable = 4 inch bend radius).
 - Use as few bends as possible between the two termination points.
 - Do not bend the cable at the termination points.
 - Isolate the lug and insulation by at least 1/4" from all metal surfaces.
9. Switch on the battery breaker.

Notes:

- Batteries are terminated at the power shelf.
- NiCd batteries require nickel plated lugs. Charles cables are equipped with the correct nickel plating.
- Ensure back up battery amperage is inputted into the power system controller per power system guidelines.
- Ensure float voltage is set per power system and battery guidelines.
- Ensure all battery terminations and bus bars have No Ox applied.
- Refer to the battery manufacturer's documentation for proper battery installation and maintenance information.

3.8.3. Battery Breaker Switches

The CUBE has a switch board on the left inside panel that is connected to the battery breakers and serves as an alarm monitor. The default switch setting is to the bottom, indicating that a battery string is present and the battery breaker is turned on. If any battery breaker is turned off or tripped, it will cause a normally open alarm connection on the alarm block "BAT BRKR" position. If no battery string is present, then move the switch for that shelf into the top position to bypass the breaker.

3.8.4. HVAC Operation

The 2000BTU DC powered HVAC compressor and fans are PID (proportional integral derivative) controlled. The compressor turns on at 25°C at low speed and will increase speed as needed to maintain that temperature. The compressor turns off at 22°C. The internal fan is always on at low speed to continually circulate heat within the cabinet. The heating cycle turns on at 8°C and off at 13°C. The CUBE is equipped with a cutoff switch that shuts off the HVAC compressor when a door is opened to minimize condensation buildup on the coils. See the label on the HVAC for firmware information. For further information, refer to the HVAC documentation that ships with the CUBE.

-NOTE-

Changing the cooling or heating cycles' default factory set points can lead to system performance issues, such as equipment failures, increased power use, unnecessary alarms, noise, condensation build up, compressor or fan failure caused by excessive runtimes and vibration. Avoid placing items in front of the HVAC's return and supply vents. Maintain a minimum of 2" clearance to enable proper air flow.

3.8.5. Overheat Thermostat

The CUBE is equipped with an overheat (high temperature) alarm thermostat in the equipment compartment that provides a normally closed connection. The overheat alarm is factory set at 60°C and opens the connection if this temperature is exceeded.

-NOTE-

Changing the overheat (high-temp) thermostat default factory set points can lead to unnecessary alarms or system performance issues, such as equipment failures as a result of unreported alarms.

3.8.6. Alarm Block Connections

A 10-position, labeled alarm block monitors components in the equipment compartment. See the electrical diagram for information about alarm connections. All connections are normally closed and will open upon alarm.

3.8.7. Fiber and Copper Entry

The CUBE has multiple Ø2.50" knockouts on the sides and rear that accommodate Ø2.00" and conduit fittings. See Figure 2 for knockout locations.

3.9. Conduit Seals

All conduit openings on the CUBE must be completely sealed with a duct seal compound to prevent moisture from entering the CUBE. Use a moldable, flame-retardant putty style duct seal material. Do not use an expanding foam seal. Mold the putty so that the open space around the wire or conduit is completely sealed, as shown in Figure 9. If the openings must be accessed at any time, remove the putty and set it aside. When work is complete, re-mold the putty to re-seal the opening.

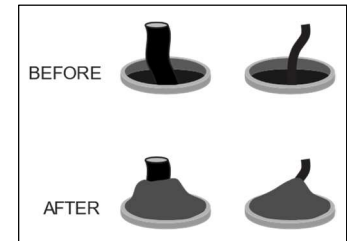


Figure 9 Applying Putty Seal

4. PERIODIC MAINTENANCE

In the event that the enclosure must be opened in freezing conditions, use a narrow, pointed metallic object such as a screwdriver or chisel, along with a non-metallic device like a rubber mallet, to remove excessive ice buildup around the door and locking mechanism. A commercial aerosol de-icer spray can be used to free up locks and latches if needed. Use protective gloves and safety glasses when applying de-icer sprays.

Periodic cleaning of the battery filter screens is important to maintain proper ventilation. To clean the filter screens, remove the four nuts on each screen and take out the screens. Use a soft brush or hose to remove any debris from the screen. Once clean, replace the screens using the four nuts removed previously.

5. TECHNICAL ASSISTANCE AND REPAIR SERVICE

For questions on product repair or if technical assistance is required, contact Charles Technical Support.

847-806-8500

techserv@charlesindustries.com (email)

<http://www.charlesindustries.com/techserv.htm>

6. WARRANTY & CUSTOMER SERVICE

Charles Industries LLC offers a one-year warranty on the CUBE product. The Charles warranty is limited to the operation of the CUBE hardware as described in this documentation and does not cover equipment which may be integrated by a third party. The terms and conditions applicable to any specific sale of product shall be defined in the resulting sales contract. For questions on warranty or other customer service assistance, contact your Charles Customer Service Representative.

847-806-6300

mktsev@charlesindustries.com (email)

http://www.charlesindustries.com/main/telecom_sales_support.htm

7. SPECIFICATIONS

7.1. Regulatory Specifications

- Designed to meet GR-487
- UL-2416 Listed

If CUBE's are field-modified, a customer provided ETL field evaluation of the modified components may be required to re-establish ETL certification to UL standards. Consult local jurisdictions for guidance on a site-by-site basis.

7.2. Product Specifications

| Physical | |
|--|-----------------------------------|
| Dimensions | 74"Hx32"Wx33"D |
| Weight | Approx. 724 lbs. as shipped |
| Battery Tray Size | 10"Hx21"Wx26"D |
| Materials | 0.125 aluminum |
| Maximum Supported Weight | 560 lbs. per battery tray |
| Color | Off-white |
| Electrical | |
| Supported Batteries | 48VDC VRLA (see Table 2) |
| Cable Entry | See Figure 2 and section 3.8.8 |
| Thermal | |
| HVAC System | 48VDC powered, Vikinor VAK-600-DC |
| Cooling Capacity | 2000BTU |
| Environmental | |
| Operating Temp. Range, Outside Enclosure | -40° to +115°F, -40° to 46°C |
| Operating Temp Range, Inside Enclosure | -40° to +149°F, -40° to 65°C |
| Humidity | 0 to 95% (non-condensing) |
| Altitude | Up to 2,000 meters (6560 feet) |
| Kits and Replacement Parts | |
| Touch-up Paint | 02-000290-0 |
| 216 Type Security Tool | 07-002070-0 |
| Replacement Gasket | 80-006668-A |
| Optional Mounting Plinth | 97-PLNTHPMBBCAB |
| Shim Kit for Leveling | 97-000010-0 |
| Lift-Up Handle | 39-000335-0 |
| Door Rod Latch | 39-000336-0 |
| 1/4 Turn Latch | 39-000142-0 |
| 1/4 Turn Latch with Padlock Hasp | 39-000311-0 |
| 4-Wire Door Alarm Switch (Black) | 17-400319-0 |
| HVAC Cutoff Switch (Black with White Button) | 17-400322-0 |
| Overheat Thermostat | 99-004548-0 |
| Battery Disconnect | 18-908176-0 |

Table 1 CUBE Specifications

7.3. Supported Batteries

| Manufacturer | Model Number | Ah | L | W | H | Weight (lbs.) |
|-----------------|-----------------|-----|------|-------------------------|--------------------------------|---------------|
| Northstar | NSB190FT HT RED | 190 | 12.6 | 4.9 | 22.0 | 132 |
| Energysys | SBS XL 170F-FT | 170 | 12.4 | 4.9 | 22.1 | 128 |
| Energysys | SBS XL 210F-FT | 210 | | | | |
| DEKA Fahrenheit | HT200ET | 190 | 12.7 | 4.9, Top 4.7, Bottom | 23.0, Battery 24.0, Handles | 151 |
| Narada | 12HTB200F | 200 | 12.4 | 4.9 | 20.9, Base | 132 |
| C&D | TEL 12-180 F | 180 | 12.6 | 4.8 | 20.1 | 131 |
| C&D | TEL 12-210 F | 210 | 12.6 | 4.9 | 20.3 | 140 |

Table 1 Supported Batteries