

Charles Universal Broadband Enclosure

Site Support Family CUBE-SSxx207xxx

General Description and Installation

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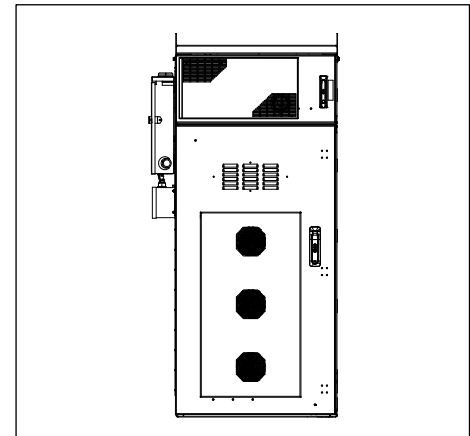


Figure 1 Front View of the CUBE

1. GENERAL INTRODUCTION

1.1. Document Purpose

This document provides general information for the CUBE- SSxx207xxx family of the Charles Industries’ Universal Broadband Enclosure (CUBE) product line. Supplemental documentation that ships with the CUBE contains more detailed information about the models. Figure 1 shows a closed front view of the enclosure.

-NOTE-
Hereafter, the Charles Universal Broadband Enclosure CUBE-SSxx207xxx will be referred to as the “CUBE.”

1.2. Product Purpose

This CUBE consists of a protective enclosure for an integrated system of electronic components and equipment that can serve fiber and copper interfaces.

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. The installer connects the power, fiber and copper connections. Detailed mounting and installation information is covered in Section 3.

2. PRODUCT DESCRIPTION

The CUBE includes a battery compartment and an equipment compartment. The equipment compartment has 7RU of 23" rack mount spacing and a 750W heat exchanger. The battery compartment supports -48VDC customer supplied batteries. The differences among the models in this series are in the thermal devices on the battery compartment, the number of battery strings supported (two or four), battery type (NiCd or VRLA), the AC load center, and the power shelf (see Table 2).

Figure 2 shows a dimensional drawing of the CUBE. Note: the side-mounted AC load center is not present on all models (see Table 2). The supplemental documentation that ships with the CUBE includes a diagram of the CUBE components.

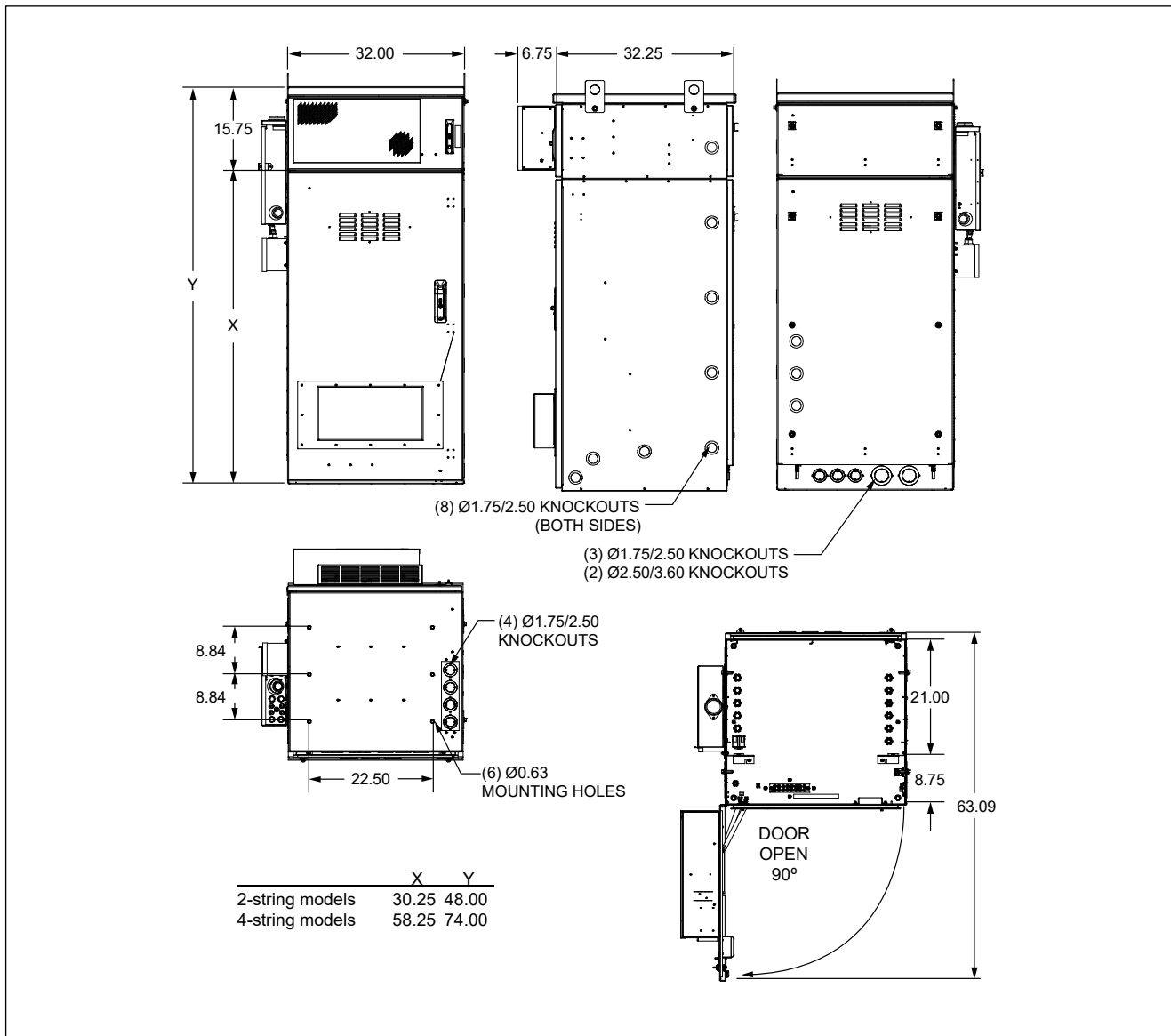


Figure 2 CUBE Dimensions (in inches)

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 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 the supplemental documentation 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 3.

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>
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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.

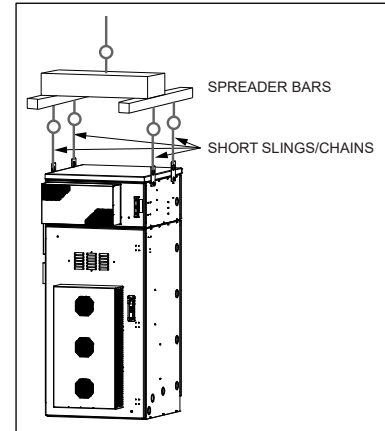


Figure 3 Lifting the CUBE

3.6. Mounting the CUBE

The CUBE can be mounted on a new or existing concrete or composite pad. Order Charles CPAD-MM1EXX or CPAD-MM2EXX. A gasket is provided for placing the CUBE on a concrete pad. If the gasket becomes damaged during installation, order a replacement under part number 80-005194-A. The gasket is not needed if mounting on a CPAD.

The CUBE can be mounted with the optional plinth kit (97-002162-A). This plinth is also available as a factory-installed kit (96-002162-A). If using the plinth, install the gasket underneath the plinth.

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%

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 4 shows the required conduit openings and mounting hole dimensions for entering/mounting the bottom of the CUBE. Use these dimensions when designing the pad.

	WARNING	<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>
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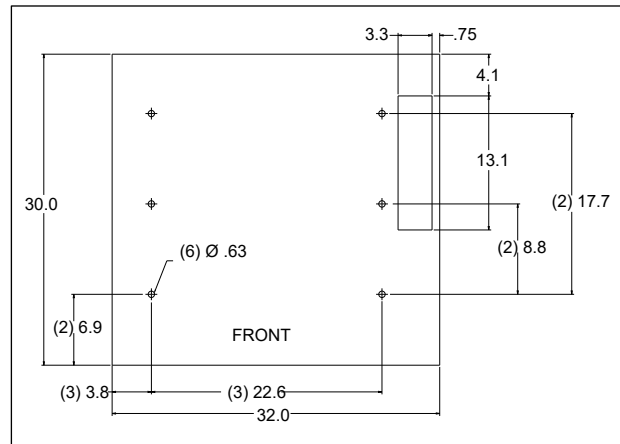


Figure 4 Mounting Hole Dimensions (in inches)

3.6.3. Mounting the CUBE on a Pad

Six 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”. Use the gasket as a mounting hole location template.
2. Clean any debris from the concrete pad.
3. Install the gasket by positioning it on the pad so that it is underneath the bottom of the CUBE when the cabinet is installed. Line up the gasket so that the cutouts are in proper position around the conduit opening and the bolt holes as shown in Figure 5.
4. Open the battery compartment to allow access to mounting holes.
5. 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 and the gasket. Dress the cable/conduit so that it aligns with the CUBE openings as it is lowered onto the pad.
6. 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.
7. Secure the CUBE to the pad using the 1/2”-13 hex head bolts. Tighten all bolts securely.
8. 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 6.
9. Once the CUBE is secured, remove the slings and tagline. Close the battery compartment door.

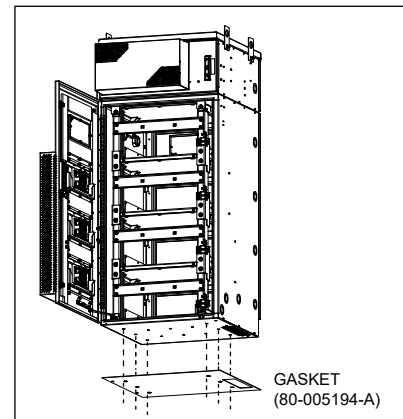


Figure 5 Gasket Installation

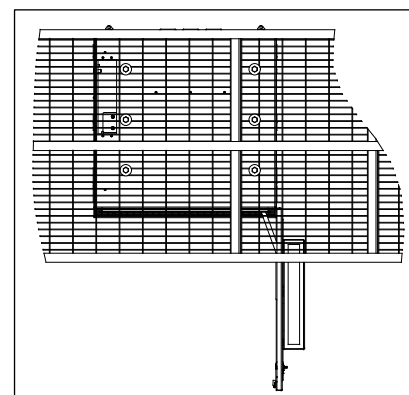


Figure 6 Installing on a Platform

3.6.4. Mounting the CUBE on a CPAD

First, follow the instructions that ship with the CPAD to ensure that the CPAD is securely installed in the ground. Then proceed to mount the CUBE on the CPAD. Six customer supplied, corrosion resistant, 1/2”-13, 2” long fully threaded hex head bolts are required for mounting the CUBE to the CPAD. Use the following steps to mount the CUBE to a CPAD.

1. Clean any debris from the CPAD.
2. Open the battery compartment to allow access to mounting holes.
3. Ensure that the CUBE is parallel to the CPAD surface as it is placed onto the CPAD and that it aligns with the holes in the CPAD. Dress the cable/conduit so that it aligns with the CUBE openings as it is lowered onto the CPAD.
4. Place the CUBE on the CPAD. Loosen the slings so that all the weight is on the CPAD. Check that the CUBE is properly aligned.
5. Secure the CUBE to the CPAD using the 1/2”-13 hex head bolts. Tighten all bolts securely.
6. Once the CUBE is secured, remove the slings and tagline. Close the battery compartment door.

3.7. CUBE Wiring and Equipment

After the CUBE is properly mounted in the desired location, apply No-Ox where bus bar and other 2-hole lug connections will be made. Install ground and power connections. Always ground the equipment first, before making any other connections.

	WARNING	Perform all bonding and grounding connections prior to any electrical and communications connections.
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In order to prevent condensation prior to being placed in service, do not remove the desiccant until the CUBE is sealed and power is applied. Refer to supplemental documents for electrical diagrams for each CUBE.

3.7.1. Ground Connection

Use the 2x8 position ground bar provided in the equipment compartment for all grounding of internal equipment. Stack hardware as shown in Figure 7. External ground lugs are available on the sides of the battery compartment for connecting a site ground wire.

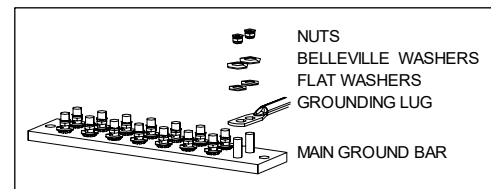


Figure 7
Ground Bar Hardware Stack

3.7.2. Battery Connection

	WARNING	Always turn off battery breakers or disconnect blue Anderson connectors prior to servicing batteries. Disregard the (+) and (-) polarity markings on the blue Anderson connectors. The cable assemblies are used on both +24VDC and -48VDC products, so markings on the Anderson connectors are misleading.
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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. Disconnect the Anderson connector(s) or switch off the battery breaker located in the battery compartment.
2. Remove the battery retainer bracket by removing the hardware. Optional: (SS and BB only) Use the Charles 97-002145-A temporary shelf to allow easier disconnection of interconnecting straps. The shelf attaches to CUBE in front of the battery tray. Installers can then slide the batteries from the battery tray onto the shelf, disconnect the interconnecting straps, and remove the batteries.
3. If replacing batteries, disconnect battery cables from terminals and loosen the battery retaining strap(s).
4. VRLA Only: Remove the battery temperature probe.
5. Remove the interconnecting straps from the batteries. Remove batteries.
6. Carefully position the new batteries on the battery tray or temporary shelf. Connect the interconnecting straps to each battery string. If using the 97-002145-A temporary shelf, then slide the batteries onto the battery tray once the connection is complete and remove the shelf.
7. VRLA Only: Replace battery temperature probe to the closest battery.
8. Connect the battery cables to the appropriate terminals.
9. Secure the battery retaining straps and reinstall the battery retainer brackets using hardware from step 2.
10. Properly manage the battery cables.
 - o Ensure that the bending radius is not less than 5x the cable diameter (e.g. 4/0 battery cable = 4 inch bend radius).
 - o Use as few bends as possible between the two termination points.
 - o Do not bend the cable at the termination points.
11. Reconnect the Anderson connector(s) or switch on the battery breaker.

Notes:

- If using Anderson connectors, then all battery strings are terminated to the bus bars on the right side. The top bus bar is the power bus for -48VDC or +24VDC cabinets. The bottom bus bar is used for the return voltage. The bus bars have covers and use 1/4"-20 hex bolts for securing connections. If using battery breakers, then batteries are terminated at the power shelf.
- NiCD Only: NiCd batteries require nickel plated lugs. Charles cables are equipped with the correct nickel plating.
- VRLA Only: Ensure temperature compensation probes are installed per power system guidelines.
- 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.

3.7.3. Overheat Thermostat

The CUBE is equipped with overheat (high temperature) alarm thermostats in the equipment and in the battery compartments. These overheat thermostats are wired in series and provide a normally closed connection. The overheat alarm in the equipment compartment is set at 60°C for all models. The battery compartment overheat alarm is set for 35°C in units with a TEC (VRLA batteries) or 60°C in units with a DAC (NiCd batteries).. Either alarm will open the connection if its 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.

3.7.4. 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 alarm connections are normally closed and will open upon alarm.

3.7.5. Masterlock Provision

The cabinet has provisions for an optional Masterlock locking device. There are two kits necessary to complete a Masterlock cabinet door lock installation for an online system: a Network Controller kit (Charles 96-MLNTWKCTR-A) and a door kit. The door kit part number contains a door code and a region code (96-MLXDRX-XXX). Contact Charles for the appropriate part number for the installation. Refer to the documentation supplied with the Masterlock locking device for installation and use instructions.

3.7.6. Fiber and Copper Entry

There are multiple Ø1.75"/2.5" knockouts on the sides and rear that are used for cable entry. Refer to Figure 2 for their locations. The Ø1.75" knockouts accommodate Ø1.25" conduit fittings, and the Ø2.50" knockouts accommodate Ø2.0" conduit fittings.

3.8. 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 7. 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.

3.9. Verifying the Installation

Verify that earth ground and all grounding and bonding is complete and functional. After verifying that all installer connections are secure and complete, apply voltage.

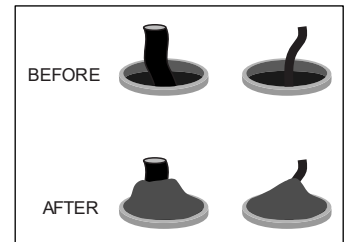


Figure 7 Applying Putty Seal

4. PERIODIC MAINTENANCE

In the event that the enclosure needs to be opened in freezing conditions, a narrow, blunt metallic object such as a screwdriver or chisel, along with a non-metallic device like a rubber mallet, may be used 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.

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.

Reset the GFCI duplex receptacle periodically to ensure it is working. The unit meets UL-943, which requires an auto-monitoring (self-testing) feature. A flashing or solid red LED indicates a fault. If the unit continues to show a fault after resetting, replace the unit.

The heat exchanger requires no scheduled maintenance other than cleaning the fans and heat exchanger core if they become contaminated with dust or residue. Remove the cover by removing the screws on the outside. Examine periodically to determine the required cleaning periods based on the installed environmental conditions.

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, Ltd. 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

mktserv@charlesindustries.com (email)

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

7. SPECIFICATIONS

7.1. Regulatory Specifications

- Designed to meet GR-487
- GFCI: UL-943 Listed

If CUBEs 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	2-string: 48"Hx32"Wx32"D 4-string: 74"Hx32"Wx32"D
23" Equipment Rack Space and Hole Spacing	12.25" (7RU) rack spacing with tapped EIA #12-24 mounting holes
Battery Tray Size	12.75"Hx21"Wx27"D
Maximum Supported Weight	Rack Rails: 77 lbs. Battery Trays: 400 lbs. per tray
Materials	0.125 aluminum
Color	Off-white
Electrical	
Bonding and Grounding	2x8 position ground bar in equipment compartment
Cable Entry	See Figures 2 and 3 or Section 3.7.7
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
Plinth Mounting Kit	Factory installed: 96-002162-A; Field installed: 97-002162-A
Replacement Gasket	80-005194-A
Shim Kit for Leveling	97-000010-0
Swing Handle	39-000148-0
Lift-Up Handle	39-000335-0
Door Rod Latch	39-000336-0
4-Wire Door Alarm Switch (Black)	17-400319-0
2-Wire Door Alarm Switch (White)	17-400314-0
15A GFCI Outlet	04-100207-0
Overheat Thermostat	99-004548-0

Table 1 CUBE Specifications

Part Number	Thermal System	AC Load Center	Power System	Battery Type
CUBE-SS4B207DB1	750W heat exchanger, DAC for batteries	12-position	n/a	2 strings 48VDC NiCd
CUBE-SS4D207DB1	750W heat exchanger, DAC for batteries	12-position	n/a	4 strings 48VDC NiCd
CUBE-SS4D207XB1	750W heat exchanger, TEC for batteries	12-position	n/a	4 strings 48VDC VRLA

Table 2 CUBE Models and Individual Specifications