Charles Universal Broadband Enclosure
CUBE-RL21611DB2 and CUBE-RL21611DB3
General Description and Installation

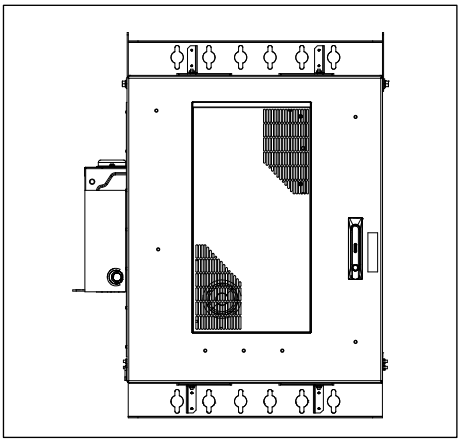

Figure 1 Front View of the CUBE

1. GENERAL INTRODUCTION

1.1. Document Purpose

This document provides general information for the CUBE-RL21611DB2 and CUBE-RL21611DB3 of the Charles Industries' Universal Broadband Enclosure (CUBE) product line. Figure 1 shows a closed front view of the enclosure.

-NOTE-

Hereafter, the Charles Universal Broadband Enclosure CUBE-RL21611DB2 and CUBE-RL21611DB3 will be referred to as the "CUBE."

1.2. Product Purpose

The 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, wall, pole, or H-frame. The installer connects the power, fiber, and copper connections. Detailed mounting and installation information is covered in Section 3.

2. PRODUCT DESCRIPTION

These CUBEs have an equipment compartment with 16RU of 23" horizontal rack spacing, a 750W -48VDC heat exchanger, an 8-position AC load center, and an ABB Infinity D power shelf. The RL21611DB2 and RL21611DB3 are identical except for the exterior color.

Figure 2 shows the CUBE dimensions and Figure 3 shows the main components of the CUBE.

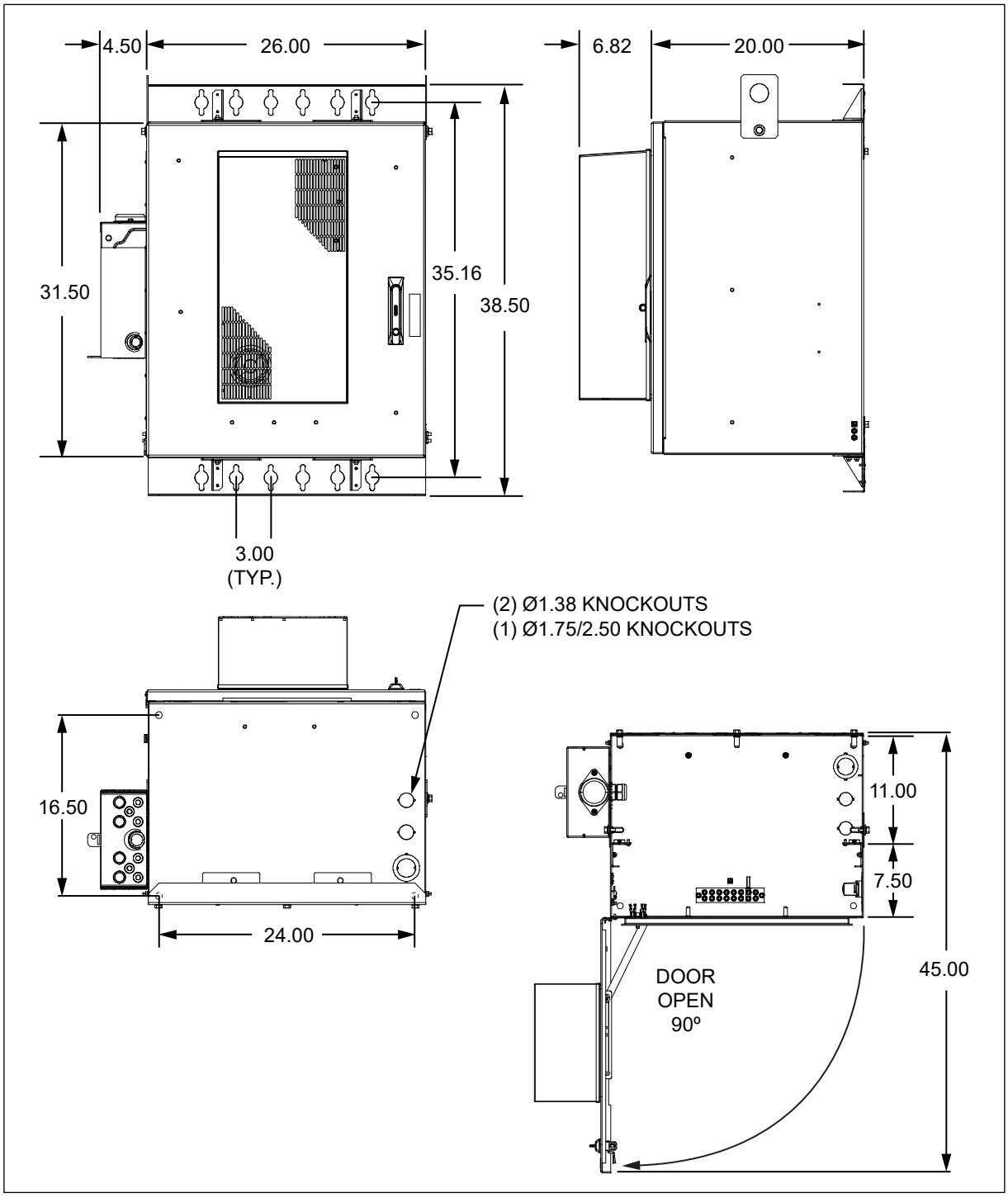

Figure 2 CUBE Dimensions (in inches)

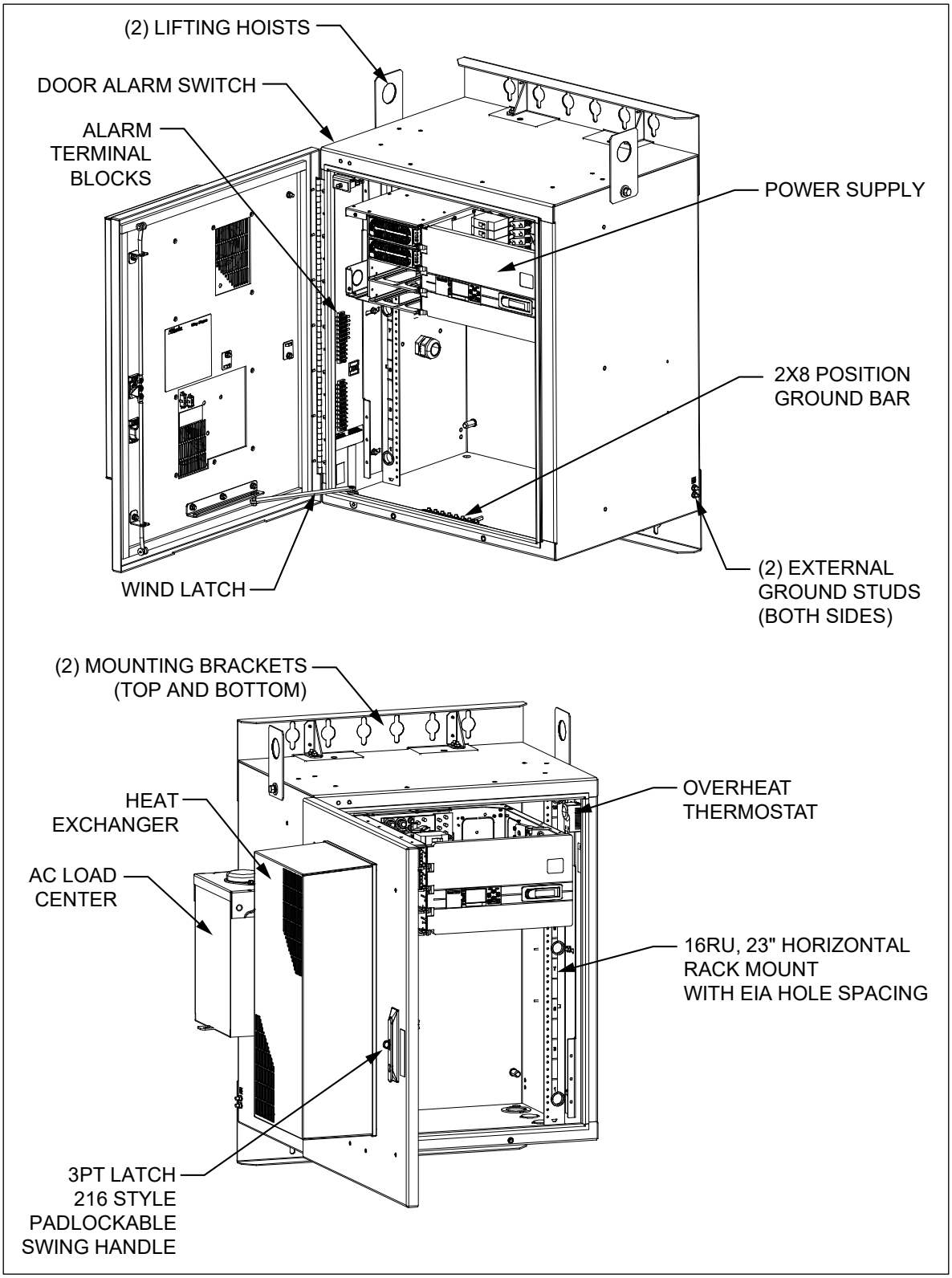

Figure 3 CUBE Components

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, wall, H-frame, or pole 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.

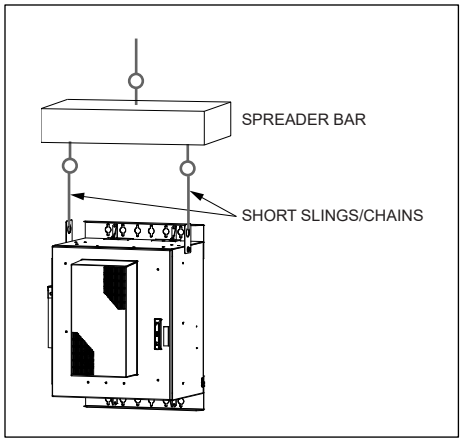

Figure 4 Lifting the CUBE

3.5.1. Required Equipment

- One derrick (crane) capable of lifting the CUBE
- Spreader bar
- Two 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**	**Improper hoisting equipment and unsafe lifting procedures can result in serious injury or death**

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 stabilizers 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

Enclosures can be mounted on a pad, wall, H-frame or pole. Refer to Figure 2 for mounting dimensions for positioning mounting hardware. Charles recommends using a minimum SAE Grade 2, corrosion-resistant bolts, washers, and nuts for all mounting applications. Use 1/2" diameter hardware for pad mounting and 3/8" diameter hardware for all other mounting styles. Bolts need to be of sufficient length depending on which type of mounting is used.

The CUBE ships with the mounting brackets facing toward the center. For wall, H-frame, or pole mounting, remove the brackets, rotate them 180º, and reattach them. Figures in this document show the brackets in the correct orientation for wall, pole, and H-frame mounting.

A minimum of 3/4" thick plywood or similar surface is required for wall mounting.

Charles kit 97-CABPMTKIT is available for pole-mount applications.

Charles kit 97-001971-A contains hardware for mounting to H-frame unistruts.

Charles kit 97-002176-A is available for mounting the CUBE to a pad. The kit includes a 10" plinth, gasket, and hardware for mounting the CUBE to 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%

3.7. 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.

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. A basic electrical diagram is shown in Figure 5.

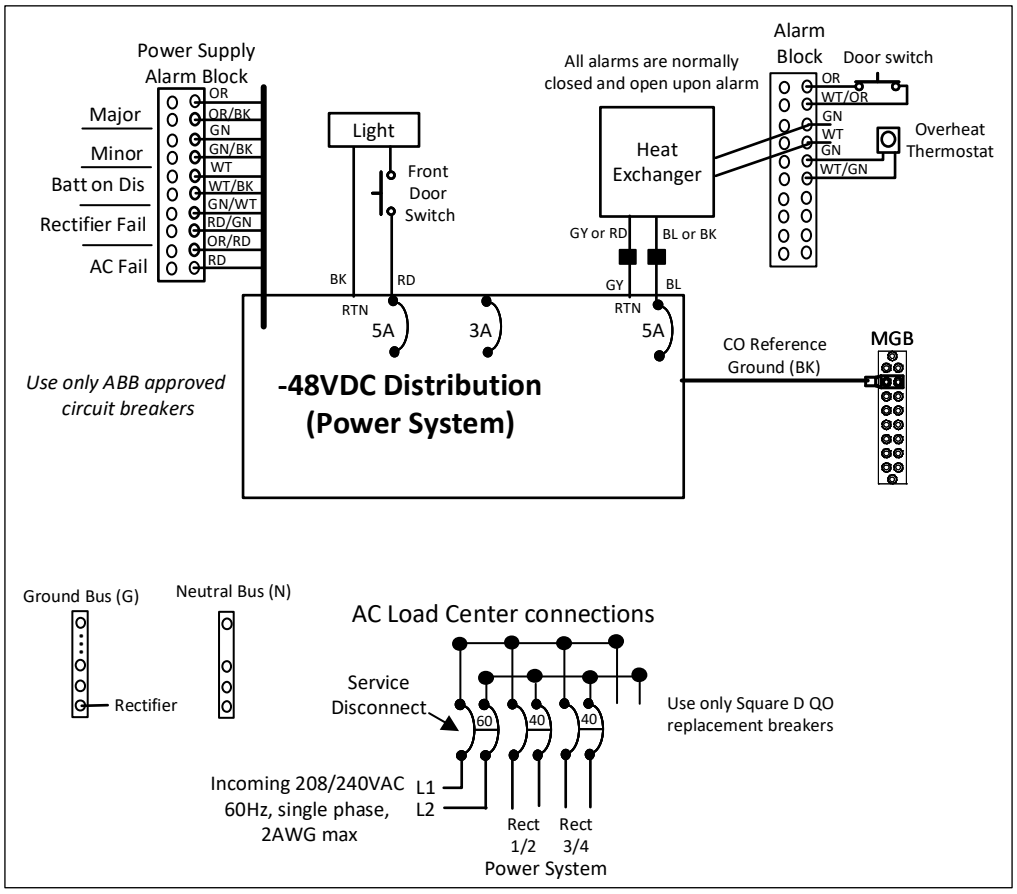

Figure 5 Electrical Diagram

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 6. External ground lugs are available on the sides of the compartment for connecting a site ground wire.

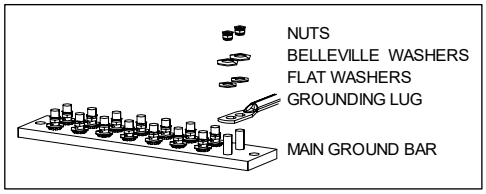

Figure 6
Ground Bar Hardware Stack

3.7.2. AC Voltage Connection

The incoming AC voltage is a single phase 208/240V at 60Hz and is connected to the 60A service disconnect breaker on the left side of the AC load center. The maximum wire size for this breaker is 2 AWG. The installer connects the two hot (line) wires to the 60A breaker, the neutral wire to the neutral bus and the ground wire to the ground bus. Use wire that is sized per National Electrical Code NFPA70 table 310.16.

3.7.3. -48VDC Power System

The CUBE is equipped with an ABB Infinity D power system with two 50A rectifiers, a controller, and an alarm cable. The rectifiers are controlled by two 40A breakers in the AC load center. Refer to the ABB power supply documentation located inside the CUBE for information regarding the power supply operation and configuration.

3.7.4. Heat Exchanger Operation

The 750W DC powered heat exchanger in the equipment compartment has a fan speed controller and includes an internal and an external fan. Both fans' speed increases with increasing internal cabinet temperature. Fans and heat exchanger settings are defined below, and are based off of the cabinet interior temperature. The maximum airflow amount supplied to the equipment by the heat exchanger is 147CFM.

Setting	Internal	External
Turn-on Setting (5°C Differential)	0°C	30°C
Medium Temp Setting	30°C	35°C
High Temp Setting	45°C	50°C
High Temp Alarm Setting	70°C	N/A
Low Temp Alarm Setting	-40°C	N/A

For more information, refer to the heat exchanger documentation found inside the CUBE.

-NOTE-
Changing the speed controller default factory set points can lead to system performance issues, such as equipment failures, increased power use, unnecessary alarms, noise, condensation build up, fan failure caused by excessive runtimes and vibration.
Avoid placing items in front of the heat exchanger's return and supply vents. Maintain a minimum of 6" clearance to enable proper air flow.

3.7.5. 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.

3.7.6. Alarm Block Connections

Two 10-position, labeled alarm blocks monitor components in the equipment compartment. See the electrical diagram for information about alarm connections. All connections are normally closed and will open on alarm.

3.7.7. Adjustable Rack Rails

The vertical rack rails have an adjustable depth. They can be repositioned to a maximum of 7" by loosening the 1/4" Keps nuts on the horizontal cutouts in each rail and then re-tightening to 60 in-lbs.

3.7.8. Fiber and Copper Entry

The CUBE bottom panel has one Ø1.75/2.50 knockout and two Ø1.38 knockouts that accommodate Ø1.00 conduit fittings. See Figure 2 for knockout locations.

3.8. Conduit Seals

All internal and external conduit openings on the CUBE must be completely sealed with a duct seal compound to prevent moisture from entering the equipment compartment. 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.

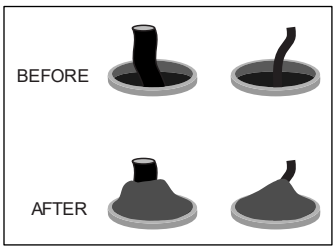

Figure 7
Applying Putty Seal

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.

4. PERIODIC MAINTENANCE

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 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
mktserv@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 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	31”Hx26”Wx20”D
Weight	Approx. 156 lbs. as shipped
23” Equipment Rack Space and Hole Spacing	28” (16RU) EIA spacing with tapped #12-24 mounting holes
Maximum Supported Weight	Rack Rails: 176 lbs.
Materials	0.125” aluminum
Color	DB2: Off-white; DB3: National Park Brown
Electrical	
Power System	48VDC, ABB Infinity D CC109158878
Rectifiers	(2) 50Amp ABB CC109158878
AC Load Center	Square D QO816L100RB
Bonding and Grounding	2x8 position ground bar inside CUBE, external ground studs on either side
Cable Entry	See Figure 2 and section 3.7.8
Thermal	
Heat Exchanger	750W, 48VDC, Vikinor VHT-040-DC
Maximum Heat Dissipation	700W@19°C above ambient with solar
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	Off-white: 02-000290-0 National Park Brown: 02-000626-0
216 Type Security Tool	07-002070-0
H-Frame Mounting Kit	97-001971-A
Plinth Mounting Kit	97-002176-A
Pole Mounting Kit	Off-white: 97-CABPMTKIT National Park Brown: 97-CABPMTKITNPB
Lift-Up Handle	39-000335-0
Door Rod Latch	39-000336-0
2-Wire Door Alarm Switch	17-400314-0
Overheat Thermostat	99-004548-0

Table 1 CUBE Specifications