

Charles Universal Broadband Enclosure

CUBE-PM63922xxx

General Description and Installation

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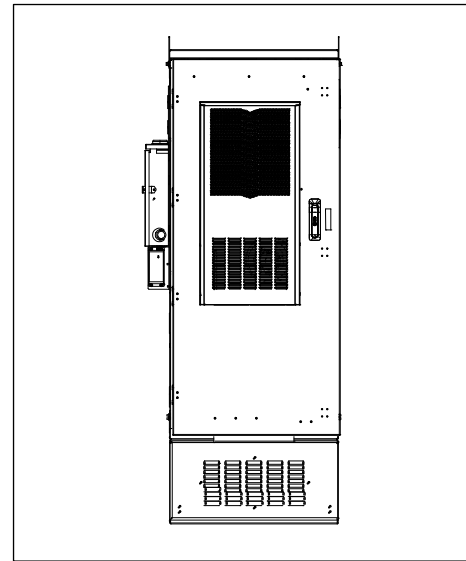


Figure 1 Front View of the CUBE

1. GENERAL INTRODUCTION

1.1. Document Purpose

This document provides general information for the CUBE-PM63922xxx 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-PM63922xxx 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 an equipment compartment and a battery compartment. The equipment compartment has 39RU of 23" rack spacing (front and rear). The battery compartment has a slide-out battery tray. Models within this family differ in their power systems and thermal systems.

Figure 2 shows the dimensions for the CUBE. Figure 3 shows the dimensions of the thermal system options. See Table 2 for a list of all models.

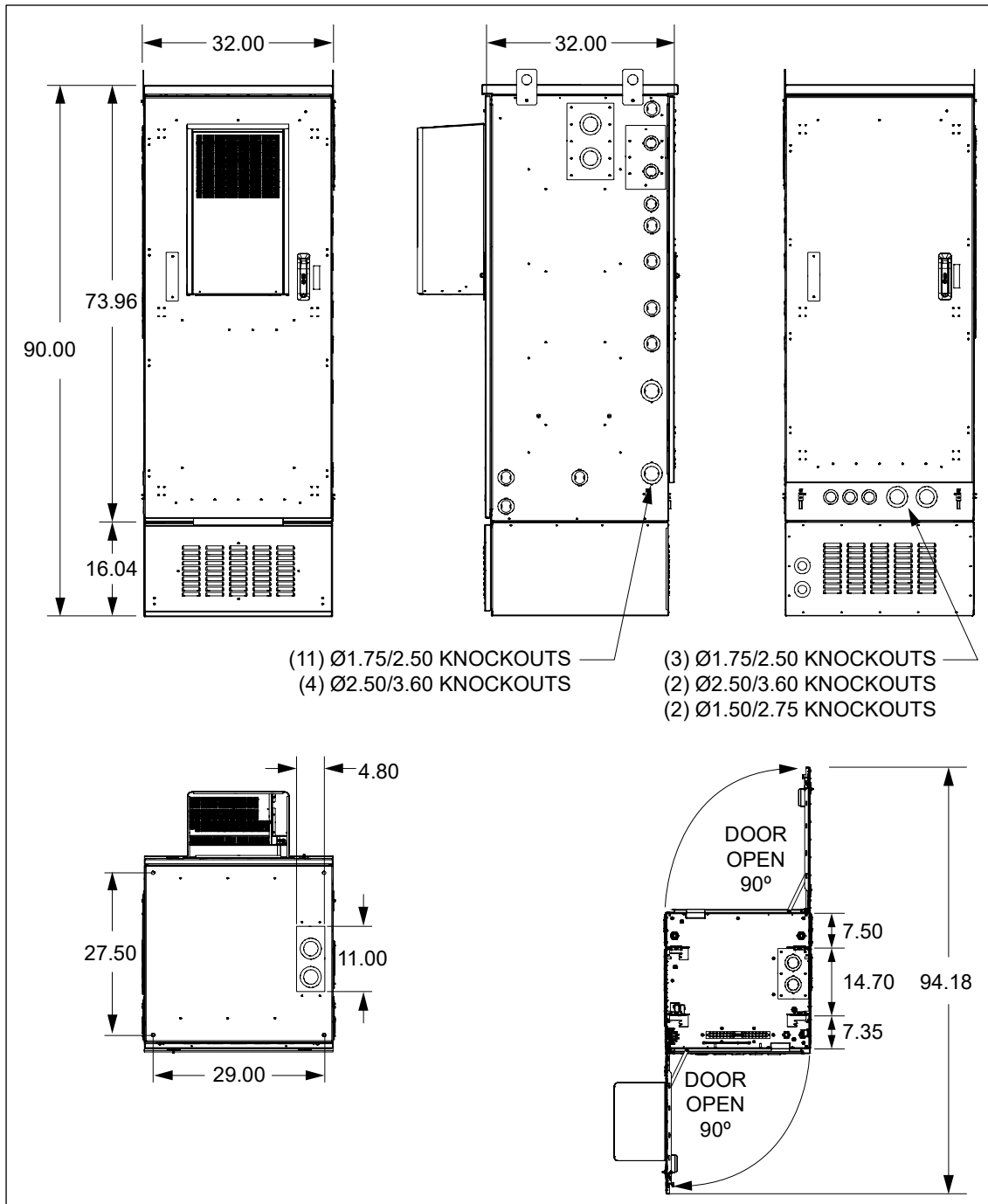


Figure 2 CUBE Dimensions (in inches)

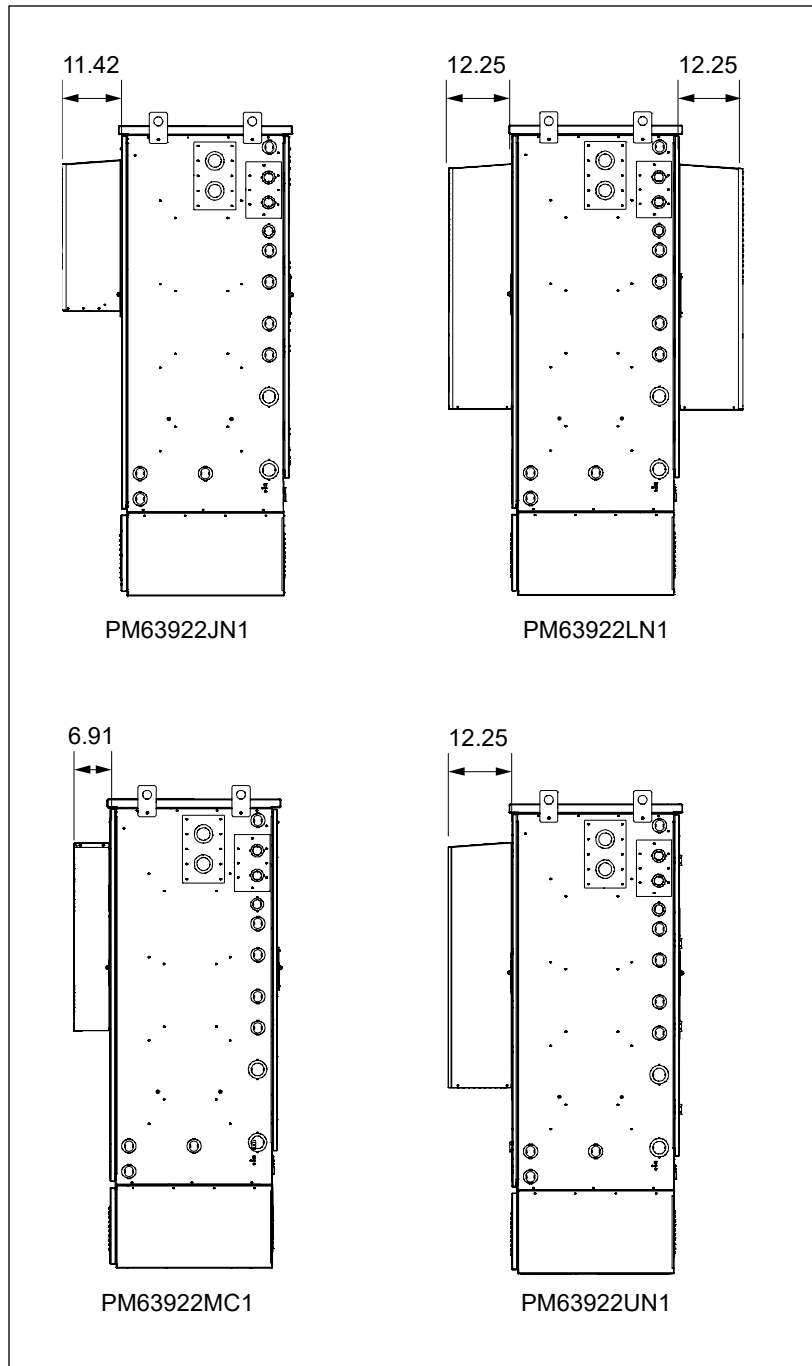


Figure 3 CUBE Thermal Equipment Dimensions (in inches)

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 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 the supplemental documentation for CUBE weight. Charles recommends the following procedure for lifting the CUBE.

	WARNING	Prior to lifting, remove the lifting brackets that hold the mounting gasket in place. Set aside the gasket, and then replace the brackets. Failure to do so can result in a failure of the lifting bracket assembly.
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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.

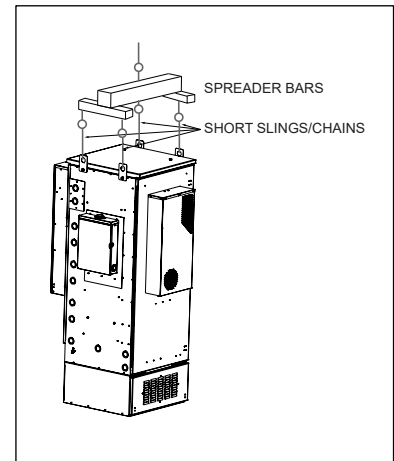


Figure 4 Lifting a CUBE

3.5.2. Warnings and Specific Safety Precautions

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

3.6. Mounting the CUBE

The CUBE can be mounted on a new or existing concrete or composite pad. Charles recommends the CPAD-MM2EXX with the optional CPAD-MM1EXXEXT or CPAD-MM2EXXEXT extension. 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 80-005300-A. The gasket is not needed if mounting on a CPAD. An optional plinth kit is also available (97-002162-A for the field mounted plinth or 96-002162-A for the factory installed 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 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.

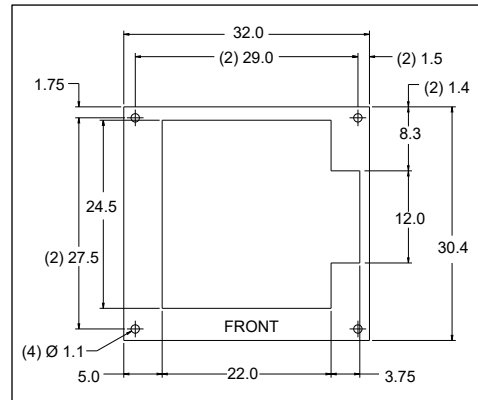


Figure 5
Mounting Hole Dimensions (in inches)

	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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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”. Use the gasket as a mounting hole location template. Remove the anchor bolts for later reuse.
2. Clean any debris from the concrete pad or platform.
3. Install the gasket and place into position on the pad/platform so that the gasket will be underneath the bottom of the CUBE when it is placed. Line up the gasket so that the cutouts are in position around the conduit opening and over the mounting holes as shown in Figure 6.
4. For cabinets in which the cable conduit is entering from the bottom of the enclosure, dress the cable conduit so that it aligns with the opening in the base as it is lowered onto the pad or platform.
5. Open the front door to allow access to the mounting holes.
6. 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.
7. 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.
8. Secure the CUBE to the pad using 1/2”-13 hex head bolts. Tighten all bolts securely.
9. 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, for each bolted joint, use 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.
10. Once the CUBE is secured, remove the slings and tagline and close the door.

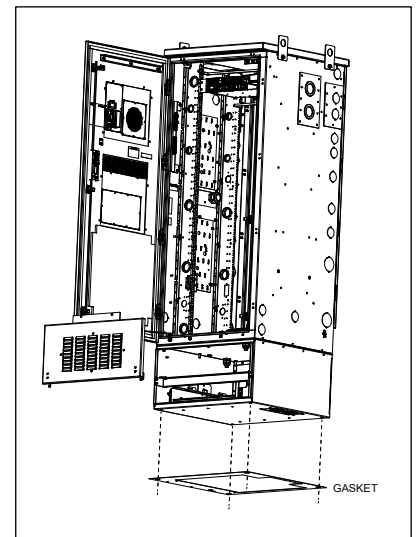


Figure 6 **Gasket Installation**

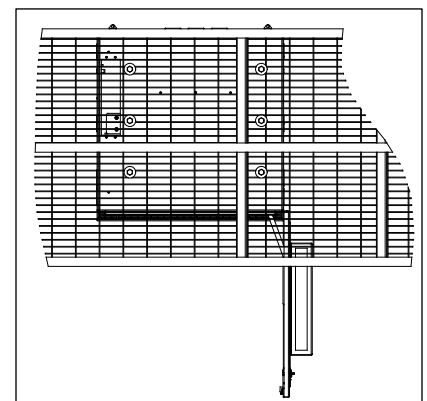


Figure 7 **Installing on a Platform**


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. Four 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 front door to allow access to the 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 and close the 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 the supplemental document that ships with the CUBE for a basic electrical diagram.

3.7.1. Ground Connection

Use the two 2x8 position ground bars provided in the equipment compartment for all grounding of internal equipment. There are four sets of external studs with nuts, two on the rear, one on the left side and one on the right of the cabinet, that are used for terminating a double-hole lug for earth ground or site ground wire.

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. If using VRLA batteries, ensure that the power system is set up for VRLA batteries with temperature compensation enabled.
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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. To open the slide-out battery tray, open the equipment chamber door and remove the two screws at the top of the battery compartment cover, and then remove the four screws on the bracket in front of the battery tray. To unlock the battery tray, press down on the left side lever and slide the battery tray forward.
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. Connect the interconnecting straps to each battery string. Slide the battery tray back into the locked position and replace the battery bracket using the four screws removed previously. Fasten the door back on using the two screws.
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.
 - Ensure that the bending radius does not exceed 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.
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 an overheat (high temperature) alarm thermostat in the equipment compartment that provides a normally closed connection. The overheat alarm is factory set at 50°C in units with air conditioners and with air conditioner/heat exchanger combinations, or 60°C in units with only heat exchangers. The alarm connection opens when 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.

3.7.4. Load Center Cover Plate

All CUBEs with AC load centers are shipped with a blank AC load center cover plate on the other side of the enclosure. The blank cover plate allows the AC load center to be mounted on either side of the enclosure, with the blank cover plate used to cover the opening in the side without the AC load center.

3.7.5. Macro Alarm Terminal Panel

An integrated macro-site alarm panel is mounted on the left wall of the cabinet. This panel provides forty protected dry contact alarm inputs to screw down terminals or 66-block connections (Figure 8).

The cabinet comes with a standard alarm schedule label (See Table 3). The table can be replaced or augmented to match the specific alarms being used. All connections are normally closed and open on alarm.

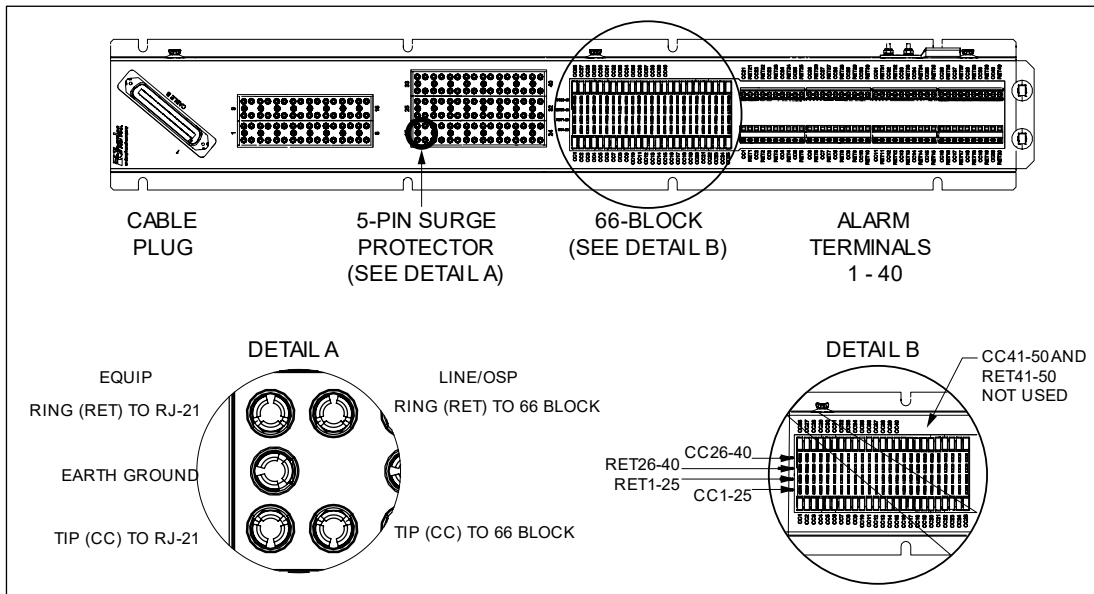


Figure 8 Alarm Terminal Panel

3.7.6. Cable Management Kit

Charles Top Hat Cable Management Kit 97-002228-A is available for field installations as an option that allows cable to enter through the top of the enclosure (Figure 9). The 97-002230-A Top Hat cable management kit is identical, but comes factory-installed. The Top Hat kit comes with a 1x4 4-inch Microflect panel. Additional 1x4 4" Microflect panels can be ordered under part number 97-002250-A. See the documentation that ships with the TopHat for more information.

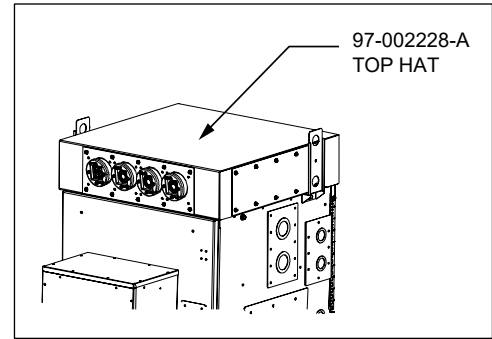


Figure 9 Top Hat Cable Management Kit

3.7.7. Adjustable Rack Rails

The vertical rack rails have an adjustable depth. To reposition the rail, loosen the nuts on the horizontal cutouts in each rail and set to different points on the front and the rear. Retighten to 60 in-lbs.

A factory installed rack extender kit option is available, part number 96-PM639RK19EXT, that changes front and rear rack rails from 23" to 19".

3.7.8. Optional Folding Laptop Tray

All of the enclosures have mounting studs on the front door for installing an optional folding laptop tray. This tray can be ordered under Charles 97-002178-A, which includes hardware for mounting.

3.7.9. Fiber and Copper Entry

Cable entry is accommodated through multiple knockouts on the sides, rear and bottom of the cabinet. The right side of the cabinet has a removable knockout plate. By ordering kit 96-ROXTEC2X9CRL, this panel is replaced with a panel that contains two 4" Microflect ports equipped with Roxtec 4" CRL seals. If desired, the installer can replace the Roxtec seals with customer-supplied Microflect boots.

Both sides of the cabinet have a removable plate. By ordering kit 96-ROXTEC2X3KFO, this plate is replaced with a six-port Roxtec seal for hybrid cables.

There are fourteen knockouts on each side of the cabinet suitable for 1.25"/2" conduit fittings. The right side has two additional knockouts for 2"/3" conduit fittings (not available if 96-ROXTEC2X9CRL is ordered). There are three 1.25"/2" conduit fitting knockouts and two 2"/3" conduit fitting knockouts along the bottom back under the rear door. A removable panel in the bottom of the cabinet has two 2/3" conduit fitting knockouts.

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. The battery compartment must be internally sealed from the equipment compartment to prevent outgassing from the batteries into 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 10. 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.

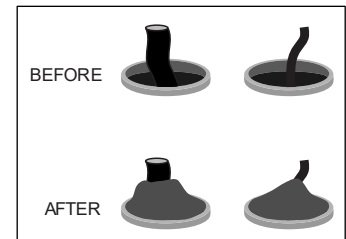


Figure 10 Applying Putty Seal

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

In the event that the enclosure needs to be opened in freezing conditions, a narrow, pointed metallic object such as a screwdriver or chisel, along with a non-metallic device such as a rubber mallet, may be used to remove excessive ice buildup around the door and locking mechanism. Use a commercial aerosol de-icer spray to free up locks and latches if needed.

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.

Heat exchangers (if equipped) require 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. Refer to the heat exchanger documentation supplied with the cabinet for more information. Refer to the air conditioner manual supplied with the air conditioner (if equipped) for periodic maintenance requirements.

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, Type 3R
- 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	89"Hx32"Wx32"D
Color	Off-white
Material	0.125" Aluminum
23" Equipment Rack Space and Hole Spacing	68.25" (39 RU) rack spacing with tapped EIA #12-24 mounting holes (front and back)
Battery Tray Dimensions	11.85"Hx20.88"Wx26.21"D
Electrical	
Cable Entrance	Refer to Figure 2 and Section 3.7.12
100kA AC Surge Protector (for versions with AC load centers)	Raycap MM2080-V-07-ALM
Supported Battery Type	-48VDC Saft Tel.X 180: 80-94693-02. Additional string supported: 80-94865-02 Up to 155Ah VRLA
Environmental	
Operating Temp. Range, Inside Enclosure	-40° to +149°F, -40° to 65°C
Operating Temp. Range, Outside Enclosure	-40° to +115°F, -40° to 46°C
Humidity	0 to 95% (non-condensing)
Altitude	Up to 2,000 meters (6560')
Kits and Replacement Parts	
Optional Plinth Mounting Kit	97-002162-A for field installation 96-002162-A for factory installation
Cable Management	Top Hat Kit 97-002228-A for field installation Top Hat Kit 97-002230-A for factory installation
Folding Laptop Tray (optional)	97-002178-A
Replacement Gasket	39-000350-0
Touch-Up Paint	02-000290-0
Rack Extender Kit (to modify rack spacing to 19")	96-PM639RK19EXT
Roxtec Entry Panels	96-ROXTEC2X9CRL coax cable entry panel 96-ROXTEC2X3KFO hybrid cable entry panel
Alarm Panel Protector Kit	97-002317-A
216 Type Security Tool	07-002070-0
Lift-Up Door Handle	39-000335-0
Lift-Up Door Latch	39-000336-0
Door Alarm Switch (Black)	17-400319-0
HVAC Cutoff Switch (Black with White Button)	17-400322-0
15A GFCI Outlet	04-100207-0
Overheat Thermostat	99-004234-0

Table 1 CUBE Specifications

CUBE Part Number	AC Load Center	Thermal
CUBE-PM63922JN1	None	4000BTU 115VAC powered HVAC
CUBE-PM63922KE3	12-position	5000BTU 48VDC powered HVAC
CUBE-PM63922LN1	None	(2) 10000BTU 48VDC powered HVACs
CUBE-PM63922LNA	None	(2) 10000BTU 230VAC powered HVACs
CUBE-PM63922MC1	20-position	1880W 48VDC powered Heat Exchanger
CUBE-PM63922UM2	12-position	10000BTU 230VAC powered HVAC
CUBE-PM63922UN1	None	10000BTU 230VAC powered HVAC

Table 2 Product Specifications by Model

Alarm Number	Description
CC1	Door Intrusion
CC2	Commercial Power Failure
CC3	Surge Suppressor/Lightening Arrestor
CC4	Rectifier Failure
CC5	Multiple Rectifier Failure
CC6	Battery Discharge
CC7	Low Voltage
CC8	DC Power Failure
CC9	Generator Running
CC10	Generator Low Fuel
CC11	Generator Failure
CC12	HVAC Failure
CC13	High Temp
CC14	Low Temp
CC15	Tower Light
CC16	Tower Light Side
CC17	RRH Up-Convertor Failure
CC18	RRH Power Failure
CC19	RRH High Humidity
CC20	RRH Intrusion
CC21	Smoke/Fire
CC22	Bus Bar Theft
CC23	Battery Breaker Alarm
CC24	
CC25	Microwave Critical
CC26	Microwave Major
CC27	Dehydrator Alarm
CC28	Fire Suppression Discharge
CC29	Fire Suppression Trouble
CC30	Secondary HVAC Running
CC31	Explosive Gas
CC32	High Humidity

Table 3 Macro Alarm Wiring Table