

Charles Universal Broadband Enclosure

CUBE-PM64412xxx

General Description and Installation

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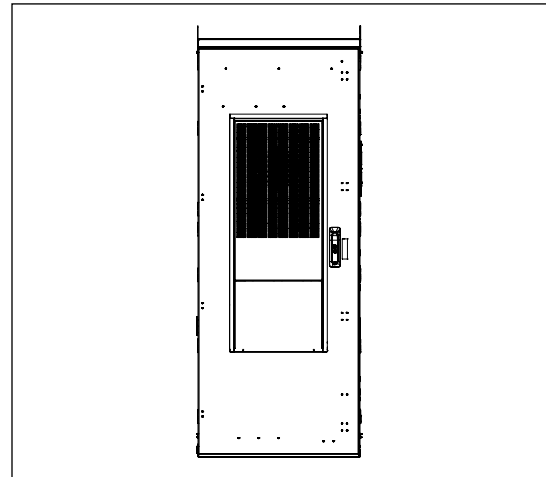


Figure 1 Front View of the CUBE

1. GENERAL INTRODUCTION

1.1 Document Purpose

This document provides general information for the CUBE-PM64412xxx 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 CUBE-PM64412xxx Charles Universal Broadband Enclosure will be referred to as the "CUBE."

1.2 Product Purpose

These CUBEs consist of a protective enclosure for an integrated system of electronic components and equipment that can serve copper and fiber interfaces. Batteries are not supported in the configurations covered by this document.

1.3 Product Mounting and Location

These enclosures are suitable for outside plant-type (OSP) locations and those that may require NEC compliance. These outdoor, weather-resistant CUBEs are to be mounted on a pad, CPAD, or steel grate. 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 with 44RU of 23" horizontal rack spacing and front and rear doors. Each unit has either an HVAC, a heat exchanger, or a CTMS mounted on one or both the doors. Figure 2 shows the dimensions for the CUBE family. Figure 3 shows the dimensions of the thermal system for each model. See Table 2 for a list of all models. The supplemental documents that ship with each model include component views.

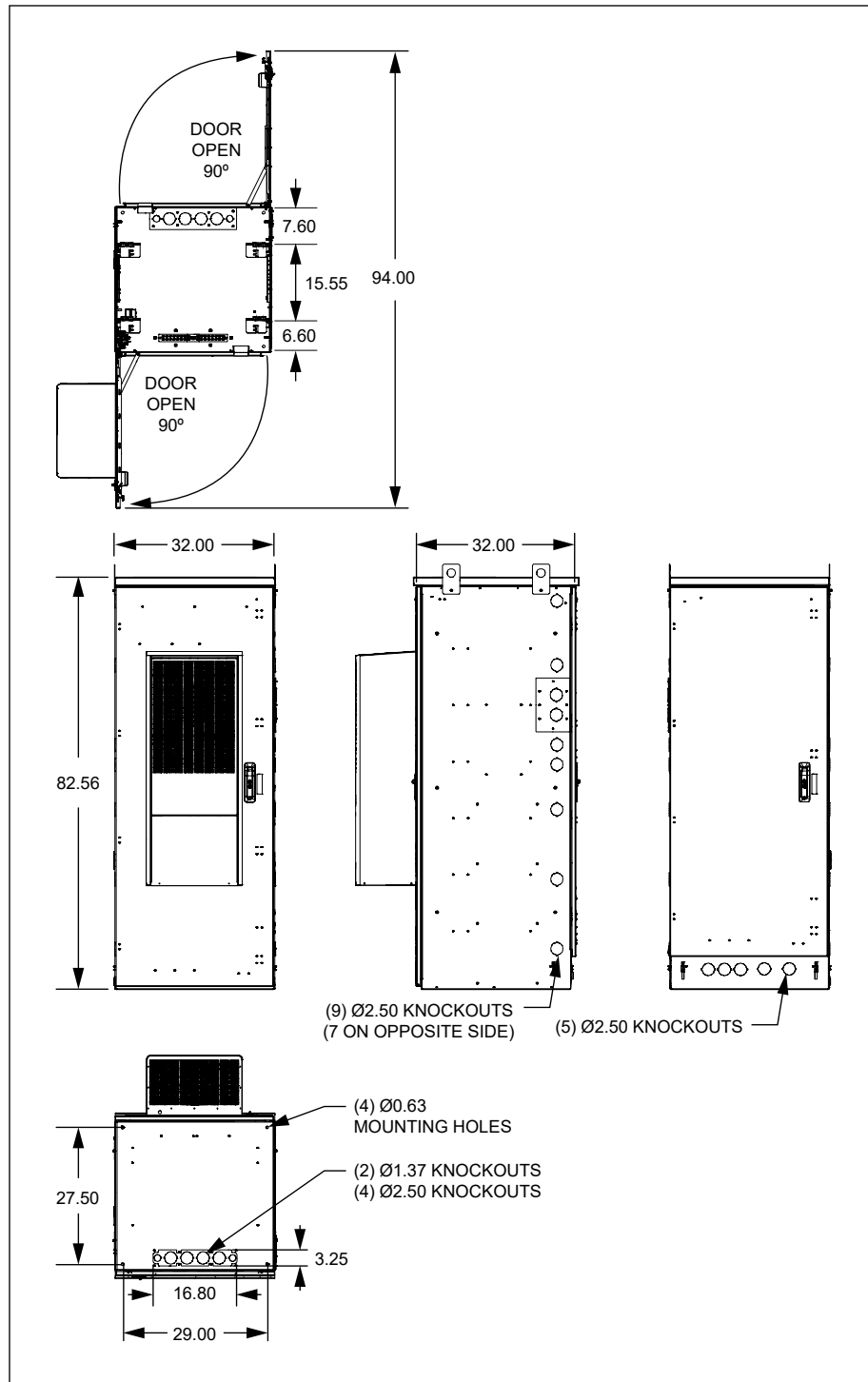


Figure 2 CUBE Dimensions (in inches) (PM64412LN1 shown)

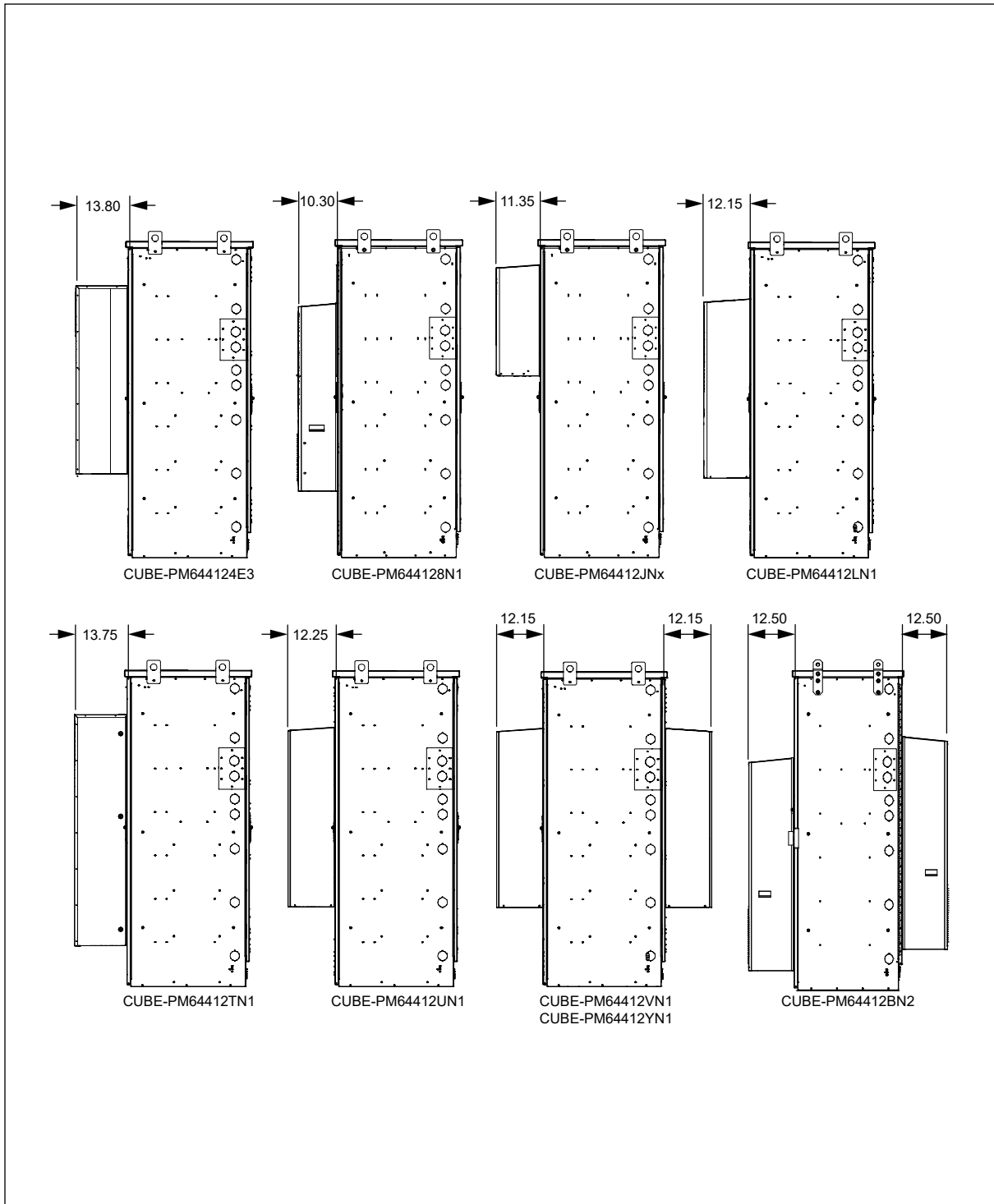


Figure 3 CUBE Thermal Equipment Dimensions (in inches)

3. INSTALLATION

3.1 Inspecting the Product

The CUBE is shipped mounted upright to 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.
- Maintain minimum spacing between the accessories and components and the housing for ITE equipment 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 latch 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--provided)
- Level
- Derrick (crane) for lifting

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 doors.
- 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 steel grate 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.

Some models have vertical (straight) lifting hoists, while others have angled lifting hoists. The lifting procedures are slightly different for each style of hoist.

	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 (for models with straight lifting hoists)
- 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 (for straight hoists) or Figure 5 (for angled hoists).

3.5.2 Warnings and Specific Safety Precautions

	WARNING	Improper hoisting equipment and unsafe lifting procedures can result in serious injury or death
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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 composite pad with the optional CPAD-MM1EXXEXT or CPAD-MM2EXXEXT extension. A loose gasket is provided for placing the CUBE on a concrete pad. If the gasket becomes damaged during installation, order a replacement under part number 39-000350-0. The gasket is not needed if mounting on a CPAD.

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%

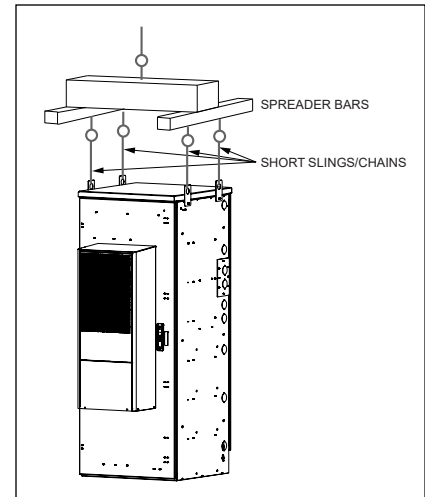


Figure 4
Lifting a CUBE with Straight Hoists

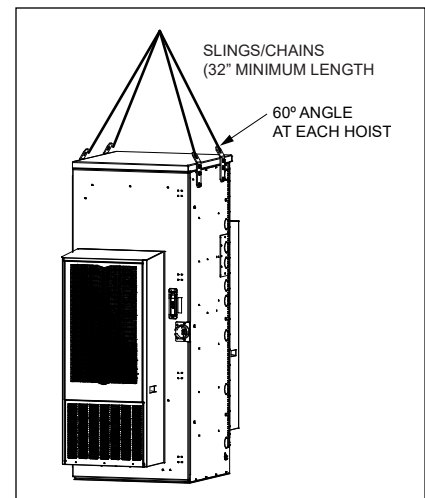


Figure 5
Lifting a CUBE with Angled Hoists

3.6.2 Constructing a New Pad

- Use only concrete for the pad. 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 6 shows the required conduit openings and mounting hole dimensions for entering/mounting the bottom of the CUBE. Use these dimensions when designing the pad.

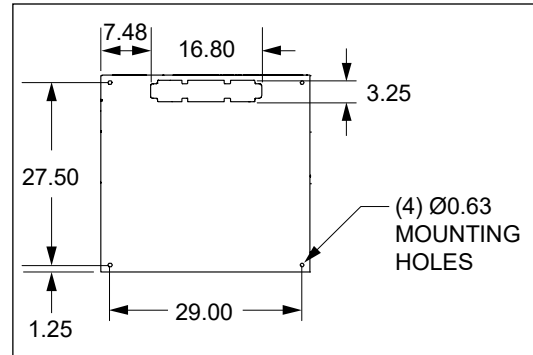


Figure 6
Mounting Dimensions (in inches, Top View)

	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. 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. The CUBE can be mounted on the pad or steel grate platform directly or with optional plinth kit 97-002162-A. The plinth can also be ordered as the factory-installed kit, 96-002162-A. 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 7.
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 of the enclosure.
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” hardware. 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 8.
10. Once the CUBE is secured, remove the slings and tagline.

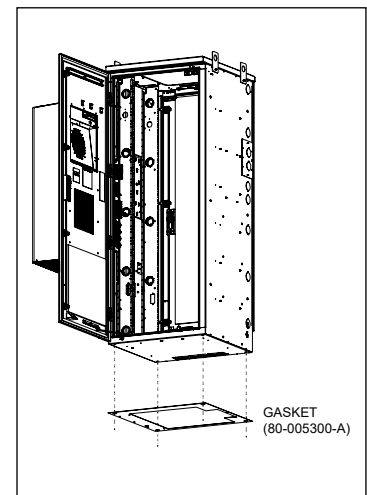


Figure 7 Gasket Installation

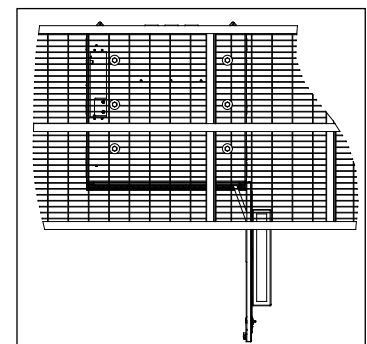


Figure 8
Installing on a Platform

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 of the enclosure.
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 CUBE 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.

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 Connections

Use the two 2x8 position ground bars provided in the equipment compartment for all grounding of internal equipment. Stack hardware as shown in Figure 9. Use the four sets of external studs with nuts (two on the rear, one on the left side and one on the right side) for terminating a double-hole lug for earth ground or site ground wire.

3.7.2 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 HVACs and CTMSs or 60°C in units with heat exchangers and will open the connection when this temperature is exceeded.

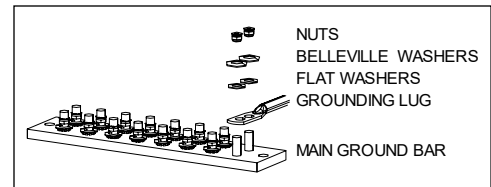


Figure 9
Ground Bar Hardware Stack

-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.

3.7.3 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 10).

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.

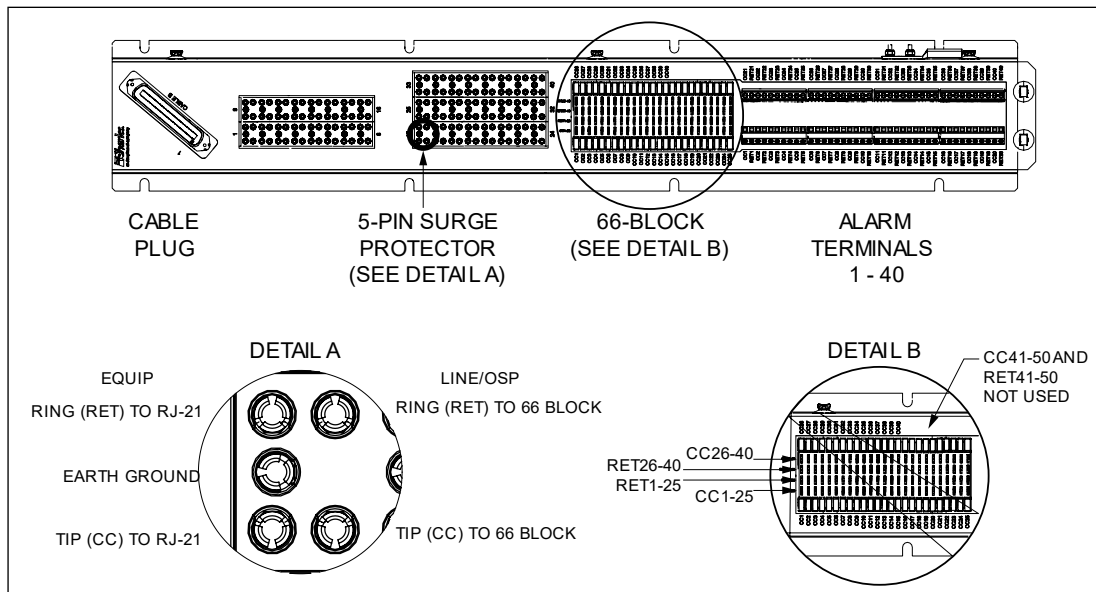


Figure 10 Alarm Terminal Panel

3.7.4 Fiber and Copper Entry

Cable entry is accommodated through multiple knockouts on the sides, rear, and bottom of the cabinet (see Figure 2 for knockout locations). A removable panel in the bottom of the cabinet has eight Ø2.50”/3.60” and four Ø1.75/2.50 knockouts. All Ø1.75/2.50 knockouts accommodate Ø1.25”/2.0” conduit fittings. All Ø2.50”/3.60” knockouts accommodate Ø2.0”/3.0” conduit fittings.

The right side of the CUBE has a removable plate. This plate can be replaced with the 96-ROXTEC2X3KFO kit that contains a six-port Roxtec seal for hybrid cables. If desired, the installer can replace the Roxtec seals with customer-supplied Microflect boots. This kit is ordered with the CUBE and installed at the factory.

3.7.5 Cable Management Kit

The optional Charles Top Hat Cable Management Kit 97-004500-A is available for field installations. The kit allows cable entry through the top of the enclosure (Figure 11). The 96-004500-A and 96-004501-A Top Hat cable management kits are similar but are factory-installed.

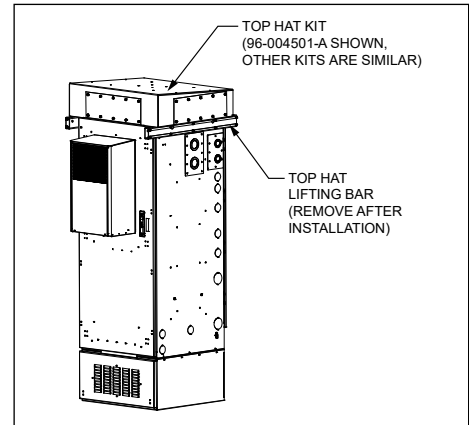


Figure 11
Top Hat Cable Management Kit

The kit comes with a pair of lifting bars for moving and lifting the CUBE. When the CUBE is fully installed, remove these bars.

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 12. 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.

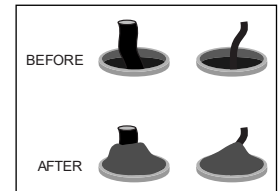


Figure 12
Applying Putty Seal

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, turn on the circuit breakers and verify that equipment turns up correctly.

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 HVAC or CTMS manual supplied with the HVAC/CTMS (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
- 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	81"Hx32"Wx32"D
Color	Off-White
Material	0.125" Aluminum
23" Equipment Rack Space and Hole Spacing	77" (44 RU) rack spacing with tapped EIA #12-24 mounting holes
Maximum Supported Weight	Rack Rails: 484 lbs.
Electrical	
Cable Entrance	96-ROXTEC2X3KFO hybrid cable entry panel (factory installed)
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 97-004500-A for field installation Top Hat Kit 96-004500-A or 96-004501-A for factory installation
Replacement Gasket	39-000350-0
Touch-Up Paint	02-000290-0
216 Type Security Tool	07-002070-0
Lift-Up Handle	39-000335-0
Door Rod Latch	39-000336-0
15A GFCI Outlet	04-100207-0
Overheat Thermostat	99-004548-0
4-Wire Door Alarm Switch (Black)	17-400319-0

Table 1 PM644912xxx Family Specifications

7.1 Part Numbers

CUBE Part Number	Thermal
CUBE-PM644124E3	6000W DC CTMS
CUBE-PM644128N1	12000BTU DC HVAC
CUBE-PM64412BN2	(2) 17000BTU DC HVAC
CUBE-PM64412JN1	4000BTU AC HVAC
CUBE-PM64412LN1	12000BTU DC HVAC
CUBE-PM64412TN1	3500W DC Heat Exchanger
CUBE-PM64412UN1	12000BTU AC HVAC
CUBE-PM64412VN1	(2) 12000BTU DC HVAC
CUBE-PM64412YN1	(2) 12000BTU AC HVAC

Table 2 PM64412xxx Part Numbers

7.2 Alarm Panel Connections

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