

Charles Universal Broadband Enclosure

CUBE-PM524xx Series

General Description and Installation

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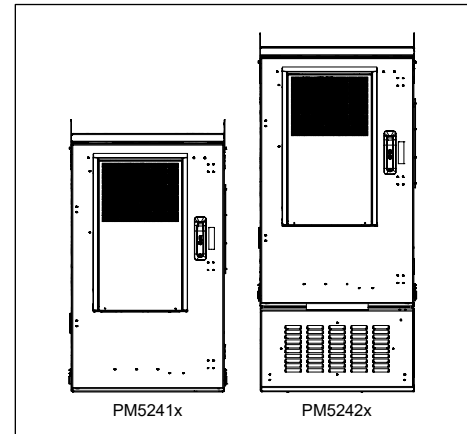


Figure 1 Front View of the CUBE

1. GENERAL INTRODUCTION

1.1. Document Purpose

This document provides general information for the CUBE-PM524xx 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 closed front views of the enclosure, with and without the battery compartment.

-NOTE-

Hereafter, the Charles Universal Broadband Enclosure CUBE-PM524xx 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.

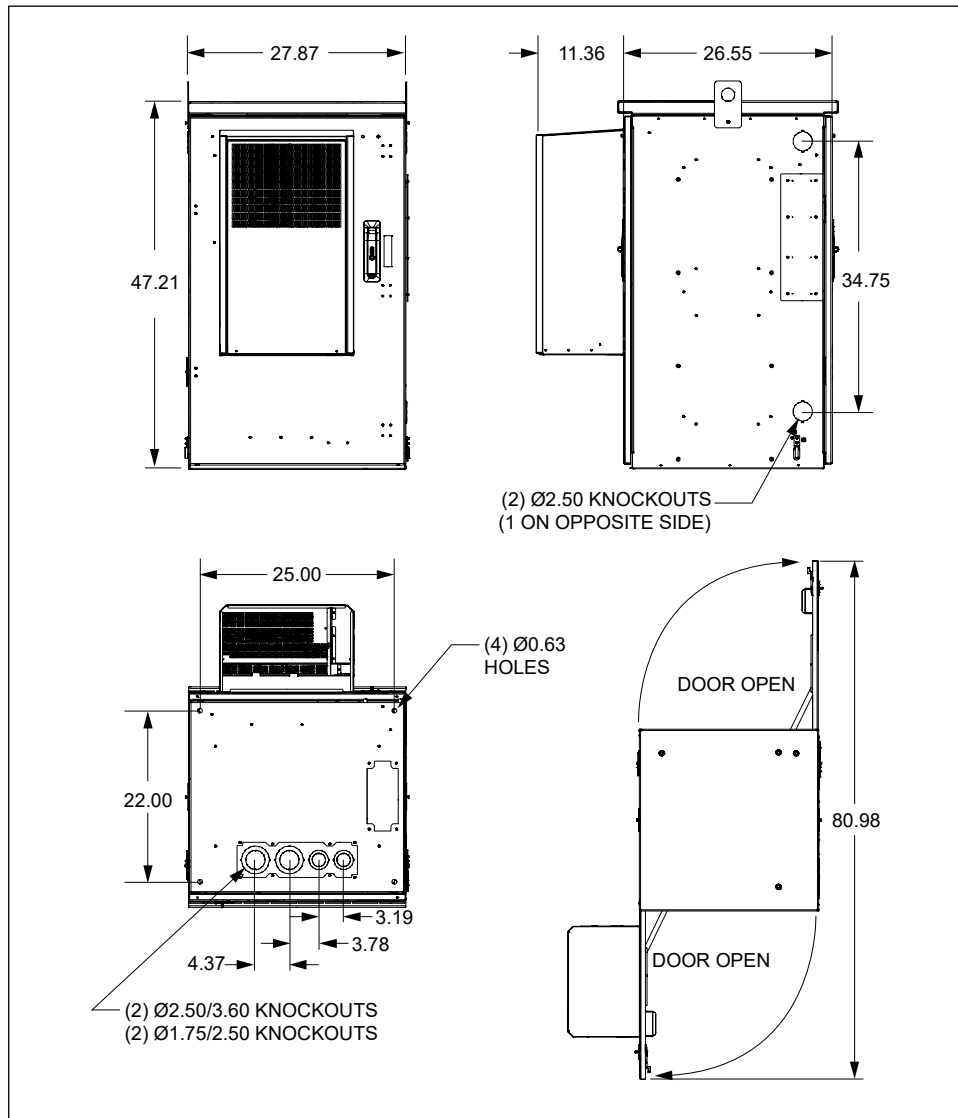
1.3. Product Mounting and Location

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

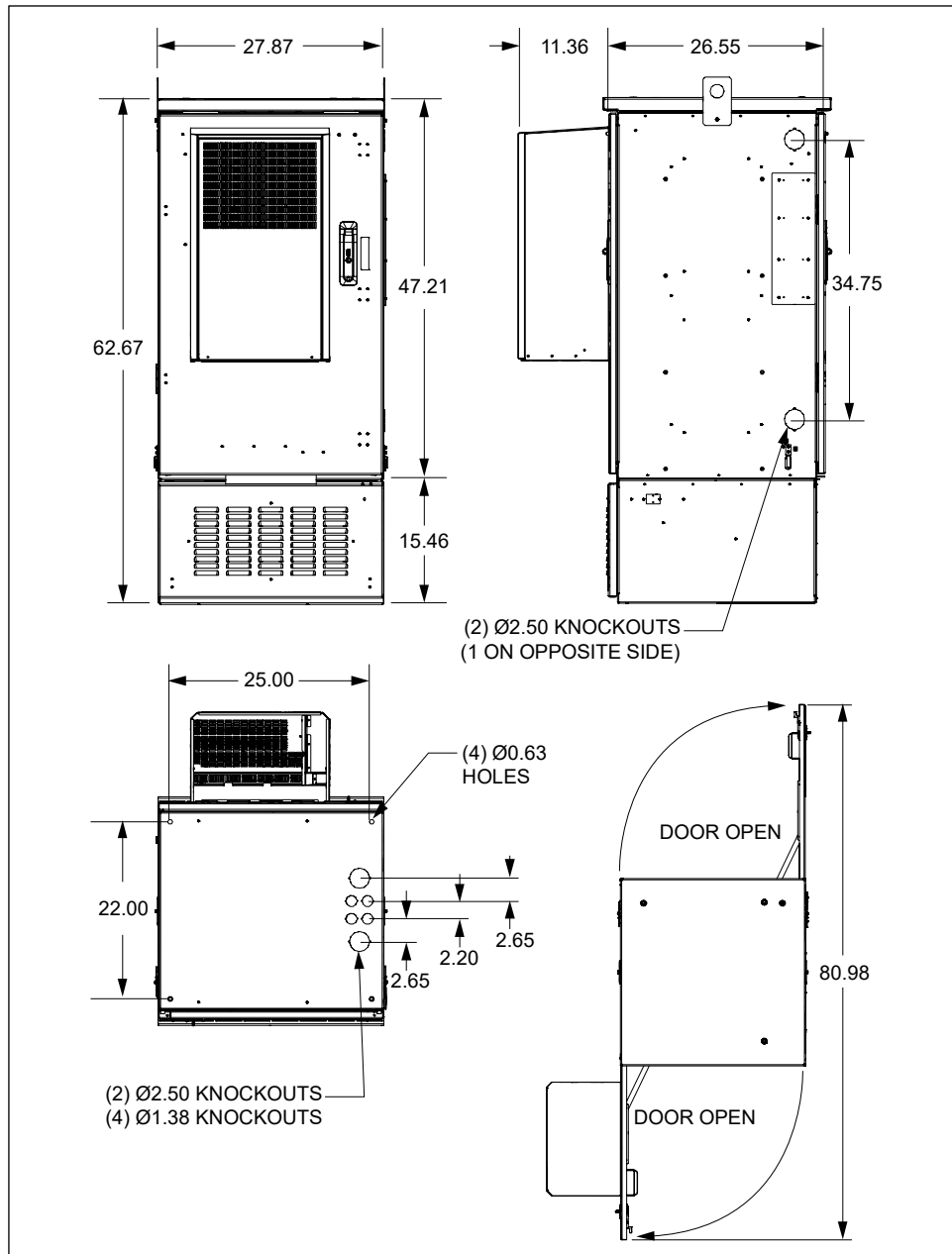
2. PRODUCT DESCRIPTION

The CUBE includes an equipment compartment with 24RU of 23" horizontal rack mount spacing. Each model includes a thermal unit mounted on the door. All PM524x2 models have front and rear doors, while all PM524x5 models have a front door and a removable rear panel. Some models include a battery compartment that supports one string of customer supplied -48VDC 170Ah VRLA batteries. See Table 2 for a listing of all models in this family.

Figure 2 shows the dimensions of models with an equipment compartment only. Figure 3 shows the dimensions of models with a battery compartment. With the exception of the thermal unit depth, all dimensions are common to all models in the family. The supplemental documentation for each model shows the components of that model.



**Figure 2 CUBE Dimensions (in inches)
(CUBE-PM52412KN1 shown)**



**Figure 3 CUBE Dimensions (in inches)
(CUBE-PM52422KN1 shown)**

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
- 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.

	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 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.

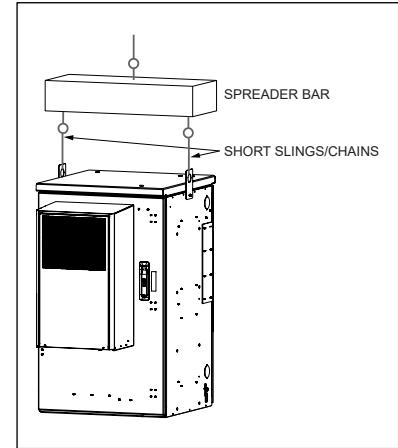


Figure 4 Lifting the CUBE

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. 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 80-005543-A. Ensure that the unit is level. For wall or pole mounting, order the Charles mounting kits (Table 1).

3.6.1. 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.

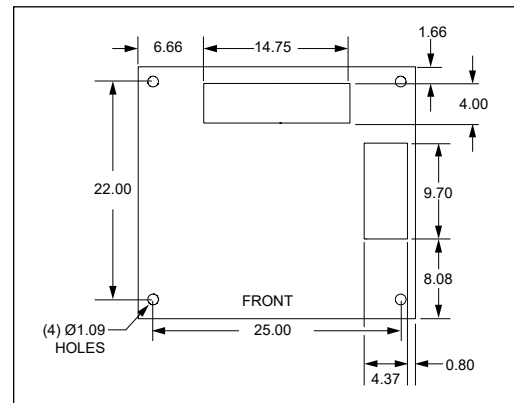


Figure 5 Mounting Hole Dimensions (in inches)

	WARNING	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.
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3.6.2. 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.
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 6.
4. For models with an equipment compartment only, open the door to allow access to the mounting holes. For models with battery compartments, open the equipment compartment door and remove the screws at the top of the battery compartment cover. 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. Once the CUBE is secured, remove the slings and tagline. Replace any panels removed and close the battery or equipment compartment door.

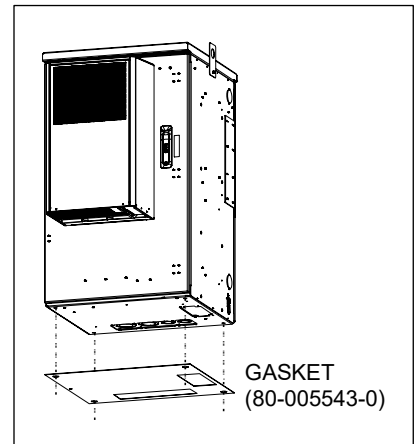


Figure 6 Gasket Installation

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. A basic electrical diagram is shown in the supplemental documentation.

3.7.1. 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%

3.7.2. Ground Connection

Use the position ground bar provided in the equipment compartment for all grounding of internal equipment. External ground lugs are available on the sides of the equipment compartment for connecting a site ground wire.

3.7.3. Battery Connection

	WARNING	<p>Always turn off battery breakers prior to servicing batteries.</p> <p>If using VRLA batteries, ensure that the power system is set up for VRLA batteries with temperature compensation enabled.</p>
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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. Switch off the battery breaker located in the battery compartment.
2. Open the equipment chamber door and remove the two screws at the top of the battery compartment cover panel, then set aside the panel. Then remove the four screws on the retaining bracket in front of the battery tray and set the bracket aside.
3. If replacing batteries, disconnect battery cables from terminals and loosen the battery retaining strap(s).
4. 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.
7. Replace the battery retaining bracket using the four screws removed previously. Fasten the door back on using the two screws.
8. Replace battery temperature probe to the closest battery.
9. Connect the battery cables to the appropriate terminals.
10. Secure the battery retaining straps and reinstall the battery retainer brackets using hardware from step 2.
11. Properly manage the battery cables.
 - o Ensure that the bending radius does not exceed 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.
12. Switch on the battery breaker.

Notes:

- Battery breakers terminate at the power shelf.
- 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.

3.7.4. 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. The alarm opens the connection if this temperature is exceeded.

<p><i>-NOTE-</i></p> <p><i>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.</i></p>
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3.7.5. Alarm Terminal Blocks

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.

3.7.6. Fiber and Copper Entry

The equipment compartment has three Ø2.50" knockouts on the sides of the equipment compartment that accommodate Ø2.00" conduit fittings. On the bottom panel, there are two Ø2.50/3.60" and two Ø1.75/2.50" knockouts that accommodate Ø2.00/3.00" and Ø1.75/2.00" fittings, respectively. See Figure 2 for knockout locations.

The battery compartment (if equipped) has two Ø2.50" knockouts and four Ø1.38" knockouts on the bottom panel that accommodate Ø2.00" and Ø1.00" conduit fittings, respectively. See Figure 3 for knockout locations.

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.

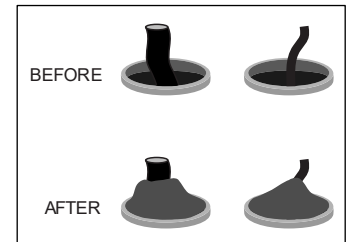


Figure 7 Applying Putty Seal

4. PERIODIC MAINTENANCE

In the event that the enclosure 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.

For units with a battery compartment, periodic cleaning of any 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.

For units equipped with an HVAC or CTMS system, refer to the HVAC or CTMS manual 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	Equipment compartment only models: 48"Hx28"Wx27"D Equipment/Battery compartment models: 63" Hx28"Wx27"D
23" Equipment Rack Space and Hole Spacing	42" (24RU) rack spacing with tapped EIA #12-24 mounting holes
Battery Tray Size (Select Models Only)	13"Hx20"Wx22"D
Materials	0.125" aluminum
Color	Off-white
Electrical	
Supported Batteries (Select Models Only)	-48VDC VRLA, 170Ah
Bonding and Grounding	One 2x8 position ground bar in equipment compartment, two external ground lugs
Cable Entry	See Figure 2, Figure 3, and section 3.7.6
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
AC Load Center Kit	96-16POSLCSPGEN
Power Shelf Kit	Factory Mounted: 96-GEINF-150-12
Cable Entry Port Kit	Factory Mounted: 99-004460-A
200A Battery Retainer Kit	Field Mounted: 97-200ABATBRKTK (only for models with battery compartment)
Side Chamber Kit	Factory Mounted: 96-004503-A; Field Mounted: 97-004503-A
Vented Side Chamber Kit	Factory Mounted: 96-004505-A
6" Plinth Kit	Factory Mounted: 96-004502-A; Field Mounted: 97-004502-A
Pole Mounting Kit	97-POLEMNTRSMNT
Wall Mounting Kit	97-PM5WALLMNTKT
Laptop Tray Kit	Factory Mounted: 96-001999-A; Field Mounted: 97-001999-A
Laptop Tray Kit, Extended Slide	Factory Mounted: 96-001990-A; Field Mounted: 97-001990-A
Replacement Gasket	80-005543-A
Shim Kit for Leveling	97-000010-0
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

7.3. CUBE Models

Part Number	Battery Compartment?	Equipment Compartment Entry	Thermal
CUBE-PM524125N1	N	Front and Rear Door	3.5K CTMS
CUBE-PM524155N1	N	Front Door, Rear Panel	3.5K CTMS
CUBE-PM524226N1	Y	Front and Rear Door	3.5K CTMS and 200W TEC
CUBE-PM524256N1	Y	Front Door, Rear Panel	3.5K CTMS and 200W TEC
CUBE-PM52415DN1	Y	Front Door, Rear Panel	750W Heat Exchanger
CUBE-PM52412JN1	N	Front and Rear Door	4000BTU AC powered HVAC
CUBE-PM52415JN1	N	Front Door, Rear Panel	4000BTU AC powered HVAC
CUBE-PM524227N1	Y	Front and Rear Door	4000BTU AC powered HVAC and 200W TEC
CUBE-PM52422MN1	Y	Front and Rear Door	1880W DC powered Heat Exchanger
CUBE-PM524257N1	Y	Front Door, Rear Panel	4000BTU AC powered HVAC and 200W TEC
CUBE-PM52412KN1	N	Front and Rear Door	4000BTU DC powered HVAC
CUBE-PM52415KN1	N	Front Door, Rear Panel	4000BTU DC powered HVAC
CUBE-PM524222N1	Y	Front and Rear Door	4000BTU DC powered HVAC and 200W TEC
CUBE-PM524252N1	Y	Front Door, Rear Panel	4000BTU DC powered HVAC and 200W TEC
CUBE-PM52422KN1	Y	Front and Rear Door	4000BTU DC powered HVAC
CUBE-PM52425KN1	Y	Front Door, Rear Panel	4000BTU DC powered HVAC
CUBE-PM52422JN1	Y	Front and Rear Door	4000BTU AC powered HVAC
CUBE-PM52425JN1	Y	Front Door, Rear Panel	4000BTU AC powered HVAC
CUBE-PM524225N1	Y	Front and Rear Door	3.5K CTMS
CUBE-PM524255N1	Y	Front Door, Rear Panel	3.5K CTMS

Table 2 CUBE Models by Part Number