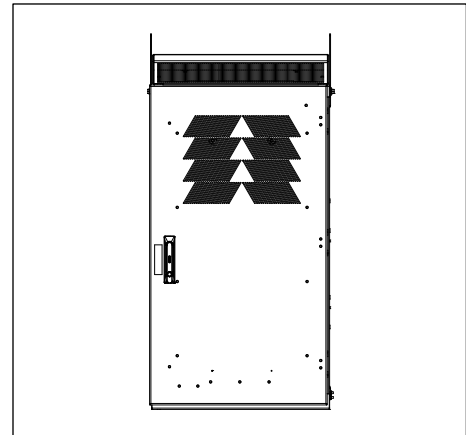


# Charles Universal Broadband Enclosure

## CUBE-SC3NN12HN4

### 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-SC3NN12HN4 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-SC3NN12HN4 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 concrete or composite 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 consists of a single radio compartment that supports either a low power or high power radio configuration. The CUBE is designed to be bolted to an existing CUBE-SC20942NEx cabinet in the field.

Low power configuration:

- (1) Nokia AWHHF radio
- (2) Nokia AirScale Micro radio
- (1) MI-3000-2042 triplexer
- (1) Nokia POD-8 DWDM

High power configuration:

- (1) Nokia AHFIB radio
- (1) Nokia AZHL radio
- (1) Nokia APAM power supply
- (2) CommScope CBC1726T-4310 diplexers
- (1) Nokia POD-8 DWDM

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

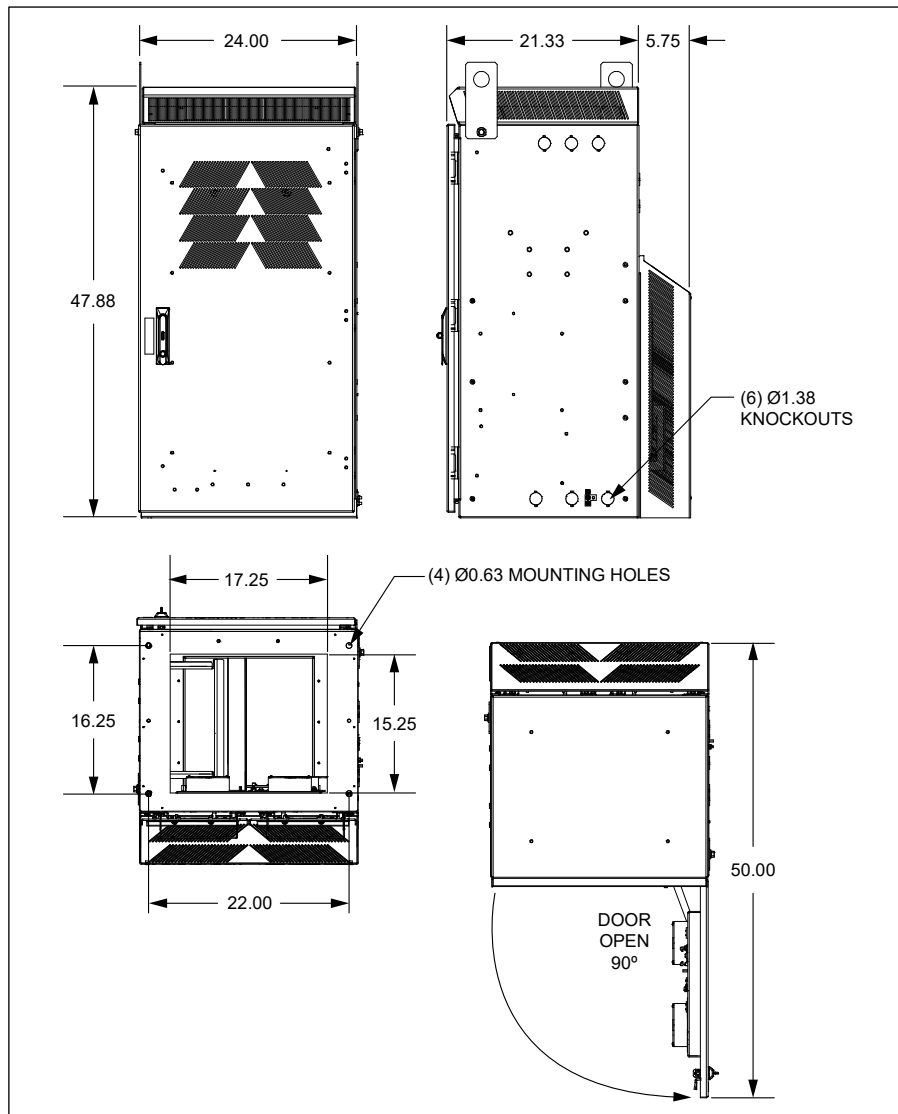
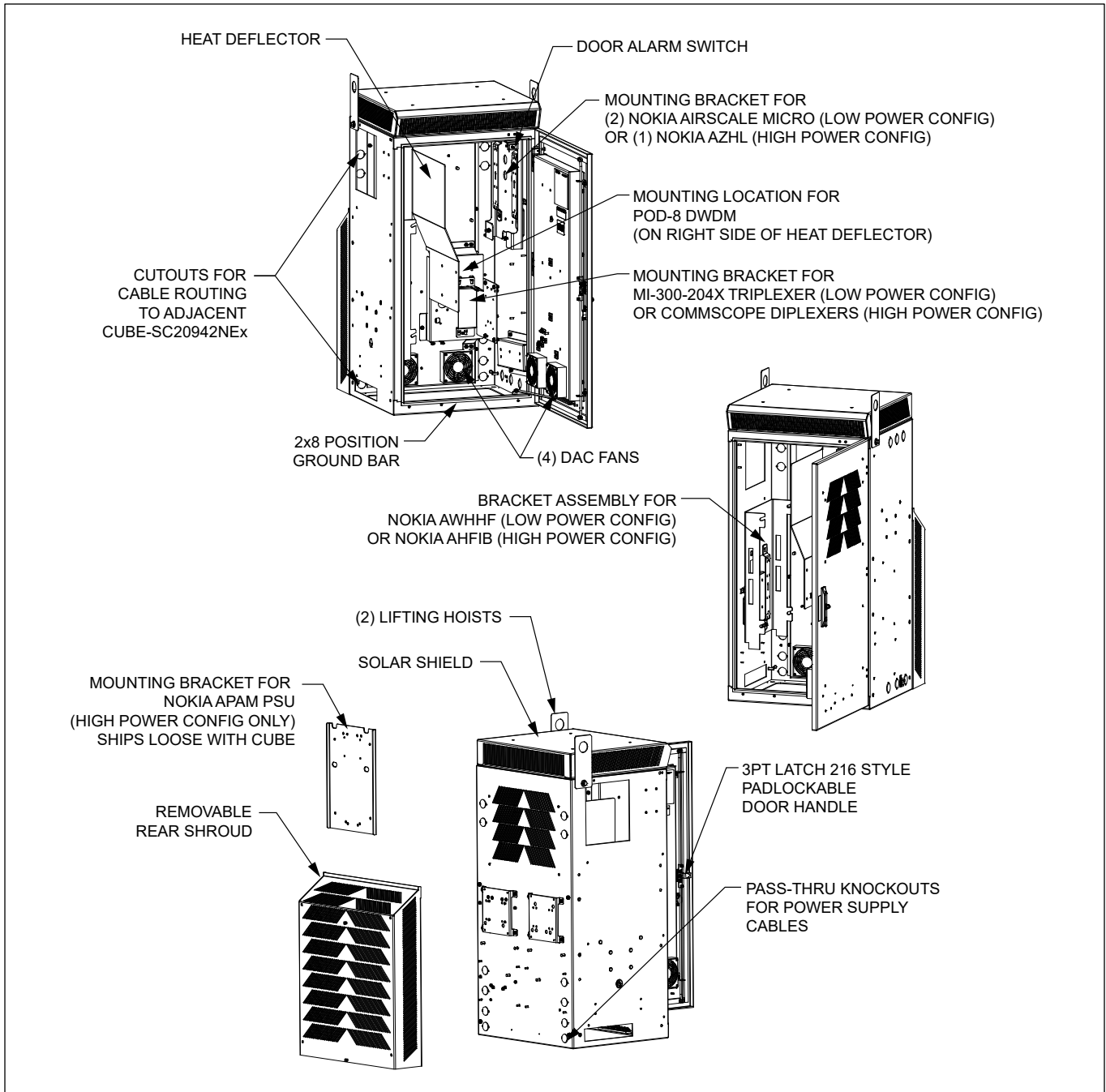


Figure 2 CUBE Dimensions (in inches)



**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 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.

#### 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

	<b>WARNING</b>	<b>Improper hoisting equipment and unsafe lifting procedures can result in serious injury or death</b>
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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 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

The CUBE can be mounted on a new or existing precast concrete pad. A gasket is provided for placing the CUBE on a pad. Should the gasket become damaged during installation, a replacement can be ordered under part number 39-000520-0. Ensure that the unit is level.

#### 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%

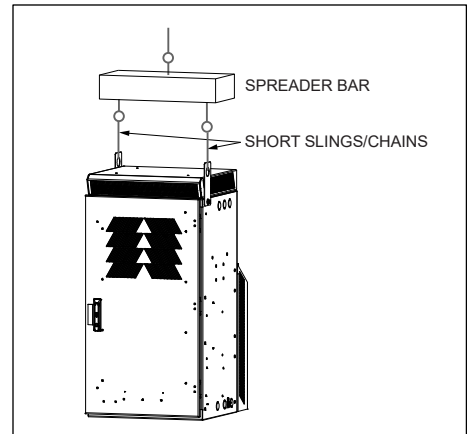
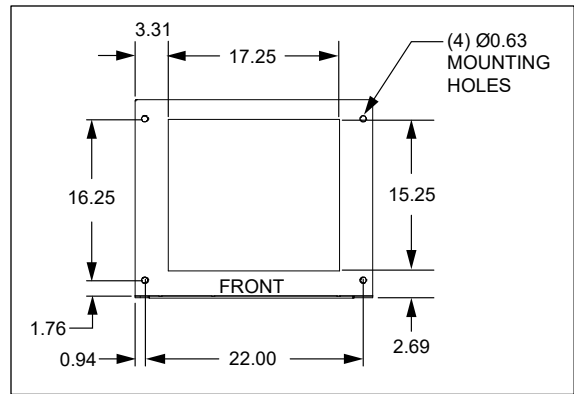


Figure 4 Lifting the CUBE

**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.



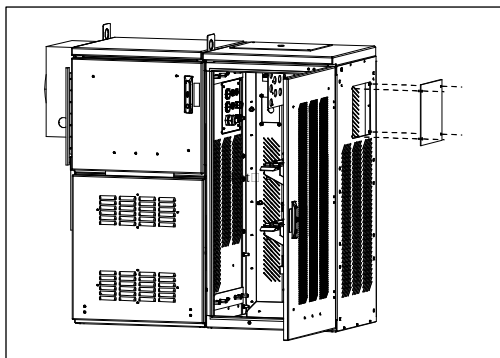
**Figure 5**  
Mounting Hole Dimensions (in inches), Top View

	<b>WARNING</b>	<p><b>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.</b></p> <p><b>The slump of the concrete shall be 2” to 4” as determined by ASTM C143 test method.</b></p>
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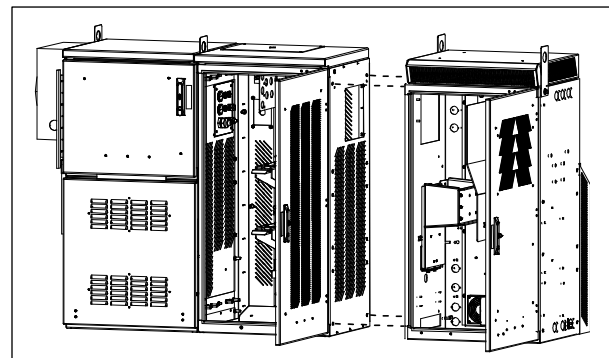
**3.6.3. Connect to the CUBE-SC20942NEx**

The CUBE is intended to mount adjacent to a CUBE-SC20942NEx.

1. Remove the plate from the right side of the SC20942NEx (Figure 6). Store or discard this plate per company practice.
2. Mount the CUBE adjacent to the SC20942NEx, securing the cabinets together using customer supplied hardware. Ensure that the opening on the left side of the CUBE is aligned with the opening on the SC20942NEx (Figure 7).



**Figure 6** Remove Side Plate



**Figure 7** Attach CUBES

### 3.6.4. 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 8.
4. Open the CUBE door 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. Close the door.

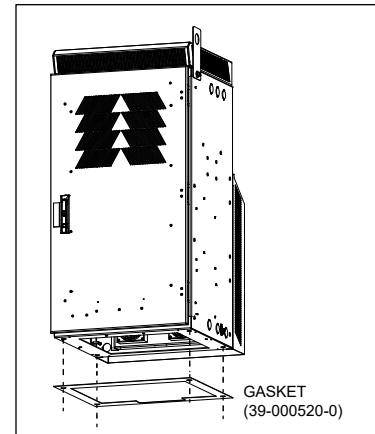


Figure 8 Gasket Installation

### 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.

	<b>WARNING</b>	<b>Perform all bonding and grounding connections prior to any electrical and communications connections.</b>
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A basic electrical diagram is shown in Figure 9.

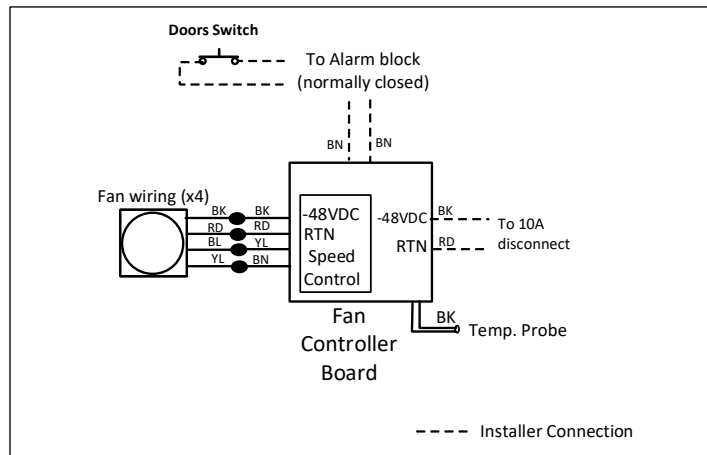


Figure 9 Electrical Diagram

#### 3.7.1. Ground Connection

Use the 2x8 position ground bar provided in the CUBE for all grounding of internal equipment. Stack hardware as shown in Figure 10. An external ground lug is available on the right side of the CUBE for connecting a site ground wire.

#### 3.7.2. Fiber and Copper Entry

The CUBE has multiple Ø1.38" knockouts on the right side that accommodate Ø1.00" conduit fittings. Cutouts on the left side allow cables to pass from the adjacent CUBE-SC20942NEx. A cutout on the bottom allows cable entry from the ground. See Figures 2 and 3 for knockout and cutout locations.

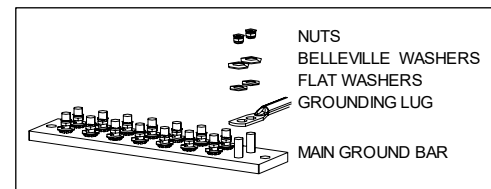


Figure 10 Ground Bar Hardware Stack

### 3.8. Equipment Mounting

In all images in this section, the CUBE door is hidden for clarity. Unless otherwise stated, hardware for installing customer equipment is not provided.

#### 3.8.1. Low Power Configuration

##### MI-3000-204X Triplexer

Install the MI-3000-204X triplexer on the left side of the forward-facing leg of the bracket (Figure 11).

##### AWHHF Radio

1. Remove the narrow vertical bracket from the left side of the CUBE by removing the screw from the bottom of the bracket and lifting the bracket hooks out of the CUBE side panel.
2. Attach the AWHHF radio to the bracket, observing the UP arrow on the bracket (Figure 12).
3. Mount the radio/bracket assembly back into the same position on the CUBE wall. Secure the bracket using the screw removed previously.

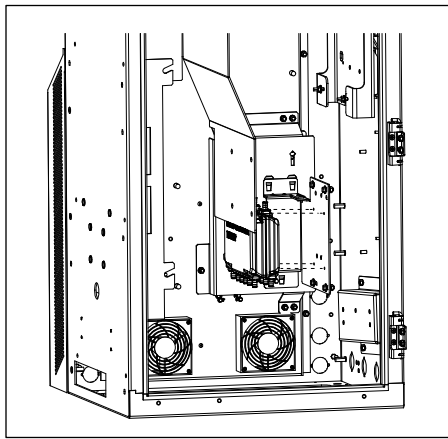


Figure 11 MI-3000-204X Triplexer

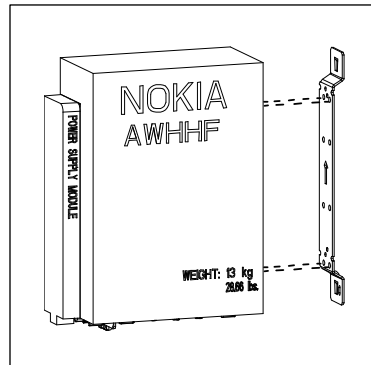


Figure 12  
AWHHF Radio onto Bracket

##### AirScale Micro Radios

1. Attach the AirScale radios to the brackets, observing the UP arrow on the brackets (Figure 13).
2. Mount the radio/bracket assemblies back into the same position on the CUBE wall. Secure the brackets using the screws removed previously (Figure 14).

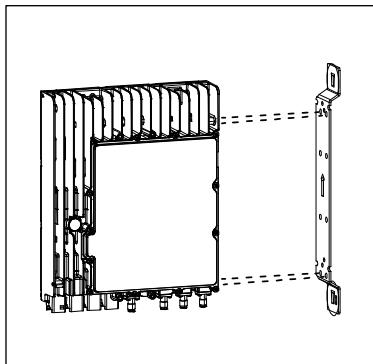


Figure 13  
AirScale Radio onto Bracket

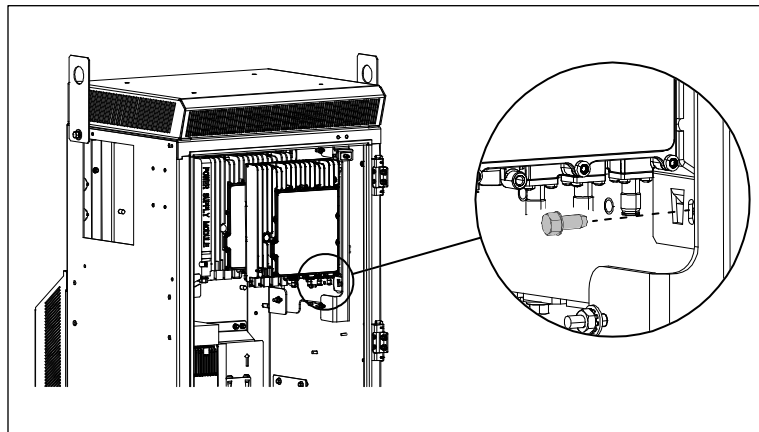


Figure 14 AirScale Radio into CUBE



**POD-8 DWDM**

Attach the DWDM onto the right side of the bottom-most vertical panel on the heat deflector panel.

The completed low power configuration is shown in Figure 15.

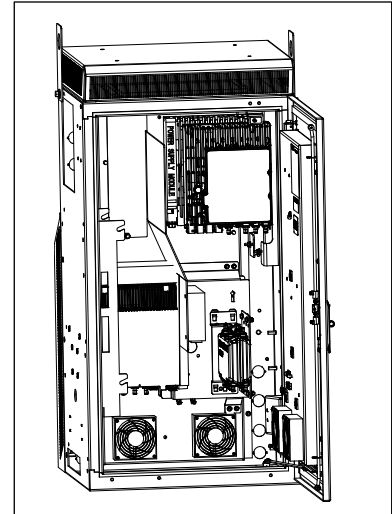
**3.8.2. High Power Configuration**

**Diplexers**

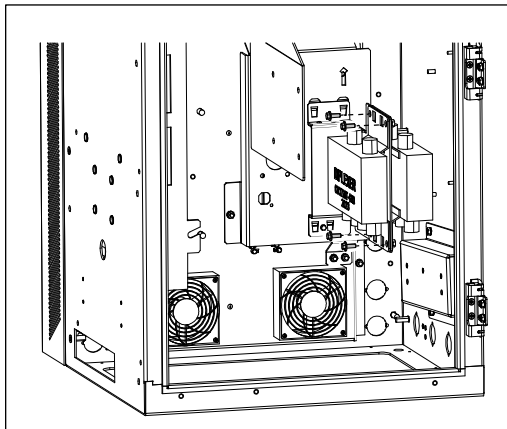
Install the diplexers on the either side of the forward-facing leg of the bracket (Figure 16)

**POD-8 DWDM**

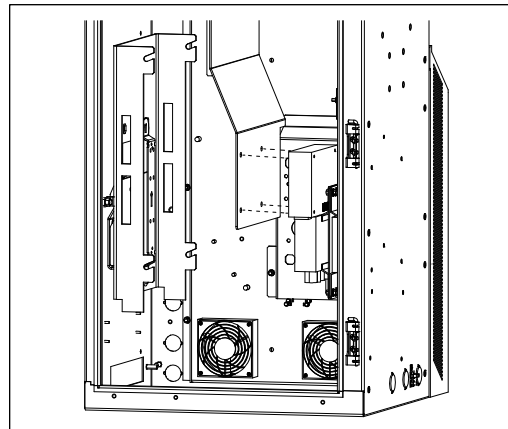
Install the DWDM onto the right side of the bottom-most vertical panel on the heat deflector panel (Figure 17)



**Figure 15**  
**Complete Low Power**  
**Configuration**



**Figure 16** Diplexers



**Figure 17** DWDM

**AHFIB Radio**

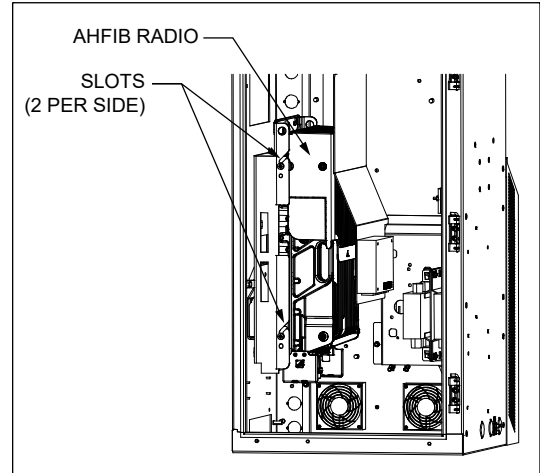
The radio is mounted on a bracket on the lower left side of the CUBE.

1. Remove the AHFIB radio from the left side of the CUBE.
2. Slide the AHFIB radio into the angled slots on the AHFIB mounting bracket (Figure 18) and secure in place using customer supplied hardware.
3. Mount the bracket back onto the left side.

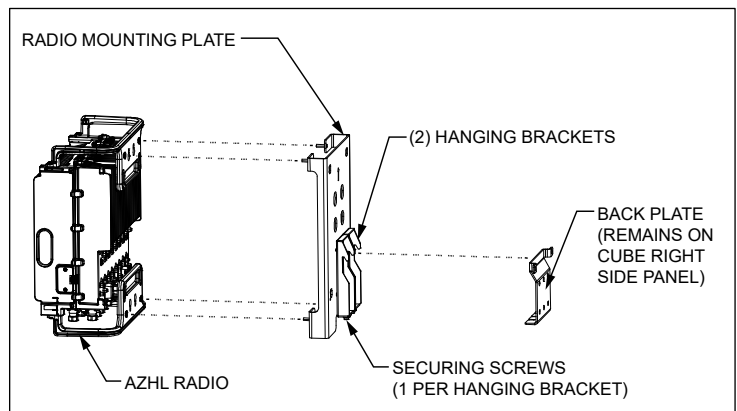
**AZHL Radio**

The radio is mounted on a hanging bracket on the upper right side of the CUBE. Figure 19 shows the hanging bracket exploded for clarity.

1. Remove the hanging brackets and the radio mounting plate from the CUBE by loosening the securing screws on the bottom of the hanging brackets and lifting the hanging brackets off the back plate.
2. Attach the AZHL radio to the front of the radio mounting plate. Secure using four 1/4-20 Keps nuts that ship with the CUBE.
3. Return the hanging brackets to the back plate and tighten the securing screws.



**Figure 18 AHFIB Radio**



**Figure 19 AZHL Radio**

## APAM Power Supply

The power supply is on the rear of the CUBE, underneath the removable rear shroud.

1. To remove the rear shroud, first remove the four plugs from the mounting holes on the back (Figure 20). Save these plugs. Insert a long Philips screwdriver (6" shaft) through these holes and loosen the four mounting screws on the CUBE back panel. Do not remove these screws from the CUBE. The rear shroud has four mounting keyhole slots that rest on the mounting screws. Once the screws are loosened, lift the shroud off the CUBE. Set the shroud aside.
2. Locate the power supply bracket that shipped loose with the CUBE. Attach the power supply bracket to the left plate on the rear of the CUBE using hardware supplied with the bracket.
3. Mount the power supply onto the power supply bracket (Figure 21).
4. Replace the shroud by hanging the keyhole slots on the four mounting screws. Use the long screwdriver through the shroud mounting holes to tighten the screws. Then replace the plugs removed previously.

The completed high power configuration is shown in Figure 22.

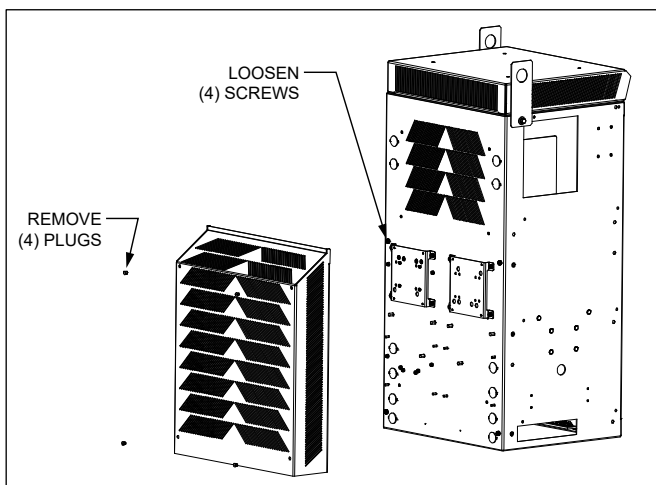


Figure 20 Rear Shroud

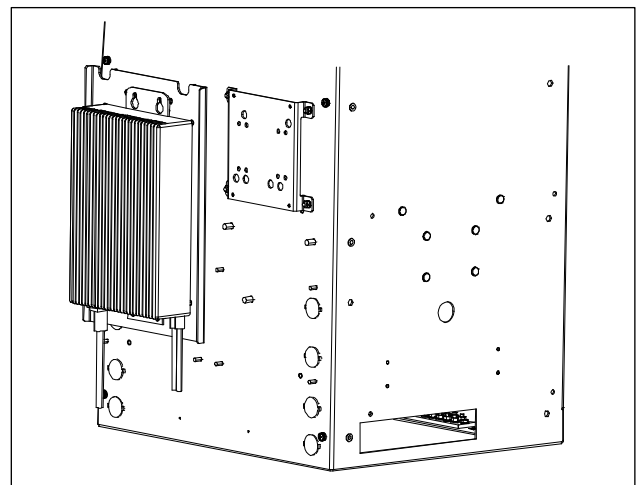


Figure 21 Power Supply

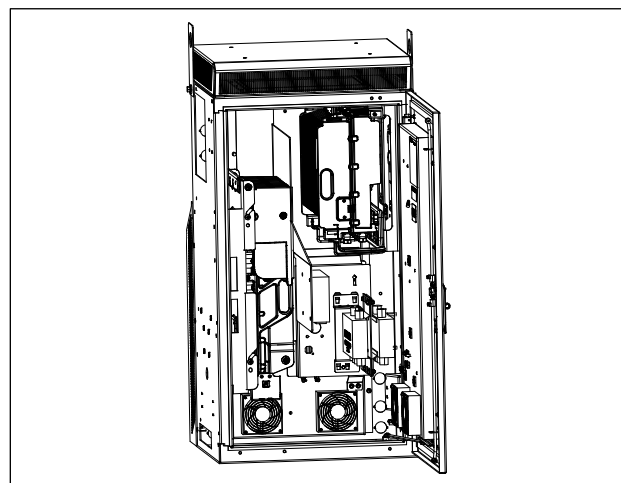


Figure 22 Complete High Power Configuration

### 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 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.

## 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](mailto: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 that 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](mailto:mktserv@charlesindustries.com) (email)  
[http://www.charlesindustries.com/main/telecom\\_sales\\_support.htm](http://www.charlesindustries.com/main/telecom_sales_support.htm)

## 7. SPECIFICATIONS

<b>Physical</b>	
Dimensions	48"Hx24"Wx25"D
Weight	Approx. 337 lbs. as shipped Low power config: 411 lbs. High power config: 495 lbs.
Materials	0.125" aluminum
Color	Off-white
<b>Electrical</b>	
Bonding and Grounding	2x8 position ground bar inside cabinet
Cable Entry	See Figure 2 and section 3.7.2
<b>Thermal</b>	
DAC	(4) 48VDC, 243CFM
<b>Environmental</b>	
Operating Temp. Range, Outside Enclosure	-40° to +115°F, -40° to 46°C
Operating Temp Range, Inside Enclosure	-40° to +131°F, -40° to 55°C
Humidity	0 to 95% (non-condensing)
Altitude	Up to 2,000 meters (6560 feet)
<b>Kits and Replacement Parts</b>	
Touch-up Paint	02-000290-0
216 Type Security Tool	07-002070-0
Replacement Gasket	39-000520-0
Shim Kit for Leveling	97-000010-0
Swing Handle	39-000148-0
2-Wire Door Alarm Switch	17-400314-0
Replacement DAC Fan	18-950454-0

Table 1 CUBE Specifications