Charles Universal Broadband Enclosure
CUBE-PM648154N1
General Description and Installation

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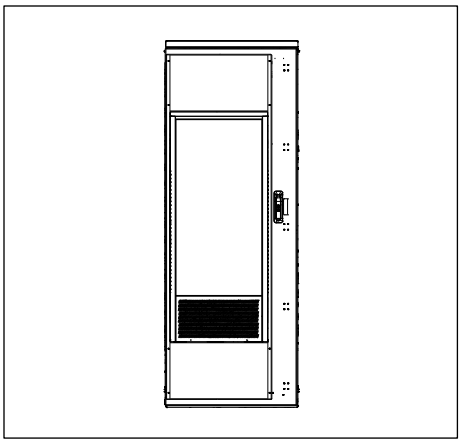

Figure 1 Front View of the CUBE

1. GENERAL INTRODUCTION

1.1. Document Purpose

This document provides general information for the CUBE-PM648154N1 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-PM648154N1 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 or platform. The installer connects the power, fiber and copper connections. Detailed mounting and installation information is covered in Section 3.

2. PRODUCT DESCRIPTION

The CUBE is a single compartment with 48RU of 23" horizontal rack space. It houses a 48VDC ABB power system, a 28000BTU HVAC system, a slide-out laptop tray, and three slack storage trays. A set of brackets mounted on the front and rear rack rails are designed to support a customer supplied Dell server.

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

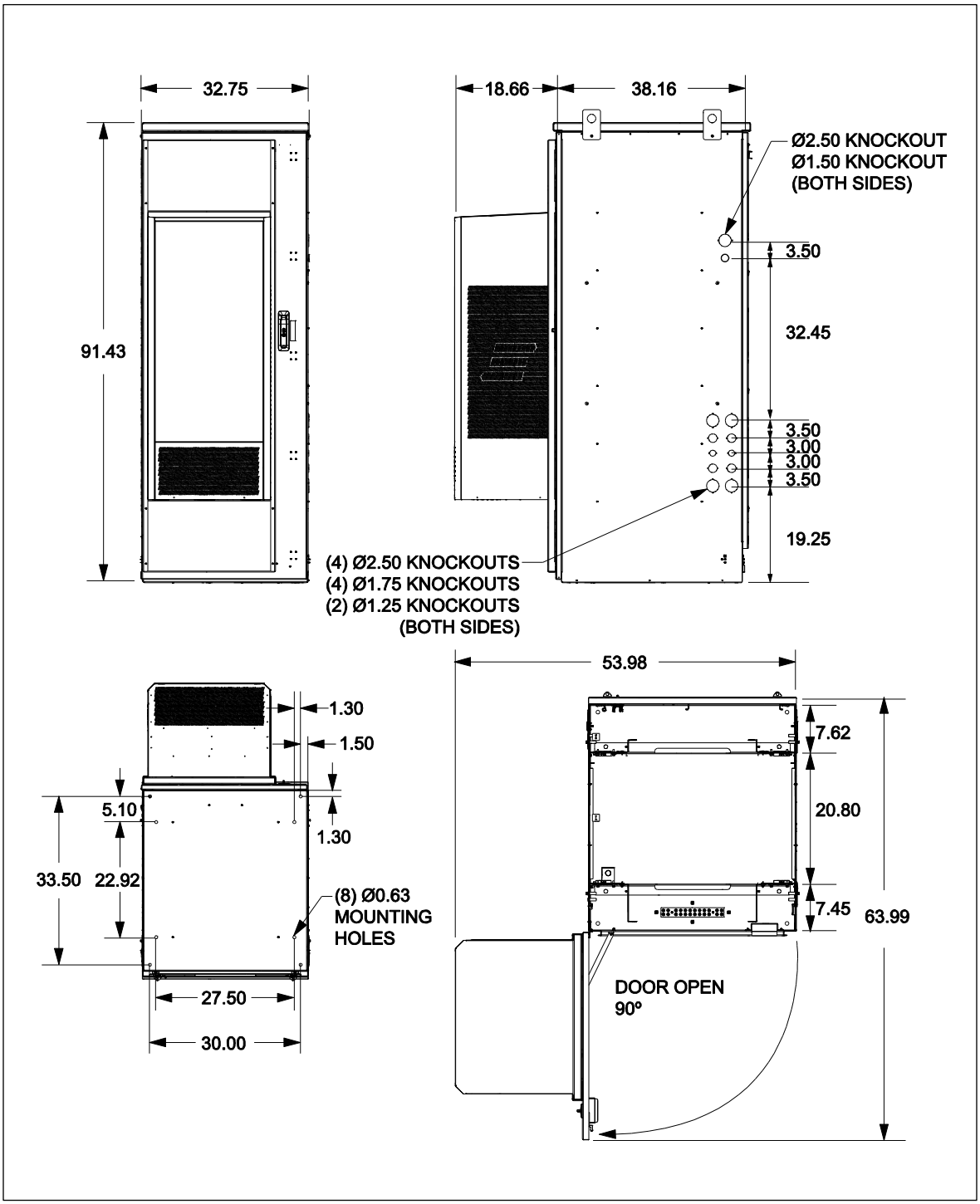

Figure 2 CUBE Dimensions (in inches)

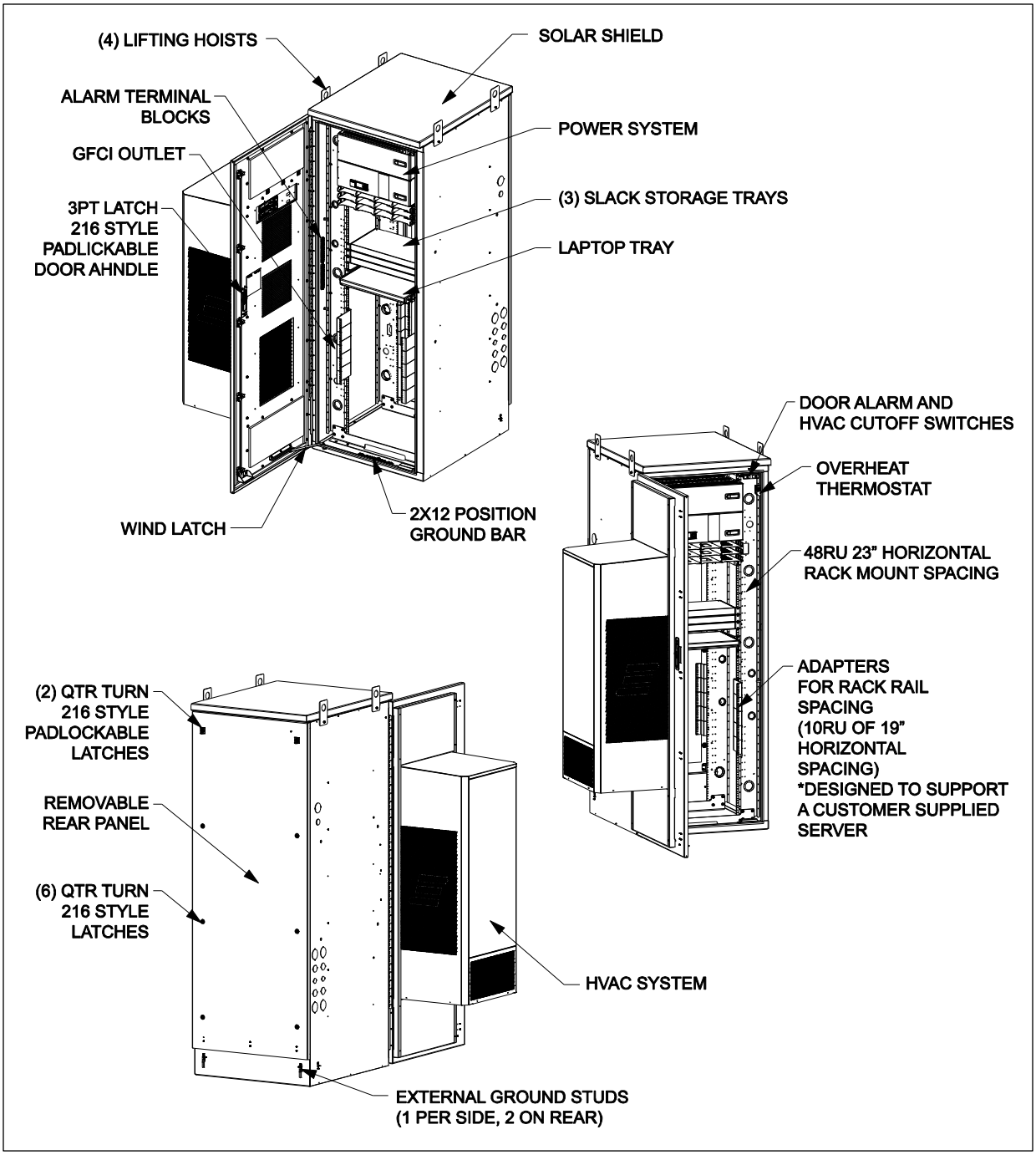

Figure 3 CUBE Components

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 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 Table 1 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.**

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.

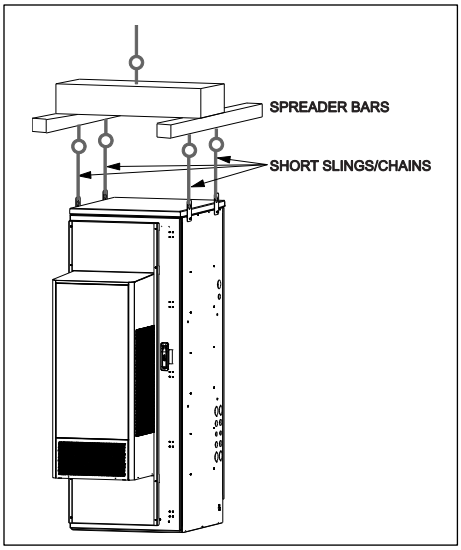

Figure 4 Lifting the CUBE

3.5.2. Warnings and Specific Safety Precautions

⚠	**WARNING**	**Improper hoisting equipment and unsafe lifting procedures can result in serious injury or death**

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 pad or a steel grate platform. 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 80-005990-A. Ensure that the unit is level.

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.

⚠	**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.**

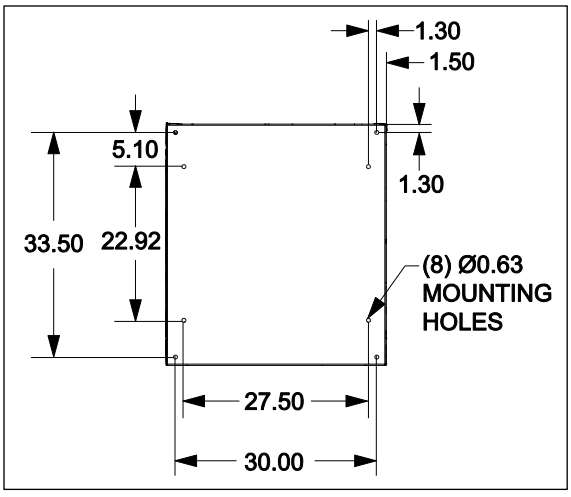

Figure 5 Mounting Hole Dimensions (in inches)

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. Open the 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. 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, each bolted joint should have 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.
9. Once the CUBE is secured, remove the slings and tagline. Close the door.

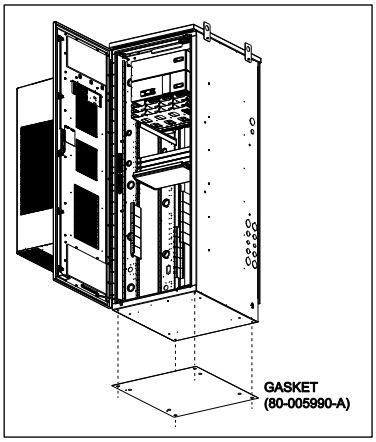

Figure 6 Gasket Installation

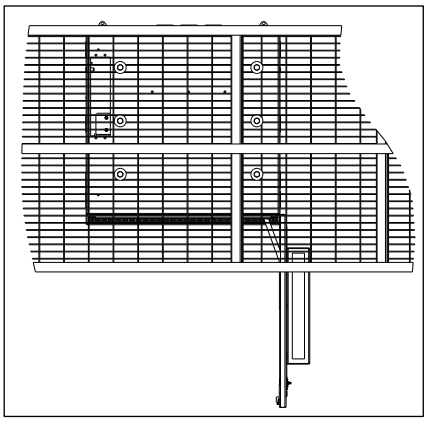

Figure 7 Installing on a Platform

3.7. CUBE Wiring and Equipment

After the CUBE is properly mounted in the desired location, apply No-Ox where bus bar and other 2-hole lug connections will be made. Install ground and power connections. Always ground the equipment first, before making any other connections.

⚠	WARNING	Perform all bonding and grounding connections prior to any electrical and communications connections.

In order to prevent condensation prior to being placed in service, do not remove the desiccant until the CUBE is sealed and power is applied. A basic electrical diagram is shown in Figure 7.

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%

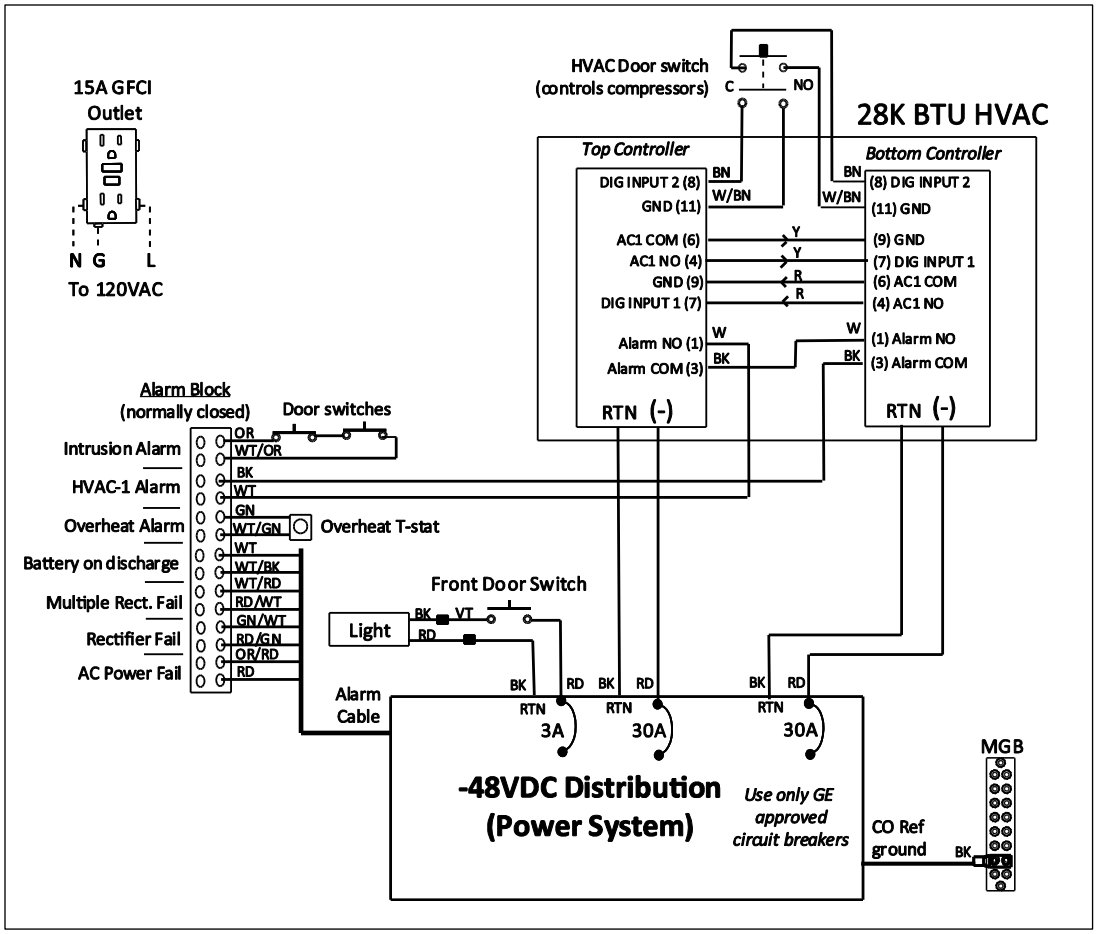

Figure 7 Electrical Diagram

3.7.2. Ground Connection

Use the 2x12 position ground bar provided in the CUBE for all grounding of internal equipment. External ground studs are available on the sides and rear for connecting a site ground wire.

3.7.3. -48VDC Power System

The 900A, 48VDC ABB Infinity power system is a single voltage system with 52 bullet-style distribution positions, three power shelves, seven rectifiers, and alarm cables. For more information, see the ABB documentation that ships with the CUBE.

The CUBE has a pair of brackets underneath the power system that support the weight of the power system during shipping. After installation, these brackets can be removed to free up additional rack rail space (Figure 8).

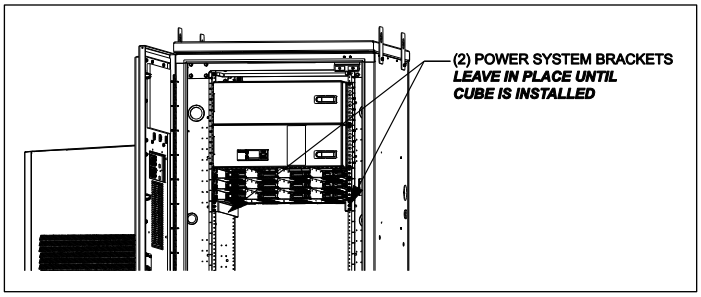

Figure 8 Power System Brackets

3.7.4. HVAC Operation

The 28000BTU DC powered HVAC compressor and fans are speed controlled. The compressor turns on at 30°C, reaches its high speed at 42°C, and turns off at 27°C. The internal fan is always on to continually circulate heat within the cabinet. The heating cycle turns on at 10°C and off at 15°C. The CUBE is equipped with a cutoff switch that shuts off the HVAC compressor when a door is opened to minimize condensation buildup on the coils. See the label on the HVAC for firmware information. For further information, refer to the HVAC documentation that ships with the CUBE.

-NOTE-

Changing the cooling or heating cycles' default factory set points can lead to system performance issues, such as equipment failures, increased power use, unnecessary alarms, noise, condensation build up, compressor or fan failure caused by excessive runtimes and vibration. Avoid placing items in front of the HVAC's return and supply vents. Maintain a minimum of 2" clearance to enable proper air flow.

3.7.5. Overheat Thermostat

The CUBE is equipped with an overheat (high temperature) alarm thermostat in the equipment compartment that provides a normally closed connection. The overheat alarm is factory set at 50°C and opens the connection if this temperature is exceeded.

-NOTE-

Changing the overheat (high-temp) thermostat default factory set points can lead to unnecessary alarms or system performance issues, such as equipment failures as a result of unreported alarms.

3.7.6. Alarm Block Connections

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.

3.7.7. Slide-out Laptop Tray and Document Holder

The slide-out tray is controlled by a pair of plungers (one on each side, Figure 9). To slide the tray out, pull these plungers outward. When the tray is fully out, place a laptop on top of the tray. To access the document storage space, lift the top of the tray upward. To close the tray, fold the top of the tray down into its original position and slide the tray back into the rack rails.

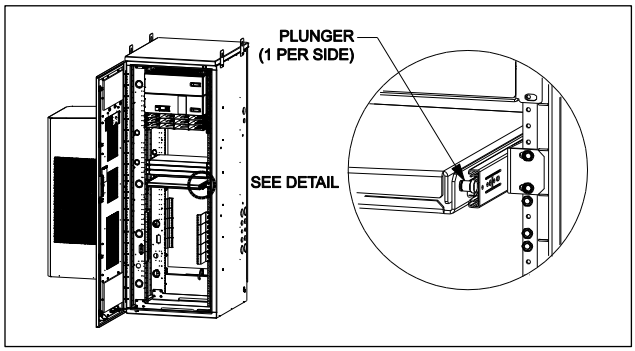

Figure 9 Tray Plungers

3.7.8. Slack Storage Tray

The slack storage tray is mounted in the rack rail. For convenience, the tray can be removed from the rack rail prior to coiling slack.

Note: The total storage capacity of the tray is 147 feet of fiber cable with a 3mm diameter.

1. The tray cover is secured with four Phillips screws. To open the tray, remove the screws and lift off the cover (Figure 10). Save the cover and screws for re-installation.
2. Create a fiber service loop by pulling the fiber from the rack rails toward the tray.
3. Coil the fiber slack inside the tray through one of the openings in the rear of the tray. Wind the fiber around the bend controls, observing the proper bend radius. Fiber exits through the second opening on the rear (Figure 11).
4. Replace the tray cover when finished.

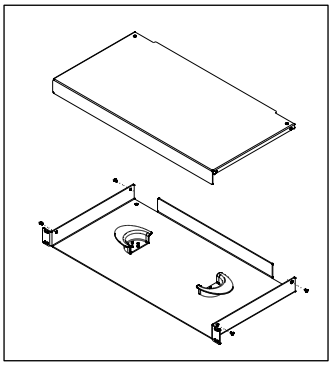

Figure 10 Opening the Tray

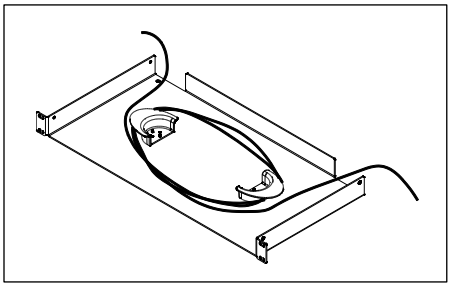

Figure 11 Fiber Routing

3.7.9. Fiber and Copper Entry

The CUBE has knockouts on both sides that accommodate conduit fittings. See Figure 2 for knockout locations.

- Ø1.25" knockouts accommodate Ø1.00" fittings.
- Ø1.50" knockouts accommodate Ø1.15" fittings
- Ø1.75" knockouts accommodate Ø1.25" fittings.
- Ø2.50" knockouts accommodate Ø2.00" fittings.

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.

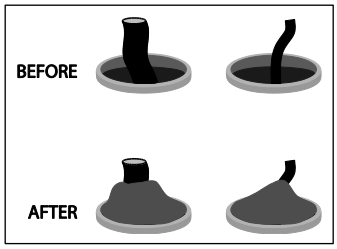

Figure 12 Applying Putty Seal

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, 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.

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.

Refer to the HVAC manual supplied with the HVAC 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	92”Hx33”Wx36”D
Weight	Approx. 780 lbs. as shipped
23” Equipment Rack Space and Hole Spacing	84” (48RU) rack spacing with tapped EIA #12-24 mounting holes
Materials	0.125” aluminum
Color	Off-white
Electrical	
Power System	900A, 48VDC, ABB 1600377508A 7 rectifiers
Bonding and Grounding	2x12 position ground bar inside cabinet External grounding points on sides and rear
Cable Entry	See Figure 2 and section 3.7.9
Thermal	
HVAC	28000BTU, Dantherm 708828-CHAR-P04
Cooling Capacity	26000BTU
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
Replacement Gasket	80-005990-A
Shim Kit for Leveling	97-000010-0
Lift-Up Handle	39-000335-0
Door Rod Latch	39-000336-0
1/4 Turn Latch	39-000142-0
1/4 Turn Latch with Padlock Hasp	39-000311-0
4-Wire 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	99-004548-0

Table 1 CUBE Specifications