

Charles Universal Broadband Enclosure

CUBE-PM63915JN3, CUBE-PM63915JN4, CUBE-PM63915JN6, CUBE-PM63915JN7, CUBE-PM63915JN8, and CUBE-PM63915JN9

General Description and Installation

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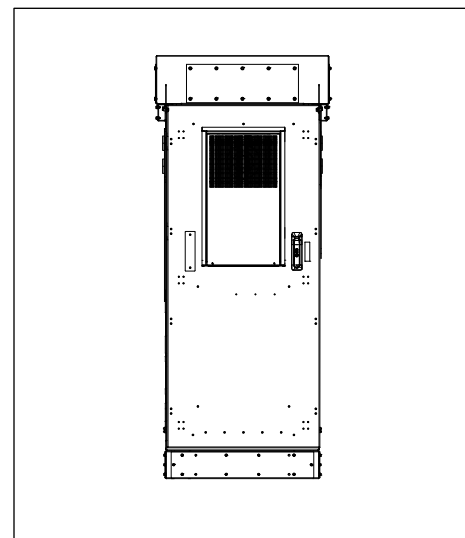


Figure 1 Front View of the CUBE

1. GENERAL INTRODUCTION

1.1. Document Purpose

This document provides general information for the CUBE-PM63915JN3/JN4/JN6/JN7/JN9 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-PM63915JNx 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 is a single compartment with 39RU of rack space (12RU at 19", 17RU at 23") and a 4000BTU AC powered HVAC system with a 1000W AC powered heater (PM63915JN9 has two heaters). The PM63915JN3 and PM63915JN4 also have an Eltek power system. The PM63915JN3, PM63915JN7, and PM63915JN9 each have four battery trays, and each tray accommodates one string of customer supplied 12V 200Ah VRLA batteries. The PM63915JN4 and PM63915JN6 do not support batteries. Both models have a front door and a removable rear panel.

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

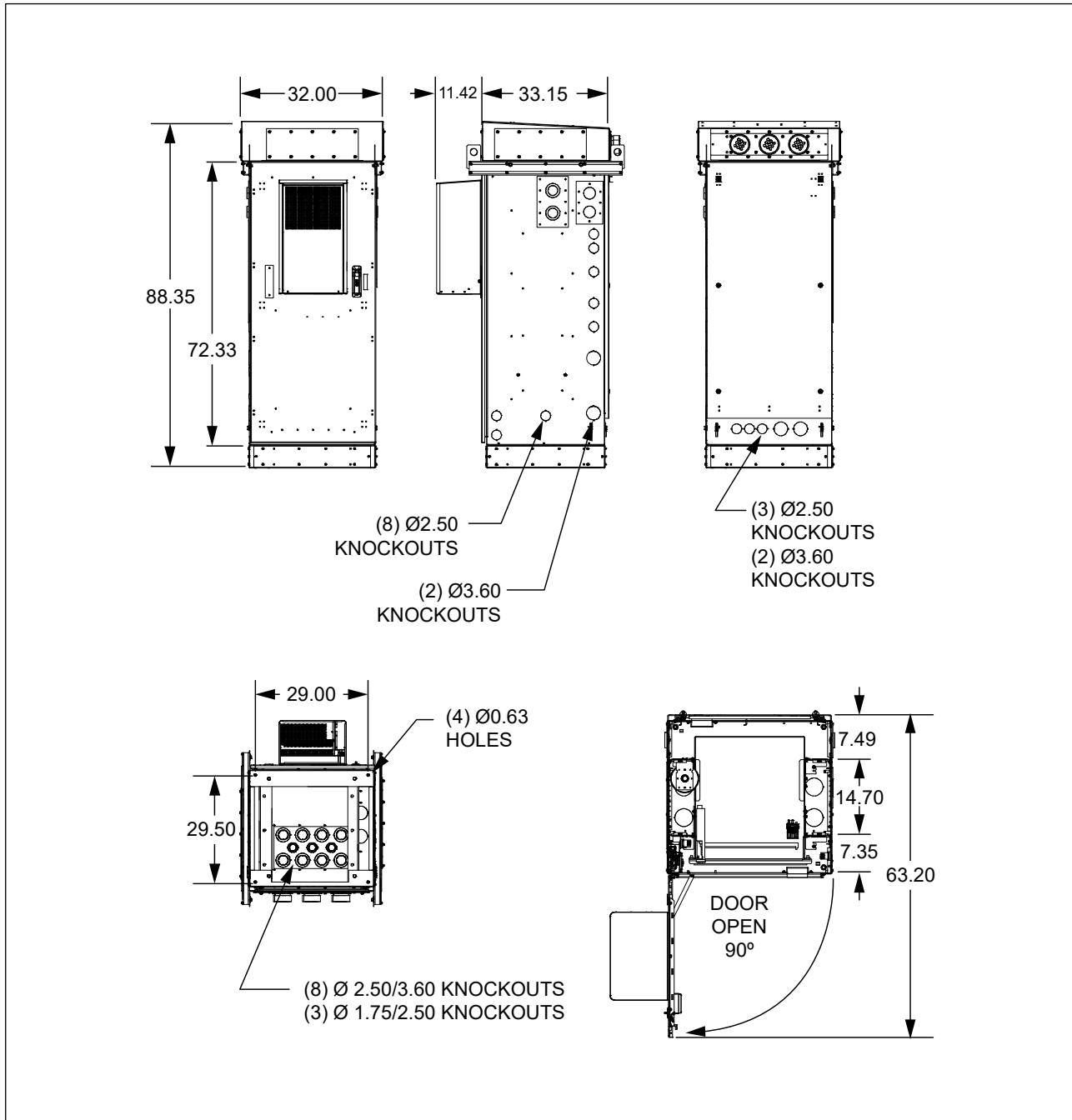


Figure 2 CUBE Dimensions (in inches)

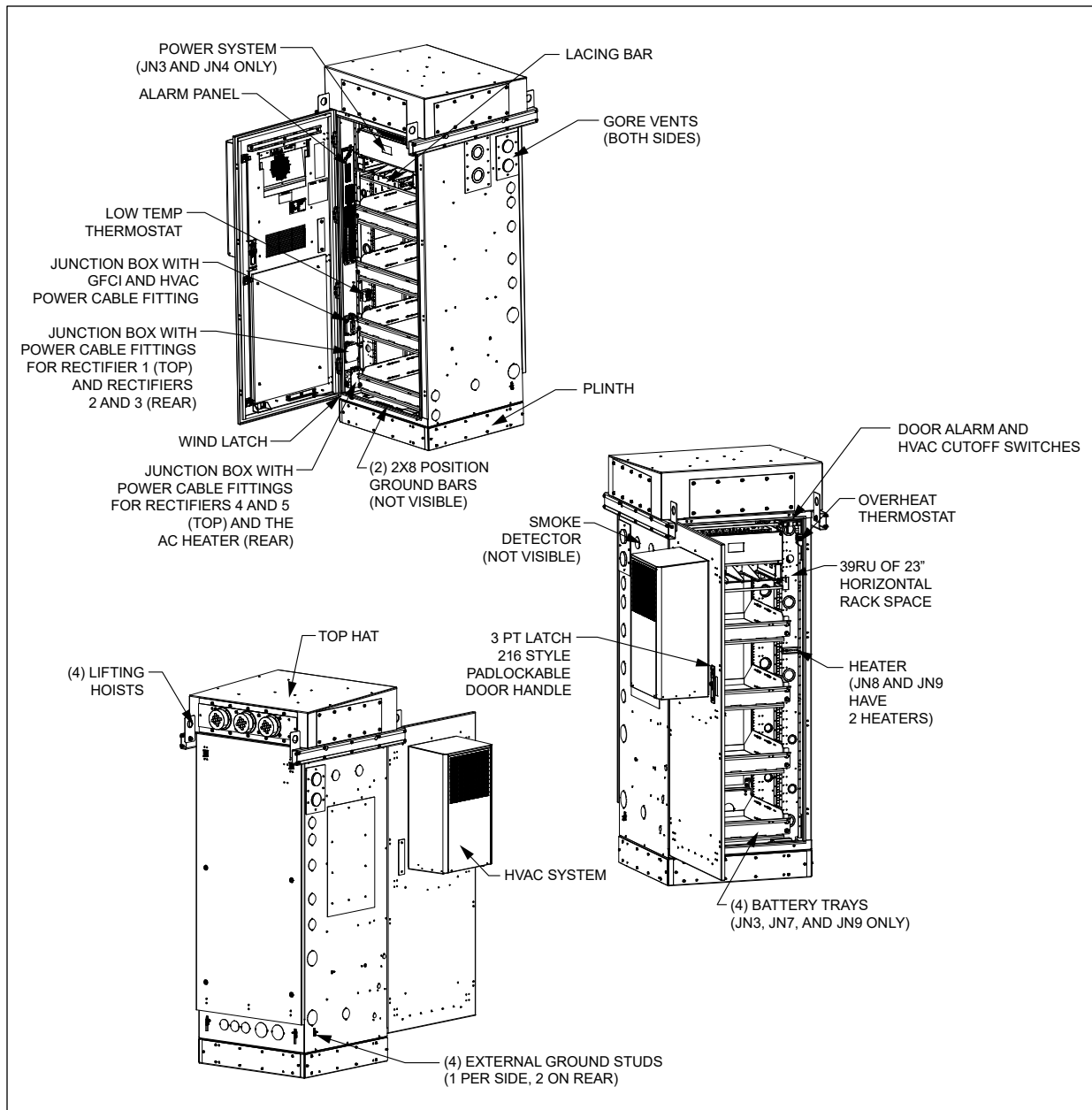


Figure 3 CUBE Components
Except where noted, all components are common to all models.

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.

	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.

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 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 80-005300-A. The gasket is not needed if mounting on a CPAD.

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.
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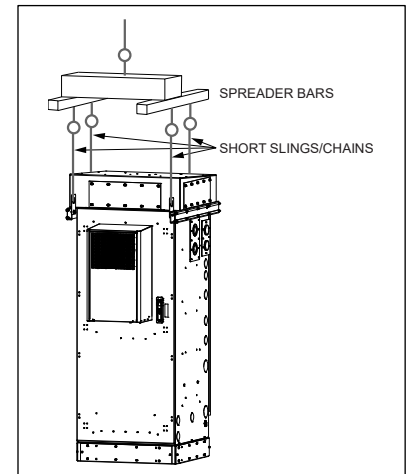


Figure 4 Lifting the CUBE

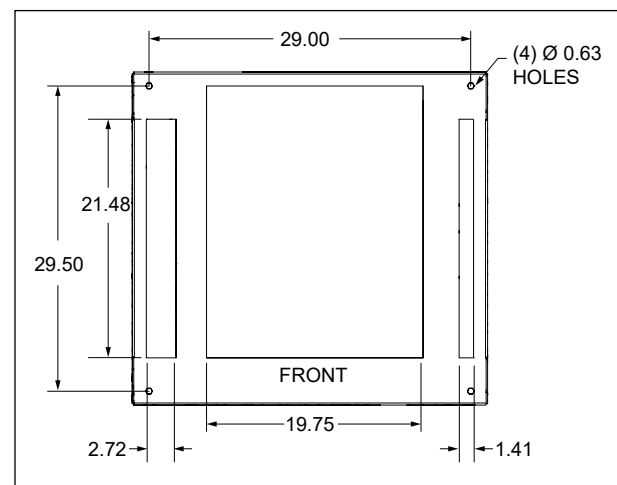


Figure 5 Mounting Hole Dimensions (in inches)

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 front 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.

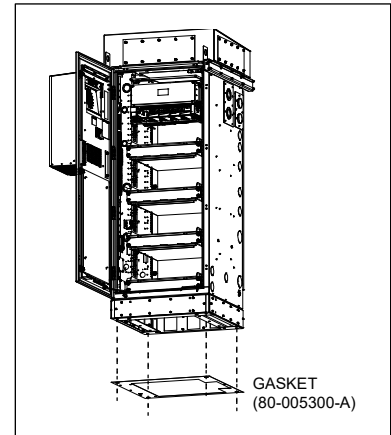


Figure 6 Gasket Installation

3.6.3. 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 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. 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.

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. Basic electrical diagrams are shown in Figures 7 through 11.

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%

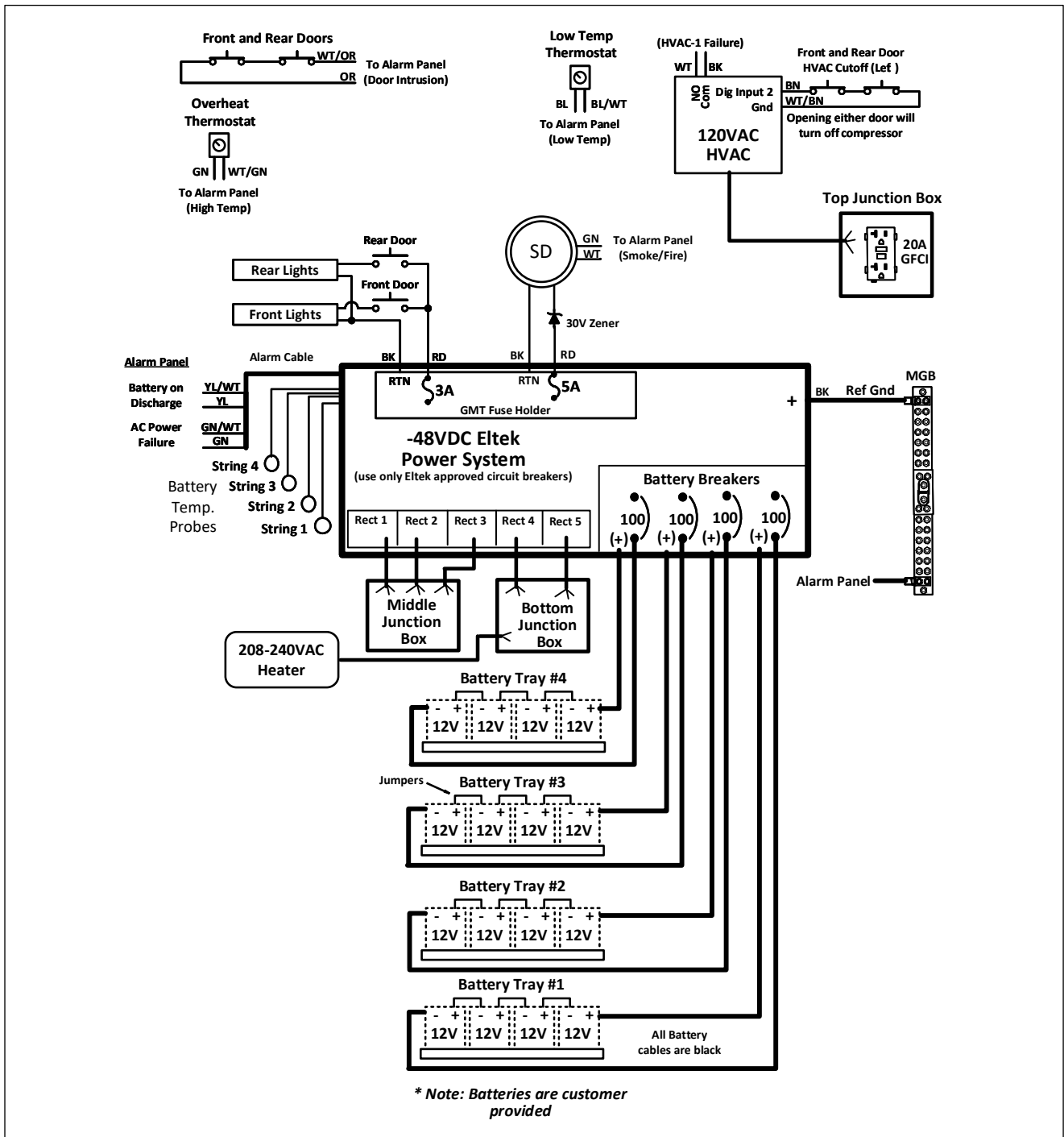


Figure 7 PM63915JN3 Electrical Diagram

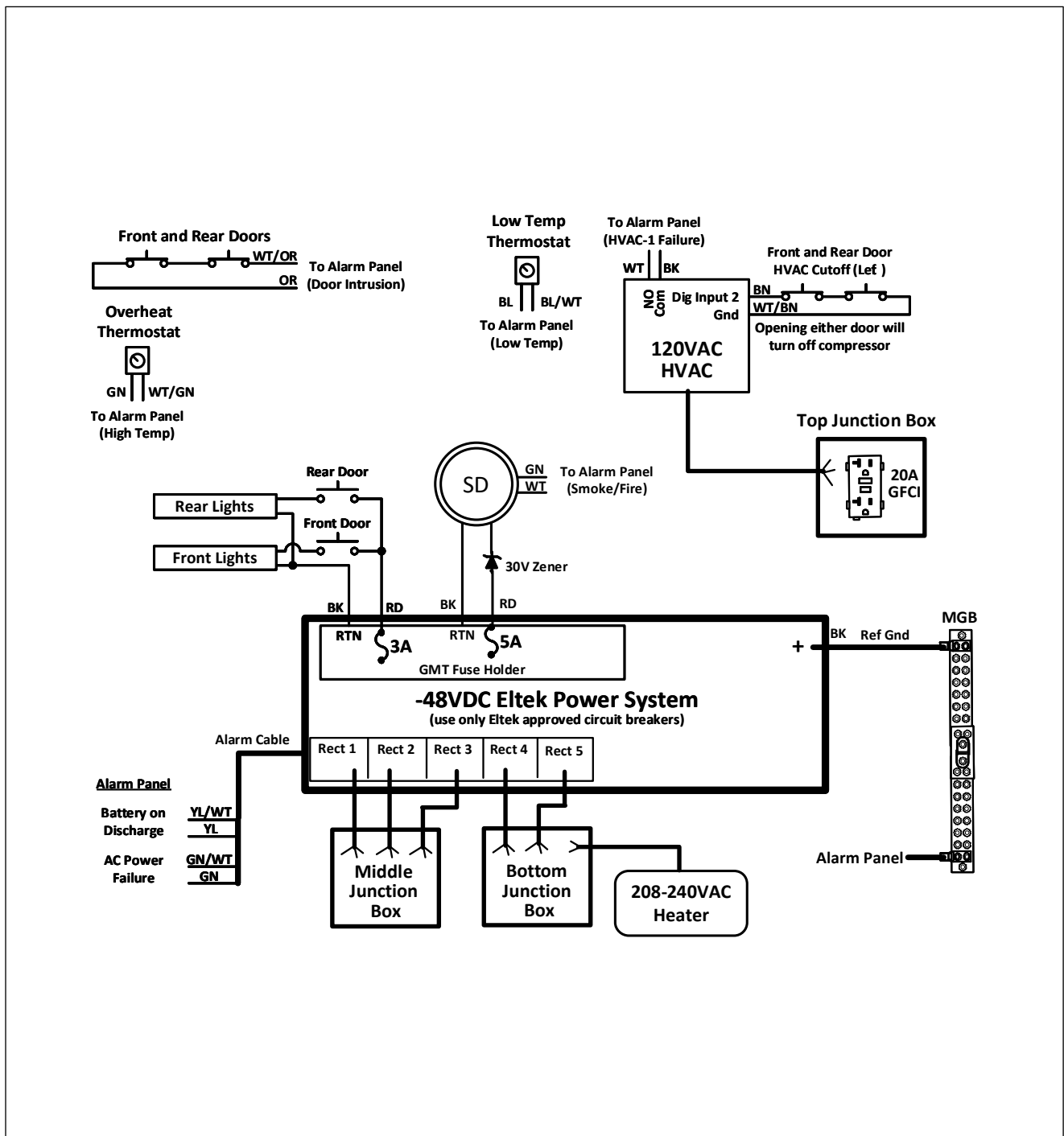


Figure 8 PM63915JN4 Electrical Diagram

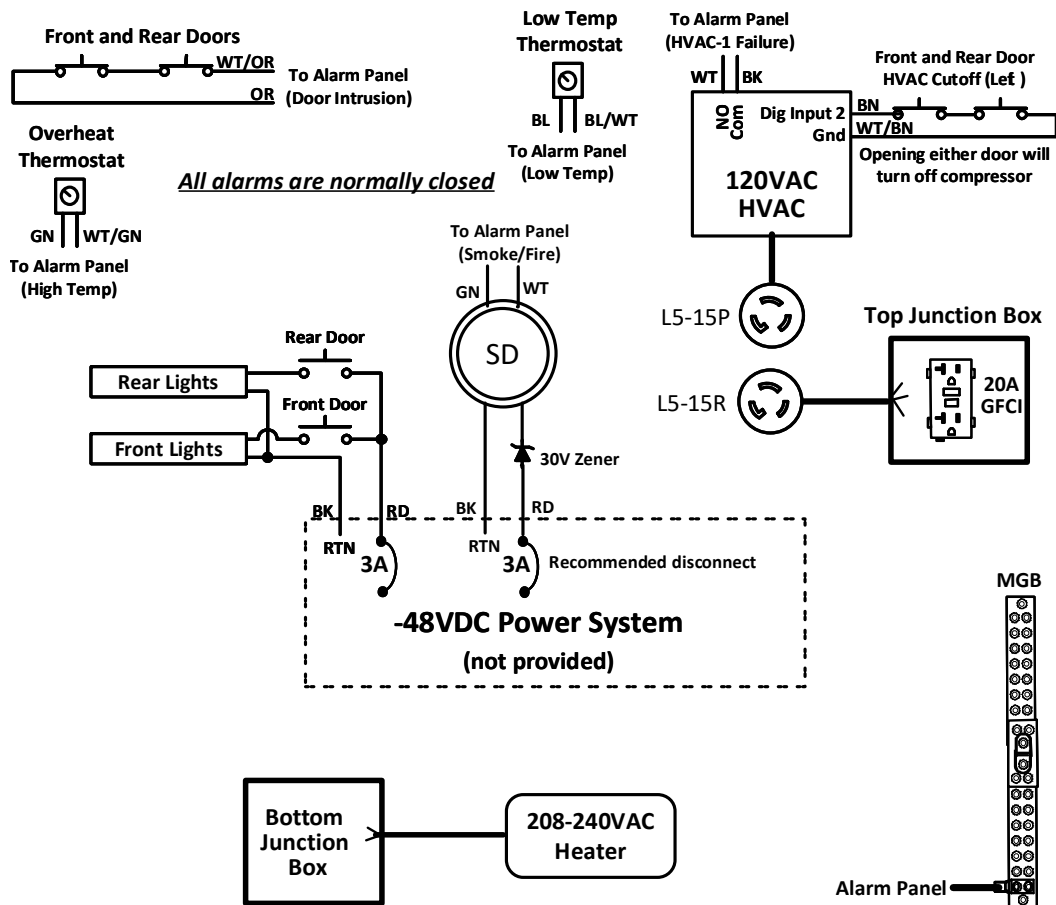


Figure 9 PM63915JN6 Electrical Diagram

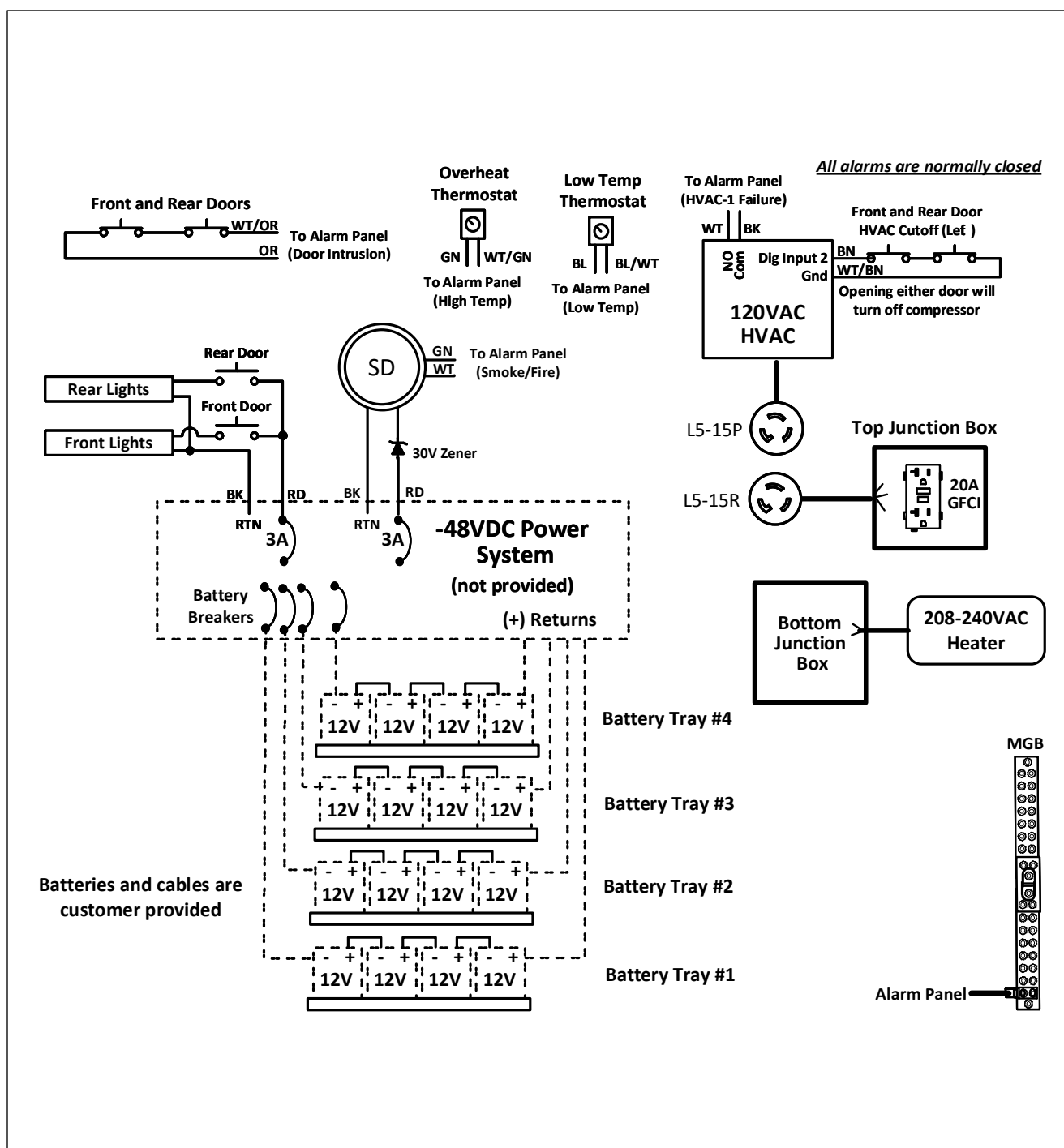


Figure 10 PM63915JN7 Electrical Diagram

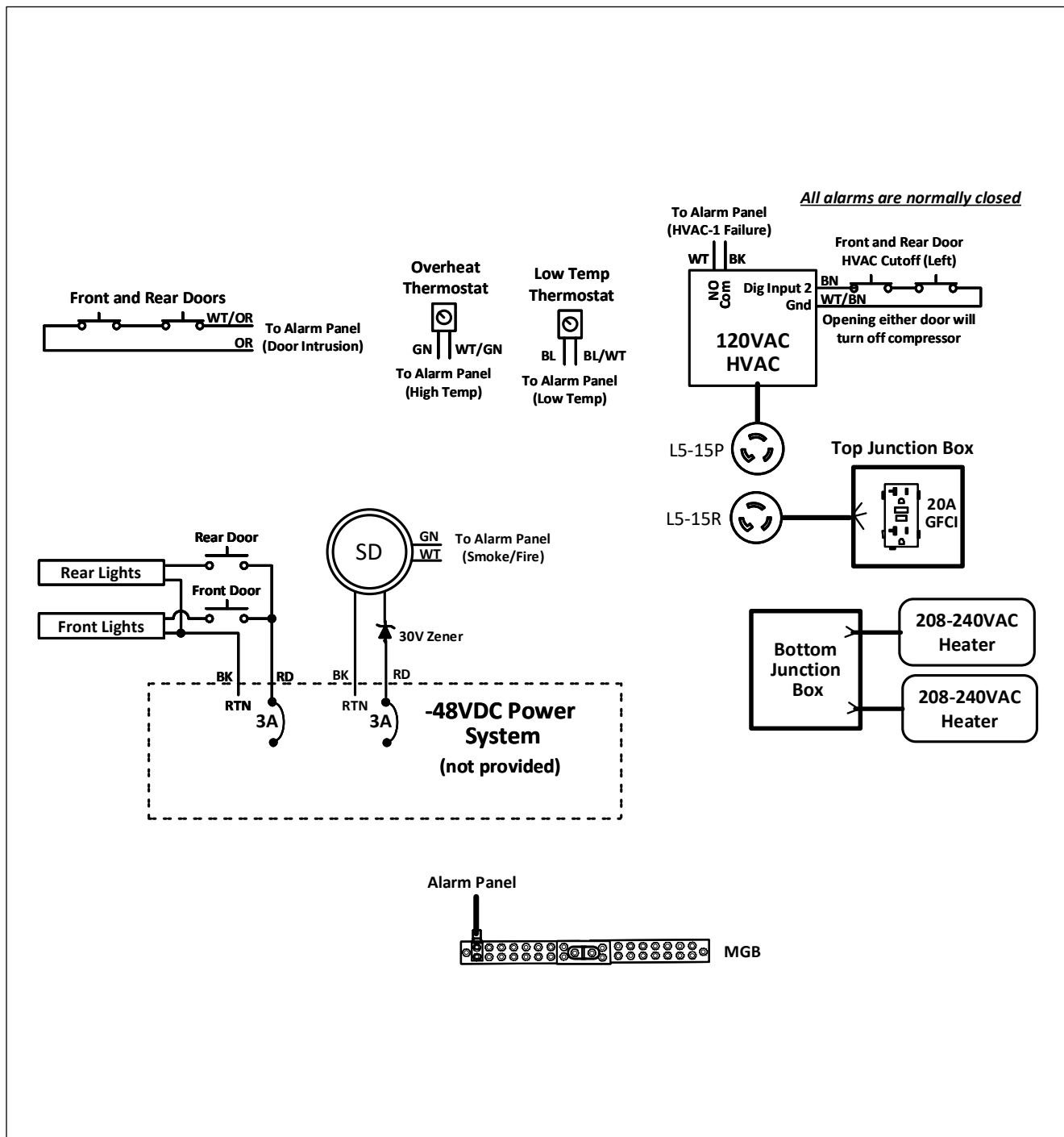


Figure 11 PM63915JN8 Electrical Diagram

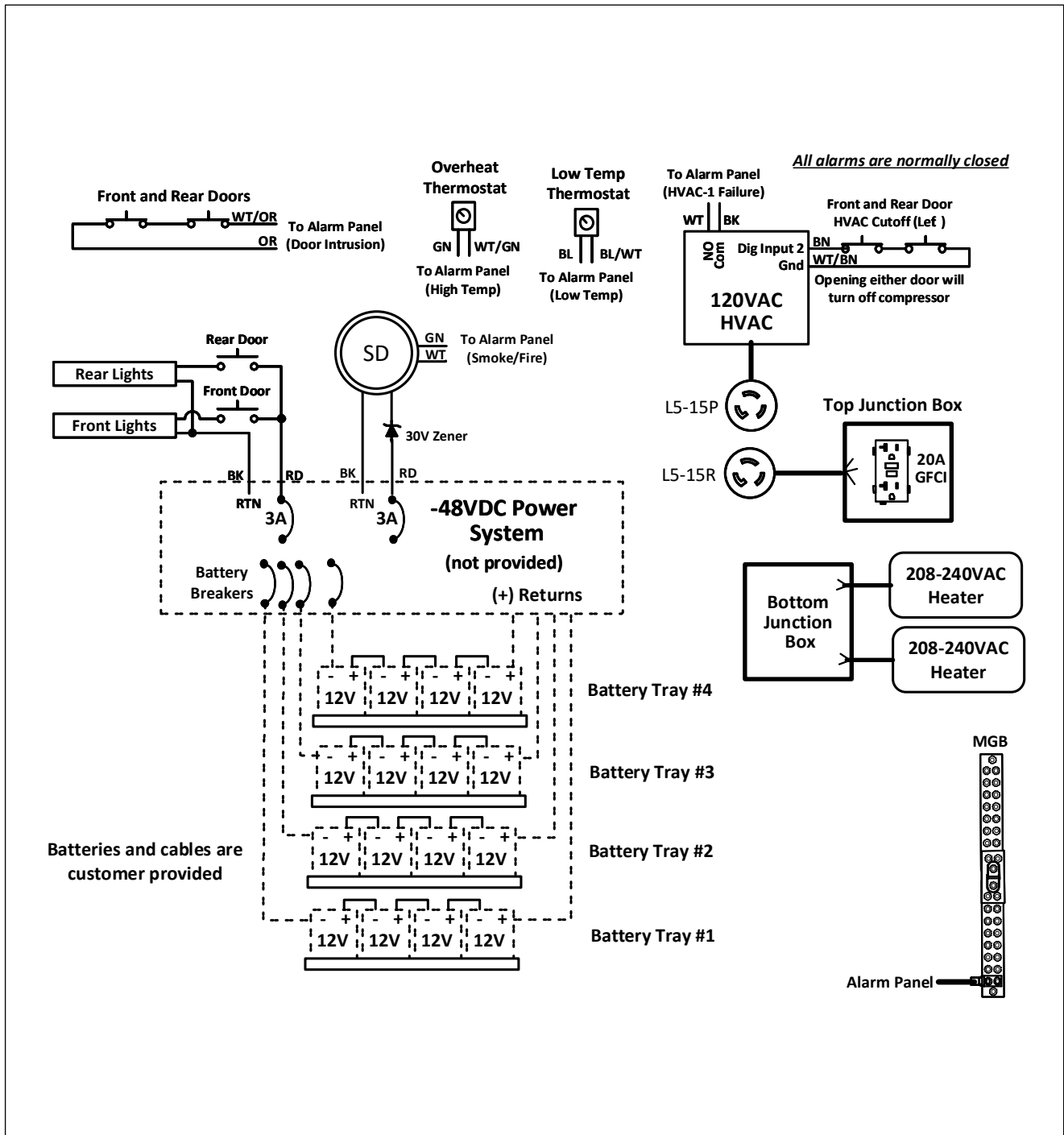


Figure 12 PM63915JN9 Electrical Diagram

3.7.2. Ground Connection


Use the two 2x8 position ground bars provided in the CUBE for all grounding of internal equipment. External ground lugs are available on the rear of the CUBE for connecting a site ground wire.

3.7.3. -48VDC Power System (PM63915JN3 and PM63915JN4 Only)

The power shelf has space for five rectifiers. Five are shipped with the CUBE and the others are customer supplied. See the Eltek documentation that ships with the unit for more information.

3.7.4. Battery Connection

Note: The PM63915JN4 and PM63915JN6 do not support batteries.

	WARNING	If using VRLA batteries, ensure that the power system is set up for VRLA batteries with temperature compensation enabled.
<ol style="list-style-type: none"> 1. If replacing batteries, disconnect battery cables from terminals on the power shelf and loosen the battery retaining strap(s). 2. Remove the battery temperature probe. 3. Remove the interconnecting straps from the batteries. Remove batteries. 4. Carefully position the new batteries on the battery tray. Connect the interconnecting straps to each battery string. 5. Replace battery temperature probe to the closest battery. 6. Connect the battery cables to the appropriate terminals on the power shelf. 7. Secure the battery retaining straps. 8. Properly manage the battery cables. <ul style="list-style-type: none"> 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. 		

Notes:

- Battery cables 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.

3.7.5. Smoke Detector

The CUBE has a smoke detector mounted behind the power system. The connection on this detector is normally closed and will open on an alarm.

3.7.6. HVAC Operation

The 4000BTU AC powered HVAC is driven by a built-in controller and temperature sensor. The factory cooling cycle turns on at 30°C and off at 27°C. The heating cycle turns on at 10°C and turns off at 15°C. The CUBE is equipped with a cutoff switch that shuts off power to the HVAC compressor when a door is opened to minimize condensation buildup on the coils. See the label on the air conditioner 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.

3.7.7. 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.

3.7.8. Low Temperature Thermostat

The CUBE is equipped with a low temperature alarm thermostat in the equipment compartment that provides a normally closed connection. The alarm is factory set at 5°C and opens the connection if the internal temperature drops below this setting.

3.7.9. Heater

The 1000W AC powered heater turns on at 5°C and turns off at 15°C. These set points are not adjustable. The JN8 and JN9 models have two heaters.

3.7.10. 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 13).

The cabinet comes with a standard alarm schedule label (See Table 2). The table can be replaced or augmented to match the specific alarms being used. All connections are normally closed and open on alarm.

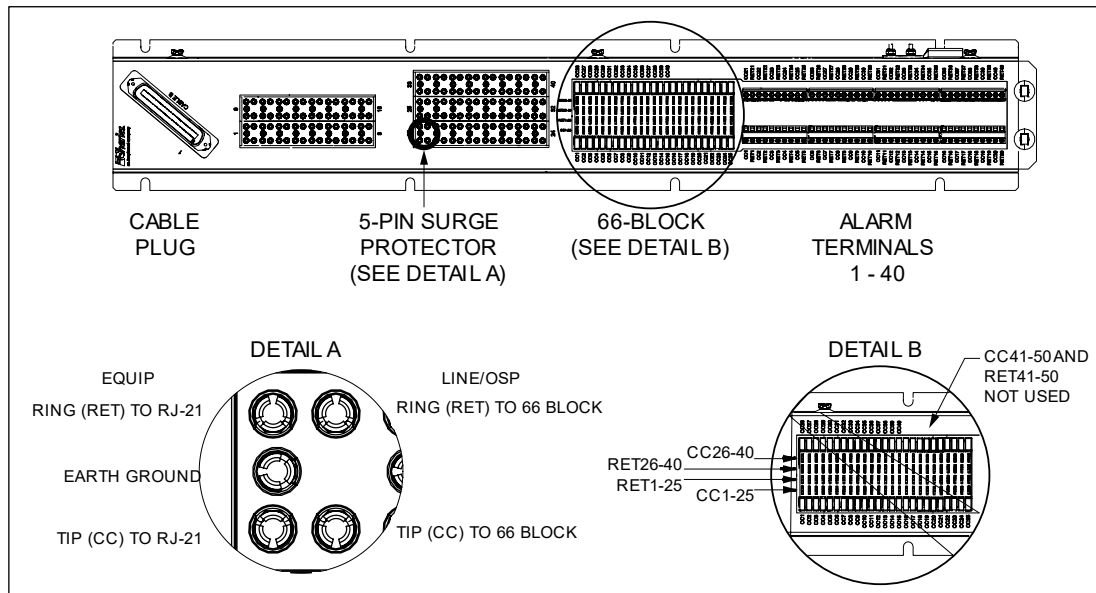


Figure 13 Alarm Terminal Panel

3.7.11. Fiber and Copper Entry

Cable enters the CUBE through multiple knockouts on the sides and rear. The Ø1.75/2.50" knockouts accommodate Ø1.25/2.00" conduit fittings, and the Ø2.50/3.60 knockouts accommodate Ø2.00/3.00 conduit fittings. The CUBE also has a cutout on the bottom for cable entry. See Figure 2 for knockout and cutout 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 14. 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.

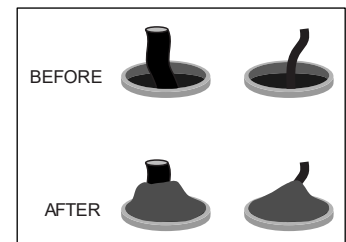


Figure 14 Applying Putty Seal

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 like a rubber mallet, may be used 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.

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 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 (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
- UL2416 Listed, Type 3R

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	80X"Hx32"Wx32"D
Weight	PM63915JN3: Approx. 440 lbs. as shipped PM63915JN4: Approx. 410 lbs. as shipped PM63915JN6: Approx. 390 lbs. as shipped PM63915JN7: Approx. 420 lbs. as shipped PM63915JN8: Approx. 375 lbs. as shipped PM63915JN9: Approx. 510 lbs. as shipped
Equipment Rack Space and Hole Spacing	19": 21" (12RU) rack spacing with tapped EIA #12-24 mounting holes 23": 47.25" (27RU) rack spacing with tapped EIA #12-24 mounting holes
Maximum Supported Weight	Rack Rails: 429 lbs. Battery Trays: 600 lbs. per tray
Materials	0.125" aluminum
Color	Off-white
Electrical	
Power System	PM63915JN3 and PM63915JN4 Only: Eltek BC2000-A01-10VC
Smoke Detector	UTC 541NCSRH
Supported Batteries	PM63915JN3 and PM63915JN7 Only: 200Ah VRLA
Bonding and Grounding	(2) 2x8 position ground bars inside CUBE, external ground studs
Cable Entry	See Figure 2
Thermal	
HVAC System	115VAC, Dantherm 708341
Cooling Capacity	1172W (4000BTU)
Heater	1000W, 230VAC, Stego 03202.0-00
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	80-005300-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
HVAC Cutoff Switch (Black with White Button)	17-400322-0
15A GFCI Outlet	04-100207-0
Thermostat	99-004548-0

Table 1 CUBE Specifications

7.3. Alarm Panel Settings

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	
CC22	Bus Bar Theft
CC23	Battery Breaker Alarm
CC24	Smoke/Fire
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 2 Macro Alarm Wiring Table
Highlighted alarms are connected at the factory.