Charles Modular Cabinet
MC-35EZEZDWN1
General Description and Installation

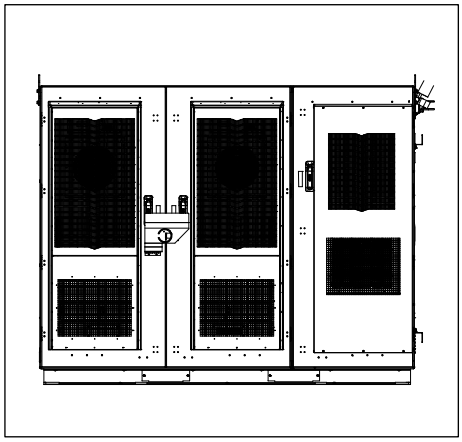

Figure 1 Front View of the MC

1. GENERAL INTRODUCTION

1.1. Document Purpose

This document provides general information for the MC-35EZEZDWN1, part of the Charles Industries Modular Cabinet series. Figure 1 shows a closed front view of the enclosure.

-NOTE-
Hereafter, the Charles Modular Cabinet, MC-35EZEZDWN1 will be referred to as the "MC."

1.2. Product Purpose

The MC consists of a protective enclosure for an integrated system of electronic components and equipment that can serve fiber and copper interfaces. This cabinet is part of Charles Industries' line of Modular Cabinets. The modular enclosures can combine multiple bays to support a variety of applications.

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 MC is to be mounted on a steel grate platform. The installer connects the power, fiber, and copper connections. Detailed mounting and installation information is covered in Section 3.

2. PRODUCT DESCRIPTION

The MC includes three bays. From the left, the first two are equipment bays with 39RU of 23" horizontal rack mount space (adjustable to 19") and a 9500W DC powered thermosiphon heat exchanger. The third bay is a power/battery bay with a 4275W DC powered thermosiphon heat exchanger. The power/battery bay supports three strings of customer supplied Enersys or Narada 210Ah batteries. The MC also has a motion-sensitive exterior light and a bracket for mounting a GPS antenna. All bays include an integrated 4" plinth on the bottom.

Figure 2 shows the MC dimensions. Figures 3 and 4 show the main components of the MC (doors are hidden in Figure 4 for a better view of interior components).

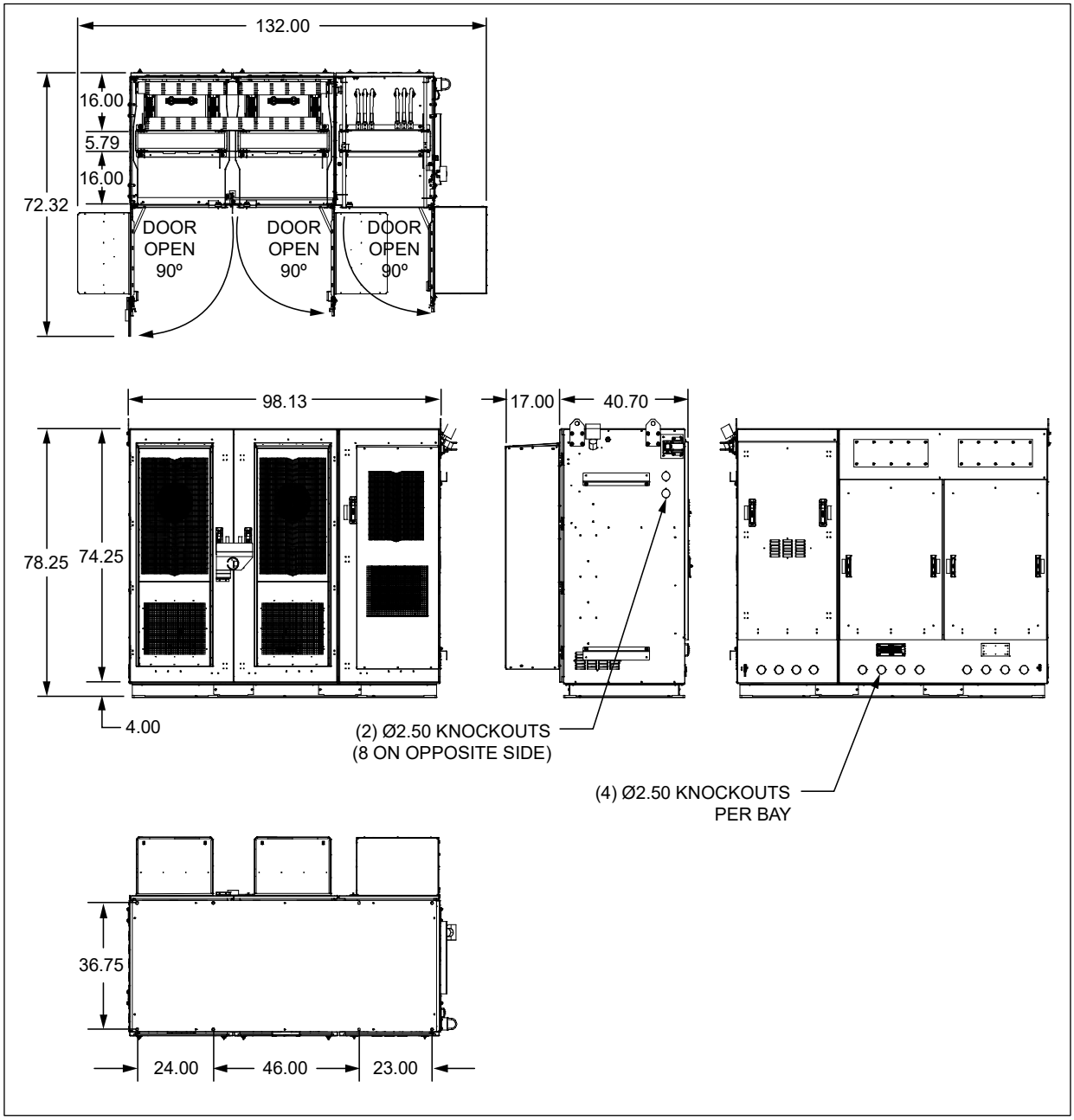

Figure 2 MC Dimensions (in inches)

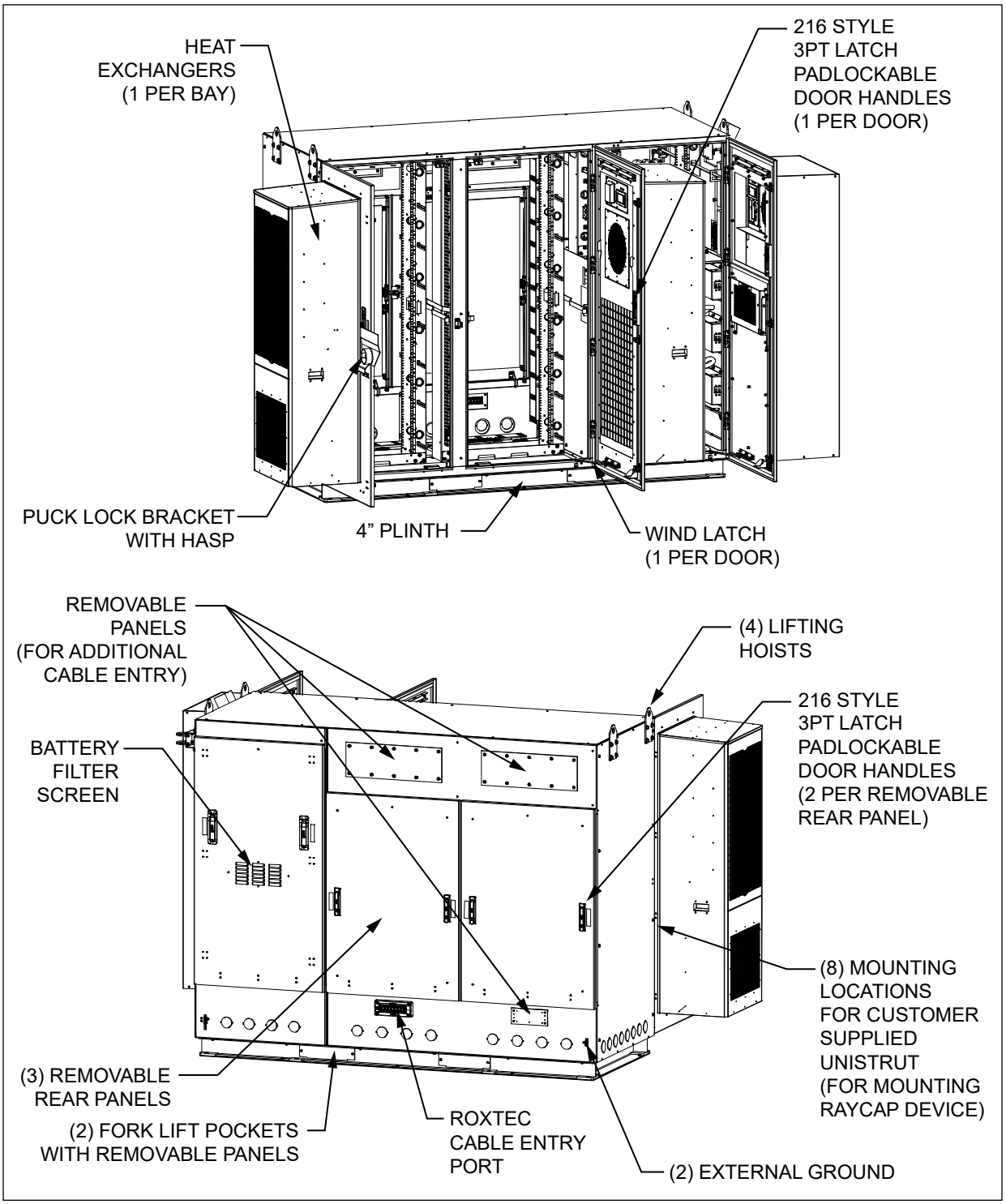

Figure 3 MC Components, With Doors

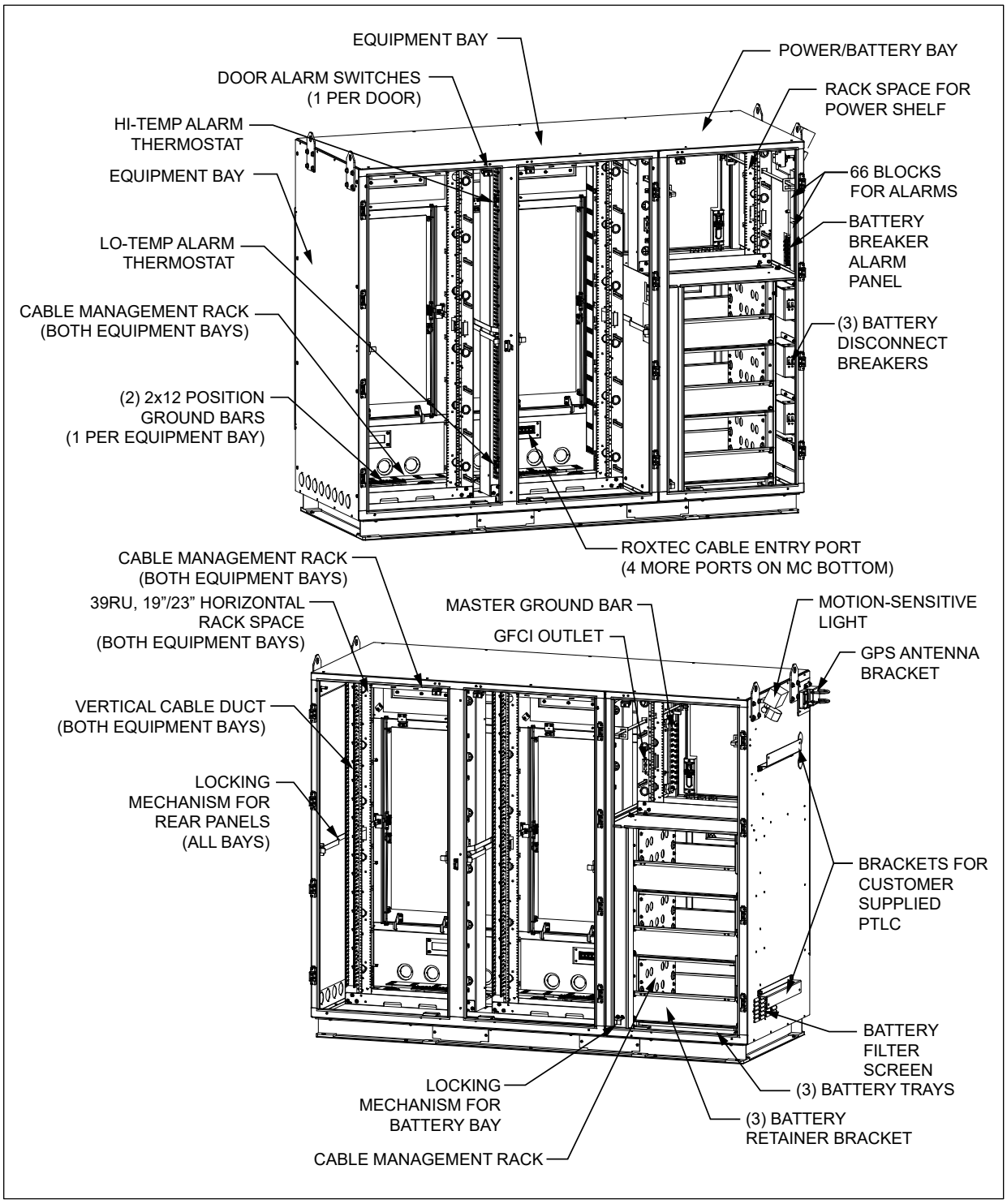

Figure 4 MC Components, Doors Hidden

3. INSTALLATION

3.1. Inspecting the Product

The MC 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 MC.
- 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 MC.

- 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 steel grate platform must be able to support the weight of the MC.
- Run all fiber and copper facilities to the site.

3.5. Lifting the MC

See Table 1 for MC weight. Charles recommends the following procedure for lifting the MC.

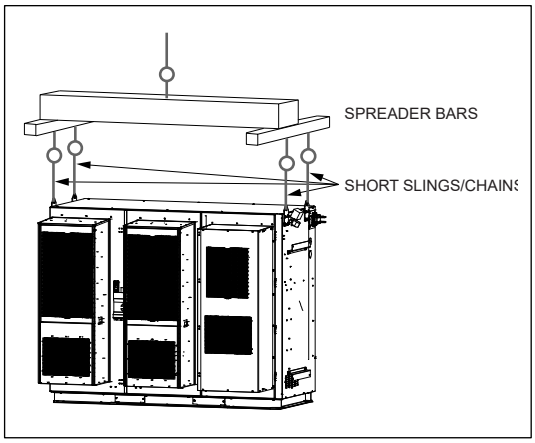

Figure 5 Lifting the MC

3.5.1. Required Equipment

- One derrick (crane) capable of lifting the MC
- Spreader bars
- Four lifting slings or chains with each having a 2,500 lbs. capacity
- Connecting links to attach slings to the MC'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 5.

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.**

Observe the following local safety procedures when performing the tasks in this section.

- Keep the MC 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 MC.
- 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 MC

To secure the MC 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 6.

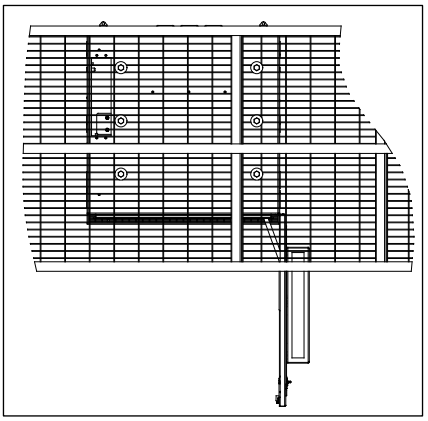

Figure 6 Installing on a Platform

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%

3.7. MC Wiring and Equipment

After the MC 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 MC is sealed and power is applied. A basic electrical diagram is shown in Figure 8.

3.7.1. Ground Connection

Use the 2x12 position ground bars provided in the equipment bays for all grounding of internal equipment. Stack hardware as shown in Figure 7. External ground lugs are available on the rear of the MC for connecting a site ground wire. A master ground bar (MGB) is located in the power (upper) section of the power/battery bay. The ground bars in the equipment bays are connected to the MGB.

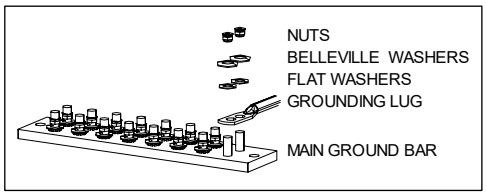

Figure 7
Ground Bar Hardware Stack

3.7.2. Battery Connection

⚠	WARNING	Always turn off battery breakers prior to servicing batteries. If using VRLA batteries, ensure that the power system is set up for VRLA batteries with temperature compensation enabled.

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 bay.
2. Remove the battery retainer bracket by removing the hardware.
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 battery temperature probe to the closest battery.
8. Connect the battery cables to the appropriate terminals.
9. Secure the battery retaining straps and reinstall the battery retainer brackets using hardware from step 2.
10. Properly manage the battery cables.
    - Ensure that the bending radius is not less than 5x the cable diameter (e.g. 4/0 battery cable = 4 inch bend radius).
    - Use as few bends as possible between the two termination points.
    - Do not bend the cable at the termination points.
11. 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.

3.7.3. Battery Breaker Alarm Switches

The MC has a switch board inside right wall of the power (upper) section in the power/battery bay. It is connected to the battery breakers and serves as an alarm monitor. The default switch setting is in the downward position, indicating that a battery string is present and the battery breaker is turned on. If any battery breaker is turned off or tripped, it will open the alarm connection on the alarm block "BAT BRKR" position. If no battery string is present, then move the switch for that shelf into the upper position to bypass the breaker alarm.

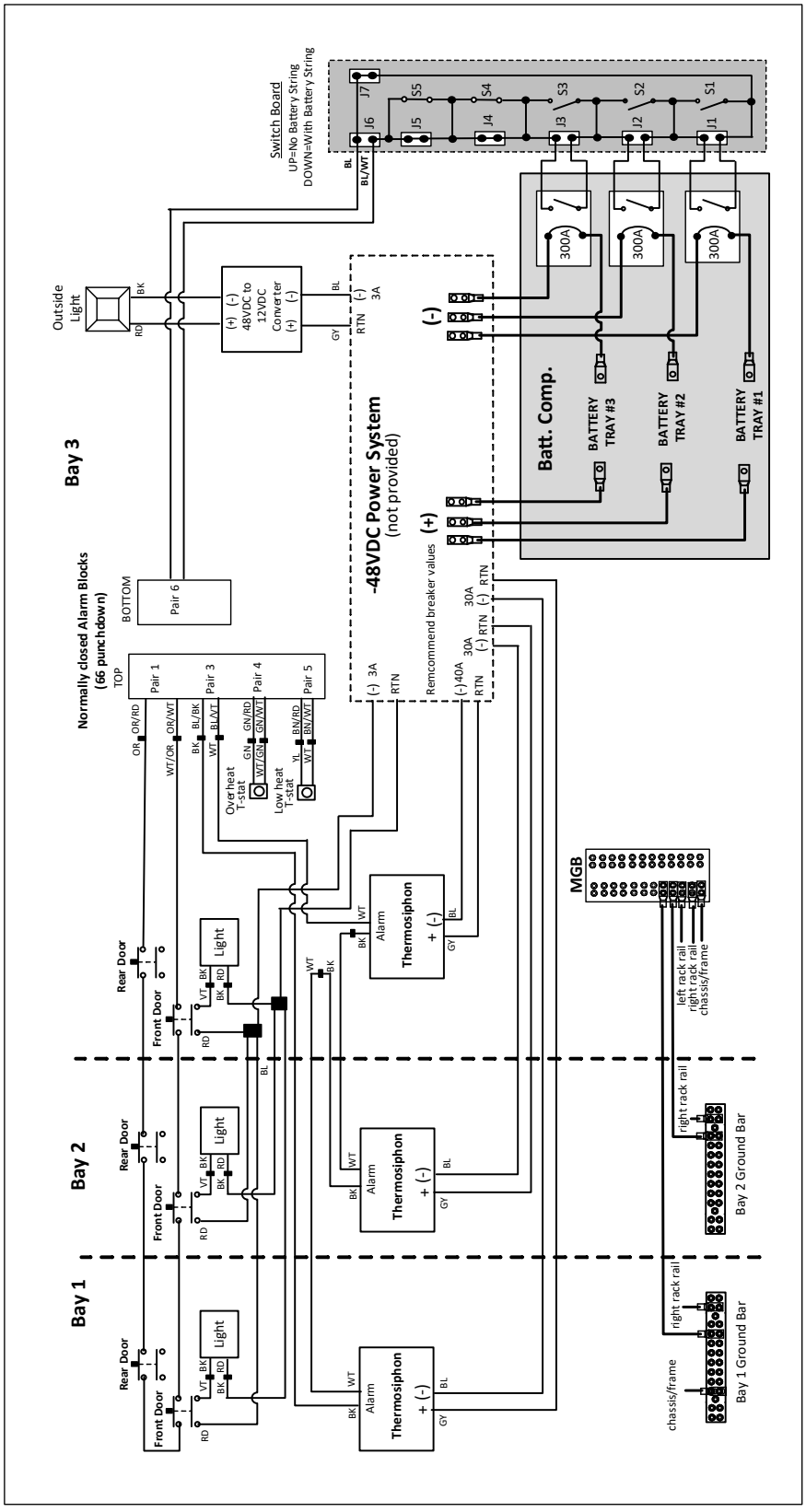

Figure 8 Electrical Diagram

3.7.4. Thermosiphon Operation

The DC powered thermosiphons on each bay have a speed controller and include an internal and an external fan. The fans' speed increases with increasing ambient temperature. Fan settings are defined below.

Fan Setting	Internal	External
Turn-on Setting	-40°C	35°C
Medium Temp Setting	35°C	35°C
High Temp Setting	45°C	45°C

For more information, refer to the thermosiphon documentation found inside the MC.

-NOTE-
Changing the speed controller default factory set points can lead to system performance issues, such as equipment failures, increased power use, unnecessary alarms, noise, condensation build up, fan failure caused by excessive runtimes and vibration.
Avoid placing items in front of the thermosiphon's return and supply vents. Maintain a minimum of 6" clearance to enable proper air flow.

3.7.5. Overheat Thermostat

The equipment bays have two thermostats mounted on the door frame divider. The upper, hi-temp thermostat is factory set at 50°C, while the lower, lo-temp thermostat is set at 5°C. These thermostats provide a normally closed connection. If the internal MC temperature exceeds either limit, the alarm opens the connection.

-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

Two 66-block alarm panels in the power/battery bay monitor components in the equipment bays. See the electrical diagram for information about alarm connections. All connections are normally closed and will open upon alarm.

3.7.7. Fiber and Copper Entry

The MC has multiple Ø2.50" knockouts on the sides and rear that accommodate Ø2.00" conduit fittings. The equipment bays also have Roxtec cable entry ports on the rear and bottom. The equipment bays are equipped for additional cable entry using the removable rear panels near the top of the bays. See Figure 2 for knockout and panel locations.

3.8. Locking Mechanisms

3.8.1. Equipment Bays, Front Doors

The two equipment bays share a puck lock hasp to secure the MC against entry. The hasp is on a hinged panel. Use a customer supplied puck lock to secure the hasp. To open the bays, remove the puck lock and fold the puck lock panel downward on its hinge to access the door latches.

3.8.2. Power/Battery Bay, Front Door

To open the power/battery bay door, first open the left-most equipment bay. The battery bay locking mechanism is a metal bar that extends across the bottom of the MC to the left bay. Release the bar to open the power/battery bay front door. Reset the locking mechanism to secure the door.

3.8.3. All Bays, Rear Panels

To remove the rear panels from the bays, first open the front doors. The locking mechanism for each panel is a metal bar that extends from the rear panel to the front of the bay. Release these bars to remove the rear panel. Reset the locking mechanism to secure the panel.

3.9. Conduit Seals

All internal and external conduit openings on the MC must be completely sealed with a duct seal compound to prevent moisture from entering the equipment bays. The battery section of the power/battery bay is internally sealed from the equipment bays to prevent outgassing from the batteries into the equipment bay. 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 9. 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.

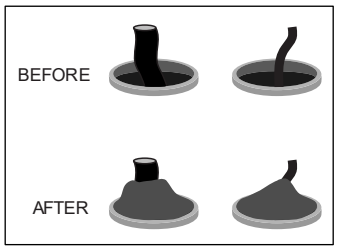

Figure 9 Applying Putty Seal

3.10. 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.

Periodic cleaning of the 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.

The thermosiphon requires no scheduled maintenance other than cleaning the fans if they become contaminated with dust or residue. Remove the cover by removing the screws on the outside. Examine periodically to determine the required cleaning periods based on the installed environmental conditions.

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 MC product. The Charles warranty is limited to the operation of the MC 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 MCs 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	78”Hx98”Wx40”D
Weight	Approx. 2025 lbs. as shipped
23” Equipment Rack Space and Hole Spacing	68.25” (39RU) rack spacing with tapped EIA #12-24 mounting holes
Battery Tray Size	13.2”Hx21.6”Wx23.1”D
Maximum Supported Weight	Rack Rails: 429 lbs. per equipment bay Battery Tray: 550 lbs. per tray
Materials	0.125” aluminum Plinths: steel
Color	Off-white
Electrical	
Supported Batteries	Enersys or Narada 210Ah VRLA
Bonding and Grounding	One 2x12 position ground bar per equipment bay, 2 external grounds on rear One 2x24 position master ground bar in power/battery bay
Cable Entry	See Figure 2 and section 3.7.7
Thermal	
Thermosiphon	Equipment Bays: 9500W, 48VDC, Vikinor VHT-500-DC Power/Battery Bay: 4275W, 48VDC, Vikinor VHT-225-DC
Maximum Heat Dissipation	Equipment Bays: 4800W@19°C above ambient with solar Power/Battery Bay: 2050W@19°C above ambient with solar
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
Swing Handle	39-000148-0
Lift-Up Handle	39-000335-0
Door Rod Latch	39-000336-0
4-Wire Door Alarm Switch	17-400329-0
GFCI Outlet	15A, 04-100207-0
Hi-temp Thermostat	99-004548-0
Lo-temp Thermostat	99-004234-0
Battery Disconnect Breaker	18-908352-0

Table 1 MC Specifications