



Liebert®

MCR™ Integrated Cabinet Solutions

User Manual

Mini Computer Room Enclosure

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Technical Support Site

If you encounter any installation or operational issues with your product, check the pertinent section of this manual to see if the issue can be resolved by following outlined procedures. Visit <https://www.VertivCo.com/en-us/support/> for additional assistance.

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IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

This manual contains important instructions that should be closely followed during installation and maintenance of this unit. Read all safety and operating instructions before attempting to operate the Liebert® MCR. Adhere to all warnings on the unit and in this manual. Follow all operating and user instructions.

This product is designed for commercial / industrial use only. This product is not intended for use with life support or other U.S. FDA designated “critical” devices. Maximum load must not exceed that shown on the Liebert® MCR rating label.

Operate this product in an indoor environment at an ambient temperature of 65°F to 105°F (23°C to 40°C). Install in a clean environment, free from moisture, flammable liquids, gases, and corrosive substances.

See **Figure 10.2** on page 51, for recommended operating conditions to prevent excessive cabinet condensation. Keep cabinet doors closed and ensure that wiring entrances are sealed tightly to minimize non-conditioned room-air intrusion into the cabinet.

Where applicable, this product must be permanently connected and powered from a suitable single-phase AC supply rated in accordance with the equipment data plate. It must be suitably grounded and protected by a circuit breaker or fuse.

This equipment complies with the requirements of the EMC directive 89/336/EEC and the published technical standards. Continued compliance requires installation in accordance with these instructions and the use of manufacturer approved accessories with output cables not exceeding 30 ft. (10m) in length. Use a shielded cable for external communications interface.

Ensure the Liebert® MCR has proper ventilation. Never block or insert objects into the ventilation holes or other openings. Maintain a minimum clearance of 12 inches (305mm) in front, rear and top of the Liebert® MCR for proper air flow and cooling. Top-mount ECMs require at least 12 in. (305mm) on the Liebert® MCR’s sides.



WARNING! Risk of arc flash and electric shock. Can cause injury or death. Unplug or disconnect all electric power supplies, verify with a voltmeter that power is off, and wear personal, protective equipment per NFPA 70E before working within the BCM or ECM electrical enclosures. Customer must provide earth ground to unit per NEC, CEC and local codes for permanently-connected units as applicable. Before proceeding with installation, read all instructions, verify that all the parts are included and check the nameplate to be sure the voltage matches available utility power. Refer to unit electrical schematic. Follow all local codes.



WARNING! Risk of explosive discharge from high-pressure refrigerant. Can cause injury or death. The ECM unit contains high-pressure, refrigerant gas. Relieve pressure per local codes before working with ECM piping.



WARNING! Risk of contact with high-speed moving parts. Can cause injury or death. Unplug or disconnect all local and remote electric power supplies before working in the ECM or BCM cabinets.



WARNING! Risk of mounting surface collapse. Can cause equipment and building damage, serious injury or death. Liebert® recommends that a licensed structural Engineer be utilized to determine the structural suitability of the floor or mounting wall and wall-mounting hardware selection.



CAUTION: Risk of contact with hot surfaces. Can cause injury. The compressors, fan motors and refrigerant-discharge lines are extremely hot during unit operation. Allow sufficient time for them to cool before working within the BCM or ECM unit cabinets. Use extreme caution and wear protective gloves and arm protection when working on or near hot compressors, fan motors and/or refrigerant-discharge lines.



CAUTION: Risk of contact with sharp edges, splinters, and exposed fasteners. Can cause injury. Only properly-trained personnel wearing appropriate safety headgear, gloves, shoes and glasses should attempt to move, lift, remove packaging from, or prepare unit for installation.

IMPORTANT! Risk of drain pan overflow. Can cause extensive building and equipment damage. Ensure the cabinet remains sealed during operation. Seal all cable entrance points with the factory-supplied cable entrance provisions, or with a close-cell foam (field-supplied). Ensure that the cabinet is installed on a level surface. The ECM cooling module must be level within 1/4 inch from front-to-rear and side-to-side to ensure proper drainage of condensate water. Drain lines must be kept open and free of dirt and debris. Regularly-scheduled maintenance must be performed.

IMPORTANT! Risk of clogged or leaking drain lines. Can cause equipment and building damage. Drain lines must be inspected regularly and maintenance must be performed to ensure that drain water runs freely through the drain system and that lines are clear and free of obstructions and in good condition with no visible sign of damage or leaks. Improper installation, application and service practices can result in water leakage from the unit. Water leakage can result in severe property damage and loss of critical data-center equipment.

IMPORTANT! Risk of excessive condensation. Can cause moisture to accumulate on the interior cabinet surfaces and equipment resulting in equipment damage. Turn-off the ECM any time the cabinet doors are open for more than 10 minutes. Do not operate the ECM in room conditions outside the limits of 10.1 on page 50. Keep the wiring entrances sealed tightly to prevent the intrusion of non-conditioned room air into the cabinet.

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GLOSSARY OF SYMBOLS

Table 4.1 Symbols

SYMBOL	DESCRIPTION
	Warning! Hazardous Voltage Present
	Caution: Note following instructions
	Consult user manual for additional information
	Indicates weight
	Indicates ground connection
	Indicates alternating current

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1 INTRODUCTION

Congratulations on purchasing a Liebert® Liebert® MCR. The highly versatile Liebert® MCR can provide an organized, secure, controlled environment in a single system for your sensitive electronic equipment.

The Liebert® MCR is available in a variety of configurations to suit your electronic equipment's environmental needs. Whether you need a rack to organize your electronic equipment, locking doors for security, a UPS for power protection, and/or an ECM air conditioner to keep your equipment at an acceptable operating temperature, the Liebert® MCR will provide the level of protection you require.

The Liebert® MCR can be upgraded to fit your changing needs as your operations expand and you add more sensitive electronic equipment.

1.1 About this Manual

The Liebert® MCR's flexibility means that a variety of configurations exist for the unit. The various sections cover:

- **Frame**—The basic setup; relevant to all Liebert® MCR configurations.
- **Enclosure**—The types of doors and side panels, as well as attendant hardware, available as upgrades to accommodate various options.
- **Power**—The wide selection of Uninterruptible Power Supply (UPS) models and Vertiv™ Rack PDUs available for the Liebert® MCR.
- **Environmental**—Computer-grade environmental conditioning units that may be employed: Environmental Control Module (ECM), Backup Cooling Module (BCM) and Fan Cooling.
- **Monitoring**—Hardware to collect data about conditions within the Liebert® MCR and about its components.

Any or all of the components may be included in your Liebert® MCR, depending on the unit's configuration. If, for example, your Liebert® MCR is equipped with an ECM, but no UPS or monitoring equipment, you might want to read the sections on Frames, Enclosures and Environmental, skipping the sections titled Power and Monitoring.

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2 MAJOR COMPONENTS

You may have any or all of the components discussed in this section, depending on your Liebert® MCR.

2.1 Frame

The base of all Liebert® MCR products is the frame. It comes in four standard heights: 24, 44, 78 and 84 inches (610, 1118, 1981 and 2134mm). All 24-inch high units are wall-mountable and are furnished with doors, side panels and 19" (483mm) square-hole mounting rails. The 44-, 78-, and 84-inch frames can accommodate shelf- or rack-mounted equipment on 19 inch (483 mm) adjustable or square-hole rails. See [Liebert® MCR model numbers](#) on page 49 and the subsequent illustrations for measurements of different models. All units (with the exception of the wall-mount units) have leveling feet and grounding lug.

The frame consists of heavy-duty, riveted 12-gauge steel construction, painted black. The front and rear vertical frame members accommodate internal mounting rail options and provide space to route and manage customer cabling.

Various cutouts in the top, bottom and rear plates permit customer cable entry; cover plates are provided as sealing and cooling options require.

Frames are selected as either non-sealed, (open frame or enclosure), or as sealed (basis for NEMA12 enclosure). All options that are added to the mounting frame conform to either the sealed or non-sealed requirements as the sealing selection dictates.

Figure 2.1 Foundation Frame



2.2 Enclosure

The mounting frame can be upgraded to an enclosure system or to a sealed mini computer room, with the addition of factory-installed panel and door configurations, gaskets and other options.

2.3 Doors

All doors are framed from sheet metal. A multi-point latch with key lock is provided for security. All doors are removable and allow for reversible (left/right) hinging. The following doors are available:

- Plexiglas™ front door
- Sheet metal front and rear door
- Insulation provided on ECM applications
- Rear doors are available in either full height or with cable entrance panels

2.4 Side Panels

Side panels are fashioned from sheet metal. Special fasteners inside and outside the unit permit removal of all panels for maintenance while preserving internal security during normal operation.

Side panels are available in solid designs. An insulation option is required for Liebert® MCR systems that use ECM cooling. This provides improved thermal and sound insulation.

2.5 Power

2.5.1 Uninterruptible Power Supply

The Uninterruptible Power Supply (UPS) can provide your electronic equipment with:

- Surge protection and suppression
- Regulated voltage and frequency
- Battery backup

A UPS protects your sensitive electronic equipment when utility power fails. It gives you time to perform a controlled shutdown of your operating system, preventing damage to the hardware, as well as allowing you to save valuable data. Liebert® UPSs also condition utility power, eliminating power spikes that could damage your instruments.

Liebert®'s PowerSure PSI and UPStation GXT4, up to 6000 VA, are available for the Liebert® MCR.

Refer to the user manual for your UPS for further details.

Figure 2.2 GXT4 UPS and Additional Battery Cabinet



2.5.2 Vertiv™ Rack PDUs

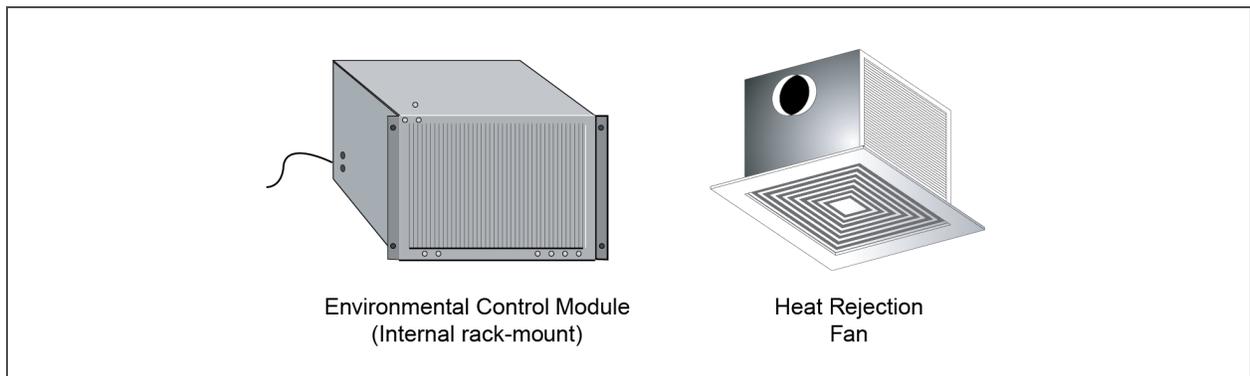
Power distribution to equipment installed in your Liebert® MCR may be eased and simplified with installation of optional Liebert® Vertiv™ Rack PDUs. For information about installing and operating the power strips.

2.6 Environmental

2.6.1 Fan Cooling System and Options

Fan Cooling Modules are available to circulate air through your Liebert® MCR, providing enhanced primary cooling for enclosure systems. Fan modules are not compatible with the Environmental Control Module (ECM) option.

Figure 2.3 Environmental Control Module and Heat Rejection Fan



2.6.2 Environmental Control Module

The Environmental Control Module (ECM) conditions and circulates the air inside the Liebert® MCR to protect your electronic equipment from heat the equipment generates. Outside (ambient) air is used to remove heat from the enclosure through the air-cooled condenser. The ECM is capacity/load-matched to Liebert®'s UPS models, along with heat transmitted into the enclosure from outside.

The ECM is available as either internal rack-mount or external top-mount. The ECM is not compatible with the 24" (610mm) wall-mount Liebert® MCR enclosures.

2.6.3 ECM Heat Rejection

For applications in confined spaces (equipment rooms or closets), an optional, ceiling-mounted heat rejection fan or direct-connect heat rejection duct options are available to ventilate the space outside the Liebert® MCR.

Refer to separate installation instructions provided with these options.

2.6.4 Back-Up Cooling Module (BCM)

For backup cooling, an optional Backup Cooling Module can be added to the Liebert® MCR. When the self-contained BCM senses an internal temperature 100°F (38°C), the Backup Cooling Module fans will circulate filtered ambient air through the enclosure. The BCM is not compatible with the 24" (610mm) wall-mount or 44" (1118mm) tall Liebert® MCR enclosures.

A BCM Energy Saver (ES) Control is an optional add-on device that reduces energy costs by allowing the BCM to operate as the primary enclosure cooler. The BCM ES Control, along with the high temperature alarm, monitors air conditions inside and outside the enclosure and, when appropriate, cycles off the ECM and activates the BCM, reducing energy consumption.

Figure 2.4 Back-up Cooling Module on the Rear of MCR



2.7 Monitoring

Vertiv offers optional monitoring solutions for the MCR that provide real-time visibility and control. The Vertiv sensor options described in this section are compatible with Liebert UPS NIC cards, including IS-UNITY-DP and IS-UNITY-LIFE, and with Liebert Rack-PDU NIC cards RPC2 and RPC.

Internal Temperature & Humidity—Factory-installed optional sensor to monitor temperature and humidity inside the `[[[Undefined variable cable_mgmt.Product1Short]]]`.

External Temperature & Humidity option—Field-located sensor package with 30-foot (9.1m) cable that monitors temperature and humidity outside the `[[[Undefined variable cable_mgmt.Product1Short]]]`.

Door Ajar Sensor—Factory-installed optional micro switches to detect an open door.

High Temperature Alarm—Factory-installed sensor / controller module to detect high temperature inside the enclosure, sound an alarm and activate the BCM, if present.

Water Detector—Field-installed LT410S for single-point detection. This option requires power supply when an ECM is not supplied.

Power Supply—Factory-installed 24VAC power source required for high temp alarm and water detector options when an ECM is not supplied.

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3 INSTALLATION

3.1 Inspection

Upon receiving your Liebert® MCR, examine the packaging for any signs of mishandling or damage. If any damage is noted, notify your local Vertiv™ representative and please file an immediate damage claim with your carrier.

3.2 Required Setup Equipment

The following tools are required to set up your Liebert® MCR:

- pallet jack
- utility knife
- 1/2" (13mm) ratchet or wrench
- 10mm wrench (for adjusting rails)
- hammer

3.3 Electrical Requirements

This section describes the electrical service requirements for your Liebert® MCR system and its options. For the full load amp requirements of each option, please refer to [Cooling Systems](#) on page 50 and [Power Systems](#) on page 53 or the component's user manual.

3.3.1 Environmental Control Module (ECM)

If your Liebert® MCR is equipped with an ECM, it should be powered from a dedicated electrical circuit.

DO NOT plug the ECM into the optional UPS or into the same input circuit to the UPS.

All 120V/60Hz ECMs are equipped with 9-foot (2.7m) long cords with NEMA 5-15 input plugs.

3.3.2 Backup Cooling Module (BCM)

The BCM is an optional, self-contained backup cooling system. If the Liebert® MCR is supplied with a UPS and BCM, the BCM is powered from the UPS. All 120V/60Hz BCMs are equipped with 6-foot (1.8m) long cords with NEMA 5-15 input plugs.

3.3.3 Uninterruptible Power Supply (UPS)

If your Liebert® MCR is equipped with a UPS, it will require connection to a dedicated electrical circuit. Review the UPS's user manual before connecting utility power to the unit.

3.4 Unloading the Liebert® MCR



CAUTION: Risk of contact with sharp edges, splinters, and exposed fasteners. Can cause injury.

Only properly-trained personnel wearing appropriate safety headgear, gloves, shoes and glasses should attempt to move, lift, remove packaging from, or prepare unit for installation.

Before you start unloading your Liebert® MCR, please note the unit weight of your model. Use at least two people when moving the unit. See **10** on page 49, **10.1** on page 50, and **10.2** on page 53 for cabinet and cooling-equipment weights.

3.4.1 Unloading a Liebert® MCR MCR

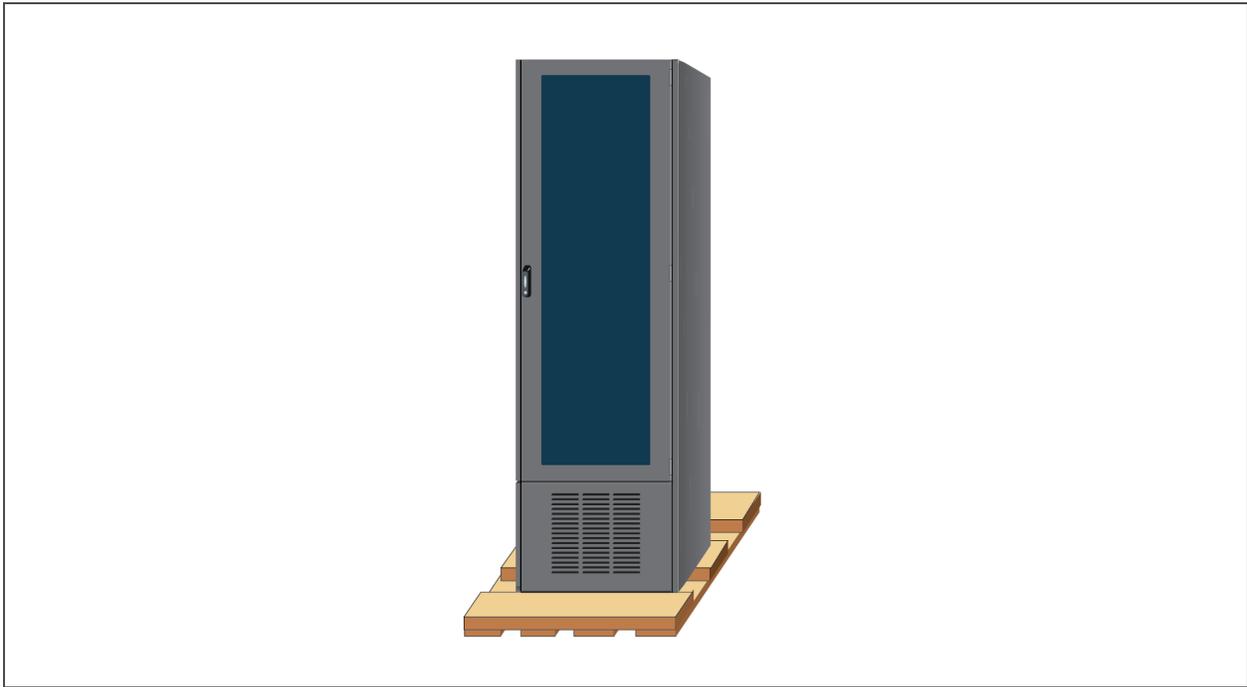
To unload the Liebert® MCR:

1. Using a pallet jack, move the Liebert® MCR near the desired location. Cut the shipping bands and remove all cardboard and plastic.
2. Remove the two 2x4s from the sides of the unit. Remove the 2x6 from the rear of the unit.
3. Using a ratchet or wrench, remove the four lag bolts from the front of the skid.
4. Remove the 2x6 from the front of the unit.
5. Slide the 4x4 runner from under the front of the skid.
6. Move the unit forward until the skid and the unit tilt.
7. Roll the unit off front of the skid.

Open the door and locate the keys, which will be inside the enclosure along with a T-handle wrench for removing the side panels. The front and rear locks use the same key. To open either door, rotate the key 1/4 turn clockwise to unlock the door, then lift the bottom of the handle. Pull the handle away from the unit and rotate it 90 degrees to open the door.

Inspect the interior of the unit for any damage done in shipping. If any damage is noted, file a claim with the shipper and inform your Liebert® supplier.

Figure 3.1 MCR on Skid



3.5 Mini Computer Room Site Preparation

When deciding where to place your Liebert® MCR Mini Computer Room, keep in mind these factors:

- adequate ventilation is necessary for proper equipment operation and protection
- service clearance must be provided
- the Liebert® MCR must be on a level surface

The environment outside the cabinet must be within the product- design operating envelope for temperature and humidity in order to prevent cabinet condensation. See **Figure 10.2** on page 51

Make sure the location has adequate ventilation to dissipate the heat rejected from the inside of the enclosure. Alcoves or closets should have louvered doors and/or open ceilings that promote air exchange. For information on Vertiv™'s optional heat rejection packages, see [Active Heat Rejection Options](#) on page 32.

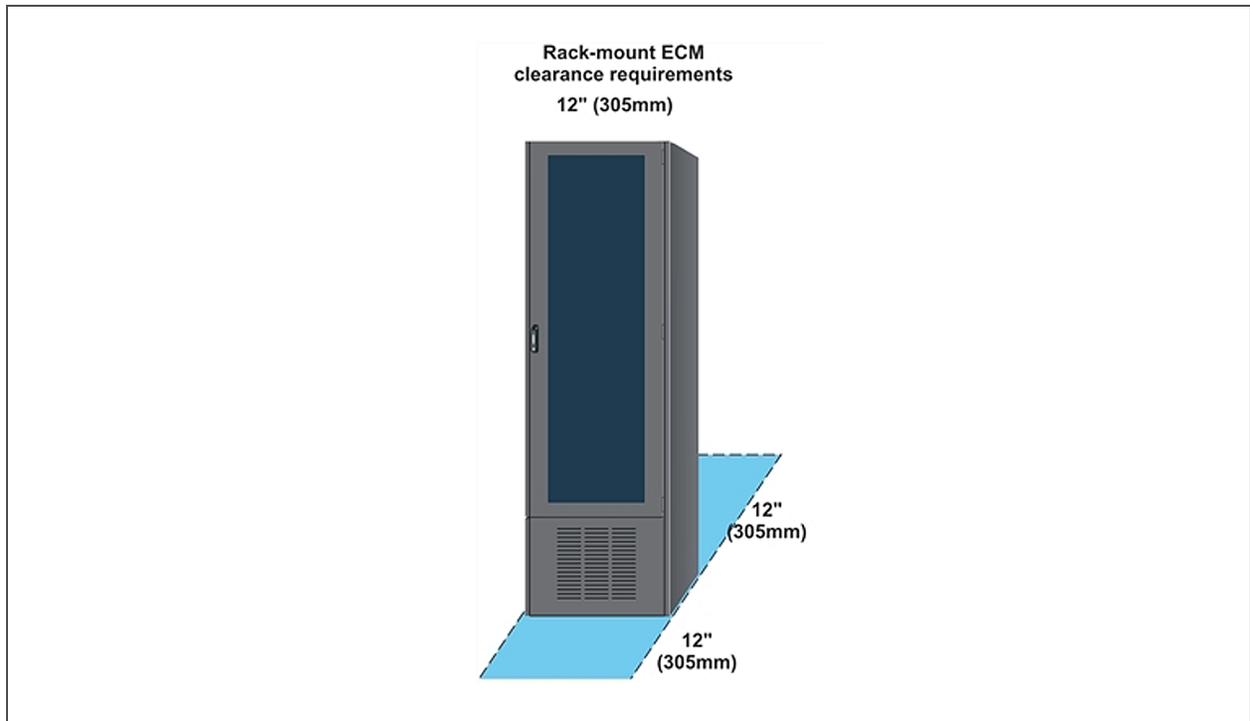
Note the dimensions of your Liebert® MCR model to determine the space required. Units with a rack-mount ECM require at least 12 inches (305mm) of clearance at the top, in front and at the rear. Do not block the airflow at the front or rear of the unit.

All units with an ECM require at least 36 inches (914mm) of service clearance in front of the unit for access to the ECM.

Top-mount ECMs require an additional 12" (305mm) of free space on the sides of the unit.

IMPORTANT! Risk of drain pan overflow. Can cause extensive building and equipment damage. Ensure the cabinet remains sealed during operation. Seal all cable entrance points with the factory-supplied cable entrance provisions, or with a close-cell foam (field-supplied). Ensure that the cabinet is installed on a level surface. The ECM cooling module must be level within 1/4 inch from front-to-rear and side-to-side to ensure proper drainage of condensate water. Drain lines must be kept open and free of dirt and debris. Regularly-scheduled maintenance must be performed.

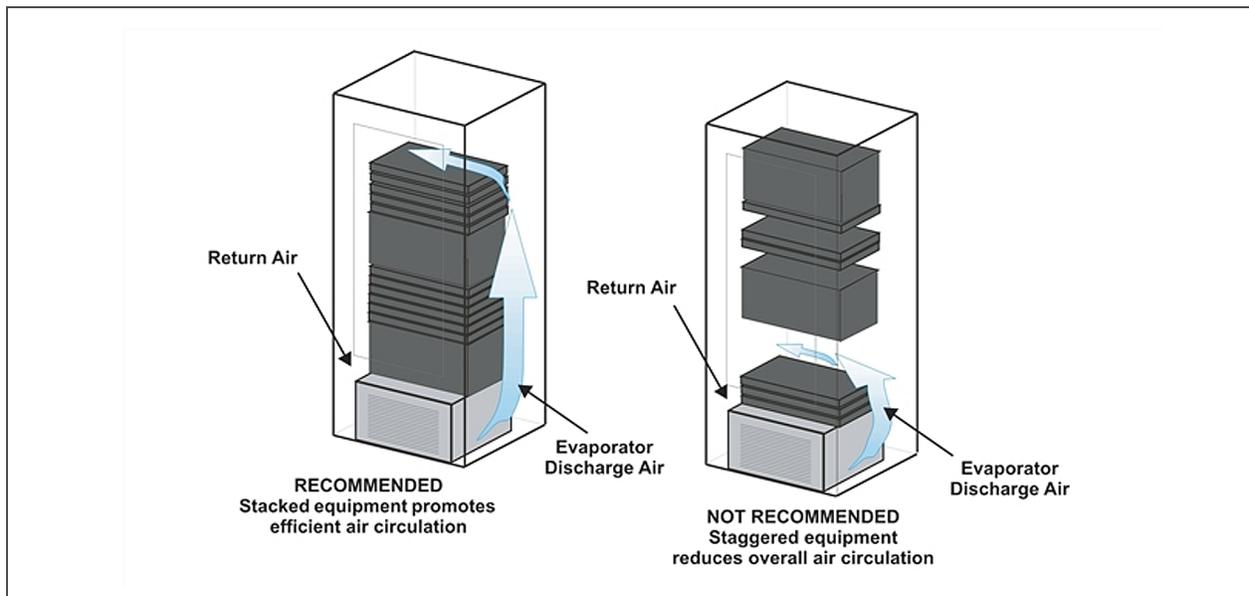
Figure 3.2 Foundation Mini Computer Room



3.5.1 Equipment Layout

To keep the unit's center of gravity as low as possible, install equipment from the bottom up, starting with the heavier units. For rack-mount ECM units, leave empty rack space (if any) at the top of the enclosure. For top-mount ECM units, any additional unused space should be as close to the bottom of the enclosure as possible while also attempting to maintain the lowest possible center of gravity.

Figure 3.3 Recommended equipment stacking arrangement



! **WARNING!** Risk of unit tip over. Can cause equipment and building damage, serious injury or death.

After customer equipment is installed, the Liebert® MCR may have a high center of gravity, particularly when equipped with a top-mount ECM. Use extreme caution when moving the unit to prevent unit from tipping over. An optional stabilizing plate is available to enhance stability.

! **WARNING!** Risk of electric shock. Can cause injury or death. Use only ETL/UL-listed/CSA-certified earth-grounding type of electrical receptacles and sockets to connect electrical power to all equipment mounted on the inside or on the Liebert® MCR cabinet.

3.6 Frame and Enclosure Configurations

3.6.1 Internal Mounting Rails

The Liebert® MCR can accommodate rack-mounted or free-standing computer and network equipment. Depending on the model, the unit features either 19-inch to 23-inch (483 or 584mm) rack rails. These internal mounting rails are designed in accordance with the EIA 310D rack standard. Both types are adjustable for equipment of different depths.

Mounting hardware compatible with front and rear-mount rails includes a fixed shelf, fixed rails, a pullout shelf, 23-inch to 19-inch (584 to 483mm) rack rail adapters and keyboard trays. Each of these optional kits is supplied with installation hardware.

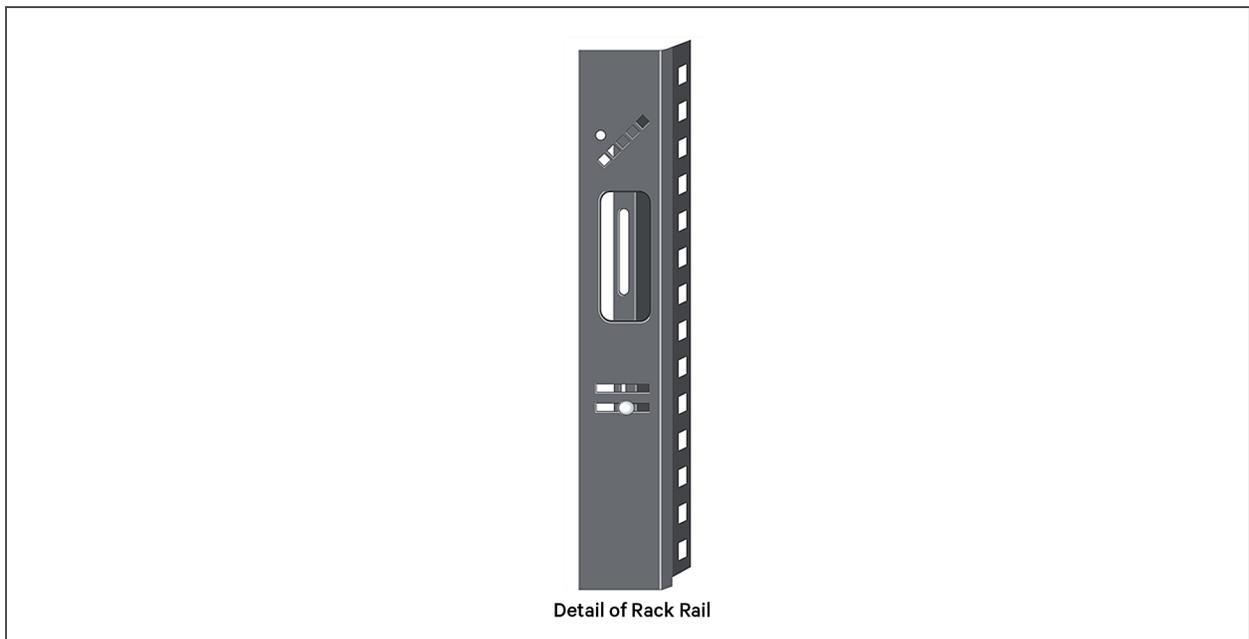
3.6.2 Front- and Rear-Mount Rails—Position

Front- and rear-mount rails are secured to the Liebert® MCR by carriage bolts that pass through horizontal slots in the frame. These slots permit you to change the front-to-rear distance between the rails as your application requires.

To position the rails:

1. Determine the proper location of the rails.
2. Loosen the bolts securing a rail to the frame.
3. Move the rail to the desired position, using the angled row of diamond-shaped holes (at right) to get the rail square. The rail is properly aligned when the rail edge is aligned through center of the diamonds at the top and the bottom of the frame. (Each diamond represents a half-inch (12.7mm) change.)
4. Tighten the bolts securing the rails to the frame.
5. Repeat for each of the three remaining rails.
6. Install your rack-mounted equipment or the shelves to hold your free-standing equipment, making sure that your equipment and the UPS are switched off.

Figure 3.4 Rail Rack Detail



3.7 Mounting Hardware

Optional mounting clip nuts and screws are available for mounting equipment to the mounting rails. Clip nuts are a clip with a captive nut that fits over vertical rack rail holes, allowing individual placement of the mounting hardware. Each clip nut and screw package includes 10 clip nuts (Type 10/32 or M6 threaded holes) and screws.

3.8 Door—Remove and Reverse

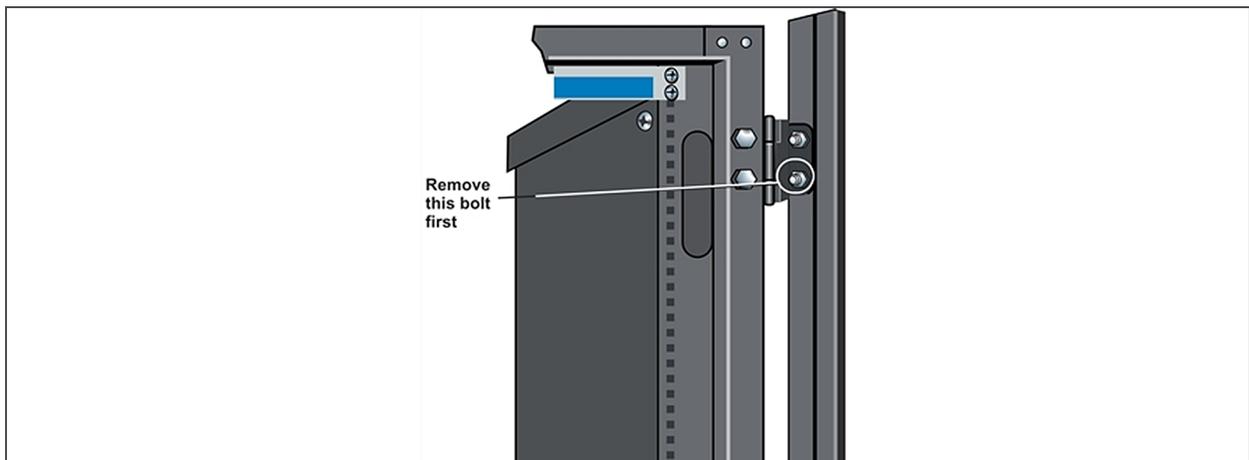
The front doors available for the Liebert® MCR are removable for convenience when installing equipment. They also are reversible, enabling you to have the single-door open in a more convenient direction if it is near a wall or other equipment.

3.8.1 Remove the Door

To remove the door:

1. Remove the bolts securing the lower half of each two-piece hinge to the door.
2. Remove the lower half of each hinge.
3. Lift the door straight up until the pins clear the hinges.
4. Set the door in a safe place.

Figure 3.5 Door Bolt Removal



3.8.2 Quick Door Removal

For minimum-security installations that also require frequent and fast removal of the door, the lower half of the hinge assembly may be permanently removed. This allows for quick removal of an open door by lifting the door straight up until the pins clear the hinge mount.

3.8.3 Reverse the Door

To reverse the door:

1. After removing the door, take out the remaining bolts and screws to remove the top half of each hinge.
2. Note the current positioning of the latches and hinges, and mark the corresponding new position on the opposite side of the frame.
3. Use a Phillips screwdriver to remove the four latches (two on the 44-inch [1118mm] unit).
4. Attach the latches on the opposite side.

5. Attach the top half of the hinges on the side where the latches had been.
6. Rotate the door 180 degrees from its original position.
7. Hang the door by inserting its pins into the hinges.
8. Reattach the bottom half of the hinges.
9. Reseal any holes that remain from previous installation.

3.8.4 Reverse the Door Handle

After the door has been reversed, the door handle of your Liebert® MCR will operate without adjustment, but it will be upside down.

To reverse the handle, follow these steps:

1. Open the door and remove all the bolts holding the door handle and lock assembly, including the four brackets (two on the 44-inch [1118mm] unit). Studs and nuts secure the brackets to the door frame.
2. Flip the door handle and lock assembly 180 degrees and reattach it with the bolts and nuts.
3. Check the handle and lock to ensure they operate properly.

3.9 Side Panels—Remove and Replace

Liebert® MCR side panels are simple to remove and replace, making it easier to install equipment. Panel removal also improves access for maintaining or replacing equipment.

3.9.1 Remove a Panel

To remove a panel:

1. Inside the Liebert® MCR, locate the two security bolts in each side panel. (The security bolts are about halfway up the side of the panels; one is near the front edge of the panel and the other near the rear.)
2. Remove the bolts with a 10mm wrench.
3. Locate the four panel retainers on the outside of the Liebert® MCR panel. There is one retainer in each corner of the panel.
4. Using the factory-supplied T-handle Allen wrench, turn the panel retainers 90 degrees counterclockwise.
5. Lift the panel off the lip at the bottom of the Liebert® MCR and set it in a safe location.

3.9.2 Replace a Panel

To replace a panel:

1. Set the panel on the lip at the bottom of the Liebert® MCR frame.
2. Using the factory-supplied T-handle Allen wrench, turn each of the four panel retainers clockwise 90-degrees.

3. For additional security, insert and tighten the two security bolts inside the Liebert® MCR, using a 10mm wrench.

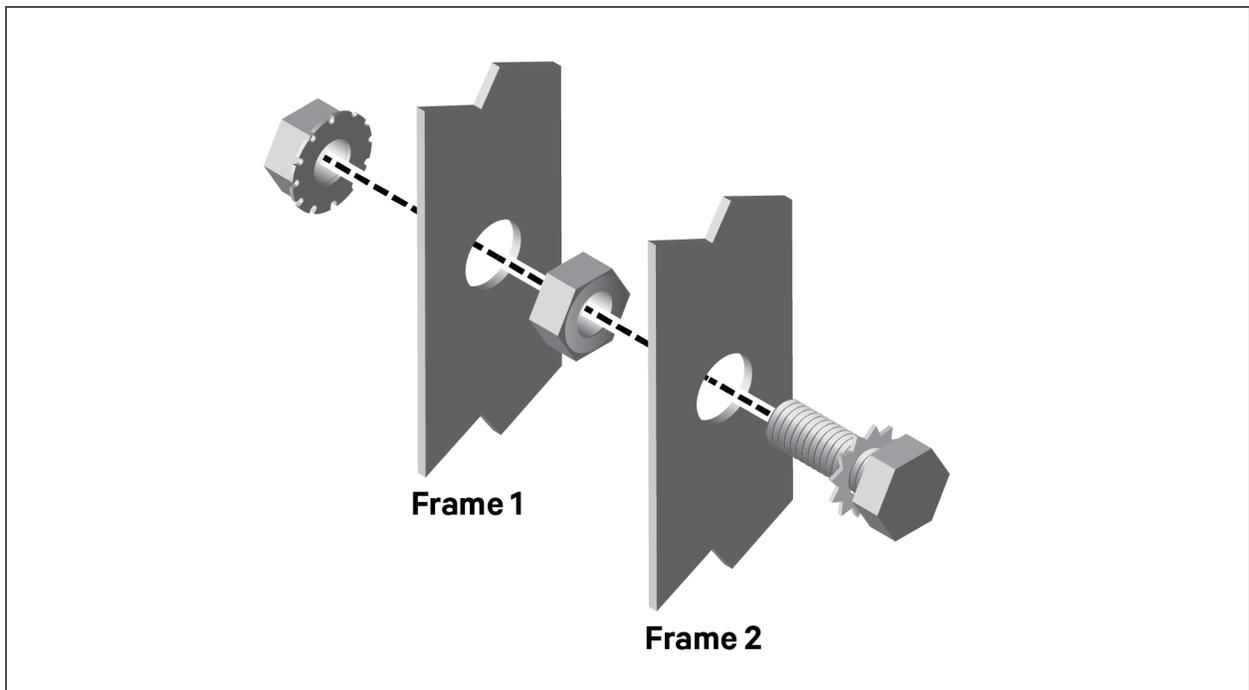
3.10 Cluster Configuration

Two or more Liebert® MCR units can be connected into a cluster, enabling you to keep several pieces of equipment together.

To connect two units:

1. Remove the side panels from the sides of the units that will be bolted together (see [Remove a Panel](#) on page 22).
2. Find the holes for the four bolts that will connect the units. These holes are at the corners of the Liebert® MCR, near the panel retainers.
3. Place a star washer on each of the four bolts and insert the bolts into the bolt holes.
4. Put a jam nut on each bolt and tighten them.
5. Remove the side panel bracket from the bottom of both frames.
6. Slide the Liebert® MCR units together with the bolts inserted into the connection holes.
7. Put a Keps nut on each bolt and tighten securely.

Figure 3.6 Clusters



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4 GENERAL CABLE MANAGEMENT OPTIONS

4.1 Cable Management

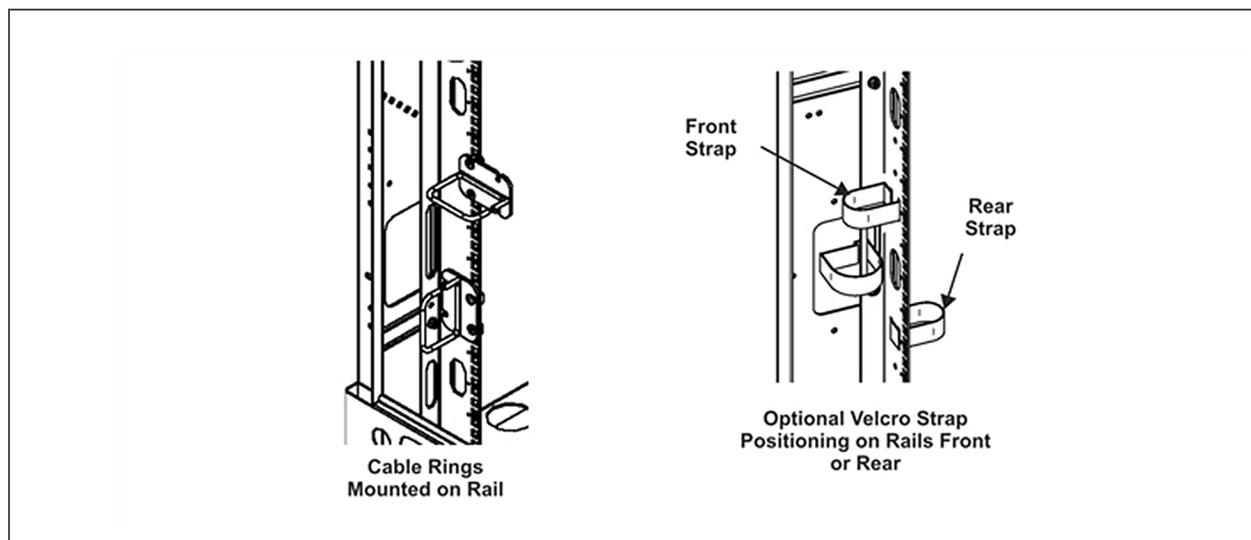
Once your equipment has been installed, you are ready to connect cables for power and communication. Before making any connections, check the equipment to ensure that all power switches are in the OFF position.

Numerous cable entrances and management provisions are built into the various Liebert® MCR configurations to ease cable installation.

Optional cable rings and Velcro straps are available for routing cables. These help not only to keep your cables organized but also separate power and communications cables, reducing electromagnetic interference.

Velcro straps are field-attached to the slots provided on the internal mounting rails and support vertical cable management.

Figure 4.1 Cable rings, Velcro straps on Liebert® MCR rails



4.2 Cable Management Considerations

When designing the equipment layout in the Liebert® MCR, consider how cables must be run for each configuration and how cable runs affect cooling, access and operational factors, such as separating power and communication cables to reduce electromagnetic interference.

Good cable management contributes to:

- Effective air flow for cooling
- Easier cable identification
- Improved access

- Reduced electromagnetic interference
- Proper bend radii, particularly for fiber optic cables
- Adequate support for large cables and heavy cable bundles

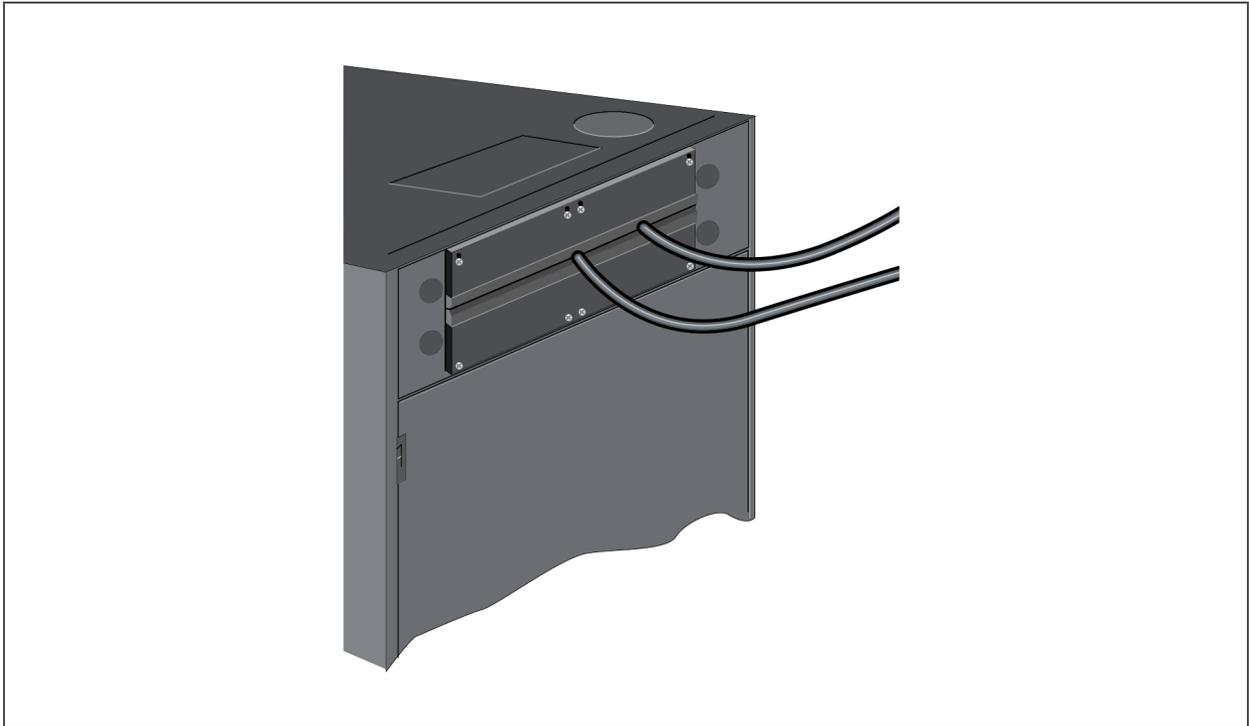
NOTE: When installing cables, leave enough slack for the unit to be rolled forward or sideways for access to components. Do not block or restrict cooling system (FAN, ECM or BCM - if provided) discharge or return airflow. Also, do not defeat the ground/earth connections between the utility/mains outlet and the Liebert® MCR.

4.3 Cable Access—Sealed Units

4.3.1 Top Cover and Back of Sealed Units

The back of the sealed unit has a sealed entrance cable raceway (a slot with foam gaskets) for cable access. Units with rack-mount ECM provide one raceway at the top of the unit, otherwise raceways are provided top and bottom. To use it, loosen the top half of the two-piece cover, pull your cables through the opening and replace the cover, making sure the gasket seals around the cables.

Figure 4.2 Sealed Entrance Cable Raceway



Optional sealed entrance cable bundles (cone-shaped seals and clamps) permit use of the round openings on the top and/or the bottom of the sealed Liebert® MCR for cable entry.

To bring cable through these holes:

1. Replace the plug with a sealed entrance cable bundle.
2. Pull the cable through the bundle.

3. The cable bundle can be trimmed to accommodate various quantities of cables.
4. Use the clamp to secure the bundle around the cables.

Figure 4.3 Sealed Entrance Cable Bundle



4.3.2 Base of Sealed Units

Sealed Liebert® MCRs can be cabled from underneath through round 2.25" (57mm) access holes lining both sides of the base. To install cable through these holes in a sealed Liebert® MCR, obtain sealed entrance cable bundles, similar to the one used for cabling through the top, from your Vertiv™ representative.

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5 STARTUP

Before plugging in your electronic equipment, make sure that all power switches are in the OFF position.

Be certain there are no obstructions, wire bundles, manuals, trash, etc., in front of or on either side of the ECM, if your unit is so equipped. Make sure all doors are shut and sealed properly. Plug the Environmental Control Module (ECM) into a dedicated utility circuit.

- ECM's evaporator fan will begin to circulate air inside the enclosure as soon as power is supplied and will operate continuously.
- The compressor in the ECM is controlled by a thermostat located in the rear left corner of the ECM. This thermostat is factory-set and does not require adjustment. If the setting is changed, contact Vertiv™ Technical Support for assistance.
- The compressor in the Environmental Control Module will shut down if the ECM return air temperature drops below approximately 75°F (18°C). The evaporator fan will continue to circulate internal cabinet air throughout the sealed enclosure. The compressor will resume operating when the Liebert® MCR ECM return air rises above approximately 75°F (18°C).
- Refer to the UPS manual for preparation for startup, details of UPS operation and the meaning of LED indicators. After you have complied with the manual's instructions, turn on the UPS. Check the UPS' indicators. If the UPS's status is normal, proceed with the next step.
- Turn on your computer and network equipment.

NOTE: The UPS's batteries may require recharging before it can fully supply your equipment's power needs for the rated time if utility power fails. To charge the UPS batteries before using the unit, you can apply power to the UPS module while you are installing your equipment or while making adjustments

NOTE: To avoid excessive condensation, turn off the ECM whenever the cabinet may be open for more than 10 minutes, such as when removing doors and/or side panels while installing equipment. Also ensure that any cable-entry points are sealed from external conditions vial the optional sealed-entrance cable bundles or raceways.

IMPORTANT! Risk of drain pan overflow. Can cause extensive building and equipment damage. Ensure the cabinet remains sealed during operation. Seal all cable entrance points with the factory-supplied cable entrance provisions, or with a close-cell foam (field-supplied). Ensure that the cabinet is installed on a level surface. The ECM cooling module must be level within 1/4 inch from front-to-rear and side-to-side to ensure proper drainage of condensate water. Drain lines must be kept open and free of dirt and debris. Regularly-scheduled maintenance must be performed.

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6 OPERATION

6.1 Environmental

6.1.1 ECM (Environmental Control Module)

The ECM is applicable to any sealed Liebert® MCR enclosure (designated by model numbers HD or RD). The Environmental Control Module (ECM) is sized to match the load capacity of the UPS system and the ambient heat transmitted into the Liebert® MCR. The module is located at the bottom of the enclosure or field-installed on top of the Liebert® MCR.

Outside (ambient) air is used to remove heat from the enclosure through the air-cooled condenser. The outside air is drawn through the louver at the front of the ECM unit and discharged at the rear of the ECM. The ECM isolates outside air from the unit's internal cooling circuit.

The compressor in the Environmental Control Module will shut down if the ECM return air temperature goes below 75°F (18°C), but the internal cabinet air will be continuously circulated by the evaporator fan. The compressor will resume operating when the Liebert® MCR ECM return air is above 75°F (18°C).

The ECM is equipped with a factory-set hot gas bypass valve so that the compressor will operate nearly continuously for maximum compressor life. This valve modulates automatically to match compressor capacity to the load. Consult Vertiv™ Technical Support if factory adjustment is desired.

The ECM requires no external plumbing connections because excess condensate is evaporated into the unit's heat-rejection air stream. A condensate drain tube (3/8" OD copper) is provided with the ECM. This drain connection will route excess condensate out of the unit in the event of an extreme condition, such as if a door is left open for an extended period while the ECM is operating, or in extremely humid environments.

NOTE: To avoid excessive condensation, turn off the ECM whenever the cabinet may be open for more than 10 minutes, such as when removing doors and/or side panels while installing equipment. Also ensure that any cable-entry points are sealed from external conditions via the optional sealed-entrance cable bundles or raceways.

6.1.2 Backup Cooling Module (BCM)

If your Liebert® MCR is equipped with the Backup Cooling Module (BCM) option, the BCM will automatically start if the high temperature alarm module detects an internal cabinet temperature of 100°F (38°C). The BCM will draw filtered exterior air into the Liebert® MCR cabinet for use as supplemental cooling and exhaust cabinet heat through the rear door. An audible alarm will sound until the cabinet temperature decreases below 100°F (38°C) or is silenced by depressing the alarm silence switch on the high temperature alarm module. Backup cooling requires the high temperature alarm module option. The High Temperature Alarm Module also includes a dry contact for optional remote monitoring of a high temperature condition. A separate control cable connects the BCM to the high temperature alarm module. The BCM is normally powered through a 6-foot (1.8m) cord with NEMA 5-15 plug connected to the factory-installed UPS, but could also be powered from a source outside the cabinet.

6.1.3 BCM Energy Saver

The Backup Cooling Energy Saver (ES) is a factory-installed option that is useful in applications involving low exterior cabinet ambient temperatures and humidity. An enthalpy controller is used to detect the exterior cabinet ambient conditions. If the exterior ambient conditions are suitable, the energy saver operation will disable the ECM and enable the backup cooling system to draw filtered exterior air into the Liebert® MCR cabinet for use as cooling. The high temperature alarm module monitors the interior cabinet temperature and if the interior temperature is less than 90°F (32°C) and the exterior conditions suitable, turns on the Backup Cooling ES and disables the ECM. If the cabinet temperature increases above 90°F (32°C), the Backup Cooling ES is disabled for one hour and the ECM is enabled to supply cabinet cooling. The one-hour time-out prevents cycling of the ES option.

6.1.4 Active Heat Rejection Options

Your Liebert® MCR requires external airspace to allow for dissipation of the heat rejected from the inside of the enclosure. The Heat Rejection Fan (HRF) is offered as a field-installed option to assist in the removal of rejected ECM heat from tight spaces or alcoves without adequate ventilation. The package includes a combination blower with inlet air louver plate. The package provides provisions for ceiling grid installation and connection of customer-supplied 8" (203mm) diameter exhaust duct (if required). The HRF is hard-wired in the field and requires a 120VAC, 60Hz, 15A power source.

The ECM heat rejection duct connects directly to the enclosure and is available as an alternative to the Heat Rejection Fan. The package includes a flexible, round duct that is 12 ft. long (365.76cm) and 8 in. (20.32cm) in diameter. The duct is field-attached to the Liebert® MCR and routed as required. An in-line booster fan, powered by customer connection, is also included to overcome duct static pressure. This option is available for 50Hz and 60Hz applications.

6.1.5 FAN Cooling

FAN cooling is used in lieu of the ECM / BCM cooling options. FAN cooling can be provided by a single fan or by dual fans; a total of five fans can be installed in the unit. Outside air is drawn through the openings at the bottom of the front and back of the unit and is discharged at the top of the unit. All 60Hz FAN units are supplied with NEMA 5-15 plugs on 15-foot (4.6m) cords.

The optional FAN filter is located behind the intake air openings at the front and rear doors of the Liebert® MCR. It should be checked periodically and cleaned. Remove the nuts securing the filter clips. Take out the filter and wash it in soapy water. Then rinse, dry and replace it. Replace the filter clips and secure to the Liebert® MCR.

6.2 Uninterruptible Power Supply

The Liebert® MCR may be supplied with any of several Liebert® UPS units or with no UPS. For integrated/matched models, the UPS and ECM are sized with matched capacities. A larger UPS, with more battery time, can be obtained, but the connected electronics load should not exceed the ECM equipment load rating. Exceeding the ECM rating could cause high temperatures that might damage the equipment housed in the Liebert® MCR.

For Liebert® MCR models supplied with a UPS, refer to the separate UPS manual for UPS operation and specifications.

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7 OPTIONAL EQUIPMENT

The Liebert® MCR is compatible with the following optional equipment.

7.1 Enclosure Systems

7.1.1 Internal Mounting Rails

- Front /Rear Rails

7.1.2 Door/Panel Options

- Plexiglas doors
- sheet metal doors
- single-door
- side panels

7.1.3 General Enclosure Options

- casters
- external keyboard trays
- sealed entrance cable bundle
- internal light
- cable tray
- cable rings
- Velcro cable management straps
- enclosure cluster kit
- stabilizing plate

7.1.4 Power

The Liebert® MCR is available with any of the following Liebert® UPS models:

On-Line UPS Systems

- GXT4

7.1.5 Vertiv Rack PDU

Liebert® Managed Power products are available in single- and three-phase power options. The units may be used in 120V, 208-240V or 230V applications, with NEMA or IEC connectors and with or without remote monitoring and individual receptacle control.

7.2 Environmental

Proper temperature levels are maintained by configuring your Liebert® MCR with the following options.

7.2.1 ECM Cooling Systems and Options

- ECM2000L: for 2000 VA or less UPS load, rack- or top-mount (field-installed), low noise
- ECM Heat Rejection Fan
- ECM Heat Rejection Duct
- ECM Extension Duct (for multi-enclosure applications)

7.2.2 BCM Cooling Systems and Options

- BCM2000: for 2000 VA or less UPS load, rear door mount, low noise

7.2.3 FAN Cooling Systems and Options

- FAN1000: single axial fan, low noise or high ambient
- FAN2000: dual axial fans, low noise or high ambient
- FAN Filter

7.3 Monitoring Options

- Internal Temp / Humidity Option
- External Temp / Humidity Option
- Door Ajar Sensor Option
- High Temp Alarm
- Water Detected Option
- Power Supply (60Hz Only)

7.4 Mounting Options

- Fixed shelves, vented, 250lb (113kg) capacity
- Pullout shelves, vented, 130lb (59kg) capacity
- Fixed Rails, 150lb (68kg) capacity
- External Keyboard Tray
- Internal Keyboard Tray (19" [483mm] Rack Keyboard) - HD/K Mounting Frames 19"
- Internal Keyboard Tray (Std Keyboard) - RD/K Mounting Frames 23"
- Mounting Clip nuts and Screws 10-32 or M6 Thread (10 sets)
- Mounting Screws for option (qty 24)
- 23" - 19" (584-483mm) Rack Rail Adapters—1U, 2U, 3U, 4U, 5U and 10U

8 MAINTENANCE

Table 8.1 Troubleshooting

PROBLEM	CAUSE	SOLUTION
ECM not cooling	No Power	Confirm unit is plugged in and the building breaker has not tripped.
	Clogged condenser coil	Clean coil. See Periodic Maintenance on page 38.
	Hot Gas bypass valve set incorrectly	Contact Vertiv™ Technical Support.
	Refrigerant loss	Verify leak. If refrigerant system needs repaired, contact Vertiv™ Technical Support.
Fans blowing warm air	ECM airflow is blocked at the intake or exhaust.	Remove airflow obstructions from the front & rear of the enclosure, ensure the cabinet has at least 12" front & rear clearance. Open Liebert® MCR doors and let compressor cool. Plug ECM in and verify compressor is energized.
	Compressor trips on thermal overload	Open Liebert® MCR doors and let compressor cool. Plug ECM in and verify compressor is energized. Verify the UPS load does not exceed ECM capacity. If no UPS, verify load of equipment does not exceed the ECM rating.
	Faulty Compressor	Contact Vertiv™ Technical Support.
Condensate draining continuously from rear drain	Excessive opening of doors	Reduce amount of opening. Get optional external keyboard tray. Unplug ECM when opening doors for extended period.
	Enclosure not properly sealed	Check cable entry points, and verify doors and side panels are closed. Reposition wires to prevent air leak, or fix or replace damaged gaskets.
Water leaking from inside the cabinet	Cabinet not level or internal drain line clogged	Ensure that the cabinet is installed on a level surface. The ECM cooling module must be level to ensure proper operation. Remove ECM and verify plastic tubing is attached to drain. Verify that condensate drain lines are not obstructed or damaged. Contact Vertiv™ Technical Support.
Excessive vibration or noise	Defective motor in blower or shipping damage	Contact Vertiv™ Technical Support.

Table 8.1 Troubleshooting (continued)

PROBLEM	CAUSE	SOLUTION
Cabinet is excessively hot	Electronic equipment not positioned for optimum cabinet airflow	Reposition equipment closer to cooling module, leaving any unused rack space at the opposite end of the cabinet
	ECM is overloaded	Verify the UPS load does not exceed ECM capacity. If no UPS, verify load of equipment does not exceed the ECM rating.
	Heat not rejected from room	Verify that Liebert® MCR is located in room with air circulation and heat rejected from ECM is sufficiently removed.
	ECM not cooling	Confirm unit is plugged in and the building breaker has not tripped. Check setting of ECM thermostat.
	Cabinet not sealed	Check cable entry points, and verify doors and side panels are closed. Reposition wires to prevent air leak, or fix or replace damaged gaskets.
Audible alarm and cabinet is excessively hot	High temp alarm module has detected an abnormal condition	Press alarm silence button on the high temp alarm module in the upper rear of the cabinet. Use the “ECM not cooling,” “Fans blowing warm air” and “Cabinet is excessively hot” causes and solutions to determine course of action.

8.1 Periodic Maintenance

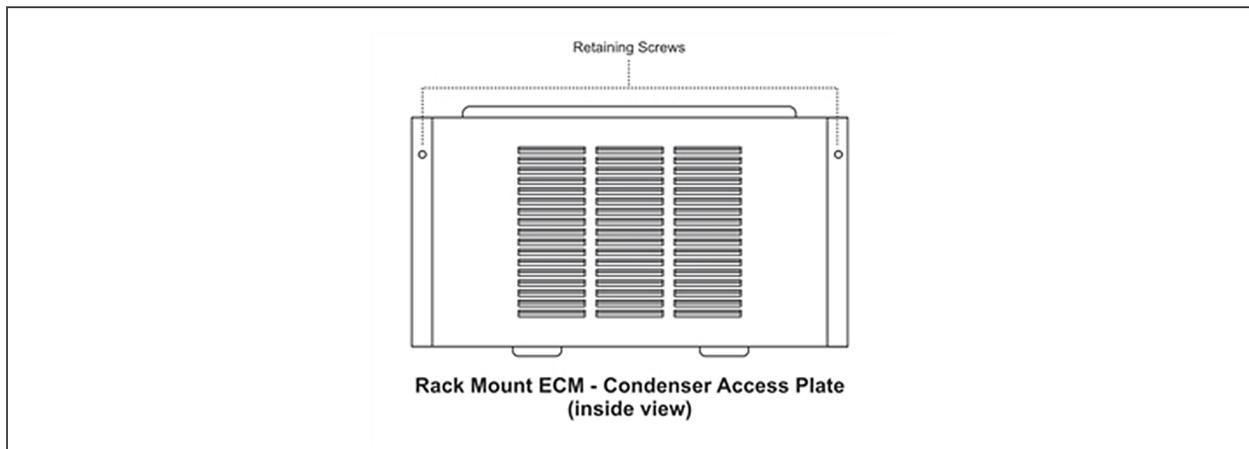
8.1.1 Mini Computer Room

The Liebert® MCR requires very little maintenance. The ECM's condenser coil fins must be inspected periodically to determine the necessary cleaning interval based on conditions at the installation site. Depending on site conditions the coil fins may require cleaning as often as twice a month or as seldom as twice per year. The condenser is located at the bottom front of the ECM. If the fins become dirty and clogged, they should be gently vacuumed with a soft bristle brush or cleaned with compressed air.

8.1.2 Rack-Mount ECM

To access the condenser fins, open the front door of the Liebert® MCR and remove the two retaining screws from the top of the front access plate. The plate will swing open freely once the screws are removed. After cleaning, swing the access plate back into position and replace the two screws.

Figure 8.1 Condenser Access Plate



8.1.3 Top-Mount ECM

For top-mount ECM units, remove power to the ECM by unplugging the power cord. Remove the sheet metal cover from the ECM by removing all screws on the front and sides of the unit. Screws on the rear of the ECM do not need to be removed. Clean the unit by gently vacuuming with a soft bristle brush or cleaning with compressed air. Reinstall the cover and all screws before restarting the ECM.

8.1.4 Cleaning the Optional FAN Air Filter

The optional FAN air filters, behind the intake air openings on the front and rear doors of the Liebert® MCR, should be inspected periodically to determine the necessary cleaning interval, based on conditions at your installation. If an air filter becomes dirty and clogged, it will require cleaning.

To do so:

- Remove the nuts securing the filter clips.
- Take out the filter and wash it in soapy water. Rinse, dry and replace it.
- Replace the filter clips and secure to the Liebert® MCR.

8.2 MCR Start-Up Inspection Checklist

8.2.1 Site Conditions

1. Confirm at least 1 ft. (0.3m) clearance in front & behind the unit. No side clearance required.
2. Confirm at least 1 ft. (0.3m) clearance above the top of the unit.
3. Confirm service clearances: 3 ft. (1m) enclosure front, or provisions to move enclosure to allow for service access.
4. Confirm site ventilation provisions: ECM is self-contained air-cooled system.
 - Sufficient ambient space to dissipate heat rejected by the ECM.
 - Ambient temperature range is 65°F (18°C) to 105°F (40°C).
 - If equipped with Heat Rejection Fan or Duct option, confirm electrical connection.

5. Confirm that the ECM cooling module is level within 1/4 inch from front-to-rear and side-to-side.
6. Confirm ECM condensate drain tube is routed out the back of the unit, flex tube is clear and not kinked.
7. Confirm separate dedicated circuits for ECM & UPS are provided (not same duplex).
 - ECMs require a 120V/60Hz/15A, single-phase 2-wire plus ground circuit.
 - Check UPS (if provided) nameplate for input electrical requirements.

8.2.2 Unit Start-Up and Operation

1. Confirm no ECM airflow obstructions:
 - External (1 ft. / 0.3m minimum clearance): Enclosure front, rear and top.
 - Internal: ECM discharge and return. Obstructions include manuals, cables, equipment overhanging shelves, etc.
2. Examine the positioning of equipment inside the cabinet.
 - Prevent short cycling of ECM airflow - no large spaces between electronic devices in the top and bottom of the cabinet.
 - Equipment with the highest heat load should be located as close to the ECM as possible.
 - Heaviest equipment installed near the bottom of the cabinet.
3. Power up ECM: Apply power via the external cord/plug connection.
 - Confirm immediate internal ECM airflow: Inside enclosure, ECM right side (evap. discharge).
 - Confirm compressor engages within two minutes (return air must be > 75°F to start compressor).
4. Record the ECM working input voltage 120VAC (+10%): _____
5. Power up UPS (if provided). Record the UPS working input voltage (separate circuit): _____

6. Check Cabinet Seals—No gaps, loose cables, air leaks:
 - Door gaskets intact / free of damage. Close front & rear doors and confirm no visible seal violations.
 - Side panels and the frame have uniform sealing.
 - Cable entrance points are sealed.

9 INSTALLATION DRAWINGS

Figure 9.1 Liebert® MCR 12U low profile wall-mount dimensions and features

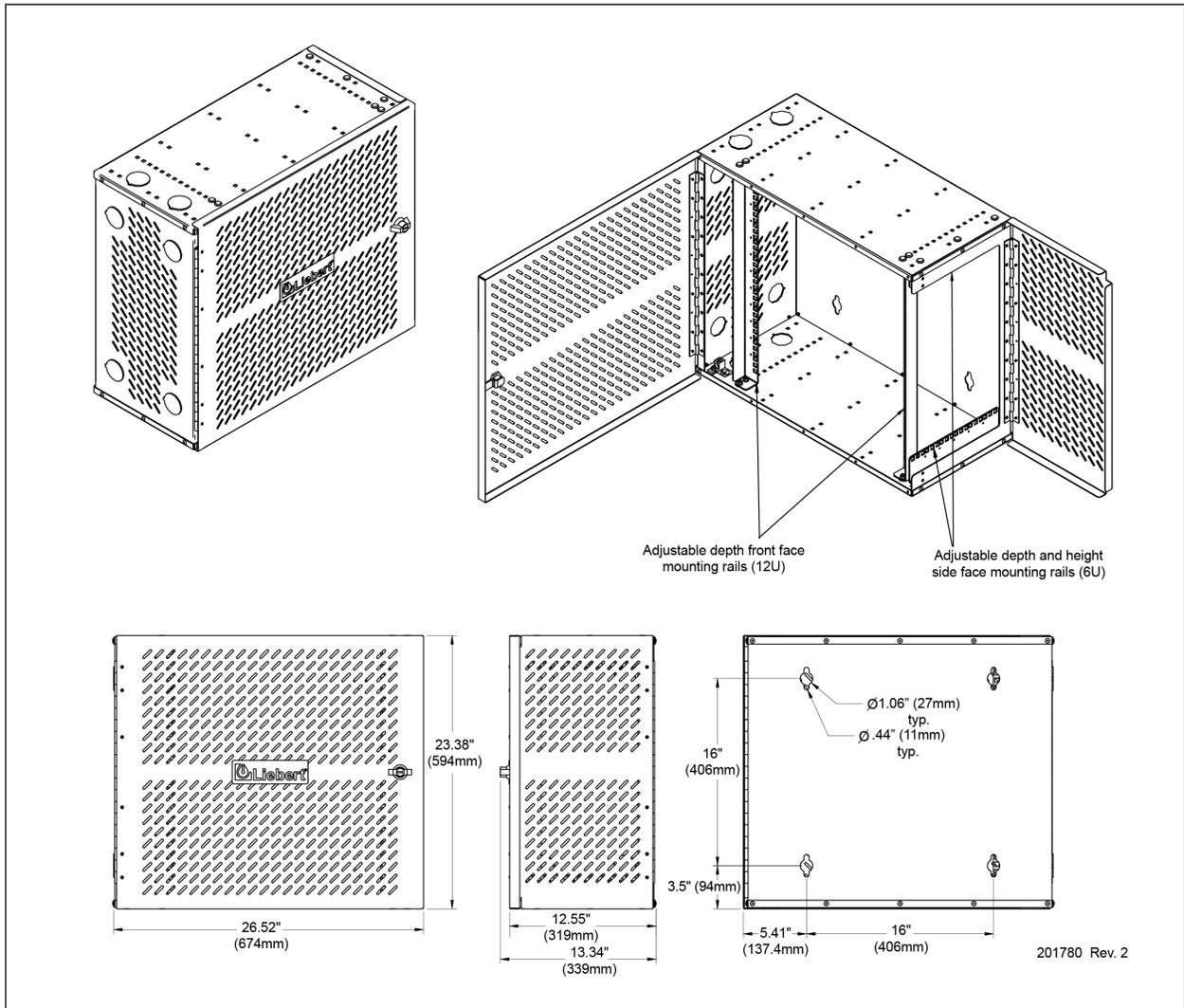


Figure 9.2 Liebert® MCR 12U hinged body wall-mount dimensions and features

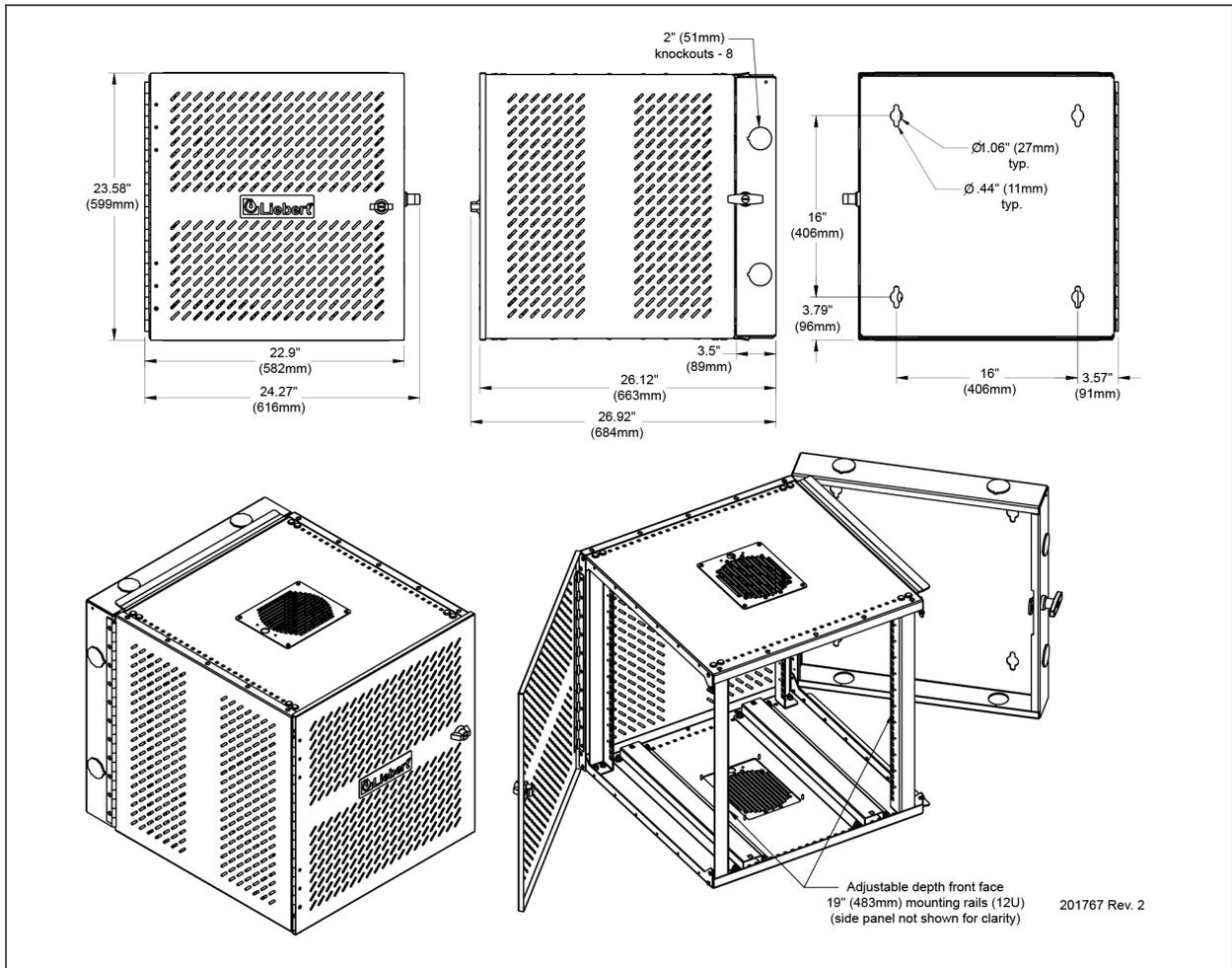


Figure 9.3 Liebert® MCR 22U Mini Computer Room with top-mount ECM dimensions and features

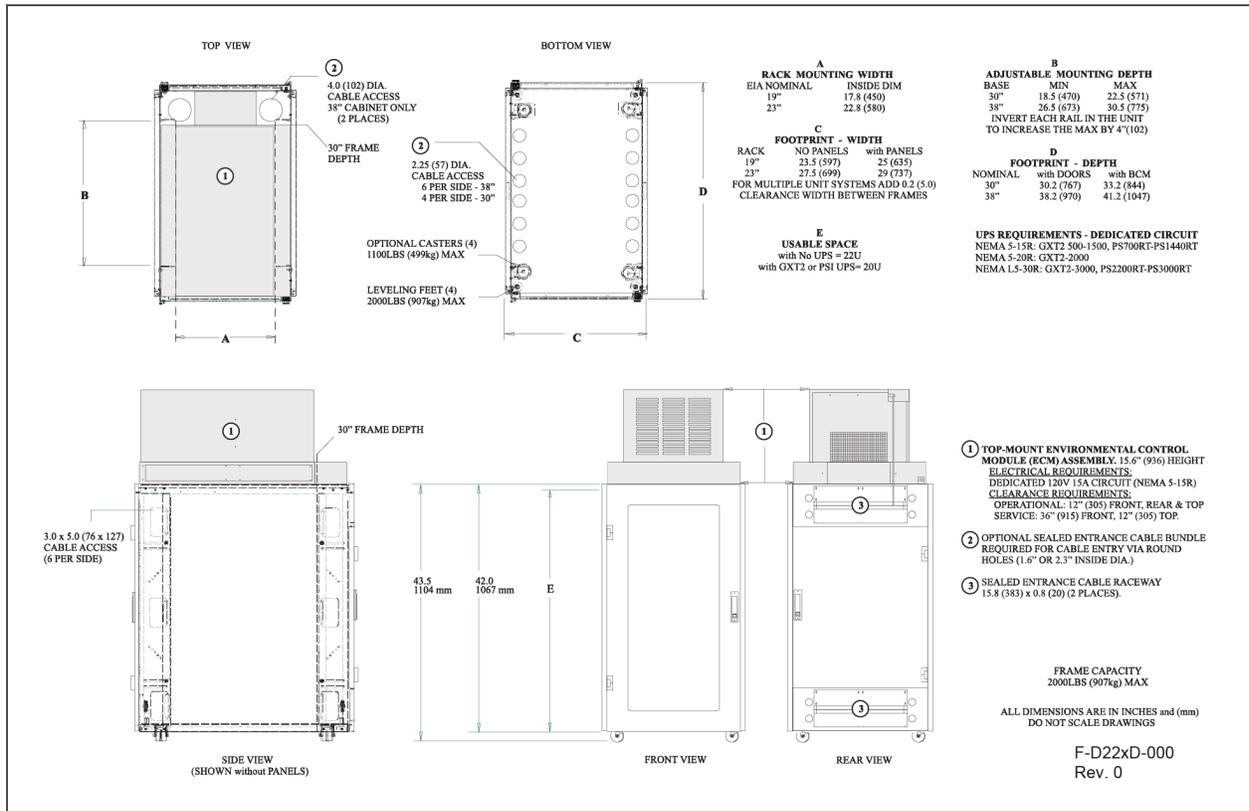


Figure 9.5 Liebert® MCR 42U Mini Computer Room with top-mount ECM dimensions and features

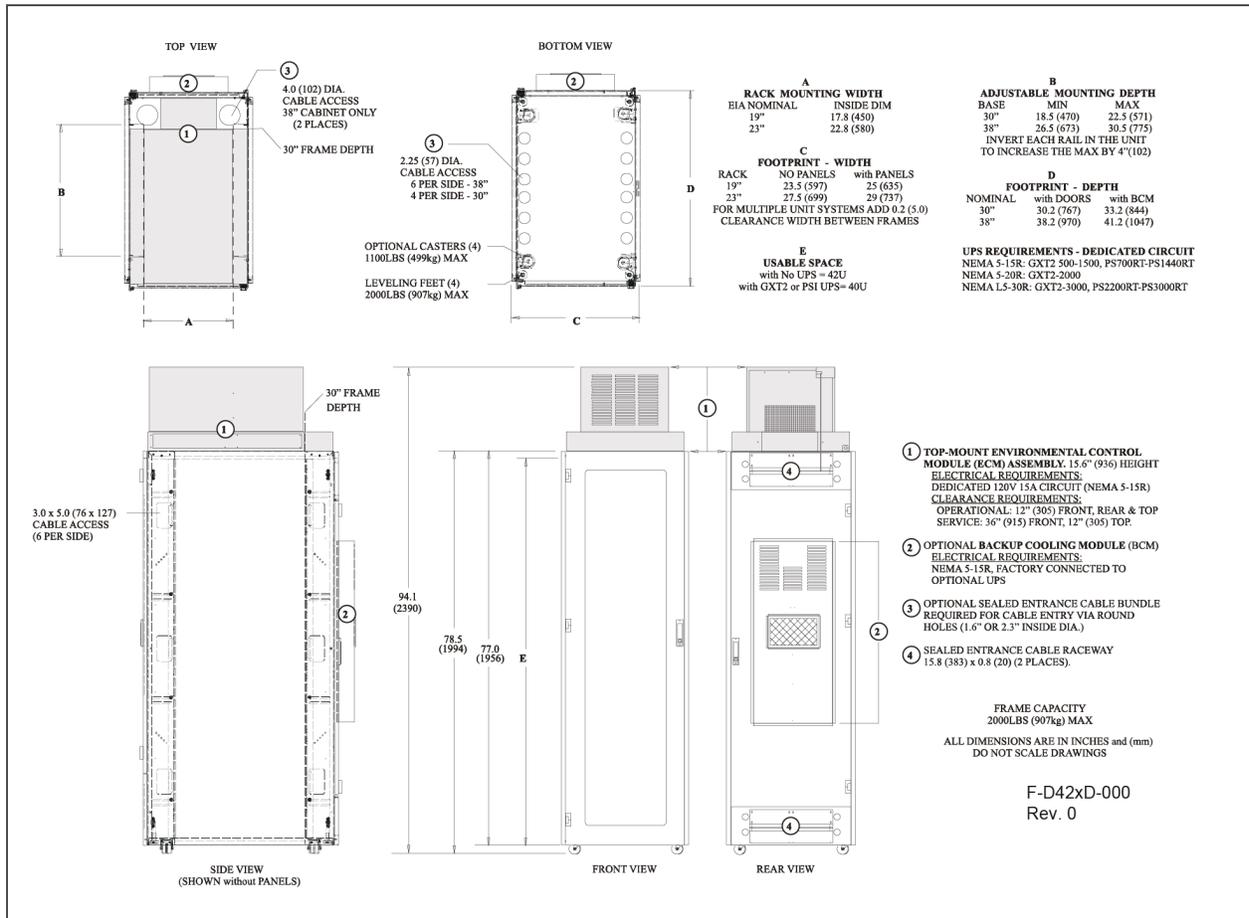
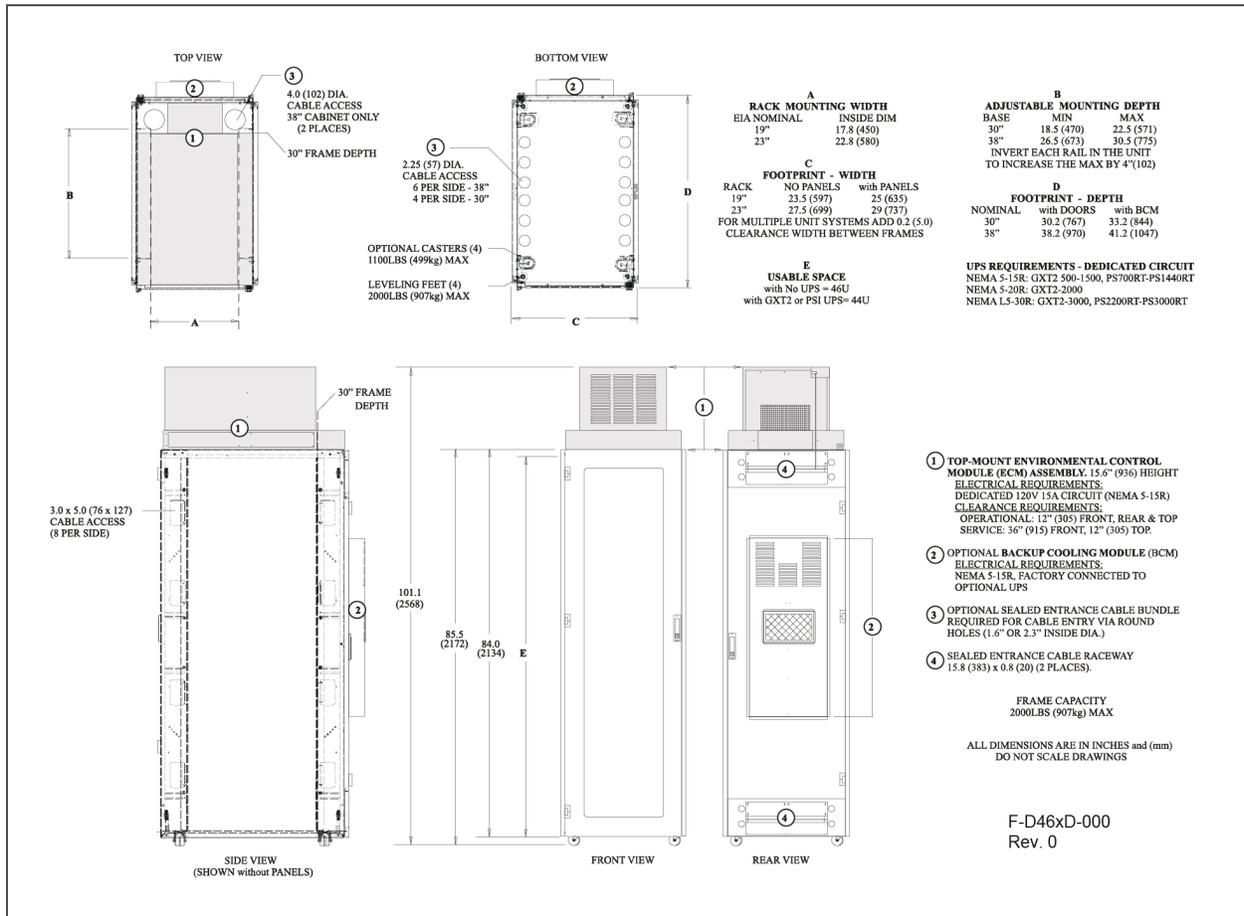


Figure 9.7 Liebert® MCR 46U Mini Computer Room with top-mount ECM dimensions and features



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10 SPECIFICATIONS

Figure 10.1 Liebert® MCR model numbers

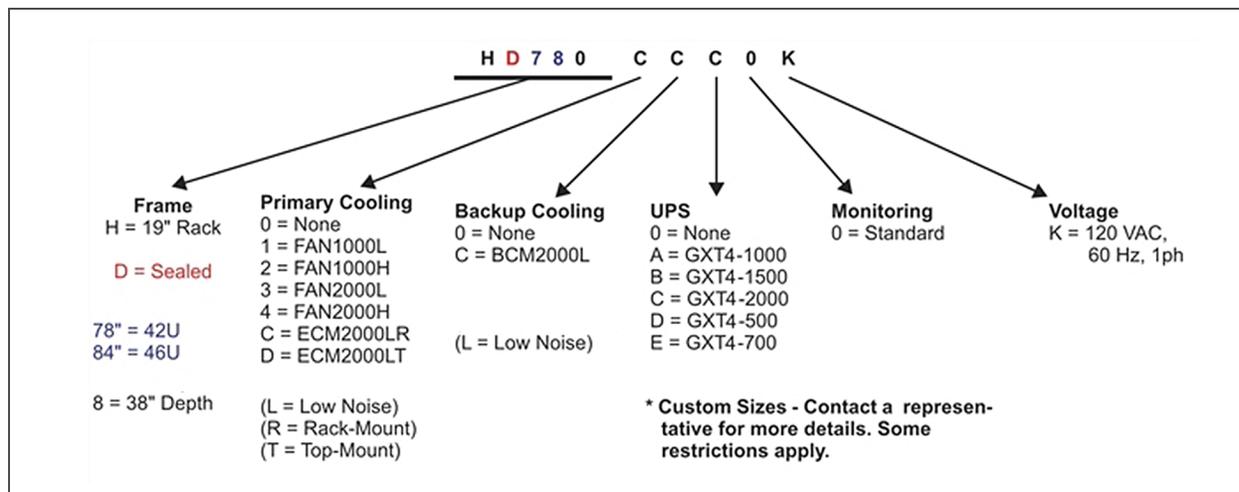


Table 10.1 Enclosure dimensions

MODEL	OVERALL CABINET DIMENSIONS				EIA 310D STANDARD RACK WIDTH		ADJUSTABLE RACK DEPTH		INTERNAL RACK HEIGHT	
	HEIGHT *	WIDTH **	DEPTH	CABINET WEIGHT****	NOMINAL	MOUNTING WIDTH, IN. (MM)	MAX ***	MIN.	U	IN. (MM)
H_440	42 (1067)	23.5 (597)	30 (762)	168 (76.2)	19 (483)	17.8 (450)	22.5 (571)	18.5 (470)	22	38.5 (978)
H_448	42 (1067)	23.5 (597)	38 (965)	168 (76.2)	19 (483)	17.8 (450)	30.5 (775)	26.5 (673)	22	38.5 (978)
H_780	77 (1956)	23.5 (597)	30 (762)	265 (120.2)	19 (483)	17.8 (450)	22.5 (571)	18.5 (470)	42	73.5 (1867)
H_788	77 (1956)	23.5 (597)	38 (965)	265 (120.2)	19 (483)	17.8 (450)	30.5 (775)	26.5 (673)	42	73.5 (1867)

Table 10.1 Enclosure dimensions (continued)

MODEL	OVERALL CABINET DIMENSIONS				EIA 310D STANDARD RACK WIDTH		ADJUSTABLE RACK DEPTH		INTERNAL RACK HEIGHT	
	HEIGHT *	WIDTH **	DEPTH	CABINET WEIGHT****	NOMINAL	MOUNTING WIDTH, IN. (MM)	MAX ***	MIN.	U	IN. (MM)
H_840	84 (2134)	23.5 (597)	30 (762)	288 (130.6)	19 (483)	17.8 (450)	22.5 (571)	18.5 (470)	46	80.5 (2045)
H_848	84 (2134)	23.5 (597)	38 (965)	288 (130.6)	19 (483)	17.8 (450)	30.5 (775)	26.5 (673)	46	80.5 (2045)

All dimensions are ± 0.1" (2.5mm)

* **Casters** add 1.5" to overall height of frame.

** **Side panels** add 0.75" each to overall width of frame. Multiple frame/enclosure clustered systems add 0.188" (3/16") clearance width between frames.

*** Dimensions are for front/rear rail options. Rails can be inverted to provide an additional 4" (102mm) of adjustment (2"; 51mm per rail set). Center-mount rail option adjustment depth: 30" depth frame = 22" and 38" depth frame = 30". Restrictions apply with ECM extension duct applications.

**** Add 101 lbs. (45.8 Kg) for a rack-mount ECM 2000

Add 140 lbs. (63.5 Kg) for a top-mount ECM2000

Add 30 lbs. (13.6 Kg) for a BCM2000 Backup Cooling Module

10.1 Cooling Systems

Table 10.2 Fan performance data

MODEL NUMBER	FANS	AIRFLOW	SOUND	INPUT POWER (1 PH)			
		CFM	DBA	VOLTS	HZ	FLA	PLUG
FAN1000L-60	1	114	47	120	60	0.2	NEMA 5-15P
FAN2000L-60	2	228	49	120	60	0.4	NEMA 5-15P
FAN1000H-60	1	235	59	120	60	0.3	NEMA 5-15P
FAN2000H-60	2	470	61	120	60	0.6	NEMA 5-15P

Table 10.3 on the next page, and Table 10.4 on the next page, describe the ECM and BCM performance data.

Figure 10.2 ECM recommended operating conditions to prevent excess cabinet condensation

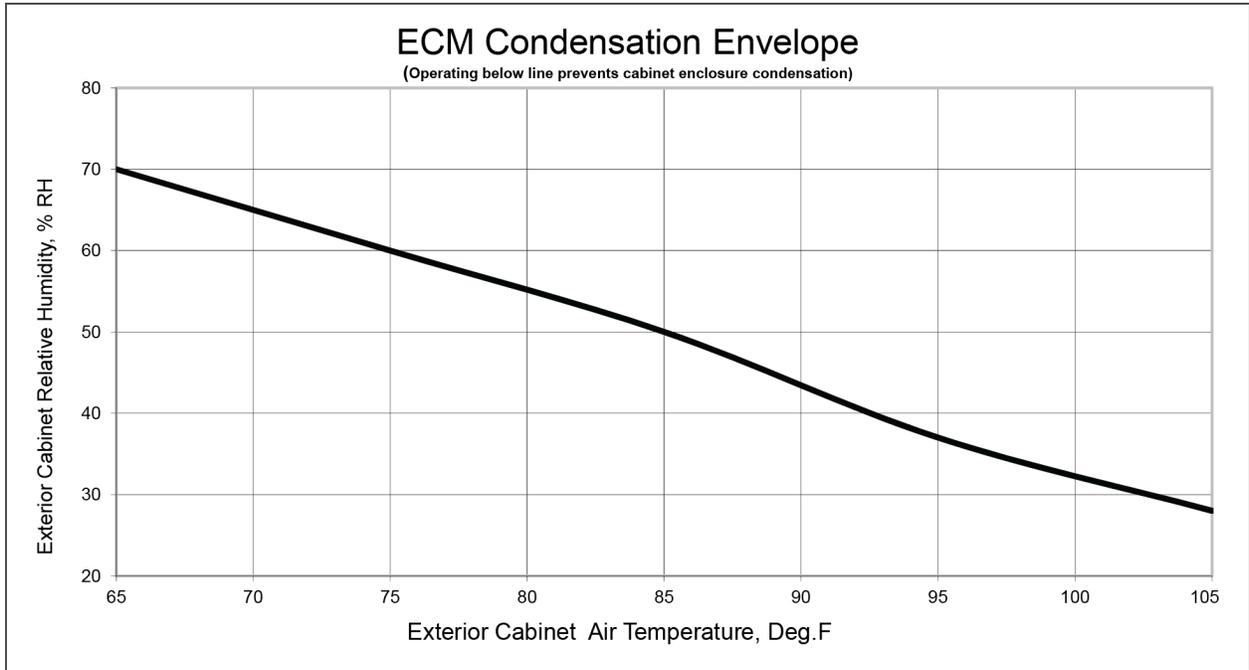


Table 10.3 ECM performance data

MODEL NUMBER	RATED CAPACITY, BTUH (W)	SUPPORTED LOAD, BTUH (W)	MAX. AMBIENT, °F (°C)	HEIGHT,** IN. (MM)-U	WIDTH, IN. (MM)	DEPTH, IN. (MM)	WEIGHT,*** LB (KG)	TOTAL HEAT REJ, BTUH (W)	INPUT POWER (1 PH)			SOUND, DBA (1.5 M)	
									VOLTS	HZ	FLA		PLUG
ECM2000L*-C60	6897 (2021)	5621 (1647)	105 (41)	12.25 (311)- 7	17.43 (443)	29 (737)	101 (45.8)	10935 (3204)	120	60	10.6	NEMA 5-15	52

* T (top-mount) and R (rack-mount).

** Add 4.25* to top-mount ECM units for interface plenum height.

*** For top-mount ECM, add 39 lb. (18kg) to listed weights.

Sound data based on sound pressure A- weighted scale for free field spherical radiation at 1.5 meters from cabinet. Sound data reflects only rack-mount design. Consult factory for top-mount data.

Table 10.4 BCM Performance Data

MODEL NUMBER	RATED CAPACITY, BTUH (W)	SUPPORTED LOAD, BTUH (W)	MAX. AMBIENT, °F (°C)	HEIGHT,** IN. (MM)-U	WIDTH, IN. (MM)	DEPTH, IN. (MM)	WEIGHT,*** LB (KG)	TOTAL HEAT REJ, BTUH (W)	INPUT POWER (1 PH)			SOUND, DBA (1.5 M)	
									VOLTS	HZ	FLA		PLUG
BCM2000L-60	N/A	5621 (1647)	105 (41)	35.0 (889)	15.5 (393.7)	3.75 (95.2)	30 (13.6)	5918 (1734)	120	60	2.0	NEMA 5-15	59

10.2 Power Systems

Table 10.5 UPS Performance Data

MODEL NUMBER	VA / WATTS	HEIGHT, IN. (MM) U	INPUT POWER (1 PH)		
			VOLTS	OPD (A)	PLUG
GXT4-700RT120	700 / 630	3.5 (89) 2	120	15	NEMA 5-15P
GXT4-1000RT120	1000 / 900	3.5 (89) 2	120	15	NEMA 5-15P
GXT4-1500RT120	1500 / 1350	3.5 (89) 2	120	15	NEMA 5-15P
GXT4-2000RT120	2000 / 1800	3.5 (89) 2	120	20	NEMA 5-20P
GXT4-3000RT120	3000 / 2700	3.5 (89) 2	120	30	NEMA L5-30P
GXT4-5000R-208	5000 / 4000	10.5 (267) 6	208	30	NEMA L6-30
GXT4-6000RT-208	6000 / 4800	7 (178) 4	208/240	30	NEMA L14-30 or Hard-Wired

* All 230V models are equipped with input sockets for use with detachable cords. Input cords are not provided, however each unit does include two 1.8m 10A load cords.

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