ADDENDUM NO. 4
issued November 27, 2024

PROJECT IDENTIFICATION

Project

Renovations to
Midland County Administrative Services Building
Architect's Project Number 20220400

Architect

Archiverde Design, LLC
2720 Rodd Street
Midland, MI 48640

INSTRUCTIONS

Purpose

This addendum forms a part of the Contract Documents and is issued to modify the Bidding Documents.

Procedure

Bidders shall verify that sub-bidders have included addendum items in their sub-bids.

The Bid shall include all items modified by this addendum.

Bidders shall acknowledge receipt of this addendum in the space provided on the bid form.

DRAWINGS

The following documents are issued as a part of this addendum:

Specification Section 017329 – Cutting and Patching
Cut Sheets for Owner Supplied In-Row Cooling Units (for reference)
Cut Sheets for Owner Supplied UPSs (for reference)
Drawing E3.3 – Third Floor Electrical Plan – Power New Work
Drawing E5.2 – Electrical Details
Drawing E5.3 – Electrical Details
Drawing E5.4 – Electrical Details

ADDENDUM ITEMS

<u>Architectural</u>

Item A1

Refer to specifications section 000110 – Table of Contents, not reissued with this Addendum.

A. Add Section 017329 – Cutting and Patching

Item A2

Refer to specifications section 017329 – Cutting and Patching, issued with this Addendum.

A. Issued Section 017329 – Cutting and Patching

Item A3

Refer to specifications section 080671 – Hardware Schedule, not reissued with this Addendum.

A. Hardware Set No. 3:
   a. Provide only 1 each of Passage set, Closer, and Wall stop. Provide 3 each of silencers.
B. Hardware Set No. 14:
   a. Electric Strike and associate card readers will be provided by the Owner. The Owner will provide the Contractor with template information for modifying the door frames to accommodate the strikes. The contractor shall provide any necessary conduit and boxes as required.

Item A4

Refer to specifications section 096813 – Tile Carpeting, not reissued with this Addendum.

A. Add Carpet CPT-3: Tufted manufactured in one color dye lot.
   1. Tile Size: 19 ½ by 19 ½ niche (500 by 500 mm), nominal.
   2. Collection: Viva Colores
   3. Color: 101144 "Tormentoso"
   4. Pattern: Quarter Turn.
   5. Application: Border/accent carpet

Item A5

Refer to drawing D2.2, not reissued with this Addendum.

A. The door and frame for Door numbers 223, 235 are both to be removed.
B. Disregard note D2 at door number 237.
C. Door 213 is to be removed, refinished, and reinstalled as door 239.1.

Item A6

Refer to drawings A9.1, A9.2 and A9.3, not reissued with this Addendum.

A. Door 259.1 shall be a new door.
B. Any doors noted in the demotion drawings to be salvaged, and not listed on the door schedules, shall be discarded.
C. Doors 303.1, 325.1, and 352.1 are in existing "Type A" frames.
D.

Mechanical

Item M1

Refer to attached cut sheets, being issued for information purposes, of new 10-ton In Row Cooling Units (AC-N1 & AC-N2 = Liebert CRV) & split DX Condensers (CU-N1 & CU-N2 = Liebert MCM)

A. New IT Data Center Air/Conditioning Units AC-N1 & AC-N2 & new split Condenser Units CU-N1 & CU-N2, which will be provided by Owner & to be installed by M.C. & E.C.

Electrical

Item E1

Refer to specification section 260537 - Boxes, not reissued with this Addendum.

A. Floor boxes are specified in this section.
B. Any floor cutting for boxes shall be performed under the general contract, in compliance with the requirements outlined in section 017329 – Cutting and Patching.

Item E2

Refer to attached cut sheets, being issued for information purposes, of new 10-ton In Row Cooling Units (AC-N1 & AC-N2 = Liebert CRV) & split DX Condensers (CU-N1 & CU-N2 = Liebert MCM)

A. New IT Data Center Air Conditioning Units AC-N1 & AC-N2 & new split Condenser Units CU-N1 & CU-N2, which will be provided by Owner & to be installed by M.C. & E.C.

Item E3

Refer to attached cut sheets, being issued for information purposes, of new 40 kVA UPSs (Liebert EXM)

A. New UPSs which will be purchased/provided by Owner & to be installed by E.C. in new IT Room 359.

Item E4

Refer to revised drawing E3.3, reissued with this Addendum.

A. Note addition of new IT A/C work plan for power to new AC-N1/CU-N1 & AC-N2/CU-N2.

Item E5

Refer to drawing E5.2, reissued with this Addendum

A. Floor Box Detail: note changes to Floor Box detail. Previous Legrand Wiremold model #RFB has been discontinued and revised to new Wiremold Evolution Series, which has an application for a raised floor installation such as called for in new Conference 371.

Item E5

Refer to drawings E5.4 & E5.5, which are revised and reissued with this Addendum.

A. Power for new IT Room 359 Data Center UPSs and AC/CUs: note changes to One-Line Diagram regarding power to UPSs and to AC/CUs.

---END OF ADDENDUM---

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SECTION 017329
CUTTING AND PATCHING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Administrative and procedural requirements for cutting and patching.
   1. Refer to other sections for specific requirements and limitations applicable to cutting and patching individual parts of the work.
   2. Demolition of selected portions of the building for alterations is included in section 024100 - Demotion.
   3. Requirements of this section apply to mechanical and electrical installations. Refer to all drawings for specific items of work requiring cutting and patching.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Agreement,including amendments to the Agreement and other Division 1 Specification Sections, apply ot this section.

1.03 DEFINITIONS

A. Cutting and Patching:
   1. Cutting and patching includes cutting existing construction to provide for installation or performance of other work, and subsequent fitting and patching required to resort surfaces to original condition.
   2. cutting and patching is also performed for repair of surfaces, items, etc., damaged during removal operations to restore surfaces to original condition or condition acceptable;le to the Owner's representative or Owner's project representative.
   3. Cutting and patching performed during the process of manufacturing products or the initial fabrication, erection, or installation process is not cutting and patching. Neither is the drilling or holes to install fasteners and similar operations.

B. Selective Demolition
   1. Selective Demolition is the remove of a significant portion of and existing building, often including major structural elements, to provide for enlargement and alteration of the structure and by this definition is not part of the work of this section.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Submit a proposal describing procedures well in advance of the time cutting and patching will be performed if the Owner or Owners' project representative requires approval of these procedures before proceeding. Request Approval to proceed, including the following information, as applicable, in the proposal:
   1. Describe the extent of cutting and patching required. Show how it will be performed and indicate why it cannot be avoided.
   2. Describe anticipated results in terms of changes to existing construction. include changes to structural elements and operating components as well as changes in the building's Appearance and other significant visual elements.
   3. List products to be used and firms or entities that will perform Work.
   4. Indicate dates when cutting and patching will be performed.
   5. List utilities that cutting and patching procedures will disturb or affect. List utilities that will be relocated and those that will be temporarily out of service. Indicate how long service will be disrupted.
   6. Where cutting and patching involves adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with the original structure.
   7. Approval by Owner or Owner's project representative to proceed with cutting and patching does not waive the Owner's right to later require complete removal and replacement of

unsatisfactory work.

1.05 QUALITY ASSURANCE

A. Do not cut and patch structural elements in a manner that would change their load carrying capacity or load deflection ratio.

B. Obtain approval of cutting and patching proposal before cutting and patching the following structural elements:
   1. Foundation construction, bearing walls, structural steel, structural concrete, lintels, structural decking, and equipment supports, etc.

C. Do not cut and patch operating elements or related components in a manner that would result in reducing their capacity to perform as intended. Do not cut and patch operating elements or related components in a manner that would result in increased maintenance or decreased operational life or safety.

D. Obtain Owner approval of the cutting and patching proposal before cutting and patching operating elements or safety related systems.

E. Visual Requirements
   1. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in the Architect's opinion, reduce the building's aesthetic qualities. Do not cut and patch construction in a manner that would result in visual evidence of cutting and patching. Remove and replace construction cut and patched in a visually unsatisfactory manner.
   2. Replace, patch, and repair material and surfaces cut or damaged by methods and with materials in such a manner as not to void any warranties required or existing.

PART 2 PRODUCTS

2.01 MATERIALS

A. Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible if identical materials are unavailable or cannot be used. Use materials whose installed performance will equal or surpass that of existing materials.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed before cutting. If unsafe or unsatisfactory conditions are encountered, take corrective action before proceeding.

B. Before proceeding, meet at the project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

3.02 PREPARATION

A. Provide temporary support of work to be cut.

B. Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the project that might be exposed during cutting and patching operations.

C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Avoid cutting existing pipe, conduit, or ductwork serving the building but scheduled to be removed or relocated until provisions have been made to bypass them.

3.03 PERFORMANCE

A. Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.

1. Cut existing or new construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.

B. Cutting
   1. Cut existing or new construction using methods least likely to damage elements retained or adjoining construction. Where possible, review proposed procedures with the original installer; comply with the original installer's recommendations.
      a. In general, where cutting, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
      b. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
      c. Cut through concrete and masonry using a cutting machine, such as a Carborundum saw or a diamond-core drill.
      d. Comply with requirements of applicable Division 2 Sections where cutting and patching requires excavating and backfilling.
      e. Where services are required to be removed, relocated, or abandoned, by-pass utility services, such as pipe or conduit, before cutting. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.

C. Patching
   1. Patch with durable seams that are invisible as possible. Comply with specified tolerances.
      a. Inspect and test patched areas to demonstrate integrity of the installation.
      b. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
      c. Where removing walls or partitions extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform color and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
         1) Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken surface containing the patch after the area has received primer and second coat.
         2) Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.

3.04 CLEANING

A. Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar items. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged areas to their original condition.

END OF SECTION

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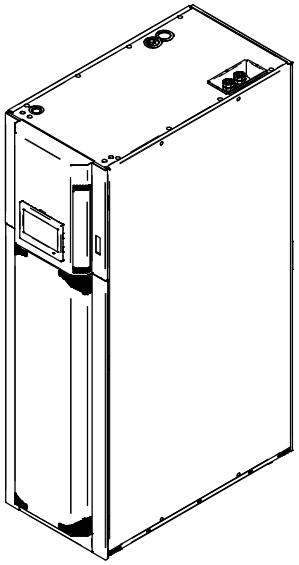
LIEBERT® CRV

600mm (24in.) AIR COOLED MODELS



In Row Cooling

Quantity Two (2) Liebert CRV Air-cooled Precision Cooling System with the following features:

- Liebert iCOM control system with 9” Color Touch Display
- Nominal 35 kW, 120 kBtuh at approximately 90F, 27% RH
- 460 Voltage, 3 Phase, 60 Hz, 32.2 FLA, 39.1 WSA, 50 OPD
- Condensate Pump 65k SCCR
- 2T temperature sensors to measure air temperature entering server racks - quantity 3
- Adjustable supply air baffle system
- Variable speed EC plug fans
- Digital scroll, variable capacity compressor utilizing R-410A
- Crankcase compressor heater
- Evaporator Type: slab, copper tubes - aluminum fins with hydrophilic coating
- Electric Reheat
- Steam Generating Humidifier
- Compliance with ASME A112.1.2 section 2.4.2 (backsiphonage testing)
- Filter Rating: MERV 8 per ASHRAE 52.2 (30% efficient by ASHRAE 52.1)
- Locking Disconnect Switch
- Top and Bottom electrical and piping connections
- One remote shutdown terminal
- One alarm contact
- The Liebert IntelliSlot Unity Card (IS-UNITY-DP) provides ground fault isolated RS-485 Modbus, BACnet IP & Modbus IP network connectivity to Building Management Systems for unit monitoring and management. Also, provides ground fault isolated 10/100 baseT Ethernet connectivity for unit monitoring and management. The supported management interfaces include: SNMP for Network Management Systems, HTTP for web page viewing, SMTP for email, and SMS for mobile messaging. This card can support dual IP and 485 protocols simultaneous.IS-UNITY-DP card is factory-installed in an IntelliSlot.
- Hot air rear return with front cold air discharge
- Front and rear service and maintenance access only
- Installation casters with leveling feet
- Powder coated panels
- Enclosure:Standard Unit, Standard Color: ZP-7021 – Black Gray Matte
- Mounting Requirements - Floorstand
- 18 inch Floorstand
- Server rack style rear door
- Superior Service Access Panel

Quantity Two (2) Liebert MC Condensers with the following features:

- Microchannel aluminum coil
- 460 Volt, 3 Phase, 60 Hz, 1.4 FLA, 1.8 WSA, 15 OPD
- Variable Speed EC Fans
- Premium electronic control board providing communication with iCOM using CANbus
- Aluminum exterior panels and 18” aluminum legs
- Single refrigerant circuit condenser
- R-410A set points
- Domestic packaging
- Short Circuit Current Rating of 65,000 Amps, rms
- Surge Protective Device for Liebert MC Condenser

Startup & Warranty Services:

- Startup by local Vertiv Access Customer Support Technician 8/5
- Warranty Services:
  - Labor Warranty Coverage – Parts and Labor for first year
  - Extended 2nd thru 3rd Year Parts Warranty
  - Extended 2nd thru 5th Year Compressor Warranty

LIEBERT CRV

PRODUCT INFORMATION
UNIT MOUNTED DISPLAY

The Liebert iCOM™ display is a microprocessor 9 inch color touch screen in an ergonomic, aesthetically pleasing housing. The display and housing will be viewable while the unit accent panels are open or closed. The display can be easily detached to view while the panel is open.

Menu Layout- The menus will be broken out into two main menu screens: User screen and Service screen. The User screen contains the menus to access parameters required for basic unit control and setup. The Service screen is designed for service personal and provides access to advanced control setup features and diagnostic information.

Password Protection- The display will contain two unique passwords to protect against unauthorized changes. An auto hide/show feature allows the user to see applicable information based on the login used.

Unit Backup and Restore- The user shall have the ability to create safety copies of important control parameters. The display has the ability for the user to automatically backup unit configuration settings to internal memory or USB storage drive. Configuration settings may be transferred to another unit for a more streamlined unit startup.

Parameter Download- The display has the ability for the user to download a report that lists parameter names, factory default settings and user programmed settings in .csv format for remote reference.

Parameter Search- The display has search fields for efficient navigation and parameter lookup.

Setup Wizards- The display will contain step by step tutorials or wizards to provide easy setup of the control.

Context Sensitive Help- The display will have an onboard help database. The database will provide context sensitive help to assist with setup and navigation of the menus.

Display Setup- The user has the ability to configure the display information based on the specific user's preference. Language, units of measure, screen contrast, home screen layout, back light timer and the hide/show of certainreadouts will be configurable through the display.

PRODUCT INFORMATION
UNIT MOUNTED DISPLAY

Additional Readouts- The display has the ability for the user to configure custom widgets on the main screen. Widget options will include items such as fan speed, call for cooling, maintenance status, call for electric reheat, call for dehumidification, call for humidification,

Status LEDs- The display will provide the user with the unit's operating status using an integrated LED. The LED will indicate if the unit has an active alarm; if the unit has an active alarm that has been acknowledged; or if the unit is on, off, or in a standby status.

Unit Alarms – All unit alarms are annunciated through both audio and visual cues, clearly displayed on the screen, automatically recorded in the event log, and communicated to optional IntelliSlot monitoring cards.

Event Log – The display will automatically store the last 400 unit-only events (messages, warnings, and alarms).

Service Contact Information – The display has the ability to store the local service or sales contact information.

Upgradeable –Display upgrades are performed through a USB connection.

Temperature Control – Precision temperature control is maintained while maximizing efficiency based on a user entered setpoint and tolerance.

Humidity Control – The dewpoint level of the room is monitored and controlled based on a user specified Relative Humidity setpoint and tolerance.

Operating Modes – 6 selectable fan and compressor operating modes allow the compressor/cooling valve and fans to modulate together or independently. The components can be set to operate based on the return air, supply air, or rack temperature sensors.

Various Control Types – Proportional, PI (proportional-integral), or Intelligent control types can be selected for supply or return temperature. These control types have been developed to maximize component life and maintain precise environmental control.

Wellness / **Maintenance** – System components are monitored to warn of potential issues in advance (helps avoid unplanned downtime) and prolongs component life.

PRODUCT INFORMATION
UNIT MOUNTED DISPLAY

Auto Restart – The unit will return to its previous operating status after loss of power. Units can be stagger started to minimize system current draw.

IntelliSlot Cards – IntelliSlot cards allow for external unit communication and control.

Service Contact Information – Local service or sales contact information can be conveniently stored in the control.

Full Text Descriptions – The large screen size eliminates the need for abbreviated text, simplifying user operation.

Upgradeable – Multiple units connected through a Unit-to-Unit network can be upgraded simultaneously or in series.

Unit-to-Unit (U2U) Communication – Communication via private Ethernet network allows for advanced control functionality (Teamwork modes, sharing sensor data, Standby Rotation, Lead-Lag, and Cascade operation).

Rack Temperature Sensors – Remote temperature sensors can be attached to the IT equipment racks to help ensure enough air at the correct temperature is being supplied by the cooling unit(s). Up to 10 racks can be equipped with a 2T temperature sensor; each 2T sensor provides two temperature readings. The control can be set to average or take the maximum of the two sensor readings per rack. Sensors are connected in a daisy-chain (one sensor plugs into another) fashion via CAN cables. These sensors help to improve energy efficiency of the unit, minimize operating noise, and provide enhanced monitoring capabilities.

Cascade – Standby units on a U2U network are automatically activated if active unit(s) cannot maintain control of the environment.

Lead-Lag – A standby unit on a U2U network is automatically activated if an alarm occurs in an active unit.

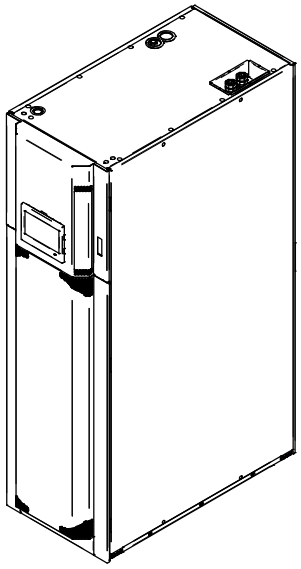
Standby Rotation – Standby units are rotated through a U2U network to balance system run hours. Units can be set to automatically rotate daily, weekly, or monthly.

Teamwork modes:

- **Mode No –** Units share data but operate independently using local sensor readings.
- **Mode 1 (Parallel) –** All units perform the same operation with the same capacity based on sensor readings from the entire network; typically for rooms with balanced heat loads.
- **Mode 2 (Independent) –** All units perform the same operation with varying capacity based on sensor readings from the entire network; typically for rooms with un-balanced heat loads.
- **Mode 3 (Optimized Aisle) –** All units perform the same operation and vary capacity based on IT server load and airflow requirements. This control mode maintains a consistent discharge air temperature while ensuring that airflow is consistently reaching the inlet of the racks.

LIEBERT® CRV

STANDARD FEATURES
600mm (24in.) AIR COOLED MODELS



STANDARD FEATURES (Refer to specification sheet for options supplied)

DX COOLING COIL The evaporator coil has 7.25 ft² (0.674 m²) face area, 4 or 5 rows deep. It is constructed of copper tubes and hydrophilic coated aluminium fins. The hydrophilic coating provides superior water carryover resistance. Two stainless steel condensate drain pans are provided.

REFRIGERATION SYSTEM Single refrigeration circuit includes a liquid line filter drier, a refrigerant sight glass with moisture indicator, an adjustable externally equalized expansion valve, and a liquid line solenoid valve.

COMPRESSOR The compressor is an R-410A scroll-type with variable capacity operation from 20-100%; commonly known as a Digital Scroll. Compressor solenoid valve unloads the compressor to provide variable capacity operation. The compressor has a suction gas cooled motor, vibration isolators, internal thermal overloads, manual reset high pressure switch, RotoLock service valves, low pressure and high pressure transducer, crankcase heater, internal centrifugal oil pump, and an operating speed of 3500 RPM @ 60Hz (2900RPM @ 50Hz).

FAN The unit is equipped with two plug fans: direct driven centrifugal fans with backward curved blades and Electronically Commutated DC motors; commonly referred to as EC plug fans. The fan speed is variable and automatically regulated by the Liebert® iCOM control through all modes of operation. Each fan has a dedicated motor and speed controller which provides a level of redundancy. The fans push air through the coil and are located on the rear panel of the unit.

SUPPLY AIR BAFFLE A field adjustable, modular supply air baffle is located in the discharge air stream. It can be quickly and easily reconfigured to redirect airflow. The angles of the vanes have been optimized to effectively distribute air to heat generating equipment in a wide variety of applications.

LIEBERT® iCOM™CONTROL SYSTEM The Liebert® CRV is controlled by the Liebert® iCOM™ Control System. The standard user interface is a 9 inch color touch screen which presents system information and allows all parameters to be viewed and adjusted. It features a 3-level password protection system. Unit-to-Unit communication with other Liebert® CRVs and two Liebert® IntelliSlot communication card housings are included as standard.

STANDARD FEATURES
600mm (24in.) AIR COOLED MODELS

2T RACK TEMPERATURE SENSORS Consist of a vented case with two temperature probes. Three (3) 2T rack sensors are standard with each Liebert® CRV. Up to ten (10) 2T housings (20 temperature probes) can be connected to a Liebert® CRV. One (1) 2T housing and both sensor probes are to be attached to a rack the cooling unit is conditioning. The sensors provide real-time, direct feedback to the cooling unit to optimize the amount of cooling and airflow required; increasing energy efficiency and ensuring proper rack inlet air temperatures. The sensor data can also be reported to remote BMS and monitoring systems. The sensor network consists of one CAN wire leaving the cooling unit and connecting to a 2T sensor. Each remaining 2T sensor is connected to the previous sensor; often referred to as a daisy-chain configuration.

REMOTE SHUTDOWN TERMINAL Provides the customer with a location to remotely shut down the unit.

COMMON ALARM CONTACT Provides the customer with a set of normally open (n/o) contacts for remote indication of unit alarms.

CABINET The exterior steel panels are custom powder coated to protect against corrosion. The double wall constructed side panels separate the ½ inch, 2.0 lb/ft^3 insulation from the airstream. The unit is mounted on casters for quick installation and provided with levelling feet. The perforated inlet and outlet panels have 81% open area, and the rear door utilizes a Knürr rack style handle and hinges.

SERVICE ACCESS All service and maintenance is performed through the front and rear of the unit; including any component removal. No side access is required. All electrical and piping connections are made through the top and/or bottom of the unit. All units are provided with a Superior Service Access Panel to provide additional access.

FILTER The unit is equipped with two deep pleated 4 inch filters rated MERV8 (based on ASHRAE 52.2-2007), located within the cabinet, and accessible from the rear of the unit. A filter clog alarm is included.

LOCKING DISCONNECT SWITCH A moulded case circuit interrupter disrupts the flow of power to the unit. The electric panel high voltage compartment can only be accessed with the switch in the 'off' position. Conveniently located behind the Liebert® iCOM™ display door for quick access.

65,000 AMP SHORT CIRCUIT CURRENT RATING (SCCR) The electrical panel provides a 65k amp SCCR.

DUAL-FLOAT CONDENSATE PUMP It has a capacity of 6 GPM (22.7 l/min) at 30ft. (9m) head. Pump is complete with integral primary and secondary float switches, pump, motor assembly, and reservoir. The secondary float shall send a signal to the local alarm and shut down the unit upon high water condition.

OPTIONAL FEATURES
600mm (24in.) AIR COOLED MODELS

OPTIONAL FEATURES (Refer to specification sheet for options supplied)

HUMIDIFIER A steam generating canister humidifier is factory-installed in the cooling unit and is operated by the Liebert® iCOM™ control system. It is complete with disposable cylinder, all supply and drain valves, steam distributor and electronic controls. The need to change the canister is indicated on the Liebert® iCOM™ display. The humidifier is designed to operate with water conductivity from 125-500 (50Hz) or 330-670 (60Hz) microS/cm. System automatically fills and drains as well as maintains the required water level based on conductivity. An air-gap within the humidifier assembly shall prevent backflow of the humidifier supply water. The humidifier is removable from the rear of the cabinet.

ELECTRIC REHEAT The electric reheat coils are low watt density, 304 stainless steel fin-tubular construction, protected by thermal safety switches and controlled in one stage.

LOW NOISE PACKAGE The Low Noise Package reduces the level of sound emitted from the compressor. The package consists of a 3/8 inch closed cell polymeric 4.5 – 8.5 lbs/ft^3 density compressor sound jacket that encloses the compressor. Additional ½ inch closed cell polymeric 3 – 8 lbs/ft^3 density sound deadening material is affixed to the underside of the Superior Service Access Panel located above the compressor and attached to the inner side of the compressor compartment panels that face the hot and cold aisles. All sound deadening material is non-shedding and located outside of the airstream.

LIEBERT® INTELLISLOT SITELINK-E CARD (IS-485EXI) Provides ground fault isolated connection to a Liebert® SiteLink-E for monitoring and management. Compatible with Liebert® SiteScan Web 4.0 or newer version.

LIEBERT® INTELLISLOT UNITY CARD (LIEBERT® IS-UNITY-DP) Provides ground fault isolated RS-485 Modbus, BACnet IP & Modbus IP network connectivity to Building Management Systems for unit monitoring and management. Also provides a ground fault isolated 10/100 baseT Ethernet connectivity for unit monitoring and management. The supported management interfaces include: SNMP for Network Management Systems, HTTP for web page viewing, SMTP for e-mail, and SMS for mobile messaging. This card can support dual IP and 485 protocols simultaneously.

FILTER The optional filters are two deep pleated 4 inch rated MERV11 following ASHRAE 52.2 (60-65% by ASHRAE 52.1), located within the cabinet and accessible from the rear of the unit. A filter clog alarm is included.

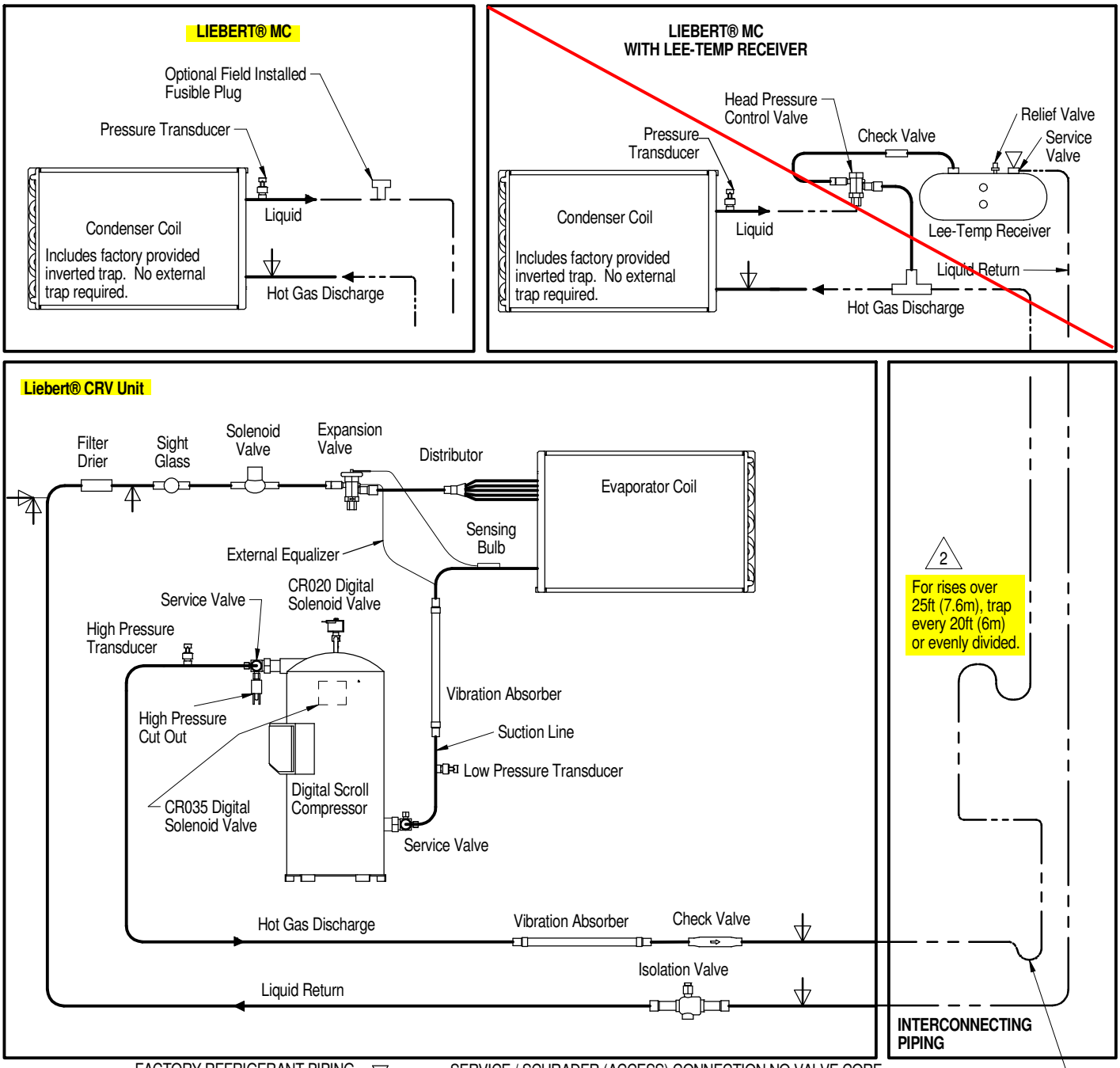
REHEAT / HUMIDIFIER LOCKOUT Includes the necessary relays to disable the reheat and humidifier from an external 24 volt signal.

ONE (1) EXTRA COMMON ALARM CONTACT Provides the customer with a total of two sets of normally open (n/o) contacts for remote indication of unit alarms.

LIEBERT® LIQUITECT SENSOR Is a solid state water sensor that has no moving parts and is hermetically sealed to keep out dust and dirt. When the sensor detects the presence of moisture the alarm system is activated.

LIEBERT® CRV

GENERAL ARRANGEMENT DIAGRAM
600mm (24in.) AIR COOLED W/ LIEBERT® MC MODELS



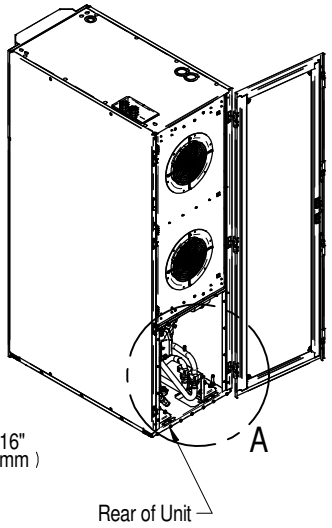
Notes:
1. Schematic representation shown. Do not use for specific connection locations.
2. Components are not supplied by Vertiv™, but are required for proper circuit operation and maintenance. Liebert® CRV has an internal trap at the base of the unit. For field piping the discharge line vertical rise starts at the base of the unit and not the top of the unit.
3. Do not isolate any refrigerant circuit from over pressurization protection.
4. Traps must be installed and horizontal lines pitched to ensure proper oil return and to reduce liquid floodback to compressor. Pitch horizontal hot gas piping at a minimum of 1/2" per 10 feet (42mm per 10m) so that gravity will aid in moving oil in the direction of the refrigeration flow.

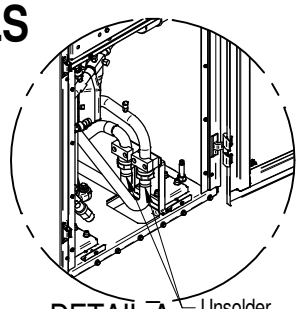
LIEBERT® CRV

PRIMARY CONNECTION LOCATIONS

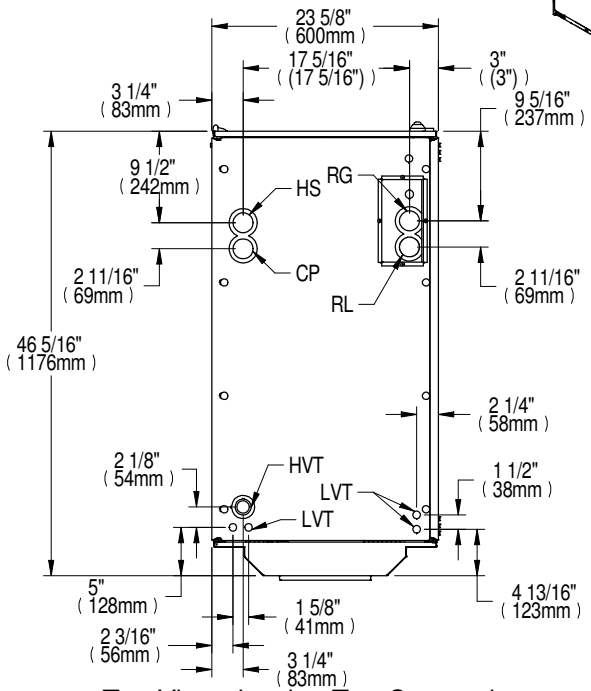
~~CR020RA~~ & CR035RA AIR COOLED MODELS

Notes:
1. Piping and electrical connections available at the top and bottom of unit.
   Attention: Air cooled systems may require additional oil to be added in the field in order to allow for sucfficient compressor lubrication. Please see the user manual for details.



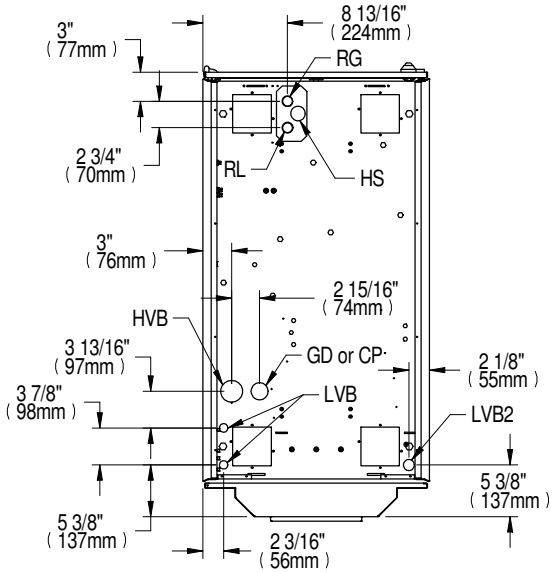


Rear of Unit



Top View showing Top Connections

Rear of Unit
(Internal Piping and top of unit removed for clarity)



Top View showing Bottom Connections
(possible with raised floor)

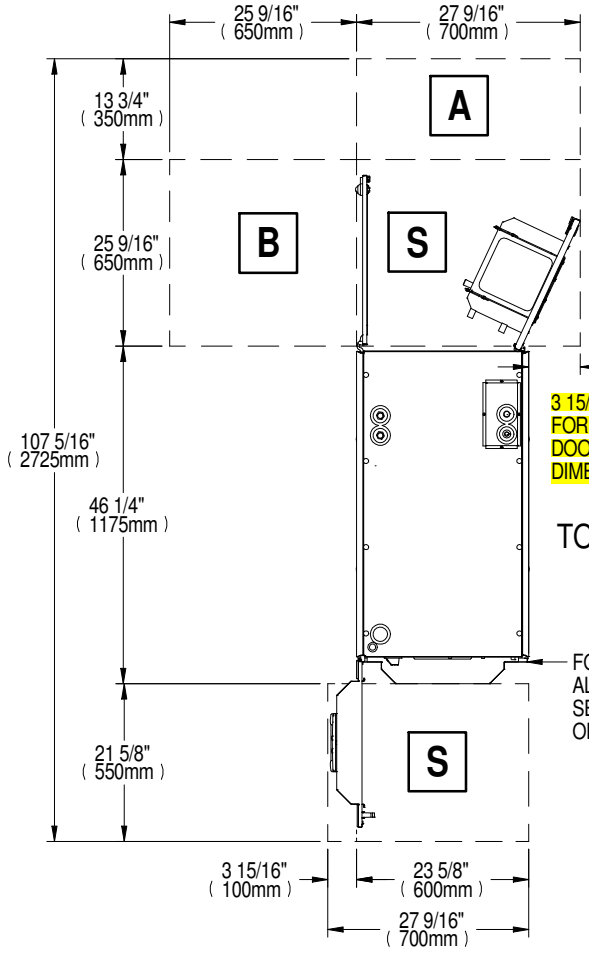
Unit Connections		CR20RA	CR35RA
RL	Refrigerant Liquid Line Inlet	1/*2" O.D. Cu	5/8" O.D. Cu
RG	Refrigerant Gas Line Outlet	5/8" O.D. Cu	7/8" O.D. Cu
GD	Gravity Coil Pan Drain	1" MPT	
CP	Condensate Pump	1/2" NPT Female	
HS	Humidifier Supply	1/2" NPT Female (top connection) 1/4" Compression Fitting (bottom connection)	
HVT	High Voltage	Combination Knockout Hole Diameter 35mm (1-3/8"), 45mm (1-3/4") and 64mm (2-1/2")	
HVB	High Voltage Bottom Entrance (feed through bottom of unit)	Hole Diameter 64mm (2-1/2")	
LVT	Low Voltage	Hole Diameter 22mm (7/8") 2 places	
LVB	Low Voltage Bottom Entrance (feed through bottom of unit)	Hole Diameter 28mm (1-1/8") 2 places	
LVB2		Hole Diameter 45mm (1-3/4") 1 place	

LIEBERT® CRV

CABINET DIMENSIONAL DATA

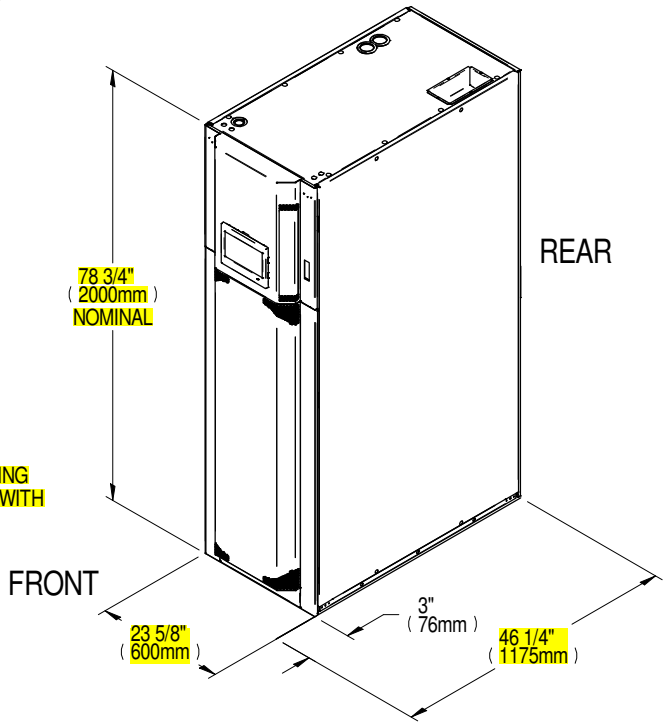
600mm (24in.) MODELS

ACCESS REQUIRED TO SERVICE THE LIEBERT® CRV UNIT WITHIN THE ROW
REAR SERVICE AREA IS S+B OR S+A WHEN B IS NOT AVAILABLE

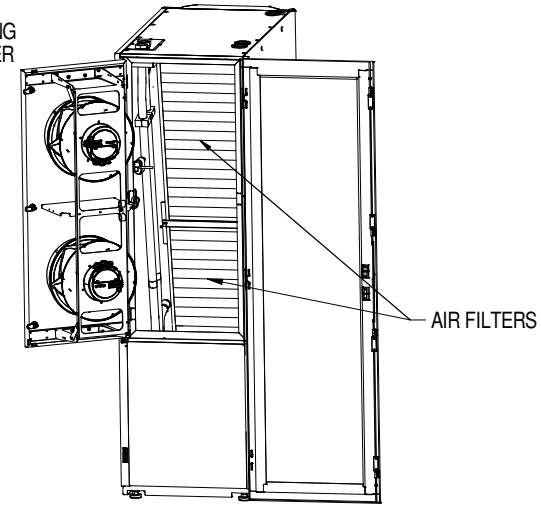


3 15/16" IS REQUIRED OPENING FOR SERVICE CLEARANCE. WITH DOOR OPENED FULLY THIS DIMENSION IS 12" (305mm)

TOP VIEW

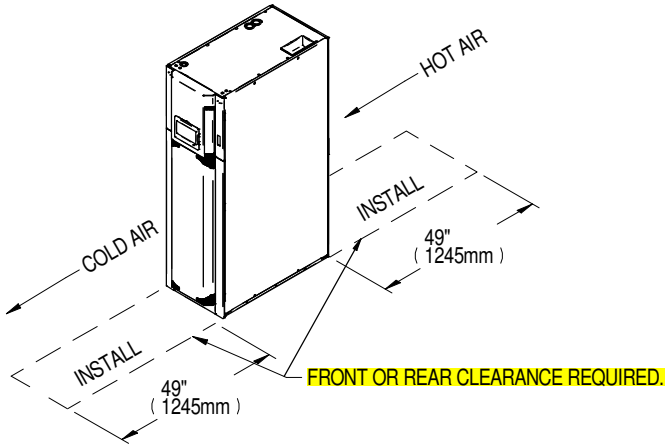


FOR PROPER AIRFLOW DISTRIBUTION: ALIGN THE FRONT DOOR OF NEIGHBORING SERVER RACKS WITH THE FRONT CORNER OF THE LIEBERT® CRV.



REAR VIEW

ACCESS REQUIRED FOR INSTALLATION OF THE LIEBERT® CRV UNIT WITHIN THE ROW.

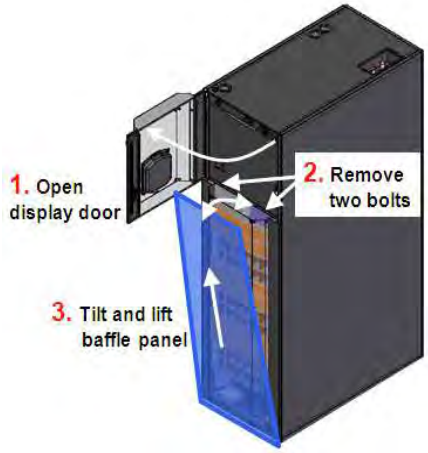


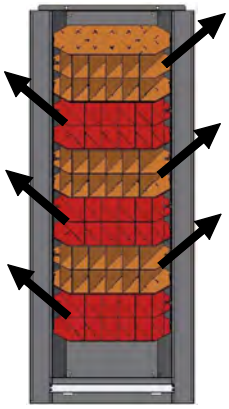
DRY WEIGHT ±5% - Lbs (kg)			
MODEL	AIR COOLED	WATER/GLYCOL	CHILLED WATER
CR020R	739 (335)	772 (350)	N/A
CR035R	805 (365)	849 (385)	
CR040R	N/A	N/A	728 (330)

LIEBERT® CRV

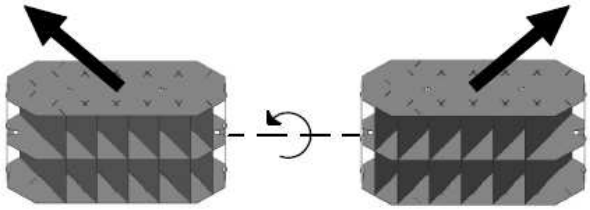
ADJUSTABLE SUPPLY AIR BAFFLES
600mm (24in.) MODELS

The Liebert® CRV has been equipped with an adjustable, modular supply air baffle system. The baffles should be adjusted at start-up to direct air to the racks the cooling unit is intended to condition. Ideally, these should be the same racks the cooling unit is pulling hot air from. The baffles can be readjusted at any time as cooling needs change. Make sure that the unit is shutdown, with input power removed, when performing any work on the unit.





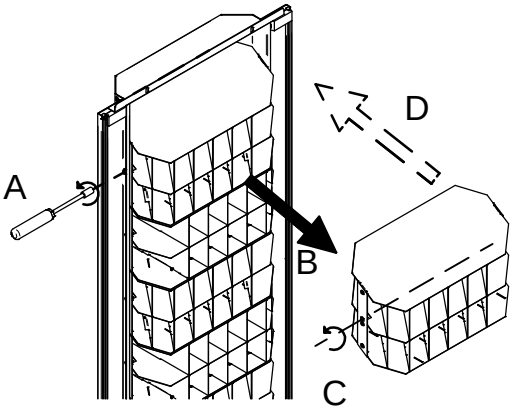
Inside View



The Liebert® CRV is shipped with the baffles in an alternating pattern as shown in the picture above. If a Liebert® CRV is installed at the end of a row, all the baffles should blow air down the cold-aisle, toward the racks. If the cooling unit is installed in-between racks, the baffle segments can be alternated to distribute air both directions. The baffle segments at the top of the panel will direct more air than the segments at the bottom. The supply air will travel the furthest when all baffle segments are pointed in the same direction, left or right.

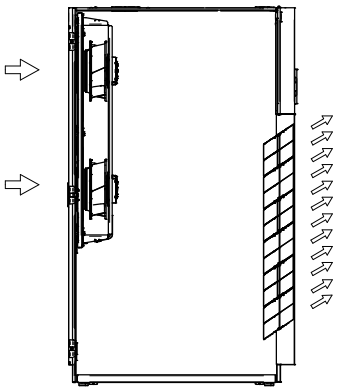
Instructions to adjust the baffle segments

A.) Remove the screws (1 on left and 1 on right side) of each baffle that must be changed ;
B.) Extract the baffle segment;
C.) Rotate baffle segment around the horizontal axis to adjust direction;
D.) Reassemble and tighten the screws.



Inside View

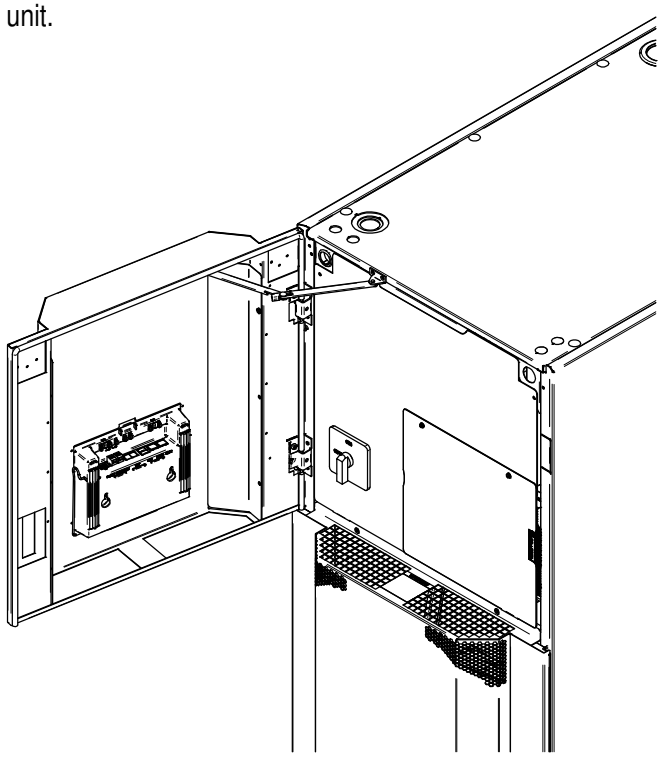
Left Side View



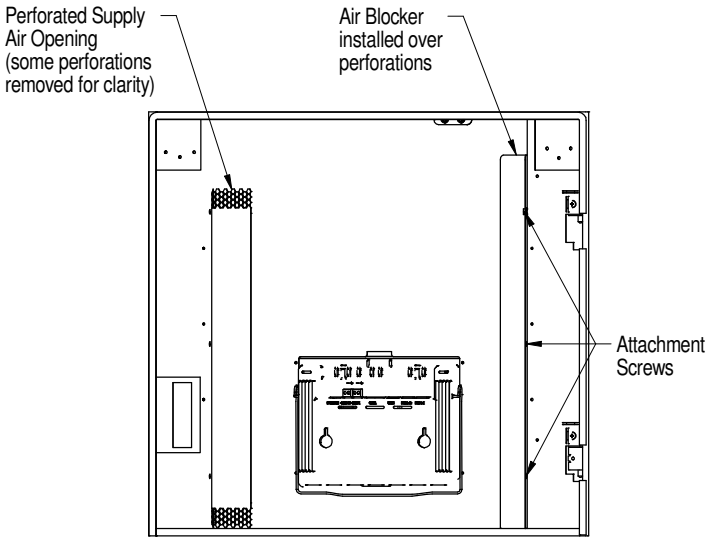
The angles of the vanes in each baffle segment have been optimized.
For proper operation, the airflow direction must always point up.

ADJUSTABLE SUPPLY AIR BLOCKER PLATE
600mm (24in.) MODELS

A blocker plate located inside the display door can be adjusted to supply air left, right, or both directions. The blocker plate should be adjusted to direct air towards the racks the Liebert® CRV is intended to condition. The blocker can be readjusted at any time as cooling needs change. Make sure that the unit is shutdown, with input power removed, when performing any work on the unit.



Front of Unit



Inside View of Display Door

The Liebert® CRV is shipped with the air blocker plate installed on one side of the display door as shown in the above image. If a Liebert® CRV is installed at the end of a row, the air blocker should be positioned to allow airflow down the cold-aisle, toward the racks. If the cooling unit is installed in-between racks, the blocker plate can be removed to allow air to discharge left and right.

Instructions to adjust the air blocker

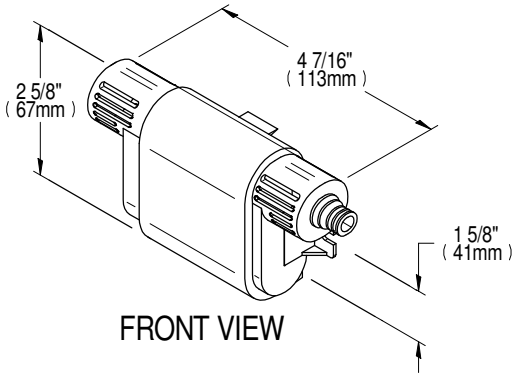
A.) Remove the three screws that attach the blocker plate to the display door.
B.) Reattach the blocker plate to the other side of the display door or remove entirely.

LIEBERT CRV

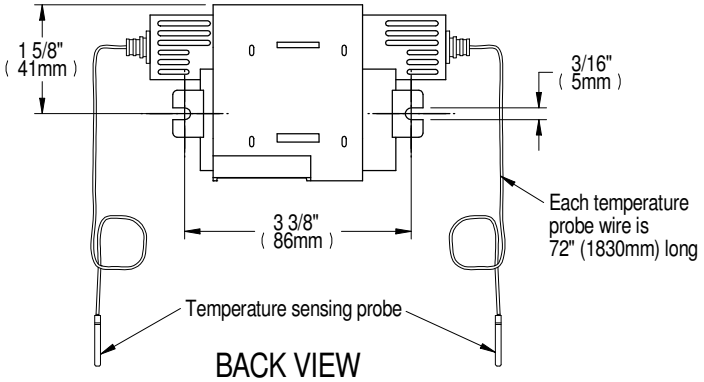
2T RACK TEMPERATURE SENSOR CONNECTIONS

600mm (24in.) MODELS

2T Sensor

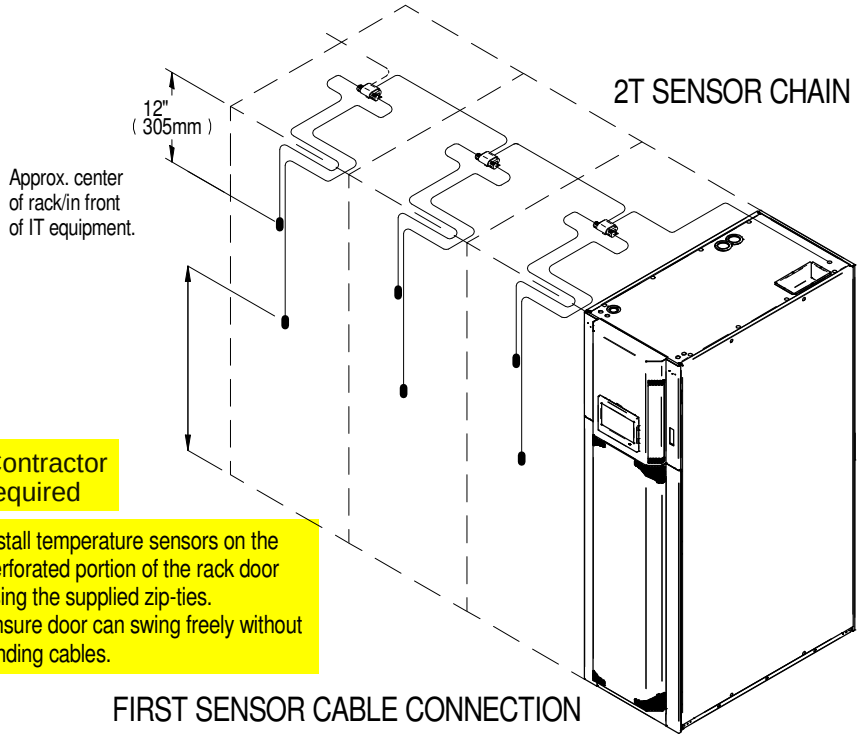


FRONT VIEW



BACK VIEW

2T SENSOR CHAIN

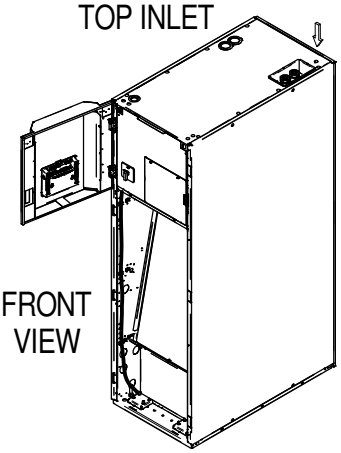


Contractor required

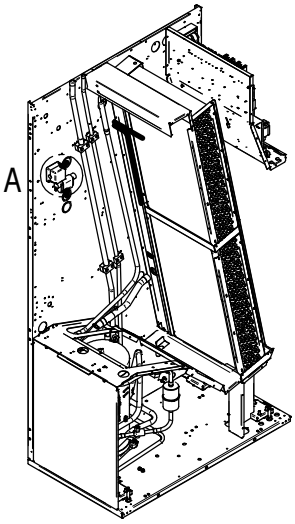
Install temperature sensors on the perforated portion of the rack door using the supplied zip-ties. Ensure door can swing freely without binding cables.

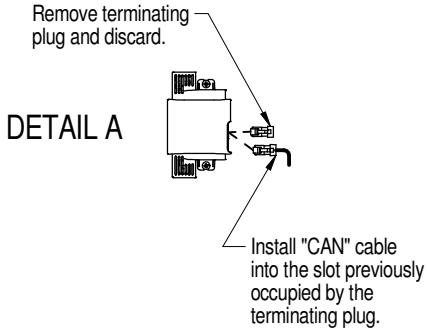
FIRST SENSOR CABLE CONNECTION

Cable Connection Entry
TOP INLET



FRONT VIEW





ELECTRICAL FIELD CONNECTIONS DESCRIPTIONS
600mm (24in.) MODELS

STANDARD ELECTRICAL CONNECTIONS

1) **High voltage connection through the bottom of the electric panel –** 1-3/8" (34.9mm), 1-3/4" (44.5mm) & 2-1/2" (64mm) diameter concentric knockout.
2) **Low voltage connection through the bottom of the electric panel -** Quantity (2) 7/8" (22mm) diameter knockouts.
3) **High voltage connection through the top of the unit –** 1-3/8" (34.9mm), 1-3/4" (44.5mm) & 2-1/2" (64mm) diameter concentric knockout.
4) **Low voltage connection through the top of the unit -** Quantity (4) 7/8" (22mm) diameter knockouts.
5) **Three phase electrical service –** Connect to terminals on disconnect switch. Three phase service not by Liebert®. (see page 2 for an important note regarding unit electrical service)
6) **Factory Installed locking Disconnect Switch**
7) **Earth ground -** Terminal for field supplied earth grounding wire.
8) **Remote unit shutdown -** Replace existing jumper between terminals 37 & 38 with field supplied normally closed switch having a minimum 75VA, 24VAC rating. Use field supplied Class 1 wiring.
9) **Customer alarm inputs -** Terminals for field supplied, normally closed contacts, having a minimum 75VA, 24VAC rating, between terminals 3 & 50, 2 & 51, 5 & 55, or 3 & 56. Use field supplied Class 1 wiring. Terminal 3 & 56 are used for humidifier alarm when a humidifier is installed. The remaining terminals are available for customer alarm inputs, such as; smoke sensors and building fire alarms.
10) **Common alarm -** On any alarm, normally open dry contact is closed across terminals 75 & 76 for remote indication. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.
11) **Heat rejection interlock -** On any call for compressor operation, normally open dry contact is closed across terminals 70 & 71 to heat rejection equipment. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.

STANDARD ELECTRICAL CONNECTIONS

12) **CANbus Connector** – Terminal block with terminals 49-1 (CAN-H) and 49-3 (CAN-L) + SH (shield connection). The terminals are used to connect the CANbus communication cable (provided by others) from the indoor unit to the Liebert® MC.

13) **CANbus Cable** – CANbus cable provided by others to connect to the outdoor condenser. No special considerations are required when the total external cable connection between the indoor unit and outdoor unit(s) is less than 450FT (137M). For total external cable connections greater than 450FT (137M) but less than 800FT (243M) a CANbus isolator is required. Contact the Factory.
Cable must have the following specifications:
Braided shield or foil shield with drain wire
   - Shield must be wired to ground at indoor unit
   - 22-18AWG stranded tinned copper
   - Twisted pair (minimum 4 twists per foot)
   - Low Capacitance (15pF/FT or less)
   - Must be rated to meet local codes and conditions
   - EXAMPLES BELDEN 89207 (PLENUM RATED), OR ALPHA WIRE 6454 CATEGORY 5, 5E, OR HIGHER

14) Do not run in same conduit, raceway, or chase as high voltage wiring.
15) For CANbus network lengths greater than 450FT (137M) call Factory.

ELECTRICAL FIELD CONNECTIONS DESCRIPTIONS
600mm (24in.) MODELS

ELECTRICAL CONNECTIONS FOR OPTIONAL FEATURES

16) **Condensate pump high water alarm** (available when optional pump is installed) - On pump high water indication, normally open dry contact is closed across terminals 88 & 89 for remote indication. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.

17) **Liebert® LiquiTect shutdown and dry contact** (available when optional Liebert® LiquiTect sensor is installed) **–** On Liebert® LiquiTect activation, normally open dry contact is closed across terminals 58 & 59 for remote indication. The Liebert® LiquiTect sensor notifies Liebert® iCOM™ of indication through terminals 60 & 61. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.

18) **Reheat and humidifier lockout** – Remote 24VAC required at terminals 82 & 83 for lockout of reheat and humidifier.

19) **Additional Common Alarm -** On any alarm, one additional normally open dry contact is closed across terminals 94 & 95 for remote indication. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.

NOTE: Refer to specification sheet for total unit full load amps, wire size amps and max overcurrent protective device size.

Important note for 460V rated Liebert® CRV units (CR****A)**

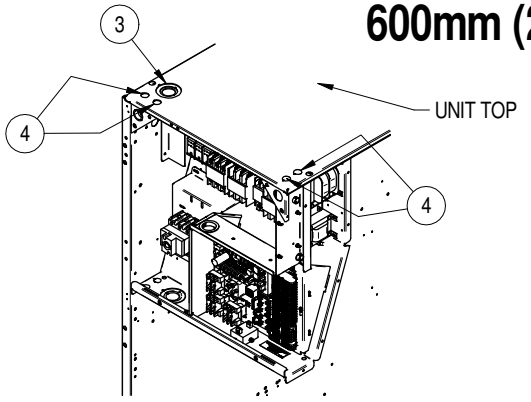
The electronically commutated (EC) motors included in the Liebert® CRV unit are suitable for connection to an electrical service providing input power to the unit with 300V or less line to ground potential only.

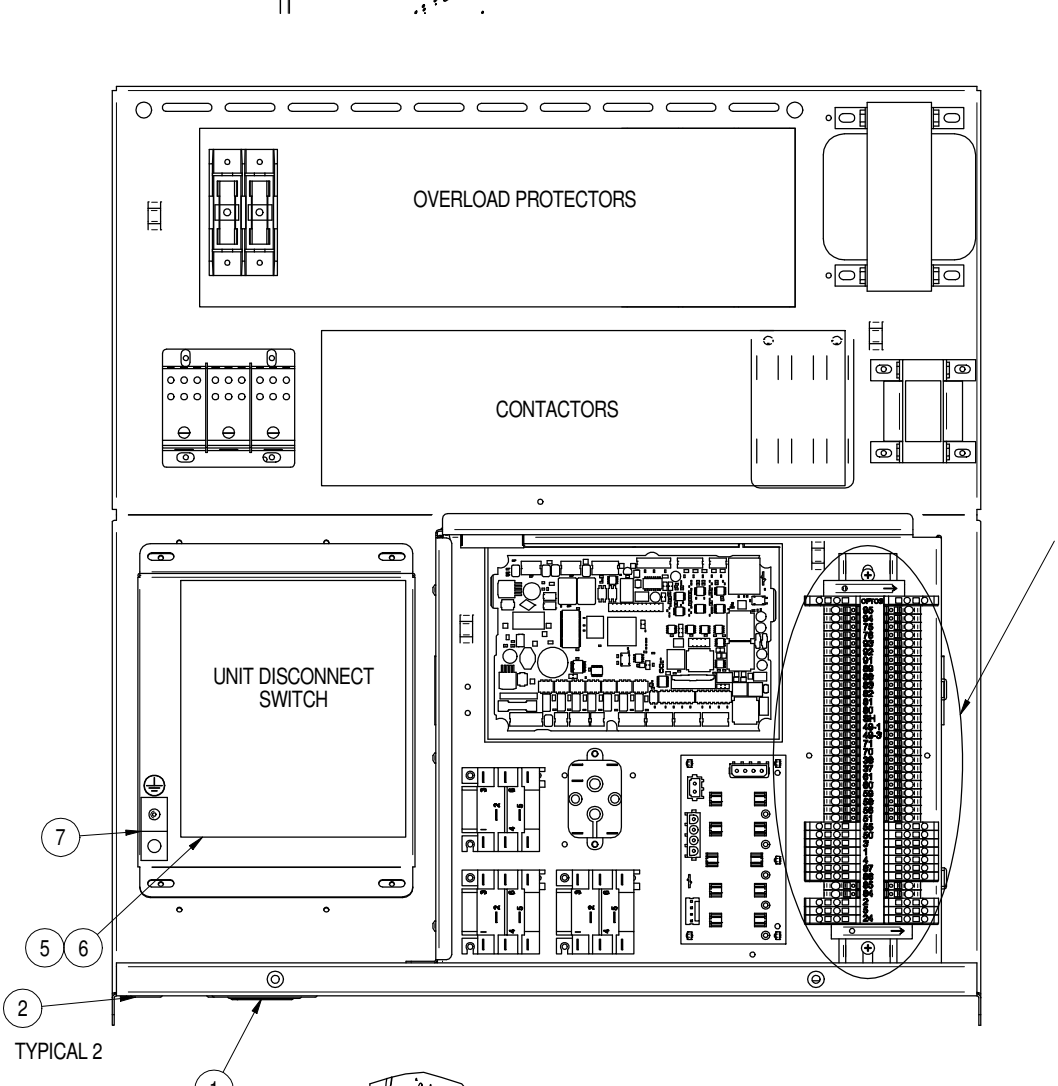
Acceptable unit input electrical service for 460V (480V) nominal units
- 480V wye with solidly grounded neutral and 277V line to ground

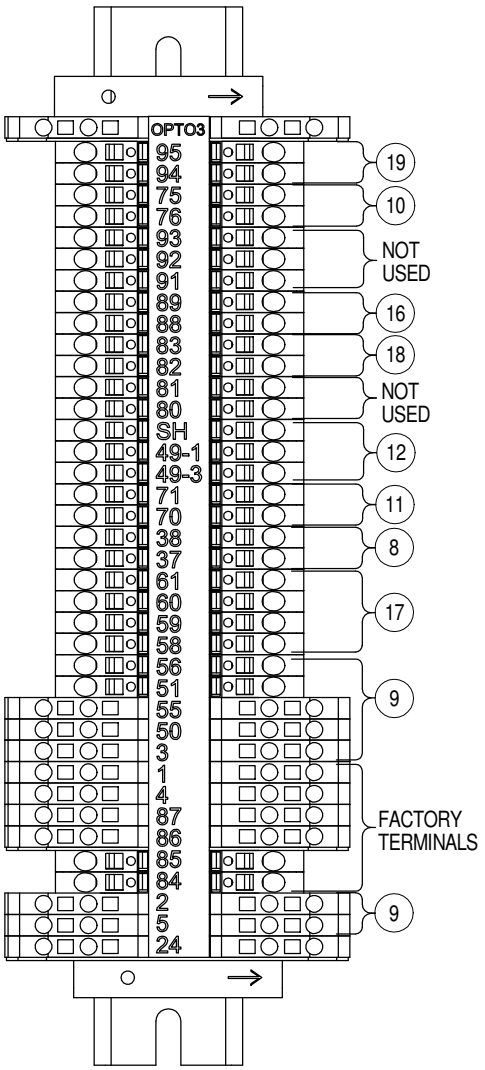
Un-acceptable unit input electrical service for 460V (480V) nominal units
- wye with high resistance (or impedance) ground
- delta without ground or with floating ground
- delta with corner ground
- delta with grounded center tap

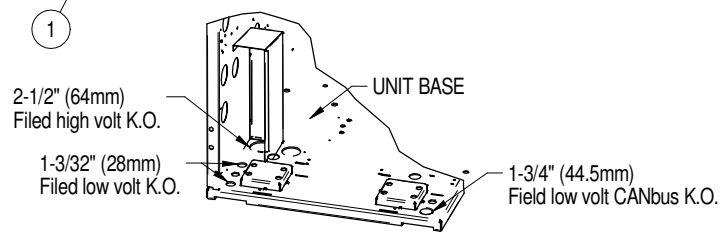
ELECTRICAL FIELD CONNECTIONS DESCRIPTIONS

600mm (24in.) MODELS







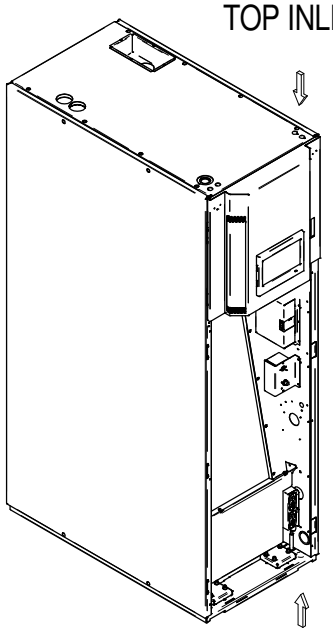


LIEBERT CRV

CONNECTION PATHS
INTELLISLOT CABLE FOR 600mm (24 in.)

Cable Connection Entry

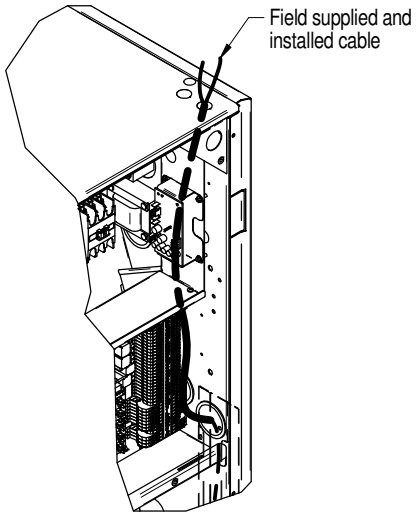
TOP INLET



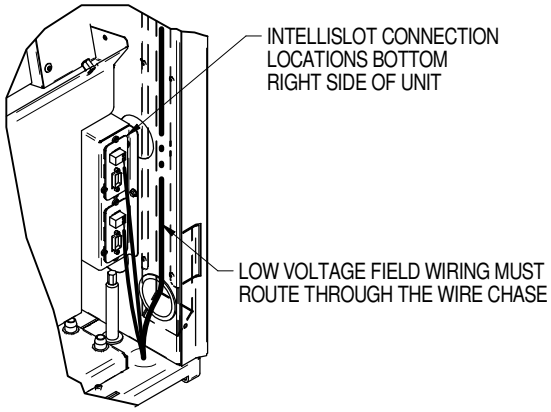
FRONT VIEW

BOTTOM INLET
(possible with raised floor)

TOP INLET PATH



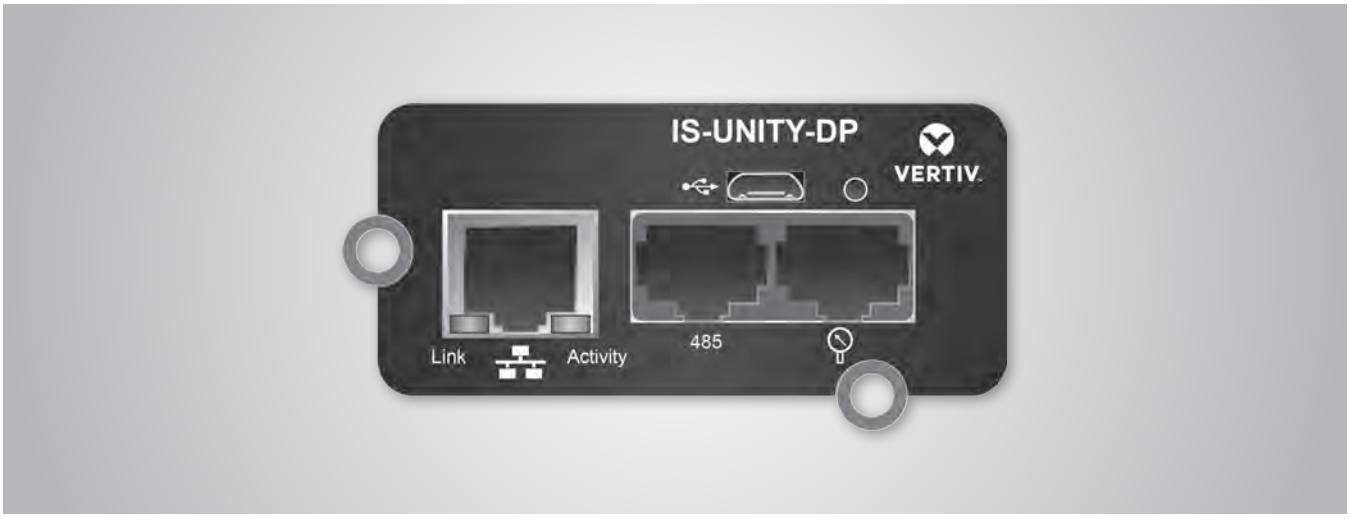
BOTTOM INLET PATH
(possible with raised floor)



Notes:
1. All wiring connections must be made per local codes.

LIEBERT® INTELLISLOT™ UNITY PLATFORM CARDS

Product Specification/Installation Guide



The Liebert IntelliSlot Unity Platform brings SNMP, BACnet IP, BACnet MSTP, Modbus TCP, Modbus RTU, YDN23 and Web management capability to many models of Vertiv's power and cooling equipment. The cards employ Ethernet and RS-485 networks to monitor and manage a wide range of operating parameters, alarms and notifications. The card also supports communication for LIFE™ Services by VERTIV.

ADDITIONAL FEATURES

- SNMPv1, SNMPv2c and SNMPv3 with MIB-II support
- HTTP/HTTPS 1.1
- BootP
- DHCP per RFC2131/2132
- Remote firmware updates via a Web browser
- IPv6 support for HTTP/HTTPS, DHCPv6, e-mail, SMS, SNMP v1/v2c/v3 and Modbus TCP
- Liebert SN Environmental Sensor Support (Web, SNMP, SMS and SMTP): Temperature, Humidity, Door Closure, Contact Closure and Leak Detection: Liebert SN-2D, Liebert SN-3C, Liebert SN-L, Liebert SN-T, Liebert SN-TH, Liebert SN-Z01, Liebert SN-Z02 and Liebert SN-Z03

IntelliSlot Unity cards are a form, fit, and function replacement for several Liebert IntelliSlot Web and 485 cards.

COMPATABILITY with Liebert Equipment

IntellSlot Card	Compatible with			
IS-UNITY-DP IS-UNITY-SNMP IS-UNITY-LIFE	Alber BDSU-50™	Liebert Deluxe System/3™	Liebert GXT3™	Liebert PeX™ *
	Liebert APM™	Liebert DS™	Liebert GXT4™	Liebert PPC™
	Liebert APS™	Liebert DSE™	Liebert HPC™	Liebert RDC™
	Liebert Challenger 3000™	Liebert EPM™	Liebert HPC-S/M/R/W/Generic™	Liebert RX™
		Liebert EXC™	Liebert HPM™	Liebert XDC™
	Liebert CRV™	Liebert eXL™	Liebert NX™ 225-600 kVA	Liebert XDP™
	Liebert CW™	Liebert EXL™ S1	Liebert NXC™	Liebert XDP-Cray™
	Liebert DCL™	Liebert eXM™	Liebert NXL™ *	
	Liebert DCP™	Liebert FDC™	Liebert NXR™	
		Liebert FPC™	Liebert PCW™/PDX™	

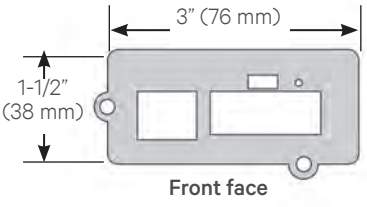
** YDN23 supported only for Liebert PeX and Liebert NXL.*

COMPATABILITY with Communication Protocols

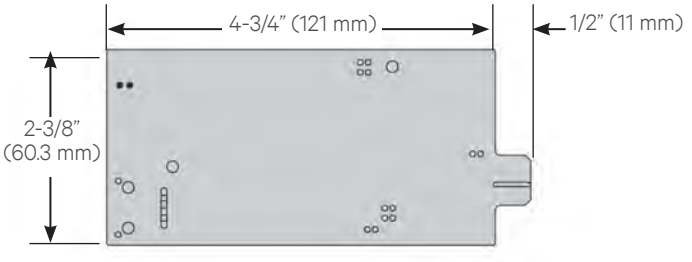
Liebert IntelliSlot Card	Life Services Support	Communication Protocol								
		HTTP HTTPS	Velocity Protocol	Email	SMS	SNMP v1, v2c, v3	BACnet IP BACnet MSTP	Modbus TCP Modbus RTU	SN Sensors	YDN23*
IS-UNITY-DP	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
IS-UNITY-SNMP	✓	✓	✓	✓	✓	✓	—	—	—	—
IS-UNITY-LIFE	✓	✓	✓	✓	✓	—	—	—	✓	—

* YDN23 supported only for Liebert PeX and Liebert NXL.

DIMENSIONS



Front face



Board

SPECIFICATIONS

Power Requirements	DC Inputs	7 to 12 VDC
	Power Consumptions:	3.6 W maximum
Dimensions, W x D x H		
Weight (assembled)	Net:	7 oz (0.2 kg)
	Shipping:	1.3 lb (0.6 kg)
Ambient Operating Environment	32 to 104°F (0 to 40°C); 10% to 90% RH (non-condensing)	
Ambient Storage Temperature	–4 to 140°F (–20 to 60°C)	
Communication Ports	Ethernet Communication	RJ-45 (LIFE™ Services requires a network connection to the Internet)
	RJ-45 (RJ-45 to 2-position terminal-block adapter)	

WIRING

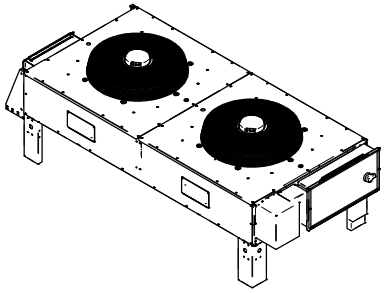
10/100 Mb/s Ethernet connector	Standard Category 5E Cable	328 ft. (100m)
RJ-45 - One-Wire Connector	Liebert® Integrated One-Wire Sensor Cable or 2m Cat 5E to Modular 1-Wire Sensor.	65.6 ft. (20m)

VertivCo.com | **Vertiv Headquarters,** 1050 Dearborn Drive, Columbus, OH, 43085, USA

590-1307-501C/SL-52646_REV11_6-17

LIEBERT MC CONDENSER

PREMIUM EFFICIENCY CONTROL
STANDARD & OPTIONAL FEATURES



STANDARD FEATURES

COIL Liebert microchannel coils are all-aluminum construction. Tubes are created by extruding small parallel refrigerant flow paths into aluminum. Full-depth louvered aluminum fins fill spaces between the tubes. Tubes, fins and aluminum headers are oven-brazed to form a complete refrigerant-to-air heat exchange coil. Baffles are used in the headers to separate one coil slab into multiple passes as needed. Coils are factory leak tested at a minimum of 300 PSIG and dehydrated. Copper stub pipes are electric resistance welded to aluminum coils and joints are protected with polyolefin to seal joint from environmental corrosive elements. Hot gas and liquid lines are brazed to the stub pipes with spun closed ends for customer piping connections. Coil pipe assembles are filled and sealed with a nitrogen holding charge for shipment. One coil is used per fan assembly.

FAN/MOTOR ASSEMBLY The fan/motor assembly is complete with external rotor motor, fan blades and fan/finger guard. Fan blades are constructed of stamped aluminum or steel extrusion coated with PP plastic. Fan guards are heavy gauge, close meshed, steel wire, coated with a black corrosion resistant finish. Fan terminal blocks located on the top of the fan guard with IP54 protection class. Fans are factory balanced and tested before shipment.

FAN MOTORS Fan motors are specifically designed for variable speed and have ball bearings. The EC fans provide internal overload protection through the built-in electronics. Each EC fan motor has built-in controller and communication module, linked via RS485 communication wire to each fan and the Premium Control Board. This allows each fan to receive and respond to precise fan speed inputs from the Premium control board.

PREMIUM EFFICIENCY FAN CONTROL The Liebert premium efficiency condenser control system is complete with control board, EC fan motor(s),refrigerant-pressure transducer(s), refrigerant-temperature thermistor(s), ambient-temperature thermistor, and motor overload protection in the factory wired control panel. The control board maintains EC fans on the same circuit to the same speed in order to maintain refrigerant head pressure. The control board receives a run signal from the compressor of the indoor unit via field-supplied low voltage interlock wires and field-supplied CANbus communication wires from the indoor unit iCOM. The control system provides refrigerant head pressure and system starting for outdoor ambient temperature as low as -30°F (-35 °C), provided the total temperature design range (from minimum to maximum) is 125°F (70°C) or less.

HOUSING The condenser housing is constructed of bright aluminum sheet and divided into individual fan sections by full width baffles. Internal structural support members, including coil support frame, are galvanized steel for strength and corrosion resistance. Panel doors are provided on two sides of each coil/fan section to provide for coil cleaning. Aluminum legs are provided with rigging holes for hoisting the unit into position.

COMMUNICATION The Premium Efficiency Control communicates with the iCOM control of the indoor Liebert unit using field supplied CANbus wires. The communication link allows for condenser alarm condition communication to iCOM, communication of other measurable items on the condenser, and fan control features to improve efficiency, sound and wintertime operation based on iCOM programming.

UNIT DISCONNECT SWITCH Locking unit disconnect switch is factory installed and wired in attached condenser control section.

~~**OPTIONAL FEATURES**~~

~~**LIEBERT LEE TEMP LOW AMBIENT CONTROL** Lee Temp receiver kits can be added to achieve head pressure control down to minimum ambient temperatures of -30 °F (-34 °C). The premium efficiency fan control when used with the Liebert Lee-Temp receiver kits runs the fan(s) at lower speeds during cold temperatures saving fan energy.~~

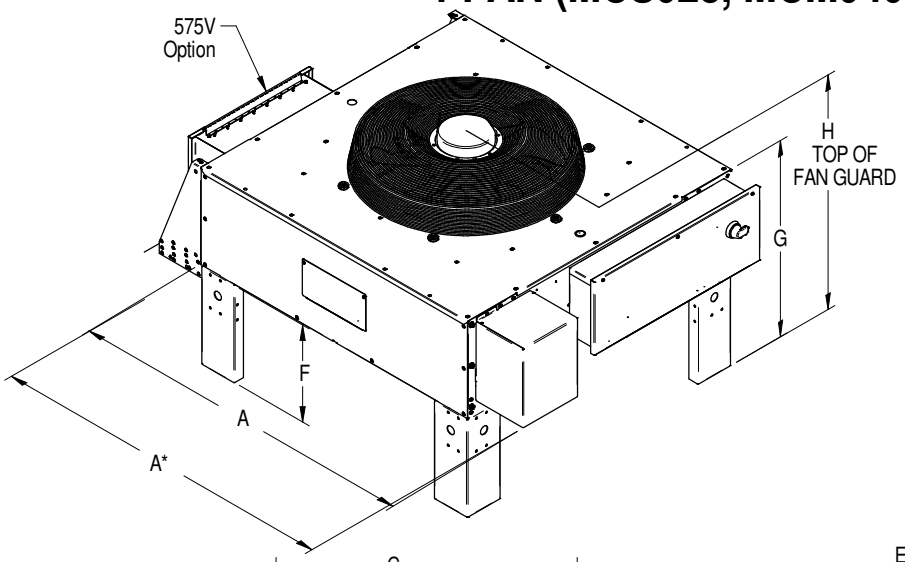
~~**575V POWER SUPPLY** The factory installed condenser option will include a secondary enclosure, a 575V to 480V, 3 phase, step down transformer, secondary fuses for the transformer, and all wiring between the main and secondary electrical enclosures. Site power connections will be made in the main electrical enclosure and the secondary enclosure will be located on the condenser end opposite of the main electrical enclosure.~~

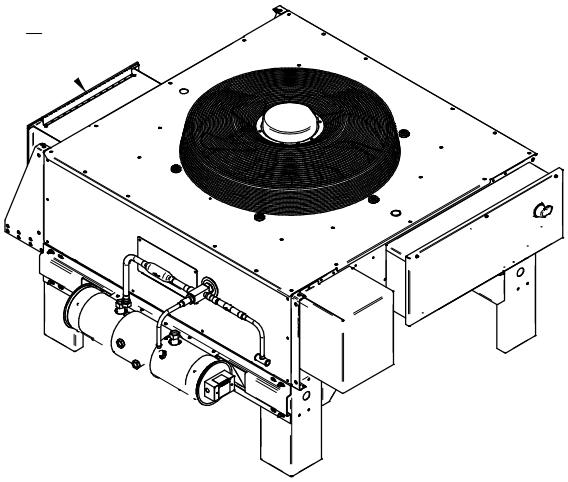
~~**E-COAT COIL PROTECTION** The aluminum microchannel coil is epoxy coated for extended coil life in corrosive environments, such as coastal areas. Factory applied E-coat using immersion and baking process provides a flexible epoxy coating to all coil surfaces and ensures complete coil encapsulation. Coil color is black and a factory applied UV topcoat protects the E-coat from solar UV ray degradation.~~

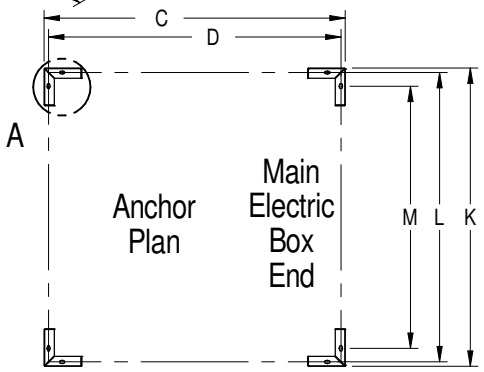
LIEBERT® MC

CABINET & ANCHOR DIMENSIONAL DATA

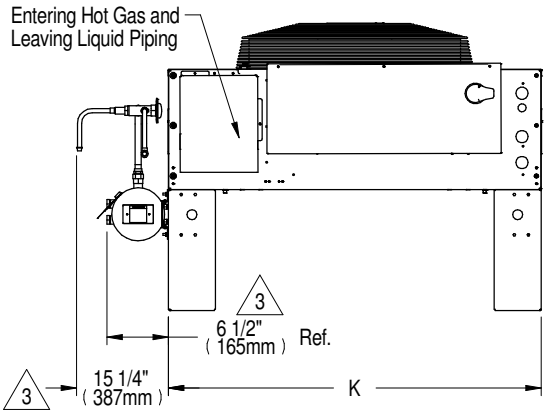
1 FAN (MCS028, MCM040, MCL055)



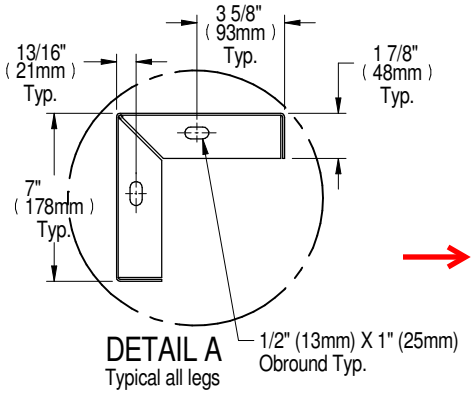




Left Side of Unit



Front View (Liebert® Lee-Temp Shown)



DETAIL A
Typical all legs

MODEL NUMBER	F in. (mm) (LEG HEIGHT DIMENSIONS) △2			
	18 (457)	36 (914)	48 (1219)	60 (1524)
MCS028 MCM040				
DIM "G"	31-5/8 (803)	49-5/8 (1260)	61-5/8 (1565)	73-5/8 (1870)
DIM "H"	39-5/8 (1006)	57-5/8 (1464)	69-5/8 (1768)	81-5/8 (2073)
MCL055				
DIM "G"	35-7/8 (911)	53-7/8 (1368)	65-7/8 (1673)	77-7/8 (1978)
DIM "H"	43-5/8 (1108)	61-5/8 (1565)	73-5/8 (1870)	85-5/8 (2175)

Note:
1. Vertiv recommends a clearance of 36" (915mm) on each side for proper operation and component access.
2. △ Cross Bracing required for legs longer than 18" (457.2mm). Quantity varies per model & options selected.
3. △ For Liebert® PDX w/EEV systems & unheated refrigerant receivers, 6-1/2" (165mm) is 9-1/4" (235mm) and 15-1/4" (387) is not applicable.

MODEL NUMBER	A in (mm)	~~A* in (mm) (575V ONLY)~~	C in (mm)	D in (mm)	K in (mm)	L in (mm)	M in (mm)
MCS028	50-5/8 (1287)	~~58 7/8 (1495)~~	44-1/8 (1120)	42-1/2 (1080)	42-1/2 (1080)	40-7/8 (1038)	35-7/8 (910)
MCM040	57-3/16 (1453)	~~65 3/8 (1661)~~	48 (1219)	46-5/16 (1177)	46 (1168)	44-3/8 (1127)	39-5/16 (999)
MCL055	68 (1727)	~~77 (1956)~~	56 (1422)	54-3/8 (1381)	55-1/2 (1410)	53-7/8 (1368)	48-3/4 (1238)

LIEBERT MC CONDENSER

CONDENSER AND OPTION WEIGHT DATA, lb(kg)

Size		Small (MCS)		Medium (MCM)			
Condenser Model		MCS028	MCS056	MCM040	MCM080		MCM160
Refrigerant Circuits		1	2	1	1	2	2
Condenser Dry Weight	18" Leg	154 (70)	270 (122)	231 (105)	441 (200)	441 (200)	860 (390)
	36" Leg	286 (130)	419 (190)	363 (165)	590 (268)	590 (268)	1066 (484)
	48" Leg	318 (144)	451 (205)	395 (179)	622 (282)	622 (282)	1114 (505)
	60" Leg	349 (158)	482 (219)	426 (193)	653 (296)	653 (296)	1160 (526)
Additional Weight for Options							
PDX-EEV Receiver		45 (20)		45 (20)	45 (20)		
Lee-Temp		55 (25)	110 (50)	55 (25)	100 (45)	110 (50)	220 (100)
DSE Receiver DA050/080/085					45 (20)		90 (41)
DSE Receiver DA125/150/165					92 (42)		184 (83)
575V Transformer		55 (25)	65 (29)	60 (27)	70 (32)	70 (32)	80 (36)
Coated Coil		4 (2)	8 (4)	5 (2)	10 (5)	10 (5)	20 (9)
Seismic/Wind Bracing 18" legs		40 (18)	40 (18)	40 (18)	40 (18)	40 (18)	57 (26)

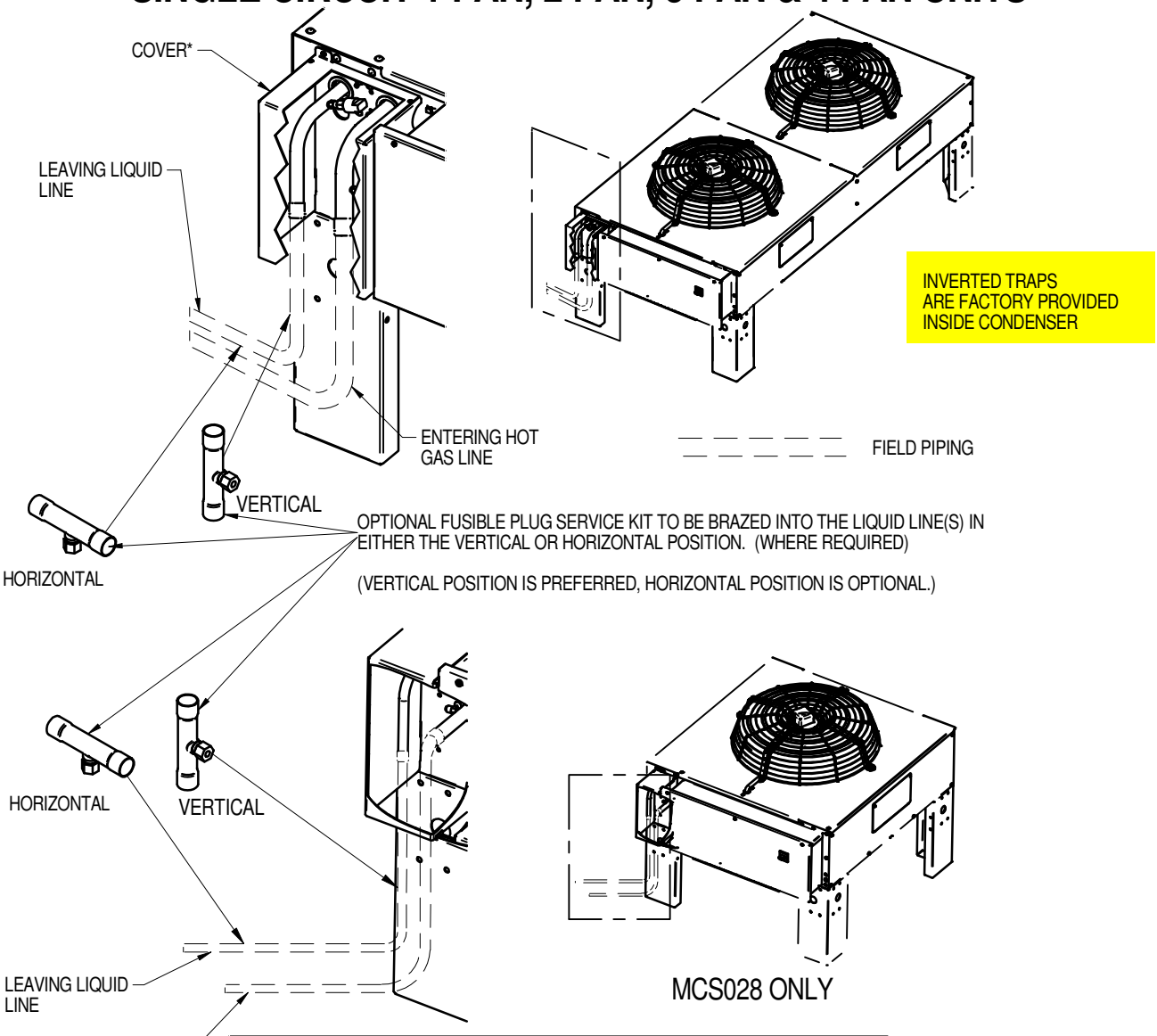
Size		Large (MCL)					
Condenser Model		MCL055	MCL110		MCL165	MCL220	
Refrigerant Circuits		1	1	2	1	1	2
Condenser Dry weight	18" Leg	344 (156)	602 (273)	602 (273)	891 (404)	1186 (538)	1186 (538)
	36" Leg	486 (220)	766 (347)	766 (347)	1136 (515)	1453 (659)	1453 (659)
	48" Leg	518 (235)	798 (362)	798 (362)	1184 (537)	1501 (681)	1501 (681)
	60" Leg	549 (249)	829 (376)	829 (376)	1230 (558)	1547 (702)	1547 (702)
Additional Weight for Options							
PDX-EEV Receiver		45 (20)					
Lee-Temp		60 (27)	115 (52)	120 (54)	175 (79)	215 (98)	240 (109)
DSE Receiver DA050/080/085			45 (20)	90 (41)	45 (20)	45 (20)	90 (41)
DSE Receiver DA125/150/165			94 (43)		94 (43)	94 (43)	188 (85)
575V Transformer		67 (30)	77 (35)	77 (35)	118 (54)	118 (54)	118 (54)
Coated Coil		8 (4)	16 (7)	16 (7)	24 (11)	32 (15)	32 (15)
Seismic/Wind Bracing 18" legs		40 (18)	40 (18)	41 (19)	57 (26)	57 (26)	57 (26)

Total weight is the sum of '**Condenser**' + ('**PDX-EEV Receiver**' or '**Lee-Temp**' or '**DSE Receiver 050/080/085**' or '**DSE Receiver 125/150/165**')'+'**Coated Coil**' + '**575V Transformer**'.+ '**Seismic/Wind Bracing**'

LIEBERT MC CONDENSER

PIPING DIMENSIONAL DATA

SINGLE CIRCUIT 1 FAN, ~~2 FAN, 3 FAN & 4 FAN UNITS~~



MODEL NO.	NUMBER OF FANS	CONDENSER CIRCUITS	CONNECTION SIZES, OD, IN	
			HOT GAS LINE	LIQUID LINE
MCS 028	1	1	7/8	5/8
MCM 040	1	1	7/8	5/8
MCM 080	2	1	1-1/8	7/8
MCL 055	1	1	1-1/8	7/8
MCL 110	2	1	1-3/8	1-1/8
MCL 165	3	1	1-3/8	1-1/8
MCL 220	4	1	1-5/8	1-3/8

* SHIPPING COVER IS NOT NECESSARY FOR PROPER CONDENSER OPERATION AND MAY BE RECYCLED IF FIELD PIPING INTERFERES WITH PROPER REATTACHMENT.

LINE SIZE & PRESSURE RATINGS

RECOMMENDED REFRIGERANT LINE SIZES CU, OD

AIR-COOLED SYSTEMS USING R-410A

	System Fluid : R-410A		Any Compressor Type				
PRODUCT	Indoor Model	Equivalent Length	50 ft (15m)	100 ft (30m)	150 ft (45m)	300 ft (91m)	450ft (137m)
Liebert® CRV	CR019RA/ CR020RA	Hot Gas Line, in.	3/4	3/4	3/4	7/8 [2]	
		Liquid Line, in.	5/8	5/8	5/8	3/4	
	CR035RA	Hot Gas Line, in.	7/8	7/8	7/8	1-1/8 [2]	
		Liquid Line, in.	3/4	3/4 [2]	3/4 [2]	7/8 [2]	
Liebert® PDX	PX011	Hot Gas Line, in.	1/2	5/8	5/8	5/8	
		Liquid Line, in.	3/8	1/2	1/2	1/2	
	PX018	Hot Gas Line, in.	5/8	5/8	5/8	3/4 [2]	
		Liquid Line, in.	1/2	1/2	1/2	5/8	
	PX023	Hot Gas Line, in.	3/4	3/4	3/4	7/8 [2]	
		Liquid Line, in.	5/8	5/8	5/8	5/8	
	PX029	Hot Gas Line, in.	7/8	7/8	7/8	1-1/8 [2]	
		Liquid Line, in.	5/8	5/8	5/8	3/4	
Liebert® DSE	DA050 / DA080/ DA085	Hot Gas Line, in.	1-1/8	1-1/8	1-1/8	1-1/8	1-1/8 [3]
		Liquid Line, in.	7/8	7/8	7/8	7/8	7/8 [3]
	DA125	Hot Gas Line, in.	1-3/8	1-3/8	1-3/8	1-3/8	1-3/8 [3]
		Liquid Line, in.	7/8	7/8	7/8	7/8	7/8 [3]
	DA150	Hot Gas Line, in.	1-3/8	1-3/8	1-3/8	1-3/8	1-3/8 [3]
		Liquid Line, in.	7/8	1-1/8	1-1/8	1-1/8	1-1/8 [3]
	DA165	Hot Gas Line, in.	1-3/8	1-3/8	1-3/8	1-3/8	1-3/8 [3]
		Liquid Line, in.	7/8	1-1/8	1-1/8	1-1/8	1-1/8 [3]
	DA250 / DA265	Hot Gas Line, in.	1-5/8	1-5/8	1-5/8 [4]	1-5/8 [4]	
		Liquid Line, in.	1-3/8	1-3/8	1-3/8 [4]	1-3/8 [4]	
Vertiv™ CoolChip EconoPhase CDU	XDM 200	Hot Gas Line, in.	1-3/8	1-3/8	1-3/8	1-3/8	1-3/8 [5]
		Liquid Line, in.	7/8	1-1/8	1-1/8	1-1/8	1-1/8 [5]
	XDM 300	Hot Gas Line, in.	1-5/8	1-5/8	1-5/8 [4]	1-5/8 [4]	
		Liquid Line, in.	1-3/8	1-3/8	1-3/8 [4]	1-3/8 [4]	

Product	System Fluid: R-410A		Digital Scroll Models				
	Indoor Model	Equivalent Length	50 ft (15m)	75 ft (23m)	100 ft (30m)	125 ft (38m)	150 ft (45m)
Liebert® Mini-Mate Variable Capacity	MT036	Suction Line, in.	7/8	7/8	7/8	7/8	7/8
		Liquid Line, in.	1/2	1/2	1/2	1/2	1/2
	MT048	Suction Line, in.	7/8	1-1/8 [2]	1-1/8 [2]	1-1/8 [2]	1-1/8 [2]
		Liquid Line, in.	1/2	1/2	5/8	5/8	5/8
	MT060	Suction Line, in.	1-1/8	1-1/8	1-1/8	1-1/8	1-1/8
		Liquid Line, in.	1/2	5/8	5/8	5/8	5/8

Notes:
1. Consult factory for proper line sizing for runs longer than maximum equivalent length shown in table.
2. Must downsize vertical riser one trade size (1-1/8" to 7/8" or 7/8" to 3/4" or 3/4" to 5/8" or 5/8" to 1/2").
3. Consult factory when actual pipe length between Liebert® MC/Liebert® EconoPhase and Liebert® DSE unit will exceed 300 ft (91 m).
4. Liebert® DSE DA250-265 and Vertiv® CoolChip EconoPhase CDU XDM300 units can be extended to max 200ft (61m) linear or 300ft. (91m) equivalent.
5. Consult factory for Vertiv® CoolChip EconoPhase CDU modules where pipe lengths exceed 300 ft (91m), or where oversized piping is considered, such as a Vertiv® CoolChip EconoPhase CDU that replaces existing Liebert® DSE DA250 models and/or uses existing piping.

LINE SIZE & PRESSURE RATINGS

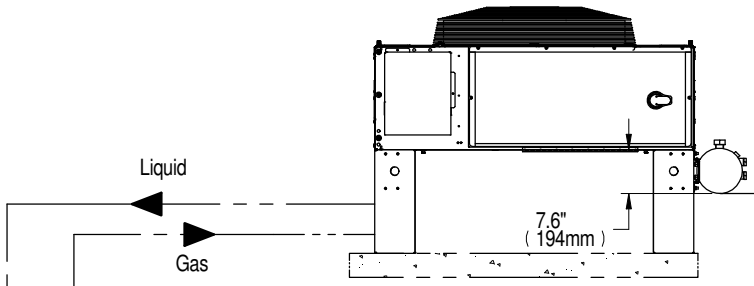
SYSTEM REFRIGERANT PRESSURES

Product	Pressure Type	System Fluid : R-407C psig (kPa)		System Fluid : R-410A psig (kPa)		System Fluid : R-454B psig (kPa)	
		High Side	Low Side	High Side	Low Side	High Side	Low Side
Liebert® CRV [2]	Design Pressure	N/A	N/A	511 (3523)	235 (1620)	N/A	N/A
	High Pressure Cutout	N/A	N/A	561 (3868)	N/A	N/A	N/A
Liebert® DS [2]	Design Pressure	364 (2510)	165 (1138)	N/A	N/A	N/A	N/A
	High Pressure Cutout	400 (2758)	N/A	N/A	N/A	N/A	N/A
Liebert® DSE (DA050-DA265)	Design Pressure	N/A	N/A	530 (3655)	235 (1620)	500 (3447)	215 (1482)
	High Pressure Cutout	N/A	N/A	580 (3999)	N/A	540 (3723)	N/A
Liebert® EconoPhase	Design Pressure	N/A	N/A	530 (3655)	N/A	N/A	N/A
	High Pressure Cutout	N/A	N/A	N/A	N/A	N/A	N/A
Liebert® MC Condenser	Design Pressure	364 (2510)		530 (3655)		N/A	N/A
	High Pressure Cutout	N/A	N/A	N/A	N/A	N/A	N/A
Liebert® MCV[3]	Design Pressure	N/A	N/A	530 (3655)	N/A	N/A	N/A
	High Pressure Cutout	N/A	N/A	N/A	N/A	N/A	N/A
Liebert® PDX [2]	Design Pressure	N/A	N/A	530 (3655)	235 (1620)	N/A	N/A
	High Pressure Cutout	N/A	N/A	580 (3999)	N/A	N/A	N/A
Liebert® Mini-Mate2 (PFH, MCD) Liebert® Datamate (DME, DMC) [2]	Design Pressure	315 (2172)	165 (1138)	N/A	N/A	N/A	N/A
	High Pressure Cutout	400 (2758)	N/A	N/A	N/A	N/A	N/A
Liebert® Mini-Mate Variable Capacity (PFD, MT, MTC) [2]	Design Pressure	N/A	N/A	530 (3655)	235 (1620)	N/A	N/A
	High Pressure Cutout	N/A	N/A	580 (3999)	N/A	N/A	N/A
Liebert® Fin/Tube Condenser	Design Pressure	320 (2206)	N/A	N/A	N/A	N/A	N/A
	High Pressure Cutout	N/A	N/A	N/A	N/A	N/A	N/A
Liebert® Piggyback (Condenser)	Design Pressure	300 (2068)		475 (3275)		N/A	N/A
	High Pressure Cutout	N/A	N/A	N/A	N/A	N/A	N/A
Liebert® DSE (DP060, DP400, DP500)	Design Pressure	N/A	N/A	530 (3655)	235 (1620)	N/A	N/A
	High Pressure Cutout	N/A	N/A	580 (3999)	N/A	N/A	N/A
Vertiv™ CoolChip EconoPhase CDU	Design Pressure	N/A	N/A	530 (3655)	235 (1620)	N/A	N/A
	High Pressure Cutout	N/A	N/A	580 (3999)	N/A	N/A	N/A
Liebert® XDC	Design Pressure	364 (2510)	163 (1124)	N/A	N/A	N/A	N/A
	High Pressure Cutout	400 (2758)	N/A	N/A	N/A	N/A	N/A

Notes:
1. Field installed interconnecting piping must be properly selected and installed based on local and national codes, the user manual, and the unit serial tag.
2. Values apply to air cooled and fluid cooled systems.
3. Product is a Heat Rejection packaged condenser. For more information see product manual.
4. Design Pressure is noted on the serial tag in all above product lines.
5. High Pressure Cutout is nominal in all above product lines.

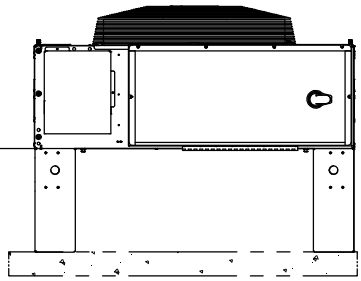
LIEBERT MC CONDENSER

AIR COOLED PIPING SCHEMATIC
CONDENSER ABOVE INDOOR UNIT



MC Condenser with Receiver

(Piping to Condenser & Receiver not shown for clarity)

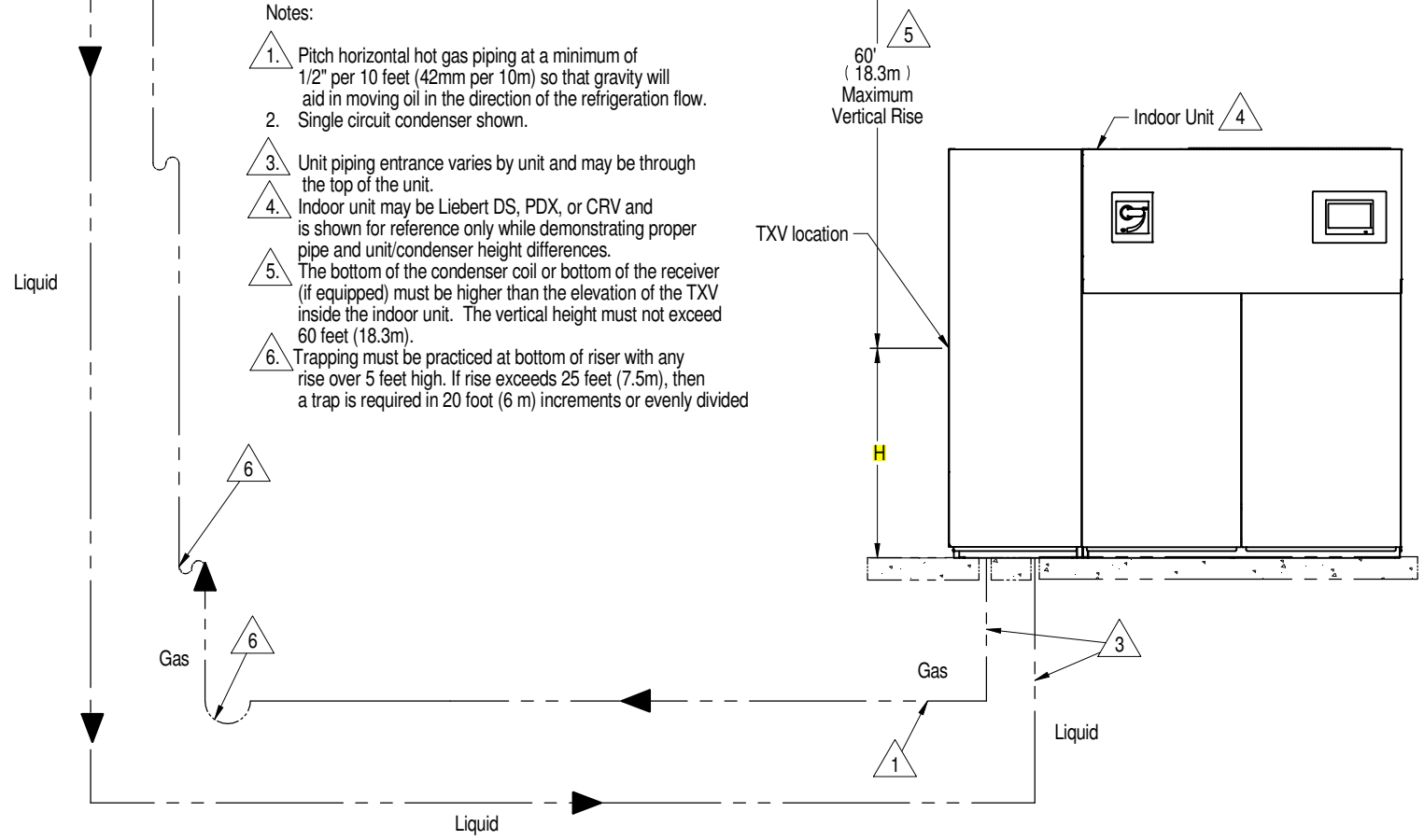


MC Condenser without Receiver

(Piping to Condenser not shown for clarity)

Notes:

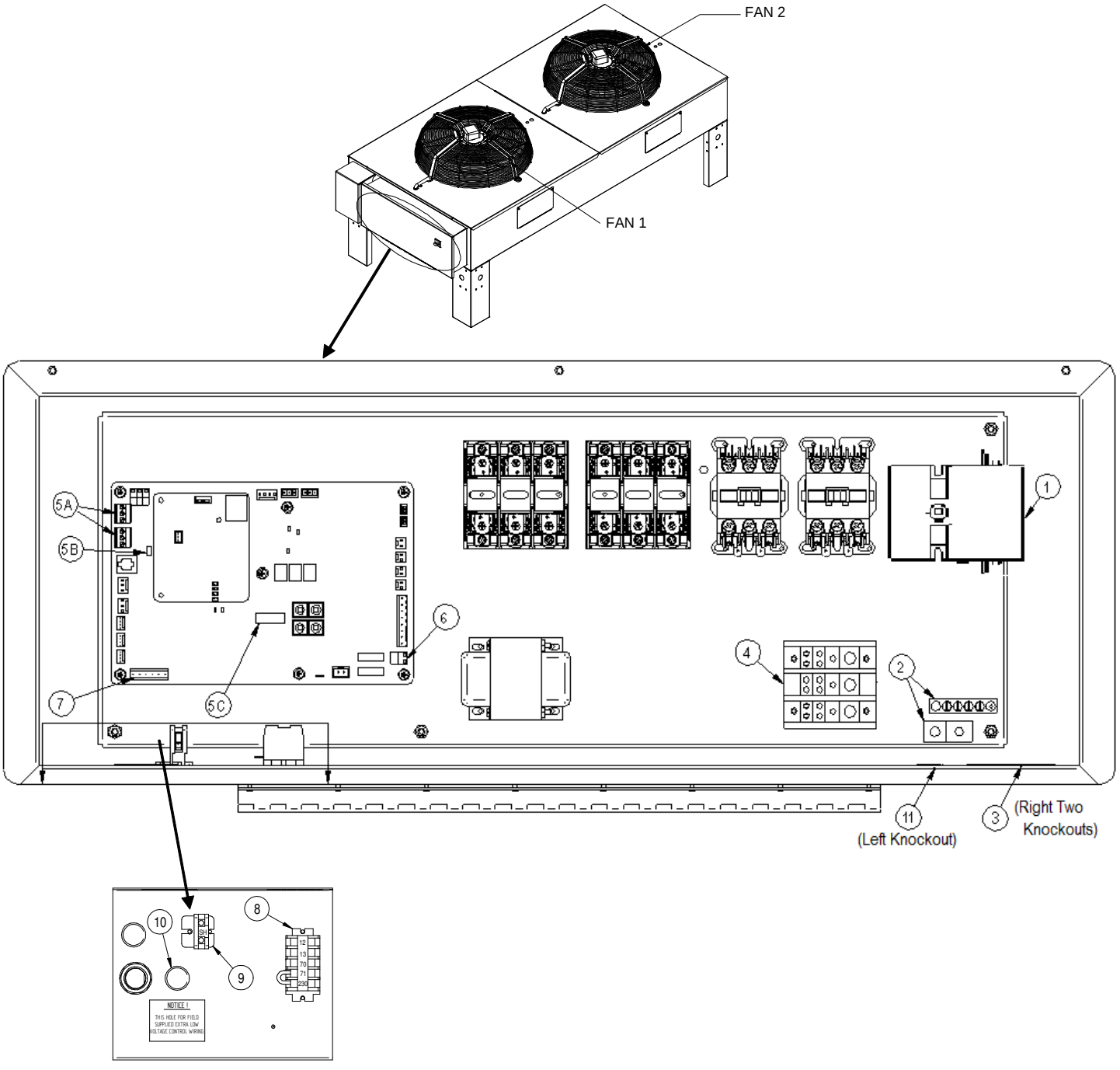
1. Pitch horizontal hot gas piping at a minimum of 1/2" per 10 feet (42mm per 10m) so that gravity will aid in moving oil in the direction of the refrigeration flow.
2. Single circuit condenser shown.
3. Unit piping entrance varies by unit and by may be through the top of the unit.
4. Indoor unit may be Liebert DS, PDX, or CRV and is shown for reference only while demonstrating proper pipe and unit/condenser height differences.
5. The bottom of the condenser coil or bottom of the receiver (if equipped) must be higher than the elevation of the TXV inside the indoor unit. The vertical height must not exceed 60 feet (18.3m).
6. Trapping must be practiced at bottom of riser with any rise over 5 feet high. If rise exceeds 25 feet (7.5m), then a trap is required in 20 foot (6 m) increments or evenly divided



Internal TXV Height	H in. (mm)
PDX Downflow	44 (1118)
PDX Upflow	20 (508)
DS035-105 Downflow/Upflow	43 (1092)
CRV - CR019	45 (1143)
CRV - CR020/CR035	27 (686)

Field piping

ELECTRICAL FIELD CONNECTIONS
PREMIUM EFFICIENCY CONTROL



KEY ELECTRICAL DETAILS:

1) **Three phase electrical service –** Terminals are on top of disconnect switch for one and two fan units. Terminals are on bottom of disconnect switch for three and four fan units. Three phase service not by Liebert. See note 5.
2) **Earth ground –** Field lug terminal for earth ground connection. Ground terminal strip for fan motor ground connection.
3) **Primary high voltage entrance –** Two 7/8" (22.2mm) diameter knockouts located at the bottom of the enclosure.
4) **SPD field connection terminals –** High voltage surge protective device (SPD) terminals. SPD is an optional device.

ELECTRICAL FIELD CONNECTIONS
PREMIUM EFFICIENCY CONTROL

5) **CANbus terminal connections –** Field terminals for CANbus cable connection.
- 5A is the CANbus connectors.
  - TB49-1 is the input terminal for CANbus high.
  - TB49-3 is the input terminal for CANbus low.
  - TB50-1 is output terminal for CANbus high.
  - TB50-3 is the output terminal for CANbus low.
  - Each CANbus cable shield is connected to terminal "SH", item 9.
- 5B is the "END OF LINE" jumper.
- 5C is the CANbus "DEVICE ADDRESS DIP SWITCH". CANbus cable not by Liebert. See Note 2. (below)

6) **Remote unit shutdown –** Replace existing jumper between terminals TB38-1 and TB38-2 with field supplied normally closed switch having a minimum 75VA 24VAC rating. Use field supplied Class 1 wiring. (This is an optional feature that may be owner specified.)

7) **Alarm terminal connections –**
   a. Common Alarm Relay indicates when any type of alarm occurs. TB74-1 is common, TB74-2 is normally open, and TB74-3 is normally closed. 1 Amp 24VAC is the maximum load. Use Class 1 field supplied wiring.
   b. Shutdown Alarm Relay indicates when condenser loses power, or when a critical alarm has occurred that shuts down the condenser unit. TB74-4 is common, TB74-5 is normally open, and TB74-6 is normally closed. 1 Amp 24VAC is the maximum load. Use Class 1 field supplied wiring.

8) **Indoor unit interlock and SPD alarm terminals –**
   a. On any call for compressor operation, normally open contact is closed across terminals 70 and 71 for Circuit 1, and normally open contact is closed across terminals 70 and 230 for Circuit 2 from indoor room unit.
   b. During SPD alarm, normally open contact is closed across terminals 12 & 13. SPD is an optional device.

9) **CANbus shield terminal –** Terminal for field shield connection of the CANbus field supplied cables. The shield of CANbus field supplied cables must not be connected to ground at the condenser.

10) **Primary low voltage entrance –** One 7/8" (22.2mm) diameter knockout that is free for customer low voltage wiring.

11) **SPD entrance –** One 7/8" (22.2mm) diameter knockout hole located at the bottom of the enclosure. High voltage surge protective device (SPD) is optional.

NOTES:

1. Refer to specification sheet for unit voltage rating, full load amp, and wire size amp ratings.
2. The CANbus wiring is field supplied and must be:
   - Braided shield or foil shield with drain wire
   - Shield must be wired to ground at indoor unit
   - 22-18AWG stranded tinned copper
   - Twisted pair (minimum 4 twists per foot)
   - Low Capacitance (15pF/FT or less)
   - Must be rated to meet local codes and conditions
   - EXAMPLES BELDEN 89207 (PLENUM RATED), OR ALPHA WIRE 6454 CATEGORY 5, 5E, OR HIGHER
3. Do not run in same conduit, raceway, or chase as high voltage wiring.
4. For CANbus network lengths greater than 450FT (137M) call Factory.

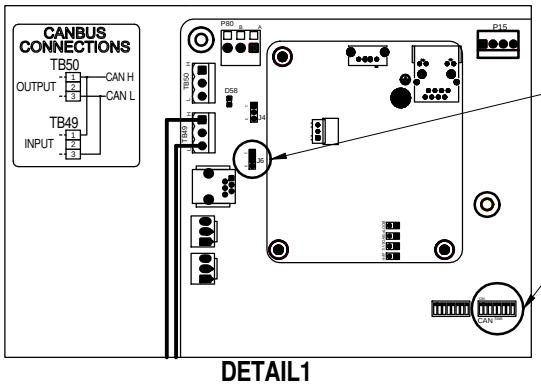
ELECTRICAL FIELD CONNECTIONS
PREMIUM EFFICIENCY CONTROL

5. All wiring must be sized and selected for insulation case per NEC and other local codes.
6. Do not bend cables to less than four times the diameter of the cable.
7. Do not deform cables when securing in bundles or when hanging them.
8. Avoid running the cables by devices that may introduce noise, such as machines, fluorescent lights, and electronics.
9. Avoid stretching cables.
10. The electrically commutated (EC) motors included in the Liebert MC Condenser are suitable for connection to power supplies with a solidly grounded neutral or high resistance to ground or corner ground.
    a. Acceptable power supplies for 208 to 575V nominal units:
        - 208V wye with solidly grounded neutral and 120V line to ground;
        - 380V wye with solidly grounded neutral and 220V line to ground;
        - 480V wye with solidly grounded neutral and 277V line to ground;
        - 575V wye with solidly grounded neutral and 332V line to ground (uses step-down transformer);
        - Wye with high resistance (or impedance) ground;
        - Delta with corner ground

    b. Unacceptable power supplies for 208V to 575V nominal units:
        - Delta without ground or with floating ground;
        - Delta with grounded center tap.

LIEBERT CRV

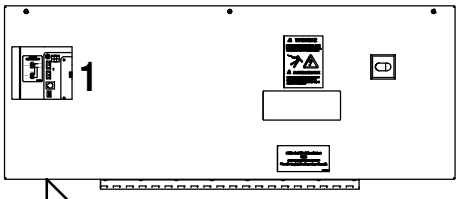
CANbus & INTERLOCK CONNECTIONS
BETWEEN 600mm (24in.) UNIT & LIEBERT MC CONDENSER (PREMIUM)



J6 TERMINATION JUMPER
MUST BE SET TO PINS 1 AND 2.

CANbus
ADDRESSING
SWITCH

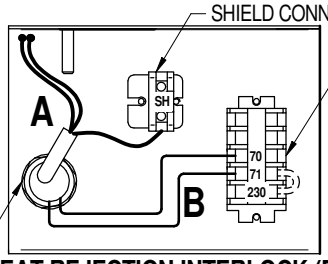
CONDENSER



DETAIL1
CAN CABLE CONNECTION (A)

SHIELD CONNECTION

FACTORY WIRING BETWEEN
MC CONTROL BOARD AND
TERMINAL STRIP.



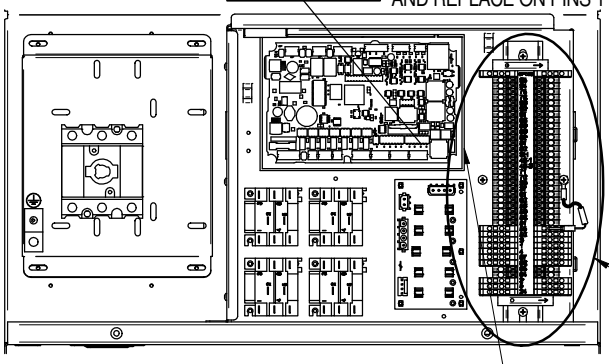
LOW VOLTAGE FIELD ENTRANCE
LOCATED ON BOTTOM LEFT OF
CONDENSER ENCLOSURE.

HEAT REJECTION INTERLOCK (B)

B
HEAT REJECTION INTERLOCK WIRE

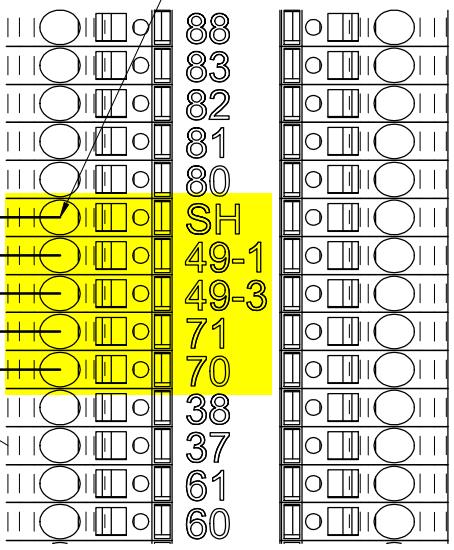
A
CANBUS COMMUNICATION CABLE

P78 TERMINATION JUMPER
FACTORY SET TO PINS 2 AND 3,
FIELD MUST REMOVE JUMPER
AND REPLACE ON PINS 1 AND 2.



PARTIAL VIEW SHOWN FOR CLARITY

SHIELDED CONNECTION



FACTORY WIRING BETWEEN
ICOM & TERMINAL STRIP

PARTIAL VIEW SHOWN FOR CLARITY

CANbus & INTERLOCK CONNECTIONS
BETWEEN 600mm (24in.) UNIT & LIEBERT MC CONDENSER (PREMIUM)

COMPONENT NOTES:
1. COMPONENT APPEARANCE, ORIENTATION,
   AND POSITION MAY VARY
   TERMINAL NAMES AND CALLOUTS REMAIN CONSTANT.
2. ALL CIRCUITS TO THESE CONNECTION POINTS ARE CLASS 2.

CAN & CABLE NOTES (A):
1. CABLE MUSTHAVE THE FOLLOWING SPECIFICATIONS:
   - BRAIDED SHIELD OR FOIL SHIELD WITH DRAIN WIRE
   - SHIELD MUST BE WIRED TO GROUND AT INDOOR UNIT
   - 22-18AWG STRANDED TINNED COPPER
   - TWISTED PAIR (MINIMUM 4 TWISTS PER FOOT)
   - LOW CAPACITANCE (15pF/FT OR LESS)
   - MUST BE RATED TO MEET LOCAL CODES AND CONDITIONS.
   - EXAMPLES BELDEN 89207 (PLENUM RATED), OR ALPHA WIRE 6454 CATEGORY 5, 5E, OR HIGHER.
2. DO NOT RUN IN SAME CONDUIT, RACEWAY, OR CHASE AS HIGH VOLTAGE WIRING.
3. FOR CANBUS NETWORK LENGTHS GREATER THAN 450FT(137M), CONTACT FACTORY.

INTERLOCK WIRE NOTES (B):
1. FIELD SUPPLIED WIRE
   - 2 CONDUCTOR 18AWG OR GREATER
   - RATED 600V

2. RUN FIELD SUPPLIED WIRES BETWEEN THE INDOOR UNIT AND THE CONDENSER.

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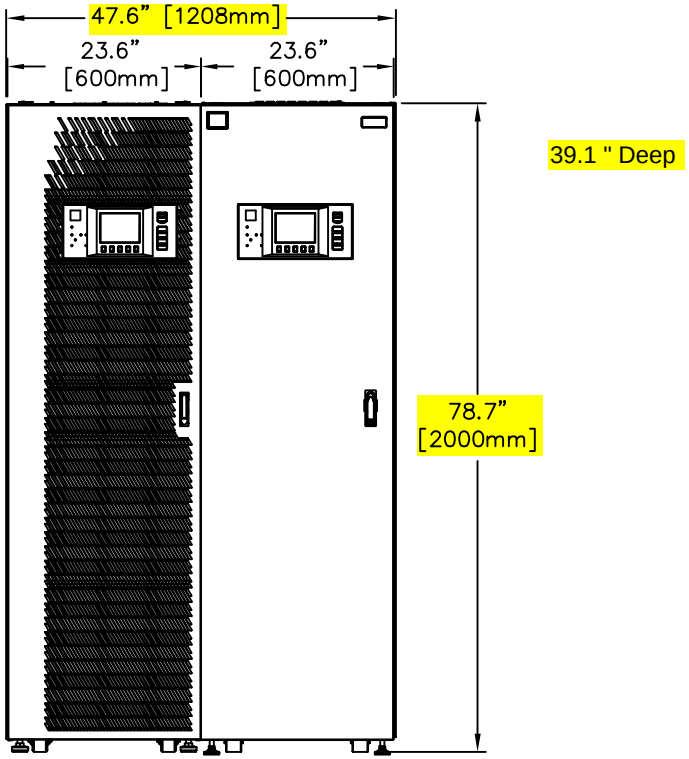
NOTES:
1. ALL DIMENSIONS ARE IN inches [mm].
2. 24" [610] MINIMUM CLEARANCE ABOVE UNIT FOR AIR EXHAUST. 36" [914] FRONT ACCESS REQUIRED FOR SERVICE.
3. KEEP CABINET WITHIN 15 DEGREES OF VERTICAL.
4. TOP AND BOTTOM CABLE ENTRY AVAILABLE THROUGH REMOVABLE ACCESS PLATES. REMOVE, PUNCH TO SUIT CONDUIT SIZE AND REPLACE.
5. UNIT BOTTOM IS STRUCTURALLY ADEQUATE FOR FORKLIFT HANDLING.
6. CONTROL WIRING AND POWER WIRING MUST BE RUN IN SEPARATE CONDUITS.
7. ALL WIRING IS TO BE IN ACCORDANCE WITH NATIONAL AND LOCAL ELECTRICAL CODES.
8. ALL BATTERY CABINETS MUST BE POSITIONED ON THE LEFT SIDE OF UPS.



FRONT VIEW

DRAWN BY K. STACY	SHEET NO. 1 OF 1	LINE-UP DETAIL 10kVA - 40kVA UPS TO BDC LIEBERT EXM			
CHK BY M. ROCKWELL	ECN NO.				
REF. DWG.	ORDER NO.		DWG. NO. EXM13028	DATE 12/2/15	REV. # 2

VERTIV.
1050 DEARBORN DRIVE
P.O. BOX 29186
COLUMBUS, OHIO 43229

FILE NAME: I:\appl\Ohio Appl\AE Submittals - Standard\eXM dwg\C) Line-Up Detail\EXM13028-02.dwg

UPS

Two (2) 40kVA Nameplate Liebert EXM UPS with the following features:

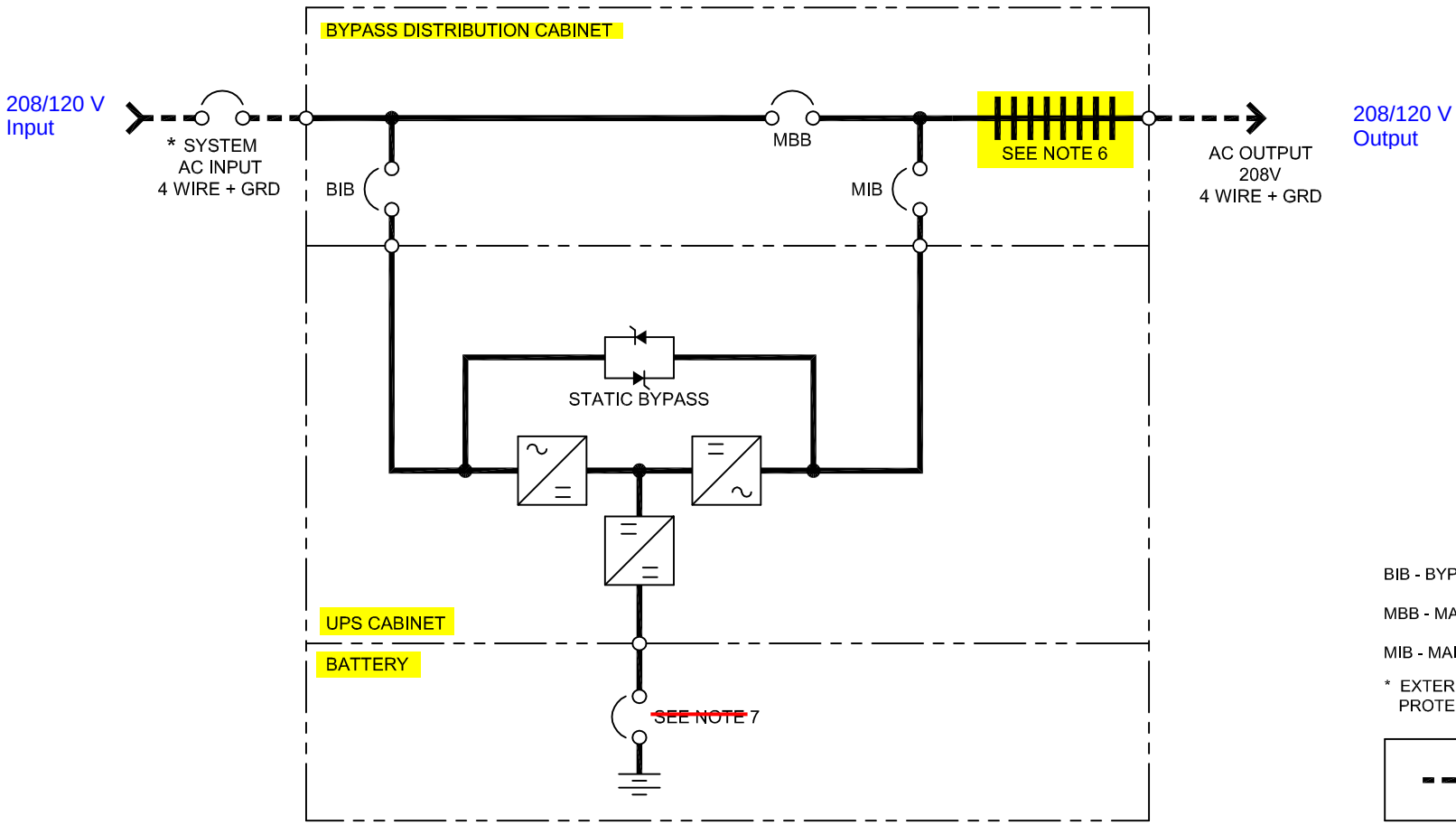
- System Input Voltage of 208/120V, 3 Phase, 4 wire plus ground
- System Output Voltage of 208/120V, 3 Phase, 4 wire plus ground
- Fixed Capacity 40kVA UPS System
- 208V Native Output Voltage
- Single Input Configuration
- One (1) IntelliSlot Unity Dual Protocol Card; P/N: IS-UNITY-DP; Monitoring and configuration of Vertiv products and environmental sensors through stand-alone Web UI or integration with Trellis™, Liebert Nform, LIFE™ Services. Supports third-party management systems using SNMP, Modbus or BACnet.
- SNMP Communication
- BACnet Communication
- One (1) IS-RELAY Relay Contact Card(s)
- Transformer-Free Architecture - Efficiency up to 95% in double conversion mode
- Unity Power Factor Rating - Delivers more usable power per kVA
- Load Power Factor Support - Supports loads 0.5 lagging to unity without derating
- Energy Optimization Mode (Eco-Mode)
- 65kAIC Rating - Provides interrupting rating and labeling of 65kA
- Active Power Factor Corrected IGBT Input Converter
- PWM transistorized (IGBT) inverter
- Continuous Duty Static Bypass Switch
- Input Contacts - Dry contacts are available for functions including monitoring external breakers, on-generator signal, and other functions
- Output Contacts - Dry contacts are available for functions including a permissive signal to maintenance bypass SKRU, to trip external breakers, and other functions
- Generator Load Control - Suppresses battery charging reducing power demand by an external signal. Shifts unit from Eco Mode to double conversion (if applicable), and synchronizes the inverter output with the bypass
- Automatic retransfer - Provides return to inverter power after an overload
- DSP based controls - Provides digital control of power conversion and system operation
- Backlit LCD display - Monitors power conversion, UPS operation and utility conditions. Deviations are logged for troubleshooting
- Temperature-Compensated Charging/Battery Load Test
- Top-and-bottom-entry cable access
- Front only service access
- Local Emergency Power Off (EPO)
- LIFE™ Services for the 1st year
- IP 20 enclosure
- Casters and leveling feet
- UL and cUL Listed to UL Standard 1778 5th Edition
- Liebert EXM Factory Services Certified Test Report
- 9 min,1 x Internal String of ENERSYS HX205-FR Batteries

Two (2) Maintenance Bypass Cabinet(s), with the following features:

- 3 Switching Devices (BIB,MBB,MIB)
- 175 Amp Breaker Trip Rating
- Key Interlock (SKRU)
- Cabinet Mounted Right Attached to Module with connecting cables factory supplied
- 600 MM - 23.6 inches Frame Size
- Front Access service design
- (1) 225 Amp, 54 pole SqD bolt/plug-in panelboard

Startup & Warranty Services:

- Startup by local Vertiv Service Technician 7/24
- Total Warranty: Parts, Labor, 4hr Response 7/24, and one (1) 8x5 PM visit after the first year



BIB - BYPASS ISOLATION BREAKER

MBB - MAINTENANCE BYPASS BREAKER

MIB - MAINTENANCE ISOLATION BREAKER

* EXTERNAL OVERCURRENT PROTECTION BY OTHERS

FIELD SUPPLIED WIRING

NOTES:

1. INSTALL IN ACCORDANCE WITH NATIONAL AND LOCAL ELECTRICAL CODES.
2. INPUT AND BYPASS MUST SHARE THE SAME SINGLE SOURCE.
3. A NEUTRAL IS REQUIRED FROM THE SYSTEM AC INPUT SOURCE. A FULL CAPACITY NEUTRAL CONDUCTOR IS RECOMMENDED. GROUNDING CONDUCTORS ARE RECOMMENDED.
4. UPS SYSTEM INPUT AND OUTPUT CABLES MUST BE RUN IN SEPARATE CONDUITS.
5. CONTROL WIRING MUST BE RUN IN SEPARATE CONDUITS.
6. BDC OFFERS ~~OPTIONAL~~ PANELBOARD. STANDARD OPTIONS INCLUDE 54 POLE/225A FOR 10-40kVA ~~AND 54 POLE/400A FOR 60-100kVA~~.
7. ~~INTERNAL BATTERY BREAKER IS OPTIONAL ON UPS WITH INTERNAL BATTERIES; BATTERY BREAKER IS FACTORY-SUPPLIED WITH EXTERNAL LIEBERT BATTERY CABINETS.~~

DRAWN BY K. STACY	SHEET NO. 1 OF 1	ONE-LINE DIAGRAM 208V SINGLE INPUT 10kVA -100kVA WITH 3 BREAKER BYPASS DISTRIBUTION CABINET AND PANELBOARD LIEBERT EXM			
CHK BY D. McLAURIN	ECN NO.				
REF. DWG.	ORDER NO.		DWG. NO. EXM11003	DATE 6/22/16	REV. # 2

VERTIV.
1050 DEARBORN DRIVE
P.O. BOX 29186
COLUMBUS, OHIO 43229

FILE NAME: I:\appl-DLW\Ohio Appl\AE Submittals - Standard\eXM dwg\208V\A) One-Line Diagram\EXM11003-02.dwg

ELECTRICAL DATA									
kVA RATING	VOLTAGE		AC INPUT CURRENT (A)			BATTERY		AC OUTPUT CURRENT (A)	
	INPUT	OUTPUT	NOM	MAX	REC OPD	NOM VDC	MAX DISCHARGE (A)	NOM	REC OPD
10	208	208	30	34	45	288	47	28	40
15	208	208	45	51	70	288	70	42	60
20	208	208	59	68	90	288	93	56	70
30	208	208	89	102	150	288	140	83	110
40	208	208	119	136	175	288	187	111	150
60	208	208	178	205	300	288	280	167	225
80	208	208	237	273	350	288	373	222	300
100	208	208	297	341	450	288	467	278	350
120	208	208	356	409	600	288	560	333	450
140	208	208	415	478	600	288	653	389	500
160	208	208	475	546	700	288	746	444	600
180	208	208	534	614	800	288	840	500	700
200	208	208	594	682	900	288	933	555	700

HEAT / WEIGHT INFORMATION							
kVA RATING	UPS HEAT DISSIPATION AT FULL LOAD (BTU/HR)	WEIGHT UNPACKED, LBS (KG)			WEIGHT PACKED, LBS (KG)		
		40kVA FRAME	100kVA FRAME	200kVA FRAME	40kVA FRAME	100kVA FRAME	200kVA FRAME
10	2,217	684 (320)	N/A	N/A	809 (367)	N/A	N/A
15	3,245	684 (320)	N/A	N/A	809 (367)	N/A	N/A
20	3,843	684 (320)	684 (320)	852 (387)	809 (367)	809 (367)	977 (443)
30	6,189	758 (344)	N/A	N/A	883 (401)	N/A	N/A
40	7,610	758 (344)	~~758 (344)~~	~~926 (420)~~	883 (401)	~~883 (401)~~	~~1,051 (477)~~
60	11,278	N/A	844 (383)	1,000 (453)	N/A	969 (440)	1,125 (510)
80	14,977	N/A	918 (416)	1,073 (487)	N/A	1,043 (473)	1,198 (543)
100	18,645	N/A	992 (450)	1,147 (520)	N/A	1,117 (507)	1,272 (577)
120	21,193	N/A	N/A	1,221 (554)	N/A	N/A	1,346 (611)
140	23,512	N/A	N/A	1,295 (587)	N/A	N/A	1,420 (644)
160	29,529	N/A	N/A	1,368 (621)	N/A	N/A	1,493 (677)
180	31,994	N/A	N/A	1,442 (654)	N/A	N/A	1,567 (711)
200	35,548	N/A	N/A	1,516 (688)	N/A	N/A	1,641 (744)

THIS CHART IS FOR UPS WEIGHTS ONLY. FOR MBC OR BDC WEIGHTS REFER TO SUBMITTAL EM2-03-S015 OR EM2-03-S016.

INTERNAL BATTERY STRING		
BATT PN	LBS	KG
12HX100	528	240
12HX150E	624	283
12HX205	1,032	468
HR1500	648	294
HR2000	960	435
HRL12110	524	238
HRL12150	622	282
HRL12200	931	422

THIS CHART APPLIES ONLY TO THE 10-40kVA MODELS.

NOTES

1. NOMINAL INPUT CURRENT (CONSIDERED CONTINUOUS) IS BASED ON FULL RATED OUTPUT LOAD. MAXIMUM CURRENT INCLUDES NOMINAL INPUT CURRENT AND MAXIMUM BATTERY RECHARGE CURRENT (CONSIDERED NONCONTINUOUS). CONTINUOUS AND NONCONTINUOUS CURRENT ARE DEFINED IN NEC 100. RECOMMENDED OVERCURRENT PROTECTION IS BASED ON 80% RATED DEVICES. * THE RECOMMENDED OVERCURRENT PROTECTION REPRESENTS 125% OF NOMINAL FULL LOAD CURRENT (CONTINUOUS) PER NEC 215.
2. MAXIMUM INPUT CURRENT IS CONTROLLED BY THE CURRENT LIMIT SETTING.
3. RECOMMENDED AC INPUT EXTERNAL OVERCURRENT PROTECTION IS BASED ON 80% RATED DEVICES AND MAXIMUM INPUT CURRENT LIMIT SETTING.
4. RECOMMENDED AC OUTPUT EXTERNAL OVERCURRENT PROTECTION IS BASED ON 80% RATED DEVICES AND FULL RATED OUTPUT CURRENT.
5. NOMINAL BATTERY VOLTAGE IS SHOWN AT 2.0 VOLTS / CELL.
6. INPUT POWER FACTOR OF 0.99 IS USED FOR THE CALCULATIONS.
7. AC INPUT "MAX CURRENT" IS DEFINED AS 15% BATTERY RECHARGE CURRENT LIMIT WHICH IS THE FACTORY DEFAULT.
8. DOMESTIC PACKAGING DIMENSIONS (WxDxH): 47.2x47.2x82.7 INCHES (1199x1199x2101 mm)

SHEET NO. 1 OF 1	DRAWN BY: N. M.	TITLE		DWG. NO. EXM18009	
ECN NO.	DESIGNED BY: B. SANBORN	TECHNICAL INFORMATION 10-200kVA, 60Hz, 208VAC IN, 208VAC OUT SINGLE INPUT LIEBERT EXM		DATE (LATEST REV.) 10/26/2020	
REF DWG.	APPROVED BY: B. SANBORN			REVISION 9	1050 DEARBORN DR P.O. BOX 29186 COLUMBUS, OH 43229

VERTIV™

NOTES:
1. NOMINAL INPUT CURRENT (CONSIDERED CONTINUOUS) IS BASED ON FULL RATED OUTPUT LOAD. MAXIMUM CURRENT INCLUDES NOMINAL INPUT CURRENT AND MAXIMUM BATTERY RECHARGE CURRENT (CONSIDERED NONCONTINUOUS). CONTINUOUS AND NONCONTINUOUS CURRENT ARE DEFINED IN NEC 100. MAXIMUM INPUT CURRENT IS CONTROLLED BY THE CURRENT LIMIT.
2. RECOMMENDED AC INPUT EXTERNAL OVERCURRENT PROTECTION IS BASED ON 80% RATED DEVICES AND MAXIMUM INPUT CURRENT LIMIT SETTING.
3. FOR THE LATEST UP-TO-DATE INFORMATION PLEASE REFER TO THE USERS MANUAL, SL-25653

Liebert eXM BDC INPUT CURRENTS, DUAL INPUT

Voltage 3-Ph, 60 Hz	BDC kVA RATING	RECTIFIER INPUT DATA					BYPASS INPUT DATA				
		RECTIFIER INPUT CURRENT (Max)	ROCPD	Copper Wire	Aluminum Wire	Bolt Size	BYPASS INPUT CURRENT (Max)	ROCPD	Copper Wire	Aluminum Wire	Bolt Size
208/120 220/127	10	34A	45A	(1) #6	(1) #4	M12	28A	40A	(1) #6	(1) #4	M12
208/120 220/127	15	51A	70A	(1) #3	(1) #2	M12	42A	70A	(1) #4	(1) #2	M12
208/120 220/127	20	68A	90A	(1) #2	(1) 1/0	M12	56A	80A	(1) #2	(1) #2	M12
208/120 220/127	30	102A	150A	(1) 2/0	(1) 4/0	M12	83A	125A	(1) 1/0	(1) 2/0	M12
208/120 220/127	40	136A	175A	(1) 4/0	(2) 1/0	M12	111A	175A	(1) 3/0	(1) 4/0	M12
208/120 220/127	60	205A	300A	(2) 3/0	(2) 4/0	M12	167A	250A	(1) 350kcmil	(2) 2/0	M12
208/120 220/127	80	273A	350A	(2) 4/0	(2) 300kcmil	M12	222A	350A	(2) 3/0	(2) 4/0	M12
208/120 220/127	100	341A	450A	(2) 350kcmil	(2) 400kcmil	M12	278A	450A	(2) 4/0	(2) 300kcmil	M12

Liebert eXM BDC INPUT CURRENTS, SINGLE INPUT

Voltage 3-Ph, 60 Hz	BDC kVA RATING	System Input Current A, Max	ROCPD	Copper Wire	Aluminum Wire	Bolt Size
208/120 220/127	10	34	45A	(1) #6	(1) #4	M12
208/120 220/127	15	51	70A	(1) #4	(1) #2	M12
208/120 220/127	20	68	90A	(1) #2	(1) 1/0	M12
208/120 220/127	30	102	150A	(1) 2/0	(1) 4/0	M12
208/120 220/127	40	136	175A	(1) 4/0	(2) 1/0	M12
208/120 220/127	60	205	300A	(2) 3/0	(2) 4/0	M12
208/120 220/127	80	273	350A	(2) 4/0	(2) 300kcmil	M12
208/120 220/127	100	341	450A	(2) 350kcmil	(2) 400kcmil	M12

Liebert eXM BDC OUTPUT CURRENTS

Voltage 3-Ph, 60 Hz	BDC kVA RATING	SYSTEM OUTPUT CURRENT	Copper Wire	Aluminum Wire	Bolt Size
208/120 220/127	10	28A	(1) #6	(1) #4	M12
208/120 220/127	15	42A	(1) #4	(1) #2	M12
208/120 220/127	20	56A	(1) #2	(1) #2	M12
208/120 220/127	30	83A	(1) 1/0	(1) 2/0	M12
208/120 220/127	40	111A	(1) 3/0	(1) 4/0	M12
208/120 220/127	60	167A	(1) 350kcmil	(2) 2/0	M12
208/120 220/127	80	222A	(2) 3/0	(2) 4/0	M12
208/120 220/127	100	278A	(2) 4/0	(2) 300kcmil	M12

DRAWN BY K. STACY	SHEET NO. 1 OF 2	TECHNICAL INFORMATION 10kVA - 100kVA BYPASS DISTRIBUTION CABINET (BDC) 208VAC IN/OUT LIEBERT EXM			VERTIV.
CHK BY D. McLAURIN	ECN NO.		DWG. NO. EXM18015A	DATE 06/27/2017	REV. # 5
REF. DWG.	ORDER NO.				1050 DEARBORN DRIVE P.O. BOX 29186 COLUMBUS, OHIO 43229

FILE NAME: I:\appl-DLW\Ohio Appl\AE Submittals - Standard\eXM dwg\208V\H) Technical Information\EXM18015A-04.dwg

3-BREAKER MBC CIRCUIT BREAKER SCHEDULE												
kVA RATING	BIB (UIB)				MIB/MBB				CB1/CB2 (OUTPUT BREAKERS)			
	AF / AT	MFG.	MFG PN	KAIC	AF / AT	MFG.	MFG PN	KAIC	AF / AT	MFG.	MFG PN	KAIC
10kVA	100/45	ABB	T2S050TW	65	100/40	ABB	T2S040TW	65	225/225	ABB	T3N225TW	50
15kVA	225/70	ABB	T3S070TW	65	225/60	ABB	T3S060TW	65	225/225	ABB	T3N225TW	50
20kVA	225/90	ABB	T3S090TW	65	225/70	ABB	T3S070TW	65	225/225	ABB	T3N225TW	50
30kVA	225/150	ABB	T3S150TW	65	225/110	ABB	T3S110TW	65	225/225	ABB	T3N225TW	50
40kVA	225/175	ABB	T3S1750TW	65	225/150	ABB	T3S150TW	65	225/225	ABB	T3N225TW	50
60kVA	400/225	ABB	T5N300TW	65	400/225	ABB	T5N300TW	65	225/225	ABB	T3N225TW	50
80kVA	400/350	ABB	T5N400TW	65	400/300	ABB	T5N400TW	65	225/225	ABB	T3N225TW	50
100kVA	600/450	ABB	T5N600BW	65	400/350	ABB	T5N400TW	65	225/225	ABB	T3N225TW	50

BDC WEIGHT INFORMATION			
BDC kVA RATING	Distribution Type	WEIGHT	
		lbs	kG
10-40kVA	No Distribution	525	239
	225A Panelboard	625	284
	No Distribution & 480V Transformer	1110	505
	No Distribution & 600V Transformer	1125	511
	225A Panelboard & 480V Transformer	1210	550
	225A Panelboard & 600V Transformer	1225	557
60-100kVA	No Distribution	550	250
	Two 225A Subfeed Breakers	660	300
	400A Panelboard	660	300
	No Distribution & 480V Transformer	1522	692
	No Distribution & 600V Transformer	1507	685
	Two 225A Subfeed Breakers & 480V Transformer	1632	742
	Two 225A Subfeed Breakers & 600V Transformer	1617	735
	400A Panelboard & 480V Transformer	1632	742
	400A Panelboard & 600V Transformer	1617	735

BDC HEAT DISSIPATION INFORMATION				
BDC kVA RATING	208:208 Transformer BTU/Hr (kWH)	220:208 Transformer BTU/Hr (kWH)	480:208 Transformer BTU/Hr (kWH)	600:208 Transformer BTU/Hr (kWH)
10	1757 (0.515)	1566 (0.459)	1638 (0.480)	1661 (0.487)
15	2402 (0.704)	2139 (0.627)	2013 (0.590)	1996 (0.585)
20	2911 (0.853)	2593 (0.760)	2733 (0.801)	2681 (0.786)
30	5012 (1.469)	4538 (1.330)	4948 (1.450)	4999 (1.465)
40	5408 (1.585)	4927 (1.444)	5343 (1.566)	5357 (1.570)
60	7503 (2.199)	6848 (2.007)	6855 (2.009)	6855 (2.009)
80	9875 (2.894)	8967 (2.628)	9513 (2.788)	9516 (2.789)
100	9602 (2.814)	8472 (2.483)	10608 (3.109)	10595 (3.105)
* HEAT DISSIPATION AT FULL LOAD				

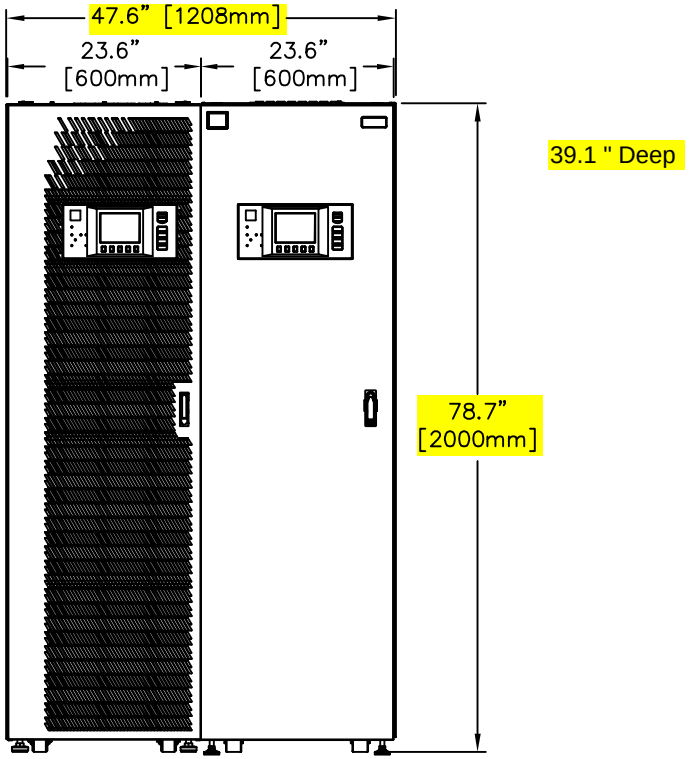
DRAWN BY K. STACY	SHEET NO. 2 OF 2	TECHNICAL INFORMATION 10kVA - 100kVA BYPASS DISTRIBUTION CABINET (BDC) 208VAC IN/OUT LIEBERT EXM	
CHK BY D. McLAURIN	ECN NO.		
REF. DWG.	ORDER NO.		

DWG. NO.	DATE	REV. #	
EXM18015B	06/27/2017	5	1050 DEARBORN DRIVE P.O. BOX 29186 COLUMBUS, OHIO 43229

VERTIV.

FILE NAME: I:\appl-DLW\Ohio Appl\AE Submittals - Standard\eXM dwg\208V\H) Technical Information\EXM18015B-04.dwg

NOTES:
1. ALL DIMENSIONS ARE IN inches [mm].
2. 24" [610] MINIMUM CLEARANCE ABOVE UNIT FOR AIR EXHAUST. 36" [914] FRONT ACCESS REQUIRED FOR SERVICE.
3. KEEP CABINET WITHIN 15 DEGREES OF VERTICAL.
4. TOP AND BOTTOM CABLE ENTRY AVAILABLE THROUGH REMOVABLE ACCESS PLATES. REMOVE, PUNCH TO SUIT CONDUIT SIZE AND REPLACE.
5. UNIT BOTTOM IS STRUCTURALLY ADEQUATE FOR FORKLIFT HANDLING.
6. CONTROL WIRING AND POWER WIRING MUST BE RUN IN SEPARATE CONDUITS.
7. ALL WIRING IS TO BE IN ACCORDANCE WITH NATIONAL AND LOCAL ELECTRICAL CODES.
8. ALL BATTERY CABINETS MUST BE POSITIONED ON THE LEFT SIDE OF UPS.

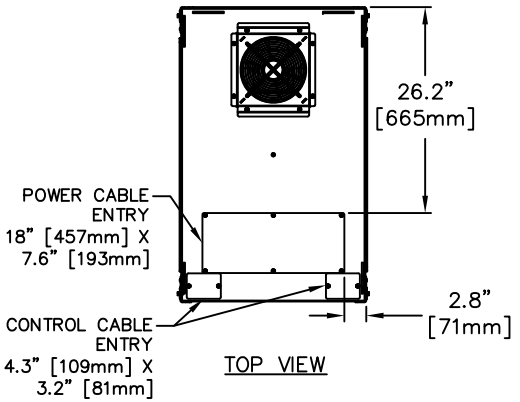


FRONT VIEW

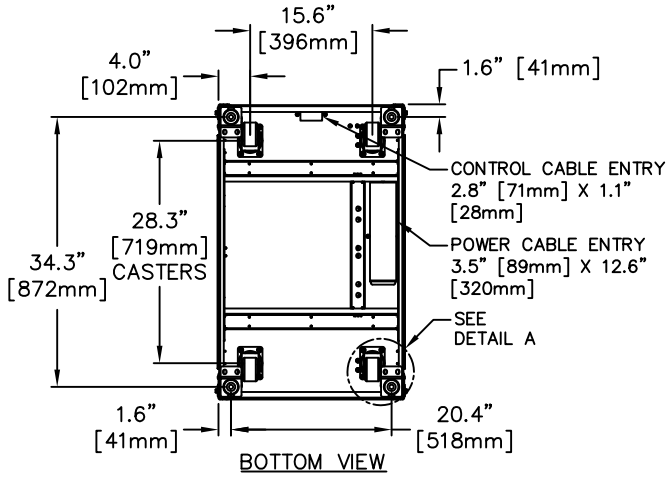
DRAWN BY K. STACY	SHEET NO. 1 OF 1	LINE-UP DETAIL 10kVA - 40kVA UPS TO BDC LIEBERT EXM			
CHK BY M. ROCKWELL	ECN NO.				
REF. DWG.	ORDER NO.		DWG. NO. EXM13028	DATE 12/2/15	REV. # 2

VERTIV.
1050 DEARBORN DRIVE
P.O. BOX 29186
COLUMBUS, OHIO 43229

FILE NAME: I:\appl\Ohio Appl\AE Submittals - Standard\eXM dwg\C) Line-Up Detail\EXM13028-02.dwg

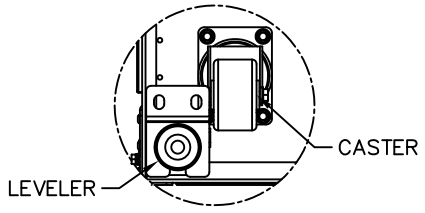


TOP VIEW

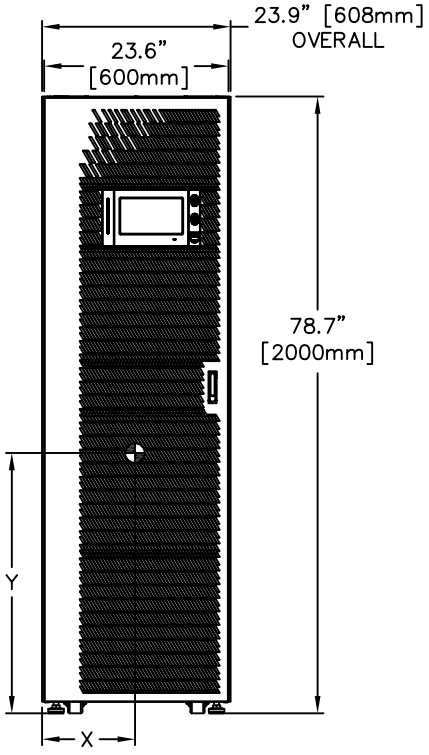


BOTTOM VIEW

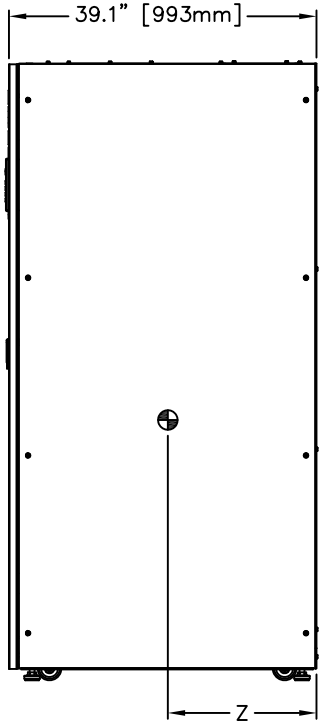
NOTES:
1. ALL DIMENSIONS ARE IN inches [mm].
2. 24" [610] MINIMUM CLEARANCE ABOVE UNIT FOR AIR EXHAUST. 36" [914] FRONT ACCESS REQUIRED FOR SERVICE.
3. KEEP CABINET WITHIN 15 DEGREES OF VERTICAL.
4. TOP AND BOTTOM CABLE ENTRY AVAILABLE THROUGH REMOVABLE ACCESS PLATES. REMOVE, PUNCH TO SUIT CONDUIT SIZE AND REPLACE.
5. UNIT BOTTOM IS STRUCTURALLY ADEQUATE FOR FORKLIFT HANDLING.
6. CONTROL WIRING AND POWER WIRING MUST BE RUN IN SEPARATE CONDUITS.
7. ALL WIRING IS TO BE IN ACCORDANCE WITH NATIONAL AND LOCAL ELECTRICAL CODES.
8. OVERALL DIMENSIONS ARE SHOWN WITH SIDE PANELS.



DETAIL A



FRONT VIEW



RIGHT SIDE VIEW

UPS kVA RATING	CENTER OF GRAVITY in(mm)		
	X	Y	Z
10 – 20	11.8"(300mm)	33.1"(840mm)	18.9"(480mm)
30 – 40	11.8"(300mm)	33.1"(840mm)	18.9"(480mm)

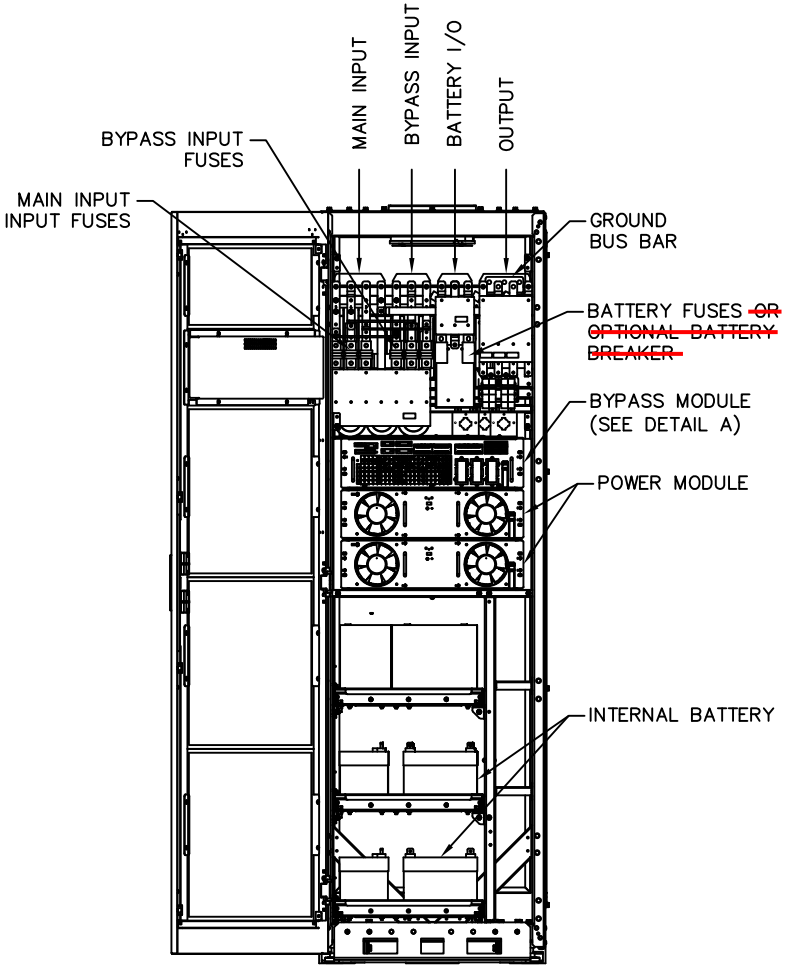
DRAWN BY K. STACY	SHEET NO. 1 OF 2
CHK BY J. SHIPMAN	ECN NO.
REF. DWG.	ORDER NO.

OUTLINE DRAWING
10kVA - 40kVA UPS
LIEBERT EXM

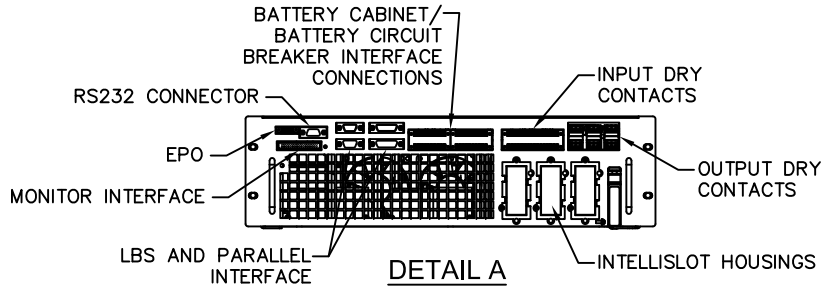
DWG. NO.	DATE	REV. #	
EXM12001A	3/23/17	6	1050 DEARBORN DRIVE P.O. BOX 29186 COLUMBUS, OHIO 43229

VERTIV.

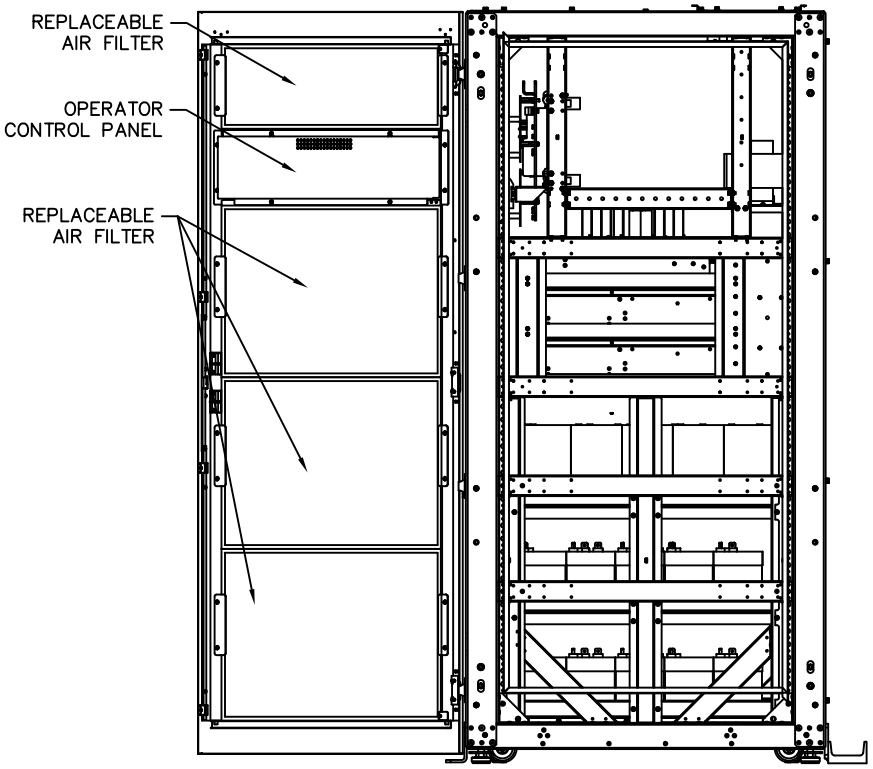
FILE NAME: I:\appl-DLW\Ohio Appl\AE Submittals - Standard\eXM dwg\208V\B) Outline Dwg\EXM12001A-06.dwg



FRONT VIEW
WITH DOOR OPENED



DETAIL A



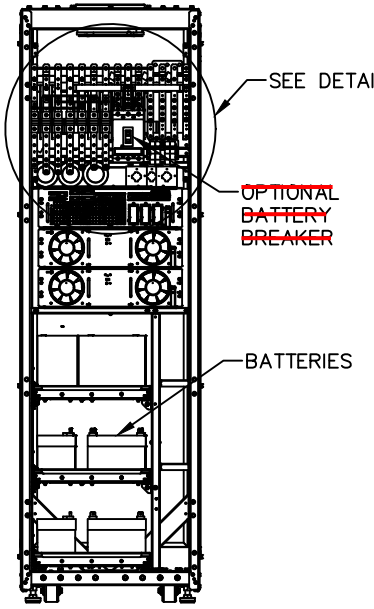
RIGHT SIDE VIEW
WITH DOOR OPENED
(AND SIDE PANEL REMOVED)

DRAWN BY K. STACY	SHEET NO. 2 OF 2	OUTLINES DRAWING MAIN COMPONENTS LAYOUT 10kVA - 40kVA UPS LIEBERT EXM	
CHK BY J. SHIPMAN	ECN NO.		
REF. DWG.	ORDER NO.		

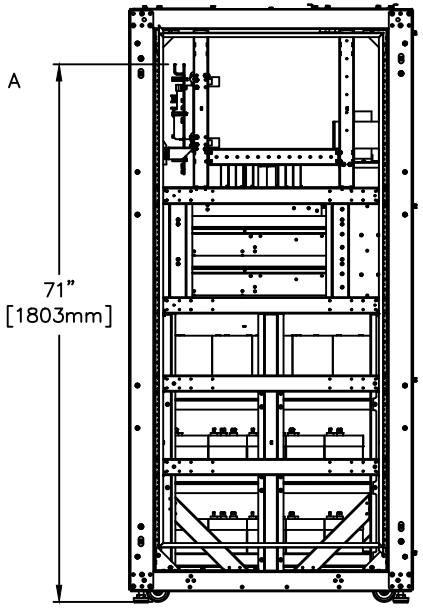
DWG. NO.	DATE	REV. #	
EXM12001B	3/23/17	6	1050 DEARBORN DRIVE P.O. BOX 29186 COLUMBUS, OHIO 43229

VERTIV.

FILE NAME: I:\appl-DLW\Ohio Appl\AE Submittals - Standard\eXM dwg\208V\B) Outline Dwg\EXM12001B-06.dwg



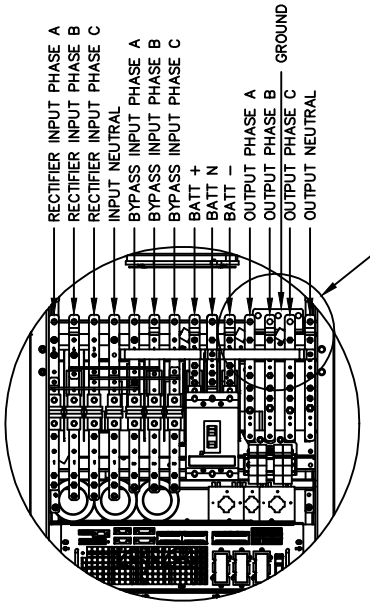
FRONT VIEW
WITH DOOR REMOVED



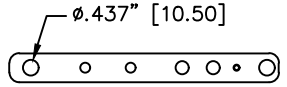
RIGHT SIDE VIEW
WITH PANEL REMOVED

NOTES:
1. ALL DIMENSIONS ARE IN inches [mm].
2. CONTROL WIRING AND POWER WIRING MUST BE RUN IN SEPARATE CONDUITS.
3. ALL WIRING IS TO BE IN ACCORDANCE WITH NATIONAL AND LOCAL ELECTRICAL CODES.

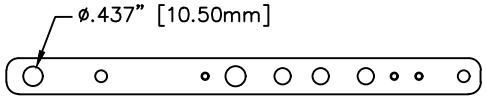
TERMINAL SPECIFICATIONS			
UNIT RATING	UTILITY CONFIGURATIONS		
	BOLT SHAFT SIZE	TORQUE	
		LB-IN	N-M
10-40	M10	240	27



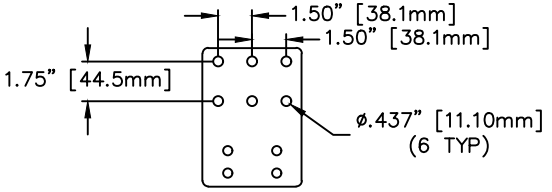
DETAIL A



DETAIL B
(RECTIFIER AND BYPASS
INPUT BUSBARS)



DETAIL C
(BATTERY AND OUTPUT
BUSBARS)



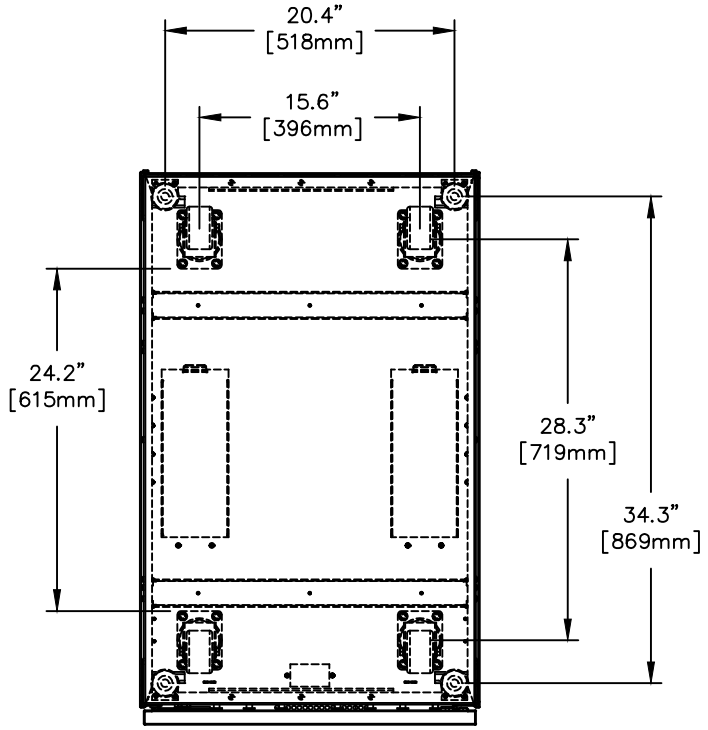
DETAIL D
(GROUND BUSBAR)

DRAWN BY N. M.	SHEET NO. 1 OF 1	TERMINAL DETAIL 10kVA - 40kVA UPS WITH INTERNAL BATTERIES LIEBERT EXM			
CHK BY B. SANBORN	ECN NO.				
REF. DWG.	ORDER NO.		DWG. NO. EXM16002	DATE 07/15/2019	REV. # 4

VERTIV.
1050 DEARBORN DRIVE
P.O. BOX 29186
COLUMBUS, OHIO 43229

FILE NAME: I:\appl-DLW\Ohio Appl\AE Submittals - Standard\eXM dwg\208V\F) Terminal Details\EXM16002-03.dwg

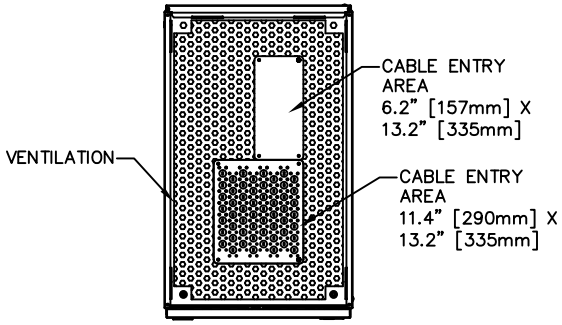
NOTES:
1. ALL DIMENSIONS ARE IN inches [mm].
2. UNIT BOTTOM IS STRUCTURALLY ADEQUATE FOR FORKLIFT HANDLING



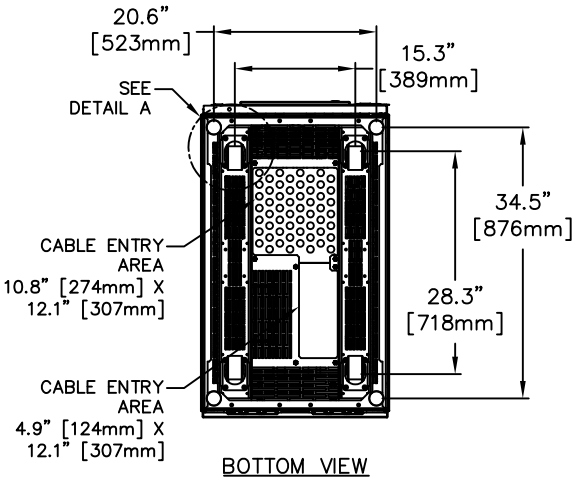
FRONT
(VIEWED LOOKING TOP DOWN)

DRAWN BY K. STACY	SHEET NO. 1 OF 1	BASE DETAIL 10kVA - 100kVA UPS LIEBERT EXM				VERTIV.
CHK BY M. DeWITT	ECN NO.					
REF. DWG.	ORDER NO.		DWG. NO. EXM08001	DATE 5/18/17	REV. # 1	1050 DEARBORN DRIVE P.O. BOX 29186 COLUMBUS, OHIO 43229

FILE NAME: I:\appl\Ohio Appl\AE Submittals - Standard\eXM dwg\I) Seismic & Base Details\EXM08001-01.dwg

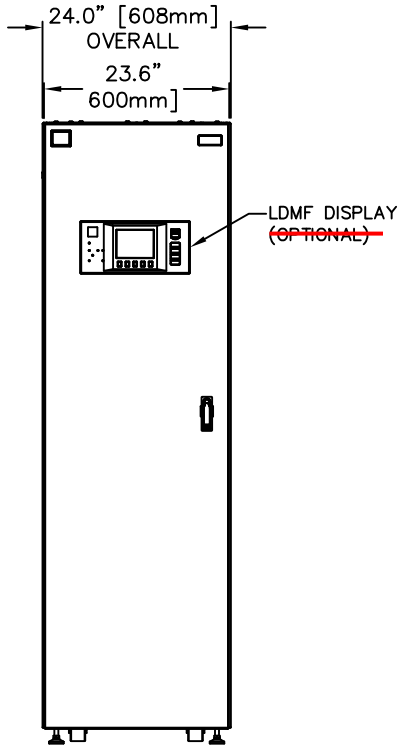


TOP VIEW

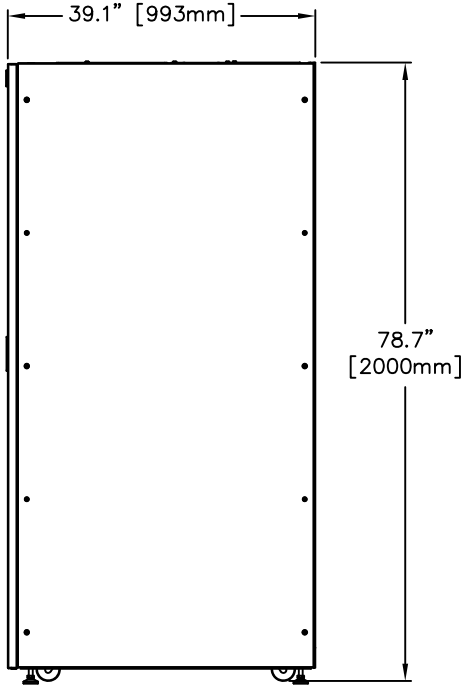


BOTTOM VIEW

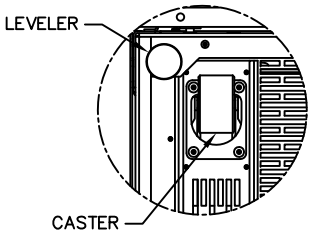
NOTES:
1. ALL DIMENSIONS ARE IN inches [mm].
2. 24" [610] MINIMUM CLEARANCE ABOVE UNIT FOR AIR EXHAUST. 36" [914] FRONT ACCESS REQUIRED FOR SERVICE.
3. KEEP CABINET WITHIN 15 DEGREES OF VERTICAL.
4. TOP AND BOTTOM CABLE ENTRY AVAILABLE THROUGH REMOVABLE ACCESS PLATES. REMOVE, PUNCH TO SUIT CONDUIT SIZE AND REPLACE.
5. UNIT BOTTOM IS STRUCTURALLY ADEQUATE FOR FORKLIFT HANDLING.
6. CONTROL WIRING AND POWER WIRING MUST BE RUN IN SEPARATE CONDUITS.
7. COPPER CABLES ONLY ARE RECOMMENDED.
8. ALL WIRING IS TO BE IN ACCORDANCE WITH NATIONAL AND LOCAL ELECTRICAL CODES.
9. OVERALL DIMENSIONS ARE SHOWN WITH SIDE PANELS.



FRONT VIEW



RIGHT SIDE VIEW



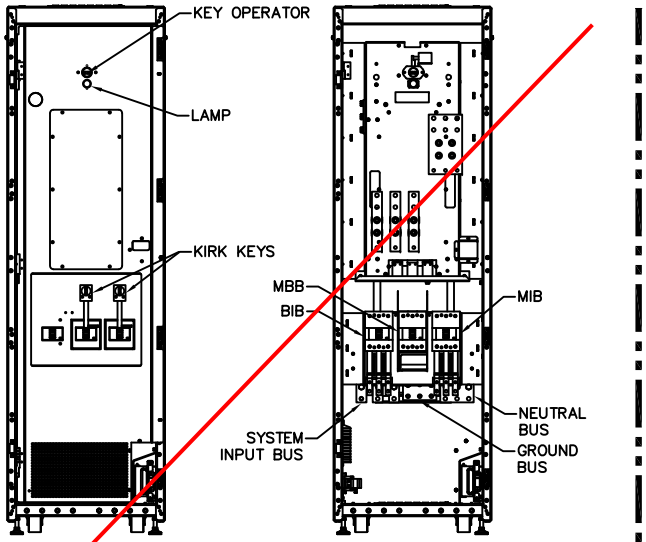
DETAIL A

DRAWN BY K. STACY	SHEET NO. 1 OF 2	OUTLINE DRAWING 10kVA - 100kVA BYPASS DISTRIBUTION CABINET (600mm) LIEBERT EXM			
CHK BY J. SHIPMAN	ECN NO.				
REF. DWG.	ORDER NO.		DWG. NO. EXM12008A	DATE 3/23/17	REV. # 3

VERTIV.

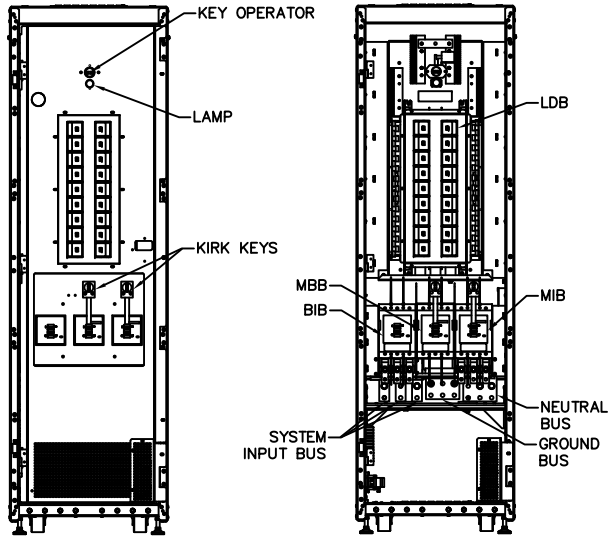
1050 DEARBORN DRIVE
P.O. BOX 29186
COLUMBUS, OHIO 43229

FILE NAME: I:\appl\Ohio Appl\AE Submittals - Standard\eXM dwg\B) Outline Dwg\EXM12008A-03.dwg



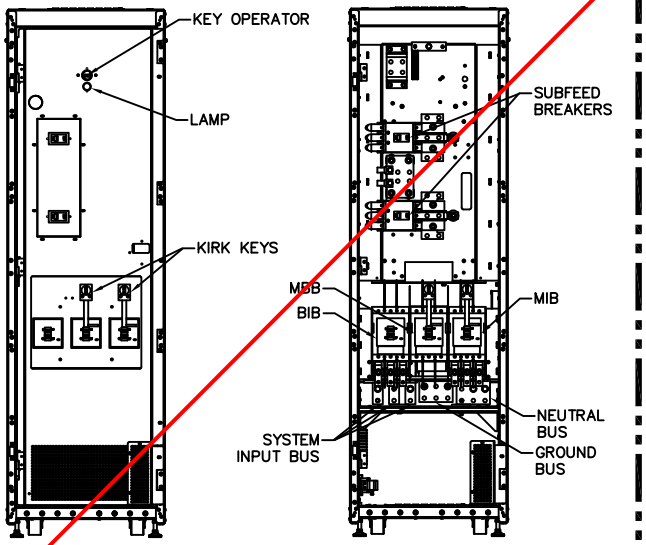
FRONT VIEW
WITH ACCENT PANEL

FRONT VIEW
WITH DOOR REMOVED
(3 BREAKER BDC)



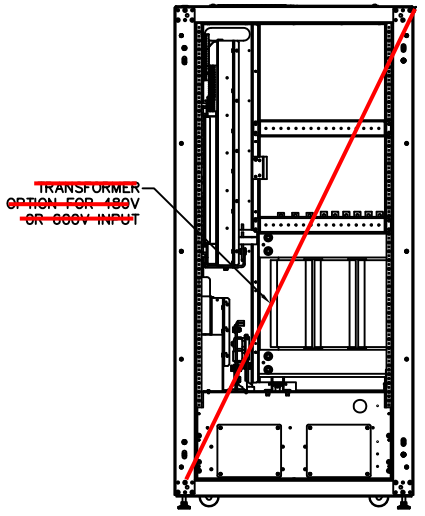
FRONT VIEW
WITH ACCENT PANEL

FRONT VIEW
WITH DOOR REMOVED
(3 BREAKER BDC W/225A OR 400A PB)



FRONT VIEW
WITH ACCENT PANEL

FRONT VIEW
WITH DOOR REMOVED
(3 BREAKER BDC WITH TWO SUBFEED BREAKERS)



RIGHT SIDE VIEW
WITH PANEL REMOVED
(TYPICAL)

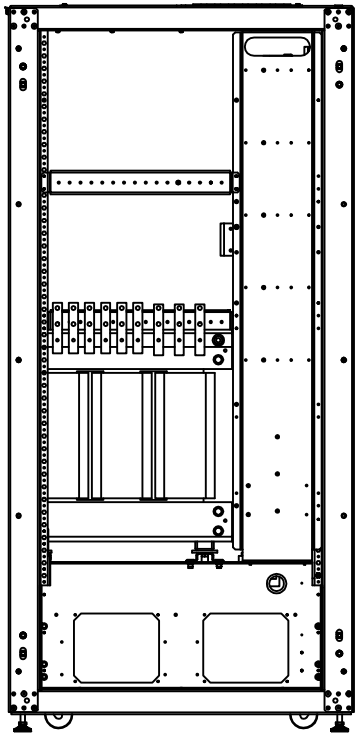
DRAWN BY K. STACY	SHEET NO. 2 OF 2	OUTLINE DRAWING MAIN COMPONENTS LAYOUT 10kVA - 100kVA 3-BREAKER BYPASS CABINET LIEBERT EXM			
CHK BY L. BRAZIS	ECN NO.				
REF. DWG.	ORDER NO.		DWG. NO. EXM12008B	DATE 3/23/17	REV. # 3

VERTIV.

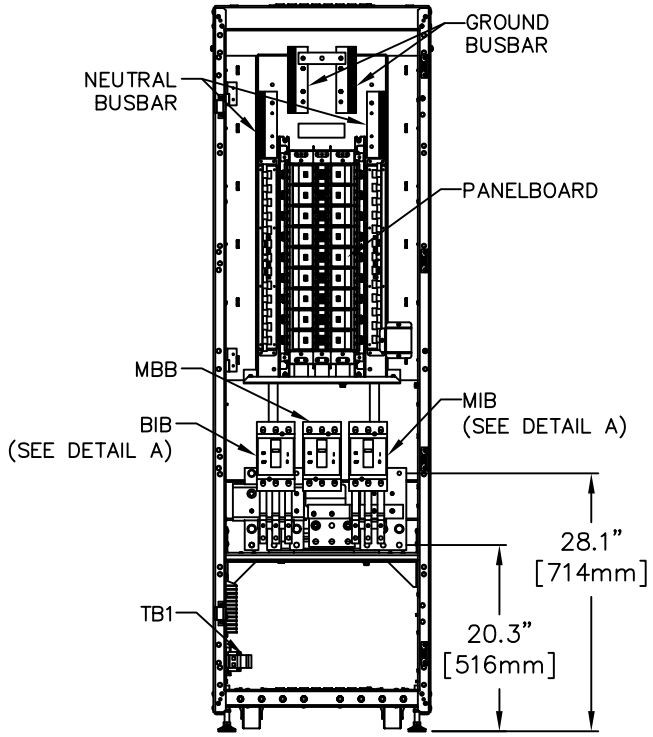
1050 DEARBORN DRIVE
P.O. BOX 29186
COLUMBUS, OHIO 43229

FILE NAME: I:\appl\Ohio Appl\AE Submittals - Standard\eXM dwg\B) Outline Dwg\EXM12008B-03.dwg

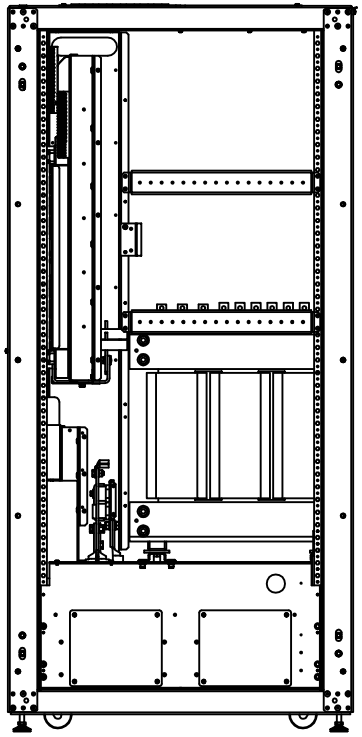
NOTES:
1. ALL DIMENSIONS ARE IN inches [mm].
2. CONTROL WIRING AND POWER WIRING MUST BE RUN IN SEPARATE CONDUITS.
3. ALL WIRING IS TO BE IN ACCORDANCE WITH NATIONAL AND LOCAL ELECTRICAL CODES.
4. IF MAINTENANCE BYPASS CABINET IS ATTACHED TO UPS, LIEBERT WILL SUPPLY THE INTERCONNECTION CABLES.
5. 225A PANELBOARD FOR 10k–40kVA ONLY. 400A PANELBOARD FOR 60–100kVA ONLY



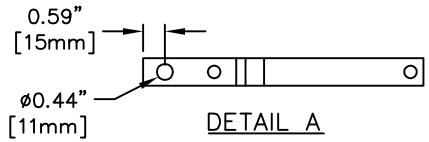
LEFT SIDE VIEW
WITH PANEL REMOVED



FRONT VIEW
WITH DOOR REMOVED



RIGHT SIDE VIEW
WITH PANEL REMOVED



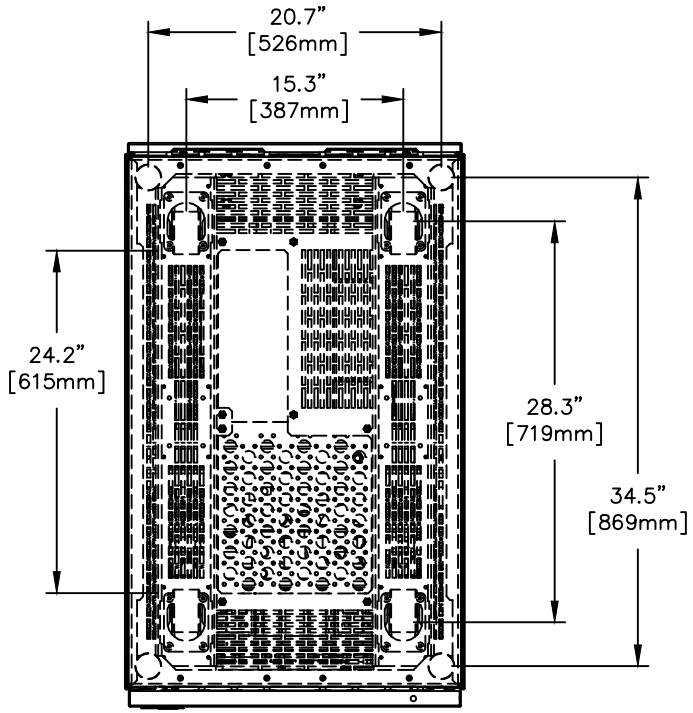
DETAIL A

DRAWN BY K. STACY	SHEET NO. 1 OF 1	TERMINAL DETAIL 10kVA - 100kVA BYPASS DISTRIBUTION CABINET WITH WITH 225A OR 400A PANELBOARD LIEBERT EXM			
CHK BY L. BRAZIS	ECN NO.				
REF. DWG.	ORDER NO.		DWG. NO. EXM16012	DATE 5/26/15	REV. # 2

VERTIV.
1050 DEARBORN DRIVE
P.O. BOX 29186
COLUMBUS, OHIO 43229

FILE NAME: I:\appl\Ohio Appl\AE Submittals - Standard\eXM dwg\F) Terminal Details\EXM16012-02.dwg

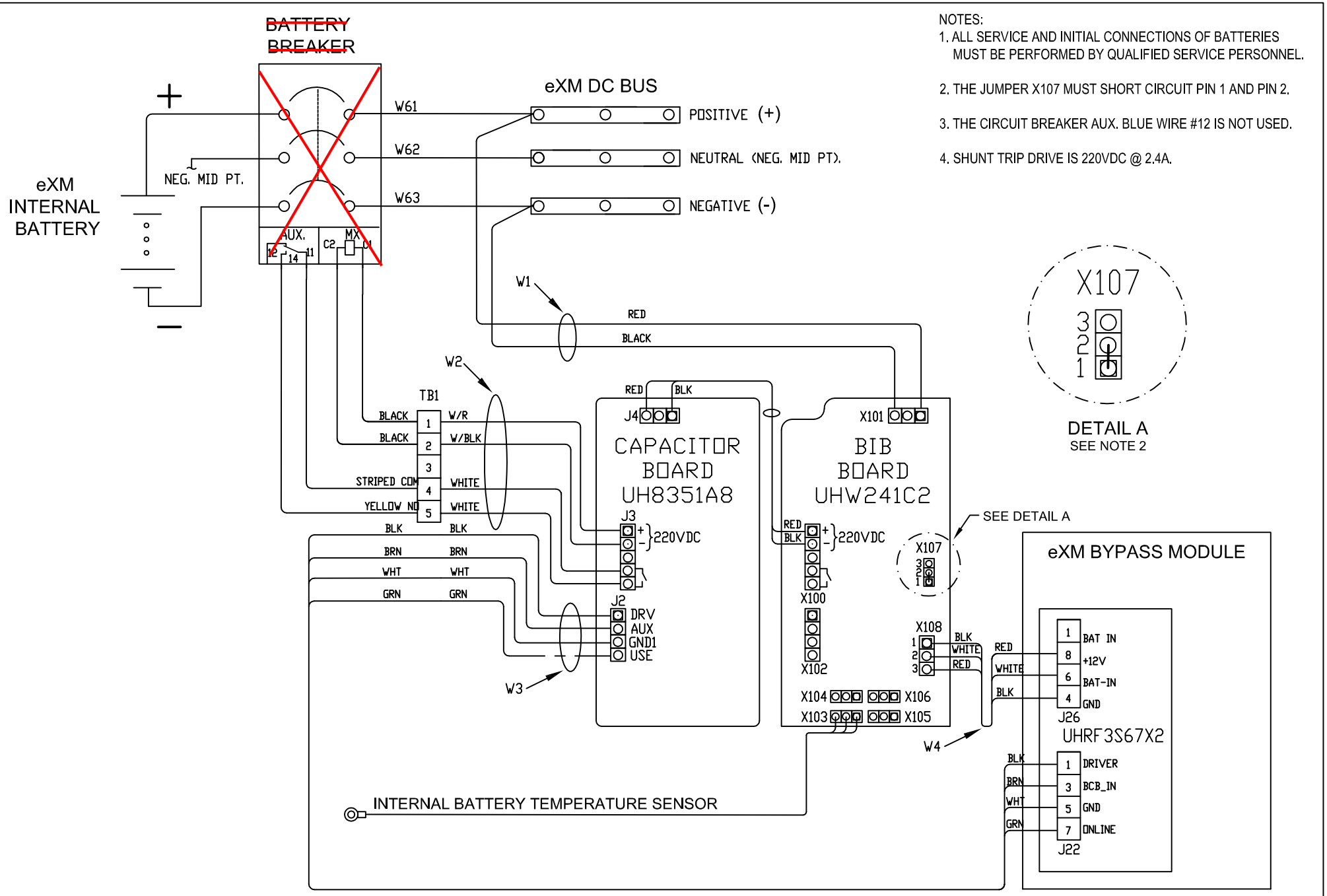
NOTES:
1. ALL DIMENSIONS ARE IN inches [mm].
2. UNIT BOTTOM IS STRUCTURALLY ADEQUATE FOR FORKLIFT HANDLING



FRONT
(VIEWED LOOKING TOP DOWN)

DRAWN BY K. STACY	SHEET NO. 1 OF 1	BASE DETAIL 10kVA - 100kVA BYPASS DISTRIBUTION CABINET (BDC) (600mm) LIEBERT EXM				VERTIV.
CHK BY M. DeWITT	ECN NO.					
REF. DWG.	ORDER NO.		DWG. NO. EXM08004	DATE 5/18/17	REV. # 1	1050 DEARBORN DRIVE P.O. BOX 29186 COLUMBUS, OHIO 43229

FILE NAME: I:\appl\Ohio Appl\AE Submittals - Standard\eXM dwg\I) Seismic & Base Details\EXM08004-01.dwg



NOTES:
1. ALL SERVICE AND INITIAL CONNECTIONS OF BATTERIES MUST BE PERFORMED BY QUALIFIED SERVICE PERSONNEL.
2. THE JUMPER X107 MUST SHORT CIRCUIT PIN 1 AND PIN 2.
3. THE CIRCUIT BREAKER AUX. BLUE WIRE #12 IS NOT USED.
4. SHUNT TRIP DRIVE IS 220VDC @ 2.4A.

DRAWN BY K. STACY	SHEET NO. 1 OF 1
CHK BY M. ROCKWELL	ECN NO.
REF. DWG.	ORDER NO.

CONTROL WIRING DIAGRAM
INTERNAL BATTERY CONNECTIONS TO UPS
10kVA - 40kVA
LIEBERT EXM

DWG. NO.	DATE	REV. #
EXM14001	12/7/15	1

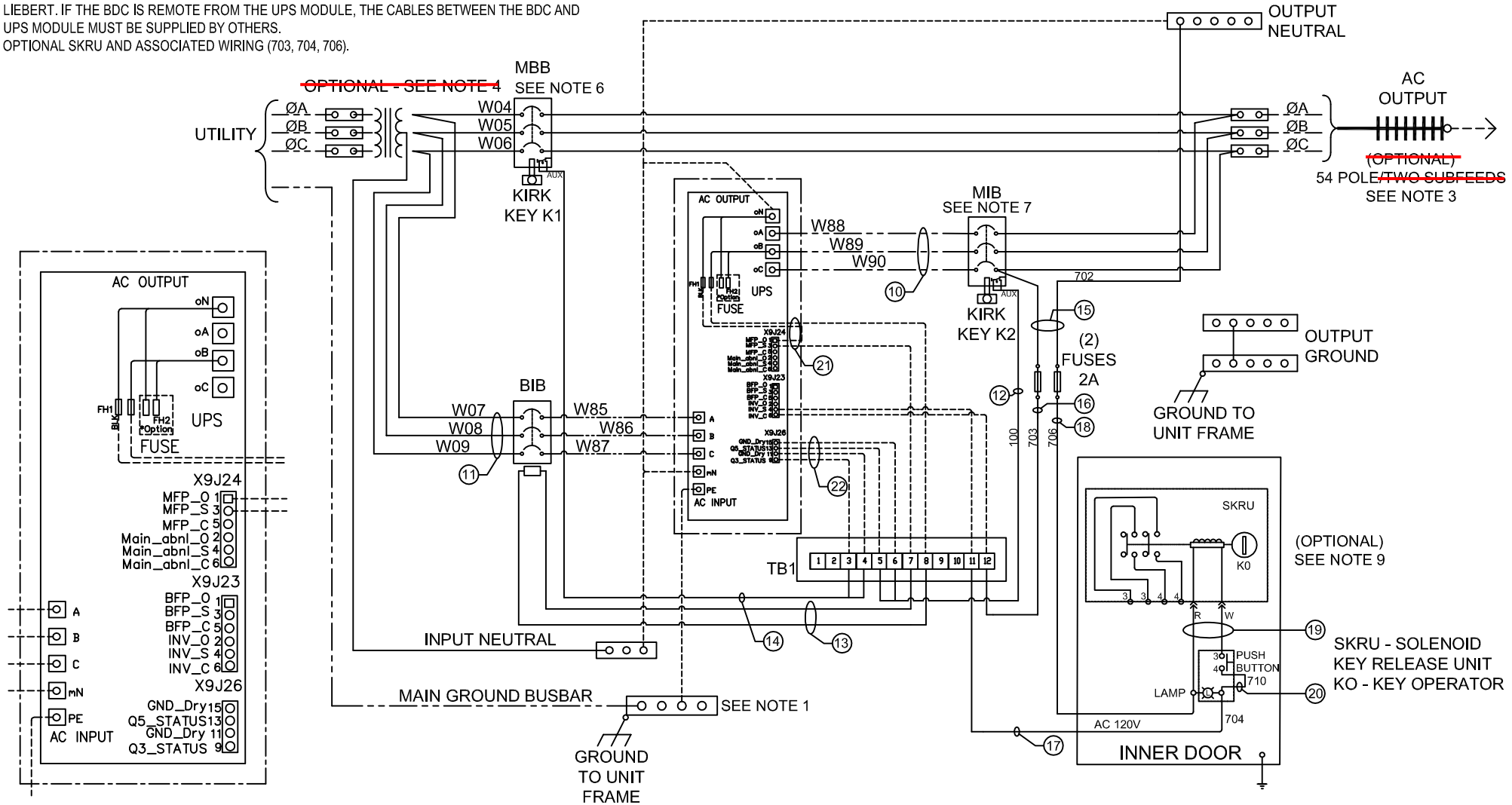
1050 DEARBORN DRIVE
P.O. BOX 29186
COLUMBUS, OHIO 43229

VERTIV.

FILE NAME: I:\appl\Ohio Appl\AE Submittals - Standard\eXM dwg\D) Control Wiring\EXM14001-01.dwg

NOTES:

1. CUSTOMER FURNISHED ELECTRODE CONDUCTOR TO BE INSTALLED IN ACCORDANCE WITH NATIONAL AND LOCAL ELECTRICAL CODES.
2. SEE INSTALLATION MANUAL FOR ADDITIONAL CONNECTION INFORMATION.
3. ~~OP~~T. 54 POLE, 225A FOR 10-40kVA FRAME ONLY ~~OR OPT. 54 POLE, 400A FOR 60-100kVA FRAME ONLY. OR TWO 225A SUBFEEDS FOR 60-100kVA ONL~~Y
4. ~~OPTIONAL TRANSFORMER. 208/220/480/600V INPU~~T.
5. OVERCURRENT PROTECTION IS BASED ON 80% RATED DEVICES.
6. MBB AUX. SWITCH CONNECTIONS ARE ON THE NORMALLY CLOSED AND COMMON POSITIONS.
7. MIB AUX. SWITCH CONNECTIONS ARE ON THE NORMALLY OPENED AND COMMON POSITIONS.
8. BDC WHEN CONNECTED TO UPS MODULE, ALL CONTROL AND POWER WIRING IS SUPPLIED BY LIEBERT. IF THE BDC IS REMOTE FROM THE UPS MODULE, THE CABLES BETWEEN THE BDC AND UPS MODULE MUST BE SUPPLIED BY OTHERS.
9. OPTIONAL SKRU AND ASSOCIATED WIRING (703, 704, 706).



DRAWN BY K. STACY	SHEET NO. 1 OF 1	CONTROL WIRING DIAGRAM SINGLE INPUT UPS AND BYPASS DISTRIBUTION CABINET LIEBERT EXM			
CHK BY M. ROCKWELL	ECN NO.				
REF. DWG.	ORDER NO.		DWG. NO. EXM14005	DATE 10/11/16	REV. # 3

VERTIV.

1050 DEARBORN DRIVE
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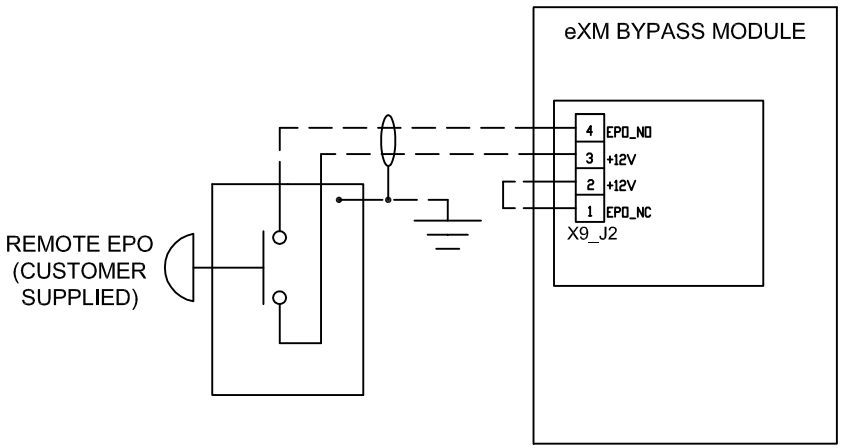
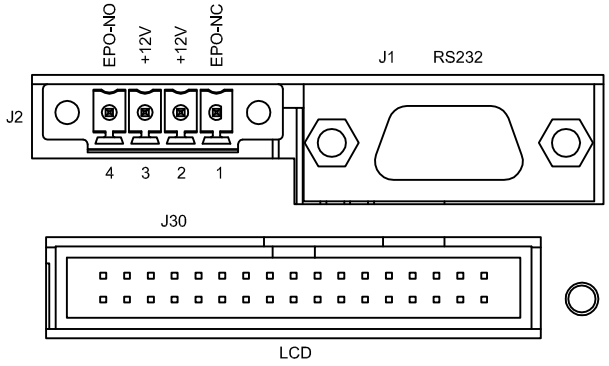
COLUMBUS, OHIO 43229

FILE NAME: I:\appl-DLW\Ohio Appl\AE Submittals - Standard\eXM dwg\208V\D) Power & Control Wiring\EXM14005-03.dwg

— — FIELD SUPPLIED WIRING

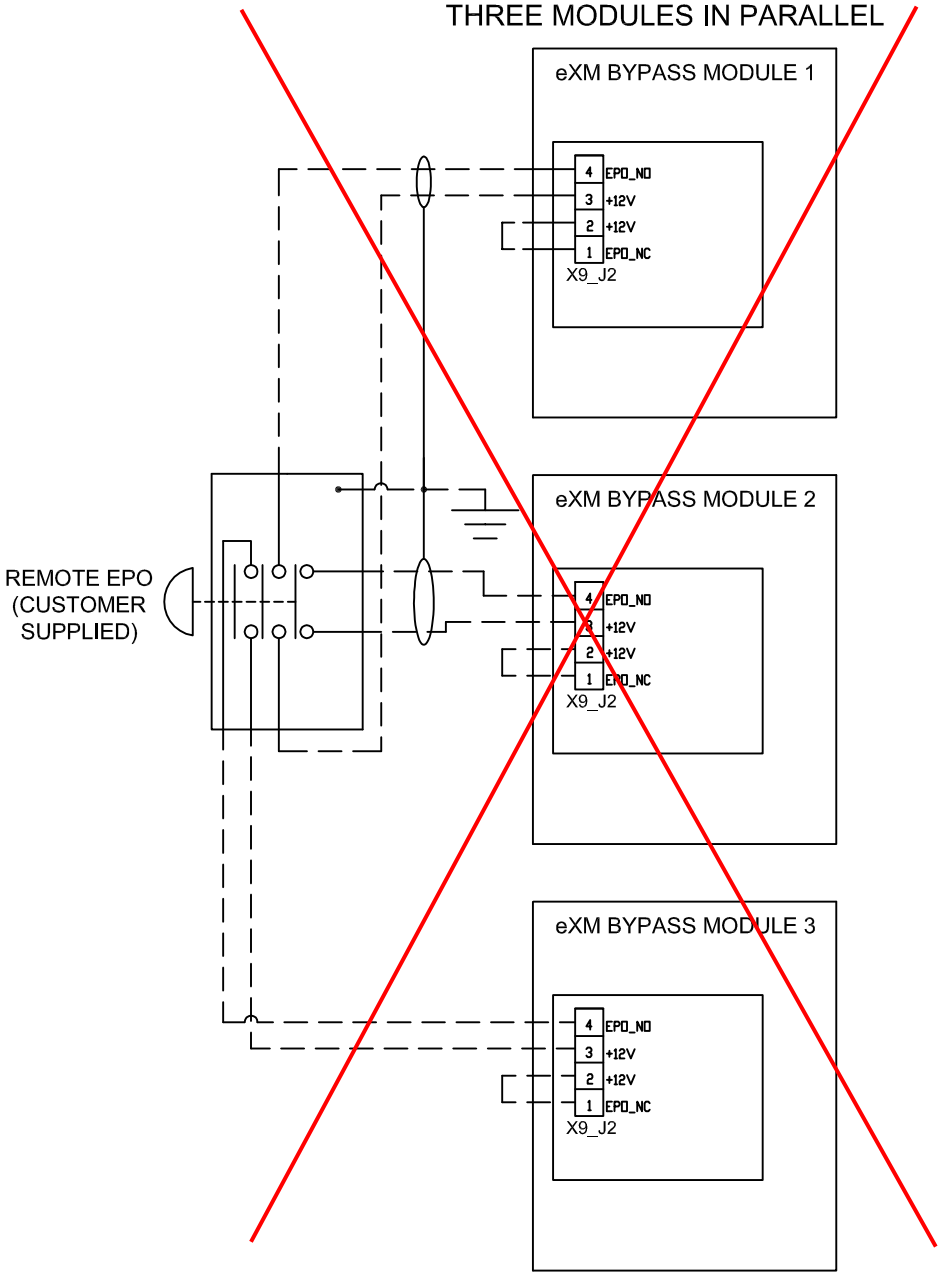
SINGLE eXM MODULE





eXM BYPASS MODULE

THREE MODULES IN PARALLEL



DRAWN BY K. STACY	SHEET NO. 1 OF 1	WIRING DIAGRAM REMOTE EPO 10kVA - 200kVA LIEBERT EXM			
CHK BY M. ROCKWELL	ECN NO.				
REF. DWG.	ORDER NO.		DWG. NO. EXM14008	DATE 12/7/15	REV. # 2

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1050 DEARBORN DRIVE
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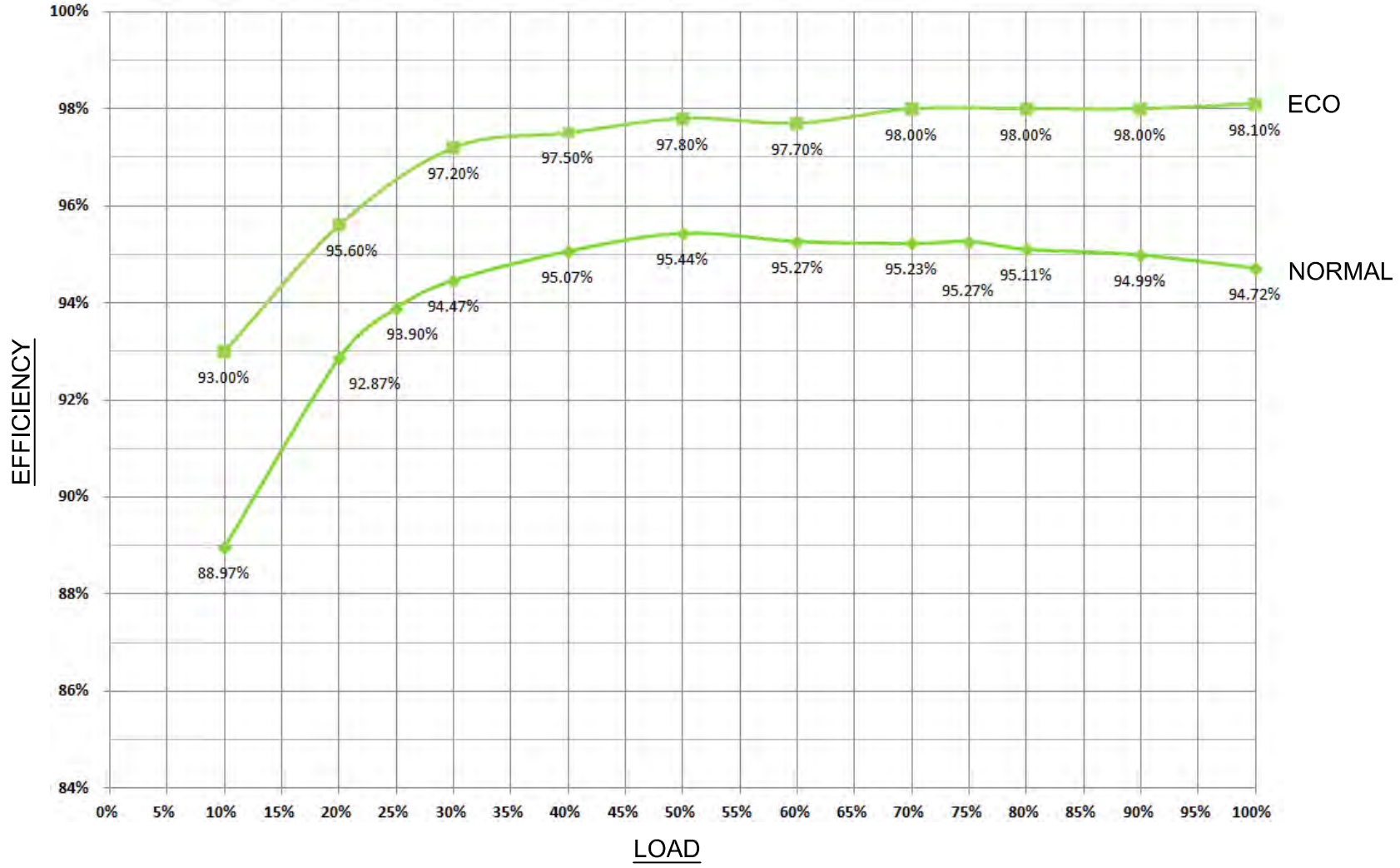
COLUMBUS, OHIO 43229

FILE NAME: I:\appl\Ohio Appl\AE Submittals - Standard\eXM dwg\D) Control Wiring\EXM14008-02.dwg

ECO MODE										
Load percentage	10	20	30	40	50	60	70	80	90	100
Efficiency AC-AC	93	95.6	97.2	97.5	97.8	97.7	98	98	98	98.1

NORMAL MODE												
Load percentage	10	20	25	30	40	50	60	70	75	80	90	100
Efficiency AC-AC	88.97	92.87	93.9	94.47	95.07	95.44	95.27	95.23	95.27	95.11	94.99	94.72



DRAWN BY K. STACY	SHEET NO. 1 OF 1	UPS EFFICIENCY 40kVA LIEBERT EXM			
CHK BY M. ROCKWELL	ECN NO.				
REF. DWG.	ORDER NO.		DWG. NO. EXM17002	DATE 9/4/15	REV. # 2

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FILE NAME: I:\appl\Ohio Appl\AE Submittals - Standard\eXM dwg\G) Efficiency Charts\EXM17002-02.dwg

LIEBERT® INTELLISLOT™ CARDS
Product Specification/Installation Guide

VERTIV™

Liebert® IntelliSlot Web Card

INTELLISLOT™ WEB CARD FAMILY

- Liebert® IntelliSlot Web Card
- Liebert® IntelliSlot Web Card-LB
- Liebert® IntelliSlot WebCard-LBDS

The Liebert IntelliSlot Web Card family delivers enhanced communications and control to Liebert UPS, Power Management and Precision Cooling systems.

Liebert IntelliSlot Web cards bring SNMP, Telnet and Web-management capability to many models of Liebert UPS, power and cooling equipment. The cards employ an Ethernet network to monitor and manage a wide range of operating parameters, alarms and notifications.

ADDITIONAL FEATURES

- SNMPv1, SNMPv2c and with MIB-II support
- HTTP/HTTPS 1.1
- Telnet
- BootP, DHCP per RFC2131/2132
- Remote sockets
- Remote firmware updates via HTTP

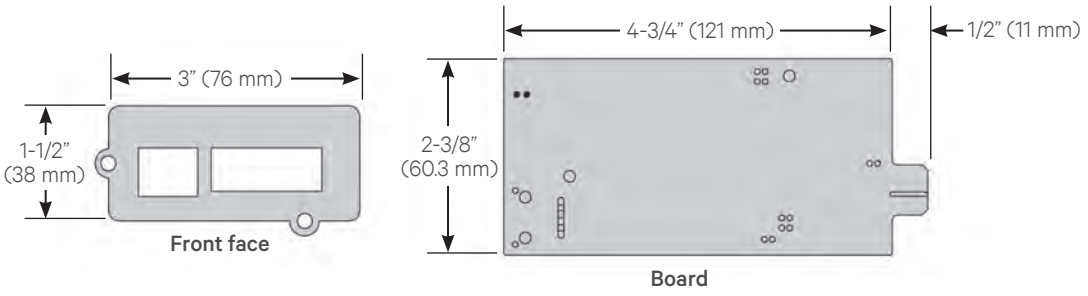
COMPATIBILITY with Liebert Equipment

IntelliSlot Web Card	Part Number	Compatible with:		
Liebert IntelliSlot Web Card	IS-WEBCARD	• Liebert PowerSure PSI™ • Liebert GXT™	• Liebert GXT™ 6kVA • Liebert GXT™ 6kVA	• Liebert GXT2U™ • Liebert Nfinity®
Liebert IntelliSlot Web Card-LB	IS-WEBLB	• Liebert NX™	• Liebert Hinet™	
Liebert IntelliSlot Web Card-LBDS	IS-WEBLBDS	• Liebert DS™ Precision Cooling Unit		

COMPATABILITY with Communication Protocols

IntelliSlot Web Card	Part Number	Compatible with:					
		SNMP	HTTP	HTTPS	EMAIL	SMS	TELNET
Liebert IntelliSlot Web Card	IS-WEBCARD	✓	✓	✓	✓	✓	✓
Liebert IntelliSlot Web Card-LB	IS-WEBLB	✓	✓	✓	✓	✓	✓
Liebert IntelliSlot Web Card-LBDS	IS-WEBLBDS	✓	✓	—	—	—	✓

DIMENSIONS



SPECIFICATIONS

Power Requirements	AC Inputs	18 - 24 VAC; 50/60 Hz
	DC Inputs	12 - 36VDC
	Power Consumptions:	6VA maximum (1.75W)
Dimensions, W x D x H	3 x 5-1/4 x 2-3/8 (76 x 134 x 38 mm)	
Weight (assembled)	Net:	7 oz (0.2 kg)
	Shipping:	1.3 lb (0.6 kg)
Ambient Operating Environment	32 to 104°F (0 to 40°C); 10% to 90% RH (non-condensing)	
Ambient Storage Temperature	–4 to 140°F (–20 to 60°C)	
Protection	SELV Isolated User Connections, Watchdog Timer Circuitry	
Communication Ports	Service Terminal (RS-232)	DB9F, DTE
	Ethernet Communications	RJ45

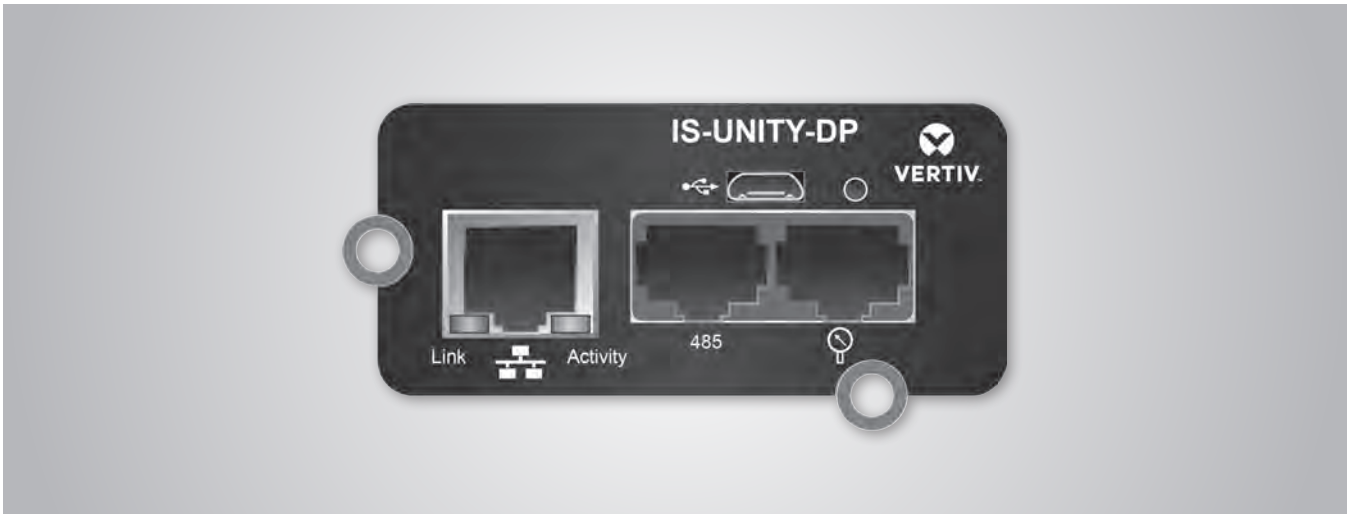
WIRING

Connection	Supported Wire Type	Max. Wire Length
1RS-232	Null Modem Cable	50 ft. (15.3m)
DB9F Connector	DTE Null Modem Cable	50 ft. (15m)
RJ45 Connector	Standard Category 5 Cable	328 ft. (100m)

To contact Vertiv Technical Support: visit www.VertivCo.com

LIEBERT® INTELLISLOT™ UNITY PLATFORM CARDS

Product Specification/Installation Guide



The Liebert IntelliSlot Unity Platform brings SNMP, BACnet IP, BACnet MSTP, Modbus TCP, Modbus RTU, YDN23 and Web management capability to many models of Vertiv's power and cooling equipment. The cards employ Ethernet and RS-485 networks to monitor and manage a wide range of operating parameters, alarms and notifications. The card also supports communication for LIFE™ Services by VERTIV.

ADDITIONAL FEATURES

- SNMPv1, SNMPv2c and SNMPv3 with MIB-II support
- HTTP/HTTPS 1.1
- BootP
- DHCP per RFC2131/2132
- Remote firmware updates via a Web browser
- IPv6 support for HTTP/HTTPS, DHCPv6, e-mail, SMS, SNMP v1/v2c/v3 and Modbus TCP
- Liebert SN Environmental Sensor Support (Web, SNMP, SMS and SMTP): Temperature, Humidity, Door Closure, Contact Closure and Leak Detection: Liebert SN-2D, Liebert SN-3C, Liebert SN-L, Liebert SN-T, Liebert SN-TH, Liebert SN-Z01, Liebert SN-Z02 and Liebert SN-Z03

IntelliSlot Unity cards are a form, fit, and function replacement for several Liebert IntelliSlot Web and 485 cards.

COMPATABILITY with Liebert Equipment

IntellSlot Card	Compatible with			
IS-UNITY-DP IS-UNITY-SNMP IS-UNITY-LIFE	Alber BDSU-50™	Liebert Deluxe System/3™	Liebert GXT3™	Liebert PeX™ *
	Liebert APM™	Liebert DS™	Liebert GXT4™	Liebert PPC™
	Liebert APS™	Liebert DSE™	Liebert HPC™	Liebert RDC™
	Liebert Challenger 3000™	Liebert EPM™	Liebert HPC-S/M/R/W/Generic™	Liebert RX™
		Liebert EXC™	Liebert HPM™	Liebert XDC™
	Liebert CRV™	Liebert eXL™	Liebert NX™ 225-600 kVA	Liebert XDP™
	Liebert CW™	Liebert EXL™ S1	Liebert NXC™	Liebert XDP-Cray™
	Liebert DCL™	Liebert eXM™	Liebert NXL™ *	
	Liebert DCP™	Liebert FDC™	Liebert NXR™	
		Liebert FPC™	Liebert PCW™/PDX™	

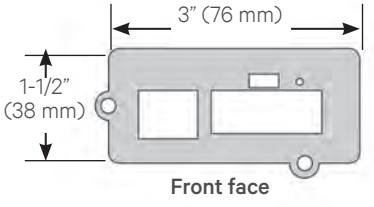
** YDN23 supported only for Liebert PeX and Liebert NXL.*

COMPATABILITY with Communication Protocols

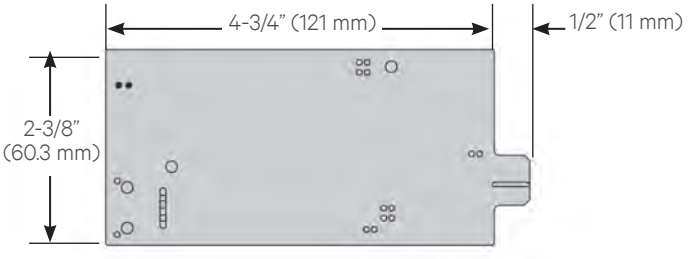
Liebert IntelliSlot Card	Life Services Support	Communication Protocol							
		HTTP HTTPS	Velocity Protocol	Email	SMS	SNMP v1, v2c, v3	BACnet IP BACnet MSTP	Modbus TCP Modbus RTU	YDN23*
IS-UNITY-DP	✓	✓	✓	✓	✓	✓	✓	✓	✓
IS-UNITY-SNMP	✓	✓	✓	✓	✓	✓	—	—	—
IS-UNITY-LIFE	✓	✓	✓	✓	✓	—	—	—	—

* YDN23 supported only for Liebert PeX and Liebert NXL.

DIMENSIONS



Front face



Board

SPECIFICATIONS

Power Requirements	DC Inputs	7 to 12 VDC
	Power Consumptions:	3.6 W maximum
Dimensions, W x D x H	2.97 x 5.2 x 1.45 in. (75.5 x 15 x 37 mm)	
Weight (assembled)	Net:	7 oz (0.2 kg)
	Shipping:	1.3 lb (0.6 kg)
Ambient Operating Environment	32 to 104°F (0 to 40°C); 10% to 90% RH (non-condensing)	
Ambient Storage Temperature	–4 to 140°F (–20 to 60°C)	
Communication Ports	Ethernet Communication	RJ-45 (LIFE™ Services requires a network connection to the Internet)
	RJ-45 (RJ-45 to 2-position terminal-block adapter)	

WIRING

10/100 Mb/s Ethernet connector	Standard Category 5E Cable	328 ft. (100m)
RJ-45 - One-Wire Connector	Liebert® Integrated One-Wire Sensor Cable or 2m Cat 5E to Modular 1-Wire	65.6 ft. (20m)

VertivCo.com | **Vertiv Headquarters,** 1050 Dearborn Drive, Columbus, OH, 43085, USA

590-1307-501C/SL-52646_REV11_6-17