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Submittal - AWS LCK062ROMP01-02-Vertiv - CRAC

LIEBERT DSE
AIR-COOLED SYSTEMS

Quotation No. CPQ-686273
Model DA050DA1A / MCL165E1A
Quantity Six (6) / Six (6)
Purpose DA050 PUMPED REFRIGERANT ECONOMIZER AIR COOLED SYSTEM – Starting On Page 3

Model PX029CA1A / MCL055E1A
Quantity Two (2) / Two (2)
Purpose PDX FLOORMOUNT AIR-COOLED SYSTEM – Starting On Page 58

Date February 26, 2024
Submitted by Vertiv, Seattle Sales Office – David Thompson

R1

Following changes are made:

1. Pages 4, 18 & 19: 24” Floorstand.
2. Pages 5, 12, 15, 16, & 17: Lowering HMI.
3. Pages 5, 12, 13, 39-41 – CANbus converter.

R2

Following changes are made:

1. ***Page 4- Changed condenser model from MCL055E1A to MCL165E1A***
2. ***Page 7- see attached DA050 performance.***
3. ***Page 62- see attached PX029 performance.***

Additional Reporting Requirements for Embodied Carbon
AMER - For concrete, steel, deck, joists, rebar, roofing, drywall, refer to the Carbon Quantity & EPD Reporting (AMER) SOP
EMEA/APJC - For concrete, refer to the Carbon Quantity & EPD Reporting (EMEA & APAC) SOP
Answer: Embodied Carbon is not applicable to the CRAC units.

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AMAZON – LCK062ROMP01-2

LIEBERT DSE™
PUMPED REFRIGERANT ECONOMIZER
AIR COOLED SYSTEM

Model:	**DA050DA1A**	**MCL055E1A**
Qty:	**Six (6)**	**Six (6)**
Tag:	**CRAC 1-1,2,3,4,5,6**	**ACCU 1-1,2,3,4,5,6**
Date:	**February 26, 2024**	
Submitted by:	**Vertiv/Liebert, Columbus Office**	
Contact:	**Jay Pitchford (614) 361-9024, jay.pitchford@vertiv.com**	

LIEBERT DSE™
PUMPED REFRIGERANT ECONOMIZER
ENGINEERING SPECIFICATION SHEET

PROJECT NAME: AMAZON – LCK062

DATE: December 12, 2023

REF. #: CPQ-586273

INDOOR SECTION MODEL NUMBER and ELECTRICAL SUPPLY REQUIREMENTS:

- DA050DA1A (with Humidifier) **Qty**: Three (3) 460V, 3 Ph, 60 Hz, 36.5 FLA, 42.9 WSA, 60 OPD
- DA050DA1A (without Humidifier) **Qty**: Three (3) 460V, 3 Ph, 60 Hz, 30.7 FLA, 37.1 WSA, 60 OPD

OUTDOOR SECTION NUMBER and ELECTRICAL SUPPLY REQUIREMENTS:

- MCL065E1A **Qty**: Six (6) 460V, 3 Ph, 60 Hz, 2.8 FLA, 3.5 WSA, 15 OPD

CABINET SECTION:

- Downflow - Front Supply & Top Return Air Distribution Pattern
- 24” High Floorstand
- 36” High Return Air Plenum Shroud with Top Duct Connection

NET CAPACITY DATA (ASHRAE 127-2007):

- See Attached Performance Sheet

FAN SECTION:

- Electronically Commutated (EC) Direct Drive Fans with Variable Speed Control
- One (1) 3.7 kW Fan Motor

FILTER SECTION:

- 4 inch MERV13 Filters
- One (1) Complete Extra Set of Filters

REHEAT SECTION:

- Siz (6) Systems: No Reheat Provided

HUMIDIFIER SECTION:

- Three (3) Systems: Infrared Humidifier – 11 lbs/hr
- Three (3) Systems: No Humidifier Provided

REFRIGERATION SECTION:

- Single R-410a Refrigerant Circuit with Digitally Unloading Scroll Compressor
- 6 Row Aluminum Coil with Copper Tubes
- Electronic Expansion Valve

AIR COOLED CONDENSER SECTION:

- Design Ambient: -20° to +120° F
- Microchannel Aluminum Coil
- Variable Speed EC Fan Motors with Integrated Fan Motor/Blade/Guard Assembly
- Aluminum Enclosure with (field-attached) Seismically Braced Legs
- Fused, Locking And Lockable Electrical Disconnect Switch
- Factory Wired And Mounted NEMA 3R Electrical Panel/Box

ECONOPHASE REFRIGERANT PUMP:

- Not Provided

SYSTEM CONTROLS & MONITORING SECTION:

- iCOM™ Controls with Touch Screen Display and Supply Air Temperature Sensor
- Return Air Temperature & Humidity Sensor
- One (1) Model LT460 Zone Leak Detection Kit with Sensing Cable
- BAS Interface with SNMP, Email, SMS, Modbus (IP/RTU) & BACnet (IP/MSTP) Protocols
- One (1) Set Each, Common Alarm Contacts and Remote Shutdown Terminals
- vNSA14-iCOM Networking Switch with Fourteen (14) Ports and Embedded Display Panel

INCLUDED FEATURES:

- Locking Disconnect with 65 kAIC System Short Circuit Current Rating
- Dual Float Condensate Pump
- Special Feature #E-31364-1:
  - Lower iCOM dispaly - 40" above bottom of frame
- Special Feature #E-204922-9:
  - Phase Loss Protection Relay – Shuts Down System on Phase Loss with Auto Restart
- Special Feature #E-200846-4:
  - iCOM Controls Quick Start Software with 6 kW Capacitive Buffer
- Special Feature #E-202814-2:
  - Top Piping Connections
- Special Feature #E-4048-4:
  - No Shutdown Upon Condensate Pump Safety Switch Signal
- Special Feature #E-4482-13:
  - No Shutdown Upon Water Detected Signal
- Special Feature #E-306371-1 &2
  - DSE & MCL To include CANbus to fiber converter

INCLUDED FACTORY SERVICES:

- One (1) Year Parts and Labor Warranty
- Five (5) Year Compressor Part Warranty
- Factory Check-Test-Warranty Inspection
- Field Technician Labor for Unit-to-Unit (U2U) Teamworking Assistance
- Field Technician Labor for BAS Communication Assistance
- Level 3 & 4 Commissioning Assistance
- Post-Installation User Training

VERTIV. Liebert Rating System (LRS) 3.6.0.10w 4.4.3.18e

Project Name:	**OH63 DA050**	Office Name:	**Liebert North America HQ**
Customer Name:	**Swanson Rink**	Phone Number:	
Engineer Name:	**JOHN GUTIERREZ**		

DSE Model DA050DP~MCL165E1 Only - High Eff.; Air Cooled

Manufacturer:	**Liebert North America**	Altitude:	**815 ft**
Unit Power Supply:	**460/3/60**	ESP:	**0.20 InH2O**
Refrigerant:	**R410A**	Width:	**77 in**
Internal Filter Class:	**Merv 8 Std. - 4 inch (102 mm)**	Depth:	**35 in**
Spec.sheet output date:	**07-Feb-23**	Height:	**76 in**
Return Airflow (std. motor):	**7200 ACFM**	Weight:	**1590 lb**

Condenser(s)

Manufacturer:	**Liebert North America**
Model:	**MCL165E1**
Condenser Type:	**MCH Condenser**
Design Ambient:	**120 °F**
Power Option:	**460/3/60**

Compressor/Pump(s)

Manufacturer:	**Copeland**
Model:	**ZPD154KCE-60Hz**
Compressor Type:	**Digital**
Power Supply:	**460/3/60**
Model:	**HPI41D**
Pump Type:	**TurbineRegen**

Evaporator(s)

Manufacturer:	**Liebert North America**
Model:	**RTDA050Evapx1**
Fin Type:	**Lanced**
Number of Rows:	**6**
Fin Density:	**12 fpi**
Face Area:	**17.01 ft²**
Surface Area:	**2364 ft²**

Miscellaneous

Humidifier Type:	**No Humidifier**
Bypass airflow:	**0 %**

Cooling Fan(s)

Model:	**EC-630-3.7kW-DN**
Description:	**DSE - DX w/PRE, w/EC Fans underfloor**
Air Supply:	**Bottom**
Power Supply:	**460/3/60**
Quantity of Motors:	**1**

System: [Compressorized Mode: Digital Loading: 100%, SC: 0 °F, SH: 13 °F] [ESP:0.2]

Ent DB (°F)	Ent WB (°F)	Ent RH (%)	Ent DP (°F)	Return Air Vol (ACFM)	Supply Air Vol (ACFM)	Air Face Vel (ft/min)	Unit Air Vol (SCFM)	Amb DB (°F)	NTCC (kW)	NSCC (kW)	THR (kW)	Cond. Airflow (ACFM)	Lvg DB (°F)	Lvg WB (°F)	Tot Comp Pwr (kW)	Sys Power Input (kW)	Sys SCOP (W/W)	Sys NSenCOP (W/W)	Fan kW (kW)	Airflow Calibration (V)	Total Pump Power (kW)
84	67	41.7	58.3	7200	6934	423	6687	120	44.1	43.2	62	21556	64	60.2	14.5	21.6	2.00	2.00	3.79	9.32	0

System

Compressor Power (kW)	Sat. Discharge Temp. (°F)	Sat. Suction Temp. (°F)
14.51	127.5	52.3

Notes

1. Capacities shown have been reduced by fan motor(s) heat (net).
2. System Power Input includes Compressor(s), Blower Motor(s), Condenser(s), and Control Power.
3. Coil airflow has not been reduced by a bypass.
4. Capacity Tolerance is 5%.
5. ACFM/ACMH is the unit actual air flow rate when measured at the specific return or supply temperature and barometric conditions that define a unique air density.
6. SCFM/SCMH is the unit air flow rate when converted to standard air density of 0.075 lb/ft3 at sea level.
7. NTCC, Net Total Cooling Capacity
8. NSCC, Net Sensible Cooling Capacity

AHRI CERTIFIED® www.ahridirectory.org
Datacom Cooling
AHRI Standard 1360

Certified in accordance with the AHRI Datacom Cooling Certification Program at AHRI Standard 1360 (I-P) and ASHRAE Standard 127-2007 Standard Rating Conditions. Certified units may be found in the AHRI Directory at www.ahridirectory.org.

LIEBERT DSE™
PUMPED REFRIGERANT ECONOMIZER
DETAILED EQUIPMENT DESCRIPTIONS

Frame
Frame is constructed of 14 gauge steel, MIG welded, and coated using an autophoretic dipping process. *Frame can be field separated into three sections for rigging through small spaces.*

Return Air Plenum Shroud
Top return-air plenum, open on the top and attached to the top of the unit. Front panel is removable to allow access to filter section for models DA080, DA085. Constructed of steel panels with 1", 1 1/2 lb. insulation custom painted in unit matching colors.

Exterior Panels
Exterior panels are powder coated, insulated with 1" 1-1/2 lbs density insulation, and have 1/4 turn fasteners for easy removal. A hinged access panel opens to a second front panel which is a protective enclosure for all high voltage components.

Filters
Deep pleated filters (see spec sheet for MERV rating), located in the cabinet, removable from the top for models DA080, DA085. A separate filter plenum with access door is provided for models DA125, DA150.

Cooling Coil
The A-Frame evaporator coil is designed with full face circuiting constructed of copper tubes and aluminum fins, manufactured by Liebert. A condensate drain pan is provided. Coil circuiting is split to three rows on the full face of the outer circuit, and three rows on the full face of the inner circuit, providing equal air distribution across each coil face. An electronic expansion valve is factory piped and wired to each refrigerant circuit.

Electronically Commutated (EC) Fans
Plug/plenum type, single inlet and dynamically balanced to a maximum vibration level of two mils in any plane. The drive package is direct drive electronically commutated, variable speed. The fans are located to draw air over the A-frame coil, to ensure even air distribution and maximum coil performance.

Reheat
Not provided for this application.

Humidifier (3 of 6 Systems)
Infrared humidifier, consisting of high intensity quartz lamps mounted above and out of the water supply. The evaporator pan is stainless steel and arranged to be serviceable without disconnecting high voltage electrical connections. The humidifier system uses bypass air to prevent over-humidification and is equipped with an

automatic water supply system. The system has an adjustable water-overfeed to prevent mineral precipitation.

Refrigeration Circuit with Digital Scroll Compressor
Each unit includes a refrigeration circuit with liquid line filter drier, refrigerant sight glass with moisture indicator, adjustable, externally equalized expansion valve, and liquid line solenoid valve. A scroll compressor with a variable capacity operation capability is located outside the airstream and is removable and serviceable from the front of the unit. A solenoid-controlled scroll head engages or disengages the compression scroll on a 15 second duty cycle, dynamically staging compressor capacity in response to load changes. The suction gas cooled compressor is also provided with vibration isolators, thermal overload, automatic reset high-pressure switch with lockout after three failures, rotalock service valves, suction line strainer and a maximum operating speed of 3500 RPM.

Refrigerant
R-410a, which meets HCFC refrigerant requirements of the Montreal Protocol and EPA Clean Air Act. Units are charged with a nitrogen holding charge, and are to be field charged with refrigerant.

Disconnect Switch – Locking Type – 65,000 Amp SCCR
The locking disconnect switch, mounted in the electrical panel, is connected to the safety lock dead front panel of the system and is interlocked mechanically. This prevents opening the panel unless the switch is in the Off position. The locking disconnect switch complies with NEC and local codes, and provides 65kA SCCR. The disconnect switch handle is also lockable to support lockout/tagout safety programs.

Floorstand
The floorstand is constructed of heliarc welded tubular steel and available in heights from 9” to 48”. Vibration isolation pads are provided on the (+/- 1.5”) adjustable legs. The floorstand will include additional bracing if the seismic option is selected. If the raised floor depth is 24” or greater, the EC cooling fans can be lowered into the floorstand for direct operation in the raised floor.

Dual Float Condensate Pump
The condensate pump is factory mounted in the cabinet and includes integral dual-float switches, pump and motor assembly, and reservoir. The secondary float will shut down the unit and indicate an alarm condition at the iCOM display (and any included remote monitoring) upon high water condition. Capacity is 6 GPM at 20’ head.

Supply Air Sensor
A factory installed and commissioned supply air sensor ships with the unit for sensor location in the field by others. The sensor is terminated on the Liebert iCOM unit controller terminal strip and the associated cable wiring is coiled within the unit for shipment. It is the responsibility of others to uncoil and locate the sensor in accordance with acceptable best practices and any local codes.

Liebert iCOM™ Microprocessor with Touch Screen Control
The Liebert iCOM unit control is microprocessor based and factory-set for Intelligent Control, which uses "fuzzy logic" and "expert systems" methods. Proportional and Tunable PID are also user selectable options. The control processor has a 9" touch screen display for user inputs, mounted in an ergonomic housing. The display & housing are viewable while the unit panels are open or closed. The controls are menu- driven, with the display organized into two main sections: User Screen and Service Screen. A password is required to make system changes within the service screen.

The display will automatically create safety copies of important control parameters, and allows the user to automatically backup unit configuration settings to internal memory or USB. Configuration settings may be transferred to another unit to standardize and streamline multi-unit startup or cooling reconfiguration. Step-by-step tutorials or wizards are provided for simplified control setup.

Status LEDs and unit alarms (audible and visual) are complimented with an onboard help database and user-customizable data display to provide the user with an intuitive human/machine interface. Software/firmware updates and upgrades, designed to provide maximum control flexibility, utility and value, can be performed via the USB port.

The Liebert iCOM control can also be remotely monitored and controlled with interfaces that provide two-way communication in industry-standard open protocols that include MODbus, Jbus, BACNet, Profibus and SNMP.

2T Rack Temperature Sensor
Consists of a vented case with two temperature probes. Up to ten (10) 2T sensors (20 temperature probes) can be connected to an iCOM-equipped Liebert system. One 2T sensor housing and both sensor probes are to be attached to a single 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 provided; 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 a CANbus wire leaving the cooling unit and connecting to a 2T sensor. Each remaining 2T sensor is connected to the previous sensor using 6 ft. CAN cables; often referred to as a daisy-chain configuration.

vNSA14 Remote 14 Port Switch
Includes industrial rail switches, universal power supply and hardwire adapter in a steel enclosure with keyed locks for networking together multiple systems with Liebert iCOM™ controls. Each panel has fourteen 10/100 Mbps twisted pair RJ45 ports, allowing connection of Ethernet-ready devices to available ports in accordance with IEEE standard 802.3. Three automatic features—autonegotiation, autopolarity and autocrossing—allow the use of standard network cables (CAT5 or better) for connection to each port, rather than a special crossover cable. The switch detects and makes adjustments for the network's speed and transmission mode, polarity and transmit-and-receive pins.

An optional embedded display panel enables convenient central viewing of units and system operation of multiple units, including auto-changeover control, autorotation of redundant units, 'teamwork' mode programming, spare parts lists, and free-field service history note entry.

Common Alarm Contact Signal
One normally open (N.O.) type programmable common alarm is provided to interface user-selected alarms with a remote alarm monitoring device.

Remote Shutdown Terminals
One set of terminals are provided to shut down the system upon remote customer input signal.

LT460 Leak Detection Cable Sensor
Provides zone leak coverage around the system by utilizing a leak detection cable. A cable termination sensor box is powered by 24 VAC from the environmental unit with two (2) Form-C dry contact common alarm relay outputs rated at 24 VAC, 3 Amp to remotely signal leak detected, loss of power and cable fault. The leak cable (see spec sheet for length provided) comes complete with hold-down clips and consist of a four-conductor cable, with two conductors being jacketed with CL2P rated covering. The two remaining conductors are covered with porous non conductive polymers. The cable is UL-listed with a CL2P rating. The end of the cable is terminated in matching male and female connectors for easy connection of cables from end to end. Accuracy of the leak cable is linear and within 1% of the length of the cable.

Factory Special Feature #E-204922
Provides under and over voltage - phase loss monitor / protection relay. Three phase automatic reset phase loss monitor to shutdown unit on loss of power. A N.O. contact that closes when power stabilizes will be wired to terminals for customer connection.

Factory Special Feature #E-200846
Provides iCOM quick start software and controls powered by factory installed 6kW capacitor buffer. Special quick-start software is included. This feature is designed so that controls can be powered by a capacitor buffer for a minimum of 3 minutes (at end of life) during power interruptions. A remote shutdown will be initiated on capacitor loss of power, and the unit will sequential auto restart when power is restored. This feature requires that the condenser to be powered from the indoor unit. Loss of power events shorter than 30 seconds will allow fans to start 6 seconds after the loss of power, and unit will reach full cooling in less than 30 seconds after power is restored, if communication to the condenser was not lost. Loss of power events greater than 30 seconds will be managed as a remote unit shutdown signal and unit will re-start normally, not in quick-start mode. If the indoor unit loses communication to the condenser, then compressors are started as soon as communications are established or 40 seconds from the time the power was restored (full cooling at 60 seconds).

Factory Special Feature #E-4048
Provides the condensate pump with a safety float switch to notify the common alarm & customer contact closure but NOT shut down the unit.

Factory Special Feature #E-4482
Provides the leak detection alarm with notification to the common alarm & customer contact closure but NOT shut down the unit. Specify NO/NC contacts.

Factory Special Feature #E-202814
Provides piping connections routed to the top of the unit for the refrigerant lines, condensate drain line and humidifier water supply line (where applicable). The hot gas refrigerant discharge lines will be factory built with traps at the bottom of the vertical riser part of the lines in the unit to insure proper oil return.

Factory Special Feature #E-306371
DSE to include CANbus Converter.

Factory Special Feature #E-31364
Lower iCOM display - 40" above bottom of frame.

LIEBERT MC - MICROCHANNEL CONDENSERS
DETAILED EQUIPMENT DESCRIPTIONS

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 a 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.

Controls
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, provided the total temperature design range (from minimum to maximum) is 125°F 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.

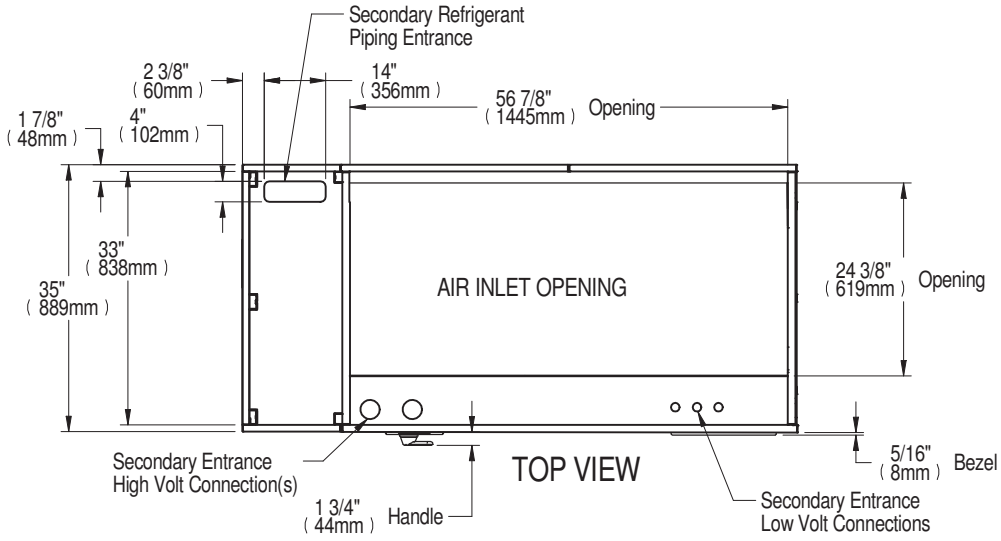
Unit Disconnect Switch
Locking unit disconnect switch is factory installed and wired in attached condenser control section. The entire electric panel is rated for 65,000 amps Short Circuit Capacity Rating (SCCR).

Factory Special Feature #E-306371
MCL to include CANbus Converter.

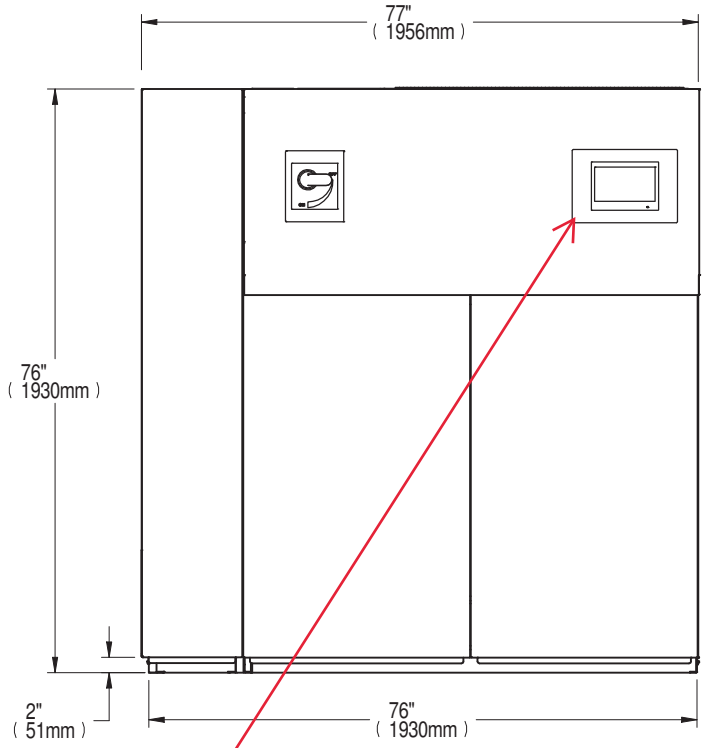
Indoor Section

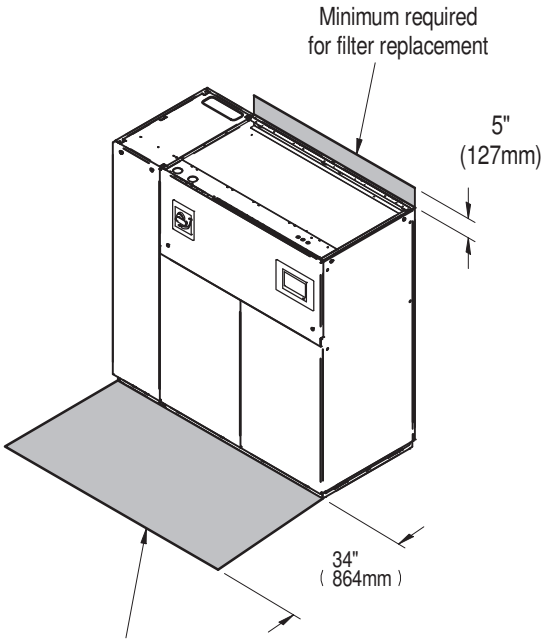
LIEBERT® DSE

CABINET DIMENSIONAL DATA
DOWNFLOW DA050 AIR COOLED



Note:
1. Filters are accessible through top of unit only.
2. Downflow electrical connections can be made from top or bottom of unit.





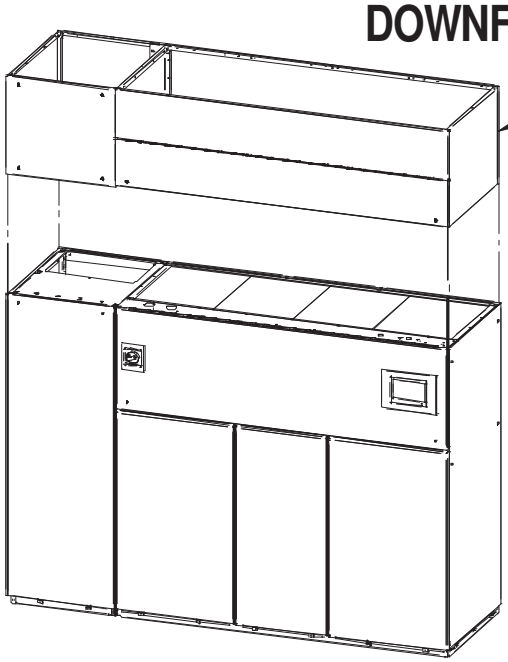
Shaded area indicates a recommended minimum clearance be provided for component access.

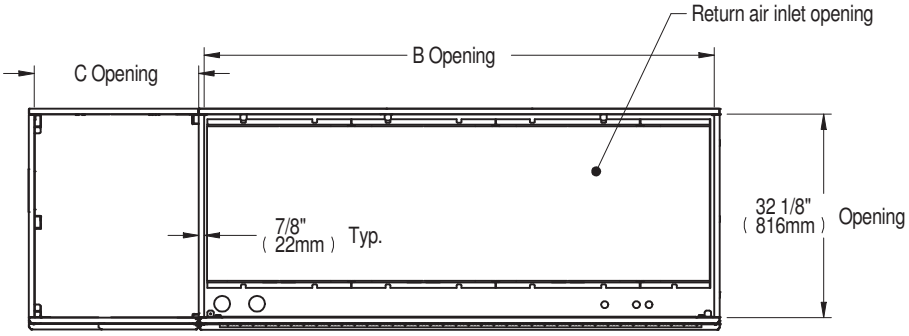
Display will be 40" up from bottom of the unit.

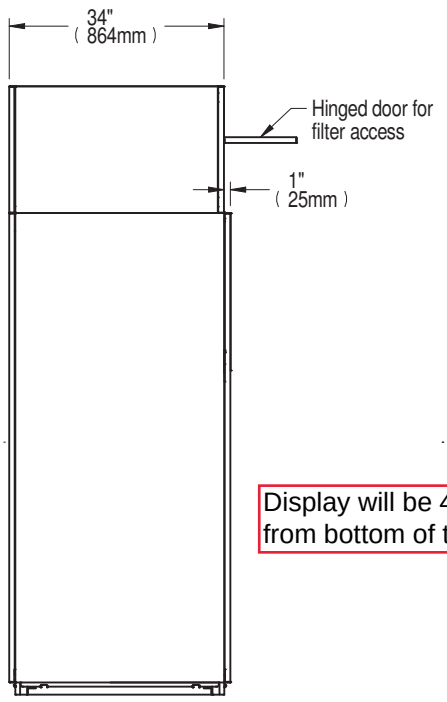
APPROXIMATE DRY WEIGHT lb (kg)
1590 (721)

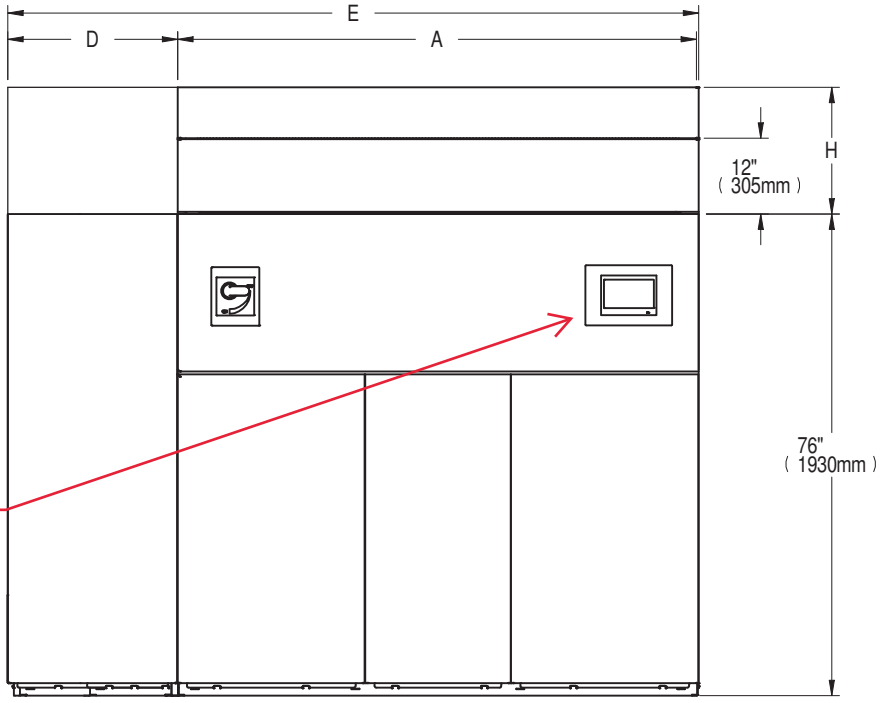
LIEBERT® DSE

PLENUM DIMENSIONAL DATA
DOWNFLOW DA050-DA085 MODELS









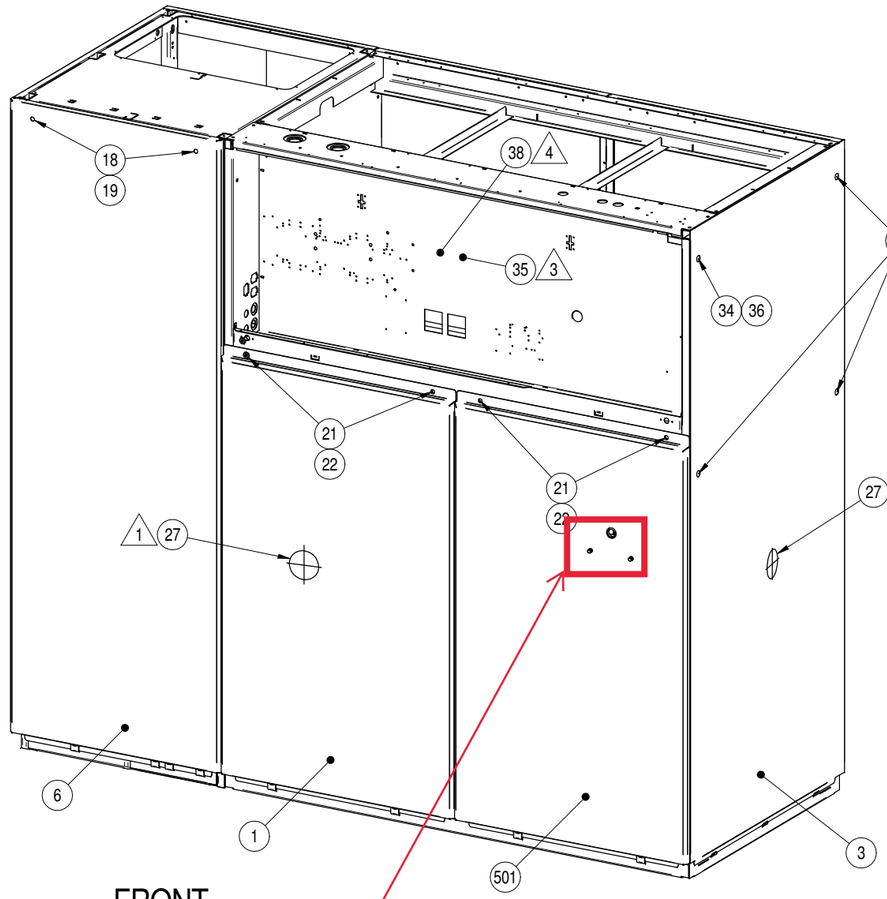
Display will be 40" up from bottom of the unit.

Plenum Dimensional Data in (mm)						Height in (mm)
	A	B	C	D	E	H
DA080-DA085 Digital Scroll Models	82-1/4 (2089)	80-1/2 (2045)	16-15/16 (430)	17-13/16 (452)	100-1/16 (2542)	20 (508)
DA050 Digital Scroll Models	59-1/4 (1505)	57-1/2 (1461)			77-1/16 (1957)	24 (610)
						30 (762) 1
						36 (914)

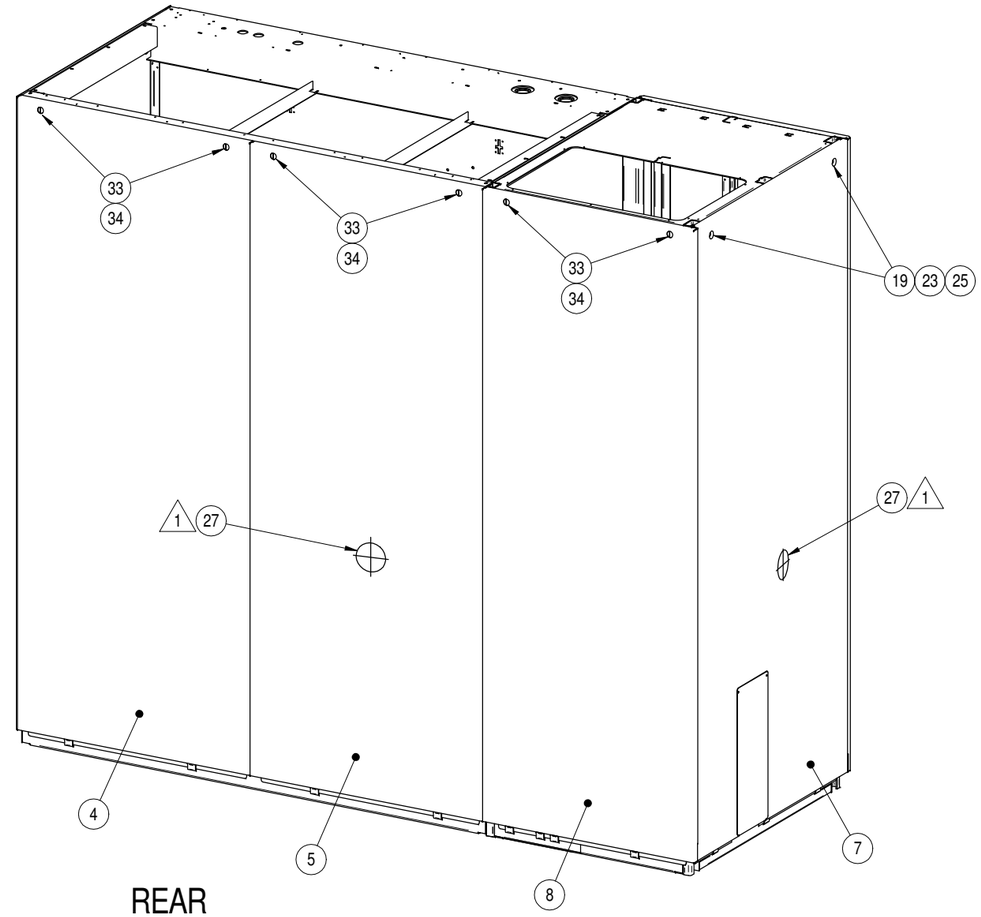
Notes:

1. Only available on DA080-DA085 model.

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
3	ADDED NEW SHEET 1 FOR 8-12 TON SHEET 2 WAS SHEET 1/2 SHEET 3 WAS SHEET 2/2 S142481A		DAVID CROSBY 11/09/2017 ANDREW MEYERS 11/09/2017



FRONT



REAR

8-12 TON

Display will be 40" up from bottom of the unit.

NOTES:

1. FOR EXACT LOCATION REFER TO DPN001125 FOR DS UNITS AND TO DPN002899 FOR DA UNITS.
2. ITEM 29 SHIPS LOOSE IN THE ENVELOPE WITH THE INSTALLATION MANUAL.
3. ITEM 35 (LABEL) TO BE CENTERED ON THE FRONT OF THE ACCENT PANEL (NOT SHOWN).
4. ITEM 38 (LABEL) TO BE CENTERED ON THE FRONT OF THE ACCENT PANEL (NOT SHOWN).

CONTROL CHARACTERISTICS SYMBOL LEGEND	C CONTROL CHARACTERISTIC
MATERIAL:	N/A
FINISH:	NONE
MATERIAL NOTE: FABRICATE FROM THE MATERIAL SPECIFIED IN ACCORDANCE WITH THE CURRENT APPLICABLE LIEBERT ENGINEERING SPECIFICATION OR AS OTHERWISE SPECIFIED ON THIS DRAWING.	

DIMENSIONAL TOLERANCES UNLESS OTHERWISE SPECIFIED			
MM (PRIMARY)		INCHES (SECONDARY)	
X	± 2	(.X)	± .1
.X	± .8	(.XX)	± .03
.XX	± .38	(.XXX)	± .015
ANGULAR		± 2°	

THIRD ANGLE PROJECTION

CORPORATE CAGE CODE:	1EDC2
	1050 DEARBORN DRIVE P.O. BOX 29186 COLUMBUS, OHIO 43229

DRAWN:	GABRIEL GUZMAN	DATE:	6/2/2016
CHECKED:	NA	DATE:	NA
ENGR:	BRYAN WHITNEY	DATE:	6/2/2016

PART NUMBER	DESCRIPTION

VERTIV.

TITLE:

PANELS EXT D DS REMOTE DISPLAY

SIZE	DRAWING NUMBER	SHEET	REV.
B	327781	1/3	3

THIRD ANGLE PROJECTION

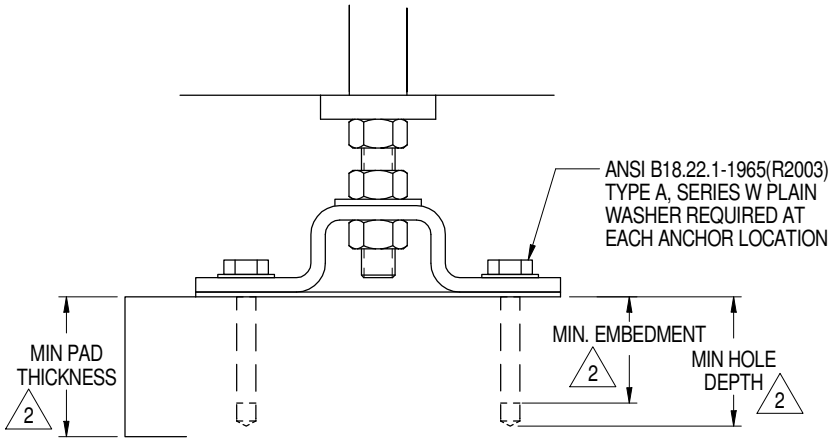
~~178224-35~~

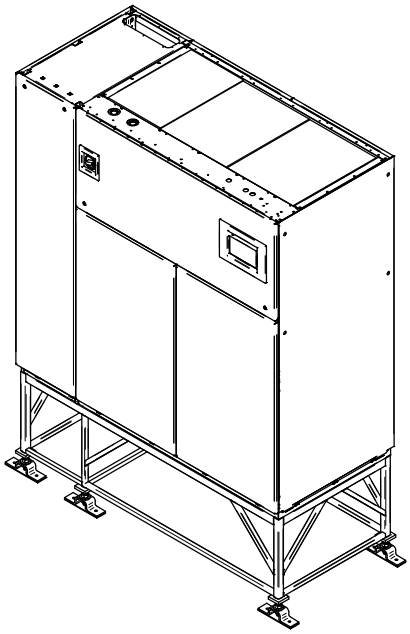
DIMENSIONAL DATA

SEISMIC ANCHORAGE RIGID FLOORSTAND DA050 18" - 48" HIGH

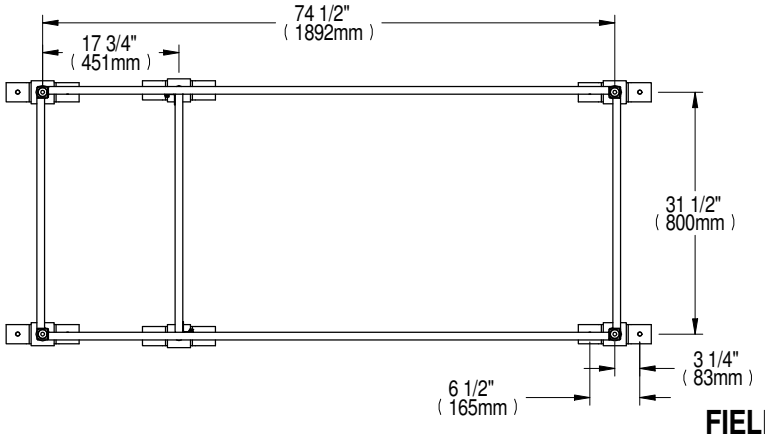
ANCHOR DETAIL

Typ. (6) Plcs



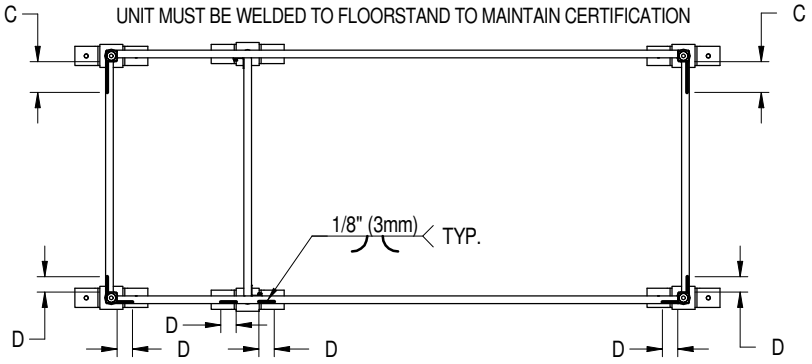


FLOOR ANCHORING DIMENSIONS



FIELD WELDING OF UNIT TO FLOORSTAND

UNIT MUST BE WELDED TO FLOORSTAND TO MAINTAIN CERTIFICATION



MODEL NUMBER	ANCHOR SIZE△1	DIMENSIONAL DATA			
		C		D	
		INCHES	MM	INCHES	MM
DA050	1/2"	4.0	102	2.0	51

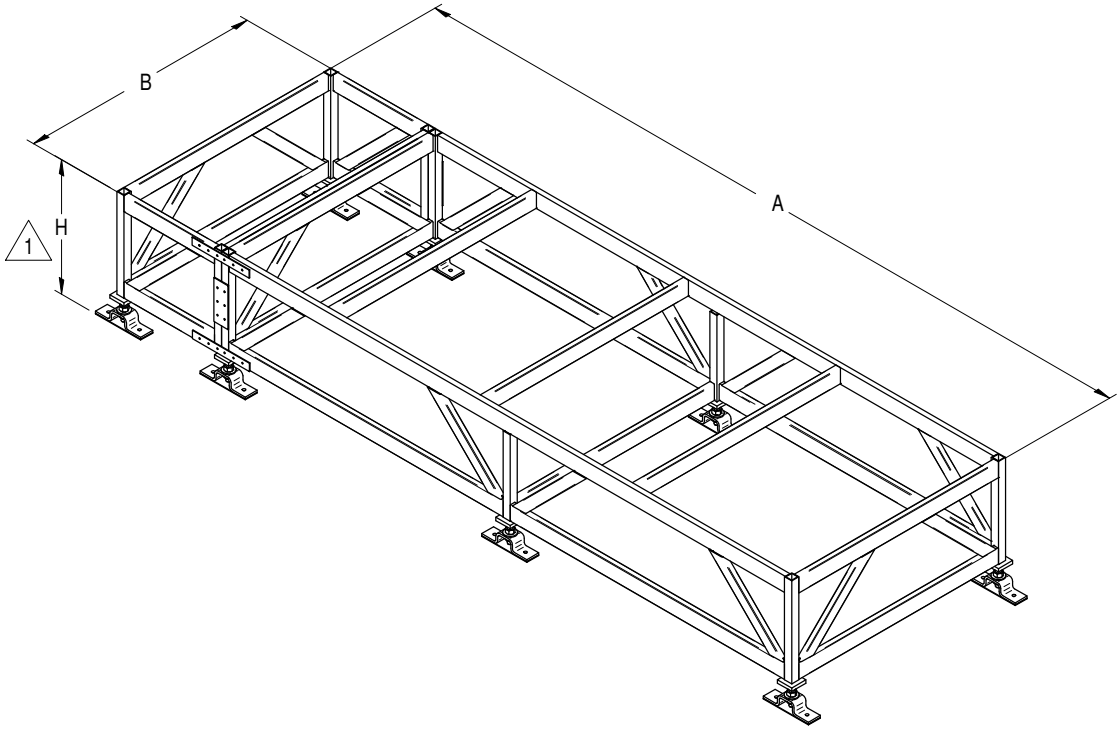
Notes:

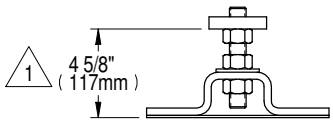
△1. Anchor Bolt sized per Hilti Kwik Bolt TZ Carbon and Stainless in concrete, ICC ESR-1917 Alternates are subject to review by Vertiv or Engineer of Record.

△2. Specified by Engineer of Record.

SEISMIC DATA

DOWNFLOW MODEL W/ EC FANS





Foot Detail

DIMENSIONAL DATA						
MODEL	OVERALL		A		B	
	INCHES	MM	INCHES	MM	INCHES	MM
DA050	77.0	1956	76.0	1930	33.0	838
DA080/085	100.0	2540	99.0	2515	33.0	838
DA125/150/165	144.0	3658	142.0	3607	45.0	1143

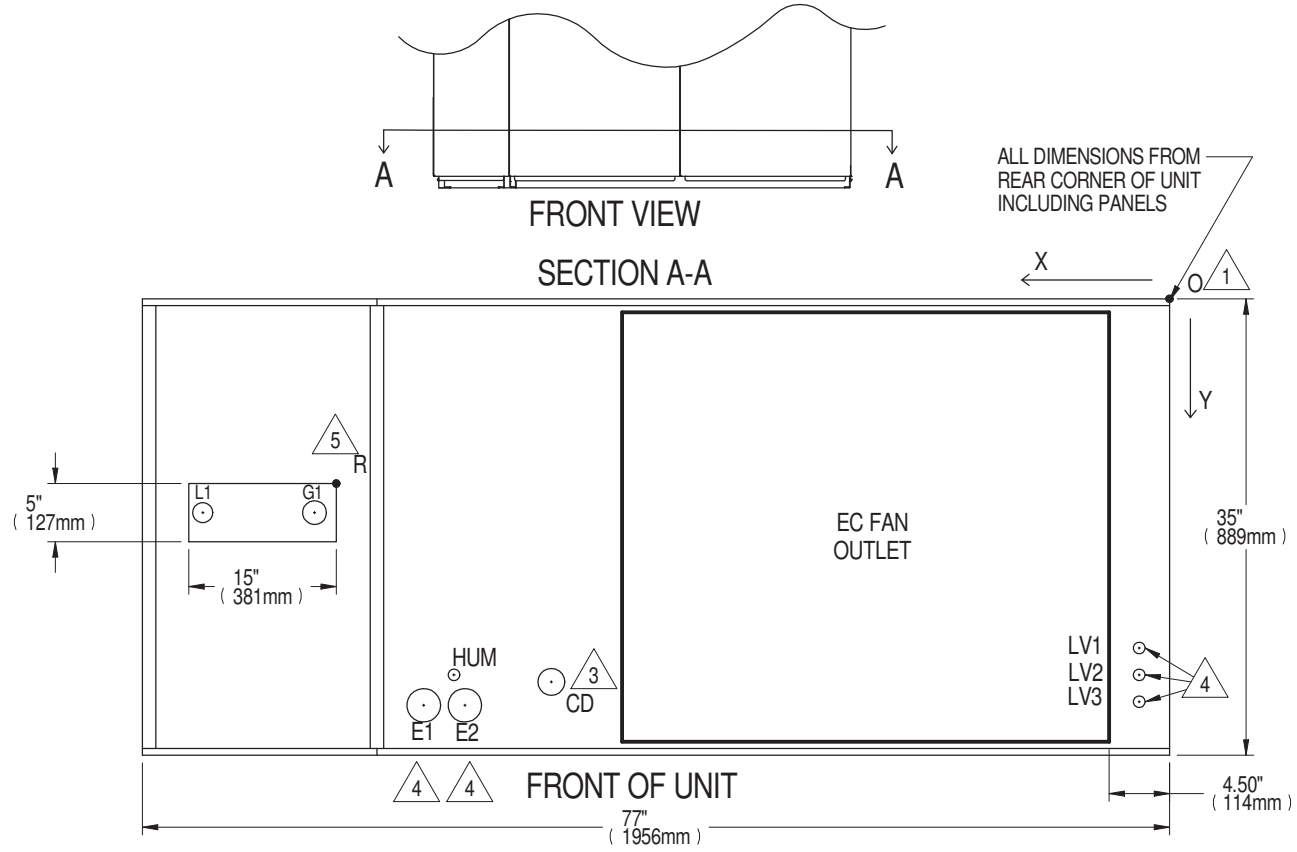
HEIGHT	
"H" NOMINAL 1	
INCHES	MM
18.0	457
24.0	610
30.0	762
36.0	914
42.0	1067
48.0	1219

Notes:

1. Foot provides ±0.25" (6mm) adjustment from nominal height "H".
2. The floor stand is not symmetrical and its orientation to the Liebert® DSE is critical to lowering the EC fans. Unless the floor stand is installed in the correct position, the blowers will not lower into the floor stand.

LIEBERT® DSE

PRIMARY CONNECTION LOCATIONS
DOWNFLOW DA050



POINT	DESCRIPTION	X in. (mm)	Y in. (mm)	CONNECTION SIZE / OPENING
R	REFRIGERANT ACCESS 5	59-7/8 (1521)	13-11/16 (348)	15" (381mm) X 5" (127mm)
L1	LIQUID LINE SYSTEM 1	71-11/16 (1821)	16-3/4 (425)	5/8" O.D. Cu
G1	HOT GAS DISCHARGE 1 3	62-9/16 (1589)	16-3/8 (416)	1-1/8" O.D. Cu
CD	CONDENSATE DRAIN 2 (infrared humidifier or no humidifier)	46 (1168)	29-1/2 (749)	
	W/ OPTIONAL PUMP			1/2" O.D. Cu
HUM	HUMIDIFIER SUPPLY LINE	53-1/2 (1359)	29 (737)	1/4" O.D. Cu
E1	ELECTRICAL CONN. (HIGH VOLT)	55-1/2 (1410)	31-1/4 (794)	2-1/2"
E2	ELECTRICAL CONN. (HIGH VOLT)	52-7/16 (1332)		
LV1	ELECTRICAL CONN. (LOW VOLT)	2-1/4 (57)	27 (686)	7/8"
LV2	ELECTRICAL CONN. (LOW VOLT)		29 (737)	
LV3	ELECTRICAL CONN. (LOW VOLT)		31 (787)	

Notes:

1. Drawing not to scale. All dimensions from rear corner of unit including panels, and have a tolerance of ±1/2" (13mm).
2. Field pitch Condensate Drain line a minimum of 1/8" (3.2 mm) per foot (305 mm). All units contain a factory installed condensate trap. Do not trap external to the unit. Select appropriate drain system materials. The drain line must comply with all local codes.
3. When piping out of the top of the unit, install traps in the discharge lines in the bottom of the unit before running lines to the top.
4. Opening for conduit chase, E1 and E2 are openings for conduit connections to 2-1/2", 1-3/4" and 1-3/8" knockouts at electric panel.
5. See DPN003533 for alternate piping from the top of the unit.

LIEBERT® DSE

ELECTRICAL FIELD CONNECTION DESCRIPTION

STANDARD ELECTRICAL CONNECTIONS

1) **Primary high voltage entrance -** 2.50" (64mm); 1.75" (44mm); 1.375" (35mm) diameter concentric knockouts located in bottom of box
2) **Secondary high voltage entrance -** 2.50" (64mm); 1.75" (44mm); 1.375" (35mm) diameter concentric knockouts located in top of box
3) **Primary low voltage entrance -** Quantity (3) 1.375" (35mm) diameter knockouts located in bottom of unit
4) **Secondary low voltage entrance -** Quantity (3) 1. 375" (35mm) diameter knockouts located in top of box
5) **Three phase electrical service -** Terminals are on main fuse block (disregard if unit has optional disconnect switch). Three phase service not by Vertiv.
6) **Earth ground -** Terminal for field supplied earth grounding wire. Earth grounding required for Liebert units.
7) **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.
8) **Customer alarm inputs -** Terminals for field supplied, normally open contacts, having a minimum 75VA, 24VAC rating, between terminals 24 & 50, 51, 55, 56. Use field supplied Class 1 wiring. Terminal availability varies by unit options.
9) **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.
10) **Heat rejection interlock -** On any call for compressor operation, normally open dry contact is closed across terminals 70 & 71(circuit 1), 230 (circuit 2) to heat rejection equipment. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring. Liebert® DSE units must be connected to Liebert® MC series condenser with premium control. It is required that the jumper between terminal 71 and terminal 230 be removed. Three wires must connect terminals 70, 71, and 230 of the indoor unit to terminals 70, 71 and 230 of the Liebert® MC series condenser.
11) **Unit factory installed disconnect switch, Fuse Block and Main Fuses –** "Locking Type" consists of a non-automatic molded case switch operational from the outside of the unit. Access to the high voltage electric panel compartment can be obtained only with the switch in the "off" position. Units with fused disconnects are provided with a defeater button that allows access to the electrical panel when power is on. The molded case switch disconnect models contain separate main fuses

CANBUS 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 Condenser –Optional Liebert® EconoPhase Unit.
13) **CANbus Cable** – CANbus cable provided by others to connect to the outdoor condenser, and optional PRE unit (DA units only). 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 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 CONNECTION DESCRIPTION

OPTIONAL ELECTRICAL CONNECTIONS

16)

17)

18) **Condensate alarm** (with condensate pump option) - 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.

19)

20)

OPTIONAL LOW VOLTAGE TERMINAL PACKAGE CONNECTIONS

21)

22)

23)

24)

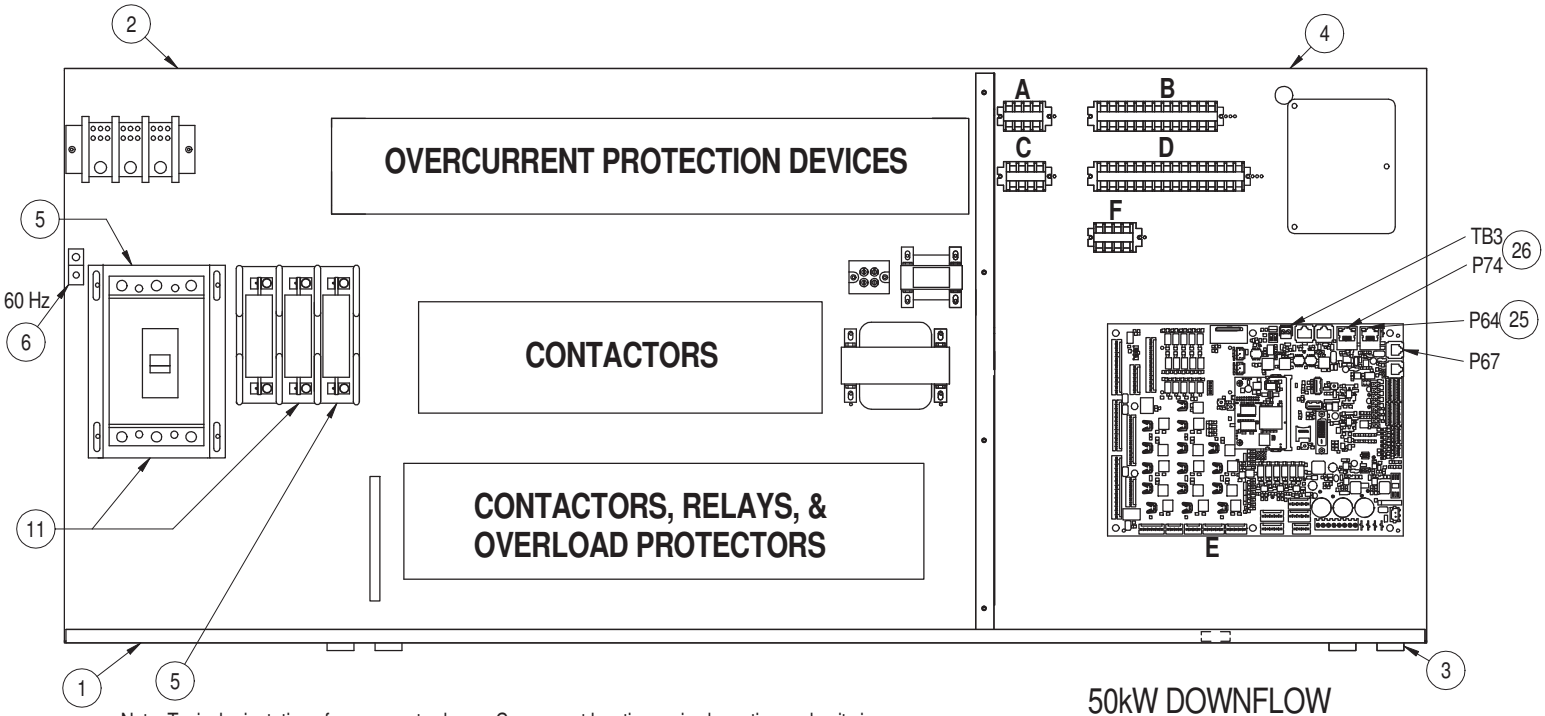
OPTIONAL COMMUNICATION CONNECTIONS.

25) **Unit-To-Unit –** Plug 64 is reserved for U2U communication.

26) **Site and BMS -** Plug 74 and terminal block 3 are reserved for Site and BMS connections. Plug 74 is an eight pin RJ45 for a Cat 5 cable. Terminal block 3 is a two position screw terminal block for use with twisted pair wires.

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

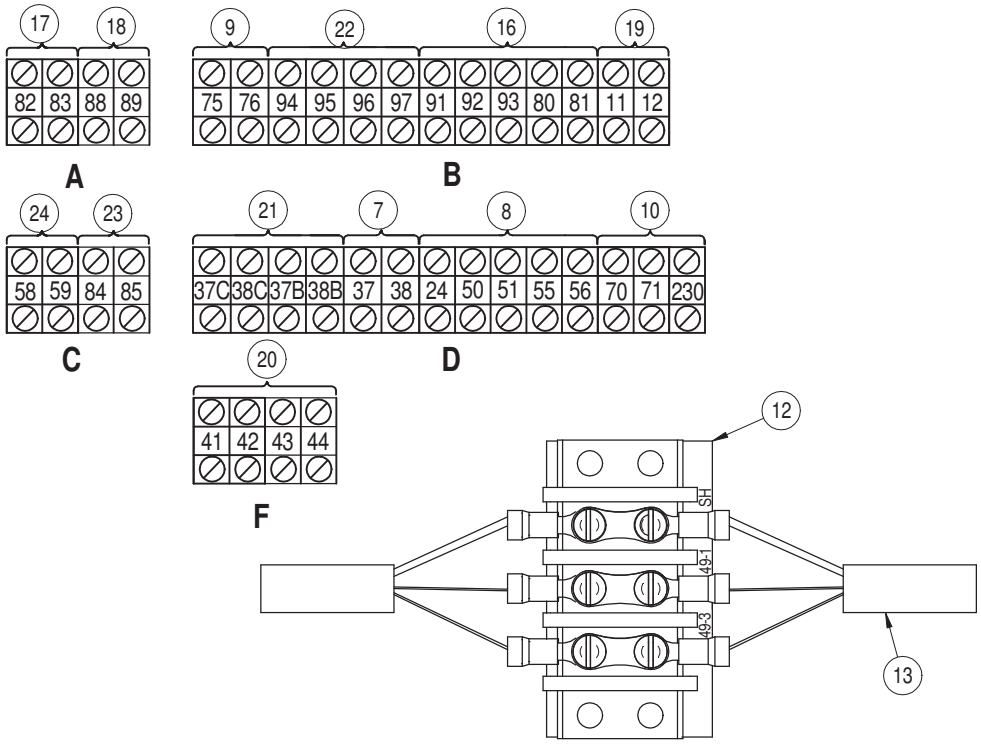
ELECTRICAL FIELD CONNECTION DESCRIPTION



50kW DOWNFLOW

Note: Typical orientation of components shown. Component location varies by option and unit size.

LOW VOLT SECTION



Item 12 Installation Conditions

1. Follow all local installation codes.
2. Do not run CAN cables in same conduit, raceway, or chase as high voltage wires (120-600V).
3. Separate high volt wires from CAN wires by 12 inches.

LIEBERT® DSE

SEISMIC APPLICATION ASSUMPTIONS AND REQUIREMENTS

Vertiv has conducted analytical modeling and dynamic shake table testing of the **Liebert® DSE** product to provide an option for those systems requiring seismic certification of compliance. This certification goes beyond the equipments ability to withstand the seismic forces: the IBC (International Building Code) , ASCE (American Society of Civil Engineers), and OSHPD (Office of Statewide Health Planning and Development) system approach includes the equipment, equipment anchorage, and the connections to the equipment [power, water supply and return and ducting]. In critical applications the equipment must be capable of performing its primary function after a seismic event within the limit of certification.

Certification Criteria

The **Liebert® DSE** certification is based on a maximum mapped maximum considered earthquake spectral response acceleration value, **S_s**, **of 3.75g** adjusted by the soil site coefficient to Soil Site Class D as the default when the site soil properties or final equipment installation location is not known. The certification maximum horizontal spectral response coefficient **S_{ds} value of 2.00g** and a maximum vertical spectral response coefficient **S_{ds} value of 2.50g** including Soil Class and Seismic Use group corrections. Soil Classes A, B, C, D, and E, and Seismic Design Categories A, B, C, D, E, and F are all covered under this certification, limited by the Sds value stated above. A seismic importance factor, **Ip, of 1.5** applies to this certification to include essential facility requirements and life safety applications for post event functionality.

Requirements for Anchorage

Anchors

1. Mounting requirement details such as brand, type, embedment depth, edge spacing, anchor spacing, concrete strength, wall bracing, and special inspection must be outlined and approved by the project Structural Engineer of Record.

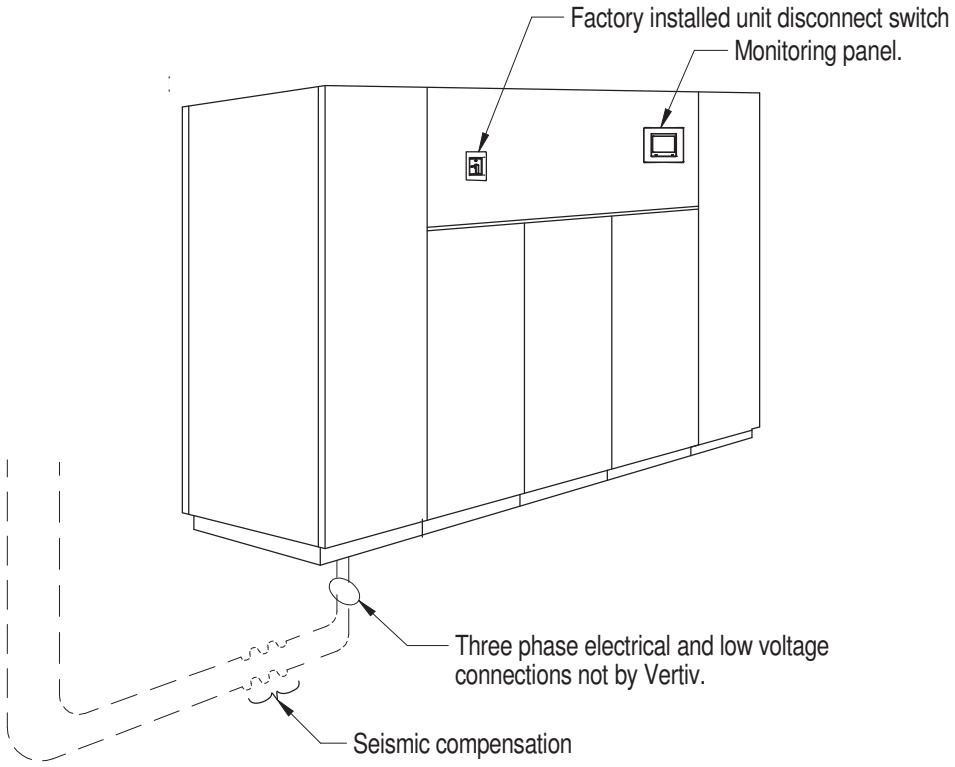
Anchorage Surface

2. Structural floors and housekeeping pads must also be seismically designed and approved by the project Structural Engineer of Record to withstand the seismic anchor loads as defined on the installation drawings. The installing contractor is responsible for the proper installation of all anchors and mounting hardware, observing the mounting requirement details outlined by the Engineer of Record. Contact the Manufacturer's Representative if a detailed Seismic Installation Calculation Package is required.

Connections to Unit

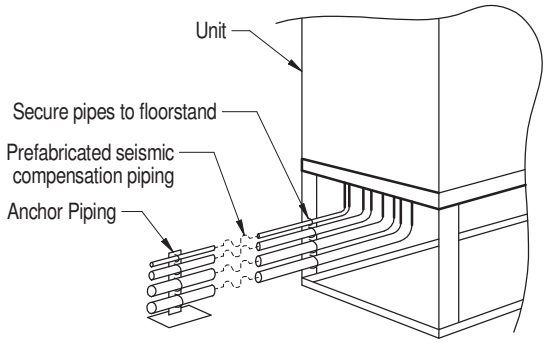
Electrical wiring, conduit, and/or other connections to the equipment is the responsibility of others. Data and recommendations are supplied here and in the unit installation supplement for seismic installation.

SEISMIC DATA
ELECTRICAL FIELD CONNECTIONS SUPPLEMENT FOR IBC CERTIFIED APPLICATIONS

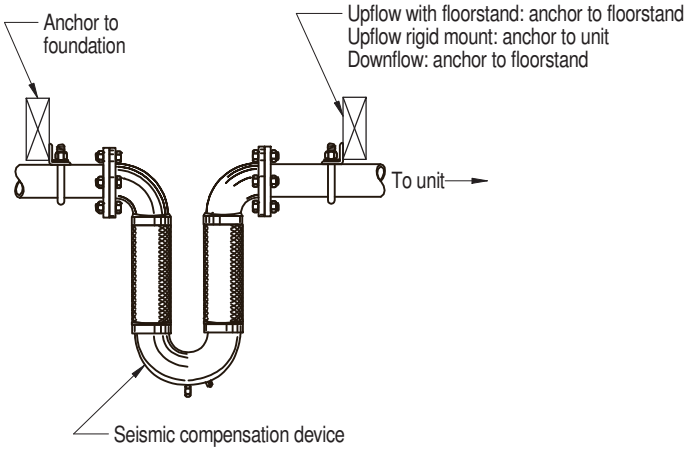


Notes:
1. Flexible conduit and conductors must be provided to allow for movement of the unit in three dimensions during a seismic event.
   The flexible conduit shall have at least one bend between the rigid connection at the unit cabinet and the connection to rigid conduit or foundation.

SEISMIC DATA
PIPING CONNECTION SUPPLEMENT FOR IBC CERTIFIED APPLICATIONS



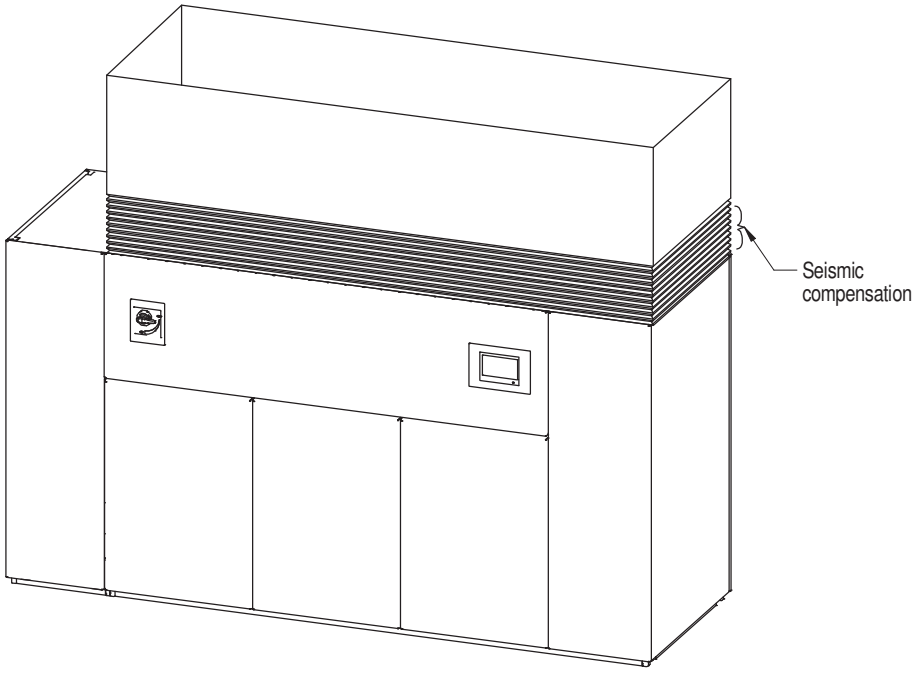
Floorstand Mount



Flexible Loop Example

Flexible Loops:
All units shall be attached to the piping system using flexible loops designed for seismic movement. Flexible loops shall be capable of movement in each plane and must completely isolate the equipment from the piping. The loops shall be suitable for an operating pressure and temperature of the system, refer to Vertiv installation instructions. This includes 1/4" copper humidifier supply, condensate drainage, and refrigerant supply and return. Follow manufacturer's installation instructions for proper seismic application of flexible loops.

SEISMIC DATA
DUCT CONNECTION SUPPLEMENT FOR IBC CERTIFIED APPLICATIONS



DOWNFLOW DUCTING EXAMPLE FOR SEISMIC APPLICATIONS

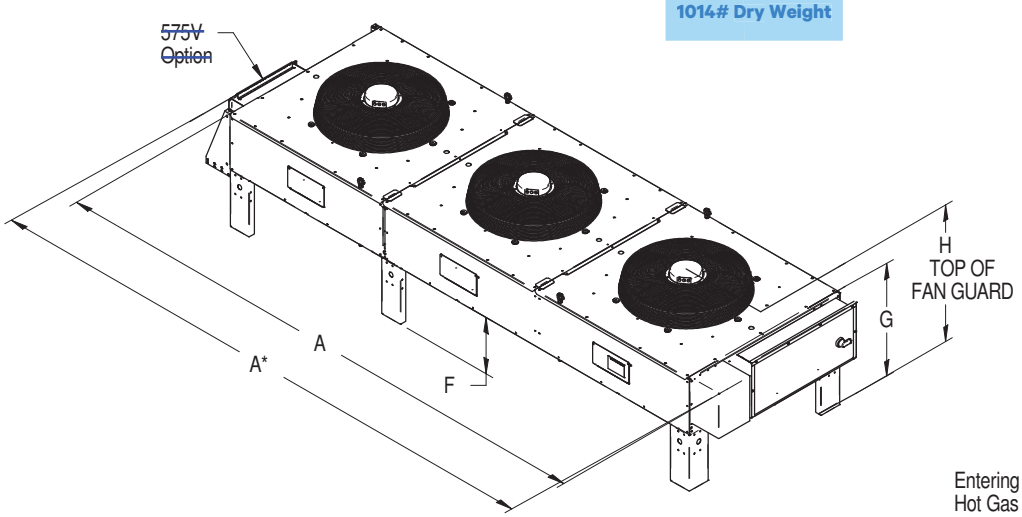
Notes:
1. All ducted units shall be attached to the ducting system using flexible duct designed for seismic movement.
   Flexible loops shall be capable of movement in each plane and must completely isolate the equipment from the duct work.
   Refer to Vertiv installation instructions for ducting requirements. Follow manufacturer's installation instructions
   for proper seismic application of flexible ducts.

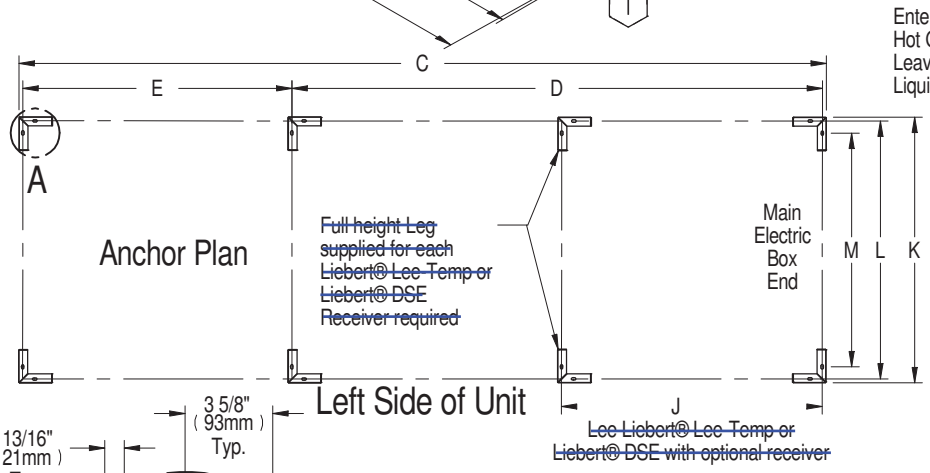
Outdoor Section

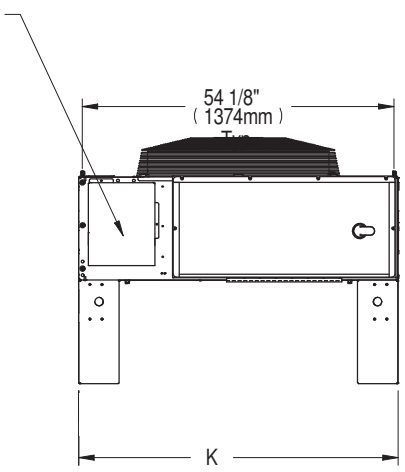
LIEBERT® MC

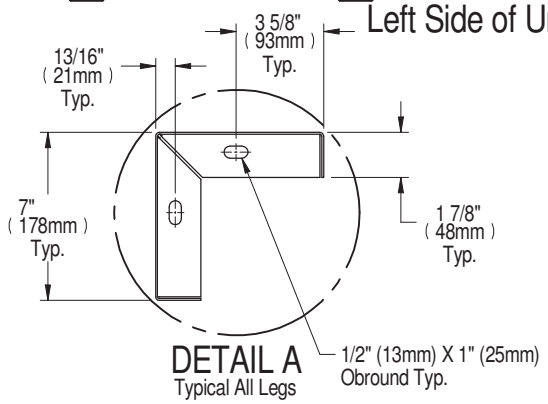
CABINET & ANCHOR DIMENSIONAL DATA

1014# Dry Weight







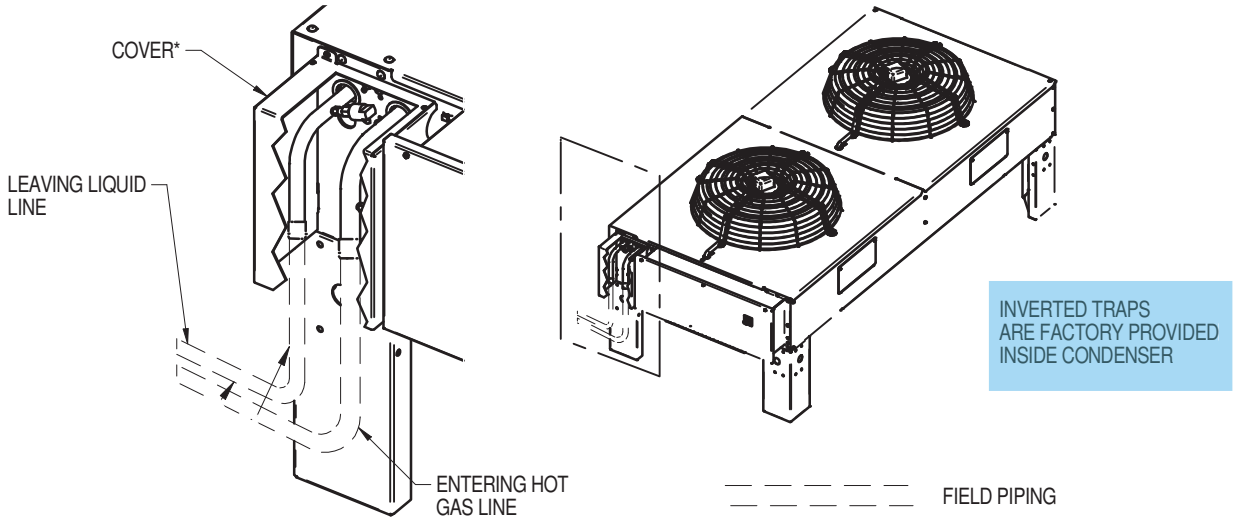


MODEL NUMBER	F LEG HEIGHT DIMENSIONS in. (mm)
MCL165	18 (457)
DIM "G"	35-7/8 (911)
DIM "H"	43-5/8 (1108)

Dimensions in. (mm)										
MODEL NUMBER	A	A* (575V ONLY)	B	C	D	E	J Liebert® Lee-Temp or Liebert® DSE Reciever optional	K	L	M
MCL165	180-1/4 (4578)		73-7/16 (1866)	168-1/4 (4274)	110-1/2 (2806)	56-1/8 (1425)		55-1/2 (1410)	53-7/8 (1368)	48-3/4 (1238)

Note:
1. Vertiv recommends a clearance of 36" (915mm) on each side for proper operation and component access.

PIPING DIMENSIONAL DATA



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

Connection Sizes Only
See Next Page for Refrigerant Line Sizing

* 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

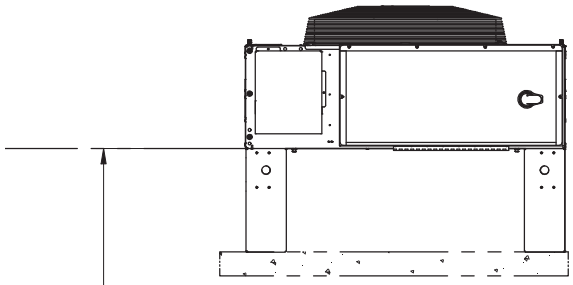
PRODUCT	Indoor Model	Equivalent Length	50 ft (15m)	100 ft (30m)	150 ft (45m)	300 ft (91m)	450ft (137m)
Liebert® CRV	CR019RA/ CR020RA	Hot Gas Line, in.	3/4	3/4	3/4	7/8 [2]	
		Liquid Line, in.	5/8	5/8	5/8	3/4	
	CR035RA	Hot Gas Line, in.	7/8	7/8	7/8	1-1/8 [2]	
		Liquid Line, in.	3/4	3/4 [2]	3/4 [2]	7/8 [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]	
Liebert® XDM	XDM 200/ XDM 400	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]

Notes:
1. Consult factory for proper line sizing for runs longer than maximum equivalent length shown in table.
2.
3. Consult factory when actual pipe length between Liebert® MC/Liebert® EconoPhase and Liebert® DSE unit will exceed 300 ft (91 m).

LIEBERT MC CONDENSER

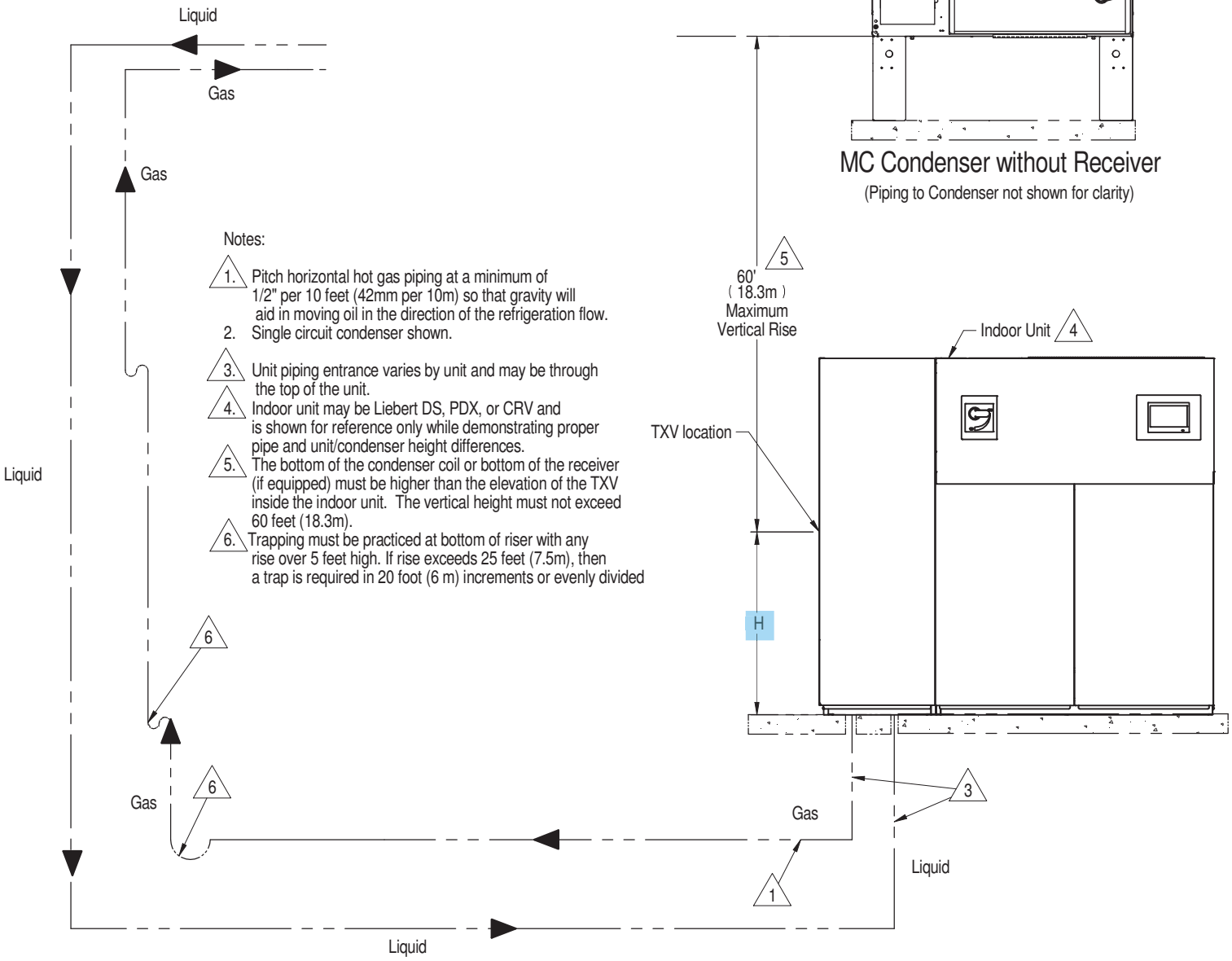
AIR COOLED PIPING SCHEMATIC

CONDENSER ABOVE INDOOR UNIT



MC Condenser without Receiver

(Piping to Condenser not shown for clarity)

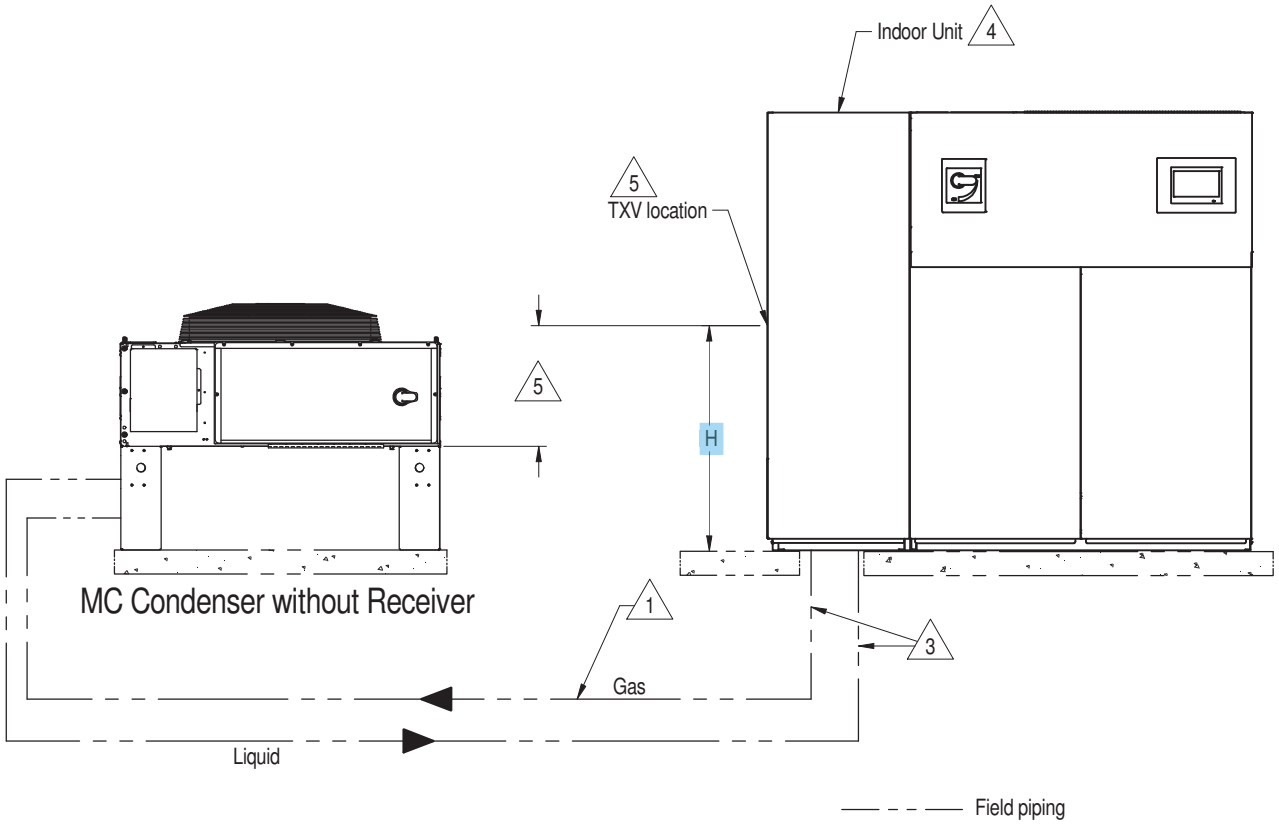


Internal TXV Height	H in. (mm)
PDX Downflow	44 (1118)
PDX Upflow	20 (508)
DA050	43 (1092)

Field piping

AIR COOLED PIPING SCHEMATIC

CONDENSER AND INDOOR UNIT AT SAME LEVEL

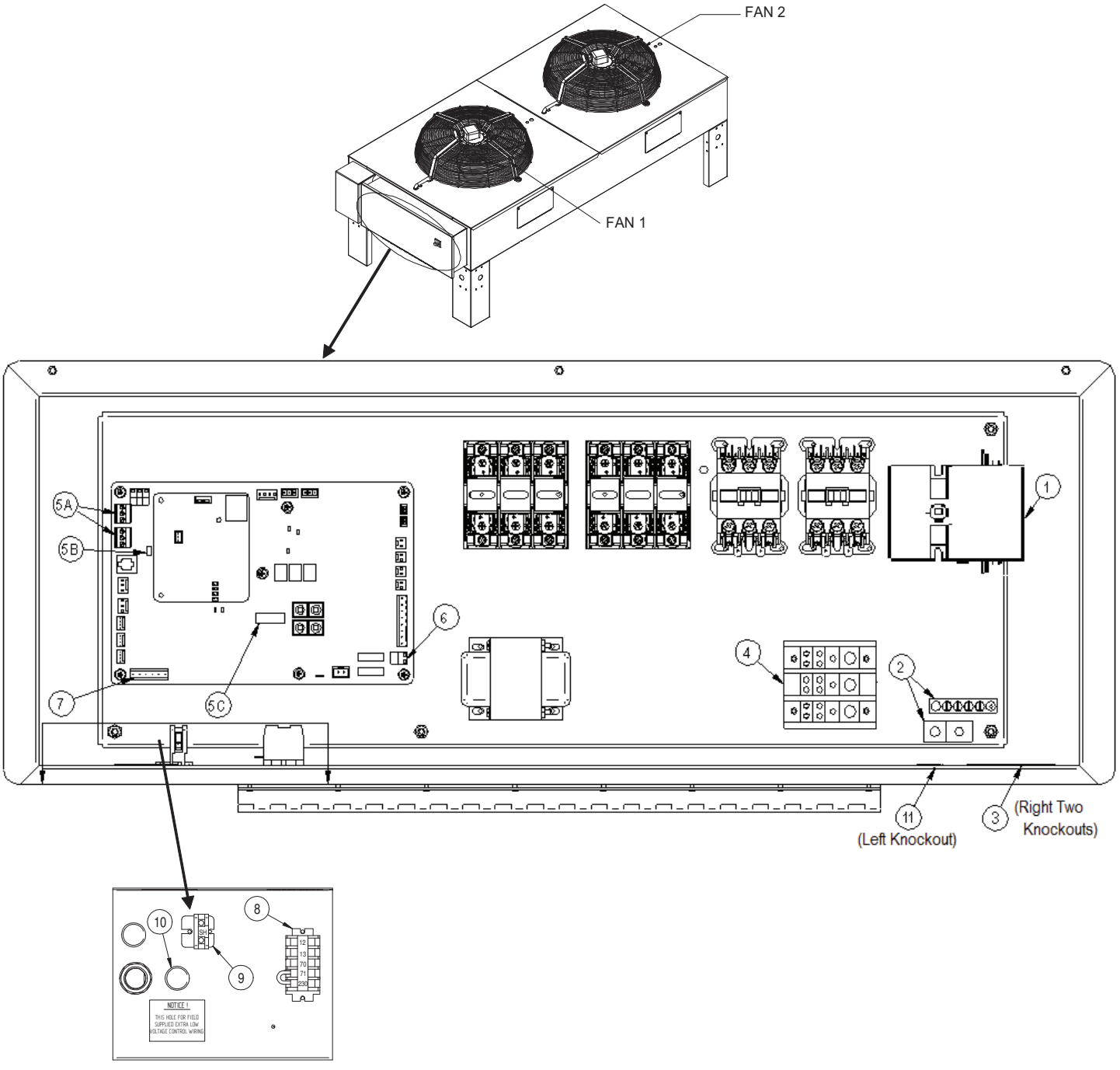


Internal TXV Height	H in. (mm)
PDX Downflow	44 (1118)
PDX Upflow	20 (508)
DA050	43 (1092)

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 may be through the top of the unit.
4. Indoor unit may be Liebert DS, PDX, or CRV and is shown for reference only.
5. The bottom of the coil must be less than 15' (4.6m) below the elevation of the TXV inside the indoor unit. Contact your Vertiv sales representative for additional information.

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 Vertiv. 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 Vertiv. 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.

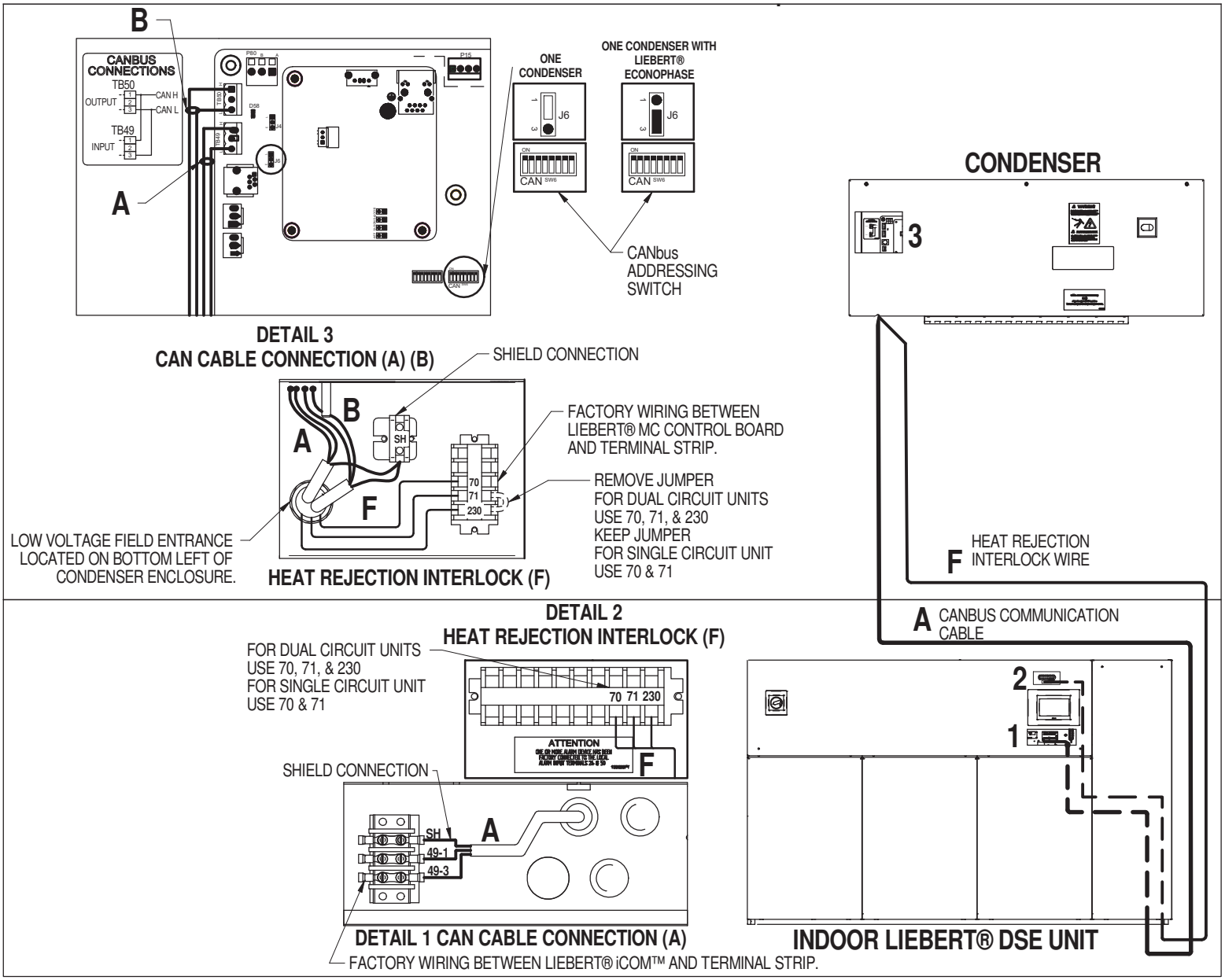
ELECTRICAL FIELD CONNECTIONS
PREMIUM EFFICIENCY CONTROL

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 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® DSE

CANbus & INTERLOCK COMMUNICATIONS



CANbus & INTERLOCK COMMUNICATIONS
USING 1 LIEBERT® MC & OPTIONAL LIEBERT® ECONOPHASE UNIT

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

CAN & CABLE NOTES (A, B):
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 VERTIV FACTORY.

INTERLOCK WIRE NOTES (F):
1. FIELD SUPPLIED WIRE
   - 2 CONDUCTOR 18AWG OR GREATER FOR SINGLE REFRIGERANT CIRCUIT DSE UNITS.
   - 3 CONDUCTOR 18AWG OR GREATER FOR DUAL REFRIGERANT CIRCUIT DSE UNITS.
   - RATED 600V
2. RUN FIELD SUPPLIED WIRES BETWEEN THE INDOOR UNIT AND THE CONDENSER.

Factory Installed

ICF-1170I Series

Industrial CAN-to-fiber converters

Features and Benefits

- Transmits data up to 2 km over optical fiber
- Converts CAN signals to fiber and fiber to CAN signals
- Baudrate up to 1 Mbps
- Dual power inputs for redundancy
- DIP switch for 120 ohm terminal resistance
- DIP switch for fiber test mode
- LEDs for Fiber Tx, Fiber Rx, Power 1, Power 2
- Wide-temperature model available for -40 to 85°C environments
- Fully compatible with the ISO 11898 standard

Certifications

Introduction

The ICF-1170I Series CAN-to-fiber converters are used to convert CAN signals from copper to optical fiber. The converters come with 2 kV optical isolation for the CAN bus system and dual power inputs with alarm contact relay to ensure that your CAN bus system will remain online.

Fiber Test Mode

Fiber Test Mode can be used to test the fiber cable between two ICF-1170I units, and it provides a simple way to determine if the fiber cable is transmitting data correctly. When in Fiber Test Mode, the fiber transceiver (Tx) will continuously send out a data signal and the Fiber Tx LED will light up. On the other side of the connection, when the ICF-1170I fiber transceiver (Rx) receives the data signal from the Tx side, the Fiber Rx LED will light up.

Specifications

Serial Interface

Optical Fiber

100BaseFX ports (multi-mode ST connector)

Low-Speed Fiber Module		Multi-Mode
Fiber Cable Requirements		50/125 µm, 800 MHz
		62.5/125 µm, 500 MHz
Typical Distance		5 km
Wavelength	Typical (nm)	850
	TX Range (nm)	840 to 860
	RX Range (nm)	800 to 900
Optical Power	TX Range (dBm)	0 to -5
	RX Range (dBm)	0 to -20
	Link Budget (dB)	15
	Dispersion Penalty (dB)	1

Factory Installed

CAN Interface

Isolation	2 kV (built-in)
No. of Ports	1
Signals	CAN_L, CAN_H, CAN Signal GND
Terminator	N/A, 120 ohms (by DIP)

Power Parameters

Input Current	221 mA @ 12 to 48 VDC
Power Consumption	221 mA @ 12 to 48 VDC
Input Voltage	12 to 48 VDC
No. of Power Inputs	2
Overload Current Protection	Supported
Power Connector	Terminal block (for DC models)

Physical Characteristics

Housing	Metal
IP Rating	IP30
Dimensions	30.3 x 70 x 115 mm (1.19 x 2.76 x 4.53 in)
Weight	178 g (0.39 lb)
Installation	DIN-rail mounting

Environmental Limits

Operating Temperature	ICF-1170I-M-ST: 0 to 60°C (32 to 140°F) ICF-1170I-M-ST-T: -40 to 85°C (-40 to 185°F)
Storage Temperature (package included)	-40 to 85°C (-40 to 185°F)
Ambient Relative Humidity	5 to 95% (non-condensing)

Standards and Certifications

EMC	EN 55032/35
EMI	CISPR 32, FCC Part 15B Class A
EMS	IEC 61000-4-2 ESD: Contact: 8 kV; Air: 15 kV IEC 61000-4-3 RS: 80 MHz to 1 GHz: 3 V/m IEC 61000-4-4 EFT: Power: 4 kV; Signal: 2 kV IEC 61000-4-5 Surge: Power: 1 kV IEC 61000-4-6 CS: 150 kHz to 80 MHz: 3 V/m; Signal: 3 V/m IEC 61000-4-8 PFMF
Safety	EN 62368-1, UL 508
Environmental Testing	IEC 60068-2-1 IEC 60068-2-2 IEC 60068-2-3
Vibration	IEC 60068-2-6

Factory Installed

MTBF

Time	792,085 hrs
Standards	Telcordia (Bellcore), GB

Warranty

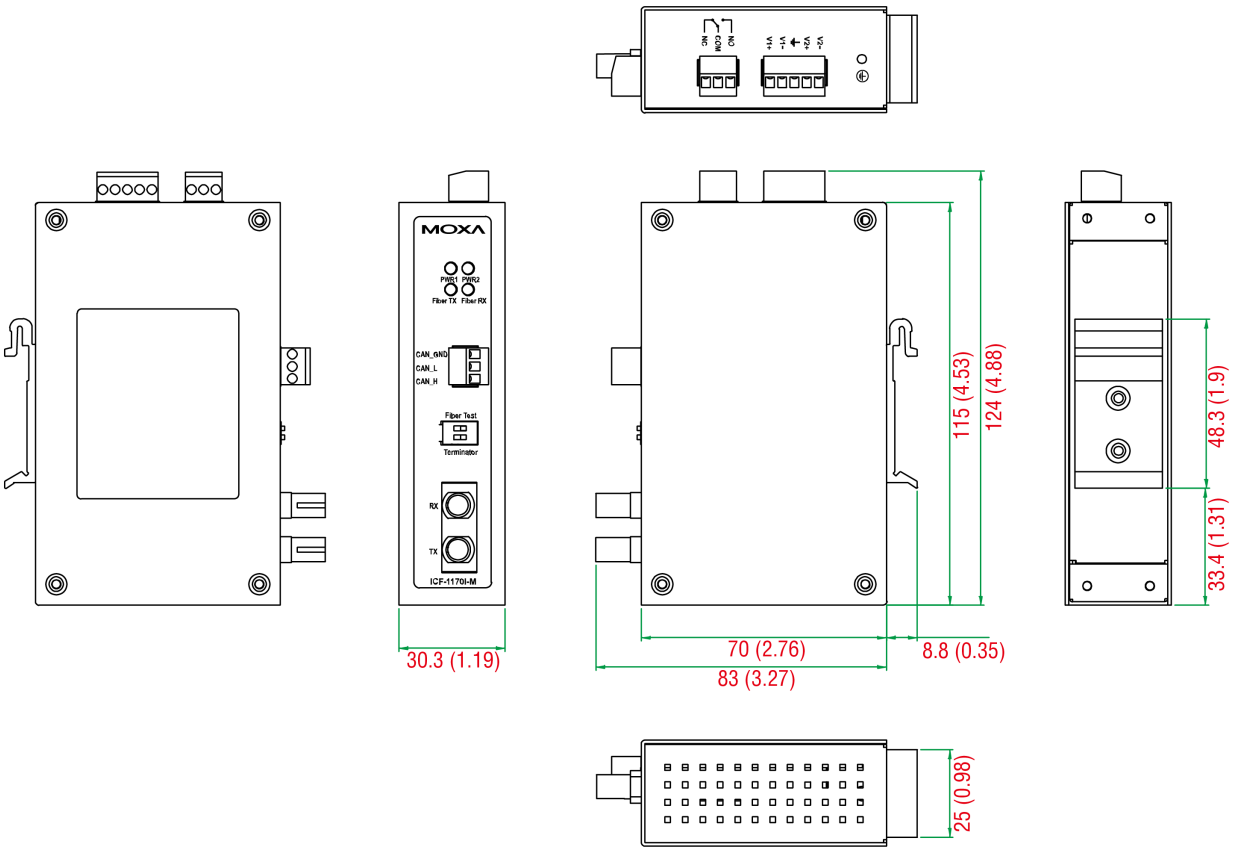
Warranty Period	5 years
Details	See www.moxa.com/warranty

Package Contents

Device	1 x ICF-1170I Series converter
Documentation	1 x quick installation guide 1 x warranty card

Dimensions

Unit: mm (inch)



Ordering Information

Model Name	Operating Temp.
ICF-1170I-M-ST ← Used on CRAC Unit	0 to 60°C
ICF-1170I-M-ST-T ← Used on the condenser.	-40 to 85°C

SEISMIC ANCHORAGE DATA
THREE FAN MODELS

WITHOUT RECEIVER

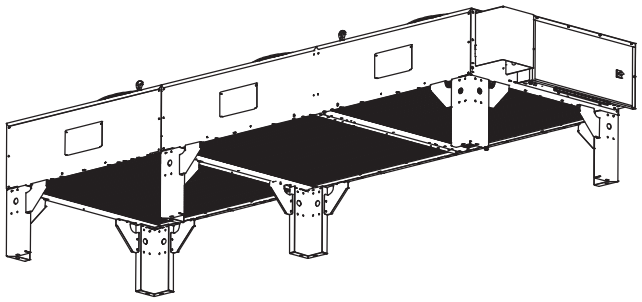


FIGURE 6

NOTES:

1. MOUNTING REQUIREMENT DETAILS SUCH AS ANCHOR BRAND, TYPE, EMBEDMENT DEPTH, EDGE SPACING, ANCHOR-TO-ANCHOR SPACING, CONCRETE STRENGTH, SPECIAL INSPECTION AND ATTACHMENT TO NON-BUILDING STRUCTURES MUST BE OUTLINED AND APPROVED BY THE ENGINEER OF RECORD FOR THE PROJECT OR BUILDING. STRUCTURAL FLOORS AND HOUSEKEEPING PADS MUST ALSO BE SEISMICALLY DESIGNED AND APPROVED BY THE PROJECT OR BUILDING STRUCTURAL ENGINEER OF RECORD TO WITHSTAND THE SEISMIC ANCHOR LOADS DEFINED IN THE TABLE BELOW. THE INSTALLING CONTRACTOR IS RESPONSIBLE FOR THE PROPER INSTALLATION OF ALL ANCHORS AND MOUNTING HARDWARE, OBSERVING THE MOUNTING REQUIREMENTS DETAILED IN THE SEISMIC INSTALLATION DRAWINGS AND ADDITIONALLY OUTLINED BY THE ENGINEER OF RECORD.

2. ALL BRACES AND FASTENERS ARE REQUIRED TO MAINTAIN IBC/OSHPD CERTIFICATION OF CONFORMITY.

3. USE WASHER, LOCK WASHER AND SCREW TO CONNECT BRACE TO CONDENSER BOTTOM BEAM (SEE SHEET 2).

4. USE WASHER,LOCK WASHER,SCREW AND NUT TO CONNECT BRACE TO CONDENSER LEG (SEE SHEET 2).

5. PLACE ANCHORAGE PLATE INSIDE EACH CONDENSER FOOT PRIOR TO FASTENING TO THE STRUCTURE. USE FLAT WASHER, LOCK WASHER AND NUT TO CONNECT CONDENSER TO THE CUSTOMER SUPPLIED ANCHOR ON THE SOLID SURFACE (SEE SHEET 1). AS A MINIMUM 3/8" GRADE ANCHORS WITH AMERICAN NATIONAL STANDARD SERIES W, TYPE A, PLAIN WASHERS (ANSI B18.22.1-1965, R1975) SELECTED TO MATCH THE NOMINAL ANCHOR DIAMETER MUST BE INSTALLED AT EACH ANCHOR LOCATION BETWEEN THE ANCHOR HEAD AND EQUIPMENT FOR TENSION LOAD DISTRUBUTION.

MODEL	FIGURE	IMPORTANCE FACTOR Ip = 1.0			IMPORTANCE FACTOR Ip = 1.5		
		MAXIMUM COMPRESSIVE REACTION Lbs.	MAX. ANCHOR LOADS (ASD)		MAXIMUM COMPRESSIVE REACTION Lbs.	MAX. ANCHOR LOADS (ASD)	
			TENSILE lbs.	SHEAR lbs.		TENSILE lbs.	SHEAR lbs.
MCL165							
SINGLE CIRCUIT WITHOUT RECEIVER	6	158	39	62	181	73	93

* ALL LOADS ARE CALCULATED PER ASCE 7-05, CHAPTER 13.6 Sds=2.0, Rp=6.0, a=2.5

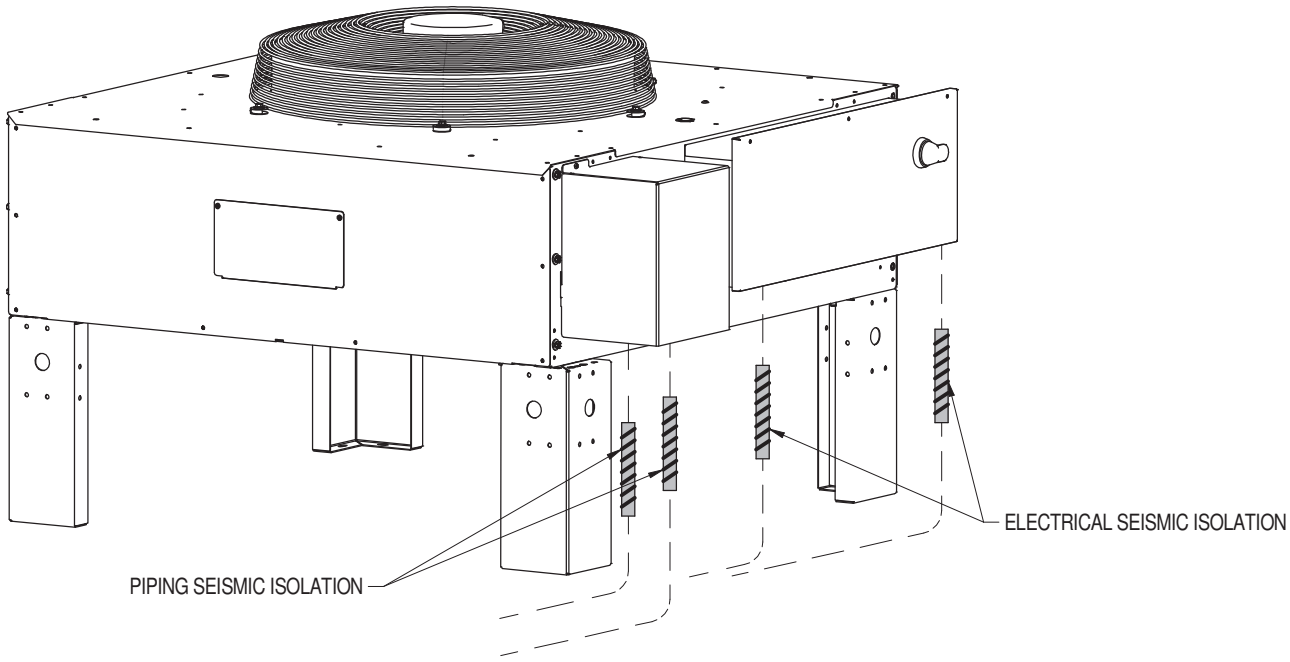
SEISMIC ANCHORAGE DATA
PIPING & ELECTRICAL WIRING CONSIDERATIONS

SEISMIC PIPING CONSIDERATIONS

Condensers for seismic application, shall be attached to the piping system using field supplied flexible loops designed for seismic movement. Flexible loops shall be capable of movement in three dimensions and must isolate the condenser from field piping. The loops shall be suitable for an operating pressure and temperature of the system. Follow manufacturer's installation instructions for proper seismic application of flexible loops. The selection of isolation brand and type must be outlined and approved by the engineer of record for the project or building.

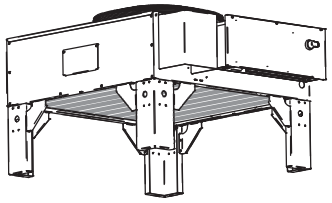
SEISMIC ELECTRICAL WIRING CONSIDERATIONS

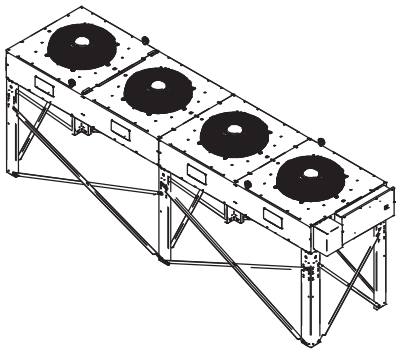
Condensers for seismic application, shall be connected to power and control circuits using field supplied flexible conduit and conductors to allow for movement of the condenser in three dimensions during a seismic event. The flexible conduit shall have at least one bend between the rigid connection at the unit cabinet and the connection to rigid conduit or foundation.



LIEBERT® MC

WIND LOAD DATA
CERTIFICATION



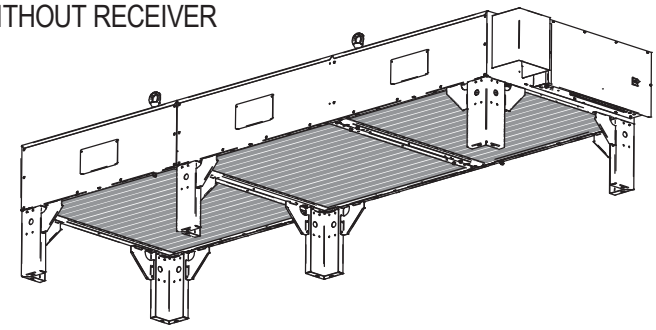


Liebert® MC is self-certified to withstand wind loading in accordance with American Society of Civil Engineers (ASCE) Minimum Design Loads for Buildings and Other Structures, ASCE 7-16. This certification is also in accordance with Florida Building Code 7th Edition, (2020) and the International Building Code (IBC) 2021. The basis for this certification is through successful analytical modeling on the above-mentioned equipment. The certification is valid under site specific wind load criteria where the wind velocity pressure does not exceed those listed in tables 1, 2, 3, and 4. The certification covers leg heights up to 60" with or without receivers. Impact resistance is not covered in this certification.

Mounting requirement details such as anchor brand, type, embedment depth, edge spacing, anchor-to-anchor spacing, concrete strength, special inspection and attachment to non-building structures must be outlined and approved by the engineer of record for the project or building. Structural floors and housekeeping pads must also be designed and approved by the project or building structural engineer of record to withstand the wind anchor loads defined herein. The installing contractor is responsible for the proper installation of all anchors and mounting hardware, observing the mounting requirements detailed in the installation drawings, and additionally outlined by the engineer of record.

WIND LOAD DATA
THREE FAN, 18" LEG HEIGHT CONFIGURATION

WITHOUT RECEIVER



NOTES:
1. All braces and fasteners are required to maintain certification of conformity, see page 2, Detail A and page 3, Detail B.
2. Use washer, lock washer and screw to connect brace to condenser bottom beam (reference view Detail B, page 3).
3. Use washer, lock washer, screw and nut to connect brace to condenser leg (reference view Detail B, page 3).
4. Place anchorage plate inside each condenser foot prior to fastening to the structure. Use flat washer, lock washer and nut to connect condenser to the customer supplied anchor on the solid surface (reference view Detail A, page 2). As a minimum 3/8" anchors with American National Standard series W, type A, plain washers (ANSI B18.22.1-1965, R1975) selected to match the nominal anchor diameter must be installed at each anchor location between the anchor head and equipment for load distribution.
5. See instruction included with part kit for more details.

TABLE 3
Liebert MC Model Numbers: MCL165
Leg height: up to 60 inches

This certification covers the following wind parameters (ultimate load):
Horizontal pressure = 107 lbs/ft²; uplift pressure = 107 lbs/ft²

Monitoring
(Local & Remote)

LIEBERT® iCOM™

PRODUCT INFORMATION
UNIT MOUNTED DISPLAY

The Liebert® iCOM™ display is a 7-inch capacitive, color-touchscreen display 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. These four-digit passwords may be customized according to User preference.

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

Parameter Download- The Liebert® iCOM™ shall enable the user to download a report that lists parameter names, factory default settings, and the user programmed settings in .csv format for remote reference.

Parameter Directory- The Liebert® iCOM™ shall provide a directory that lists all parameters in the control. The list shall provide Line ID numbers, parameter labels, and current parameter values.

PRODUCT INFORMATION
UNIT MOUNTED DISPLAY

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 certain readouts will be configurable through the 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, call for free cooling, maintenance status, call for hot water reheat, call for electric reheat, call for dehumidification, call for humidification, airflow, static pressure, fluid flow rate and cooling capacity.

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 monitoring plug connections.

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 and Control Board software upgrades are performed through a USB connection.

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).

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

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.

Timers/Sleep Mode- The menus shall allow various customer settings for turning the unit On or Off.

Sensor Calibration- The menus shall allow unit sensors to be calibrated with external sensors.

Maintenance/Wellness Settings- The menus shall allow reporting of potential component problems before they occur.

PRODUCT INFORMATION
UNIT MOUNTED DISPLAY

Options Setup- The menus shall provide operation settings for the installed components.

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.

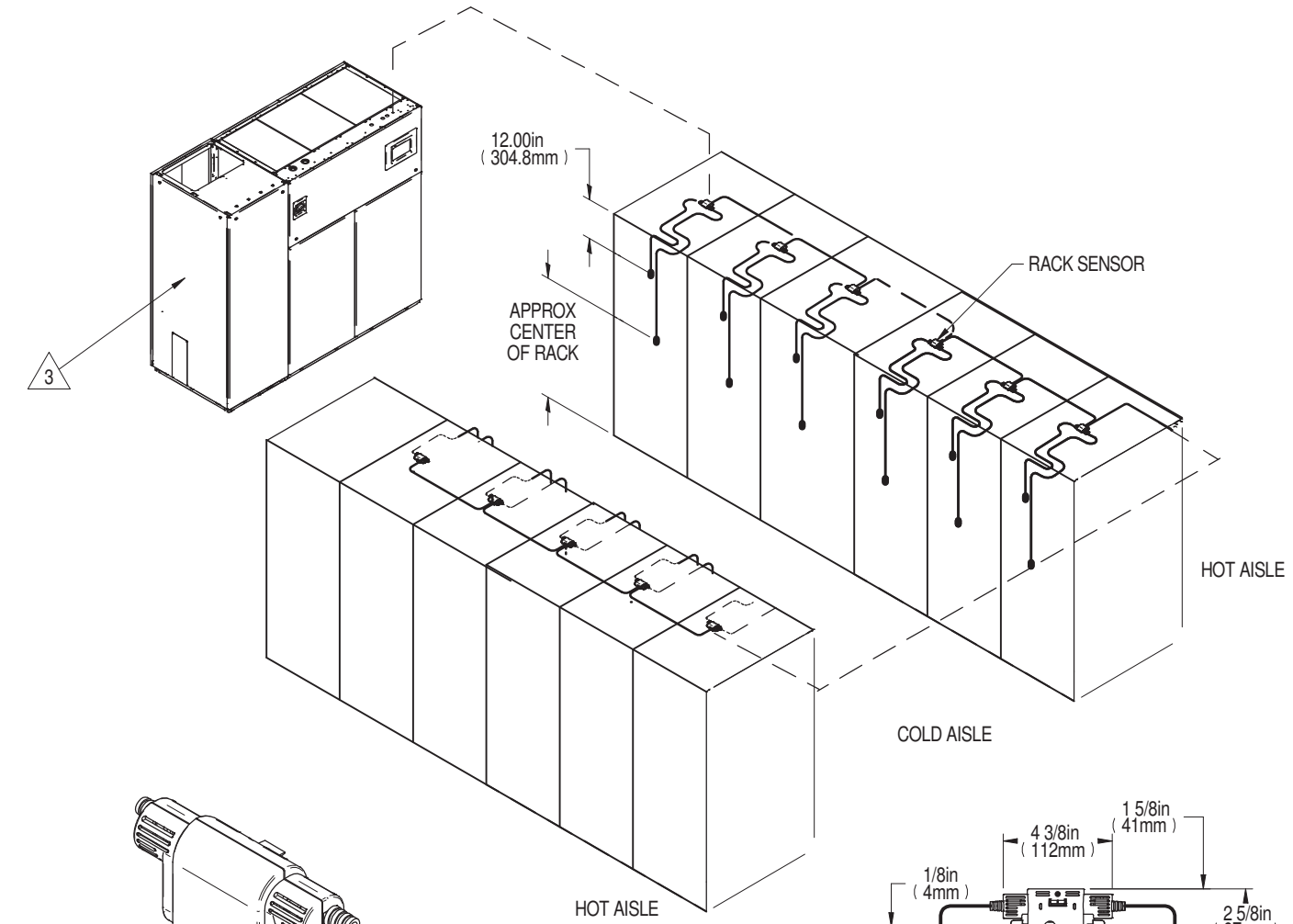
Auxiliary Boards- The menus shall allow setup of optional expansion boards.

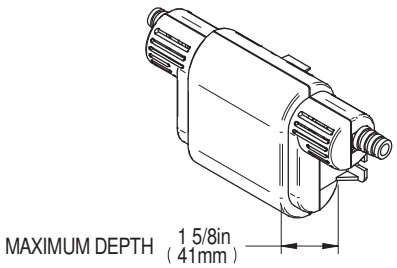
Various Sensors: The menus shall allow setup and display of optional custom sensors. The control shall include four customer accessible analog inputs for field-supplied sensors. The analog inputs shall accept a 4 to 20mA signal. The user shall be able to change the input to 0 to 5VDC or 0 to 10VDC. The gains for each analog input shall be programmable from the front display. The analog inputs shall be able to be monitored from the front display.

Diagnostics/Service Mode- The Liebert® iCOM™ control shall be provided with self-diagnostics to aid in troubleshooting. The microcontroller board shall be diagnosed and reported as pass/not pass. Control inputs shall be indicated as On or Off at the front display. Control outputs shall be able to be turned On or Off from the front display without using jumpers or a service terminal. Each control output shall be indicated by an LED on a circuit board.

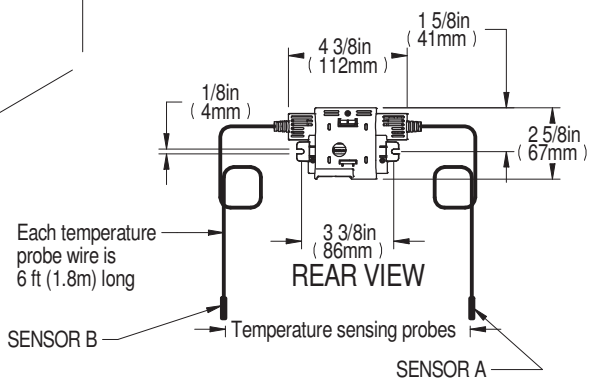
LIEBERT® iCOM™

2T RACK TEMPERATURE SENSOR CONNECTIONS





ISO VIEW



NOTE:
1. Rack sensor provided by the factory and installed by others.
2. Install temperature sensors on the perforated portion of the rack door using the supplied wire ties. Ensure door can swing open freely without binding cables.
3. The cooling unit used in this submittal drawing is a reference model, it's only purpose is to show how a 2T sensor system can be laid out.
4. The low voltage electrical knockout locations will vary between Liebert® CW, Liebert® CWA, Liebert® DS, Liebert® DSE and Liebert® PDX.
5. All the low voltage internal component orientations and positioning will vary.

RECOMMENDED WIRED SENSOR LOCATIONS

1. Racks at end of aisles/rows shall be monitored via wired/wireless temperature sensors.
2. At minimum 1 of every 3 racks should be monitored, equally spaced if populated racks exist.

SEE INSTRUCTION SHEET 310301 FOR CANBUS WIRE CONSIDERATIONS AND SENSOR INSTALLATION INSTRUCTIONS.

LIEBERT® LIQUI-TECT™ 460 KIT ZONE LEAK DETECTION SENSOR WITH CABLE

Product Specification/Installation Guide

The Liebert® Liqui-Tect™ 460 (LT460) provides zone detection of leaks, protecting equipment by constantly monitoring the area for leaking liquids. The LT460 is the ideal solution for perimeter sensing or serpentine coverage of areas requiring up to 100 feet of cable.

Selectable modes of operation provide flexible alarming options and protection for the cable. The LT460 constantly monitors a zone for leaks, internal faults, and power failures and warns of any abnormal conditions. Top cover LEDs provide status indication and also ensure that the cable is properly installed and operational under raised floors.

Two independent outputs provide a signal to a local alarm panel, Liebert cooling unit, and a remote building management system, or external equipment, such as motorized water shutoff valves.

LT460 APPLICATIONS

The LT460 is ideally suited for:

- Glycol and chilled water cooling,
- Humidification supply water piping,
- Condensate pumps and drains,
- Unit and ceiling auxillary drip pans,
- Overhead piping troughs.

LOCATIONS/PLACEMENT

The LT460 is an excellent choice for:

- Large scale network control centers,
- Data centers,
- MRI and CAT scan rooms
- Server rooms and closets,
- Unattended, remote shelters,
- Mechanical equipment rooms,
- Sensitive areas with overhead piping,
- Industrial process control rooms.

COMPONENTS

Liqui-Tect™ 460 Module

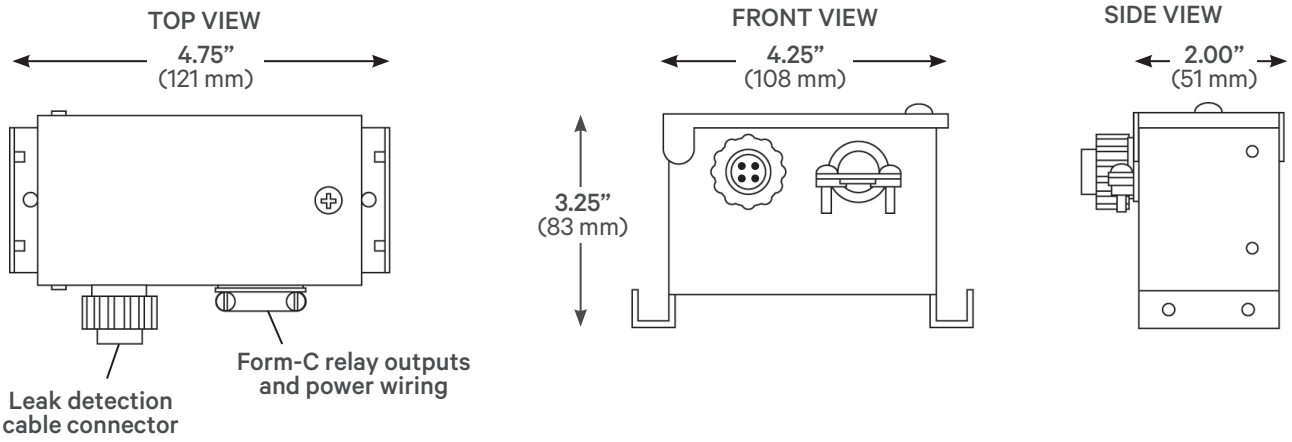
The LT460 consists of a metal enclosure with a hinged top door providing access to the internal circuit board for wiring termination and configuration of DIP switches. The LT460 will monitor up to 100 feet of connected LT500Y leak detection cable.

LT500Y Leak Detection Cable

The cable material and construction allow the cable to lie flat when used with hold down clips. The LT500Y is plenum-rated and UL listed for safe operation.

- If purchased separately, cables are available in lengths of 15, 35 and 50 feet. These cables can be connected incrementally to monitor from 15 feet up to 100 feet. An end terminator and hold-down clips (two clips required for each 6-8 feet of cable) must be ordered separately.
- If included in a kit, cables are available in lengths of 20, 25, 30, 35 and 45 feet. Cables in kits cannot be lengthened. Hold down clips are provided.

DIMENSIONS - TOP, FRONT AND SIDE



SPECIFICATIONS

Power Requirements	24 VAC 120 mA, 50/60 Hz, 3 VA (max.)
Dimensions, W x D x H	5.35 in. x 3.23 in. x 3.5 in. (135.9 mm x 82 mm x 88.9 mm) Mounting-holes require #8 screws.
Weight (assembled)	2.0 lb. (0.9 kg)
Leak-detection Cable Compatibility	All Liebert LT500 sensing cables
Maximum Leak-detection Cable Length	100 ft. (30.5 m)
Metal Enclosure	NEMA 1, IP 30

ENVIRONMENTAL CONDITIONS

Operating Temperature	50°F to 104°F (10°C to 40°C)
Operating Humidity	10% to 95% relative humidity (non-condensing)
Operating Altitude	0 to 10,000 ft. (0 to 3,048 m)
Output Relay Contact Rating	2 Form-C; 3 A rating at 24 VAC

AGENCY LISTINGS

UL	UL916
C-UL	C22.2, No. 205-M1983
CE	Yes
FCC Compliance	47 CFR, Part 15

CONFIGURATION-SWITCH SETTINGS

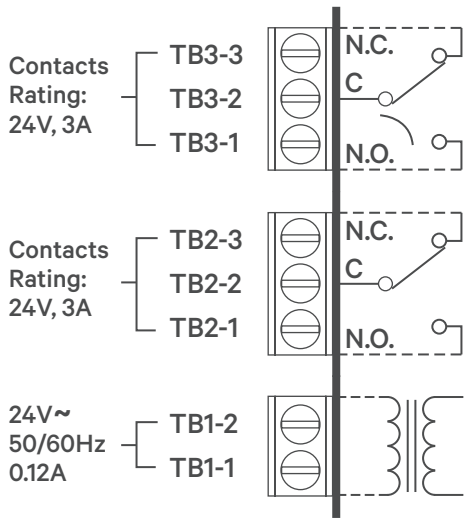
A four position DIP switch selects two alarm (filter) delays and three mutually exclusive alarm modes. The switches are located next to the wiring termination blocks.

SWITCH SETTINGS	OFF	ON
1. Leak Detect Filter	10 sec	2 min
2. Alarm Latch	No	Yes
3. Alarm Retest Delay	No	1 hr
4. Not Used	–	–

CONNECT ENCLOSURE TO EARTH GROUND

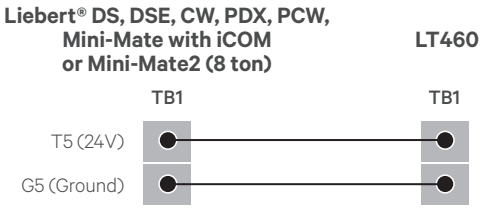
ALL CIRCUITS: CLASS 2

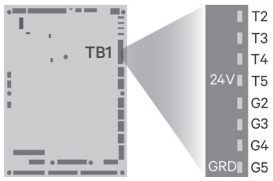
Contacts shown in POWERED, NON-ALARM state



POWER WIRING

The LT460 is rated for 24 VAC, 50/60 Hz, and 0.12 A.



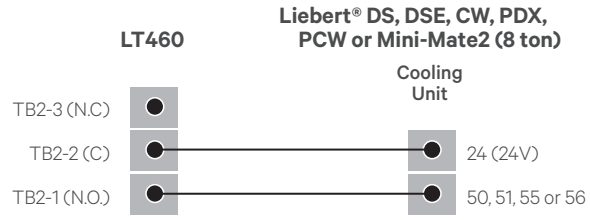


Location of T5 (24V) connection on main controller board of Liebert unit.

WIRING TO COOLING UNIT

The LT460 has two Form-C dry-contact alarm-output contacts (TB2 and TB3). Each contact is rated for 24 VAC at 3 amp.

NOTE: In Liebert® iCOM™, use the Service Options menu to add that the Liqui-Tect™ is installed

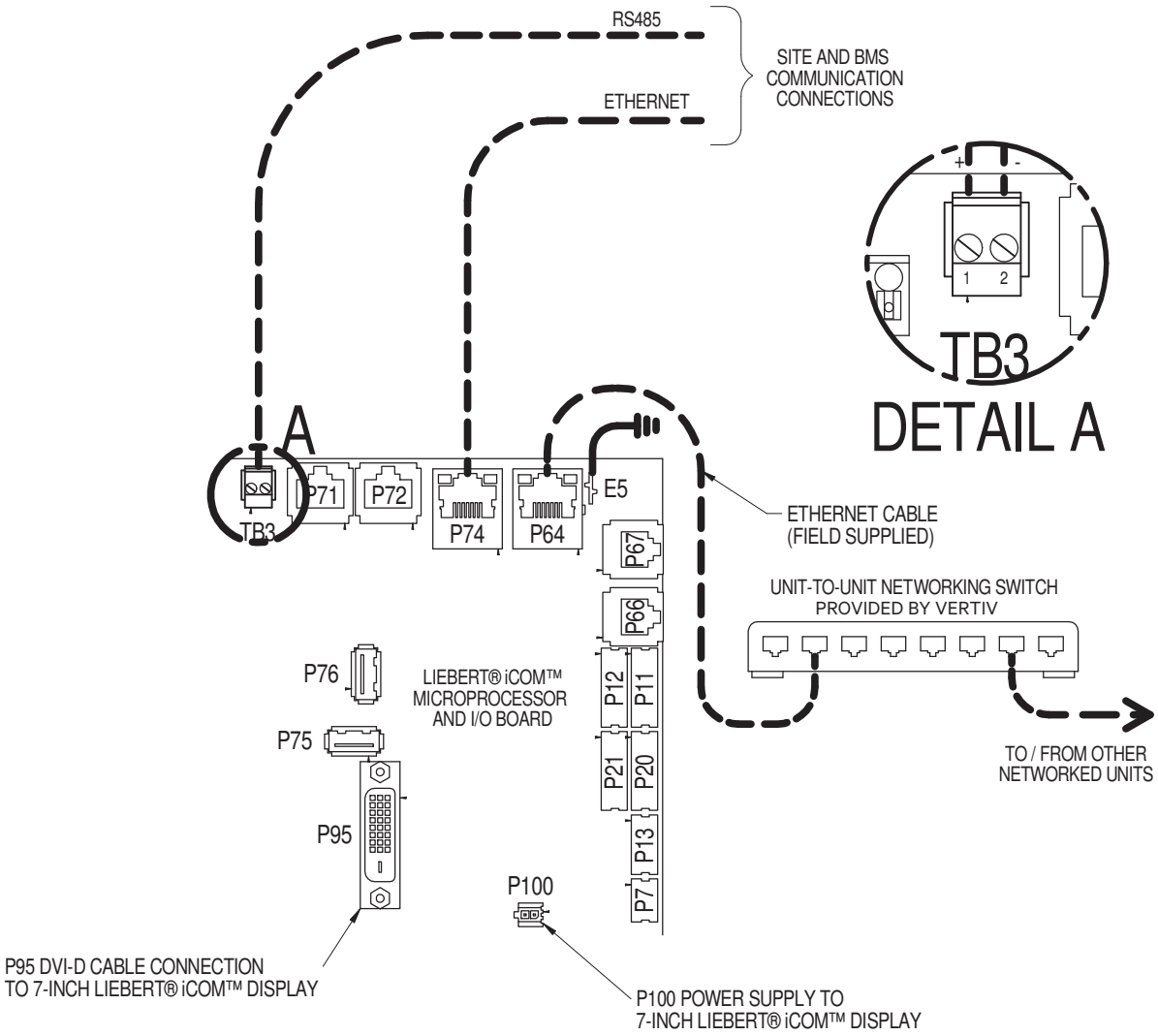


Note: Terminal 50 not available on Mini-Mate2 (8 ton)

SL-31052_Rev3_08-20

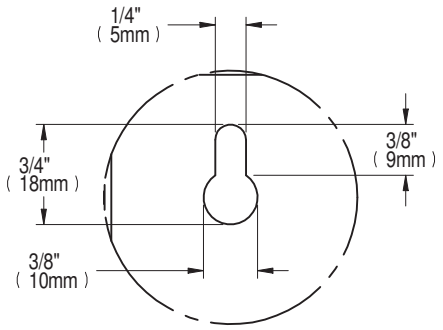
Unit-To-Unit
(U2U) Networking

UNIT TO UNIT NETWORK CONNECTIONS

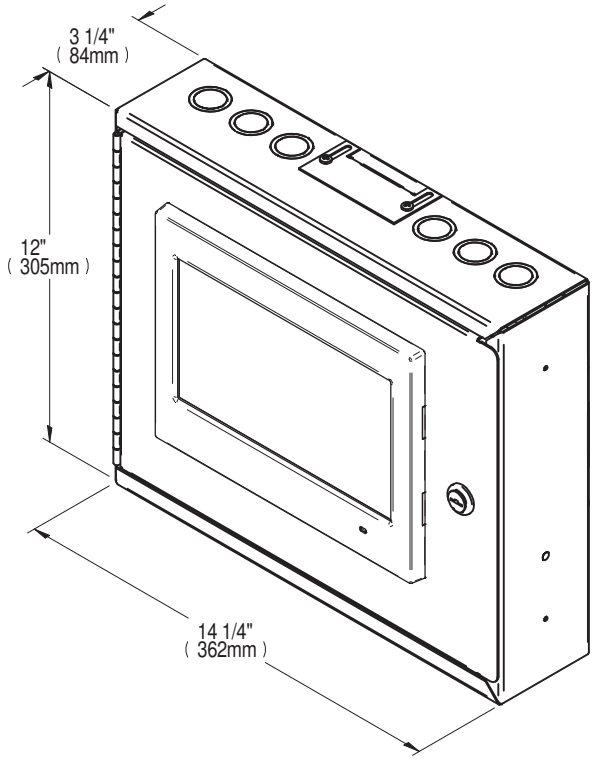


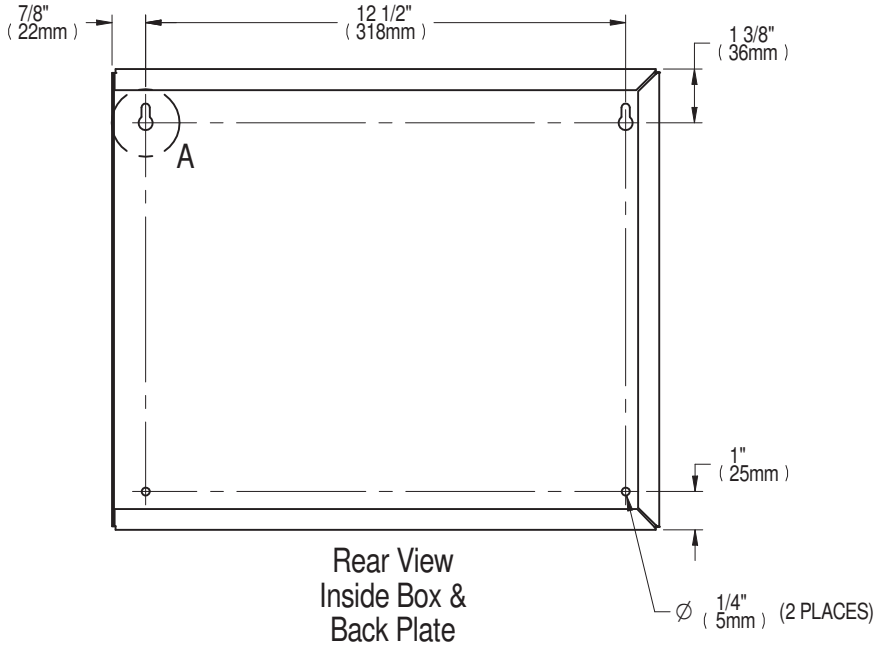
LIEBERT® vNSA

CABINET DIMENSIONAL DATA
NETWORK SWITCH ASSEMBLY W/ DISPLAY



Detail A
Mounting Slot
Typ. (2) Places

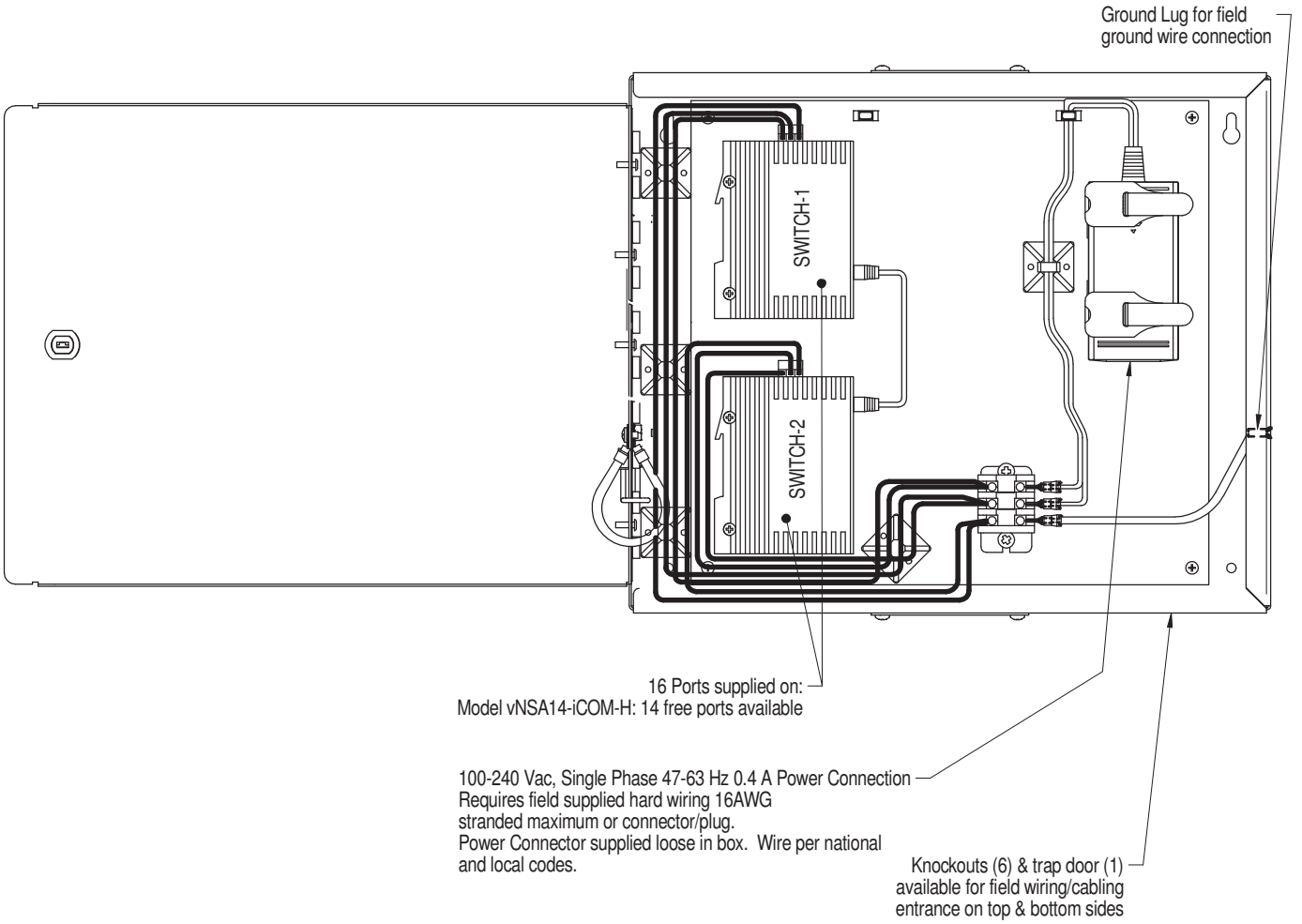




Rear View
Inside Box &
Back Plate

LIEBERT® vNSA

INTERNAL DETAILS
NETWORK SWITCH ASSEMBLY



Network Switch Model	Maximum # of Connected Cooling Units
	w/ Liebert® iCOM™ Color Display
vNSA14-iCOM-H	14 Units

Notes:
1. Field to supply CAT5 or better cables.
2.Liebert® iCOM™ networking allows for the use of having mixed display types. Contact factory for maximum number of units.

Vertiv™
Global Headquarters
United States
1050 Dearborn Drive,
Columbus, Ohio 43085
Telephone: +1 (614) 888-0246

Vertiv, Columbus Office
610 Executive Campus Drive,
Suite 110
Westerville, OH 43082
Telephone: +1 (614) 841-2709

AMAZON – LCK062ROMP01-02

LIEBERT PDX
FLOORMOUNT AIR-COOLED SYSTEM

Model:	**PX029CA1A**	**MCL055E1A**
Qty:	**Two (2)**	**Two (2)**
Tag:	**CRAC 1-7, 1-8**	**ACCU 1-7, 1-8**
Date:	**February 06, 2024**	
Submitted by:	**Vertiv/Liebert, Columbus Office**	
Contact:	**Jay Pitchford (614) 361-9024, jay.pitchford@vertiv.com**	

LIEBERT PDX™ AIR COOLED
ENGINEERING SPECIFICATION SHEET

PROJECT NAME: AMAZON – LCK062

DATE: December 11, 2023

REF. #: CPQ-567371

INDOOR SECTION MODEL NUMBER and ELECTRICAL SUPPLY REQUIREMENTS:

- PX029HA1A **Qty**: Two (2) 460V, 3 Ph, 60 Hz, 21.6 FLA, 25.7 WSA, 40 OPD

OUTDOOR SECTION MODEL NUMBER and ELECTRICAL SUPPLY REQUIREMENTS:

- MCL055E1A **Qty**: Two (2) 460V, 3 Ph, 60 Hz, 2.8 FLA, 3.5 WSA, 15 OPD

CABINET SECTION:

- Downflow Air Design – Bottom Front Supply with Top Return
- 9” High Floorstand
- 36” High Return Air Plenum Shroud with Top Duct Connection

NET CAPACITY DATA (ASHRAE 127-2007):

- See Attached Performance Data Sheet

FAN SECTION:

- Nominal 3.1 kW Electronically Commutated (EC) Direct Drive Fan
- Variable Speed Fan Through All Operation Modes

COIL SECTION:

- Tilted Slab with Copper Tubes in Hydrophilic Coated Aluminum Fins
- 9.9 ft2 Face Area, Four (4) Rows Deep

FILTER SECTION:

- 2” Deep Disposable, Rated MERV13

REHEAT SECTION:

- No Reheat Supplied

HUMIDIFIER SECTION:

- No Humidifier Supplied

AIR COOLED CONDENSER SECTION:

- Design Ambient: -20° to +120° F
- Microchannel Aluminum Coil
- Variable Speed EC Fan Motors with Integrated Fan Motor/Blade/Guard Assembly
- Aluminum Enclosure with (field-attached) Seismically Braced Legs
- Fused, Locking And Lockable Electrical Disconnect Switch
- Factory Wired And Mounted NEMA 3R Electrical Panel/Box

SYSTEM CONTROLS & MONITORING SECTION:

- iCOM™ Controls with Touch Screen Display and Supply Air Temperature Sensor
- Return Air Temperature & Humidity Sensor
- One (1) Model LT460 Zone Leak Detection Kit with Sensing Cable
- BAS Interface with SNMP, Email, SMS, Modbus (IP/RTU) & BACnet (IP/MSTP) Protocols
- One (1) Set Each, Common Alarm Contacts and Remote Shutdown Terminals

INCLUDED ACCESSORIES:

- Variable Capacity Digital Scroll Compressor
- Locking Disconnect with 65 kAIC System Short Circuit Current Rating
- Dual Float Condensate Pump
- Compressor Low Sound Package
- Special Feature #E-204922-11:
  - Phase Loss Protection Relay – Shuts Down System on Phase Loss with Auto Restart
- Special Feature #E-200846-10:
  - iCOM Controls Quick Start Software with 6 kW Capacitive Buffer
- Special Feature #E-203537-2:
  - Top Piping Connections
- Special Feature #E-4048-4:
  - No Shutdown Upon Condensate Pump Safety Switch Signal
- Special Feature #E-4482-13:
  - No Shutdown Upon Water Detected Signal

INCLUDED FACTORY SERVICES:

- One (1) Year Parts and Labor Warranty
- Five (5) Year Compressor Part Warranty
- Factory Check-Test-Warranty Inspection
- Field Technician Labor for Unit-to-Unit (U2U) Teamworking Assistance
- Field Technician Labor for BAS Communication Assistance
- Level 3 & 4 Commissioning Assistance
- Post-Installation User Training

VERTIV. Liebert Rating System (LRS) 3.6.0.10w 4.4.3.18e

Project Name:	**OH63 MDF**	Office Name:	**Liebert North America HQ**
Customer Name:	**Swanson Rink**	Phone Number:	
Engineer Name:	**JOHN GUTIERREZ**		

PDX Model PX029HA1*D~MCL055E1; Air Cooled

Manufacturer:	**Liebert North America**	Altitude:	**940 ft**
Unit Power Supply:	**460/3/60**	ESP:	**0.20 InH2O**
Refrigerant:	**R410A**	Width:	**34.5 in**
Internal Filter Class:	**Merv 8 Std. - 2 inch (51 mm)**	Depth:	**32.3 in**
Spec.sheet output date:	**22-Feb-24**	Height:	**77.6 in**
Return Airflow (std. motor):	**3100 ACFM**	Weight:	**700 lb**

Condenser(s)

Manufacturer:	**Liebert North America**
Model:	**MCL055E1**
Condenser Type:	**MCH Condenser**
Design Ambient:	**120 °F**
Power Option:	**460/3/60**

Compressor(s)

Manufacturer:	**Copeland**
Model:	**ZPD104KCE-60Hz**
Compressor Type:	**Digital**
Power Supply:	**460/3/60**

Evaporator(s)

Manufacturer:	**Liebert North America**
Model:	**RTPX029DEvapx1**
Fin Type:	**Lanced**
Number of Rows:	**4**
Fin Density:	**12 fpi**
Face Area:	**10.01 ft²**
Surface Area:	**763 ft²**

Miscellaneous

Humidifier Type:	**No Humidifier**
Bypass airflow:	**0 %**

Cooling Fan(s)

Model:	**EC-560-DN**
Description:	**D - DX Cooling Only**
Air Supply:	**Front**
Power Supply:	**460/3/60**
Quantity of Motors:	**1**

System: [Digital Loading: 79%, SC: 10 °F, SH: 12 °F] [ESP:0.2]

Ent DB (°F)	Ent WB (°F)	Ent RH (%)	Ent DP (°F)	Return Air Vol (ACFM)	Supply Air Vol (ACFM)	Air Face Vel (ft/min)	Unit Air Vol (SCFM)	Amb DB (°F)	NTCC (kW)	NSCC (kW)	THR (kW)	Cond. Airflow (ACFM)	Lvg DB (°F)	Lvg WB (°F)	Tot Comp Pwr (kW)	Sys Power Input (kW)	Sys SCOP (W/W)	Sys NSenCOP (W/W)	Fan kW (kW)	Airflow Calibration (V)
81	61	31.3	47.8	3100	2968	311	2898	120	21.4	21.4	30.9	10766	58	52.2	8.65	11.3	1.89	1.89	0.88	5.81

System

Compressor Power (kW)	Sat. Discharge Temp. (°F)	Sat. Suction Temp. (°F)
8.65	132.6	51.3

Notes

1. Capacities shown have been reduced by fan motor(s) heat (net).
2. System Power Input includes Compressor(s), Blower Motor(s), Condenser(s), and Control Power.
3. Coil airflow has not been reduced by a bypass.
4. Capacity Tolerance is 5%.
5. ACFM/ACMH is the unit actual air flow rate when measured at the specific return or supply temperature and barometric conditions that define a unique air density.
6. SCFM/SCMH is the unit air flow rate when converted to standard air density of 0.075 lb/ft3 at sea level.
7. NTCC, Net Total Cooling Capacity
8. NSCC, Net Sensible Cooling Capacity

AHRI CERTIFIED® www.ahridirectory.org
Datacom Cooling
AHRI Standard 1360

Certified in accordance with the AHRI Datacom Cooling Certification Program at AHRI Standard 1360 (I-P) and ASHRAE Standard 127-2007 Standard Rating Conditions. Certified units may be found in the AHRI Directory at www.ahridirectory.org.

LIEBERT PDX™ AIR COOLED
DETAILED EQUIPMENT DESCRIPTIONS

Cabinet and Frame
The frame is constructed from formed and riveted 14 gauge galvanized steel channel. The exterior panels are 20 gauge steel and powder coated with black matte color paint to protect against corrosion. Exterior panels are insulated with ½" (sides) and 1"(front and rear), 1-1/2 lb insulation. Front and side panels have captive, 1/4 turn fasteners to allow quick panel removal. The cabinet is designed so that components are serviceable and removable through the front. Right side access may be recommended for some model and option configurations. Consult your local Liebert office for details.

Cooling Coil
The tilted-slab cooling coil is constructed of copper tubes and hydrophilic coated aluminum fins. The hydrophilic coating significantly reduces water carryover and improves the speed of condensate drainage from the fins. A stainless steel condensate drain pain is provided below the cooling coil. See the engineering specification sheet for details on the face area, coil depth, and face velocity on the model submitted.

Electrical Panel
The high voltage compartment contains the contactors, transformers and overloads and all other high-voltage components. Each high voltage component is protected by an over current protective device. The entire high voltage panel is enclosed by a dead front panel. When the unit front door is opened by operating personnel, the high voltage components remain enclosed for operator safety.

Fan Section
The electrically commutated (EC) fan consists of a plug type, integral direct driven fan with dynamically balanced backward curved aluminum blades and is powered by a direct drive DC Motor with integrated AC-DC conversion. The fan speed can be varied and regulated by the Liebert iCOM® control through all modes of operation for energy savings and more precise cooling control. The fan is located to draw air through the coil to ensure even air distribution and maximum coil performance.

Variable Capacity Digital Scroll Compressor
The compressor is a R-410A scroll-type with variable capacity operation from 20-100%. A compressor solenoid valve unloads the compressor to provide variable capacity operation, improving energy efficiency without the harmonic distortion associated with VSD-driven compressor reduction techniques. The compressor has a suction gas cooled motor, EPDM vibration isolators, internal thermal overloads, automatic reset high pressure switch with lockout after three failure occurrences, RotoLock service valves, low pressure transducer and crankcase heater.

Compressor Sound Jacket
The compressor sound jacket encloses the compressor to reduce the level of sound emissions. The jacket consists of 3/8" closed cell polymeric 4.5 - 8.5 lb/ft3 density insulation material.

Humidifier
Not provided for this application.

Reheat
Not provided for this application.

Filters
The deep pleated 2" filters are MERV13 efficiency per ASHRAE Standard 52.2-2007. The filters are inside the Liebert PDX/PCW cabinet and are accessible from the front of the unit.

Liebert iCOM™ Microprocessor with Touch Screen Control
The Liebert iCOM unit control is microprocessor based and factory-set for Intelligent Control, which uses “fuzzy logic” and “expert systems” methods. Proportional and Tunable PID are also user selectable options. The control processor has a 9” touch screen display for user inputs, mounted in an ergonomic housing. The display & housing are viewable while the unit panels are open or closed. The controls are menu- driven, with the display organized into two main sections: User Screen and Service Screen. A password is required to make system changes within the service screen.

The display will automatically create safety copies of important control parameters, and allows the user to automatically backup unit configuration settings to internal memory or USB. Configuration settings may be transferred to another unit to standardize and streamline multi-unit startup or cooling reconfiguration. Step-by-step tutorials or wizards are provided for simplified control setup.

Status LEDs and unit alarms (audible and visual) are complimented with an onboard help database and user-customizable data display to provide the user with an intuitive human/machine interface. Software/firmware updates and upgrades, designed to provide maximum control flexibility, utility and value, can be performed via the USB port.

Disconnect Switch – Locking Type – 65,000 Amp SCCR
The locking disconnect switch, mounted in the electrical panel, is connected to the safety lock dead front panel of the system and is interlocked mechanically. This prevents opening the panel unless the switch is in the Off position. The locking disconnect switch complies with NEC and local codes, and provides 65kA SCCR. The disconnect switch handle is also lockable to support lockout/tagout safety programs.

Dual-Float Condensate Pump
The dual-float condensate pump has a capacity of 5 GPM at 40 ft head. Pump is complete with integral primary and secondary float switches, pump, motor assembly and reservoir. The secondary float sends an alarm signal to the Liebert iCOM®, which will display the condensate pump alarm and shut down the unit upon a high water condition. An additional dedicated N.O. contact signal is provided as well. This option is factory-installed on upflow models and field-installed on downflow models.

Floor Stand
Constructed of galvanized steel and available in heights from 6" to 24" in 3" increments, adjustable ±1.5", with vibration isolation pads provided on the adjustable legs.

Return Air Plenum
The field-assembled plenum is constructed of 20 gauge steel and powder-coat painted to match the system cabinet. The panels are insulated and have captive, quarter-turn fasteners for front service access. The plenum has solid side panels with top duct connection in heights from 18" to 48” in 6” increments.

Supply Air Sensor
The supply air temperature sensor provides real-time monitoring of discharge air temperature that is reported at the Liebert iCOM™ control panel. On downflow models, the sensor can also provide direct feedback to control the supply air temperature delivered to the raised floor plenum by adjusting the cooling capacity (compressor or chilled water valve).

LT460 Leak Detection Cable Sensor
Provides zone leak coverage around the system by utilizing a leak detection cable. A cable termination sensor box is powered by 24 VAC from the environmental unit with two (2) Form-C dry contact common alarm relay outputs rated at 24 VAC, 3 Amp to remotely signal leak detected, loss of power and cable fault. The leak cable (see spec sheet for length provided) comes complete with hold-down clips and consist of a four-conductor cable, with two conductors being jacketed with CL2P rated covering. The two remaining conductors are covered with porous non conductive polymers. The cable is UL-listed with a CL2P rating. The end of the cable is terminated in matching male and female connectors for easy connection of cables from end to end. Accuracy of the leak cable is linear and within 1% of the length of the cable.

Common Alarm Contact Signals
The common alarm contacts provide the customer with a set of normally open contacts for remote indication of unit alarms. A total of four alarm contacts are provided; one contact is dedicated to the condensate pump on units with a condensate pump.

Remote Shutdown Terminals
One set of terminals are provided to shut down the system upon remote customer input signal.

Factory Special Feature #E-204922
Provides under and over voltage - phase loss monitor / protection relay. Three phase automatic reset phase loss monitor to shutdown unit on loss of power. A N.O. contact that closes when power stabilizes will be wired to terminals for customer connection.

Factory Special Feature #E-200846
Provides iCOM quick start software and controls powered by factory installed 6kW capacitor buffer. Special quick-start software is included. This feature is designed so that controls can be powered by a capacitor buffer for a minimum of 3 minutes (at end of life) during power interruptions. A remote shutdown will be initiated on capacitor loss of power, and the unit will sequential auto restart when power is restored.

This feature requires that the condenser to be powered from the indoor unit. Loss of power events shorter than 30 seconds will allow fans to start 6 seconds after the loss of power, and unit will reach full cooling in less than 30 seconds after power is restored, if communication to the condenser was not lost. Loss of power events greater than 30 seconds will be managed as a remote unit shutdown signal and unit will re-start normally, not in quick-start mode. If the indoor unit loses communication to the condenser, then compressors are started as soon as communications are established or 40 seconds from the time the power was restored (full cooling at 60 seconds).

Factory Special Feature #E-4048
Provides the condensate pump with a safety float switch to notify the common alarm & customer contact closure but NOT shut down the unit.

Factory Special Feature #E-4482
Provides the leak detection alarm with notification to the common alarm & customer contact closure but NOT shut down the unit. Specify NO/NC contacts.

Factory Special Feature #E-203537
Provides top connections for the refrigerant and condensate drain lines. Rubber/plastic Condensate drain connection remains out the bottom as standard since condensate pump ships loose for field installation under the unit but with this feature a copper line will be routed from the bottom of the unit to the top for field connection to the condensate pump discharge when that option is connected. Non standard condensate pump will be used to allow drain and condensate pump discharge to be connected from front of unit.

LIEBERT MICROCHANNEL CONDENSERS
DETAILED EQUIPMENT DESCRIPTIONS

Coil

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 Motor(s)

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 System

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 or with optional, field-supplied CANBUS communication wires from the indoor unit iCOM. The system head pressure can be maintained across an ambient temperature range of 125°F.

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.

Locking Disconnect Switch

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

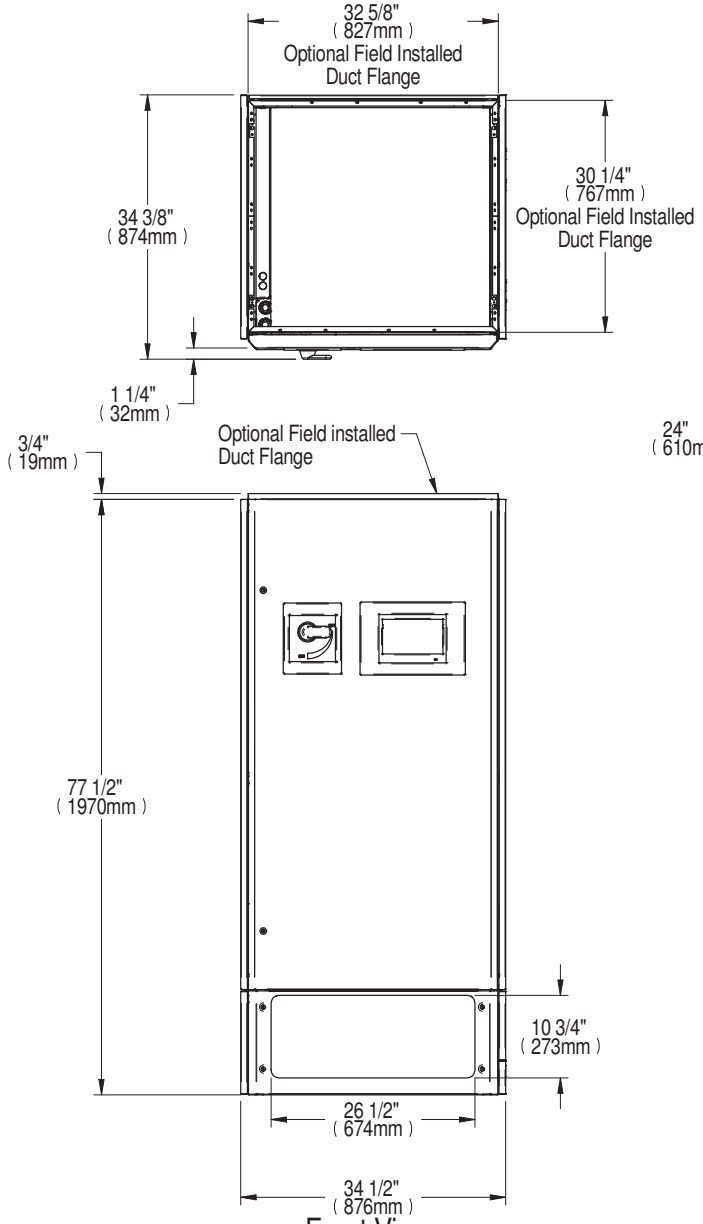
Communication

The EC Fan/Premium Control System shall include an electronic control board, EC fan motor(s) with internal overload protection, refrigerant and ambient temperature thermistors and refrigerant pressure transducers. The control board receives a ‘run’ signal from the indoor unit from either field-supplied low voltage interlock wires to the compressor side switch, or a (field-supplied) CANbus communication wires from the indoor unit's Liebert iCOM control, or both. The control board utilizes sensor and communication inputs to maintain refrigerant pressure by controlling each EC fan on the same refrigerant circuit to the same speed. The CANbus link also provides for communication of condenser alarm conditions and other outdoor parametric data for control features that can improve efficiency, sound and wintertime operation based on iCOM programming.

Indoor Section

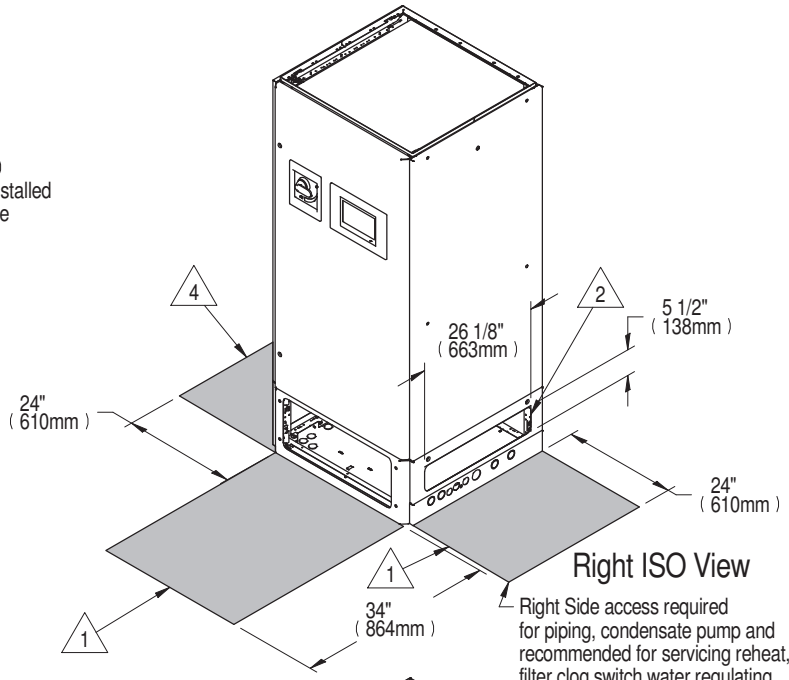
CABINET DIMENSIONAL DATA

DOWNFLOW FLOOR LEVEL DISCHARGE MODELS



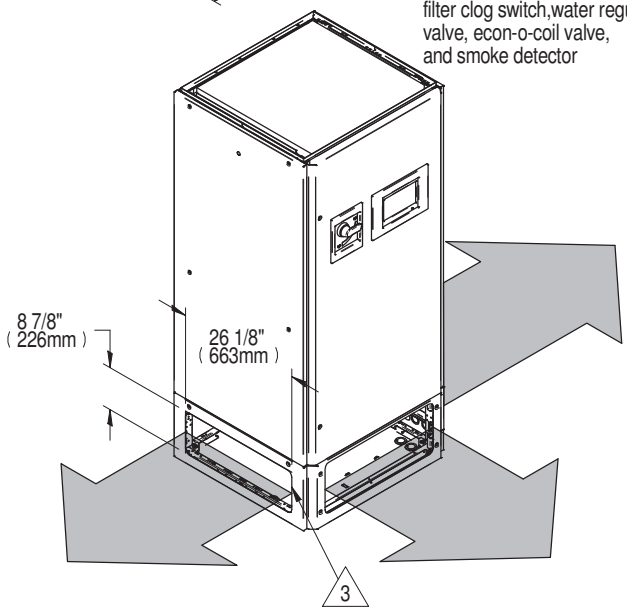
Front View

DRY WEIGHT lb (kg) APPROXIMATE			
Liebert® PDX Model No.	**PX011**	**PX018-023**	**PX029**
Air Cooled	600 (272)	670 (304)	700 (317)



Right ISO View

Right Side access required for piping, condensate pump and recommended for servicing reheat, filter clog switch,water regulating valve, econ-o-coil valve, and smoke detector



Left ISO View

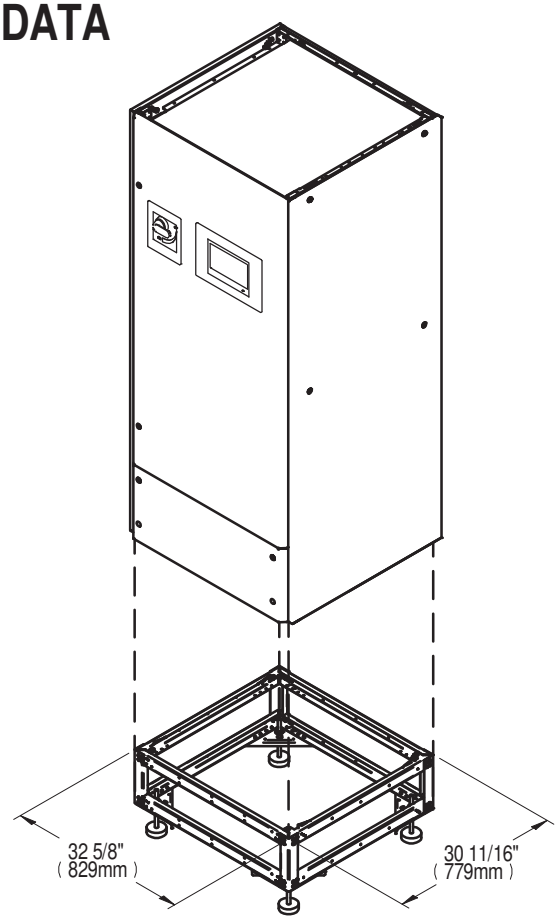
Notes:

1. Shaded area indicates a recommended minimum clearance be provided for component access and air discharge.
2. Optional opening for units with right side discharge or right and left side discharge.
3. Optional opening for units with left side discharge or right and left side discharge.
4. Shaded area indicates recommended clearance for air discharge.

LIEBERT® PDX/PCW

FLOORSTAND & FLOOR PLANNING

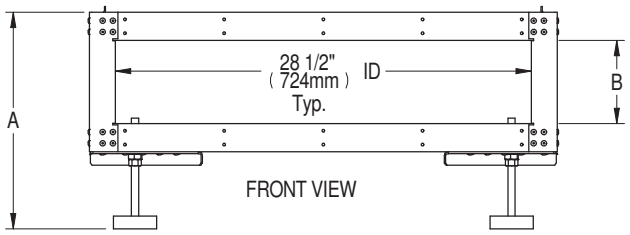
DIMENSIONAL DATA

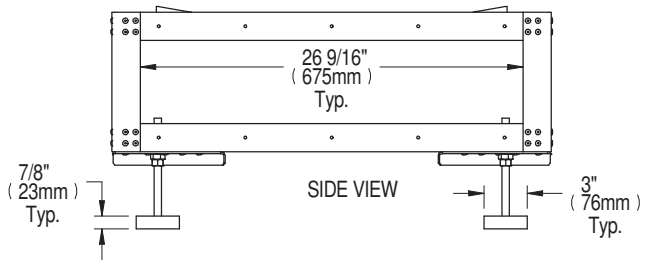


Height in. (mm)	
A	B
12 (305)	2-3/4 (70)
15 (381)	5-3/4 (146)
18 (457)	8-3/4 (223)
21 (533)	11-3/4 (299)
24 (610)	14-3/4 (375)

NOTES:
1. Leveling feet are provided with ±1-1/2" (38mm) adjustment for all floorstands.
2. Using the table above and the boxes to the left of the floorstand views select one floorstand size. If you have any difficulty please contact your Vertiv™ Sales Representative for assistance.

☐





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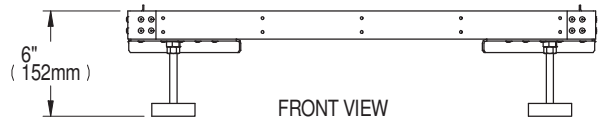

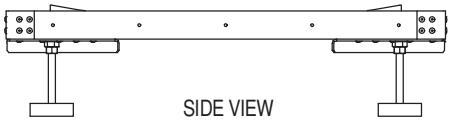

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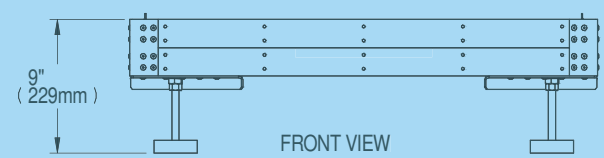
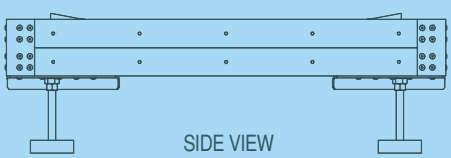
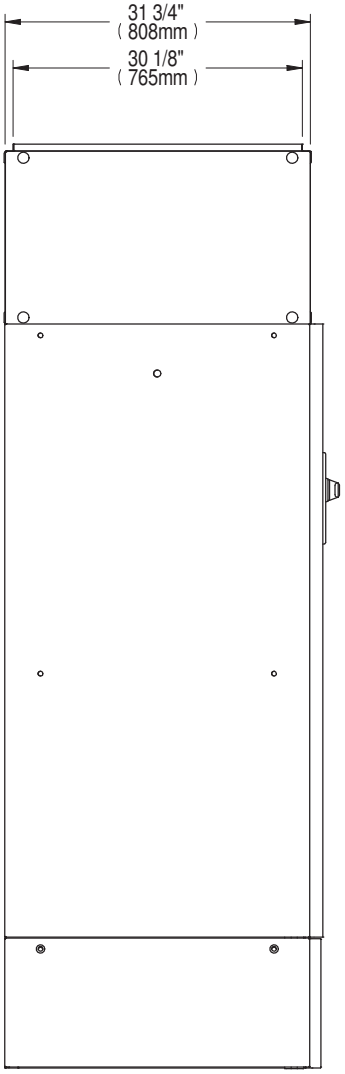
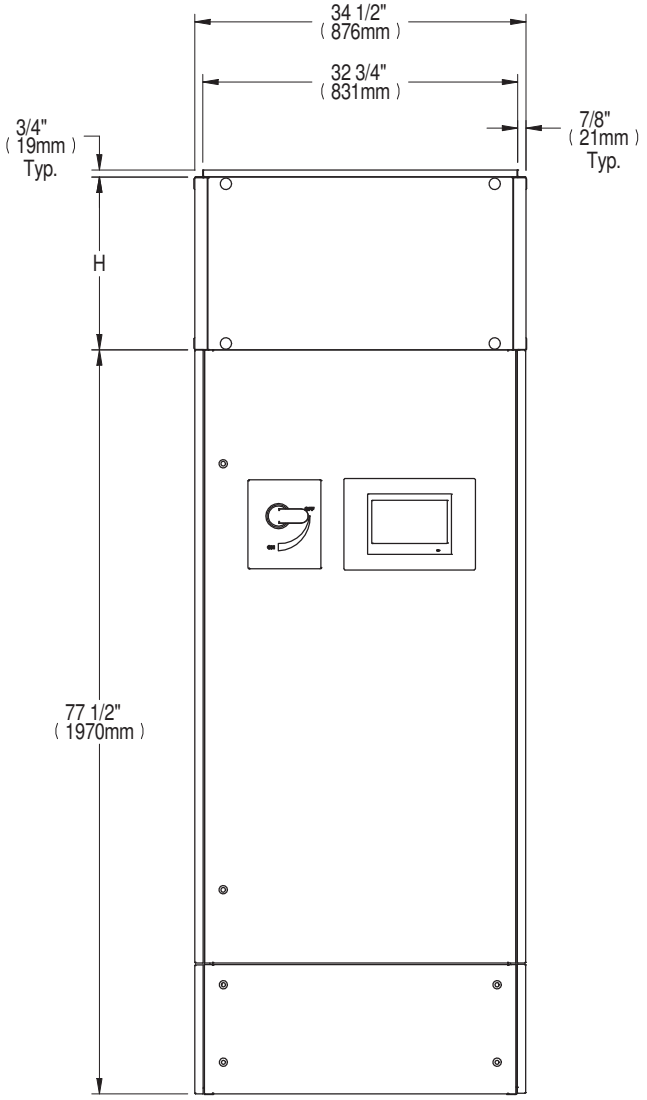




PLENUM DIMENSIONAL DATA
DOWNFLOW RETURN W/ DUCT COLLAR



LEFT SIDE VIEW - WITH PLENUM



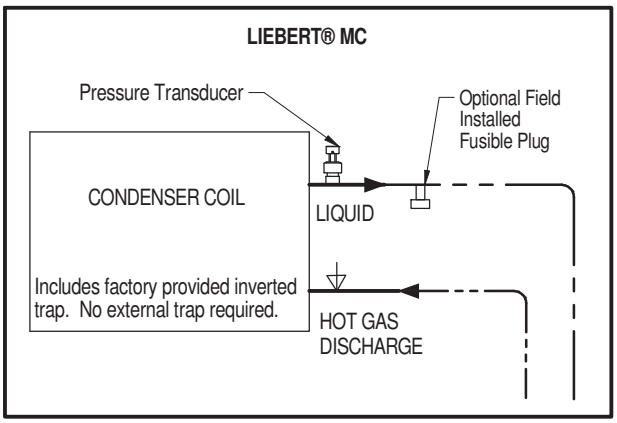
FRONT VIEW - UNIT WITH PLENUM

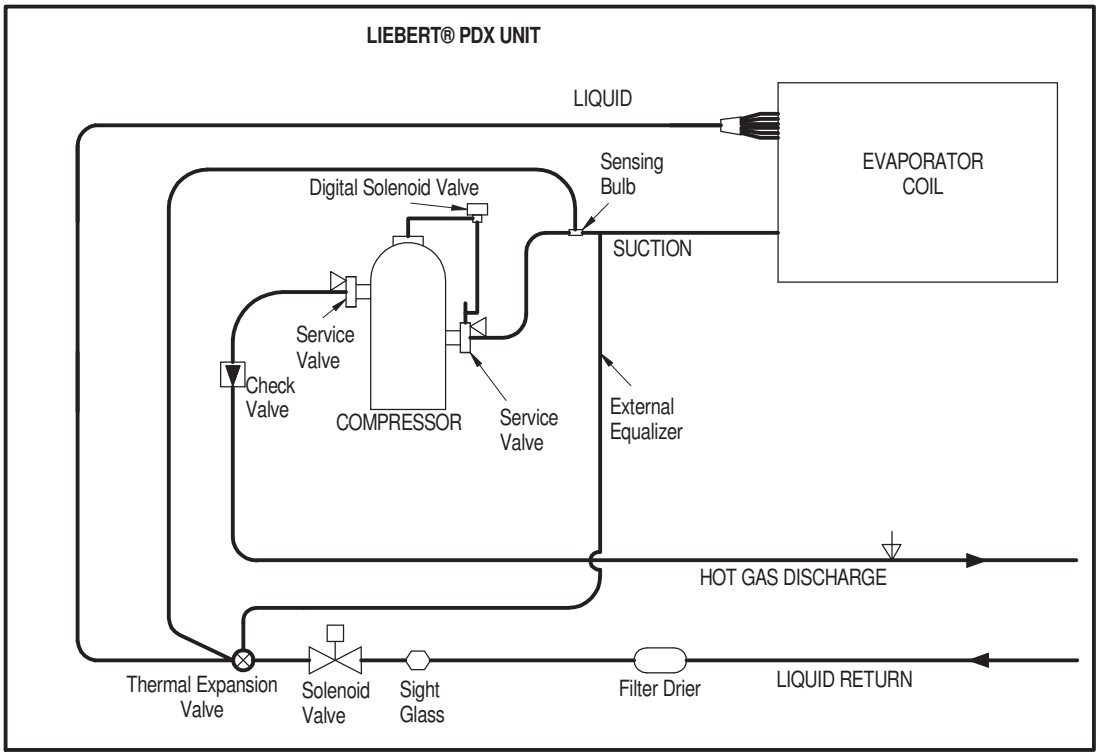
	Height H in (mm)
	18 (457)
	24 (609)
	30 (762)
X	36 (914)
	42 (1066)
	48 (1219)

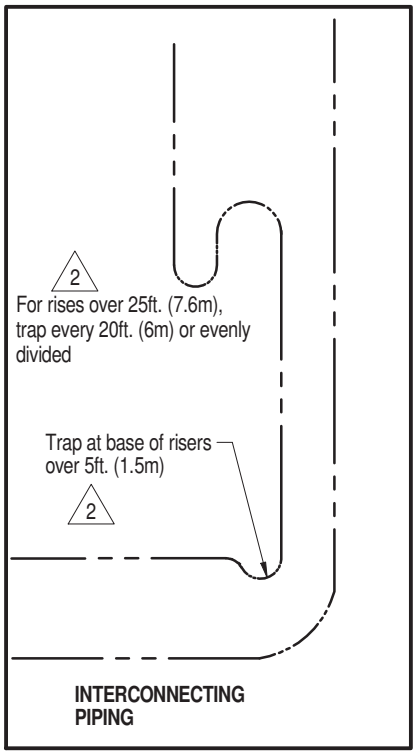
Notes:
1. All Plenums are shipped flat (non-assembled) and must be assembled on site.

LIEBERT® PDX

PIPING SCHEMATIC
AIR COOLED MODELS WITH TXV







FACTORY REFRIGERANT PIPING

FIELD PIPING

SERVICE / SCHRADER (ACCESS) CONNECTION NO VALVE CORE

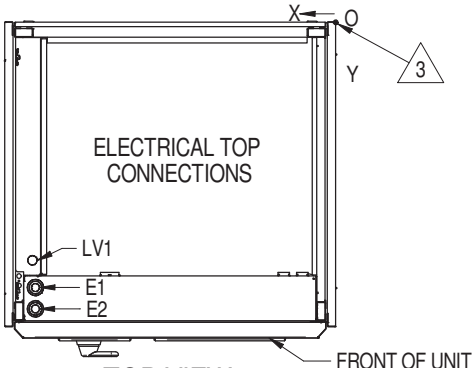
SERVICE / SCHRADER (ACCESS) CONNECTION WITH VALVE CORE

Notes:

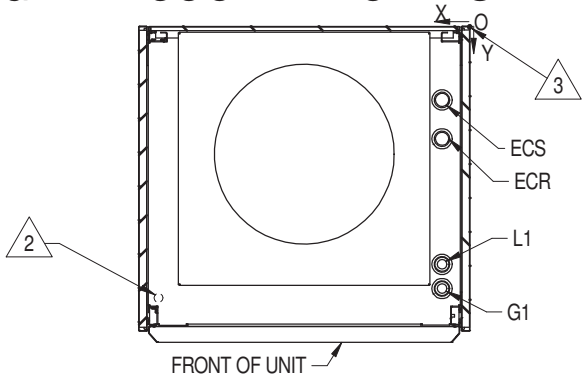
1. Schematic representation shown. Do not use for specific connection locations.
2. Components are not supplied by Liebert® but are required for proper circuit operation and maintenance.
3. Traps must be installed and horizontal lines pitched to ensure proper oil return and to reduce liquid floodback 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.
4. Do not isolate any refrigerant circuits from over pressurization protection.

LIEBERT® PDX

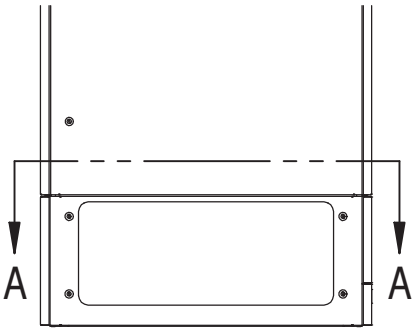
PRIMARY CONNECTION LOCATIONS
DOWNFLOW FRONT DISCHARGE AIR COOLED MODELS



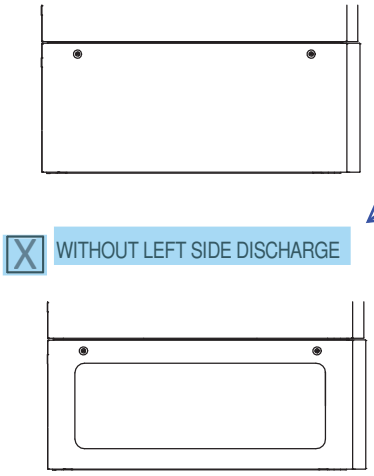
TOP VIEW

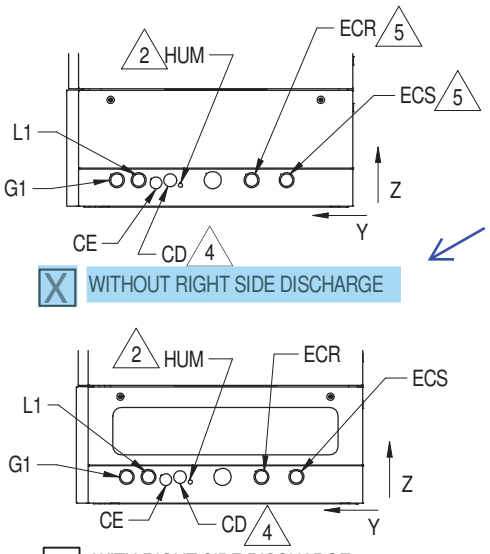


SECTION A-A



FRONT VIEW


X WITHOUT LEFT SIDE DISCHARGE



X WITHOUT RIGHT SIDE DISCHARGE

☐ WITH LEFT SIDE DISCHARGE

☐ WITH RIGHT SIDE DISCHARGE

POINT	DESCRIPTION	X in. (mm)	Y in. (mm)	Z in. (mm)	CONNECTION SIZE / OPENING		
					PX011	PX018, PX023	PX029
L1	LIQUID LINE SYSTEM	2-7/8 (73)	24-3/4 (629)	3 (76)			5/8"
G1	HOT GAS DISCHARGE		27-3/8 (695)				7/8"
CD 4	CONDENSATE DRAIN	N/A	21-1/8 (537)		3/4" NPT FEMALE		
CE	CONDENSATE ELECTRICAL		22-3/4 (578)	2-3/4 (70)	1-3/8"		
HUM 2	HUMIDIFIER SUPPLY LINE						
ECS 5	ECON-O-COIL SUPPLY						
ECR 5	ECON-O-COIL RETURN						
E1	ELECTRICAL CONN. (HIGH VOLT) TOP	31-1/4 (793)	27-5/8 (701)	N/A	7/8", 1-3/8", 1-3/4"		
E2	ELECTRICAL CONN. (HIGH VOLT) TOP		29-7/8 (758)				
LV1	ELECTRICAL CONN. (LOW VOLT) TOP	31-5/8 (803)	24-7/8 (632)		1"		

Notes:

1. Pipes at various heights to allow for tube cutter to be used. Will require stub tubes and elbows for connection at all tube locations.

2. ~~Humidifier supply line will need to be routed through this opening to the connection at the left hand side of the unit~~.

3. Drawing not to scale. All dimensions from rear corner of unit including panels, and have a tolerance of ± 1/2" (13mm).

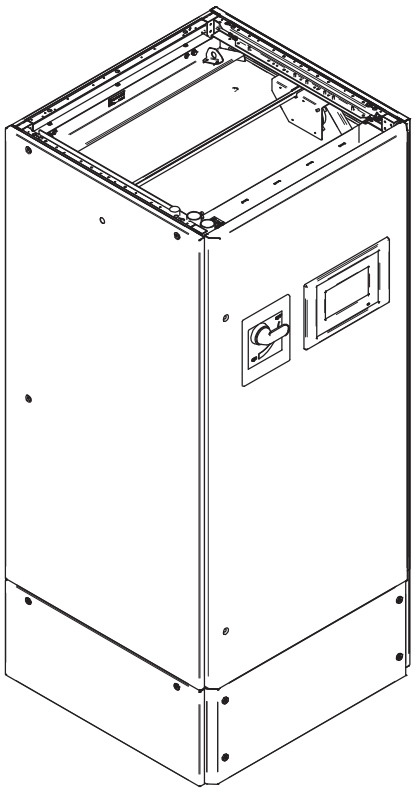
4. Field pitch Condensate Drain line a minimum of 1/8" (3.2 mm) per foot (305 mm). All units contain a factory installed condensate trap. Do not trap external to the unit Drain line may contain boiling water. Select appropriate drain system materials. The drain line must comply with all local codes.

5. ~~Supplied on Dual Cooling Systems only (4 pipe system)~~.

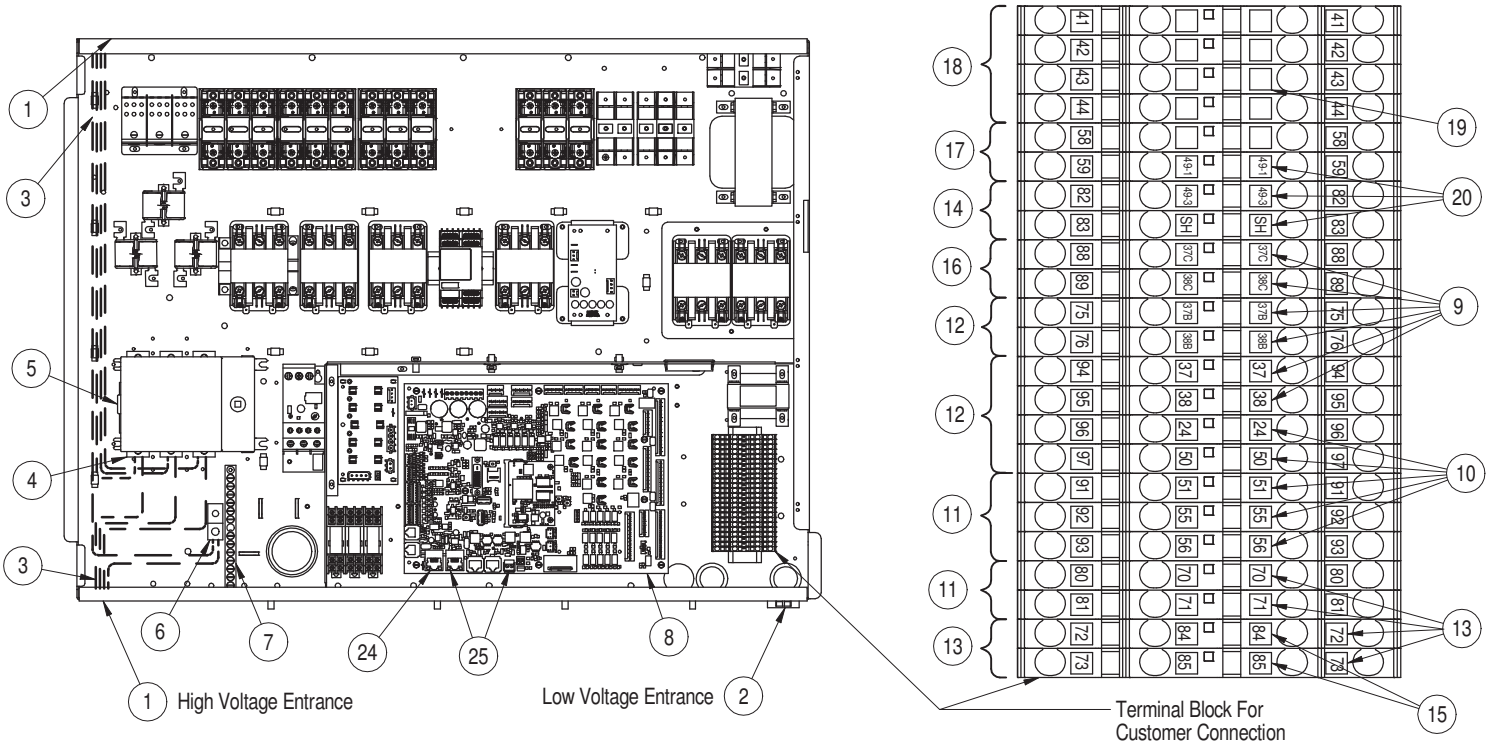
6. All refrigerant & water piping connections are O.D. Copper except as noted.

LIEBERT® PDX/PCW

ELECTRICAL FIELD CONNECTIONS



DOWNFLOW UNIT



LIEBERT® PDX/PCW

ELECTRICAL FIELD CONNECTIONS
UPFLOW & DOWNFLOW MODELS

1. **High Voltage Entrance.** Supplied on top and bottom of electric box. Knockout size Ø1.75in (44.5mm).
2. **Low Voltage Entrance.** Ø1.375 in. (34.9mm) hole located on bottom of Electric Box.
3. **Three phase Electric Service and earth ground.** Field supplied.
4. **Three phase connection.** Electric service connection terminals on disconnect.
5. **Factory installed disconnect switch.** Fused disconnect switch provided on units.
6. **Earth ground connection.** Connection terminals for field supplied earth grounding wire.
7. **Earth ground bar.** Connection terminals with factory ground from each high voltage component for field supplied earth grounding wire.
8. **Control and monitoring section** of electric box.
9. **Remote unit shutdown.** Replace existing jumper between terminals 37 & 38 with normally closed switch having a minimum 75VA, 24VAC rating. Use field supplied Class 1 wiring.
10. **Remote Alarm Device (RAD) Connections.** Alarm connections may be factory wired or field wired. See schematic, RAD1-4, for factory wired alarms. For field wired alarms, use Class 1 wiring to connect normally open contacts between terminals 24 & 50, 24 & 51, 24 & 55, or 24 & 56. Suitable for 24VAC.
11.
12. **Common alarm connection.** Field supplied Class 1 wiring to common alarm terminals 75 & 76 (~~and optional 94 & 95, and 96 & 97~~), which are factory connected to normally open contacts, 1 Amp, 24VAC maximum on common alarm relay (R3).
13. **Heat rejection connection.** Field supplied Class 1 wiring to heat rejection interlock terminals 70 & 71 which are factory connected to normally open compressor side switch
14.
15.
16. **Optional Condensate Alarm (Dual Float Condensate Pump only).** Relay terminals located on customer connection terminal block for remote indication. Field supplied Class 1 wiring to connections #88 & #89.
17.
18.
19. **Spare Terminals for Optional Devices**. Customer connection when optional device is supplied. See unit schematic.

ELECTRICAL FIELD CONNECTIONS
UPFLOW & DOWNFLOW MODELS

20. 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 Condenser.

21. CANbus Cable. CANbus cable provided by others to connect to the outdoor condenser and optional PRE unit. 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). For external cable connections greater than 450FT (137M), but less than 800FT (243M) a CANbus isolator is required (Contact 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

22. Do not run in same conduit, raceway, or chase as high voltage wiring.

23. For CANbus network lengths greater than 450FT (137M) call Factory.

OPTIONAL COMMUNICATION CONNECTIONS

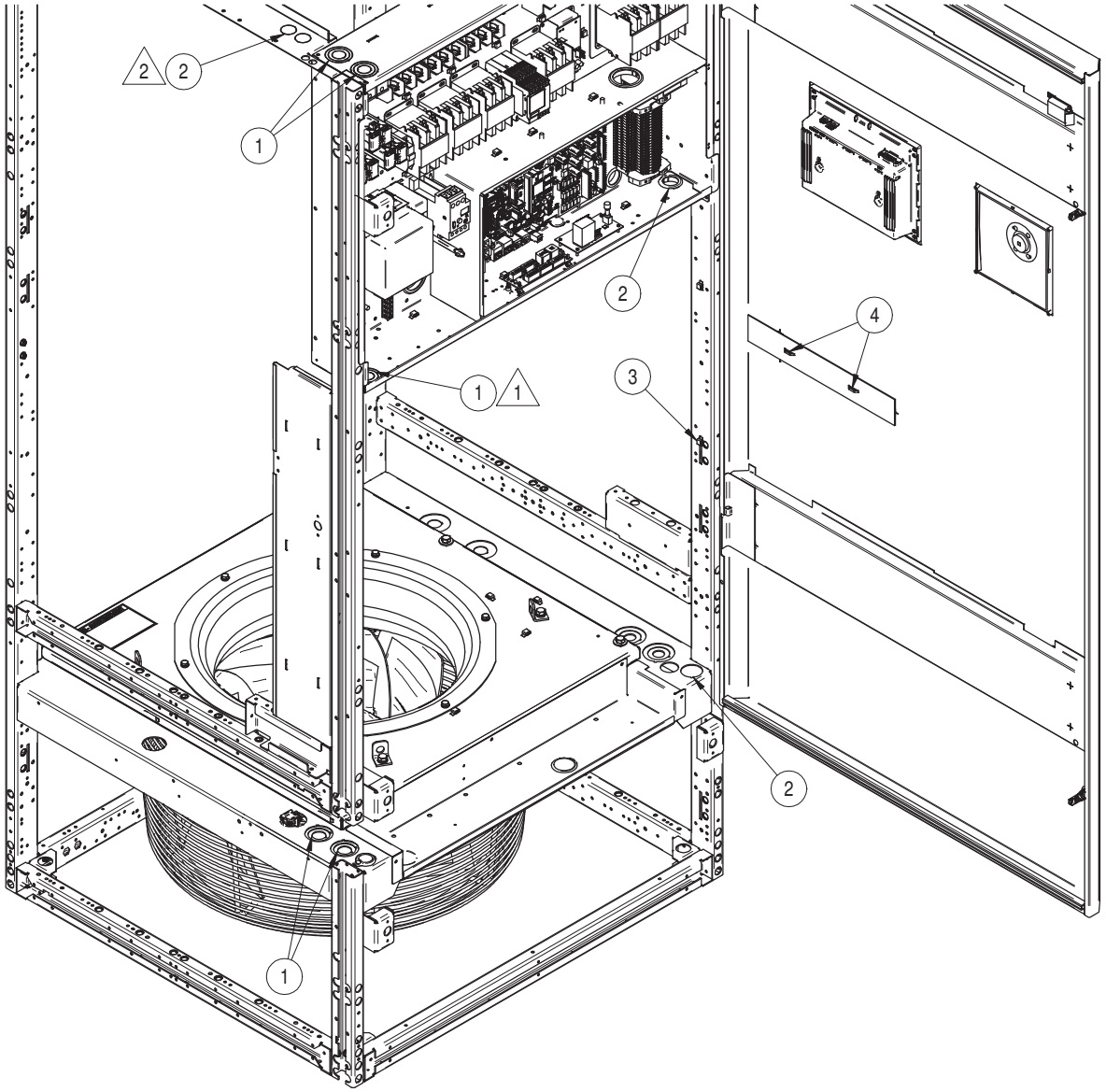
24. Unit-To-Unit – Plug 64 is reserved for U2U communication.

25. Site and BMS – Plug 74 and terminal block 3 are reserved for Site and BMS connections. Plug 74 is an eight pin RJ45 for a Cat 5 cable. Terminal block 3 is a two position screw terminal block for use with twisted pair wires. Only one of these connections can be used at a time.

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

LIEBERT® PDX/PCW

ELECTRICAL FIELD CONNECTIONS



1. Opening for field wiring. Suggested entry point for HV field wiring to unit.
2. Opening for field wiring. Suggested entry point for LV field wiring to unit.
3. Wire tie anchors. Use to secure customer Ethernet wiring to control board.
4. Wire tie anchors. Use to secure customer wiring.

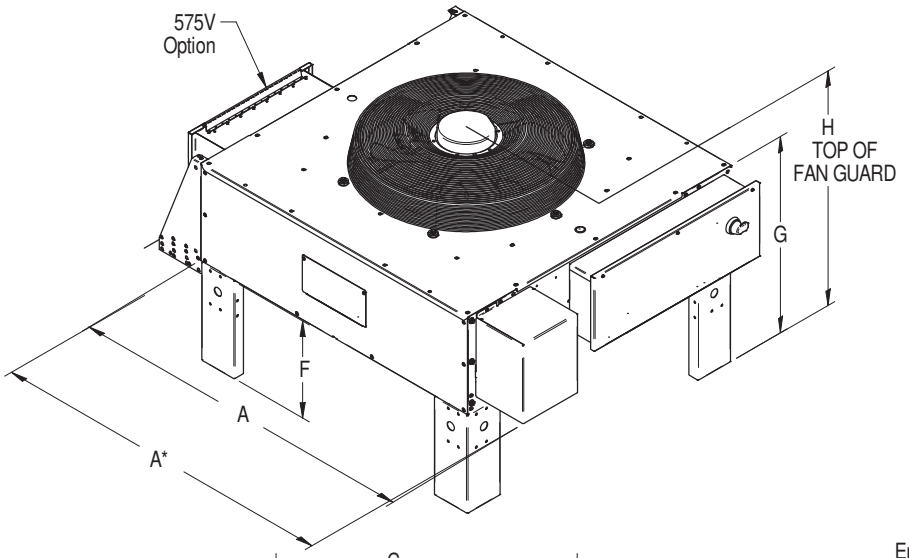
NOTES:

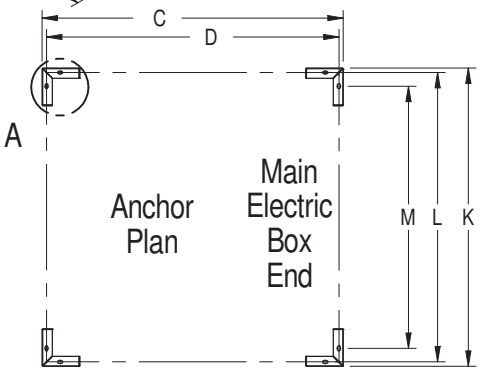
1. Requires bushing if conduit is terminated below.
2. Wire needs to be routed behind electric box to Low Voltage entrance on bottom of Electric Box.

Outdoor Section

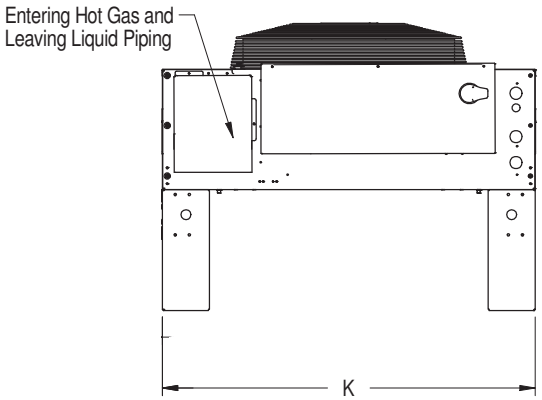
LIEBERT® MC

CABINET & ANCHOR DIMENSIONAL DATA

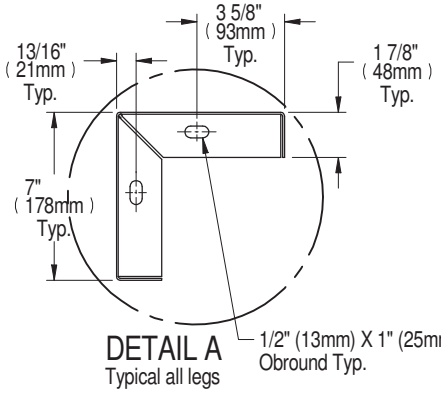




429# Dry Weight



Left Side of Unit

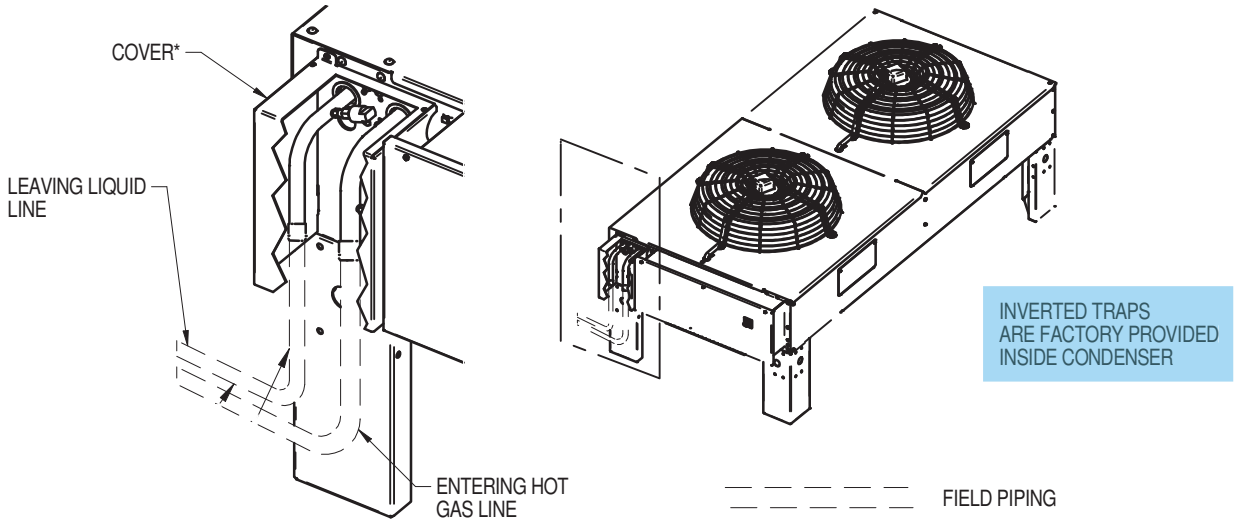


MODEL NUMBER	F in. (mm) (LEG HEIGHT DIMENSIONS) 2			
	18 (457)	36 (914)	48 (1219)	60 (1524)
MCS028 MCM040				
DIM "G"	31-5/8 (803)	49-5/8 (1260)	61-5/8 (1565)	73-5/8 (1870)
DIM "H"	39-5/8 (1006)	57-5/8 (1464)	69-5/8 (1768)	81-5/8 (2073)
MCL055				
DIM "G"	35-7/8 (911)	53-7/8 (1368)	65-7/8 (1673)	77-7/8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

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)		56 (1422)	54-3/8 (1381)	55-1/2 (1410)	53-7/8 (1368)	48-3/4 (1238)

PIPING DIMENSIONAL DATA



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

Connection Sizes Only
See Next Page for
Refrigerant Line Sizing

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

LINE SIZE & PRESSURE RATINGS

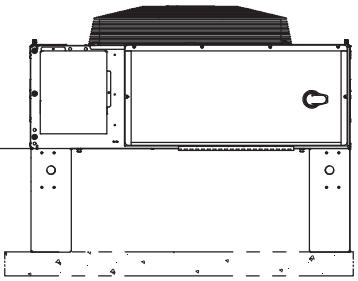
RECOMMENDED REFRIGERANT LINE SIZES CU, OD

AIR-COOLED SYSTEMS USING R-410A

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]	
Liebert® XDM	XDM 200/ XDM 400	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]

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").

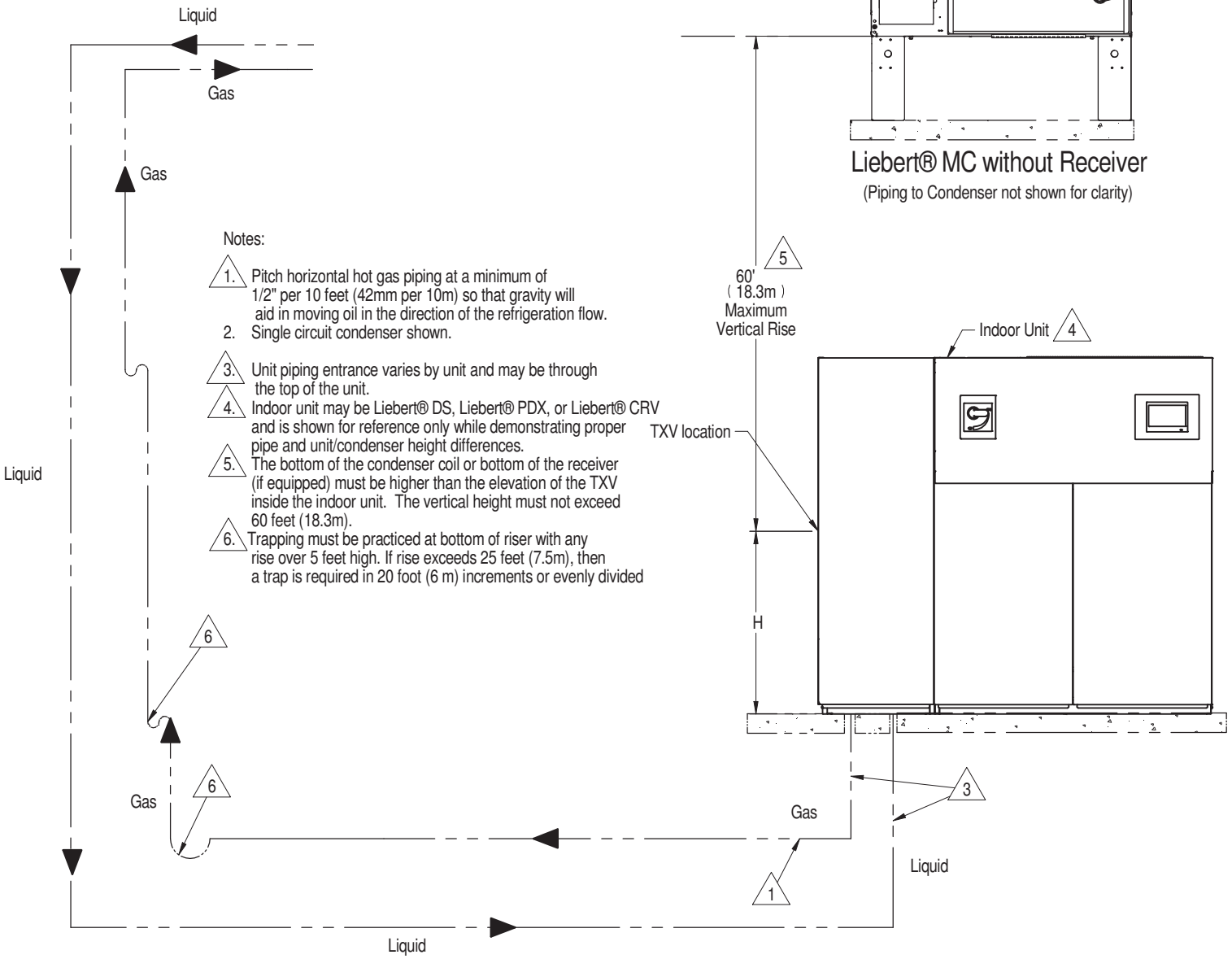
AIR COOLED PIPING SCHEMATIC
CONDENSER ABOVE INDOOR UNIT



Liebert® MC without Receiver
(Piping to Condenser not shown for clarity)

Notes:

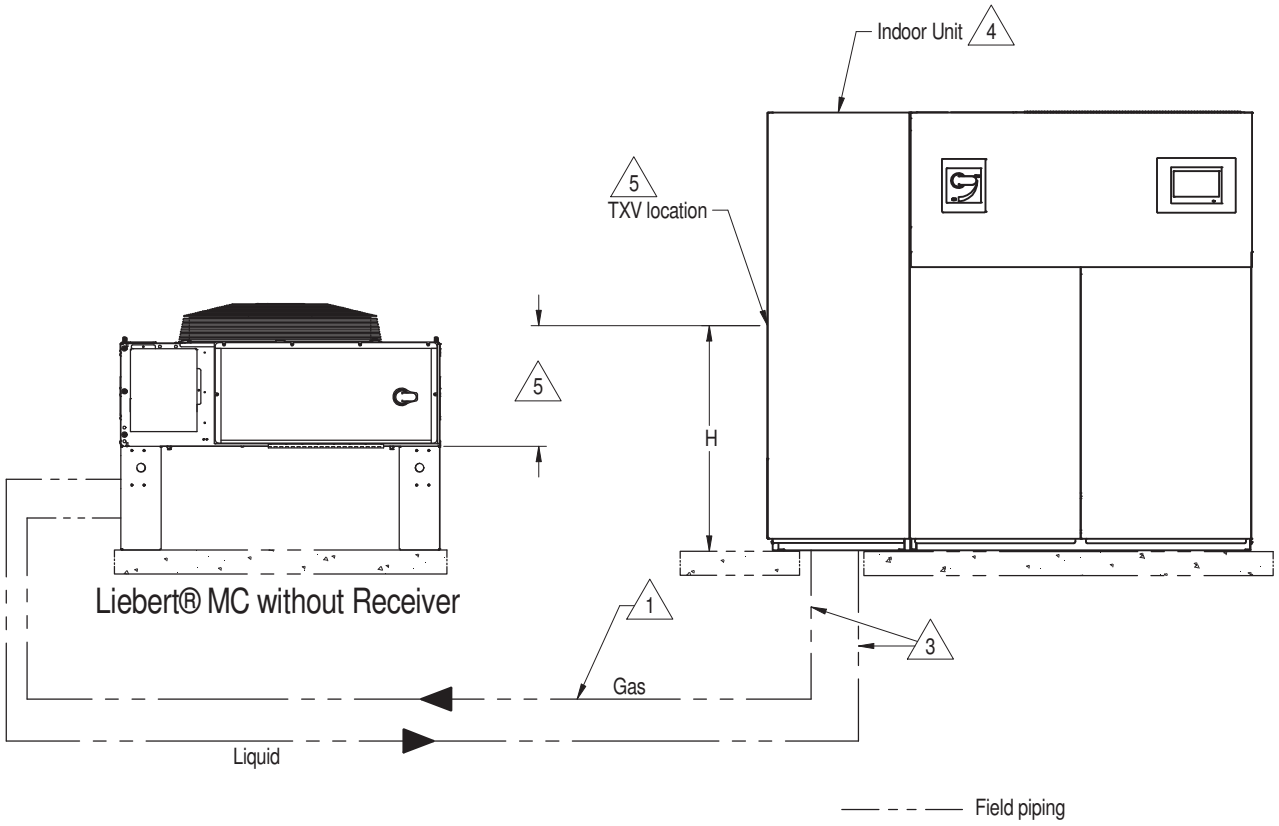
1. Pitch horizontal hot gas piping at a minimum of 1/2" per 10 feet (42mm per 10m) so that gravity will aid in moving oil in the direction of the refrigeration flow.
2. Single circuit condenser shown.
3. Unit piping entrance varies by unit and may be through the top of the unit.
4. Indoor unit may be Liebert® DS, Liebert® PDX, or Liebert® 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)
Liebert® PDX Downflow	44 (1118)

Field piping

AIR COOLED PIPING SCHEMATIC
CONDENSER AND INDOOR UNIT AT SAME LEVEL

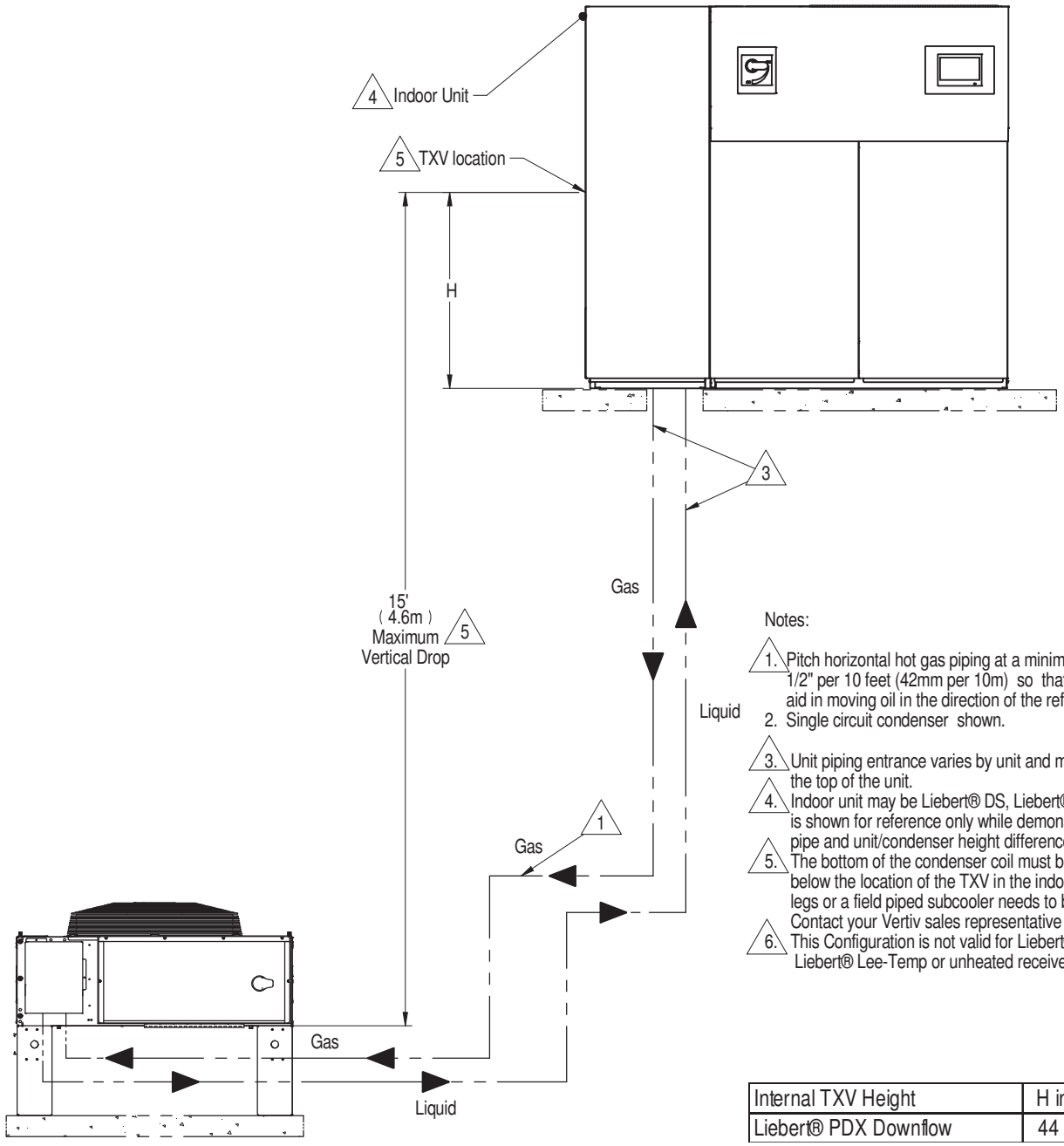


Internal TXV Height	H in. (mm)
Liebert® PDX Downflow	44 (1118)

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 may be through the top of the unit.
4. Indoor unit may be Liebert® DS, Liebert® PDX, or Liebert® CRV and is shown for reference only.
5. The bottom of the coil must be less than 15' (4.6m) below the elevation of the TXV inside the indoor unit. Contact your Vertiv sales representative for additional information.

AIR COOLED PIPING SCHEMATIC
CONDENSER BELOW INDOOR UNIT



Liebert® MC without receiver

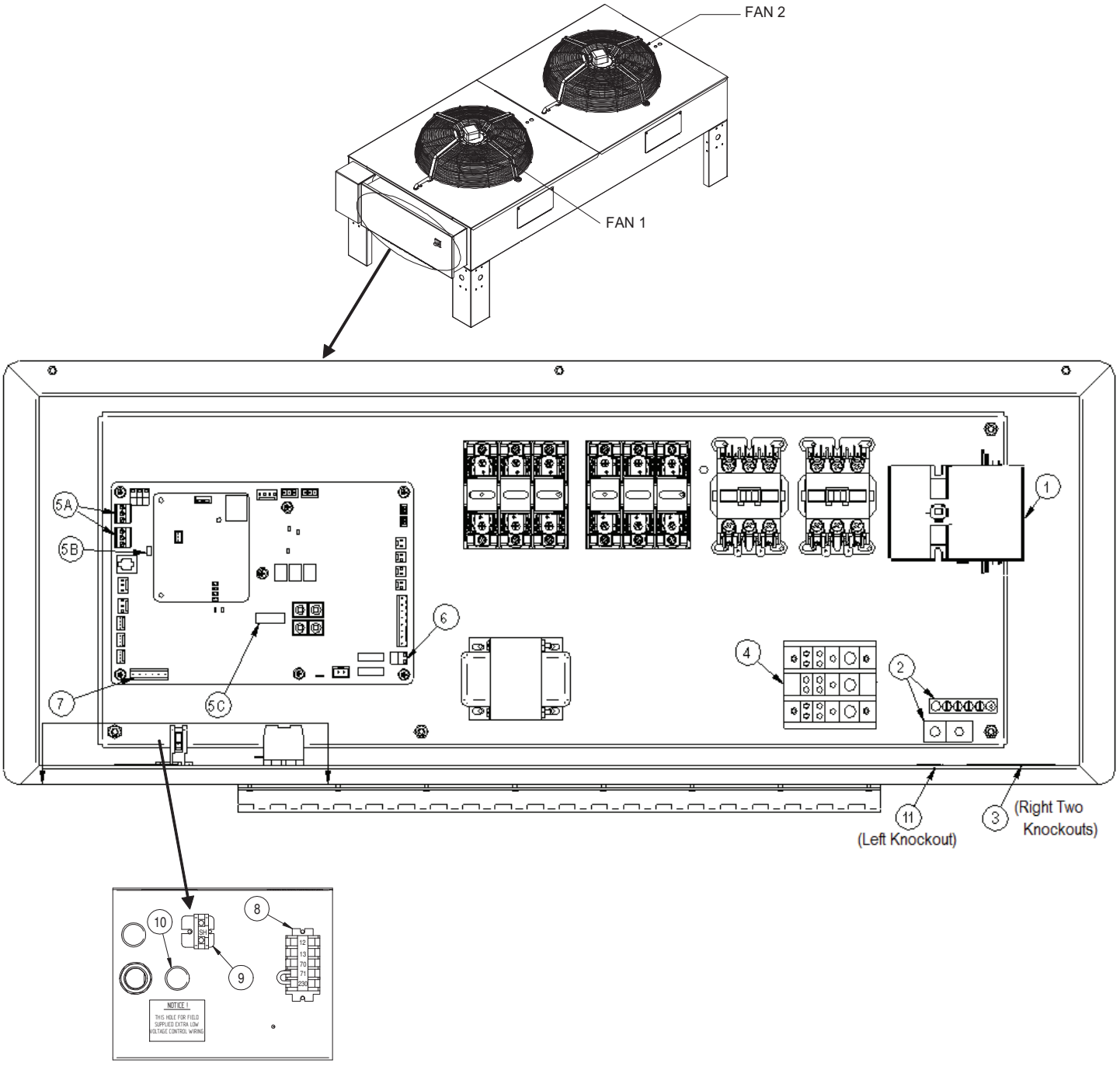
Field piping

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 may be through the top of the unit.
4. Indoor unit may be Liebert® DS, Liebert® PDX, or Liebert® CRV and is shown for reference only while demonstrating proper pipe and unit/condenser height differences.
5. The bottom of the condenser coil must be less than 15 feet (4.6m) below the location of the TXV in the indoor unit, otherwise extended legs or a field piped subcooler needs to be utilized. Contact your Vertiv sales representative for additional information.
6. This Configuration is not valid for Liebert® MC with Liebert® Lee-Temp or unheated receiver.

Internal TXV Height	H in. (mm)
Liebert® PDX Downflow	44 (1118)

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 Vertiv. 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 Vertiv. 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:

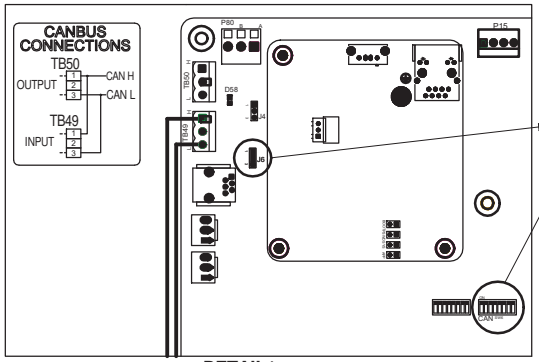
1. Refer to specification sheet for unit voltage rating, full load amp, and wire size amp ratings.
2. The CANbus wiring is field supplied and must be:
    - Braided shield or foil shield with drain wire
    - Shield must be wired to ground at indoor unit
    - 22-18AWG stranded tinned copper
    - Twisted 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 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.

CANbus & INTERLOCK CONNECTIONS
BETWEEN LIEBERT® PDX UNIT & LIEBERT® MC CONDENSER (PREMIUM)

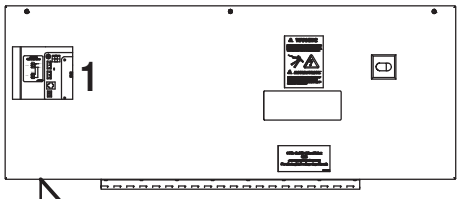


J6 TERMINATION JUMPER MUST BE SET TO PINS 1 AND 2.

CANbus ADDRESSING SWITCH

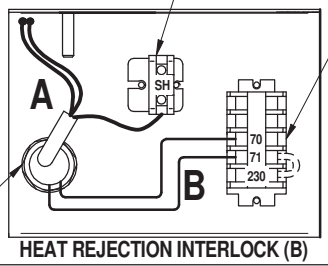
DETAIL1
CAN CABLE CONNECTION (A)

LIEBERT® MC CONDENSER



SHIELD CONNECTION

FACTORY WIRING BETWEEN MC CONTROL BOARD AND TERMINAL STRIP.



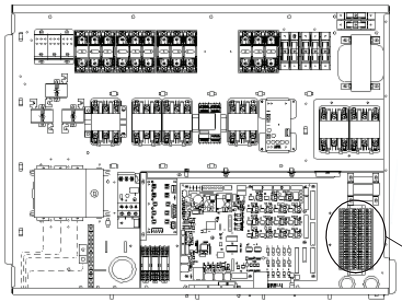
LOW VOLTAGE FIELD ENTRANCE LOCATED ON BOTTOM LEFT OF CONDENSER ENCLOSURE.

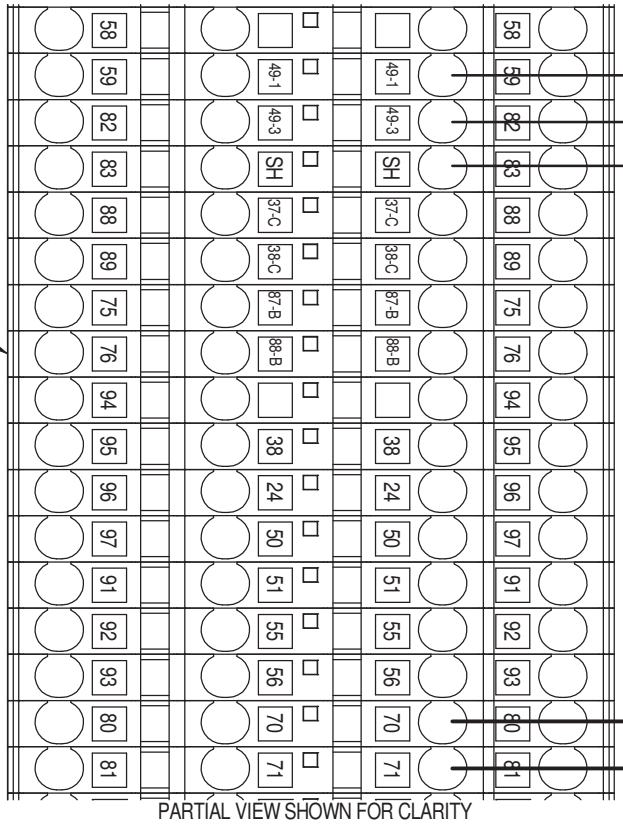
HEAT REJECTION INTERLOCK (B)

A
CANbus CABLE CONNECTION

B
HEAT REJECTION INTERLOCK WIRE

INDOOR UNIT





PARTIAL VIEW SHOWN FOR CLARITY

CANbus & INTERLOCK CONNECTIONS
BETWEEN LIEBERT® PDX UNIT & LIEBERT® MC CONDENSER (PREMIUM)

COMPONENT NOTES:
1. COMPONENT APPEARANCE, ORIENTATION AND POSITIONING 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.

SEISMIC ANCHORAGE DATA

ONE FAN MODELS

Without Receiver

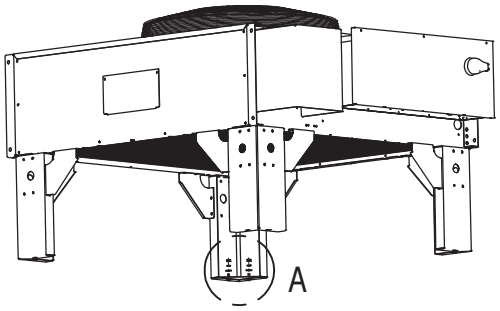


Figure 1

With Receiver
(View shows bracket only.
Receiver removed for clarity)

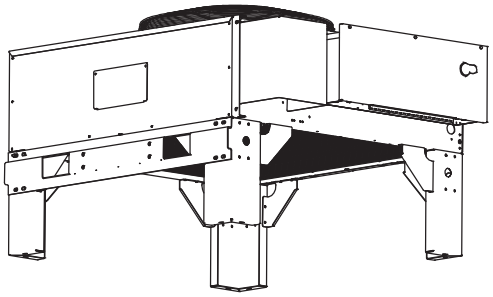
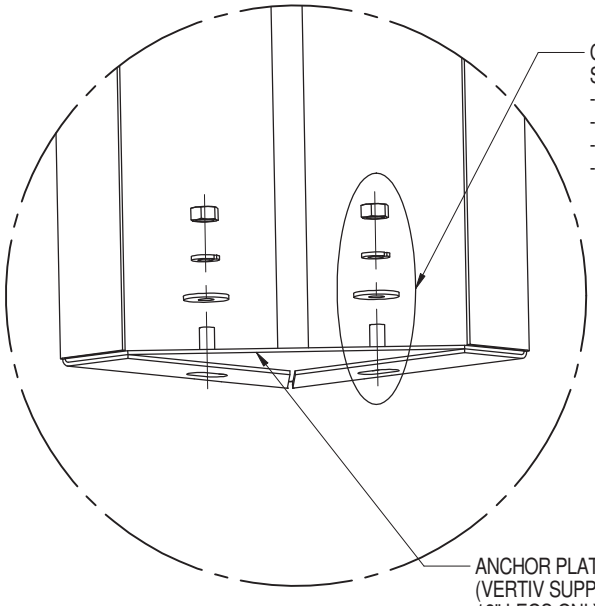


Figure 2



DETAIL A

NOTES:

1. MOUNTING REQUIREMENT DETAILS SUCH AS ANCHOR BRAND, TYPE, EMBEDMENT DEPTH, EDGE SPACING, ANCHOR-TO-ANCHOR SPACING, CONCRETE STRENGTH, SPECIAL INSPECTION AND ATTACHMENT TO NON-BUILDING STRUCTURES MUST BE OUTLINED AND APPROVED BY THE ENGINEER OF RECORD FOR THE PROJECT OR BUILDING. STRUCTURAL FLOORS AND HOUSEKEEPING PADS MUST ALSO BE SEISMICALLY DESIGNED AND APPROVED BY THE PROJECT OR BUILDING STRUCTURAL ENGINEER OF RECORD TO WITHSTAND THE SEISMIC ANCHOR LOADS DEFINED IN THE TABLE BELOW. THE INSTALLING CONTRACTOR IS RESPONSIBLE FOR THE PROPER INSTALLATION OF ALL ANCHORS AND MOUNTING HARDWARE, OBSERVING THE MOUNTING REQUIREMENTS DETAILED IN THE SEISMIC INSTALLATION DRAWINGS AND ADDITIONALLY OUTLINED BY THE ENGINEER OF RECORD.
2. ALL BRACES AND FASTENERS ARE REQUIRED TO MAINTAIN IBC/OSHPD CERTIFICATION OF CONFORMITY.
3. USE WASHER, LOCK WASHER AND SCREW TO CONNECT BRACE TO CONDENSER BOTTOM BEAM (SEE SHEET 2).
4. USE WASHER, LOCK WASHER,SCREW AND NUT TO CONNECT BRACE TO CONDENSER LEG (SEE SHEET 2).
5. PLACE ANCHORAGE PLATE INSIDE EACH CONDENSER FOOT PRIOR TO FASTENING TO THE STRUCTURE. USE FLAT WASHER, LOCK WASHER AND NUT TO CONNECT CONDENSER TO THE CUSTOMER SUPPLIED ANCHOR ON THE SOLID SURFACE (REFERENCE VIEW DETAIL A). AS A MINIMUM 3/8" GRADE ANCHORS WITH AMERICAN NATIONAL STANDARD SERIES W, TYPE A, PLAIN WASHERS (ANSI B18.22.1-1965, R1975) SELECTED TO MATCH THE NOMINAL ANCHOR DIAMETER MUST BE INSTALLED AT EACH ANCHOR LOCATION BETWEEN THE ANCHOR HEAD AND EQUIPMENT FOR TENSION LOAD DISTRIBUTION.

MODEL	FIGURE	IMPORTANCE FACTOR Ip = 1.0			IMPORTANCE FACTOR Ip = 1.5		
		MAXIMUM COMPRESSIVE REACTION	MAX. ANCHOR LOADS (ASD)		MAXIMUM COMPRESSIVE REACTION	MAX. ANCHOR LOADS (ASD)	
			TENSILE	SHEAR		TENSILE	SHEAR
			lbs.	lbs.		lbs.	lbs.
MCS028							
WITHOUT RECEIVER	1	37	14	14	47	24	21
WITH RECEIVER	2	43	15	23	56	27	35
MCM040							
WITHOUT RECEIVER	1	37	14	14	47	24	21
WITH RECEIVER	2	43	15	23	56	27	35
MCL055							
WITHOUT RECEIVER	1	37	14	14	47	24	21
WITH RECEIVER	2	43	15	23	56	27	35

* ALL LOADS ARE CALCULATED PER ASCE 7-05, CHAPTER 13.6 Sds=2.0, Rp=6.0, a=2.5

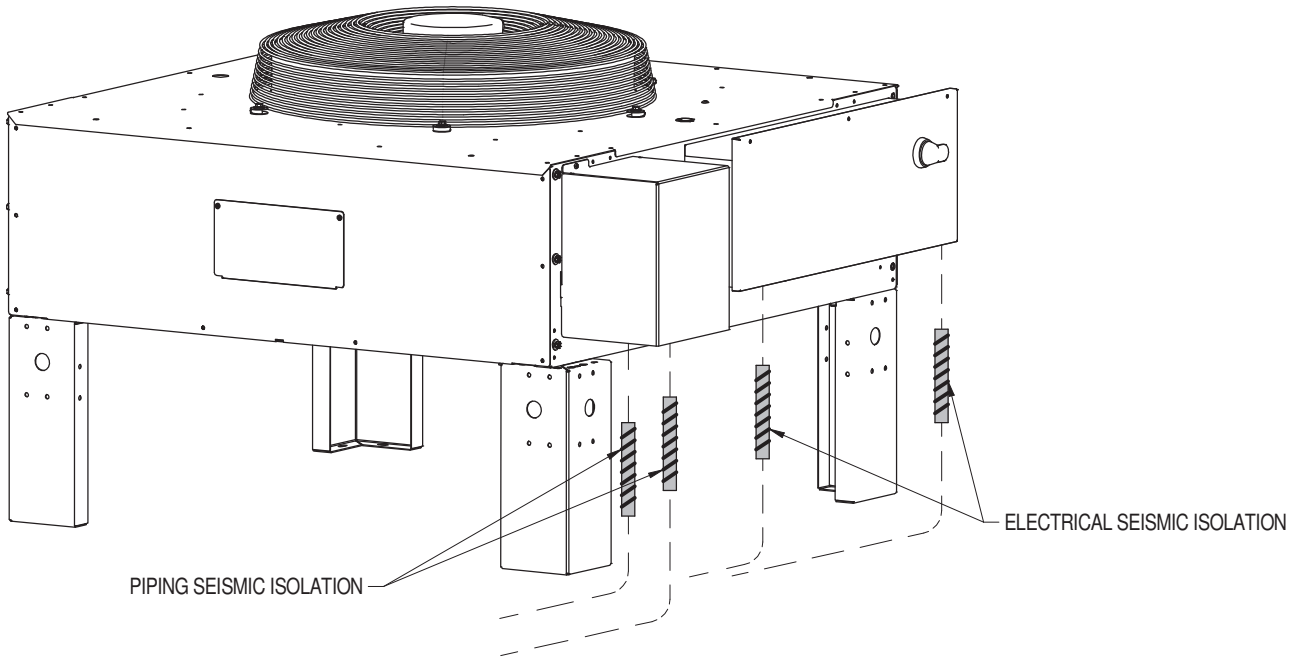
SEISMIC ANCHORAGE DATA
PIPING & ELECTRICAL WIRING CONSIDERATIONS

SEISMIC PIPING CONSIDERATIONS

Condensers for seismic application, shall be attached to the piping system using field supplied flexible loops designed for seismic movement. Flexible loops shall be capable of movement in three dimensions and must isolate the condenser from field piping. The loops shall be suitable for an operating pressure and temperature of the system. Follow manufacturer's installation instructions for proper seismic application of flexible loops. The selection of isolation brand and type must be outlined and approved by the engineer of record for the project or building.

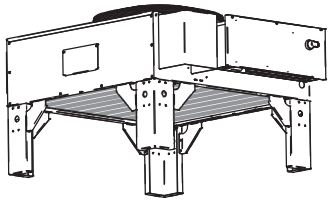
SEISMIC ELECTRICAL WIRING CONSIDERATIONS

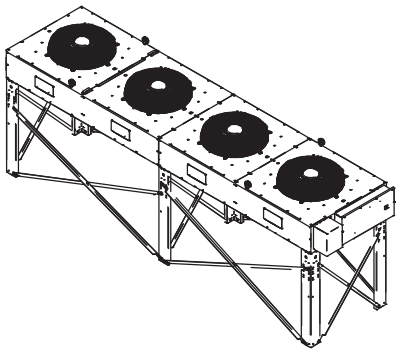
Condensers for seismic application, shall be connected to power and control circuits using field supplied flexible conduit and conductors to allow for movement of the condenser in three dimensions during a seismic event. The flexible conduit shall have at least one bend between the rigid connection at the unit cabinet and the connection to rigid conduit or foundation.



LIEBERT® MC

WIND LOAD DATA
CERTIFICATION

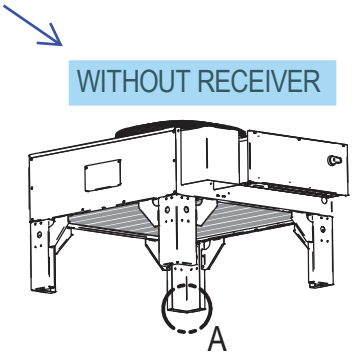


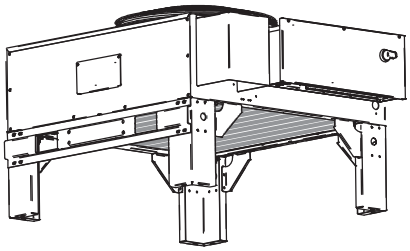


Liebert® MC is self-certified to withstand wind loading in accordance with American Society of Civil Engineers (ASCE) Minimum Design Loads for Buildings and Other Structures, ASCE 7-16. This certification is also in accordance with Florida Building Code 7th Edition, (2020) and the International Building Code (IBC) 2021. The basis for this certification is through successful analytical modeling on the above-mentioned equipment. The certification is valid under site specific wind load criteria where the wind velocity pressure does not exceed those listed in tables 1, 2, 3, and 4. The certification covers leg heights up to 60" with or without receivers. Impact resistance is not covered in this certification.

Mounting requirement details such as anchor brand, type, embedment depth, edge spacing, anchor-to-anchor spacing, concrete strength, special inspection and attachment to non-building structures must be outlined and approved by the engineer of record for the project or building. Structural floors and housekeeping pads must also be designed and approved by the project or building structural engineer of record to withstand the wind anchor loads defined herein. The installing contractor is responsible for the proper installation of all anchors and mounting hardware, observing the mounting requirements detailed in the installation drawings, and additionally outlined by the engineer of record.

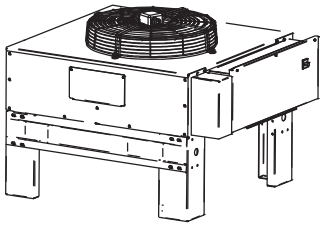
WIND LOAD DATA
ONE FAN, 18" LEG HEIGHT CONFIGURATION

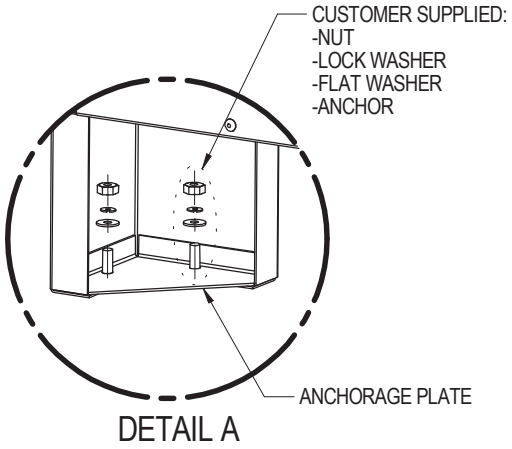




WITH RECEIVER

(VIEWS SHOW RECEIVER BRACKET ONLY.
RECEIVER NOT SHOWN FOR CLARITY)





DETAIL A

NOTES:
1. All braces and fasteners are required to maintain certification of conformity, see page 2, Detail A and page 3, Detail B.
2. Use washer, lock washer and screw to connect brace to condenser bottom beam (reference view Detail B, page 3).
3. Use washer, lock washer, screw and nut to connect brace to condenser leg (reference view Detail B, page 3).
4. Place anchorage plate inside each condenser foot prior to fastening to the structure. Use flat washer, lock washer and nut to connect condenser to the customer supplied anchor on the solid surface (reference view Detail A, page 2). As a minimum 3/8" anchors with American National Standard series W, type A, plain washers (ANSI B18.22.1-1965, R1975) selected to match the nominal anchor diameter must be installed at each anchor location between the anchor head and equipment for load distribution.
5. See instruction included with part kit for more details.

TABLE 1
Liebert MC Model Numbers: MCS028, MCM040, MCL055
Leg height: up to 60 inches

This certification covers the following wind parameters (ultimate load):
Horizontal pressure = 107 lbs/ft²; uplift pressure = 107 lbs/ft²

Monitoring
(Local & Remote)

LIEBERT® iCOM™

PRODUCT INFORMATION
UNIT MOUNTED DISPLAY

The Liebert® iCOM™ display is a 7-inch capacitive, color-touchscreen display 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. These four-digit passwords may be customized according to User preference.

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

Parameter Download- The Liebert® iCOM™ shall enable the user to download a report that lists parameter names, factory default settings, and the user programmed settings in .csv format for remote reference.

Parameter Directory- The Liebert® iCOM™ shall provide a directory that lists all parameters in the control. The list shall provide Line ID numbers, parameter labels, and current parameter values.

PRODUCT INFORMATION
UNIT MOUNTED DISPLAY

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 certain readouts will be configurable through the 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, call for free cooling, maintenance status, call for hot water reheat, call for electric reheat, call for dehumidification, call for humidification, airflow, static pressure, fluid flow rate and cooling capacity.

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 monitoring plug connections.

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 and Control Board software upgrades are performed through a USB connection.

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).

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

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.

Timers/Sleep Mode- The menus shall allow various customer settings for turning the unit On or Off.

Sensor Calibration- The menus shall allow unit sensors to be calibrated with external sensors.

Maintenance/Wellness Settings- The menus shall allow reporting of potential component problems before they occur.

PRODUCT INFORMATION
UNIT MOUNTED DISPLAY

Options Setup- The menus shall provide operation settings for the installed components.

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.

Auxiliary Boards- The menus shall allow setup of optional expansion boards.

Various Sensors: The menus shall allow setup and display of optional custom sensors. The control shall include four customer accessible analog inputs for field-supplied sensors. The analog inputs shall accept a 4 to 20mA signal. The user shall be able to change the input to 0 to 5VDC or 0 to 10VDC. The gains for each analog input shall be programmable from the front display. The analog inputs shall be able to be monitored from the front display.

Diagnostics/Service Mode- The Liebert® iCOM™ control shall be provided with self-diagnostics to aid in troubleshooting. The microcontroller board shall be diagnosed and reported as pass/not pass. Control inputs shall be indicated as On or Off at the front display. Control outputs shall be able to be turned On or Off from the front display without using jumpers or a service terminal. Each control output shall be indicated by an LED on a circuit board.

LIEBERT® LIQUI-TECT™ 460 KIT ZONE LEAK DETECTION SENSOR WITH CABLE

Product Specification/Installation Guide

The Liebert® Liqui-Tect™ 460 (LT460) provides zone detection of leaks, protecting equipment by constantly monitoring the area for leaking liquids. The LT460 is the ideal solution for perimeter sensing or serpentine coverage of areas requiring up to 100 feet of cable.

Selectable modes of operation provide flexible alarming options and protection for the cable. The LT460 constantly monitors a zone for leaks, internal faults, and power failures and warns of any abnormal conditions. Top cover LEDs provide status indication and also ensure that the cable is properly installed and operational under raised floors.

Two independent outputs provide a signal to a local alarm panel, Liebert cooling unit, and a remote building management system, or external equipment, such as motorized water shutoff valves.

LT460 APPLICATIONS

The LT460 is ideally suited for:

- Glycol and chilled water cooling,
- Humidification supply water piping,
- Condensate pumps and drains,
- Unit and ceiling auxillary drip pans,
- Overhead piping troughs.

LOCATIONS/PLACEMENT

The LT460 is an excellent choice for:

- Large scale network control centers,
- Data centers,
- MRI and CAT scan rooms
- Server rooms and closets,
- Unattended, remote shelters,
- Mechanical equipment rooms,
- Sensitive areas with overhead piping,
- Industrial process control rooms.

COMPONENTS

Liqui-Tect™ 460 Module

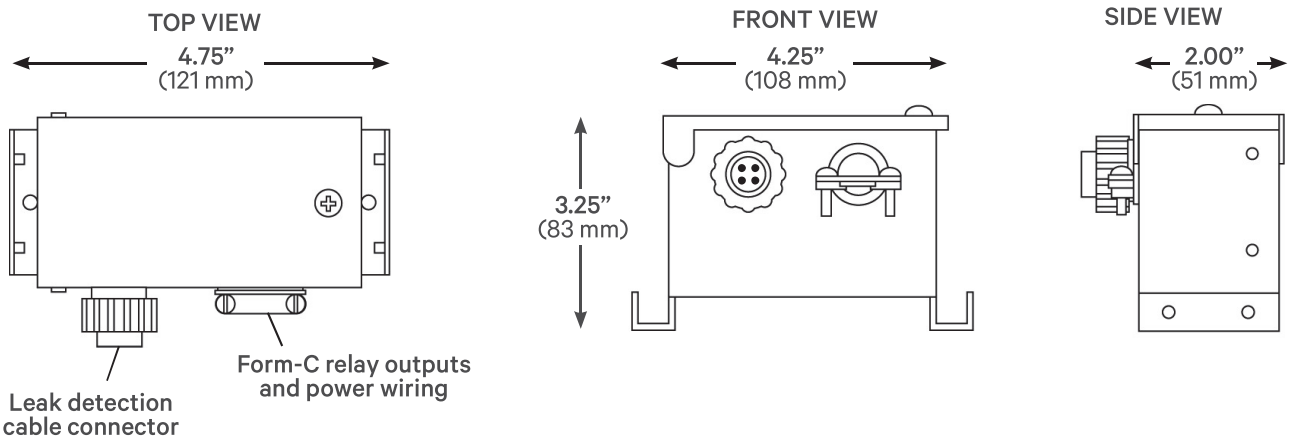
The LT460 consists of a metal enclosure with a hinged top door providing access to the internal circuit board for wiring termination and configuration of DIP switches. The LT460 will monitor up to 100 feet of connected LT500Y leak detection cable.

LT500Y Leak Detection Cable

The cable material and construction allow the cable to lie flat when used with hold down clips. The LT500Y is plenum-rated and UL listed for safe operation.

- If purchased separately, cables are available in lengths of 15, 35 and 50 feet. These cables can be connected incrementally to monitor from 15 feet up to 100 feet. An end terminator and hold-down clips (two clips required for each 6-8 feet of cable) must be ordered separately.
- If included in a kit, cables are available in lengths of 20, 25, 30, 35 and 45 feet. Cables in kits cannot be lengthened. Hold down clips are provided.

DIMENSIONS - TOP, FRONT AND SIDE



SPECIFICATIONS

Power Requirements	24 VAC 120 mA, 50/60 Hz, 3 VA (max.)
Dimensions, W x D x H	5.35 in. x 3.23 in. x 3.5 in. (135.9 mm x 82 mm x 88.9 mm) Mounting-holes require #8 screws.
Weight (assembled)	2.0 lb. (0.9 kg)
Leak-detection Cable Compatibility	All Liebert LT500 sensing cables
Maximum Leak-detection Cable Length	100 ft. (30.5 m)
Metal Enclosure	NEMA 1, IP 30

ENVIRONMENTAL CONDITIONS

Operating Temperature	50°F to 104°F (10°C to 40°C)
Operating Humidity	10% to 95% relative humidity (non-condensing)
Operating Altitude	0 to 10,000 ft. (0 to 3,048 m)
Output Relay Contact Rating	2 Form-C; 3 A rating at 24 VAC

AGENCY LISTINGS

UL	UL916
C-UL	C22.2, No. 205-M1983
CE	Yes
FCC Compliance	47 CFR, Part 15

CONFIGURATION-SWITCH SETTINGS

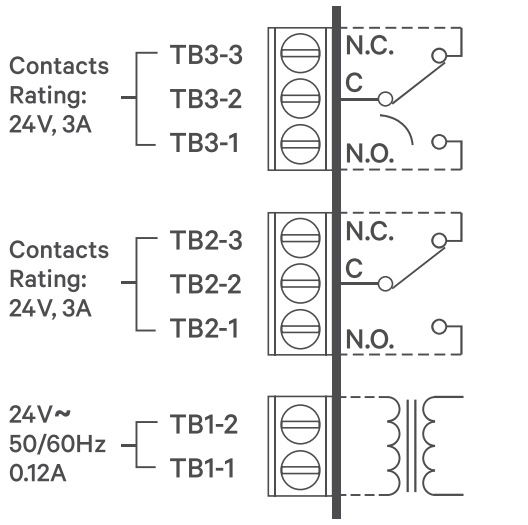
A four position DIP switch selects two alarm (filter) delays and three mutually exclusive alarm modes. The switches are located next to the wiring termination blocks.

SWITCH SETTINGS	OFF	ON
1. Leak Detect Filter	10 sec	2 min
2. Alarm Latch	No	Yes
3. Alarm Retest Delay	No	1 hr
4. Not Used	–	–

CONNECT ENCLOSURE TO EARTH GROUND

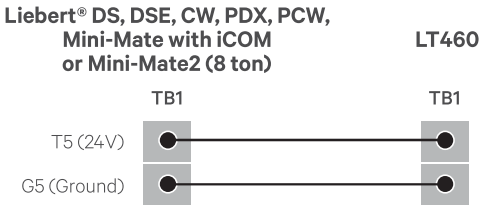
ALL CIRCUITS: CLASS 2

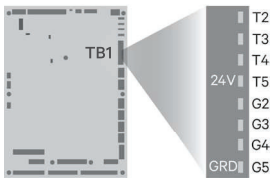
Contacts shown in POWERED, NON-ALARM state



POWER WIRING

The LT460 is rated for 24 VAC, 50/60 Hz, and 0.12 A.



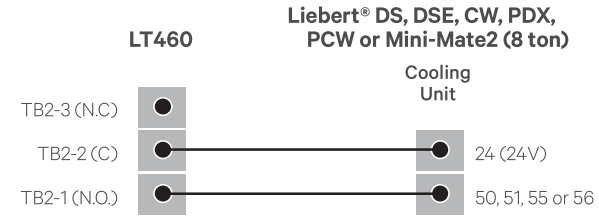


Location of T5 (24V) connection on main controller board of Liebert unit.

WIRING TO COOLING UNIT

The LT460 has two Form-C dry-contact alarm-output contacts (TB2 and TB3). Each contact is rated for 24 VAC at 3 amp.

NOTE: In Liebert® iCOM™, use the Service Options menu to add that the Liqui-Tect™ is installed



Note: Terminal 50 not available on Mini-Mate2 (8 ton)

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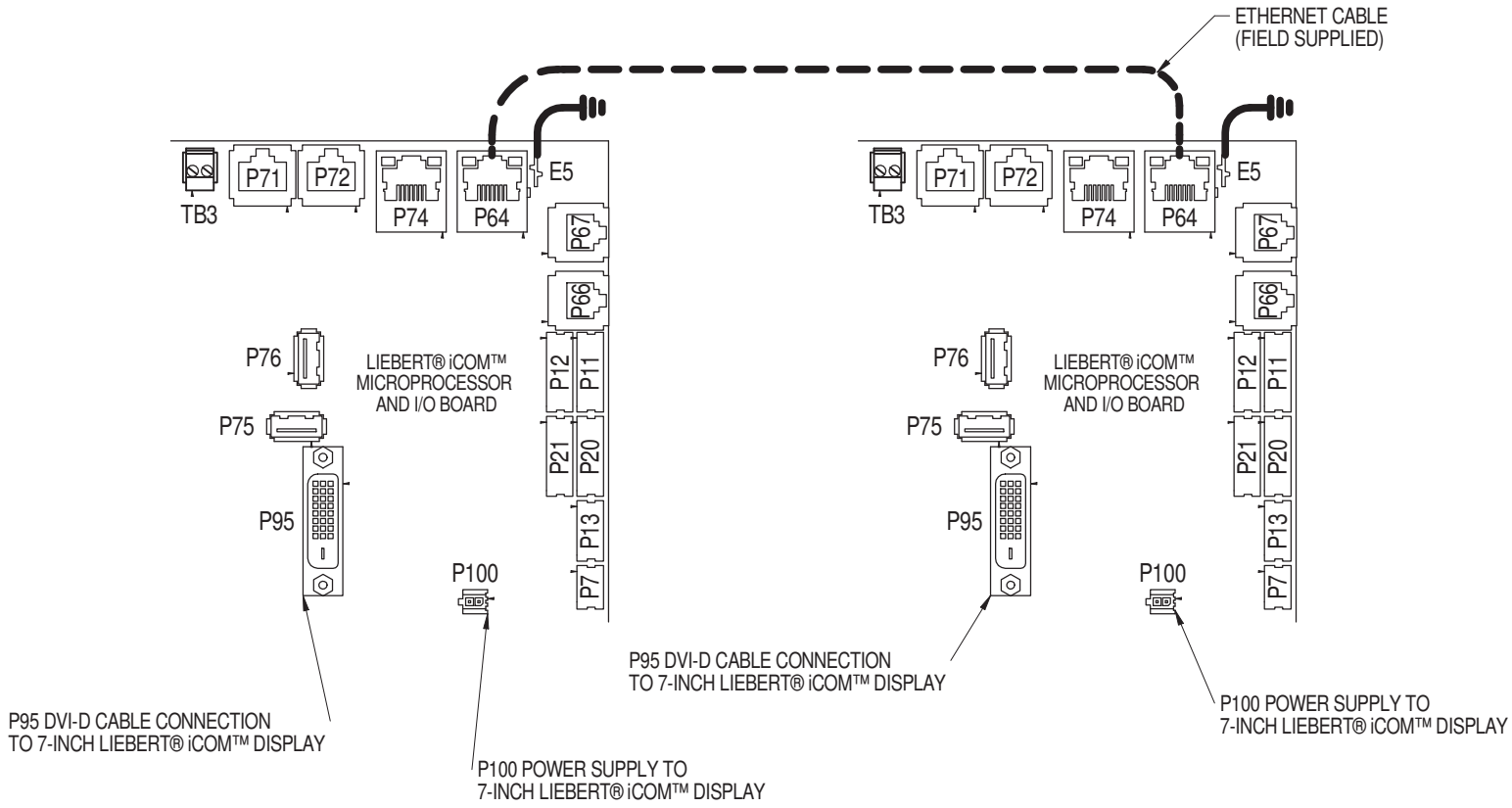
Unit-To-Unit
(U2U) Networking

UNIT TO UNIT NETWORK CONNECTIONS



NOTE* For dual-unit network configurations only