

Attachment A

1. Liebert DS

Model Number: DS070ADC1EI9E20

Quantity: 1

ELECTRICAL SUPPLY REQUIREMENTS

Voltage: 208 Volt, 3 Phase

Full Load Amps:129.2A

Wire Sizing Amps:156.9A

Overcurrent Protection Device:175.0A

Short Circuit Current Rating (SCCR): 65,000 Amps, rms

CABINET SECTION

- Downflow
- Color: ZP-7021 – Black Gray Matte
- Locking Disconnect Included
- Condensate Pump Not Included
- Domestic Packaging

UNIT PERFORMANCE DATA (See Attached Page 10)

- Total: _____ kW (_____ kBtuh)
- Sensible: _____ kW (_____ kBtuh)
- _____ °F (_____ °C) DB
- _____ °F (_____ °C) WB
- _____ % RH

FAN AND MOTOR

- EC motorized impeller with THD Transformer
- EC motorized impeller with fans operating inside the unit
- Airflow: 9600 CFM
- External Static Pressure: 0.2 inches
- Fan Motor Horsepower: 4.15
- Motor Quantity: 2

FILTER SECTION

- Efficiency based on ASHRAE Standard 52.2
- 4" Filters, MERV 8 rating

HUMIDIFIER SECTION

- Infrared Humidifier
- Capacity: 22 lbs/hr (10 kg/hr)

REHEAT SECTION

- 3-Stage Electric Reheat
- Capacity: 25 kW (85.3 kBTU/H) includes fan motor

CONTROL, SENSORS AND MONITORING SECTION

- Liebert iCOM Control with High Definition Display
 - Integrated Controls and High Definition Color User Interface
 - Display Language is English
 - Audible and Visual Alarms
- iCOM based communication
 - Base Comms & Connectivity includes one Ethernet port and one RS-485 port on iCOM controller, dedicated to supporting BACnet IP, Modbus TCP/IP, BACnet 485 , Modbus 485 and SNMP v1/v2c/v3
- Supply Air Sensor
- Internal Temperature/Humidity Sensors for return air sensing.
- Common Alarm Contact
No low voltage terminal package selected
- LT460-Z45 Zone Leak Sensor - Quantity per unit: 1

FLOORSTANDS AND PLENUM SECTION

- No Plenum
- 15" Floorstand (Verify before ordering)

OUTDOOR AIR-COOLED CONDENSER

- Condenser P/N: MCM080E8YD
- Outdoor Design Ambient Temperature: 95°F (35°C)
- EC Fans/Premium Controls

CABINET SECTION

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.

Supply Air

- Supply air exits from the bottom of the unit, with air scrolled towards the front.

Return Air

- Return air enters the top of the unit

Exterior Panels

Exterior panels are powder coated, insulated with 1" (25mm) 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

Filters are located in the cabinet, removable from the top.

Deep pleated 4" filters with a MERV 8 rating.

Humidifier

High intensity infrared quartz lamps over a stainless steel humidifier pan. An automatic water supply system continuously maintains water level and an automated flush system greatly reduces mineral precipitation. A flow control valve permits operation at water pressure between 15 and 150 PSIG (103.4 and 1034 kPa).

Reheat

Electric reheat coils are low watt density, 304/304 stainless steel fin tubular construction, protected by thermal safety switches, controlled in three stages.

REFRIGERATION SECTION

Refrigeration Circuits

Each unit includes two (2) independent refrigeration circuits with hot gas mufflers, liquid line filter driers, refrigerant sight glass with moisture indicator, non-adjustable, externally equalized expansion valves, and liquid line solenoid valves. Compressors located outside the airstream and shall be removable and serviceable from the front of the unit.

Compressors

Two compressors. Scroll-type compressors with variable capacity control. The compressor solenoid valve cycles in response to room load in order to unload the compressor. The controller engages or dis-engages the compressor on a 15 second control cycle. Includes vibration isolators, thermal overloads, automatic reset high pressure switch with control lockout after three (3) failures, suction line strainer, and rotalock service valves.

Evaporator Coil

A-Frame design, with offset orientation to ensure proper condensate drainage. Coil is constructed of interwoven circuiting of rifled copper tubes and aluminum fins manufactured by Liebert. A stainless-steel condensate drain pan is provided.

Refrigerant

R-407C refrigerant, which meets the EPA clean air act and Montreal Protocol requirements for phase out of HCFC refrigerants. Field supplied and field charged on air-cooled units.

Control, Sensors and Monitoring

Liebert iCOM

The Liebert iCOM unit control is factory-set for Intelligent Control which uses 'fuzzy logic' and 'expert systems' methods. Proportional and Tunable PID are user selectable options. Internal unit component control includes the following: System Auto Restart, Sequential Load Activation, Hot Water Flush Cycles (if hot water coil is present), and Predictive Humidity Control. The control system and electronic circuitry is provided with self-diagnostics to aid in troubleshooting. The microcontroller board is diagnosed and reported as pass/not pass. Control inputs are indicated as on or off at the front monitor panel. Control outputs are able to be turned On or Off from the front monitor panel without using jumpers or a service terminal.

The display and housing are viewable while the unit panels are open or closed. The display is organized into three main sections: User Menus, Service Menus and Advanced Menus. The system displays user menus for: active alarms, event log, graphic data, unit view/status overview (including the monitoring of room conditions, operational status in % of each function, date and time), total run hours, various sensors, display setup, and service contacts. A password is required to make system changes within the service or advanced menus.

The Liebert iCOM control can activate an audible and visual alarm in event of any of the following conditions: High/Low Temperature, High/Low Humidity, Change Filters, Loss of Air Flow or Power, and four separate Custom Alarms.

Unit-to-Unit communication with another Liebert DS unit included as standard using a private ethernet network between iCOM controllers. Optional network switch required for unit-to-unit communication between three or more Liebert DS.

iCOM – High Definition Color Display

The standard user interface is the 7" High Definition Color Display which presents system information and allows all parameters to be viewed and adjusted. It features a capacitive touchscreen for navigation ease and LED color indicating operational status.

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.

Temperature & Humidity Sensors

Internal Temperature/Humidity Sensors

Factory installed and commissioned return air temperature/humidity sensors are mounted inside the unit and are factory wired to the Liebert iCOM unit controller. Sensors are used for unit control and

monitoring.

Common Alarm Contact

The common alarm contacts provide the customer with a set of normally open contacts for remote indication of unit alarms.

Unit Factory Installed Locking Disconnect Switch

The Locking Disconnect 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. The molded case switch disconnect models contain separate main fuses. Units with fused disconnect have main fuses within the disconnect.

Base-Comms for BMS Connectivity

The Liebert iCOM controller provides one Ethernet Port and one RS-485 Port dedicated for BMS Connectivity. Provides ground fault isolated RS-485 Modbus, BACnet IP & Modbus IP network connectivity to Building Management Systems for unit monitoring and management. Also, provides ground fault isolated 10/100 baseT Ethernet connectivity for unit monitoring and management. The supported management interfaces include: SNMP for Network Management Systems, HTTP for web page viewing, SMTP for email, and SMS for mobile messaging. The iCOM controller can support dual IP on one network and one 485 protocol simultaneously.

Liebert Liqui-Tect® 460 Zone Leak detection Module with Cable Kit for Remote Mounting

The zone water sensor cables have no moving parts and are hermetically sealed to keep out dust and dirt. The Liebert Liqui-tect 460 (LT460) provides a zone detection of leaks. The LT460 constantly monitors points for leaks, internal faults and power failures and warn of any abnormal conditions. LEDs provide status indication and also ensure the cable is properly installed and operational under raised floors. The LT460 provides two independent outputs provide a signal to a local alarm panel, Liebert environmental unit, remote building management system or external equipment.

Liebert 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 monitors up to 100 feet of connected LT500Y leak detection cable.

LT500Y Leak Detection Cable

The cable material and construction allows the cable to lie flat when used with hold-down clips. The LT500Y is be plenum-rated and UL-listed for safe operation. Cables are available in lengths of 20, 25, 30, 35 and 45 feet.

Air-Cooled Condenser

The Liebert manufactured outdoor air cooled condenser. Low profile, multiple direct drive, propeller fan type. Aluminum cabinet with aluminum microchannel coils arranged for vertical air discharge.

Outdoor Condenser with Premium Control and EC Fans

The Liebert MC air-cooled condenser has a Premium Control Board driving variable speed EC fans. The Premium Control System is complete with pressure transducers, ambient and liquid line thermistors and an electronic control board integrating sensor signals and information from iCOM (via field supplied CANBus to CANbus connection terminals) to regulate the fan speed to maintain head pressure of each circuit independently. Controls are factory wired and mounted a NEMA 3R factory mounted electrical box. A fused, locking and lockable disconnect switch is factory mounted with through the electrical box . The EC fans are an integrated assembly containing an EC fan motor, quiet swept fan blade and finger/hail guard. Motors include ball bearings, permanent lubrication, internal overload protection through built-in electronics. The Premium Control provides positive start-up and operation in ambient temperature as low as -30°F (-34.4°C) .

Services

Warranties:

- Labor Warranty Coverage and Warranty Inspection Included

Value Added Services:

- iCOM Networking included

1. 1 Liebert MC

Liebert MC

ENGINEERING SPECIFICATION SHEET Air-Cooled Microchannel Condenser

Model Number: MCM080E8YD00D5
Quantity: 1

ELECTRICAL SUPPLY REQUIREMENTS

Air Cooled Condenser: 208/230 Volt, 3 Phase, 60 Hz, 4.6 FLA 5.2 WSA 15 OPD

STANDARD FEATURES

- Microchannel aluminum coil(s)
- Integrated fan motor/blade/guard assembly
- Electronic control of fan speed
- Factory wired and mounted NEMA 3R electrical panel/box
- Fused, locking and lockable electrical disconnect switch
- Variable fan speed motors
- Short Circuit Current Rating of 65,000 Amps, rms

CABINET

- Bright aluminum exterior panels
- Bright aluminum NEMA 3R box containing main electrical panel
- Bright aluminum legs
- Aluminum exterior panels and 18" aluminum legs

CONTROL/COMMUNICATION FAN

- Variable speed EC fan

- Premium electronic control board providing communication with Liebert® iCOM using CANbus

REFRIGERANT & CIRCUITS

- R-407C (R-22) set points
- Dual refrigerant circuits

OPTIONAL FEATURES

- Surge Protection Device Kit for Field Installation

VERTIV Liebert Rating System (LRS) 3.6.0.8w 4.4.3.18e

Liebert DS Model DS070AD~MCM080E8; Air Cooled

Manufacturer:	Liebert North America	Altitude:	0 ft
Unit Power Supply:	460/3/60	ESP:	0.20 InH2O
Refrigerant:	R407C	Width:	98 in
Internal Filter Class:	Merv 8 Std. - 4 inch (102 mm)	Depth:	35 in
Spec.sheet output date:	23-Nov-21	Height:	76 in
Return Airflow (std. motor):	9600 ACFM	Weight:	1970 lb

Condenser(s)	Compressor(s)	Evaporator(s)
Manufacturer: Liebert North America	Manufacturer: Copeland	Manufacturer: Liebert North America
Model: MCM080E8	Model: ZRD125KCE-60Hz	Model: RTDS053Evapx2
Condenser Type: MCH Condenser	Compressor Type: Digital	Fin Type: Lanced
Design Ambient: 95 °F	Power Supply: 460/3/60	Number of Rows: 3
Power Option: 460/3/60	Manufacturer: Copeland	Fin Density: 12 fpi
	Model: ZRD125KCE-60Hz	Face Area: 24.65 ft ²
	Compressor Type: Digital	Surface Area: 1712 ft ²
	Power Supply: 460/3/60	

Miscellaneous	Cooling Fan(s)
Humidifier Type: Infrared	Model: EC-560-UP
Model: IR_22lb_9.6kW	Description: DS - DX Cooling Only w/EC Fans in the unit
Bypass airflow: 2 %	Air Supply: Bottom
	Power Supply: 460/3/60
	Quantity of Motors: 2

System 1: [Digital Loading: 100%, SC: 5 °F, SH: 14 °F] [ESP:0.2]
 System 2: [Digital Loading: 100%, SC: 5 °F, SH: 14 °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 (kBtu/hr)	NSCC (kBtu/hr)	THR (kBtu/hr)	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)
72	60	49.7	52.2	9600	9266	382	9427	95	224	184	311.4	11856	54.2	51.4	21.2	27.3	1.98	1.98	4.65	8.61

System 1		
Compressor Power (kW)	Sat. Discharge Temp. (°F)	Sat. Suction Temp. (°F)
10.61	127.5	45.2
System 2		
Compressor Power (kW)	Sat. Discharge Temp. (°F)	Sat. Suction Temp. (°F)
10.61	127.5	45.2

Notes

- Capacities shown have been reduced by fan motor(s) heat (net).
- System Power Input includes Compressor(s), Blower Motor(s), Condenser(s), and Control Power.
- Coil airflow is reduced by a bypass of 2% of total unit airflow.
- Capacity Tolerance is 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.
- SCFM/SCMH is the unit air flow rate when converted to standard air density of 0.075 lb/ft³ at sea level.
- NTCC, Net Total Cooling Capacity
- NSCC, Net Sensible Cooling Capacity

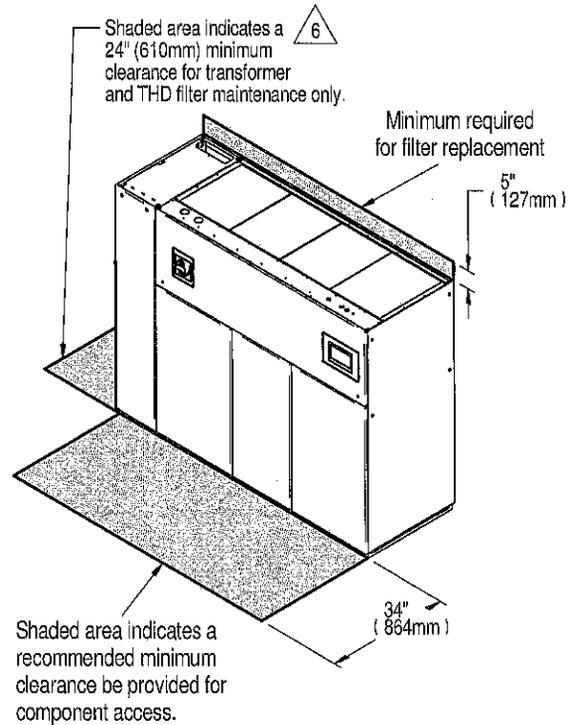
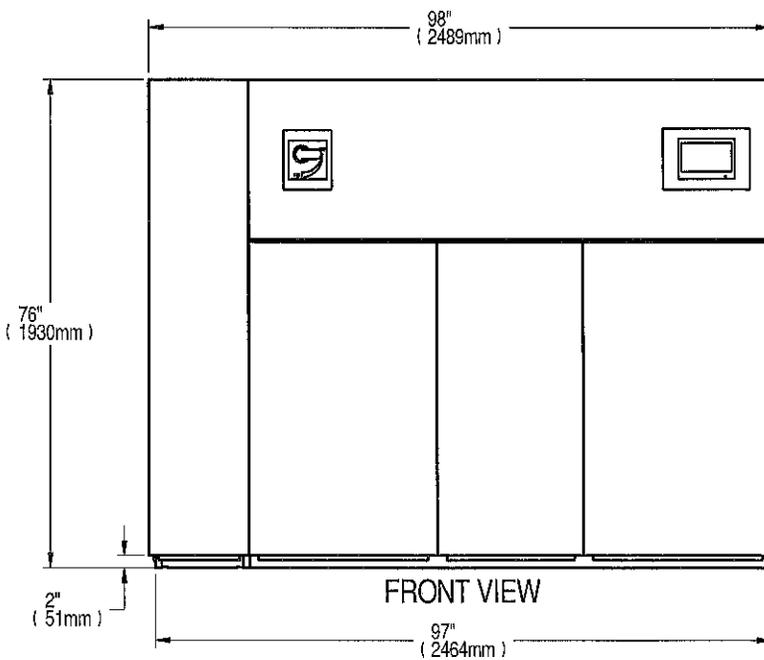
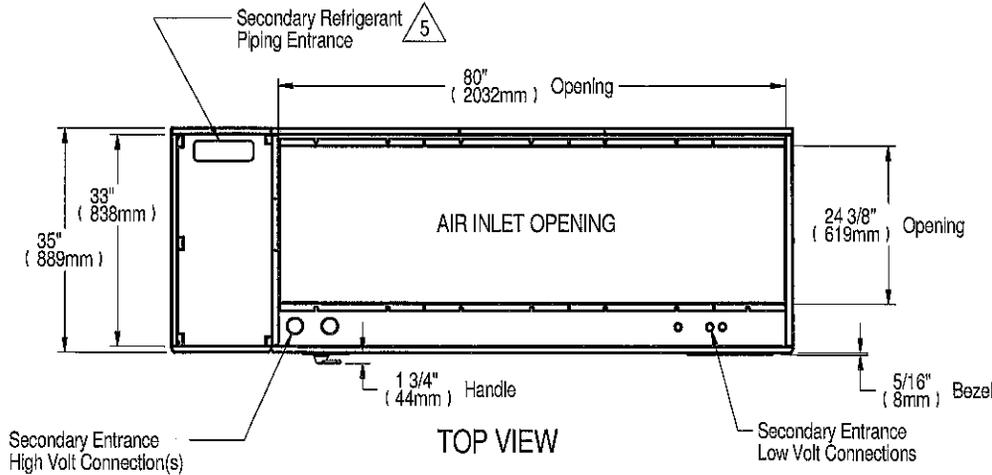


Certified in accordance with the AHRI Datacom Cooling Certification Program at AHRI Standard 1360 and ASHRAE Standard 127-2007 Standard Rating Conditions. Certified units may be found in the AHRI Directory at www.ahrirectory.org.



LIEBERT DS

CABINET DIMENSIONAL DATA DS DOWNFLOW AIR COOLED 53-77kW (15-22 TONS) W/ SCROLL OR DIGITAL SCROLL COMPRESSOR MODELS



Dry Weight (approximate) lb. (kg) $\triangle 4$		
Model No.	Air Cooled	Dual Cool
DS053	1920 (871)	2100 (953)
DS070	1970 (894)	2150 (975)
DS077	2020 (916)	2200 (998)

Notes:

- Filters are accessible through top of unit only.
- Downflow electrical connections can be made from top or bottom of unit.
- Digital Scroll Compressors not available on 77kW models.

$\triangle 4$. Add 120lbs (54kg) for 575V transformer.

$\triangle 5$. Secondary Refrigerant piping entrance. Not available with 575V.

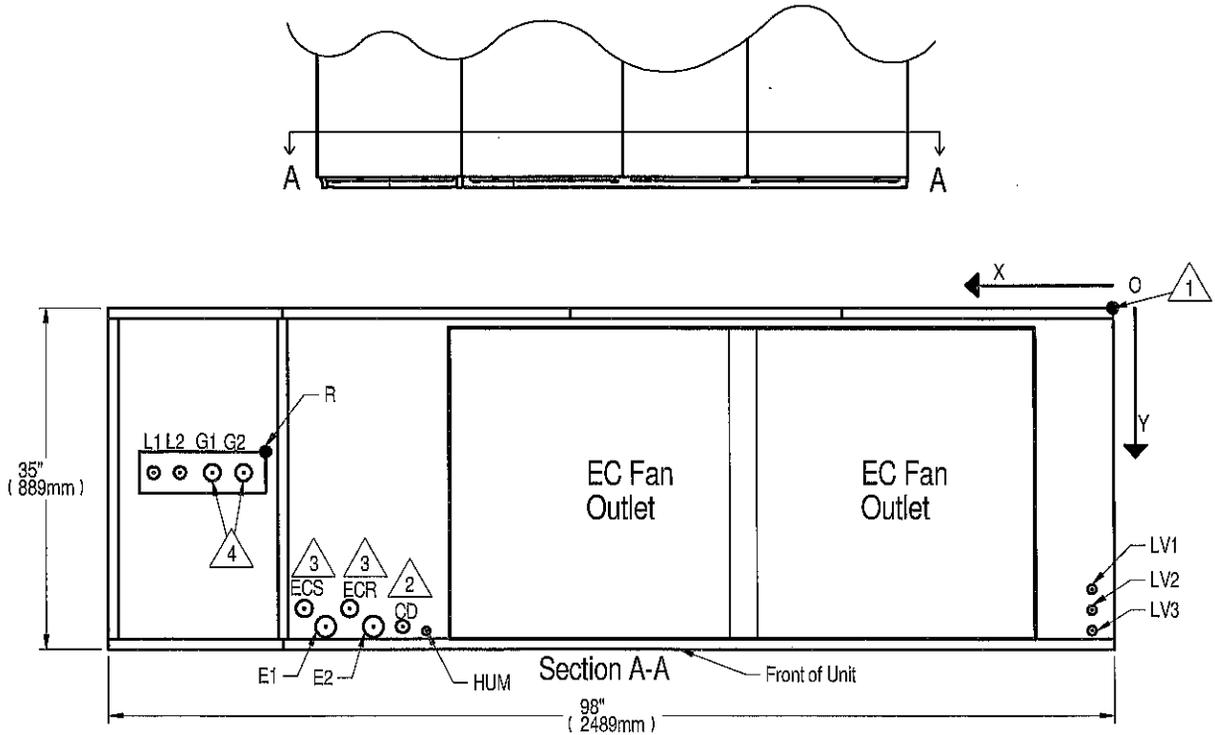
$\triangle 6$. Unit power must be off when performing transformer and THD filter maintenance.



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LIEBERT DS

PRIMARY CONNECTION LOCATIONS DOWNFLOW AIR COOLED 53-77kW SCROLL OR DIGITAL SCROLL COMPRESSOR MODELS W/ EC FANS



POINT	DESCRIPTION	X in. (mm)	Y in. (mm)	CONNECTION SIZE / OPENING	
R	DS REFRIGERANT ACCESS	81-3/4 (2076)	14-3/4 (375)	12-3/16" (310mm) X 4" (102mm)	
				53kW (15 TONS)	70 & 77kW (20 & 22 TONS)
L1	LIQUID LINE SYSTEM 1	94-11/16 (2405)	16-3/4 (425)	1/2" O.D. Cu	5/8" O.D. Cu
L2	LIQUID LINE SYSTEM 2	91-7/8 (2334)			
G1	HOT GAS DISCHARGE 1	88-3/4 (2254)	16-3/8 (416)	7/8" O.D. Cu	1-1/8" O.D. Cu
G2	HOT GAS DISCHARGE 2	85-9/16 (2173)			
CD	CONDENSATE DRAIN (Infrared humidifier or no humidifier) W/ OPTIONAL PUMP	68-3/8 (1737)	31-3/8 (797)	3/4" NPT FEMALE	
				1/2" O.D. Cu	
HUM	HUMIDIFIER SUPPLY LINE	76-1/2 (1943)	29 (737)	1/4" O.D. Cu	
ECS	ECON-O-COIL SUPPLY	78-5/8 (1997)	22-1/4 (565)	2-1/8" O.D. Cu	
ECR	ECON-O-COIL RETURN	73-15/16 (1878)	26-9/16 (675)		
E1	ELECTRICAL CONN. (HIGH VOLT)	78-1/2 (1994)	31-1/8 (791)	2-1/2"	
E2		75-3/8 (1915)			
LV1	ELECTRICAL CONN. (LOW VOLT)	2 (51)	29 (737)	7/8"	
LV2			30-7/8 (784)		
LV3			32 (813)		

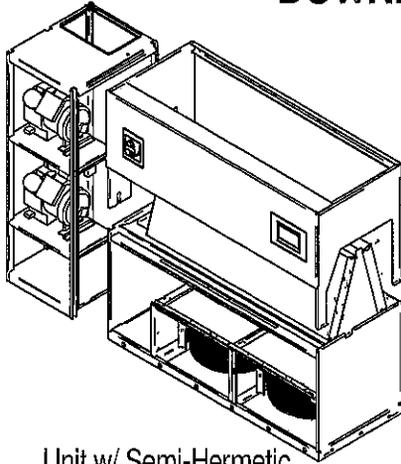
Notes:

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. Supplied on Dual Cooling systems only.
4. When piping out the top of the unit, install traps in the discharge lines in the bottom of the unit before running lines to the top.
5. Digital Scroll compressor not available on DS077 models.

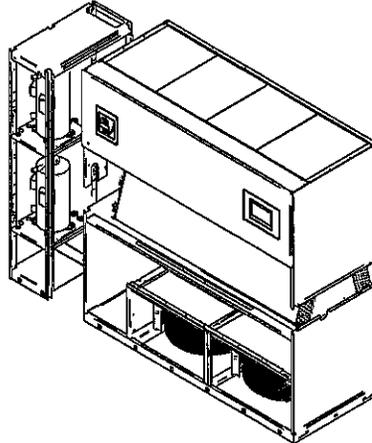


LIEBERT DS

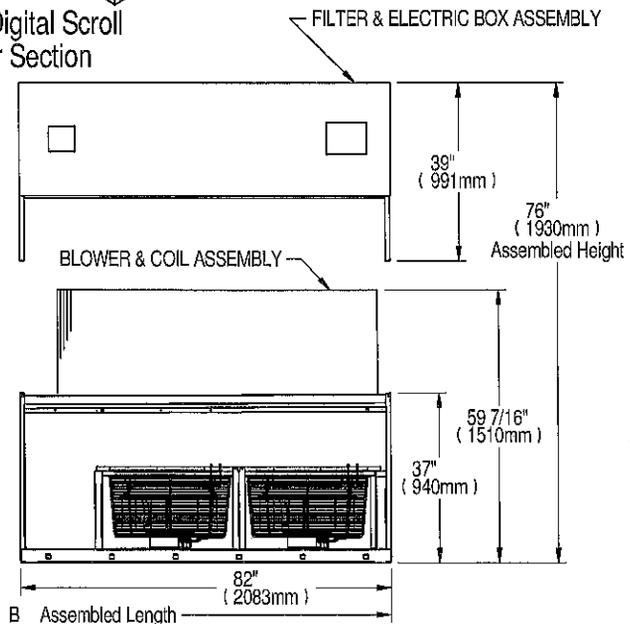
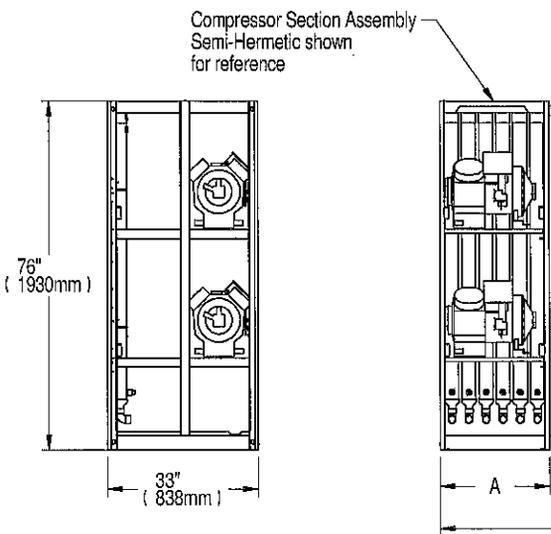
DISASSEMBLY DIMENSIONAL DATA DOWNFLOW 53-77kW (15-22 TONS) MODELS



Unit w/ Semi-Hermetic Compressor Section



Unit w/ Scroll/Digital Scroll Compressor Section

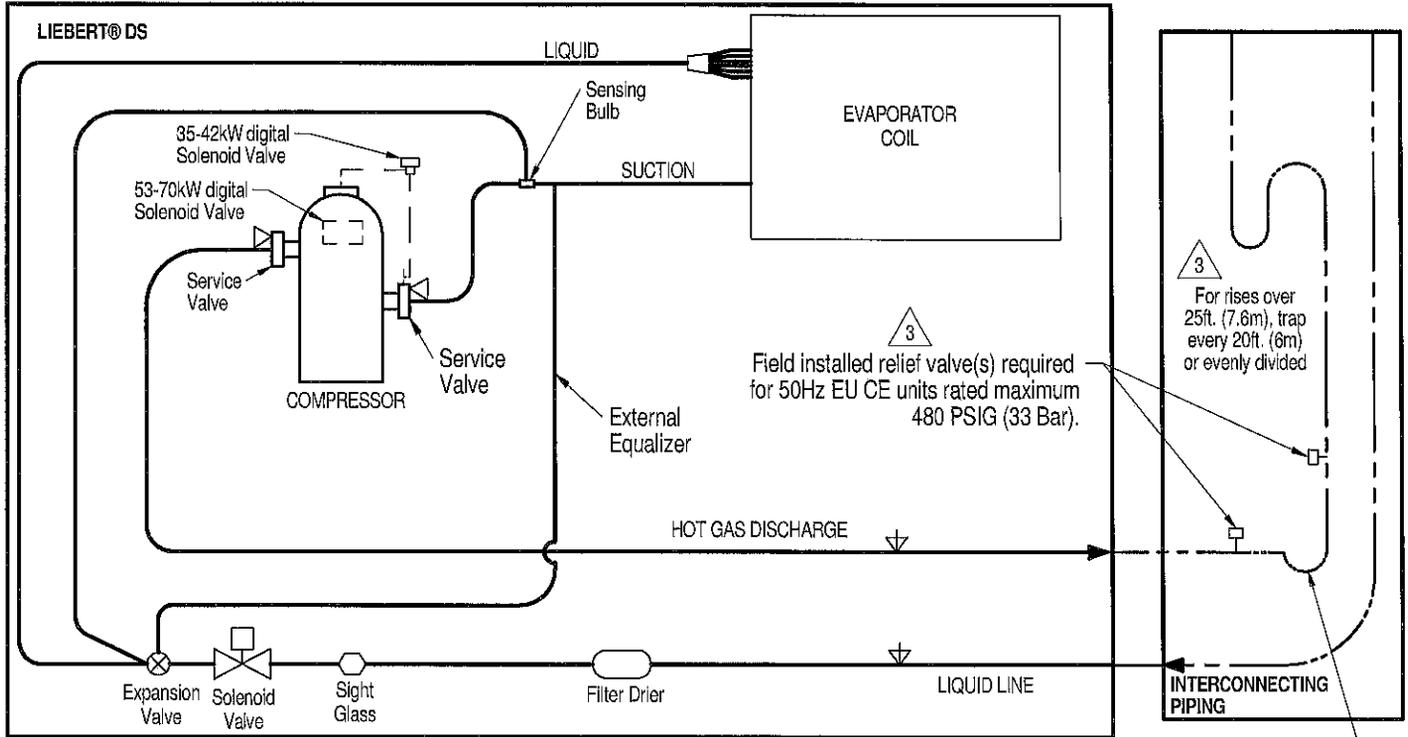
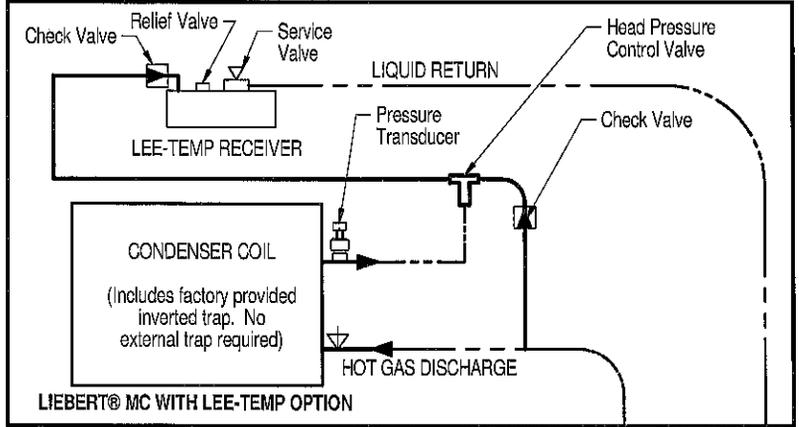
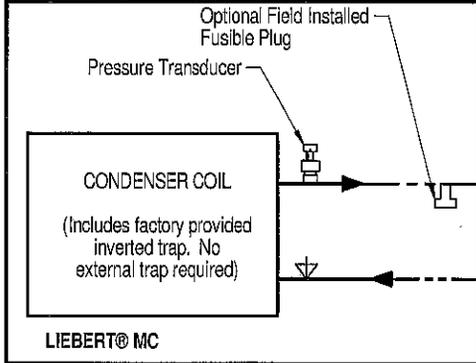


Compressor Type	Cooling Type	A in. (mm)	B in. (mm)
Scroll or Digital Scroll	Air Cooled	15 (381)	97 (2464)
	Air Cooled w/ Dual Cool		
	Water/Glycol		
Semi-Hermetic	GLYCOOL™/Dual Cool	26 (660)	108 (2743)
	Air Cooled		
	Air Cooled w/ Dual Cool		
	Water/Glycol		
	GLYCOOL™/Dual Cool		

- Notes:
- Drawing Views are simplified with panels removed to show overall dimensions. See disassembly and handling instructions in installation manual.
 - Semi-Hermetic Compressor options only available on 77kW models.

Assembly	APPROXIMATE DRY WEIGHT lb (kg) (Includes Panels)							
	Semi-Hermetic Compressor		Scroll or Digital Scroll Compressor		Semi-Hermetic Compressor		Scroll or Digital Scroll Compressor	
	Air Cooled	A/C w/ Dual Cool	Air Cooled	A/C w/ Dual Cool	Water/Glycol	GLYCOOL™/Dual Cool	Water/Glycol	GLYCOOL™/Dual Cool
Compressor Assembly	970 (441)	970 (441)	540 (246)	540 (246)	1270 (578)	1270 (578)	840 (382)	840 (382)
Filter & Electric Box Assembly	250 (114)	250 (114)	250 (114)	250 (114)	250 (114)	250 (114)	250 (114)	250 (114)
Blower & Coil Assembly	1230 (560)	1410 (641)	1230 (560)	1410 (641)	1230 (560)	1410 (641)	1230 (560)	1410 (641)

PIPING SCHEMATIC W/ LIEBERT® MC AIR COOLED SCROLL OR DIGITAL SCROLL COMPRESSOR MODELS



OPTIONAL FACTORY PIPING

- FACTORY REFRIGERANT PIPING
- - - FIELD PIPING
- ▽ SERVICE/SCHRADER (ACCESS) CONNECTION NO VALVE CORE
- ▽ SERVICE/SCHRADER (ACCESS) CONNECTION WITH VALVE CORE

Notes:

1. Single refrigeration circuit shown for clarity.
2. Schematic representation shown. Do not use for specific connection locations.
3. Components are not supplied by Vertiv, but are required for proper operation and maintenance.
4. Traps must be installed and horizontal lines pitched to ensure proper oil return and to reduce liquid floodback to compressor. Pitch horizontal hot gas piping at a minimum of 1/2" per 10 feet (42mm per 10m) so that gravity will aid in moving oil in the direction of the refrigeration flow.
5. Do not isolate any refrigerant circuits from over pressurization protection.



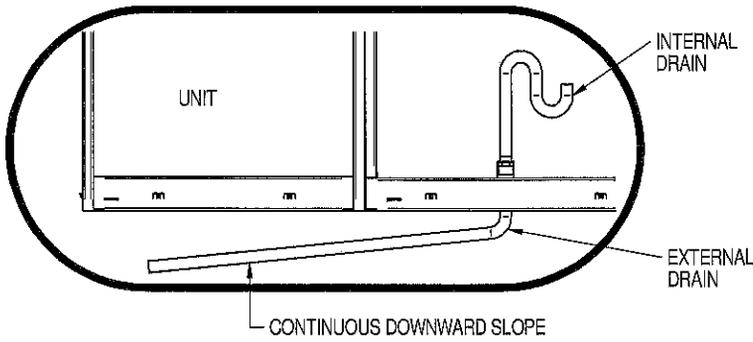
VERTIV™

LIEBERT DS

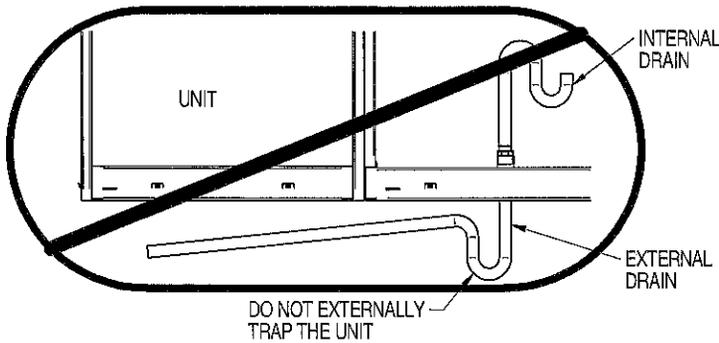
DRAIN SYSTEMS

UPFLOW & DOWNFLOW MODELS

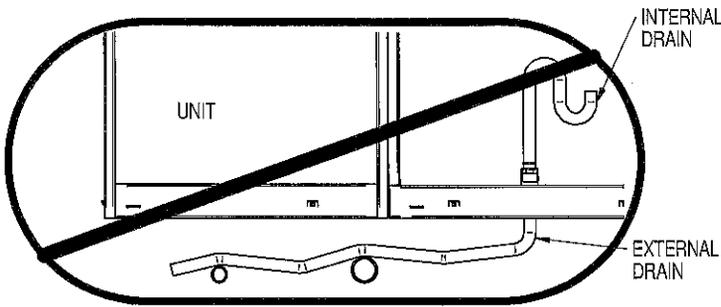
DOWNFLOW DS UNIT



CORRECT



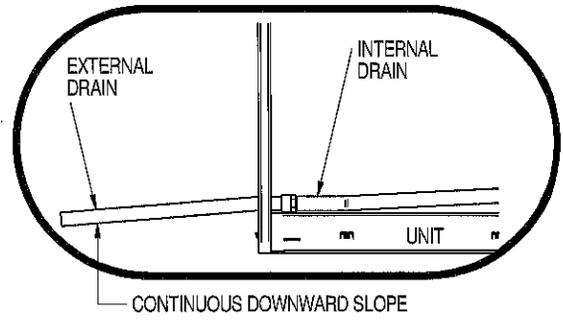
INCORRECT



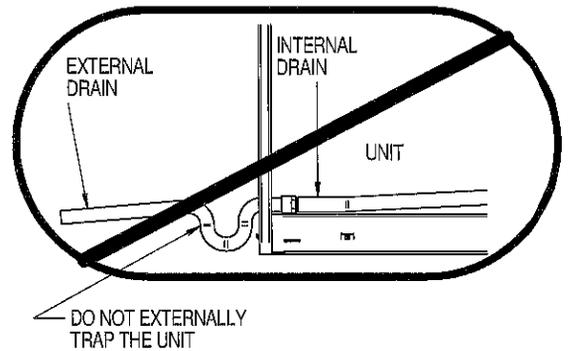
THESE ARE EXTERNAL TRAPS ALSO, ALTHOUGH UNINTENTIONAL. LINES MUST BE RIGID ENOUGH NOT TO BOW OVER TOP OF OTHER OBJECTS.

INCORRECT

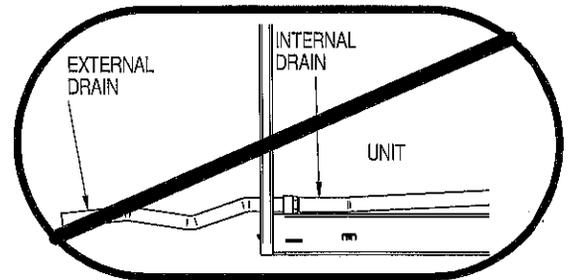
UPFLOW DS UNIT



CORRECT



INCORRECT



THESE ARE EXTERNAL TRAPS ALSO, ALTHOUGH UNINTENTIONAL. LINES MUST BE RIGID ENOUGH NOT TO BOW OVER TOP OF OTHER OBJECTS.

INCORRECT



LIEBERT DS

ELECTRICAL FIELD CONNECTION DESCRIPTION UPFLOW AND DOWNFLOW MODELS

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 Liebert.
- 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. When DS unit is paired with a Liebert MC series condenser, remove jumper between terminal 71 and terminal 230. 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 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.



VERTIV

LIEBERT DS

ELECTRICAL FIELD CONNECTION DESCRIPTION UPFLOW AND DOWNFLOW MODELS

OPTIONAL ELECTRICAL CONNECTIONS

- 16) **Smoke sensor alarm - Factory** wired dry contacts from smoke sensor are 91-common, 92-NO, and 93-NC. Supervised contacts, 80 & 81, open on sensor trouble indication. This smoke sensor is not intended to function as, or replace, any room smoke detection system that may be required by local or national codes. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.
- 17) **Reheat and humidifier lockout** - Remote 24VAC required at terminals 82 & 83 for lockout of reheat and humidifier.
- 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) **Remote humidifier** - On any call for humidification, normally open dry contact is closed across terminals 11 & 12 to signal field supplied remote humidifier. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.
- 20) **Auxiliary cool contact** - On any call for econ-o-coil operation, normally open dry contact is closed across terminals 72 & 73 on dual cool units only. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.
- 21) **Analog Inputs**- Terminals 41, 42, 43, 44 are user configurable for 0-10V, 0-5V, or 4-20MA.

OPTIONAL LOW VOLTAGE TERMINAL PACKAGE CONNECTIONS

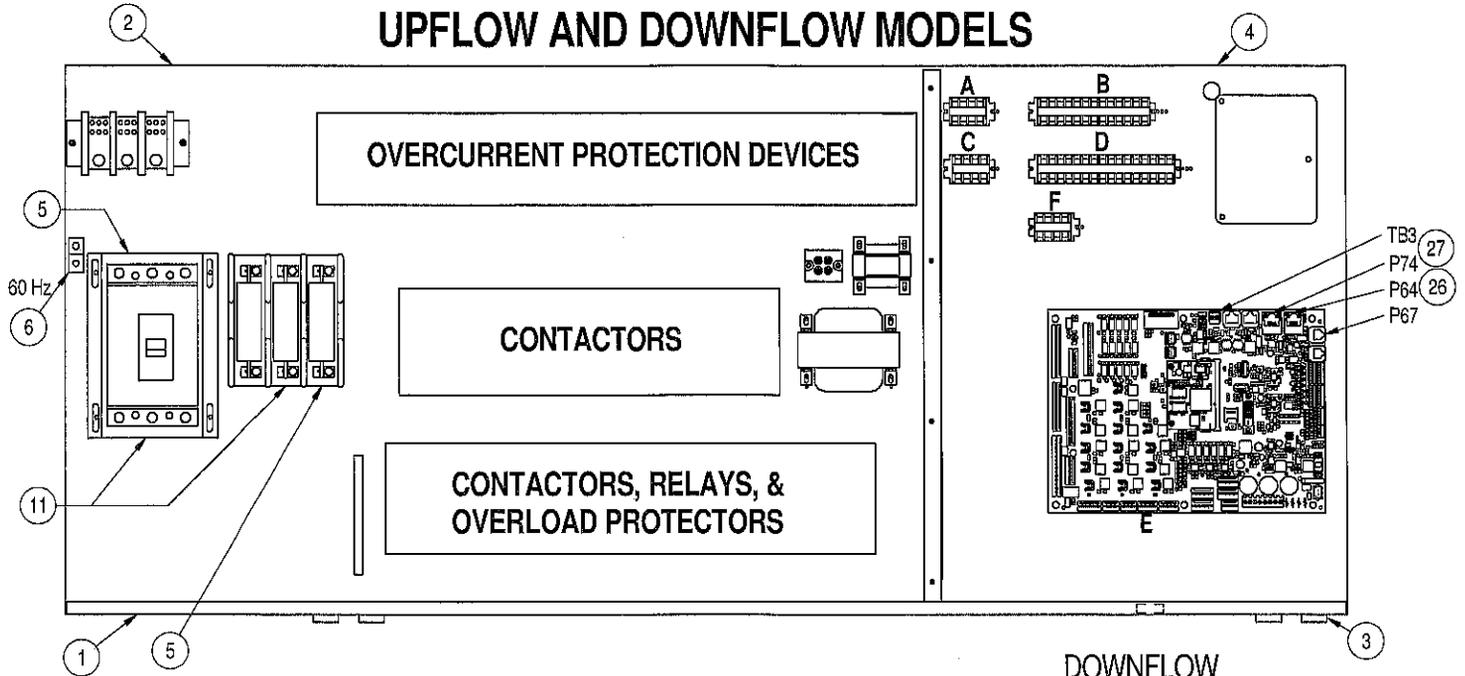
- 22) **Remote unit shutdown** - Two additional contact pairs available for unit shutdown (labeled as 37B & 38B, 37C & 38C). Replace jumpers with field supplied normally closed switch having a minimum 75VA, 24VAC rating. Use field supplied Class 1 wiring.
- 23) **Common alarm** - On any alarm, two additional normally open dry contacts are closed across terminals 94 & 95 and 96 & 97 for remote indication. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.
- 24) **Main fan auxiliary switch** - On closure of main fan contactor, normally open dry contact is closed across terminals 84 & 85 for remote indication. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.
- 25) **Liqui-Tect shutdown and dry contact** - On Liqui-Tect activation, normally open dry contact is closed across terminals 58 & 59 for remote indication (Liqui-Tect sensor ordered separately). 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.

OPTIONAL COMMUNICATION CONNECTIONS

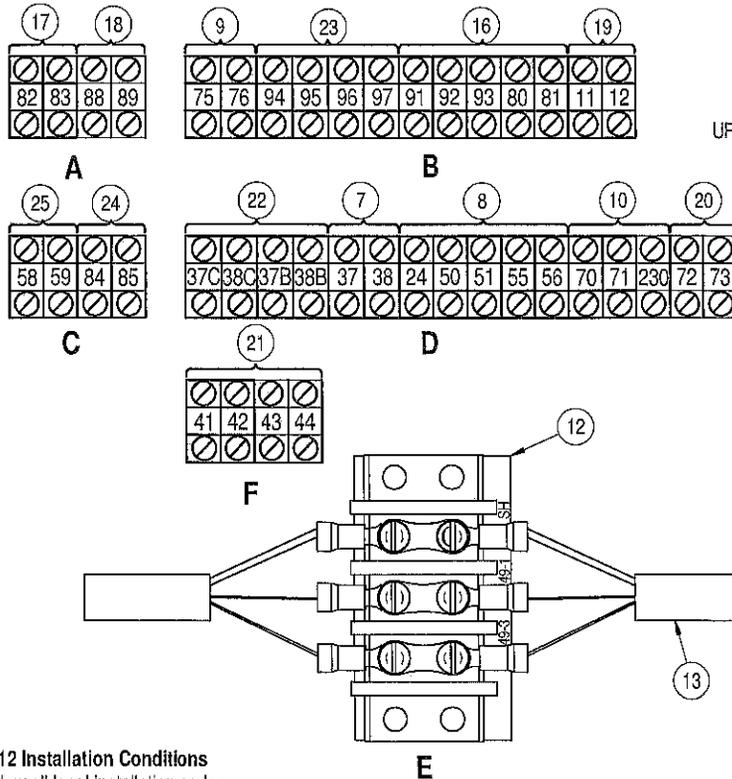
- 26) **Unit-To-Unit** – Plug 64 is reserved for U2U communication
- 27) **Site and BMS**- Plug 74 and terminal block 3 are reserved for Site and BMS connections. Plug 74 is an eight pin RJ45 for a Cat 5 cable. Terminal block 3 is a two position screw terminal block for use with twisted pair wires.

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

ELECTRICAL FIELD CONNECTION DESCRIPTION UPFLOW AND DOWNFLOW MODELS

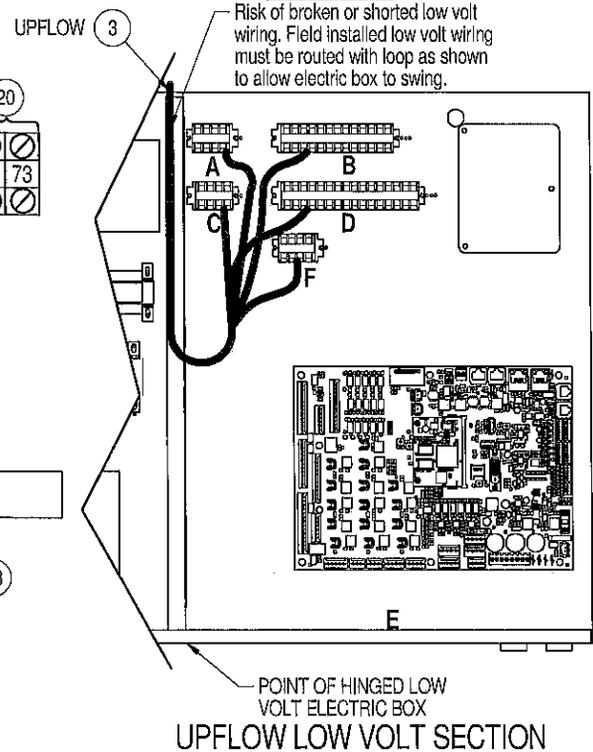


Note: Typical orientation of components shown. Component location varies by option and unit size.



CAUTION:

Risk of broken or shorted low volt wiring. Field installed low volt wiring must be routed with loop as shown to allow electric box to swing.



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.



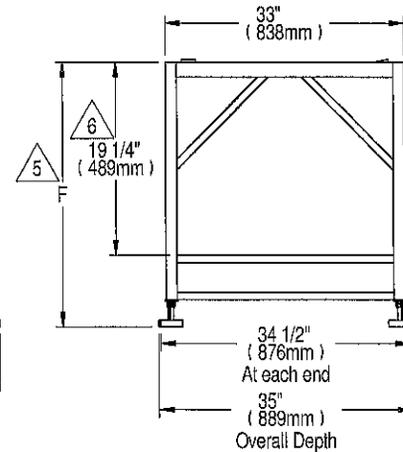
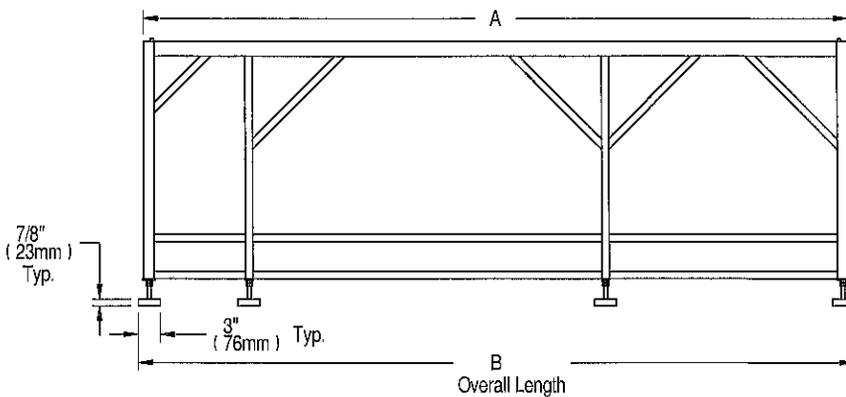
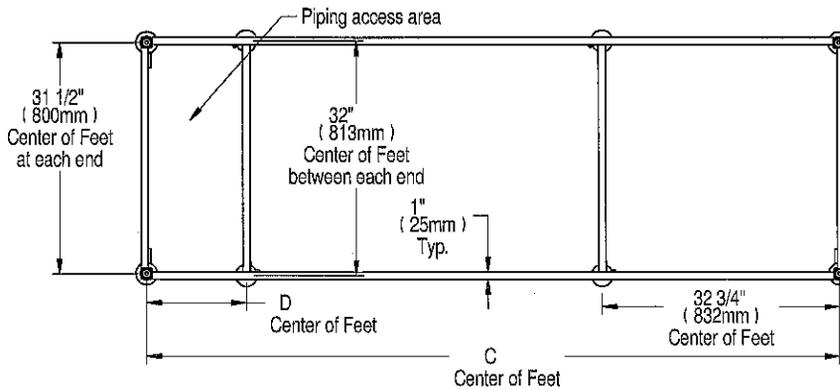
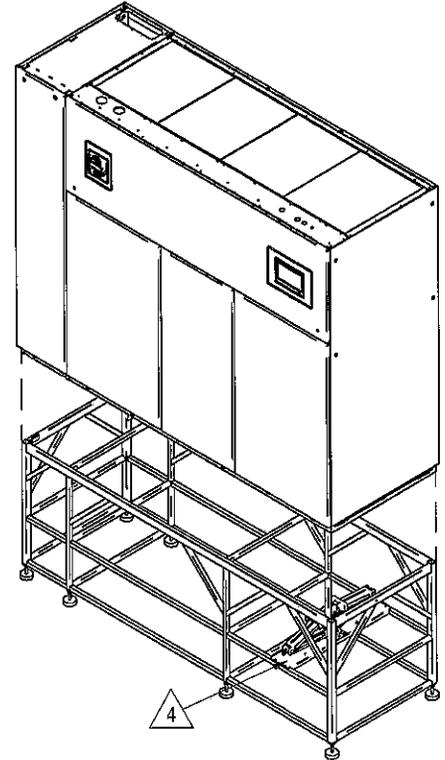
VERTIV

LIEBERT DS

FLOORSTAND DIMENSIONAL DATA 53kW-77kW (15-22 TONS) W/ EC FANS

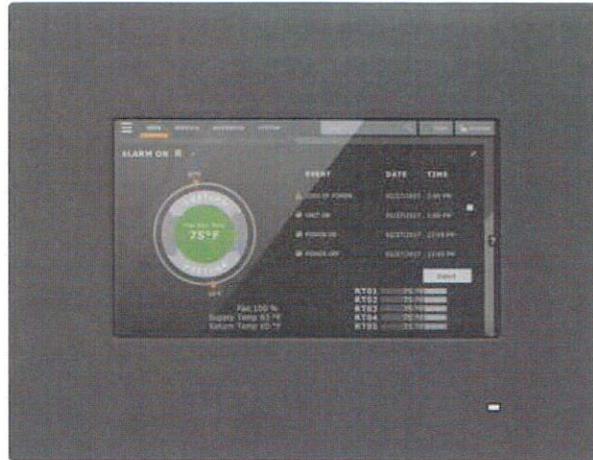
Notes:

1. This floorstand should be used when EC fans are intended to be lowered under a raised floor. 24-48" floorstands allow fan to be lowered under raised floor.
2. Right side of paneled unit is flush with right side of floorstand. All other paneled sides overhang floorstand 1" (25mm).
3. The floorstand used with EC units is not symmetrical and its orientation to the Liebert DS is critical for lowering the EC fans. Unless the floorstand is installed in the correct position, the blowers will not lower into the floor stand.
4. Jack and jack support are shipped loose and are intended to be placed into position under each fan and utilized to lower or raise that fan as needed for Downflow units.
5. Leveling feet are provided with $\pm 1\text{-}1/2"$ (38mm) adjustment from nominal height "F".
6. Applies to 36", 42" & 48" Floorstand.



	Dimensional Data in (mm)			
	A	B	C	D
53kW - 70kW, Water/Glycol/GLYCOOL™ Scroll Models	108 (2743)	109-1/2 (2781)	106-1/2 (2705)	24-3/4 (629)
53kW - 70kW, Air-Cooled Scroll and Air-Cooled Digital Scroll Models	97 (2464)	98-1/2 (2502)	95-1/2 (2426)	13-3/4 (349)
77kW, All Semi-hermetic Models	108 (2743)	109-1/2 (2781)	106-1/2 (2705)	24-3/4 (629)
77kW, Air-Cooled Scroll Models	97 (2464)	98-1/2 (2502)	95-1/2 (2426)	13-3/4 (349)

Height in (mm)
F/5
24 (610)
30 (762)
36 (914)
42 (1067)
48 (1219)

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.



LIEBERT® iCOM™

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.



LIEBERT® iCOM™

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.

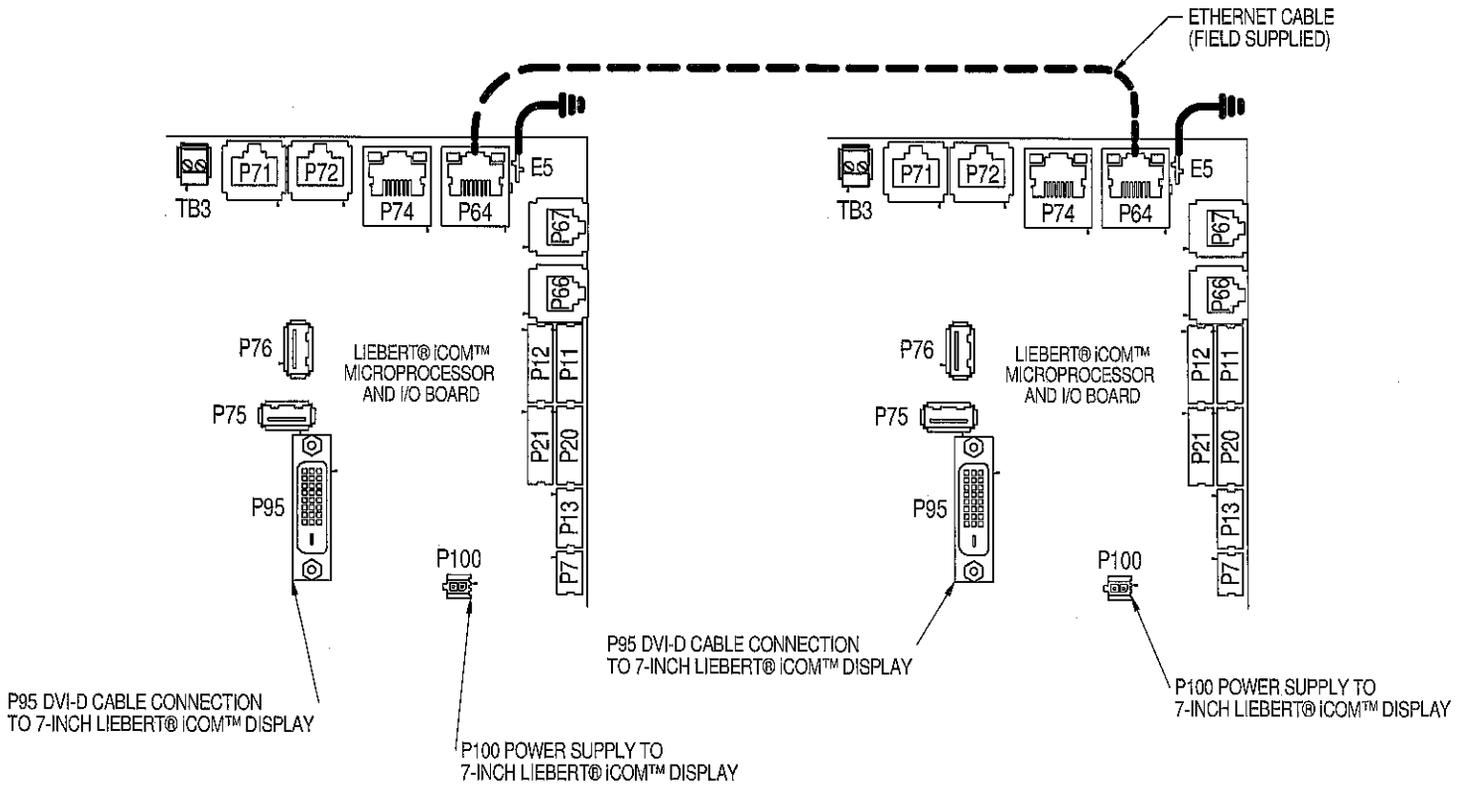
Auxiliary Boards- The menus shall allow setup of optional expansion boards.

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.

UNIT TO UNIT NETWORK CONNECTIONS

**LIEBERT® CW, LIEBERT® CWA, LIEBERT® DS, LIEBERT® DSE,
LIEBERT® PDX, LIEBERT® PCW**



NOTE* For dual-unit network configurations only

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 auxiliary 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

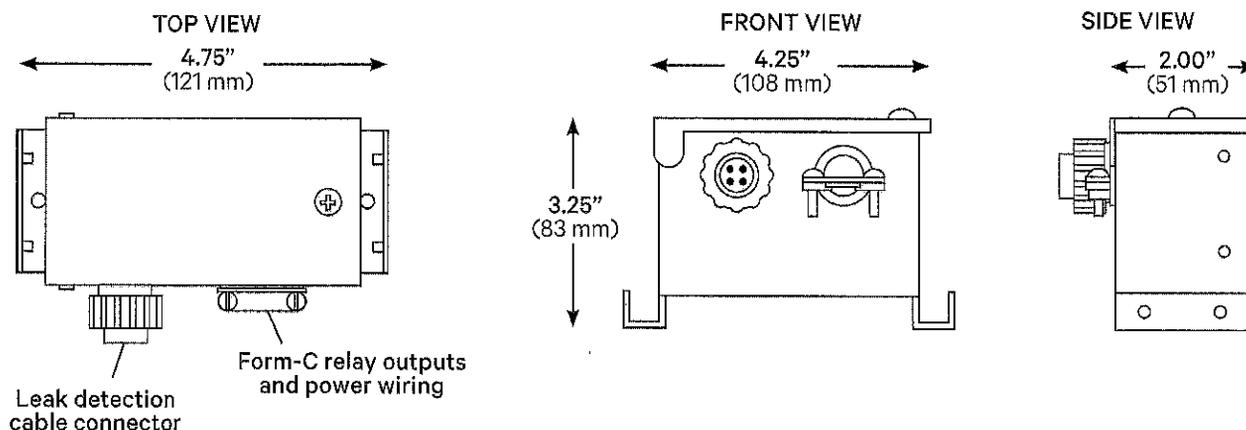
The LT460 consists of a metal enclosure with a hinged top door providing access to the internal circuit board for wiring termination and configuration of DIP switches. The LT460 will monitor up to 100 feet of connected LT500Y leak detection cable.

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

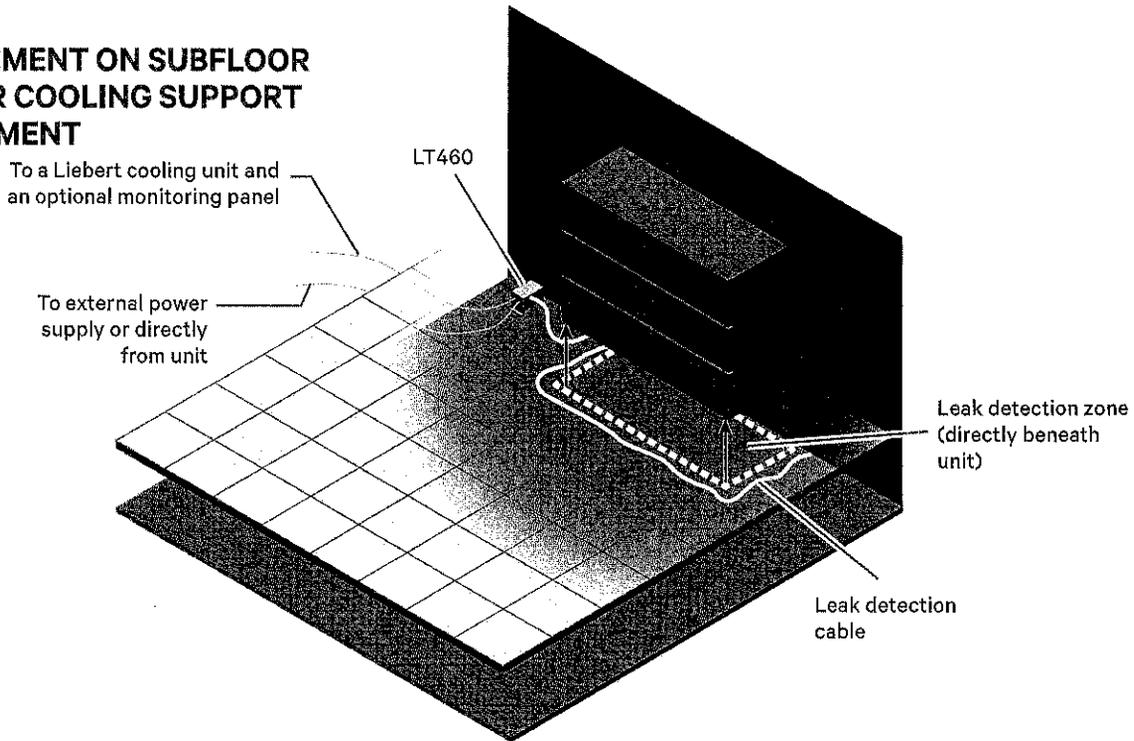
ENVIRONMENTAL CONDITIONS

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

PLACEMENT ON SUBFLOOR UNDER COOLING SUPPORT EQUIPMENT



CONFIGURATION-SWITCH SETTINGS

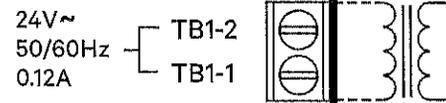
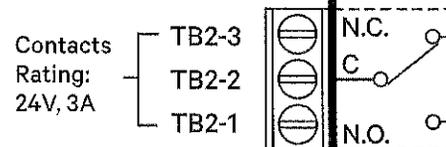
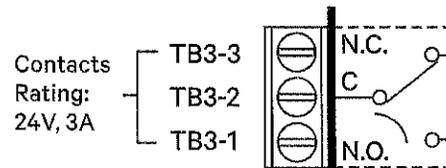
A four position DIP switch selects two alarm (filter) delays and three mutually exclusive alarm modes. The switches are located next to the wiring termination blocks.

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	-	-

ALL CIRCUITS: CLASS 2

Contacts shown in POWERED, NON-ALARM state

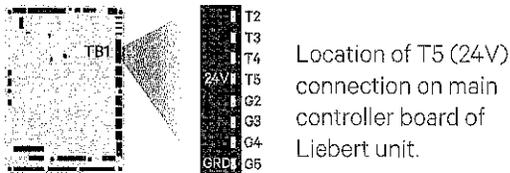


CONNECT ENCLOSURE TO EARTH GROUND

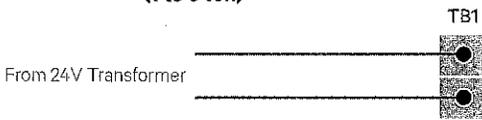
POWER WIRING

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

Liebert® DS, DSE, CW, PDX, PCW, Mini-Mate with iCOM or Mini-Mate2 (8 ton) **LT460**

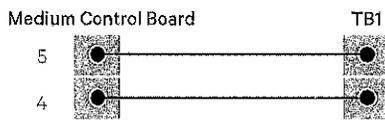


Liebert® Mini-Mate2 (1 to 5 ton) **LT460**

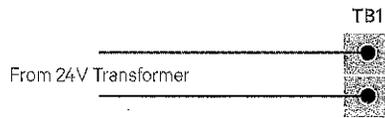


* Requires external transformer (there are no designated terminal connections on the unit)

Liebert® CRV Medium Control Board **LT460**



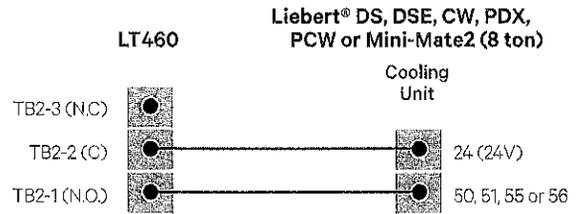
Transformer **LT460**



WIRING TO COOLING UNIT

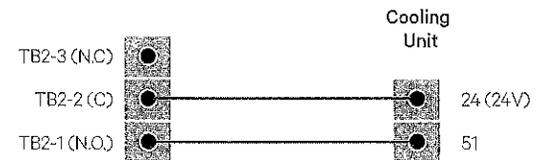
The LT460 has two Form-C dry-contact alarm-output contacts (TB2 and TB3). Each contact is rated for 24 VAC at 3 amp.

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)

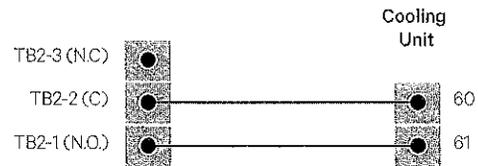
LT460 **Liebert® Mini-Mate Variable Capacity with iCOM**



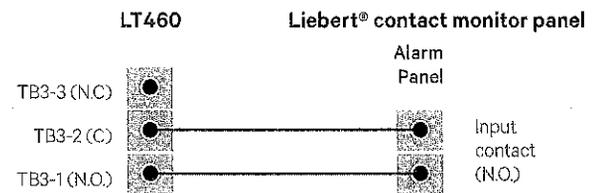
LT460 **Liebert® Mini-Mate2, (1 to 5 ton)**



LT460 **Liebert® CRV**



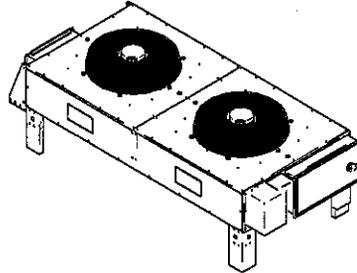
WIRING TO AUXILIARY ALARM PANELS





LIEBERT® MC

PREMIUM EFFICIENCY CONTROL STANDARD & OPTIONAL FEATURES



STANDARD FEATURES

COIL Liebert® MC 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 assemblies are filled and sealed with a nitrogen holding charge for shipment. One coil is used per fan assembly.

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

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

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

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

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

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

OPTIONAL FEATURES

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

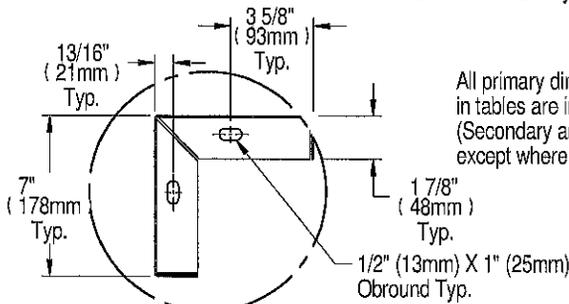
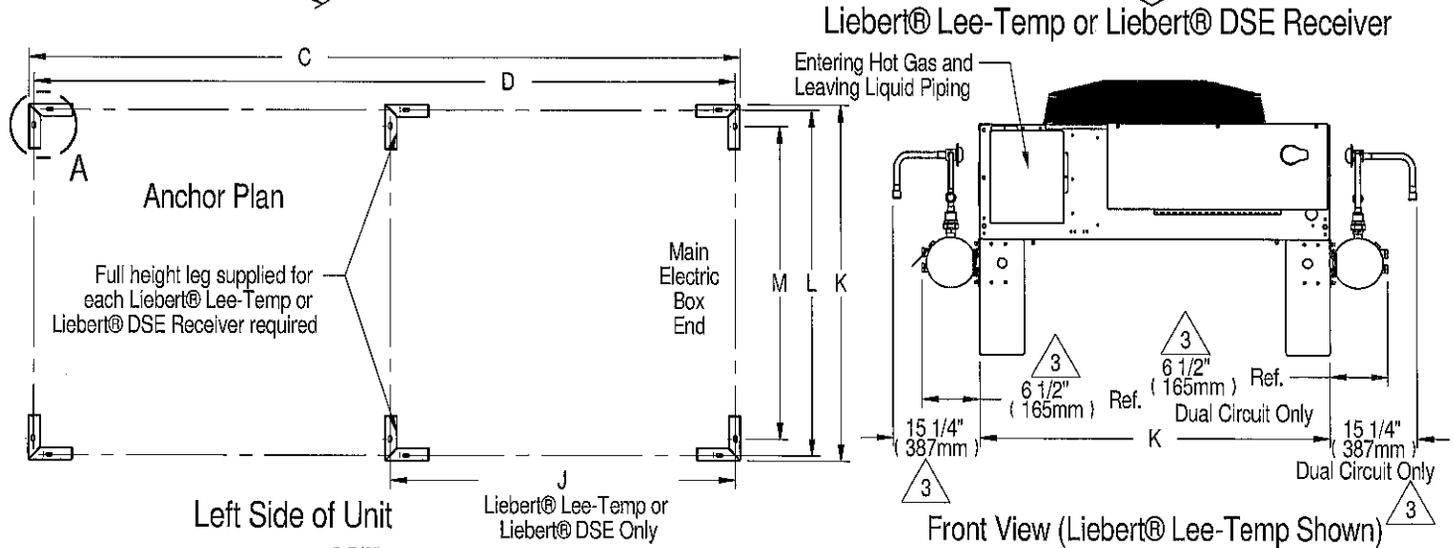
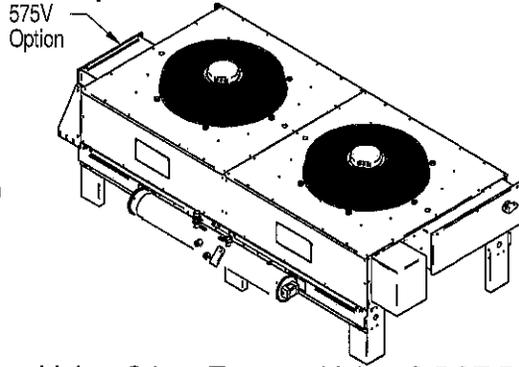
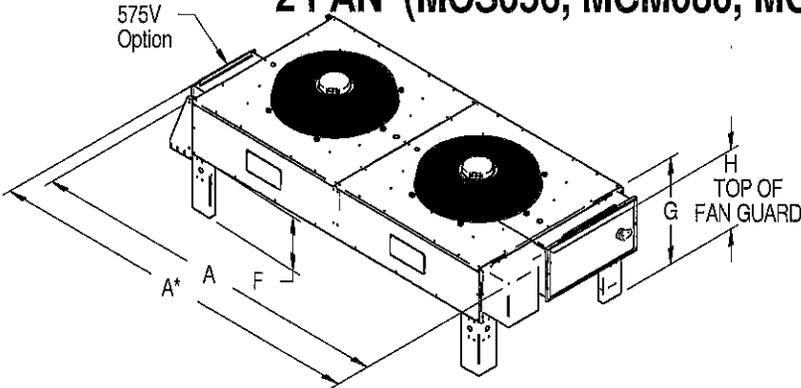
575V POWER SUPPLY The factory installed condenser option will include a secondary enclosure, a 575V-to-480V, 3 phase, step down transformer, secondary fuses for the transformer, and all wiring between the main and secondary electrical enclosures. Site power connections will be made in the main electrical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

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



LIEBERT® MC

CABINET & ANCHOR DIMENSIONAL DATA 2 FAN (MCS056, MCM080, MCL110) DUAL CIRCUIT



All primary dimensions in tables are in inches (Secondary are in mm) except where specified

MODEL NUMBER	F 2 (LEG HEIGHT DIMENSIONS)			
	MCS056	18 (457)	36 (914)	48 (1219)
MCM080	31-5/8 (803)	49-5/8 (1260)	61-5/8 (1565)	73-5/8 (1870)
MCL110	39-5/8 (1006)	57-5/8 (1464)	69-5/8 (1768)	81-5/8 (2073)
MCS056	35-7/8 (911)	53-7/8 (1368)	65-7/8 (1673)	77-7/8 (1978)
MCM080	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" (457mm). Quantity varies per model & options selected.

3. For Liebert® DSE models only, 6-1/2" (165mm) dimension is 9-1/4" (235mm) and 15-1/4" (387mm) dimension is not applicable.

MODEL NUMBER	A	A* (575V ONLY)	C	D	J Liebert® Lee-Temp or Liebert® DSE Receivers Only	K	L	M
MCS056	94-7/8 (2411)	103-1/8 (2619)	88-3/8 (2245)	86-3/4 (2203)	42-1/2 (1079)	42-1/2 (1080)	40-7/8 (1038)	35-7/8 (910)
MCM080	105-1/4 (2674)	113-7/16 (2882)	96-1/16 (2440)	94-7/16 (2398)	46-5/16 (1177)	46 (1168)	44-3/8 (1127)	39-5/16 (999)
MCL110	124-1/8 (3152)	133-1/8 (3381)	112-1/8 (2848)	110-1/2 (2806)	54-3/8 (1381)	55-1/2 (1410)	53-7/8 (1368)	48-3/4 (1238)



VERTIV

LIEBERT MC CONDENSER

CONDENSER AND OPTION WEIGHT DATA, lb(kg)

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

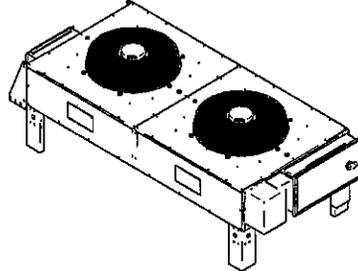
Size		Large (MCL)					
Condenser Model		MCL055	MCL110		MCL165	MCL220	
Refrigerant Circuits		1	1	2	1	1	2
Condenser Dry weight	18" Leg	344 (156)	602 (273)	602 (273)	891 (404)	1186 (538)	1186 (538)
	36" Leg	486 (220)	766 (347)	766 (347)	1136 (515)	1453 (659)	1453 (659)
	48" Leg	518 (235)	798 (362)	798 (362)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

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



LIEBERT® MC

PREMIUM EFFICIENCY CONTROL STANDARD & OPTIONAL FEATURES



STANDARD FEATURES

COIL Liebert® MC 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 assemblies are filled and sealed with a nitrogen holding charge for shipment. One coil is used per fan assembly.

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

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

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

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

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

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

OPTIONAL FEATURES

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

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

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



LIEBERT AIR COOLED SYSTEMS

RECOMMENDED REFRIGERANT LINE SIZES CU, OD LIEBERT AIR-COOLED SYSTEMS USING R-407C

System Fluid : R-407C		Standard Scroll Models (Non-Digital Scroll)				4-Step Semi-Hermetic or Digital Scroll Models			
Indoor Model	Equivalent Length	50 ft (15m)	100 ft (30m)	150 ft (45m)	200 ft (60m)	50 ft (15m)	100 ft (30m)	150 ft (45m)	
DS035	Hot Gas Line, in.	7/8	7/8	7/8		3/4	7/8	7/8	
	Liquid Line, in.	1/2	5/8	5/8		1/2	5/8	5/8	
DS042	Hot Gas Line, in.	7/8	7/8	7/8		7/8	7/8	1-1/8 ²	
	Liquid Line, in.	1/2	5/8	5/8		5/8	5/8	5/8	
DS053	Hot Gas Line, in.	7/8	1-1/8	1-1/8		7/8	1-1/8 ²	1-1/8 ²	
	Liquid Line, in.	5/8	7/8	7/8		5/8	7/8	7/8	
DS070	Hot Gas Line, in.	1-1/8	1-1/8	1-1/8		1-1/8 ²	1-1/8 ²	1-1/8 ²	
	Liquid Line, in.	7/8	7/8	7/8		7/8	7/8	7/8	
DS077 ³	Hot Gas Line, in.	1-1/8	1-1/8	1-1/8		1-1/8	1-1/8	1-1/8	
	Liquid Line, in.	7/8	7/8	7/8		7/8	7/8	7/8	
DS105 ³	Hot Gas Line, in.	1-3/8	1-3/8	1-3/8		1-3/8	1-3/8	1-3/8	
	Liquid Line, in.	7/8	7/8	1-1/8		7/8	7/8	1-1/8	
XDC160	Hot Gas Line, in.	1-1/8 ⁴	1-1/8 ⁴	1-3/8 ⁴		1-3/8 ⁴			
	Liquid Line, in.	7/8	1-1/8	1-1/8		1-1/8			

System Fluid : R-407C		Standard Scroll Models (Non-Digital Scroll)				
Indoor Model	Equivalent Length	50 ft (15m)	75 (23m)	100 ft (30m)	125 (38m)	150 ft (45m)
MMD12	Suction Line, in.	5/8	5/8	7/8	7/8	7/8
	Liquid Line, in.	3/8	3/8	3/8	3/8	3/8
MMD18 / DME020	Suction Line, in.	5/8	7/8	7/8	7/8	7/8
	Liquid Line, in.	3/8	3/8	3/8	1/2	1/2
MMD24 / DME027	Suction Line, in.	7/8	7/8	7/8	7/8	7/8
	Liquid Line, in.	3/8	3/8	1/2	1/2	1/2
MMD36/ MMD35 / DME037 / MMD96-3T / MMD95-3T	Suction Line, in.	7/8	7/8	1-1/8 ²	1-1/8 ²	1-1/8 ²
	Liquid Line, in.	1/2	1/2	1/2	1/2	1/2
MMD60/ MMD59 / MMD96-5T /MMD95-5T	Suction Line, in.	1-1/8	1-1/8	1-1/8	1-3/8	1-3/8
	Liquid Line, in.	1/2	5/8	5/8	5/8	5/8

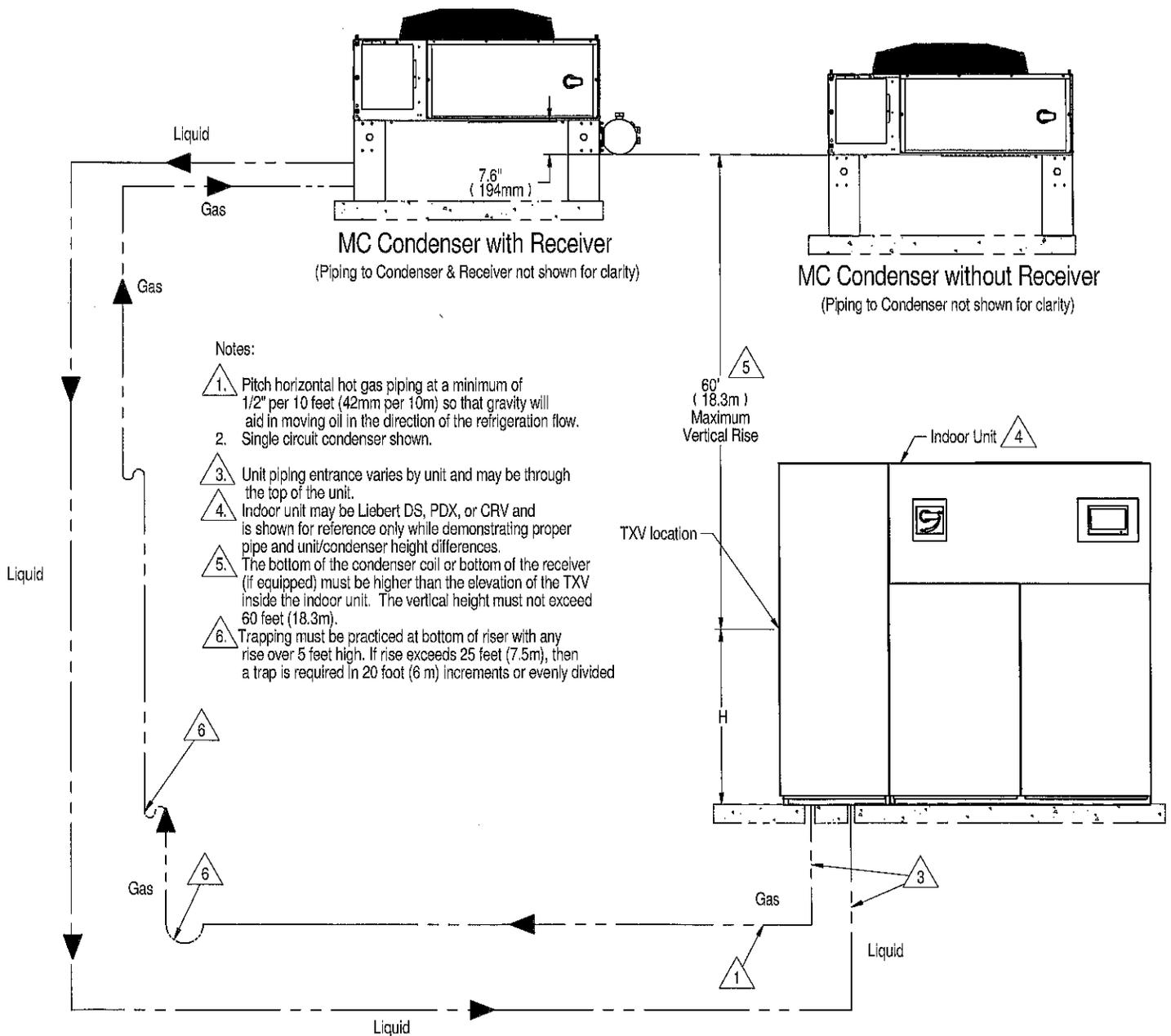
Note:

1. Consult factory for proper line sizing for runs longer than maximum equivalent length shown in tables above.
2. Downsize vertical riser one trade size (1-1/8" to 7/8").
3. Digital scroll not available on 077 and 105 models.
4. Double risers are required when hot gas vertical rise is 15 ft (4.6m) or more. Refer to Liebert® XDC user manual



LIEBERT MC CONDENSER

AIR COOLED PIPING SCHEMATIC CONDENSER ABOVE INDOOR UNIT



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 while demonstrating proper pipe and unit/condenser height differences.
5. The bottom of the condenser coil or bottom of the receiver (if equipped) must be higher than the elevation of the TXV inside the indoor unit. The vertical height must not exceed 60 feet (18.3m).
6. Trapping must be practiced at bottom of riser with any rise over 5 feet high. If rise exceeds 25 feet (7.5m), then a trap is required in 20 foot (6 m) increments or evenly divided

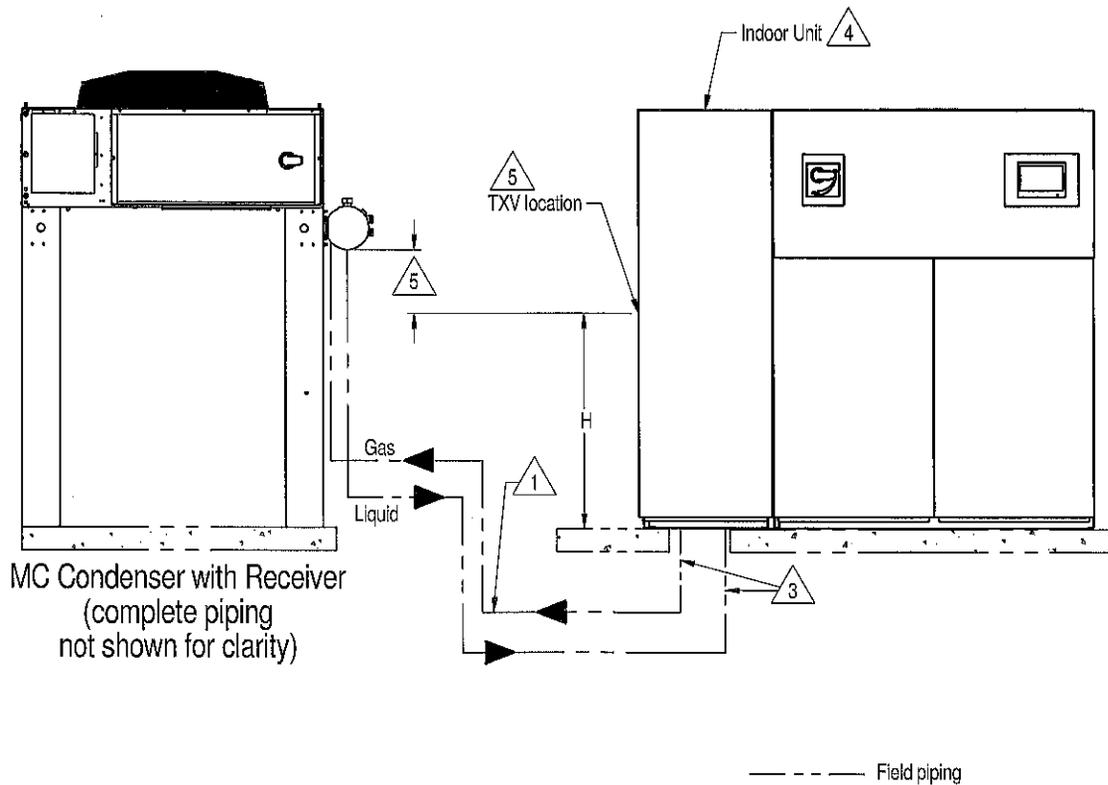
Internal TXV Height	H in. (mm)
PDX Downflow	44 (1118)
PDX Upflow	20 (508)
DS035-105 Downflow/Upflow	43 (1092)
CRV - CR019	45 (1143)
CRV - CR020/CR035	27 (686)

----- Field piping



LIEBERT MC CONDENSER

AIR COOLED PIPING SCHEMATIC CONDENSER AND INDOOR UNIT AT SAME LEVEL



Notes:

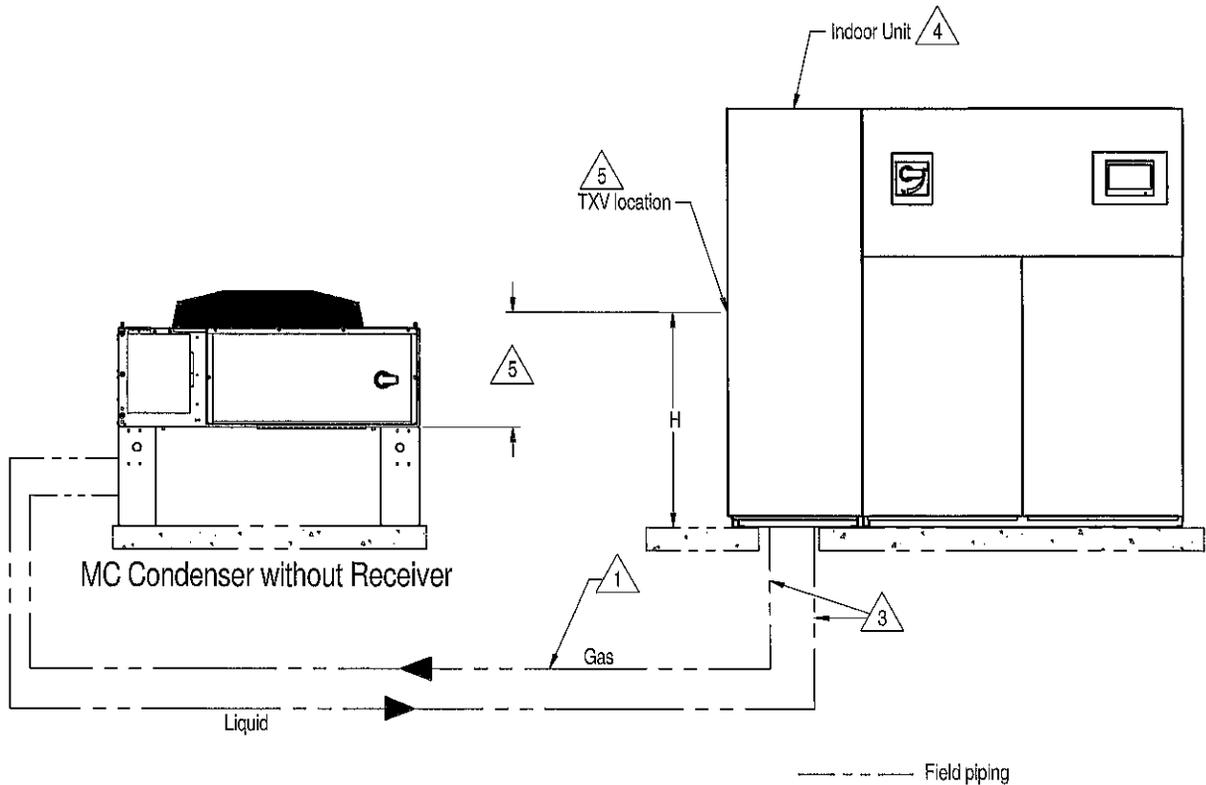
1. Pitch horizontal hot gas piping at a minimum of 1/2" per 10 feet (42mm per 10m) so that gravity will aid in moving oil in the direction of the refrigeration flow.
2. Single circuit condenser shown.
3. Unit piping entrance varies by unit and may be through the top of the unit.
4. Indoor unit may be Liebert DS, PDX, or CRV and is shown for reference only.
5. The bottom of the receiver must be higher than the elevation of the TXV inside the indoor unit, otherwise extended legs or a field piped subcooler needs to be utilized. Contact your Vertiv sales representative for additional information.

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



LIEBERT MC CONDENSER

AIR COOLED PIPING SCHEMATIC CONDENSER AND INDOOR UNIT AT SAME LEVEL



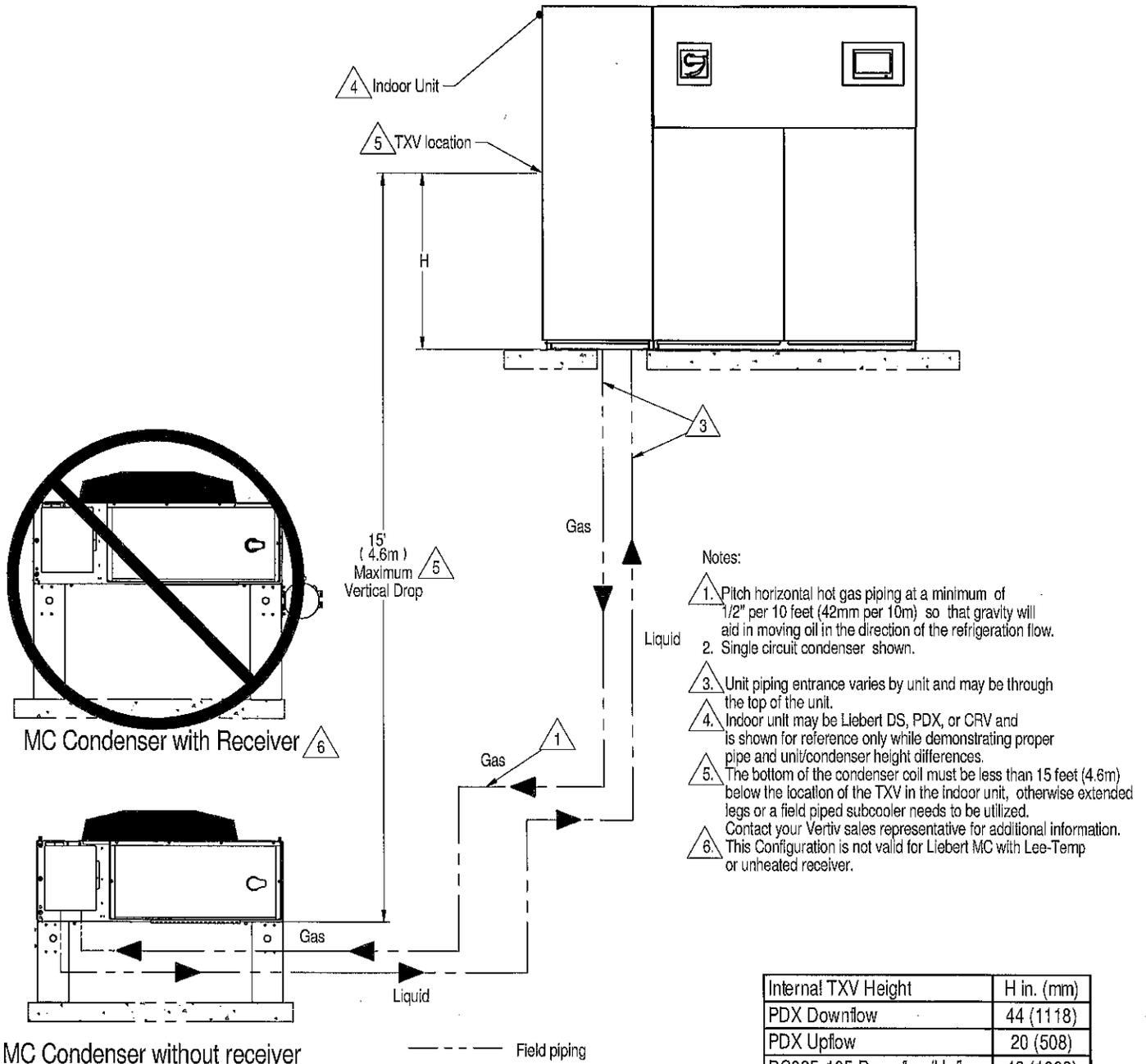
Notes:

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.

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

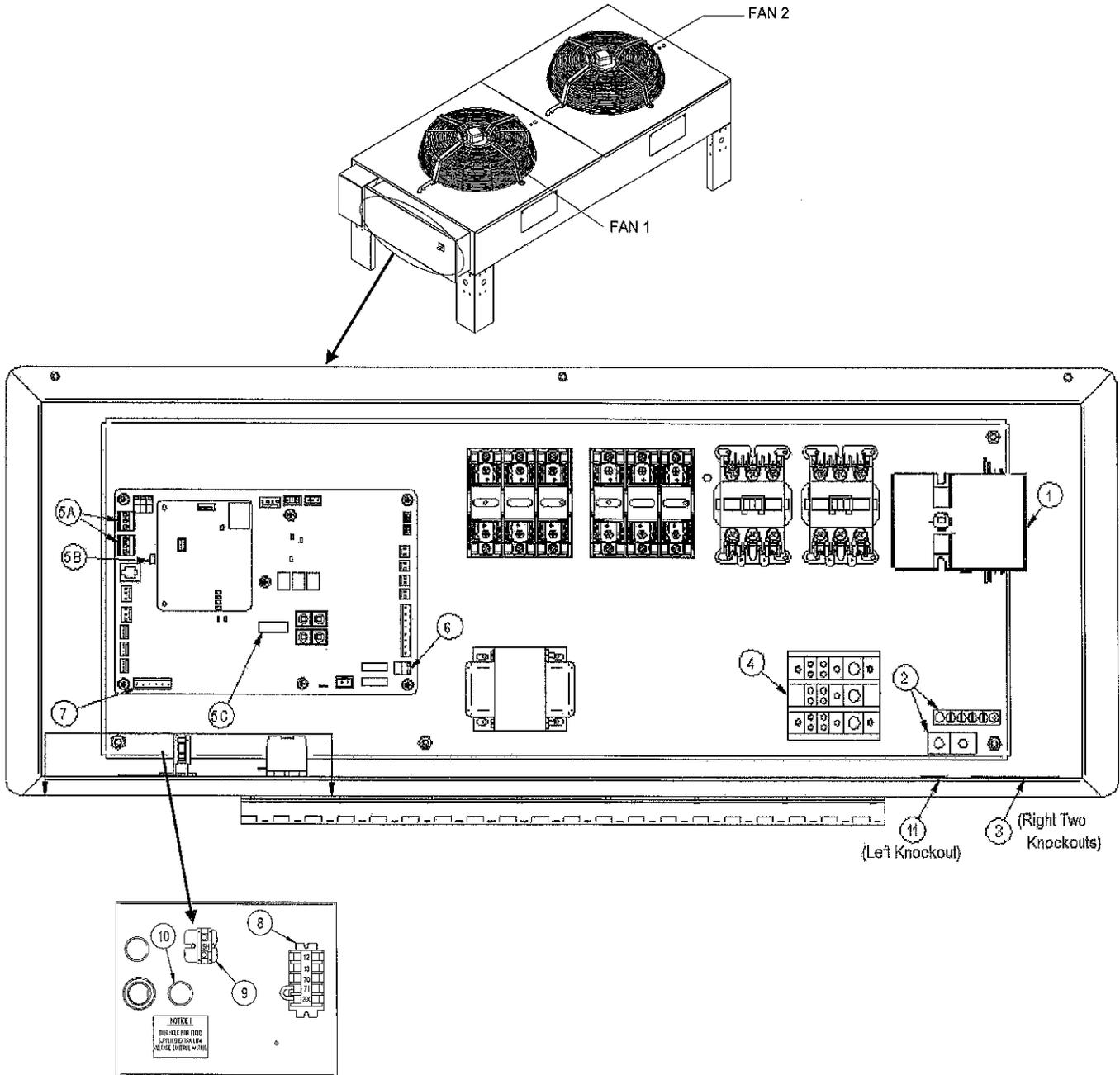
LIEBERT MC CONDENSER

AIR COOLED PIPING SCHEMATIC CONDENSER BELOW INDOOR UNIT



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

**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.



LIEBERT® MC

ELECTRICAL FIELD CONNECTIONS PREMIUM EFFICIENCY CONTROL

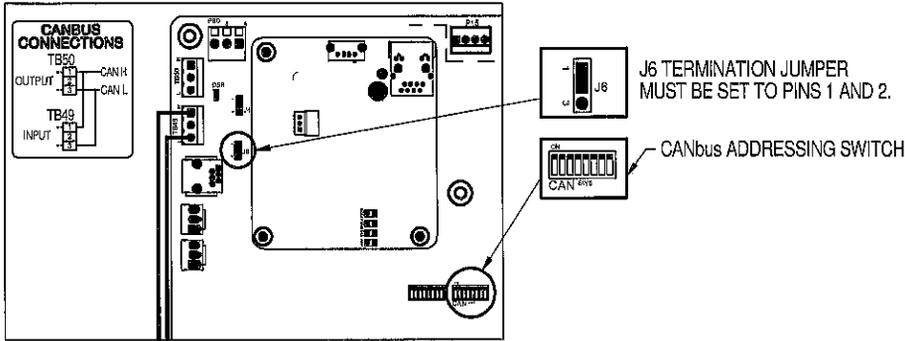
5. All wiring must be sized and selected for insulation case per NEC and other local codes.
6. Do not bend cables to less than four times the diameter of the cable.
7. Do not deform cables when securing in bundles or when hanging them.
8. Avoid running the cables by devices that may introduce noise, 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.



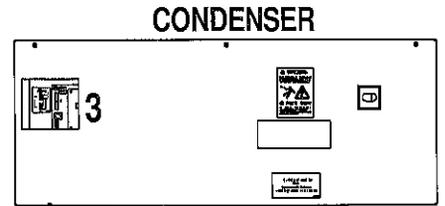
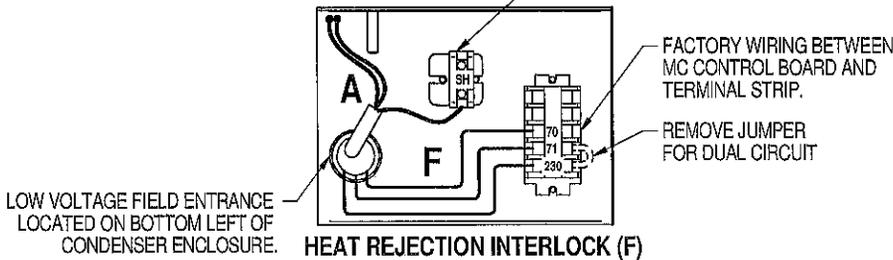
VERTIV.

LIEBERT DS

CANbus & INTERLOCK CONNECTIONS BETWEEN LIEBERT DS & LIEBERT MC CONDENSER (PREMIUM)



DETAIL 3
CAN CABLE CONNECTION (A) — SHIELD CONNECTION



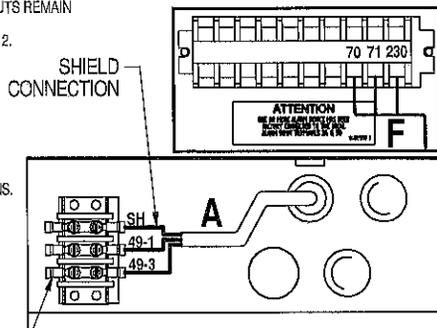
F HEAT REJECTION INTERLOCK

DETAIL 2
HEAT REJECTION INTERLOCK (F)

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.

CABLE NOTES (A):
1. 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.
2. DO NOT RUN IN SAME CONDUIT, RACEWAY, OR CHASE AS HIGH VOLTAGE WIRING.
3. FOR CANBUS NETWORK LENGTHS GREATER THAN 450FT (137M), CONTACT LIEBERT FACTORY.

WIRE NOTES (F):
1. FIELD SUPPLIED WIRE
- 3 CONDUCTOR 18AWG OR GREATER
- RATED 600V
2. RUN FIELD SUPPLIED WIRES BETWEEN THE INDOOR UNIT AND THE CONDENSER.



DETAIL 1 CAN CABLE CONNECTION (A)
FACTORY WIRING BETWEEN ICOM AND TERMINAL STRIP.

