Liebert®
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HEAT REMOVAL/PRECISION AIR

DataMate

USER MANUAL FOR REV 3 MODELS

1.5 - 3 Tons
50 & 60 Hz

EMERSON™
Network Power

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PRODUCT MODEL INFORMATION

DataMate Evaporators—DME027E-PH3	
DME	DataMate Evaporator
027E	020E = 1.5-ton Evaporator
	027E = 2-ton Evaporator
	037E = 3-ton Evaporator
	044C = 3-ton Chilled Water Unit
-	- = Place Holder (air cooled)
P	P = 208/230V, 1 ph, 60 Hz
	Y = 208/230V, 3 ph, 60 Hz
	W = 200/230V, 1 ph, 50 Hz
H	H = With Humidifier and Reheat
	C = Cooling Only
	0 = With Reheat
3	3 = Product Revision Level

Prop Fan Condensing Units PFC018A-PL0 (example)	
PF	Prop Fan Condensing Unit
C	C = Standard Condensing Unit
	H = Hot Gas Bypass
18A	020A = 1.5-ton Condensing Unit
	027A = 2-ton Condensing Unit
	037A = 3-ton Condensing Unit
-	- = Standard Coil
	C = Coated Coil
P	P = 208/230V, 1 ph, 60 Hz
	S = 220/240V, 1 ph, 60 Hz
	Y = 208/230V, 3 ph, 60 Hz*
L	L = 95°F Ambient, Lee-temp
	H = High Ambient
0	0 = Revision Level

Indoor Condensing Units—MCD26W2A00	
MC	MiniMate2 Indoor Condensing Unit
D	0 = No Disconnect
	D = Disconnect
26W	23A = 2-ton air-cooled condensing unit (50 Hz)
	24A = 2-ton air-cooled condensing unit (60 Hz)
	35A = 3-ton air-cooled condensing unit (50 Hz)
	36A = 3-ton air-cooled condensing unit (60 Hz)
	25W = 2-ton water/glycol condensing unit (50 Hz)
	26W = 2-ton water/glycol condensing unit (60 Hz)
	37W = 3-ton water/glycol condensing unit (50 Hz)
	38W = 3-ton water/glycol condensing unit (60 Hz)
L	L = Lee-temp Head Pressure Control (Air Cooled)
	2 = 2-way, water/glycol reg valve, 150 psi
	3 = 3-way, Water/Glycol reg valve, 150 psi
	D = 2-way, water/glycol reg valve, 350 psi
	T = 3-way, water/glycol reg valve, 350 psi
A	P = 208/230V, 1 ph, 60 Hz
	X = 277V, 1 ph, 60 Hz
	S = 220/240V, 1 ph, 50 Hz
	A = 460V, 3 ph, 60 Hz
	Y = 208/230V, 3 ph, 60 Hz
	M=380/415V, 3 ph, 50 Hz
H	0=No Hot Gas Bypass
	H=Hot Gas Bypass
0	0=Revision Level

*Y available only in 3 ton

Table iii System configurations, 60 Hz

Nominal Capacity	Evaporator	Condensing Unit			
		Indoor Centrifugal	Outdoor Prop Fan	Remote Water/Glycol	Integral Water/Glycol
1-1/2 tons	DME020E	N/A	PFC020A	N/A	DMC022WG
2 tons	DME027E	MCD24A	PFC027A	MCD26W	DMC029WG
3 tons	DME037E	MCD37A	PFC037A	MCD38W	DMC040WG
	DME044C	Self-Contained Chiller Water			

Table iv System configurations, 50 Hz

Nominal Capacity	Evaporator	Condensing Unit			
		Indoor Centrifugal	Outdoor Prop Fan	Remote Water/Glycol	Integral Water/Glycol
1-1/2 tons	DME020E	N/A	PFC019A	N/A	DMC022WG
2 tons	DME027E	MCD23A	PFC026A	MCD25W	DMC029WG
3 tons	DME037E	MCD36A	PFC036A	MCD37W	DMC040WG
	DME044C	Self-Contained Chiller Water			

1.0 INTRODUCTION

1.1 Product Description and Features

The DataMate is a temperature/humidity control system with a nominal rating of 1.5, 2 and 3 tons. Actual capacity will depend on selected options. Each DataMate consists of an indoor evaporator module and a condensing module. The evaporator is installed against a wall inside the computer room. Models are available in air, water, glycol or integral water/glycol cooled condensing units. DataMate is also available as a self-contained chilled water unit, complete with fan/coil and chilled water valve. The system may also include an optional humidifier. Models are available for cooling only that do not include reheat or humidifier.

The DataMate system includes one stage of cooling for temperature control as well as an optional single-stage electric reheat. The optional humidity control uses one stage to dehumidify and an optional stage to humidify. The system controller automatically switches over to the required function (cool/heat, dehumidify/humidify) based on programmed setpoints and room conditions.

1.1.1 Controls

The DataMate evaporator module includes a wall-mounted control panel. The control panel includes a liquid crystal display (LCD) screen and a membrane key pad with 8 selector switches. The display indicates temperature, humidity, system operating status, setpoints and alarms. Use the selector switches (pads) to operate the system by adjusting control setpoints for cool/heat, dehumidify/humidify and alarm setpoints.

All control setpoints and alarm setpoints are programmable. The temperature can be displayed in degrees Fahrenheit or degrees Celsius. The microprocessor can retain a programmed schedule of two control changes per day for the entire seven-day week. The program is stored in nonvolatile memory, so it will not be lost during a power failure.

1.1.2 Evaporator Components and Air Distribution System

All DataMate evaporator sections include the evaporator coil, the thermostatic expansion valve, filter dryer and blower. A reheat assembly and a steam generating humidifier are available as options. The evaporator unit requires a power source and a power disconnect switch.

The evaporator coil is constructed of copper tubes and aluminum fins and is designed for the high sensible heat ratio required for electronic equipment. Room air circulation is accomplished by double-inlet, direct-drive centrifugal blowers that have been dynamically balanced. The blower motor has self-aligning bearings and lifetime lubrication. Two air delivery rates (high and low) are specified for each unit. The system pulls room air through a return grille at the bottom and delivers conditioned air from the top grille. Cleanable filter(s) are accessible by unscrewing the quarter-turn fasteners on the front panel.

1.1.3 Condensing Components Air Cooled Systems

Two different air cooled systems are available: the ceiling-mounted indoor centrifugal fan condensing unit and the outdoor propeller fan condensing unit.

- The centrifugal fan condensing unit (available in 2 and 3 ton only) is for indoor locations and includes the scroll compressor with crankcase heater, high-pressure switch, condenser coil and blower system. Pressure is regulated by the Lee-Temp flood back head pressure control.
- The propeller fan unit is for outdoor locations and includes the scroll compressor with crankcase heater, high-pressure switch, condenser coil, propeller fan and Lee-Temp flood back head pressure control.

1.1.4 Remote Water/Glycol Condensing Units—2 and 3 Ton Only

The ceiling-mounted condensing unit for water/glycol-cooled models includes the scroll compressor, coaxial condenser coil and water regulating valve. The standard design pressure is 150 psig.

Integral Water/Glycol-Cooled Models

This unit consists of the reciprocating compressor, brazed plate condenser and water regulating valve. The design pressure is 150 psig. The unit is designed solely for indoor use and is attached directly to the left end of the evaporator. No precharged refrigerant lines are required for this unit.

Chilled Water Model (3 ton only)

The Chilled Water model is designed for use with an existing chilled water loop. It contains a chilled water coil and an on/off valve to control the flow of chilled water.

1.2 Optional Equipment

1.2.1 Humidifier

The optional steam-generating humidifier is factory-installed and tested. It adds pure water vapor (up to 3 lb/hr) to the room air to control humidity within levels recommended for computer equipment. The humidifier components include the steam canister with automatic flushing circuit, strainer, inlet tube, drain, solenoid valve and copper discharge nozzle. Note that humidity control (humidification and dehumidification) is available only if a humidifier is provided.

1.2.2 Condensate Pump Kit

A condensate pump is required when the evaporator is installed below the level of the gravity-fed drain line. Components include the pump, check valve, sump, level sensor and controls. The pump is automatically controlled by the water level in the sump. The condensate pump kit is field-installed in the evaporator housing.

1.2.3 Pre-Charged Refrigerant Line Sets

The remote condensing unit requires two refrigerant lines to connect the evaporator to the condensing unit. Factory precharged line sets, with quick connect fittings, are available in 15 and 30 foot lengths. Each set includes an insulated copper suction line and a copper liquid line, both charged with R-22 refrigerant and sealed.

1.2.4 Refrigerant Line Sweat Adapter Kit

This kit includes the compatible fittings required (two for the insulated suction line and two for the liquid line) when using field-supplied interconnecting refrigerant lines, instead of the pre-charged line sets.

1.2.5 277-Volt Transformer

When the evaporator requires 277 volts, one transformer is required for the evaporator. A transformer may also be required if the condensing unit is not rated for 277 volts. See unit serial tag to determine voltage required. The integral water/glycol-cooled units require only one transformer to power the entire system. 1-1/2 and 2 ton systems use the 37.5 amp transformer; 3 ton systems use a 50 amp transformer.

1.2.6 Remote Monitoring and Control

Liebert can provide a variety of remote monitoring and control devices to enhance your DataMate system. These include water detection, remote monitoring of a single unit, remote control of multiple units and remote monitoring and control of a complete building system, including security access control.

2.0 SITE PREPARATION AND INSTALLATION

2.1 Installation Considerations

NOTE
Before installing unit, determine whether any building alterations are required to run piping, wiring and duct work. Carefully follow all unit dimensional drawings and refer to the submittal engineering dimensional drawings of individual units for proper clearances.

The system can be installed in any of several ways. However, the evaporator should always be mounted on a wall in the equipment room. The condensing unit can be mounted above the ceiling, underneath a raised floor, in another room or outside. The condensing unit for the integral water/glycol units is attached directly to the evaporator.

2.1.1 DataMate Configurations

Air-cooled models may utilize an indoor centrifugal fan condensing unit if an outdoor location is impractical. The indoor condensing unit may be located near the evaporator to minimize refrigerant piping or near the outside wall to minimize air duct work.

Air-cooled models may also use an outdoor condensing unit, which can be mounted on either the roof or the ground.

Water and glycol-cooled models utilize condensing units that can be located above the ceiling or under a raised floor.

The integral water/glycol model condensing unit attaches directly to the left end of the evaporator and requires no pre-charged refrigerant lines. It must be connected to an electric source and a water or glycol loop.

Table 1 Application limits, evaporator and chilled-water units*

Input Voltage		Range of Return Air Conditions to Unit	
Min	**Max**	**Dry Bulb Temp.**	**Relative Humidity**
-5%	+10%	65°F to 85°F (18°C to 29°C)	20% to 80%

*Unit will operate at these conditions but will not control to these extremes.

Table 2 Application limits, indoor and outdoor air-cooled condensing units

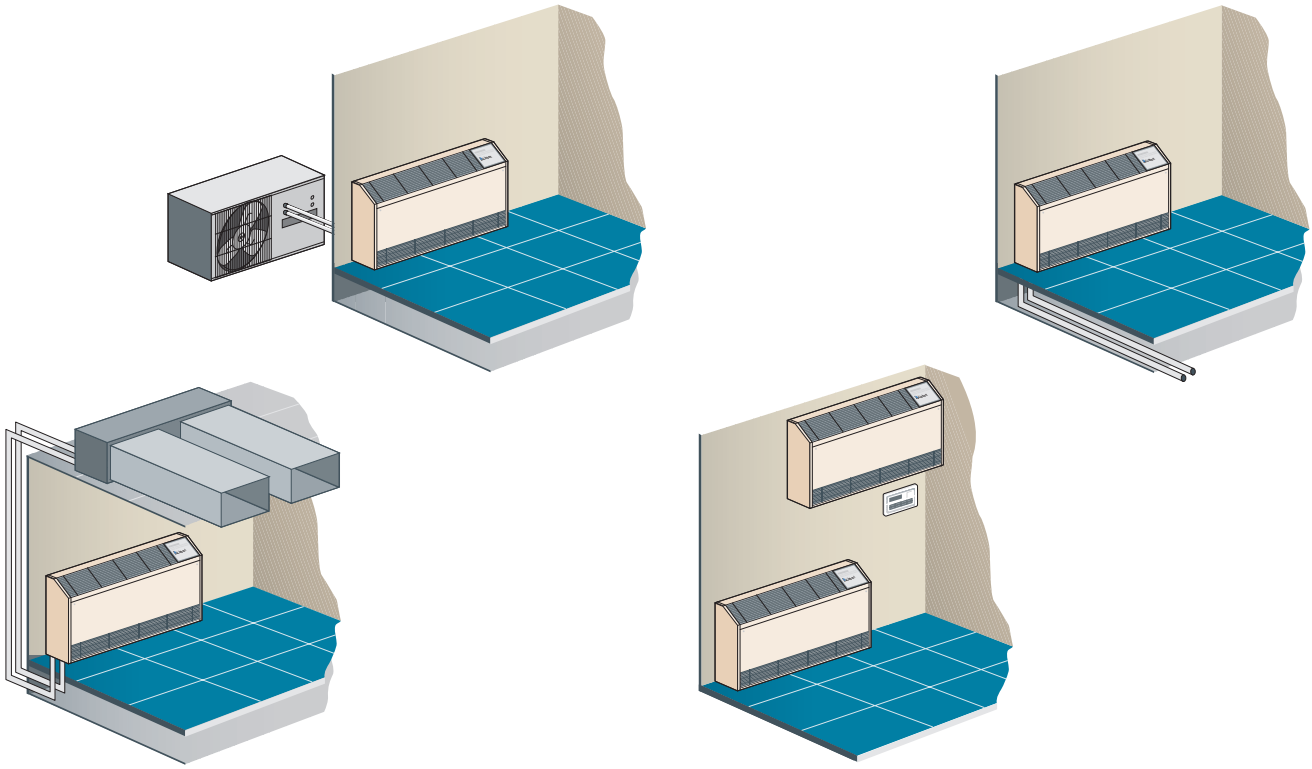
Input Voltage			Entering Dry Bulb Air Temperature	
Min	**Max**	**Condensing Units**	**Min**	**Max**
-5%	+10%	Outdoor Prop Fan Condensing Unit	-30°F (-34°C)	120°F (49°C)
		Indoor Air-Cooled Centrifugal Condensing Unit	-20°F (-29°C)	115°F (46°C)

Table 3 Application limits, indoor water/glycol-cooled condensing units

Input Voltage		Entering Fluid Temperature	
Min	**Max**	**Min**	**Max**
-5%	+10%	65°F (18.3°C) *	115°F (46°C)

*Operation below 65°F (18°C) may result in reduced valve life and fluid noise.

Figure 1 DataMate configurations



2.1.2 Room Preparation

The room should be well insulated and must have a sealed vapor barrier. The vapor barrier in the ceiling and walls can be a polyethylene type film. Paint on concrete walls or floors should be vapor resistant.

NOTE
The single most important requirement for maintaining environmental control in the conditioned room is the vapor barrier.

Outside or fresh air should be kept to a minimum. Outside air adds to the heating, cooling, humidifying and dehumidifying loads of the site. It is recommended that outside air be kept below 5% of the total air circulated in the computer room. Doors should be properly sealed to minimize leaks and should not contain grilles.

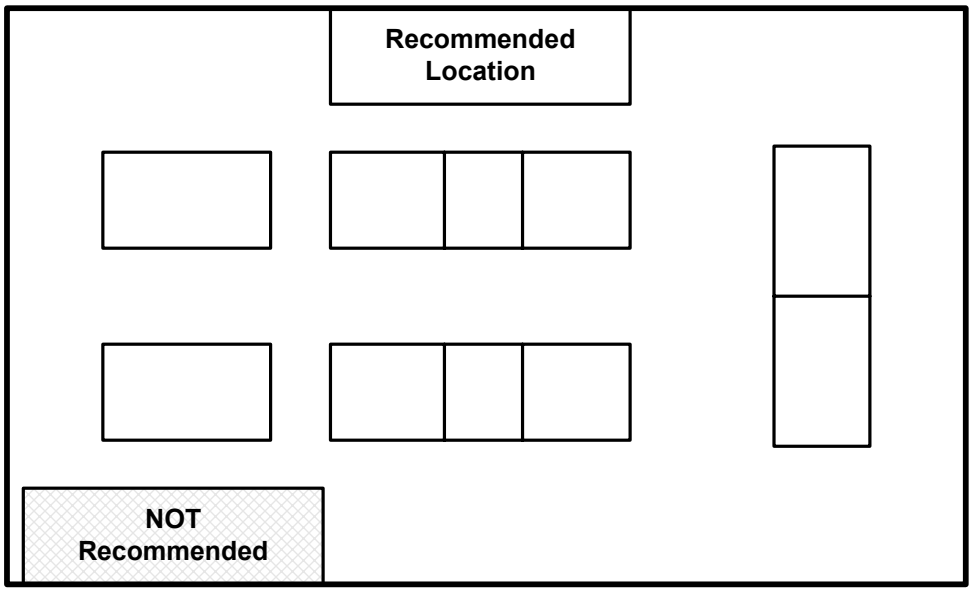
2.1.3 Location Considerations

CAUTION
Units contain water. Water leaks can cause damage to sensitive equipment below. DO NOT MOUNT UNITS OVER SENSITIVE EQUIPMENT. A field-supplied pan with drain must be installed beneath cooling units and water/glycol-cooled condensing unit.

NOTE
Do not mount units in areas where normal unit operating sound may disturb the working environment.

Try to locate the evaporator in an unobstructed floor space to facilitate service. Avoid locations in confined areas that affect the air flow pattern and result in short cooling cycles, downdrafts and air noise. Avoid locating the unit in an alcove or at the extreme end of a long, narrow room. Avoid installing multiple units close to each other. This can result in crossing air patterns, uneven loads and competing operating modes. Do not attach additional devices (such as smoke detectors, etc.) to the cabinet that will interfere with routine maintenance or service.

Figure 2 Proper room location



2.2 Application Weights

WARNING

Follow all unit dimensional drawings carefully. determine whether any building alterations are required to run piping, wiring and duct work. Also refer to the submittal engineering dimensional drawings of individual units for clearances.

Table 4 Evaporator and condensing unit net weights

Model Number	lb	kg
Evaporator Section		
DME020E	230	104
DME027E	330	150
DME037E	365	166
DME044E	365	166
Outdoor, Propeller Fan Condensing Unit		
PFC020A	200	91
PFC027A	200	91
PFC037A	241	109
Indoor, Centrifugal Fan Condensing Unit		
MCD24A	230	104
MCD36A	240	109
Water/Glycol Cooled Condensing Unit		
MCD26W	175	79
MCD38W	190	86
Piggyback Water/Glycol Condensing Unit		
DMC022WG	170	77
DMC029WG	170	77
DMC040WG	175	78

2.3 Equipment Inspection (Upon Receipt)

When the DataMate arrives, inspect all items for any visible damage. Do not accept a damaged unit from the shipper!

If possible, do not uncrate equipment until it is close to its final location. All required assemblies are banded and shipped in corrugated containers. If you discover any damage when you uncrate the unit, report it to the shipper and to your Liebert supplier immediately.

2.4 Installing the Evaporator

Unlatch the front cabinet door and remove the screws that secure the cabinet to the chassis. Lift off the cabinet. Eight keyholes (.50 in. head, .22 in. slot) are provided on the back of the unit for mounting on the wall. The unit must be level.

NOTE
Make sure the wall can support the full weight of the unit.

2.4.1 Changing Air Flow Direction

The air discharge grille on the evaporator can be placed in one of three different positions: vertical, horizontal or 45°.

To change the air flow direction:

1. Remove the front panel using quarter turn fasteners.
2. Remove the cabinet by removing the four retaining screws. Lift off the cabinet.
3. Remove the left end panel.
4. Remove the grille by sliding it to the left end of the unit.
5. The grille can be inverted or rotated to select the desired air discharge direction.
6. After the desired air flow direction has been set, reverse **Steps 1** through **4** above.

Figure 3 Removing the front panel and cover

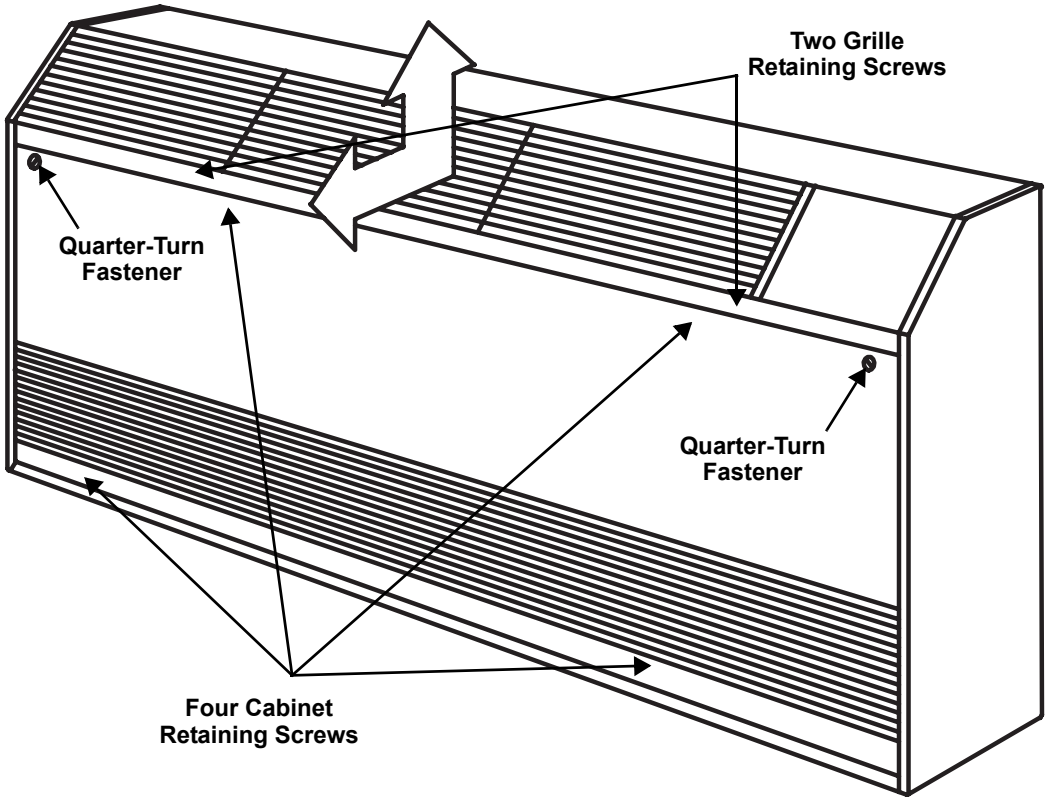


Figure 4 Unit, floor cutout dimensional data

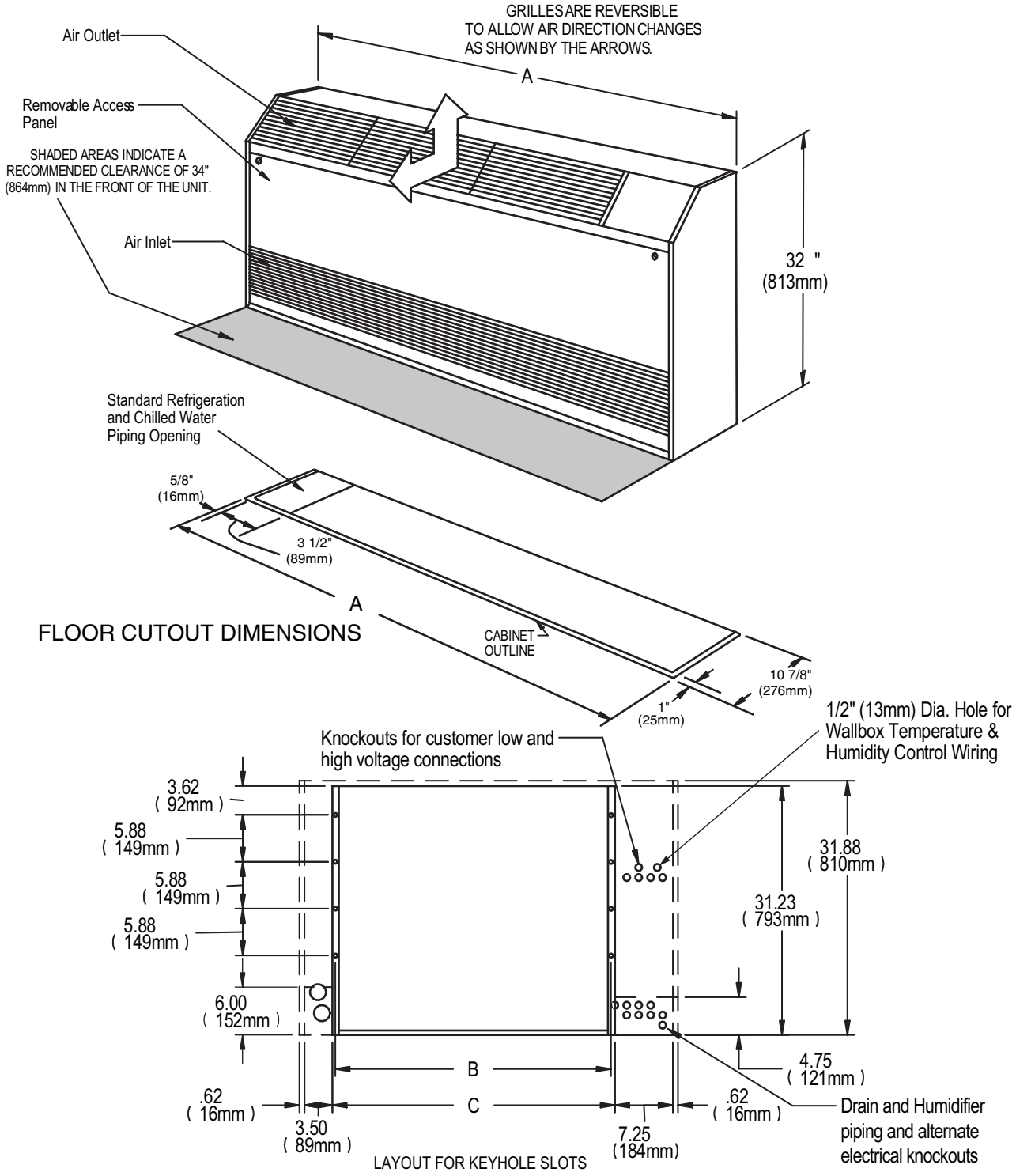


Table 5 Fan/coil and chilled water module dimensional data

Dimensional Data, In. (mm)				
MODEL	**A**	**B**	**C**	**Shipping weight lbs. (kg)**
DME020E	46-1/2 (1181)	33-3/4 (857)	34-7/16 (874)	230 (104)
DME027E	64-1/8 (1628)	51-1/2 (1308)	52-3/16 (1325)	330 (150)
DME037E	64-1/8 (1628)	51-1/2 (1308)	52-3/16 (1325)	365 (165)
DME044C	64-1/8 (1628)	51-1/2 (1308)	52-3/16 (1325)	365 (165)

2.4.2 Piping Connections and Cooling Requirements

The following pipe connections are required (refer to **Figure 5**):

- A drain line from the evaporator coil drain pan
- A drain line from the optional humidifier (if applicable)
- A drain line from the optional condensate pump (if required for this installation) (Refer to **Figure 7**)
- A water supply line to the optional humidifier (if applicable)
- Connections between the evaporator unit and the appropriate loop (water, glycol or refrigerant to condensing unit

NOTE
During start-up, inspect for leaks at all piping connections

Evaporator Coil Drain Line

A 3/4 in. (19mm) O.D. connection is provided for the evaporator coil condensate drain. The drain line must be located so it will not be exposed to freezing temperatures. The drain line should be the full size of the drain connection. Pitch the drain line per local and national codes.

NOTE
The drain line must be trapped outside the unit.

Humidifier Drain Line

Units supplied with the optional humidifier have a 1/2 in. (13mm) hose barb connection to drain the steam generating humidifier canister. The drain line should be the full size of the drain connection. Pitch the drain line per local and national codes.

NOTE
The drain line must be trapped outside the unit. This line may contain boiling water. Use copper or other suitable material for the drain line.

Humidifier Water Supply Line

Units supplied with the optional humidifier package have a 1/4 in. (6.4mm) tube fitting connection for water inlet. Supply pressure range is 10 psig to 150 psig. Required flow rate is 1 gpm. A shut-off valve should be installed in this line to isolate the humidifier for maintenance.

Loop Connections

Chilled Water Piping—Install manual service shut-off valves at the supply and return lines of each unit. This will provide for routine service or emergency isolation of the unit.

The ambient conditions and the minimum water temperature to be supplied from the chiller will determine whether supply and return lines should be insulated. Insulating them will prevent condensation of the water supply and return lines to the unit.

The minimum recommended water temperature is 42°F. Design pressure is 125 psig. Connections size is 3/4 in. FPT for supply and return lines.

Water/Glycol Piping—Manual service shut-off valves should be installed at the supply and return line to each unit to enable routine service and/or emergency isolation of the unit. When the condensing fluid quality is poor, it is recommended that filters (that can be easily replaced or cleaned) be placed in the supply line. These filters extend the service life of the condenser.

The maximum fluid pressure is 150 psig. For applications above this pressure, consult the factory.

The water/glycol-cooled systems will operate in conjunction with a cooling tower, city water or dry-cooler.

Refrigerant (R-22) Piping—Two refrigerant lines, an insulated copper suction line and a copper liquid line, are required between the evaporator and the condensing unit.

All refrigeration piping should be installed with high temperature brazed joints. Prevailing good refrigeration practices should be employed for piping supports, leak testing, dehydration and charging of the refrigeration circuits. The refrigeration piping should be isolated from the building by the use of vibration isolating supports. To prevent tube damage when sealing openings in walls and to reduce vibration transmission, use a soft flexible material to pack around the tubes.

When installing remote condensing units above the evaporator, the suction gas line should be trapped at the evaporator. This trap will retain refrigerant oil in the off cycle. When the unit starts, oil in the trap is carried UP the vertical riser and returns to the compressor.

NOTE

When installing remote condensing units below the evaporator, the suction gas line should be trapped with an inverted trap the height of the evaporator. This prevents refrigerant migration to the compressor during off cycles.

If it is necessary to charge units after piping is complete, refer to ***2.10 - Checklist for Completing Installation*** *for refrigerant charge (R-22) requirements.*

Pre-Charged Lines—Pre-charged refrigerant line sets (insulated copper suction line and copper liquid line) are available from the factory in lengths of 15 and 30 feet. The maximum distance between the evaporator and condensing unit is 45 feet (connecting one 30 foot and one 15 foot line set together). For longer piping runs, contact your sales representative. A sweat adapter kit is also available to permit field supplied piping. It is recommended that lines be sized so they do not exceed 2°F saturated temperature loss for the total equivalent length.

It is important to handle the pre-charged lines with care so that they will not get kinked or damaged. Use tube benders and make all bends before making connections to either end. Coil any excess tubing in a horizontal plane with the slope of the tubing towards the condensing unit.

Refrigerant Charge Requirements

Total refrigerant charge (R-22) will be required only if units are evacuated during installation or maintenance. During operation, refer to pressures in **2.4.2 - Piping Connections and Cooling Requirements**.

Total Refrigerant = Units and Lines

Table 6 Unit refrigerant charges

Model No.	Charge	
	lb-oz	kg
DME020E	0-4	0.11
DME027E	0-5	0.14
DME037E	0-7	0.20
MCD24A	8-6	3.8
MCD36A	13-5	6.0
MCD26W	2-9	1.2
MCD38W	3-6	1.5
PFC020A	5-10	2.5
PFC027A	8-12	3.9
PFC037A	15-12	7.1
DMC022WG	2-15	1.3
DMC029WG	3-11	1.6
DMC04OWG	3-13	1.7

Table 7 Line set refrigerant charges

Line Set, in.	Length ft. (m)	Charge	
		lb-oz.	kg
1/4 liquid, 5/8 suction	15 (4.6)	0-4	0.11
	30 (9.1)	0-8	0.23
3/8 liquid, 7/8 suction	15 (4.6)	0-10	0.28
	30 (9.1)	1-4	0.57

Quick Connect Fittings

NOTE
When hard piping is used, complete all piping and evacuate lines before connecting quick connects.

Be especially careful when connecting the quick connect fittings. Read through the following steps before making the connections.

1. Remove protector caps and plugs.
2. Carefully wipe coupling seats and threaded surfaces with a clean cloth.
3. Lubricate the male diaphragm and synthetic rubber seal with refrigerant oil.
4. Thread the coupling halves together by hand to insure that the threads mate properly.
5. Tighten the coupling body hex nut and union nut with the proper size wrench until the coupling bodies “bottom out” or until a definite resistance is felt.
6. Using a marker or pen, make a line lengthwise from the coupling union nut to the bulkhead.
7. Tighten the nuts an additional quarter turn; the misalignment of the lines shows how much the coupling has been tightened. This final quarter turn is necessary to insure that the joint does not leak.

If a torque wrench is used, the following torque values are recommended:

Table 8 Torque values

Coupling Size	lb-ft
– #6	10-12
– #10	35-45
– #11	35-45

Table 9 Typical refrigerant pressures (psig)

Suction			60 to 90
Discharge			
	Air Cooled		260
	Water Cooled		
		65°F to 75°F water	210
		85°F water	225
	Glycol Cooled		295
	Maximum		330
	High-pressure cut-out		360

Figure 5 Evaporator piping connections

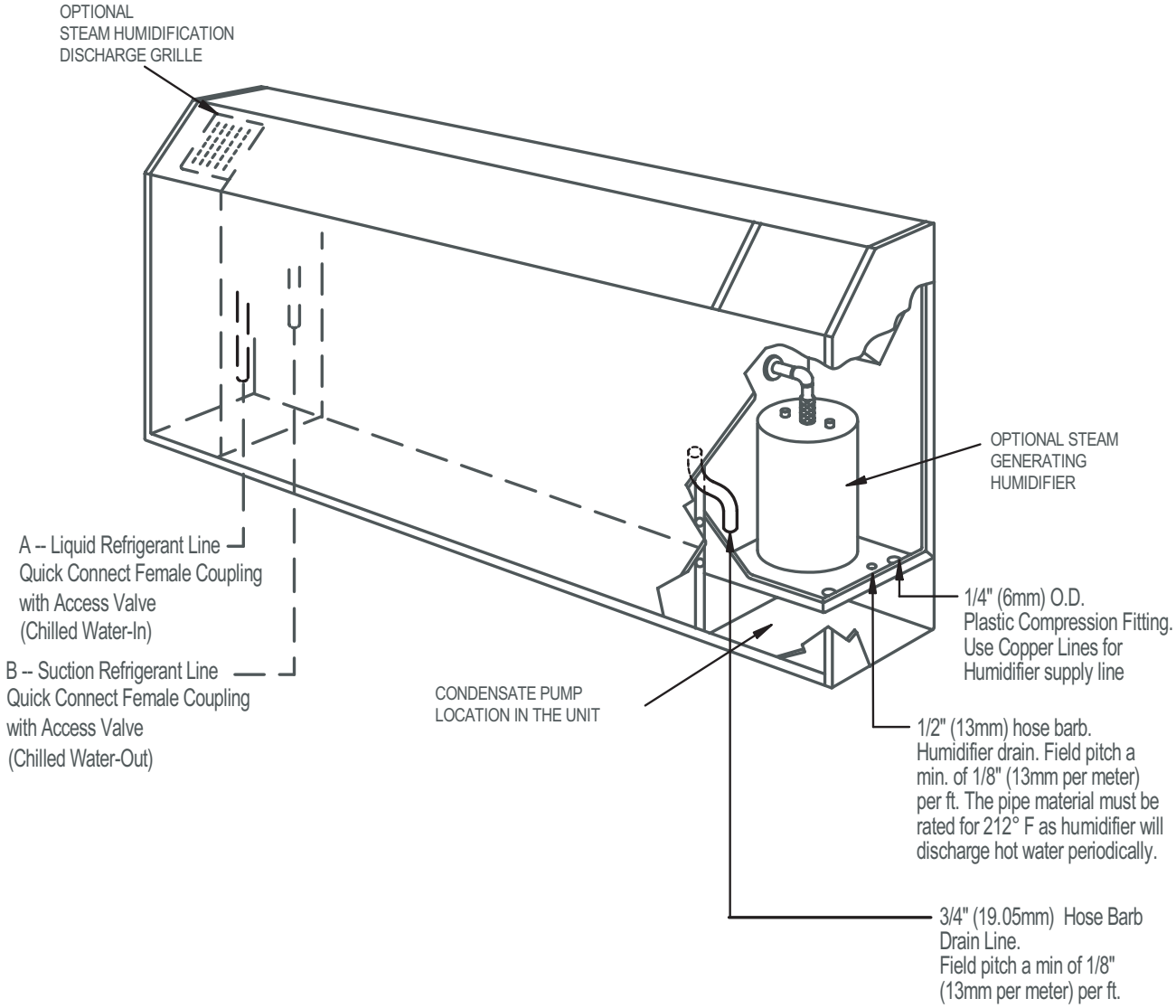


Table 10 Unit piping outlet connection sizes — pipe size in. (mm)

Model #	Liquid Line A	Suction Line B
DME020E	3/8 – #6 (9.5)	5/8 – #10 (15.9)
DME027E	3/8 – #6 (9.5)	7/8 – #11 (22.2)
DME037E	3/8 – #6 (9.5)	7/8 – #11 (22.2)
	Water Inlet	**Water Outlet**
DME044C	3/4 FPT	3/4 FPT

2.4.3 Electrical Connections

WARNING

Unit contains hazardous electrical voltage. Disconnect power supply before working within. Line side of factory disconnect remains energized when disconnect is off.

Each unit is shipped from the factory with all internal wiring completed. Refer to electrical schematic when making connections. Electrical connections to be made at the installation site are:

- Power supply to the evaporator unit
- Power supply to the condensing unit
- Control wiring between the evaporator unit and the condensing unit
- Power and control wiring (factory supplied) to the condensate pump (if applicable)
- Control wiring between wall box remote controls and the evaporator unit

Power Connections

All power and control wiring and ground connections must be in accordance with the National Electrical Code and local codes. Refer to unit serial tag for wire size and circuit protection requirements.

CAUTION

Use copper wiring only. Make sure that all connections are tight.

Make sure that voltage supplied matches the voltage specified on the unit name plate. A power disconnect switch is required to isolate the unit for maintenance. Route the supply power to the disconnect switch and then to the unit. Route the conduit through the hole provided in the cabinet. Connect earth ground to lug provided near terminal board.

NOTE

When an Integral Water/Glycol Cooled condensing unit is being used, the line voltage supply is connected to the condensing unit. The evaporator is powered from the condensing unit using a factory-supplied interconnecting cable.

Transformer Taps

The power terminal connections are labeled L1 and L2. **For 208VAC applications, you must change the input transformer connection.** Refer to the electrical schematic.

Control Connections

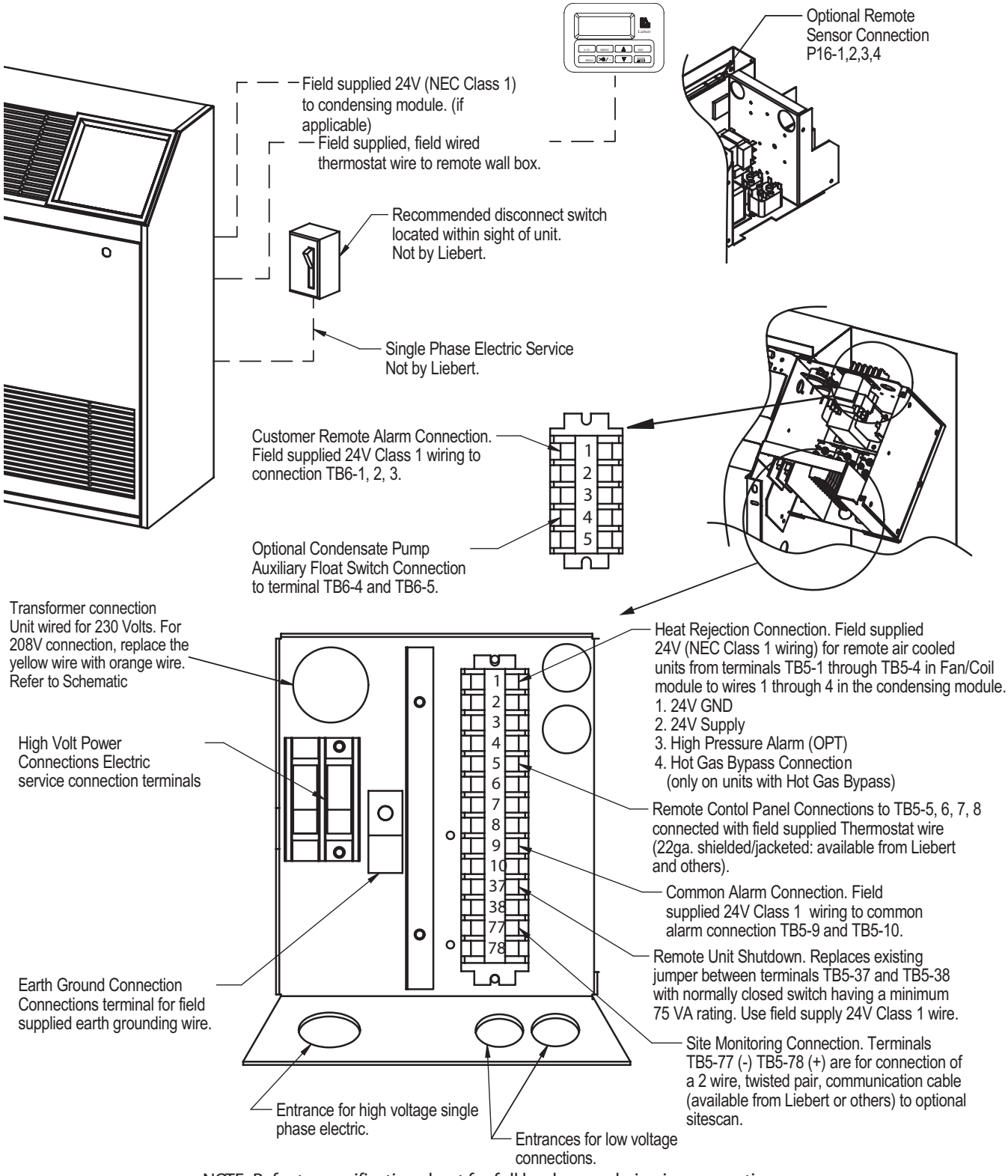
A field-supplied 3 or 4 wire control connection (24VAC) is required between the evaporator and the condensing unit. Control wiring must be installed in accordance with the National Electrical Code (NEC) Class 1 circuit. Glycol-cooled units also require a two-wire control connection to the drycooler and pump. A Class 1 circuit is required for water/glycol units.

Control wiring between the evaporator and the condensing unit must not allow a voltage drop in the line of more than 1 volt (16 gauge minimum for 75 feet). **Do not connect additional electrical devices to the control circuit.** The circuit breaker contained in the transformer housing is sized only for the factory-supplied control system.

Additional control wiring will be required if your system includes other optional monitoring and control devices.

Four wire (thermostat-type) must be connected between the evaporator control board and the wall box. See **Figure 6**.

Figure 6 Evaporator unit electrical connections



NOTE: Refer to specification sheet for full load amp and wire size amp. ratings.

2.4.4 Condensate Pump Installation

A condensate pump is required when the evaporator is installed below the level of the gravity-fed drain line. Components include the pump, check valve, sump, level sensor and controls. The pump is automatically controlled by the water level in the sump.

Install the condensate pump inside the evaporator housing on the right side. The pump kit includes all necessary fittings and complete instructions.

Disconnect power and remove the evaporator housing.

The following piping connections are required:

- Unit drain pan
- Unit humidifier drain (if present)
- Pump output to customer drain line

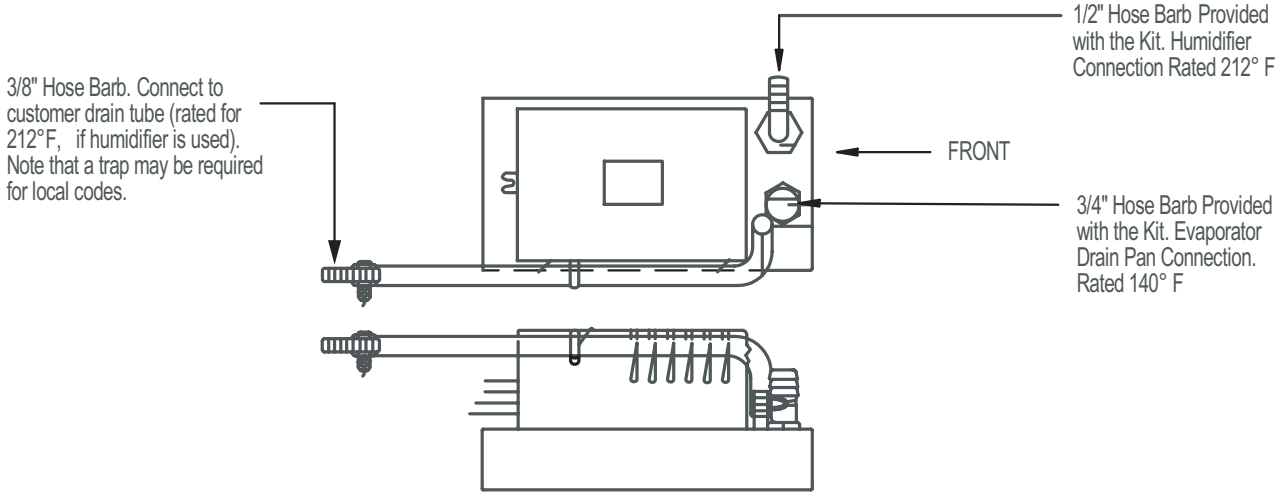
A wiring harness is provided for the condensate pump. The following electrical connections are required:

- Line voltage (yellow wires)
- Control voltage (red wires)
- Ground connection (green wire)

Tighten all connections. Apply power and check pump operation before replacing the evaporator housing. Inspect for leaks. Replace evaporator housing.

Schedule periodic inspections of the piping connections. The pump sump should be cleaned as often as the evaporator air filter. Monthly cleaning is recommended.

Figure 7 Optional condensate pump (field installed)



2.5 Outdoor Air Cooled Condensing Unit Installation

2.5.1 Location Considerations

To insure a satisfactory air supply, locate air cooled propeller fan condensing units in a clean area, away from loose dirt and foreign matter that may clog the coil. Condensing units must not be located in the vicinity of steam, hot air or fume exhausts or closer than 18 inches from a wall, obstruction or adjacent unit. Avoid areas where heavy snow will accumulate at air inlet and discharge locations.

The condensing unit should be located for maximum security and maintenance accessibility. Avoid ground-level sites with public access. Note that recommended maximum refrigerant line length is 45 feet.

Install a solid base capable of supporting the weight of the condensing unit. The base should be at least two inches higher than the surrounding grade and two inches larger than the dimensions of the condensing unit base.

Figure 8 Outdoor air cooled condensing units

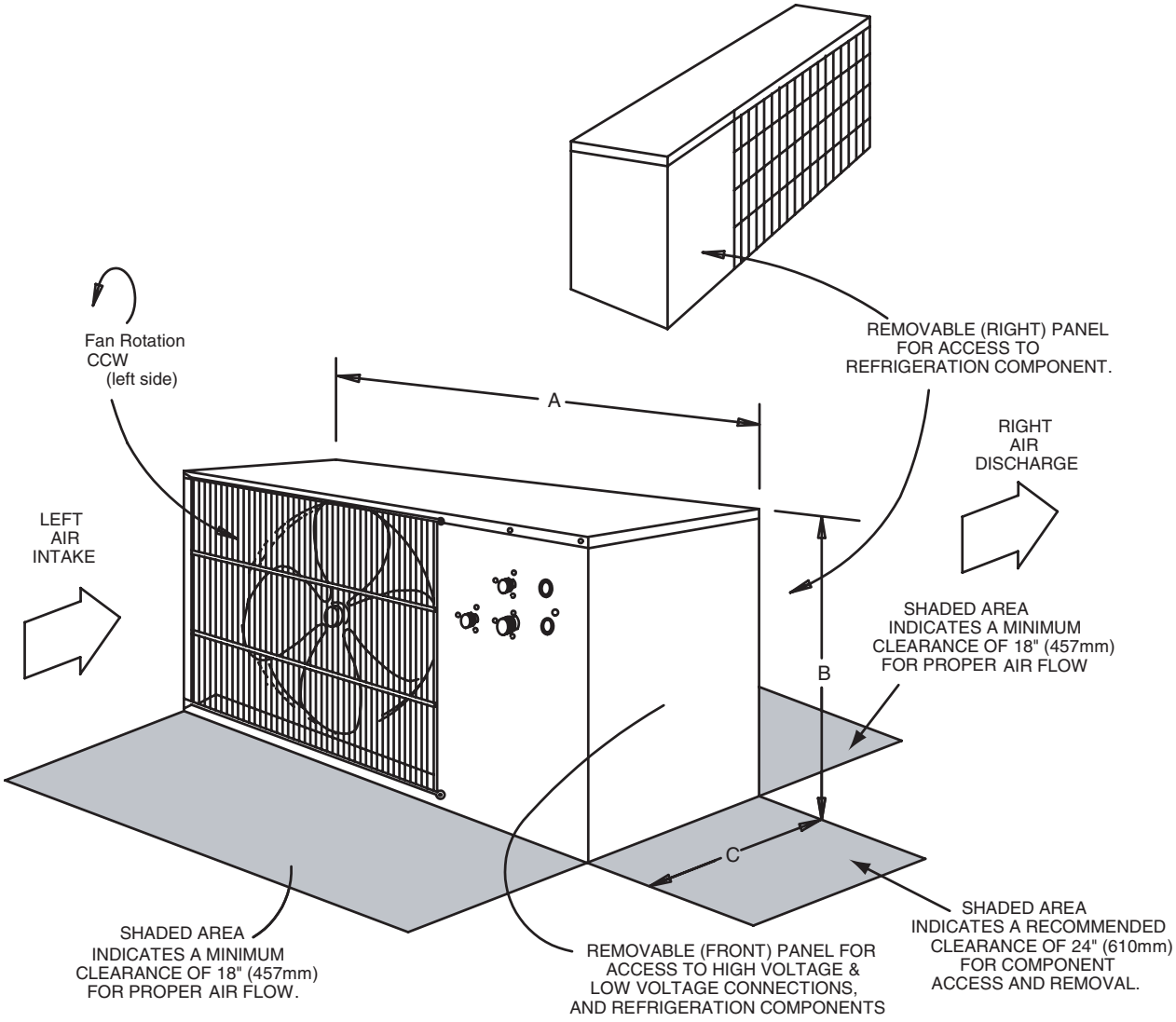


Table 11 Outdoor air cooled condensing units dimensional data

Model Numbers		Dimensional Data, In., (mm)			Module Weight lbs. (kg) net.
60 HZ	50HZ	A	B	C	
PFH014A-L	PFH013A-L	40 (1016)	23 1/2 (597)	18 (457)	200 (91)
PFH020A-L	PFH019A-L				
PFH027A-L	PFH026A-L				
PFH027A-H	PFH026A-H	48 (1219)	31 (787)	18 (457)	241 (109)
PFHZ27A-L	PFHZ26A-L				
PFH037A-L	PFH036A-L				
PFH042A-L	PFH041A-L				
PFH037A-H	PFH036A-H	53 (1343)	36 1/4 (918)	18 (457)	351 (159)
PFHZ37A-L	PFHZ36A-L				

2.5.2 Piping Connections

Two refrigerant lines are required to connect the outdoor condensing unit to the ceiling unit. The bottom connection is for the insulated copper suction line. The top connection is for the copper liquid line. Details are given in **2.4.2 - Piping Connections and Cooling Requirements**.

2.5.3 Electrical Connections

WARNING

Unit contains hazardous electrical voltage. Disconnect power supply before working within. Line side of factory disconnect remains energized when disconnect is off.

Power Connections

The outdoor condensing unit requires its own power source and earth ground, with a disconnect switch (field supplied) to isolate the unit for maintenance. Voltage supplied must agree with the voltage specified on the unit nameplate. An optional transformer is available for 277VAC, single-phase applications.

Control Connections

A field-supplied 3 or 4-wire (24VAC) control connection is required between the condensing unit and the evaporator. Refer to **Figure 8** and the electrical schematic.

2.6 Installing Ceiling Condensing Units

The unit is mounted above the ceiling and must be securely mounted to the roof structure. Use threaded suspension rods (SAE Grade 1 minimum) and four locknuts (3/8 in. – 16).

Recommended clearance between ceiling grids and structural members is unit height plus three inches.

Install the four field-supplied rods by suspending them from a suitable ceiling support. Locate the rods so that they mate with the four outside comer rigging holes.

Attach hanging brackets to the threaded rods with the supplied nuts and grommets. The rubber grommets provide vibration isolation. The ceiling and ceiling supports of existing buildings may require reinforcements. Be sure to follow all applicable codes.

WARNING

Be sure the supporting roof structure is capable of supporting the weight of the unit(s) and the accessories.

Be sure to securely anchor the top ends of the suspension rods. make sure all nuts are tight.

Do not install units directly above computer equipment.

Install a safety pan, with drainline, under water/glycol-cooled condensing units.

2.6.1 Lifting the Units Into Place

NOTE

Be sure to read the directions for installing each type of unit before proceeding.

Using a suitable lift device, raise each unit up to meet the bottom of the two hanging brackets suspended from the ceiling via the threaded rods. Center the unit so that the bolts can be easily inserted into the factory-supplied captive nuts.

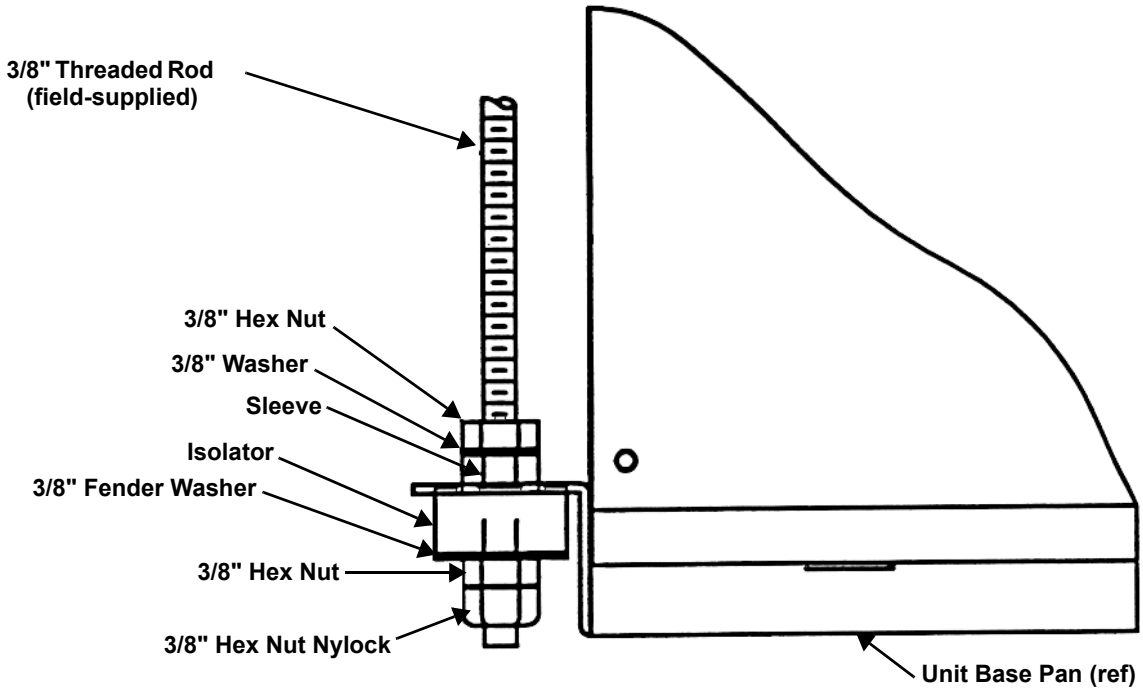
Use bolts, washers and locknuts to attach hanging brackets to the bottom of the cabinet.

Tighten locknuts sufficiently so that the weight of the unit is supported evenly by the four rods. Make sure the unit is level within the space by adjusting the locknuts.

NOTE

The unit must be level in order to operate properly.

Figure 9 Above the ceiling mounting bracket detail



2.7 Centrifugal Fan Condensing Unit Installation

2.7.1 Location Considerations

The centrifugal fan air cooled condensing unit may be located above the dropped ceiling or any remote indoor area using the hangers and hardware provided.

To mount the unit in the ceiling, refer to **2.6 - Installing Ceiling Condensing Units**.

2.7.2 Piping Connections

Details for refrigerant (R-22) loop piping are in **2.4.2 - Piping Connections and Cooling Requirements**.

2.7.3 Electrical Connections

WARNING

Unit contains hazardous electrical voltage. Disconnect power supply before working within. Line side of factory disconnect remains energized when disconnect is off.

Power Connections

The centrifugal condensing unit requires its own power source and earth ground, with a disconnect switch (field supplied) to isolate the unit for maintenance. Voltage supplied must agree with the voltage specified on the unit nameplate.

Control Connections

A field-supplied three- or four-wire control connection is required from the evaporator unit to the condensing unit. Refer to **Figure 11** and the electrical schematic.

2.7.4 Ducting

The total external static pressure for the inlet and outlet ducts, including grille, must not exceed 0.5 inches of water. Hood intake dimensions should be the same as the condensing unit duct dimensions.

If the condensing unit draws air from the outside of the building, rain hoods must be installed. In addition, install a triple layer bird screen over rain hood openings to eliminate the possibility of insects, birds, water and debris from entering the unit.

Use flexible ductwork or nonflammable cloth collars to attach ductwork to the unit and to control vibration transmission to the building. Attach the ductwork to the unit using the flanges provided. Locate the unit and ductwork so that the discharge air does not short circuit to the return air inlet.

Avoid directing the hot exhaust air toward adjacent doors or windows.

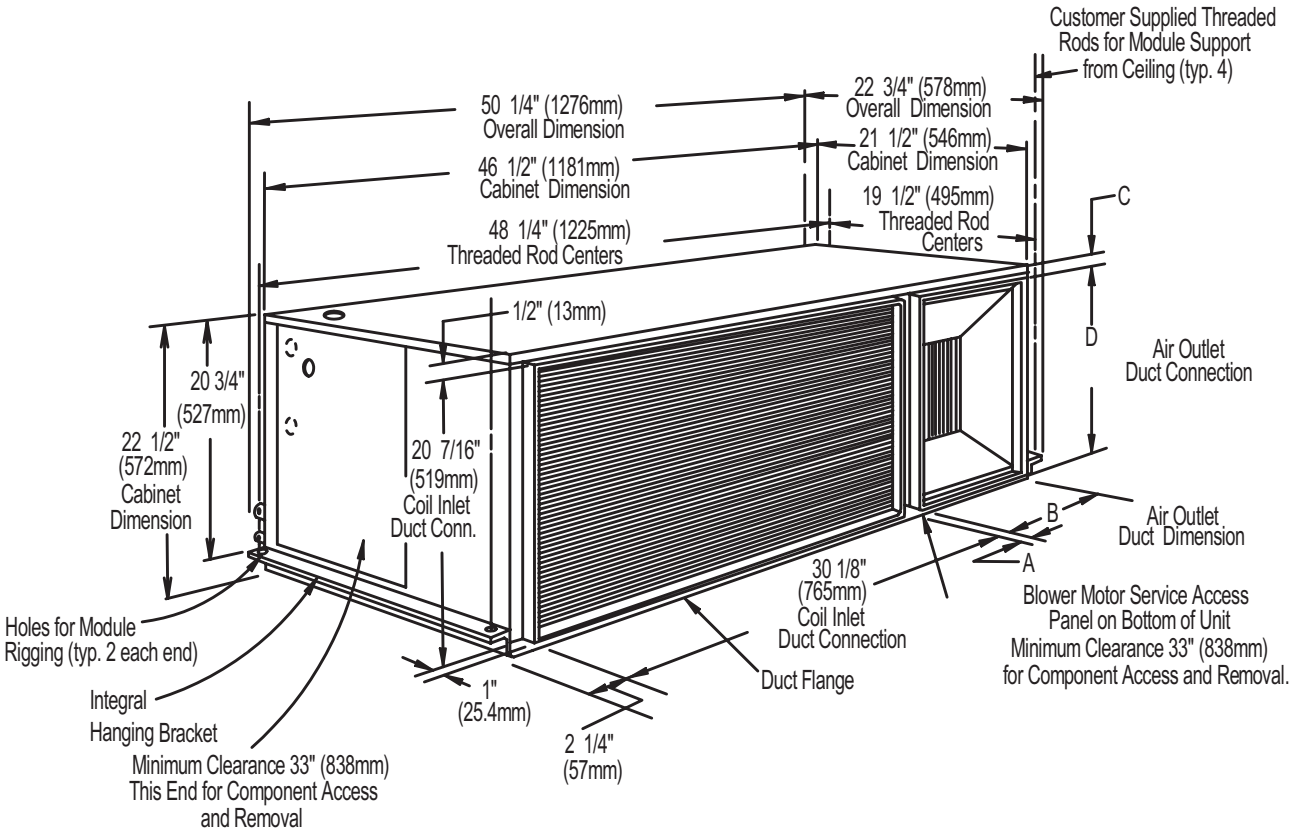
Normal operating sound may be objectionable if the condensing unit is placed directly over quiet work areas. Ductwork that runs through a conditioned space or is exposed to areas where condensation may occur must be insulated. Whenever possible, ductwork should be suspended using flexible hangers. Ductwork should not be fastened directly to the building structure. In applications where the ceiling plenum is used as the heat rejection domain, the discharge air must be directed away from the condensing unit air inlet and a screen must be added to the end of the discharge duct to protect service personnel.

For multiple unit installations, space the units so that the hot condensing unit exhaust air is not directed toward the air inlet of an adjacent unit.

Table 12 Air flow – CFM (l/s)

2 Ton	3 Ton
1,000 (472)	1,650 (779)

Figure 10 Centrifugal condensing unit dimensions and pipe connections (2 and 3 ton)



DIMENSIONAL DATA

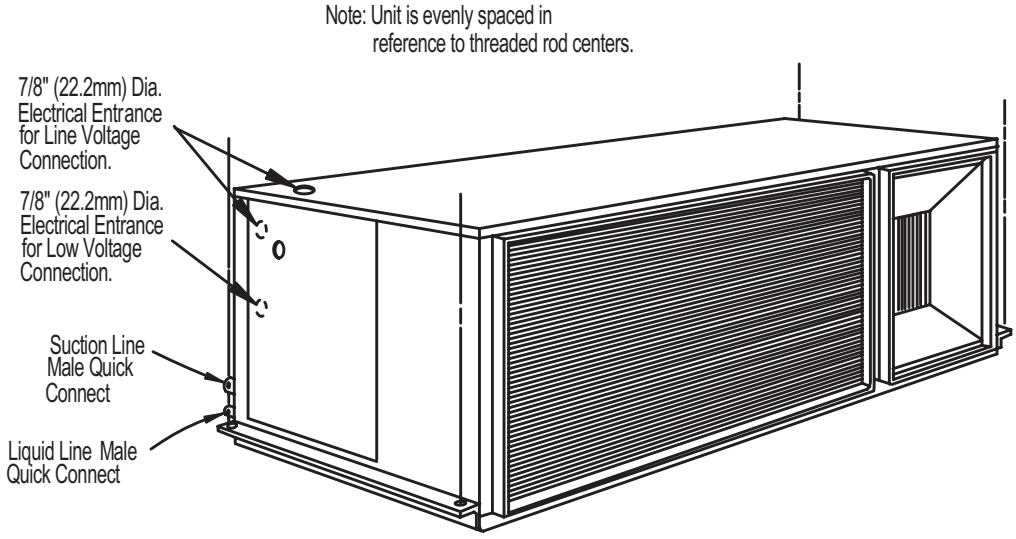
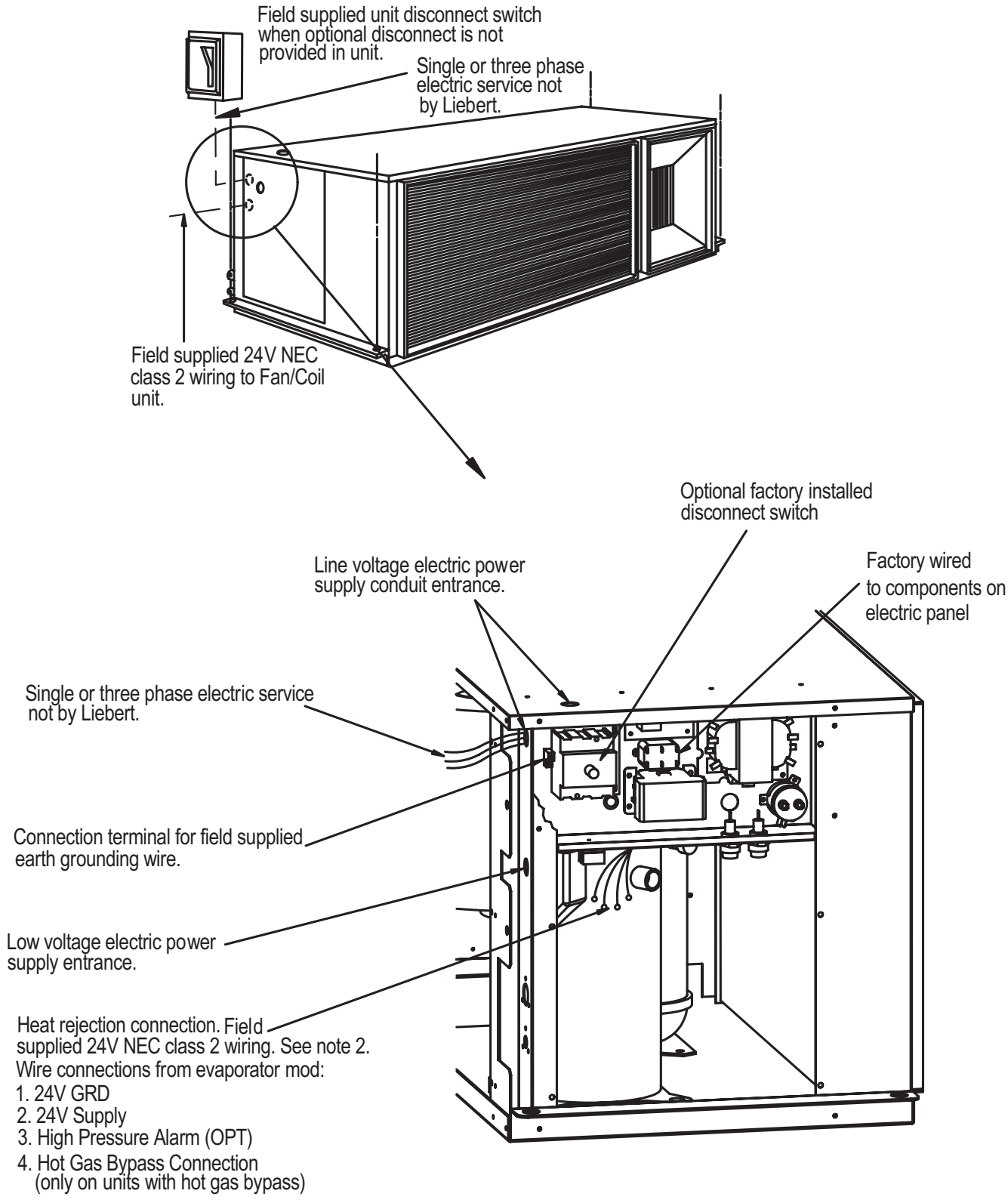


Table 13 Centrifugal condensing unit dimensions

Model	Dimensions, in. (mm)			
	A	B	C	D
MC*23A MC*24A MC*35A MC*36A	1-7/16 (37)	11-7/16 (290)	1/2 (13)	20-7/16 (519)
MC*39A	1-5/8 (41)	11-3/4 (298)	5-3/8 (137)	11-3/4 (298)

Figure 11 Centrifugal condensing unit electrical connections (2 and 3 ton)



NOTES:
1. Refer to specification sheet for full load amp. and wire size amp. ratings.
2. Control voltage wiring must be a minimum of 16 GA (1.6mm) for up to 75' (23m) or not to exceed 1 volt drop in control line.

Figure 12 General arrangement drawing, chilled water

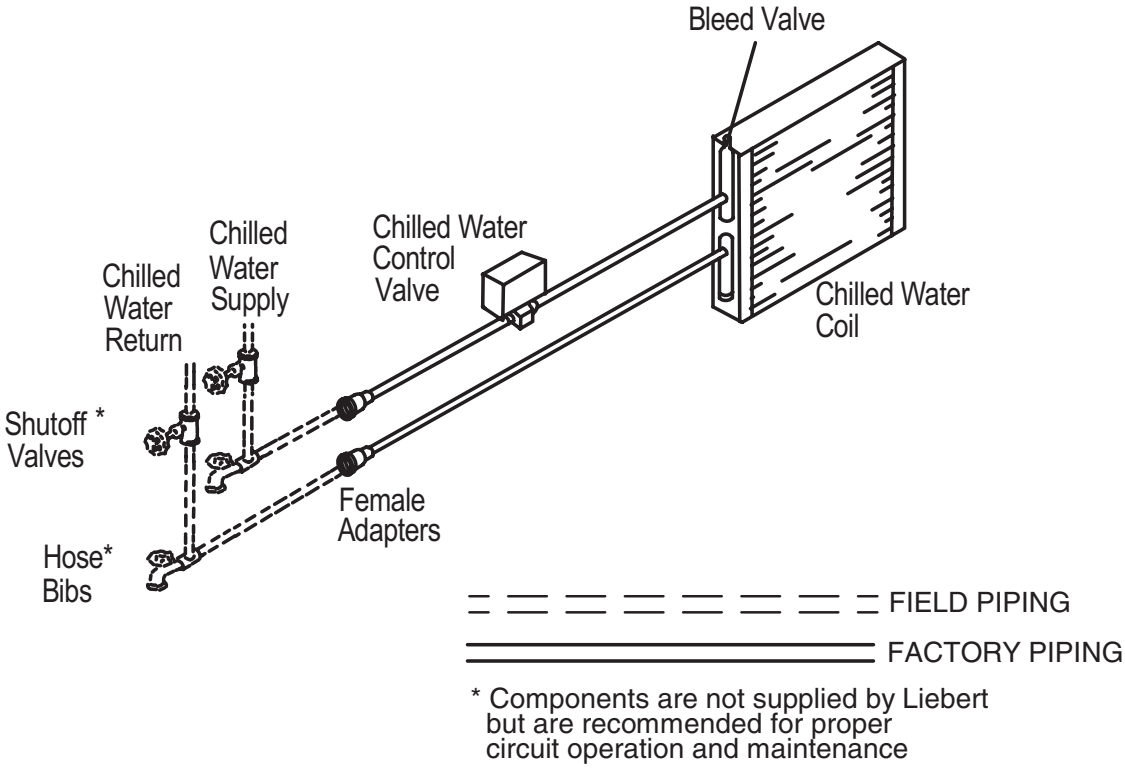


Figure 13 General arrangement drawing, water/glycol cooled

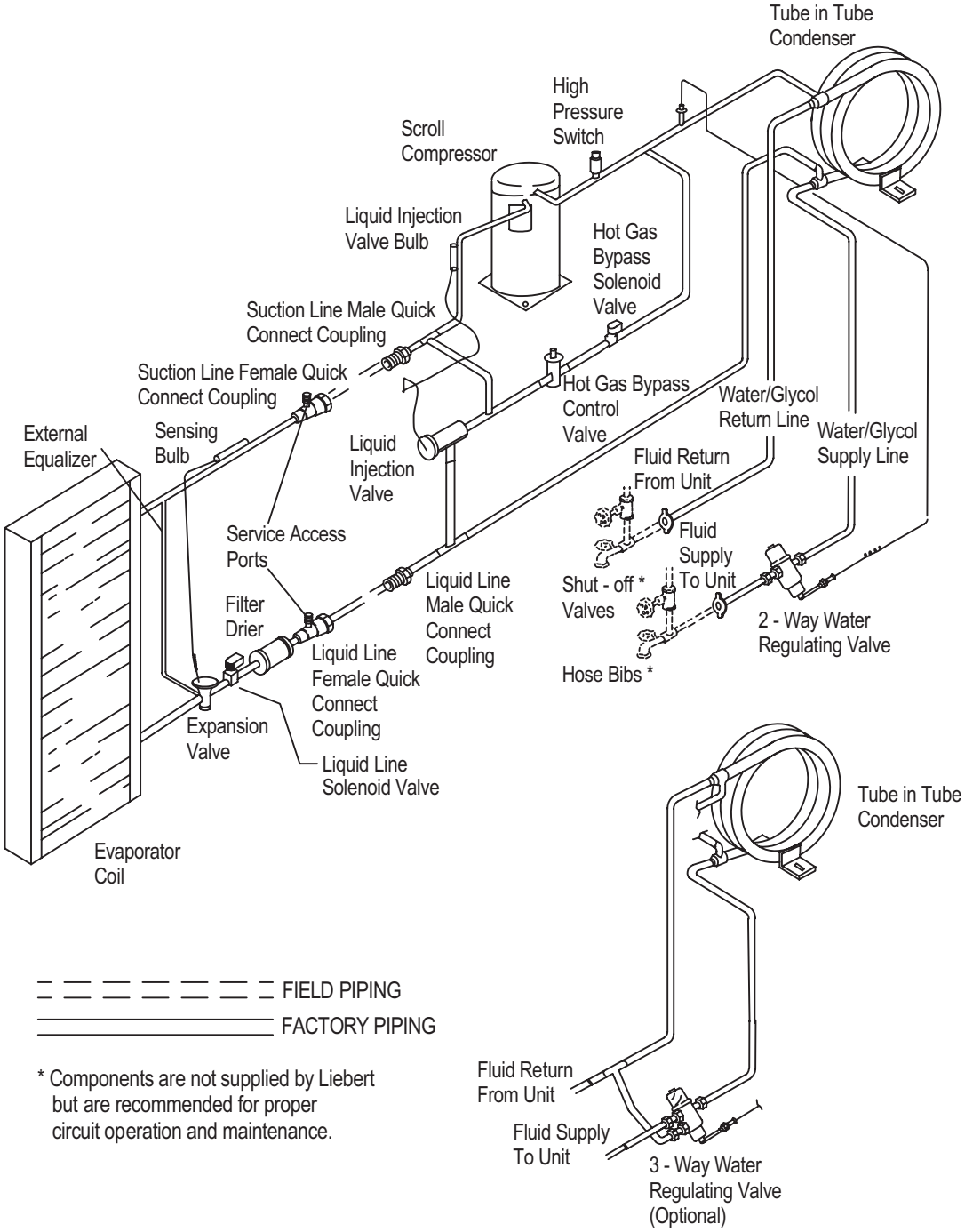
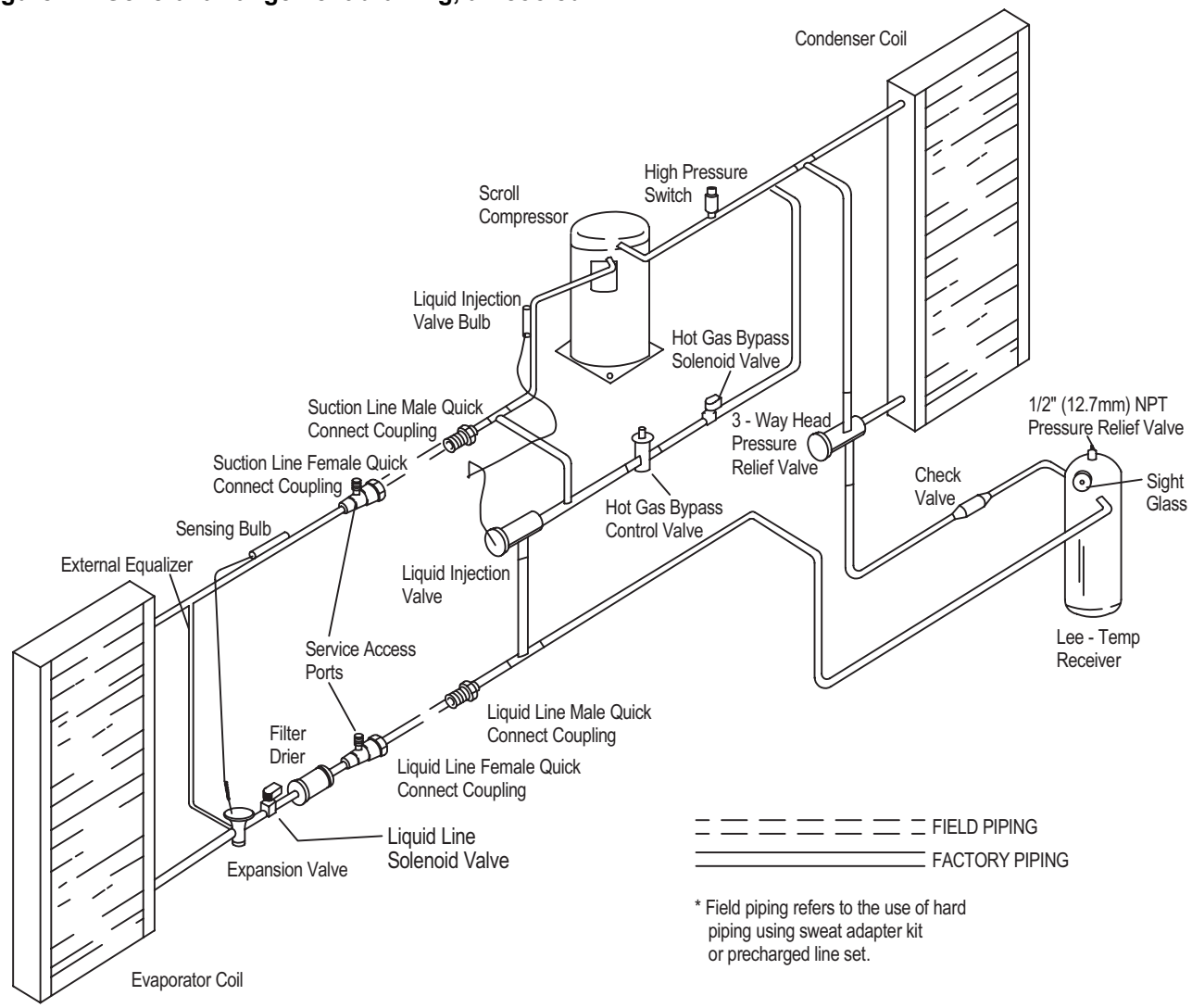


Figure 14 General arrangement drawing, air cooled



2.8 Water and Glycol Cooled Condensing Unit Installation

2.8.1 Location Considerations

The Water and Glycol Cooled condensing units may be located above the dropped ceiling or any remote indoor area using the hangers and hardware provided.

To mount the unit in the ceiling, refer to **2.6 - Installing Ceiling Condensing Units**.

2.8.2 Piping Connections

Piping Considerations

Do not use galvanized pipe in glycol systems. Manual service shut-off valves should be installed at the supply and return line to each unit. This enables routine service and/or emergency isolation of the unit. When the condensing unit fluid quality is poor, filters (that can be easily replaced or cleaned, with 16-20 mesh screen) should be placed in the supply line. These filters extend the service life of the condensing units.

Condensing fluid connections (FPI) are 3/4 in. Details for refrigerant (R-22) loop piping are in **2.4.2 - Piping Connections and Cooling Requirements**.

Condensing Unit Fluid Requirements

The maximum fluid pressure is 150 psig. For applications above this pressure, consult the factory.

The water cooled system will operate in conjunction with either a cooling tower or city water. Glycol cooled systems will operate in conjunction with a cooling tower, city water or drycooler. Automotive anti-freeze must not be used in glycol systems. Prepare glycol solution using customary practices.

Regulating Valve

Water/Glycol cooled units include a coolant flow regulating valve which may require adjustment.

Attach refrigeration gauges to the compressor discharge and suction lines. Raise the head pressure by turning the adjusting screw clockwise. Allow enough time between adjustments for the system to stabilize. Refer to recommended operating pressures in **2.4.2 - Piping Connections and Cooling Requirements**.

When the refrigeration system has been off for approximately 10 to 15 minutes, the coolant flow should stop. If the coolant continues to flow, the valve is improperly adjusted (head pressure too low).

Flush the valve by inserting a screwdriver or similar tool under the two sides of the main spring and lifting. This will open the valve seat and flush out any dirt particles,

2.8.3 Electrical Connections.

WARNING

Unit contains hazardous electrical voltage. Disconnect power supply before working within. Line side of factory disconnect remains energized when disconnect is off.

CAUTION

Use copper, copper-clad aluminum or aluminum wiring only. Make sure that all connections are tight.

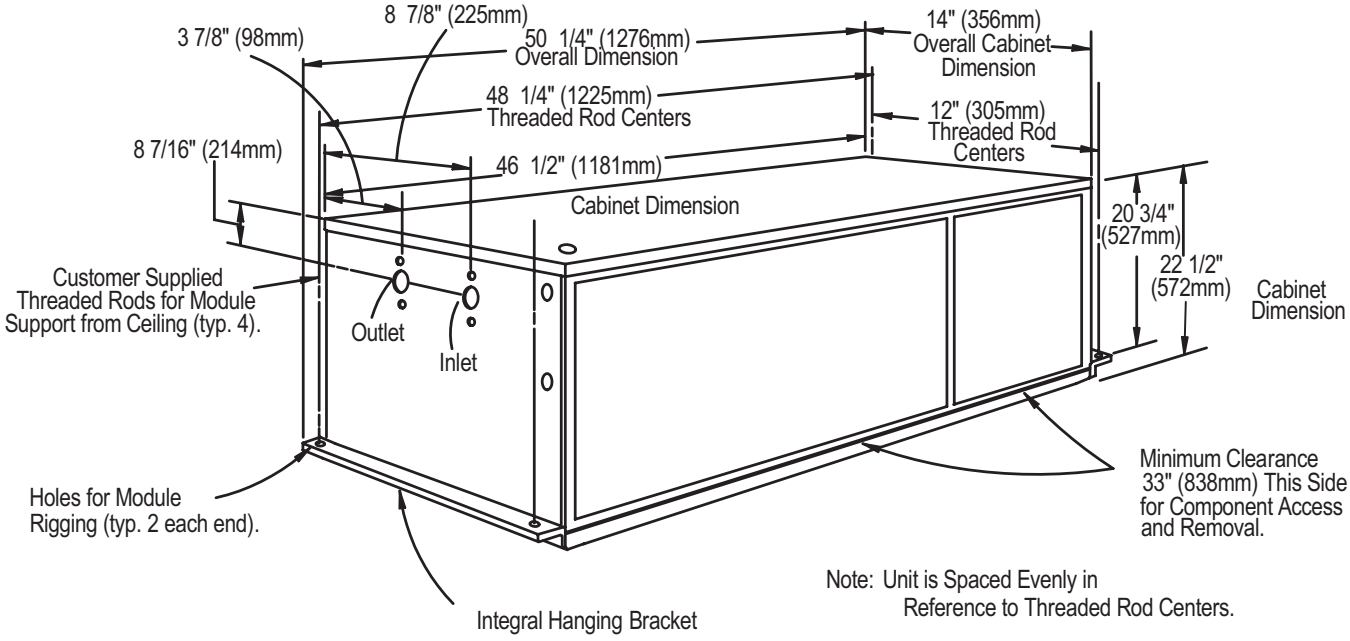
Power Connections

The condensing unit requires its own power source and earth ground, with a disconnect switch (field supplied) to isolate the unit for maintenance. Voltage supplied must agree with the voltage specified on the unit nameplate.

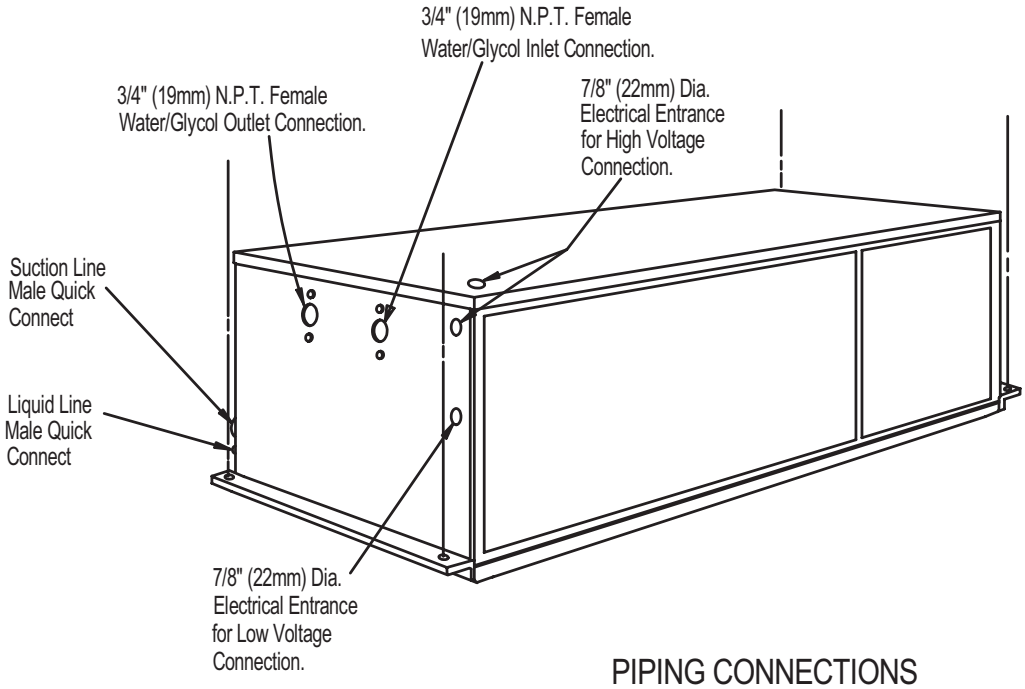
Control Connections

A field-supplied 3- or 4-wire (24VAC) control connection is required from the evaporator unit to the condensing unit. Refer to **Figure 16** and the electrical schematic.

Figure 15 Water and glycol cooled condensing units: dimensions and pipe connections (2 and 3 ton)

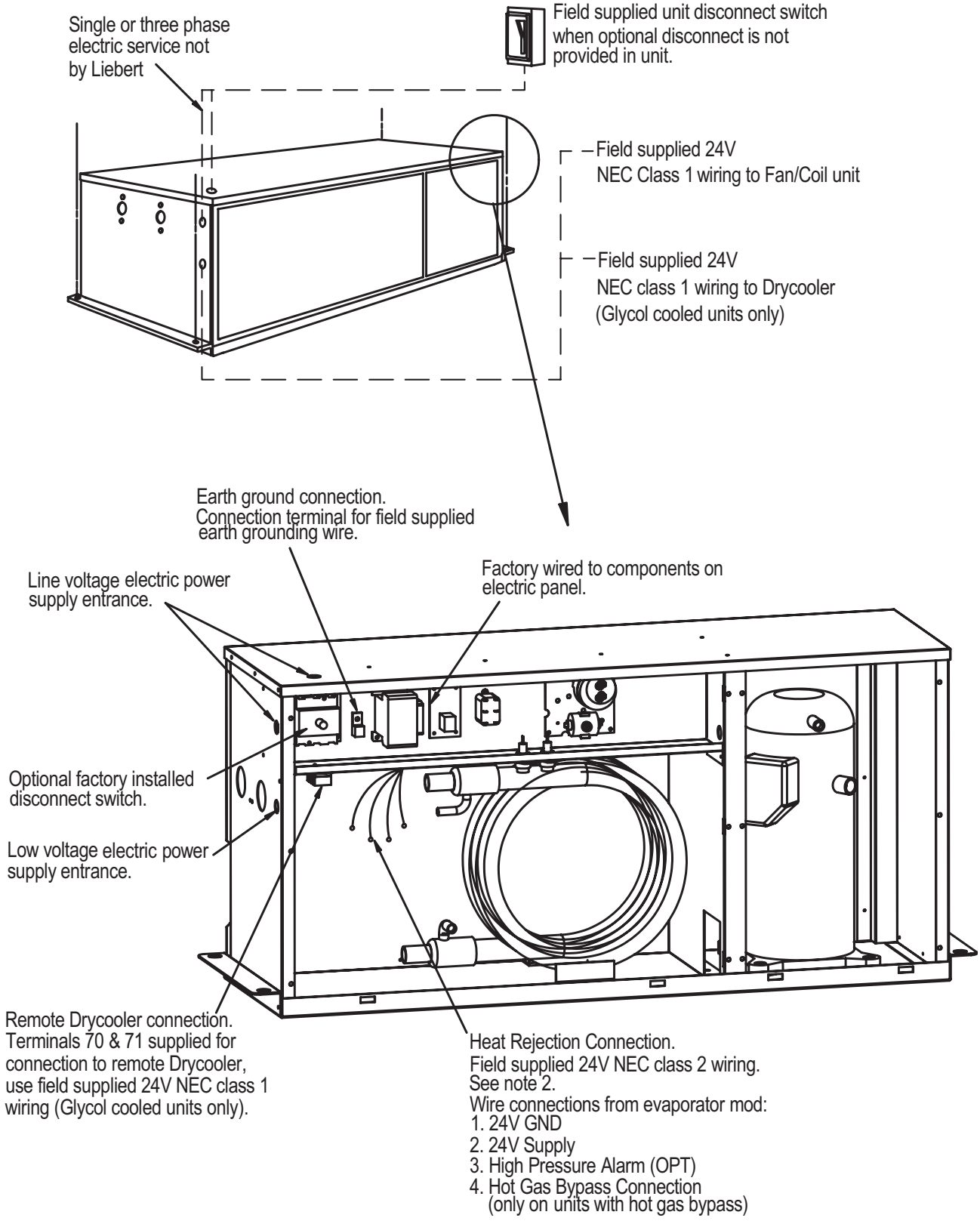


DIMENSIONAL DATA



PIPING CONNECTIONS

Figure 16 Water and glycol cooled condensing units: electrical connections (2 and 3 ton)



NOTES:

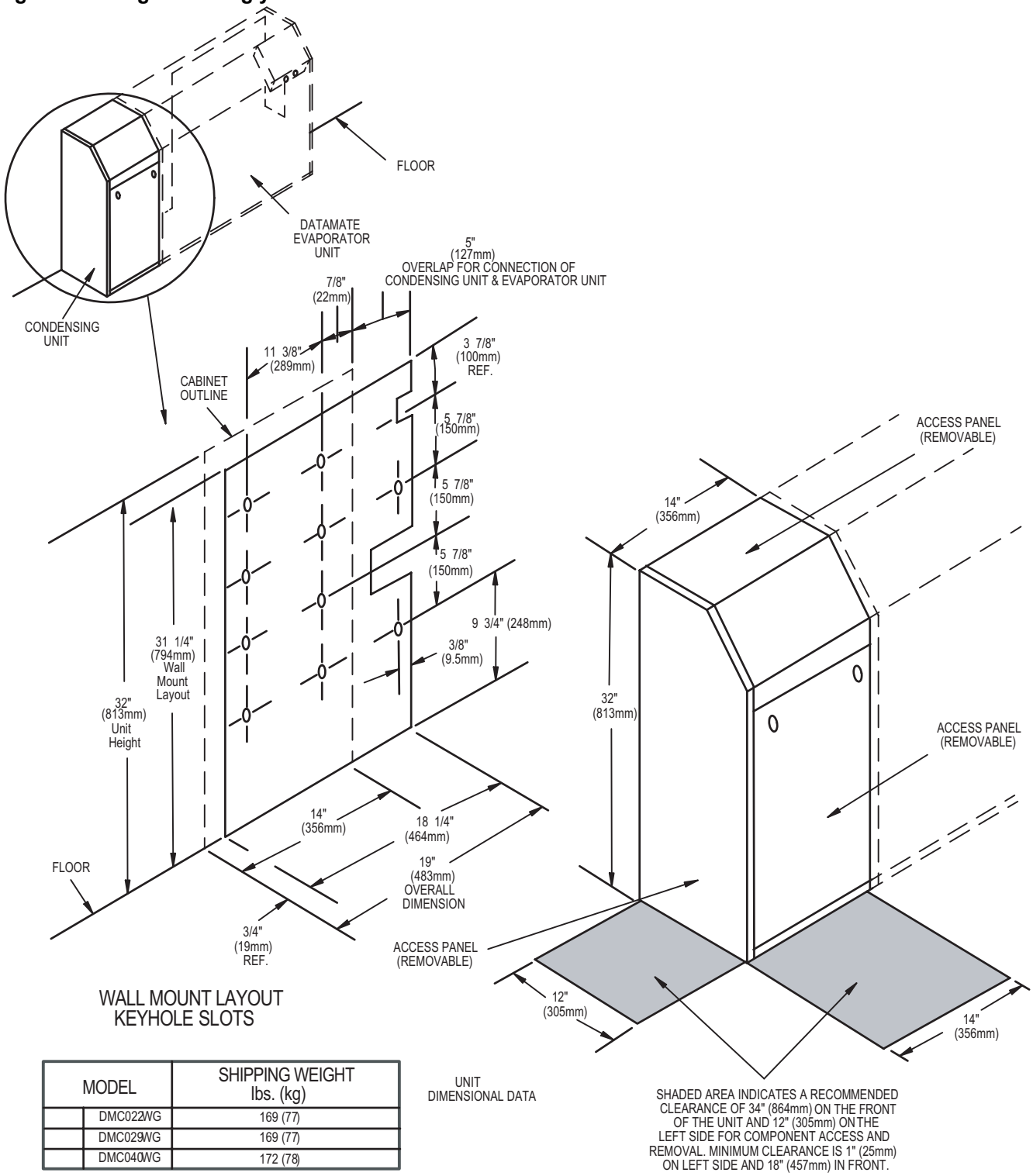
1. Refer to specification sheet for full load amp. and wire size amp. ratings.
2. Control voltage wiring must be a minimum of 16 GA (1.6mm) for up to 75' (23m) or not to exceed 1 volt drop in control line.

2.9 Integral Water/Glycol Condensing Unit Installation

2.9.1 Location Considerations

The integral water/glycol condensing unit is suitable for indoor installation only. The unit is designed to be attached to the left side of the evaporator chassis.

Figure 17 Integral water/glycol unit dimensions



MODEL	SHIPPING WEIGHT lbs. (kg)
DMC022WG	169 (77)
DMC029WG	169 (77)
DMC040WG	172 (78)

UNIT DIMENSIONAL DATA

Unlatch the front cabinet door and remove the two screws that secure the cabinet to the chassis. Lift off the cabinet. Eight keyhole slots are provided for mounting the unit on the wall (refer to **Figure 17**).

2.9.2 Piping Connections

Manual service shut-off valves should be installed at the supply and return line to each unit. This enables routine service and/or emergency isolation of the unit. When the condensing unit fluid quality is poor, it is recommended that filters (that can be easily replaced or cleaned, with 16-20 mesh screen) be placed in the supply line. These filters extend the service life of the condensing unit.

Remove back plate. Reinstall after connections. Remove piping access plate on evaporator end panel but do not remove the end panel.

Connection Sizes O.D. Copper

DME020E	5/8
DME027E/DME037E	7/8

Condensing Unit Fluid Requirements

The maximum fluid pressure is 150 psig. For applications above this pressure, consult the factory.

The system will operate in conjunction with either a cooling tower, city water or drycooler.

Regulating Valve

Refer to **2.8.2 - Piping Connections** for a description of the regulating valve and instructions for adjustment.

2.9.3 Electrical Connections

WARNING

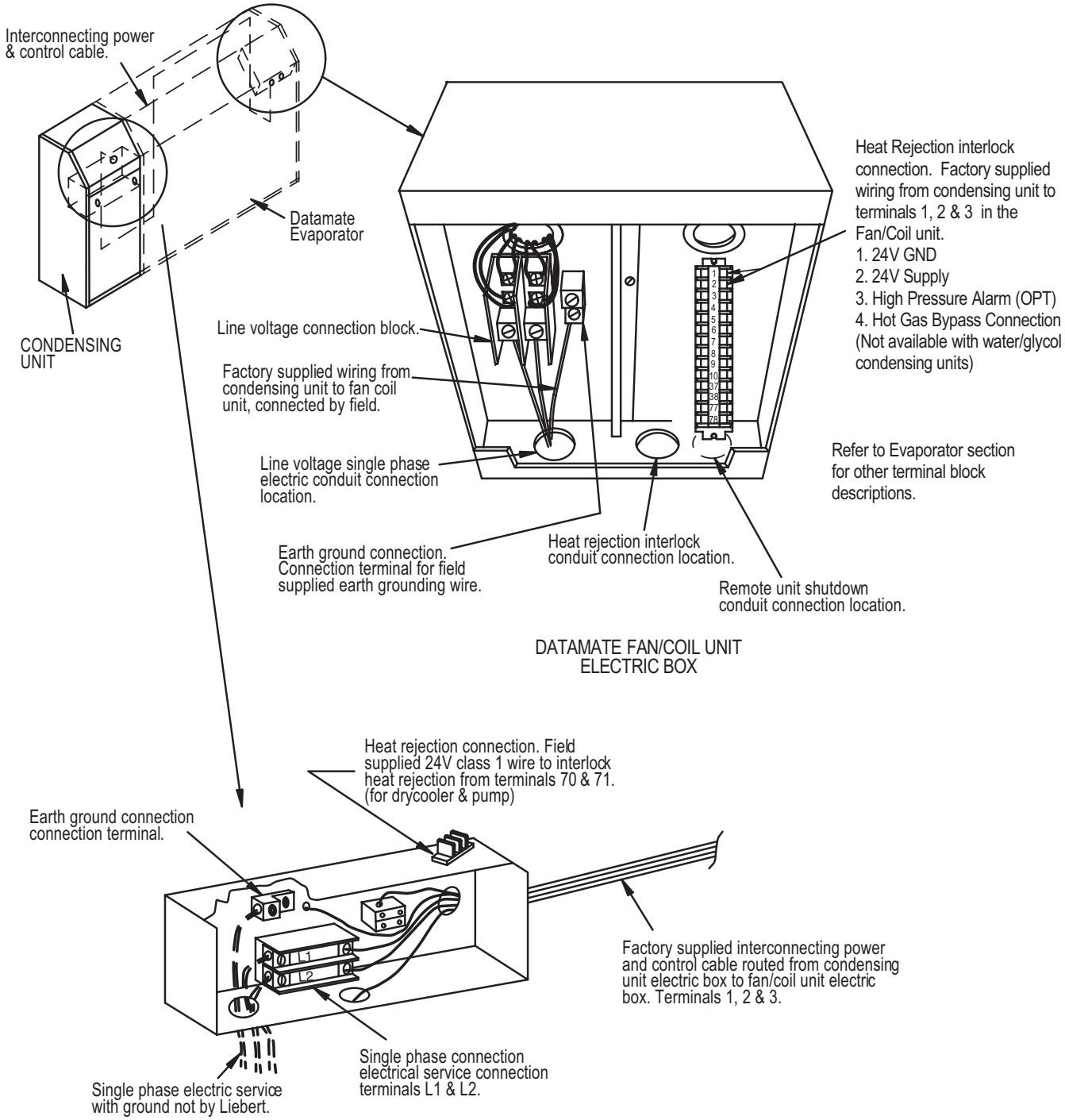
Unit contains hazardous electrical voltage. Disconnect power supply before working within. Line side of factory disconnect remains energized when disconnect is off.

When an integral condensing unit is used with the evaporator, the evaporator is powered from the condensing unit. Route the factory-supplied interconnecting power/control cable to the evaporator and wire it to the power terminal block in the electric box. This unit is shipped with a wire harness. Refer to **Figure 18** and the electrical schematic.

Heat Rejection Connections

If the integral condensing unit is used in a glycol loop, it must be connected to the drycooler. Terminals are provided on the condensing unit electric box for Class 2 wiring to the heat rejection equipment.

Figure 18 Integral water/glycol condensing unit connections



NOTE: Refer to specification sheet for full load amp. and wire size amp. ratings.

2.10 Checklist for Completing Installation

___ 1. Proper clearances for service access have been maintained around the equipment.

___ 2. Equipment is level and mounting fasteners are tight.

___ 3. Piping completed to refrigerant or coolant loop (if required). Refrigerant charge added (if required).

___ 4. Condensate pump installed (if required).

___ 5. Drain line connected.

___ 6. Water supply line connected to humidifier (if required).

___ 7. All piping connections are tight.

___ 8. Safety pan installed under water/glycol cooled condensing units.

___ 9. Ducting completed if required.

___ 10. Line voltage to power wiring matches equipment nameplate.

___ 11. Power wiring connections completed to disconnect switch, evaporator and condensing unit, including earth ground.

___ 12. Control panel DIP switches set based on customer requirements.

___ 13. Power line circuit breakers or fuses have proper ratings for equipment installed.

___ 14. Control wiring connections completed to evaporator and condensing unit (if required), including wiring to optional controls.

___ 15. All wiring connections are tight.

___ 16. Foreign materials have been removed from in and around all equipment installed (shipping materials, construction materials, tools, etc.).

___ 17. Fans and blowers rotate freely without unusual noise.

___ 18. Inspect all piping connections for leaks during initial operation.

3.0 MICROPROCESSOR CONTROL

The Microprocessor Control features an easy to use menu-driven LCD display. The menus, control features and circuit board details are described in this section. Detailed information concerning controls (**4.0 - System Performance, Microprocessor Controls**) and alarms (**5.0 - Alarms**) are provided.

3.1 Feature Overview

To turn the unit ON, press the ON/OFF (I/O) key after power is applied. To turn the unit OFF, press the ON/OFF (I/O) key before power is disconnected.

The following control keys may be used to move through the menus, as prompted on the LCD display:

- I/O—turns unit on or off (top far left).
- MENU – Enables user to access the program menu to change control parameters, alarms, setback schedule, etc. (top near left).
- UP ARROW—Increases the value of displayed parameter while in a set mode (setpoints, time, etc.) (top near right).
- ESC—Escape; allows user to move back to a previous menu (top far right).
- FAN HI/LO—Changes the fan speed between high and low (bottom far left)
- Alarm Silence/? (Help)—If an alarm is present, pressing this key will silence the alarm. If this key is pressed when no alarm is present, help text will appear (bottom near left).
- DOWN ARROW—Decreases the value of displayed parameter while in a set mode (bottom near right).
- ENTER—After setting a control point, press ENTER to store the information in the microprocessor (bottom far right).

Figure 19 Wall box

Active alarms are displayed on the LCD screen and sound an audible beep. To silence an alarm, press the Alarm Silence/Help key as prompted on the display.

Setpoints, DIP switch settings and other selections were made during factory testing of your unit and are based upon typical operating experience. (Other default selections were made according to options included with your unit). MAKE ADJUSTMENTS TO THE FACTORY DEFAULT SELECTIONS ONLY IF THEY DO NOT MEET YOUR SPECIFICATIONS.

Allowable ranges are displayed by pressing the help key. A password will be required (if enabled) to change setpoints, time delays, etc.

The display normally shown includes the present room temperature, humidity, active status functions (cooling, heating, dehumidifying, humidifying), normal fan speed/low fan speed and active alarms. The status display my also be selected from the main menu. More detailed status and alarm information is available from the menu.

3.2 Main Menu <Menu>

Press the MENU key to display the Main Menu. Menu selections (in the following order) include:

- SETPOINTS
- STATUS
- ACTIVE ALARMS
- TIME
- DATE
- SETBACK
- SETUP OPERATION
- SETPT PASSWORD
- SETUP PASSWORD
- CALIBRATE SENSORS
- ALARM ENABLE
- ALARM TIME DELAY
- COMMON ALARM ENABLE
- CUSTOM ALARMS
- CUSTOM TEXT
- DIAGNOSTICS
- END OF MENU

Use the UP or DOWN arrow to scroll through the selections, then when ready to select a particular function press “Enter” key.

3.3 Setpoints

Setpoints and system setup parameters are kept in nonvolatile memory. Selecting SETPOINTS from the Main Menu will display the following selections:

- TEMPERATURE SETPOINT
- TEMPERATURE SENSITIVITY
- HUMIDITY SETPOINT
- HUMIDITY SENSITIVITY
- HIGH TEMPERATURE ALARM
- LOW TEMPERATURE ALARM
- HIGH HUMIDITY ALARM
- LOW HUMIDITY ALARM

Scroll through this submenu by using the UP or DOWN arrow, then press ENTER to select a particular function. To change a value, press ENTER and use the UP or DOWN arrows. When the value has been changed press ENTER to store the value. For example to change the temperature setpoint from the main status display.

1. Press MENU key to display main menu.
2. Scroll to “SETPOINTS” using the UP or DOWN arrow key. Press ENTER key.
3. Scroll to “TEMP SETPOINT” using the UP or DOWN arrow key. Press ENTER key.
4. Use the UP or DOWN arrow to change the value. Press ENTER key.

Table 14 Default setpoints and allowable ranges

Setpoint	Default	Range
Temperature Setpoint	72°F	40-90°F (5-32°C)
Temperature Sensitivity	2.0°F	1-9.9°F (0.6-5.6°C)
Humidity Setpoint	50%	20-80% RH
Humidity Sensitivity	5%	1-30% RH
High Temperature Alarm	80°F	35-95°F (2-35°C)
Low Temperature Alarm	65°F	35-95°F (2-35°C)
High Humidity Alarm	60%	15-85% RH
Low Humidity Alarm	40%	15-85% RH

3.4 Status

The operator can monitor the percentage heating, cooling, dehumidifying and humidifying status of the unit by selecting the STATUS submenu.

3.5 Active Alarms

The operator can monitor the alarms status by selecting ALARMS, which will display a “No Alarm Present” or “Alarm XX of YY” alert and description. If more than one alarm is activated, use the UP or DOWN arrow to scroll through the alarms list. (“XX” reference is the number of the alarm shown, while the “YY” reference is the total number of alarms activated).

3.6 Time

The controller time clock must be set to allow for the setback control. The clock uses the 24 hour system (i.e., 12 midnight is entered 24:00). To change the time press ENTER to select the function, then use the UP or DOWN arrow to change the first character, press enter to store, then press the UP or DOWN arrow to change the section character, press ENTER to store, etc. There is a battery backup for the date and time feature.

3.7 Date

The controller date must be set to allow for setback control. To change the date press ENTER, then use the UP or DOWN arrow to change the first character, press ENTER to store, press the UP or DOWN arrow to change the second character, etc.

3.8 Setback

The microprocessor can be programmed for night and weekend setback. Two (2) events can be programmed for a five-day workweek and two (2) events can be programmed for a two-day weekend. The following table can be used to devise a setback plan.

Table 15 Night and weekend setback plan

Event	Weekend	Weekday
Time 1		
Temperature1		
Sensitivity 1		
Humidity 1		
Humidity Sensitivity 1		
Time 2		
Temperature 2		
Sensitivity 2		
Humidity 2		
Humidity Sensitivity 2		

3.9 Setup Operation

Selecting SETPOINT/SETUP from the Main Menu will display the following selections:

- RESTART TIME DELAY
- C/F DEGREES
- HUMIDITY CONTROL METHOD

Use the UP and DOWN arrows to scroll through the submenu. Press ENTER to select a particular function.

3.9.1 Restart Time Delay

This function delays unit restart after main power is restored to the unit. If several systems are operating, the time delays should be set to different values to cause a sequential start. Delay can be set from 0.1 minutes (6 seconds to 9.9 minutes. Setting the value to zero (0) will prevent unit restart when power is restored. In this case, the unit must be restarted manually by pressing the I/O button on the keypad.

3.9.2 C/F Degrees

The control may be selected to show readings and setpoints in either degrees Fahrenheit (°F) or Celsius (°C). To change the value use ENTER to select this function, then use the UP or DOWN arrow to change the value. Press ENTER to store the value.

3.9.3 Humidity Control Method

The operator may select either relative (direct) or absolute (predictive) humidity control. If *relative* is selected, the RH control is taken directly from the RH sensor. If *absolute* is selected, the RH control is automatically adjusted whenever return air temperature deviates from the desired temperature setpoint (i.e., predictive humidity control). The LCD display will indicate percentage relative humidity for both methods of control. If the *absolute* feature is selected, the adjusted humidity reading will also be shown. When utilizing the predictive humidity control feature, the humidity level is automatically adjusted ~2% RH for each degree difference between the return air temperature and the temperature setpoint.

In terms of relative humidity control, unnecessary dehumidification can result when overcooling occurs during a dehumidification cycle. This is due to a higher than normal RH reading caused by overcooling the room (about 2% RH for each degree of overcooling). This drop in temperature extends the dehumidification cycle. Later, when the dehumidification ends and the temperature rises to the setpoint, the RH reading falls. The final RH reading will then be lower than actually desired. If the temperature drop was significant enough, the percentage RH could be low enough to activate the humidifier.

If the absolute humidity control is selected, over-dehumidification may be avoided. When overcooling occurs (i.e., causing an increase in the RH reading) the humidity control program estimates what the RH will be when the dehumidification cycle ends and temperature returns to the setpoint. This allows the dehumidification cycle to end at the proper time. The predictive humidity control can greatly reduce energy consumption by minimizing both compressor/reheat operation. Use the UP or DOWN arrow to select the desired humidity control method.

Table 16 Setup functions, default values and allowable ranges

Function	Default	Range
Restart Time Delay	0.1	0 to 9.9 min (0 = manual restart)
C/F Degrees	°F	°C or °F
Humidity Control	Rel	Relative or Absolute

3.10 Change Passwords

The display will prompt the operator to enter a three-digit password when attempting to make changes. The system includes two (2) passwords, one for setpoints and one for setup. The system allows the password to be changed by first entering the default password set at the factory (1-2-3) for setpoints and (3-2-1) for setup. The password function provides system security, so that only authorized personnel are allowed to make changes to the system. (If unauthorized changes are being made, the passwords may be compromised and new ones should be selected). The password function can be disabled by setting DIP switch 8 in the wallbox to OFF.

3.11 Calibrate Sensors

The temperature and humidity sensors can be calibrated by selecting the CALIBRATE SENSORS menu item. The temperature sensor can be calibrated ±5°F, while the humidity sensor can be calibrated ±10% RH. When calibrating the humidity sensor, the value shown will always be% RH, even though absolute humidity control may be selected. If absolute humidity control is selected, the Normal Status Display will display the adjusted reading. This reading may not agree with the relative humidity reading displayed while in calibration.

If the sensors are subject to frequent wide temperature and humidity swings, it may be necessary to shorten the cycling by increasing the sensor response time delay. If the sensors are located too close to the air discharge, they will likely experience rapid swings in measurement. The factory default is 30 seconds. Another method in reducing compressor cycling is to increase the temperature and/or humidity sensitivity.

3.12 Alarm Enable

Each alarm can be disabled or enabled. Use the UP or DOWN arrow to select a particular alarm, press ENTER to select either ENABLE or Disable. Then press ENTER again to store the change. When the alarm is disabled it will NOT report to either the wallbox beeper or the common alarm relay.

NOTE

The high water alarm will automatically shut the unit off. Similarly, optional factory-installed smoke detectors are wired to shut the evaporator unit off, regardless of the enable/disable status.

3.13 Alarm Time Delay

Each individual alarm can be programmed with a time delay (**Table 17**), causing the unit to delay a specified amount of time (0-255 seconds) before recognizing the alarm. The alarm condition must be present for the full amount of the time delay before the alarm will sound. If the alarm condition is diverted prematurely, the alarm will not be recognized and the time delay will automatically reset.

NOTE

For software alarms such as "loss of power" and "short cycle," the time delay should be left at the factory default of 0.

Table 17 Alarm default time delays

Alarm	Default Time Delay (seconds)
Custom Alarm #1	0
Custom Alarm #2	6
High Temperature	30
Low Temperature	30
High Humidity	30
Low Humidity	30
Short Cycle	0
Loss of Power	0
Humidifier Problem	2
High Head Pressure	2

3.14 Common Alarm Enable

Each individual alarm can be selected to activate/deactivate the common alarm relay. If the energize common alarm function is set to YES, the relay is energized immediately as the alarm is annunciated and de-energized when the alarm condition is diverted after the alarm has been recognized. If the alarm is completely DISABLED, the alarm has no effect on the common alarm relay. Use the UP or DOWN arrow to scroll to a particular alarm, press the ENTER button to select it, then press the ENTER key again to select YES or NO.

3.15 Custom Alarms

The custom alarm messages can be selected from a list of standard alarm messages or the operator can write his/her own message. A MAXIMUM OF TWO (2) ALARM MESSAGES CAN BE CUSTOMIZED. The two custom alarm messages will initially display the previously programmed message but can be changed.

The text for custom alarms can be changed at any time by selecting CUSTOM ALARMS. To change the text for a custom alarm, select the alarm you would like to change, 1 or 2. Using the UP or DOWN arrow, step through the list of seven standard alarm messages (listed below) and two custom alarms. Select the alarm message desired and store it by pressing ENTER.

- SMOKE DETECTED
- WATER FLOW LOSS
- SMOKE DETECTED
- LOSS OF AIR FLOW
- HUMIDIFIER PROBLEM
- FILTER CLOG

3.16 Custom Text

To modify the two custom alarm messages select CUSTOM TXT. Then select CUS TXT #1 or CST TXT #2. Text can be up to 20 characters in length and can be either a blank space or any of the following alphanumeric characters and symbols:

- A,B,C,D,E,F,G,H,I,J,K,L,M,N,O,P,Q,R,S,T,U,V,W,X,Y,Z
- #,%,*,-
- 0,1,2,3,4,5,6,7,8 or 9

Use the UP or DOWN arrow to select a character, then press ENTER. The cursor will move to the next space where you may once use the UP or DOWN arrow to select another character, etc.

LCD Display Contrast

The level of contrast due to the viewing angle of the LCD display can be adjusted using a potentiometer screw, inside the wallbox next to the display.

Nonvolatile Memory

All critical information is stored in nonvolatile memory. Setpoints, setup parameters and component run hours are kept inside the microcontroller in EEPROM.

Equipment Options Switches

Equipment options are selected and enabled using DIP switches 1 through 7. These are located on the control board near TB1. These switches are factory set and should not require any user changes. The setting and function of the switches can be individually read on the LCD display.

NOTE
In order to update the dip switch settings, power must be cycled off, then on, from the unit disconnect switch.

Table 18 Equipment Switch Settings (Unit Control Board)

Switch	OFF Position	ON Position
1	Compressor	Chill Water
2	Staged Reheat	n/a
3	Not Used	Not Used
4	Not Used	Not Used
5	Enable Reheat	Disable Reheat
6	Enable Humidifier	Disable Humidifier
7	Enable Dehumidifier	Disable Dehumidifier
8	Electric Reheat	n/a

Table 19 Switch settings (wall box board)

Switch	OFF Position	ON Position
1	Beeper Disable	Beeper Enable
2	Not Used	Not Used
3	Not Used	Not Used
4	Not Used	Not Used
5	Not Used	Not Used
6	Not Used	Not Used
7	Disable Setback	Enable Setback
8	Enable Password	Disable Password

3.17 Run Diagnostics

By selecting RUN DIAGNOSTICS, maintenance personnel can check system inputs, outputs and conduct a test of the microcontroller circuit board from the wall box control. A review of the system inputs and the microcontroller test can be done without interrupting normal operation.

Test Outputs

When this feature is selected, the unit is effectively turned off. When stepping from one load to the next, the previous load is automatically turned off. The loads can also be toggled on/off by selecting ENTER. Once turned on, the output will remain on for five minutes unless toggled off or the test outputs function is exited by selecting MENU/ESC (compressor is limited to 15 seconds on to prevent damage).

CAUTION

Testing compressor output for more than a few seconds could damage the compressor. To eliminate damaging the compressor during testing, DO NOT test compressor output for more than a few seconds.

CAUTION

Extended unit operation in the test outputs mode for troubleshooting may cause damage to unit. DO NOT operate unit in the test outputs mode any longer than is necessary for troubleshooting.

NOTE

Fan turned on with all loads.

The outputs are as follows:

- Main Fan
- Comp1
- C1 & HGBP
- Comp2
- C2 & HGBP
- C1 & C2
- Chill Water/Gly (if present)
- Reheat 1
- Reheat 2
- Humidifier
- Common Alarm

Test Inputs

With the unit on and the fan running, the input states may be displayed for the following devices:

- Input Power.
- High Water in Pan
- High Head Comp1
- High Head Comp2
- Air sail switch (requires additional factory-installed components).
- Filter Clog
- Humidifier Prob.
- Custom Alarm #1
- Custom Alarm #2
- Custom Alarm #3)

Test Control Board

By selecting this function, the microcontroller will perform a self test lasting approximately 10 seconds. When the test is complete, the display will show the ROM checksum, ROM part number and firmware revision number.

Figure 20 Control menu

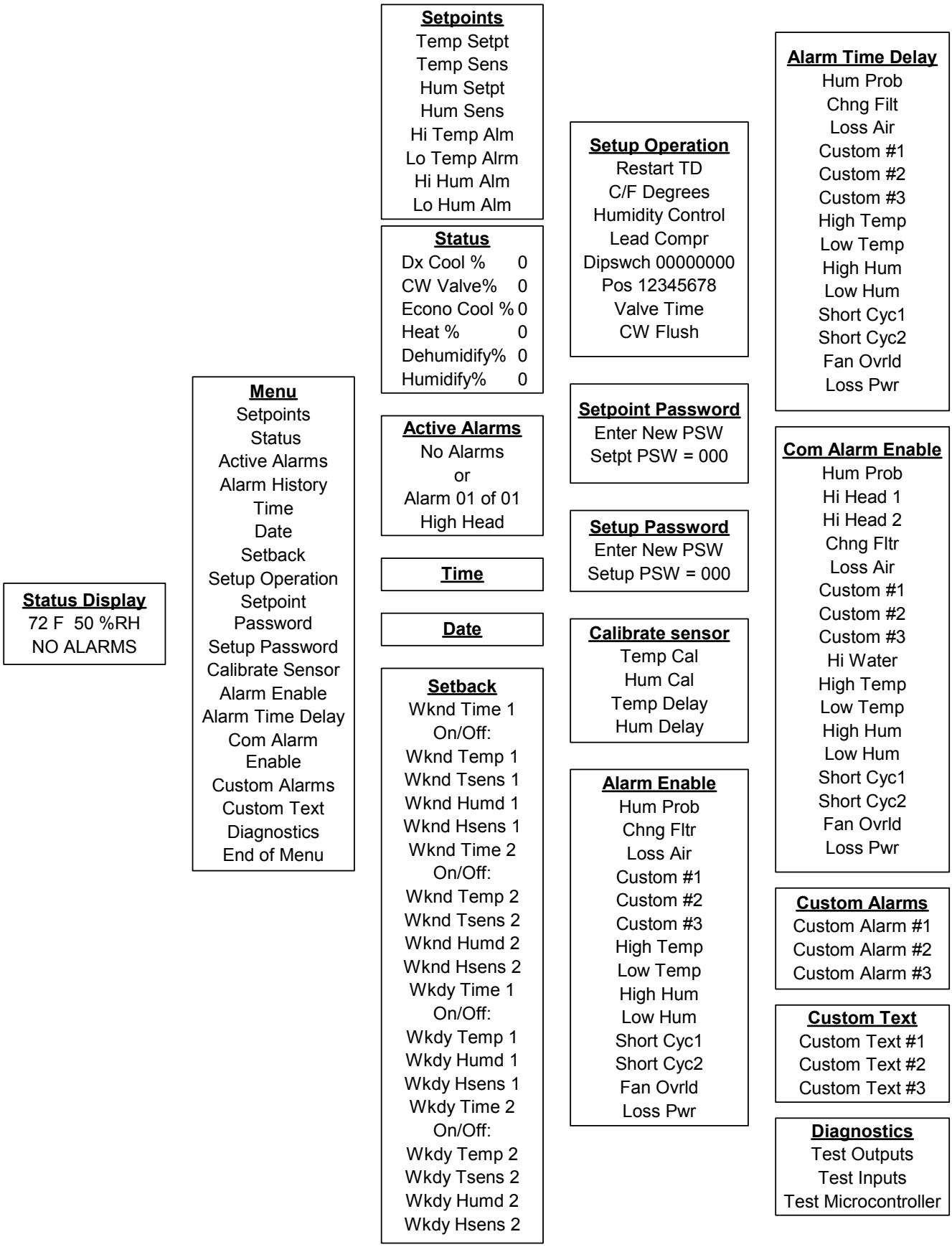
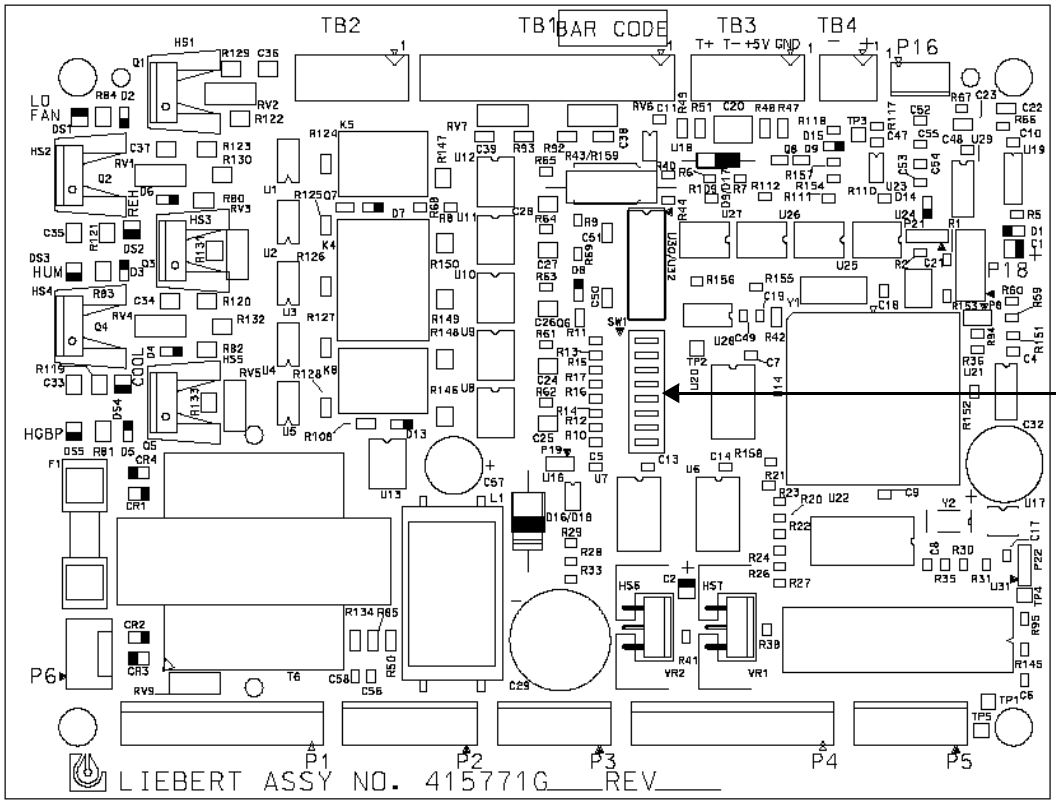
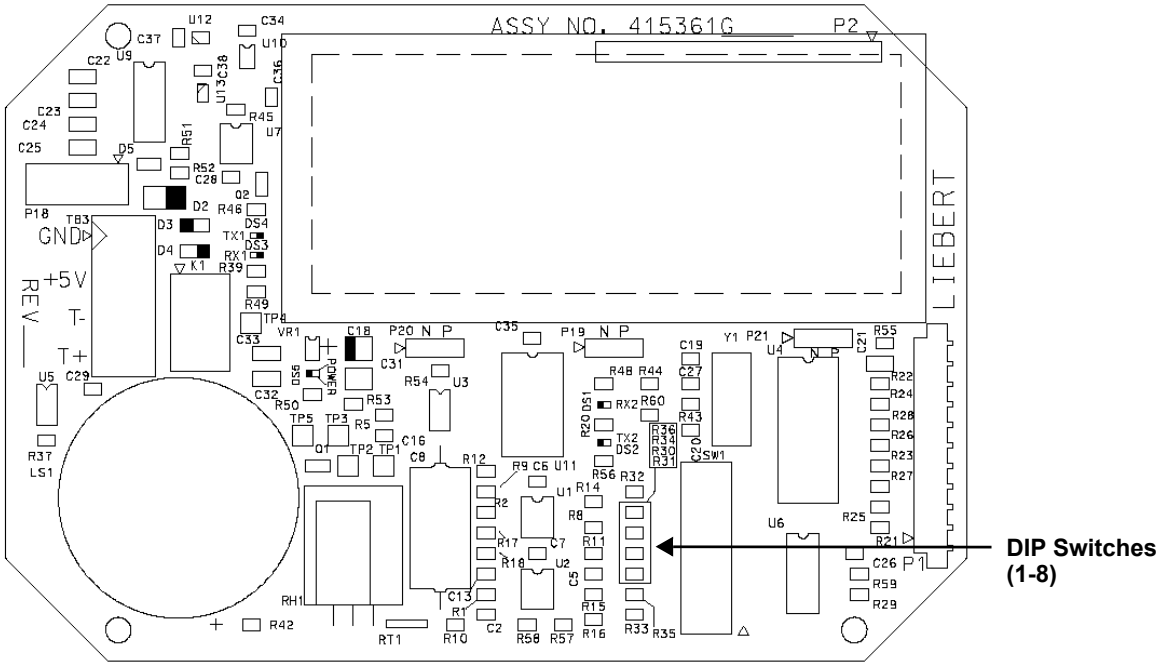


Figure 21 Control board (inside evaporator)



TB2-4	Hot Gas Bypass
TB2-3	High Head Alarm Connection
TB2-2	Heat Rejection
TB2-1	Heat Rejection
TB1-9	Condensate Pump Aux Alarm
TB1-8	Condensate Pump Aux Alarm
TB1-7	Common Alarm Connection
TB1-6	Common Alarm Connection
TB1-5	Remote Shutdown
TB1-4	Remote Shutdown
TB1-3	Customer Alarm Connection #2
TB1-2	Customer Alarm Connection #1
TB1-1	Customer Alarm Connection (Common)
TB3-4	Connection to TB3 pin 4 of wall box
TB3-3	Connection to TB3 pin 3 of wall box
TB3-2	Connection to TB3 pin 2 of wall box
TB3-1	Connection to TB3 pin 1 of wall box
TB4-2	Site Monitoring Connection (-)
TB4-1	Site Monitoring Connection (+)
P16	Remote Sensor Connection

Figure 22 Wall box board



4.0 SYSTEM PERFORMANCE, MICROPROCESSOR CONTROLS

This section provides a detailed description of how the DataMate responds to operator inputs and room conditions.

4.1 Temperature Control

4.1.1 Cooling/Heating Required

The temperature control program for the microprocessor is based on a calculated percentage requirement for cooling/heating.

4.1.2 Cooling Operation (Compressorized Direct Expansion and Chilled Water)

Cooling is ACTIVATED when the temperature control calculates a requirement for cooling of 100%. It is DEACTIVATED when the cooling requirement drops below 50%. The optional hot gas bypass is energized when a call for cooling occurs, unless there is also a call for dehumidification.

Table 20 Cooling and dehumidification load response of hot gas bypass

Situation	Hot Gas Bypass
Cooling only	ON
Dehumidification only	OFF
Cooling with Dehumidification	OFF

4.1.3 Heating Operation

Electric Heat

The reheat stage is ACTIVATED when the temperature control calculates a requirement of 100%. Conversely, the reheat is DEACTIVATED when the heat requirement is 50% less than the activation point.

4.2 Humidity Control

4.2.1 Dehumidification/Humidification Required

The humidity control is based on a calculated percentage requirement for dehumidification or humidification (i.e., the difference between the return air humidity and the humidity setpoint). As the return air humidity rises above the humidity setpoint, the percent dehumidification required increases proportionally from 0 to 100% over a humidity band equal to the humidity sensitivity setting. The converse is true for percent humidification requirement.

4.2.2 Dehumidification Operation, Compressorized Direct Expansion (DX) Systems

Dehumidification with the standard configuration is accomplished by operating the compressor without the hot gas bypass active. The fan will operate at low speed unless the cooling requirement reaches 100%. At that time, the low speed fan is disabled (unless manually overridden by the user) until the cooling requirement decreases to 0%. Dehumidification will also be disabled if the heating requirement exceeds 125%. It is re-enabled when the heating requirement reaches 50%.

4.2.3 Humidification Operation

The canister humidifier is activated when the humidity control calculates a requirement of 100% humidification and is deactivated when the humidification requirement falls below 50%.

4.3 Load Control Features

The control system monitors the compressor and prevents it from turning on within a 3 minute period of being off. If this on-off-on cycle occurs too often (e.g., 10 times in one hour) a Short Cycle Alarm will occur.

4.3.1 Communications

The control system uses a two-wire, RS-422 channel to communicate with Liebert Site Products via a proprietary protocol. A converter board (ECA2) is available to allow communications with a “dumb” terminal or a computer using RS-232 channel. More details are provided in the Site Products and ECA2 User Manual.

The communications channel provides both monitoring and control options, including:

- TEMPERATURE/HUMIDITY: Current temperature and humidity readings.
- STATUS (%), Cooling/heating and humidify/dehumidify operating status.
- PRESENT ALARMS: Alarms currently activated.
- SETPOINTS:
  - Temperature Setpoint
  - Temperature Sensitivity
  - Humidity Setpoint
  - Humidity Sensitivity
  - High Temperature Alarm
  - Low Temperature Alarm
  - High Humidity Alarm
  - Low Humidity Alarm
- ON/OFF STATUS and CONTROL
- SILENCE ALARM

5.0 ALARMS

The microprocessor control system will audibly and visually signal all enabled alarms (including two custom alarms). These special alarms can be chosen from the optional alarm list and/or can have their own fully custom text. The custom alarm inputs are contact closures wired from terminal TB1-1 through a normally open contact to either TB1-2 (alarm 1) or TB1-3 (alarm 2). The alarms can be enabled/disabled (refer to **3.0 - Microprocessor Control**) and a time delay of 0-255 seconds can be set. The alarms can also be programmed to either sound the alarm & activate the common alarm relay OR to sound the alarm only.

When a new alarm occurs, it is displayed on the screen and the audible alarm is activated. (If communicating with a Liebert Site Product, the alarm is also transmitted). The message PRESS ALARM SILENCE will prompt the operator to silence the alarm. After the alarm is silenced, the display will return to the Normal Status Display. Alarms can be reviewed by selecting the ACTIVE ALARMS feature. The alarms also can be silenced through communications with a Liebert Site Products Unit.

Many alarms will reset automatically when the alarm condition is no longer present and only after it has been acknowledged by being silenced. The exceptions are: 1) software alarms, i.e., Loss of Power and Short Cycle alarms will reset automatically 30 seconds after being silenced or acknowledged; and 2) specific alarms monitoring overload or high-pressure switches may require a manual reset depending upon the model.

5.1 Alarms: Definitions and Troubleshooting

The following list provides a definition and troubleshooting suggestions for each type of alarm. Refer to **8.0 - Troubleshooting** for additional details. If you need further assistance, contact your Liebert supplier. ALARMS MUST BE SPECIFIED AT THE TIME OF ORDER. OTHER DEVICES AND WIRING MAY BE REQUIRED AT THE FACTORY FOR SOME OF THE ALARMS.

5.1.1 Custom Alarms

Custom alarm(s) messages are programmed at the LCD display. The message displayed may be included in a list of provided alarms or it may be customized text (for up to 3 alarms). IF CUSTOMIZED TEXT IS USED, MAINTENANCE PERSONNEL SHOULD BE INFORMED OF THE ALARM FUNCTION AND THE REQUIRED ACTION.

5.1.2 High Head Pressure

Compressor head pressure is monitored with a pressure sensor switch. (One SPDT pressure switch is used.) If head pressure exceeds 360 psig, the switch turns off the compressor contactor and sends an input signal to the control. The condition is acknowledged by pressing the alarm silence button on the wall box, which will clear if high head pressure is alleviated. If the head pressure alarm has activated three times, the alarm will lock until the unit is serviced. After the head-pressure problem is fixed, reset the control by disconnecting power to the evaporator unit.

Air Cooled Systems

Check for power shut off to the condenser, condenser fans not working, defective head pressure control valves, dirty condenser coils or crimped lines.

Water/Glycol/ Systems

Check water regulating valves. Verify water/glycol flow (i.e., pumps operating and service valves open). Is water tower or drycooler operating? Is the coolant temperature entering the condenser at or below design conditions? Is AUX relay (terminals 70 & 71) operating during cooling to turn on the drycooler?

5.1.3 Humidity

The humidity alarm may be activated under the following conditions:

- **High:** The room return air humidity exceeds the pre-set high humidity alarm setpoint. Is the unit set up for dehumidification? Check DIP switch.
- **Low:** The room return air humidity decreases to the low humidity alarm setpoint. Is the unit setup for humidification? Check DIP switch.
- **High and Low Humidity (simultaneously):** The simultaneous display of two alarms results in loss of the humidity input signal. DASHES WILL BE DISPLAYED IN THE HUMIDITY READING DISPLAY. Under these conditions, the control system deactivates both humidification and dehumidification. Check for a disconnected cable or failed sensor.

NOTE

Check for proper setpoints. Does the room have a vapor barrier to seal it from outdoor humidity? Are doors or windows open to outside air?

5.1.4 Temperature

The temperature level alarm may be activated under the following conditions:

- **High:** The room return air temperature increases to the high temperature alarm setpoint. Check for proper setpoint value. Is the room load more than the unit can handle (i.e., capacity too small)? Make sure cooling components are operating (compressor or valves).
- **Low:** The room return air temperature decreases to the low temperature alarm setpoint. Check for proper setpoint value. Make sure all heating components are operating (e.g., contactors, reheats, etc.). Are reheats drawing the proper current (refer to amp rating on nameplate).
- **High and Low (simultaneously):** The simultaneous display of these two alarms results in loss of the temperature input signal (or the humidity is out of sensor range-15 to 85% RH). Dashes will be displayed for the temperature reading. The control system will initiate 100% cooling. Check for a disconnected cable or a failed sensor.

5.1.5 Loss of Power

The Loss of Power alarm will activate (after power is restored to the unit) if the unit has lost power or the disconnect switch was incorrectly turned off before the unit ON/OFF switch was pressed. A Liebert remote monitoring unit (optional) will immediately indicate loss of power.

5.1.6 Short Cycle

A Short Cycle alarm will occur if a compressor system has exceeded 10 cooling start attempts in a one-hour period. This can be caused by low refrigerant level or if the room cooling load is small compared to unit capacity. Check for leaks, crimped lines and defective components. If the room load is low, increase the temperature sensitivity to reduce cycle.

5.2 Optional/Custom Alarms

5.2.1 Loss of Water Flow

The Loss of Water Flow alarm will occur if no water flow is detected in the chilled water or condenser water supply line. And external flow switch is required for this alarm. Check of service valves closed, pumps not working, etc.

6.0 SYSTEM TESTING AND MAINTENANCE

This section describes system testing, maintenance and replacement procedures. Use copies of the Maintenance Inspection Checklist to record preventive maintenance inspections.

WARNING

Unit contains hazardous electrical voltage. Disconnect power supply before working within. Line side of factory disconnect remains energized when disconnect is off.

6.1 System Testing

6.1.1 Environmental Control Functions

The performance of all control circuits can be tested by changing the setpoints, which activates each of the main functions.

6.1.2 Cooling

To test the cooling function, set the setpoint to a temperature of 10°F (5°C) below room temperature. A call for cooling should register and prompt the equipment to begin cooling cycle. (Disregard any temperature alarms.) Upon completion of testing, return setpoint to the desired temperature.

6.1.3 Heating

Reheat may be tested by setting the setpoint 10°F (5°C) above room temperature. A call for heating should register and prompt the equipment to begin heating cycle. (Disregard any temperature alarms). Upon completion of testing, return setpoint to the desired temperature.

6.1.4 Humidification

To check humidification, set the humidity setpoint at RH 10% above the room humidity reading. After a short delay, the canister will fill with water and steam will be produced. Upon completion of testing, return the humidity setpoint to the desired humidity.

6.1.5 Dehumidification

The dehumidification performance can be tested by setting the humidity setpoint at RH 10% below room relative humidity. The compressor should turn on. Upon completion of testing, return humidity setpoint to the desired humidity.

6.1.6 Remote Shutdown

A connection point is provided for remote shutdown devices supplied by the customer. This terminal strip is located in the electric panel. (Terminals 37 and 38 are fitted with a jumper when no remote shutdown device is installed).

6.2 Maintenance

6.2.1 Electric Panel

The electric panel should be inspected on a semiannual basis for any loose electrical connections.

6.2.2 Filters

Filters are usually the most neglected item in an environmental control system. In order to maintain efficient operation, they should be checked monthly and changed as required. ALWAYS TURN POWER OFF BEFORE REPLACING FILTERS.

The washable filter is located behind the access door on the lower front of the fan coil unit.

6.2.3 Direct Drive Blower Package

Monthly inspection of the blower package includes: motors, motor mounts and impellers.

Fan Impellers and Motor Bearings

Fan impellers should be thoroughly inspected and any debris removed. Check to see if they are tightly mounted on the fan shaft and do not rub against the fan housing during rotation. Although the motor bearings are permanently sealed and self-lubricating and do NOT need lubricated, they should be inspected monthly for signs of wear.

Air Distribution

Since all unit models are designed for constant volume air delivery, any unusual restrictions within the air circuit must be avoided.

6.2.4 Refrigeration System

Each month the components of the refrigeration system should be inspected for proper function and signs of wear. Since in most cases evidence of malfunction is present prior to component failure, periodic inspections can be a major factor in the prevention of most system failures. Refrigerant lines must be properly supported and not allowed to vibrate against ceilings, floors or the unit frame. Inspect all refrigerant lines every six months for signs of wear and proper support. Inspect the capillary and equalizer lines from the expansion valve.

Suction Pressure

Suction pressure will vary with load conditions. Suction pressure normally ranges from 58 psi to 75 psi (405 kPa to 517 kPa).

Discharge Pressure

The discharge pressure will vary greatly with load and ambient conditions (**Table 21**). The high-pressure switch will shutdown the compressor at its cut-out setting.

Table 21 Typical discharge pressures

System Design	psig	(kPa)
Air Cooled	180-275	(1242-1895)
Water Cooled 65 to 85ºF water (18 to 29.4ºC)	200-225	(1380-1550)
Glycol Cooled	210-275	(1445-1895)
Maximum	330	(2275)
High-Pressure Cut-Out	360	(2480)

Thermostatic Expansion Valve

The thermostatic expansion valve keeps the evaporator supplied with enough refrigerant to satisfy load conditions. Proper valve operation can be determined by measuring superheat level. If too little refrigerant is being fed to the evaporator, then the superheat will be high. Conversely, if too much refrigerant is being supplied, then the superheat will be low. The correct superheat setting is between 10 and 15°F (5.6 and 8.3°C).

Air Cooled Condensing Units

Restricted airflow through the condenser coil will reduce the operating efficiency of the unit. Additionally, it can result in high compressor head pressure and loss of cooling. Using compressed air or commercial coil cleaner, clean the condenser coil of all debris that will inhibit airflow. In winter, do not permit snow to accumulate around the side or underneath the condenser. At the same time check for bent or damaged coil fins and repair as necessary. Check all refrigerant lines and capillaries for vibration and support as necessary. Carefully inspect all refrigerant lines for signs of oil leaks.

Coaxial Condensers (Water/Glycol Cooled Condensing Units)

Each water or glycol-cooled module has a coaxial condenser consisting of an exterior steel tube and an interior copper tube. If the water supply is clean, coaxial condensers do not normally require maintenance or replacement. Should your system begin to operate at high head pressure with reduced capacity and all other causes have been eliminated, the condenser may be obstructed or fouled and should be replaced.

Regulating Valves

The water regulating valve automatically regulate the amount of fluid necessary to remove the heat from the refrigeration system, permitting more fluid to flow when load conditions are high and less fluid to flow when load conditions are low. The valve consists of a brass body, balance spring, valve seat, valve disc holders, capillary tube to discharge pressure and adjusting screw.

The water regulating valve is designed to begin opening at 180 psi (1240 kPa) and be fully opened at 240 psi (1655 kPa). The valve is factory set and should not need adjustment. There is a significant difference in the way standard pressure and high-pressure valves are adjusted. Consult Liebert Service.

Glycol Solution Maintenance

It is difficult to establish a specific schedule of inhibitor maintenance since the rate of inhibitor depletion depends upon local water conditions. Analysis of water samples at time of installation and every six (6) months should help to establish a pattern of depletion. A visual inspection of the solution and filter residue is often helpful in judging whether or not active corrosion is occurring. The complexity of problems caused by water requires expert advice from a water treatment specialist plus a regular maintenance program schedule. It is important to note that improper use of water treatment chemicals can cause severe problems.

Proper inhibitor maintenance must be performed in order to prevent corrosion of the glycol system. Consult your glycol manufacturer for proper testing and maintenance procedures. Do not mix products from different manufacturers.

Hot Gas Bypass (Optional)

Operation

When applying hot gas bypass with split system condensing units, bypassing discharge gas to the compressor suction line offers more flexibility than conventional hot gas bypass to the evaporator unit.

The hot gas bypass valve is installed between the compressor discharge piping and suction piping, bypassing the condenser and evaporator coils. The discharge gas mixes with the suction gas, raising the suction temperature and pressure and decreasing the mass flow through the evaporator. The higher suction temperatures could cause compressor overheating, therefore a separate liquid quenching valve is provided to mix refrigerant from the system liquid line with the discharge gas before mixing with the suction gas entering the compressor.

During normal operation, when the evaporator is under full load the hot gas bypass equalizer pressure will remain high enough to keep the valve port closed. If the evaporator load decreases, the evaporator temperature and pressure will drop. When the suction pressure reduces below the hot gas bypass valve setting the hot gas bypass valve opens diverting some of the refrigerant flow back to the compressor suction. The liquid quenching valve bulb senses this increased superheat and opens, allowing liquid refrigerant to mix with the discharge gas, desuperheating it.

Proper mixing of the three refrigerant paths ensures stable operation and system performance. The liquid quenching valve bulb must be located downstream of all these connections to control superheat at the compressor inlet. Superheat settings for the liquid quenching valve are chosen to maintain consistency with the system expansion valve. During hot gas bypass operation higher superheats, 25-40°F (14-22°C), may be observed at the compressor. The liquid quenching valve is internally equalized and superheat is not adjustable.

Adjustment

1. Install the suction and discharge pressure gauge.
2. Adjust temperature setpoint to call for cooling so that the refrigeration compressor will run continuously.
3. Remove the TOP adjusting nut from the valve.
4. Insert an Allen wrench in the brass hole at top of valve in adjusting port and turn CLOCKWISE if a higher evaporator temperature is required. Adjust no more than 1/4 turn at a time. Let the system stabilize for 15 minutes before determining if additional adjustment is necessary.
5. After obtaining the suction pressure required, reinstall cap tightly making sure there are no leaks.
6. Let the evaporator operate for approximately 10 to 15 minutes to make sure the suction pressure is within the range desired.
7. There may be a fluctuation of approximately 3 to 6 psig (21 to 41 kPa) on the evaporator due to the differential on the hot gas bypass.
8. Return temperature setpoint to the desired setting.

Replacement Procedures

Compressor Replacement—Infrequently, a fault in the motor insulation may result in a motor burnout (if system is properly installed, motor burnout rarely occurs). Primarily this type of failure is due to mechanical or lubrication problems, where the burnout is a secondary consequence.

Early detection can prevent a large percentage of the problems that can cause compressor failures. Periodic maintenance inspections by alert service personnel (i.e., identification of abnormal operation) can be a major factor in reducing maintenance costs. It is easier and more cost-effective to implement the necessary preventative steps that ensure proper system operation; rather than ignore a problem until it results in compressor failure and costly replacement. When troubleshooting a compressor problem, check all electrical components for proper operation:

CAUTION

Avoid touching or contacting the gas and oils with exposed skin. Severe burns will result. Use long rubber gloves in handling contaminated parts.

- Check all fuses and circuit breakers.
- Check pressure switch operation.
- If a compressor failure has occurred, determine whether its cause is an electrical or mechanical problem.

CAUTION

System contains refrigerant. Recover refrigerant before maintenance

Mechanical Failure—If you have determined that a mechanical failure has occurred, the compressor must be replaced. If a burnout occurs, correct the problem and clean the system. It is important to note that successive burnouts OF THE SAME SYSTEM are usually caused by improper cleaning. If a severe burnout has occurred, the oil will be black and acidic.

Electrical Failure—In the event of an electrical failure and subsequent burnout of the refrigeration compressor motor, proper procedures must be followed to thoroughly remove any acids that would cause a future failure. There are two kits that can be used with a complete compressor burnout - Sporlan System Cleaner and Alco Dri-Kleener. Follow the manufacturer's procedure. DAMAGE TO A REPLACEMENT COMPRESSOR DUE TO IMPROPER SYSTEM CLEANING CONSTITUTES ABUSE UNDER THE TERMS OF THE WARRANTY, THEREBY VOIDING THE WARRANTY.

Replacement compressors are available from your Liebert supplier and will be shipped to the job site in a reusable crate (as required by the service contractor). If the compressor is under warranty, it must be returned to Liebert in order to receive proper warranty credit. It should be returned in the same container the replacement was shipped in. The possible cause(s) or condition(s) of the damage should be legibly recorded on the provided return tag.

Proper procedures to remove and replace the failed compressor are:

1. Disconnect power
2. Attach suction and discharge gauges to access fittings.
3. Recover refrigerant using standard recovery procedures and equipment.

NOTE

Release of refrigerant to the atmosphere is harmful to the environment and unlawful. Refrigerant must be recycled or discarded in accordance with federal, state and local regulations.

4. Remove failed compressor.
5. Install replacement compressor and make all connections. Pressurize and leak test the system at approximately 150 psig (1034 kPa) pressure.
6. Follow manufacturer's instructions for clean out kits.
7. Evacuate the system twice to 1500 microns and the third time to 500 microns. Break the vacuum each time with clean, dry refrigerant to 2 psig (13.8 kPa).
8. Charge the system with refrigerant (R-22) based on requirements of the evaporator, condensing unit and lines. Refer to the installation manual or the unit nameplate.
9. Apply power and operate the system. Check for proper operation. Refer to **Table 21** for discharge pressure.

6.2.5 Humidifier

The optional humidifier system consists of a water canister with an internal set of electrodes that generate the steam used for humidification. The steam is introduced into the air through a copper discharge tube in the coil bypass section.

The humidifier Run/Drain switch is located near the humidifier canister. This switch should be in the Run position when the humidifier is in normal operation and in the Drain position when a manual drain sequence is required.

The humidifier is designed to operate with water systems having 10 to 150 psig water pressure. Steam generating capacity is 3 lb/hr.

Humidifier Operation

1. During start-up, when the controller calls for humidification, the fill valve opens and water enters the canister. When the water level reaches the electrodes, current flows and heats the water. The canister fills until the amperage reaches the setpoint and the fill valve closes. As the water warms, its conductivity increases and the current rises. If the amperage reaches 115% of the setpoint, the drain valve opens momentarily. This reduces electrode contact with the water and lowers the current to 100%. Boiling soon commences and the canister operates normally.
2. Normal operation is controlled by a time cycle which is factory set at 60 seconds. At the end of each cycle, the fill valve opens to replenish the water boiled off so a “steady state” is maintained.
3. If the conductivity of the water is low, the fill valve will remain open. Before the amperage reaches setpoint, the water level may reach the overflow tube and drain. Boiling should commence in time. As water is boiled off, the mineral concentration in the canister increases. The humidifier eventually reaches full output and goes into normal operation. Refer to **Circuit Board Adjustments on page 52** for the “%” pot.
4. During canister operation, the mineral concentration increases and water boils off rapidly. The current decreases quickly because water contacts less electrode surface. When the current decreases to the low threshold point before the end of the time cycle, the drain valve opens. The mineral laden water drains out and is replaced with fresh water. This lowers the mineral concentration and returns the canister to “steady state” operation and prolongs canister life. The frequency of drains depends on water conductivity.
5. The electrode surface will eventually become coated with a layer of insulating material, which causes a drop in current flow. The water level in the canister will slowly rise exposing new electrode surface to the water to maintain normal output. Eventually, the steady state water level will reach the overflow tube and continuously drain water out of the canister. Steam capacity will decline. At this point, all of the electrode surface has been used up and the canister should be replaced.

NOTE

When the unit stays in humidification mode and no longer produces steam, the humidifier canister needs to be replaced.

6. If the mineral concentration is too high, arcing can occur. If the electrodes start to arc, turn off the humidifier immediately and replace the canister.

See **Page 52** for instructions for replacing the canister.

Circuit Board Adjustments

WARNING

Circuit board adjustment should be performed by qualified personnel only. Hazardous voltages are present in the equipment. Use extreme caution. Power may be disconnected while making adjustments.

Humidifier operation is governed by the humidifier control board. This board is located on the left side of the evaporator unit. Three potentiometers are mounted on the board. These pots can be used to adjust for extreme water conductivity conditions and capacity.

The "%" pot controls the amperage at which the drain will energize. This adjustment is factory set at 70%, which indicates that the unit will drain when the amperage decreases to 70% of the setpoint. The% value should be increased for highly conductive water and decreased for less conductive water. If a change of three to four percent in either direction does not resume normal operation, consult Customer Service and Support.

The pot marked "cap adj" controls humidifier capacity. It is factory set at 65%. Adjustment may be required if more humidification is needed.

NOTE

If condensation occurs on the discharge grille, reduce humidifier capacity.

The pot marked "sec" controls the duration of the drain cycle. This adjustment is factory set at 60 seconds. Consult Customer Service and Support before adjusting either of these two pots.

Replacing the Humidifier Canister

The proper procedure to replace the humidifier canister is:

1. Turn off the humidifier by lowering the humidity setpoint below the ambient humidity level. Record the original setpoint.
2. Turn unit off at wallbox.
3. Place the RUN/DRAIN switch in the DRAIN position to drain the water from the canister.
4. Return the RUN/DRAIN switch to the RUN position after the canister has drained.
5. Turn OFF the power at the main unit.
6. Remove the cover from the humidifier cabinet.
7. Locate the power wires to the steam canister. They are connected to the canister with 1/4" quick connects. Make note of the wiring configuration before removing any wires. Refer to schematic on unit. Slide the rubber boot back to expose the connections. Remove the three (3) power wires and the canister full wire. Do not loosen the screws that secure the electrodes.

WARNING

Canister and steam hose may be hot! Allow time for the humidifier to cool before replacing parts.

8. Loosen the steam outlet hose clamps and slide the steam hose away from the canister fitting.
9. Remove the canister.
10. Reverse previous steps to reassemble humidifier, paying special attention to the following:
    - sealing the O-ring on the canister
    - making sure the steam outlet hose is connected without leaks
    - connecting the power wire correctly
    - returning the run/drain switch to the "run" position
    - checking to make sure no leaks are present

7.0 MAINTENANCE INSPECTION CHECKLIST

Date: _____ Prepared By: _____

Model #: _____ Serial Number: _____

NOTE

Regular inspections are necessary to assure proper cleanliness. Should inspection reveal corrosion particles on the reheating element or adjoining surfaces (including ducts and plenums), appropriate cleaning should be performed. Periodic reheating element replacement may be required to meet specific application requirements.

MONTHLY

Filters

___ 1. Check for restricted airflow.
___ 2. Check for filter.
___ 3. Wipe section clean.

Fan Section

___ 1. Impellers free of debris and move freely
___ 2. Bearings in good condition

Humidifier

___ 1. Check canister for mineral deposits.
___ 2. Check condition of electrodes.
___ 3. All hoses and fittings tight.
___ 4. Check water make-up valve for leaks.

System, Including Condensate Pump

___ 1. Check and clean out unit drain lines, humidifier and drain, condensate pump and building drain lines

SEMIANNUALLY

Compressor Section

___ 1. Signs of oil leaks
___ 2. Vibration isolation

Refrigeration Cycle

___ 1. Suction pressure
___ 2. Head pressure
___ 3. Superheat
___ 4. Evaporator coil clean
___ 5. Insulation intact

Air Cooled Condensing Unit (if applicable)

___ 1. Condenser coil clean
___ 2. Motor mount tight
___ 3. Bearings in good condition
___ 4. Refrigerant lines properly supported

Flood Back Head Pressure Control

___ 1. Check refrigerant level

Water or Glycol Cooled Condensing Unit

___ 1. Water valve adjustment
___ 2. Water flow
___ 3. Water leaks

Glycol Pump (if applicable)

___ 1. Glycol leaks
___ 2. Pump operation
___ 3. Glycol solution
___ 4. pH level

Electric Panel

___ 1. Check electrical connections
___ 2. Operational sequence

Electric Reheat

___ 1. Check element for signs of corrosion.

Notes:

_____

_____

_____

_____

Signature: _____

Make photocopies of this form for your records

8.0 TROUBLESHOOTING

Table 22 Troubleshooting

Symptom	Possible Cause	Check Or Remedy
Unit will not start	No power to unit	Check voltage at input terminal block.
	Control voltage circuit breaker (at transformer) open	Locate short and reset circuit breaker.
	Float switch relay has closed due to high water in the condensate pump sump.	Check drain and line as well as for failed pump. Access through left panel. Power must be cycled at the disconnect to reset.
	Jumper not in place	Check terminal 37 and 38 for jumper or N/C contact. Check pins P39-1 and P39-2 for jumper or N/C firestat contact.
No cooling	"Cooling" is not displayed at the control panel.	Adjust TEMP control setpoint and sensitivity to require cooling.
	Short cycle prevention control	Control software delays compressor 3 minutes cooling, from stop to start
	Compressor contactor not pulling in.	Check for 24VAC ± 2VAC at terminals TB5-1 and TB5-2. If voltage, check contactor.
	Compressor high head pressure	See below for cause.
	Plugged filter/dryer.	Replace filter/dryer.
	Low refrigerant charge.	Check pressure gauges. At low ambient temperatures, proper refrigerant charge is very important on units with Lee-Temp receivers.
Compressor high head pressure	Insufficient air flow across condenser coil	Remove debris from coil and air inlets.
	Water/Glycol Cooled only: No fluid flowing through condenser.	Check fluid supply to regulating valve. Adjust valve if necessary.
	Condenser fan not operating	Check fan operation.
Humidifier does not operate	DIP switch not set to enable humidifier option	See DIP switch settings.
	"HUMIDIFY" not displayed at control panel	Increase humidity control setpoint and sensitivity to require humidification.
	Defective board	Check voltage at P3-1 and P3-2 on interface board for 24VAC ± 2VAC. If no voltage, check wiring and/or replace board. Check wiring from control panel to humidifier circuit board.
	Failed humidity sensor	Humidity display will indicate dashes. Check wiring from temperature/ humidity board to the control board and from the wall box to the control board. Replace wallbox or temperature/humidity circuit board (if remote).
	No water flow	Make sure switch is in Run position. Check humidifier water supply (including filter screen) and check nylon overflow line if canister is full.
	Canister fill rate is not keeping up with the steam output	Check fill valve screen opening and capillary tube for obstructions. Check water supply pressure (minimum 10 psig).
Reheat will not operate	DIP switch not set to enable reheat option	See DIP switch settings.
	"HEAT" not displayed at the control panel	Increase temperature setpoint to require heating.
	Reheat safety open, defective reheat contact or defective board	Check voltage at P2-1 or P2-2 to P34-10 on control board for 24VAC ± 2VAC. If voltage, check reheat contactor and reheat safety. If no voltage, check wiring and/or replace board.
	Element is burned out	Turn off power. Check element continuity with Ohm meter.

Table 22 Troubleshooting (continued)

Symptom	Possible Cause	Check Or Remedy
Cooling cycle too short	Sensor response delay too short	Increase sensor response delay. See **3.11 - Calibrate Sensors**.
Display freezes and control pads do not respond	Static discharge	During period of low humidity, static electricity can cause the control program to freeze or display incorrect information. Although this is unlikely, the control can be reset by cycling power from the disconnect switch.
Condensate pump does not operate	Open or short circuit in wiring	Find open or short circuit and repair power to pump.
Continuous cooling	Failed temperature sensor	Temperature display will indicate dashes. Check wiring from temperature/humidity board (remote sensors) to the control board or from control board to wallbox. Replace temperature/humidity circuit board (remote sensors) or wallbox.
Continuous Heating Dehumidification Humidification	Shorted wiring or failed control board	Check wiring and/or replace control board.
No fan operation at low speed when selected at control panel	Open wiring or failed interface board	Verify “LOW FAN” is displayed at the control panel. Check for 24VAC ± 2VAC at terminals P1-6 and P1-7. If no voltage, check wiring and/or replace interface board.
No fan operation at low speed during dehumidification	Temperature is more than 2°F above the HIGH TEMP setpoint	Verify with display. COOL requirement overrides DEHUMIDIFY.
Display	Incorrect wiring	Review section **2.4.3 - Electrical Connections**. Verify VDC between 5 and 6 volts at TB-3 Pin 1 (ground) and TB-3 Pin 2 of the control board and wall box. If the transmit lines (TB-3 Pin 3 & 4) are not connected, only the power LED will be lit. It will flash once every 10-12 seconds. If T- is connected but not T+, TX1 will flash about every 2-3 seconds, and the power LED will flash once every 10-12 seconds. If T+ and T- are reversed, the power LED and RX1 Will be lit and flash every 10-12 seconds. NOTE: Erratic operation of the unit could occur. If no LED is lit, there is no power or the +5VDC polarity is reversed. If any of these conditions occur, remove power from the evaporator using the disconnect switch, and correct the wiring from the control board to the wall box. NOTE: It may take up to 20 seconds for the display to appear on the wall box LCD after power is applied.

NOTES

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Technical Support/Service

Web Site
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800-543-2378
powertech@liebert.com

Environmental Systems
800-543-2778

Outside the United States
614-888-0246

Locations

United States
1050 Dearborn Drive
P.O. Box 29186
Columbus, OH 43229

Italy
Via Leonardo Da Vinci 8
Zona Industriale Tognana
35028 Piove Di Sacco (PD)
+39 049 9719 111
Fax: +39 049 5841 257

Asia
23F, Allied Kajima Bldg.
138 Gloucester Road
Wanchai
Hong Kong
+852 2 572 2201
Fax: +852 2 831 0114

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