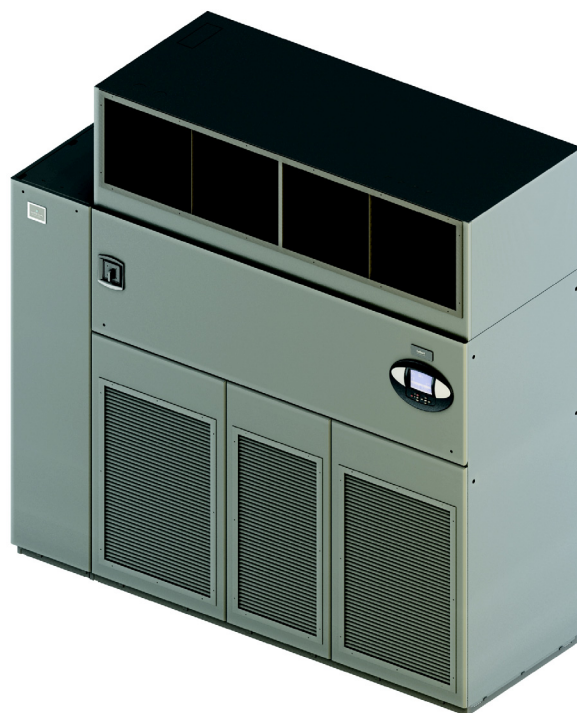


# Liebert® DSE™

User Manual—Downflow, 80-150kW, 23-43 Tons; Upflow, 80-85kW, 23-24 Tons; 50/60Hz





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## IMPORTANT SAFETY INSTRUCTIONS

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### SAVE THESE INSTRUCTIONS

This manual contains important safety instructions that should be followed during the installation and maintenance of the Liebert DSE. Read this manual thoroughly before attempting to install or operate this unit.

Only qualified personnel should move, install or service this equipment.

Adhere to all warnings, cautions and installation, operating and safety instructions on the unit and in this manual. Follow all operating and user instructions.



#### WARNING

Arc flash and electric shock hazard. Open all local and remote electric power disconnect switches and wear personal protective equipment per NFPA 70E before working within the electric control enclosure. Failure to comply can cause serious injury or death.

Customer must provide earth ground to unit, per NEC, CEC and local codes, as applicable.

Before proceeding with installation, read all instructions, verify that all the parts are included and check the nameplate to be sure the voltage matches available utility power.

The Liebert iCOM® microprocessor does not isolate power from the unit, even in the “unit off” mode. Some internal components require and receive power even during the “unit off” mode of Liebert iCOM control.

The factory-supplied optional disconnect switch is inside the unit. The line side of this switch contains live high-voltage.

The only way to ensure that there is NO voltage inside the unit is to install and open a remote disconnect switch. Refer to unit electrical schematic.

Follow all local codes.



#### WARNING

Risk of explosive discharge from high-pressure refrigerant. Can cause injury or death.

This unit contains fluids and gases under high pressure. Relieve pressure before working with piping.



#### WARNING

Risk of refrigerant system rupture or explosion. Can cause equipment damage, injury or death.

Do not exceed the design pressure rating that is marked on the nameplate.

Do not install a shutoff valve between the compressor and the field-installed pressure relief valve.

For systems requiring EU CE compliance (50Hz), the system installer must provide and install a discharge pressure relief valve rated for a maximum of 650 psig (45bar) in the high side refrigerant circuit. The pressure relief valve must be CE-certified to the EU Pressure Equipment Directive by an EU “Notified Body.”



#### WARNING

Risk of very heavy 145 lb (65.7kg) fan modules dropping downward suddenly. Can cause injury or death.

Support fan modules before removing mounting hardware. Use caution to keep body parts out of the fan modules pathway during repositioning. Only properly trained and qualified personnel should work on this equipment.



## WARNING

Risk of improper moving. Can cause equipment damage, injury or death.

Use only lifting equipment that is rated for the unit weight by an OSHA-certified rating organization. Shipping weights and unit weights are listed in **Table 2** and **Figure 7**. Use the center of gravity indicators (see **Figure 18**) on the unit to determine the position of the slings. The center of gravity varies depending on the unit size and selected options. The slings must be equally spaced on either side of the center of gravity indicator.



## WARNING

Risk of contact with high-speed rotating fan blades. Can cause injury or death.

Open all local and remote electric power disconnect switches and verify that the fan blades have stopped rotating before working in the unit.

Do not operate unit with any or all cabinet panels removed.



## CAUTION

Risk of sharp edges, splinters, and exposed fasteners. Can cause injury.

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



## CAUTION

Risk of contact with hot surfaces. Can cause injury.

The compressors, fan motors, refrigerant discharge lines, humidifiers and reheats are extremely hot during unit operation. Allow sufficient time for them to cool before working within the unit cabinet. Use extreme caution and wear protective gloves and arm protection when working on or near hot compressors, fan motors, discharge lines, humidifiers and reheats.



## CAUTION

Risk of improper handling of cabinet panels. Can cause personal injury and equipment damage.

Cabinet panels can exceed 5ft. (1.5m) in length and weigh more than 35lb. (15.9kg). Follow relevant OSHA lifting recommendations and consider using a two-person lift for safe and comfortable removal and installation of cabinet panels. Only properly trained and qualified personnel wearing appropriate safety headgear, gloves and shoes should attempt to remove or install cabinet panels.



## NOTE

*The Liebert indoor cooling unit has a factory-installed high-pressure safety switch in the high side refrigerant circuit. Consult local building codes to determine whether the Liebert Premium Efficiency Control (PCB) condensers will require field-provided pressure relief devices.*

## NOTICE

Risk of clogged or leaking drain lines. Can cause equipment and building damage.

This unit requires a water drain connection. Drain lines must be inspected regularly and maintenance must be performed to ensure that drain water runs freely through the drain system and that lines are clear and free of obstructions and in good condition with no visible sign of damage or leaks. This unit may also require an external water supply to operate.

Improper installation, application and service practices can result in water leakage from the unit. Water leakage can result in severe property damage and loss of critical data center equipment.

Do not locate unit directly above any equipment that could sustain water damage.

Emerson recommends installing leak detection equipment for unit and supply lines.

## **NOTICE**

Risk of a leaking coolant fluid system due to freezing and/or corrosion. Can cause very expensive equipment and building damage.

Cooling coils, heat exchangers and piping systems that are connected to open cooling towers or other open water/glycol systems are at high risk of freezing and premature corrosion. Fluids in these systems must contain the proper antifreeze and inhibitors to prevent freezing and premature coil, piping and heat exchanger corrosion. The water or water/glycol solution must be analyzed by a competent local water treatment specialist before startup to establish the inhibitor and antifreeze solution requirement and at regularly scheduled intervals throughout the life of the system to determine the pattern of inhibitor depletion.

The complexity of water/glycol solution condition problems and the variations of required treatment programs make it extremely important to obtain the advice of a competent and experienced water treatment specialist and follow a regularly scheduled coolant fluid system maintenance program.

Read and follow individual unit installation instructions for precautions regarding fluid system design, material selection and use of field-provided devices. Liebert systems contain iron and copper alloys that require appropriate corrosion protection. It is important to have the system running with flow through exchangers maintained at initial system fill for 24 to 48 hours depending on size and system configuration.

Water chemistry varies greatly by location, as do the required additives, called inhibitors, that reduce the corrosive effect of the fluids on the piping systems and components. The chemistry of the water used must be considered, because water from some sources may contain corrosive elements that reduce the effectiveness of the inhibited formulation. Sediment deposits prevent the formation of a protective oxide layer on the inside of the coolant system components and piping. The water/coolant fluid must be treated and circulating through the system continuously to prevent the buildup of sediment deposits and or growth of sulfate reducing bacteria.

Proper inhibitor maintenance must be performed in order to prevent corrosion of the system. Consult glycol manufacturer for testing and maintenance of inhibitors.

Commercial ethylene glycol, when pure, is generally less corrosive to the common metals of construction than water itself. It will, however, assume the corrosivity of the water from which it is prepared and may become increasingly corrosive with use if not properly inhibited.

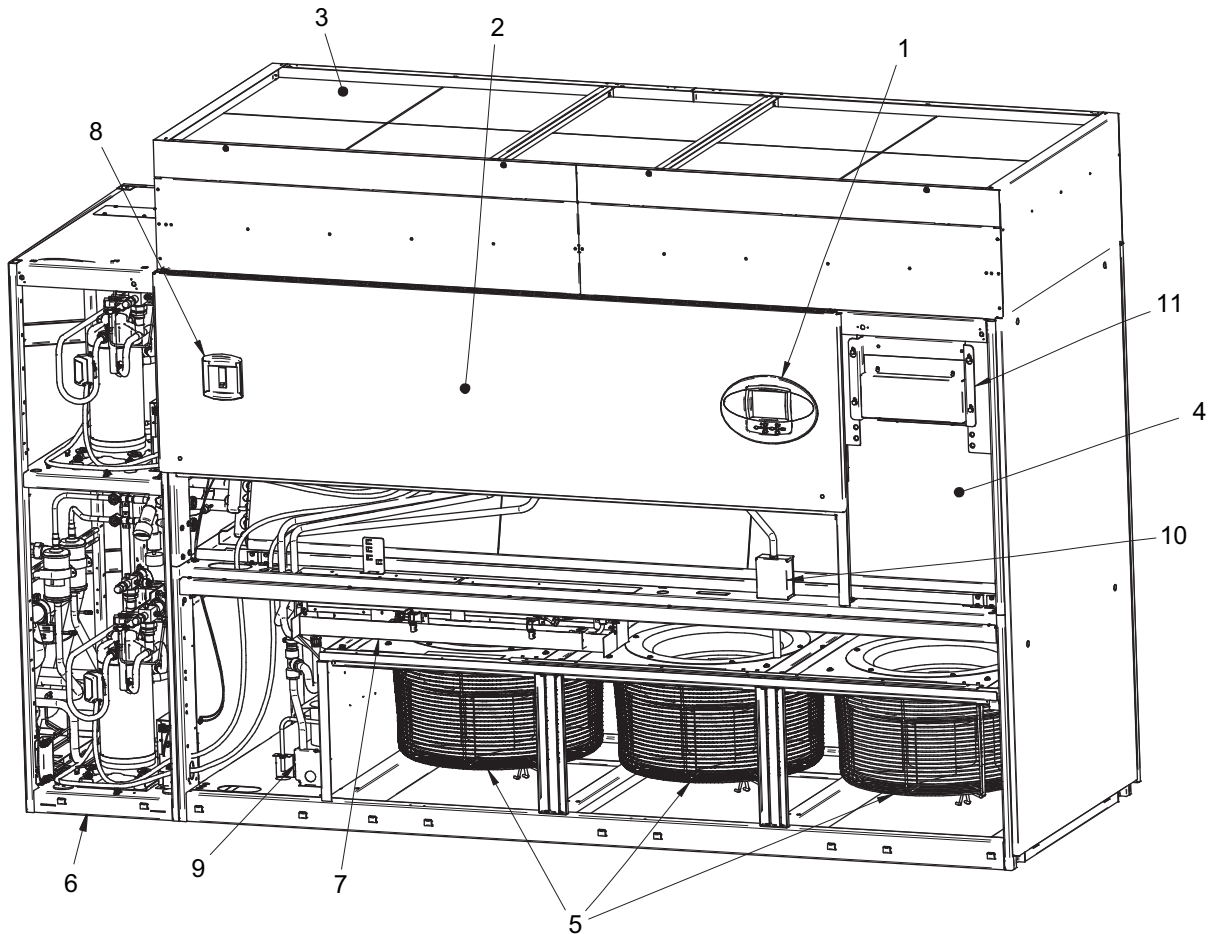
## **NOTICE**

Risk of no-flow condition can cause equipment damage.

Do not leave the unit in a no-flow condition. Idle fluid allows the collection of sediment that prevents the formation of a protective oxide layer on the inside of tubes. Keep unit switched On and system pump operating continuously.

## 1.0 COMPONENTS AND NOMENCLATURE

Figure 1 Downflow model component locations

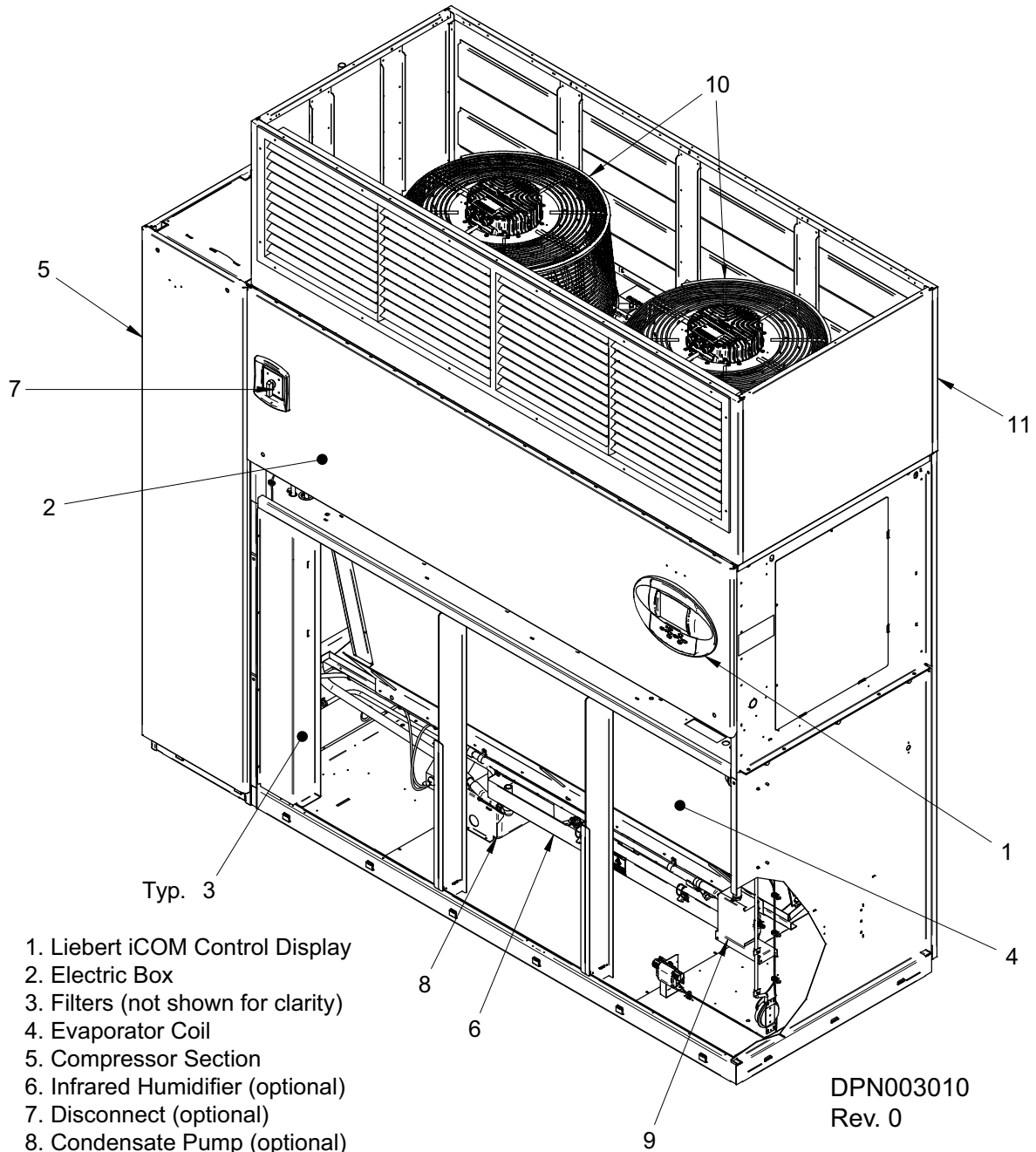


- |   |                                    |
|---|------------------------------------|
| 1. Liebert iCom Control Display           | 7. Infrared Humidifier (optional)  |
| 2. Electric Box                           | 8. Disconnect (optional)           |
| 3. Filters Plenum (not shipped with unit) | 9. Condensate Pump (optional)      |
| 4. Evaporator Coil                        | 10. Smoke Sensor (optional)        |
| 5. Fan Modules (internal position)        | 11. THD Assembly (575V units only) |
| 6. Compressor Section                     |                                    |

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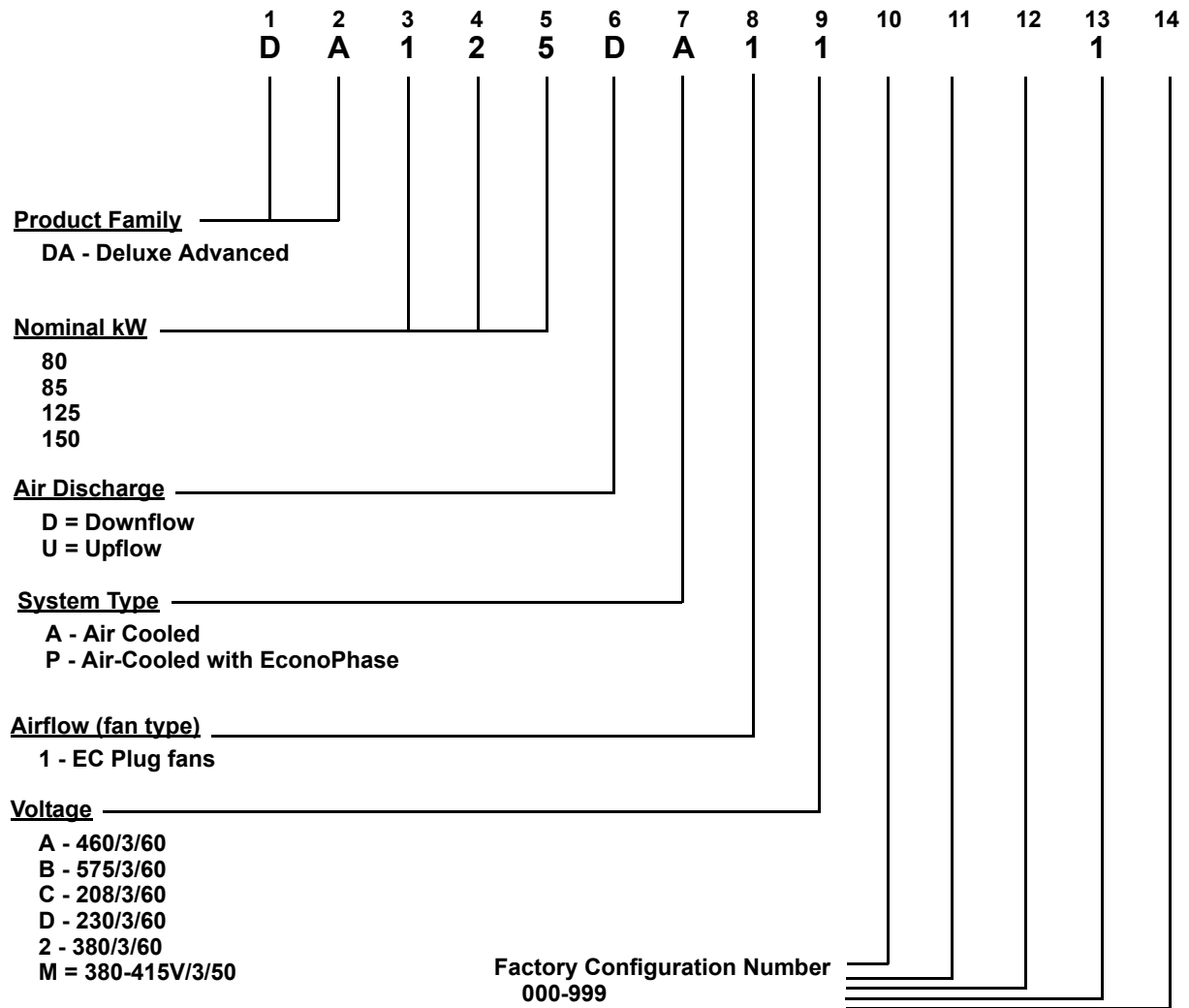
Figure 2 Upflow model component locations



- 1. Liebert iCOM Control Display
- 2. Electric Box
- 3. Filters (not shown for clarity)
- 4. Evaporator Coil
- 5. Compressor Section
- 6. Infrared Humidifier (optional)
- 7. Disconnect (optional)
- 8. Condensate Pump (optional)
- 9. Smoke Sensor (optional)
- 10. EC Fans
- 11. Plenum (Front Discharge Shown)

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Figure 3 Liebert DSE model number nomenclature

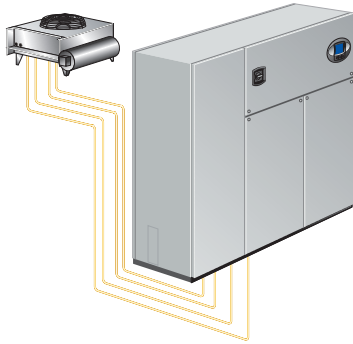


## 2.0 COOLING CONFIGURATIONS



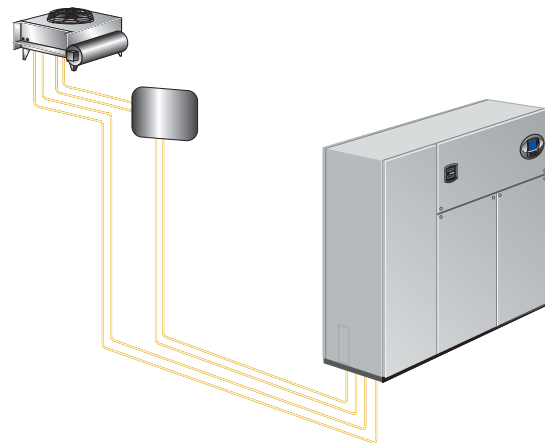
### NOTE

*All field-installed piping must comply with applicable local, state and federal codes.*



#### Air-Cooled

Air-cooled unit piping is spun closed from the factory and contain a nitrogen holding charge. Each installation requires refrigerant piping to a condenser.



#### Air-Cooled with EconoPhase Pumping Unit

This system has all the features of a standard air-cooled system, with the added benefit of an economizer mode that can be used when the outdoor temperature is cold enough to cool the refrigerant enough to suspend use of the compressors.

## 3.0 PRE-INSTALLATION GUIDELINES

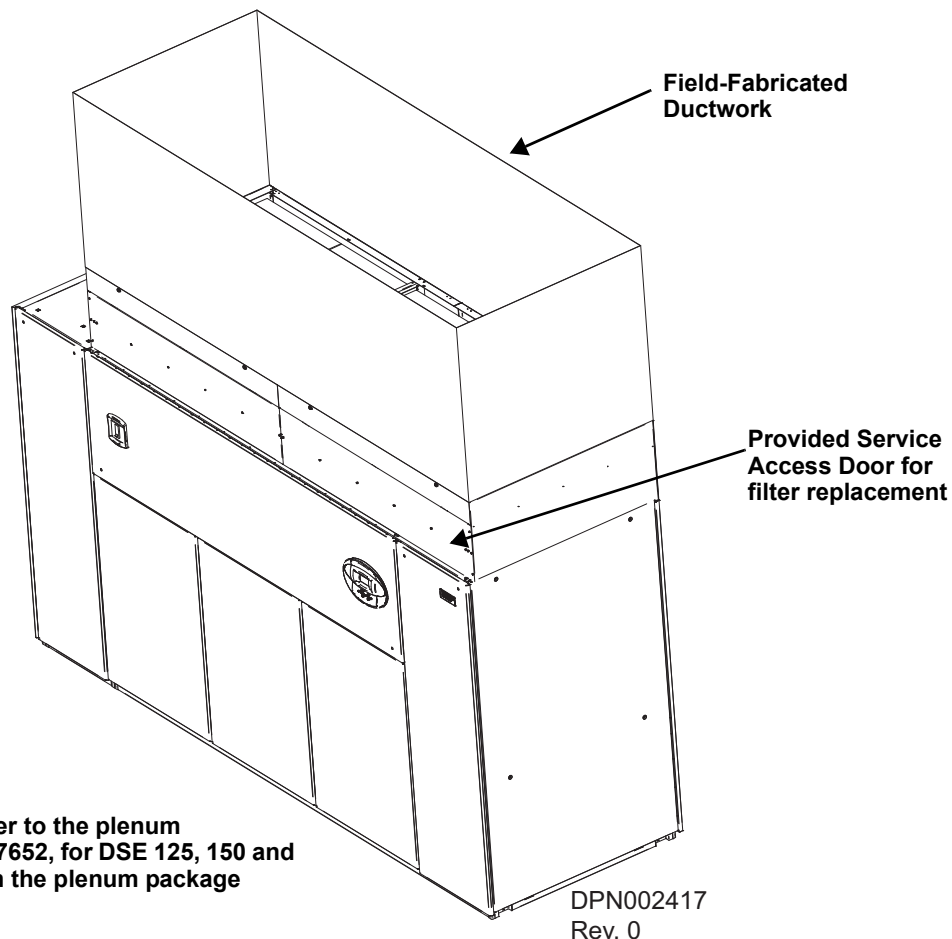
### 3.1 Room Preparation

- Verify that the floor is level, solid and sufficient to support the unit. See **Table 2** for unit weights.
- Confirm that the room is properly insulated and has a sealed vapor barrier.
- For proper humidity control, keep outside or fresh air to an absolute minimum (less than 5% of total air circulated in the room).
- Do not install Liebert DSE units in an alcove or at the end of a long, narrow room.
- Install the units as close as possible to the largest heat load.
- Allow at least the minimum recommended clearances for maintenance and service. See **Figures 6 through 10** for dimensions.
- Emerson recommends installing an under-floor water detection system. Contact your local Emerson representative for information.

### 3.2 Air Distribution—Downflow Units

- Verify that the raised floor has been properly sized for the unit's airflow and the room is free of airflow restrictions.
- Perforated floor tiles in the raised floor should ensure minimal pressure loss.
- The raised floor must provide 7-1/2" (191mm) of clearance
- A minimum of 24" (610mm) is required to operate the fans when they are lowered with the Emerson-provided jacking mechanism.
- Ensure that there is adequate clearance above the unit for service, such as replacing filters.
- Optional plenums are available for downflow unit ducting.

**Figure 4 Downflow unit ducting and plenum ducting**



Liebert Plenum - Refer to the plenum installation sheet, 197652, for DSE 125, 150 and 165 units, included in the plenum package

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### 3.3 Air Distribution—Upflow Units

Various configurations are possible:

- Front return
- Rear return

For in-room applications with supply and return grilles, several feet of clearance must be maintained at the unit's intake and discharge.

Refer to the ASHRAE handbook for general good practices regarding duct sizing and design.



## WARNING

Risk of contact with high-speed moving parts. Can cause injury or death.

Disconnect all local and remote electric power supplies, verify with a voltmeter that power is Off and that all moving parts have stopped rotating before working in the unit.

Do not operate upflow units without installing a plenum, ductwork or guard over the blower opening(s) on the top surface of the unit cabinet.

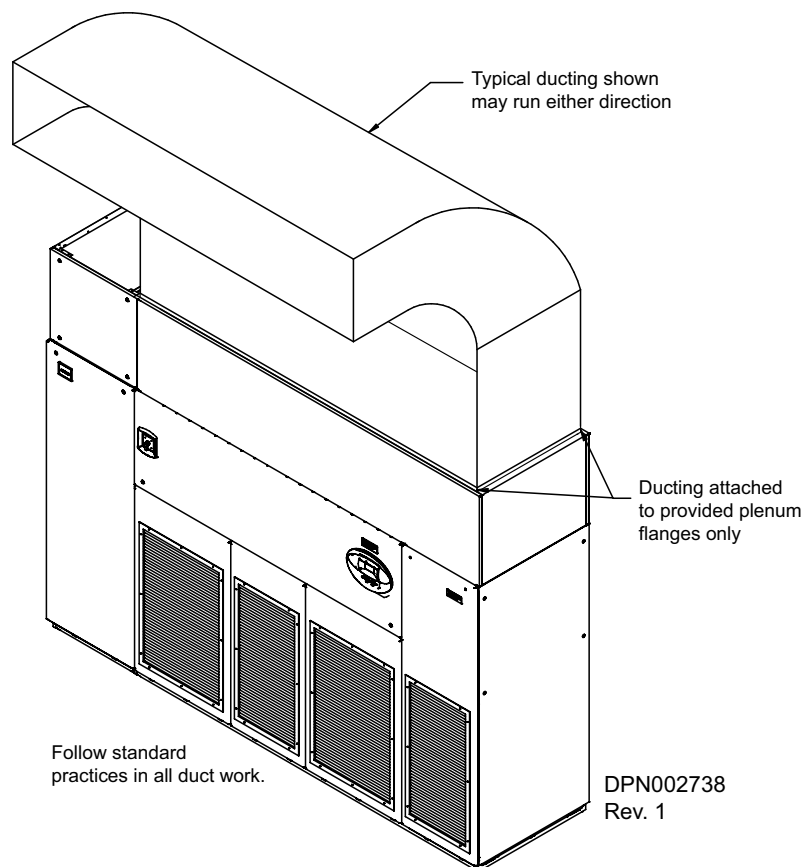
Ductwork must be connected to the blower(s), or a plenum must be installed on the blower deck for protection from rotating blower wheel(s) on upflow units.



## NOTE

Drain traps are qualified to a return duct static of negative 1.5 i.w.g. (-1.5 i.w.g).

**Figure 5 Upflow unit ducting and plenum ducting**



### 3.4 Connections and System Setup

- Plan the routing of wiring, piping and ductwork to the unit. See **Figures 23** through **68** and **Figures 76** and **77** for unit connection locations.
- The unit requires a drain, which must comply with all applicable codes. This drain line may contain boiling water. See **10.1.1 - Condensate Piping—Field-Installed** for details.
- Three-phase electrical service is required for all models. Electrical service must conform to national and local electrical codes. See equipment nameplate for details.
- If seismic requirements apply, consult your local Emerson representative for information about a seismic-rated floor stand.



#### NOTE

*Seal openings around piping and electrical connection to prevent air leakage. Failure to do so could reduce the unit's cooling performance.*

The Liebert DSE controls superheat with an electronic expansion valve (EEV). The EEV controller adjusts the orifice based on suction pressure and temperature. The EEV control will drive the valve to maintain the superheat setpoint, set in the Liebert iCOM, using a Proportional, Integral, Derivative (PID) routine. The PID control values are set at the factory for most applications. These default values PID will allow stable superheat control of the unit.

For DA080/085 the default PID values must be updated to special PID values when the condenser is installed at the same level as the evaporator,  $\pm 10$  feet (3m). The PID control values (both default and special) are noted **Table 1**.

**Table 1 EEV control values, default and special settings**

Model #	EEV Settings	
	Default Values	Special Values (condenser and evaporator at same level $\pm 10'$ [3m])
DA080/085 Downflow Models	E144 = MAN	E144 = MAN
	E160 = 0.7	E160 = 1.5
	E161 = 250	E161 = 250
	E162 = 4.2	E162 = 2.5
DA080/085 Upflow Models	E144 = MAN	
	E160 = 2.5	
	E161 = 250	
	E162 = 4.2	
DA125/150	E144 = MAN	
	E160 = 1.8	
	E161 = 250	
	E162 = 2.5	

### 3.5 Operating Conditions

#### 3.5.1 Cooling, Dehumidification and Humidification

The Liebert DSE must be operated in a conditioned space within the operating envelope ASHRAE recommends for data centers: Maximum return air temperature of 105°F (40°C) and maximum dew point of 59°F (15°C). The recommended minimum return air temperature setpoint for the Liebert DSE is 75°F (24°C).

Operating outside this envelope can decrease equipment reliability.

Refer to ASHRAE's publication, "Thermal Guidelines for Data Processing Environments."



#### NOTE

*If running in supply air control, the minimum supply air setpoint is 64°F (18°C).*

### **DA125 and DA150 Dehumidification Control**

The DA125 is designed to maximize sensible cooling not latent cooling loads. With all four compressors running, no reheat will be available at this dehumidification load point (Stage 4).

The room load must be 94.1kW (74% of unit capacity) to prevent overcooling the room at 85°F (29°C) return air temperature. If the room load is too low to maintain the setpoint, the compressors will cycle On and Off. During Stage 3, with three of the four compressors running, 10kW of reheat will be available to offset cooling. During Stage 1 and 2, with one and two compressors running respectively, 30kW of reheat is available to offset cooling. For rooms with multiple units, Emerson® recommends performing dehumidification in Teamwork mode to prevent compressor cycling in case of lightly loaded rooms or by having standard Liebert DSE units available to perform dehumidification. Liebert DSE units in dehumidification mode might not hold the temperature setpoint unless there is sufficient room load. This will allow for better dehumidification of the room. The Liebert DSE will allow the return air temperature to run down to 68°F (20°C) regardless of the temperature setpoint during dehumidification mode of operation.

### **DA080 and DA085 Dehumidification Control**

The DA080 and DA085 will run at lower evaporator temperatures than a DA125. This will result in a higher percentage of latent cooling than with a DA125 at a given return air temperature.

Dehumidification on DA080 and DA085 is possible with only one circuit running. In dehumidification mode, with one circuit running, a single stage 15kW electric reheat (customer option) is available to help offset cooling for lightly loaded rooms, but overcooling will be allowed down to 68°F (20°C). If the unit is running in dehumidification mode with both circuits (compressors) running, the electric reheat is not available to offset cooling. All Liebert DSE units allow the indoor blower to run at a reduced speed during dehumidification mode to increase the amount of dehumidification being performed.

#### **3.5.2 Heating**

The Liebert DSE is qualified for heating-only operation at temperatures not exceeding 80°F (27°C).

#### **3.5.3 Humidification Control**

To prevent the humidifier from running when not required (especially when return air temperatures exceed 75°F [24°C]), the default control for humidity and dehumidification is based on dew point temperature, not relative humidity. If this default control is changed, adjust the relative humidity setpoint based on return air temperature to prevent from overhumidifying the space.

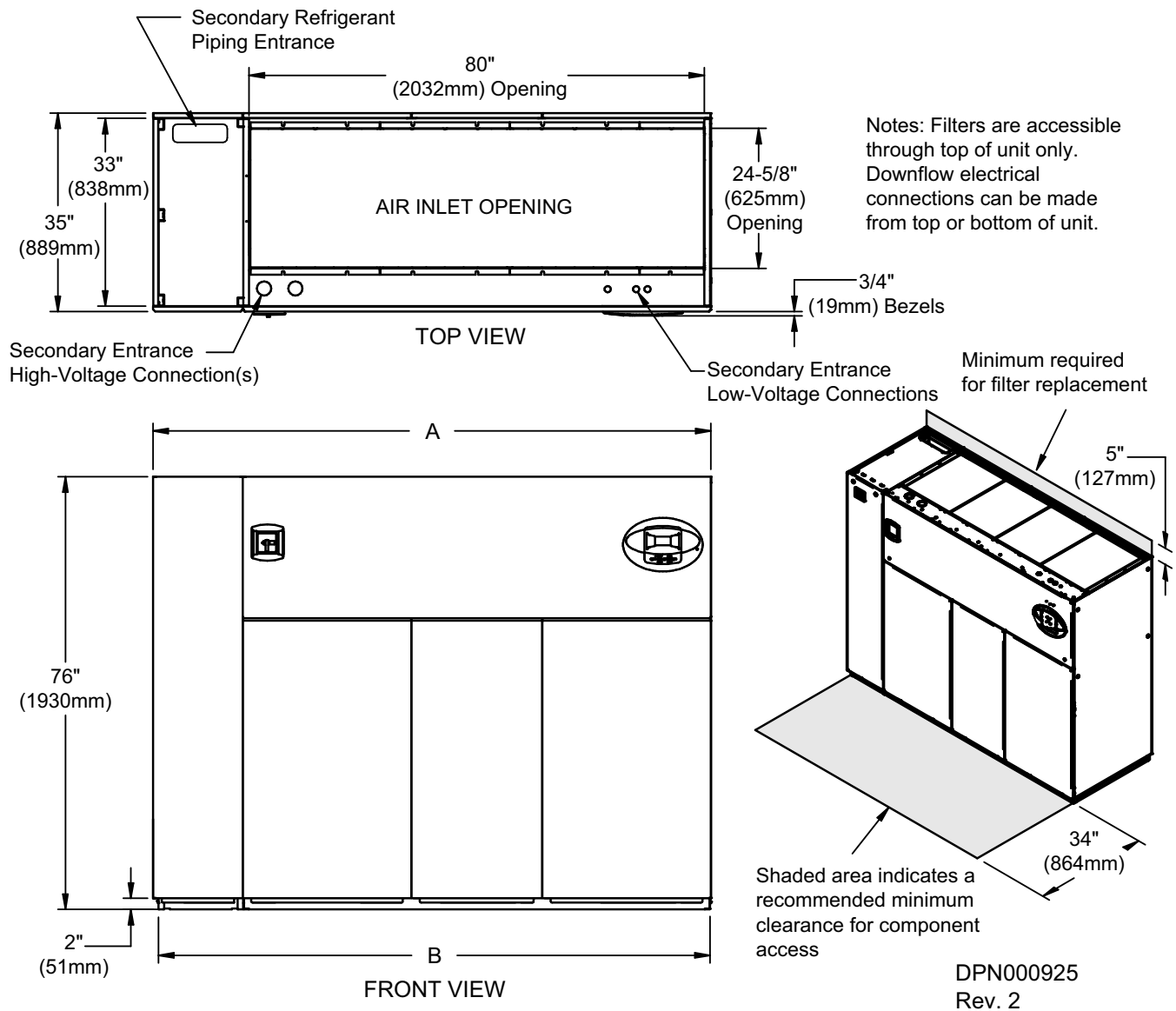
## 4.0 LIEBERT DSE DIMENSIONS AND WEIGHTS

**Table 2 Shipping dimensions and weights—domestic and export**

Model #	Domestic Packaging		Export Packaging	
	Dimensions L x W x H, in. (mm)	Weight lb (kg)	Dimensions L x W x H, in. (mm)	Weight lb (kg)
<b>Downflow and Upflow Models</b>				
DA080*A DA080*P DA085*A DA085*P	120 x 45 x 85 (3048 x 1143 x 2159)	2500 (1134)	120 x 45 x 85.5 (3048 x 1143 x 2172)	2730 (1238)
DA125*A DA125*P DA150*A DA150*P	153 x 54 x 85 (3886 x 1372 x 2159)	3785 (1717)	153.5 x 54.5 x 85.5 (3899 x 1384 x 2172)	3991 (1810)

### 4.1 Dimensions—Downflow and Upflow Models

Figure 6 Cabinet and floor planning dimensions—Downflow, air-cooled, DA080 and DA085 models



Dry Weight, lb. (kg), approximate		
Model No.	DA080	DA085
Air Cooled	2200 (998)	2250 (1021)
Dual Cool	N/A	N/A
Dimensions, in. (mm)		
Air Cooled "A"	100 (2540)	100 (2540)
Air Cooled "B"	99 (2515)	99 (2515)

Source: DPN00925, Rev. 2

**Figure 7 Cabinet and floor planning dimensions—Downflow, air-cooled, DA125 and DA150, tandem scroll compressor models**

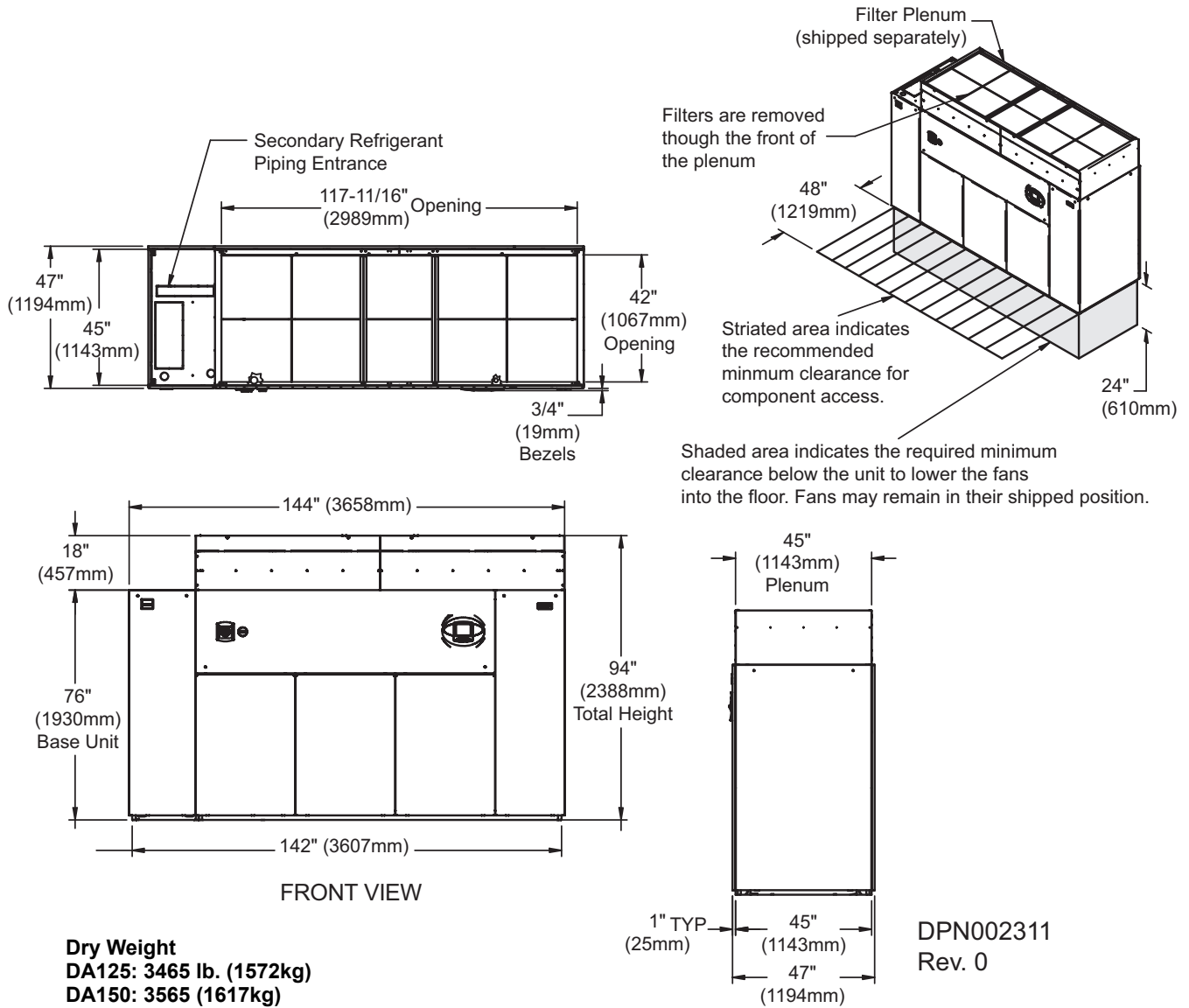
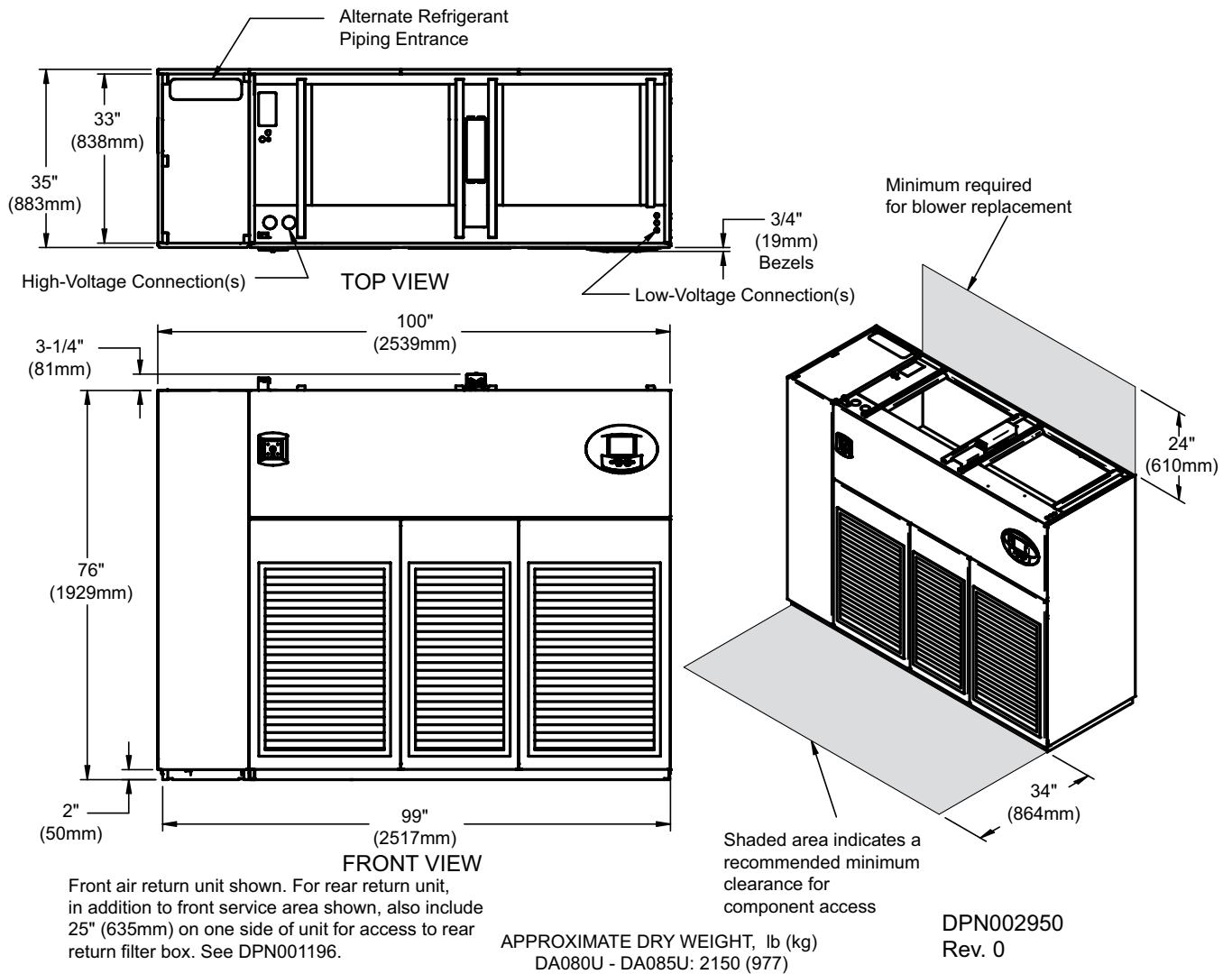


Figure 8 Cabinet and floor planning dimensions—Upflow, DA080U-DA085U models



## 4.2 Floor Stand Dimensions, Downflow and Upflow Models

Figure 9 Floor stand and floor planning dimensions—Downflow and upflow, DA080 and DA085 models

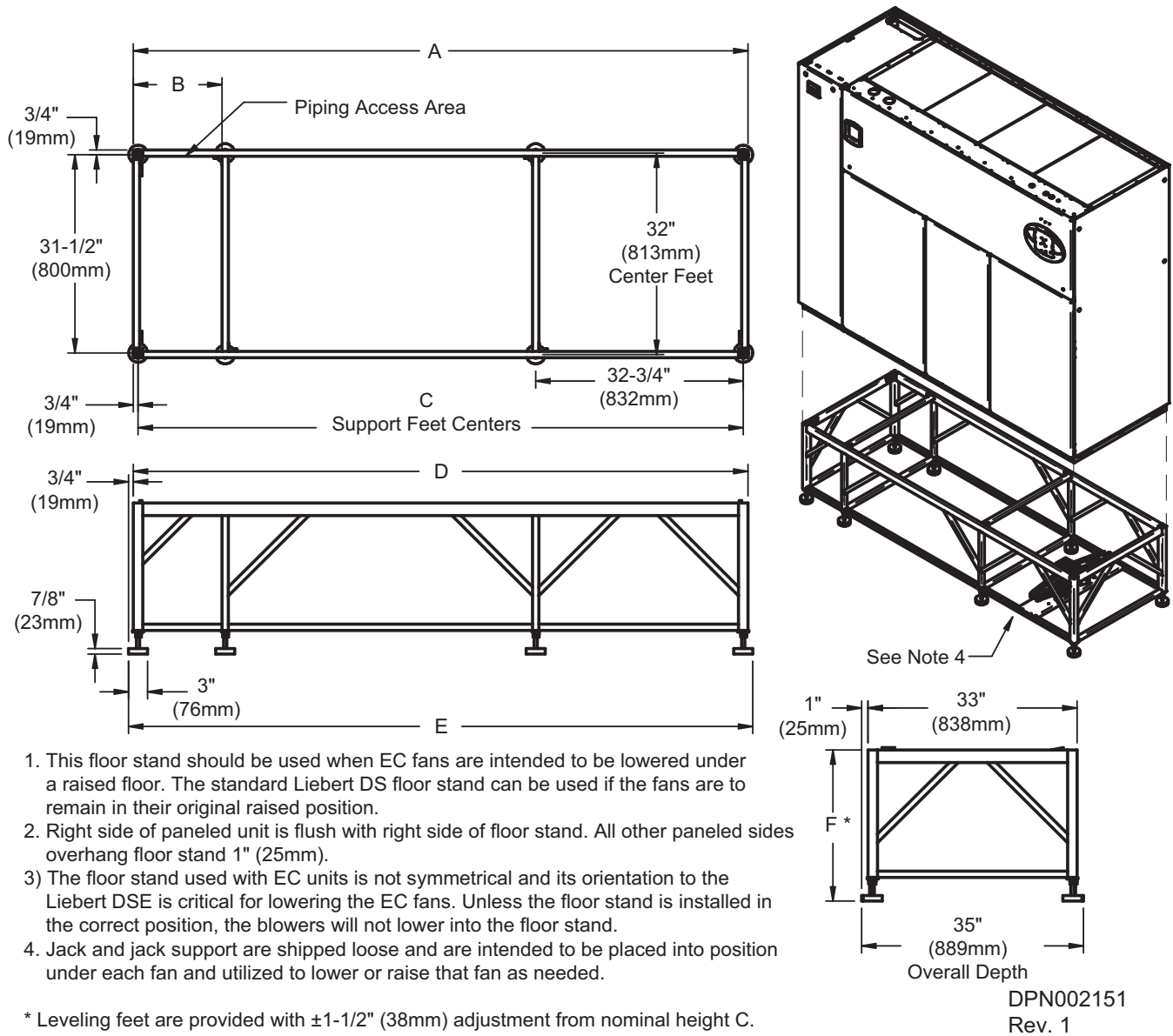


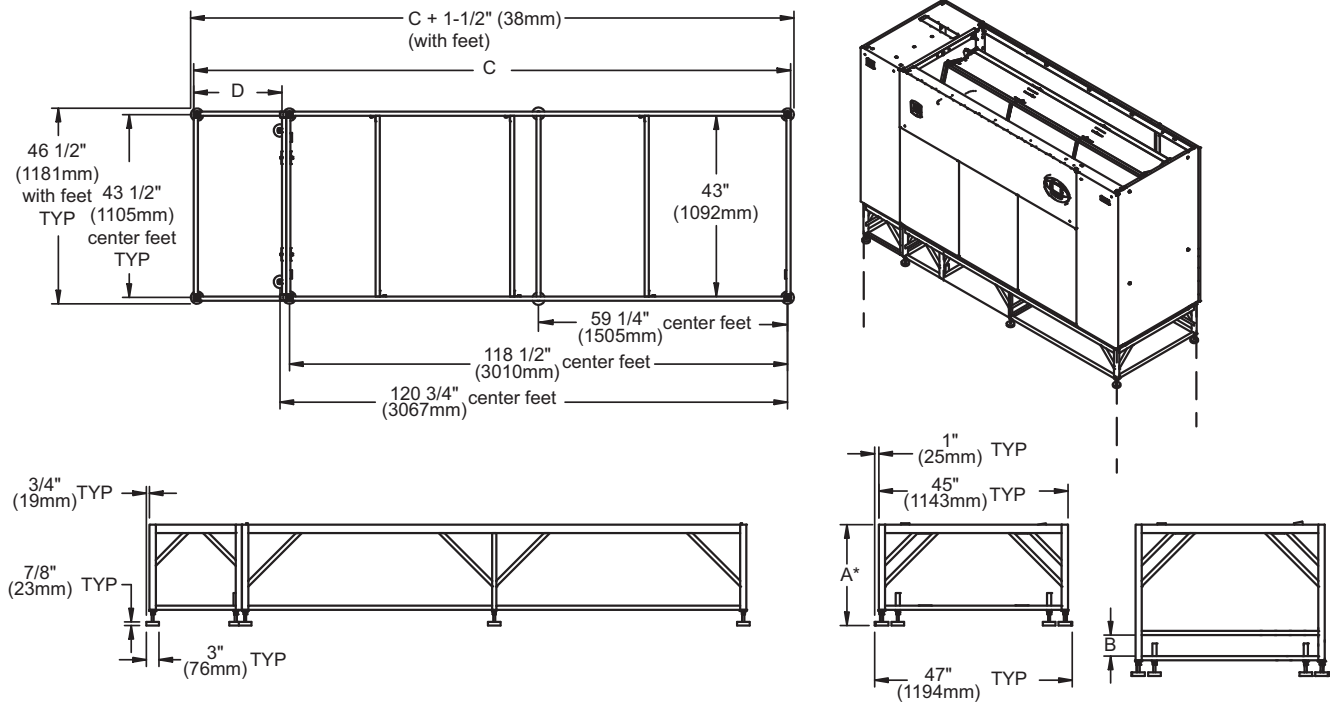
Table 3 Floor stand and floor planning dimensions—Downflow, 080kW and 085kW

Models	Dimensions, in. (mm)					Height F in. (mm)
	A	B	C	D	E	
DA080, DA085 Air-Cooled Digital Scroll Models	99 (2515)	17 (432)	97.5 (2477)	99 (2515)	100.5 (2553)	24 (610)
						30 (762)
						36 (914)
						42 (1067)
						48 (1219)

Source: DPN002151, Rev. 1



Figure 10 Floor stand and floor planning dimensions—Downflow, DA125 and DA150 models



1. This floor stand should be used when EC fans are intended to be lowered into the floor stand.  
The standard Liebert floor stand can be used if the fans are to remain in their original raised position.
2. All paneled sides of unit overhang floorstand 1" (25mm).
3. The floor stand used with EC units is not symmetrical and proper orientation required for lowering the blowers. Unless the floor stand is installed in the correct position, the blowers will not lower into the floor stand.
- 4) Jack and jack support are shipped loose and are intended to be placed into position under each fan and utilized to lower or raise that fan as needed individually.
- 5) Jack to lower blowers not provided with 18" floor stand.

\* Leveling feet are provided with  $\pm 1\text{-}1/2"$  (38mm) adjustment from nominal height A.

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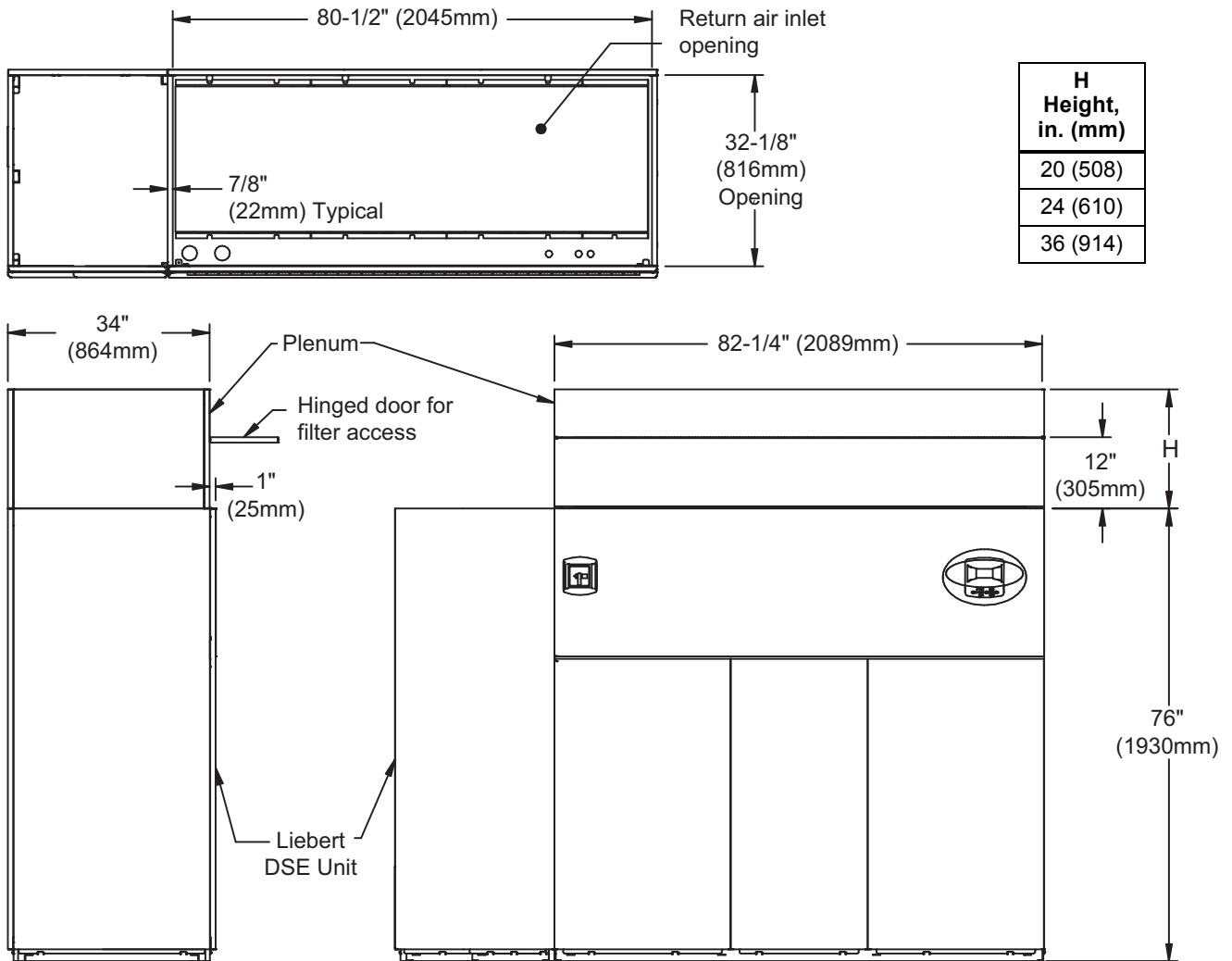
Table 4 Floor stand and floor planning dimensions—Downflow, 125kW (35 ton) models

Height, in. (mm)		Dimensions, in. (mm)	
A *	B *	Coolant Type	
		C	D
24 (610)	—	Air-Cooled	142 (3607)
30 (762)	—		
36 (914)	5 (127)		
42 (1067)	11 (279)		
48 (1219)	17 (432)		

Source: DPN002315, Rev. 2

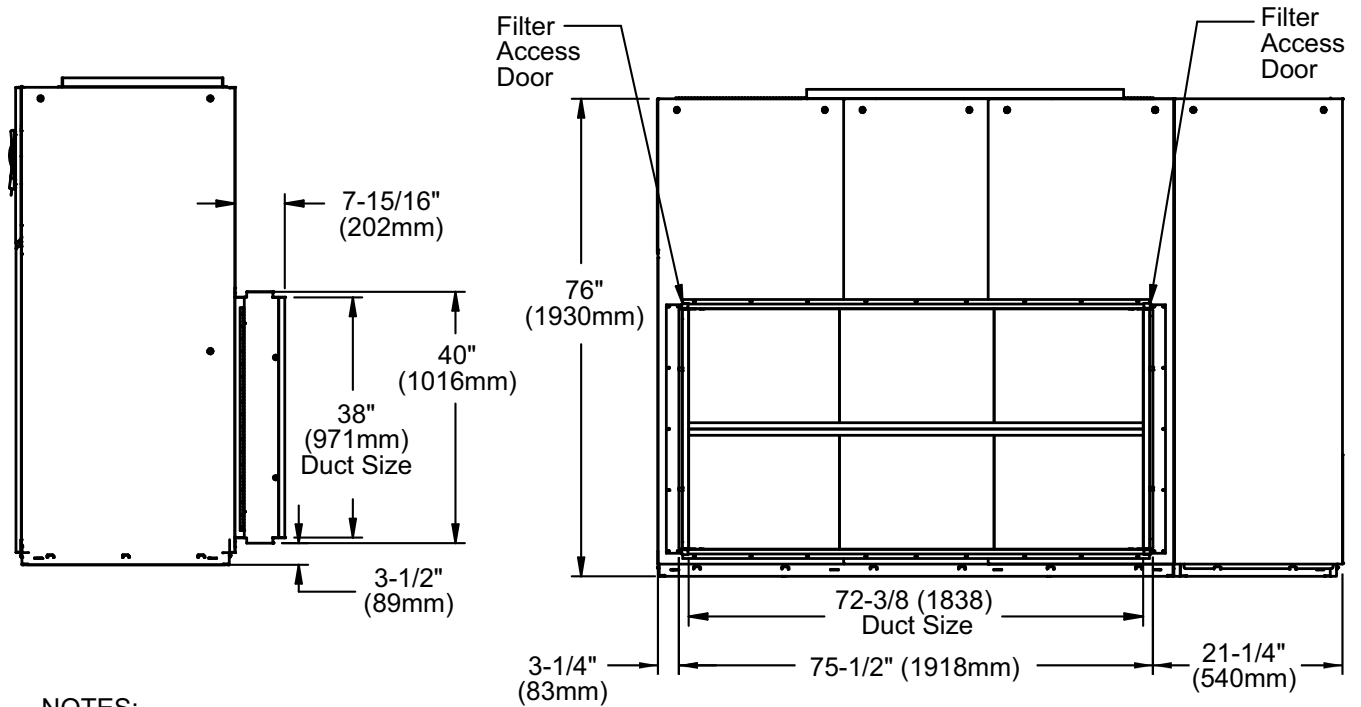
### 4.3 Blower Outlet and Deck Dimensions

Figure 11 Plenum dimensions—Downflow, DA080 and DA085 models



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Figure 12 Rear return filter box dimensions, upflow DA080U and DA085U, all compressor models



NOTES:

1. Unit has six filters; filters can be accessed from either side.
2. 25" (635mm) minimum clearance provided on one side for filter access.
3. Filter boxes are shipped flat and must be field-assembled.

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Figure 13 Plenums and EC fan dimensions, Liebert DA080U and DA085U, upflow models

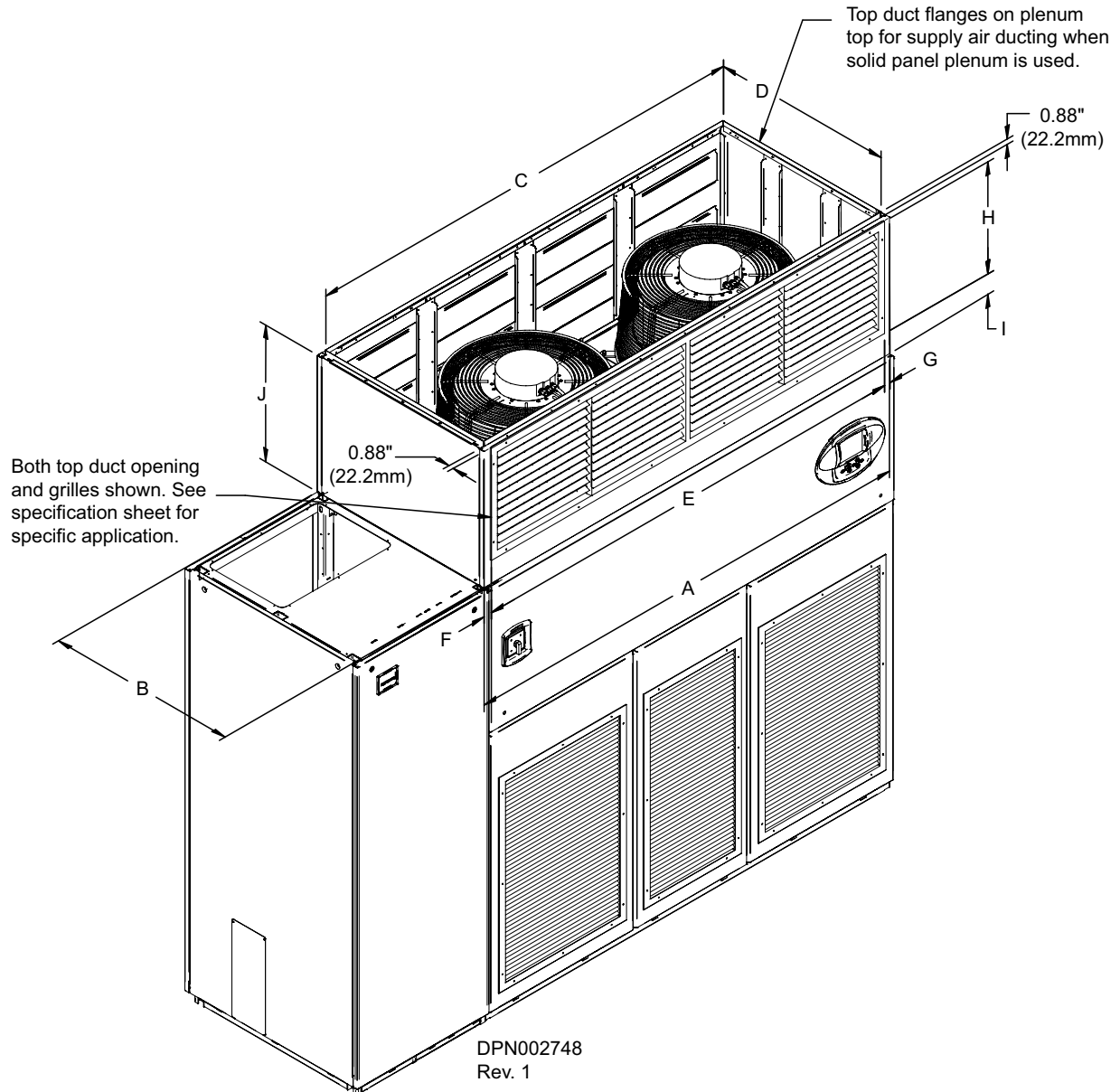


Table 5 Plenum dimensions, in (mm)

Model	A	B	C	D	E	F	G	H	I
DA080U DA085U	82 (2083)	34 (864)	81 (2057)	32 (813)	80 (2032)	1 (25)	1 (25)	20 (508)	4 (102)

Table 6 Plenum height, in (mm)

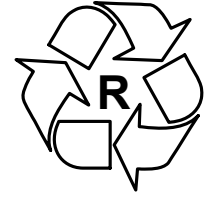
Supply Air	J
Grille and Top Discharge	24 (610)
Top Discharge Only	30 (762)
Top Discharge Only	36 (914)

## 5.0 EQUIPMENT INSPECTION AND HANDLING

Upon arrival of the unit and before unpacking it, verify that the labeled equipment matches the bill of lading. Carefully inspect all items for damage, either visible or concealed. For initial access use a 7/32" Allen wrench for panel removal. Damage should be immediately reported to the carrier and a damage claim filed with a copy sent to Emerson Network Power or to your sales representative.

### 5.1 Packaging Material

All material used to package this unit is recyclable. Please save for future use or dispose of the material appropriately.



## SAFETY INFORMATION



### WARNING

Risk of top-heavy unit falling over. Can cause equipment damage, injury or death.

Verify that all lifting equipment is rated for the weight of the unit and read all of the following instructions before attempting to move the unit, lift it, remove packaging or prepare the unit for installation. See **Table 2** for unit weights.



### CAUTION

Risk of sharp edges, splinters and exposed fasteners. Can cause personal injury.

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

### NOTICE

Risk of overhead interference. The unit may be too tall to fit through a doorway while on the skid. Measure the unit and doorway heights and refer to the installation plans to verify clearances prior to moving the unit. If the Liebert DSE is too large to fit through doors, halls or other tight spaces, the unit can be partly dismantled. Contact Emerson® Network Power Liebert Services for details.

### NOTICE

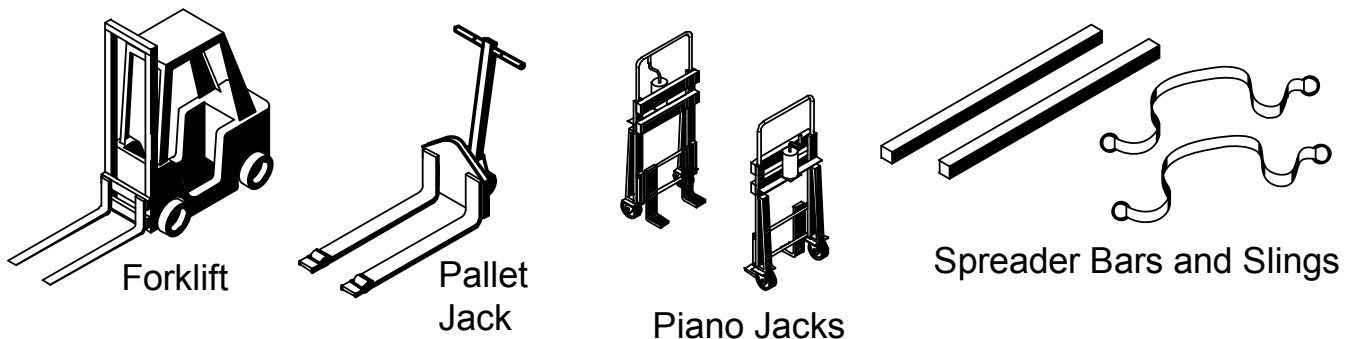
Risk of improper handling with forklift. Can cause unit damage.

Keep tines of the forklift level and at a height suitable to fit below the skid and/or unit to prevent exterior and/or underside damage.

### NOTICE

Risk of improper storage. Keep the Liebert DSE upright, indoors and protected from dampness, freezing temperatures and contact damage.

Figure 14 Equipment recommended for handling Liebert DSE



If possible, transport the Liebert DSE with a forklift or pallet jacks. If that is not possible, use a crane with belts or cables, slings and spreader bars.

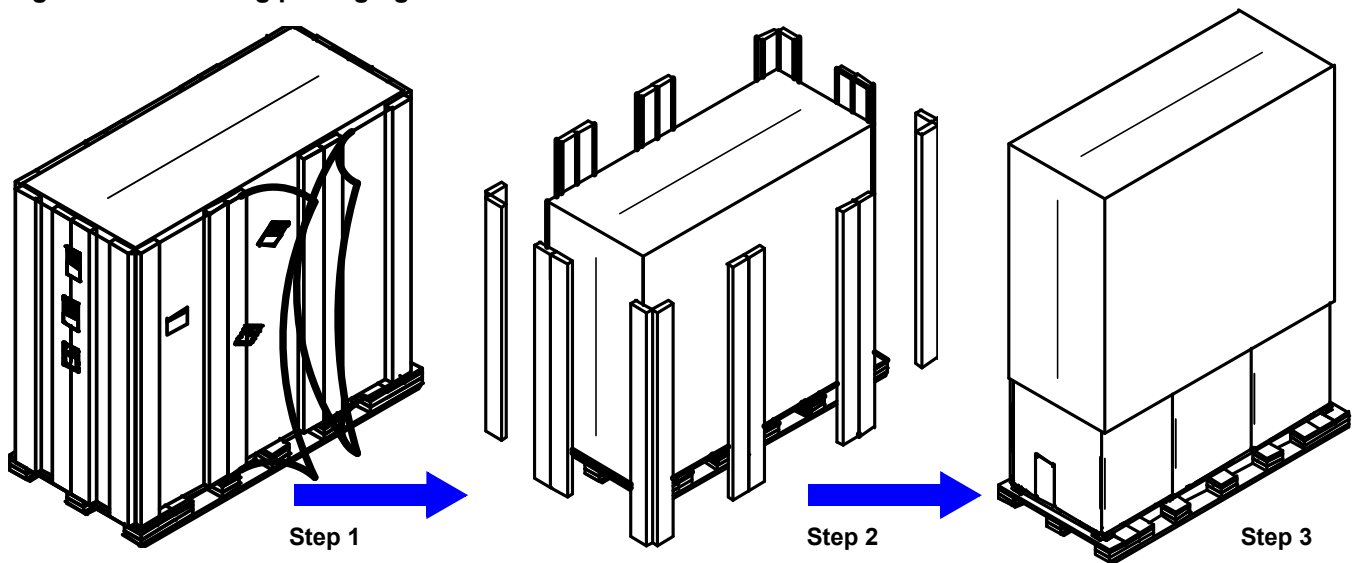
- If using a forklift or pallet jack, make sure that the forks (if adjustable) are spread to the widest allowable distance that will fit under the skid.  
Ensure the fork length is suitable for the unit length.
- When moving the packaged Liebert DSE with a forklift, lift the unit from the designated “heavy side” of the unit no higher than 6" (152mm) off the ground. Ensure that the opposite end still touches the ground.
- The unit is to be pulled by the forklift—If the unit must be lifted higher than 6" (152mm) great care must be exercised: Personnel who are not directly involved in moving the unit must be kept 20' (5m) or farther from the lift point of the unit.
- Always refer to the location of the center of gravity indicators when lifting the Liebert DSE (see **Figure 18**).

## 5.2 Unpacking the Unit

Remove outer packaging when ready to install the unit.

- Remove the exterior stretch wrap packaging material from around the unit, exposing the protective corner and side packaging planks.
- Remove the corner and side packaging planks from the unit, exposing the bag over the unit.
- Remove the bag from the unit when ready to remove the skid and install the unit.

**Figure 15 Removing packaging**



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### 5.2.1 Removing the Unit from the Skid With a Forklift

1. Align a forklift with either the front or rear side of the unit.

#### **! WARNING**

Risk of improper moving. Can cause equipment damage, injury or death.

Use the center of gravity indicators on the unit to determine the entry points for the tines (see **Figure 18**). The center of gravity varies depending on the unit size and selected options.

The forklift's tines must be equally spaced on either side of the center of gravity indicator.

2. Insert the tines of the forklift completely under the base of the Liebert DSE.

#### **! WARNING**

Risk of improper moving. Can cause equipment damage, injury or death.

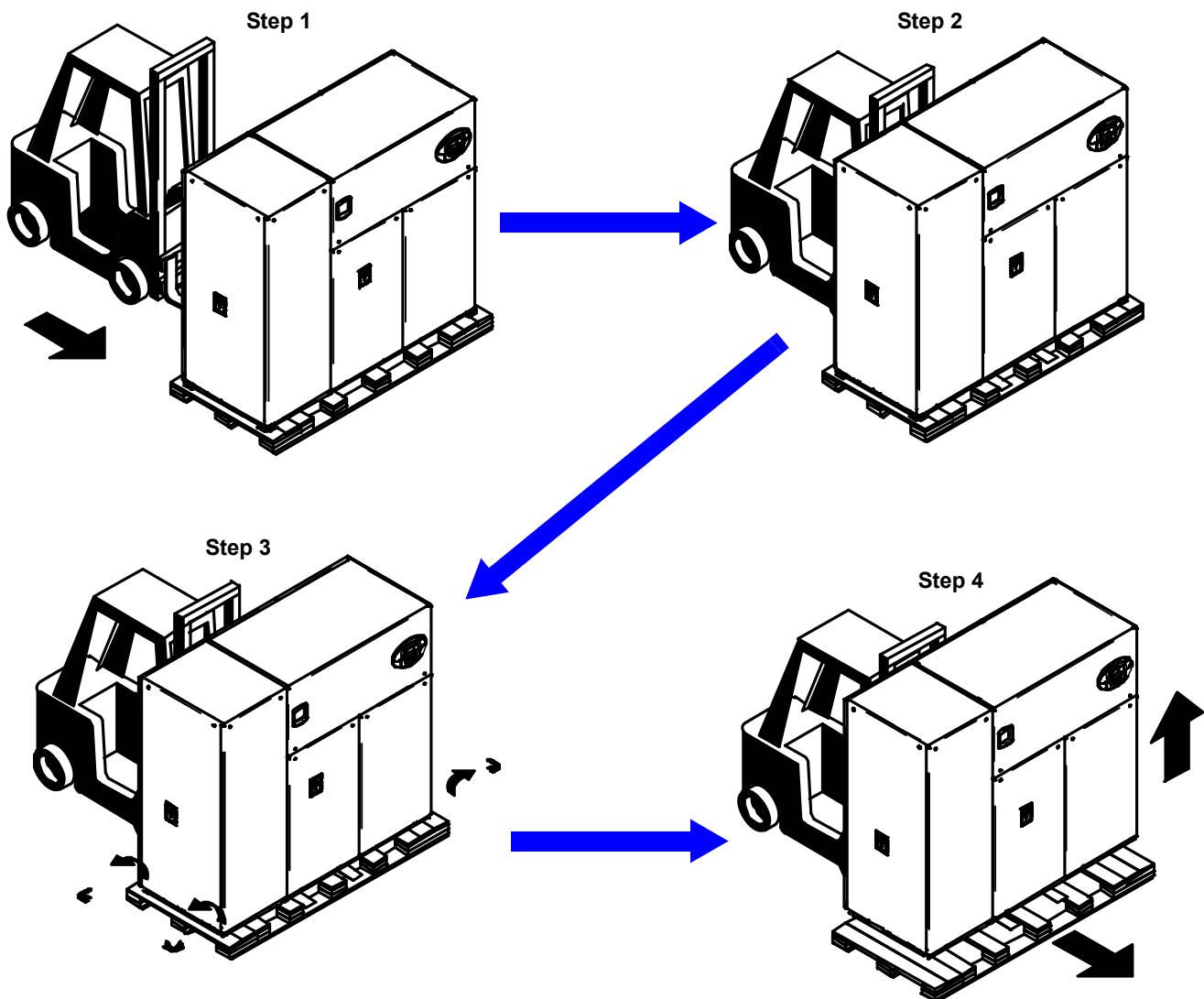
Ensure that the tines are level, not angled up or down.

The tines must be at a height that will allow proper clearance under the unit.

Ensure the tines extend beyond the opposite side of the unit.

3. Remove the lag bolts from each bracket holding the Liebert DSE to the skid.
4. Lift the unit off the skid—no more than 6" (152mm)—and remove the skid.

**Figure 16 Remove the unit from the skid**

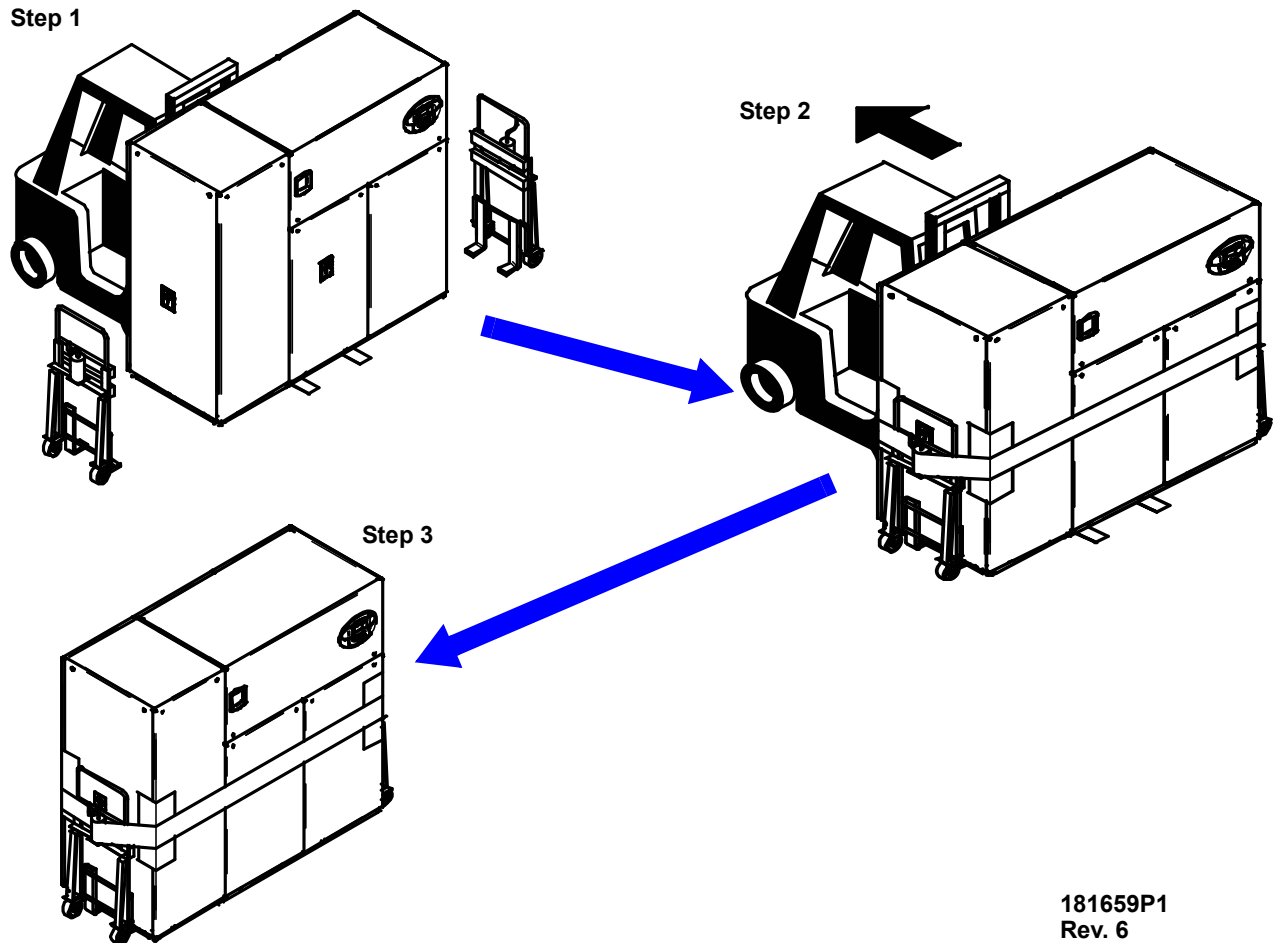


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### 5.2.2 Moving the Unit to the Installation Location with Piano Jacks

1. With the Liebert DSE elevated, place two piano jacks into position—one at either end of the unit.
2. Lower the unit to a height suitable for the piano jacks and place protective material between the Liebert DSE and the piano jacks.
3. Secure the unit to the piano jacks and remove the forklift.
4. Use the piano jacks to move the unit for installation.

Figure 17 Moving the unit to its installation location



### 5.2.3 Removing Piano Jacks

1. Lower the unit as much as the piano jacks will allow.
2. Undo all strapping holding the piano jacks to the unit.
3. Use a pry bar or similar device to lift one end of the unit just enough to allow removal of the piano jack from that end.
4. Repeat **Step 3** to remove the piano jack on the opposite end.
5. Remove all material that might have been used to protect the unit from the piano jacks and strapping.



## 5.2.4 Removing Liebert DSE from Skid Using Rigging



### WARNING

Risk of improper moving. Can cause equipment damage, injury or death.

Use the center of gravity indicators (see **Figure 18**) on the unit to determine the position of the slings. The center of gravity varies depending on the unit size and selected options.

The forklift's tines must be equally spaced on either side of the center of gravity indicator.

1. Space the slings equidistant on either side of the center of gravity indicator (see **Figure 18**).

**Figure 18** Locate center of gravity marker and place slings

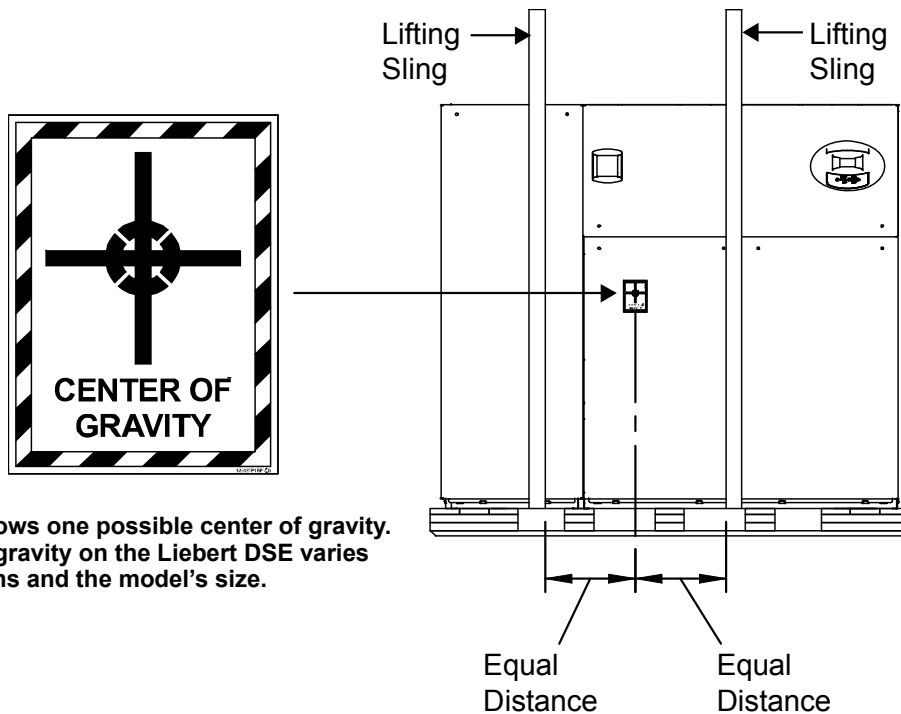


Illustration shows one possible center of gravity. The center of gravity on the Liebert DSE varies with the options and the model's size.

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2. Place the slings between the bottom rails of the Liebert DSE and the top of the skid.



#### NOTE

*Unit is shown without packaging. These instructions may be applied with the outer packaging in place.*

3. Use spreader bars or a similar device and padding to ensure the Liebert DSE will not be damaged when the unit is lifted. Lifting will force the slings toward the Liebert DSE and the slings may damage the unit unless it is properly protected.
4. Remove the lag bolts from the bracket securing the Liebert DSE to the shipping skid.
5. Remove the brackets.



#### NOTE

*Depending on final installation location, the skid may need to remain under the unit. Therefore, the lag bolts and brackets would not yet be removed.*

6. Lift the Liebert DSE off the skid.



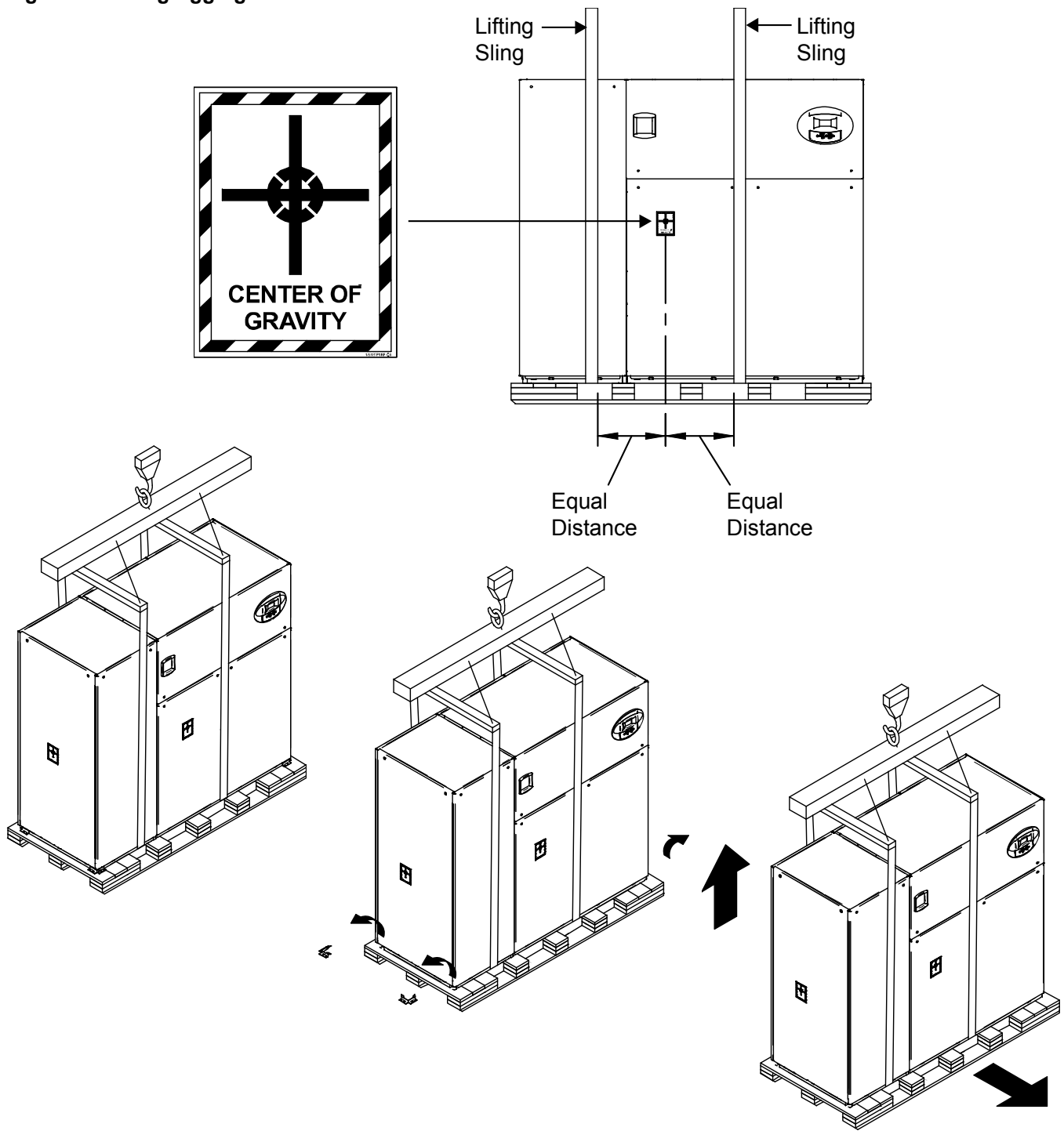
### WARNING

Risk of unit falling over. Can cause building and equipment damage, injury or death.

Verify that all lifting equipment is rated for the unit weight. See **Table 2** for unit weights.

7. Move the skid from under the unit.

Figure 19 Using rigging to lift Liebert DSE off skid

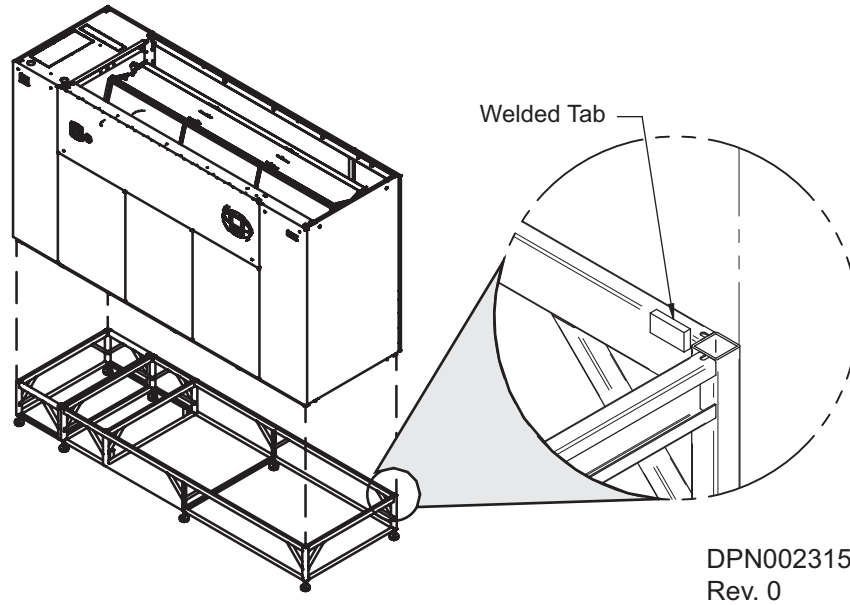


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### 5.3 Placing the Unit on a Floor Stand

**Liebert Floor Stand**—Refer to the floor stand installation sheet in the floor stand package. Lower the unit onto the floor stand. Refer to **Figure 20**. Be sure to align the welded tabs on top of the floor stand with the inside of the unit frame base.

**Figure 20** Setting the unit on a floor stand



#### NOTE

*The floor stand for Liebert DSE units is not symmetrical. Its orientation to the Liebert DSE unit is critical for lowering the EC fans. Unless the floor stand is installed in the correct position, shown in **Figure 20**, the fans will not lower into the floor stand.*

*Once the unit is set on the floor stand, remove the banding straps holding the coil to the coil support. The straps are required only for shipping.*

## 6.0 EC FANS

Liebert DSE downflow models are equipped with EC fans that can be operated either in their fully raised position or lowered into the floor stand for increased efficiency from reduced air resistance.

The fans are also removable, easing maintenance and replacement.



### WARNING

Risk of very heavy 145 lb. (65.7kg) fan modules dropping downward suddenly. Can cause injury or death.

Support fan modules before removing mounting hardware.

Use caution to keep body parts out of the fan modules pathway during repositioning.

Only properly trained and qualified personnel should work on this equipment.



### WARNING

Risk of electric shock and high speed rotating fan blades. Can cause injury or death.

Open all local and remote electric power disconnect switches and verify that fan blades have stopped rotating before working within.



### CAUTION

Risk of improper handling of cabinet panels. Can cause personal injury and equipment damage.

Cabinet panels can exceed 5ft. (1.5m) in length and weigh more than 35lb. (15.9kg). Follow relevant OSHA lifting recommendations and consider using a two-person lift for safe and comfortable removal and installation of cabinet panels. Only properly trained and qualified personnel wearing appropriate safety headgear, gloves and shoes should attempt to remove or install cabinet panels.



### NOTE

*The Liebert DSE unit should be used with the fans either in their original raised position or with the fans in their fully lowered position. Suspension of fans in an intermediate position will directly affect product performance and is not recommended.*

## 6.1 Lowering the EC Fans into the Floor Stand—Downflow Units

### Tools Needed

- 1/2" hex socket and wrench
- Factory-supplied jack, crank and jack support
- cable tie cutter

1. Remove the middle and bottom panels from the front of the unit.
2. For ease of fan lowering, Emerson recommends removing the infrared humidifier using the approved infrared humidifier removal procedure.
3. Position the factory-supplied jack and jack support under the fan to be lowered.
4. Raise the jack to safely support the fan before removing any hardware.

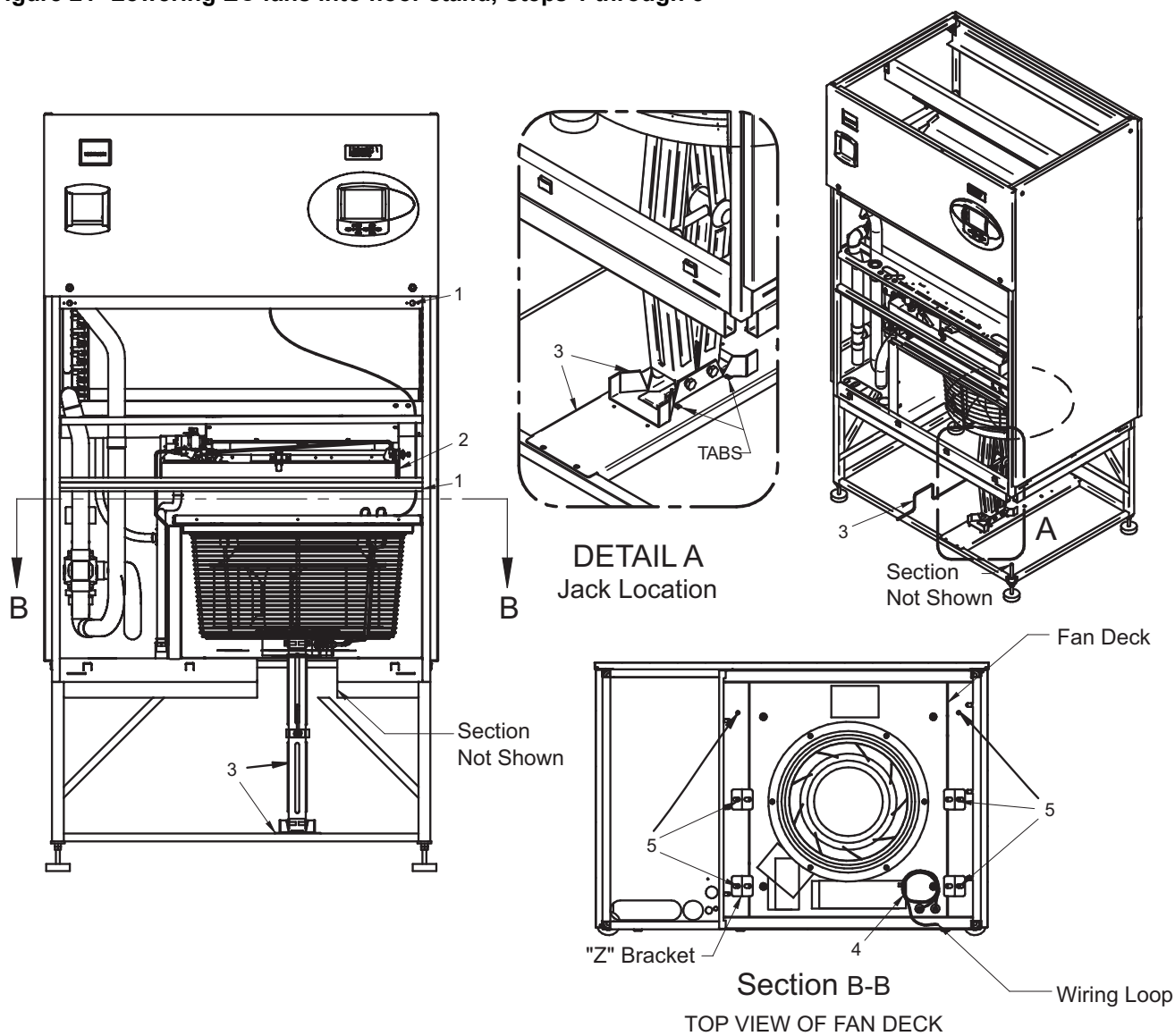


### NOTE

*A properly positioned jack will be centered between the first and second set of tabs on the jack support. The jack will be biased toward the front of the unit.*

5. Cut and remove the cable tie that retains the wiring loop to the blower mounting plate. All other cable ties that route the fan wiring should remain intact.

Figure 21 Lowering EC fans into floor stand, Steps 1 through 5



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6. Remove the six 1/2" hex head screws and the "Z" brackets. Retain the hardware for later use.
7. Using the jack, lower the fan module slowly until it rests on the frame of the unit.

## NOTICE

Risk of equipment snagging cables and wiring. Can cause unit damage.

Monitor the position of the fan harnesses and other parts while lowering the fan to be sure that they are not caught or pinched.

8. Secure the fan module in the fully lowered position by reinstalling the hex head screws directly to the frame. Screw clearance holes are provided in the fan module.



### NOTE

*Not all hardware retained will be used to secure the fans in the lowered position.*

9. Repeat **Steps 3** through **8** to lower remaining fan modules.

Figure 22 Lowering EC fans into floor stand, Steps 7 through 8

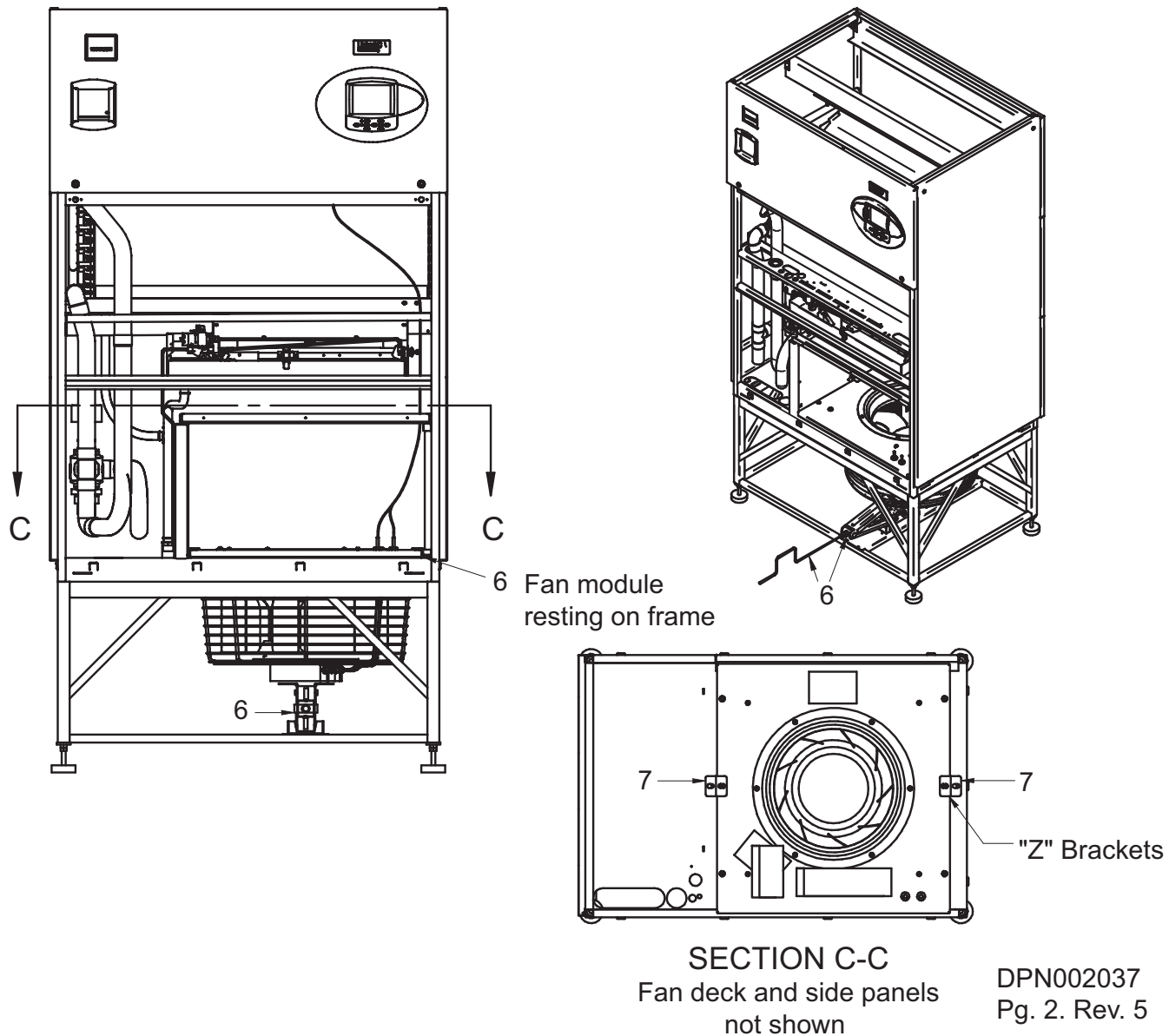
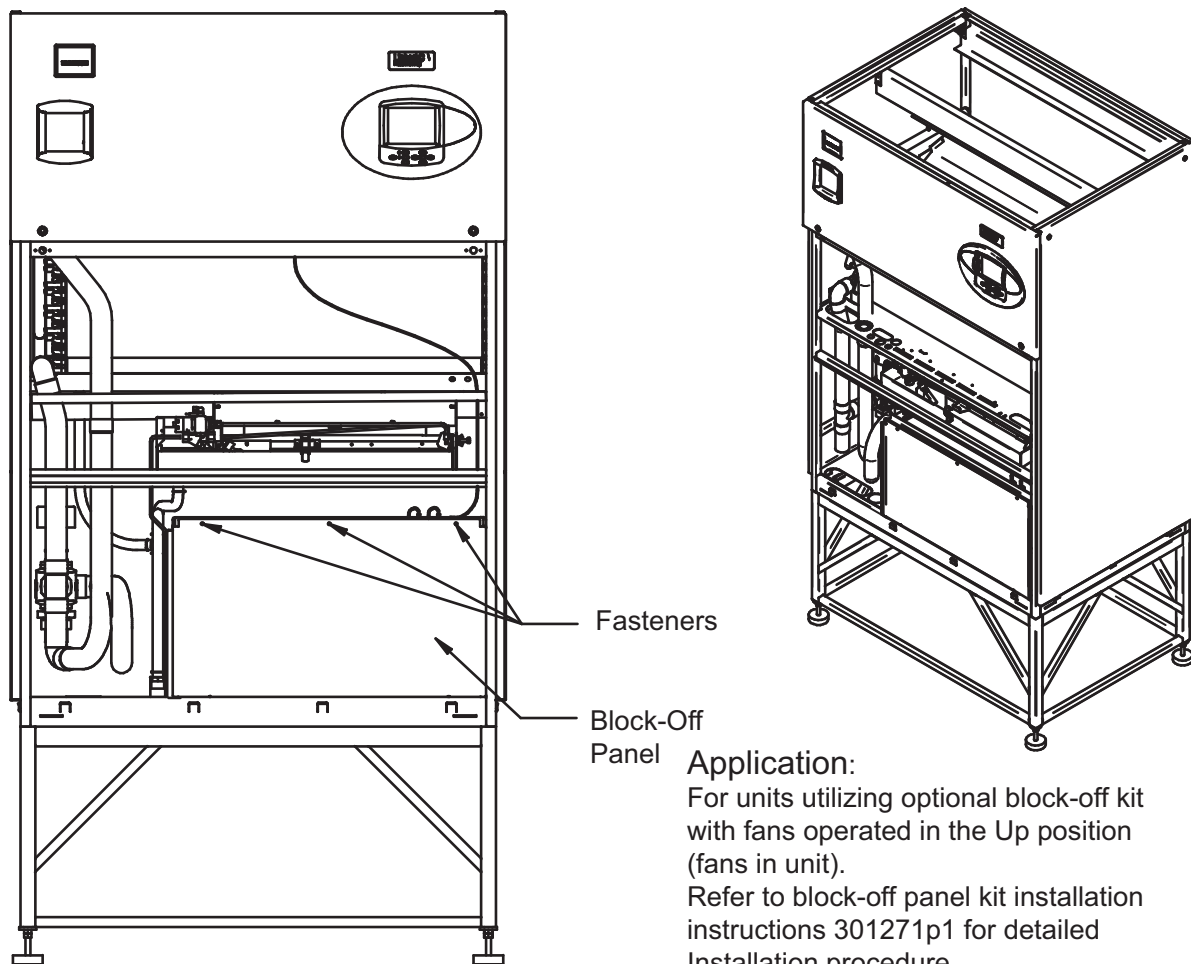


Figure 23 EC fan block-off panel kit installation



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**Application:**

For units utilizing optional block-off kit with fans operated in the Up position (fans in unit).

Refer to block-off panel kit installation instructions 301271p1 for detailed Installation procedure.

Note: The fans must be operated in either the fully raised position or fully lowered position. No other fan positioning is supported.

## 6.2 Removing the EC Fans—Downflow Units

The EC fans in Liebert DSE units can be removed for easier maintenance or for replacement.



### WARNING

Risk of electric shock and contact with high-speed rotating fan blades. Can cause injury or death.

Open all local and remote electric power disconnect switches, verify with a voltmeter that power is Off, and verify that fan blades have stopped rotating before working within the electric control enclosure or electric connection enclosures.



### WARNING

Risk of very heavy 145 lb. (65.7kg) fan modules dropping downward suddenly. Can cause injury or death.

Support fan modules before removing mounting hardware.

Use caution to keep body parts out of the fan modules pathway during repositioning.

Only properly trained and qualified personnel should work on this equipment.



### NOTE

*The Liebert DSE should be used with the fans either in their original raised position or with the fans in their fully lowered position. Suspension of fans in an intermediate position will directly affect product performance and is not recommended.*

1. Remove the panels from the front of the unit.
2. Remove the humidifier pan to ease fan removal.
3. **If the fan module has been lowered into the floor stand**, position the jack support and jack supplied with the unit under the fan module so it is safely supported before removing any hardware.  
**If the fan module has been raised**, proceed to **Step 6**. A properly positioned jack will be centered between the first and second set of tabs on the jack support as shown in Detail A in **Figure 24**.
4. Remove the hardware used to retain fan module in the lowered position. Retain the hardware for reinstalling the fan module.
5. Use the jack to raise the fan module slowly out of the floor stand and into the unit until the fan motor clears the front frame channel.

### NOTICE

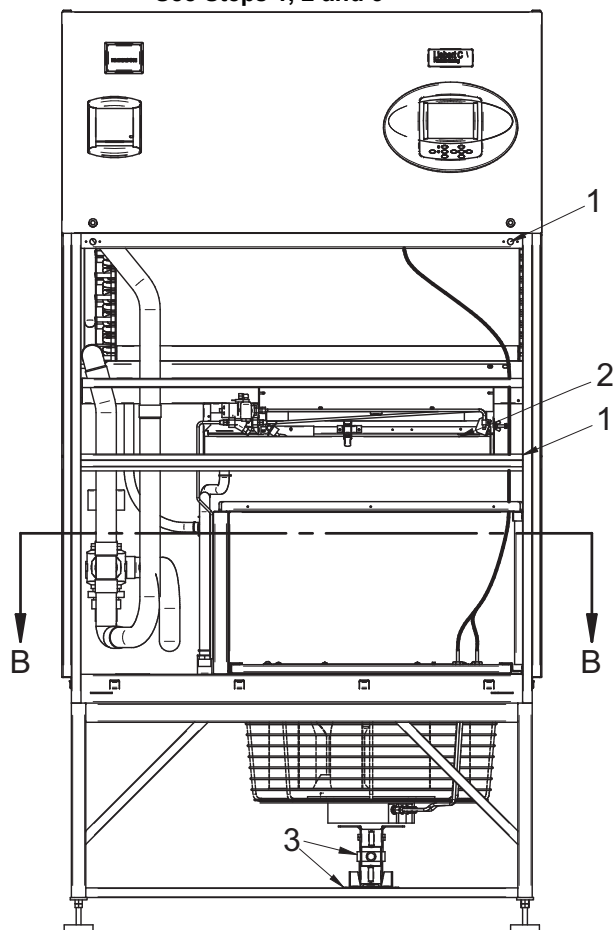
Risk of equipment snagging cables and wiring. Can cause unit damage.

Monitor the position of the fan harnesses and other parts while raising the fan to be sure that they are not caught or pinched.

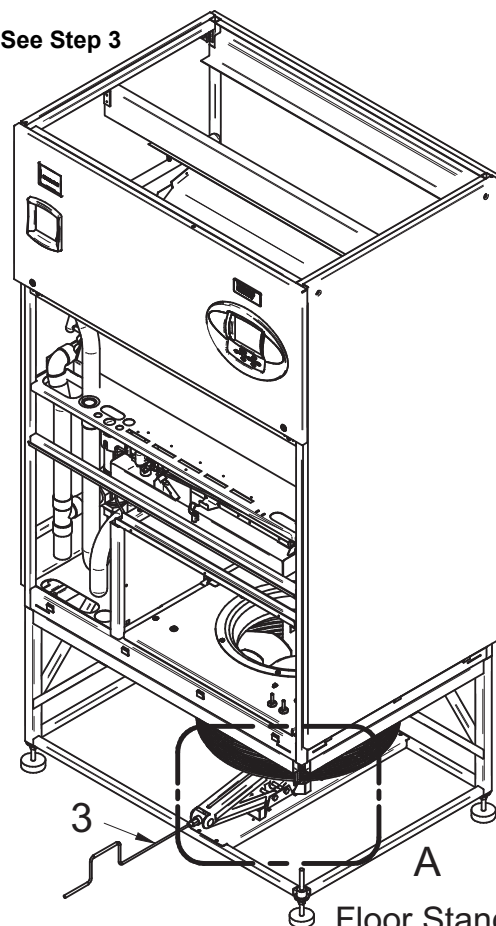


Figure 24 Removing the EC fans, Steps 1 through 5

See Steps 1, 2 and 3



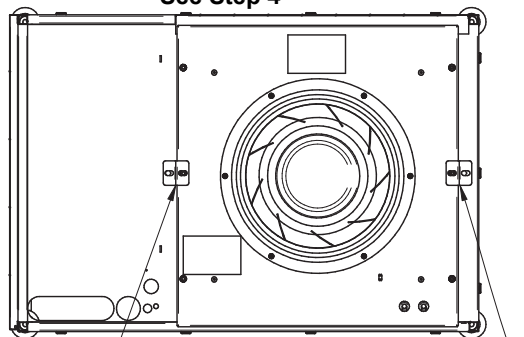
See Step 3



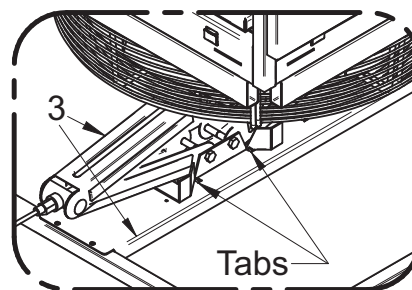
Floor Stand  
Partly Hidden

See Step 3

See Step 4



Hardware 4 SECTION B-B Hardware 4



DETAIL A  
Jack Location

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6. Insert a field-supplied fan removal device under the fan module. The fan removal device should rest securely on the front and rear frame channels (see **Figure 25**).
7. Disconnect high-voltage and low-voltage fan motor wiring from the fan motor electric component inside the electric panel. Carefully cut cable ties as needed.



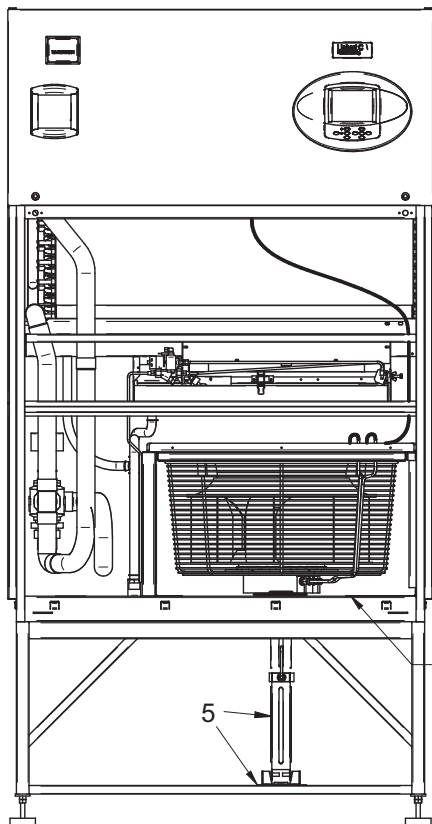
**NOTE**

*Refer to the unit's electrical schematic for specific wire attachment points.*

8. Using the removal device, slide the fan module out through the front of the unit (see **Figure 25**).
9. To reinstall the fan module, reverse the steps above. Remove the field-supplied fan removal device before resuming unit operation.

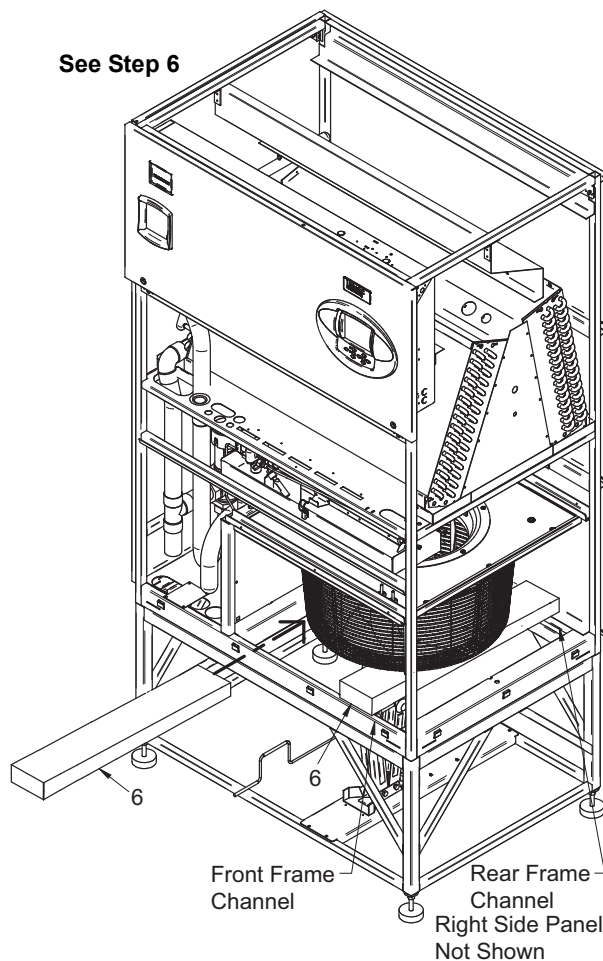
Figure 25 EC fan removal procedure, Steps 6 through 9

See Step 5

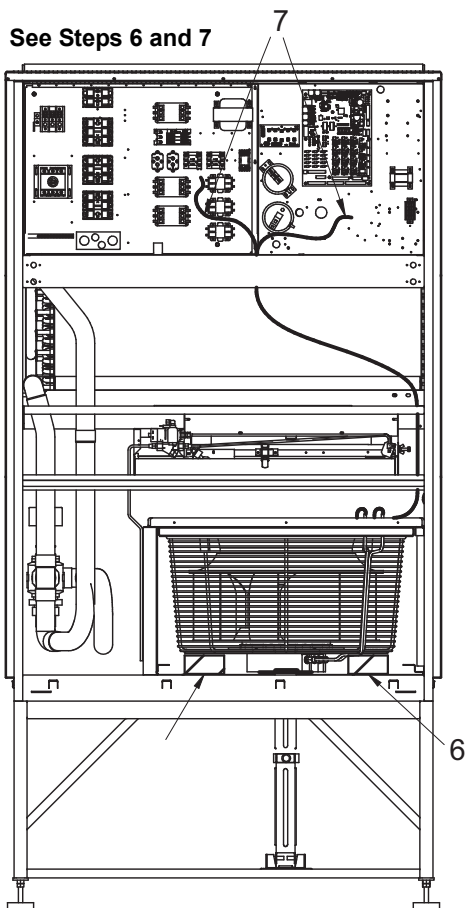


Front Frame Channel

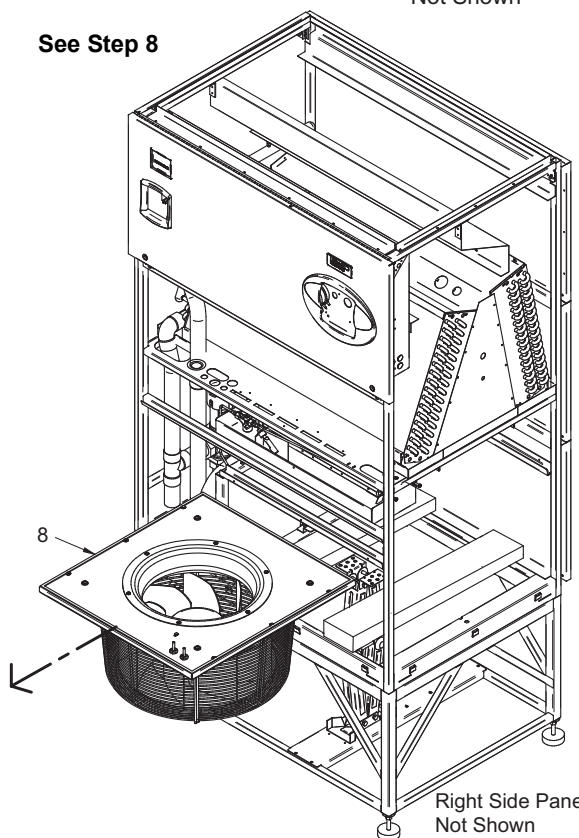
See Step 6



See Steps 6 and 7



See Step 8



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Right Side Panel  
Not Shown

## 6.3 Installing EC Fans and Plenum on Liebert DSE—Upflow Models



### WARNING

Risk of electric shock. Can cause injury or death. Open all local and remote electric power disconnect switches before working within the electric connection enclosures.



### WARNING

Risk of sharp edges and heavy parts. Improper handling can cause equipment damage, injury or death.

- Use extreme caution and install the EC fan(s) and plenum(s) on the Liebert DSE only as described in these instructions.
- More than one person may be required to complete the assembly and installation. Installer(s) must be properly trained and qualified to lift, move and manipulate heavy equipment from floor level to the top of the unit.
- Wear OSHA-approved safety headgear, eye protection, gloves and shoes when moving, lifting and installing the fan(s) and plenum(s).
- Equipment used in moving, lifting and installing the fan(s) and plenum(s) must meet OSHA requirements and be rated for the weight of the fan(s) and plenum(s). If ladders are used, verify that they are rated for the combined weight of the fan(s), plenum(s) and installer(s) as loaded. See **Tables 7, 8 and 10** for EC fan and plenum weights.
- Read and follow the lifting equipment and/or ladder manufacturer's operating instructions and safety requirements.

### 6.3.1 Installation Steps—General Outline

Follow the steps outlined below to install the fans and plenums. **Refer to detailed instructions on following pages**; see **Figure 39** for gasket tape application locations.

1. Assemble the plenum's rear and side panels using factory-provided screws to secure the panels.
2. Lift the assembled panels onto the top of the Liebert DSE and secure them to the unit with the provided angle brackets and screws.
3. Place the EC fan assembly(s) on top of the Liebert DSE.
4. Align the mounting holes of the assembly base with the threaded locations on top of the unit.
5. Attach the fan assembly(s) to the unit using the factory-provided bolts, washers and spacers.
6. Route the EC fan wire harnesses, according to the number of assemblies, into the junction box(es).
7. Connect all wires inside the junction box(es).
8. Attach the front panel of the plenum to the previously attached plenum side panels using the factory-provided hardware and screws.
9. **For grilled plenums:** Attach the top panel to the top of the assembled plenum sides using the factory-provided screws.
10. When a compressor section plenum is ordered, assemble the rear, side and front panels using the factory-provided screws.
11. Lift the assembled compressor section plenum from **Step 10**, position it on top of the Liebert DSE and secure it to the unit with the factory-provided angle brackets, channels and screws.

**Table 7 Liebert DSE upflow plenum with EC fan assembly sizes and weights**

Plenum Height	24" (610mm)	30" (762mm)	36" (917mm)	See Figure #
Unit Description	Assembly Number and Weight			
<b>Unit Length 109" (2769mm) / 98" (2489mm) - DA080U-DA085U</b>				
Non-grilled plenum, Length 82" (2089mm)	312208G1 112 lb. (51kg)	312208G2 136 lb. (62kg)	312208G3 156 lb. (71kg)	<b>29</b>
Front discharge, Length 82" (2089mm)	312198G1 160 lb. (73kg)	—	—	<b>30</b>
Rear discharge, Length 82" (2089mm)	312411G1 173 lb. (79kg)	—	—	<b>31</b>

**Table 8 Liebert DSE upflow EC fan assembly**

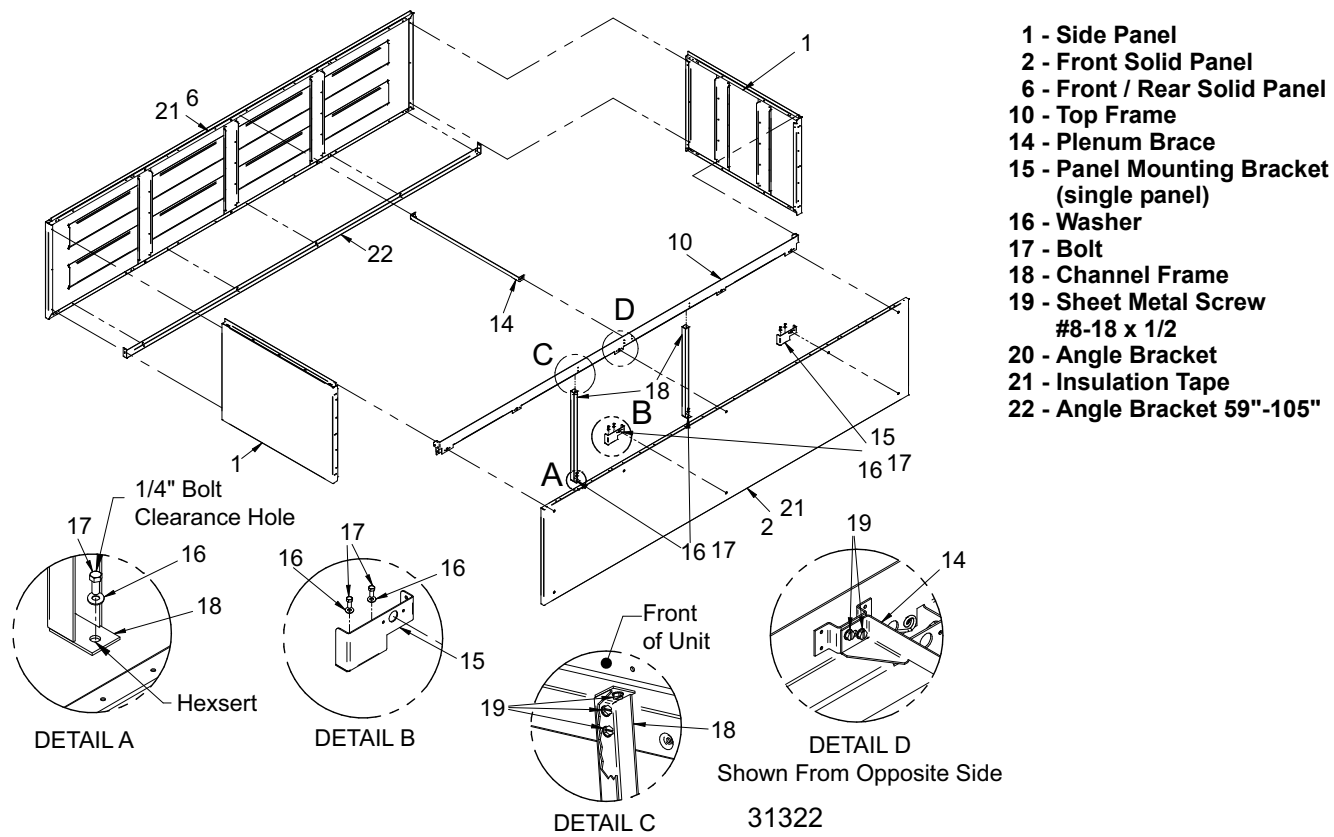
Part Number	Weight	Fan Size (Nominal)	Voltage / kW	Unit Size
312583G3	102 lb. (46kg)	22" (560mm)	460V/3.1kW	DA080U / DA085U
312583G4	102 lb. (46kg)	22" (560mm)	208V/2.9kW	DA080U / DA085U

**Table 9 Liebert DSE upflow plenum assembly parts list**

Item #	Description	Quantity
1	Side Panel	2
2	Front Solid Panel	1
3	Front Grilled Panel	1
4	Short Front Grilled Panel	1
5	Short Rear Grilled Panel	1
6	Front / Rear Solid Panel	1
7	Rear Grilled Panel	1
8	Angle Top Rear	1
9	Channel Panel	1 or 2
10	Top Frame	1
11	Top Panel Brace	1
12	Top Panel (with holes)	1
13	Top Panel (plain)	1
14	Plenum Brace	1
15	Panel Mounting Bracket (single panel)	1 or 2
16	Washer 1/4	Varies Depending on Assembly
17	Bolt 1/4-20 x 7/8	
18	Channel Frame	
19	Sheet Metal Screw #8-18 x 1/2	
20	Angle Bracket	
21	Insulation Tape	
22	Angle Bracket 59" to 105" (1498.6 to 2667mm)	1

Refer to **Figures 29** through **34**; not all parts are used for all models.

**Figure 26 Non-grilled plenum—Plenum length, 105" (2673mm); unit length, 132" (3353mm) or DA080U-DA085U**

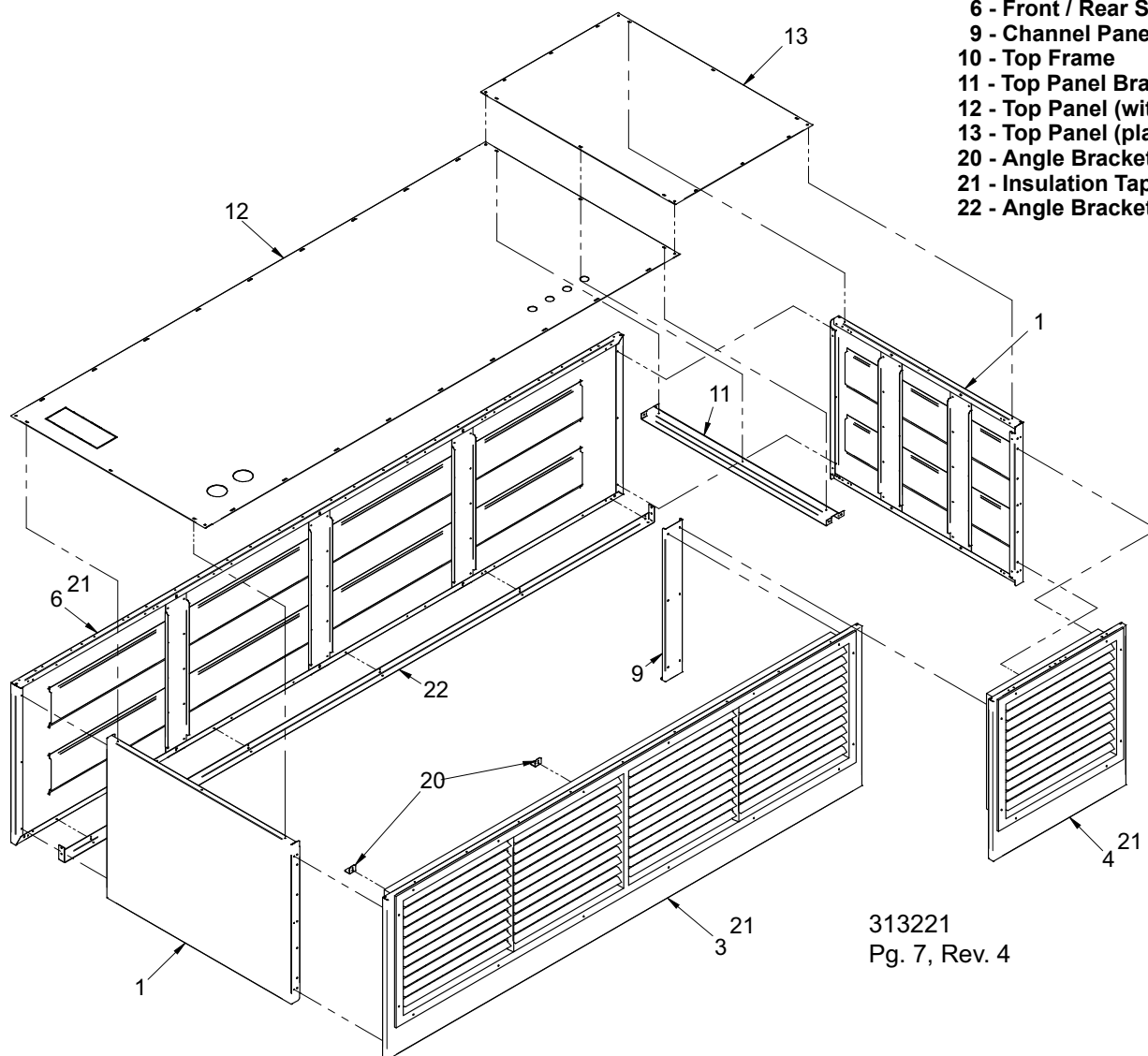


**Notes:**

1. Detail views A, B, C and D show the proper installation of Items 14, 15 and 18.
2. Orientation of components in all detail views is the same in Figures 28, 29 and 31.

Figure 27 Grilled plenum—Plenum length, 105" (2673mm), unit length, 132" (3353mm), front discharge

- 1 - Side Panel
- 3 - Front Grilled Panel
- 6 - Front / Rear Solid Panel
- 9 - Channel Panel
- 10 - Top Frame
- 11 - Top Panel Brace
- 12 - Top Panel (with holes)
- 13 - Top Panel (plain)
- 20 - Angle Bracket
- 21 - Insulation Tape
- 22 - Angle Bracket 59"-105"



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Figure 28 Grilled plenum—Plenum length, 105" (2673mm), unit length, 132" (3353mm), rear discharge

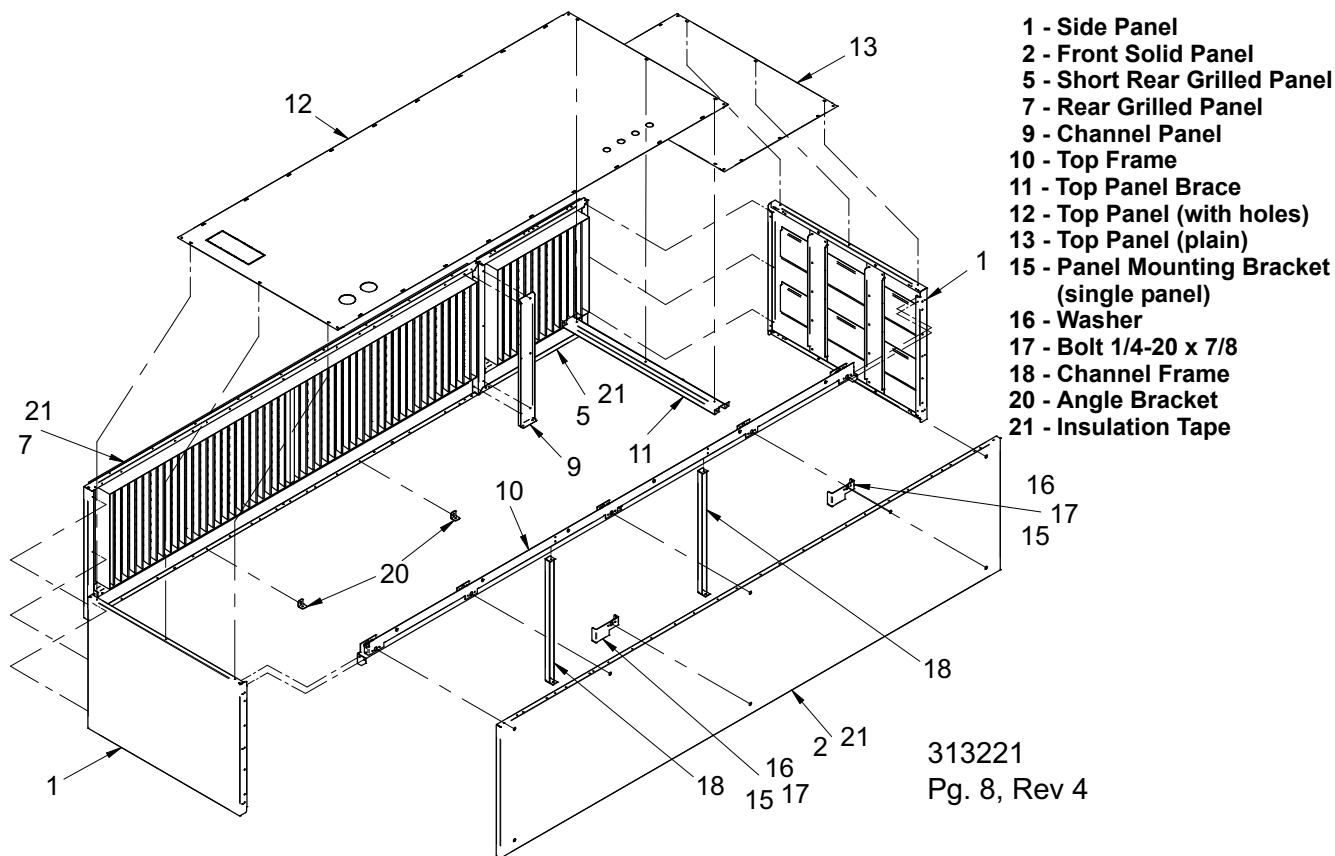
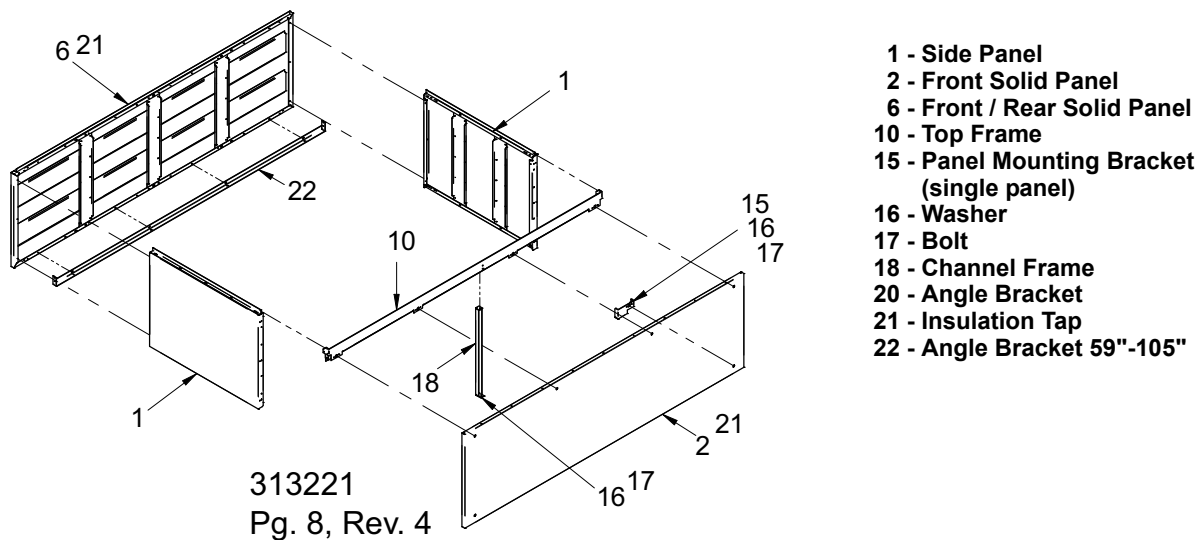
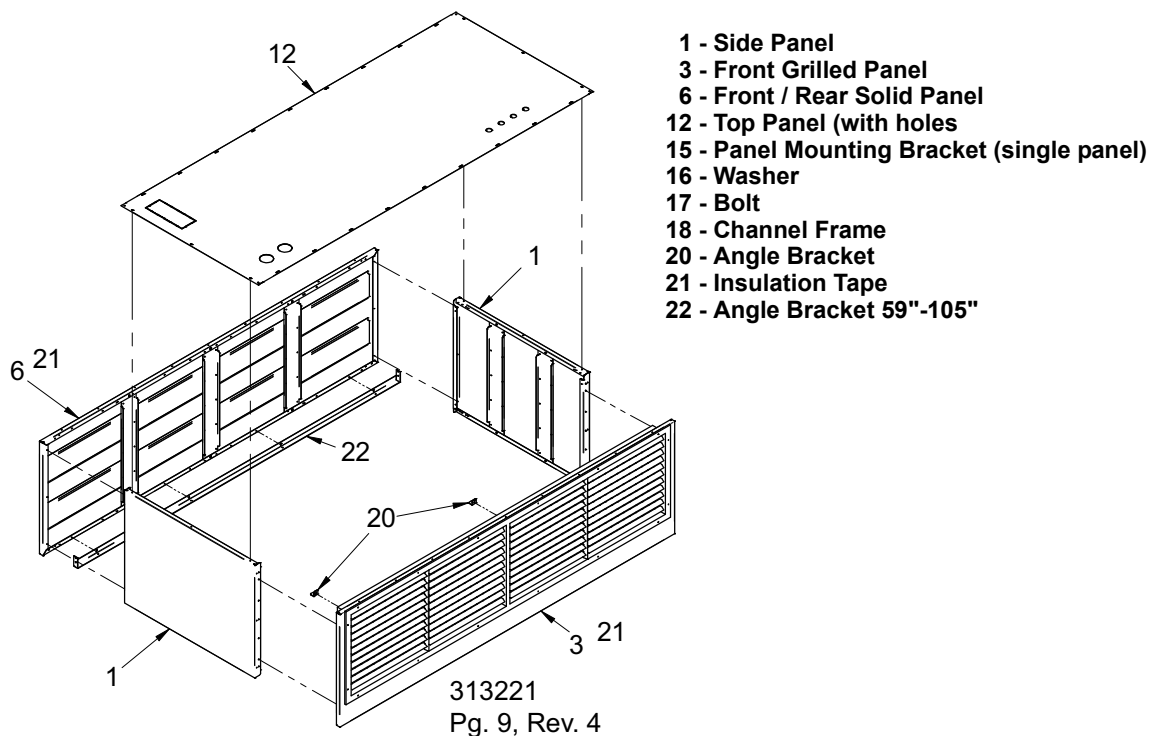


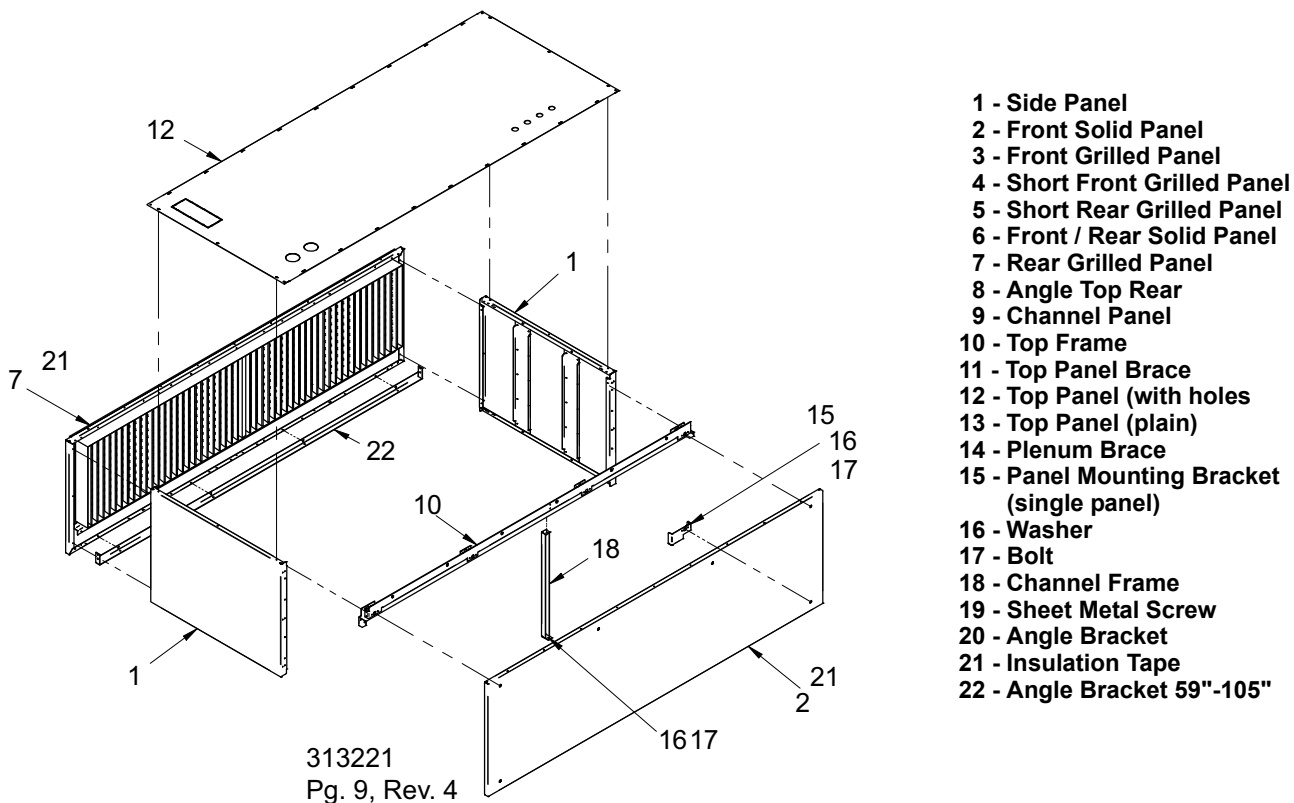
Figure 29 Non-grilled plenum—Plenum length. 82" (2089mm); unit length, 109" or 98" (2769mm or 2489mm) or DA080U-DA085U



**Figure 30 Grilled plenum, front discharge—Plenum length 82" (2089mm); unit length 109" or 98" (2769mm or 2489mm) or DA080U-DA085U**

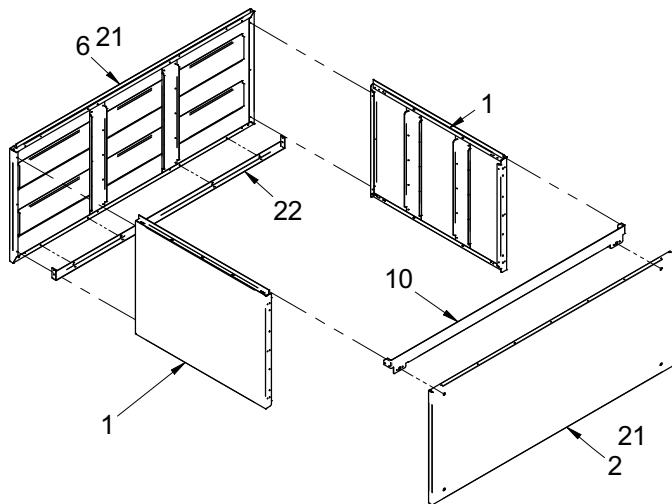


**Figure 31 Grilled plenum, rear discharge—Plenum length 82" (2089mm); unit length 109" or 98" (2769mm or 2489mm) or DA080U-DA085U**





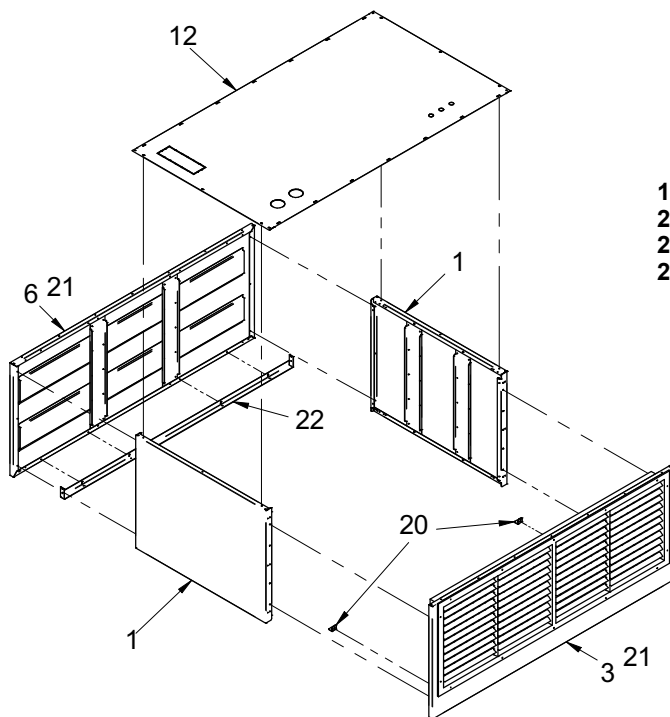
**Figure 32 Non-grilled plenum—Plenum length 59" (1505mm); unit length 73" or 86" (1854mm or 2184mm)**



- 1 - Side Panel
- 2 - Front Solid Panel
- 6 - Front / Rear Solid Panel
- 10 - Top Frame
- 20 - Angle Bracket
- 21 - Insulation Tape
- 22 - Angle Bracket 59"-105"

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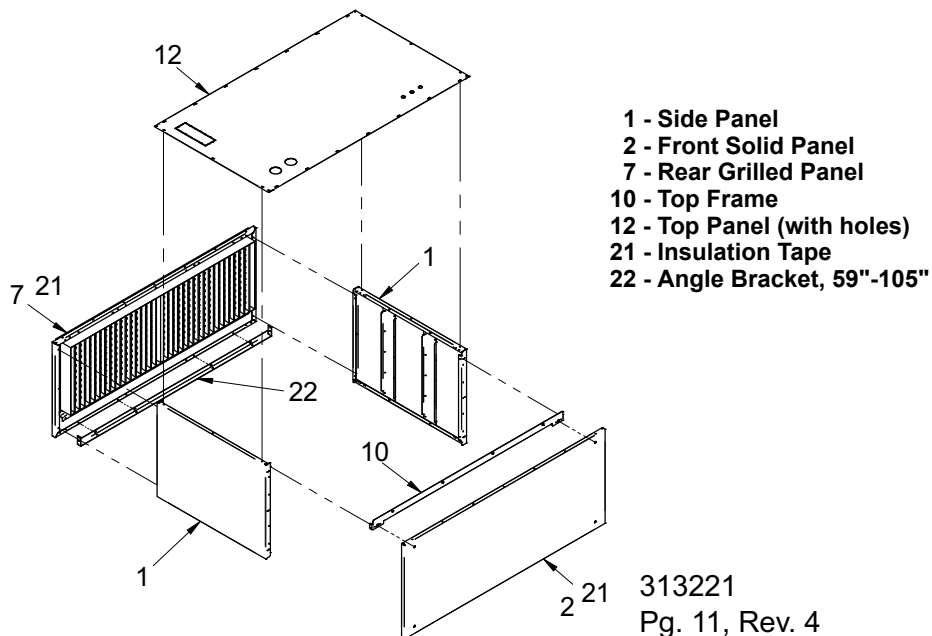
**Figure 33 Grilled plenum, front discharge—Plenum length 59" (1505mm); unit length 73" or 86" (1854mm or 2184mm)**



- 1 - Side Panel
- 3 - Front Grilled Panel
- 6 - Front / Rear Solid Panel
- 12 - Top Panel (with holes)
- 20 - Angle Bracket
- 21 - Insulation Tape
- 22 - Angle Bracket, 59"-105"

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**Figure 34** Grilled plenum, rear discharge—Plenum length 59" (1505mm); unit length 73" or 86" (1854mm or 2184mm)



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**Table 10** Liebert DSE upflow compressor section plenums

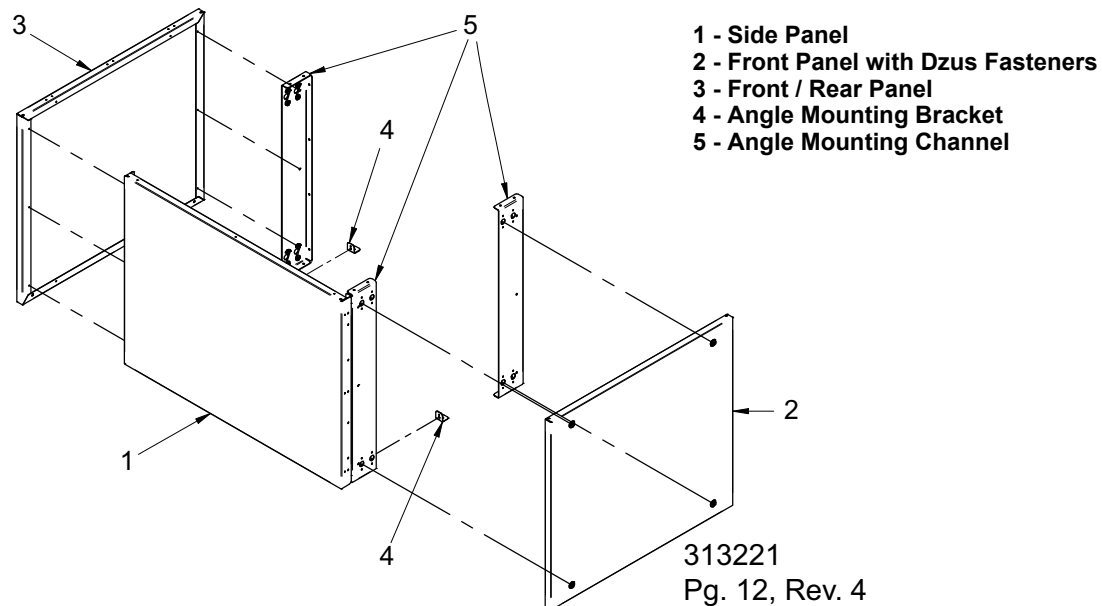
Part #	Weight, lb. (kg)	Plenum Size, in. (mm)	See Figure
313202G10	27 (12)	17 x 24 (432 x 610)	36
313202G11	30 (14)	17 x 30 (432 x 762)	36
313202G12	33 (15)	17 x 36 (432 x 914)	36

**Table 11** Liebert DSE upflow compressor section plenum assembly parts list

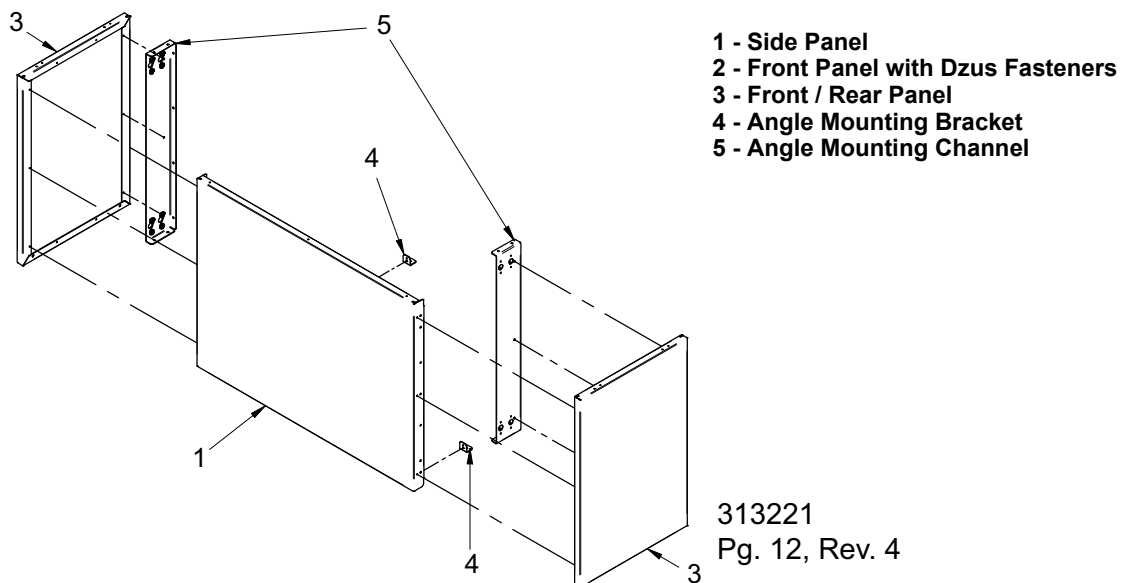
Item	Description	Quantity
1	Side Panel	1
2	Front Panel with Dzus Fasteners	1
3	Front / Rear Panel	1 or 2
4	Angle Mounting Bracket	2
5	Angle Mounting Channel	2 or 3
6	Sheet Metal Screw	Varies Depending on Assembly

Optional item; see **Figures 35** and **36** (not all parts are used for all models)

**Figure 35 Compressor section plenum—26" x 24" (660mm x 610mm); 26" x 30" (660mm x 762mm); 26" x 36" (660mm x 914mm)**

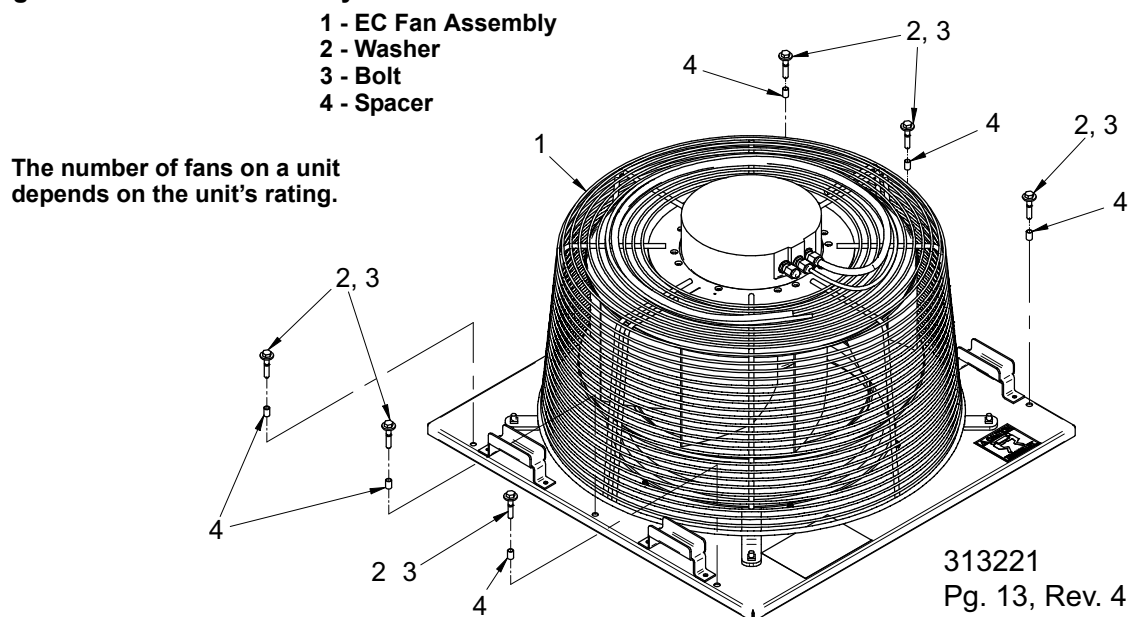


**Figure 36 Compressor section plenum—13" x 24" (330mm x 610mm); 13" x 30" (330mm x 762mm); 13" x 36" (330mm x 914mm); 15" x 24" (381mm x 610mm); 15" x 30" (381mm x 762mm); 15" x 36" (381mm x 914mm); 17" x 24" (432mm x 610mm); 17" x 30" (432mm x 762mm); 17" x 36" (432mm x 914mm)**



### 6.3.2 EC Fan Assembly

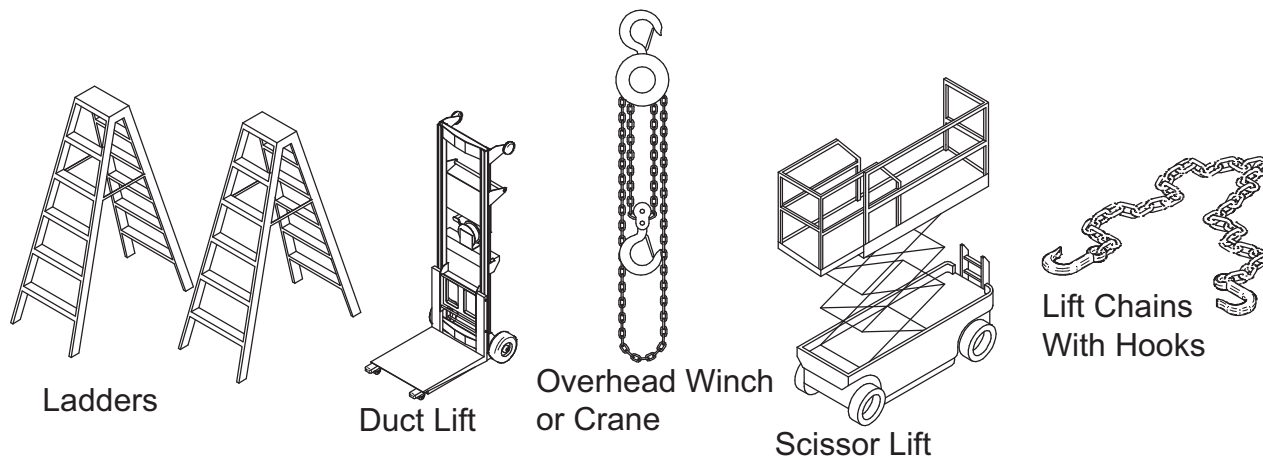
Figure 37 EC fan assembly



### 6.3.3 Upflow Plenum and EC Fan Preparation-General Guidelines

1. Grilled plenums are intended for Liebert DSE upflow units only. Non-grilled plenums provide access for installing and servicing EC fan assembly(s) on upflow units that have field-supplied ductwork.
2. Move all parts to the installation location and remove the packaging.
3. Verify that the fan motor(s) voltage rating and capacity are appropriate for the marked unit voltage and capacity. Refer to **Table 8**.
4. Disconnect all power to the unit before beginning installation. See **Warning on page 50**.
5. Emerson recommends using either a duct lift or scissors lift to assist in installing the EC fan assembly(s) on top of the cooling unit.

Figure 38 Recommended tools for installation of the upflow plenum and EC fan



### 6.3.4 Upflow Plenum and EC Fan Installation



#### WARNING

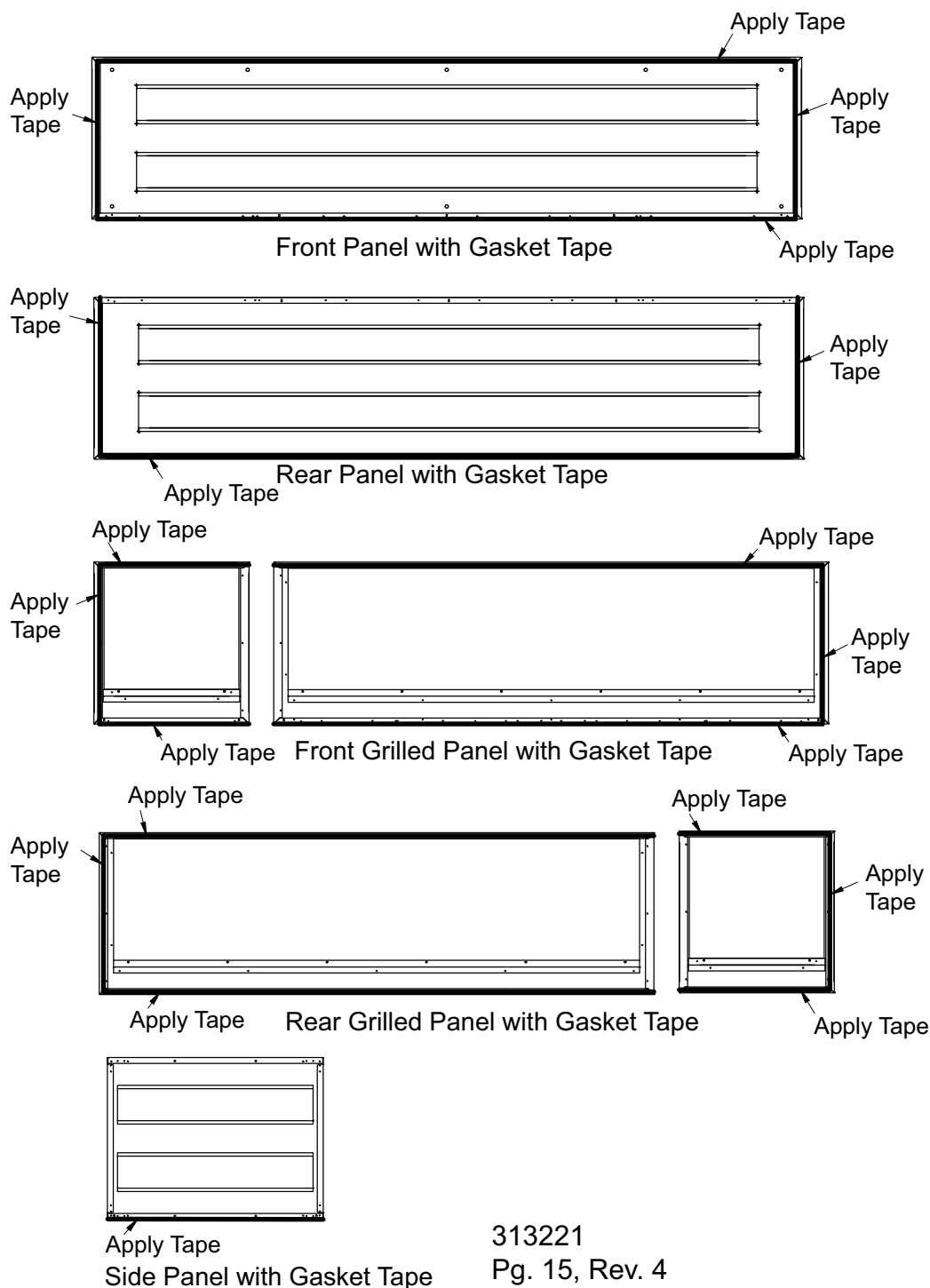
Risk of electric shock. Can cause serious injury or death.

Open all local and remote electric power disconnect switches and verify that power is off with a volt meter before making any electrical connections.

#### Preparation

Apply gasket tape as shown in **Figure 39**.

**Figure 39 Gasket tape application**



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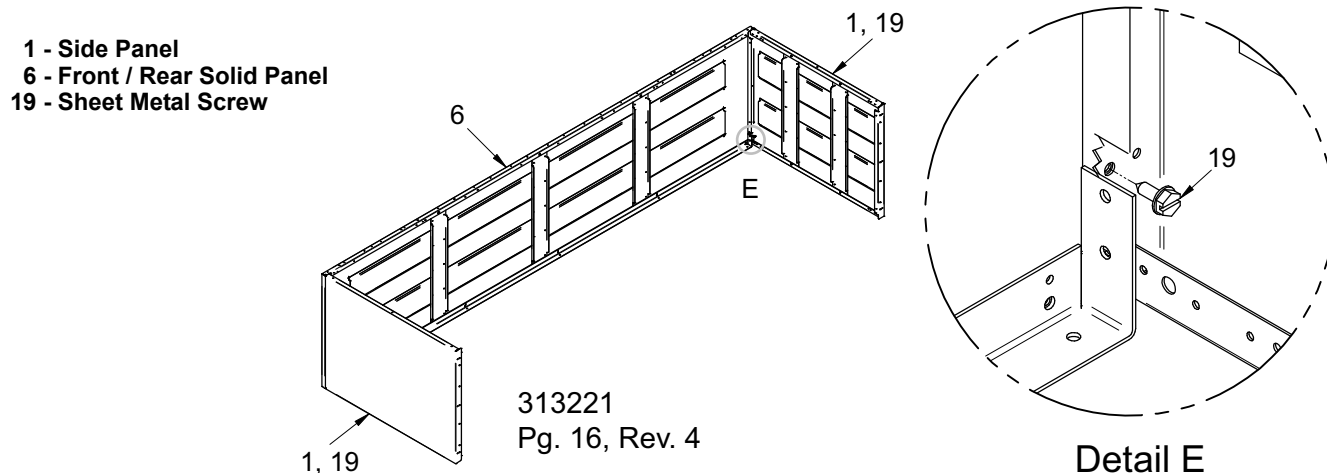
Refer to **Figure 40** for **Step 1** (for non-grilled plenum and front discharge grilled plenum)

1. Attach two side panels (Item 1) to the front/rear solid panel (Item 6) using 10 screws (Item 19). See Detail E in **Figure 40** for screw placement.

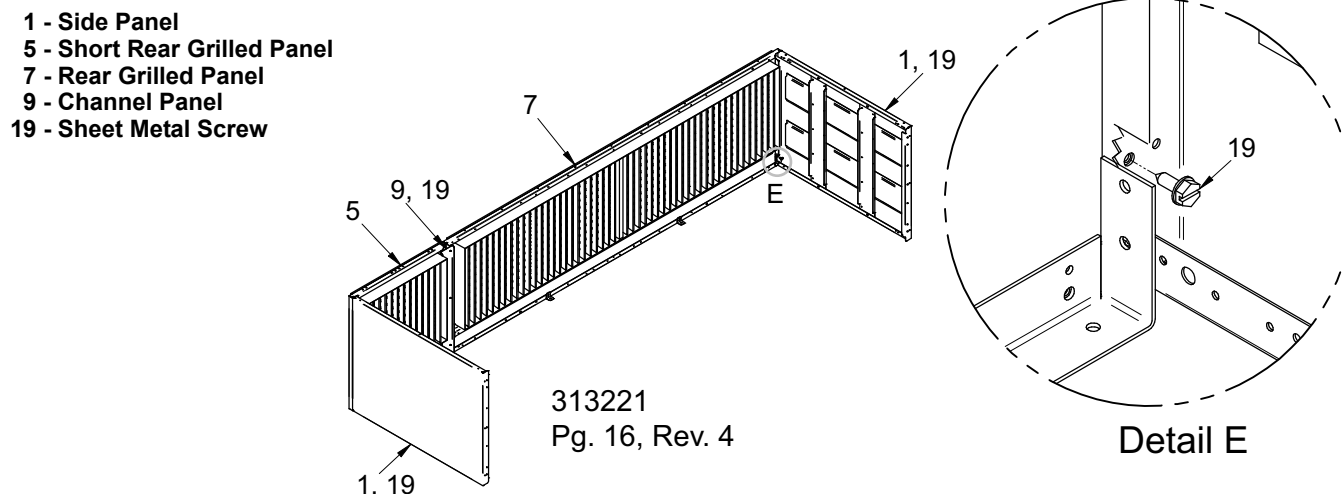
Refer to **Figure 41** for **Steps 2 and 3**: (for rear discharge grilled plenum)

2. Attach the short rear grilled panel (Item 5) and the rear grilled panel (Item 7) together using the channel panel (Item 9) and 10 screws (Item 19).
3. Attach two side panels (Item 1) to the assembly from **Step 2**, using 10 screws (Item 19). See Detail E in **Figures 40 and 41** for placement of the screws.

**Figure 40 Non-grilled plenum / grilled plenum, front discharge**



**Figure 41 Grilled plenum, rear discharge**

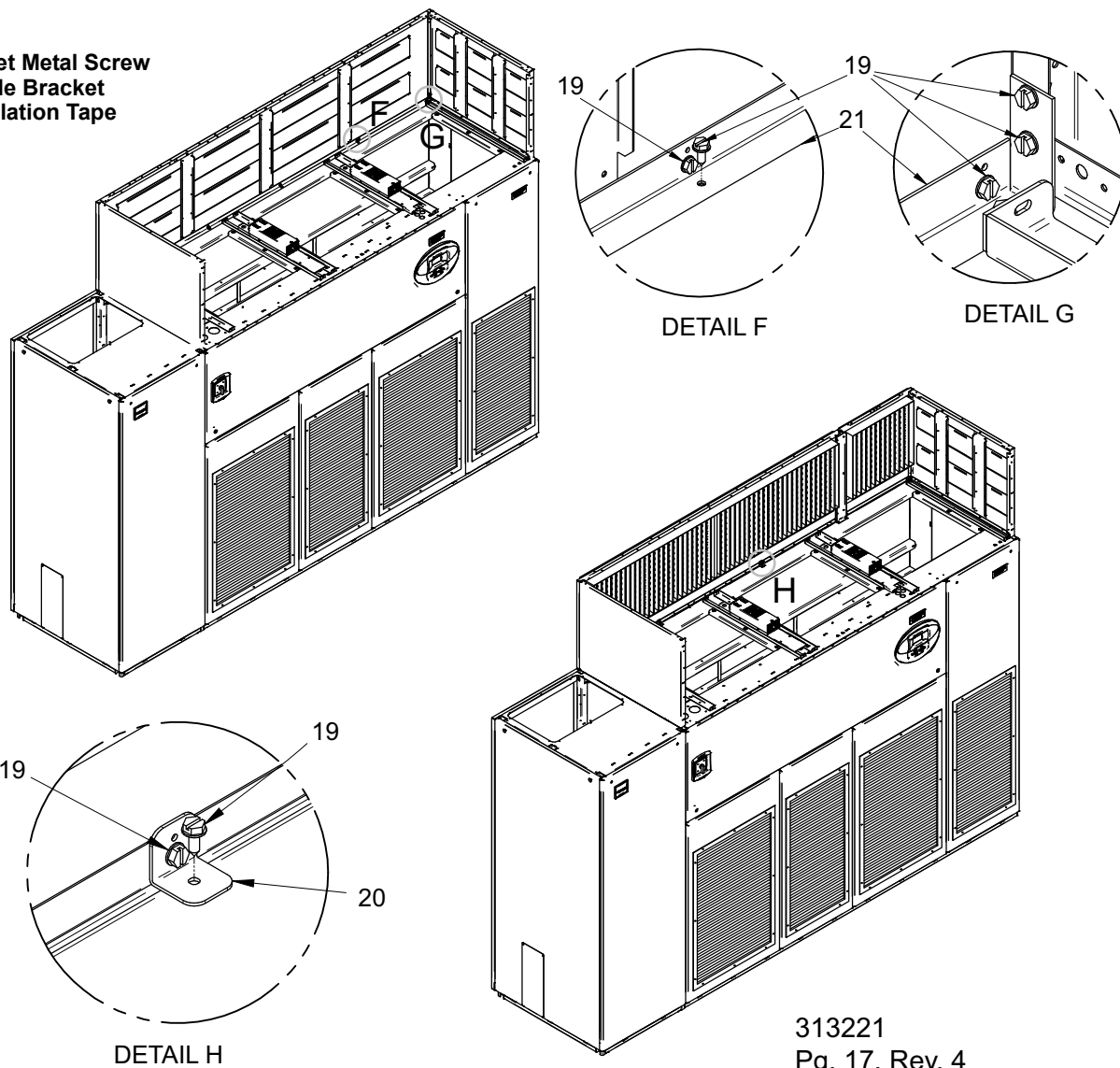


Refer to **Figure 42** for **Steps 4** through **6**.

4. Lift the assembled panels from **Step 1** or **Steps 2 and 3**, and place them on the top of the Liebert DSE.
5. Attach the assembled panels to the top of the Liebert DSE using angle bracket 59"-105" (Item 22) and screws (Item 19) as shown in Detail F and Detail G.
6. Attach the assembled panels to the top of the Liebert DSE using angle brackets (Item 20) and screws (Item 19) as shown in Detail H.

Figure 42 Plenum placement on top of Liebert DSE

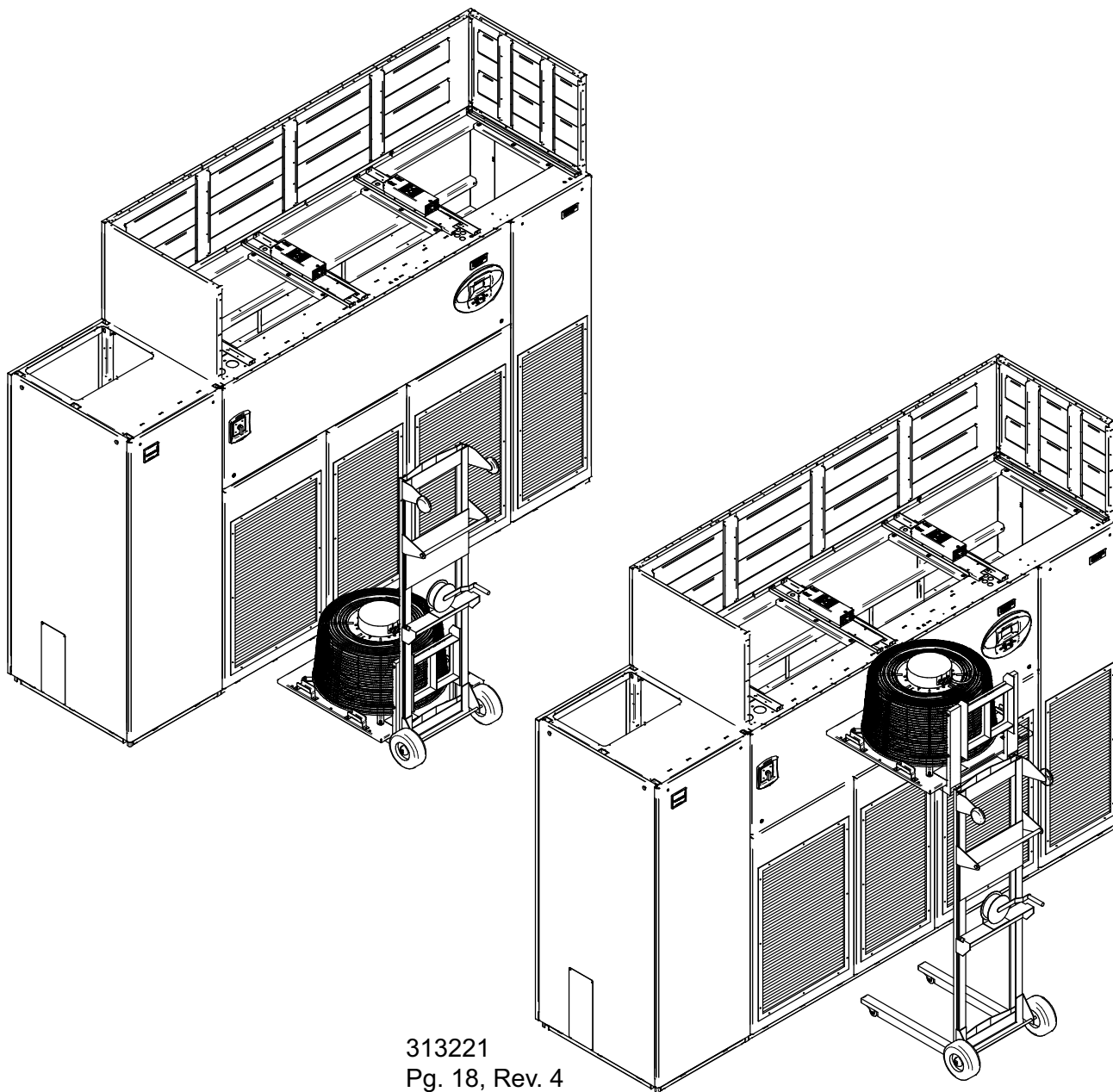
- 19 - Sheet Metal Screw
- 20 - Angle Bracket
- 21 - Insulation Tape



Refer to **Figure 43** for **Steps 7** through **9**.

7. Place the EC fan assembly onto the lifting device (duct lift shown as one option for lifting the EC fan assembly).
8. Orient the lifting device so that it is in line with where the EC fan assembly is to be installed.
9. Lift the EC fan assembly to just above the top of Liebert DSE. Make sure not to damage the unit panels or the installed plenum panels

**Figure 43** EC fan assembly alignment for placement on top of Liebert DSE



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Refer to **Figure 44** for **Steps 10** through **12**.

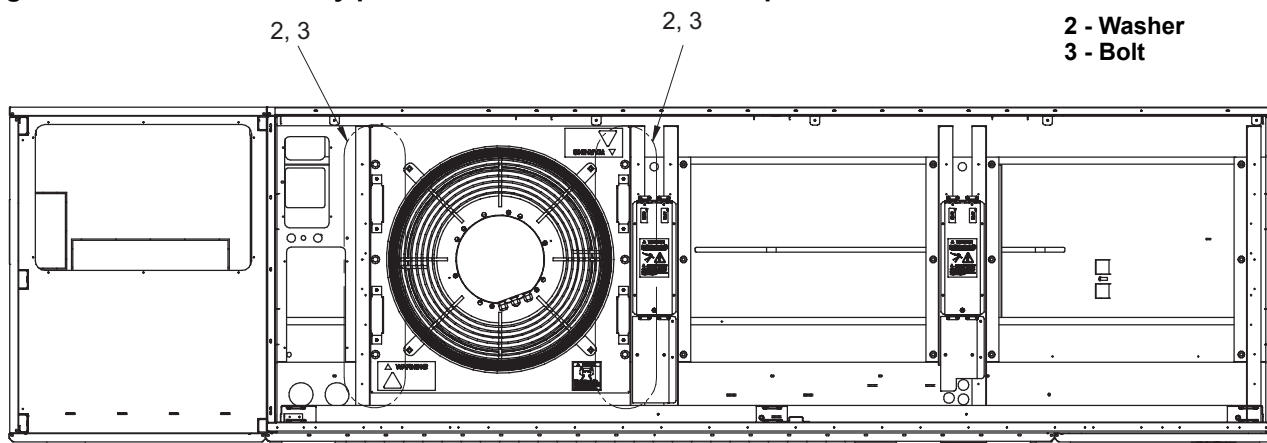
10. With the EC fan assembly lifted to clear the top of the Liebert DSE, use the handles to slide the EC fan assembly onto the top of the Liebert DSE.
11. Slide the assembly until the mounting holes on the assembly base aligns with the threaded locations on top of the Liebert DSE.

**NOTE**

*The assembly must be lifted over the hinge along the top of the Liebert DSE.*

12. Attach the EC fan assembly using six washers, bolts and spacers (Items 2, 3 and 4).

**Figure 44** EC fan assembly placement and attachment on top of Liebert DSE

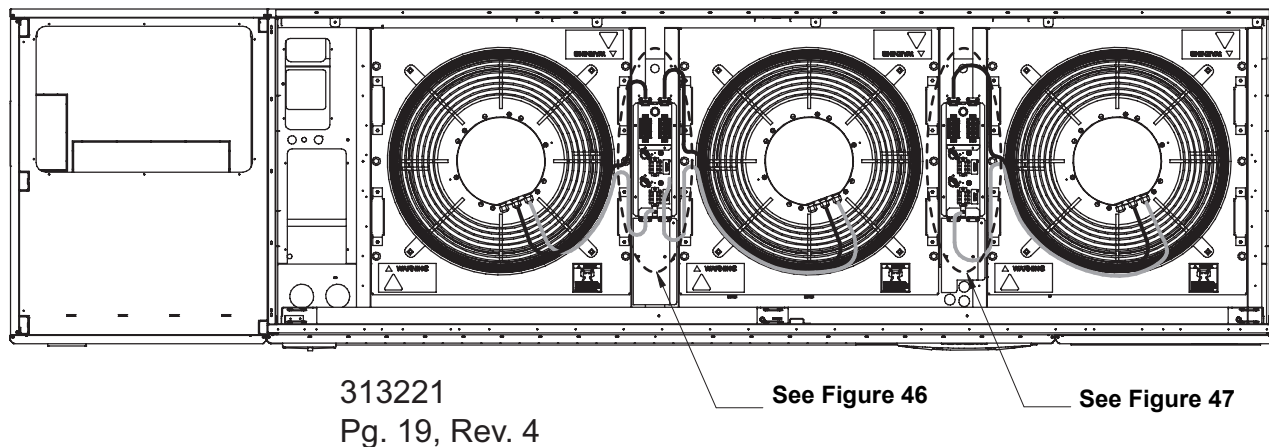


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Refer to **Figure 45** for **Steps 13** through **17**.

13. Route the wire harnesses from the EC fans as indicated.  
Existing wire ties holding the harnesses to the fan cage may require removal.
14. Black-sleeved wire harnesses contain wires for fan control.
15. Gray-sleeved wire harnesses contain wires for motor high-voltage connection.
16. Insert wire harnesses into the indicated openings of the junction boxes. Make sure not to route the wiring over the handles of the EC fan assembly.  
Refer to **Figures 46** and **47** for wire connections inside the junction box.
17. Use the factory-provided wire ties to secure the wire harnesses to the fan cage to prevent the wire harnesses from moving while the fans are operating.

**Figure 45 EC fan wire routing**

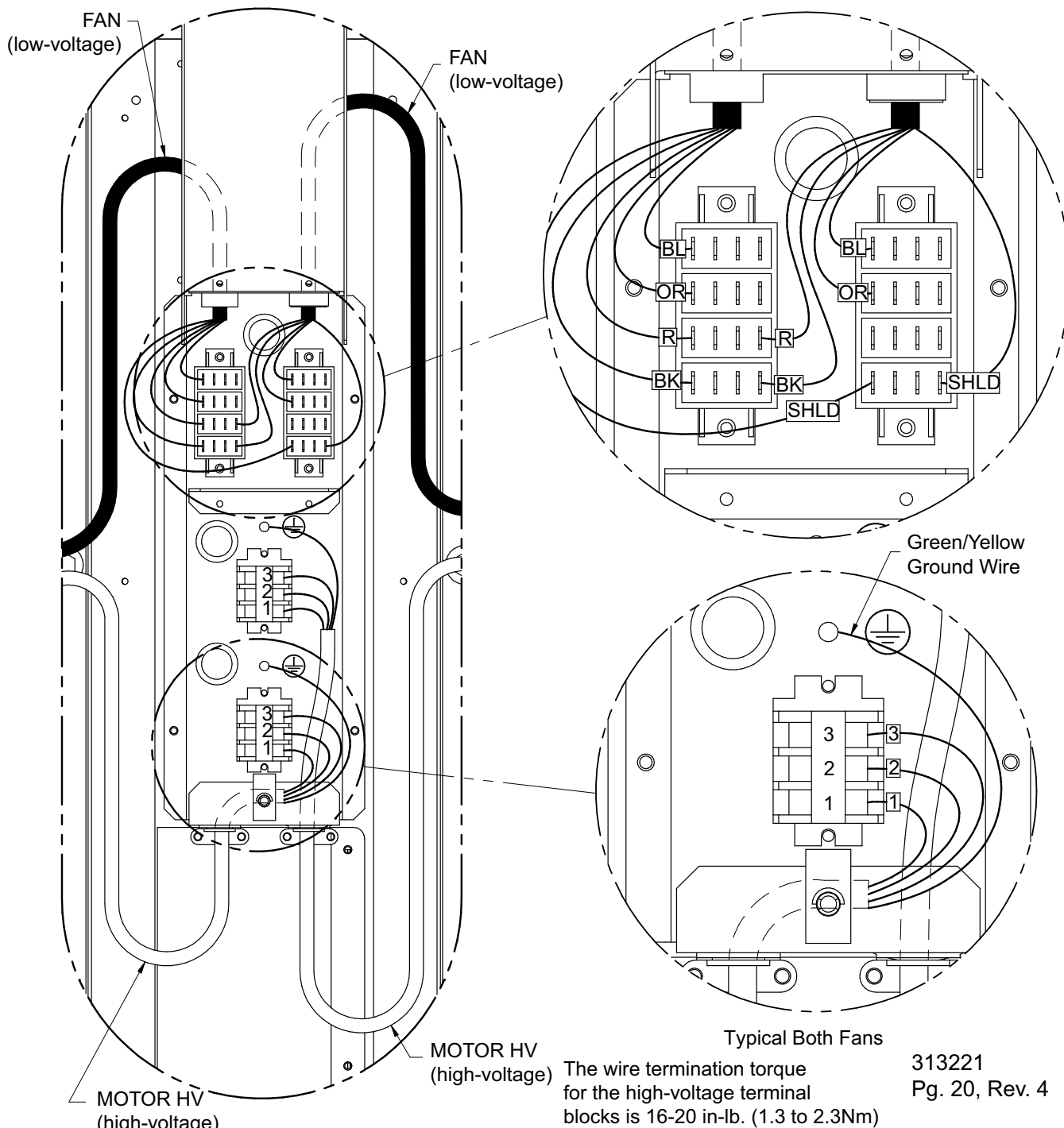


## WARNING

Risk of short circuit and electric shock from pinched wires. Can cause equipment damage, loss of power to fans, serious injury or death.

Verify that all wiring is contained within the junction box before closing and securing the cover.

Figure 46 Junction box connection (Fans 1 and 2 for units with two or three fans)

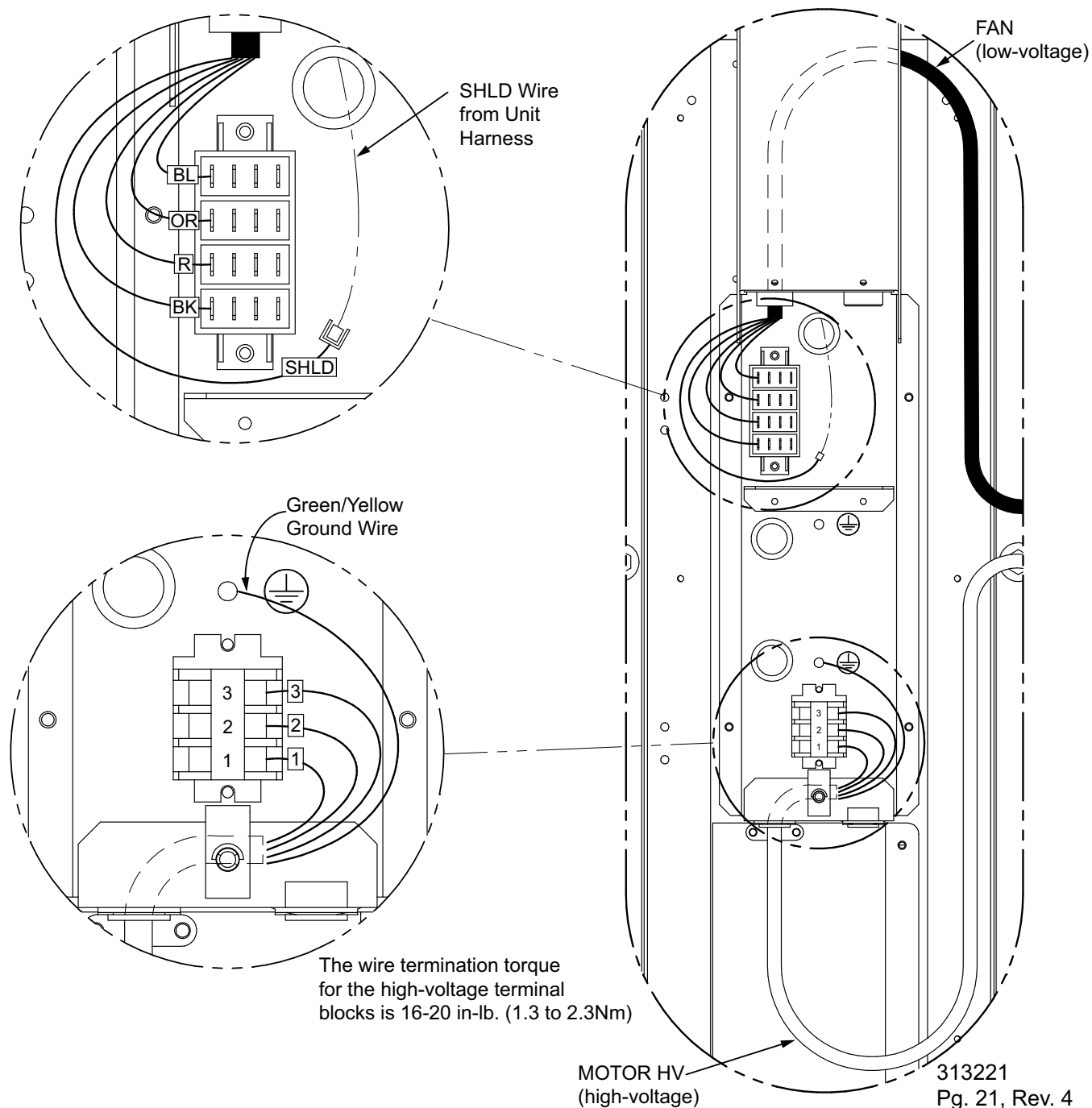


## WARNING

Risk of short circuit and electric shock from pinched wires. Can cause equipment damage, loss of power to fans, serious injury or death.

Verify that all wiring is contained within the junction box before closing and securing the cover.

Figure 47 Junction box connection (Fan 3 for units with three fans; Fan 1 for single-fan units)

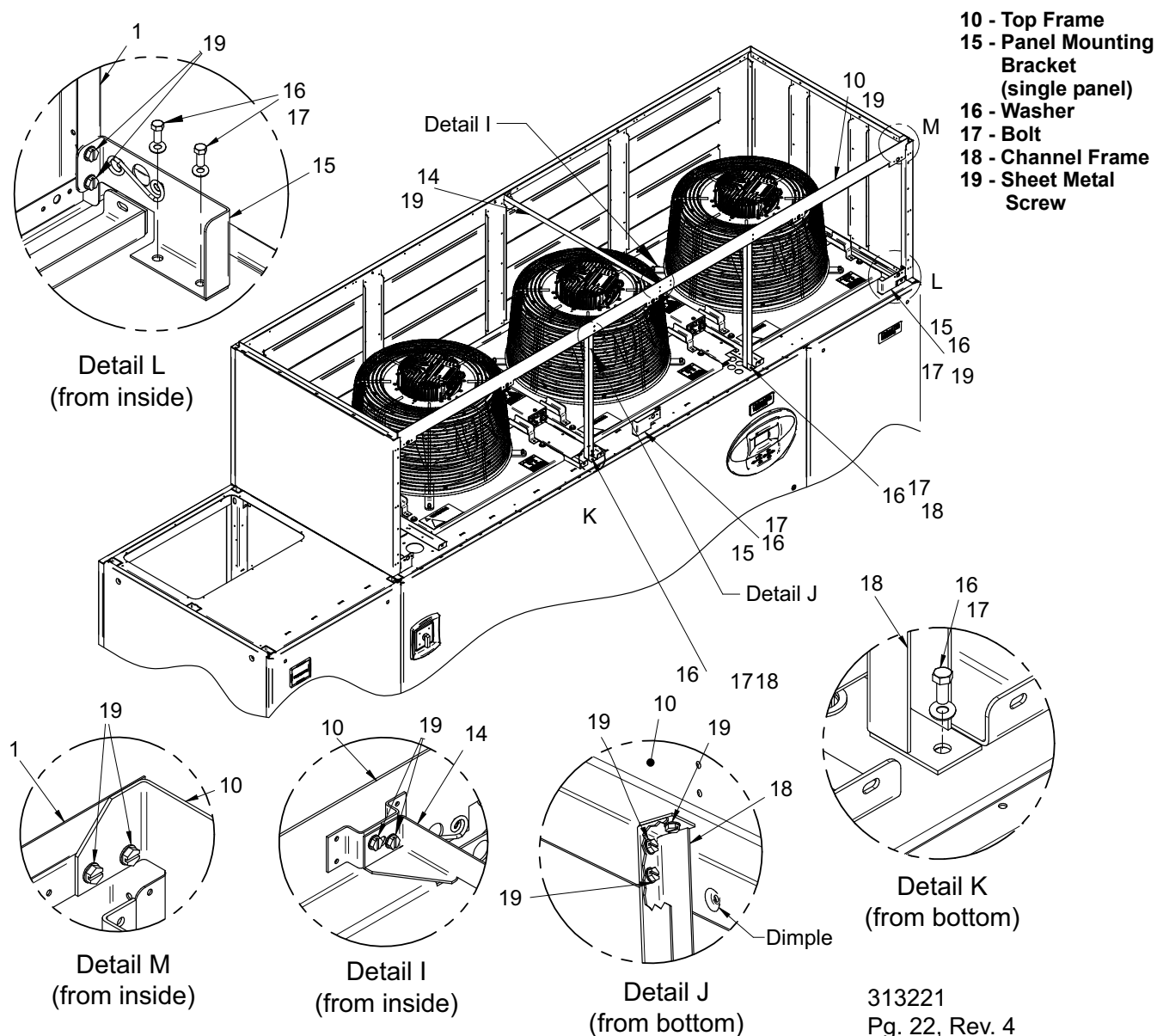


### Frame Members for Non-Grilled Plenum

Refer to **Figure 48** for **Steps 18** through **22**.

18. Attach the channel frames (Item 18) to the top frame (Item 10). Use three screws (Item 19) for each channel frame. Dimples must be on the bottom flange of the top frame (Item 10). See Detail J.
19. Attach the top frame and channel frame assembly from **Step 18** to the top of the Liebert DSE. Use a washer and bolt (Items 16 and 17) for each channel frame (Item 18). See Detail K.
20. Attach the assembled frame to the side panels of the plenum. Use two screws (Item 19) for each side panel attachment. See Detail M.
21. Attach the panel mounting brackets (Item 15) to the top of the Liebert DSE using two washers and bolts (Items 16 and 17) for each mounting bracket. Use two screws (Item 19) to attach the right side bracket (Item 15) to the side panel. See Detail L.
22. Attach the plenum brace (Item 14) to the top frame (Item 10) and rear panel using screws (Item 19) in two places on each side. See Detail I.

**Figure 48** Front frame members for non-grilled plenum



### Frame Members for Grilled, Rear Discharge Plenum

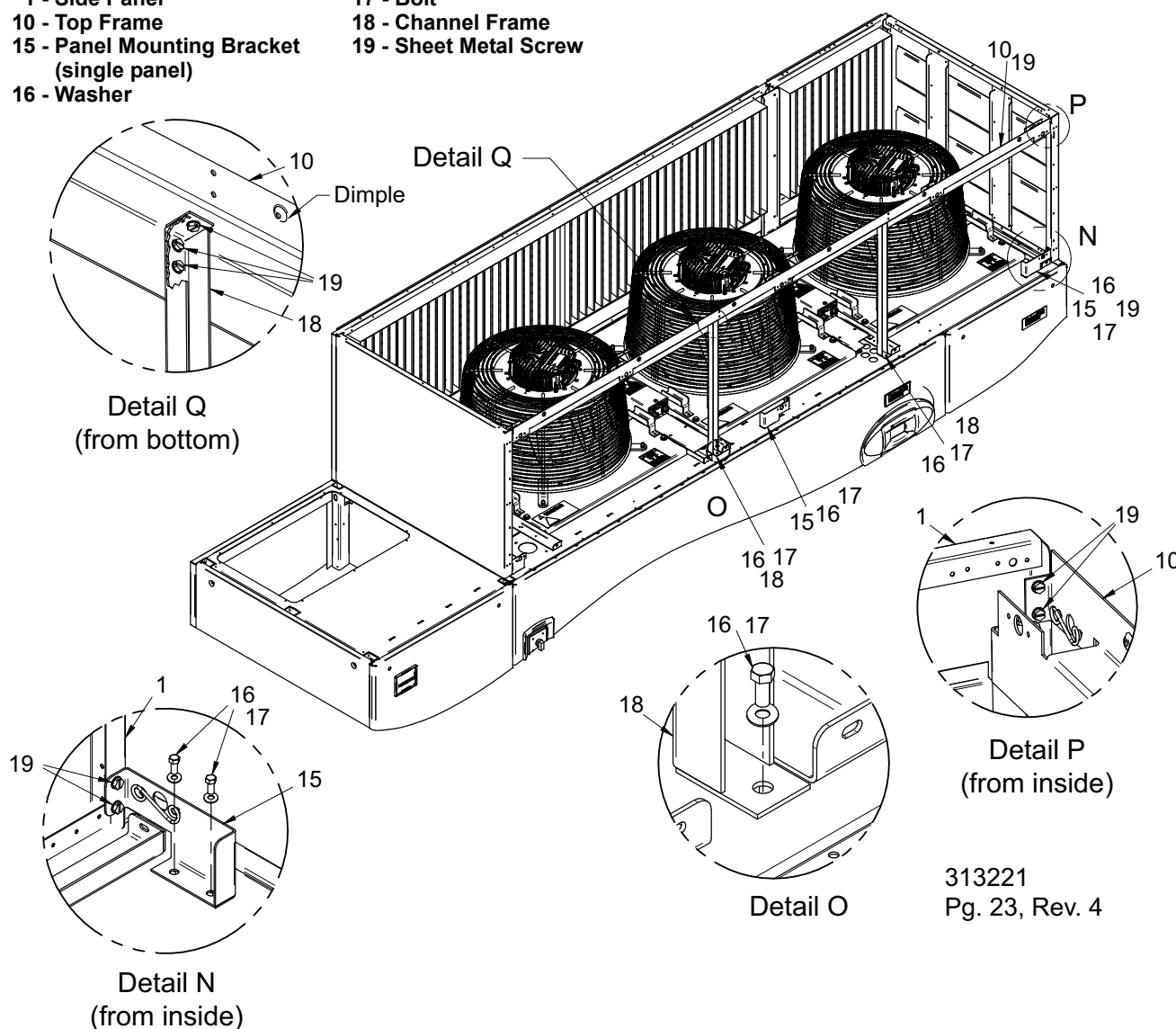
Refer to **Figure 49** for **Steps 23** through **26**.

23. Attach the channel frames (Item 18) to the top frame (Item 10). Use three screws (Item 19) for each channel frame. Dimples must be on the top flange of the top frame (Item 10). See Detail Q.
24. Attach the top frame and channel frame assembly from **Step 23** to the top of the Liebert DSE. Use a washer and bolt (Items 16 and 17) for each channel frame (Item 18). See Detail O.
25. Attach the assembled frame to the side panels of the plenum. Use two screws (Item 19) for each side panel attachment. The smaller flange should be attached to the side panel. See detail P.
26. Attach the panel mounting brackets (Item 15) to the top of the Liebert DSE using two washers and bolts (Items 16 and 17) for each mounting bracket. Use two screws (Item 19) to attach the right side bracket (Item 15) to the side panel. See Detail N in **Figure 49**.

Skip to **Steps 34** and **35** for top panel attachment.

**Figure 49** Front frame members for grilled, rear-discharge plenum

- |   |                        |
|---|------------------------|
| 1 - Side Panel                                | 17 - Bolt              |
| 10 - Top Frame                                | 18 - Channel Frame     |
| 15 - Panel Mounting Bracket<br>(single panel) | 19 - Sheet Metal Screw |
| 16 - Washer                                   |                        |



Refer to **Figure 50** for **Steps 27** and **28**.

27. Connect the front grilled panel (Item 3) and the short front grilled panel (Item 4) using a channel panel (Item 9) and 10 screws (Item 19).

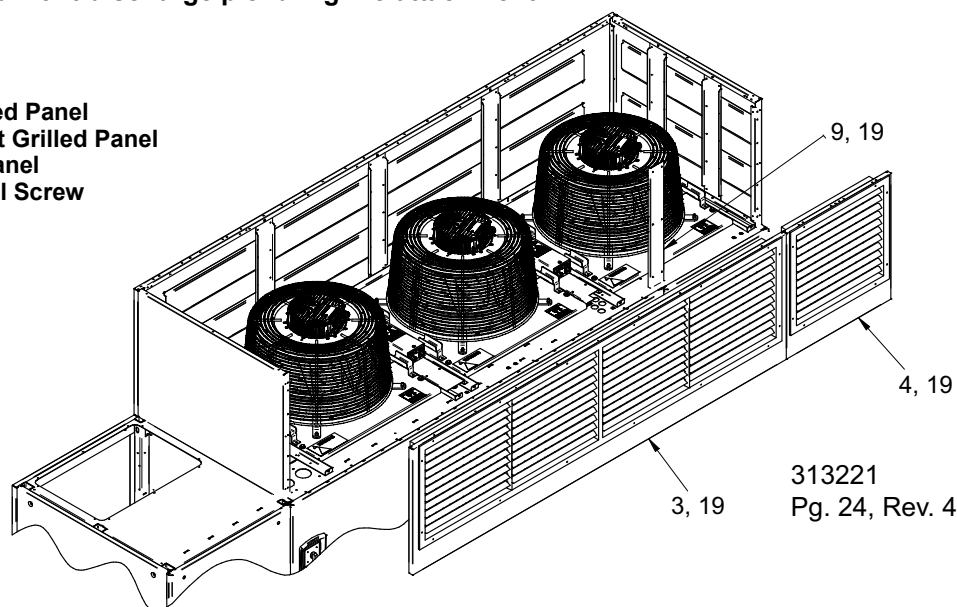
28. Attach the front grilled panel and short grilled panel assembly from **Step 27** to the plenum side panels, which have already been placed. Use 10 screws (five per side).

Refer to **Figure 51** for **Step 29**.

29. Attach the front solid panel (Item 2) to the previously placed front frame using Dzus fasteners factory-installed in the front solid panel.

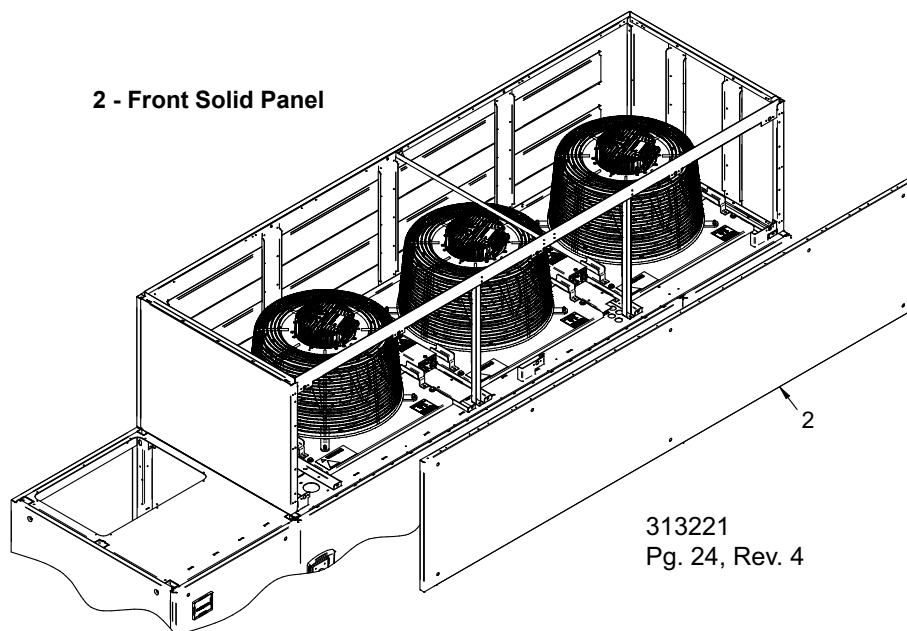
**Figure 50 Grilled front-discharge plenum grille attachment**

- 3 - Front Grilled Panel
- 4 - Short Front Grilled Panel
- 9 - Channel Panel
- 19 - Sheet Metal Screw



**Figure 51 Non-grilled plenum front panel attachment**

- 2 - Front Solid Panel

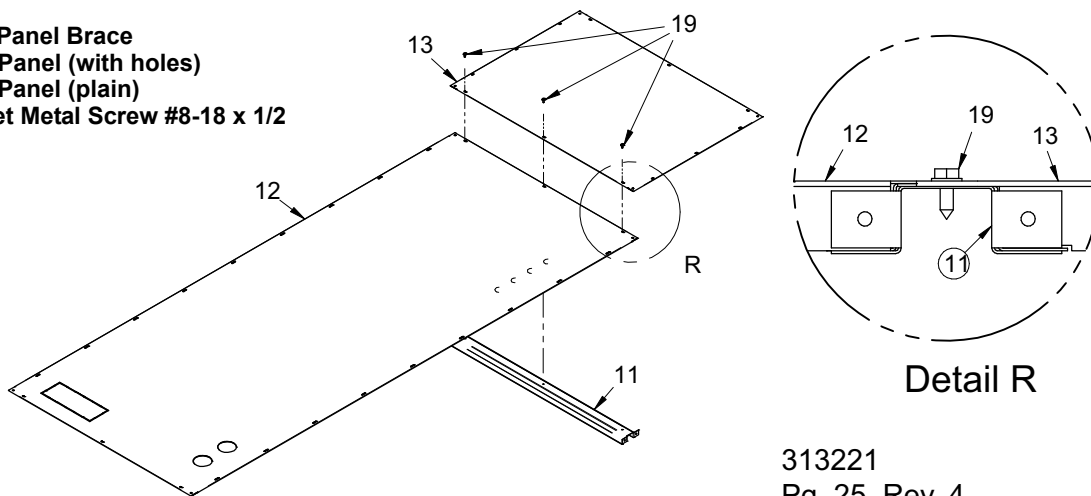


Refer to **Figure 52** for **Step 30**

30. Attach the top panel brace (Item 11) to the top panel (Item 12) and to the top panel (Item 13) three screws (Item 19). See Detail R.

**Figure 52 Top panel members for grilled front/rear-discharge plenum**

- 11 - Top Panel Brace
- 12 - Top Panel (with holes)
- 13 - Top Panel (plain)
- 19 - Sheet Metal Screw #8-18 x 1/2



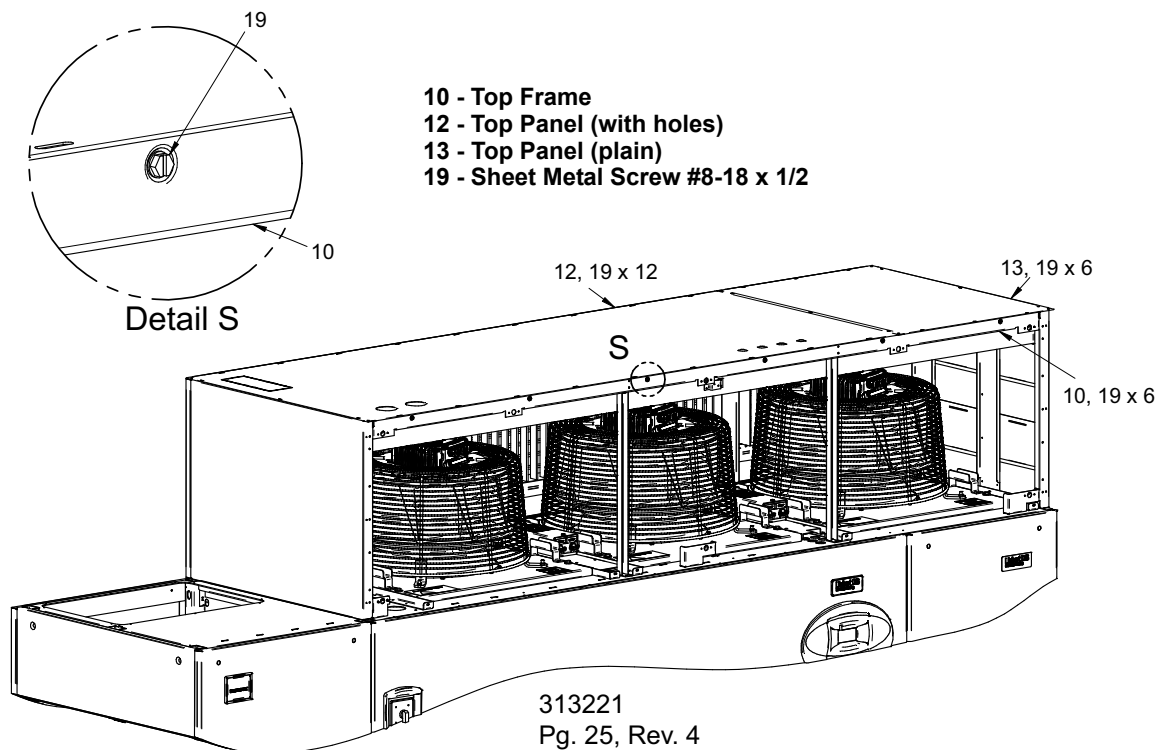
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Refer to **Figure 53** for **Step 31**.

31. Attach assembled items from **Step 30** to:

- the side panel (Item 1) using three screws (Item 19) on each side
- the short rear grilled panel (Item 5) using three screws (Item 19)
- rear grilled panel (Item 7) using nine screws (Item 19) and to
- the top frame (Item 10) using six screws (Item 19) as shown in Detail S.

**Figure 53 Top panel attachment for grilled rear-discharge plenum**



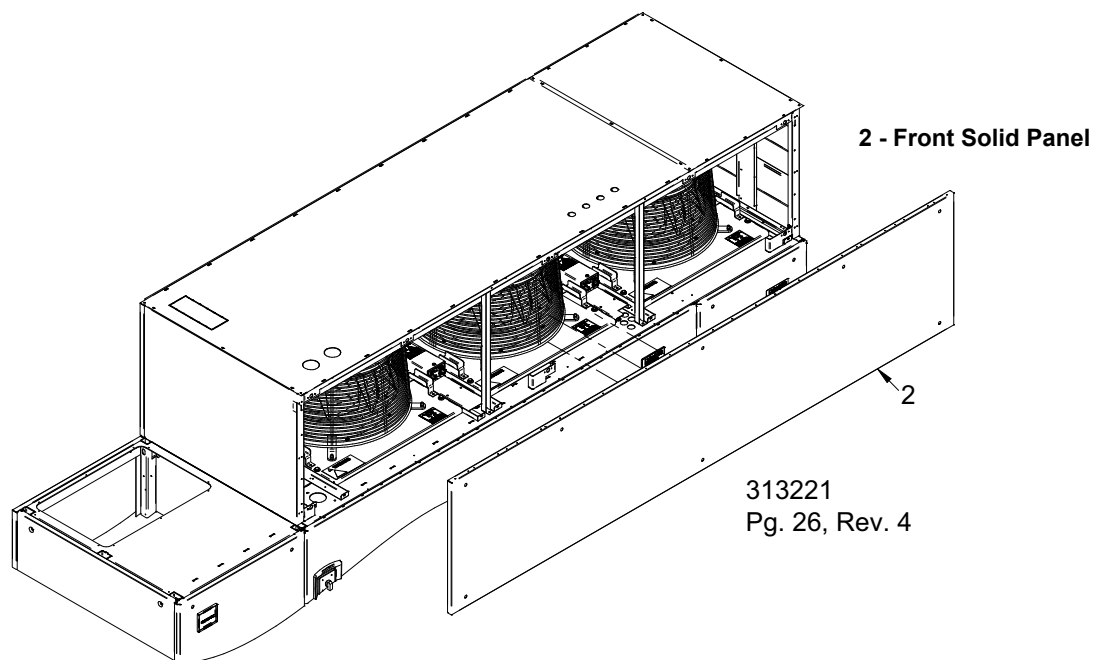
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Refer to **Figure 54** for **Step 32**.

32. Attach the front solid panel (Item 2) using Dzus fasteners factory-installed in the front solid panel (Item 2).

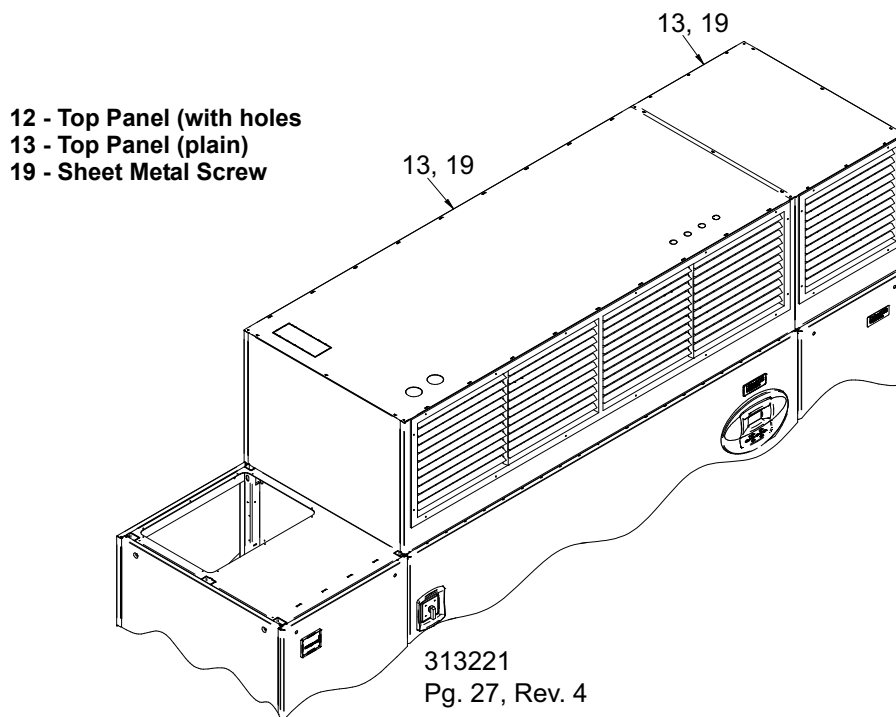
**Figure 54 Rear-grilled plenum front panel attachment**



Refer to **Figure 55** for **Step 33**.

33. Attach the top panel with holes (Item 12) and top panel plain (Item 13) to the top of the previously placed plenum panels. Use 39 screws (Item 19).

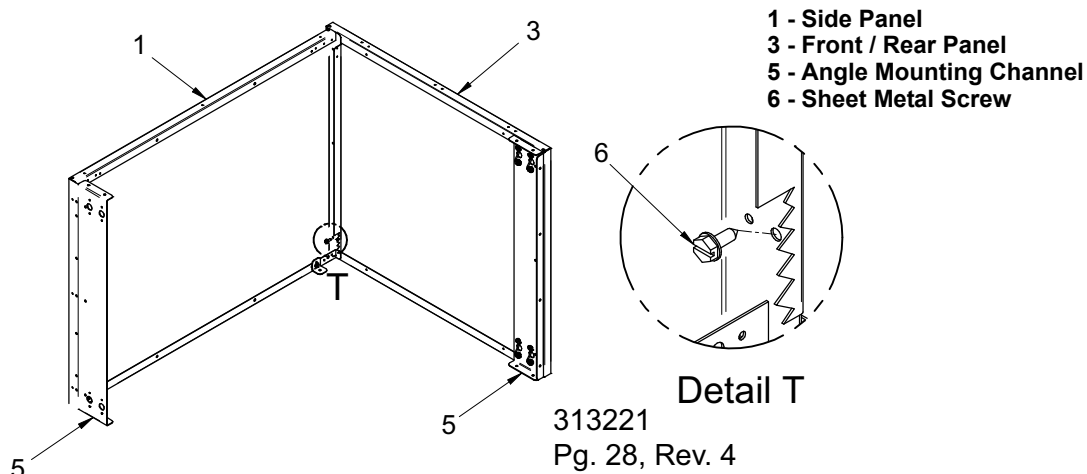
**Figure 55 Grilled plenum front discharge top panel attachment**



Refer to **Figure 56** for **Steps 34** and **35**.

34. Attach the side panel (Item 1) to the front/rear panel (Item 3) using three screws (Item 6). See Detail T in **Figure 56** for placement of the screws.
35. Attach two angle mounting channels (Item 5) to the parts assembled in **Step 34** using seven screws (Item 6).

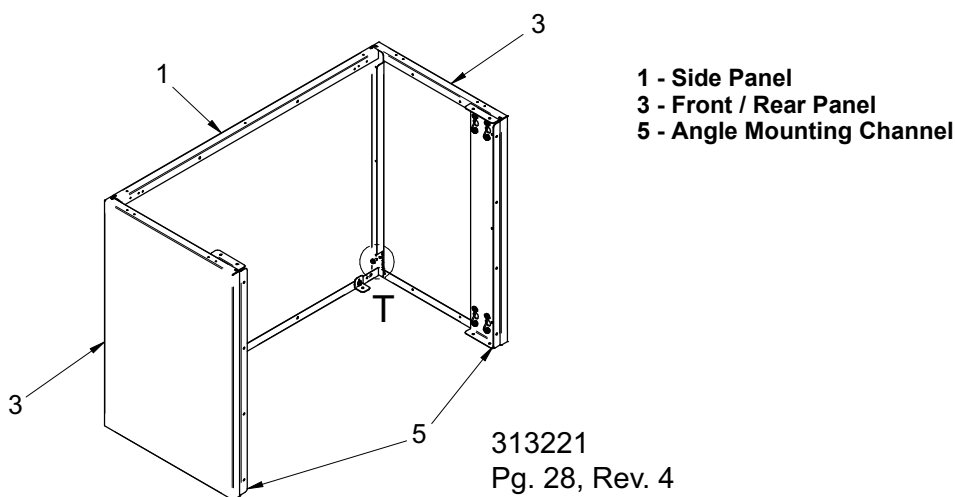
**Figure 56** 26" (660mm) compressor section plenum



Refer to **Figure 57** for **Steps 36** and **37**.

36. Attach the side panel (Item 1) to two front/rear panels (Item 3) using six screws (Item 6). See Detail C in for placement of the screws.
37. Attach two angle mounting channels (Item 5) to the parts assembled in **Step 36** using six screws (Item 6).

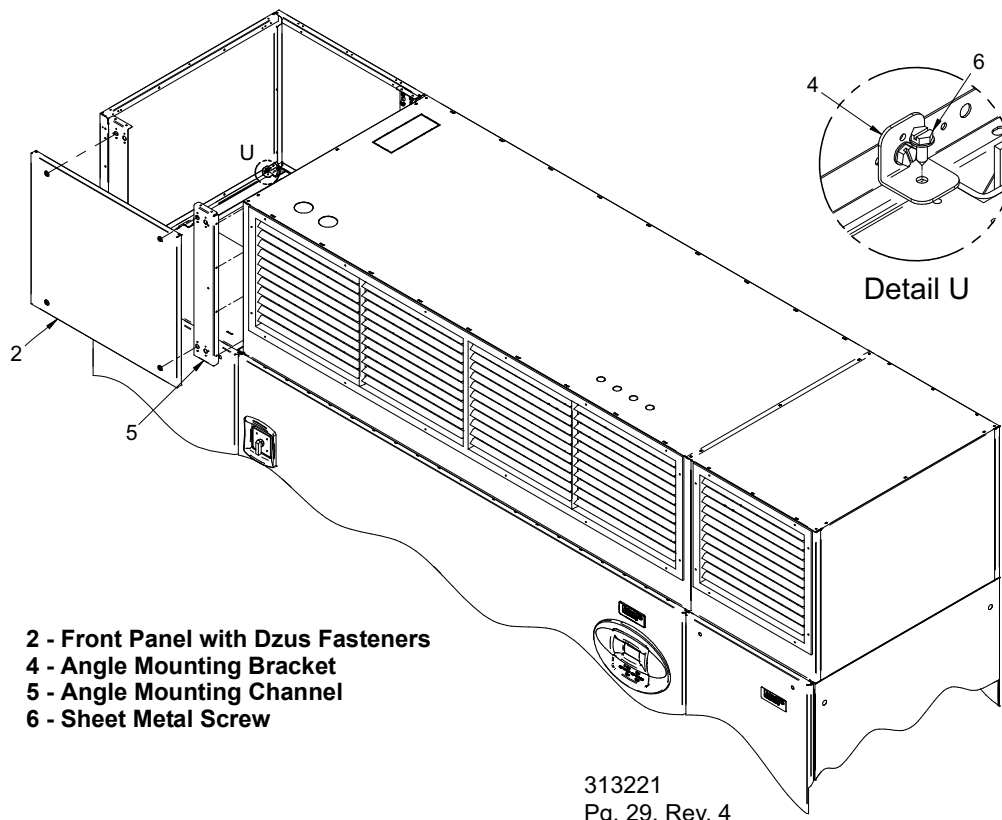
**Figure 57** 13", 15" and 17" (330mm, 381mm and 432mm) compressor section plenum



Refer to **Figure 58** for **Steps 38** through **41**.

38. Place the panels assembled in **Steps 36** and **37** on top of the Liebert DSE.
39. Attach assembled panels to the top of the Liebert DSE with an angle mounting bracket (Item 4) and an angle mounting channel (Item 5) using screws (Item 6) as shown in Detail U in **Figure 58**.
40. Attach the angle mounting channel (Item 5) to the side of the EC fans plenum with screws (Item 6).
41. Attach the front panel with Dzus fasteners (Item 2) to the previously placed compressor section panels (Items 1, 3 and 5) and angle mounting channel (Item 5) using the Dzus fasteners factory-installed in the front panel.

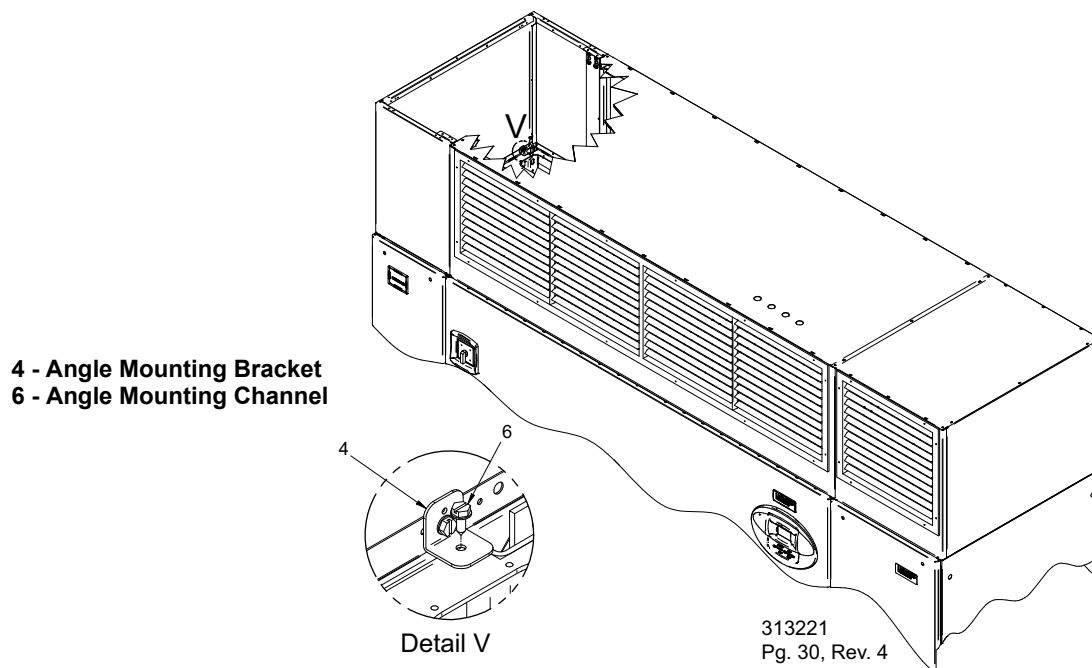
**Figure 58 Placement of 26" (660mm) compressor section plenum on top of Liebert DSE**



Refer to **Figure 59** for **Steps 42** and **43**.

42. Lift the assembled compressor section plenum from **Steps 36** and **37** and place it on top of the Liebert DSE.
43. Attach the assembled compressor section plenum to the top of the Liebert DSE and the side of the EC fans plenum with angle mounting brackets (Item 4) and angle mounting channels (Item 5) using screws (Item 6) as shown in Detail V in **Figure 59**.

**Figure 59 Placement of 13", 15" and 17" (330mm, 381mm and 432mm) compressor section plenum on Liebert DSE**



### 6.3.5 Plenum Installation for Downflow Units



## WARNING

Risk of electrical shock! Can cause serious injury or death!

Open all local and remote electric power disconnect switches and verify with a voltmeter that power is Off before working within the electric control enclosure or electric connection enclosures.

Risk of falling plenum can cause serious injury or death. Attach the plenum to the unit only as described in these instructions.



## CAUTION

Risk of sharp edges and heavy parts can cause serious injury.

Use only qualified HVAC installation personnel to install this plenum.

Two (2) or more people are required to install the plenum.

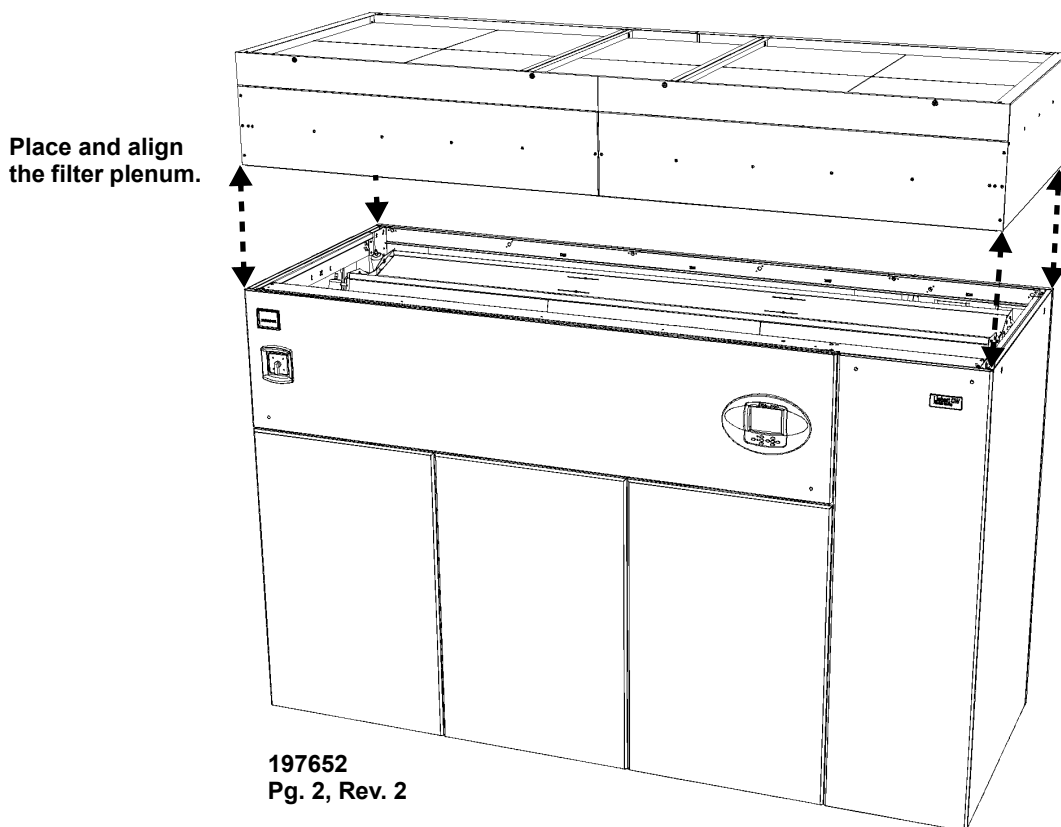
Wear gloves to prevent injury to hands.

Wear safety glasses to prevent injury to eyes.

This plenum houses filters and is required for unit operation.

1. Filter plenums are intended for DA125 and DA 150 units only.
2. Apply gasket tape to the top of the frame perimeter. Gasket tape applied to the front perimeter should be 2 inches (51mm) from the front panels.
3. Place the filter plenum on the unit and align the plenum with the back and sides of the unit as shown in **Figure 60**. The filters remain in the plenum.

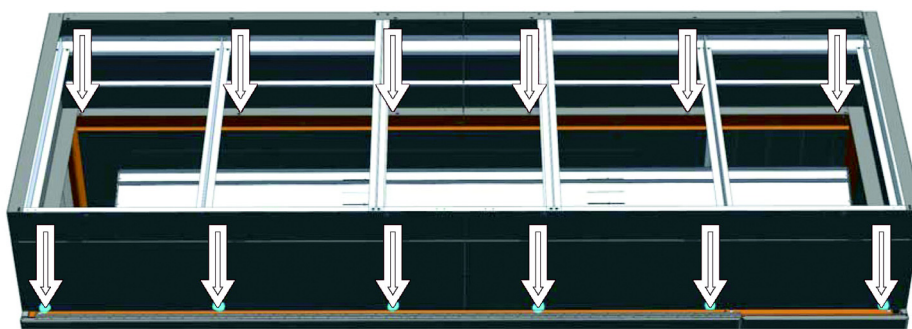
**Figure 60** Place filter plenum on unit



4. Remove filters and access doors from the plenum.
5. From inside, attach the filter plenum to the top of the unit using twelve 1/4-14 screws in the locations shown **Figure 61**. Slots in the filter plenum should align with the screw bite holes in the unit frame.

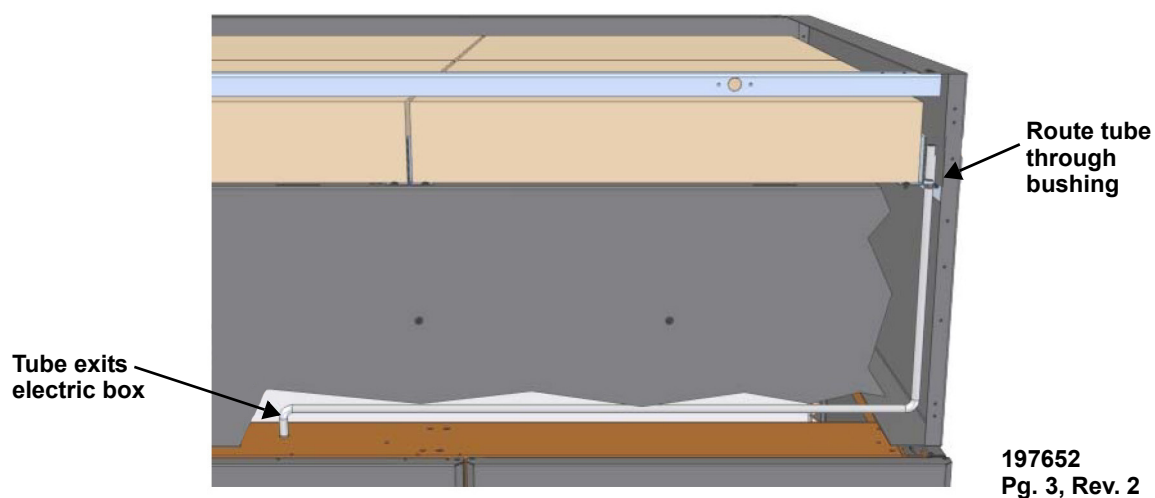
**Figure 61 Attach filter plenum to unit**

Arrows point to screw locations on the plenum.



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- Route the filter clog sensing tube. The tube exits the unit above the electric box. Cut the cable tie to loosen the bundled tube. Route the filter clog tube through the hole in the filter rack as shown in **Figure 62**.

**Figure 62 Route filter clog sensing tube**

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- Replace the filters.
- Attach the doors.

## 7.0 DISASSEMBLING LIEBERT DSE DOWNFLOW UNITS

The Liebert DSE has a modular frame construction that allows separating the unit into three sections. Each of these sections is more easily maneuvered through tight spaces or placed in small elevators.

A qualified service technician with the required tools and recommended assistance can disassemble an air-cooled unit in about four hours, assuming refrigerant evacuation is not required.

This procedure requires four or more people for lifting the filter and electric box assembly.



### WARNING

Risk of explosive discharge from high-pressure refrigerant. Can cause serious injury or death. This unit contains fluids and/or gases under high pressure. Relieve pressure before working with piping, compressors or other internal components.



### WARNING

Risk of top heavy unit falling over. Improper handling can cause equipment damage, serious injury, or death.

Verify that all lifting equipment is rated for the unit weight and read all instructions before attempting to move or lift unit. Unit weights are specified in **Table 2**. Installation and service of this equipment should be done only by properly trained and qualified personnel who have been specially trained in the installation of air conditioning equipment.



### CAUTION

Risk of sharp edges and heavy parts. Can cause personal injury.

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



### CAUTION

Risk of handling heavy and lengthy parts. Can cause personal injury and equipment damage.

Cabinet panels can exceed 5ft. (1.5m) in length and weigh more than 35lb. (15.9kg). Follow relevant OSHA lifting recommendations and consider using a two-person lift for safe and comfortable removal and installation of cabinet panels. Only properly trained and qualified personnel wearing appropriate safety headgear, gloves and shoes should attempt to remove or install cabinet panels.

### NOTICE

Risk of improper disassembly. Can cause equipment damage.

Disassembling this unit requires substantial work, including reclaiming refrigerant and charging the unit, cutting and brazing refrigerant lines, cutting and brazing water lines, disconnecting and reconnecting electrical lines and moving heavy, bulky equipment. One member of the crew disassembling the unit must be qualified in wiring, brazing and refrigeration.

Improperly disassembling or reassembling the Liebert DSE may affect warranty.

### 7.1 Required Equipment

- Piano jacks
- Stepladder
- Refrigeration tools

## 7.2 Disassembly—Models DA080 and DA085 Downflow Units

See **Figure 63** for a detailed view of the unit.

1. Remove the unit from its shipping skid before beginning (refer to **5.2 - Unpacking the Unit**).
2. Remove all panels except the top front accent.
3. Remove all filters. This allows access to the screws for metal plate blocking off the top coil and removal of the filter plate.

All wires are hot-stamped and all circuit board connectors are lettered to ease connection. Some cable ties must be cut and replaced. Refer to the unit's wiring schematic on the unit's deadfront panel for details.

### NOTICE

Do not lay the compressor section on its side. It must remain upright. The coil section also must remain upright.

4. Label the three quick-connect plugs from the compressor compartment and disconnect them.
5. Disconnect the two CAN connections and cut the wire ties going to the EEV boxes in the bottom of the compressor section.
6. Disconnect the compressor wire harness, including the crankcase heater wires, if present, from the contactor in the electric box.
7. Pull the conduit and wires into the compressor compartment.
8. Disconnect the fan motor wire harness from the bottom of the contactor in the electric box.
9. Pull the conduit and wires into the bottom section of the Liebert DSE.
10. **Reheat—Optional Component**
  - a. Disconnect the reheat wire harness from the bottom of the contactor in the electric box.
  - b. Unplug the low-voltage quick connect for the reheat safety wires.
  - c. Pull the conduit and wires into the unit's blower and coil assembly section.
11. **Humidifier—Optional Component**
  - a. Disconnect the humidifier wire harness from the bottom of the contactor in the electric box.
  - b. **For infrared humidifiers:** Remove the quick-connect plugs from the following low-voltage connections: 35-5 and 35-6 (safety under pan), 35-3 and 35-4 (humidifier make-up valve), and 8-5 and 8-7 (high water alarm).  
**For steam generating humidifiers:** Remove the quick-connect plugs from the following low-voltage connections: 35-1, H-24H and H-24G, and 35-7 and HAR-24H.
  - c. Disconnect 35-3 and 35-4 from the control board.
  - d. Pull the conduit and wires into the unit's blower and coil assembly section.
12. **Condensate Pump—Optional Component**
  - a. Disconnect the condensate pump's high-voltage wiring harness.
  - b. Remove the low-volt wires from terminal strips #24 and #55.
  - c. Pull the conduit and wires into the unit's blower and coil assembly section.
13. Disconnect the air sail switch wires and pull them into the electric box.
14. **Smoke Detector—Optional Component**
  - a. Remove the smoke detector cover.
  - b. Remove the plug connector from the smoke detector and pull it into electric box.
  - c. Remove the wires from terminal strips #91, 92, 93 and route them into the smoke detector box.
  - d. Remove the sensing tube from top of the smoke detector.  
The wand and tube will remain attached to filter and electric box assembly.
15. Close the electric box cover and the accent panel.
16. Remove the pull bar that supports the accent panel from the left end of unit, otherwise it will fall out when the compressor section is removed.
17. Evacuate and recover all refrigerant from the Liebert DSE.  
Air-cooled units are shipped with a nitrogen holding charge.

## NOTICE

Risk of compressor oil contamination with moisture. Can cause equipment damage.

Emerson recommends front-seating the compressor service valves. Front-seating the valves keeps the nitrogen or refrigerant charge in the compressor and prevents moisture from contaminating the compressor oil.

18. Cut the insulation and pull it back from the piping.
19. Cut the refrigerant piping with a tubing cutter; if there is no Schrader fitting, let the nitrogen bleed out before cutting all the way through the pipe.



### NOTE

*Emerson does not recommend unsweating refrigerant connections.*

20. Immediately cap and seal all piping that has been cut, including the suction and liquid lines.

### 7.2.1 Remove the Compressor Assembly—Models DA080 and DA085 Downflow Units

1. Secure the compressor wire harness to the compressor assembly.
2. Remove the 10 thread-cutting bolts holding the compressor section assembly to the filter and electric box assembly and the blower and coil assembly.

There are five bolts in the front, four in the back and one on the top at the middle of the unit.

- a. Begin removing bolts at the bottom of the unit and progress toward the top. Use this method for the front and back bolts.
- b. Stabilize the compressor section before removing the top, middle bolt.

## NOTICE

Risk of improper handling. Can cause compressor and/or piping damage.

The compressor section is top-heavy and has a small base. It must remain upright. Do not lay the compressor section on its side during or after removing it from the Liebert DSE. Do not remove shipping blocks from semi-hermetic compressors until the Liebert DSE is fully reassembled and ready for installation.



### NOTE

*Emerson recommends using piano jacks when moving this section.*

### 7.2.2 Remove the Filter and Electric Box Assembly—Models DA080 and DA085 Downflow Units

1. Using a stepladder to reach the top of the Liebert DSE, remove the filter support plate; it is attached to the filter and electric box assembly with two screws, one on each end.
2. Remove tags from the Schrader fittings on top of the coil headers. Retain the tags for replacement during reassembly.
3. Remove 16 screws, (8) on each side, from the evaporator top cover plate to coil assembly. Coil top blocker will remain with top section for rigidity.
4. Remove coil access plates from the left side of the Liebert DSE.
5. Remove the four thread-cutting bolts securing the filter and electric box assembly to the blower and coil assembly. There are two on the left and two on the right.
6. Separate the unit sections with caution.

## NOTICE

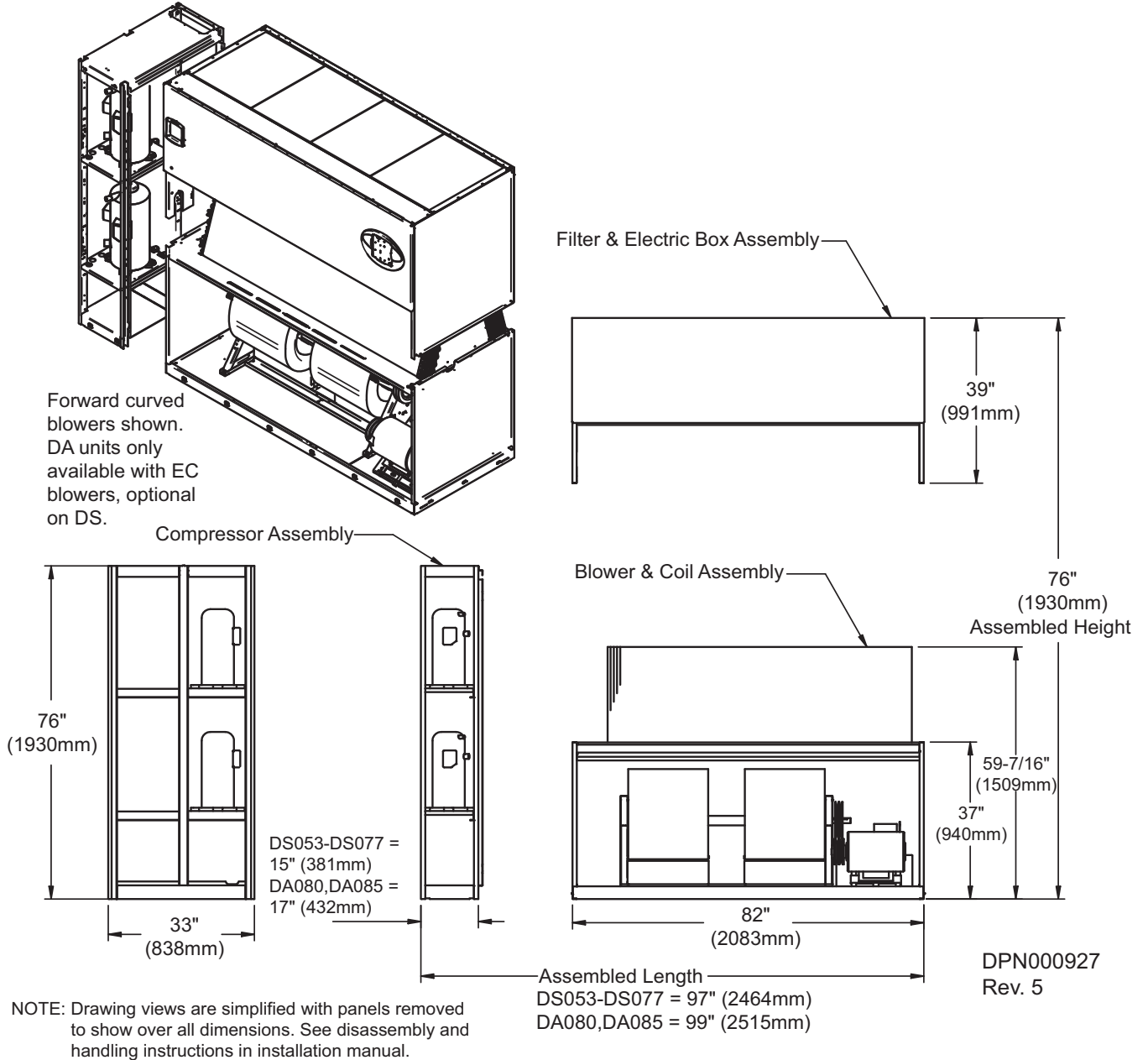
Risk of improper handling. Can cause equipment damage.

- The filter and electric box section should be moved forward and set on the floor.
- Make sure to lift the coil plate over the Schrader fittings on the headers. Emerson recommends using four people to remove this section. Special care is required when moving this section because the legs are not designed to withstand strong shocks.
- The blower and coil assembly must remain upright. The coil is not secured to the blower and coil assembly.
- Secure the coil to the bottom section with straps or a similar method before moving the section.

7. Move each section of the Liebert DSE to the installation location.



Figure 63 Component dimensions, Liebert DSE downflow models DA080 and DA085



Component	Approximate Dry Weight Including Panels, lb (kg)
Compressor Assembly	590 (269)
Filter and Electric Box Assembly	250 (114)
Blower and Coil Assembly	1410 (641)

Source: DPN000927, Rev. 5

### 7.3 Reassembly—Models DA080 and DA085 Downflow Units

1. Replace the top section.  
Make sure to clear the Schrader valves on the coil header.
2. Reconnect the filter and electric box assembly to the blower and coil assembly using thread-cutting bolts.  
Torque the bolts to 225 in-lb. (25Nm)
3. Reattach the evaporator top cover plate; there are eight screws on each side.
4. Reattach the filter support plate to the filter and electric box assembly; there is one screw on each side.
5. Reattach the tags to the Schrader fittings on top of the coil headers.
6. Replace the compressor section.  
Insert all compressor thread-cutting bolts before tightening any of the bolts.
7. Reinstall the pull bar to support the accent panel.
8. Reattach the low-voltage plugs in the compressor section.
9. Reconnect the wiring for the compressor, fan motor, reheat, humidifier, condensate pump, smoke detector and air sail switch.
10. Reattach the sensing tube to the top of the smoke detector.

#### 7.3.1 Reconnecting Piping, Charging and Replacing Panels—Models DA080 and DA085 Downflow Units

1. Piping must be reassembled in accordance with local codes.
2. Move insulation and plastic bushings away from the brazing area.
3. Wrap piping with wet cloths. Use copper fittings where required.
4. Refer to **10.0 - Piping** for piping guidelines and to the ASHRAE Refrigeration Handbook for general, good-practice refrigeration piping.
5. Open the service valves on the compressor.
6. Reinsert the plastic bushings.
7. Charge the Liebert DSE with refrigerant; see the unit's nameplate for the proper charge.
8. Reinstall the galvanized panels on the left side of the coil.
9. Replace the filters.
10. Replace the panels.

## 7.4 Reassembly Checklist—Models DA080 and DA085 Downflow Units

- 1. Thread-cutting bolts reconnected and torqued to 225 in-lb. (25Nm)
- 2. Top cover plate attached to coil
- 3. Filter plate attached
- 4. High-voltage wires connected to proper contactors:
  - a. Compressor
  - b. Fan motor
  - c. Reheat, if applicable
  - d. Humidifier, if applicable
  - e. Condensate pump, if applicable
- 5. Low-voltage wires connected
  - a. Actuator
  - b. Terminal strip
  - c. Plug connections
  - d. Smoke detector, if applicable
- 6. Coil access plates on right and left replaced
- 7. Humidifier lines brazed
- 8. Suction and liquid refrigerant lines brazed
- 9. Vacuum pulled and unit checked for leaks
- 10. Unit recharged
- 11. Filters replaced
- 12. Panels replaced

## 7.5 Disassembly—Models DA125 and DA150 Downflow Units

For detailed views units, see **Figure 64**.

1. Remove the unit from its shipping skid before beginning (refer to **5.2 - Unpacking the Unit**).
2. Remove all panels except the top front accent.
3. All wires are hot-stamped and all circuit board connectors are lettered to ease connection. Some cable ties must be cut and replaced. Refer to the unit's wiring schematic on the unit's deadfront panel for details.

### NOTICE

Risk of improper handling. Can cause compressor and/or piping damage.

Do not lay the compressor section on its side. It must remain upright. The coil section also must remain upright.

4. Label the three quick-connect plugs from the compressor compartment and disconnect them.
5. Disconnect the CAN connections going to the EEV boxes in front of each compressor.
6. Disconnect the compressor wire harness, including the crankcase heater wires, from the contactor in the electric box.
7. Pull the conduit and wires into the compressor compartment.
8. Close the electric box cover and the accent panel.
9. Evacuate and recover all refrigerant from the Liebert DSE.  
Air-cooled units are shipped with a nitrogen holding charge.

### NOTICE

Risk of compressor oil contamination with moisture. Can cause equipment damage.

Emerson recommends front-seating the compressor service valves. Front-seating the valves keeps the nitrogen or refrigerant charge in the compressor and prevents moisture from contaminating the compressor oil.

10. Cut the insulation and pull it back from the piping.
11. Cut the refrigerant piping with a tubing cutter; if there is no Schrader fitting, let the nitrogen bleed out before cutting all the way through the pipe.



#### NOTE

*Emerson does not recommend unsweating refrigerant connections.*

12. Immediately cap and seal all piping that has been cut, including the suction and liquid lines.

### 7.5.1 Remove the Compressor Assembly—Models DA125 and DA150 Downflow Units

1. Secure the compressor wire harness to the compressor assembly.
2. Remove the 20 thread-cutting bolts holding the compressor section assembly to the filter and electric box assembly and the blower and coil assembly.

There are eight bolts in the front, eight in the back and four in the bottom of the unit.

- a. Begin removing bolts at the bottom of the unit and progress toward the top. Use this method for the front and back bolts.
- b. Stabilize the compressor section before removing the bolts.

### NOTICE

Risk of improper handling. Can cause compressor and/or piping damage.

The compressor section is top-heavy and has a small base. It must remain upright. Do not lay the compressor section on its side during or after removing it from the Liebert DSE.



#### NOTE

*Emerson recommends using piano jacks when moving this section.*

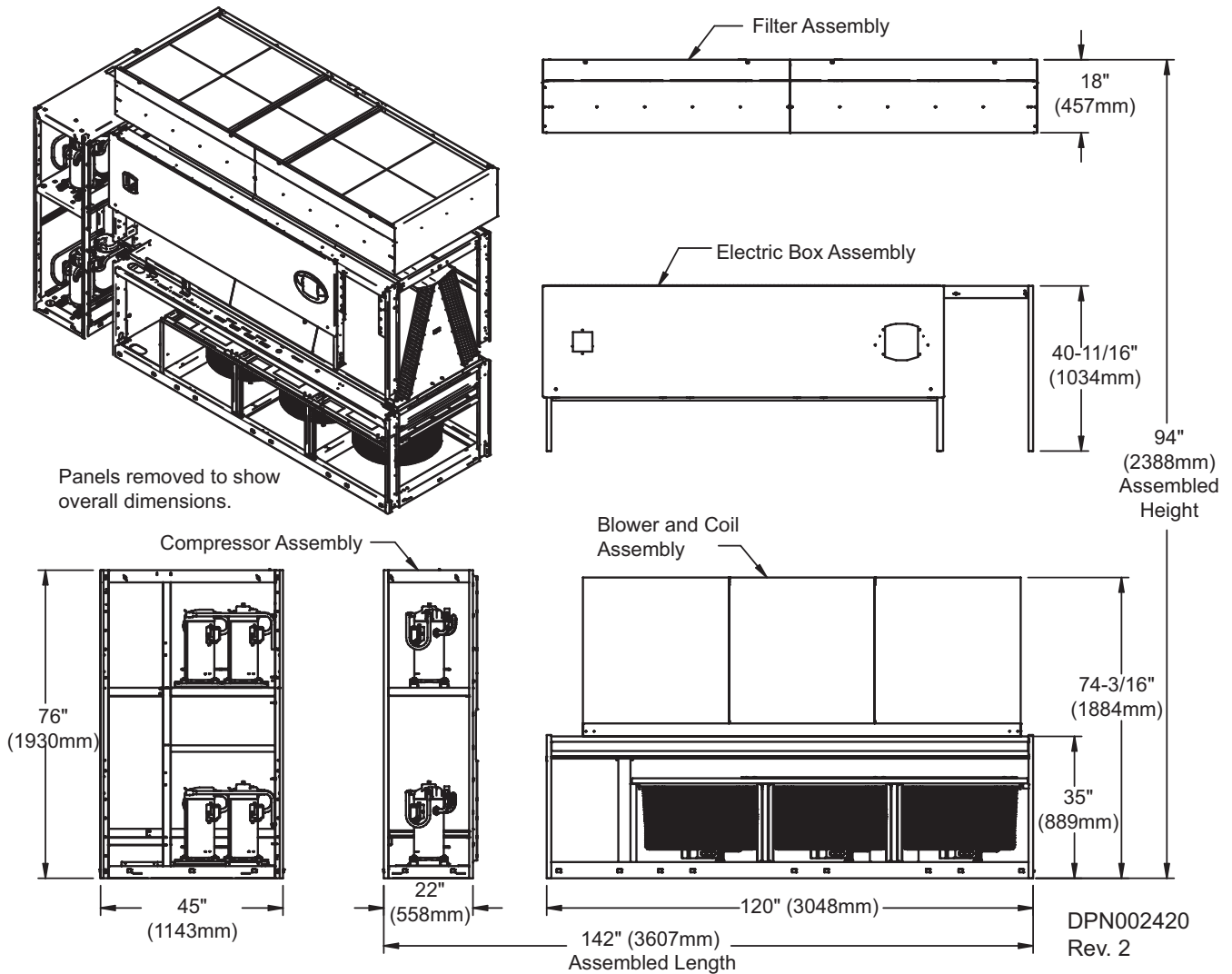
# NOTICE

Risk of improper handling. Can cause equipment damage.

- The blower and coil assembly must remain upright. The coil is not secured to the blower and coil assembly.
- Secure the coil to the bottom section with straps or a similar method before moving the section.

Move each section of the Liebert DSE to the installation location.

**Figure 64 Component dimensions, Liebert DSE models DA125 and DA150 downflow units**



Component	Approximate Weight Including Panels, lb (kg)	
	DA125	DA150
Compressor Assembly	630 (286)	739 (335)
Electric Box Assembly	417 (189)	417 (189)
Blower and Coil Assembly	2218 (1006)	2218 (1006)
Filter Assembly	200 (91)	200 (91)

Source: DPN002420, Rev. 2

## 7.6 Reassembly—Models DA125 and DA150 Downflow Units

1. Replace the compressor section.  
Insert all compressor thread-cutting bolts before tightening any of the bolts.
2. Reattach the low-voltage plugs in the compressor section.
3. Reconnect the wiring for the compressor.

### 7.6.1 Reconnecting Piping, Charging and Replacing Panels—Models DA125 and DA150 Downflow Units

1. Piping must be reassembled in accordance with local codes.
2. Move insulation and plastic bushings away from the brazing area.
3. Wrap piping with wet cloths. Use copper fittings where required.
4. Refer to **10.0 - Piping** for piping guidelines and to the ASHRAE Refrigeration Handbook for general, good-practice refrigeration piping.
5. Open the service valves on the compressor.
6. Reinsert the plastic bushings.
7. Charge the Liebert DSE with refrigerant; see the unit's nameplate for the proper charge.
8. Reinstall the galvanized panels on the left side of the coil.
9. Replace the panels.
10. Install the filter plenum as instructed in the included instructions.

## 7.7 Reassembly Checklist—Models DA125 and DA150 Downflow Units

- 1. Thread-cutting bolts reconnected and torqued to 225 in-lb. (25Nm)
- 2. Top cover plate attached to coil
- 3. Filter plate attached
- 4. High-voltage wires connected to proper contactors on compressor
- 5. Low-voltage wires connected
  - a. Actuator
  - b. Terminal strip
  - c. Plug connections
- 6. Suction and liquid refrigerant lines brazed
- 7. Vacuum pulled and unit checked for leaks
- 8. Unit recharged
- 9. Panels replaced
- 10. Filter plenum installed.

## 8.0 UPFLOW DISASSEMBLING LIEBERT DSE UNITS

The Liebert DSE has a modular frame that allows separating the unit into three sections. Each of these sections is more easily maneuvered through tight spaces or placed in small elevators.

A qualified service technician with the required tools and recommended assistance can disassemble an air-cooled unit in about four hours, assuming refrigerant evacuation is not required.

This procedure requires four or more people to lift the electric box assembly on upflow units



### WARNING

Risk of explosive discharge from high-pressure refrigerant. Can cause serious injury or death. This unit contains fluids and/or gases under high pressure. Relieve pressure before working with piping, compressors or other internal components.



### WARNING

Risk of top heavy unit falling over. Improper handling can cause equipment damage, serious injury, or death.

Read all instructions before attempting to move or lift unit. Installation and service of this equipment should be done only by properly trained and qualified personnel who have been specially trained in the installation of air conditioning equipment.



### CAUTION

Risk of sharp edges and heavy parts. Can cause injury.

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



### CAUTION

Risk of handling heavy and lengthy parts. Can cause personal injury and equipment damage.

Cabinet panels can exceed 5 ft. (1.5m) in length and weigh more than 35 lb. (15.9kg). Follow relevant OSHA lifting recommendations and consider using a two-person lift for safe and comfortable removal and installation of cabinet panels. Only properly trained and qualified personnel wearing appropriate safety headgear, gloves and shoes should attempt to remove or install cabinet panels.

### NOTICE

Risk of improper disassembly. Can cause equipment damage.

Disassembling this unit requires substantial work, including reclaiming refrigerant and charging the unit, cutting and brazing refrigerant lines, cutting and brazing water lines, disconnecting and reconnecting electrical lines and moving heavy, bulky equipment. One member of the crew disassembling the unit must be qualified in wiring, brazing and refrigeration. Improperly disassembling or reassembling the Liebert DSE may affect warranty.

## 8.1 Required Equipment

- Piano jacks
- Stepladder
- Refrigeration tools

### NOTICE

Risk of improper handling. Can cause equipment damage.

Do not lay the compressor section on its side. It must remain upright. The coil section also must remain upright.

## 8.2 Disassembly-Upflow Models DA080 and DA085

See **Figure 65** for a detailed view of the unit.

1. Remove the unit from its shipping skid before beginning (refer to **5.2 - Unpacking the Unit**).
2. Remove all panels except the top front accent.
3. Remove all filters. This allows easier access to items located in the filter and coil assembly.
4. All wires are hot-stamped and all circuit board connectors are lettered to ease connection. Some cable ties must be cut and replaced. Refer to the unit's wiring schematic on the unit's deadfront panel for details.
5. Label the three quick-connect plugs from the compressor compartment and disconnect them.
6. Disconnect the two CAN connections and cut the wire ties going to the EEV boxes in the bottom of the compressor section.
7. Disconnect the compressor wire harness, including the crankcase heater wires, if present, from the contactor in the electric box.
8. Pull the conduit and wires into the compressor compartment.
9. **Reheat-Optional Component**
  - a. Disconnect the reheat wire harness from the bottom of the contactor in the electric box.
  - b. Unplug the low-voltage quick connect for the reheat safety wires.
  - c. Pull the conduit and wires into the unit's filter and coil assembly section.
10. **Humidifier-Optional Component**
  - a. Disconnect the humidifier wire harness from the bottom of the contactor in the electric box.
  - b. **For infrared humidifiers:** Remove the quick-connect plugs from the following low-voltage connections: 35-5 and 35-6 (safety under pan), 35-3 and 35-4 (humidifier makeup valve), and 8-5 and 8-7 (high water alarm).
  - c. Disconnect 35-3 and 35-4 from the control board.
  - d. Pull the conduit and wires into the unit's filter and coil assembly section.
11. **Condensate Pump-Optional Component**
  - a. Disconnect the condensate pump's high-voltage wiring harness.
  - b. Remove the low-volt wires from terminal strips #24 and #55.
  - c. Pull the conduit and wires into the unit's filter and coil assembly section.
12. **Smoke Detector-Optional Component**
  - a. Remove the smoke detector cover.
  - b. Remove the plug connector from the smoke detector and pull it into the electric box.
  - c. Remove the wires from terminal strips #91, 92, 93 and route them into the smoke detector box.
  - d. Remove the sensing tube from the bottom of the plastic elbow.
13. Close the electric box cover and the accent panel.
14. Remove the pull bar that supports the accent panel from the left end of the unit, otherwise it will fall out when the compressor section is removed.
15. Evacuate and recover all refrigerant from the Liebert DSE. Air-cooled units are shipped with a nitrogen holding charge.

### NOTICE

Risk of compressor oil contamination with moisture. Can cause equipment damage.

Emerson recommends front-seating the compressor service valves. Front-seating the valves keeps the nitrogen or refrigerant charge in the compressor and prevents moisture from contaminating the compressor oil.

16. Cut the insulation and pull it back from the piping.
17. Cut the refrigerant piping with a tubing cutter; if there is no Schrader fitting, let the nitrogen bleed out before cutting all the way through the pipe.



#### NOTE

*Emerson does not recommend unsweating refrigerant connections.*

18. Immediately cap and seal all piping that has been cut, including the suction and liquid lines.



### 8.3 Remove the Compressor Assembly- Upflow Models DA080 and DA085

1. Secure the compressor wire harness to the compressor assembly.
2. Remove the 10 thread-cutting bolts holding the compressor section assembly to the filter, the electric box assembly and the blower and coil assembly. There are five bolts in the front, four in the back and one on the top at the middle of the unit.
  - a. Begin removing bolts at the bottom of the unit and progress toward the top. Use this method for the front and back bolts.
  - b. Stabilize the compressor section before removing the top, middle bolt.

## NOTICE

Risk of improper handling. Can cause compressor and/or piping damage.

The compressor section is top-heavy and has a small base. It must remain upright. Do not lay the compressor section on its side during or after removing it from the Liebert DSE.



### NOTE

*Emerson recommends using piano jacks when moving this section.*

### 8.4 Remove the Blower and Electric Box Assembly-Upflow Models DA080 and DA085

1. Remove the access plate from right end of unit. This will provide a place to grasp the blower and electric box assembly and move it. Remove the coil access plates on the left side of the unit for clearance when brazing the suction and discharge lines.
2. Remove the thread-cutting bolts holding the unit sections together; there are four on the left and four on the right.
3. Separate the unit sections with caution.

## NOTICE

Risk of improper handling. Can cause damage to the Liebert DSE.

- The blower and electric box section should be moved forward and set on the floor. Emerson recommends using four people to remove this section.
  - The filter and coil assembly must remain upright. The coil is not secured to the filter and coil assembly.
  - Secure the coil to the bottom section with straps or a similar method before moving the section.
4. Move each section of the Liebert DSE to the installation location.

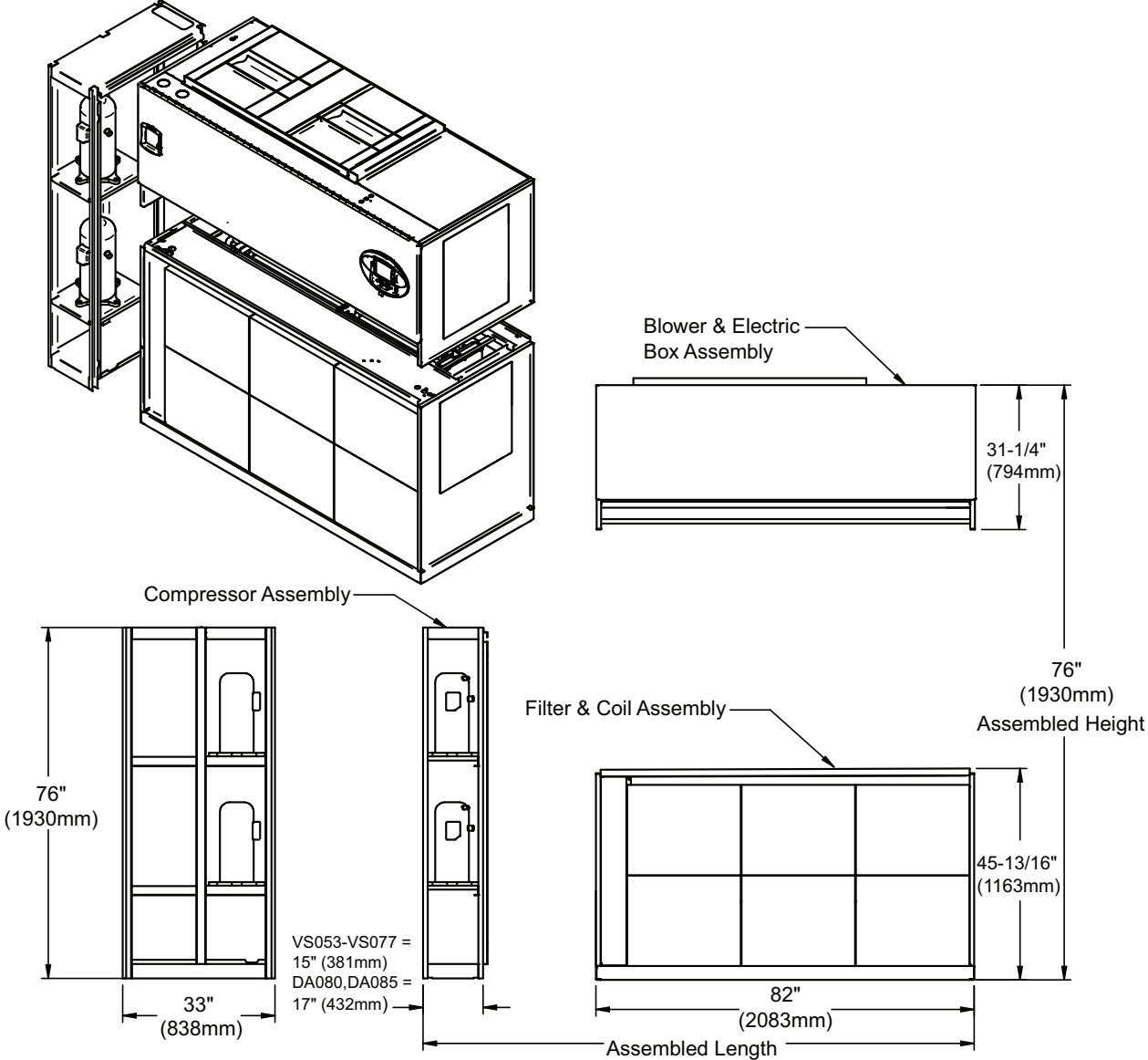
## 8.5 Reassembly-Upflow Models DA080 and DA085

1. Replace the top section. Make sure to clear the Schrader valves on the coil header.
2. Reattach the top section using thread-cutting bolts; there are four on each side. Torque the bolts to 225 in-lb. (25Nm)
3. Reinstall the motor access plate. Do not replace the left end coil access plates until brazing is finished.
4. Reattach compressor section. Insert all compressor thread-cutting bolts before tightening them all down.
5. Reinstall the pull bar to support the accent panel, if applicable.
6. Reattach the low-voltage plugs in the compressor section.
7. Reconnect the wiring for the compressor, reheat, humidifier, condensate pump and smoke detector if applicable.
8. Reattach the sensing tube.
9. Piping must be reassembled in accordance with local codes.
10. Move insulation and plastic bushings away from the brazing area.
11. Wrap piping with wet cloths. Use copper fittings where required.
12. Refer to **10.0 - Piping** for piping guidelines and to the ASHRAE Refrigeration Handbook for general, good-practice refrigeration piping.
13. Open the service valves on the compressor.
14. Reinsert the plastic bushings.
15. Charge the Liebert DSE with refrigerant; see the unit's nameplate for the proper charge.
16. Reinstall the galvanized panels on the left side of the coil.
17. Replace the filters.
18. Replace the panels.

## 8.6 Reassembly Checklist-Upflow Models DA080 and DA085

1. Thread-cutting bolts reconnected and torqued to 225 in-lb. (25Nm)
2. High-voltage wires connected to proper contactors:
  - a. Compressor
  - b. Reheat, if applicable
  - c. Humidifier, if applicable
  - d. Condensate pump, if applicable
3. Low-voltage wires connected
  - a. Terminal strip
  - b. Plug connections
  - c. Smoke detector, if applicable
4. Coil access plates on left replaced
5. Motor access plate on right side replaced
6. Suction and liquid refrigerant lines brazed
7. Vacuum pulled and unit checked for leaks
8. Unit recharged
9. Filters replaced
10. Panels replaced

Figure 65 Component dimensions, Liebert DSE upflow models DA080U and DA085U



NOTE: Drawing views are simplified with panels removed to show overall dimensions. See disassembly and handling instructions in installation manual.

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## 9.0 ELECTRICAL CONNECTIONS

Three-phase electrical service is required for all models. Electrical service must conform to national and local electrical codes. Refer to equipment nameplate regarding wire size and circuit protection requirements. Refer to electrical schematic when making connections. Refer to **Figure 68** for electrical service entrances into unit.

A manual electrical disconnect switch should be installed in accordance with local codes and distribution system. Consult local codes for external disconnect requirements.



### WARNING

Arc flash and electric shock hazard. Open all local and remote electric power disconnect switches, verify with a voltmeter that power is Off and wear personal protective equipment per NFPA 70E before working within the electric control enclosure. Failure to comply can cause serious injury or death.

Customer must provide earth ground to unit, per NEC, CEC and local codes, as applicable.

Before proceeding with installation, read all instructions, verify that all the parts are included and check the nameplate to be sure the voltage matches available utility power.

The Liebert iCOM<sup>®</sup> microprocessor does not isolate power from the unit, even in the “unit off” mode. Some internal components require and receive power even during the “unit off” mode of Liebert iCOM control.

The factory-supplied optional disconnect switch is inside the unit. The line side of this switch contains live high-voltage.

The only way to ensure that there is NO voltage inside the unit is to install and open a remote disconnect switch. Refer to unit electrical schematic.

Follow all local codes.



### WARNING

Risk of electric shock. Can cause serious injury or death.

Open all local and remote electric power disconnect switches and verify with a voltmeter that power is Off before working within the electric connection enclosures.

Before proceeding with installation, read all instructions, verify that all the parts are included and check the nameplate to be sure the voltage matches available utility power.

Reinstall all terminal covers before connecting power to the unit. Failure to install these covers exposes high-voltage terminals.

Follow all local codes.



### WARNING

Risk of improper wiring, piping, moving, lifting and handling. Can cause equipment damage, serious injury or death.

Installation and service of this equipment should be done only by qualified personnel who have been specially trained in the installation of air conditioning equipment.



### WARNING

Risk of overheated terminals. Can cause smoke and fire resulting in activation of fire/smoke alarms and fire suppression systems, building evacuation, dispatching of fire and rescue equipment and personnel, damage to building and equipment, injury or death.

Use copper wiring only. Make sure that all connections are tight according to the torque specifications shown on the side of the component.



### CAUTION

Risk of electric shock and short circuits. Can cause equipment damage, injury or death.

Insert CSA certified or UL listed bushings into holes and or knockouts used to route wiring through to protect the wire insulation from contact with sheet metal edges.

## NOTICE

Risk of improper electrical connection of three-phase input power. Can cause backward compressor rotation and unit damage.

Service technicians should use a gauge set on the Liebert DSE system during the initial startup to verify that the three-phase power is connected properly. The EC fans are not a reliable indicator of proper connection. The blowers will rotate the same direction, regardless of the three-phase power input.

Three-phase power must be connected to the unit line voltage terminals in the proper sequence so that the compressors rotate in the proper direction.

Incoming power must be properly phased to prevent compressors from running backward. Emerson recommends checking the unit's phasing with proper instrumentation to ensure that power connections were made correctly. Emerson also recommends verifying discharge and suction pressures during startup to ensure that the compressors are running in the correct direction.

## NOTICE

Risk of improper electrical supply connection. Can cause equipment damage.

See transformer label for primary tap connections. Installer will need to change transformer primary taps if applied unit voltage is other than pre-wired tap voltage.



### NOTE

*Seal openings around piping and electrical connection to prevent air leakage. Failure to do so could reduce the unit's cooling performance.*

## 9.1 Standard Electrical Field Connections, DA080 and DA085 Upflow and Downflow

Source: DPN000807, Revision 9; refer to Figures 66 and 67

1. **Primary high-voltage entrance**—2.5" (64mm); 1.75" (44mm); 1.375" (35mm) diameter concentric knockouts located in bottom of box.
2. **Secondary high-voltage entrance**—2.5" (64mm); 1.75" (44mm); 1.375" (35mm) diameter concentric knockouts located in top of box.
3. **Primary low-voltage entrance**—Three knockouts, each 1.375" (35mm) diameter, in bottom of unit.
4. **Secondary low-voltage entrance**—Three knockouts, each 1.375" (35mm) diameter, in top of box.
5. **Three-phase electrical service**—Terminals are on main fuse block (disregard if unit has optional disconnect switch). Three-phase service not by Emerson.
6. **Earth ground**—Terminal for field supplied earth grounding wire. Earth grounding required for Liebert units.
7. **Remote unit shutdown**—Replace existing jumper between Terminals 37 and 38 with field supplied normally closed switch having a minimum 75VA, 24VAC rating. Use field-supplied Class 1 wiring.
8. **Customer alarm inputs**—Terminals for field-supplied, normally open contacts, having a minimum 75VA, 24VAC rating, between Terminals 24 and 50, 51, 55, 56. Use field-supplied Class 1 wiring. Terminal availability varies by unit options.
9. **Common alarm**—On any alarm, normally open dry contact is closed across Terminals 75 and 76 for remote indication. 1 amp, 24VAC maximum load. Use field-supplied Class 1 wiring.
10. **Heat rejection interlock**—On any call for compressor operation, normally open dry contact is closed across Terminals 70 and 71 (Circuit 1), 230 (Circuit 2) to heat rejection equipment. 1 amp, 24VAC maximum load. Use field-supplied Class 1 wiring. Three wires must connect Terminals 70, 71 and 230 of the indoor unit to Terminals 70, 71 and 230 of the Liebert MC series condenser. Liebert DSE units must be connected to Liebert MC series condenser with premium control. The jumper between Terminal 71 and Terminal 230 must be removed. Three wires must connect Terminals 70, 71 and 230 of the indoor unit to Terminals 70, 71 and 230 of the Liebert MC series condenser.

## 9.2 CANbus Electrical Connections, DA080 and DA085 Upflow and Downflow

Source: DPN000807, Revision 98; refer to Figures 66 and 67

11. **CANBus Connector**—Terminal block with Terminals 49-1 (CAN-H) and 49-3 (CAN-L) + SH (shield connection). The terminals are used to connect the CANBus communication cable (provided by others) from the indoor unit to the Liebert MC – Premium Model and optional PRE unit.
12. **CANBus Cable**—CANbus cable provided by others to connect to the outdoor condenser. Cable must have the following specifications:
  - a. Conductors—22-18AWG stranded tinned copper
  - b. Twisted pair
  - c. Braided shield or foil shield with drain wire
  - d. Low-capacitance—15pf/ft or less
  - e. UL-approved temperature rated to 167 (75°C)
  - f. UL-approved voltage rated to 300V
  - g. UV-resistant and moisture-resistant if not provided in conduit.
  - h. Plenum-rated—NEC type CMP (if required by national or local codes.)

## 9.3 Optional Electrical Field Connections, DA080 and DA085 Upflow and Downflow

Source: DPN000807, Revision 9; refer to Figures 66 and 67

13. **Unit factory-installed disconnect switch, fuse block and main fuses**—Two types of disconnect switches are available: locking and non-locking. The non-locking type consists of a non-automatic molded case switch operational from the outside of the unit. Access to the high-voltage electric panel compartment can be obtained with the switch in either the On or Off position. The locking type is identical except access to the high-voltage electric panel compartment can be obtained only with the switch in the Off position. Units with fused disconnects are provided with a defeater button that allows access to the electrical panel when power is on. The molded case switch disconnect models contain separate main fuses. Units with fused disconnect have main fuses within the disconnect. Only fused disconnects are used on dual disconnect options.
14. **Secondary disconnect switch and earth ground**
15. **Three-phase electrical service**—Terminals are on top of the disconnect switch. Three-phase service not by Liebert.
16. **Smoke-sensor alarm**—Factory-wired dry contacts from smoke sensor are 91-common, 92-NO, and 93-NC. Supervised contacts, 80 and 81, open on sensor trouble indication. This smoke sensor is not intended to function as, or replace, any room smoke detection system that may be required by local or national codes. 1 AMP, 24VAC maximum load. Use field-supplied Class 1 wiring.
17. **Reheat and humidifier lockout** - Remote 24VAC required at terminals 82 and 83 for lockout of reheat and humidifier.
18. **Condensate alarm (with condensate pump option)**—On pump high water indication, normally open dry contact is closed across terminals 88 and 89 for remote indication. 1 AMP, 24VAC maximum load. Use field-supplied Class 1 wiring.
19. **Remote humidifier** - On any call for humidification, normally open dry contact is closed across Terminals 11 and 12 to signal field-supplied remote humidifier. 1 AMP, 24VAC maximum load. Use field-supplied Class 1 wiring.
20. **Auxiliary cool contact**—On any call for Econ-O-Coil operation, normally open dry contact is closed across Terminals 72 and 73 on dual-cool units only. 1 amp, 24VAC maximum load. Use field-supplied Class 1 wiring.

## 9.4 Optional Low-Voltage Terminal Package Field Connections, DA080 and DA085 Upflow and Downflow

Source: DPN000807, Revision 9; refer to Figures 66 and 67

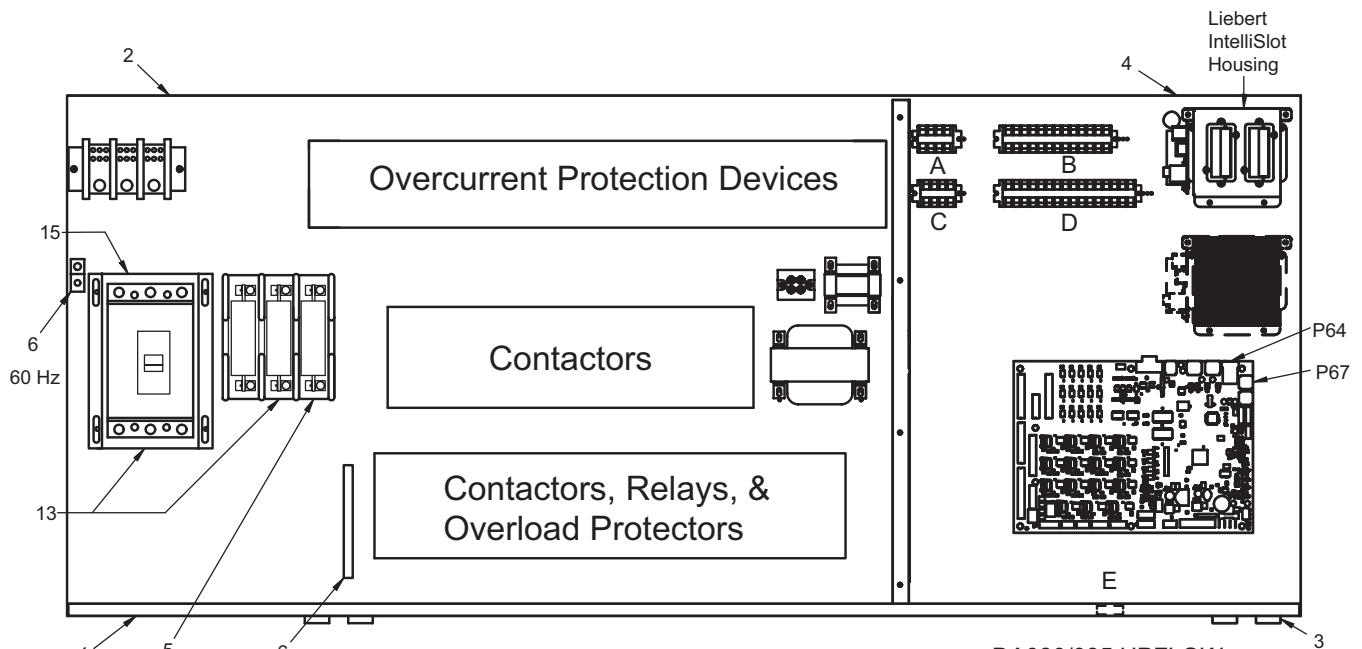
21. **Remote unit shutdown**—Two additional contact pairs available for unit shutdown (labeled as 37B and 38B, 37C and 38C). Replace jumpers with field-supplied normally closed switch having a minimum 75VA, 24VAC rating. Use field-supplied Class 1 wiring.
22. **Common alarm**—On any alarm, two additional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



### NOTE

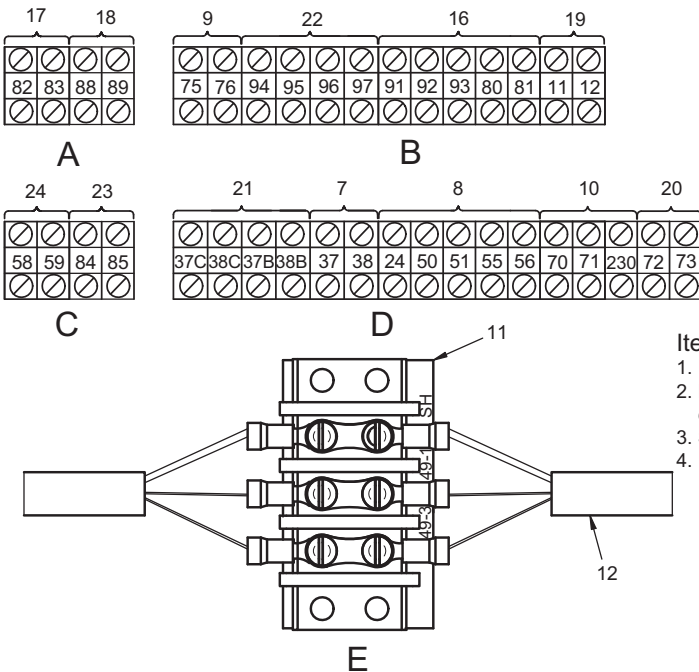
*Refer to specification sheet for total unit full load amps, wire size amps and maximum overcurrent protective device size.*

Figure 66 Electrical field connections DA080, and DA085 upflow and downflow models, single-molded case switch disconnect with main fuses



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

DA080/085 UPFLOW  
AND DOWNFLOW  
LOW-VOLTAGE SECTION



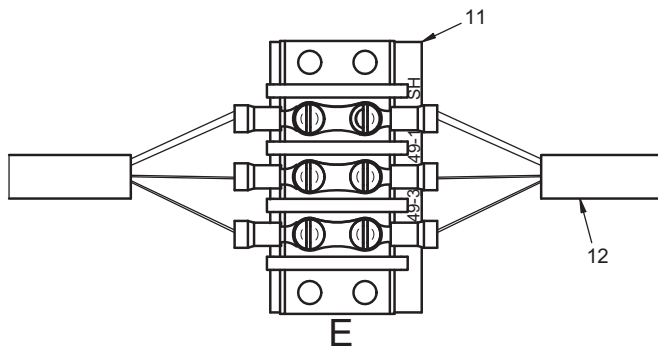
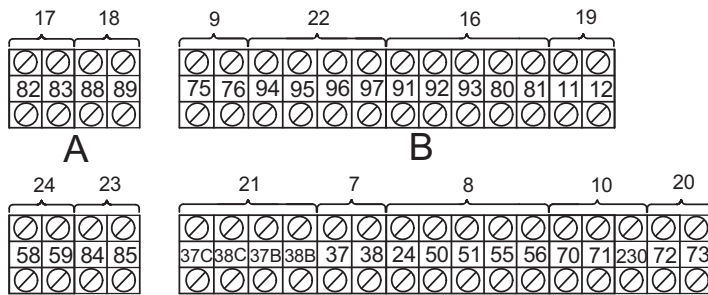
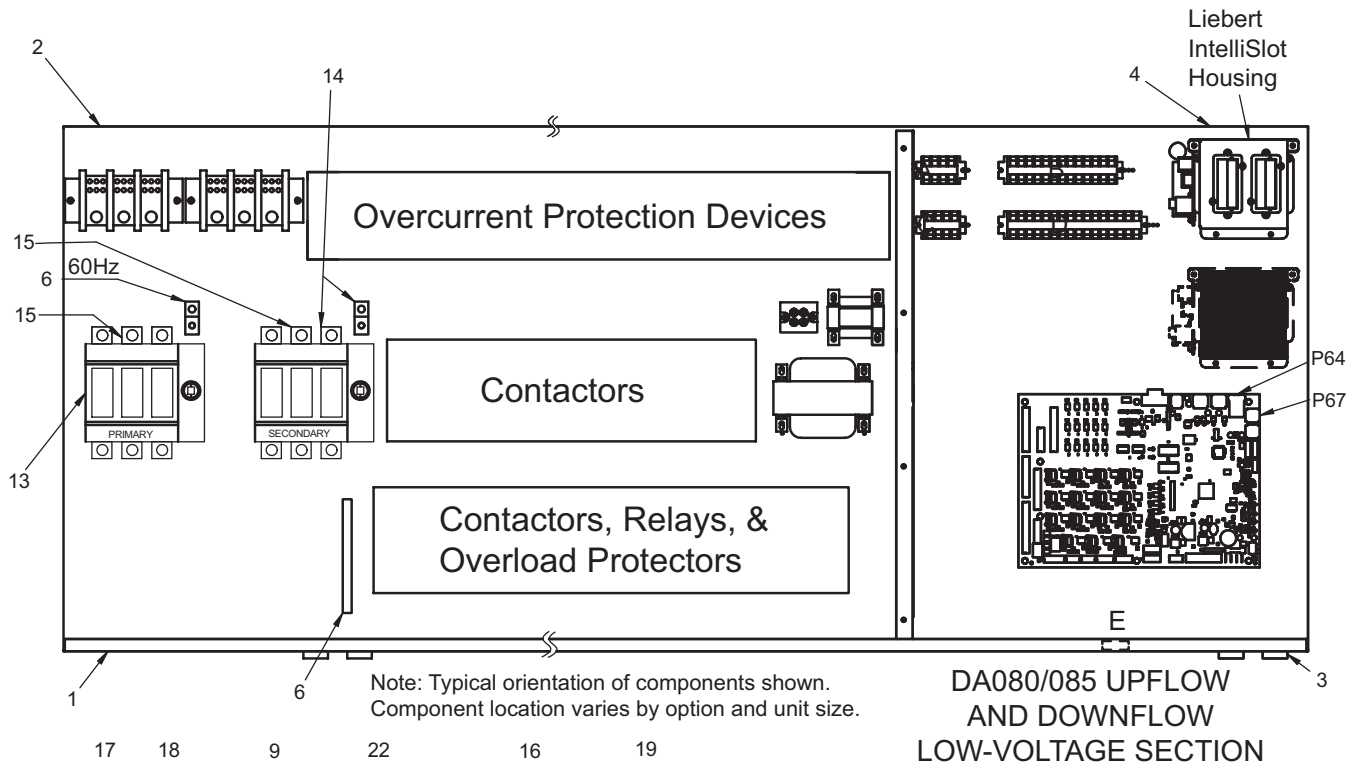
Item 12 Installation Conditions

1. Follow all local installation codes.
2. Do not run CAN cables in same conduit, raceway or chase as high-voltage wires (120-600V).
3. Separate high-voltage wires from can wires by 12 in. (305mm)
4. For runs greater than 350ft (107m), contact factory.

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**Figure 67 Electrical field connections, DA080 and DA085 upflow and downflow models, dual-fused disconnect switches**



**Item 12 Installation Conditions**

1. Follow all local installation codes.
2. Do not run CAN cables in same conduit, raceway or chase as high-voltage wires (120-600V).
3. Separate high-voltage wires from CAN wires by 12 in. (305mm)
4. For runs greater than 350ft. (107m), contact factory.

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## 9.5 Standard Electrical Field Connections, DA125 and DA150 Downflow Models

Source: DPN002318, Revision 4; refer to Figures 70 and 71 for numbered items

1. **Primary high-voltage entrance**—2.5" (64mm); 1.75" (44mm); 1.375" (35mm) diameter concentric knockouts in bottom of box.
2. **Primary low-voltage entrance**—Three knockouts, each 1.375" (35mm) diameter, in bottom of unit.
3. **Three-phase electrical service**—Terminals are on top of the disconnect switch. Three-phase service not by Emerson.
4. **Earth ground**—Terminal for field-supplied earth grounding wire. Earth grounding required for Liebert units.
5. **Remote unit shutdown**—Replace existing jumper between Terminals 37 and 38 with field-supplied, normally closed switch having a minimum rating of 75VA, 24VAC. Use field-supplied Class 1 wiring.
6. **Customer alarm inputs**—Terminals for field-supplied, normally open contacts having a minimum rating of 75VA, 24VAC, between Terminals 24 and 50, 51, 55, 56. Use field-supplied Class 1 wiring. Terminal availability varies by unit options.
7. **Common alarm**—On any alarm, normally open dry contact is closed across Terminals 75 and 76 for remote indication. 1 amp, 24VAC maximum load. Use field-supplied Class 1 wiring.
8. **Heat rejection interlock**—On any call for compressor operation, normally open dry contact is closed across Terminals 70 and 71 (Circuit 1), 230 (Circuit 2) to heat rejection equipment. 1 amp, 24VAC maximum load. Use field-supplied Class 1 wiring.
9. **CANbus Connector**—Terminal block with 49-1 (CAN-H) and 49-3 (CAN-L). The terminals are used to connect the CANbus communication cable (provided by others) from the indoor unit to the Liebert MC Condenser-Premium Model and Optional PRE unit.
10. **CANbus Cable**—CANbus cable provided by others to connect to the outdoor condenser. Cable must meet the following specifications:
  - a. Conductors—22-18AWG stranded, tinned copper
  - b. Twisted pair (minimum eight twists per foot)
  - c. Braided shield or foil shield with drain wire
  - d. Low capacitance—15pf/ft or less
  - e. UL-approved temperature rated to 75°C
  - f. UL-approved voltage rated to 300V
  - g. UV-resistant and moisture-resistant if not run in conduit.
  - h. Plenum rated—NEC type CMP, if required by national or local codes

## 9.6 Optional Electrical Field Connections, DA125 and DA150 Downflow Models

Source: DPN002318, Revision 4; refer to Figures 70 and 71 for numbered items

### 11. Factory-installed disconnect switch

12. **Smoke sensor alarm**—Factory-wired dry contacts from smoke sensor are 91-common, 92-NO and 93-NC. Supervised contacts, 80 and 81, open on sensor trouble indication. This smoke sensor is not intended to function as or replace any room smoke detection system that may be required by local or national codes. 1A, 24VAC maximum load. Use field-supplied Class 1 wiring.
13. **Reheat and humidifier lockout**—Remote 24VAC required at Terminals 82 and 83 for lockout of reheat and humidifier.
14. **Condensate alarm (with condensate pump option)**—On pump high water indication, normally open dry contact is closed across Terminals 88 and 89 for remote indication. 1A, 24VAC maximum load. Use field-supplied Class 1 wiring.
15. **Remote humidifier**—On any call for humidification, normally open dry contact is closed across Terminals 11 and 12 to signal field-supplied remote humidifier. 1A, 24VAC maximum load. Use field-supplied Class 1 wiring.

## 9.7 Optional Low Voltage Terminal Package Connections, DA125 and DA150 Downflow Models

Source: DPN002318, Revision 4; refer to Figures 70 and 71 for numbered items

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



### NOTE

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

Figure 68 Electrical field connections for DA125 and DA150 downflow models

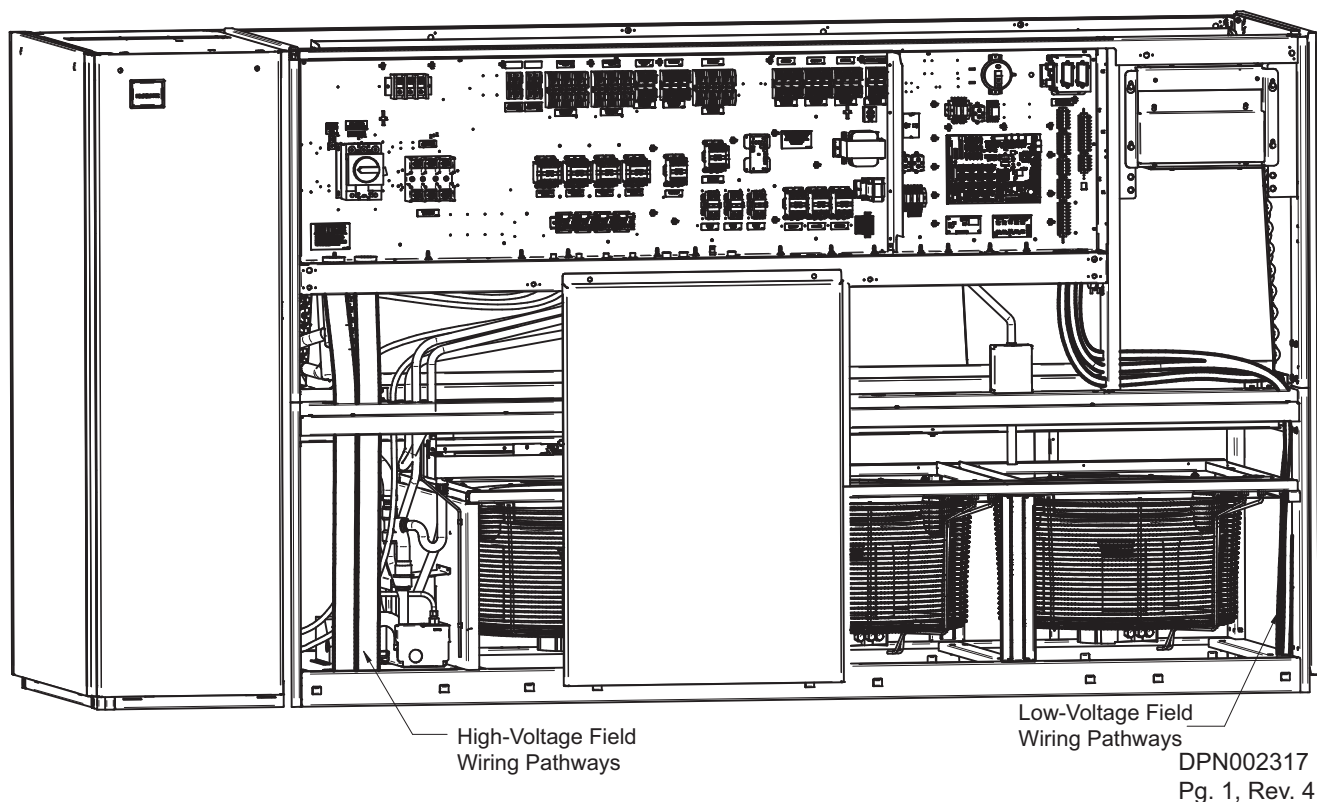
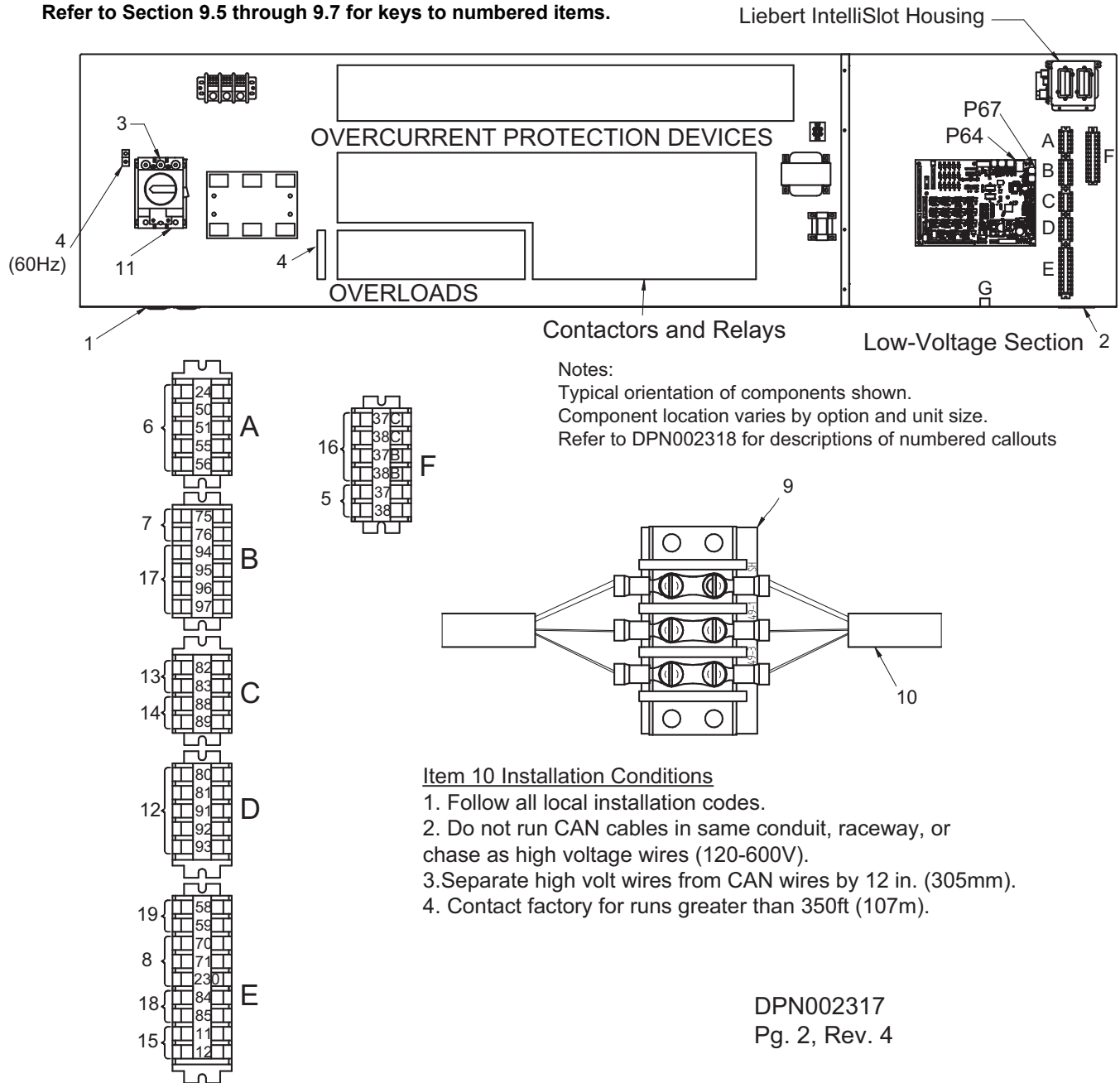


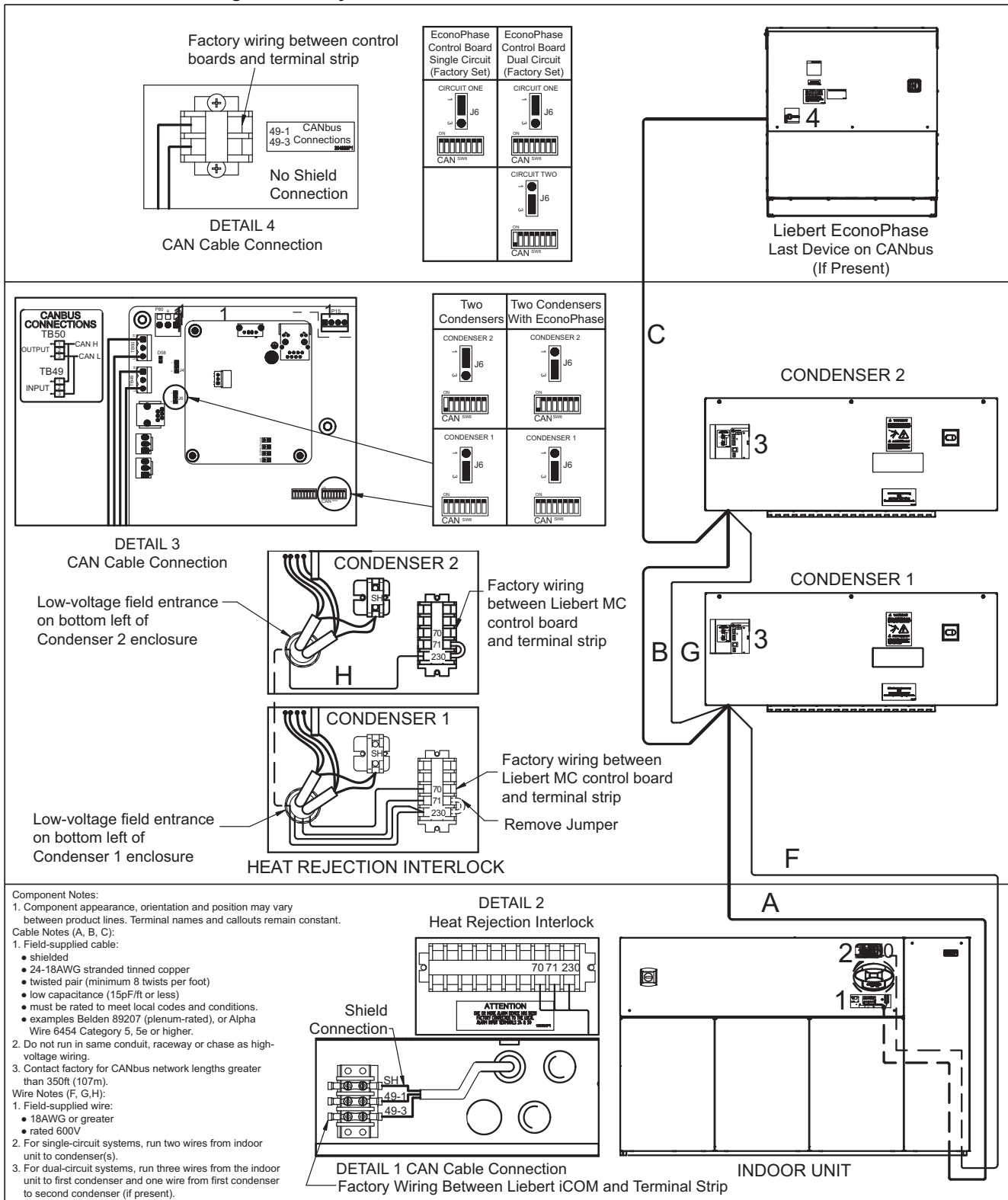
Figure 69 Electrical field connections for DA125 and DA150 downflow models

Refer to Section 9.5 through 9.7 for keys to numbered items.



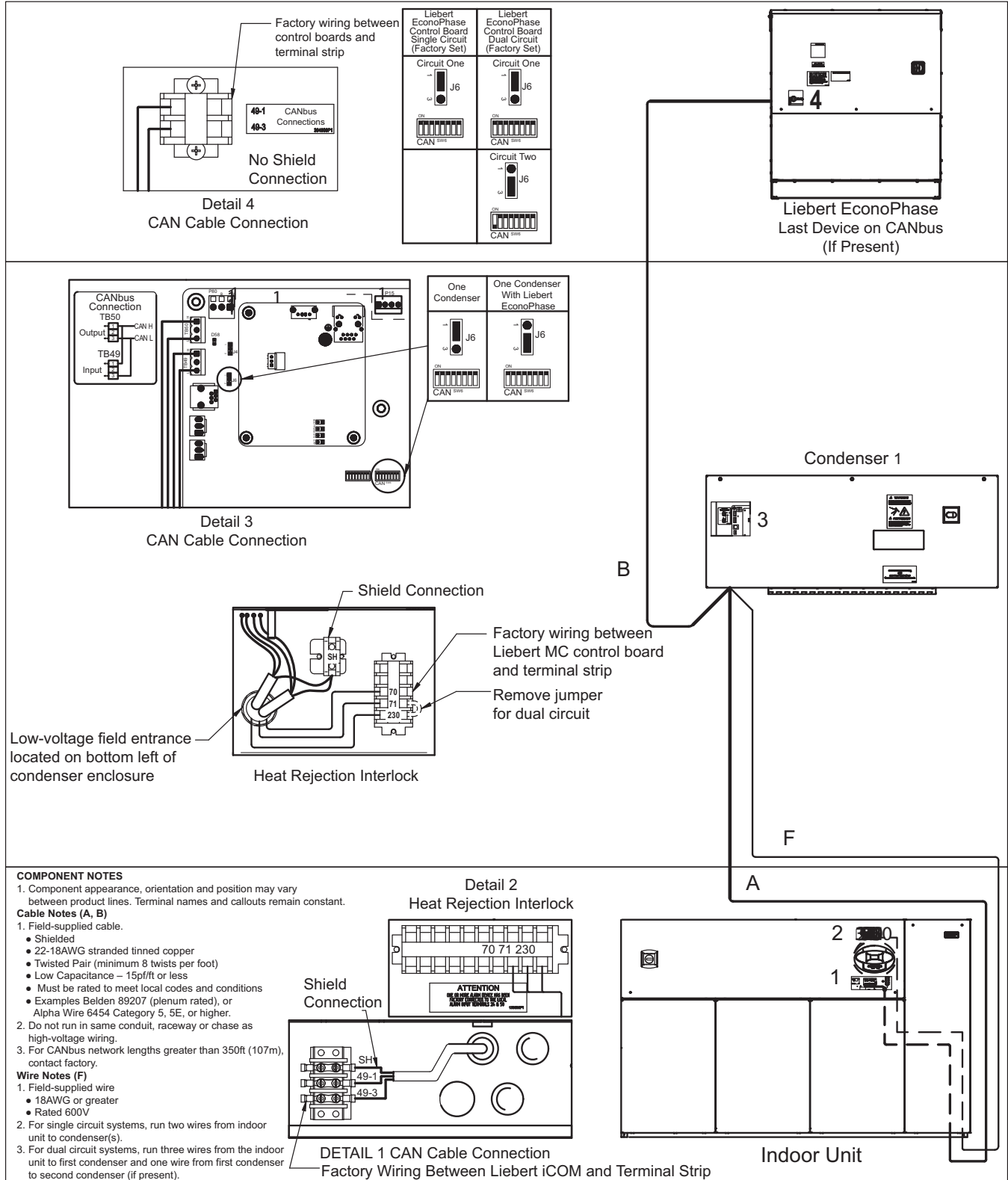
**Figure 70 CANbus cable connections between indoor unit, Liebert MC™ condenser and optional Liebert EconoPhase™ pumping unit**

Refer to Section 9.5 through 9.7 for keys to numbered items.



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Figure 71 Electrical field connections Premium Efficiency Control, three-fan models



DPN002631  
Rev. 2

## 10.0 PIPING

All fluid and refrigeration connections to the unit, with the exception of the condensate drain, are sweat copper. Factory-installed piping brackets must not be removed. Field-installed piping must be installed in accordance with local codes and must be properly assembled, supported, isolated and insulated. Avoid piping runs through noise-sensitive areas, such as office walls and conference rooms.

Refer to specific text and detailed diagrams in this manual for other unit-specific piping requirements.

All piping below the elevated floor must be located so that it offers the least resistance to air flow. Careful planning of the piping layout under the raised floor is required to prevent the air flow from being blocked. When installing piping on the subfloor, it is recommended that the pipes be mounted in a horizontal plane rather than stacked one above the other. Whenever possible, the pipes should be run parallel to the air flow.

### 10.1 Fluid Connections

#### NOTICE

Risk of clogged or leaking drain lines. Can cause equipment and building damage.

This unit requires a water drain connection. Drain lines must be inspected regularly and maintenance must be performed to ensure that drain water runs freely through the drain system and that lines are clear and free of obstructions and in good condition with no visible sign of damage or leaks. This unit may also require an external water supply to operate.

Improper installation, application and service practices can result in water leakage from the unit. Water leakage can result in severe property damage and loss of critical data center equipment.

Do not locate unit directly above any equipment that could sustain water damage.

Emerson recommends installing leak detection equipment for unit and supply lines.



#### NOTE

*Seal openings around piping and electrical connection to prevent air leakage. Failure to do so could reduce the unit's cooling performance.*

#### 10.1.1 Condensate Piping—Field-Installed

- Do not reduce drain lines
- Do not expose drain line to freezing temperatures
- Drain line may contain boiling water. Use copper or other suitable material
- Drain line must comply with local building codes
- Emerson recommends installing under-floor leak detection equipment

#### Gravity Drain—Units Without Factory-Installed Condensate Pump

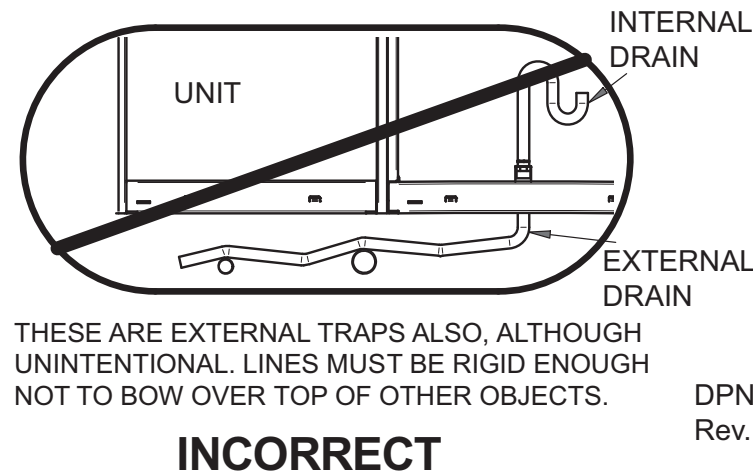
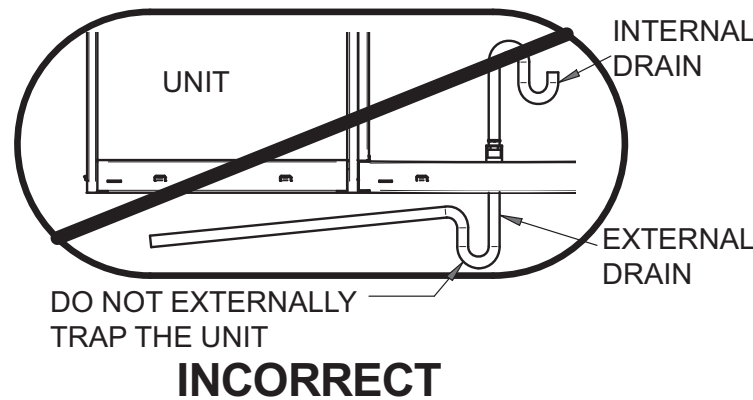
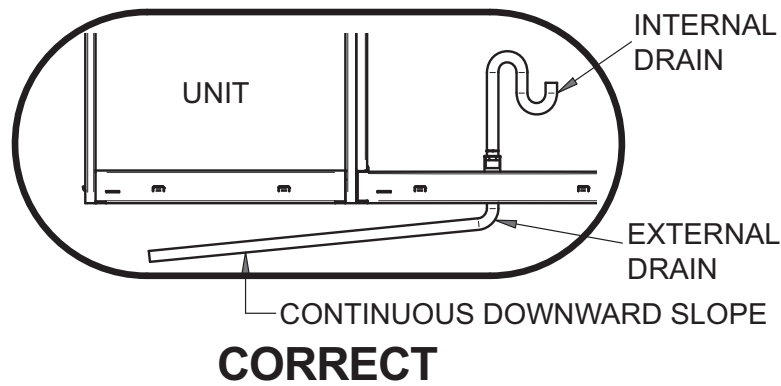
- 3/4" FPT drain connection is provided on units **without** optional factory-installed condensate pump with infrared humidifier or no humidifier; 1-1/4" FPT connection is provided on units with steam generating humidifier
- Pitch drain line toward drain a minimum of 1/8" (3mm) per 1 foot (305mm) of length
- Drain is trapped internally. Do not trap external to equipment
- Drain line must be sized for 2 gpm (7.6 l/m) flow

#### NOTICE

Risk of double trapping the unit drain line. Can cause drain water to back up and overflow the unit cabinet resulting in building and equipment damage.

Do not install an external drain line trap. A drain line trap has been factory-installed inside the unit cabinet.

Figure 72 Gravity drain for downflow units



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### Condensate Pump

- 1/2" copper sweat connection is provided on units **with** optional factory-installed condensate pump
- Condensate Pump (60Hz): Condensate pump is rated for approximately 400 gph at 10 feet total head pressure (25.2 l/m at 29.9kPA total head pressure)
- Condensate Pump (50Hz): Condensate pump is rated for approximately 315 gph at 10 feet total head pressure (19.8 l/m at 29.9kPA total head pressure)
- Size piping based on available condensate head



### 10.1.2 Humidifier Supply Water—Optional Infrared

- 1/4" supply line; maximum water pressure is 150 psi (1034kPa)
- Size humidifier supply line for 1 gpm (3.8 l/m), with a minimum water pressure of 20 psi (138kPa)
- Do not supply de-ionized water to the humidifier

## 10.2 Refrigeration Piping



### WARNING

Risk of explosive discharge from high-pressure refrigerant. Can cause serious injury or death. This unit contains fluids and/or gases under high pressure. Relieve pressure before working with piping.



### WARNING

Risk of refrigerant system rupture or explosion. Can cause equipment damage, serious injury or death.

Use extreme caution when charging the refrigerant system. Do not pressurize the system higher than the design pressure marked on the unit nameplate. Do not install a shutoff valve between the compressor and the field-installed pressure relief valve.

For systems requiring EU CE-compliance (50Hz), the system installer must provide and install a discharge pressure relief valve rated for a maximum of 650 psig (45bar) in the high side refrigerant circuit. Do not install a shutoff valve between the compressor and the field-installed relief valve. The pressure relief valve must be CE-certified to the EU Pressure Equipment Directive by an EU “Notified Body.”



### NOTE

*The Liebert indoor cooling unit has a factory-installed high-pressure safety switch in the high side refrigerant circuit. Consult local building codes to determine whether the Liebert Premium Efficiency Control (PCB) condensers will require field-provided pressure relief devices.*

## NOTICE

Risk of oil contamination with water. Can cause equipment damage.

Liebert DSE units require POE (polyolester) oil. See **14.9.1 - Compressor Oil** for requirements. POE oil absorbs water at a much faster rate when exposed to air than previously used oils. Because water is the enemy of a reliable refrigeration system, extreme care must be used when opening systems during installation or service. If water is absorbed into the POE oil, it will not be easily removed and will not be removed through the normal evacuation process. If the oil is too wet, it may require an oil change. POE oils also have a property that makes them act as a solvent in a refrigeration system. Maintaining system cleanliness is extremely important because the oil will tend to bring any foreign matter back to the compressor.

## NOTICE

Risk of improper refrigerant charging. Can cause equipment damage.

Refrigerant charge must be weighed into scroll and digital scroll compressors before they are started. Starting scroll and digital scroll compressors without proper refrigerant charging can cause the compressors to operate at less than 5°F (-15°C) evaporator temperature and at less than 20psig (138kPa). Operation for extended periods at less than 20psig (138kPa) can cause premature compressor failure.

### 10.2.1 Piping Guidelines—Air-Cooled Units

- Indoor unit ships with a nitrogen holding charge. Do not vent the evaporator until all refrigerant piping is in place, ready for connection to the unit and condenser.
- Use copper piping with a brazing alloy with a minimum temperature of 1350°F (732°C), such as Sil-Fos. Avoid soft solders, such as 50/50 or 95/5.
- Use a flow of dry nitrogen through the piping during brazing to prevent formation of copper oxide scale inside the piping. When copper is heated in the presence of air, copper oxide forms. POE oils will dissolve these oxides from inside the copper pipes and deposit them throughout the system, clogging filter driers and affecting other system components.
- A pure dry nitrogen flow of 1-3ft<sup>3</sup>/min (0.5-1.5 l/s) inside the pipe during brazing is sufficient to displace the air. Control the flow using a suitable measuring device.
- Ensure that the tubing surfaces to be brazed are clean and that all burrs have been removed from the ends of the tubes.
- Ensure that all loose material has been cleaned from inside the tubing before brazing.
- Protect all refrigerant line components within 18" (460mm) of the brazing site by wrapping them with a wet cloth or with a suitable heat sink compound.
- Isolate piping from the building using vibration-isolating supports.
- Refer to **Table 12** for piping sizes.
- Install traps on hot gas (discharge) lines at the base of vertical risers over 5 feet high. If the rise exceeds 25 feet (7.5m), then install a trap in 20-foot (6m) increments or evenly divided of vertical rise.
- Pitch horizontal hot gas piping down at a minimum rate of 1/2" per 10 feet (42mm per 10m) so that gravity will aid in moving oil in the direction of refrigerant/oil flow.
- Condenser cannot be installed below the evaporator. The maximum height of the condenser above the evaporator is 60 feet (18.3m).
- Consult factory if piping run exceeds 300 feet (91.4m) actual length, or 450 feet (137.2m) equivalent length.
- Keep piping clean and dry, especially on units with R-410A refrigerant.
- Avoid piping runs through noise-sensitive areas.
- Do not run piping directly in front of indoor unit discharge airstream.
- Refrigerant oil—do not mix oil types or viscosities (see **14.9.1 - Compressor Oil**)
- Refer to ASHRAE Refrigeration Handbook for general, good-practice refrigeration piping. The Liebert indoor cooling unit has a factory-installed high-pressure safety switch in the high side refrigerant circuit. Consult building codes to determine if condensers without receivers will require field-provided pressure relief devices. A fusible plug kit is available for field installation.



#### NOTE

*All indoor and outdoor field refrigerant piping must have at least 1/2" of insulation. All outdoor insulation must be UV and ozone resistant.*

**Table 12 Recommended refrigerant line sizes - OD copper**

Model	DA080 and DA085		DA125		DA150	
	Hot Gas Line, in.	Liquid Line, in.	Hot Gas Line, in.	Liquid Line, in.	Hot Gas Line, in.	Liquid Line, in.
50ft (15m)	1-1/8	7/8	1-3/8	7/8	1-3/8	7/8
100ft (30m)	1-1/8	7/8	1-3/8	7/8	1-3/8	1-1/8
150ft (45m)	1-1/8	7/8	1-3/8	7/8	1-3/8	1-1/8
300ft (90m)	1-1/8	7/8	1-3/8	7/8	1-3/8	1-1/8
450ft (137m)	1-1/8	7/8	1-3/8	7/8	1-3/8	1-1/8



#### NOTE

*Install a 1-3/8" liquid line between the condenser and the Liebert EconoPhase™ unit, regardless of line sizes indicated in **Table 12**. See **Figures 73 and 74**.*

**Table 13 Indoor unit approximate refrigerant charge for R-410A**

System Type	Model	R-410A Charge, lb (kg)	
		Outer Circuit	Inner Circuit
Air-Cooled	DA080	16 (7.3)	14 (6.4)
Air-Cooled	DA085	18 (8.2)	16 (7.3)
Air-Cooled	DA125	28 (12.7)	25 (11.3)
Air-Cooled	DA150	28 (12.7)	25 (11.3)

**Table 14 Interconnecting piping refrigerant charge**

Line Size, O.D., in.	R-410A, lb/100 ft. (kg/30m)	
	Liquid Line	Hot Gas Line
7/8	19.8 (9.1)	2.3 (1.0)
1-1/8	33.8 (15.5)	3.9 (1.8)
1-3/8	51.5 (23.5)	5.9 (2.7)

**Table 15 Condenser refrigerant charge**

Standard Condenser Models	R410A Charge per Circuit Including Receiver, lb (kg)	
	Large Receiver	Small Receiver
MCL110E2	—	14 (6.4)
MCM160E2	—	15 (6.8)
MCL220E2	27 (12.2)	20 (9.1)
MCL165E1	33 (15)	26 (11.8)
MCL220E1	39 (17.7)	32 (14.5)

Condenser charge includes receivers

Small Receiver: 28" long; Large Receiver: 60" long

**Table 16 Liebert PR125/PR085 module charge**

System Type	Model	R410A Charge per Circuit, lb (kg)
Liebert EconoPhase™ Pumping Unit	PR125 PR085	5.4 (2.5)

**Table 17 Condenser ambient selections**

Outdoor Design Ambient	High Efficiency Condenser Match-Ups				Small Footprint Condenser Match-Ups			
	DA080	DA085	DA125	DA150	DA080	DA085	DA125	DA150
95°F (35°C)	MCM160	MCM160	MCL220	MCL165 (x2)	MCL110	MCL110	MCM160	MCL220
100°F (38°C)	MCM160	* MCL220	* MCL165 (x2)	MCL165 (x2)	* MCM160	* MCM160	* MCL220	* MCL165 (x2)
105°F (41°C)	MCL220	MCL220	* MCL220 (x2)	MCL220 (x2)	MCM160	MCM160	* MCL165 (x2)	MCL165 (x2)

\* Consult factory for alternate selections

## 10.2.2 Scroll and Digital Scroll—Additional Oil Requirements

System charges over 75lb (34kg) per circuit require additional oil charge. See **Table 18** for the amount required for various system charge levels.

After the system has been fully charged with refrigerant, use a hand pump to add the additional oil at the suction side of the system while the system is running.

The amount of oil added by field service must be recorded on the tag marked “Oil Added Field Service Record,” attached to each compressor. The date of oil addition must be included as well.

**Table 18 Additional oil required per refrigerant charge**

Model	System Charge Per Circuit - lb (kg) *								
	40 (18.1)	60 (27.2)	80 (36.3)	100 (45.5)	120 (54.2)	140 (63.8)	160 (73.0)	180 (82.1)	200 (91.3)
	Additional Oil Required Per Circuit - Ounces (Grams)								
DA080	5 (142)	13 (369)	21 (595)	29 (822)	37 (1049)	45 (1276)	53 (1503)	61 (1729)	69 (1956)
DA085	5 (142)	13 (369)	21 (595)	29 (822)	37 (1049)	45 (1276)	53 (1503)	61 (1729)	69 (1956)
DA125	0	8 (226.8)	14.0 (396.9)	20.0 (567)	26.0 (737.1)	32.0 (907.2)	40.0 (1134)	46.0 (1304.1)	52.0 (1474.2)
DA150	10 (283.5)	26.0 (737.1)	42 (1190.7)	58 (1644.3)	74 (2097.9)	90 (2551.5)	106 (3005)	122 (3458.6)	138 (3912.2)

\* Consult your Emerson representative for system charges over 200 lb. (90.7kg).

## NOTICE

Risk of improper compressor lubrication. Can cause compressor and refrigerant system damage.

Failure to use oil types, viscosities and quantities recommended by the compressor manufacturer may reduce compressor life and void the compressor warranty. See **Table 20** for compressor oil types.

- Do not mix polyolester (POE) and mineral-based oils.
- Do not mix oils of different viscosities.
- Consult Emerson or the compressor manufacturer if questions arise.

## 10.3 Dehydration/Leak Test and Charging Procedures for R-410A

### 10.3.1 Air-Cooled Condenser - Premium Efficiency Control (PCB version)

The Liebert Premium Efficiency Control (PCB version) condenser is required for air-cooled Liebert DSE models. The Electronically Commutative (EC) fan control system utilizes a Premium Efficiency Control (PCB) board, EC fan motor(s) operating from 0 to 100% RPM based on refrigerant head pressure, and refrigerant pressure transducer(s). The PCB board determines frequency changes required to adjust the EC fan speed based on refrigerant head pressure. The PCB board, EC fan(s), and transducer(s) are factory-wired. Multiple fan dual refrigeration circuit condensers adjust fan speed independently to match each circuit's head pressure conditions.



#### NOTE

*Liebert EconoPhase™ pumping units cannot be used with the Liebert Lee-Temp™ kit.*

## Condenser Piping

Two discharge lines and two liquid lines must be field-installed between the indoor unit and the outdoor condenser. See **Figure 74** for additional field-installed piping needed at the condenser.



### NOTE

*The condenser requires communication wiring from the indoor unit. See **Item 8, Heat rejection interlock, in 9.5 - Standard Electrical Field Connections, DA125 and DA150 Downflow Models.***



### NOTE

*Keep the evaporator unit and condenser closed with their factory charge of dry nitrogen while all field piping is installed. Keep the field piping clean and dry during installation. Do not allow it to stand open to the atmosphere.*

*When all the field interconnecting piping is in place, vent the condenser's dry nitrogen charge and connect to the field piping. Finally, vent the evaporator unit's dry nitrogen charge and make its piping connection last.*

*Follow all proper brazing practices, including a dry nitrogen purge to maintain system cleanliness.*

*The condenser connection pipes must be wrapped with a wet cloth to keep the pressure and temperature sensors cool during any brazing.*

## Leak Check and Evacuation Procedure

Proper leak check and evacuation can be performed only with all system valves open and check valves accounted for.



### NOTE

*Systems with scroll or digital scroll compressors include a factory-installed check valve and an additional downstream Schrader valve with core in the compressor discharge line. Proper evacuation of the condenser side of the compressor can be accomplished only using the downstream Schrader valve. See piping schematics, **Figures 73 and 74.***

1. Electronic expansion valves will need to be opened for evacuation.
2. For scroll and digital scroll compressors, connect refrigerant gauges to the suction rotalock valves and discharge line Schrader valves (see **Note** above) on both compressors.
3. Starting with Circuit #1, open the service valves and place a 150 PSIG (1034 kPa) of dry nitrogen with a tracer of refrigerant. Check system for leaks with a suitable leak detector.
4. With pressure still in Circuit #1, open the compressor service valves in Circuit #2. If pressure increases in Circuit #2, the system is cross-circuited and must be rechecked for proper piping. If there is no pressure increase, repeat the leak check procedure for Circuit #2.
5. After completion of leak testing, release the test pressure (per local code) and pull an initial deep vacuum on the system with a suitable pump.
6. After four hours, check the pressure readings and, if they have not changed, break vacuum with dry nitrogen. Pull a second and third vacuum to 250 microns or less. Recheck the pressure after two hours.

## System Charging

### NOTICE

Risk of improper refrigerant charging. Can cause equipment damage. When adding liquid refrigerant to an operating system, it may be necessary to add the refrigerant through the compressor suction service valve. Care must be exercised to avoid damage to the compressor. Emerson recommends connecting a sight glass between the charging hose and the compressor suction service valve. This will permit adjusting the cylinder hand valve so that liquid can leave the cylinder while allowing vapor to enter the compressor.

### NOTICE

Risk of refrigerant overcharge. Can cause equipment damage.

Care must be taken to prevent charging the system with too much refrigerant. Refer to the unit charging tables noted in **Step 3**.

1. Check the unit's nameplate for refrigerant type to be used. Unit control configurations differ depending on refrigerant type.
2. Refrigerant charging requires unit operation. Refer to **12.0 - Checklist for Completed Installation**.
3. Calculate the amount of charge for the system. Refer to the unit, condenser and refrigerant line charge data in **Tables 13, 14, 15 and 16**.
4. Weigh in as much of the system charge as possible before starting the unit. Do not exceed the calculated charge by more than 0.5 lb. (0.37kg).
5. Turn on the unit MC disconnect switch. Emerson recommends charging the unit with the return air setpoint between 75°F and 85°F (24-29°C). The return air temperature to the unit being charged must be stable and must be maintained greater than 65°F (18°C). If this is not possible due to lack of heat load, then load banks must be used to offset the cooling load during startup. Please see **Receiver Refrigerant Level on page 95** for the proper charge level in the receiver based on return air temperature and outdoor temperature at time of charging.
6. Turn on the indoor unit disconnect switch.
7. Operate the unit for 30 minutes using the charging function for System # 1 and System # 2 in the diagnostic section of the Liebert iCOM® control.

The charging function operates the compressor at full capacity, energizes the blower motor and opens the EEV.

### NOTICE

Risk of improper operation. Can cause compressor failure.

Operating the unit with the EEV closed can cause compressor failure. The reheat and humidifier are disabled. A minimum of 20psig (138kPa) must be established and maintained for the compressor to operate. The charging function can be reset as many times as required to complete unit charging.



#### NOTE

*A digital scroll compressor can have a clear sight glass only when operating at 100% capacity. When operating with a receiver, the sight glass might not become clear even when operating at 100% capacity.*

*When operating below 100%, the sight glass may show bubbles with each 15-second unloading cycle.*

## Receiver Refrigerant Level

There are two refrigerant-level sight glasses on each receiver at the condenser. Refrigerant level will vary with outside temperature and return air temperature at the indoor unit. Check the refrigerant level after the unit has been on for at least 15 minutes and the return air temperature is stable and between 75°F and 85°F (24-29°C).

### Sight Glass Levels

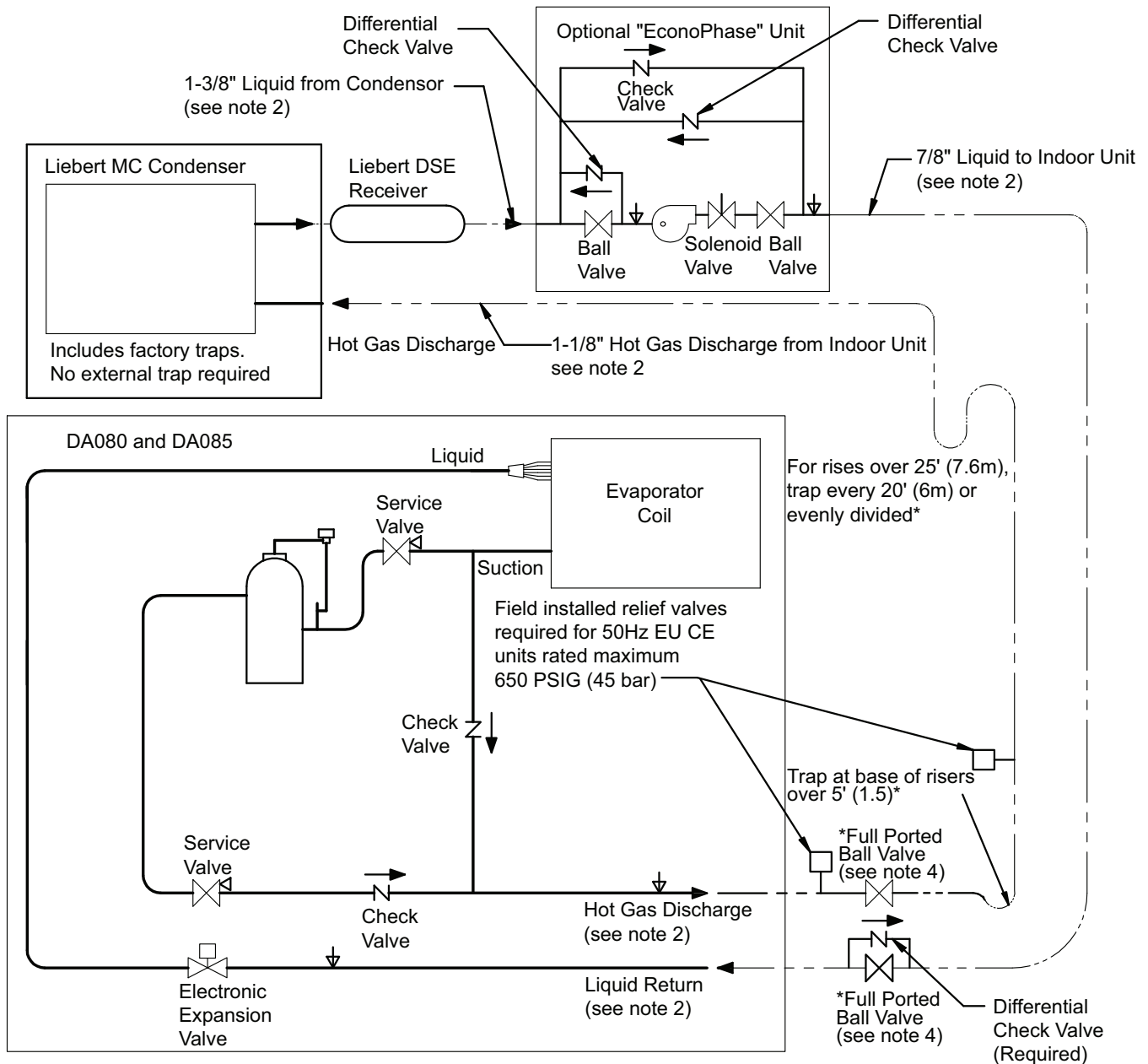
- 40°F (4.5°C) and lower—Bottom sight glass is 3/4 full
- 40 (4.5°C) and higher—Bottom sight glass is full

If the return air temperature cannot be maintained between 75°F and 85°F (24-29°C) (due to lack of load), then the liquid level in the receiver must be adjusted to the following if return air is between 65°F and 75°F (18-29°C):

- 40°F (4.5°C) and lower—Charge to the bottom of the top sight glass
- 40 (4.5°C) and higher—Top sight glass is 1/4 full

# 11.0 PIPING SCHEMATICS

Figure 73 Piping schematic—Air-cooled DA080, DA085 models



- Refrigerant Piping
- - - Field Piping
- ▽ Service/Schrader (Access) Connection, No Valve Core
- ▽ Service/Schrader (Access) Connection, with Valve Core

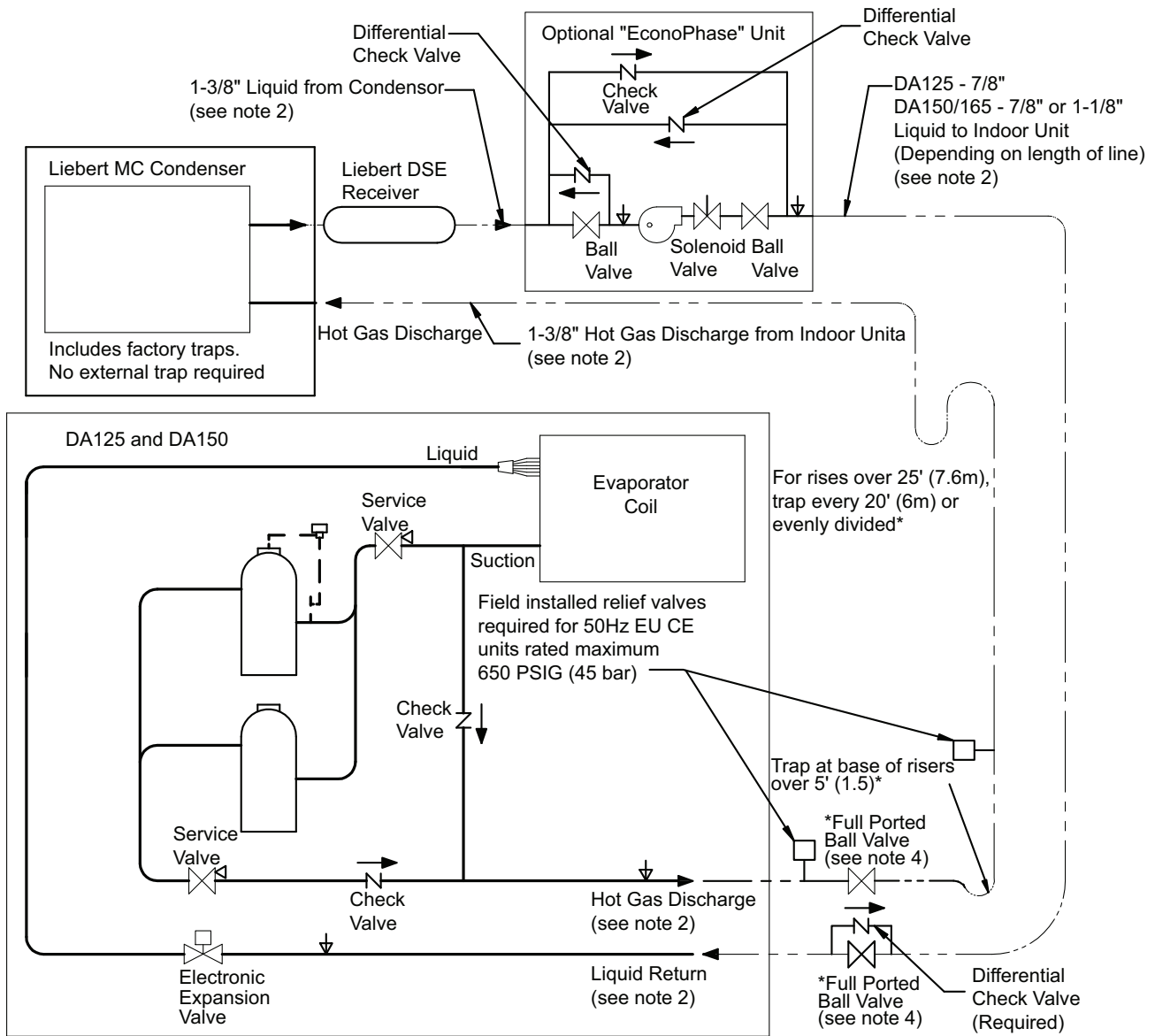
\* Components are not supplied by Liebert but are required for proper circuit operation and maintenance

1. Two refrigeration circuits provided. Single refrigeration circuit shown for clarity.
2. Circuit 1 must be maintained between indoor unit, condenser and EconoPhase unit. Circuit 2 must be maintained between indoor unit, condenser and EconoPhase unit.
3. Schematic representation shown. Do not use for specific connection locations.
4. Port in ball must be the same diameter as the piping I.D.
5. Length of piping between condenser and indoor unit shall be no greater than 300 ft (91.4 m) [Maximum equivalent length of 450 ft (137.2 m)].
6. Vertical height of condenser above indoor unit shall be no greater than 60ft (18.3m).
7. All indoor and outdoor field refrigerant piping must be insulated, 1/2" minimum thickness. All outdoor insulation must be UV- and ozone-resistant

DPN002615  
Rev. 4



Figure 74 Piping schematic—Air-cooled DA125 and DA150 models



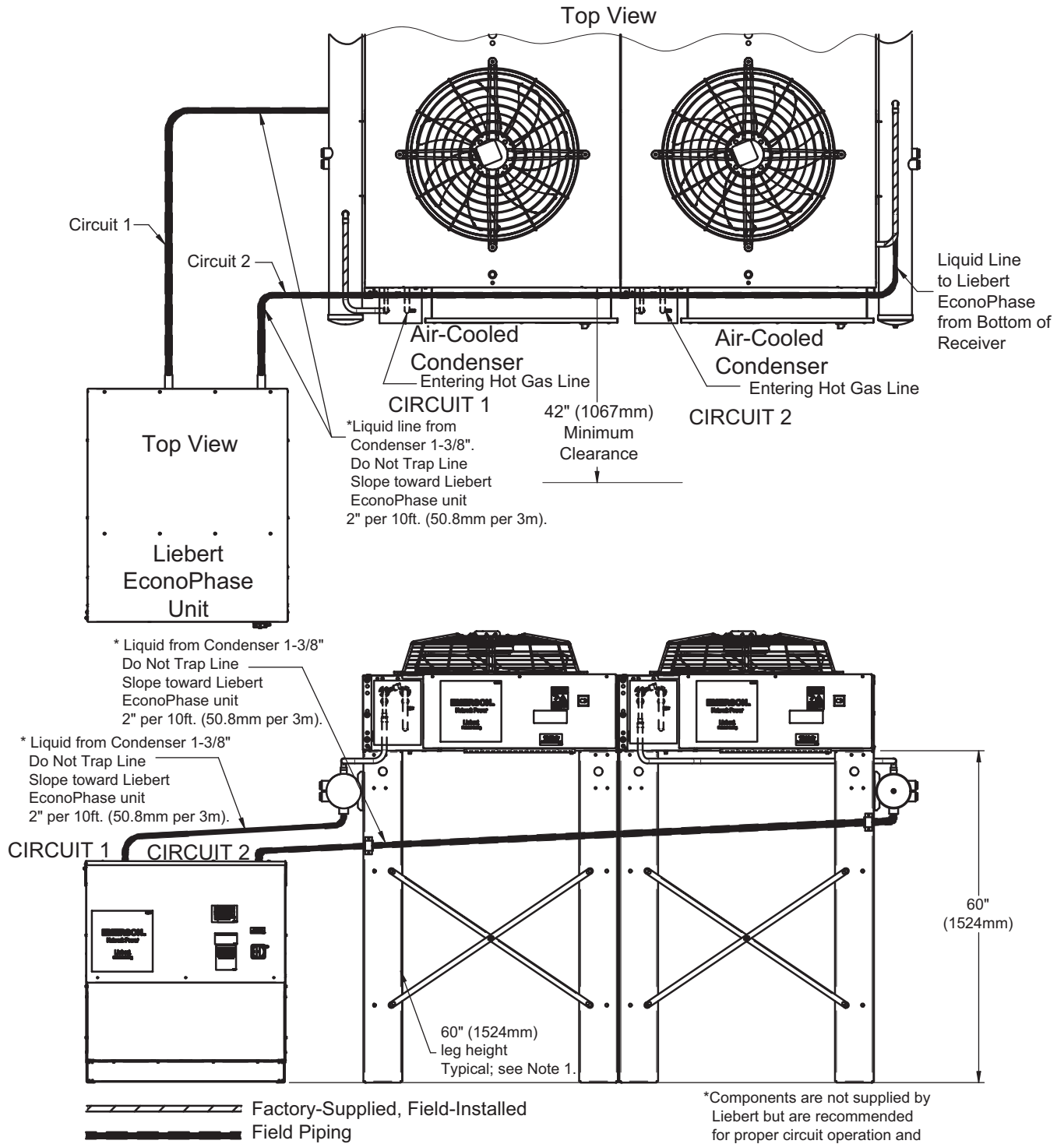
- Refrigerant Piping
- - - Field Piping
- ▽ Service/Schrader (Access) Connection, No Valve Core
- ▽ Service/Schrader (Access) Connection, with Valve Core

\* Components are not supplied by Liebert but are required for proper circuit operation and maintenance

1. Two refrigeration circuits provided. Single refrigeration circuit shown for clarity.
2. Circuit 1 must be maintained between indoor unit, condenser and EconoPhase unit.  
Circuit 2 must be maintained between indoor unit, condenser and EconoPhase unit.
3. Schematic representation shown. Do not use for specific connection locations.
4. Port in ball must be the same diameter as the piping I.D.
5. Length of piping between condenser and indoor unit shall be no greater than 300 ft (91.4 m) [Maximum equivalent length of 450 ft (137.2 m)].
6. Vertical height of condenser above indoor unit shall be no greater than 60ft (18.3m).
7. All indoor and outdoor field refrigerant piping must be insulated, 1/2" minimum thickness. All outdoor insulation must be UV- and ozone-resistant

DPN002340  
Rev. 7

Figure 75 Condenser and Liebert EconoPhase™ unit locations, typical unit arrangement diagram layout



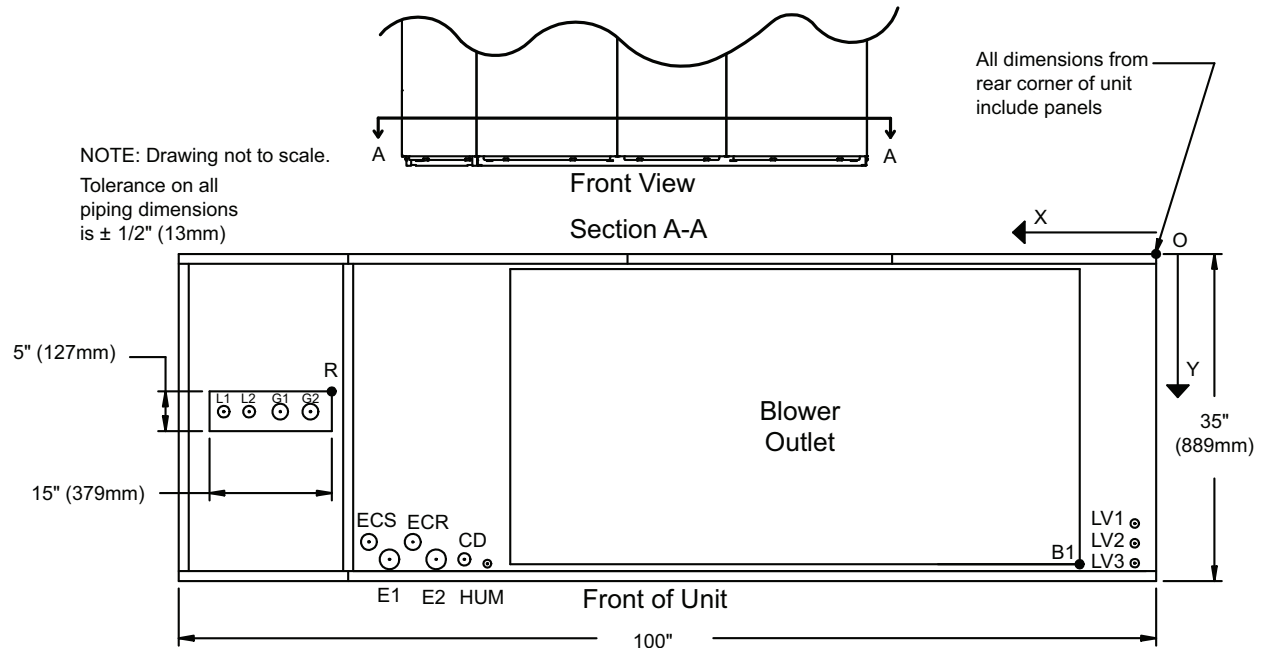
1. For proper pump function, a minimum elevation difference of 60" (1524 mm) must be maintained between the bottom of condenser box to the bottom of Liebert EconoPhase unit.
2. All indoor and outdoor field refrigerant piping must be insulated, 1/2" minimum. All outdoor insulation must be UV- and ozone-resistant.

\*Components are not supplied by Liebert but are recommended for proper circuit operation and maintenance.

\*\*Components supplied by Liebert and must be field-installed.

DPN002324  
Rev. 3

**Figure 76 Primary connection locations—Downflow, air-cooled DA080 and DA085 scroll compressor models**



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

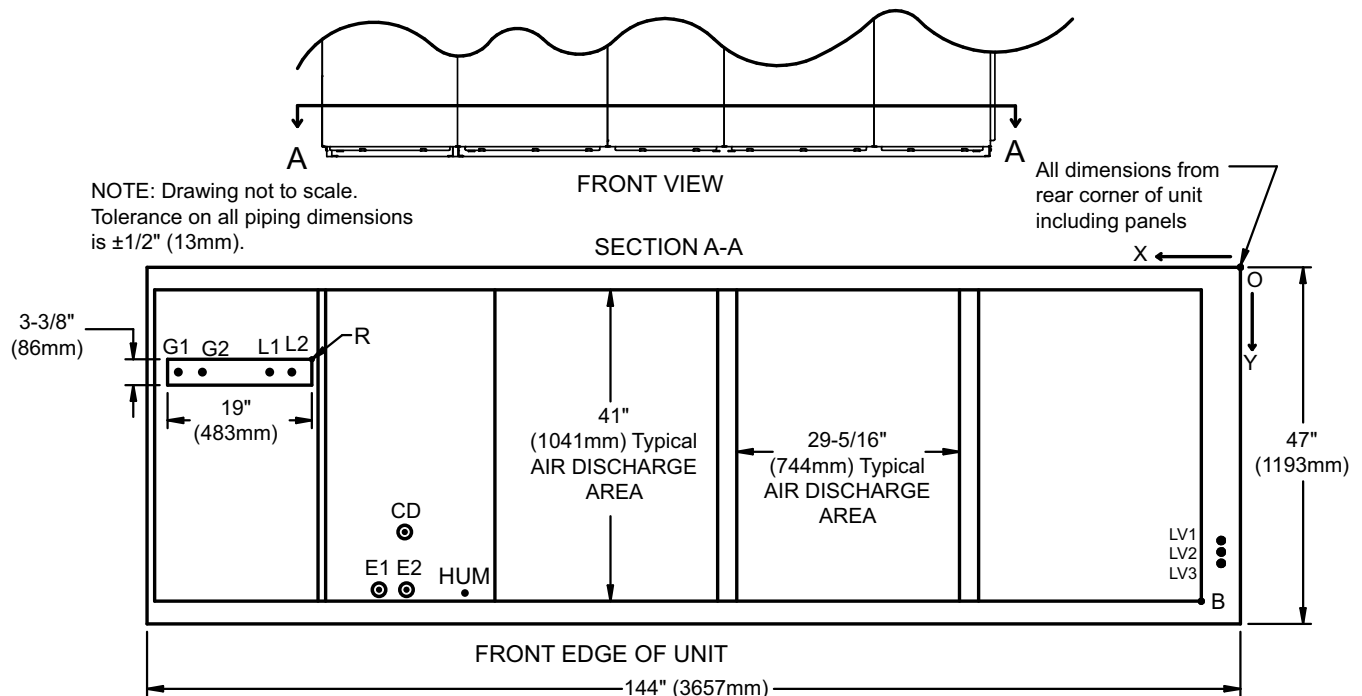
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 Rev. 2

Point	Description	X, in. (mm)	Y, in. (mm)	Connection Size / Opening in. (mm)
R	Refrigerant Access	82-7/8 (2105)	13-11/16 (348)	15 x 5 (379 x 127)
L1	Liquid Line System 1	94-11/16 (2405)	16-3/4 (425)	1/2" / 5/8" Cu Sweat
L2	Liquid Line System 2	91-7/8 (2334)	16-3/4 (425)	1/2" / 5/8" Cu Sweat
G1	Hot Gas Discharge 1	88-3/4 (2254)	16-3/8 (416)	7/8" / 1-1/8" Cu Sweat
G2	Hot Gas Discharge 2	85-9/16 (2173)	16-3/8 (416)	7/8" / 1-1/8" Cu Sweat
CD	Condensate Drain (Infrared Humidifier or No Humidifier) *	68-3/8 (1737)	31-3/8 (797)	3/4 FPT
	W/ Optional Pump	68-3/8 (1737)	31-3/8 (797)	1/2" Cu Sweat
Hum	Humidifier Supply Line	76-1/2 (1943)	29 (736)	1/4" Cu Sweat
HS	Hot Water Reheat Supply	Consult Factory		
HR	Hot Water Reheat Return	Consult Factory		
E1	Electrical Connection (High-Voltage)	78-1/2 (1994)	31-1/8 (790)	2-1/2"
E2	Electrical Connection (High-Voltage)	75-3/8 (1915)	31-1/8 (790)	2-1/2"
LV1	Electrical Connection (Low-Voltage)	2 (51)	29 (737)	7/8"
LV2	Electrical Connection (Low-Voltage)	2 (51)	30-7/8 (784)	7/8"
LV3	Electrical Connection (Low-Voltage)	2 (51)	32 (813)	7/8"
B1	Blower Outlet	4-1/2 (114)	33 (838)	58-3/8 x 30 (148 x 762)

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

Source: DPN002182, Rev. 2

Figure 77 Primary connection locations—Downflow, air-cooled DA125 scroll compressor models



NOTE: Drawing not to scale.  
Tolerance on all piping dimensions is  $\pm 1/2"$  (13mm).

All dimensions from rear corner of unit including panels

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

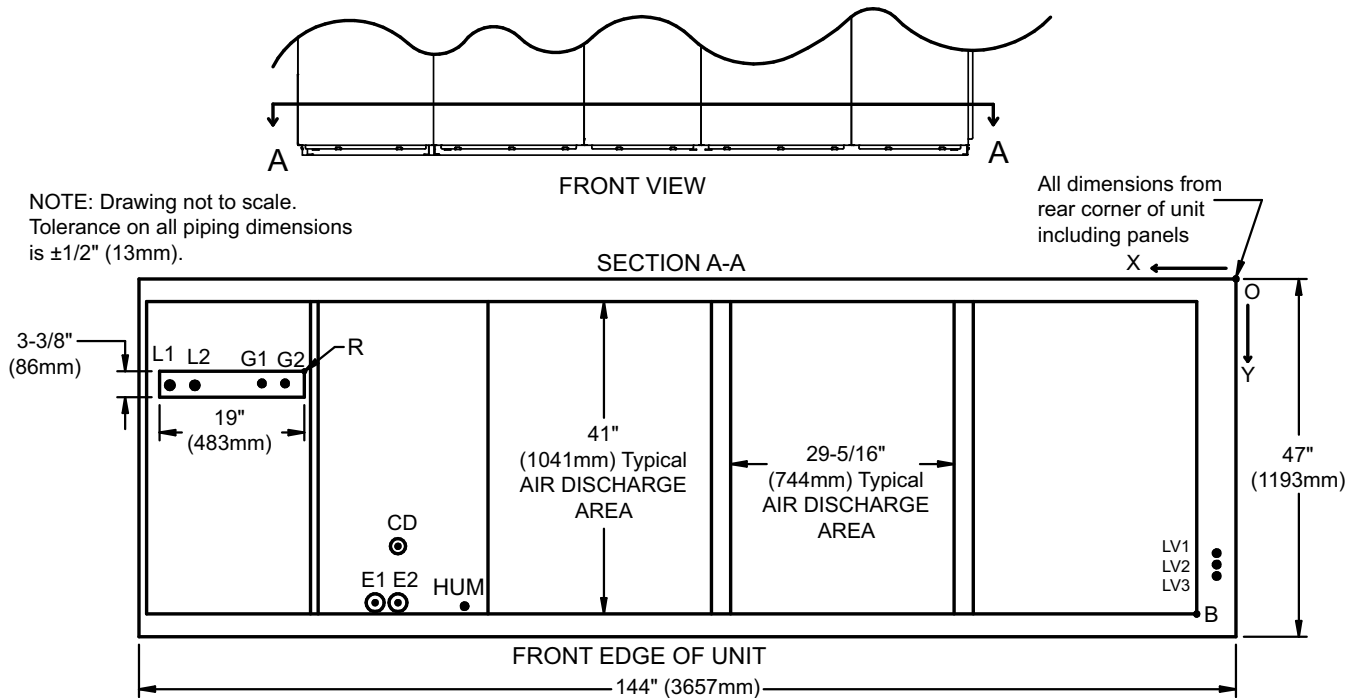
⦿ Opening for conduit chase, E1 and E2 are openings for conduit for connections to 2-1/2", 1-3/4" and 1-3/8" knockouts at electric panel

DPN002312  
Pg. 1, Rev. 4

Point	Description	X in. (mm)	Y in. (mm)	DX Only	DX with EconoPhase Pumping Unit
				Connection Size/ Opening, in. (mm)	
R	Refrigerant Access	122-5/16 (3106)	12-1/8 (333)	19 x 3-3/8 (483 x 86)	19 x 3-3/8 (483 x 86)
L1	Liquid Line System 1	127-7/8 (3248)	13-3/4 (348)	7/8 Cu Sweat	7/8 Cu Sweat
L2	Liquid Line System 2	124-13/16 (3170)	13-3/4 (348)	7/8 Cu Sweat	7/8 Cu Sweat
G1	Hot Gas Discharge 1	140 (3554)	14 (355)	1-1/8 Cu Sweat	1-3/8 Cu Sweat
G2	Hot Gas Discharge 2	136-11/16 (3471)	14 (355)	1-1/8 Cu Sweat	1-3/8 Cu Sweat
CD	Condensate Drain (infrared humidifier or no humidifier) *	110 (2794)	35-1/16 (891)	1-1/8 FPT	1-1/8 FPT
	Condensate Drain (steam generating humidifier) *	Consult Factory			
	W/ Optional Pump	110 (2794)	35-1/16 (891)	1/2 Cu Sweat	1/2 Cu Sweat
HUM	Humidifier Supply Line	101-1/4 (2572)	43 (1091)	1/4 Cu Sweat	1/4 Cu Sweat
HS	Hot Water Reheat Supply	Consult Factory			
HR	Hot Water Reheat turn	Consult Factory			
E1	Electrical Connection (High-Voltage)	113 (2870)	42-1/2 (1080)	2-1/2	2-1/2
E2	Electrical Connection (High-Voltage)	110 (2794)	42-1/2 (1080)	2-1/2	2-1/2
LV1	Electrical Connection (Low-Voltage)	2-1/2 (64)	36 (914)	7/8	7/8
LV2	Electrical Connection (Low-Voltage)	2-1/2 (64)	37-1/2 (952)	7/8	7/8
LV3	Electrical Connection (Low-Voltage)	2-1/2 (64)	39 (991)	7/8	7/8
B	Blower Outlet	5-1/8 (131)	44 (1117)	93" x 41" (2362 x 1041)	93" x 41" (2362 x 1041)

Source: DPN002312, Rev. 4, Page 1

Figure 78 Primary connection locations—Downflow, air-cooled DA150 scroll compressor models



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

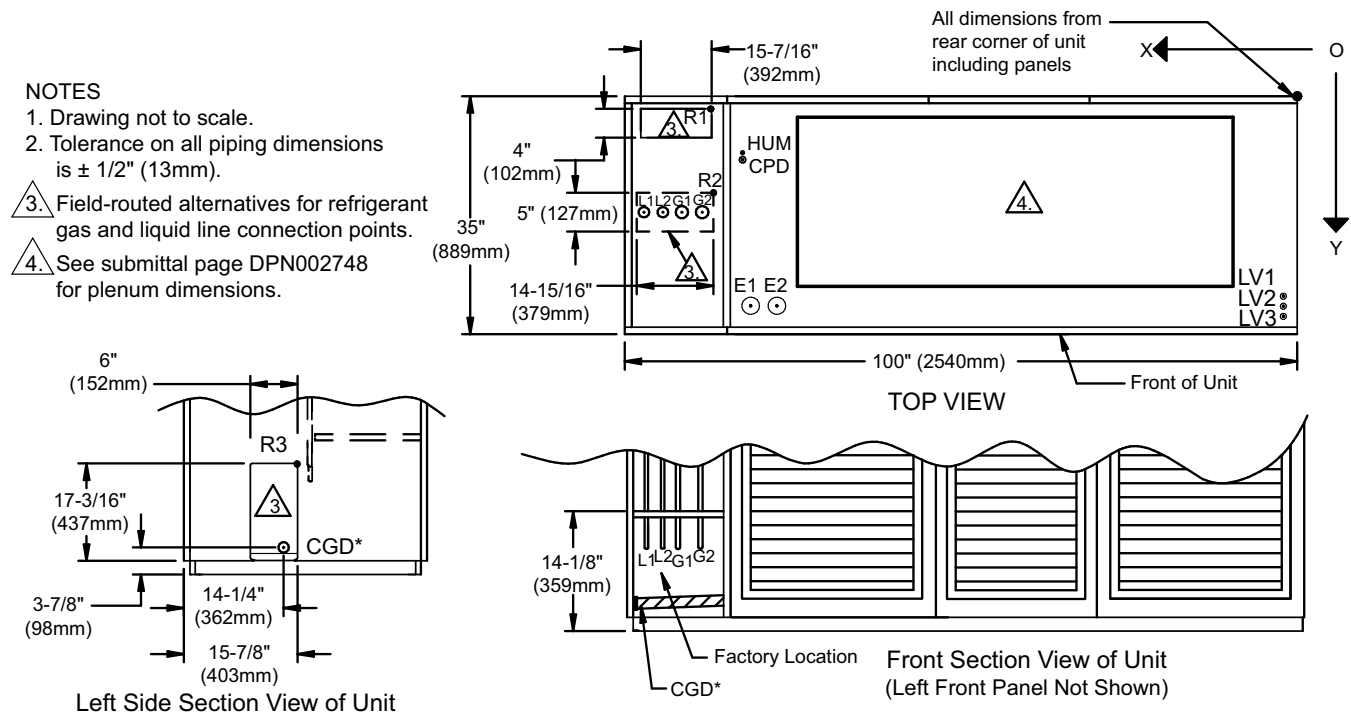
- Opening for conduit chase, E1 and E2 are openings for conduit for connections to 2-1/2", 1-3/4" and 1-3/8" knockouts at electric panel

DPN002312  
Pg. 2, Rev. 4

Point	Description	X in. (mm)	Y in. (mm)	DX Only	DX with EconoPhase
				Connection Size/Opening, in. (mm)	
R	Refrigerant Access	122-5/16 (3106)	12-1/8 (333)	19 x 3-3/8 (483 x 86)	19 x 3-3/8 (483 x 86)
L1	Liquid Line System 1	140 (3554)	14 (355)	1-1/8 Cu Sweat	1-1/8 Cu Sweat
L2	Liquid Line System 2	136-11/16 (3471)	14 (355)	1-1/8 Cu Sweat	1-1/8 Cu Sweat
G1	Hot Gas Discharge 1	127-7/8 (3248)	13-3/4 (348)	1-3/8 Cu Sweat	1-3/8 Cu Sweat
G2	Hot Gas Discharge 2	124-13/16 (3170)	13-3/4 (348)	1-3/8 Cu Sweat	1-3/8 Cu Sweat
CD	Condensate Drain (infrared humidifier or no humidifier) *	110 (2794)	35-1/16 (891)	1-1/8 FPT	1-1/8 FPT
	Condensate Drain (steam generating humidifier) *	Consult Factory			
	W/ Optional Pump	110 (2794)	35-1/16 (891)	1/2 Cu Sweat	1/2 Cu Sweat
HUM	Humidifier Supply Line	101-1/4 (2572)	43 (1091)	1/4 Cu Sweat	1/4 Cu Sweat
HS	Hot Water Reheat Supply	Consult Factory			
HR	Hot Water Reheat Return	Consult Factory			
E1	Electrical Connection (High Volt)	113 (2870)	42-1/2 (1080)	2-1/2	2-1/2
E2	Electrical Connection (High Volt)	110 (2794)	42-1/2 (1080)	2-1/2	2-1/2
LV1	Electrical Connection (Low Volt)	2-1/2 (64)	36 (914)	7/8	7/8
LV2	Electrical Connection (Low Volt)	2-1/2 (64)	37-1/2 (952)	7/8	7/8
LV3	Electrical Connection (Low Volt)	2-1/2 (64)	39 (991)	7/8	7/8
B	Blower Outlet	5-1/8 (131)	44 (1117)	93 x 41 (2362 x 1041)	93 x 41 (2362 x 1041)

Source: DPN002312, Rev. 4, Page 2

Figure 79 Primary connection locations—Upflow, air-cooled DA080U, DA085U scroll compressor models



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

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Point	Description	X inches (mm)	Y inches (mm)	Connection Size/Opening, inches (mm)
R1	Refrigerant Access (Top)	83-5/8 (2124)	1-7/8 (48)	15-7/16 x 4 (392 x 102)
R2	Refrigerant Access (Bottom)	82-15/16 (2106)	13-5/8 (346)	14-15/16 x 5 (379 x 127)
R3	Refrigerant Access (Side)	—	—	6 x 17-3/16 (152 x 437)
L1	Liquid Line System 1	94-9/16 (2402)	16-3/4 (425)	5/8 Cu Sweat
L2	Liquid Line System 2	91-7/8 (2334)	16-3/4 (425)	5/8 Cu Sweat
G1	Hot Gas Discharge 1	88-7/8 (2257)	16-7/16 (418)	1-1/8 Cu Sweat
G2	Hot Gas Discharge 2	85-5/8 (2175)	16-7/16 (418)	1-1/8 Cu Sweat
CGD	Condensate Gravity Drain	—	—	3/4 FPT
CPD	Condensate Pump Discharge (Optional)	79-5/16 (2015)	11-7/8 (302)	1/2 Cu Sweat
HUM	Humidifier Supply Line	79-5/16 (2015)	9-7/8 (251)	1/4 Cu Sweat
E1	Electrical Connection (High Voltage)	78-1/8 (1984)	30 (762)	2-1/2
E2	Electrical Connection (High Voltage)	74-3/8 (1889)	30 (762)	2-1/2
LV1	Electrical Connection (Low Voltage)	2-5/8 (66)	28-9/16 (726)	7/8
LV2	Electrical Connection (Low Voltage)	2-5/8 (66)	30 (762)	7/8
LV3	Electrical Connection (Low Voltage)	2-5/8 (66)	31-7/16 (799)	7/8

Source: DPN002951, Rev. 0

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## 12.0 CHECKLIST FOR COMPLETED INSTALLATION

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### 12.1 Moving and Placing Equipment

- 1. Unpack and check received material.
- 2. Proper clearance for service access has been maintained around the equipment.
- 3. Equipment is level and mounting fasteners are tight.
- 4. If the equipment has been disassembled for installation, unit must be reassembled per instructions.

### 12.2 Electrical

- 1. Supply voltage and phase matches equipment nameplate.
- 2. Wiring connections completed between disconnect switch, evaporator unit and heat rejection equipment.
- 3. Power line circuit breakers or fuses have proper ratings for equipment installed.
- 4. Control wiring connections completed between indoor evaporator and heat rejection equipment.
- 5. All internal and external high- and low-voltage wiring connections are tight.
- 6. Confirm that unit is properly grounded to an earth ground.
- 7. Control transformer setting matches incoming power.
- 8. Electrical service conforms to national and local codes.
- 9. Check blowers and compressors for proper rotation.

### 12.3 Piping

- 1. Piping completed to refrigerant or coolant loop (if required).
- 2. Piping has been leak-checked, evacuated and charged (if required).
- 3. Additional oil has been added for system charges over 75 pounds (34kg) per circuit (see **10.2.2 - Scroll and Digital Scroll—Additional Oil Requirements**).
- 4. Piping is properly sized, sloped and trapped as shown in the piping schematics.
- 5. Check piping inside and outside of equipment for proper support.
- 6. Ensure that factory clamps have been reinstalled.
- 7. Drain line connected, not obstructed or leaking and pitched per local code.
- 8. Water supply line connected to humidifier and not leaking.
- 9. System charge has been carefully measured. Accurate microchannel condenser charge is critical.
- 10. Liebert EconoPhase™ pumping unit has been correctly piped into liquid line.

### 12.4 Other

- 1. Ducting complete (if required), maintain access to filters.
- 2. Filters installed.
- 3. Check fasteners that secure compressors, reheats, humidifier and motors—some may have become loose during shipment.
- 4. Verify water detection is properly installed around all units (recommended).
- 5. Control panel DIP switches are set based on user requirements.
- 6. Blower drive system rotates freely.
- 7. Remove rubber band from float in optional infrared humidifier.
- 8. Seal openings around piping and electrical connections.
- 9. Installation materials and tools have been removed from equipment (literature, shipping materials, construction materials, tools, etc.).
- 10. Locate blank startup sheet, ready for completion by installer or startup technician.

## 13.0 INITIAL STARTUP CHECKS AND COMMISSIONING PROCEDURE FOR WARRANTY INSPECTION



### WARNING

Risk of electric shock. Can cause serious injury or death

Disconnect local and remote power supplies before working within.

Before proceeding with installation, read all instructions, verify that all the parts are included and check the nameplate to be sure the voltage matches available utility power.

Follow all local codes.



### WARNING

Risk of improper wiring, piping, moving, lifting and/or handling. Can cause equipment damage, serious injury or death.

Only qualified service personnel should move, install or service this equipment.

Read all installation, operating and safety instructions before proceeding.

Read and follow all warnings in this manual.



### CAUTION

Risk of smoke generation. Can cause fire suppression and alarm system activation, resulting in injury and down time during building evacuation and mobilization of emergency fire and rescue services.

Startup operation of optional electric reheat elements may activate facility alarm and fire suppression system. Prepare and take appropriate steps to manage this possibility. Activating reheat during initial startup may burn off particulates from electric reheat elements.

Before beginning initial startup checks, make certain that unit was installed according to the instructions in this manual. All exterior panels must be in place.

### NOTICE

Risk of improper electrical connection of three-phase input power. Can cause backward compressor operation and unit damage.

Service technicians should use a gauge set on the Liebert DSE system during the initial startup to verify that the three-phase power is connected properly. The EC fans are not a reliable indicator of proper connection. The blowers will rotate the same direction, regardless of the three-phase power input.

- Confirm that all items on **12.0 - Checklist for Completed Installation** have been done.
- Locate “Liebert DSE Warranty Inspection Check Sheet” in unit electric panel. (Document number SAFM-8542-29)
- Complete “Liebert DSE Warranty Inspection Check Sheet” during startup. (Document number SAFM-8542-29).
- Forward the completed “Liebert DSE Warranty Inspection Check Sheet” to your local Emerson sales office. This information must be completed and forwarded to Emerson to validate warranty.
- Contact your local Emerson sales representative or Liebert Precision Cooling Products Support if you have any questions or problems during unit startup and commissioning.

Local Emerson Sales offices and Liebert Precision Cooling Products Support contacts can be found at [www.liebert.com](http://www.liebert.com) or by calling 1-800-LIEBERT.

Liebert DSE warranty startup procedures includes the following steps. These steps must be completed to validate warranty.



### 13.1 Information for Warranty Inspection—Remove Power From Unit Disconnect

Complete the following items on the warranty inspection form:

- Installer name and address
- Owner name and address
- Site contact name and phone number
- Installation date
- Indoor unit model number and serial number
- Outdoor unit (condenser or drycooler) model number and serial number
- Condition of unit when received
- Is there a freight damage claim in process? If so, have all relevant parties been notified?
- Have manuals been kept with unit?
- Is the Liebert Precision Cooling unit connected to site monitoring or switchover controls?
- Provide model and serial of connected controls for switchover controls.

### 13.2 Startup Checks With Panels Removed and Main Disconnect Off

- \_\_\_ 1. Check all internal piping clamps and tighten or secure if needed.
- \_\_\_ 2. Check field piping for proper support and proper connection.
- \_\_\_ 3. Check unit electrical connections, including and Mate N' Loc connections to the control boards, and tighten or secure if needed.
- \_\_\_ 4. Remove all debris, tools and documents from unit area.

#### 13.2.1 Inspect and Record

Main Fan hp: \_\_\_\_\_

Voltage: \_\_\_\_\_

EC Plug Fan: Assemblies Tight and Secured (check one)

\_\_\_ Fan secured in UP position

\_\_\_ Fan secured in Down position

Filter Size: \_\_\_\_\_

Quantity: \_\_\_\_\_

Piping Size (Air Cooled Only)

Discharge: \_\_\_\_\_

Liquid: \_\_\_\_\_

\_\_\_ Piping trapped according to installation manual (air cooled)

Total Equivalent Length for Discharge and Liquid Piping: \_\_\_\_\_

#1 Compressor Model #: \_\_\_\_\_

#1 Compressor Serial #: \_\_\_\_\_

#2 Compressor Model #: \_\_\_\_\_

#2 Compressor Serial #: \_\_\_\_\_

### 13.3 Startup

1. Turn On the Main Disconnect.
2. Check voltage at disconnect and record.  
L1-L2 \_\_\_\_\_ L2-L3 \_\_\_\_\_ L1-L3 \_\_\_\_\_
3. Check control voltage transformers for proper output. Secondary voltage(s) should not exceed 27VAC under load. Change tap if necessary.  
T1 \_\_\_\_\_ Volts.
4. Check fan rotation for proper direction. Change wiring at contactor if necessary.



#### NOTE

*EC blowers will NOT run backwards regardless of phasing. Check suction and discharge pressures to verify correct compressor rotation.*

5. Service technicians should use a gauge set on the Liebert DSE system during the initial startup to verify that the three-phase power is connected properly. The rotation direction of EC blowers is not a reliable indicator of proper connection. The blowers will rotate the same direction, regardless of the three-phase power input.
6. Check and record Main Fan amps.  
L1 \_\_\_\_\_ L2 \_\_\_\_\_ L3 \_\_\_\_\_ Fuse \_\_\_\_\_
7. Increase temperature setpoint to energize reheats. Check and record amperage.  
#1 \_\_\_\_\_ #2 \_\_\_\_\_ #3 \_\_\_\_\_ Fuse \_\_\_\_\_



#### NOTE

*Adjust all setpoints for proper operation after testing. With advanced microprocessor controls, you can use diagnostics to test operation of separate components.*

8. Increase humidity setpoint to energize humidifier. Check and record amperage  
L1-L2 \_\_\_\_\_ L2-L3 \_\_\_\_\_ L1-L3 \_\_\_\_\_
9. Check water level and adjust high limit float for proper operation.
10. If condensate pump has been supplied, check for proper operation.
11. Decrease humidity setpoint to call for dehumidification. Check for valve travel in dehumidification mode.
12. Decrease temperature setpoint to energize compressor(s). Check and record compressor amps.  
#1 L1 \_\_\_\_\_ L2 \_\_\_\_\_ L3 \_\_\_\_\_ Fuse \_\_\_\_\_  
#2 L1 \_\_\_\_\_ L2 \_\_\_\_\_ L3 \_\_\_\_\_
13. Check compressor operating pressure and record. (Check digital compressors fully loaded position.) (Scroll compressors may run backward. Check pressures to verify proper rotation.)  
Suction Pressure 1 \_\_\_\_\_ 2 \_\_\_\_\_  
Discharge Pressure 1 \_\_\_\_\_ 2 \_\_\_\_\_
14. Sight glass clear? 1 \_\_\_\_\_ 2 \_\_\_\_\_
15. Sight glass dry? 1 \_\_\_\_\_ 2 \_\_\_\_\_
16. Check compressor oil sight glass, should be 1/2 to 3/4 full while running. Adjust accordingly.
17. Check superheat on each circuit. Should be approximately 10°-20°.  
Circuit 1 \_\_\_\_\_ Circuit 2 \_\_\_\_\_
18. Check low pressure settings.  
Low pressure cutout 1 \_\_\_\_\_ 2 \_\_\_\_\_  
Low pressure cut in 1 \_\_\_\_\_ 2 \_\_\_\_\_
19. Check to ensure that piping and electrical connections at Liebert EconoPhase™ pumping unit are correct.

## 13.4 Commissioning Procedure With Panels On

1. Disconnect all power to the environmental control unit and check.
2. Remove all line voltage fuses except the main fan fuses and the control voltage fuses in the electric panel. (Use Liebert iCOM<sup>®</sup> to activate loads.)
3. Turn On power to the unit and check line voltage on main unit disconnect switch. Line voltage must be within 10% of nameplate voltage.
4. Turn On the main unit disconnect switch and check secondary voltage at transformer T1. Voltage at T1 must be 24VAC  $\pm$  2.5VAC (check at TB1-1 and TB1-5). T1 voltage must not exceed 28VAC. Change primary tap if necessary.
5. Push the On button. Blower will start and the On lamp will light.
6. Check fan rotation if not correct make necessary changes to the line side of the unit disconnect with power Off. **(The unit is phased at the factory.)**
7. Unit will operate at the factory-set configuration for all component operations. The operator may set the values for temperature and humidity setpoints, the proportional band and the deadband. The user menu may be used to set alarms and other control functions. Refer to the Liebert iCOM user manual, SL-18835, for large or small display operation and settings.

### NOTICE

Risk of improper control system operation. Can cause damage to equipment.

Do not change Advanced Menu parameter settings in the Liebert iCOM without first getting permission from Emerson Network Power Liebert Services.

Lowering this parameter to less than 100% will cause the coil to freeze on DX units, will overheat the reheat components on any unit and cause condensation problems on any unit equipped with a humidifier.

8. Turn Off the unit with the On/Off button.
9. Remove power from main unit disconnect and main breaker and check with a meter.
10. Replace all fuses removed in **Step 2**.
11. Restore power to the unit.
12. Turn On the main unit disconnect switch.
13. Press the On button.
14. Check and record the current draw on all line voltage components and match with serial tag.



#### NOTE

*Electric Reheat. See **Caution on page 104**. Activate for a minimum of five (5) minutes.*

15. Check for unusual noises and vibration. Note observations on the warranty inspection form's comments section.
16. Check all lines for leaks. Note observations on warranty inspection form.
17. Record all of the following on the warranty inspection form:
  - All component voltages and current draws
  - All air temperatures indoor and outdoor
  - All refrigerant pressures
  - All levels of refrigerant and oil in sight glasses
  - Record refrigerant pressure switch settings and operating pressures
  - Record superheat and subcooling.



#### NOTE

*Unit superheat should be in the range of 10 to 20°F (-12 to -6°C).*

18. Test all control sequences and functions of your unit for proper operation. Use Liebert iCOM user manual as a guide to system control operations.
19. Complete the warranty inspection form with sign-off data.

### Return Completed Startup Form to Your Local Emerson Sales Office

Local Emerson sales offices and air product support contacts can be found on the Liebert Web site: [www.liebert.com](http://www.liebert.com) or call 1-800-LIEBERT for Precision Cooling product support.

## 14.0 MAINTENANCE



### WARNING

Risk of electric shock and contact with high speed moving parts and hot surfaces. Can cause serious injury or death.

Open all local and remote electric power disconnect switches, verify with a voltmeter that power is Off, verify that all moving parts have stopped rotating and allow the compressor shell, fan motor(s), electrical components, heaters, humidifier and refrigerant lines to sufficiently cool down to a temperature safe for human contact before working within electrical connection enclosures or the unit cabinet.

Before proceeding with installation, read all instructions, verify that all the parts are included and check the nameplate to be sure the voltage matches available utility power.

Follow all local codes.



### WARNING

Risk of improper wiring, piping, moving, lifting and handling. Can cause equipment damage, serious injury or death.

Only qualified service personnel should work on this equipment.

Read all installation, operating and safety instructions before proceeding.

Read and follow all warnings, cautions and notices in this manual

### NOTICE

Risk of improper control system operation. Can cause damage to equipment.

Do not change Advanced Menu parameter settings in the Liebert iCOM® without first getting permission from Liebert Service.

Lowering this parameter to less than 100% will cause the coil to freeze on DX units, will overheat the reheat components on any unit and cause condensation problems on any unit equipped with a humidifier.

The Liebert DSE is a single component in the facility heat removal system. The system includes air distribution (raised floors, duct systems), outdoor heat rejection (condensers, pumps, piping, ambient temperature, etc.) and indoor cooling and humidity loads (equipment load, location, outside air infiltration). Proper application and maintenance of the entire system is critical to the life and reliability of the Liebert DSE.

- Good maintenance practices are essential to minimizing operation costs and maximizing product life.
- Read and follow monthly and semi-annual maintenance schedules included in this manual. These minimum maintenance intervals may need to be more frequent based on site-specific conditions.
- See the Liebert iCOM® user manual, SL-18835, for instructions on how to utilize the unit controller to predict some service maintenance intervals.
- Emerson recommends the use of trained and authorized service personnel, extended service contracts and factory-specified replacement parts. Contact your local Emerson representative.

### 14.1 Facility Fluid and Piping Maintenance for Water and Glycol Systems

Maintaining facility water and glycol quality is required throughout the life of the coolant fluid piping system. Fluid and piping system maintenance schedules must be established and performed. A coolant fluid maintenance program must be established that will evaluate fluid chemistry and apply necessary treatment. The complexity of water/glycol solution condition problems and the variations of required treatment programs make it extremely important to obtain the advice of a competent and experienced water treatment specialist and follow a regularly scheduled coolant fluid system maintenance program.

Perform periodic inspections of the facility and the unit coil and/or heat exchanger and coolant fluid piping system for leaks and visible damage.

## 14.2 Filters

### NOTICE

Risk of improper filter installation and filter collapse. Can cause equipment damage.

Pleat direction is non-standard. Use only short-pleat filters (see **Figure 80**). Long-pleat filters are subject to collapse at high airflows.

To maximize the performance and reliability of Liebert DSE equipment, use only Liebert filters. Contact your local Emerson representative to order replacement filters.

**Table 19 Filter quantities, downflow units**

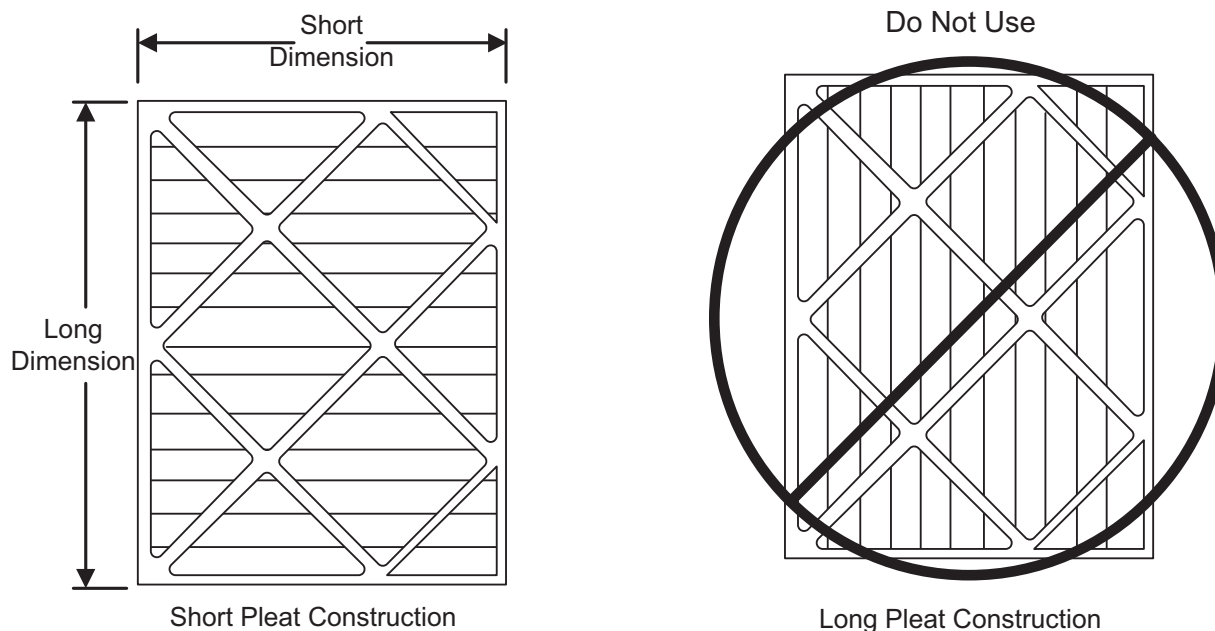
Unit Size	Filter Size Width x Length	Number of Filters	
		4" Filter Option MERV8 MERV 11 or MERV 13	2" Primary / 2" Pre-Filter Option; MERV 11 Primary Filter/MERV 8 Pre-Filter, or MERV 13 Primary Filter/ MERV 8 Pre-Filter
DA080/085	25x20 *	4	4/4
DA125/150	21.5x24	10	10/10

\* Denotes filters required to have "V" supports between each pleat (integral to the filters supplied through Liebert Services).

### 14.2.1 Filter Replacement Procedure

1. Disconnect power from the Liebert DSE.
2. Using a stepladder, remove filters from the top of the unit.  
The downflow return air plenum includes a filter access door.
3. Replace with new filters—install the filters in the proper direction of the airflow (see **Figure 80**).
4. Test the operation of the filter clog switch.  
The unit panels must be in place and closed to find this point.
5. Start the blower and turn the switch counterclockwise until the alarm is energized.
6. Turn the adjusting knob one turn clockwise or to the desired filter change point.

**Figure 80 Proper filter pleat direction**



The filter pleat direction should run parallel to the direction of the short side of the filter, as shown above. Do NOT use long pleat filter construction, as shown at right above, because it can result in filter collapse.

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## 14.3 Blower Drive System—EC Fans

### 14.3.1 Fan Impellers and Bearings

Fan impellers should be periodically inspected and any debris removed. Check to ensure that the impellers can rotate freely and that the fan guards are still properly mounted for sufficient protection against accidentally contacting the impeller. Bearings used on the units are maintenance-free. Consult the factory for more information.

### 14.3.2 Protective Features

Monitoring functions protect the motor against overtemperature of electronics, overtemperature of motor and incorrect rotor position detection. With any of these failures, an alarm will display through the Liebert iCOM® and the motor stops electronically. There is no automatic restart. The power must be switched off for a minimum of 20 seconds once the motor is at a standstill.

The motor also provides locked rotor protection, undervoltage/phase failure detection and motor current limitation. These conditions will display an alarm through the Liebert iCOM.



### WARNING

Risk of electric shock and contact with high-speed rotating EC fan impeller blades. Can cause serious injury or death. Open all local and remote electric power disconnect switches, verify with a voltmeter that power is Off and verify that all EC fans have stopped rotating before working within the unit cabinet and electric connection enclosures.

When connecting the motor to input power, dangerous voltages occur. Do not open the motor within the first 5 minutes after disconnection of all phases.

Dangerous external voltages can be present at main fan Terminal KL2 even after the motor has been turned Off.



### WARNING

Risk of contact with hot surfaces. Can cause injury.

Wear appropriate protective clothing and use proper skin protection when touching the electronics housing or allow time for the housing to cool before replacing parts.

The electronics housing can get hot and can cause severe burns



### CAUTION

Risk of improper moving, lifting and handling. Can cause equipment damage or injury.

Only properly trained and qualified personnel should work on this equipment. Fan modules weigh in excess of 145lb. (65.7kg) each. Take precautions and use OSHA-recommended lifting techniques to avoid injury and dropping fans during removal, replacement or lifting/moving operations.

Verify that all lifting equipment and ladders are rated for the weight of the fans and the personnel on the ladders (if used).

### NOTICE

Risk of improper installation. Can cause equipment damage.

Only a properly trained and qualified technician should install or open this motor.

Use Class 1, 600V, 60/75°C copper wire only.

## 14.4 Humidifier—Infrared

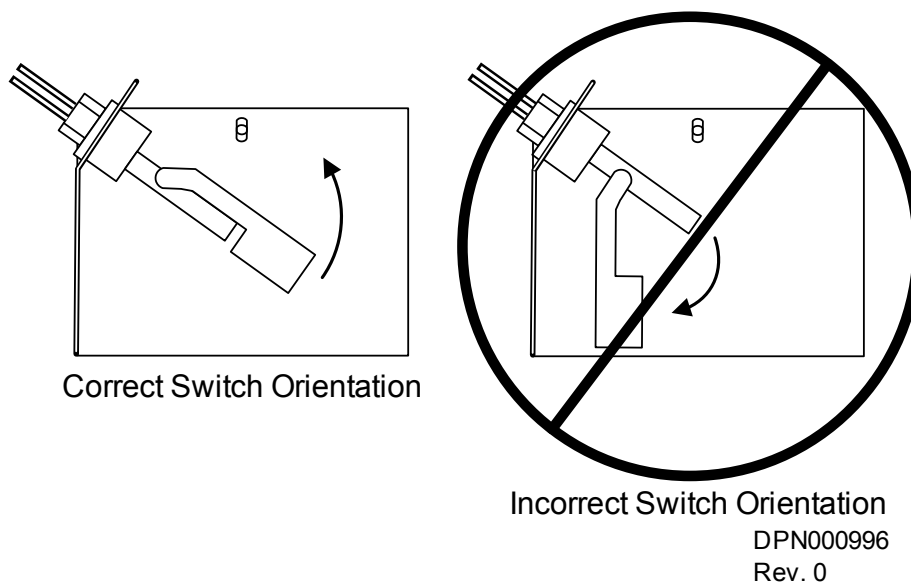
During normal humidifier operation, deposits of mineral solids will collect in humidifier pan and on the float switch. These must be cleaned periodically to ensure proper operation. Frequency of cleaning must be locally established since it is dependant on humidifier usage and local water quality. A spare pan is recommended to reduce maintenance time at unit. The Liebert autoflush system can greatly increase the time between cleanings, but does not eliminate the need for periodic checks and maintenance (see Liebert iCOM® user manual SL-18835 for autoflush setup). To help reduce excessive scaling in locations with difficult water quality, the use of Vapure is recommended (contact your local Emerson representative).

### 14.4.1 Cleaning Humidifier Pan and Float Switch

Before turning off unit:

1. With unit operating, remove call for humidification at the Liebert iCOM control.
2. Let the blower operate 5 minutes to allow the humidifier and water to cool.
3. If unit has a condensate pump, turn unit OFF at Liebert iCOM control.
4. Pull out the humidifier standpipe in pan.
5. Inspect the O-ring (replace if necessary).
6. Let the pan drain and condensate pump operate (if applicable).
7. Disconnect power from the unit.
8. Disconnect the drain coupling from the bottom of the pan.
9. Remove the thermostat from the bottom of the pan and the retaining screws from the sides of the pan.
10. Slide the pan out.
11. Loosen scale on side and bottom of pan with a stiff nylon brush or plastic scraper.
12. Flush with water.
13. Carefully clean scale off float switch (make sure to reinstall correctly (see **Figure 81**)).
14. Reinstall the pan, thermostat, standpipe, drain coupling and screws into the humidifier.
15. Operate the humidifier and check for leaks.

**Figure 81 Correct orientation of float switch**



## 14.4.2 Changing Humidifier Lamps



### WARNING

Risk of electric shock. Can cause serious injury or death.

Open all local and remote electric power disconnect switches and verify with a voltmeter that power is Off before performing maintenance on the humidifier.



### CAUTION

Risk of contact with hot surfaces. Can cause injury.

Allow the enclosure and bulbs to cool to a temperature safe for human contact or wear thermally insulated gloves and arm protection before attempting to remove the bulbs from the insulators.

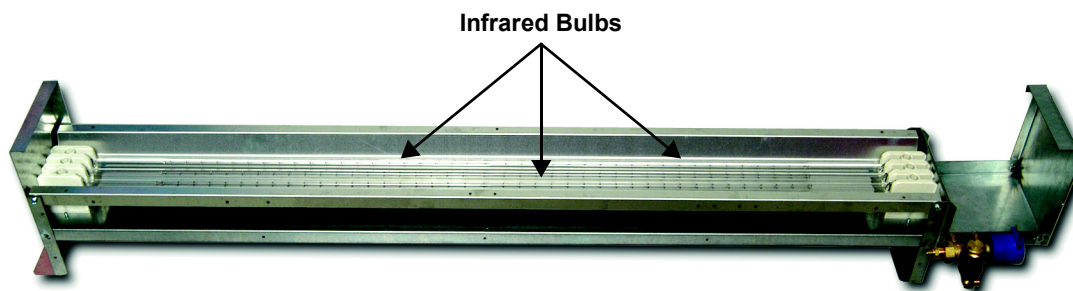


### NOTE

*Touching quartz lamps with bare hands will severely shorten bulb life. Skin oils create hot spots on lamp surface. Wear clean cotton gloves when handling lamps.*

1. Remove humidifier pan (see 14.4.1 - **Cleaning Humidifier Pan and Float Switch, Steps 1 through 10**).
2. Disconnect power from unit.
3. At humidifier, remove screws and cover from high-voltage compartment.
4. Disconnect one end of purple jumper wires.
5. Using a continuity meter, locate burned out lamp.
6. Remove lamp brackets under lamps.
7. Loosen two screws securing lamp lead wires to junction block.
8. Pull bulb straight down and discard.
9. Wrap lead wires once around new lamp's metal ends. This will support lamp and allow for thermal expansion. Insert lead wires into junction block and torque screws to 30 in-lb.
10. Reassemble by reversing **Steps 1 through 9**.

**Figure 82 Infrared humidifier lamps**



## 14.5 Condensate Drain and Condensate Pump Systems

### 14.5.1 Condensate Drain

Check for leaks and serviceability of tubing. Clear obstructions in tubing during routine maintenance.



### 14.5.2 Condensate Pump

1. Disconnect power to unit using disconnect switch.



## WARNING

Risk of electric shock. Can cause serious injury or death.

The Liebert iCOM® microprocessor does not isolate power from the unit, even in the “Unit Off” mode. Some internal components require and receive power even during the “unit off” mode of the Liebert iCOM control.

Open all local and remote electric power disconnect switches and verify with a voltmeter that power is Off before working on the condensate pump.

2. Check and clear obstructions in gravity lines leading to condensate pump.
3. Remove sump and clean with a stiff nylon brush and flush with water.
4. Inspect and clear clogs in discharge check valve and float mechanism.
5. Reassemble and check for leaks.

### 14.6 Air-Cooled Condenser

- Clear coil surface of all debris that will inhibit airflow.
- Check for bent or damaged coil fins and correct.
- Do not permit snow to accumulate around or under outdoor unit.
- Periodically consider commercial cleaning of coil surface
- Inspect fans, motors and controls for proper operation.
- Check all piping and capillaries for proper support.
- Inspect for leaks.

### 14.7 Reheat—Electric Reheat (Three-Stage)

- Inspect and clean reheat elements.
- Inspect and tighten support hardware.

### 14.8 Electronic Expansion Valve

This high efficiency unit is equipped with an Electronic Expansion Valve (EEV) on each circuit in place of the standard thermal expansion valve (TXV). The EEV controls superheat through the Liebert iCOM® controls by actively measuring suction pressure via a transducer attached to the suction line rotalock and suction temperature via a thermister strapped to the suction line. The EEV actively adjusts the orifice size and resulting mass flow of refrigerant to maintain the superheat setpoint (set in Liebert iCOM).



## NOTE

*Intermittent loss of subcooling may result in EEV/superheat instability. If superheat instability is observed, check for proper refrigerant level in receiver (see **10.2.1 - Piping Guidelines—Air-Cooled Units** for the proper charge level). If proper charge is observed in receiver, and superheat remains unstable, then increase superheat setting in the Liebert iCOM to 15°F (8.49°C).*

## 14.9 Compressor

### 14.9.1 Compressor Oil

# NOTICE

Risk of improper compressor lubrication. Can cause compressor and refrigerant system damage.

Failure to use oil types, viscosities and quantities recommended by the compressor manufacturer may reduce compressor life and void the compressor warranty. See oil types specified in **Table 20**.

- Do NOT mix polyolester (POE) and mineral-based oils.
- Do NOT mix oils of different viscosities.

Consult Emerson or the compressor manufacturer if you have questions.

**Table 20 Compressor oil types**

Compressor Type	R-410a Refrigerant
Copeland Tandem Scroll and Digital Scroll	POE Oil - 32 Centistoke Viscosity

Use Copeland POE Oil ULTRA 32-3MAF or other Copeland-approved oil.

### 14.9.2 Tandem Scroll and Digital Scroll Compressors

Hermetic scroll and digital scroll compressors do not have an oil sight glass.



#### NOTE

*Refer to 10.2.2 - Scroll and Digital Scroll—Additional Oil Requirements for approved oil types and additional oil required based on the system's refrigerant charge.*

### 14.10 Evaporator Coil

This unit contains nested A-frame coils. This results in different evaporator (suction) temperatures between System 1 and System 2. The outer A-coil (System 1) will operate at a higher evaporator temperature than the inner A-coil (System 2) when operating at the same compressor loading.

### 14.11 Compressor Replacement

Replacement compressors are available through your local Emerson office. Compressors are shipped in reusable packaging. If unit is under warranty, complete and include Liebert Service Credit Application (LSCA) with the compressor that is being returned. The original compressor should be returned in the same packaging.

#### 14.11.1 Compressor Motor Burnout

If a burnout has occurred, a full system clean-out is required; if not, compressor and system problems will continue.

For clean-out warnings and procedures, see Copeland Application Engineering Bulletin 24-1105 "Principles of Cleaning Refrigeration Systems" or Carlyle Service Guide, Literature # 020-611.

#### 14.11.2 Digital Compressor Unloading Solenoid(s)

When replacing a digital scroll compressor, digital solenoid valve and coil must be replaced. Compressor and valve kit are shipped separately. Valve kit must be field-brazed to the top of the compressor in proper orientation and supported with the original factory bracket.

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### 14.11.3 Compressor Replacement Procedure

Follow these steps to replace the Liebert DSE unit's entire tandem compressor set:

1. Disconnect power and follow all warnings at front of this manual.
2. Attach suction and discharge gauges to access fittings.
3. Front-seat service valves to isolate the compressor. Reclaim charge from compressor.
4. Remove marked pressure transducer and discharge pressure switch.
5. Open all local and remote electric power disconnect switches.
6. Detach the service valves from the compressor.
7. Remove failed the compressor.
8. If required, follow the compressor manufacturer's suggested clean-out procedures.
9. Install the replacement compressor and make all connections. Replace gaskets or seals on service valves. Replace the unloading solenoid.
10. Evacuate, charge and operate per **10.3 - Dehydration/Leak Test and Charging Procedures for R-410A**.

## NOTICE

Risk of improper component reinstallation. Can cause equipment damage.

Identify and mark the location of the suction pressure transducer and discharge pressure switch. These devices look similar and they must be reinstalled in their original location.

## 15.0 HVAC MAINTENANCE CHECKLIST

Source: DPN002952, Rev. 0

Inspection Date	_____	Job Name	_____
Indoor Unit Model #	_____	Indoor Unit Serial Number #	_____
Condenser Model #	_____	Condenser Serial #	_____
Liebert EconoPhase™ Model #	_____	Liebert EconoPhase Serial #	_____
Room Temperature/Humidity	_____ °F/	% Ambient Temperature	_____ °F (°C)

### Evaporator/Filters

- 1. Check/replace filters
- 2. Grille area unrestricted
- 3. Wipe section clean
- 4. Coil clean
- 5. Clean condensate pan
- 6. Clean trap in condensate drain
- 7. Check/test filter clog switch operation (if equipped)

### Blower Section (Centrifugal) (If Equipped)

- 1. Blower wheels free of debris
- 2. Check belt tension and condition; replace if needed.
- 3. Check/lube bearings
- 4. Check/lube motor (if supplied with grease ports). Check motor manufacturer's Web site for procedure, amount and type of grease required.
- 5. Check sheave/pulley; replace if worn.
- 6. Check motor mount
- 7. Check/test air sail switch (if equipped)

<input type="checkbox"/> 8. Motor#1 Amp Draw	L1	L2	L3
<input type="checkbox"/> 9. Motor#2 Amp Draw	L1	L2	L3
<input type="checkbox"/> 10. Motor#3 Amp Draw	L1	L2	L3
Compare to nameplate amps _____			

### Blower Section (EC Fan) (If Equipped)

- 1. Mounting bolts tight
- 2. Fan guard bolts tight
- 3. Impeller spins freely
- 4. Check/test air sail switch (if equipped)

<input type="checkbox"/> 5. Motor#1 Amp Draw	L1	L2	L3
<input type="checkbox"/> 6. Motor#2 Amp Draw	L1	L2	L3
<input type="checkbox"/> 7. Motor#3 Amp Draw	L1	L2	L3
Compare to nameplate amps _____			

### Reheat (If Equipped)

- 1. Inspect elements
- 2. Check/retorque wire connections (inside reheat box)
- 3. Reheat Amp Draw L1 L2 L3

**Steam Generating Humidifier (If Equipped)**

- 1. Check drain valve/drain lines/trap for clogs
- 2. Check water fill valve and all hoses for leaks
- 3. Check condition of steam hose
- 4. Clean strainer
- 5. Replace humidifier bottle if necessary
- 6. Check operation of humidifier
- 7. Humidifier Amp Draw          L1                    L2                    L3

**Infrared Humidifier (If Equipped)**

- 1. Check drain lines and trap for clogs
- 2. Check/clean pan for mineral deposits
- 3. Clean reflector
- 4. Check water make-up valve for leaks
- 5. Check humidifier lamps; replace if burned out)
- 6. Check/retorque wire connections (inside humidifier box)
- 7. Check humidifier high water alarm operation
- 8. Humidifier amp draw          L1                    L2                    L3

**Condensate Pump (If Equipped)**

- 1. Check for debris in sump
- 2. Check operation of float(s) (free movement)
- 3. Check/clean discharge check valve

**Electrical Panel**

- 1. Check fuses
- 2. Check contactors for pitting; replace if pitted
- 3. Check/retorque wire connections

**Controls**

- 1. Check/verify control operation (sequence)
- 2. Check/test the changeover device(s) (if equipped)
- 3. Check/test the water detection device(s) (if equipped)
- 4. Check/test the CAN connection between indoor and outdoor units (if equipped)

**Refrigeration Piping**

- 1. Check refrigerant lines (clamps secure/no rubbing/no leaks)
- 2. Check for moisture (sight glass)
- 3. Check for restriction temperature drop across filter dryer

**Drain Piping**

- 1. Check for free running drain system
- 2. Clear out obstructions and material buildup on tubing walls
- 3. Check for leaks, corrosion and damaged piping
- 4. Check for tubing kinks or damage

**Compressor Section (If Equipped)**

- 1. Check oil level
- 2. Check for oil leaks
- 3. Check compressor mounts (springs/bushings)
- 4. Cap tubes (not rubbing)
- 5. Check/retorque wire connections (inside compressor box)
- 6. Compressor operation (vibration/noise)
- 7. Check crankcase heater fuses/operation (if equipped)
- 8. Check for refrigerant leaks
- 9. Suction pressure 

Circuit #1	Circuit #2
------------	------------
- 10. Discharge pressure 

Circuit #1	Circuit #2
------------	------------
- 11. Superheat 

Circuit #1	Circuit #2
------------	------------
- 12. Low-pressure switch cut-out 

Circuit #1	Circuit #2
------------	------------
- 13. Low-pressure cut-in 

Circuit #1	Circuit #2
------------	------------
- 14. High-pressure cut-out 

Circuit #1	Circuit #2
------------	------------
- 15. Amp draw
 

Circuit #1A	L1	L2	L3
Circuit #2A	L1	L2	
Circuit #1B	L1	L2	
Circuit #2B	L1	L2	L3

**Water-Cooled Condensers (If Equipped)**

- 1. Verify proper water maintenance/treatment is being performed
- 2. Check water regulating valve (motorized ball valve) operation
- 3. Verify water flow
- 4. Cap tubes (not rubbing)
- 5. Check for water/glycol leaks
- 6. Entering water temp \_\_\_\_\_ °F (°C) Leaving Water Temp \_\_\_\_\_ °F (°C)

**Chilled Water / Econ-O-Coil (If Equipped)**

- 1. Verify proper water maintenance is being performed
- 2. Check for water/glycol leaks
- 3. Stroke free-cooling valve open and closed

**Air-Cooled Fin and Tube Condenser / Drycooler (if Equipped)**

- 1. Coil clean and free of debris
- 2. Motor mounts tight
- 3. Bearings in good condition (motor)
- 4. Piping support/clamps secure
- 5. Check/re-torque wire connections
- 6. Check contactors for pitting (replace if pitted)
- 7. Check fuses
- 8. Verify fan speed control operation (if equipped)
- 9. Check surge protection device status indicator lights (if equipped)
- 10. Stat settings
- 11. Refrigerant level (Liebert Lee-Temp)
- 12. Glycol level
- 13. Glycol solution \_\_\_\_\_ %
- 14. Water/glycol solution flowing continuously/clean and free of debris
- 15. Water treatment plan established and followed for open cooling tower application
- 16. Check refrigerant/glycol lines for signs of leaks/repair as found

<input type="checkbox"/> 17. Motor Amp Draw #1	L1	L2	L3
	(L1 and L2 on Fan Speed Control Motor)		
	#2 L1	L2	L3
	#3 L1	L2	L3
	#4 L1	L2	L3
	#5 L1	L2	L3
	#6 L1	L2	L3
	#7 L1	L2	L3
	#8 L1	L2	L3
	#9 L1	L2	L3
	#10 L1	L2	L3

**Liebert MC™ Condenser**

- 1. Coil clean
- 2. Fans free of debris
- 3. Fans securely mounted
- 4. Motor bearings in good condition
- 5. Check all refrigerant lines and capillaries for vibration isolation; support as necessary
- 6. Check for refrigerant leaks
- 7. Check surge protection device status indicator lights (if installed)
- 8. Check/re-torque wire connections
- 9. Check contactors for pitting; replace if pitted
- 10. Check operational sequence/setpoints

- \_\_\_ 11. Charge verification:
- \_\_\_ a. Outdoor ambient temp \_\_\_\_\_
  - \_\_\_ b. Subcooling \_\_\_\_\_
  - \_\_\_ c. Indoor unit return air temp \_\_\_\_\_
  - \_\_\_ d. Sight glass level \_\_\_\_\_

___ 12. Motor Amp Draw #1	L1	L2	L3
	#2 L1	L2	L3
	#3 L1	L2	L3
	#4 L1	L2	L3

**GLYCOL PUMP (If Equipped)**

- \_\_\_ 1. Check pump rotation
- \_\_\_ 2. Check for glycol leaks
- \_\_\_ 3. Pump pressures #1
 

Suction	Discharge
#2 Suction	Discharge
#3 Suction	Discharge
- \_\_\_ 4. Amp draw
 

#1 L1	L2	L3
#2 L1	L2	L3
#3 L1	L2	L3
- \_\_\_ 5. Verify pump changeover (if unit has multiple pumps)

**Liebert EconoPhase™ Pumped Refrigerant Economizer**

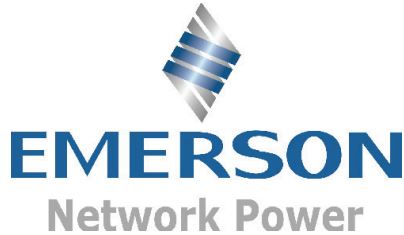
- \_\_\_ 1. Check for refrigerant leaks
- \_\_\_ 2. Check/retorque wire connections
- \_\_\_ 3. Check contactors for pitting; replace if pitted
- \_\_\_ 4. Verify pump speed control operation
- \_\_\_ 5. Check pump mounting







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SL-18925\_REV6\_09-14

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