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Dallas, Texas, USA

INSTALLATION INSTRUCTIONS

Dave Lennox *Signature*[®] Collection CB31MV Units

MULTI-POSITION AIR HANDLER
505,341M
04/08
Supersedes 07/07

Technical
Publications
Litho U.S.A.

WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Installation and service must be performed by a qualified installer or service agency.

CAUTION

Physical contact with metal edges and corners while applying excessive force or rapid motion can result in personal injury. Be aware of, and use caution when working near these areas during installation or while servicing this equipment.

IMPORTANT

The Clean Air Act of 1990 bans the intentional venting of refrigerant (CFCs, HCFCs and HFCs) as of July 1, 1992. Approved methods of recovery, recycling or reclaiming must be followed. Fines and/or incarceration may be levied for noncompliance.

IMPORTANT

This unit must be matched with an indoor coil as specified in Lennox Engineering Handbook. Coils previously charged with HCFC-22 must be flushed.

Table of Contents

CB31MV Up-flow/Down-flow Unit Dimensions	2
CB31MV Horizontal LH/RH Unit Dimensions	3
General Information	4
Shipping and Packing List	4
Requirements	4
Installing the Unit	4
Brazing Connections	8
Installing the Condensate Drain	9
Inspecting and Replacing Filters	9
Sealing the Unit	9
Adjusting the BDC3 Blower Control Board	9
Adjusting the Blower Speed	9
Making Electrical Connections	11
Repairing or Replacing Cabinet Insulation	20

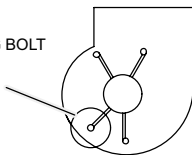
RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE

IMPORTANT INFORMATION TO INSTALLER

CHECK FOR AND REMOVE THE FOLLOWING ITEMS BEFORE OPERATING UNIT.

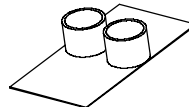
MOTOR SHIPPING BOLT

A



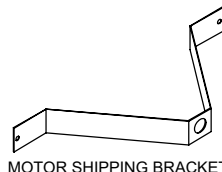
HOUSING SUPPORT PAD

B



HORIZONTAL DRAIN PAN (SEE UP-FLOW APPLICATIONS ON PAGE 4 AND DOWN-FLOW APPLICATIONS ON PAGE 6)

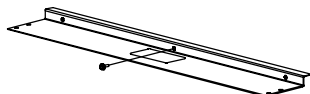
E



D

TOP CAP SHIPPING BRACKET (REPLACE SCREWS IN TOP CAP AFTER REMOVAL)

C

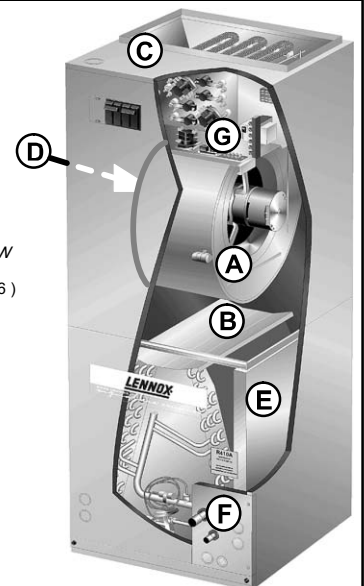


REFRIGERANT LINE CAPS [SEE BRAZING CONNECTION ON PAGE 8]

F

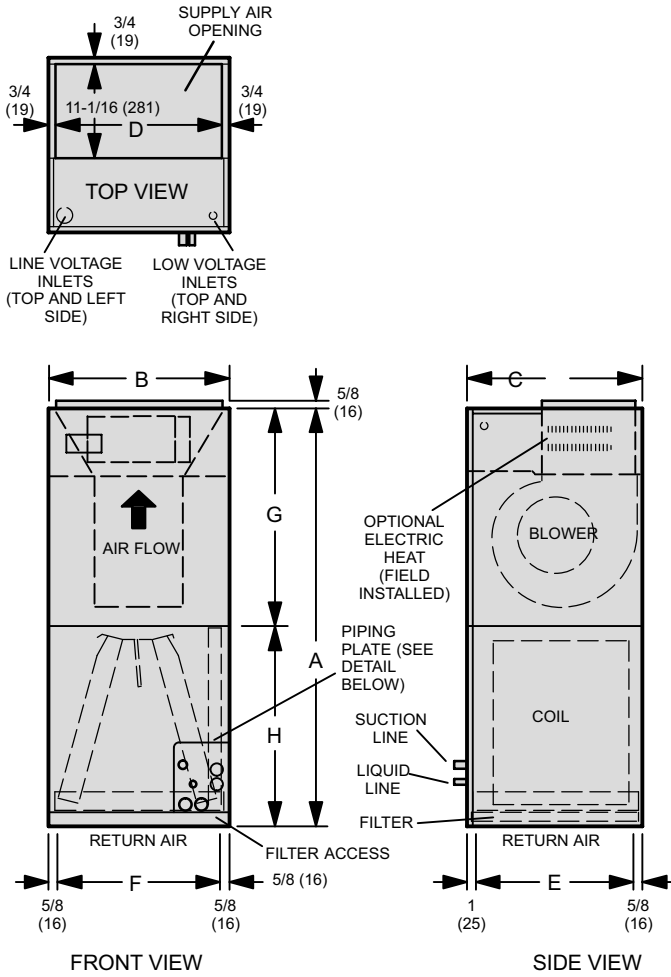
CONFIGURATION JUMPERS (IF NECESSARY) (SEE ADJUSTING THE BDC3 BLOWER CONTROL BOARD ON PAGE 11.)

G

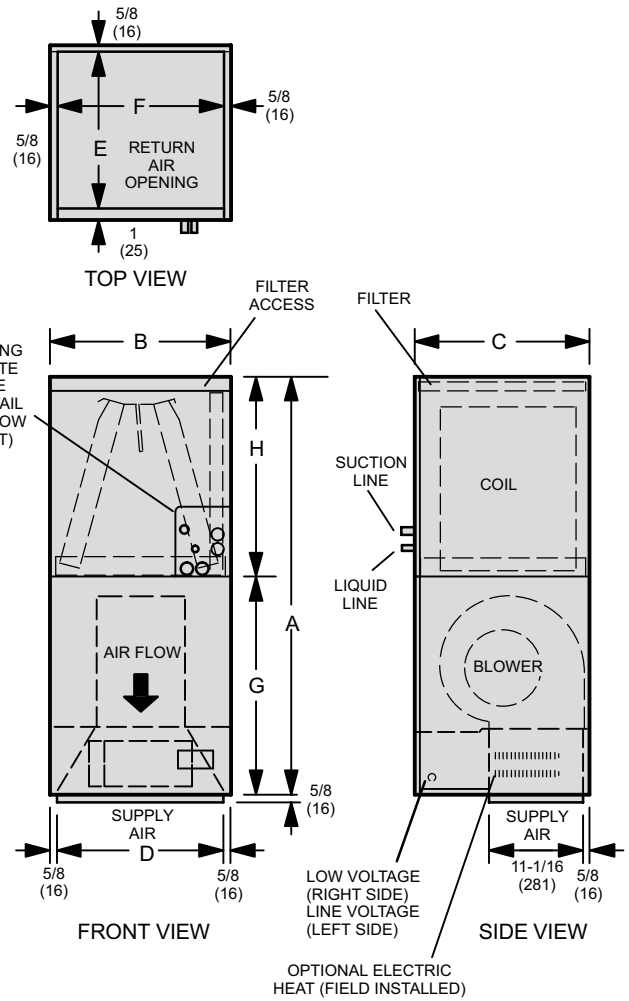


CB31MV Up-flow and Down-flow Unit Dimensions - Inches (mm)

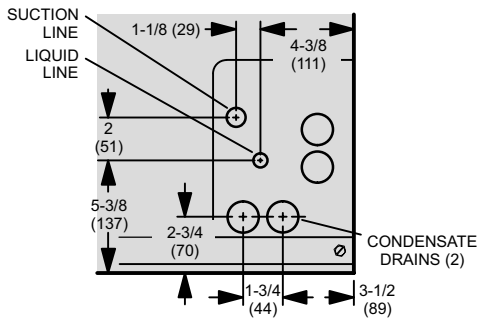
DIMENSION	A	B	C	D	E	F	G	H
CB31MV-041 inches (mm)	51 (1295)	21-1/4 (540)	22-5/8 (502)	19-3/4 (575)	21 (533)	20 (508)	26-3/8 (670)	24-5/8 (625)
CB31MV-051, -065 inches (mm)	58-1/2 (1486)	21-1/4 (540)	24-5/8 (625)	19-3/4 (502)	23 (584)	20 (508)	27-7/8 (708)	30-5/8 (778)



UP-FLOW POSITION



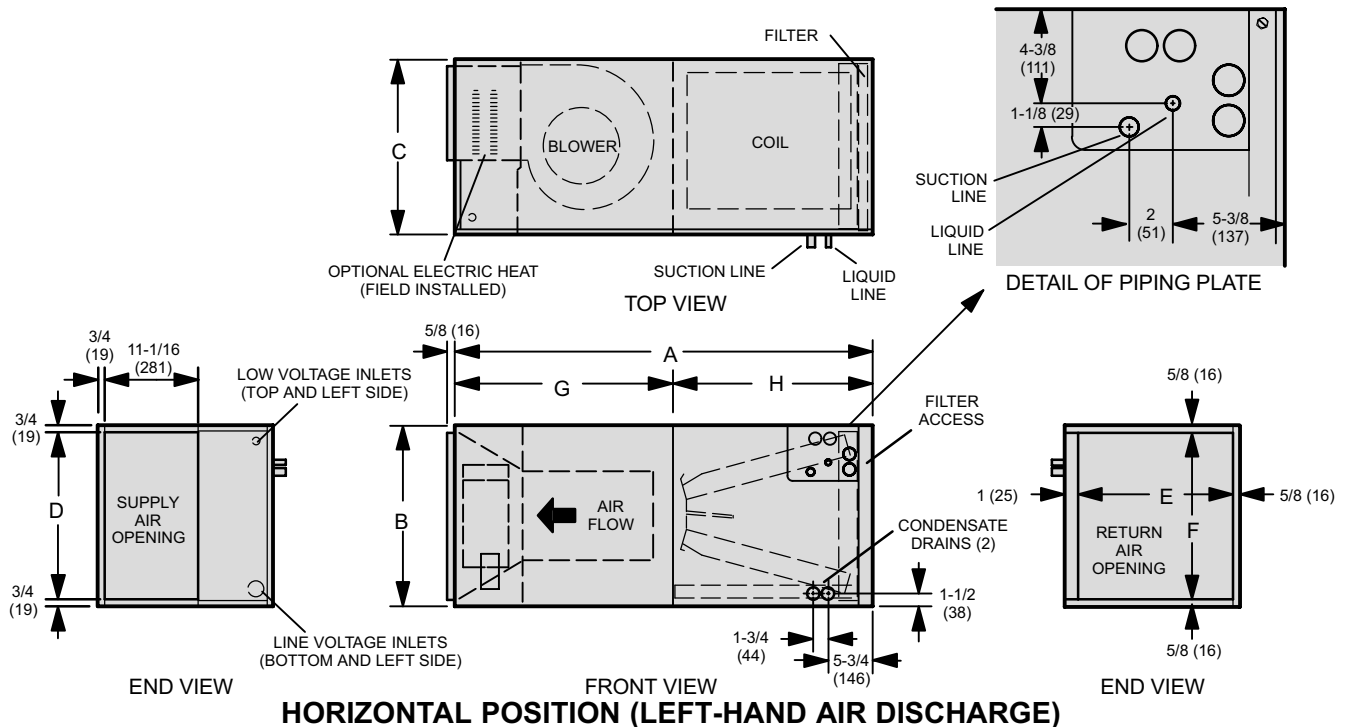
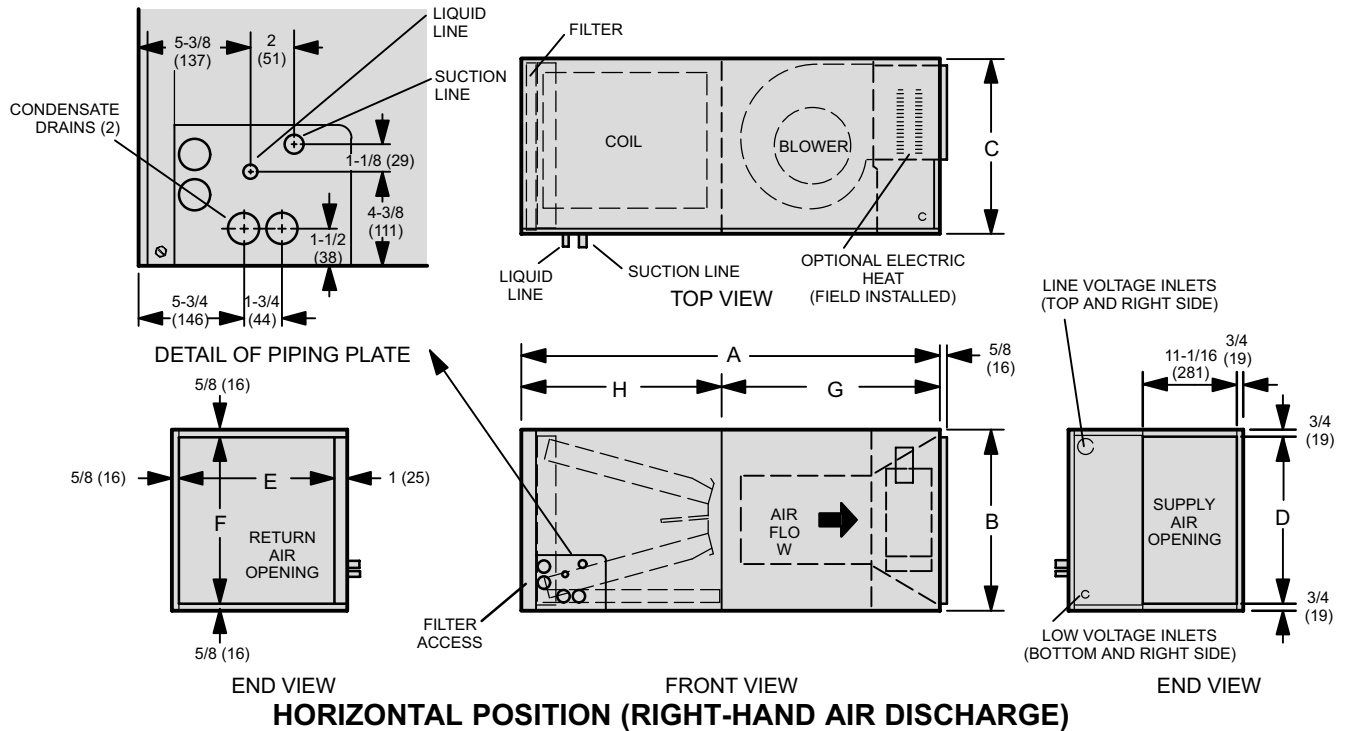
DOWN-FLOW POSITION



DETAIL OF PIPING PLATE

CB31MV Horizontal Left- and Right-Hand Unit Dimensions - Inches (mm)

DIMENSION	A	B	C	D	E	F	G	H
CB31MV-041 inches (mm)	51 (1295)	21-1/4 (540)	22-5/8 (502)	19-3/4 (575)	21 (533)	20 (508)	26-3/8 (670)	24-5/8 (625)
CB31MV-051, -065 inches (mm)	58-1/2 (1486)	21-1/4 (540)	24-5/8 (625)	19-3/4 (502)	23 (584)	20 (508)	27-7/8 (708)	30-5/8 (778)



WARNING

Product contains fiberglass wool.

Disturbing the insulation in this product during installation, maintenance, or repair will expose you to fiberglass wool. Breathing this may cause lung cancer. (Fiberglass wool is known to the State of California to cause cancer.)

Fiberglass wool may also cause respiratory, skin, and eye irritation.

To reduce exposure to this substance or for further information, consult material safety data sheets available from address shown below, or contact your supervisor.

**Lennox Industries Inc.
P.O. Box 79900
Dallas, TX 75379-9900**

General Information

The CB31MV air handler units are designed for installation with optional field-installed electric heat and a matched remote outdoor unit. These units are for indoor installation only. The units are designed for multi-positional installations and are shipped (completely assembled) from the factory for installation in up-flow or horizontal right-hand air discharge applications.

These instructions are intended as a general guide and do not supersede local or national codes in any way. Consult authorities having jurisdiction before installation. Check equipment for shipping damage; if found, immediately report damage to the last carrier.

Shipping and Packing List

Package 1 of 1 contains the following:

- 1—Assembled air handler unit
- 2—Drip shields (for down-flow application only)

Requirements

In addition to conforming to manufacturer's installation instructions and local municipal building codes, installation of Lennox air handler units (with or without optional electric heat), **MUST** conform with the following National Fire Protection Association (NFPA) standards:

- NFPA No. 90A - Standard for Installation of Air Conditioning and Ventilation Systems
- NFPA No. 90B - Standard for Installation of Residence Type Warm Air Heating and Air Conditioning Systems

This unit is approved for installation clearance to combustible material as stated on the unit rating plate. Accessibility and service clearances must take precedence over combustible material clearances.

Installing the Unit

WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Installation and service must be performed by a qualified installer or service agency.

CB31MV units are factory-configured for installation in up-flow or horizontal right-hand air discharge applications. The units must be field-modified for installation in either down-flow or horizontal left-hand air discharge applications.

DISASSEMBLE AND REASSEMBLE AIR HANDLER UNIT

The CB31MV air handler unit consists of two sections which are shipped assembled from the factory. If necessary, the unit may be disassembled to facilitate setting the unit. Follow the steps below:

To disassemble:

- Step 1. Remove access panels.
- Step 2. Remove both blower and coil assemblies. This will lighten the cabinet for lifting.
- Step 3. Remove one screw from the left and right posts inside the unit. Remove one screw from each side on the back of the unit. Unit sections will now separate.

To reassemble:

- Step 1. Align cabinet sections together.
- Step 2. Reinstall screws.
- Step 3. Replace blower and coil assemblies.
- Step 4. Replace access panel.

UP-FLOW AIR DISCHARGE APPLICATION

Use the following procedures to configure the unit for up-flow operations:

- Step 1. Remove access panels.
- Step 2. Remove corrugated padding from the space between the blower and coil assemblies.
- Step 3. Discard drip shields which are shipped inside corner post packaging. The shields are used in down-flow applications only.
- Step 4. The horizontal drain pan must be removed when the coil blower is installed in the up-flow position. Removing horizontal drain pan will allow proper airflow and increase efficiency.

- Step 5. Place unit in desired location. Unit must be level. Connect return and supply air plenums as required using sheet metal screws.
- Step 6. If the application will not include a return air plenum, install the unit on a raised stand at least 14" from the floor to ensure proper air return. Lennox offers an optional up-flow unit stand as listed in table 1.

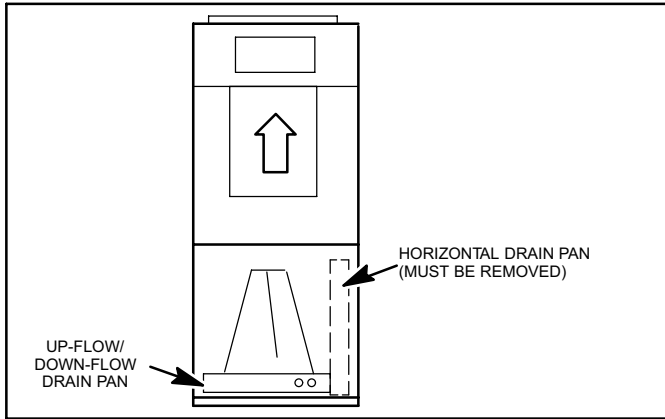


Figure 1. Up-flow Configuration

Table 1. Optional Unit Side Stand (Up-Flow Only)

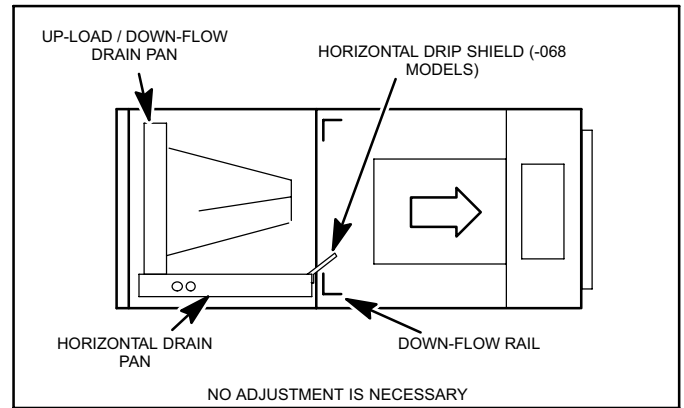
Model	Kit Number
-21, -26, and -31	45K31
-41 through -65.	45K32

HORIZONTAL RIGHT-HAND AIR DISCHARGE APPLICATION

Use the following procedures to configure the unit for horizontal right-hand discharge operations:

NOTE - For horizontal applications, a secondary drain pan is recommended. Refer to local codes.

- Step 1. Remove access panels and the horizontal drip shield (-068 model) and the corrugated padding between the blower and coil assembly. Discard the corrugated padding and the down-flow drip shields from the foam pads on top of the unit.
- Step 2. Install the horizontal shield on the front edge of the horizontal drain pan as illustrated in figure 2.
- Step 3. No further adjustment is necessary. Set unit so that it is sloped 1/4 inch towards the drain pan end of the unit.
- Step 4. If suspending the unit, it must be supported along the entire length of the cabinet. If using chain or strap, use a piece of angle iron or sheet metal attached to the unit (either above or below) so that the full length of the cabinet is supported. Use securing screws no longer than 1/2 inch to avoid damage to coil or filter as illustrated in figure 3. Connect return and supply air plenums as required using sheet metal screws.



**Figure 2. Right-hand Discharge Configuration
HORIZONTAL RIGHT-HAND DISCHARGE APPLICATION IN HIGH HUMIDITY AREAS**

For horizontal applications in high humidity areas remove the down-flow rail closest to the drain pan.

To remove rail:

- Step 1. Remove the screws from the rail at the back of unit and at the cabinet support rail.
- Step 2. Remove the down-flow rail then replace screws.
- Step 3. Seal around the exiting drain pipe, liquid line, and suction line to prevent humid air from infiltrating into the unit.

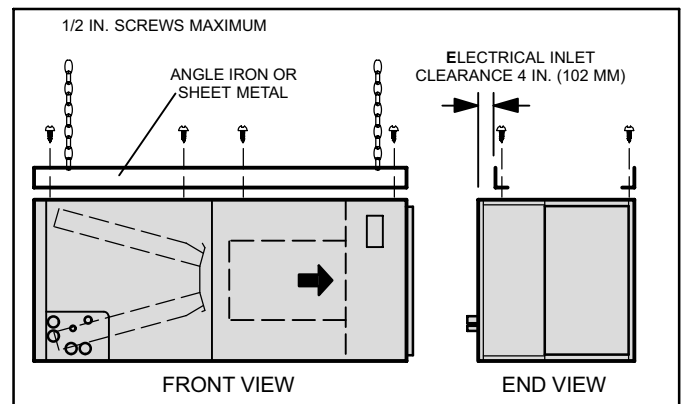


Figure 3. Suspending Horizontal Unit

⚠ IMPORTANT

When removing the coil, there is possible danger of equipment damage and personal injury. Be careful when removing the coil assembly from a unit installed in right- or left-hand applications. The coil may tip into the drain pan once it is clear of the cabinet. Support the coil when removing it.

HORIZONTAL LEFT-HAND AIR DISCHARGE APPLICATION

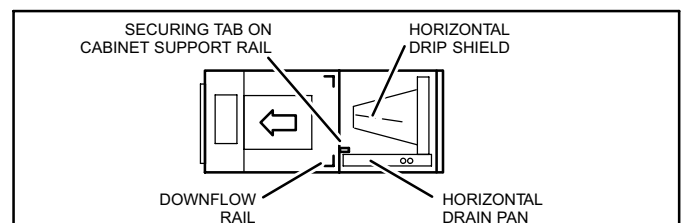


Figure 4. Left-hand Air Discharge Configuration

NOTE - For horizontal applications, a secondary drain pan is recommended. Refer to local codes.

Use the following procedures to configure the unit for horizontal left-hand discharge operations:

- Step 1. Remove access panels. Remove corrugated padding from space between the blower and coil assemblies. Discard drip shields which are shipped inside corner post packaging. The shields are used in down-flow applications only.
- Step 2. Slide coil assembly from unit. Remove the horizontal drain pan.
- Step 3. Remove drain plugs from back drain holes on horizontal drain pan. Reinstall plugs on front holes.
- Step 4. Rotate drain pan 180° front to back and install it on the opposite side of coil.
- Step 5. Remove screws from top cap. Remove horizontal drip shield screw located in the center of the back coil end seal as illustrated in figure 5 on page 6.
- Step 6. Rotate horizontal drip shield 180° front to back.
- Step 7. Remove plastic plug from left hole on coil front end seal and re-install plug in back hole.
- Step 8. Reinstall horizontal drip shield screw in front coil end seal. Drip shield should drain downward into horizontal drain pan inside coil.

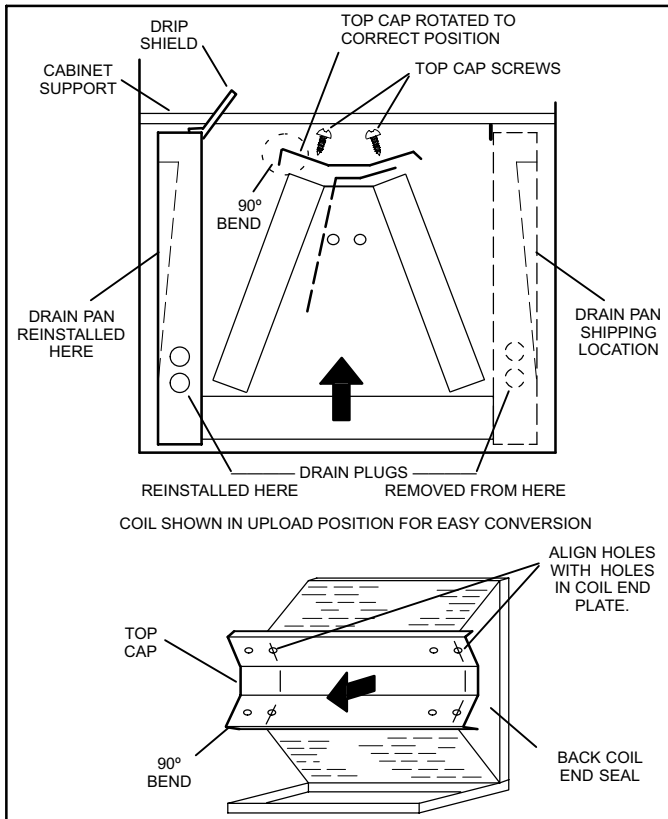


Figure 5. Field Modification (left-hand air discharge)

- Step 9. Rotate top cap 180° front to back and align with unused screw holes. Holes must align with front and back coil end plates. Note that top cap has a 45° bend on one side and 90° bend on the other. The 90° bend must be on the same side as the horizontal drain pan as illustrated in figure 5.

NOTE - Use extreme care when reinstalling screws into coil end plate engaging holes. Coil damage could result by misalignment.

- Step 10. From the up-flow position, flip cabinet 90° to the left and set into place. Replace coil assembly. Secure coil in place by bending down tab on cabinet support rail as illustrated in figures 4 and 5.

*NOTE - For horizontal applications in **high humidity areas**, remove the down-flow rail closest to the drain pan. To remove rail, remove screw from rail at back of unit and at cabinet support rail. Remove down-flow rail then replace screws. Also, seal around the exiting drain pipe, liquid and suction lines to prevent infiltration of humid air.*

- Step 11. Knock out drain seal plate from access door. Secure plate to cabinet front flange using the provided screw.
- Step 12. Flip access door and replace it on the unit.
- Step 13. Set unit so that it is sloped 1/4 inch towards the drain pan end of the unit as illustrated in figure 6. Connect return and supply air plenums as required using sheet metal screws.

- Step 14. If suspending the unit, it must be supported along the entire length of the cabinet. If using chain or strap, use a piece of angle iron or sheet metal attached to the unit (either above or below) so that the full length of the cabinet is supported. Use securing screws no longer than 1/2 inch to avoid damage to coil or filter as illustrated in figure 3 on page 5. Connect return and supply air plenums as required using sheet metal screws.

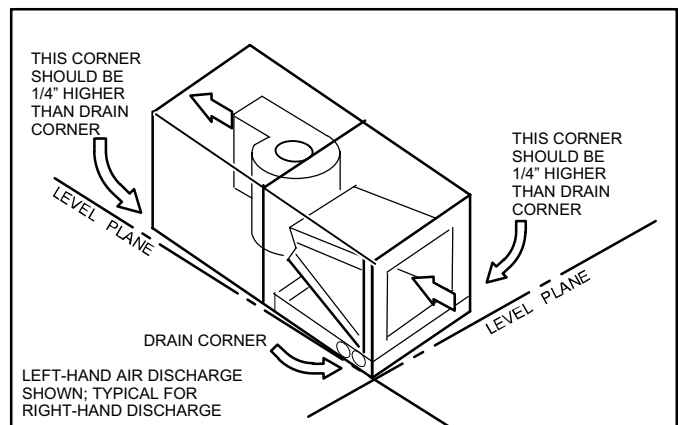


Figure 6. Sloping for Proper Drainage DOWN-FLOW AIR DISCHARGE APPLICATIONS

Use the following procedures to configure the unit for down-flow operations:

⚠ CAUTION

If electric heat section with circuit breakers (ECB29/ECB31) is applied to down-flow CB31MV unit, the circuit breakers must be rotated 180° to the UP position. See ECB29/ECB31 installation instructions for more details.

The following table lists the sizes of the available drip shields.

Table 1. Down-flow Drip Shields

Unit	Part No.	Length	Width
CB31MV-41	LB-74272	17.875	4.6718
CB31MV-051, 065	LB-89864	19.875	4.6718

- Step 1. Remove the access panels. If necessary, remove the corrugated padding from the space between the blower and coil assemblies. Remove the drip shields from the inside of the cornerpost packaging.
- Step 2. Remove the coil assembly from the unit.
- Step 3. Remove the horizontal drain pan to ensure peak operating efficiency and proper air flow in the down-flow position as illustrated in figure 7.

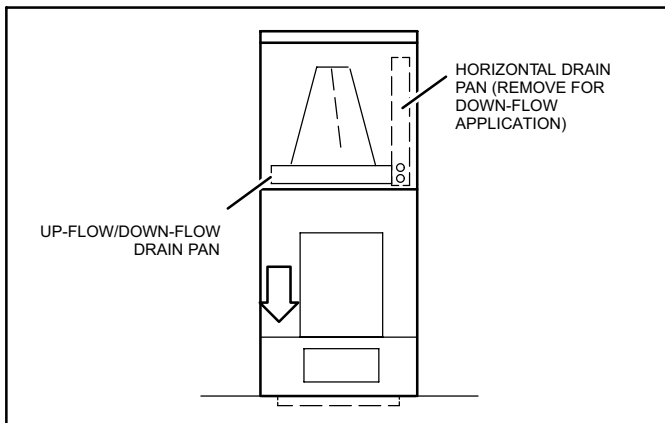


Figure 7. Down-flow Air Discharge Position

- Step 4. Rotate cabinet 180° from the upright position. It may be necessary to remove the blower assembly to lighten the cabinet for lifting.
- Step 5. Apply precut foam tape to the drip shields as illustrated in figure 9. The foam tape creates a seal between the drip shield and the coil to prevent water from entering into the air stream.
- Step 6. From the underside of the coil, install the down-flow drip shield firmly in place as illustrated in figure 10.
- Step 7. Replace the coil assembly and blower (if it was removed). Replace the coil access panel.
- Step 8. Make sure the air handler unit is level. Connect the return and supply air plenums as required using sheet metal screws.

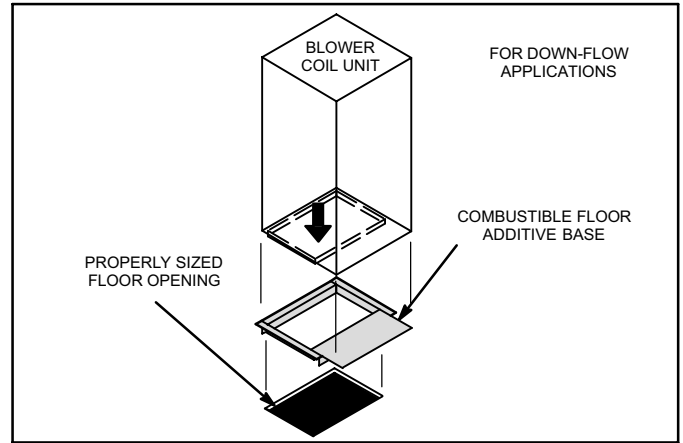


Figure 8. Install Unit on Combustible Flooring

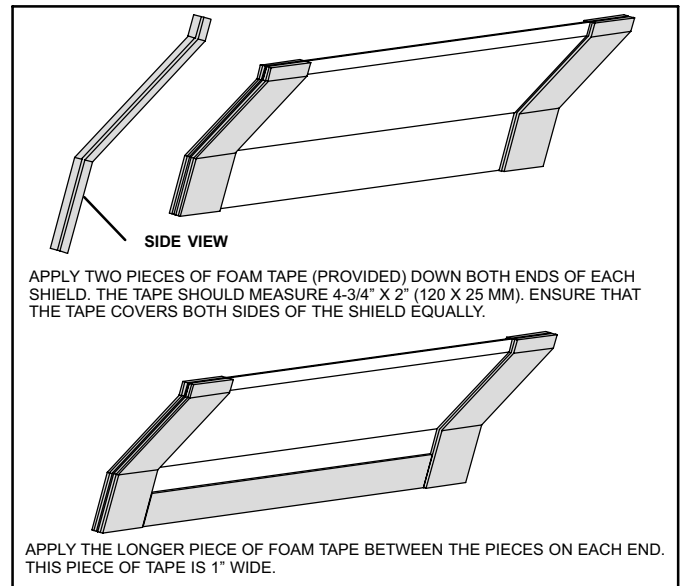


Figure 9. Applying Foam Tape to Drip Shields

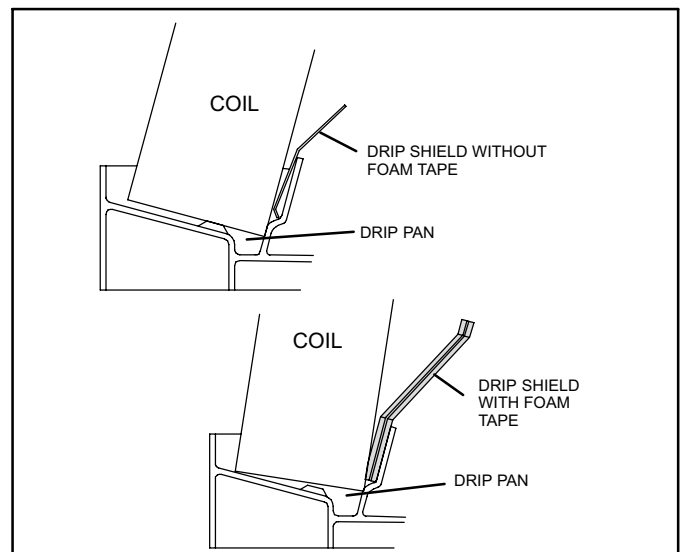


Figure 10. Down-flow Drip Shields

NOTE - For down-flow application, metal or class I supply and return air plenums must be used.

For down-flow installation on combustible flooring, an additive base must be used as illustrated in figure 8.

Cut an opening appropriately sized for combustible base. Base dimensions are illustrated in figure 11.

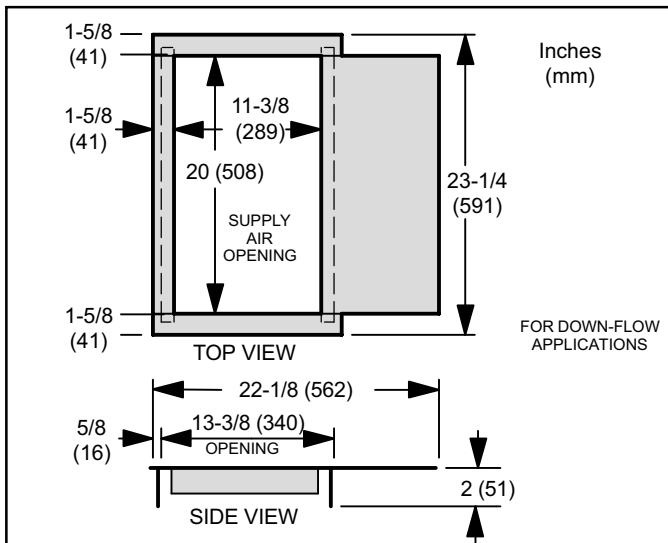


Figure 11. Combustible Base Dimensions

After opening has been cut, set the additive base into opening. Connect outlet air plenum to the additive base. Set the unit on the additive base so flanges of the unit drop into the base opening and seal against the insulation strips. The unit is now locked in place. Install return air plenum and secure with sheet metal screws.

Brazing Connections

⚠ WARNING



Danger of explosion!

Can cause equipment damage, injury, or death.

When using a high pressure gas such as dry nitrogen to pressurize a refrigeration or air conditioning system, use a regulator that can control the pressure down to 1 or 2 psig (6.9 to 13.8 kPa).

⚠ IMPORTANT

To prevent the build up of high levels of nitrogen when purging, be sure it is done in a well ventilated area. Purge low pressure nitrogen (1 to 2 psig) through the refrigerant piping during brazing. This will help to prevent oxidation and the introduction of moisture into a system.

All CB31MV air handlers are equipped with a factory-installed, internally mounted check/expansion valve, which is suitable for use in R410-A applications. Use Lennox L15 (sweat) series line sets as listed in table 2 on page 9, or use field-fabricated refrigerant lines. L10 (flare)

line sets may be used by cutting off flare nut. Refer to the piping section of the Lennox Unit Information Service Manual for proper size, type and application of field-fabricated lines.

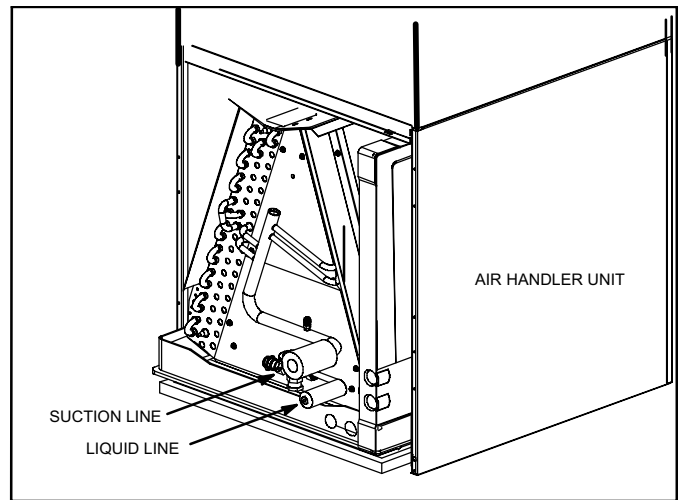


Figure 12. Brazing Connections

NOTE: CB31MV series evaporators use nitrogen or dry air as a holding charge. If there is no pressure when the rubber plugs are removed, check the coil or line set for leaks before installing. After installation, pull a vacuum on the line set and coil before releasing the unit charge into the system.

NOTE: See outdoor unit instructions on how to flow nitrogen through line sets.

- Step 1. Remove access panel.
- Step 2. Remove the refrigerant line caps from the refrigerant lines.
- Step 3. Use a wet rag to protect TXV sensing bulb (or remove it) when brazing suction line connections.
- Step 4. Place a wet rag against piping plate and around the suction line connection. The wet rag must be in place to guard against damage to the paint.
- Step 5. With the wet rag in place, position field provided elbow fitting to air handler's suction line and line set. Start nitrogen flow before brazing.
- Step 6. After the procedure is completed then remove the wet rag.
- Step 7. Place wet rag against piping plate and around the liquid line connection. Position liquid line elbow to air handler's suction line and to line set. Start nitrogen flow and begin brazing both connections and after procedure is completed then remove both wet rags.
- Step 8. Refer to instructions provided with outdoor unit for leak testing, evacuating and charging procedures.
- Step 9. Install access panel.

Table 2. Refrigerant Line Kits

CB31MV Units	Liquid Line	Vapor/Suction Line	L10 Line Sets	L15 Line Sets
-41	3/8 in (10 mm)	3/4 in. (19 mm)	L10-41 20 ft. - 50 ft. (6 m - 15 m)	L15-41 20 ft. - 50 ft. (6 m - 15 m)
-51	3/8 in (10 mm)	7/8 in. (22 mm)	L10-65 30 ft. - 50 ft. (9 m - 15 m)	L15-65 30 ft. - 50 ft. (9 m - 15 m)
-65	3/8 in (10 mm)	1-1/8 in. (29 mm)	Field Fabricated	Field Fabricated

Installing the Condensate Drain

Connect main condensate drain and route downward to an open drain or sump. Do not connect drain to a closed waste system. Refer to figure 13 for typical condensate trap configuration.

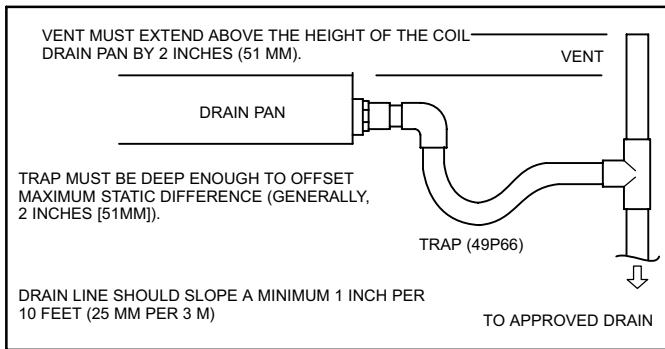


Figure 13. Condensate Drain Connection

It is recommended that the auxiliary drain be connected to a drain line for all units. If auxiliary drain is not connected, it must be plugged with provided cap. **For down-flow units, the auxiliary drain MUST be connected and routed to a drain.** See figure 14 on page 9 for main and auxiliary drain locations.

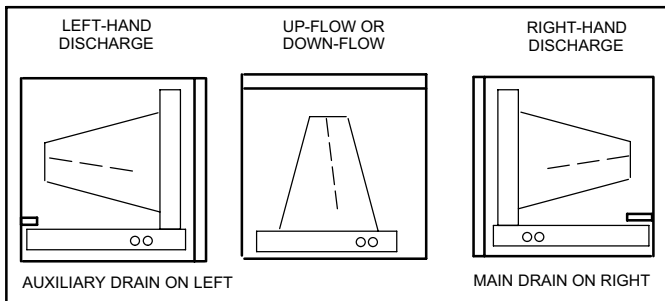


Figure 14. Main and Auxiliary Drain Locations

The following practices are recommended to ensure condensate removal:

- Drain piping should not be smaller than the drain connections at drain pan.
- Install a trap in the main drain line. The trap must be deep enough to offset the difference in static pressure between drain pan and atmosphere. Generally, two inches is satisfactory for medium static applications.

- Slope horizontal runs 1 inch per 10 feet of drain line to offset friction.
- Leave an open vent in the drain line, as shown in figure 13 to overcome line length, friction and static pressure.
- Construct drains in a manner which will facilitate future cleaning. Drains must not interfere with filter access as illustrated in figure 13 on page 9 .
- Route auxiliary drain to an area where homeowner will notice it draining. The auxiliary drain line does not require venting or a trap. Refer to local codes.

Inspecting and Replacing Filters

⚠ IMPORTANT

Filter access panel must be in place during unit operation. Excessive warm air entering the unit may result in water blow-off problems.

Filters may be duct-mounted or installed in cabinet. A filter is factory-installed. Note that filter access door fits over access panel. Air leakage will occur if access panel is placed over filter door.

Filters should be inspected monthly and must be cleaned or replaced when dirty to assure proper furnace operation. Units are equipped with standard throw-away type filters which should be replaced when dirty.

To replace filter:

- Step 1. Loosen the thumbscrews holding the filter panel in place.
- Step 2. Slide the filter out of the guides on either side of cabinet.
- Step 3. Insert new filter.
- Step 4. Replace panel.

See table 3 for replacement filter sizes.

Table 3. Filter Dimensions

Unit Model No.	Filter Size inches (mm)
CB31MV-41	20 x 22 (508 x 559)
CB31MV-51, -65	20 x 24 (508 x 610)

Sealing the Unit

Seal the unit so that warm air is not allowed into the cabinet. Warm air introduces moisture, which results in water blow-off problems. This is especially important when the unit is installed in an unconditioned area.

Make sure the liquid line and suction line entry points are sealed with either the provided flexible elastomeric thermal insulation, or field provided material (e.g. *Armaflex*, *Permagum* or equivalent). Any of the previously mentioned materials may be used to seal around the main and auxiliary drains, and around open areas of electrical inlets.

Adjusting the BDC3 Blower Control Board

CB31MV units are equipped with a variable speed motor that is capable of maintaining a specified CFM throughout the external static range. A particular CFM can be obtained by positioning jumpers (**COOL**, **HEAT**, and **ADJUST**) on

the BDC3 control board. The jumpers are labeled 1, 2, 3, and 4. Each of the numbers corresponds with an air volume (CFM) setting. The **ADJUST** jumper is labeled Test, -, +, and Norm. The + and - pin settings are used to

add or subtract a percentage of the CFM selected. The Test jumper is used to operate the motor in the test mode. The delay jumper controls the timing for the fan delay.

Table 4. Blower Speed Tap Selection

CB31MV Air Handler	RECOMMENDED SPEED TAP SELECTION			
	COOL		HEAT	
	Condensing Unit	Heat Pump	Condensing Unit With Electric Heat Only	Heat Pump With Electric Heat
-041	COOL PIN #3	COOL PIN #3	HEAT PIN #4	HEAT PIN #4
-051	COOL PIN #2	COOL PIN #2	HEAT PIN #1	HEAT PIN #1
-065	COOL PIN #3	COOL PIN #3	HEAT PIN #1	HEAT PIN #1

* Minimum setting for heat.

Figure 15 on page 10 provides an illustration of the BDC3 control board. Use tables 5 and 6 on page 12 to determine the correct air volume for heat and cool speed taps.

The appropriate speed according to application and CFM need is selected by moving jumper pins.

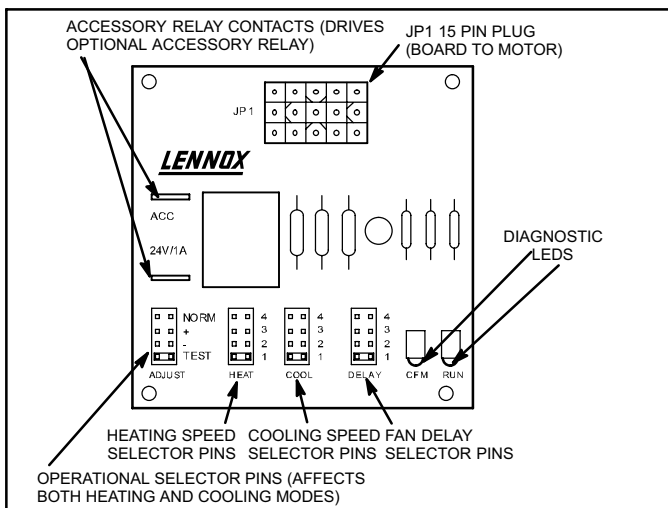


Figure 15. BDC3 Variable Speed Control Board Selections

Diagnostic LEDs located on the BDC3 control board are provided to aid in identifying the unit's mode of operation. Certain scenarios will arise depending on the jumper positions. Read through the jumper settings sections before adjusting Blower speed. Refer to figure 15 for identification.

Adjusting Blower Speed

DIAGNOSTIC LEDES

- Step 1. **RUN LED** indicates there is a demand for the Blower motor to run.
- Step 2. **CFM LED** indicates the CFM at which the unit is operating. The light flashes once for approximately every 100 CFM. For example, if the unit is operating at 1000 CFM, **CFM LED** will flash 10 times. If the CFM is 1150, **CFM LED** will flash 11 full times plus one fast or half flash.

At times the light may appear to flicker or glow. This takes place when the control is communicating with the motor between cycles. This is normal operation.

! IMPORTANT

Before changing jumper setting, make sure the motor has completely stopped. Any jumper setting change will not take place while the motor is running.

Table 4 lists the recommended factory Blower speed tap selections for CB31MV series units. These settings are for nominal tonnage match-ups with the CB31MV. When matched with other sizes, it is recommended that the CFM be adjusted to approximately 400 CFM per ton.

To change jumper positions, gently pull the jumper off the pins and place it on the desired set of pins. The following section outlines the different jumper selections available and conditions associated with each one as illustrated in figure 15.

After the CFM for each application has been determined, the jumper settings must be adjusted to reflect those given in tables 5 and 6. From the tables, determine which row of CFM volumes most closely matches the desired CFM. Once a specific row has been chosen (+, NORMAL, or -), CFM volumes from other rows cannot be used. Below are descriptions of the jumper selections.

ADJUST JUMPERS

The **ADJUST** pins allow the motor to run at normal speed, approximately 10% higher, or approximately 10% lower than normal speed. Table 5 gives three rows (+, NORMAL, and -) with their respective CFM volumes. Notice that the normal adjustment setting for heat speed position #3 is 1315 CFM. The + adjustment setting for that position is 1445 CFM and for the - adjustment setting is 1185 CFM. After the adjustment setting has been determined, chose the remainder speed jumper settings from those offered in the table in that row.

The **TEST** pin is available to bypass the BDC3 control and run the motor at approximately 70% to test that the motor is operational. This is beneficial primarily in troubleshooting. G must be energized for motor to run.

COOL JUMPERS

The **COOL** jumper is used to determine the CFM during either 1) cooling or 2) heat pump operation without a call for electric heat. These jumper selections are activated for cooling when Y2 and DS terminals in the CB31MV are energized and for heating when Y2 is energized.

Applications without the SignatureStat™ humidity control will provide either 70% of the **COOL** CFM during first-stage cooling for two-speed outdoor units. 100% of **COOL** CFM is provided for systems with a single-speed outdoor unit.

Applications with the SignatureStat™ humidity control create different CFM volumes. For example, during a first-stage cooling call (two-speed outdoor unit) with demand from the SignatureStat™ thermostat, the air volume is 40% of the **COOL** jumper selection. For a normal **COOL** (Pin #2 setting for CB31MV-41), the CFM is 1125; the reduced speed is 450 CFM (1125 x 40% = 450). This arrangement provides for additional dehumidification during standard first stage cooling. See tables 7 and 8 for various scenarios concerning use of the SignatureStat™ humidity control and the CB31MV series unit.

For applications with Harmony II® zone control, the Blower CFM volume is determined by the Harmony II control center. The minimum air handler speed is predetermined at 650 CFM for -41 series units and 850 CFM for -51 and -65 series units. This speed is not adjustable. See footnotes in tables 5 and 6.

With the thermostat set for “Continuous Fan” and without a call for heating or cooling, the CB31MV will provided 50% of the **COOL** CFM selected.

*NOTE - For two-speed heat pumps, air handler will operate at 70% of the **COOL** selection until supplemental electric heat is demanded. At that time, the air handler will operate at the **HEAT** speed selected. This arrangement provides for warmer supply air during second-stage heating.*

HEAT™ JUMPERS

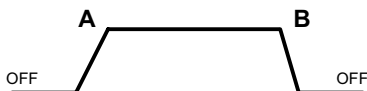
The **HEAT** jumper is used to determine CFM during electric heat operation only. These jumper selections are activated only when W1 is energized.

DELAY JUMPERS

The **DELAY** jumper is used to set the specific motor fan operation during cooling mode. Depending on the application, one of four options may be chosen by moving the jumper to the appropriate set of pins.

#1 Pins Jumpered —

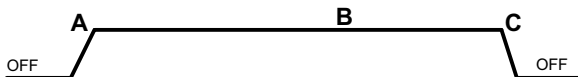
- A Motor runs at 100% until demand is satisfied.



- B Once demand is met, motor ramps down to stop.

#2 Pins Jumpered —

- A Motor runs at 100% until demand is satisfied.



- B Once demand is met, motor runs at 100% for 45 seconds. Then,

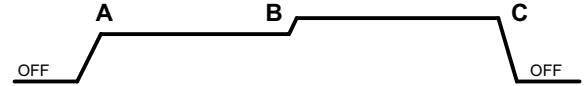
- C ramps down to stop.

*NOTE - Blower **OFF DELAY** also applies during heat pump operation*

#3 Pins Jumpered —

- A Motor runs at 82% for approximately 7-1/2 minutes. If demand has not been satisfied after 7-1/2 minutes,

- B motor runs at 100% until demand is satisfied.



- C Once demand is met, motor ramps down to stop.

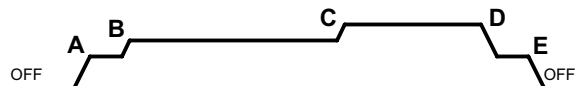
#4 Pins Jumpered —

- A Motor runs at 50% for 30 seconds.

- B Motor then runs at 82% for approximately 7-1/2 minutes. If demand has not been satisfied after 7-1/2 minutes,

- C Motor runs at 100% until demand is satisfied.

- D Once demand is met, motor runs at 50% for 30 seconds. Then,



- E ramps down to stop.

Making Electrical Connections

Wiring must conform to the current National Electric Code ANSI/NFPA No. 70, or Canadian Electric Code Part I, CSA Standard C22.1, and local building codes. Refer to following wiring diagrams. See unit nameplate for minimum circuit ampacity and maximum overcurrent protection size.

Select the proper supply circuit conductors in accordance with tables 310-16 and 310-17 in the National Electric Code, ANSI/NFPA No. 70 or tables 1 through 4 in the Canadian Electric Code, Part I, CSA Standard C22.1.

⚠ WARNING

USE COPPER CONDUCTORS ONLY!

This unit is provided with knockouts for conduit. Refer to figure 16 for unit schematic wiring diagram. Refer to figures 17, 19, 20 and 21 for typical field wiring.

Separate openings have been provided for 24V low voltage and line voltage. Refer to the dimension illustration of specific location.

⚠ WARNING

Run 24V Class II wiring only through specified low voltage opening. Run line voltage wiring only through specified high voltage opening. Do not combine voltage in one opening.

Table 5. CB31MV-041 Air Handler Performance

0 through 0.80 in. w.g. (0 Through 200 Pa) External Static Pressure Range

ADJUST Jumper Setting	BDC3 Jumper Speed Position															
	HEAT Speed								COOL Speed*							
	1		2		3		4		1		2		3		4	
	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
+	1230	580	1335	630	1445	680	1545	730	1090	515	1225	580	1380	650	1545	730
NORM	1120	530	1215	575	1315	620	1400	660	975	460	1125	530	1275	600	1400	660
—	1010	475	1200	565	1185	560	1265	595	900	425	1000	470	1135	535	1265	595

* First-stage (two-stage units only) cooling is approximately 70% of the COOL speed rating.
 Continuous fan speed is approximately 50% of COOL speed rating.
 Lennox Harmony II® Zone Control Applications - Minimum air handler speed is approximately 380 cfm (180 L/s).
 NOTE - The effect of static pressure, filter and electric heater resistance is included in the air volumes listed.

Table 6. CB31MV-051, -065 Air Handler Performance

0 through 0.80 in. w.g. (0 Through 200 Pa) External Static Pressure Range

ADJUST Jumper Setting	BDC3 Jumper Speed Position															
	HEAT Speed								COOL Speed*							
	1		2		3		4		1		2		3		4	
	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
+	1850	875	1960	925	2090	985	2150	1015	1625	765	1820	860	2055	970	2145	1010
NORM	1705	805	1800	850	1900	895	2005	945	1425	670	1625	765	1805	850	2005	945
—	1560	735	1625	765	1720	810	1770	835	1205	570	1375	650	1555	735	1725	815

* First-stage (two-stage units only) cooling is approximately 70% of the COOL speed rating.
 Continuous fan speed is approximately 50% of COOL speed rating.
 Lennox Harmony II® Zone Control Applications - Minimum air handler speed is approximately 400 cfm (190 L/s).
 NOTE - The effect of static pressure, filter and electric heater resistance is included in the air volumes listed.

Table 7. CB31MV SignatureStat™ and Single Stage Outdoor Unit

Operating Sequence		System Demand							System Response			
System Condition	Step	Thermostat Demand				Relative Humidity			Compressor	Air Handler CFM (COOL)	Comments	
		Y1	O	G	W1	Status	D					
NO CALL FOR DEHUMIDIFICATION												
Normal Operation	1	On		On	On			Acceptable	24 VAC	High	100%	Compressor and indoor air handler follow thermostat demand
<i>BASIC MODE (only active on a Y1 thermostat demand)</i>												
Normal Operation	1	On		On	On			Acceptable	24 VAC	High	100%	SignatureStat™ energizes Y1 and de-energizes D on a call for dehumidification
Dehumidification Call	2	On		On	On			Demand	0 VAC	High	60%/65%*	
<i>PRECISION MODE (operates independent of a Y1 thermostat demand)</i>												
Normal Operation	1	On		On	On			Acceptable	24 VAC	High	100%	Dehumidification mode begins when humidity is greater than set point
Dehumidification call	2	On		On	On			Demand	0 VAC	High	60%/65%*	
Dehumidification call ONLY	1	On		On	On			Demand	0 VAC	High	60%/65%*	SignatureStat™ will try to maintain room humidity setpoint by allowing the room space to maintain a cooler room thermostat setpoint**
Jumpers at indoor unit with a single stage outdoor unit With Condensing unit - Y1 to Y2 and R to O With Heat Pump - Y1 to Y2												
Lennox SignatureStat™ used for these applications are 51M26 - 1 heat / 1 cool or 51M28 - 2 heat / 2 cool heat pump												
* During dehumidification, cooling air handler speed is as follows: 65% of COOL cfm for -41units, 60% COOL cfm for -51 and -61 units												
** In Precision mode, SignatureStat™ thermostat built BEFORE October 2003 will maintain room temperature up to 3°F (1.8°C) cooler than room thermostat setting. Precision thermostat built AFTER October 2003 will maintain room temperature up to 2°F (1.2°C) cooler than the room thermostat setting.												

Table 8. CB31MV, SignatureStat™ and Two-Stage Outdoor Unit

Operating Sequence		System Demand								System Response		
System Condition	Step	Thermostat Demand						Relative Humidity		Compressor	Air Handler CFM (COOL)	Comments
		Y1	Y2	O	G	W1	W2	Status	D			
NO CALL FOR DEHUMIDIFICATION												
Normal Operation - Y1	1	On		On	On			Acceptable	24 VAC	Low	70%	Compressor and indoor air handler follow thermostat demand
Normal Operation - Y2	2	On	On	On	On			Acceptable	24 VAC	High	100%	
ROOM THERMOSTAT CALLS FOR FIRST STAGE COOLING												
<i>BASIC MODE (only active on a Y1 thermostat demand)</i>												
Normal Operation	1	On		On	On			Acceptable	24 VAC	Low	70%	SignatureStat energizes Y2 and de-energizes D on a call for dehumidification
Dehumidification Call	2	On	On	On	On			Demand	24 VAC	High	60%/65%*	
<i>PRECISION MODE (operates independent of a Y1 thermostat demand)</i>												
Normal Operation	1	On		On	On			Acceptable	24 VAC	Low	70%	Dehumidification mode begins when humidity is greater than set point
Dehumidification call	2	On	On	On	On			Demand	0 VAC	High	60%/65%*	
Dehumidification call ONLY	1	On	On	On	On			Demand	0 VAC	High	60%/65%*	**SignatureStat™ will try to maintain room humidity setpoint by allowing the room space to maintain a cooler room thermostat setpoint
ROOM THERMOSTAT CALLS FOR FIRST AND SECOND STAGE COOLING												
<i>BASIC MODE (only active on a Y1 thermostat demand)</i>												
Normal Operation	1	On	On	On	On			Acceptable	24 VAC	High	100%	SignatureStat energizes Y2 and de-energizes D on a call for dehumidification
Dehumidification Call	2	On	On	On	On			Demand	0 VAC	High	60%/65%*	
<i>PRECISION MODE (operates independent of a Y1 thermostat demand)</i>												
Normal Operation	1	On	On	On	On			Acceptable	24 VAC	High	100%	Dehumidification mode begins when humidity is greater than set point
Dehumidification call	2	On	On	On	On			Demand	0 VAC	High	60%/65%*	
Dehumidification call ONLY	1	On	On	On	On			Demand	0 VAC	High	60%/65%*	**SignatureStat™ will try to maintain room humidity setpoint by allowing the room space to maintain a cooler room thermostat setpoint
Jumpers at indoor unit with a two stage outdoor unit With Condensing unit - R to O With Heat Pump - none												
Lennox SignatureStat™ used for these applications are 51M27 - 2 heat / 2 cool or 51M28 - 2 heat / 2 cool heat pump. * During dehumidification, cooling air handler speed is as follows: 65% of COOL cfm for -41units, 60% COOL cfm for -51 and -61 units ** In Precision mode, SignatureStat™ thermostat built BEFORE October 2003 will maintain the room temperature up to 3°F (1.8°C) cooler than room thermostat setting. Precision thermostat built AFTER October 2003 will maintain the room temperature up to 2°F (1.2°C) cooler than the room thermostat setting.												

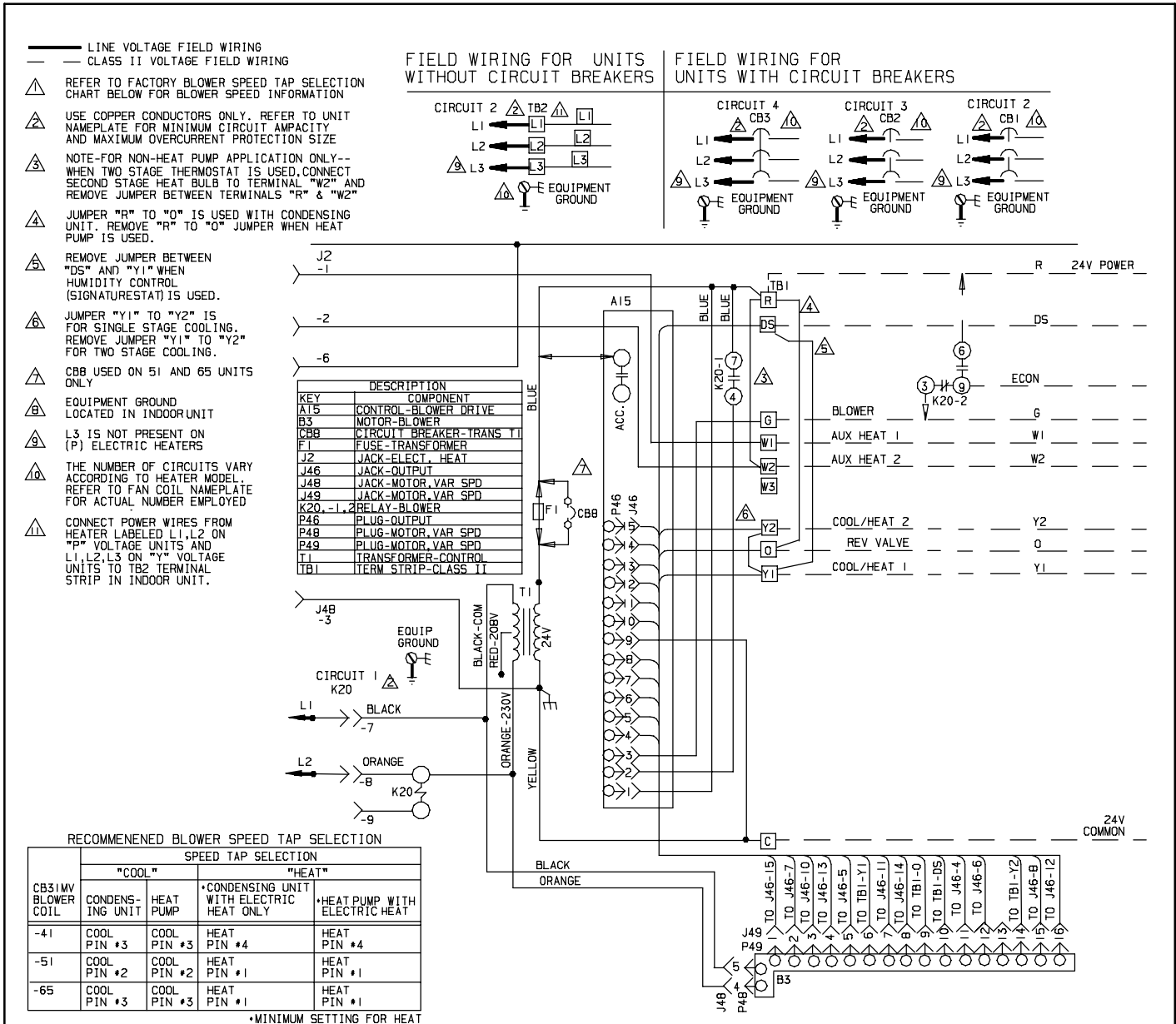


Figure 16. CB31MV Blower Coil Unit Typical Wiring Diagram

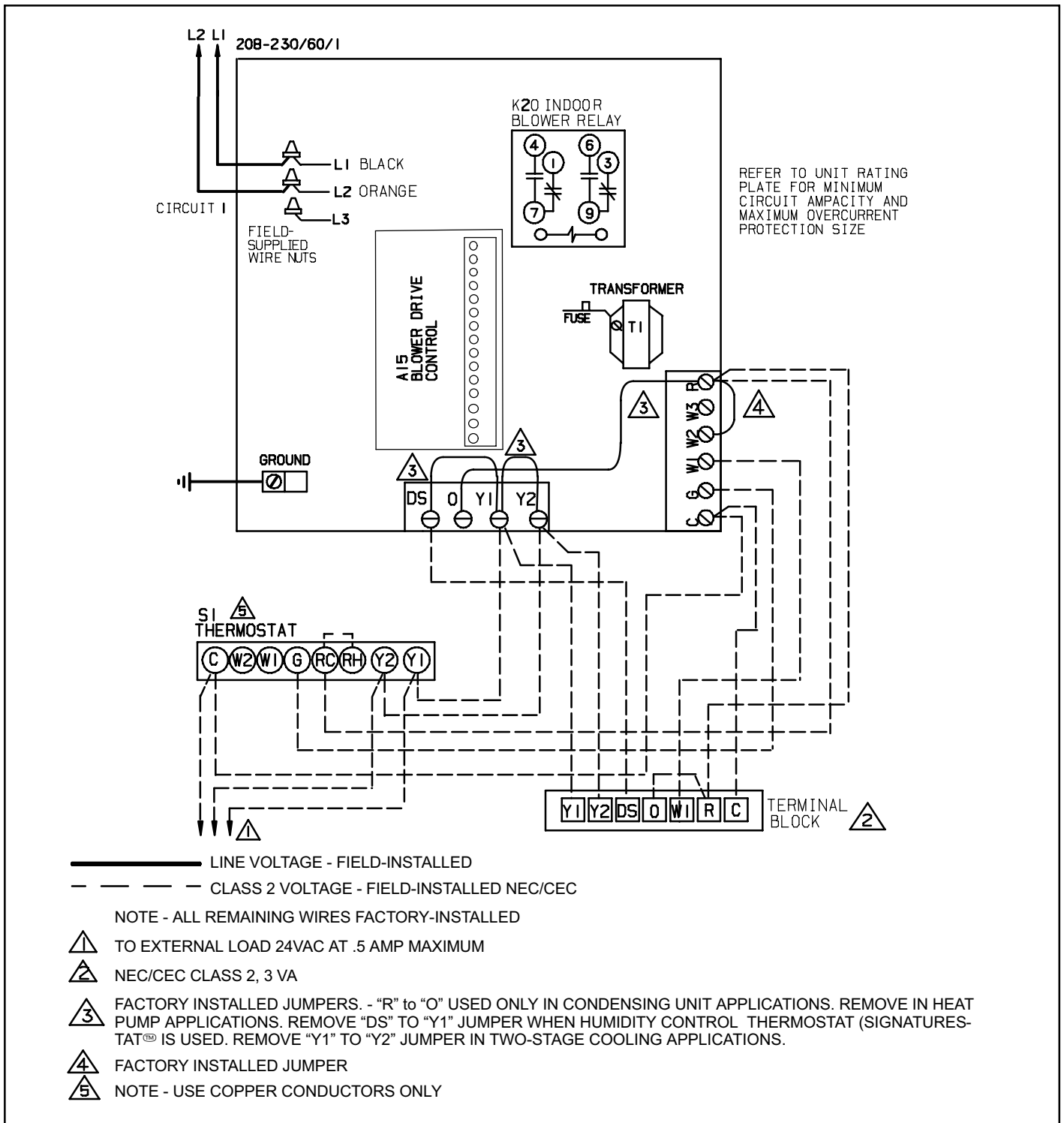
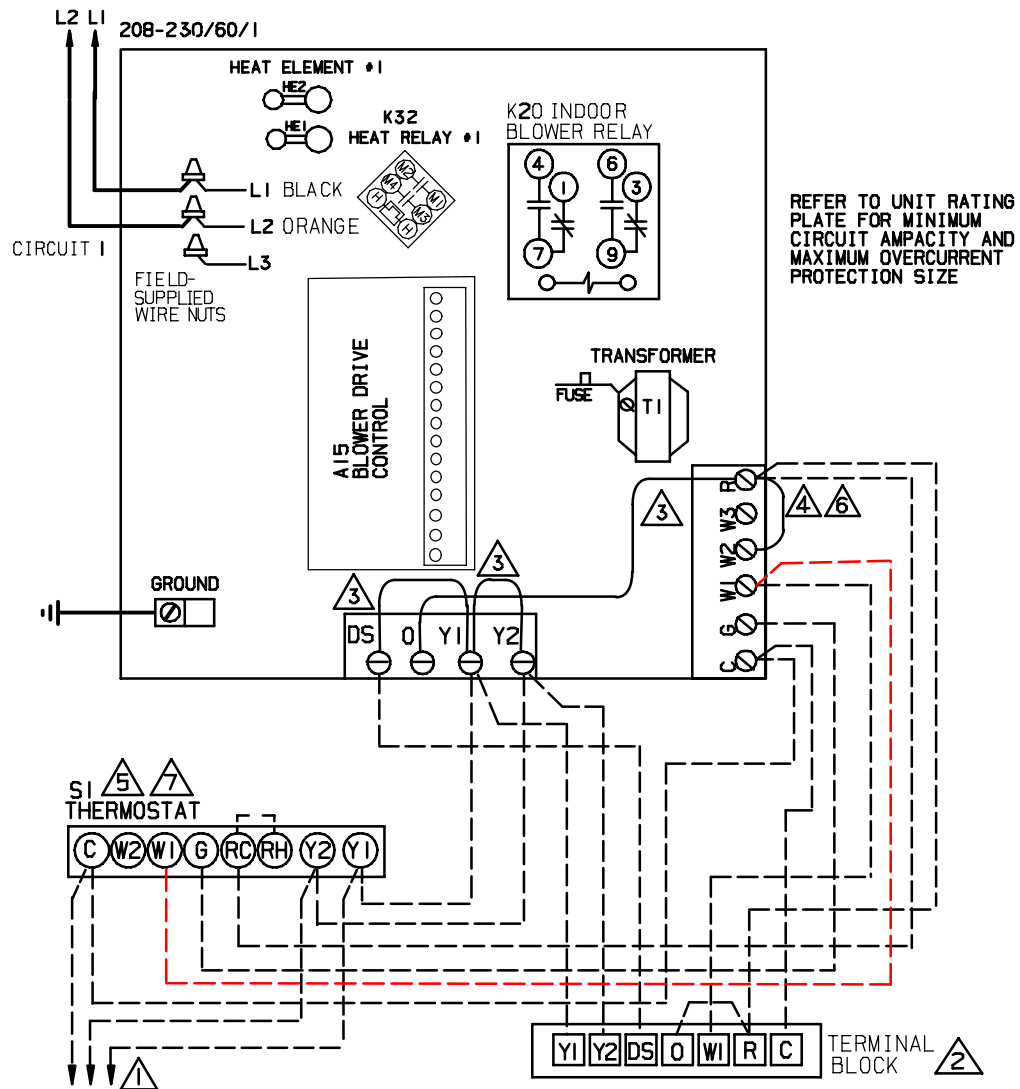


Figure 17. Cooling Application



———— LINE VOLTAGE - FIELD-INSTALLED

- - - - - CLASS 2 VOLTAGE - FIELD-INSTALLED NEC/CEC

NOTE - ALL REMAINING WIRES FACTORY-INSTALLED

⚠ TO EXTERNAL LOAD 24VAC AT .5 AMP MAXIMUM

⚡ NEC/CEC CLASS 2, 3 VA

⚡ FACTORY INSTALLED JUMPERS. - "R" to "O" USED ONLY IN CONDENSING UNIT APPLICATIONS. REMOVE IN HEAT PUMP APPLICATIONS. REMOVE "DS" TO "Y1" JUMPER WHEN HUMIDITY CONTROL THERMOSTAT (SIGNATURESTAT®) IS USED. REMOVE "Y1" TO "Y2" JUMPER IN TWO-STAGE COOLING APPLICATIONS.

⚡ FACTORY INSTALLED JUMPER

⚡ NOTE - USE COPPER CONDUCTORS ONLY

WHEN TWO-STAGE THERMOSTAT IS USED, CONNECT SECOND-STAGE HEAT BULB TO TERMINAL "W2," REMOVE JUMPER BETWEEN TERMINALS "R" AND "W2"

THERMOSTAT HEAT ANTICIPATION SETTING .4 AMP (ELECTRIC HEAT)

Figure 18. Cooling Application with Electric Heat

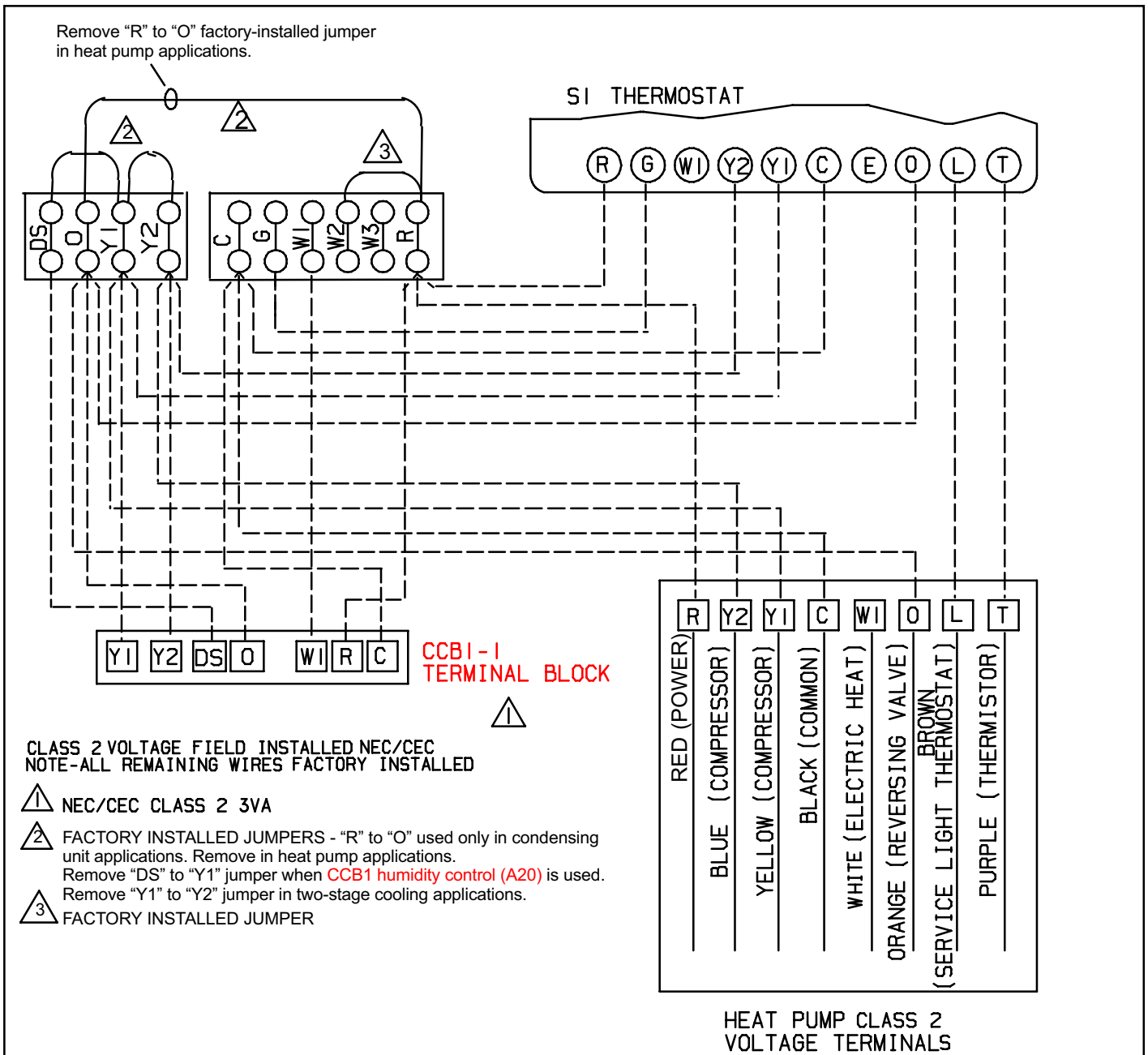


Figure 20. Heat Pump

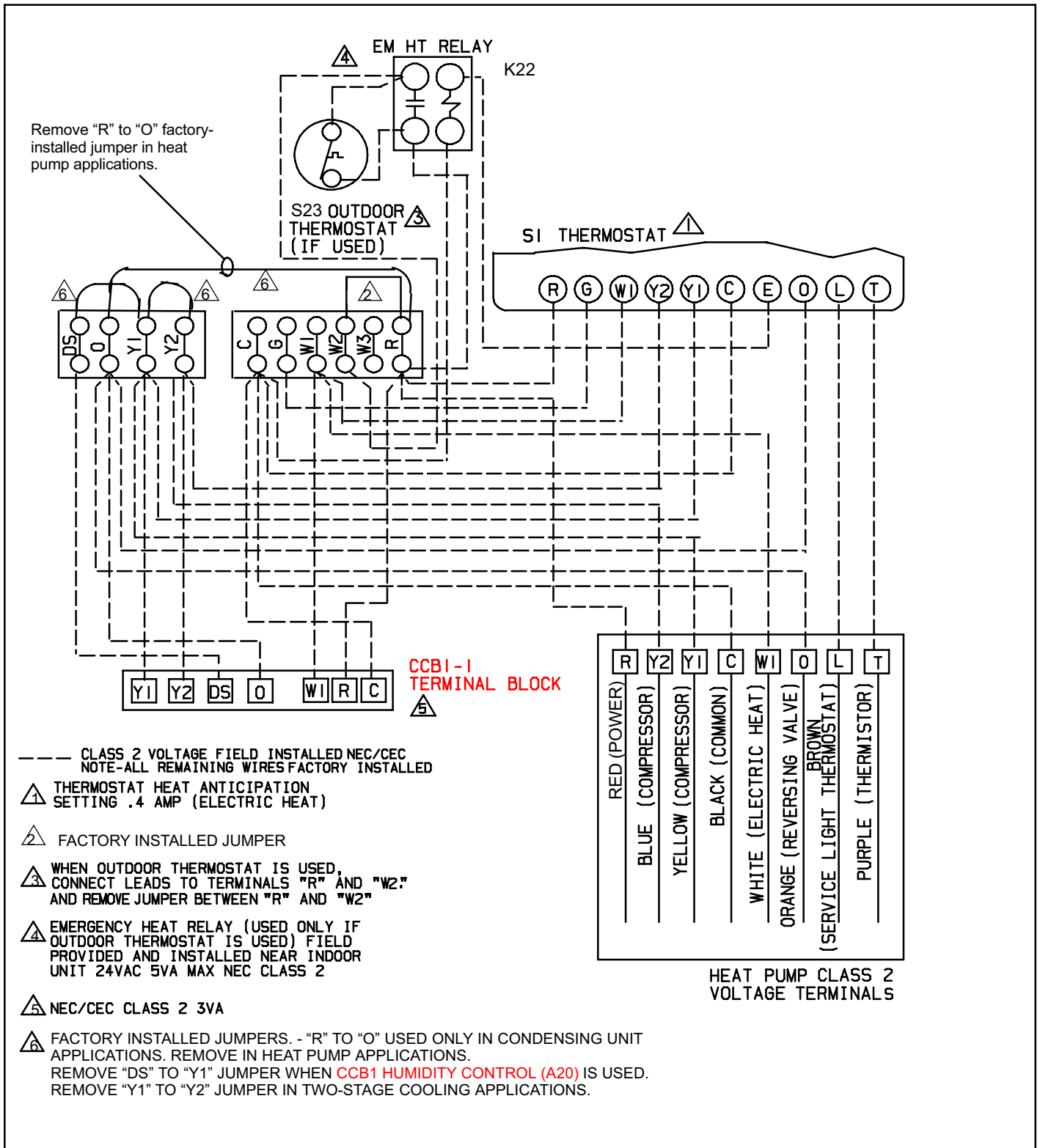


Figure 21. Heat Pump with Electric Heat

Repairing or Replacing Cabinet Insulation

! IMPORTANT

DAMAGED INSULATION MUST BE REPAIRED OR REPLACED before the unit is put back into operation. Insulation loses its insulating value when wet, damaged, separated or torn.

Matt- or foil-faced insulation is installed in indoor equipment to provide a barrier between outside air conditions (surrounding ambient temperature and humidity) and the varying conditions inside the unit. If the insulation barrier is damaged (wet, ripped, torn or separated from the cabinet walls), the surrounding ambient air will affect the inside surface temperature of the cabinet. The temperature/humidity difference between the inside and outside of the cabinet can cause condensation on the inside or outside of the cabinet which leads to sheet metal corrosion and subsequently, component failure.

REPAIRING DAMAGED INSULATION

Areas of condensation on the cabinet surface are an indication that the insulation is in need of repair.

If the insulation in need of repair is otherwise in good condition, the insulation should be cut in an X pattern, peeled open, glued with an appropriate all-purpose glue and placed back against the cabinet surface, being careful to not overly compress the insulation so the insulation can retain its original thickness. If such repair is not possible, replace the insulation. If using foil-faced insulation, any cut, tear, or separations in the insulation surface must be taped with a similar foil-faced tape.

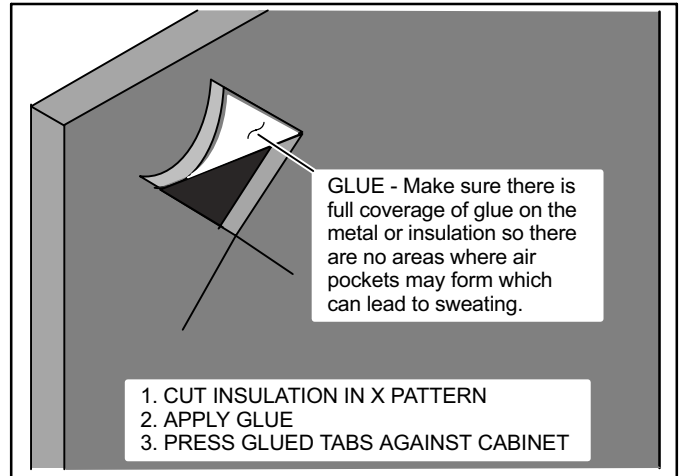


Figure 22. Repairing Insulation

! WARNING

Electric Shock Hazard.

Can cause injury or death.

Foil-faced insulation has conductive characteristics similar to metal. Be sure there are no electrical connections within a 1/2" of the insulation. If the foil-faced insulation comes in contact with electrical voltage, the foil could provide a path for current to pass through to the outer metal cabinet. While the current produced may not be enough to trip existing electrical safety devices (e.g. fuses or circuit breakers), the current can be enough to cause an electric shock hazard that could cause personal injury or death.