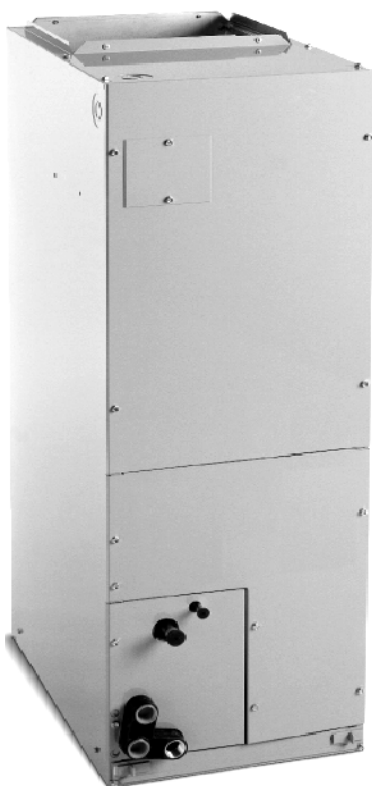


# INSTALLATION INSTRUCTIONS



Use **ONLY** factory listed electric heaters.

## Models EBV

2-5 Ton

General Information / Installation .....	2
Upflow Installations .....	3
Downflow Installations .....	3
Horizontal Installations .....	3
Ductwork Connections .....	4
Electrical Connections .....	5
Diagrams .....	6
Transformer Information .....	7
Refrigerant Tubing .....	8
Refrigerant Flow Control .....	8
Condensate Drains .....	9
Condensate Drain Diagrams .....	10
Start-Up Procedures .....	11
Sequence of Operation .....	13
Airflow Curve Charts .....	14

## Variable Speed Fan Coils

### Safety Labeling and Signal Words

#### Danger, Warning and Caution

The signal words **DANGER**, **WARNING** and **CAUTION** are used to identify levels of hazard seriousness. The signal word **DANGER** is only used on product labels to signify an immediate hazard. The signal words **WARNING** and **CAUTION** will be used on product labels and throughout this manual and other manuals that may apply to the product.

**DANGER** - Immediate hazards which **WILL** result in severe personal injury or death.

**WARNING** - Hazards or unsafe practices which **COULD** result in severe personal injury or death.

**CAUTION** - Hazards or unsafe practices which **COULD** result in minor personal injury or product or property damage.

#### Signal Words in Manuals

The signal word **WARNING** is used throughout this manual in the following manner:

**⚠ WARNING**

The signal word **CAUTION** is used throughout this manual in the following manner:

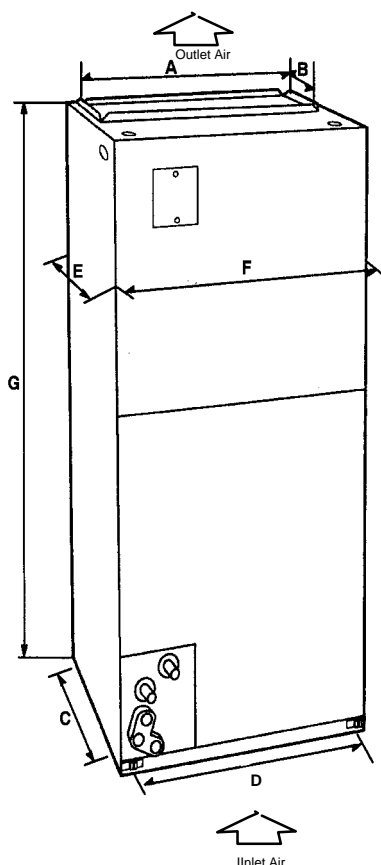
**⚠ CAUTION**

#### Product Labeling

Signal words are used in combination with colors and/or pictures on product labels.

Figure 1

## Clearances &amp; Dimensions



EBV Dimensions							
Unit Sizes	A	B	C	D	E	F	G
2400	15-3/4"	11"	19-13/16"	15-5/8"	22-1/16"	17-5/8"	47-11/16"
3600	19-1/4"	11"	19-13/16"	19-1/8"	22-1/16"	21-1/8"	53-7/16"
4800	19-1/4"	11"	19-13/16"	19-1/8"	22-1/16"	21-1/8"	53-7/16"
6000	22-3/4"	11"	19-13/16"	22-11/16"	22-1/16"	24-11/16"	59-3/16"

## CLEARANCES

## NO HEATERS

All Sides .....	0"
From Supply Duct .....	0"
Recommended Service From Front .....	20"
(Service for blower, filter if installed)	

## WITH HEATERS

All Sides .....	0"
From First Three Feet of Supply Duct to Combustibles .....	1"
From Duct after Three Feet .....	0"
Recommended Service From Front .....	20"

# **WARNING**

## Fire Hazard

When heaters are installed maintain clearances from combustible materials as specified on unit rating plate. Do not use plastic lined or combustible flexible ducting within 36 inches of the supply end of the air handler.

Failure to do so can result in fire, property damage, personal injury or death.

## General Information

# **WARNING**

Installation or repairs made by unqualified persons can result in hazards to you and others. Installation **MUST** conform with local building codes and with the National Electrical Code NFPA70 current edition.

The information contained in this manual is intended for use by a qualified service technician familiar with safety procedures and equipped with the proper tools and test instruments.

Failure to carefully read and follow all instructions in this manual can result in equipment malfunction, property damage, personal injury and/or death.

The blower cabinet may be used for cooling or heat pump operation with or without electric heat. The cabinet can be installed in an upflow or horizontal position (Figure 2, 3). EBV models are shipped with the horizontal kit already installed.

## Location

Select the best position which suits the installation site conditions. The location should provide adequate structural support, space in the front of the unit for service access, clearance for return air and supply duct connections, space for refrigerant piping connections and condensate drain line connections. If heaters are being installed make sure adequate clearance is maintained from supply ductwork, (see Fig. 1).

**NOTE:** Internal filter can be accessed from separate filter door. If the filter can **NOT** be easily accessed, a remote filter is recommended. Refer to ACCA Manual D for remote filter sizing.

If the unit is located in an area of high humidity, nuisance sweating of casing may occur. On these installations a wrap of 2" fiberglass insulation with a vapor barrier is recommended.

## INTRODUCTION

The EBV model is designed for flexibility and can be used for upflow, horizontal, or downflow (kit required) applications. These units are available for systems of 24,000 through 60,000 Btuh nominal cooling capacity. Factory authorized electric heater packages are available in sizes 5 through 30kw. See Product Specification Literature for available accessory kits.

## HEATER PACKAGES

A factory approved, field installed UL listed heater package is available from your equipment supplier. See unit rating plate for a list of factory approved heaters. Heaters that are not factory approved could cause damage which would not be covered under the equipment warranty.

## INSTALLATION

### PROCEDURE 1- CHECK EQUIPMENT

Unpack unit and move to final location. Remove carton taking care not to damage unit. Inspect equipment for damage prior to installation. File claim with shipping company if shipment is damaged or incomplete. Locate unit rating plate which contains proper installation information. Check rating plate to be sure unit matches job specifications.

### PROCEDURE 2- MOUNT FAN COIL

Unit can stand or lie on floor, or hang from ceiling or wall. Allow space for wiring, piping, and servicing unit.

**NOTE:** To ensure proper drainage for horizontal installations, unit must be installed so it is within 1/8 in. level of the length and width of unit.

#### A. Upflow Installation

If return air is to be ducted, install duct flush with floor. Set unit on floor over opening. Only use return-air opening provided. All return air must pass through the coil. (See Fig. 2.)

#### B. Modular Units

The EBV Fan Coil in size 6000 is a 2-piece modular unit. Modular construction allows installer to disassemble unit into 2 components, coil box and blower box, for ease of installation. (See Fig. 4)

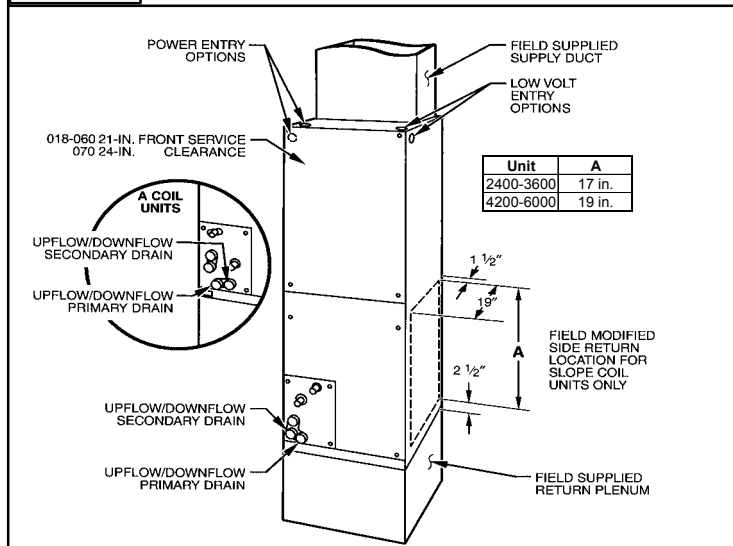
To disassemble unit, remove rear corner brackets by removing 2 screws which secure brackets. (See Fig. 4) Remove either 2 screws in each front corner of coil box, or 2 screws in blower box. Do not remove all 4 screws in each corner. (See Fig. 4) Sections may now be separated by lifting top section from lower section. To reassemble, reverse above procedure. Be certain to reinstall all fasteners when reassembling.

#### C. Horizontal Installation

Be sure installation complies with all applicable building codes that may require installation of secondary condensate pan.

1. Arrange support for unit by setting it in or above secondary condensate drain.
2. When suspending unit from ceiling, dimples in casing indicate proper location of screws for mounting metal support straps (See Fig. 3)

**Figure 2 Slope Coil Unit In Upflow Application**



**NOTE:** For optimum condensate drainage performance in horizontal installations, unit should be leveled along its length or raised 1/4" at the air inlet. The unit should also be pitched forward 1/4" to 1/2" toward the front condensate drains.

**NOTE:** Modular units can be disassembled and components moved separately to installation area for reassembly. This process accommodates small scuttle holes and limiting entrances to installation sites.

#### D. Horizontal-Right Conversion of Units with Slope Coils

**NOTE:** Gasket kit number EBAC01GSK is required for horizontal slope coil conversion to maintain low air leak/low sweat performance.

1. Remove blower and coil access panels and fitting panel. (See Fig. 5.)
2. Remove screw securing coil assembly to right side casing flange.
3. Remove coil assembly.
4. Lay fan coil on its right side and reinstall coil assembly with condensate pan down. (See Fig. 5.)
5. Attach coil to casing flange using coil mounting screw previously removed.
6. Make sure the pan cap in the fitting door is properly seated on the fitting door to retain the low air leak rating of the unit.
7. Add gaskets from kit EBAC01GSK per kit instructions.
6. Align holes with tubing connections and condensate pan connections, and reinstall access panels and fitting panel. Make sure liquid and suction tube grommets are in place to prevent air leaks and cabinet sweating. Install after brazing.

#### E. Horizontal Right Conversion of Units With A-Coil

1. Remove blower and coil access panel and fitting panel. (See Fig. 6.)
2. Remove metal clip securing fitting panel to condensate pan. Remove fitting panel.
3. Remove 2 snap-in clips securing A-coil in unit.
4. Slide coil and pan assembly out of unit.
5. Remove horizontal drain pan support bracket from coil support rail on left side of unit and reinstall on coil support rail on right side of unit.
6. Convert air-seal assembly for horizontal right. (See Fig. 6.)
  - A. Remove air-seal assembly from coil by removing 4 screws.
  - B. Remove coil drip flanges from A-coil and reinstall on right side of coil (same side as horizontal drain pan).
  - C. Remove filler plate (A) and install air splitter (B) in place of filler plate.



## CAUTION

### UNIT or PROPERTY DAMAGE HAZARD

**Failure to follow this caution may result in property damage.**

**A field fabricated auxiliary drain pan, with a separate drain is REQUIRED for all installations over a finished living space or in any area that may be damaged by overflow from a restricted main drain pan. In some localities, local codes require an auxiliary drain pan for ANY horizontal installation.**

- D. Install filler plate (A) as shown in horizontal right application.
- E. Remove condensate troughs (C) and install on opposite tube sheets.
- F. Install hose onto plastic spout.
7. Install horizontal pan on right side of coil assembly.
8. Slide coil assembly into casing. Be sure coil bracket on each corner of vertical pan engages coil support rails.
9. Reinstall 2 snap-in clips to correctly position and secure coil assembly in unit. Be sure clip with large offsets is used on right side of unit to secure horizontal pan.
10. Remove 2 oval coil access panel plugs and reinstall into holes on left side of coil access panel and fitting panel.
11. Remove insulation knockouts on right side of coil access panel
12. Reinstall access fitting panels, aligning holes with tubing connections and condensate pan connections. Be sure to reinstall metal clip between fitting panel and vertical condensate pan.

Make sure liquid and suction tube grommets are in place to prevent air leaks and cabinet sweating.

#### F. Downflow Installations

To convert units for downflow applications, refer to Installation Instructions supplied with kit for proper installation.

#### G. Manufactured and Mobile Home Housing Applications

1. Fan coil unit must be secured to the structure using field-supplied hardware.
2. Allow a minimum of 24" clearance from access panels.

3. Recommended method of securing for typical applications
  - a. If fan coil is away from wall, attach pipe strap to top of fan coil using No. 10 self tapping screws. Angle strap down and away from back of fan coil, remove all slack, and fasten to wall stud of structure using 5/16-in. lag screws. Typically both sides of fan coil.
  - b. If fan coil is against wall, secure fan coil to wall stud using 1/8-in. thick right-angle brackets. Attach brackets to fan coil using No. 10 self tapping screws and to wall stud using 5/16-in. lag screws. (See Fig. 9).

#### PROCEDURE 3-AIR DUCTS

Connect supply-air duct over the outside of 3/4-in. flanges provided on supply-air opening. Secure duct to flange, using proper fasteners for type of duct used, and seal duct-to-unit joint. If return-air flanges are required, install factory authorized accessory kit.

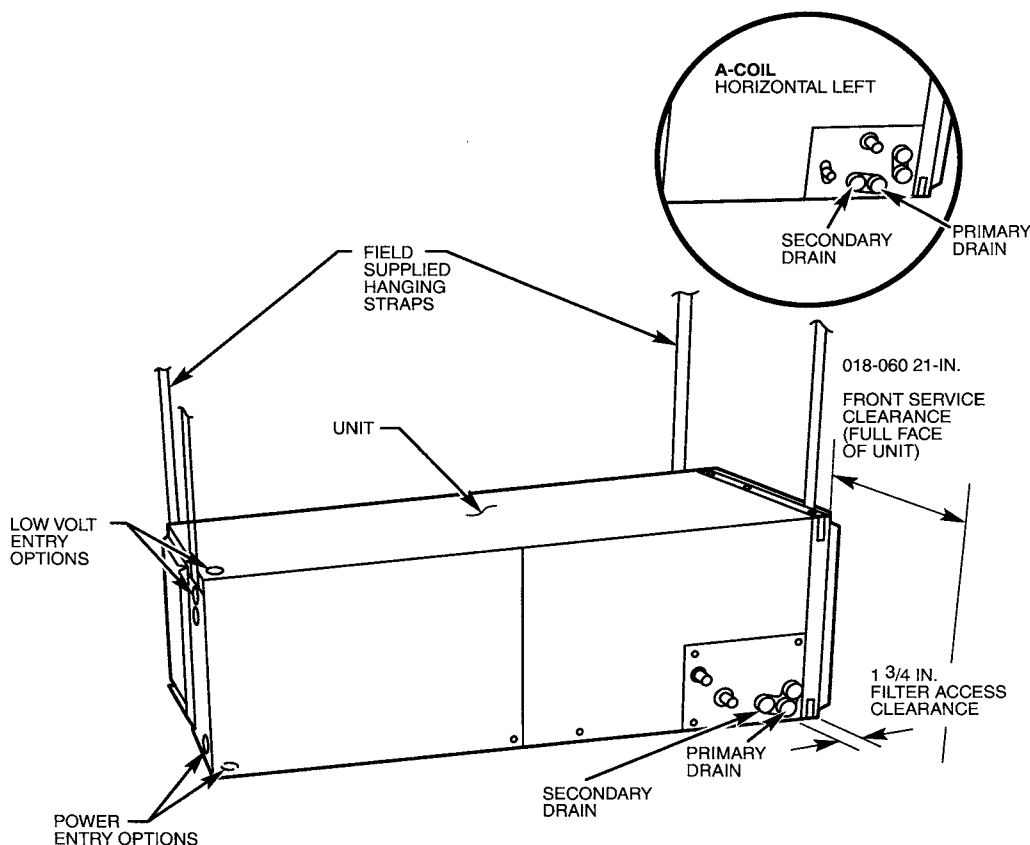
Use flexible connectors between ductwork and unit to prevent transmission of vibration. When electric heater is installed, use heat-resistant material for flexible connector between ductwork and unit at discharge connection. Ductwork passing through unconditioned space must be insulated and covered with vapor barrier.

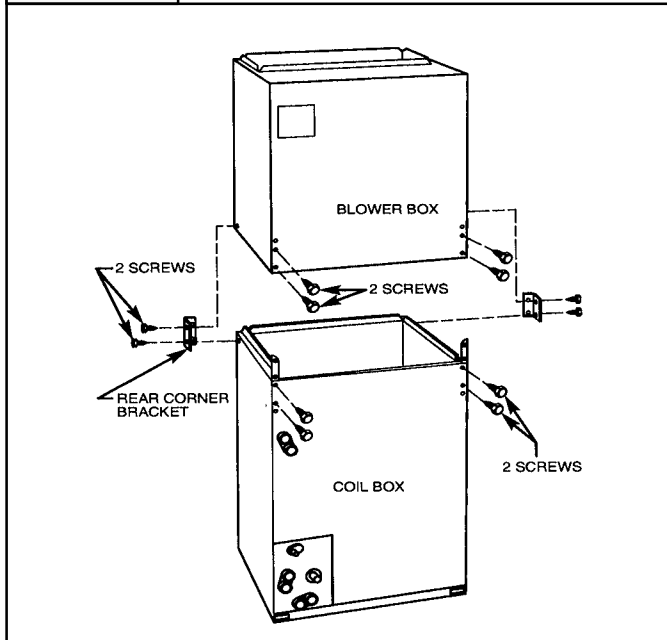
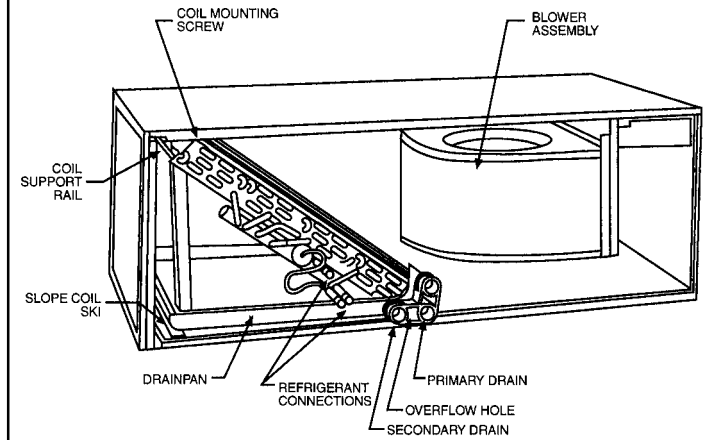
#### Ductwork Acoustical Treatment

Metal duct systems that do not have a 90 degree elbow and 10 ft. of main duct to first branch take off may require internal acoustical insulation lining. As an alternative, fibrous ductwork may be used if constructed and installed in accordance with the latest edition of SMACNA construction standard on fibrous glass ducts. Both acoustical lining and fibrous ductwork shall comply with National Fire Protection Association as tested by UL Standard 181 for Class 1 air ducts.

**Figure 3**

**Slope Coil In Horizontal Left Application**



**Figure 4 Removal of Brackets on Modular Units****Figure 5 Conversion for Horizontal Right Applications Using a Slope Coil****PROCEDURE 4-ELECTRICAL CONNECTIONS**

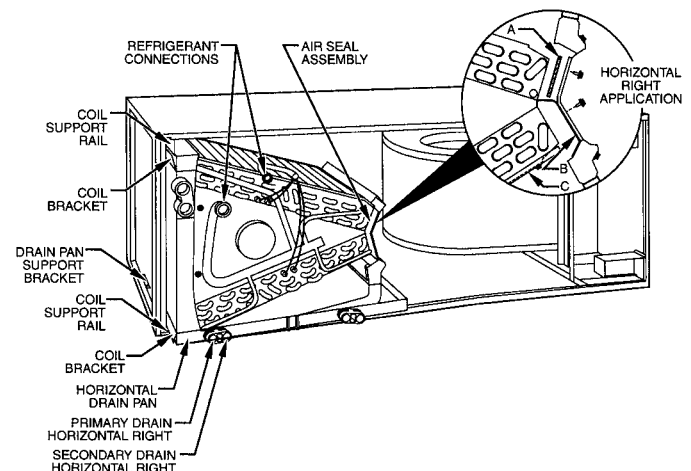
On units with a factory installed disconnect with pull-out removed, service and maintenance can be safely performed on only the load side of the control package.

**WARNING****SHOCK and UNIT DAMAGE HAZARD**

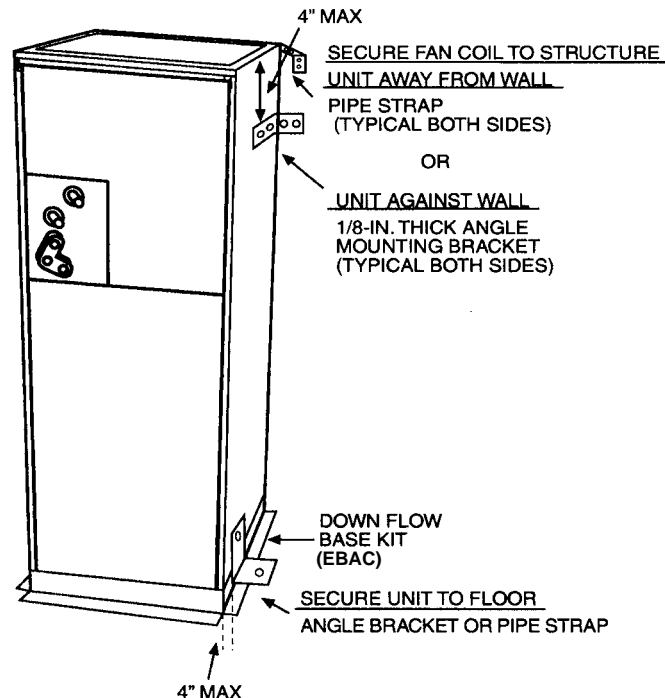
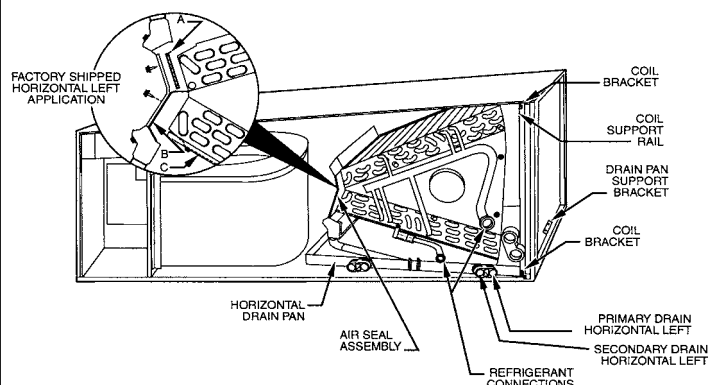
Failure to follow this warning could result in personal injury or death and unit damage.

Field wires on the line side of the disconnect found in the fan coil unit remain live, even when the pull-out is removed. Service and maintenance to incoming wiring can not be performed until the main disconnect switch (remote to the unit) is turned off. Failure to do so will result in electrical shock causing personal injury or death.

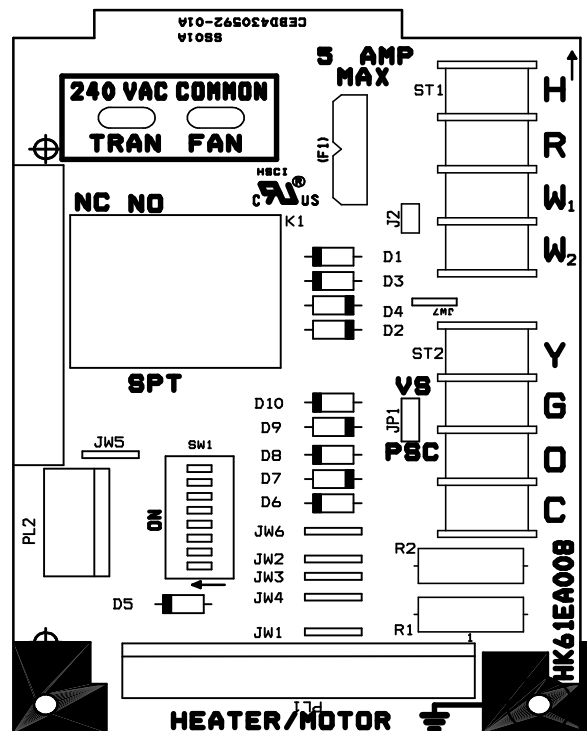
Before proceeding with electrical connections, make certain that supply voltage, frequency, phase, and ampacity are as specified on the unit rating plate. See unit wiring label for proper field high- and low-voltage wiring. Make all electrical connections in accordance with the NEC and any local codes or ordinances that may apply. Use copper wire only. The unit must have a separate branch electric circuit with a field-supplied disconnect switch located within sight from and readily accessible from the unit.

**Figure 6 Conversion for Horizontal Right Applications Using A-Coil**

**Figure 9**      **Mobile Home or Manufactured Housing Applications**



**Figure 8** | **Fan Coil Printed Circuit Board**



If unit contains an electric heater, remove and discard power plug from fan coil and connect male plug from heater to female plug from unit wiring harness. (See Electric Heater Installation Instructions.)

1. Connect 208/230v power leads from field disconnect to yellow and black stripped leads.

2. Connect ground wire to unit ground lug.

**NOTE:** Units installed without electric heat should have a field-supplied sheet metal block-off plate covering the heater opening. This will reduce air leakage and formation of exterior condensation.

**⚠ WARNING**

## ELECTRIC SHOCK HAZARD

**Failure to follow this warning could result in personal injury or death and unit damage.**

**Before installing or servicing system, always turn off all power to system. There may be more than 1 disconnect switch. Turn off accessory heater power if applicable.**

**NOTE:** Before proceeding with electrical connections, make certain that supply voltage, frequency, and phase are as specified on unit rating plate. Be sure that electrical service provided by the utility is sufficient to handle the additional load imposed by this equipment. See unit wiring label for proper field high- and low-voltage wiring. Make all electrical connections in accordance with NEC and any local codes or ordinances that may apply. Use copper wire only. The unit must have a separate branch electric circuit with a field-supplied disconnect switch located within sight from, and readily accessible from the unit.

**B. 24-v Control System****CONNECTION TO UNIT**

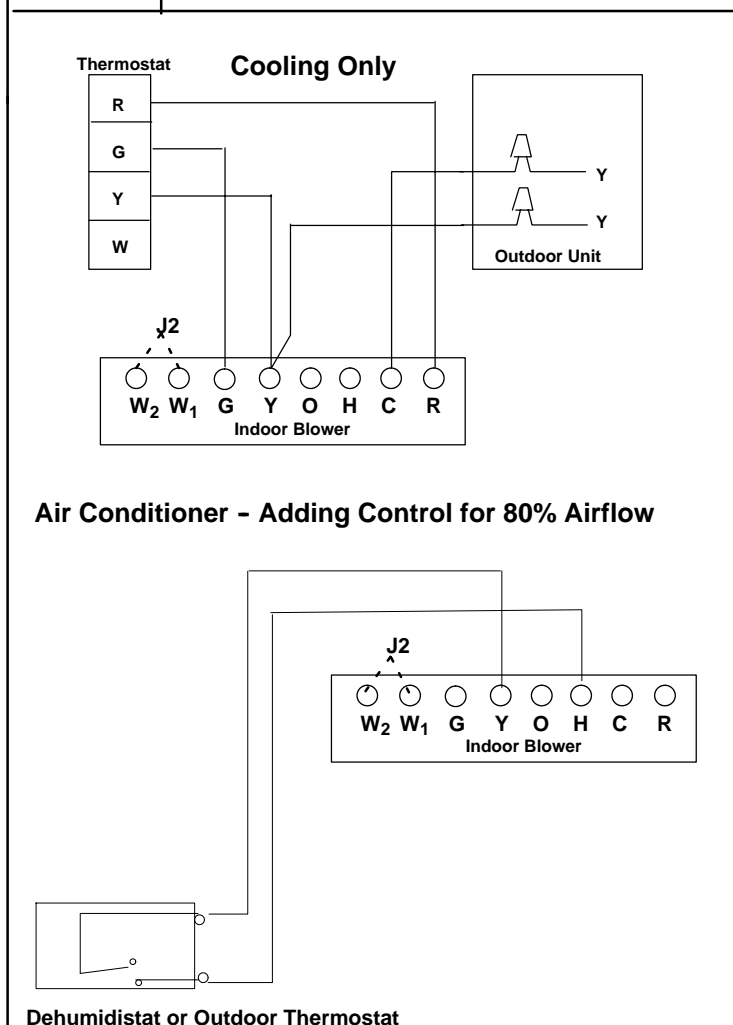
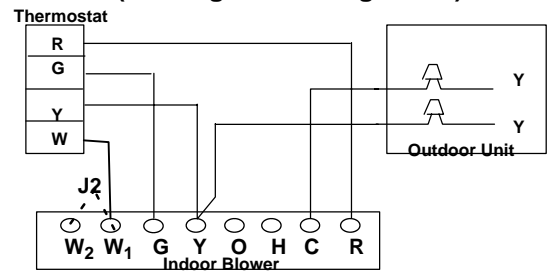
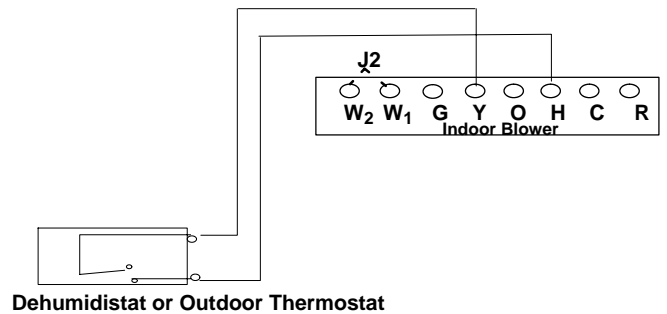
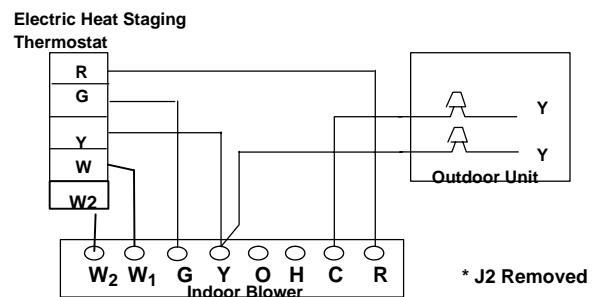
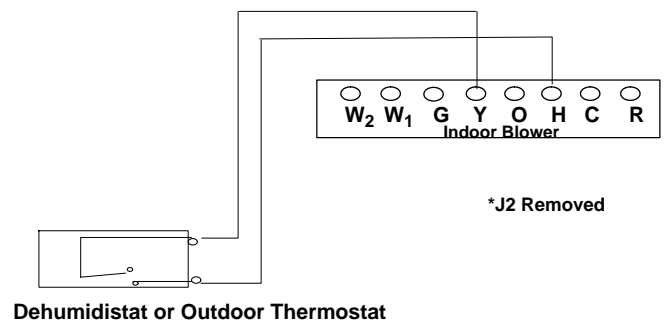
Wire low voltage in accordance with wiring label on the blower. (See Fig. 8, 10, 11, 12, 13 and 14). Use no. 18 AWG color-coded, insulated (35 C minimum) wire to make the low-voltage connections between the thermostat, the unit, and the outdoor equipment. If the thermostat is located more than 100 ft. from the unit (as measured along the low-voltage wire), use No. 16 AWG color-coded, insulated (35 C minimum) wire. All wiring must be NEC Class 1 and must be separated from incoming power leads. Refer to outdoor unit wiring instructions for any additional wiring procedure recommendations.

**TRANSFORMER INFORMATION**

Transformer is factory-wired for 230v operation. For 208v applications, disconnect the black wire from the 230v terminal on transformer and connect it to the 208v terminal. (See Fig. 14).

**HEATER STAGING**

The controls are factory circuited for single-stage operation. When 2 or 3 stages are desired, remove J2 (Jumper-2) from the control board. (See Fig. 13).

**Figure 10 Wiring Layout A/C Unit, No Heat****Figure 11****Wiring Layout Air Conditioning Unit****(Cooling and 1-Stage Heat)****Air Conditioner - Adding Control for 80% Airflow****(Cooling and 2-Stage Heat)****Air Conditioner - Adding Control for 80% Airflow**

## C. Ground Connections



### WARNING

#### ELECTRICAL SHOCK HAZARD

Failure to follow this warning could result in electric shock, fire, or death.

According to NEC, ANSI/NFPA 70, and local codes, the cabinet must have an uninterrupted or unbroken ground to minimize personal injury if an electrical fault should occur. The ground may consist of electrical wire or metal conduit when installed in accordance with existing electrical codes. If conduit connection uses reducing washers, a separate ground wire must be used.

**NOTE:** Use UL-listed conduit and conduit connector for connecting supply wire(s) to unit to obtain proper grounding. Grounding may also be accomplished by using grounding lugs provided in control box.

## D. Fan Control Board Jumper Instructions

The fan control board (see Fig. 8) has two jumpers. Jumper 1 (JP1) jumpers two of three pins. The control unit should be factory set to the VS (variable speed) position and should be left in this position in most cases.

If there is a motor or control failure, and a variable speed replacement is not readily available, it may be necessary to use a PSC motor until the proper part can be ordered. This "limp mode" can be accessed by moving JP1 to the PSC pins. In this position a PSC motor can replace the VS motor.

Jumper 2 (J2) is used to stage electric heaters. When in place, J2 ties W1 and W2 together which should be used for single stage heat. When J2 is removed, it allows W1 and W2 to be controlled separately and is for applications using two stage electric heating.

## Motor Speeds and Airflow

### See Figure 15

The motor speed can be set on one of eight speeds and the air flow will adjust between 60%, 80% and 100% depending on settings. Time ON / OFF settings can also be adjusted.

Determine coil static pressure drop, consult coil manual and measure duct system static pressure, then determine required speed setting from blower charts.

For Cooling/ HP Heating – Set switches 6, 7, and 8 on the motor control to position 0 (off) or 1 (on) as specified on blower charts.

For Electric Heating – Set switches 3, 4, and 5 on the motor control to position 0 (off) or 1 (on) as specified on blower charts.

Set switches 1 and 2 to position 0 (off) or 1 (on) as specified in Figure 12 to control Fan delay ON – OFF.

**NOTE:** Power must be completely OFF to unit any time switch settings are changed or settings will not take effect.

## Adding Humidistat or Outdoor Thermostat

Adding a humidistat or outdoor thermostat allows the airflow to be reduced to 80% of normal allowing greater humidity control. Humidistats are preferred but an outdoor thermostat can be used but can only be set based on temperature. Suggested starting point is 85 F, but this will vary depending on several factors.

The control must be wired differently on air conditioners and heat pumps. On air conditioners connect to Y and Dehum terminals H, (see Figure 10).

**HEAT PUMPS ONLY:** Heat pumps must use only the outdoor thermostat, because it is powered instead of just performing a switching function. This allows it to be out of the circuit when continuous circulation is desired, which is required for the system to operate on Fan Only for circulation, which is 60% airflow. On heat pumps connect to Y and Dehum terminals H, and C and O to power the outdoor thermostat (see Figure 12).

**NOTE:** The outdoor thermostat is not used for this application and if W and H are energized at the same time, the unit will not run. The powered outdoor thermostat only allows H to be energized when the system is in the cooling mode.

## PROCEDURE 5-REFRIGERANT TUBING AND FLOW CONTROL

Field-supplied tubing must be of refrigerant grade. Suction tube must be insulated. Do not use damaged, dirty, or contaminated tubing because it may plug refrigerant flow-control device. **ALWAYS** evacuate the coil and field-supplied tubing to 500 microns before opening outdoor unit service valves.



### CAUTION

#### UNIT DAMAGE HAZARD

Failure to follow this caution may result in unit damage.

Braze with Sil-Fos or Phos-copper on copper to copper joints and wrap a wet cloth around rear of fitting to prevent damage to TXV.



### CAUTION

#### UNIT DAMAGE HAZARD

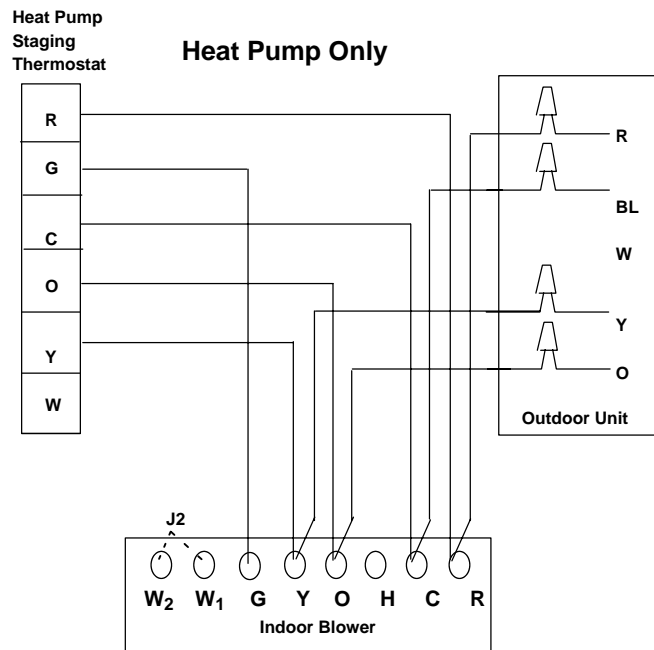
Failure to follow this caution may result in unit damage.

If using an EBV model with field installed TXV in conjunction with a single-phase reciprocating compressor, a compressor hard start kit is required.

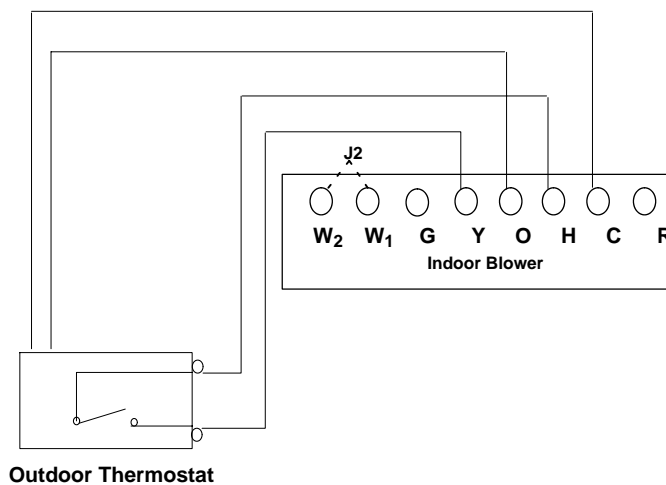


Figure 12

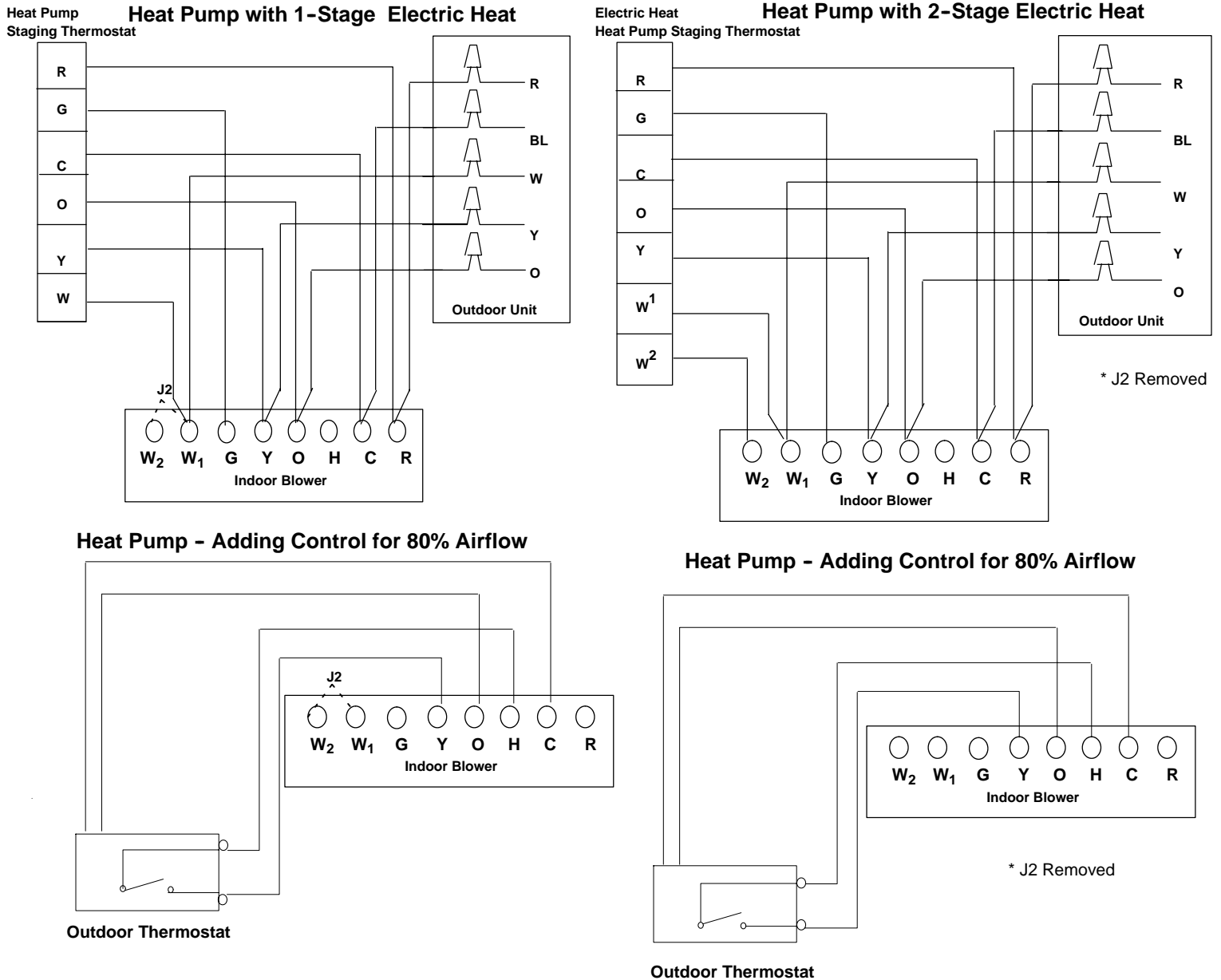
## Wiring Layout Heat Pump, No Heat

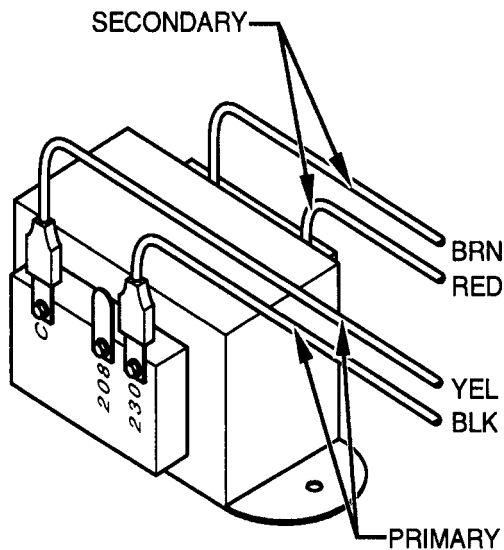


## Heat Pump - Adding Control for 80% Airflow

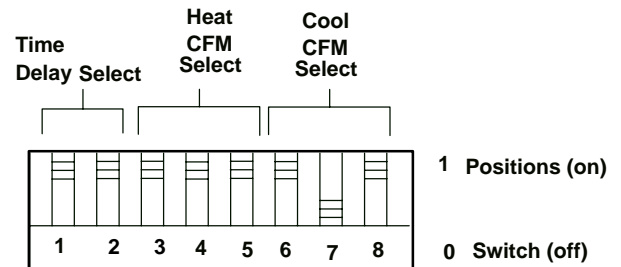


**Figure 13** Typical Low Voltage Control Schematic For Heat Pumps



**Figure 14 Transformer Connections****PROCEDURE 6-CONDENSATE DRAINS**

Units are equipped with primary and secondary 3/4-in. FPT drain connections. For proper condensate line installations see Fig. 2, 3, 5, 6 and 7. To prevent property damage and achieve optimum drainage performance, BOTH primary and secondary drain lines should be installed and include properly-sized condensate traps. (See Fig. 17). Factory-approved condensate traps are available (Kit No. EBAC01CTK1). Be sure to install plastic push-in plugs in unused condensate drain fittings. It is recommended that PVC fittings be used on the plastic condensate pan. Finger-tighten plus 1-1/2 turns. Do not over-tighten. Use pipe dope.

**Figure 15 Motor Speeds****Time Delays:**

- (0,0) = 30 Seconds
- (0,1) = 60 Seconds
- (1,0) = 90 Seconds (factory setting)
- (1,1) = 0 Seconds

**CAUTION****UNIT or PROPERTY DAMAGE HAZARD**

**Failure to follow this caution may result in property damage**

**Shallow, running traps are inadequate and DO NOT allow proper condensate drainage. (See Fig. 18).**

When connecting condensate drain lines, avoid blocking filter access panel, thus preventing filter removal. After connection, prime both primary and secondary condensate traps.

**NOTE:** When connecting condensate drain lines, avoid blocking filter access panel, thus preventing filter removal. After connection, prime both primary and secondary condensate traps.

**NOTE:** If unit is located in or above a living space where damage may result from condensate overflow, a field-supplied, external condensate

pan should be installed underneath the entire unit, and a secondary condensate line (with appropriate trap) should be run from the unit into the pan. Any condensate in this external condensate pan should be drained to a noticeable place. As an alternative to using an external condensate pan, some localities may allow the use of a separate 3/4-in. condensate line (with appropriate trap) to a place where the condensate will be noticeable. The owner of the structure must be informed that when condensate flows from the secondary drain or external condensate pan, the unit requires servicing or water damage will occur.

Figure 16

Refrigerant Flow-Control Device

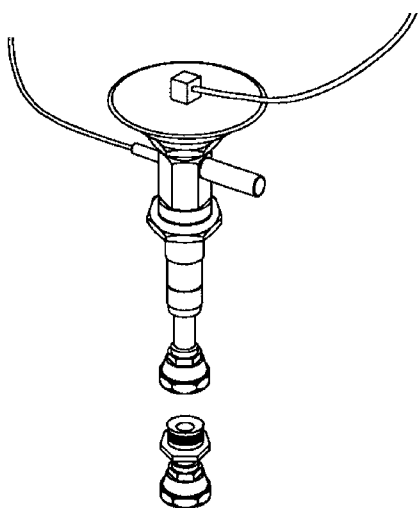


Figure 17

Recommended Condensate Trap

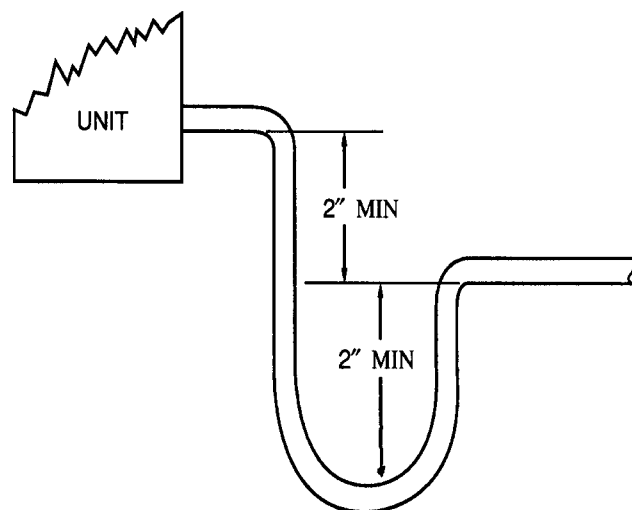
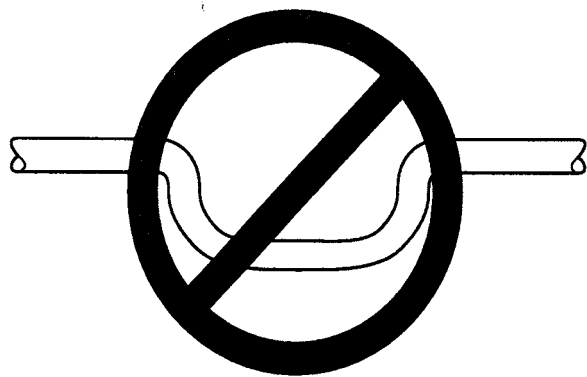


Figure 18

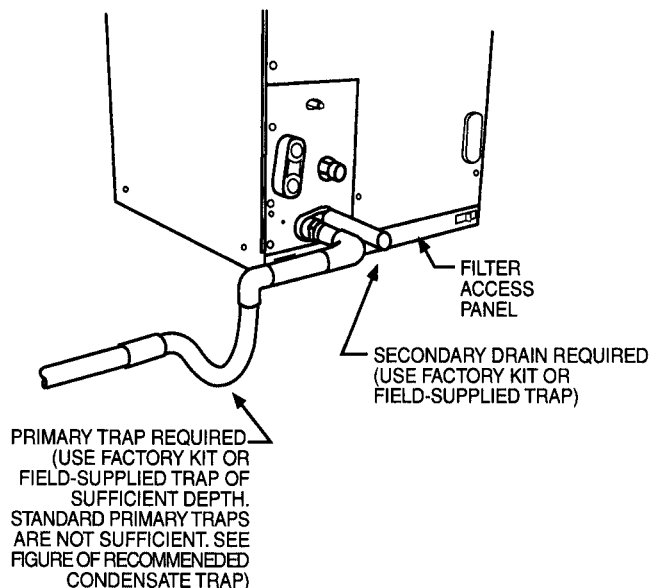
Insufficient Condensate Trap



DO NOT USE SHALLOW RUNNING TRAPS!

Figure 19

Condensate Drain



Install traps in the condensate lines as close to the coil as possible. (See Fig. 19). Make sure that the outlet of each trap is below its connection to the condensate pan to prevent condensate from overflowing the drain pan. **Prime all traps**, test for leaks, and insulate traps if located above a living area. Condensate drain lines should be pitched downward at a minimum slope of 1 in. for every 10 ft of length. Consult local codes for additional restrictions or precautions.

#### PROCEDURE 7-SEQUENCE OF OPERATION

##### A. Continuous Fan

Thermostat closes R to G. G energizes fan relay on electronic fan board which completes circuit to indoor blower motor. When G is de-energized, there is a 90 sec delay before relay opens.

##### B. Cooling Mode

Thermostat energizes R to G, R to Y, and R to O (heat pump only). G energizes fan relay on electronic fan board which completes circuit to indoor blower motor. When G is de-energized, there is a 90 sec delay before fan relay opens.

##### C. Heat Pump Heating Mode

Thermostat energizes R to G and R to Y. G energizes fan relay on electronic fan board which completes circuit to indoor blower motor. When G is de-energized, there is a 90 sec delay before fan relay opens.

##### D. Heat Pump Heating with Auxiliary Electric Heat

Thermostat energizes R to G, R to Y, and R to W. G energizes fan relay on electronic fan board which completes circuit to indoor blower motor. W energizes electric heat relay(s) which completes circuit to heater element(s). When W is de-energized, electric heat relay(s) open, turning off heater elements. When G is de-energized there is a 90 sec delay before fan relay opens.

##### E. Electric Heat or Emergency Heat Mode

Thermostat closes R to W. W energizes electric heat relay(s) which completes circuit to heater element(s). Blower motor is energized through normally closed contacts on fan relay. When W is de-energized, electric heat relay(s) opens.

#### START-UP PROCEDURES

Refer to outdoor unit Installation Instructions for system start-up instructions and refrigerant charging method details.



## CAUTION

#### UNIT DAMAGE HAZARD

Failure to follow this caution may result in poor unit operation, performance or unit damage.

**Never operate unit without a filter. Damage to blower motor or coil may result. Factory authorized filter kits must be used when locating the filter inside the unit. For those applications where access to an internal filter is impractical, a field-supplied filter must be installed in the return duct system.**

#### CARE AND MAINTENANCE

To continue high performance and minimize possible equipment failure, it is essential that periodic maintenance be performed on this equipment. Consult your local dealer as to the proper frequency of maintenance contract. The ability to properly perform maintenance on this equipment requires certain mechanical skills and tools. If you do not possess these, contact your dealer for maintenance. The only consumer service recommended or required if filter replacement or cleaning on a monthly basis.

## Airflow Curves

