# Installation Instruction

## Direct Expansion Fan Coil Units Sizes 018—071

## PF1MNB

**NOTE:** Read the entire instruction manual before starting the installation.
This symbol → indicates a change from the last publication.

### SAFETY CONSIDERATIONS

Improper installation, adjustment, alteration, service, maintenance, or use can cause explosion, fire, electrical shock, or other conditions which may cause personal injury or property damage. Consult a qualified installer, service agency, or your distributor or branch for information or assistance. The qualified installer or agency must use factory-authorized kits or accessories when modifying this product. Refer to the individual instructions packaged with the kits or accessories when installing.

Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloth for brazing operations. Have fire extinguisher available. Read these instructions thoroughly and follow all warnings or cautions attached to the unit. Consult local building codes and National Electrical Code (NEC) for special requirements.

Recognize safety information. This is the safety-alert symbol ⚠ . When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury.

Understand the signal word, DANGER, WARNING, and CAUTION. These words are used with the safety-alert symbol. DANGER identifies the most serious hazards which **will** result in severe personal injury or death. WARNING signifies hazards which **could** result in personal injury or death. CAUTION is used to identify unsafe practices which **would** result in minor personal injury or product and property damage. NOTE is used to highlight suggestions which will result in enhanced installation, reliability, or operation.

**⚠ WARNING: Before installing or servicing unit, always turn off all power to unit. There may be more than 1 disconnect switch. Turn off accessory heater power if applicable. Electrical shock can cause personal injury or death.**

### INTRODUCTION

Model PF1MNB Fan Coil Units are designed for flexibility and can be used for upflow, horizontal, or downflow applications.

→ These units are designed to meet the low air leak requirements currently in effect. Because of this, the units need special attention in the condensate pan and drain connection area and when brazing tubing. These units are available for application in systems of 18,000 through 60,000 Btuh nominal cooling capacities. (See Fig. 2 and 3.) Factory-authorized, field-installed electric heater packages are available in 3 through 30 kw. See Product Data for available accessory kits.

### → HEATER PACKAGES

This unit may or may not be equipped with an electric heater package. For units not equipped with factory installed heat, 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. If fan coil contains a factory installed heater package, minimum circuit ampacity (MCA) and maximum fuse/breaker may be different than units with a same size field installed accessory heater. The difference is not an error and is due to calculation difference per UL guidelines.

### 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 UNIT

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

**IMPORTANT:** When unit is installed over a finished ceiling and/or living area, building codes may require a field-supplied secondary condensate pan to be installed under entire unit. Some localities may allow as an alternative, the running of a separate, secondary condensate line. Consult local codes for additional restrictions or precautions.

#### A. Upflow Installation

If return air is to be ducted through a floor, set unit on floor over opening and use 1/8- to 1/4-in. thick fireproof resilient gasket between duct, unit, and floor.

Side return is a field option on slope coil models. Cut opening per dimensions. (See Fig. 1.) A field-supplied bottom closure is required.

Form: IM-PF1M-04 Cancels: IM-PF1M-03 Printed in U.S.A. 1-03 Catalog No. 53PF-1M5

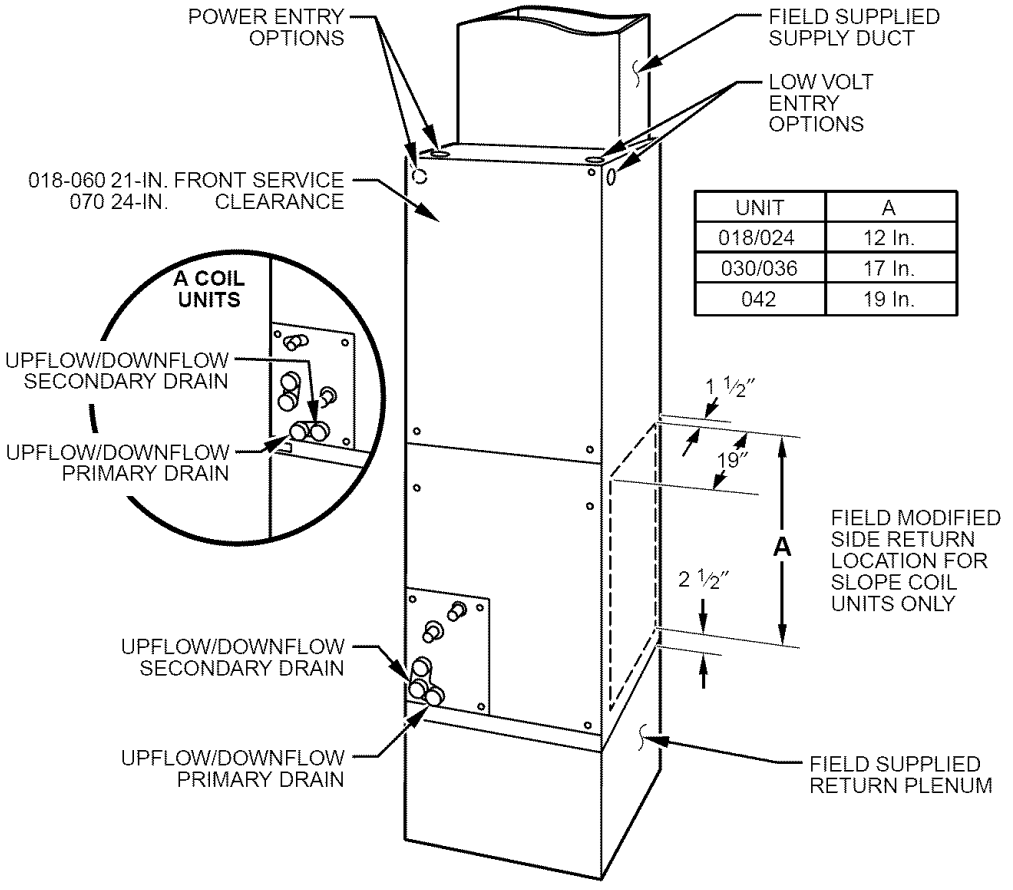


**Fig. 1—Slope Coil Unit in Upflow Application**

### B. Downflow Installation

→ **NOTE:** To convert units for downflow applications, refer to Installation Instructions supplied with kit for proper installation. For slope fan coils, use kit Part No. KFADC0201SLP. For A fan coils use kit Part No. KFADC0401ACL. Use fireproof resilient gasket, 1/8- to 1/4-in. thick, between duct, unit, and floor.

**NOTE:** Gasket kit number KFAHD0101SLP is also required for all downflow applications to maintain low air leak/low sweat performance.

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→ ⚠ **CAUTION: The conversion of the fan coil to downflow requires special procedures for the condensate drains on both A-coil and Slope units.**
**The vertical drains have an overflow hole between the primary and secondary drain holes. This hole is plugged for all applications except downflow, but must be used for downflow.**
**During the conversion process, remove the plastic cap covering the vertical drains only and discard. Remove the plug from the overflow hole and discard. At completion of the downflow installation, caulk around the vertical pan fitting to door joint to retain the low air leak performance of the unit.**

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### C. Horizontal Installation

Units must not be installed with access panels facing up or down. Units are factory built for horizontal left installation (See Fig. 2 and 6.) When suspending unit from ceiling, dimples in casing indicate suitable location of screws for mounting metal support straps. (See Fig. 2.)

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⚠ **CAUTION: To ensure proper drainage for horizontal installations, unit must be installed level with its long direction or slightly raised at the return air inlet 1/4-in., and pitched slightly towards condensate drain, 1/4-in. to 1/2-in.**

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**NOTE:** Modular units (sizes 070, 071) can be disassembled and components moved separately to installation area for reassembly. This process accommodates small scuttle holes and limiting entrances to installation sites. (See Fig. 3.)

HORIZONTAL RIGHT CONVERSION OF UNITS WITH SLOPE COILS

→ **NOTE:** Gasket kit number KFAHD0101SLP 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. 4.)
2. Remove coil mounting screw securing coil assembly to right-side casing flange.
3. Remove coil assembly.
4. Lay fan coil unit on its right side and reinstall coil assembly with condensate pan down. (See Fig. 4.)
5. Attach coil to casing flange using coil mounting screw previously removed.

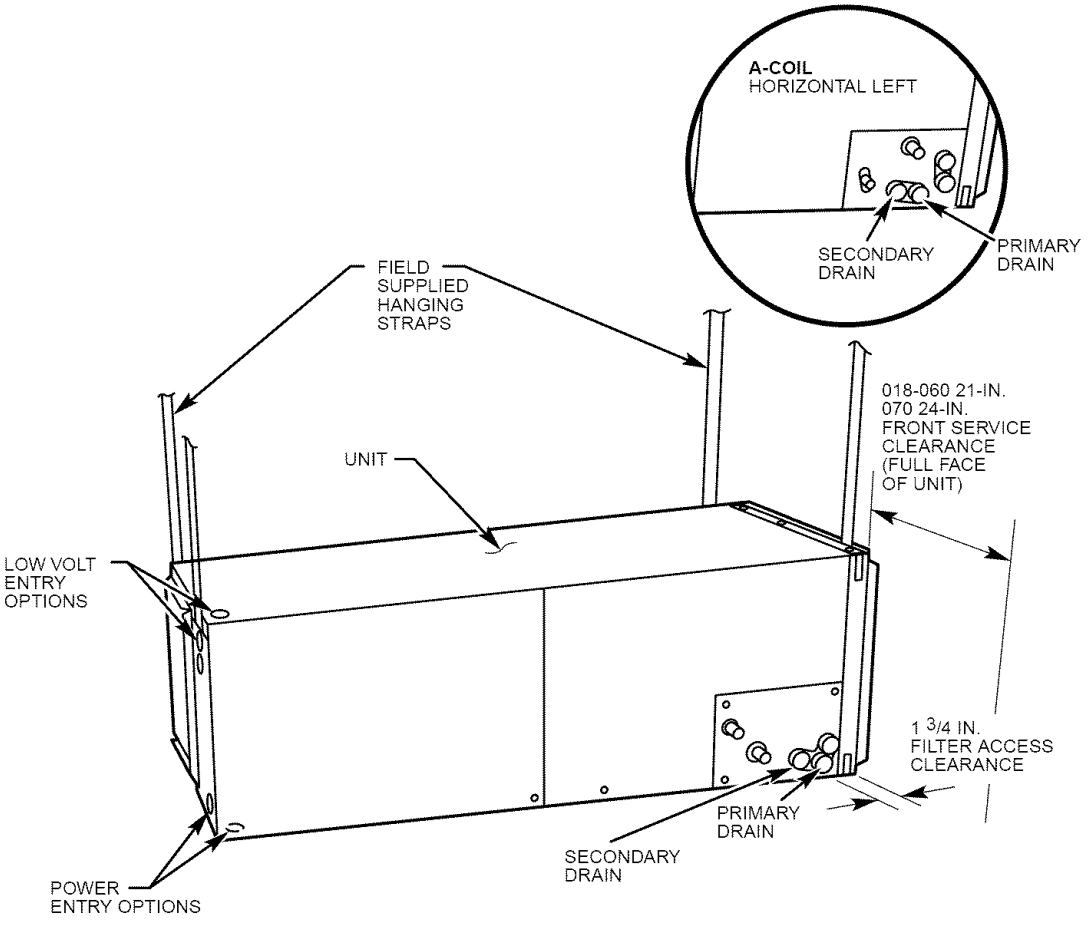


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**Fig. 2—Slope Coil Unit in Horizontal Left Application**

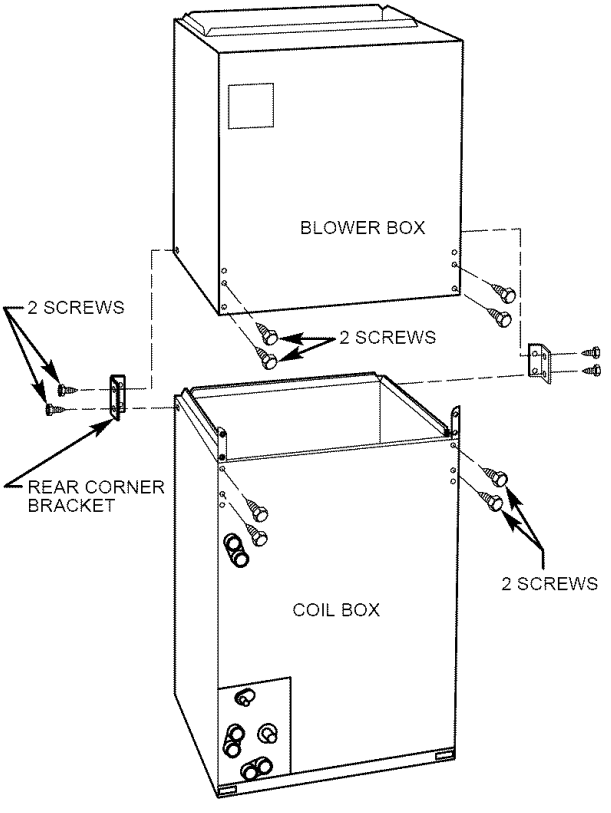


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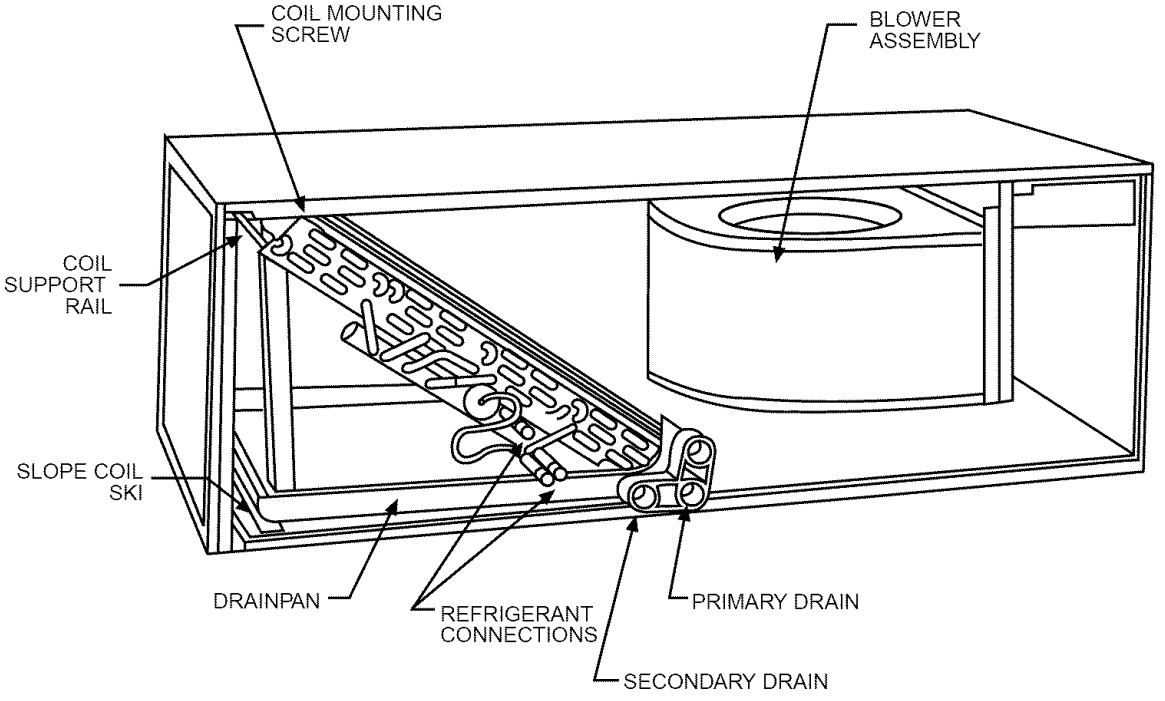
**Fig. 3—Removal of Brackets on Modular Unit**

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→ **Fig. 4—Conversion for Horizontal Right Applications Using a Slope Coil**

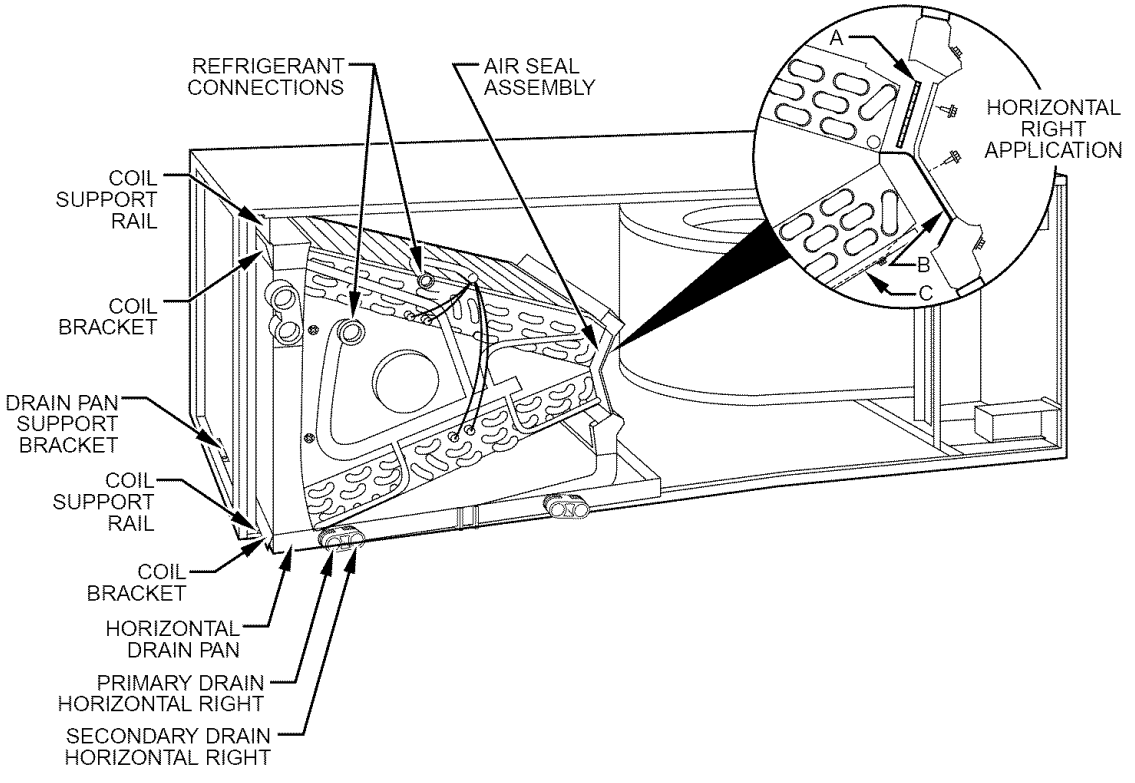


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**Fig. 5—Conversion for Horizontal Right Applications Using A-Coil**

→ 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 KFAHD per kit instructions.

8. 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.

HORIZONTAL RIGHT CONVERSION OF UNITS WITH A-COIL

1. Remove blower and coil access panels. (See Fig. 5.)
2. Remove metal clip securing fitting panel to condensate pan. Remove fitting panel.
3. Remove 2 snap-in clips securing A-coil in unit.

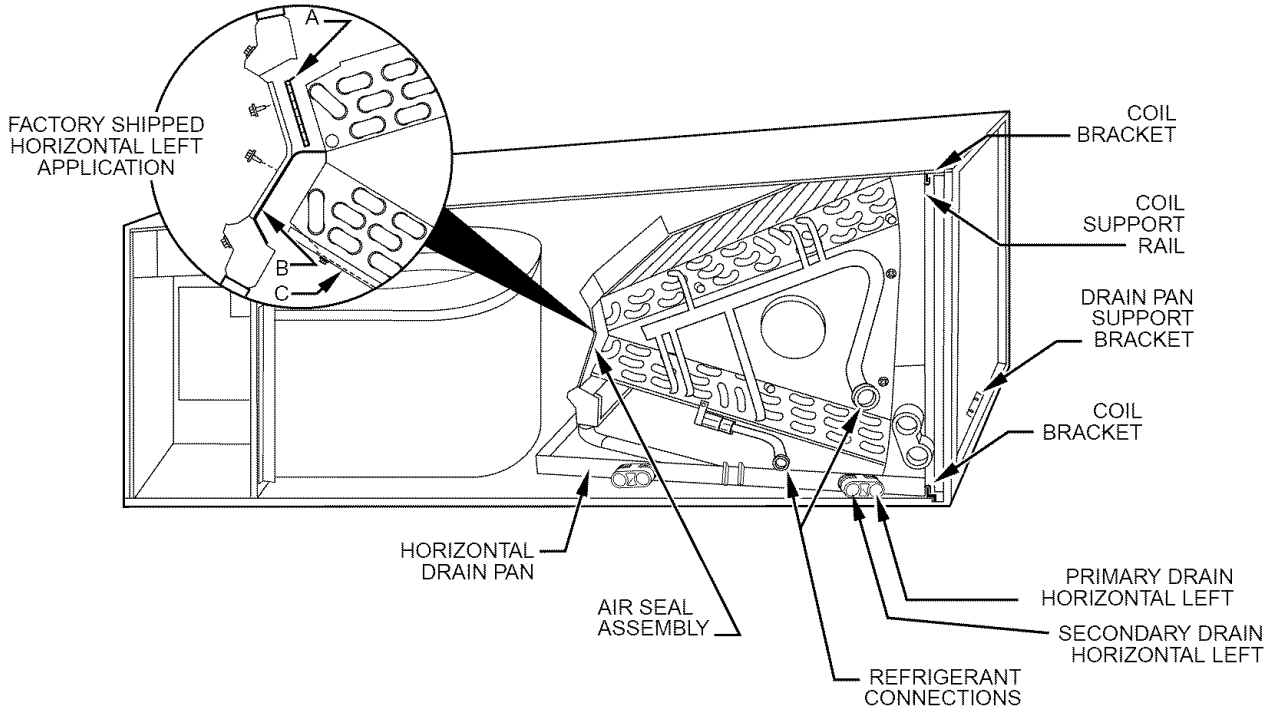



**Fig. 6—A-Coil in Horizontal Left Application (Factory Ready)**

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
   a. Remove air-seal assembly from coil by removing 4 screws. (See Fig. 5.)
   b. Remove air splitter (B) from coil seal assembly by removing 3 screws. (See Fig. 5—factory-shipped inset.)
   c. Remove filler plate (A) and install air splitter (B) in place of filler plate.
   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 offset is used on right side of unit to secure horizontal pan.
10. → Remove two oval fitting caps from the left side of the coil door and fitting panel.
11. Remove insulation knockouts on right side of coil access panel.
12. Remove 2 oval coil access panel plugs and reinstall into holes on left side of coil access panel and fitting panel.
13. → Install condensate pan fitting caps (from Step 10) in the right side of the coil door making sure that the cap snaps and seats cleanly on the back side of the coil door. Make sure no insulation interferes with seating of the cap.
14. Reinstall access and 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.

## PROCEDURE 3—AIR DUCTS

Connect supply-air duct over outside of the 3/4-in. flanges provided on supply-air opening. Secure duct to flange, using proper fasteners for the 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.

→ Units equipped with 20-30kw electric heaters require a 1-in. clearance to combustible materials for the first 36 in. of supply duct.

### A. Ductwork Acoustical Treatment

Metal duct systems that do not have a 90° elbow and 10 ft of main duct to first branch takeoff 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.

## PROCEDURE 4—ELECTRICAL CONNECTIONS

**NOTE:** See B for electrical connection of size 071.

### A. Sizes 018 Through 070

All products from the factory utilize a printed-circuit board (PCB) which has a low-voltage circuit protective fuse (5 amp), fan motor speed tap selection terminal (SPT), and time delay relay (TDR) jumper. To disable the TDR feature, cut the JW1 jumper wire. (See Fig. 7.)

When a factory-approved accessory heater package has been installed, check all factory wiring per unit wiring diagram and inspect factory wiring connections to be sure none were loosened in transit or installation. See unit rating plate for approved heater packages.

**⚠ CAUTION: If a disconnect switch is to be mounted on the unit, select a location where drill or fastener will not contact electrical or refrigerant components.**

Before proceeding with electrical connections, make certain that supply voltage, frequency, phase, and ampacity are as specified on 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.

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

**⚠ WARNING: 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.**

#### LINE-VOLTAGE CONNECTIONS

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

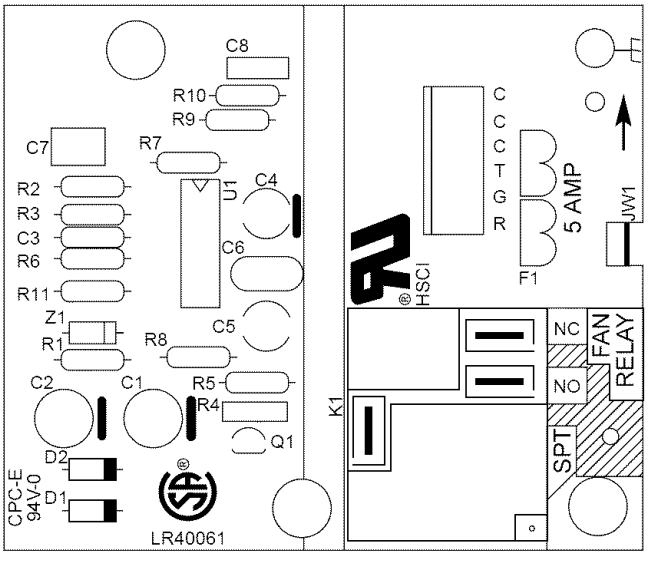
For units without electric heat:

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.

#### 24-V CONTROL SYSTEM

1. Connection To Unit—Wire low voltage in accordance with wiring label on blower. (See Fig. 8, 9, 10, 11, and 12.) 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 thermostat is located more than 100 ft from 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.
2. Transformer Information—Transformer is factory wired for 230-v operation. For 208-v applications, disconnect black wire from 230-v terminal on transformer and connect it to the 208-v terminal. (See Fig. 13.)
3. Heater Staging—The controls are factory-circuited for single-stage operation. For 2-stage operation, use outdoor thermostat kit KHAOT0301FST, and for 3-stage use both kits KHAOT0201SEC and KHAOT0301FST. When 2 stages are desired, cut W3 at the W2 wire nut, strip and reconnect per the thermostat kit instruction. (See Fig. 11.) When 3 stages are desired, cut the W2 wire nut off and discard. Strip W2, W3, and E and reconnect per thermostat kit instructions. (See Fig. 12.)

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→ **Fig. 7—Fan Coil Printed-Circuit Board**

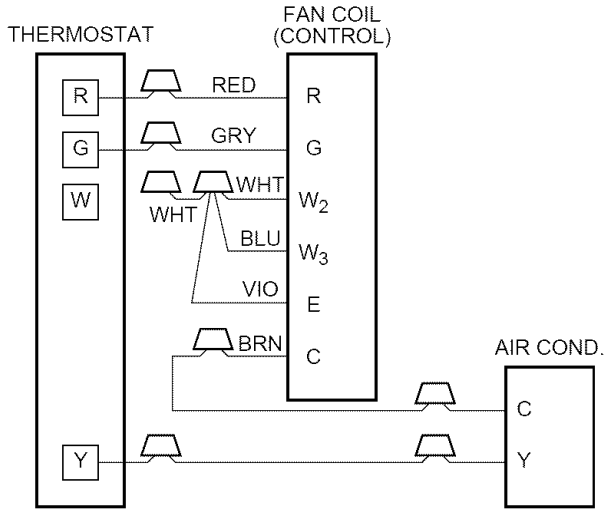


**Fig. 8—Wiring Layout Air Conditioning Unit (Cooling Only)**

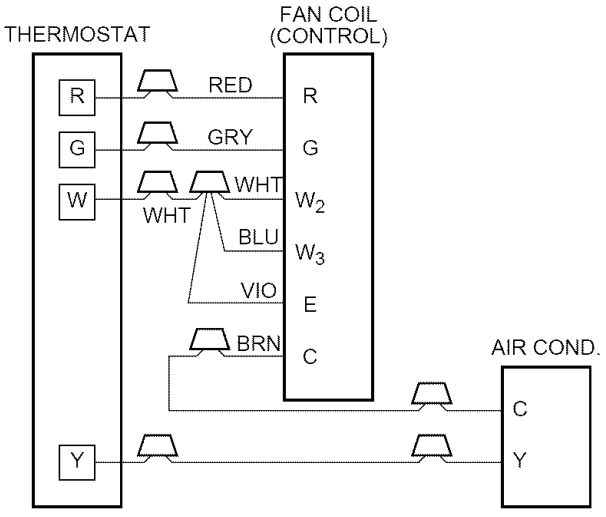


**Fig. 9—Wiring Layout Air Conditioning Unit (Cooling and 1-Stage Heat)**

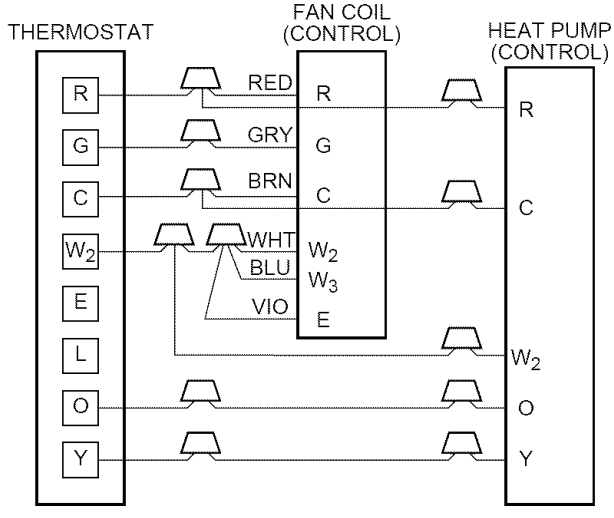


**Fig. 10—Wiring Layout Heat Pump Unit (Cooling and 2-Stage Heat with No Outdoor Thermostat)**

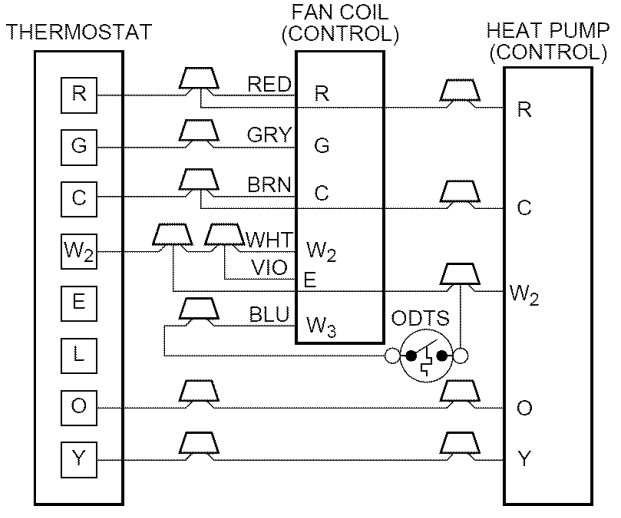


**Fig. 11—Wiring Layout Heat Pump Unit (Cooling and 2-Stage Heat with 1 Outdoor Thermostat)**

⚠ **CAUTION: If W2, W3, and E on any 3 stage heater (18, 20, 24, or 30kw), are individually connected as with outdoor thermostats or any other situation, emergency heat relay must be used. This relay is in kit KHAOT0201SEC and is normally used with kit KHAOT0301FST for a 2 outdoor thermostat system.**

**NOTE:** When 3 stages are used or anytime the E terminal is not tied to W2, the emergency heat relay, part of outdoor thermostat kit KHAOT0201SEC must be used.

GROUND CONNECTIONS

→ ⚠ **WARNING: 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 conection uses reducing washers, a separate ground wire must be used. (See Ground/Conduit Note below.) Failure to follow this warning could result in electric shock, fire, or death.**

**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.

MINIMUM CFM AND MOTOR SPEED SELECTION

Units with or without electric heaters require a minimum CFM. Refer to unit wiring label to ensure that fan speed selected is not lower than minimum fan speed indicated.

Fan speed selection is done at fan relay on printed-circuit board. To change motor speeds, disconnect fan lead used on relay terminal (SPT) and replace with motor speed tap desired. (See Fig. 14.) Save insulating cap and place on motor lead removed from relay.

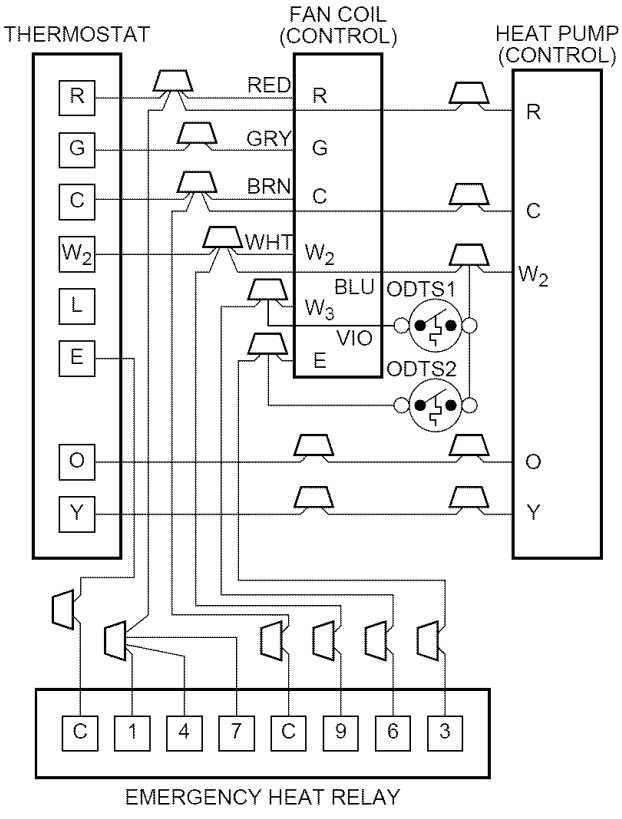


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**Fig. 12—Wiring Layout Heat Pump Unit (Cooling and 2-Stage Heat with 2 Outdoor Thermostats)**

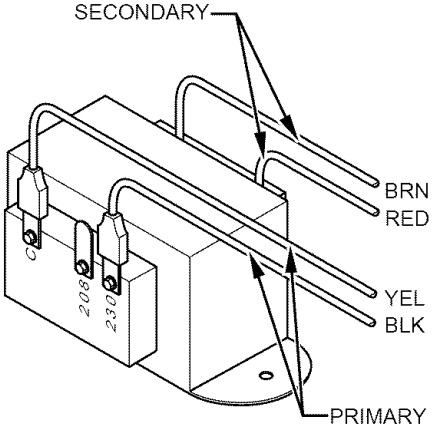


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**Fig. 13—Transformer Connections**

**NOTE:** In low static applications, lower motor speed tap should be used to reduce possibility of water being blown off coil.

Sizes 018 through 036 have 2 motor speed taps. Sizes 042 through 070 have 3 motor speed taps. Low speed (red) is designed for mismatch outdoor unit applications. Medium speed (blue) is designed for straight matched operations. High speed (black) is used with high external static duct systems of straight matched systems.

**B. Size 071**

LINE-VOLTAGE CONNECTIONS

Units with 15- and 20-kw heaters are factory wired for dual-circuit operation. When single-circuit operation is required, install factory-authorized adapter kit for fused models only.

Check all factory wiring per unit wiring diagram and inspect factory wiring connections to be sure none were loosened in transit or installation.

**⚠ WARNING: 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. Electrical shock can cause personal injury or death.**

**⚠ CAUTION: If a disconnect switch is to be mounted on the unit, select a location where drill or fastener will not contact electrial or refrigerant components. Electrical shock can cause personal injury or death.**

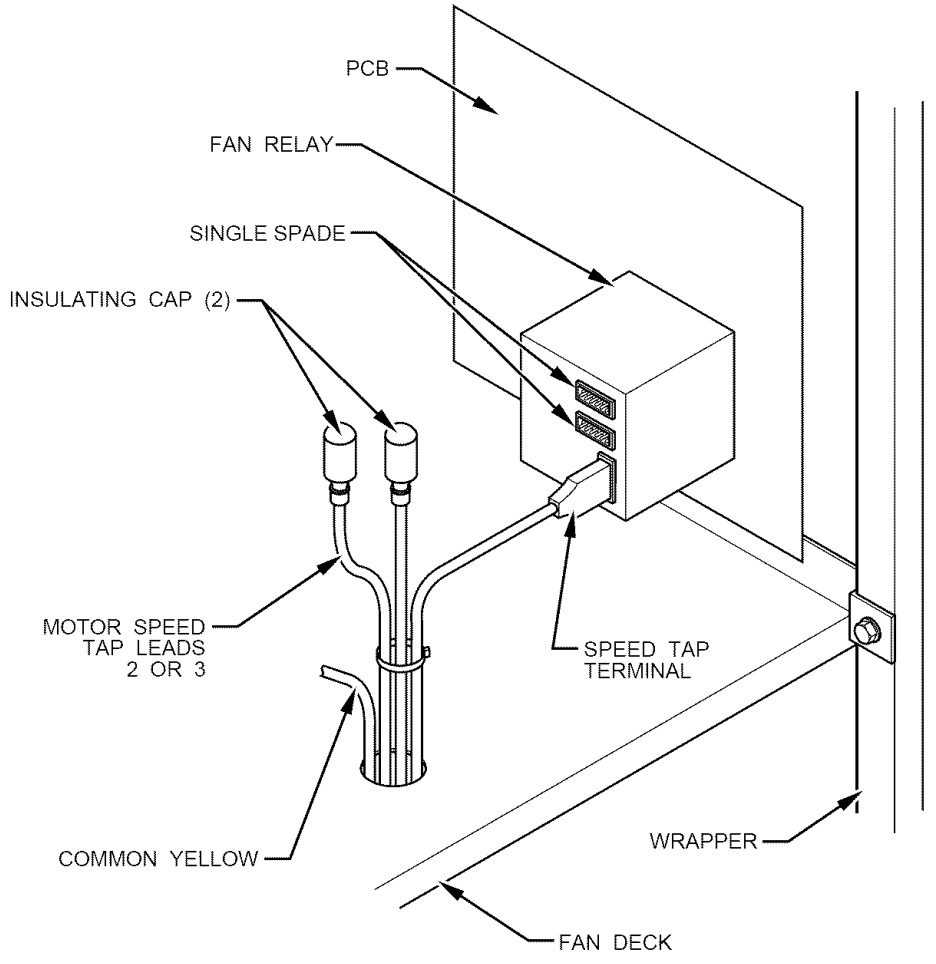



**Fig. 14—Fan Coil Fan Relay and Speed Tap Terminal**

**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.

### 24-V CONTROL SYSTEM CONNECTIONS TO UNIT PRINTED-CIRCUIT BOARD (PCB)

Refer to unit wiring instructions for recommended wiring procedures. Use No. 18 AWG color-coded, insulated (35°C minimum) wires to make low-voltage connections between thermostat and unit. If thermostat is located more than 100 ft from unit (as measured along the low-voltage wires), use No. 16 AWG color-coded, insulated (35°C minimum) wires. PCB is circuited for single-stage heater operation. When additional heater staging is desired using 2-stage or outdoor thermostats, see applicable outdoor unit instructions. Remove Jumper J2 on PCB.

1. The 5-, 8-, and 10-kw heaters are single stage only.
2. The 9- and 15-kw heaters are adaptable for 2-stage operation.
3. The 18-, 20-, 24- and 30-kw heaters are adaptable for up to 3-stage operation.

Connect low-voltage leads to thermostat and outdoor unit. (See Fig. 15.)

**NOTE:** Where local codes require thermostat wiring be routed through conduit or raceways, splices can be made inside fan coil unit. All wiring must be NEC Class 1 and must be separated from incoming power leads.

A factory-authorized disconnect kit is available for installation of 0- through 10-kw applications. When electric heat packages with circuit breakers are installed, the circuit breaker can be used as a disconnect.

Transformer is factory wired for 230-v operation. For 208-v applications, disconnect black wires from 230-v terminal on the transformer and connect them to the 208-v terminal. (See Fig. 13.)

The secondary circuit of the transformer is protected by a 5-amp fuse mounted on the printed-circuit board.

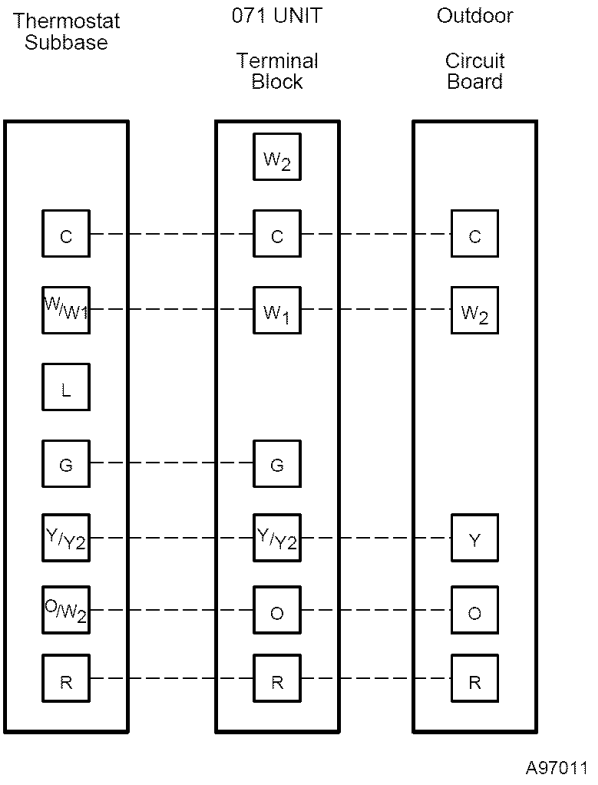



**Fig. 15—Single-Speed Heat Pump Wiring**

GROUND CONNECTIONS

**⚠ WARNING: The cabinet must have an uninterrupted or unbroken ground according to NEC, ANSI/NFPA 70 and local codes 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. (See Ground/Conduit Note below.) Failure to follow this warning could result in an electrical shock, fire, or death.**

**NOTE:** Use UL listed conduit and conduit connector to connect supply wire(s) to unit and obtain proper grounding. Grounding may also be accomplished by using grounding lug provided in control box. Use of dual or multiple supply circuits will require grounding of each circuit to ground lugs provided on unit and heaters.

**PROCEDURE 5—REFRIGERANT TUBING**

Use accessory tubing package or field-supplied tubing 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 coil and field-supplied tubing to 500 microns before opening outdoor unit service valves.

→ **⚠ CAUTION: A brazing shield MUST be used when tubing sets are being brazed to the unit connections to prevent damage to the unit surface and condensate pan fitting caps.**

→ Units have sweat suction and liquid tube connections. Make suction tube connection first.

1. Cut tubing to correct length.
2. Insert tube into sweat connection on unit until it bottoms.
3. Braze connection using silver bearing or non-silver bearing brazing materials. Do not use solder (materials which melt below 800°F). Consult local code requirements.

→ **⚠ CAUTION: Wrap a wet cloth around rear of fitting to prevent damage to TXV and factory-made joints.**

4. Evacuate coil and tubing system to 500 microns using deep vacuum method.

**PROCEDURE 6—REFRIGERANT FLOW-CONTROL DEVICE**

**⚠ CAUTION: If using a TXV (071 size factory installed) in conjunction with a single-phase reciprocating compressor, a compressor start capacitor and relay are required. Consult outdoor unit pre-sale literature for start assist kit part number.**

Replace piston if required. Check piston size shown on indoor unit rating plate to see if it matches required piston shown on outdoor unit rating plate. If it does not match, replace indoor piston with piston shipped with outdoor unit. The piston shipped with outdoor unit is correct for any approved indoor coil combination. (See Fig. 16.) When changing piston, use a back-up wrench. Hand tighten hex nut, then tighten with wrench 1/2 turn. Do not exceed 30 ft-lbs.

## PROCEDURE 7—CONDENSATE DRAINS

→ ⚠ **CAUTION: The conversion of the fan coil to downflow requires special procedures for the condensate drains on both A-coil and Slope units.**
**The vertical drains have an overflow hole between the primary and secondary drain holes. This hole is plugged for all applications except downflow, but must be used for downflow.**
**During the conversion process, remove the plastic cap covering the vertical drains only and discard. Remove the plug from the overflow hole and discard. At completion of the downflow installation, caulk around the vertical pan fitting to door joint to retain the low air leak performance of the unit.**

→ To connect drains the cap openings must be removed. Use a knife to start the opening near the tab and using pliers, pull the tab to remove the disk. Clean the edge of the opening if necessary and install the condensate line. Finally caulk around the lines where they exit the fitting to retain the low leak rating of the unit.

Units are equipped with primary and secondary 3/4 in. FPT drain connections. For proper condensate line installation see Fig. 1, 2, 4, 5, and 6. 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 and 19.) Factory-approved traps are available. It is recommended that PVC fittings be used on the plastic condensate pan. Do not over-tighten. Finger-tighten plus 1-1/2 turns. Use pipe dope.

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

**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 entire unit, and a secondary condensate line (with appropriate trap) should be run from unit into 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 condensate will be noticeable. The owner of the structure must be informed that when condensate flows from the secondary drain or external condensate pan, unit requires servicing or water damage will occur.

Install traps in condensate lines as close to coil as possible. (See Fig. 19.) Make sure that outlet of each trap is below its connection to 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 8—ACCESSORIES

### A. Electric Heaters

See unit rating plate for factory approved electric heater kits. Follow installation instructions provided with kit.

### B. Electronic Air Cleaner

SIZES 018—070

The Electronic Air Cleaner may be connected to fan coil as shown in Fig. 20. This method requires a field supplied 240v/120v 40va transformer because it uses the 230-v fan coil power supply.

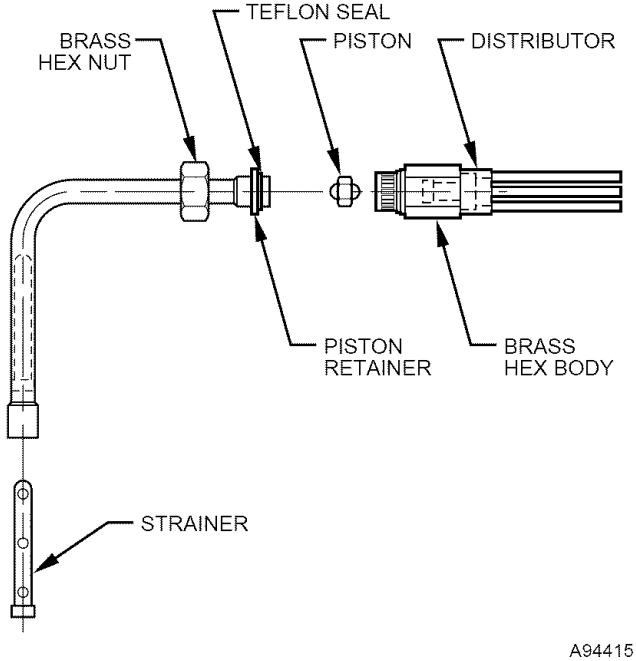
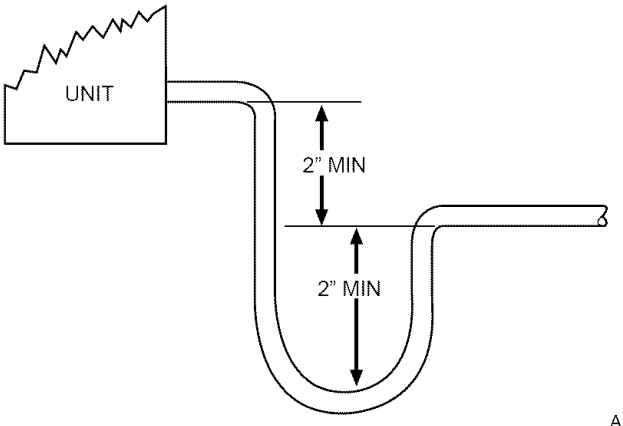
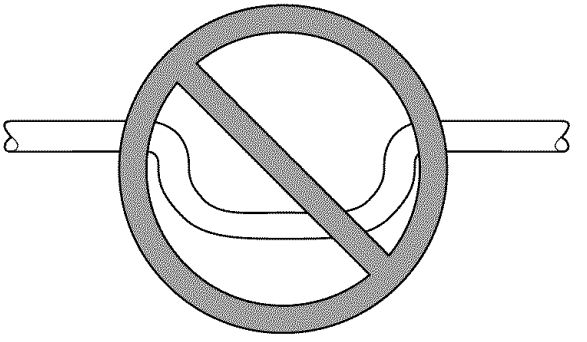



**Fig. 16—Refrigerant Flow-Control Device (071 Size Has TXV and Strainer)**




A03002

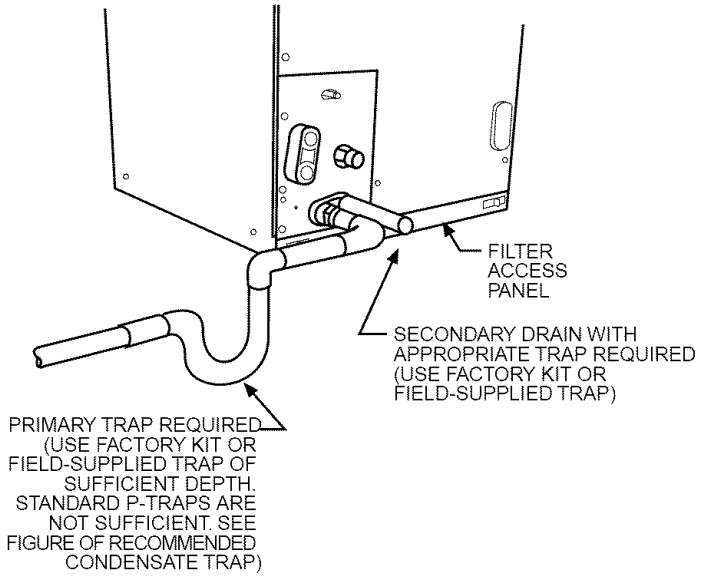
→ **Fig. 17—Recommended Condensate Trap**



DO NOT USE SHALLOW RUNNING TRAPS!

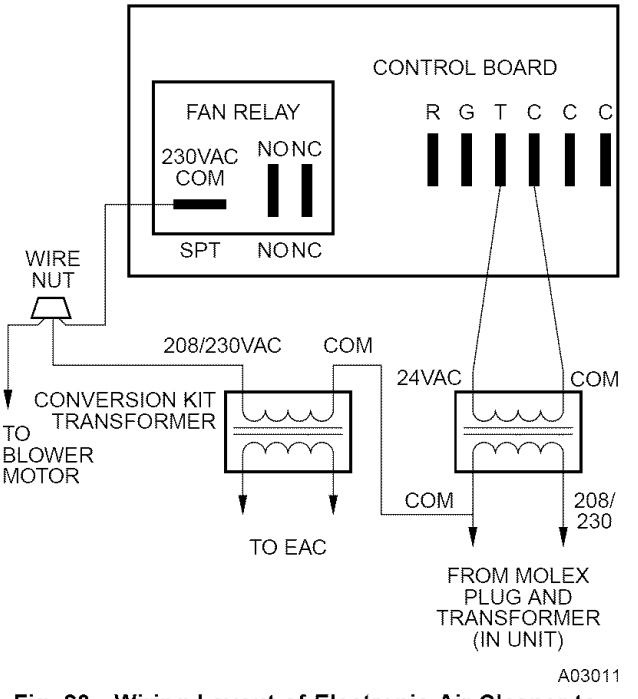
A03013

→ **Fig. 18—Insufficient Condensate Trap**




A03003

→ **Fig. 19—Condensate Drain**




A03011

→ **Fig. 20—Wiring Layout of Electronic Air Cleaner to Fan Coil — Sizes 018—070**

SIZE 071

Because the ECM blower motor used in the 071 size fan coil is controlled by low-voltage signals, a switched 230vac electronic air cleaner power signal is not available. This signal is replaced by a 24vac signal which is provided at PCB terminals AUX1 and AUX2 (See Fig. 21.) This signal is present whenever the G thermostat signal is present (heat pump heating, cooling and continuous blower modes). When the fan coil is installed with an electric air cleaner, use field supplied 24vac relay.

The EAC relay kit consists of a 24vac relay which mounts directly on the PCB bracket inside the fan coil using factory punched screw holes, 2 mounting screws, 2 pre-terminated wires for connection of the relay coil to the AUX1 and AUX2 terminals, 2 No. 16 AWG stripped leads for connection of the relay contacts for control of power to the EAC, wire nuts, and wiring instructions. (See Fig. 22.)

If the EAC relay is field supplied, use field supplied wiring, terminations and wire per the EAC wiring schematic. (See Fig. 23.)

**NOTE:** When the 071 size is installed with an air conditioner and the electric heat is the primary heating device, a thermostat which turns on the G output with a call for heat is required for air cleaning or humidification during heating mode. A thermostat with the fan-on with W option set to "on" is recommended.

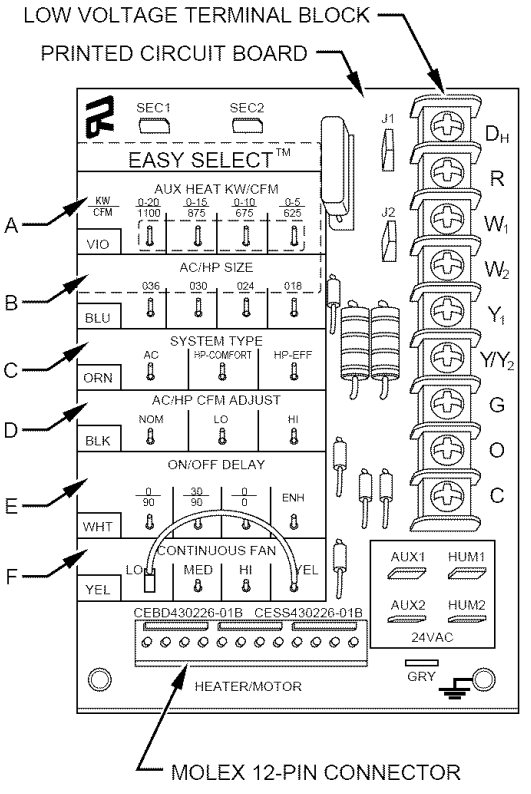
### C. Humidifier

SIZES 018—070

Connect humidifier and humidistat to fan coil unit as shown in Fig. 24 and 25. The cooling lockout relay is optional. (See Fig. 24.)

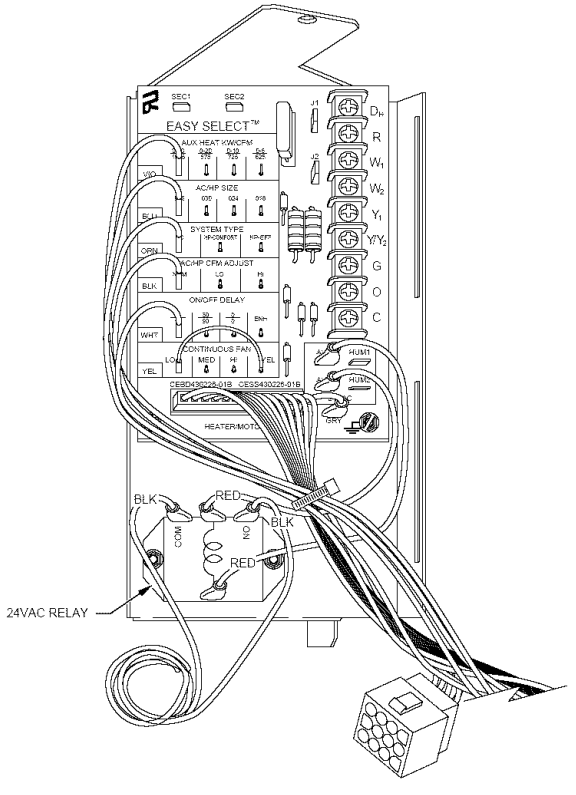
SIZE 071

Terminals HUM1 and HUM2 are provided for direct connection to the low-voltage control of a humidifier through a standard humidistat. These terminals are energized with 24-vac when G thermostat signal is present. (See Fig. 27.) Alternately, the 24vac signal may be sourced from the W and C terminal block connections.



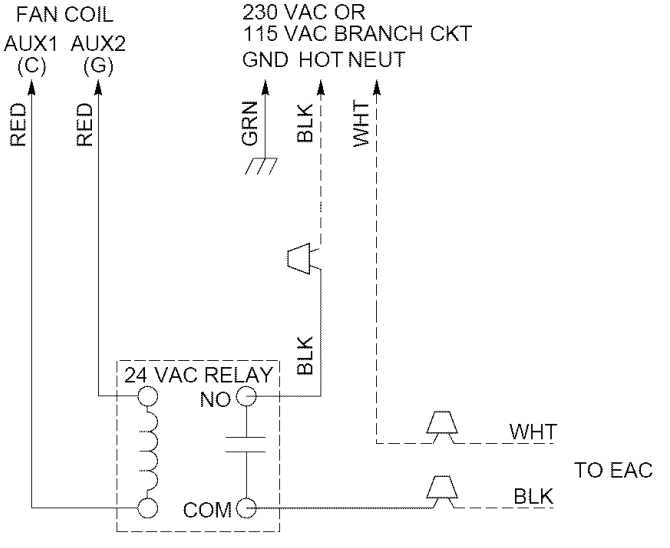

A95275

**Fig. 21—Detail of PF1MNB071 Printed-Circuit Board**



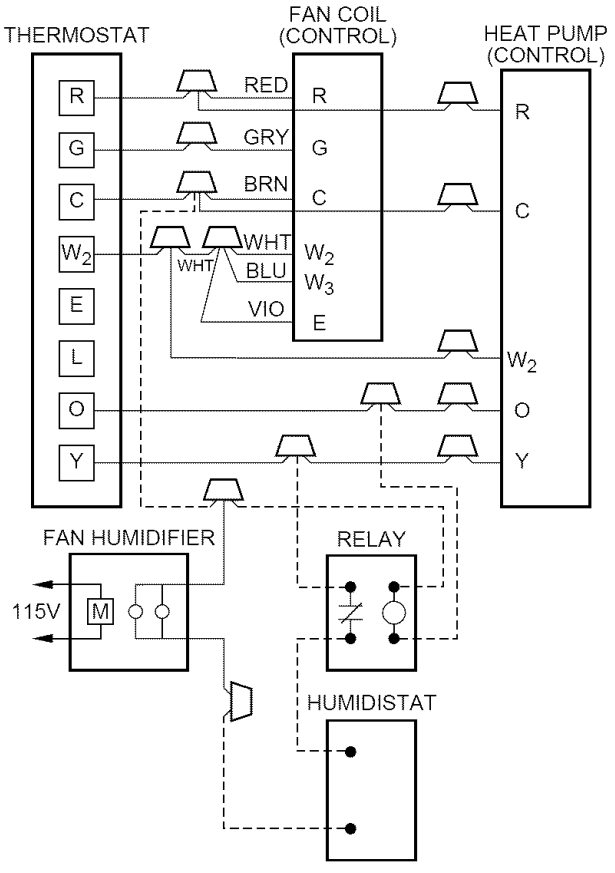

A95277

**Fig. 22—PCB Mounted with Wiring and Accessory Air Cleaner Relay**



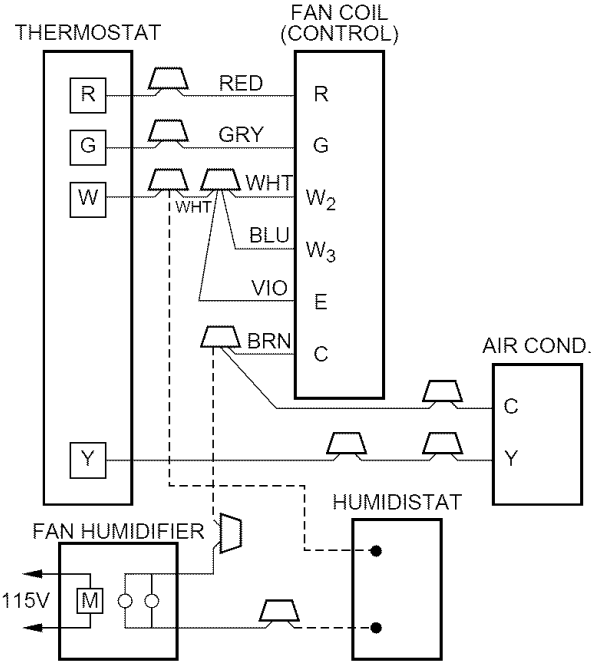

A98625

**Fig. 23—EAC Relay Wiring Schematic**



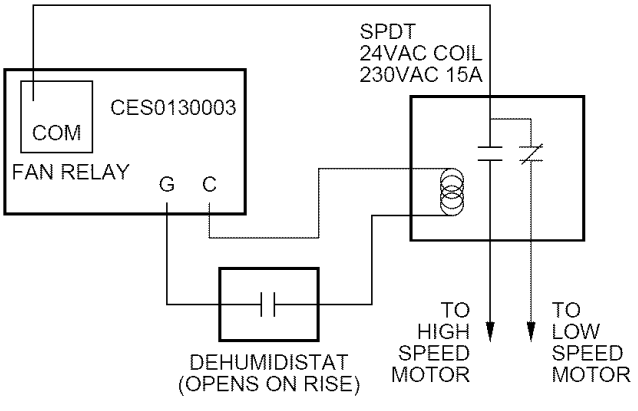

A95294

**Fig. 24—Wiring Layout of Humidifier to Heat Pump**



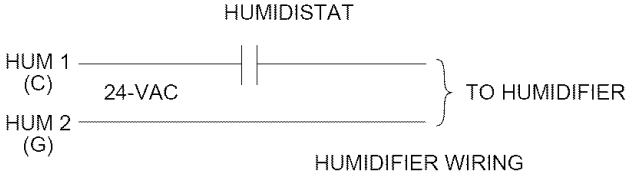

A95295

**Fig. 25—Wiring Layout of Humidifier to Fan Coil with Electric Heat**




A95296

**Fig. 26—Latent Capacity Control**




A95317

**Fig. 27—Humidifier Wiring**

## PROCEDURE 9—SEQUENCE OF OPERATION

### A. 018-070 Fan Coil Sequence of Operation

#### CONTINUOUS FAN

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

#### COOLING MODE

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

#### HEAT PUMP HEATING MODE

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

#### HEAT PUMP HEATING WITH AUXILIARY ELECTRIC HEAT

Thermostat energizes R to G, R to Y, and R to W. G energizes fan relay on PCB 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) opens turning off heater elements. When G is de-energized there is a 90 sec delay before fan relay opens.

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 turning off heater elements. Blower motor is de-energized after heater relay(s) opens.

### B. PF1MNB071 Fan Coil Sequence of Operation

CONTINUOUS FAN

Thermostat closes circuit R to G. The blower runs at continuous fan airflow.

COOLING MODE

Thermostat closes circuits R to Y/Y2, R to O, and R to G. Fan coil delivers single-speed cooling airflow.

ELECTRIC HEAT HEATING MODE

Thermostat closes circuit R to W/W1, or W2. Fan coil delivers the selected electric heat airflow.

HEAT PUMP HEATING MODE

Thermostat closes circuit R to Y/Y2, and R to G. Fan coil delivers single-speed heat pump heating airflow.

HEAT PUMP HEATING WITH AUXILIARY ELECTRIC HEAT

Thermostat closes circuits R to Y/Y2 and/or R to Y1 with R to W/W1 or W2 (and R to O in the case of defrost). In the event that electric heating is called for by thermostat while heat pump is also operating in either heating or defrost mode, the motor will modify its airflow output, if necessary, to provide an airflow which is defined as safe for operation of electric heater during heat pump operation. That airflow is the greater of the heat pump heating airflow and the electric heater only airflow.

## START-UP

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

## PROCEDURE 1—EASY SELECT CONFIGURATION TAPS (SIZE 071 ONLY)

The EASY SELECT taps are used by the installer to configure a system. The ECM uses the selected taps to modify its operation to a pre-programmed table of airflows. Airflows are based on system size or mode of operation and those airflows are modified in response to other inputs such as the need for de-humidification. (See Fig. 21.)

The fan coil must be configured to operate properly with system components with which it is installed. To successfully configure a basic system (see information printed on circuit board label located next to select pins), move the 6 select wires to the pins which match the components used.

### A. AUXILIARY HEAT KW/CFM — Select heater range for size of electric heater installed

Installer must select the auxiliary heat airflow approved for application with kw size heater installed. If no heater is installed, this step can be skipped. Each select pin is marked with a range of heaters for which airflow, also marked, is approved. For increased comfort select the narrowest kw range matching the heater size, for example, 0-10 for 10-kw heater. This airflow must be greater than the minimum CFM for electric heater application with the size system installed for safe and continuous operation. (See Tables 1 and 2 for airflow delivery and minimum CFM.) Note that airflow marked is the airflow which will be supplied in emergency heat mode and heating mode on air conditioners when electric heat is the primary heating source. In heat pump heating mode when electric heaters are energized, the ECM will run the higher of heat pump heating airflow and electric heater airflow to ensure safe heater operation. The factory selection is the largest heater range approved. (See Fig. 21, A as indicated.)

### B. AC/HP SIZE — Select system size installed

The factory setting for air conditioner or heat pump size is the largest unit meant for application with the model of fan coil purchased. The installer needs to select the air conditioner or heat pump size to ensure that airflow delivered falls within proper range for the size unit installed. This applies to all operational modes with the exception of electric heat modes. (See Fig. 21, B as indicated.)

### C. SYSTEM TYPE — Select system type installed AC or HP

The type of system must be selected:

1. AC — Air conditioner
2. HP-COMFORT — Provides approximately 315 CFM/ton for higher normal heating air delivery temperature. Provides approximately 350 CFM/ton cooling airflow for good humidity removal.
3. HP-EFF — Heat Pump Efficiency provides same airflow for heating and cooling modes to increase overall HP efficiency; approximately 350 CFM/ton.

The factory setting is AC. (See Fig. 21, C as indicated.)

### D. AC/HP CFM ADJUST — Select Medium, Low, or High airflow

To provide airflow at the rates described above, the AC/HP ADJUST select is factory set to the nominal (nom) tap. The adjust selections HI/LO will regulate airflow supplied for all operational modes, except non-heat pump heating modes. HI provides 15 percent airflow over nominal unit size selected and LO provides 10 percent airflow below nominal unit size selected. The adjust selection options are provided to adjust airflow supplied to meet individual installation needs for such things as noise, comfort, and humidity removal. (See Fig. 21, D as indicated.)

### E. ON/OFF DELAY — Select desired time delay profile

Four motor operation delay profiles are provided to customize and enhance system operation. (See Fig. 21, E as indicated)

→ **NOTE:** The ON/OFF time delay profiles are active only in heat pump only heating and cooling modes.
In auxiliary heat modes, there is a zero on delay and a one minute off delay programmed into the motor that cannot be overridden.

Selection options are:

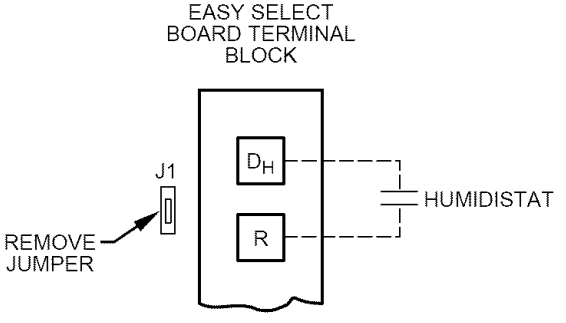
1. The standard 90 sec off delay (Factory setting) at 100 percent airflow.
2. No delay option used for servicing unit or when a thermostat is utilized to perform delay functions.
3. A 30 sec on delay with no airflow/ 90 sec off delay at 100 percent airflow profile is used when it is desirable to allow system coils time to heat-up/cool-down in conjunction with the airflow.
4. ENH, enhanced selection, provides a 30 sec on delay with no airflow/ plus 150 sec at 70 percent airflow/ no off delay for added comfort. This profile will minimize cold blow in heat pump operation and could enhance system efficiency.

### F. CONTINUOUS FAN — Select desired fan speed when thermostat is set on continuous fan

1. LO speed — factory setting, 50% cooling mode airflow
2. MED speed — move connector to MED, 65% cooling mode airflow
3. HI speed — move connector of HI, 100% cooling mode airflow. (See Fig. 21, F as indicated.)

### G. LOW-VOLTAGE CIRCUIT FUSING AND REFERENCE

The low-voltage circuit is fused by a board mounted 5-amp automotive fuse placed in series with the transformer SEC2 and the R circuit. The C circuit of the transformer is referenced to chassis ground through a printed circuit run at SEC1 connected to metal standoff marked with ground symbol.




A95316

**Fig. 28—Humidistat Wiring for De-Humidify Mode**

### H. De-Humidify Mode

SIZES 018—070 (LATENT CAPACITY CONTROL)

See Fig. 26 for wiring of latent capacity control.

SIZE 071 (HUMIDISTAT CONNECTION)

If increased latent capacity is an application requirement, the field wiring terminal block provides connection terminals for use of a standard humidistat. The 071 size fan coil will detect the humidistat contacts opening on increasing humidity and reduce its airflow to approximately 80% of nominal cooling mode airflow. This reduction will increase system latent capacity until humidity falls to a level which causes humidistat to close its contacts. When contacts close, airflow will return to 100% of selected cooling airflow. To activate this mode, remove Jumper J1 and wire in a standard humidistat. (See Fig. 28.)

## 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 proper frequency of maintenance and availability of a 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 is filter replacement or cleaning on a monthly basis. New filters are available from your local dealer/distributor.

**⚠ CAUTION: 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.**

## Table 1—PF1M Airflow Delivery (CFM)

| UNIT FAN SIZE | OUTDOOR UNIT CAPACITY BTUH | ELECTRIC HEATER KW RANGE | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0—10 | | | 0—15 | | | 0—20 | | | 0—30 | | |
| | | LO | NOM | HI | LO | NOM | HI | LO | NOM | HI | LO | NOM | HI |
| 071 | 36,000 | 1100 | 1100 | 1250 | 1350 | 1350 | 1350 | * | * | * | * | * | * |
| | 42,000 | 1140 | 1270 | 1460 | 1350 | 1350 | 1460 | 1525 | 1525 | 1525 | * | * | * |
| | 48,000 | 1305 | 1450 | 1665 | 1350 | 1450 | 1665 | 1525 | 1525 | 1665 | 1750 | 1750 | 1750 |
| | 60,000 | 1630 | 1810 | 2085 | 1630 | 1810 | 2085 | 1630 | 1810 | 2085 | 1750 | 1810 | 2085 |

* Airflow not recommended for heater/system size.

**NOTE:** LO, NOM, and HI refer to AC/HP CFM ADJUST selection.

## Table 2—PF1M Minimum CFM for Electric Heater Application

| FAN COIL UNIT | HEAT PUMP UNIT SIZE | CFM | | | | |
|---|---|---|---|---|---|---|
| | | HEATER SIZE KW | | | | |
| | | 5 | 8, 9, 10 | 15 | 18, 20 | 24, 30 |
| 071 | Heater Only | 1050 | 1050 | 1050 | 1050 | 1750 |
| | 036 | 1100 | 1100 | 1350 | 1350 | — |
| | 042 | 1125 | 1125 | 1350 | 1350 | — |
| | 048 | 1300 | 1300 | 1350 | 1465 | 1750 |
| | 060 | 1625 | 1625 | 1625 | 1750 | 1750 |

**NOTES:**
1. Heater Only—Air conditioner with electric heater application.
2. These airflows are minimum acceptable airflows as UL listed. Actual airflow delivered will be per airflow delivery chart for Electric Heating Modes.