

# INSTALLATION MANUAL

## SINGLE PIECE AIR HANDLERS

MODELS: F\*FP



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## SAFETY



This is a safety alert symbol. When you see this symbol on labels or in manuals, be alert to the potential for personal injury.

Understand and pay particular attention to the signal words **DANGER**, **WARNING**, or **CAUTION**.

**DANGER** indicates an **imminently** hazardous situation, which, if not avoided, **will result in death or serious injury**.

**WARNING** indicates a **potentially** hazardous situation, which, if not avoided, **could result in death or serious injury**.

**CAUTION** indicates a potentially hazardous situation, which, if not avoided **may result in minor or moderate injury**. It is also used to alert against unsafe practices and hazards involving only property damage.

### WARNING

*Improper installation may create a condition where the operation of the product could cause personal injury or property damage. Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage. Refer to this manual for assistance or for additional information, consult a qualified contractor, installer or service agency.*

### CAUTION

*This product must be installed in strict compliance with the installation instructions and any applicable local, state, and national codes including, but not limited to building, electrical, and mechanical codes.*

## SPECIFIC SAFETY RULES AND PRECAUTIONS

### **WARNING**

#### **FIRE OR ELECTRICAL HAZARD**

*Failure to follow the safety warnings exactly could result in serious injury, death or property damage.*

*A fire or electrical hazard may result causing property damage, personal injury or loss of life.*

1. Install this air handler only in a location and position as specified in SECTION I of these instructions.
2. Always install the air handler to operate within the air handler's intended maximum outlet air temperature. Only connect the air handler to a duct system which has an external static pressure within the allowable range, as specified on the air handler rating plate.
3. When an air handler is installed so that supply ducts carry air circulated by the air handler to areas outside the space containing the air handler, the return air shall also be handled by duct(s) sealed to the air handler casing and terminating outside the space containing the air handler.
4. The air handler is not to be used for temporary heating of buildings or structures under construction.
5. The size of the unit should be based on an acceptable heat loss calculation for the structure. ACCA, Manual J or other approved methods may be used.

## SAFETY REQUIREMENTS

1. This air handler should be installed in accordance with all national and local building/safety codes and requirements, local plumbing or wastewater codes, and other applicable codes.
2. Refer to the unit rating plate for the air handler model number, and then see the dimensions page of this instruction for supply air plenum dimensions in Figure 1. The plenum must be installed according to the instructions.
3. Provide clearances from combustible materials as listed under Clearances to Combustibles.
4. Provide clearances for servicing ensuring that service access is allowed for both the burners and blower.
5. Failure to carefully read and follow all instructions in this manual can result in air handler malfunction, death, personal injury and/or property damage.
6. Check the rating plate and power supply to be sure that the electrical characteristics match.
7. Air handler shall be installed so the electrical components are protected from water.
8. Installing and servicing heating equipment can be hazardous due to the electrical components. Only trained and qualified personnel should install, repair, or service heating equipment. Untrained service personnel can perform basic maintenance functions such as cleaning and replacing the air filters. When working on heating equipment, observe precautions in the manuals and on the labels attached to the unit and other safety precautions that may apply.
9. These instructions cover minimum requirements and conform to existing national standards and safety codes. In some instances these instructions exceed certain local codes and ordinances, especially those who have not kept up with changing residential and non-HUD modular home construction practices. These instructions are required as a minimum for a safe installation.

## GENERAL INFORMATION

This Single Piece Air Handler provides the flexibility for installation in any upflow or horizontal application. These versatile models may be used for cooling or heat pump operation with or without electric heat. **BRAND LABEL** (available from Distribution) can be applied to center of the blower access panel.

The unit can be positioned for bottom return air in the upflow position, and right or left return in the horizontal position.

Top and side power wiring and control wiring, accessible screw terminals for control wiring, easy to install drain connections and electric heaters all combine to make the installation easy, and minimize installation cost.

## INSPECTION

As soon as a unit is received, it should be inspected for possible damage during transit. If damage is evident, the extent of the damage should be noted on the carrier's freight bill. A separate request for inspection by the carrier's agent should be made in writing. Also, before installation the unit should be checked for screws or bolts, which may have loosened in transit. There are no shipping or spacer brackets which need to be removed.

Also check to be sure all accessories such as heater kits, suspension kits, and coils are available. Installation of these accessories or field conversion of the unit should be accomplished before setting the unit in place or connecting any wiring, electric heat, ducts or piping.

## LIMITATIONS

These units must be wired and installed in accordance with all national and local safety codes.

Voltage limits are as follows:

Air Handler Voltage	Voltage code	<sup>1</sup> Normal Operating Voltage Range
208/230-1-60	06	187-253

1. Rated in accordance with ARI Standard 110, utilization range "A".

Airflow must be within the minimum and maximum limits approved for electric heat, evaporator coils and outdoor units.

Entering Air Temperature Limits			
Wet Bulb Temp. °F		Dry Bulb Temp. °F	
Min.	Max.	Min.	Max.
57	72	65	95

## CLEARANCES

Clearance must be provided for:

1. Refrigerant piping and connections - minimum 12" recommended.
2. Maintenance and servicing access - minimum 36" from front of unit recommended for blower motor / coil replacement.
3. Condensate drain line.
4. Filter removal - minimum 36" recommended.

## LOCATION

Location is usually predetermined. Check with owner's or dealer's installation plans. If location has not been decided, consider the following in choosing a suitable location:

1. Select a location with adequate structural support, space for service access, clearance for air return and supply duct connections.
2. Use hanging brackets to wall mount unit as shown under suspension kits section.
3. Normal operating sound levels may be objectionable if the air handler is placed directly over some rooms such as bedrooms, study, etc.
4. Precautions should be taken to locate the unit and ductwork so that supply air does not short circuit to the return air.
5. Select a location that will permit installation of condensate line to an open drain.

**NOTE:** When the coil is installed in a draw-thru application, it is recommended to trap the primary and secondary drain line. If the secondary drain line is not used, it must be capped. The coil is provided with a secondary drain. It should be piped to a location that will give the occupant a visual warning that the primary drain is clogged. If the secondary drain is not used it must be capped.

6. Proper electrical supply must be available.
7. If unit is located in an area of high humidity (ie: an unconditioned garage or attic), nuisance sweating of casing may occur. On these installations, unit duct connections and other openings should be properly sealed and a wrap of 2" fiberglass insulation with vinyl vapor barrier should be used.

### CAUTION

*When an evaporator coil is installed in an attic or above a finished ceiling, an auxiliary drain pan should be provided under the coil as is specified by most local building codes.*

### CAUTION

*If electric heat is used, a minimum clearance of 1" must be maintained on all sides of the supply air duct and/or plenum continuously for up to 3' (See Figure 1).*

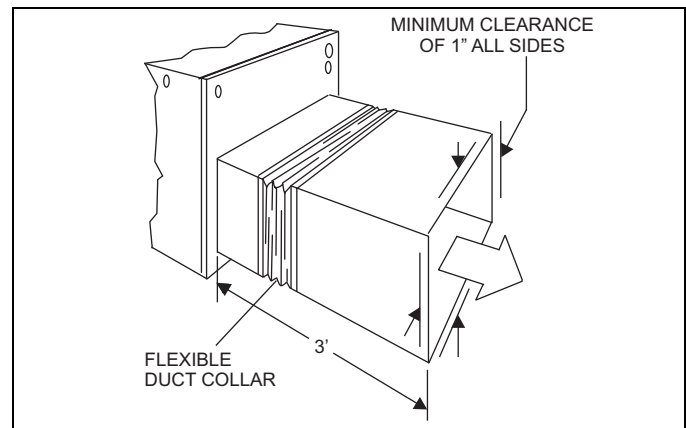


FIGURE 1: Plenum Clearances

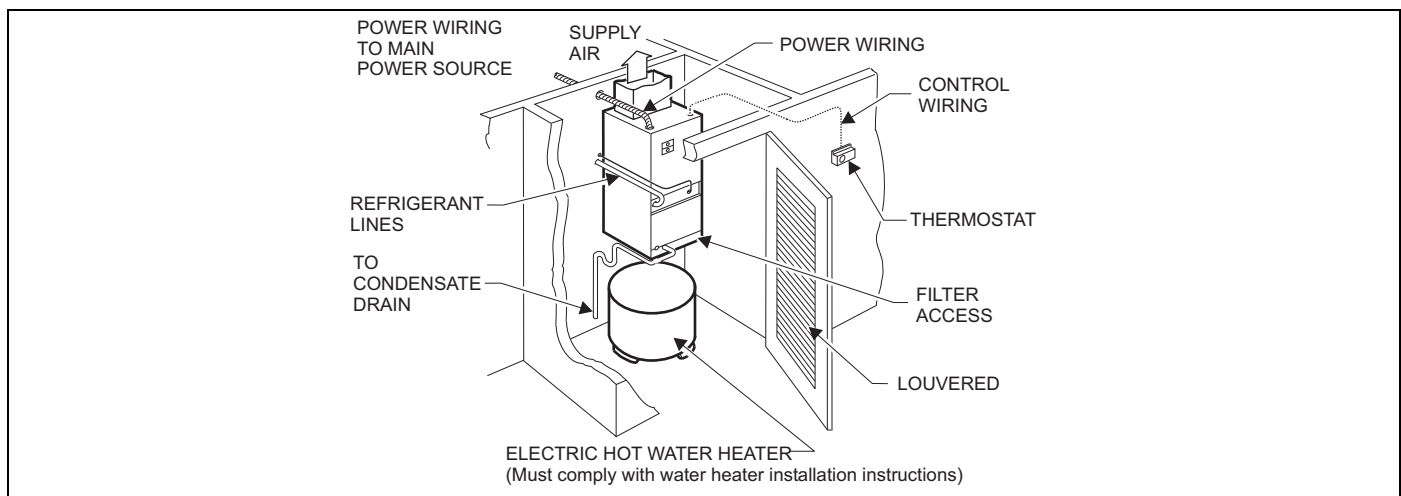


FIGURE 2: Typical Installation

## HORIZONTAL DRAIN PAN CONVERSION

These air handler units are supplied ready to be installed in a right hand horizontal position. If unit requires left hand positioning, the unit must have the pan installed in the correct position. Conversion must be made before brazing the refrigerant connections to the coil.

1. Remove blower access, coil access, and center access panels.
2. Remove two screws from horizontal drain pan, to remove pan from position "3A" if factory installed. See Figure 3.
3. Position horizontal pan, as required in either "A" or "B" position, locking it into the vertical drain pan as shown.
4. Horizontal drain pans have 4 plugged drains. Remove plugs from connections being used. If this step is overlooked, it can lead to a water problem later.
5. Use removed plug to plug primary of upflow drain pan.
6. Attach horizontal pan with 2 screws removed in step no. 2 or supplied with the unit. Ensure that the drain pan is lying flat against the insulation of the cabinet.
7. Horizontal drain cutout in the center access panel should be removed by using a utility knife (if not previously cut out).
8. Re-position and replace access panels.

### CAUTION

*Do not try to knock out panel opening for secondary drain pan. See Item 7.*

### CAUTION

*Models F\*FP045,048,060 have a coil baffle and support bracket factory installed for right hand horizontal application (refer to Figure 3C). For left hand applications the coil support bracket must be moved to the right side of the coil, and the coil baffle must be rotated to avoid water blow-off.*

*To rotate baffle, remove the coil assembly from the unit (remove front two screws holding the coil support bracket and the two screws holding the drain pan). Remove four screws in coil baffle and remove the coil baffle and rotate ends.*

*Resecure the baffle and reinstall the coil assembly ensuring that the rear of the drain pan is secured under the back flange of the unit. Reinstall the coil support bracket on the right side of the coil.*

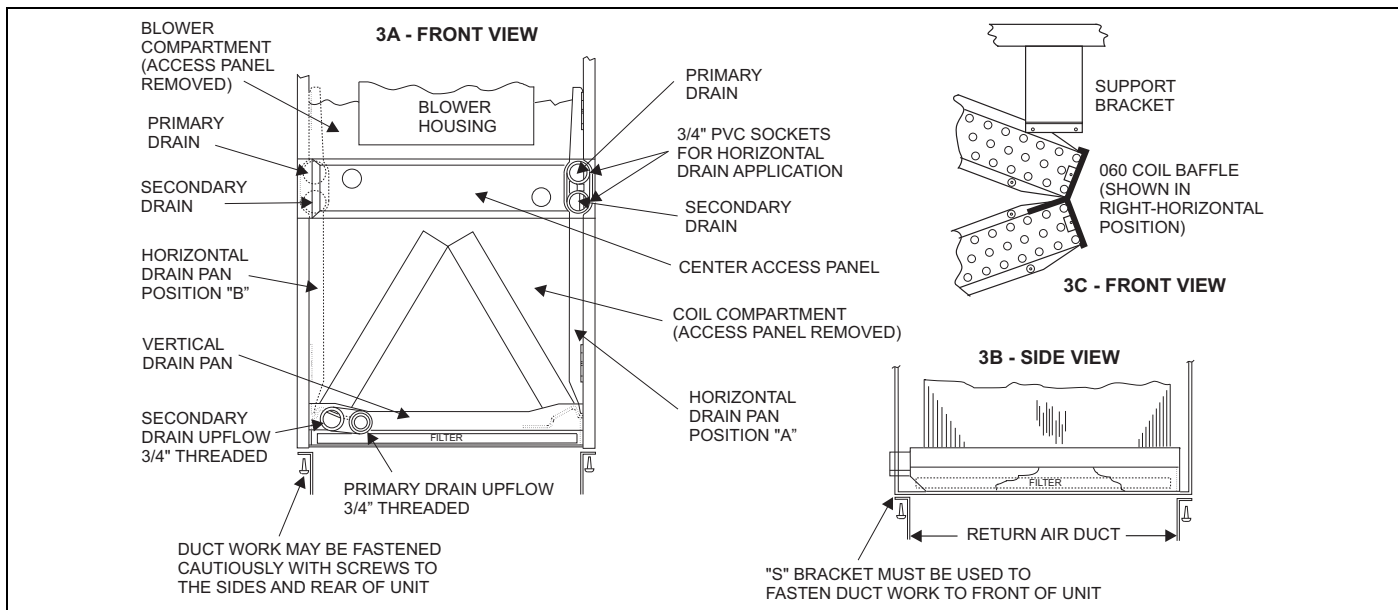


FIGURE 3: Filter Access &amp; Drain Pan Conversion / Coil Baffle

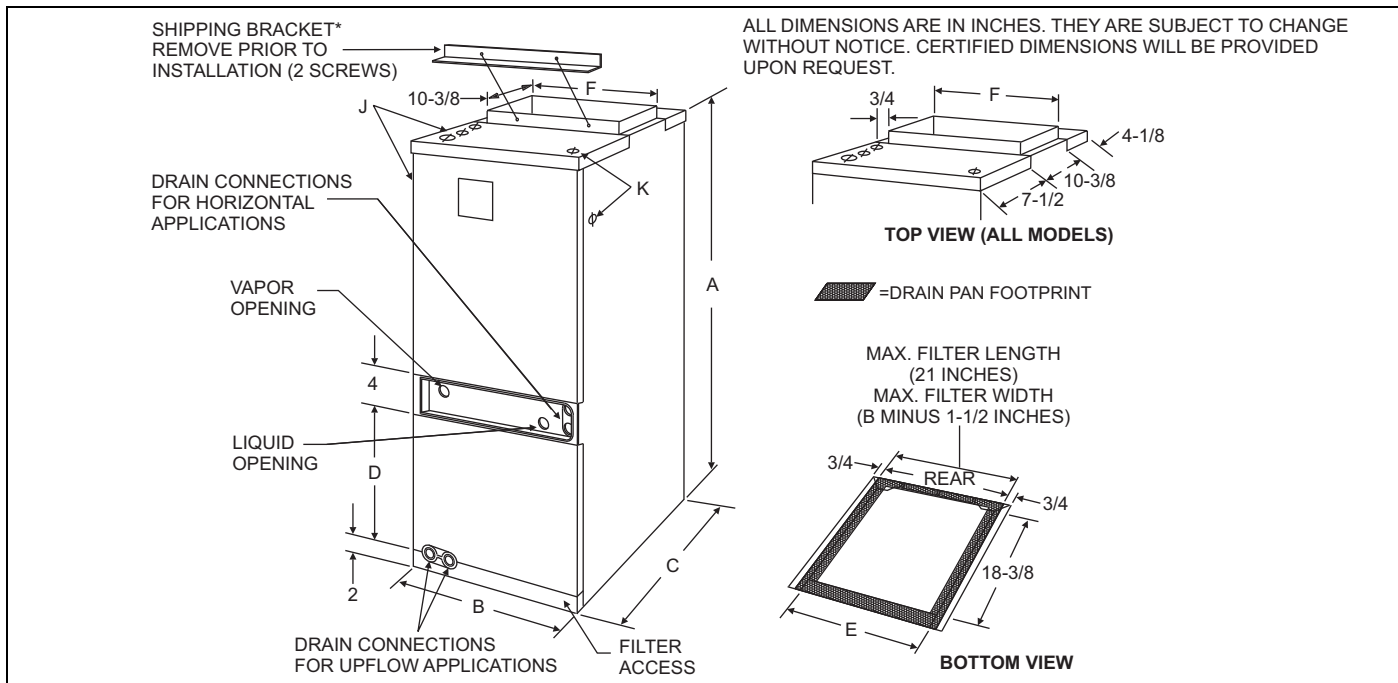


FIGURE 4: Dimensions &amp; Duct Sizes

TABLE 1: Dimensions

MODELS F*FP	Dimensions						Wiring K.O.'s*		Refrigerant Connections Line Size	
	A	B	C	D	E	F	J	K	Liquid	Vapor
	Height	Width	Depth				Power	Control		
024	40-3/4	18	22	12-1/8	14-7/8	16-1/2	7/8 (1/2) 1-3/8 (1)	7/8 (1/2)	3/8	5/8
030	40-3/4	18			14-7/8	16-1/2				3/4
036	40-3/4	21-1/2			18-3/8	20				3/4
040	40-3/4	21-1/2			18-3/8	20				7/8
042	40-3/4	21-1/2			18-3/8	20				7/8
045	50-3/4	24			20-7/8	22-1/2				7/8
048	50-3/4	24	17-3/8	17-3/8	20-7/8	22-1/2	7/8 (1/2) 1-3/8 (1), 1-23/32 (1-1/4)			7/8
060	50-3/4	24			20-7/8	22-1/2				7/8

## DUCT CONNECTIONS

### ⚠ WARNING

Use 1/2" screws to connect ductwork to bottom of unit. Longer screws will pierce the drain pan and cause leakage. If pilot holes are drilled, drill only through field duct and unit bottom flange.

**NOTE:** The electric heat accessory should be installed before the supply air duct is attached to the supply air openings. Refer to the electric heater kit instructions for proper installation.

Air supply and return may be handled in one of several ways best suited to the installation. See Figure 4 for dimensions for duct inlet and outlet connections.

The vast majority of problems encountered with combination heating and cooling systems can be linked to improperly designed or installed duct systems. It is therefore highly important to the success of an installation that the duct system be properly designed and installed.

Use flexible duct collars to minimize the transmission of vibration/noise into the conditioned space. If electric heat is used, non-flammable material must be used.

Where return air duct is short, or where sound may be a problem, sound absorbing glass fiber should be used inside the duct. Insulation of duct work is a must where it runs through an unheated space during the heating season or through an uncooled space during the cooling season. The use of a vapor barrier is recommended to prevent absorption of moisture from the surrounding air into the insulation.

The supply air duct should be properly sized by use of a transition to match unit opening. All ducts should be suspended using flexible hangers and never fastened directly to the structure. This unit is not designed for non-ducted (freeblow) applications. Size outlet plenum or transition to discharge opening sizes shown in Figure 4.

Duct work should be fabricated and installed in accordance with local and/or national codes. This includes the standards of the National Fire Protection Association for Installation of Air-Conditioning and Ventilating Systems, NFPA No. 90B.

## AIR FILTERS

Air filters must be field supplied. A 1" filter access rack has been built into the unit. See Figure 4. Remove filter access cover shown. Install proper size filter. Standard 1" size permanent or throw away filter may be used, or, permanent washable filters are available using model numbers: 1PF0601, 602, 603BK. See Table 3 for filter size.

### ⚠ CAUTION

Equipment should never be operated without filters.

## SUSPENSION KITS

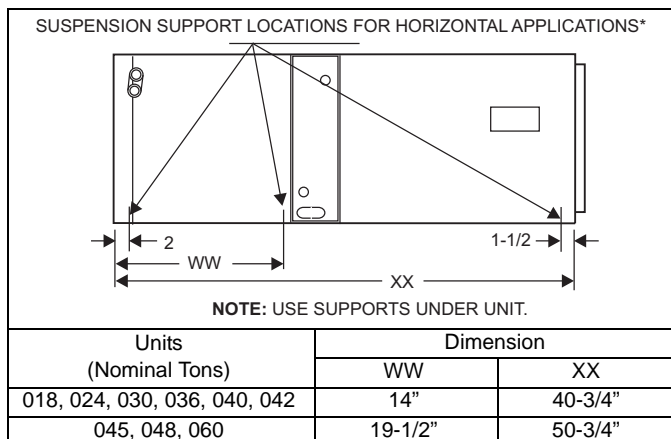


FIGURE 5: Typical Horizontal Installation

A suspension kit is available. Models 1BH0601 (unit sizes 018-060) is designed specifically for the units contained in this instruction (upflow application only). For installation of these accessory kits, see the instructions packed with the kit.

For suspension of these units in horizontal applications, it is recommended to use angle steel support brackets with threaded rods, supporting the units from the bottom, at the locations shown in Figure 5.

## COIL METERING DEVICES

The coil in this Air Handler unit will have a TXV metering device installed at the factory.

Air Handlers can be ordered with an R-22 TXV factory installed which can be easily converted to R-410A by changing the bolt-on TXV. Refer to the TXV metering device section for installation notes.

Air Handler "Flex-coils" are also available without a factory installed metering device. For added application flexibility an orifice metering device, R-22 TXV or R-410A TXV should be installed on the flex-coil in the field to meet your refrigerant choice.

TABLE 2: Installed TXV Sizes

Indoor Coil Model	Factory Installed Metering Device
F4FP024H06T2A	TXV 2A
F4FP024H06T2B	TXV 2B
F4FP024H06T3X	None
F4FP030H06T2A	TXV 2A
F4FP030H06T3X	None
F4FP036H06T2A	TXV 2A
F4FP036H06T3X	None
F4FP040H06T2A	TXV 2A
F4FP040H06T2C	TXV 2C
F4FP040H06T3X	None
F4FP042H06T2A	TXV 2A
F4FP042H06T2C	TXV 2C
F4FP042H06T3X	None
F4FP045H06T2C	TXV 2C
F4FP045H06T3X	None
F5FP048H06T2C	TXV 2C
F5FP048H06T3X	None
F5FP060H06T2C	TXV 2C
F5FP060H06T3X	None

## TXV Metering Device

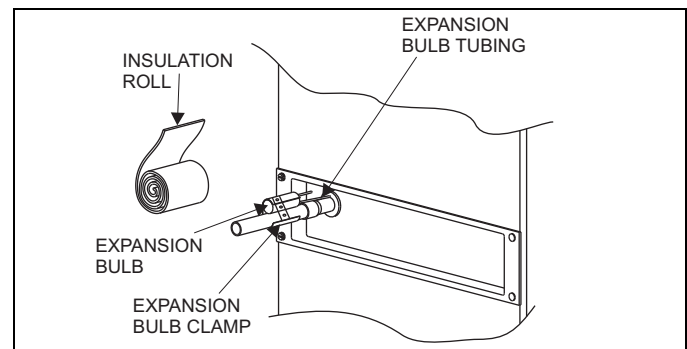


FIGURE 6: TXV Bulb Installation

Please refer to Table 2 to verify which TXV is installed in this Air Handler unit and that this AHU is a valid system match for the AC or HP unit installed.

The TXV is bolted into the coil assembly of this Air Handler unit at the factory. The temperature sensing bulb will need to be attached to the coil suction header line after the line set is brazed to the coil.

1. Make sure the TXV bulb is outside of the Air Handler cabinet. Excess tubing should remain inside the cabinet.
2. Take caution not to apply high temperatures to the TXV assembly or equalizer line while brazing.
3. Attach field line sets and braze to coil connections. Replace access panels & secure.
4. Secure the TXV bulb to the suction line with the clamp provided. Choose a horizontal location as close to the cabinet as possible, but not directly on the brazed connection joint. Refer to Figure 7.
5. The bulb should be in direct contact with the coil suction line along the length of the bulb.
6. If the suction line is 3/4" diameter - position the bulb near the top of the copper tube as shown. If the tube is 7/8" diameter - position the bulb near the bottom of the tube. Refer to Figure 7.
7. Wrap the clamp, bulb & line securely with insulation provided.

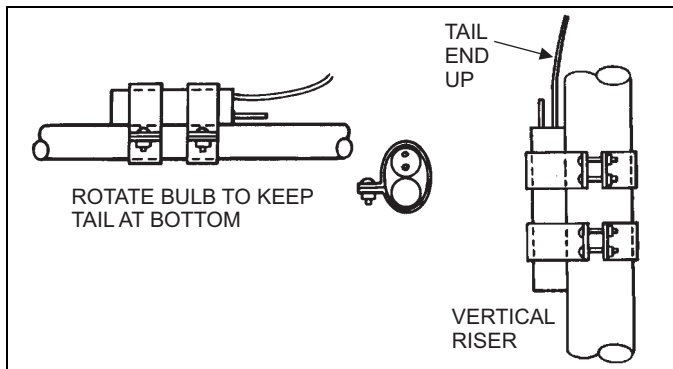


FIGURE 7: Bulb Location

## CAUTION

### COIL UNDER PRESSURE.

Relieve pressure by removing plug from piping connection. Coil will have factory installed TXV. See outdoor unit documentation for correct TXV to be used. Refer to unit nameplate for TXV identification for this unit.

**NOTE:** The coil should be open to the air for no more than 2 minutes to keep moisture and contaminants from entering the system. If the coil cannot be brazed into the refrigeration system in that time, the ends should be temporarily closed or plugged. For a short term delay, use masking tape over the ends of the copper tubing to close the tube to the air. For a longer term delay, use plugs or caps. There is no need to purge the coil if this procedure is followed.

## REFRIGERANT LINE CONNECTION

See the outdoor unit installation instructions for the procedure to install field supplied tubing for systems with sweat fittings.

Stub adapters are available to adapt sweat connections to quick connections.

Connect lines as follows:

**NOTE:** Route the refrigerant lines to the coil in a manner that will not obstruct service access to the coil, air handling system or filter.

1. Suction line connections are made outside the center access panel. Center access panel is recessed to assure sufficient room for brazing or it can be removed and slid over the suction line during brazing.
2. Plan for TXV bulb placement.
3. Remove rubber plugs from refrigerant lines.

4. Braze the suction line. Re-attach the center access panel, if it had been removed.
5. Braze the liquid line.
6. Install supplied grommets on both the suction and liquid lines to complete the air seal.
7. See previous section for TXV bulb.

Lines should be sound isolated by using the appropriate hangers or strapping.

When field supplied lines are used, be sure to insulate the suction line only.

## ELECTRIC HEATERS AND OPERATING CONTROLS

The low voltage transformer and fan / heater control, are standard on all models. See Figure 8. The air handlers are shipped pre-wired to operate as cooling only applications. To complete the installation for cooling only, install the 6-pin jumper plug to the control board to bypass the heater limit controls. This jumper plug is secured to the duct cover near the 4-pin power plug harness. Failure to install the plug will cause the blower to run continuously. (See Figure 8).

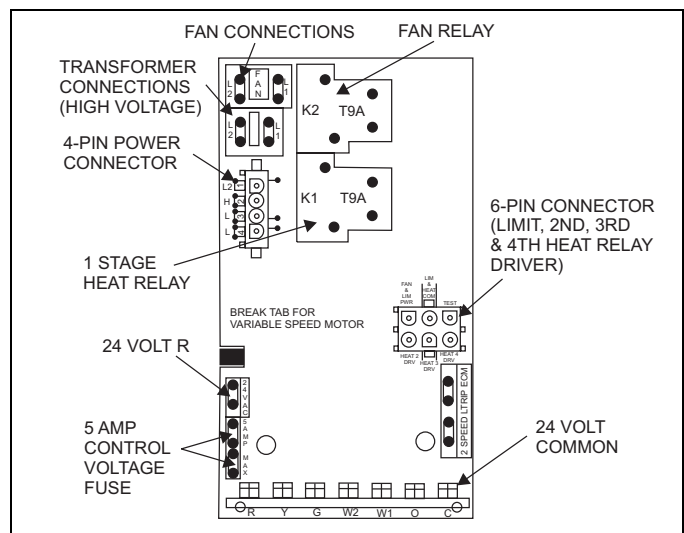


FIGURE 8: Control Board

Mark the unit nameplate with the appropriate heater selection on the space provided or NONE to indicate cooling only. To operate these units with electric heat, it is necessary to field install an electric heater kit (2HK). See Electric Heater Kit Accessory Installation instructions for proper installation procedure. Prior to installing electric heat, it is necessary to perform the following procedure:

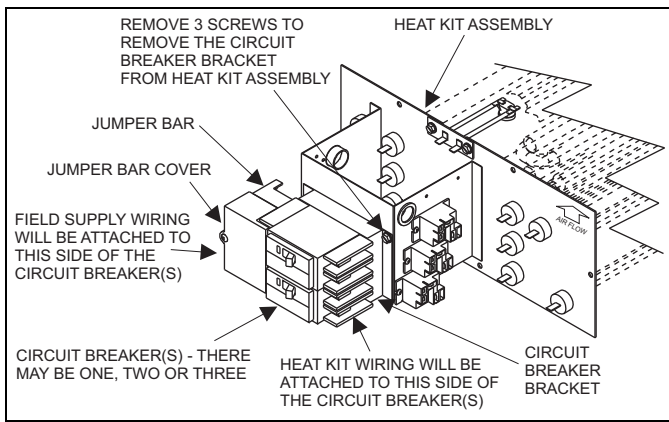
1. Remove the 4-pin power plug from the control board (See Figure 8).

**NOTE:** This pin must not be used when electric heaters are installed.

2. Remove the four (4) screws from the duct cover and remove the duct cover from the air handler.

### Right-hand Airflow Application Only - Models with Circuit Breakers

If unit is to be installed for right hand air flow, the circuit breakers in the heat kit will need to be removed and rotated 180°, so the OFF position will be down when the cabinet is positioned on the right side. This is an NEC requirement. **Do One Breaker At A Time - to make sure wires are reconnected properly.** Loosen terminal screws on the wires and gently pull the wires back from the breaker. Remove screws securing the breaker plate and rotate 180°, then secure the breaker plate and reconnect the wires to the breaker. See Figure 9.



**FIGURE 9:** Electric Heaters in Horizontal Configuration - Right Hand Air Flow

## LOW VOLTAGE CONTROL CONNECTION

The 24 volt power supply is provided by an internally wired low voltage transformer which is standard on all models. However, if the unit is connected to a 208 volt power supply the low voltage transformer must be rewired to the 208 volt tap. See the unit wiring label.

Field supplied low voltage wiring can exit the unit on the top right hand corner or the right hand side panel (see Fig. 5, item K).

Install a 7/8" plastic bushing in the selected hole and keep low voltage wiring as short as possible inside the control box.

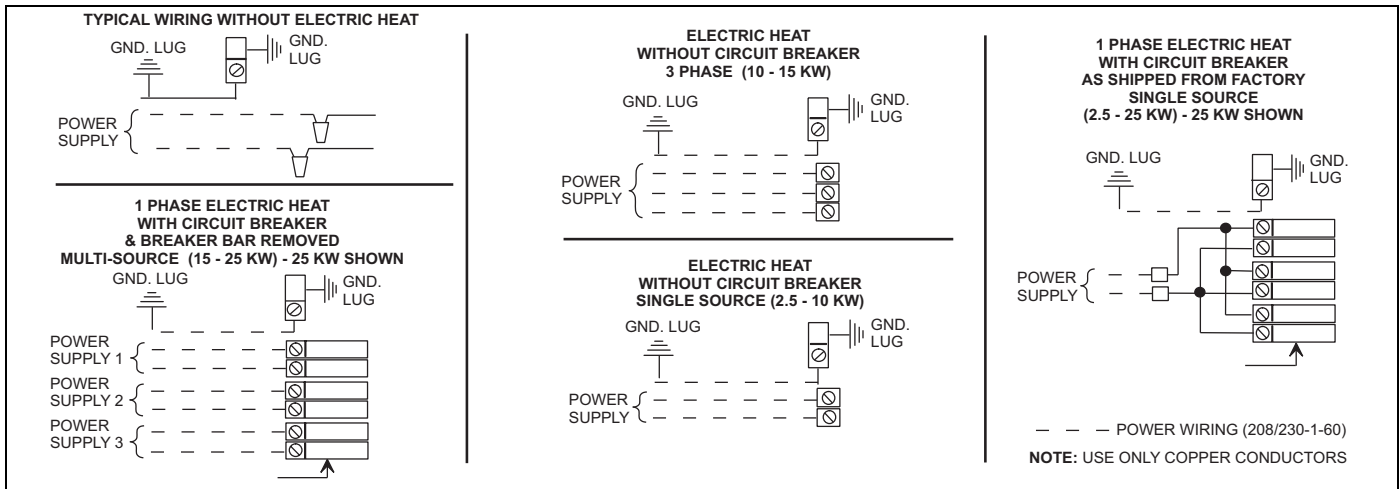
The field wiring is to be connected at the screw terminals of the control board. Refer to Figure's 12 and 13.

**NOTE:** All wiring must comply with local and national electrical code requirements. Read and heed all unit caution labels.

**NOTE:** It is possible to vary the amount of electric heat turned on during the defrost cycle of a heat pump. Standard wiring will only bring on 5 KW of electric heat during defrost see Table 6 and Figures 12 and 13 for alternate staging.

## LINE POWER CONNECTIONS

Power may be brought into the unit through the supply air end of the unit (top when unit is vertical) or the left side panel. Use the hole appropriate to the unit's orientation in each installation to bring conduit from the disconnect. The power lead conduit should be terminated at the electrical control box. Refer to Tables 4, 8 & 10 for wire requirements. Also see Figure 10.



**FIGURE 10:** Line Power Connections

## BLOWER SPEED CONNECTIONS

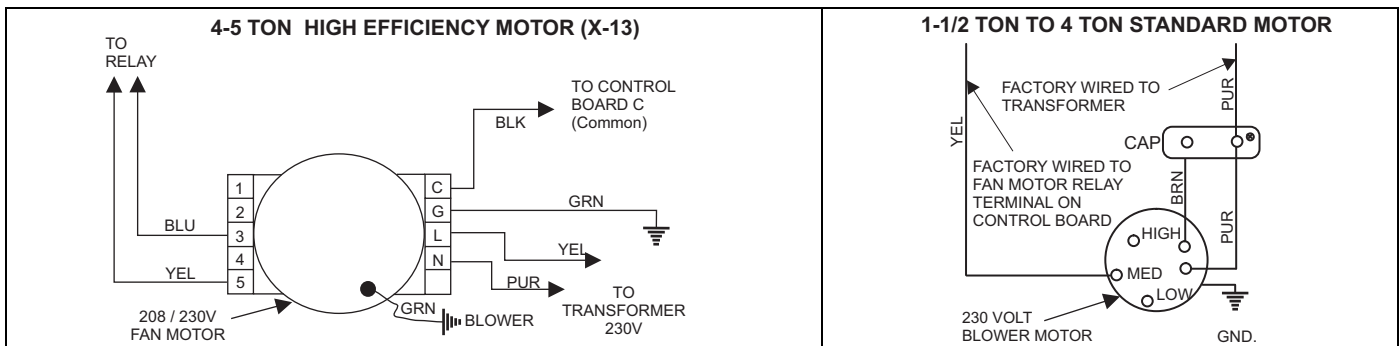
Except for F4FP045, which has a 4-speed motor, and F5FP\* which has a 5-speed high efficiency X-13 motor, all air handlers contain three speed blower motors which are pre-wired to the control board.

Adjust blower motor speed to provide airflow within the minimum and maximum limits approved for evaporator coil, electric heat and outdoor unit. Speed tap adjustments are made at the motor terminal block. See Figure 11. Airflow data is shown in Tables 6 and 11.

Higher efficiencies will be obtained if the indoor air volume is as high as possible provided the CFM does not exceed limitations and the sound level is not objectionable.

Connect motor wires to motor speed tap receptacle for speed desired. See wiring label for motor wiring details. See Figure 11.

The unit control is designed for the addition of a two speed fan kit. See accessory kit for details.



**FIGURE 11:** Blower Speed Connections

**TABLE 3:** Physical and Electrical Data

Models F*FP		024	030	036	040
Blower - Diameter x Width		10 x 6	10 x 8	10 x 8	10 x 8
Motor	HP	1/4	1/3	1/2	1/3
	Nominal RPM	1075	1075	1075	1075
Voltage		208/230			
Amps	Full Load (208/230)	1.6/1.4 (50 Hz:2.1)	2.5 / 2.2	3.3/2.9 (50 Hz:2.3)	2.5 / 2.2
	Locked Rotor (208/230)	3.3 / 2.9	6.2 / 5.5	7.4 / 6.5	6.2 / 5.5
Filter <sup>1</sup>	Type	DISPOSABLE OR PERMANENT			
	Size	16 x 20 x 1	16 x 20 x 1	20 x 20 x 1	20 x 20 x 1
	Permanent Type Kit	1PF0601BK	1PF0601BK	1PF0602BK	1PF0602BK
Shipping / Operating Weight (lbs.)		98 / 93	105 / 100	115 / 109	121 / 115

Models F*FP		042	045	048	060
Blower - Diameter x Width		10x8	10x10	11x10	11x10
Motor	HP	3/4	1/3	1.0	1.0
	Nominal RPM	1130	925	1050	1050
Voltage		208/230		230	
Amps	Full Load (208/230)	4.4/3.8	3.0/2.7	7.6	7.6
	Locked Rotor (208/230)	11.9/10.3	4.8/4.1	NA	NA
Filter <sup>1</sup>	Type	DISPOSABLE OR PERMANENT			
	Size	20 x 20 x 1	22 x 20 x 1	22 x 20 x 1	22 x 20 x 1
	Permanent Type Kit	1PF0602BK	1PF0603BK	1PF0603BK	1PF0603BK
Shipping / Operating Weight (lbs.)		121/115	150/144	153/147	160/154

1. Field Supplied

**TABLE 4:** Electrical Data - Cooling Only (50 & 60 Hz)

Models F*FP	Total Motor Amps		Minimum Circuit Ampacity		Max. O.C.P. <sup>1</sup> Amps/Type	Minimum Wire Size A.W.G.
	60 Hertz		60 Hertz			
	208V	230V	208V	230V		
024	1.6	1.5	2.0	1.8	15	14
030	2.5	2.3	3.2	2.8	15	14
036	3.3	3.0	4.2	3.7	15	14
040	2.5	2.3	3.2	2.8	15	14
042	4.4	4.0	5.5	4.8	15	14
045	3.1	2.6	3.9	3.4	15	14
048	7.6	7.6	9.5	9.5	15	14
060	7.6	7.6	9.5	9.5	15	14

1. OCP = Over Current Protection device, must be HACR type Circuit Breaker or Time Delay fuse.

**TABLE 5:** Conversion Table

KW & MBH Conversions - for Total Power Input Requirement					
FOR	208V	OPERATION MULTIPLY	240V	TABULATED kW & MBH BY	.751
	230V		240V		.918
	220V		240V		.840

TABLE 6: Electrical Data - 1 Ø - 208/230-1-60<sup>1</sup>

Models F*FP	Heater* Model	Max. Static & Min. CFM		Total Heat <sup>2</sup>				KW Staging <sup>3</sup>					
				KW		MBH		W1 Only		W2 Only		W1 + W2	
		Static	Tap	208V	230V	208V	230V	208V	230V	208V	230V	208V	230V
024	2HK*6500506B	0.5	Low	3.8	5.0	13.0	17.1	3.8	5.0	3.8	5.0	3.8	5.0
	2HK*6500806B		Low	5.6	7.5	19.1	25.6	3.8	5.0	5.6	7.5	5.6	7.5
	2HK*6501006B		Low	7.5	10.0	25.6	34.1	3.8	5.0	7.5	10.0	7.5	10.0
030	2HK*6500506B	0.5	Low	3.8	5.0	13.0	17.1	3.8	5.0	3.8	5.0	3.8	5.0
	2HK*6500806B		Low	5.6	7.5	19.1	25.6	3.8	5.0	5.6	7.5	5.6	7.5
	2HK*6501006B		Low	7.5	10.0	25.6	34.1	3.8	5.0	7.5	10.0	7.5	10.0
	2HK16501506B		High	11.3	15.0	38.6	51.2	3.8	5.0	7.5	10.0	11.3	15.0
036	2HK*6500506B	0.5	Low	3.8	5.0	13.0	17.1	3.8	5.0	3.8	5.0	3.8	5.0
	2HK*6500806B		Low	5.6	7.5	19.1	25.6	3.8	5.0	5.6	7.5	5.6	7.5
	2HK*6501006B		Low	7.5	10.0	25.6	34.1	3.8	5.0	7.5	10.0	7.5	10.0
	2HK16501506B		Med	11.3	15.0	38.6	51.2	3.8	5.0	7.5	10.0	11.3	15.0
	2HK16501906B <sup>4</sup>	0.5	High	13.2	17.6	45.1	60.1	2.8	3.8	10.4	13.8	13.2	17.6
040	2HK*6500506B	0.5	Low	3.8	5.0	13.0	17.1	3.8	5.0	3.8	5.0	3.8	5.0
	2HK*6500806B		Low	5.6	7.5	19.1	25.6	3.8	5.0	5.6	7.5	5.6	7.5
	2HK*6501006B		Low	7.5	10.0	25.6	34.1	3.8	5.0	7.5	10.0	7.5	10.0
	2HK16501506B		High	11.3	15.0	38.6	51.2	3.8	5.0	7.5	10.0	11.3	15.0
042	2HK*6500506B	0.5	Low	3.8	5.0	13.0	17.1	3.8	5.0	3.8	5.0	3.8	5.0
	2HK*6500806B		Low	5.6	7.5	19.1	25.6	3.8	5.0	5.6	7.5	5.6	7.5
	2HK*6501006B		Low	7.5	10.0	25.6	34.1	3.8	5.0	7.5	10.0	7.5	10.0
	2HK16501506B		Low	11.3	15.0	38.6	51.2	3.8	5.0	7.5	10.0	11.3	15.0
045	2HK*6500506B	0.5	Low	3.8	5.0	13.0	17.1	3.8	5.0	3.8	5.0	3.8	5.0
	2HK*6500806B		Low	5.6	7.5	19.1	25.6	3.8	5.0	5.6	7.5	5.6	7.5
	2HK*6501006B		Med	7.5	10.0	25.6	34.1	3.8	5.0	7.5	10.0	7.5	10.0
	2HK16501506B		High	11.3	15.0	38.6	51.2	3.8	5.0	7.5	10.0	11.3	15.0
048	2HK*6500506B	0.5	Med Low	3.8	5.0	13.0	17.1	3.8	5.0	3.8	5.0	3.8	5.0
	2HK*6500806B		Med Low	5.6	7.5	19.1	25.6	3.8	5.0	5.6	7.5	5.6	7.5
	2HK*6501006B		Med Low	7.5	10.0	25.6	34.1	3.8	5.0	7.5	10.0	7.5	10.0
	2HK16501506B		Med Low	11.3	15.0	38.6	51.2	3.8	5.0	7.5	10.0	11.3	15.0
	2HK16502006B		Med Low	15.0	20.0	51.2	68.3	3.8	5.0	11.3	10.0	15.0	20.0
	2HK16502506B		Med Low	18.8	25.0	64.2	85.3	3.8	5.0	11.3	15.0	18.8	25.0
060	2HK*6500506B	0.5	Med	3.8	5.0	13.0	17.1	3.8	5.0	3.8	5.0	3.8	5.0
	2HK*6500806B		Med	5.6	7.5	19.1	25.6	3.8	5.0	5.6	7.5	5.6	7.5
	2HK*6501006B		Med	7.5	10.0	25.6	34.1	3.8	5.0	7.5	10.0	7.5	10.0
	2HK16501506B		Med	11.3	15.0	38.6	51.2	3.8	5.0	7.5	10.0	11.3	15.0
	2HK16502006B		Med	15.0	20.0	51.2	68.3	3.8	5.0	7.5	10.0	15.0	20.0
	2HK16502506B		Med	18.8	25.0	64.2	85.3	3.8	5.0	11.3	15.0	18.8	25.0

1. Heat amps shown at 240V represents maximum heater rating.

2. See conversion Table 5.

3. If first stage heat or 66 is connected to W1, otherwise refer to this table.

4. 2HK16501906B only applies to F4FP036 model.

\* May be 0 (no breaker) or 1 (with breaker).

**TABLE 7:** Electrical Data - (For **Single Source** Power Supply) - Copper Wire 1 Ø - 208/230-1-60<sup>1</sup>

Models F*FP	Heater* Model	Heater Amps 240V	Field Wiring					
			Min. Circuit Ampacity		Max. O.C.P. <sup>2</sup> Amps/Type		75°C Wire Size - AWG	
			208V	230V	208V	230V	208V	230V
024	2HK*6500506B	20.8	24.7	27.7	25	30	10	10
	2HK*6500806B	31.3	35.5	40.7	40	45	8	8
	2HK*6501006B	41.7	46.9	53.7	50	60	8	6
030	2HK*6500506B	20.8	25.8	28.7	30	30	10	10
	2HK*6500806B	31.3	36.7	41.7	40	45	8	8
	2HK*6501006B	41.7	48.1	54.7	50	60	8	6
	2HK16501506B	62.5	70.9	80.8	80	90	4	3
036	2HK*6500506B	20.8	26.8	29.5	30	30	10	10
	2HK*6500806B	31.3	37.7	42.6	40	45	8	8
	2HK*6501006B	41.7	49.1	55.6	50	60	8	6
	2HK16501506B	62.5	71.9	81.6	80	90	4	3
	2HK16501906B <sup>3</sup>	73.3	83.3	95.2	90	100	3	3
040	2HK*6500506B	20.8	25.8	28.7	30	30	10	10
	2HK*6500806B	31.3	36.7	41.7	40	45	8	8
	2HK*6501006B	41.7	48.1	54.7	50	60	8	6
	2HK16501506B	62.5	70.9	80.8	80	90	4	3
042	2HK*6500506B	20.8	28.1	30.5	30	35	10	8
	2HK*6500806B	31.3	38.9	43.6	40	45	8	8
	2HK*6501006B	41.7	50.3	56.6	60	60	6	6
	2HK16501506B	62.5	73.2	82.6	80	90	4	3
045	2HK*6500506B	20.8	26.6	29.3	30	30	10	10
	2HK*6500806B	31.3	37.4	42.3	40	45	8	8
	2HK*6501006B	41.7	48.8	55.3	50	60	8	6
	2HK16501506B	62.5	71.7	81.4	80	90	4	3
048	2HK*6500506B	20.8	32.8	35.6	35	40	8	8
	2HK16500806B	31.3	43.0	48.4	45	50	8	8
	2HK16501006B	41.7	55.3	61.5	60	70	6	4
	2HK16501506B	62.5	77.3	87.8	80	90	4	3
	2HK16502006B	83.3	101.0	113.8	110	125	2	1
060	2HK16502506B	104.2	124.3	139.9	125	150	1	1/0
	2HK*6500506B	20.8	32.8	35.6	35	40	8	8
	2HK16500806B	31.3	42.9	48.3	45	50	8	8
	2HK16501006B	41.7	55.3	61.6	60	70	6	4
	2HK16501506B	62.5	78.5	87.8	80	90	4	3
	2HK16502006B	83.3	101.0	113.8	110	125	2	1
060	2HK16502506B	104.2	122.2	139.5	125	150	1	1/0

1. Heat amps shown at 240V represents maximum heater rating.

2. O.C.P. = Over Current Protection device, must be HACR type Circuit Breaker or Time Delay fuse.

3. 2HK16501906B only applies to F4FP036 model.

\* May be 0 (no breaker) or 1 (with breaker).

**TABLE 8:** Electrical Data - (For **Multi-Source** Power Supply) - Copper Wire 1 Ø - 208/230-1-60<sup>1</sup>

Models F*FP	Heater Model	Min. Circuit Ampacity			Max. O.C.P. <sup>1</sup> Amps/Type			75°C Wire Size - AWG		
		Circuit			Circuit			Circuit		
		1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
		208/230	208/230	208/230	208/230	208/230	208/230	208/230	208/230	208/230
030	2HK16501506B	25.8/28.7	45.1/52.1	—	30/30	50/60	—	10/10	8/6	—
036	2HK16501506B	26.8/29.5	45.1/52.1	—	30/30	50/60	—	10/10	8/6	—
	2HK16501906B <sup>2</sup>	38.3/42.6	45.7/52.6	—	40/45	50/60	—	8/8	8/6	—
040	2HK16501506B	25.8/28.7	45.1/52.1	—	30/30	50/60	—	10/10	8/6	—
042	2HK16501506B	28.1/30.5	45.1/52.1	—	30/35	50/60	—	10/8	8/6	—
045	2HK16501506B	26.6/29.3	45.1/52.1	—	30/30	50/60	—	10/10	8/6	—
048	2HK16501506B	32.8/35.6	45.1/52.1	—	35/40	50/60	—	8/8	8/6	—
	2HK16502006B	55.3/61.6	45.1/52.1	—	60/70	50/60	—	6/4	8/6	—
	2HK16502506B	32.8/35.6	45.1/52.1	45.1/52.1	35/40	50/60	50/60	8/8	8/6	8/6
060	2HK16501506B	32.8/35.6	45.1/52.1	—	35/40	50/60	—	8/8	8/6	—
	2HK16502006B	55.3/61.6	45.1/52.1	—	60/70	50/60	—	6/4	8/6	—
	2HK16502506B	33.8/35.6	45.1/52.1	45.1/52.1	35/40	50/60	50/60	8/8	8/6	8/6

1. O.C.P. = Over Current Protection device, must be HACR type Circuit Breaker or Time Delay fuse.

2. 2HK16501906B only applies to F4FP036 model.

**TABLE 9:** Electrical Data - 3 Ø - 208/230-3-60<sup>1</sup>

Models F*FP	Heater <sup>2</sup> Model	Max. Static & Min. CFM		Total Heat				KW Staging <sup>3</sup>					
				KW		MBH		W1 Only		W2 Only		W1 + W2	
		Static	Tap	208	230	208	230	208	230	208	230	208	230
024	2HK06501025B	0.5	Low	7.5	10.0	25.6	34.1	3.8	5.0	7.5	5.0	7.5	10.0
030	2HK06501025B	0.5	Low	7.5	10.0	25.6	34.1	3.8	5.0	7.5	5.0	7.5	10.0
	2HK06501525B	0.5	High	11.3	15.0	38.6	51.2	3.8	5.0	7.5	10.0	11.3	15.0
036	2HK06501025B	0.5	Low	7.5	10.0	25.6	34.1	3.8	5.0	7.5	5.0	7.5	10.0
	2HK06501525B	0.5	High	11.3	15.0	38.6	51.2	3.8	5.0	7.5	10.0	11.3	15.0
040	2HK06501025B	0.5	Low	7.5	10.0	25.6	34.1	3.8	5.0	7.5	5.0	7.5	10.0
	2HK06501525B	0.5	High	11.3	15.0	38.6	51.2	3.8	5.0	7.5	10.0	11.3	15.0
042	2HK06501025B	0.5	Low	7.5	10.0	25.6	34.1	3.8	5.0	7.5	5.0	7.5	10.0
	2HK06501525B	0.5	Low	11.3	15.0	38.6	51.2	3.8	5.0	7.5	10.0	11.3	15.0
045	2HK06501025B	0.5	Med	7.5	10.0	25.6	34.1	3.8	5.0	7.5	5.0	7.5	10.0
	2HK06501525B	0.5	High	11.3	15.0	38.6	51.2	3.8	5.0	7.5	10.0	11.3	15.0
048	2HK06501025B	0.5	Med Low	7.5	10.0	25.6	34.1	3.8	5.0	7.5	5.0	7.5	10.0
	2HK06501525B	0.5	Med Low	11.3	15.0	38.6	51.2	3.8	5.0	7.5	10.0	11.3	15.0
060	2HK06501025B	0.5	Med	7.5	10.0	25.6	34.1	3.8	5.0	7.5	5.0	7.5	10.0
	2HK06501525B	0.5	Med	11.3	15.0	38.6	51.2	3.8	5.0	7.5	10.0	11.3	15.0

1. Heat amps shown at 240V represents maximum heater rating.
2. Heaters are 3 Phase.
3. If first stage heat or 66 is connected to W1, otherwise refer to this table.

**TABLE 10:** Electrical Data - (For **Single Source** Power Supply) - Copper Wire 3 Ø - 208/230-3-60<sup>1</sup>

Models F*FP	Heater <sup>2</sup> Model	Field Wiring					
		Min. Circuit Ampacity		Max. O.C.P. <sup>3</sup> Amps/Type		75°C Wire Size - AWG	
		208V	230V	208V	230V	208V	230V
024	2HK06501025B	41.2	46.5	45	50	8	8
030	2HK06501025B	42.2	47.4	45	50	8	8
	2HK06501525B	42.2	47.4	45	50	8	8
036	2HK06501025B	43.1	48.2	45	50	8	8
	2HK06501525B	43.1	48.2	45	50	8	8
040	2HK06501025B	42.2	47.4	45	50	8	8
	2HK06501525B	42.2	47.4	45	50	8	8
042	2HK06501025B	44.2	49.1	45	50	8	8
	2HK06501525B	44.2	49.1	45	50	8	8
045	2HK06501025B	42.8	47.9	45	50	8	8
	2HK06501525B	42.8	47.9	45	50	8	8
048	2HK06501025B	48.3	53.9	50	60	8	6
	2HK06501525B	48.3	53.9	50	60	8	6
060	2HK06501025B	48.3	53.9	50	60	8	6
	2HK06501525B	48.3	53.9	50	60	8	6

1. Heat amps shown at 240V represents maximum heater rating.
2. Heaters are 3 Phase.
3. O.C.P. = Over Current Protection device, must be HACR type Circuit Breaker or Time Delay fuse.

**TABLE 11:** Airflow Data for 230 Volt - Heat Pump Models<sup>1</sup>

Models	Blower Motor Speed	230 Volt									
		CFM @ External Static Pressure - IWC									
		0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
F4FP024H06T**	High	950	910	865	835	775	730	662	590	502	400
	Med	845	815	785	745	705	654	594	524	439	344
	Low	650	630	605	575	540	508	450	383	285	158
F4FP030H06T**	High	1,270	1,210	1,150	1,085	1,015	946	862	769	645	502
	Med	1,050	1,040	995	930	855	804	714	624	494	364
	Low	855	820	780	735	680	624	550	447	333	190
F4FP036H06T**	High	–	1,310	1,250	1,175	1,120	1,053	983	894	779	645
	Med	1,200	1,150	1,100	1,040	985	933	879	795	711	587
	Low	1,060	1,015	970	925	860	809	740	661	572	453
F4FP040H06T**	High	1,270	1,210	1,150	1,085	1,015	946	802	769	645	502
	Med	1,050	1,040	995	930	855	804	714	624	494	364
	Low	855	820	780	735	680	624	550	447	333	190
F4FP042H06T**	High	–	1,575	1,500	1,420	1,350	1,273	1,192	1,102	996	871
	Med	1,460	1,395	1,330	1,260	1,190	1,125	1,052	960	842	695
	Low	1,250	1,200	1,155	1,100	1,050	1,001	931	851	751	631
F4FP045H06T**	High	1,575	1,535	1,475	1,390	1,310	1,245	1,147	1,030	897	735
	Med High	1,375	1,315	1,255	1,185	1,110	1,040	944	848	732	606
	Med Low	1,210	1,160	1,110	1,050	980	921	844	737	640	533
	Low	1,035	990	940	890	825	770	698	616	524	432
F5FP048H06T**	High	2223	2158	2090	2029	1929	1861	1788	1679	1594	1501
	Med High	1948	1904	1801	1815	1777	1741	1681	1618	1539	1453
	Med	1741	1690	1649	1606	1564	1516	1476	1436	1387	1353
	Med Low	1499	1454	1415	1370	1328	1269	1228	1191	1132	1093
	Low	1286	1233	1177	1142	1092	1039	987	960	888	842
F5FP060H06T**	High	2195	2145	2070	2008	1920	1852	1754	1663	1570	1462
	Med High	1938	1899	1873	1824	1791	1724	1679	1603	1521	1420
	Med	1726	1681	1641	1607	1560	1517	1485	1433	1402	1349
	Med Low	1525	1483	1441	1383	1356	1291	1253	1208	1169	1123
	Low	1306	1254	1204	1160	1114	1061	1008	980	914	876

NOTE: Air flow data shown above 1/2" w.c. external static pressure is for REFERENCE ONLY. Maximum allowable external static when electric heat is used is limited to 1/2" w.c. Maximum allowable external static pressure may also be limited by minimum CFM requirements for proper Heat Pump operation.

1. Includes Return Air Filter and Largest Electric Heater.

All F\*FP series air handler units are UL Listed up to 1/2" w.c. external static pressure, including air filter, wet coil, and largest kW size heater.

**TABLE 12:** Airflow Data<sup>1</sup> for 208 Volt - Heat Pump Models

Models	Blower Motor Speed	208 Volt									
		CFM @ External Static Pressure - IWC									
		0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
F4FP024H06T**	High	855	819	779	752	698	657	596	531	452	360
	Med.	760	733	706	670	634	589	535	472	395	310
	Low	585	567	545	518	486	457	405	344	257	142
F4FP030H06T**	High	1143	1089	1035	977	914	851	776	692	581	451
	Med.	941	936	895	837	770	724	643	562	445	328
	Low	770	738	702	662	612	561	495	402	300	171
F4FP036H06T**	High	1235	1179	1125	1058	1008	947	885	804	701	580
	Med.	1080	1035	990	936	887	840	791	716	640	528
	Low	954	914	873	833	774	728	666	595	515	408
F4FP040H06T**	High	1143	1089	1035	977	914	851	776	692	581	451
	Med.	941	936	895	837	770	724	643	562	445	328
	Low	770	738	702	662	612	561	495	402	300	171
F4FP042H06T**	High	1400	1418	1350	1278	1215	1145	1073	991	897	784
	Med.	1314	1266	1197	1135	1071	1012	947	864	758	625
	Low	1125	1080	1040	990	945	901	838	766	676	568
F4FP045H06T**	High	1418	1382	1328	1251	1179	1120	1032	927	807	661
	Med-high	1238	1184	1130	1067	999	936	850	763	659	545
	Med-low	1089	1044	999	945	882	829	760	663	576	480
	Low	932	891	846	801	743	693	628	554	472	389
F5FP048H06T**	High	2209	2140	2093	2000	1939	1864	1746	1724	1655	1587
	Med High	1945	1906	1871	1819	1784	1741	1667	1640	1595	1550
	Med	1739	1690	1640	1602	1559	1516	1470	1431	1387	1343
	Med Low	1506	1464	1415	1369	1325	1283	1238	1193	1139	1100
	Low	1301	1248	1197	1151	1095	1054	1005	958	909	860
F5FP060H06T**	High	2134	2124	2052	1979	1861	1756	1639	1597	1512	1427
	Med High	1916	1875	1838	1777	1744	1671	1594	1584	1537	1490
	Med	1716	1671	1613	1569	1523	1475	1429	1384	1337	1290
	Med Low	1494	1435	1390	1341	1284	1241	1194	1139	1087	1036
	Low	1276	1223	1168	1115	1068	1009	965	902	847	792

NOTE: Air flow data shown above 1/2" w.c. external static pressure is for REFERENCE ONLY. Maximum allowable external static when electric heat is used is limited to 1/2" w.c. Maximum allowable external static pressure may also be limited by minimum CFM requirements for proper Heat Pump operation.

1. Includes Return Air Filter and Largest Electric Heater.

All F\*FP series air handler units are UL Listed up to 1/2" w.c. external static pressure, including air filter, wet coil, and largest KW size heater.

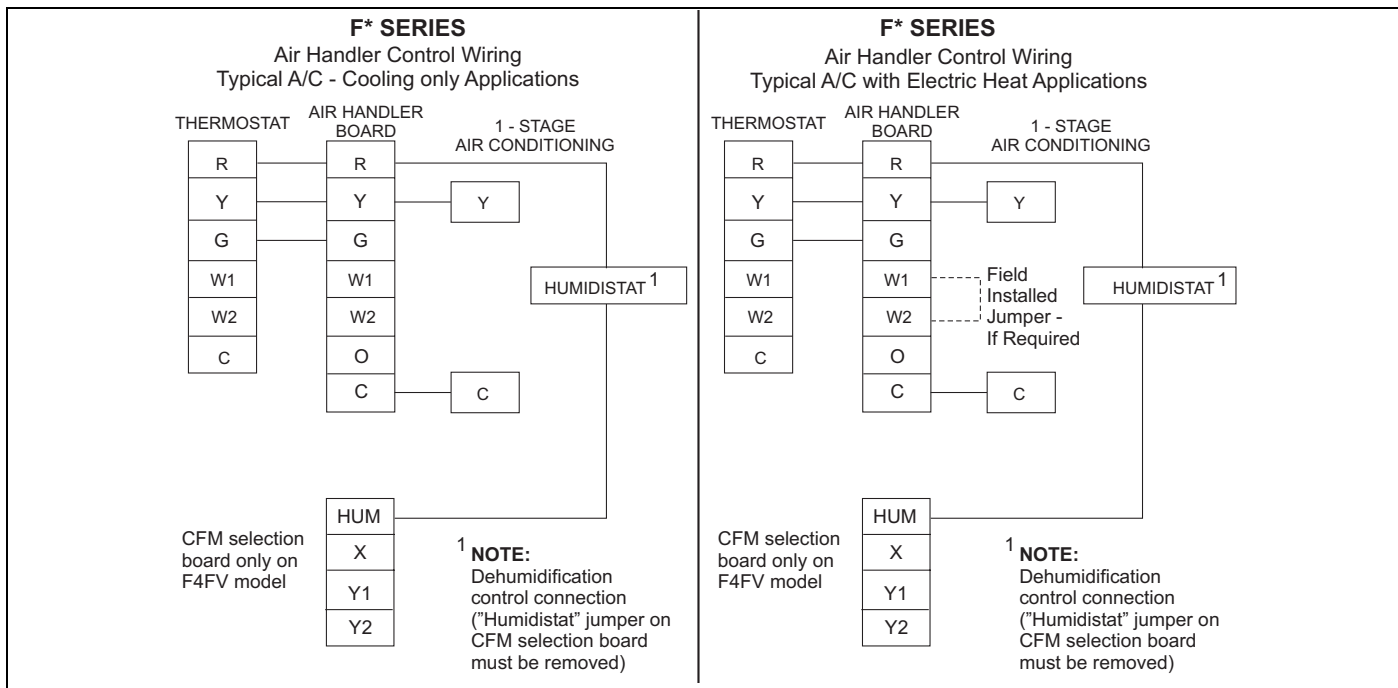


FIGURE 12: Cooling Models with Electric Heat Wiring

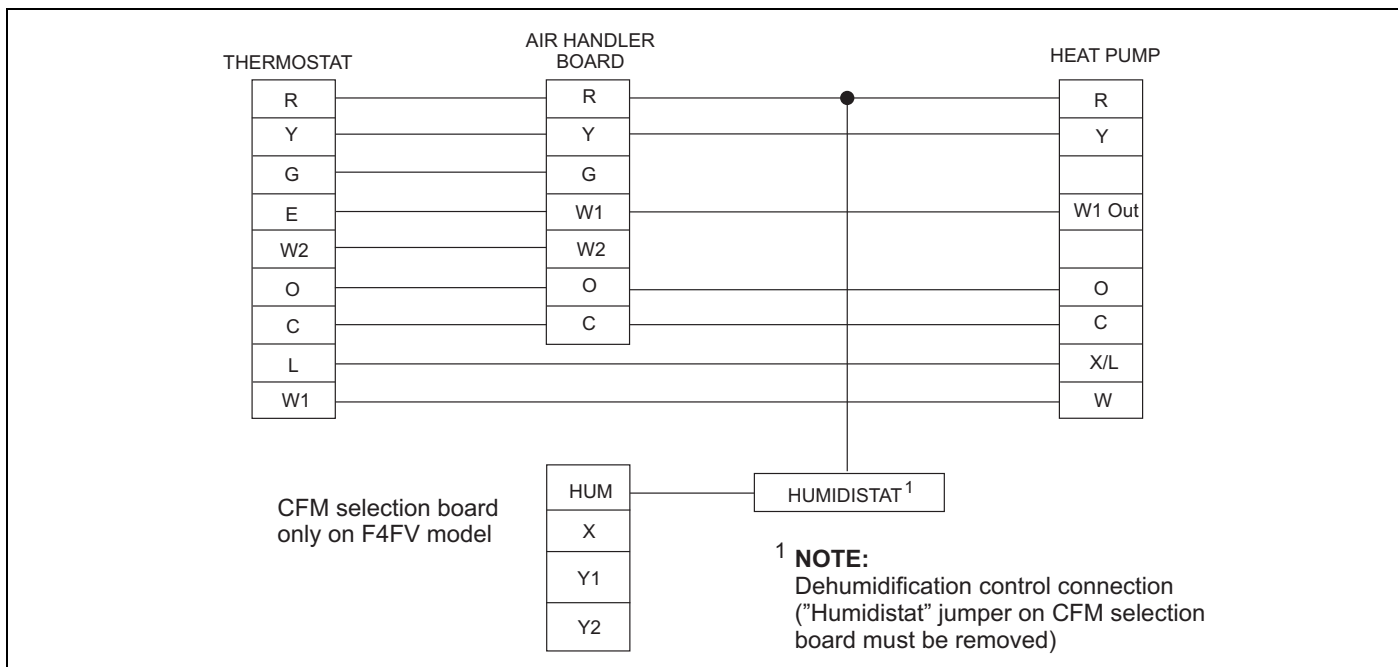


FIGURE 13: Single Stage Heat Pump Control Wiring

**NOTES:**

1. "Y" Terminal on Air Handler Control Board must be connected for full CFM and applications requiring 60 second Blower Off Delay for SEER enhancement.
2. <sup>1</sup>Optional Dehumidification Humidistat contacts open on rise.
3. For F4FV model - Remove Humidistat Jumper on CFM Selection Board - if used.
4. For F4FV model - For Heat Pump Applications - Remove Heat Pump Jumper on CFM Selection Board.
5. To change quantity of heat during HP defrost cycle - Reverse connections at W1 and W2 on Air Handler Control Board.

## DRAIN CONNECTIONS

All drain lines should be trapped a minimum of three inches, should be pitched away from unit drain pan and should be no smaller than the coil drain connection.

### CAUTION

*Threaded drain connection should be hand-tightened, plus no more than one turn.*

### CAUTION

*Horizontal drain cutout in the center access panel should be removed by using a utility knife. DO NOT TRY TO KNOCK OUT.*

Route the drain line so that it does not interfere with accessibility to the coil, air handling system or filter and will not be exposed to freezing temperatures. See Figures 2, 3 and 4.

### CAUTION

*When the coil is installed in an attic or above a finished ceiling, an auxiliary drain pan should be provided under the coil as is specified by most local building codes. When this exterior secondary drain pan is used that secondary drain should be piped to a location that will give the occupant a visual warning that the primary drain is clogged.*

Coils should be installed level or pitched slightly toward the drain end. Suggested pitch should not exceed 1/4 inch per foot of coil.

The coil is provided with a secondary drain that should be trapped and piped to a location that will give the occupant a visual warning that the primary drain is clogged. If the secondary drain is not used it must be capped.

The drain pan connections are designed to ASTM Standard D 2466 Schedule 40, 3/4" PVC is preferred. Since the drains are not subject to any pressure it is not necessary to use Schedule 40 pipe for drain lines.

It is recommended that all drain connections be sealed with teflon tape or equivalent.

## MAINTENANCE

Filters must be cleaned or replaced when they become dirty. Inspect at least once per month. The frequency of cleaning depends upon the hours of operation and the local atmospheric conditions. Clean filters keep unit efficiency high.

## COIL CLEANING

If the coil needs to be cleaned or replaced, it should be washed with Calgon CalClean (mix one part CalClean to ten parts water) or other non-acidic cleaners. Allow solution to remain on coil for 30 minutes before rinsing with clean water. Solution should not be permitted to come in contact with painted surfaces.

## LUBRICATION

The bearings of the blower motor are permanently lubricated.

## CONDENSATE DRAINS

During the cooling season check the condensate drain lines to be sure that condensate is flowing from the primary drain but not from the secondary drain. If condensate ever flows from the secondary drain the unit should be promptly shut off and the condensate pan and drains cleaned to insure a free flowing primary drain.

**TABLE 13:** Troubleshooting Guide

PROBLEM	POSSIBLE CAUSE
Blower Runs all of the time	<ol style="list-style-type: none"> <li>1. No heat units do not have 6-pin connector installed.</li> <li>2. Limit open or not connected.</li> <li>3. Variable speed break-out tab broken out.</li> <li>4. Blower OFF delay (approx. 1 min).</li> <li>5. Thermostat fan switch in "ON" position.</li> </ol>
Blown Fuse	<ol style="list-style-type: none"> <li>1. Low voltage short to C or ground from R, Y, G, W, or O.</li> </ol>
No 24V	<ol style="list-style-type: none"> <li>1. 4-pin connector loose.</li> <li>2. Loose wire from control to transformer (24V and 230V).</li> <li>3. Blown fuse on control board.</li> </ol>
No 2nd stage heat	<ol style="list-style-type: none"> <li>1. Check 6-pin connector and connections to panel mount relays.</li> <li>2. Verify that both W<sub>1</sub> &amp; W<sub>2</sub> are connected at the terminal strip.</li> </ol>
No Heat or Limited Heating	<ol style="list-style-type: none"> <li>1. Check filter.</li> <li>2. Closed registers.</li> <li>3. Restricted airflow (supply registers or return registers)</li> <li>4. Check blower motor operation.</li> <li>5. If the safety limit opens 4 times, the control will not permit the heating element to operate for 1 hour.</li> </ol>

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## NOTES