INSTALLATION MANUAL

SINGLE PIECE
STANDARD ECM AIR HANDLERS

MODELS: AHX SERIES

ISO 9001
Certified Quality
Management System

LIST OF SECTIONS

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SECTION I: GENERAL

The AHX single piece air handler provides the flexibility for installation in any upflow, downflow, or horizontal application. The AHX60 model is a two-piece model that comes as upflow and horizontal right applications and has to be separated and repositioned for downflow and horizontal left applications.

These versatile models may be used for cooling or heat pump operation with or without electric heat.

A BRAND LABEL (available from Distribution) may be applied to the center of the blower access panel.

The unit can be positioned for bottom return air in the upflow position, top return air in the downflow 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.

SECTION II: 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.

⚠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 III 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 in the space to be cooled/heated.
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 or gain 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 3. The plenum must be installed according to the instructions.
3. Provide clearances from combustible materials as listed under Clearances.
4. Provide clearances for servicing ensuring that service access is allowed for electric heaters 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/cooling equipment can be hazardous due to the electrical components. Only trained and qualified personnel should install, repair, or service heating/cooling equipment. Untrained service personnel can perform basic maintenance functions such as cleaning and replacing the air filters. When working on heating/cooling 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.

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	Normal Operating Voltage Range[1]
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

SECTION III: UNIT INSTALLATION

CLEARANCES

Clearances must be taken into consideration, and provided for as follows:

1. Refrigerant piping and connections - minimum 12" (30.5 cm) recommended.
2. Maintenance and servicing access - minimum 36" (91.4 cm) from front of unit recommended for blower motor / coil replacement.
3. Condensate drain lines routed to clear filter and panel access.
4. Filter removal - minimum 36" (91.4 cm) recommended.
5. The ductwork and plenum connected to this unit are designed for zero clearance to combustible materials.
6. A combustible floor base accessory is available for downflow applications of this unit, if required by local code.

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 this single piece air handler unit, is not recommended.
3. Normal operating sound levels may be objectionable if the air handler is placed directly over some rooms such as bedrooms, study, etc.
4. Select a location that will permit installation of condensate line to an open drain or outdoors allowing condensate to drain away from structure.

NOTICE

The primary and secondary drain line must be trapped to allow proper drainage of condensate water. 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.

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

6. Proper electrical supply must be available.
7. If unit is located in an area of high humidity (i.e. 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" (50.1 cm) fiberglass insulation with vinyl vapor barrier should be used.

NOTICE

In severe high humidity, high temperature indoor unit environments, an accessory insulation blanket is available to supplement the standard cabinet insulation. Insulate with UPG Kit: 1VJ0117 for B cabinets, 1VJ0121 for C cabinets or 1VJ0124 on 57" (1.4 m) height or 1VJ0224 on 52" (1.3 m) height D cabinets or seal completely with adequate fiberglass insulation using vapor barrier on the outside.

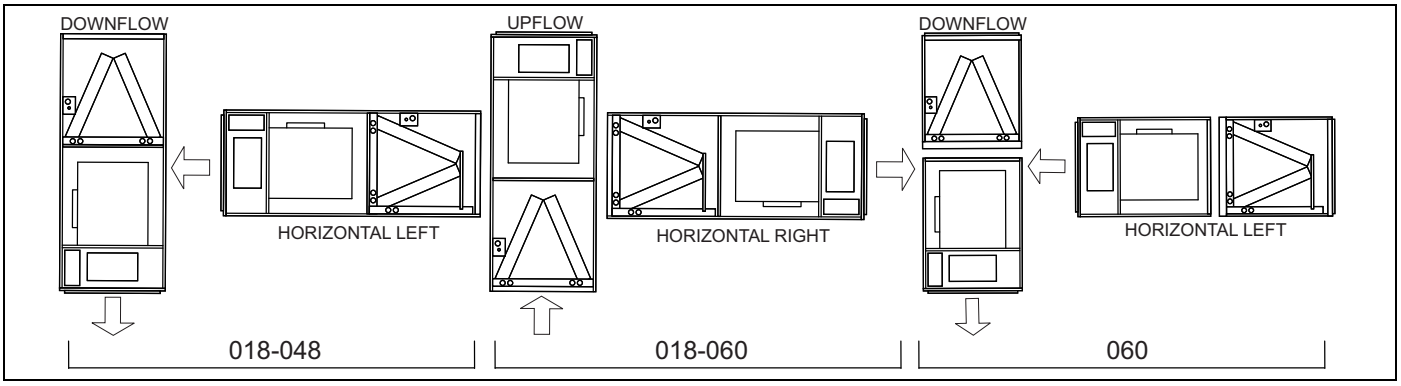


FIGURE 1: Typical Installation

DOWNFLOW AND HORIZONTAL CONVERSION

These air handler units are supplied ready to be installed in a upflow and right hand horizontal position. If unit (except AHX60) requires left hand positioning, the unit must have the coil assembly repositioned.

For AHX60, if left hand or downflow positioning is required, this two-piece unit must be separated by disengaging the blower until from the coil unit, repositioned, and then re-assembled as shown in Figure 1.

NOTICE

For both horizontal applications, the condensate deflector should be positioned as shown in Figure 5.

1. Remove blower, coil, and filter access panels.

NOTICE

Conversion must be made before brazing the refrigerant connections to the coil.

For downflow and horizontal left installations, follow steps 2 - 8.

2. Remove tubing connection panel.
3. Remove front drain pan, hold down bracket.
4. Slide coil assembly out of air handler.
5. Rotate cabinet 180º so blower outlet is facing down.
6. Re-install coil assembly on downflow bracket.
7. Re-attach front drain pan, hold down bracket.
8. Re-attach tubing connection panel.
9. For horizontal applications, rotate air handler 90º into desired orientation.
10. Re-position drain plugs as necessary based on air handler orientation.
11. Re-position and replace access panels.

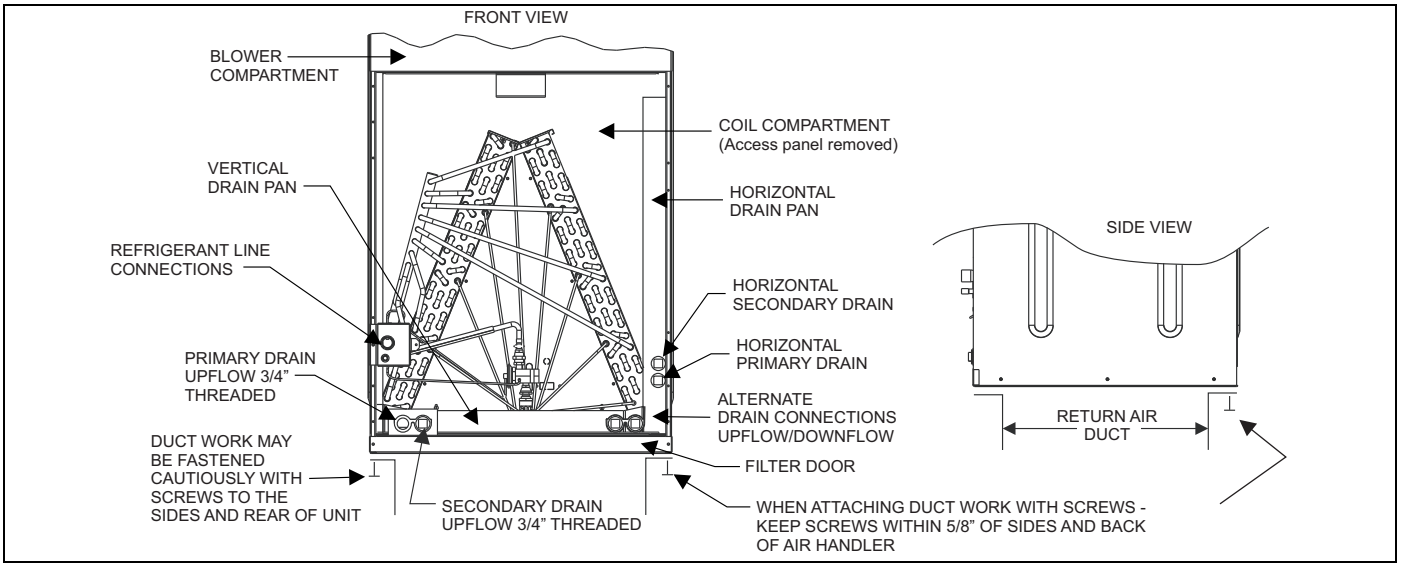


FIGURE 2: Return Duct Attachment & Component Location

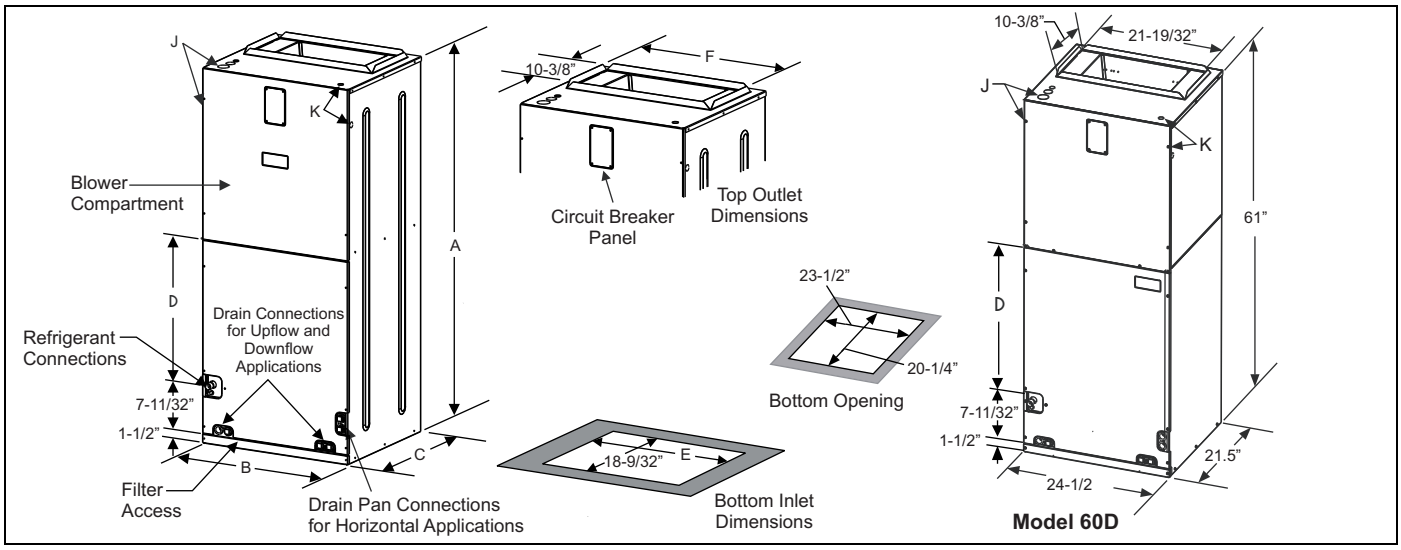


FIGURE 3: Dimensions & Duct Connection Dimensions

TABLE 1: Dimensions

Models AHX	Dimensions						Wiring Knockouts[1]		Refrigerant Connections Line Size	
	A	B	C	D	E	F	J	K		
	Height	Width	Depth				Power	Control	Liquid	Vapor
18B	46"	17-1/2"	21-1/2"	12-3/8"	13-29/32"	14-19/32"	7/8" (1/2") 1 3/8" (1") 1 23/32" (1-1/4")	7/8" (1/2")	3/8"	3/4"
24B	46"	17-1/2"		12-3/8"	13-29/32"	14-19/32"				3/4"
30B	46"	17-1/2"		12-3/8"	13-29/32"	14-19/32"				3/4"
36C	52"	21"		17-1/8"	17-13/32"	18-3/32"				7/8"
42D	57"	24-1/2"		22-1/8"	20-29/32"	21-19/32"				7/8"
48D	57"	24-1/2"		22-1/8"	20-29/32"	21-19/32"				7/8"
60D	61"	24-1/2"		26-1/8"	23-1/2"	21-19/32"				7/8"

1. Actual size (Conduit size).

SUCTION FEEDER TUBE CONDENSATE DEFLECTOR

UPFLOW OR DOWNFLOW

No action required. See Figure 4.

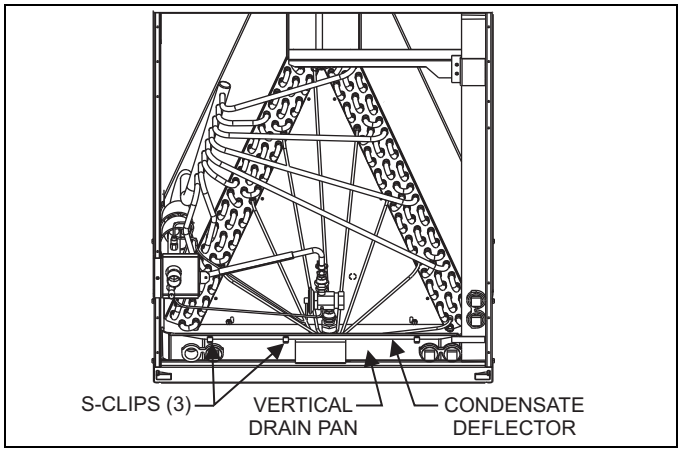


FIGURE 4: Condensate Deflector on Vertical Drain Pan

HORIZONTAL LEFT OR RIGHT

Use an appropriate tool to pry out water deflector with two or three s-clips from the vertical drain pan, see Figure 4. Relocate the deflector with s-clips on the Horizontal Drain Pan lined up to the coil support bracket. See Figure 5. This positions the deflector below the feeder tubes to channel the condensate to the drain pan.

NOTICE

The condensate deflector should be installed in the s-clip section which is inside the drain pan edge. See Figure 6.

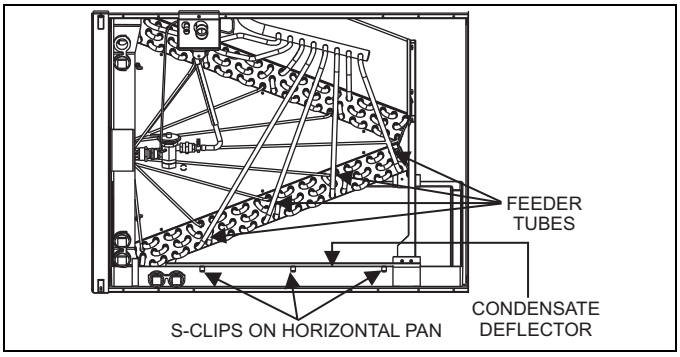


FIGURE 5: Condensate Deflector on Horizontal Drain Pan Edge

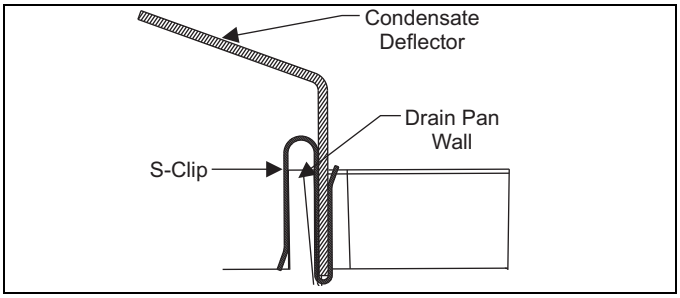


FIGURE 6: S-Clip Installation

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 though field duct and unit bottom flange.

Air supply and return may be handled in one of several ways best suited to the installation. See Figure 3 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 3.

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.

DUCT WORK TRANSITION

Duct work that is not designed to match the supply air opening can cause turbulence inside the plenum box. This turbulence can change the air flow patterns across the heat kit limit switch. If the factory suggested transition can not be fabricated, it is recommended a block off plate (approximately 8” in height and running the full width of the plenum) be attached to the supply opening Please refer to Figure 7 as a visual aid. The use of this block off plate will keep better air circulation across the limit switch.

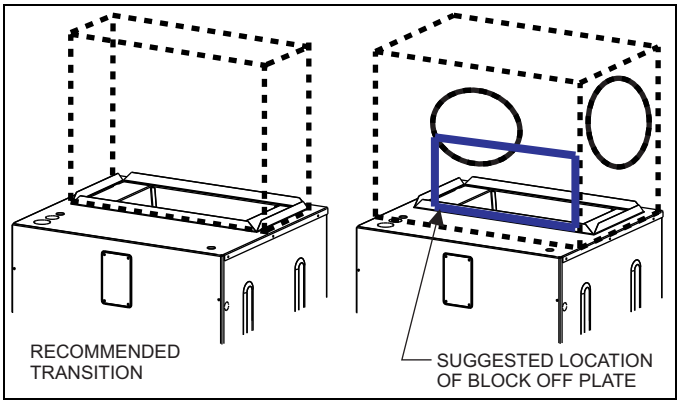


FIGURE 7: Duck Work Transition

The above suggestions will not alleviate problems caused by improper installation. When receiving intermittent fault codes pertaining to the limit switch, always double check your airflow CFM, motor speed and static pressures.

AIR FILTERS

Air filters must be field supplied. A 1" filter access rack has been built into the unit (except for AHX60, which requires an external filter). See Figure 3. 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, 603, 604BK. See Table 7 for filter size.

⚠CAUTION

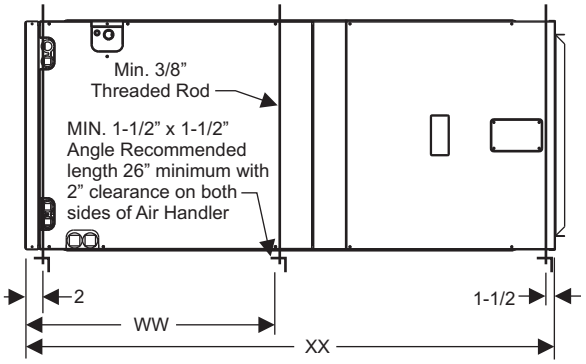
Equipment should never be operated without filters.

HORIZONTAL SUSPENSION

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 7.

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

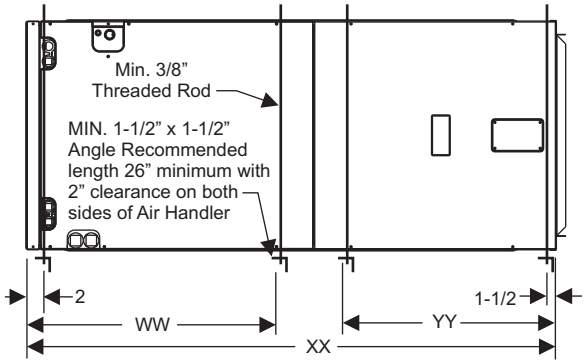
SUSPENSION SUPPORT LOCATIONS FOR HORIZONTAL APPLICATIONS



018-048

Units (Nominal Tons)	Dimension	
	WW	XX
018, 024, 030	20	46
036	24	52
042, 048	28	57

SUSPENSION SUPPORT LOCATIONS FOR HORIZONTAL APPLICATIONS



060

Units (Nominal Tons)	Dimensions		
	WW	XX	YY
060	24	61	22

FIGURE 8: Typical Horizontal Installation

TXV METERING DEVICES

The model number is of the 3X model series:

The coil will require an orifice or R410A TXV to be installed in the field. Refer to installation manual with TXV kit. It is recommended to install a orifice or TXV kit prior to brazing line sets.

Please refer to Outdoor Unit Tech Guide to verify which orifice or TXV required for field installation in this coil and that this is a valid system match for the AC or HP unit installed.

Attach temperature sensing bulb to the coil suction header line.

NOTICE

After attaching the field installed TXV's, take caution not to apply high temperatures to the TXV assembly or equalizer line while brazing.

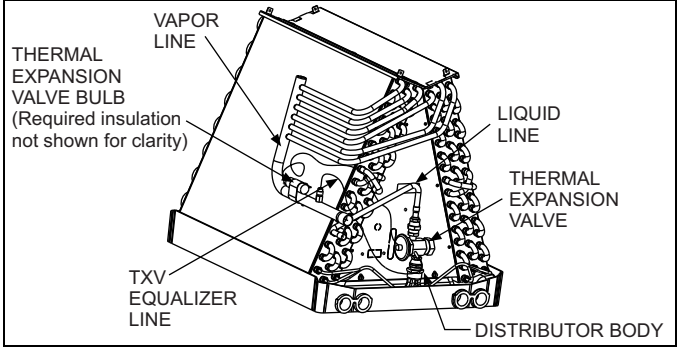


FIGURE 9: Field Installed TXV

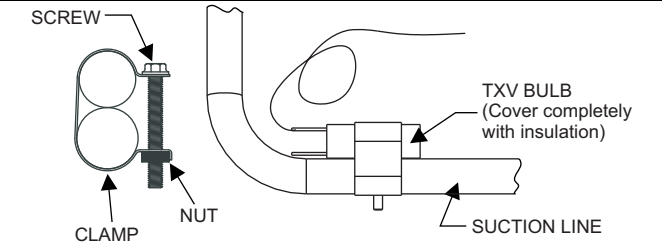


FIGURE 10: Proper Bulb Location

⚠ CAUTION

COIL UNDER PRESSURE.

Relieve pressure by depressing schrader core. Coil may have factory installed TXV or may require orifice or TXV to be added. See outdoor unit documentation for correct orifice or TXV to be used. Refer to coil nameplate for TXV identification for this unit.

NOTICE

The coil should be open to the air for no more than 2 minutes to keep moisture and contaminates 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

⚠ CAUTION

Coil is under inert gas pressure. Relieve pressure from coil by depressing schrader core.

⚠ CAUTION

Dry nitrogen should always be supplied through the tubing while it is being brazed, because the temperature required is high enough to cause oxidation of the copper unless an inert atmosphere is provided. The flow of dry nitrogen should continue until the joint has cooled. Always use a pressure regulator and safety valve to insure that only low pressure dry nitrogen is introduced into the tubing. Only a small flow is necessary to displace air and prevent oxidation.

Connect lines as follows:

NOTICE

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 and liquid line connections are made outside the cabinet. Leave the tubing connection panel attached to the cabinet with the tubes protruding through it. Coil access panel should be removed for brazing. The lines are swedged to receive the field line set tubes.
2. Remove the heat shield from the Customer Packet, soak in water, and install over coil tubing to prevent overheating of cabinet.
3. Wrap a water soaked rag around the coil connection tubes inside the cabinet to avoid damaging the TXV bulb.
4. Remove grommets where tubes exit the cabinet to prevent burning them during brazing.
5. Purge refrigerant lines with dry nitrogen.
6. Braze the suction and liquid lines.
7. Remove the heat shield.
8. Re-attach the grommets to the lines carefully to prevent air leakage.
9. Attach the coil access panel to the cabinet.

Refer to Outdoor unit Installation Manual for evacuation, leak check and charging instructions.

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

All evaporator coil connections are copper-to-copper and should be brazed with a phosphorous-copper alloy material such as Silfos-5 or equivalent. DO NOT use soft solder.

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 1/16 turn.

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 and 3 for drain connection locations.

⚠ CAUTION

When the coil is installed in an attic or above a finished ceiling, an auxiliary drain pan should be provided under the coil if specified by local building codes. When this exterior secondary drain pan is used that 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” per foot (21mm/m) 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. Use 3/4" PVC or steel threaded pipe. 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.

SECTION IV: ELECTRIC HEATER INSTALLATION

If the air handler requires electric heat, install the electric heat kit according to the installation instructions included with the kit. After installing the kit, mark the air handler nameplate to designate the heater kit that was installed. If no heater is installed, mark the name plate appropriately to indicate that no heat kit is installed.

The HEAT ENABLE jumper (See Figure 10) must be moved to the HEAT position to enable operation of the heater.

Use only 4HK heater kits, as listed on Air Handler name plate and in these instructions. Use data from Tables 10 through 19 for information on required minimum motor speed tap to be used for heating operation, maximum over-current protection device required and minimum electrical supply wiring size required – for listed combination of Air Handler and Heater Kit.

For upflow, downflow and horizontal right hand applications the kits can be installed without modification.

Field modification is required for horizontal left hand airflow application only. Follow instructions with heater for modification.

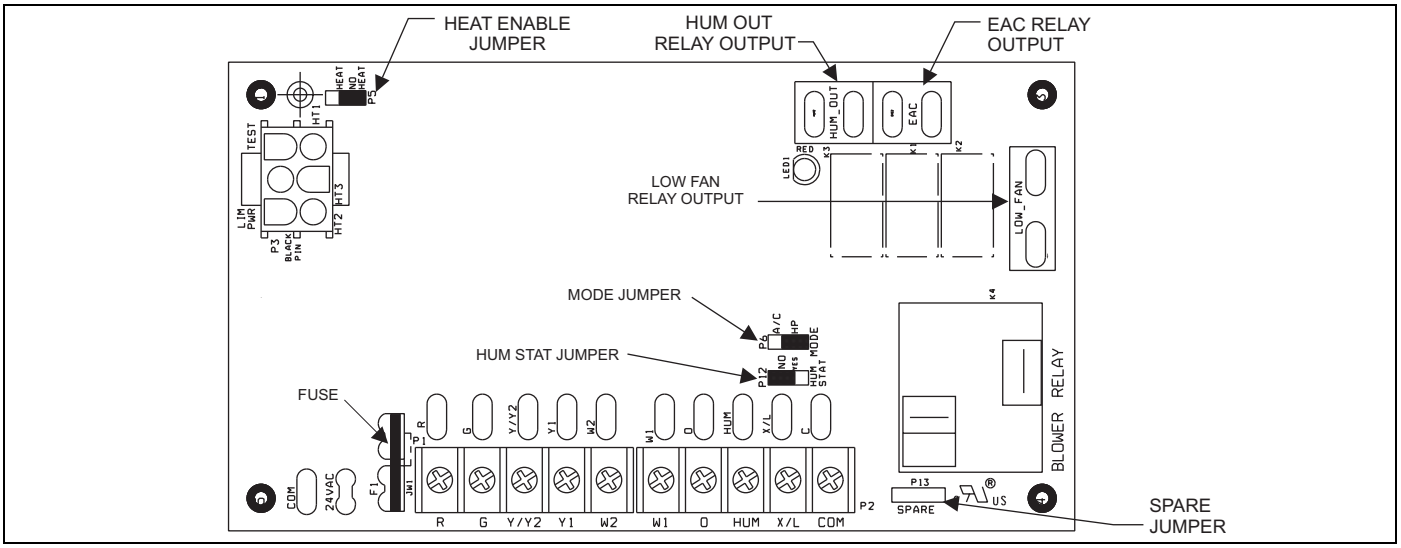


FIGURE 11: Control Board

SECTION V: LOW VOLTAGE CONTROL CONNECTIONS

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. Refer to Figure 3.

Remove desired knockout and pierce foil faced insulation to allow wiring to pass through. Use as small of a hole as possible to minimize air leakage.

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

To further minimize air leakage, seal the wiring entry point at the outside of the unit.

The field wiring is to be connected at the screw terminals of the control board. Refer to Figures 10, 13, & 14.

NOTICE

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

NOTICE

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 the first stage of electric heat during defrost. See Heat Output and Limit Connections and Table 6 for additional information on heat during defrost cycle.

TABLE 2: Low Voltage Connections

Terminal	Signal	Comment
R	24 VAC power (fused).	
G	Continuous Fan operation.	
Y/Y2	Second or full stage compressor operation.	
Y1	First stage compressor operation.	Not used with outdoor units having one stage compressors.
W2	Second stage heat operation.	
W1	First stage heat operation.	
O	Reversing valve operation.	24 VAC will be present at this terminal when the MODE jumper is in the AC position. This is normal.
HUM	Humidity switch input.	24 VAC will be present at this terminal when the HUM STAT jumper is in the NO position. This is normal.
X/L	Connection point for heat pump fault indicator.	This terminal is a connection point only and does not affect air handler control operation.
COM	24 VAC common.	

The low voltage connections may be connected to the screw terminals or the quick connect terminals. The screw terminals and the quick connect terminals are physically connected on the control board.

HUMIDITY SWITCH INPUT

The air handler control is designed to work with a humidity control that closes when the humidity is below the set-point. The control is open when the humidity is above the set-point. This humidity control may be referred to as a humidistat or a dehumidistat.

The humidity switch controls both humidification and de-humidification operation of the control. The control provides humidification using the HUM OUT relay output and de-humidification by lowering the blower speed. This is accomplished using the LOW FAN output and a field installed two-speed fan relay kit for non-variable speed models and the de-humidification input of the motor for variable speed models.

The humidity switch should be connected to the R and HUM terminals of the control. See Figure 10.

SECTION VI: REQUIRED CONTROL SET-UP

IMPORTANT

The following steps must be taken at the time of installation to insure proper system operation.

1. Consult system wiring diagram to determine proper thermostat wiring for your system.
2. If heat kit is installed, change HEAT ENABLE jumper from NO HEAT to HEAT position.
3. If a humidstat is installed, change HUM STAT jumper from NO to YES.
4. Set the MODE jumper to A/C (Air Conditioner) or HP (Heat Pump) position depending on the outdoor unit included with the system.

FUNCTIONALITY AND OPERATION

JUMPER PER POSITIONS

Heat Enable Jumper

The HEAT ENABLE jumper configures the control for heat kit operation. The jumper must be in the HEAT position if a heat kit is installed with the air handler.

With the jumper in the NO HEAT position, the control will not energize the heat relay outputs or sense the limit switch input.

If the jumper is not present, the control will operate as if the jumper is in the HEAT position. If the jumper is not present and a heat kit is not present, the control will sense an open limit condition and the blower will run continuously.

Hum Stat Jumper

The HUM STAT jumper configures the control to monitor the humidity switch input. With the jumper in the NO position, the control will energize the HUM terminal with 24 VAC continually. With the jumper in the YES position, the control will monitor the HUM input to control the HUM OUT output to control an external humidifier.

If the jumper is not present, the control will operate as if the jumper is in the YES position.

Mode Jumper

The MODE jumper configures the control to operate properly with an air conditioner (AC position) or heat pump (HP position). With the jumper in the AC position, the control will energize the O terminal with 24 VAC continually. With the jumper in the HP position, the O input signal is received from the room thermostat.

If the jumper is not present, the control will operate as if the jumper is in the HP position.

SPARE Jumper

The control includes a spare jumper that can be used if a jumper is lost. The SPARE jumper does not have any effect on the operation of the control.

External Relay Outputs

The control includes three outputs to drive external relays having 24 VAC coils. The outputs have a maximum rating of 1.0 Amp pilot duty at 24 VAC.

HUM OUT

The HUM OUT output can be used to drive an external relay or solenoid (24 VAC coil) to control a humidifier. The output is energized when the HUM input is energized, the HUM STAT is in the YES position, and the control has a thermostat call for heating (heat pump or electric heat).

EAC

The EAC output is used as motor input because of the high efficiency non-variable speed motor that comes with these AHX models. The EAC output can be used to drive an external relay (24 VAC coil) to control an electronic air cleaner. The output is energized whenever the blower relay on the control is energized.

LOW FAN

The LOW FAN output is used to switch the speed input to the motor to a lower speed tap during cooling and heat pump modes (Y1/Y2).

The LOW FAN is de-energized during any call for electric heat (W1,W2). Hence, once W1 or W2 is energized, the system runs on high speed.

The LOW FAN output is energized when the control has the following inputs.

TABLE 3: Low Fan Control Inputs

Input	Operational Mode
G	Continuous Fan operation
Y1 or Y1 and O	First stage compressor operation
Y/Y2 and HUM de-energized with HUM STAT jumper in YES position	Dehumidification during cooling

STATUS AND FAULT CODES

The control includes an LED that displays status and fault codes. These codes are shown in Table 3. The control will display the fault codes until power is removed from the control or the fault condition is no longer present.

TABLE 4: Fault Codes

Fault or Status Condition	LED1 (RED) Flash Code
Status	
No power to control	OFF
Normal operation	2s ON / 2s OFF
Control in test mode	Rapid Flash
Control failure	ON
Limit Faults	
Limit switch currently open (not in lockout)	1
Multiple limit openings with no call for heat	2
Multiple limit openings during one call for heat	3
Single long duration limit opening	4
Multiple long duration limit openings	5
Fan failure	6
Wiring Related Faults	
Simultaneous call for heating and cooling	7
Internal Control Faults	
Control recovered from internal event	9

BLOWER DELAYS

The control includes the following blower delays:

TABLE 5: Blower Delays

Condition	Blower Delay
Following call for cooling	60 seconds
Following call for heat pump heating	30 seconds
Following call for electric heat heating	10 seconds

HEAT OUTPUT AND LIMIT CONNECTIONS

The control is connected to the heater relays and limit switch using the 6-pin connector. The relay outputs and the limit switch signal are 24 VDC.

The control energizes the heat relays and senses the limit switch input as shown in Table 6 when the HEAT ENABLE jumper is in the HEAT position.

TABLE 6: Heat Relays

Input	Heat Relay Output
W1	HT1
W2	HT1 and HT2
W1 and W2	HT1 and HT2 and HT3

The control energizes the first stage of electric heat immediately, the second stage 10 seconds after the call for second stage heat, and the third stage 20 seconds after the call for third stage heat.

Depending on the heat kit installed in the air handler, the control provides the flexibility to configure the amount of heat delivered with the first stage heating call. As an example, when the control's W1 input is connected to the room thermostat's first stage heat signal, a call for first stage heat will energize one heating element (HT1). If the control's W2 input is connected to the room thermostat's first stage heat signal, a call for first stage heat will energize two heating elements (HT1 and HT2). With either configuration, the control will energize three heating elements (HT1, HT2, and HT3) when it receives a first and second stage heat input from the thermostat.

LIMIT SWITCH AND LOCKOUT OPERATION

Limit Switch Operation

If the HEAT ENABLE jumper is in the HEAT position and the limit switch opens (fault code 1), the control will immediately de-energize all electric heat relay outputs and energize the blower (if it wasn't already energized). When the limit switch closes, the control will re-energize electric heat according to the thermostat inputs using normal timings.

Fan On Lock Condition

If the limit switch opens multiple times during a single call for electric heat (fault code 3) or if the limit switch opens for a long duration (fault code 4), the control will energize the blower until power is removed from the control. The control will cycle the heat outputs on and off as the limit re-closes and opens. The constant fan operation will signal the homeowner that a problem has occurred and a service call is required.

Soft Lockout

If the limit switch opens for a second long duration period during a single call for heat (fault code 5), the control will keep the blower locked on and lock out the heat outputs for one hour. The control will only reset this one hour lockout when the power is removed from the control. After the one hour period has passed, the control will re-energize electric heat according to the thermostat inputs using normal timings. The blower will remain locked on from the first long duration limit opening.

Hard Lockout

The control has a hard lockout condition during which the control will keep all heat outputs de-energized until power is removed from the control. The control de-energizes the blower five minutes after entering the hard lockout condition.

If the limit switch closes and re-opens during the one hour soft lockout period, the control will enter a hard lockout condition and continue to indicate a fault code 5.

If the limit switch opens twice when no call for electric heat is present (fault code 2), the control will enter a hard lockout condition.

If the limit switch opens multiple times soon after a soft lockout reset (fault code 6), the control will enter a hard lockout condition.

Wiring Related Faults

If the control receives a simultaneous call for heating and cooling (fault code 7), the control will perform both heating and cooling operation

SECTION VII: 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 11, 12, 14 and 15 to determine proper wire sizing. Also see Figure 3. To minimize air leakage, seal the wiring entry point at the outside of the unit.

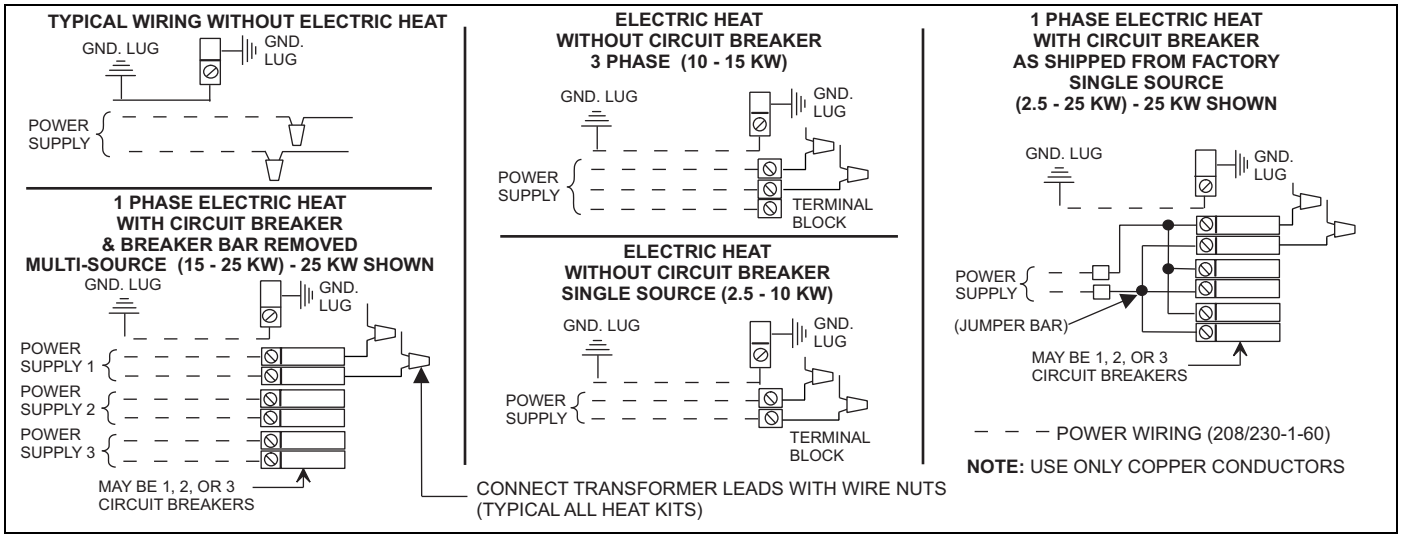


FIGURE 12: Line Power Connections

SECTION VIII: BLOWER SPEED CONNECTIONS

All air handlers contain a programmed 5 speed high efficiency brushless DC motor.

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 12. Airflow data is shown in Tables 16 and 17.

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

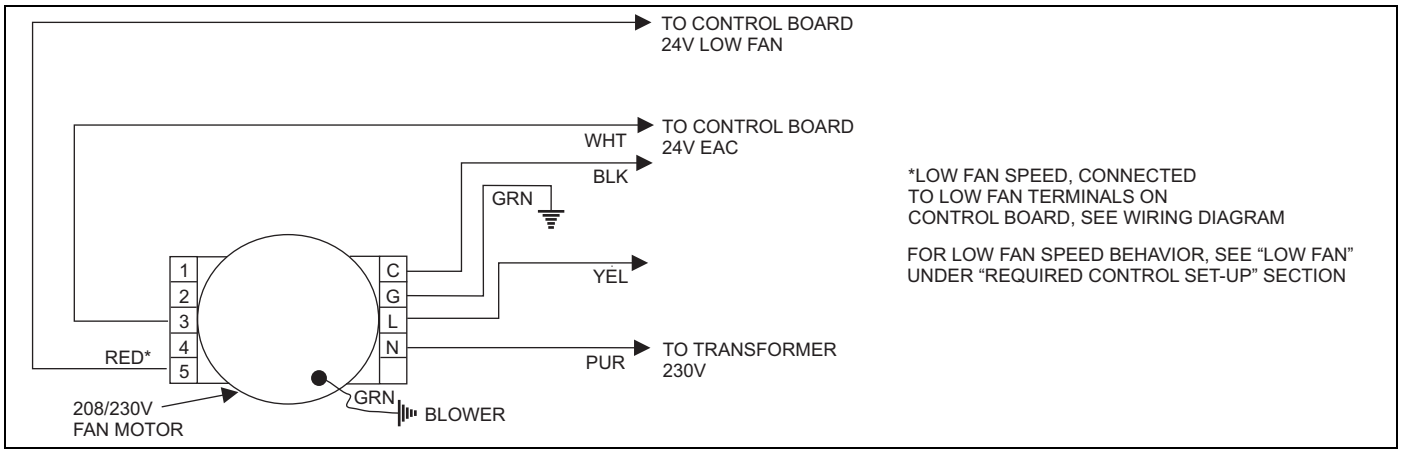


FIGURE 13: Blower Speed Connections

SECTION IX: UNIT DATA

TABLE 7: Physical and Electrical Data

Models		**18B**	**24B**	**30B**	**36C**
Blower - Diameter x Width		9 x 6	10 x 9	10 x 9	10 X 10
Motor	HP	1/3 HP	1/3 HP	1/3 HP	1/3 HP
	Nominal RPM	1050	1050	1050	1050
Voltage		230			
Amps	Full Load (230)	2.8	2.8	2.8	2.8
Filter[1]	Type	DISPOSABLE OR PERMANENT			
	Size	16 x 20 x 1	16 x 20 x 1	16 x 20 x 1	20 x 20 x 1
	Permanent Type Kit	1PF0601BK	1PF0601BK	1PF0601BK	1PF0602BK
Shipping / Operating Weight (lbs.) - H Models		131/125	139/133	142/136	165/159

Models		**42D**	**48D**	**60D[2]**
Blower - Diameter x Width		10 x 10	10 x 10	11 x 10
Motor	HP	1/2 HP	1/2 HP	3/4 HP
	Nominal RPM	1050	1050	1050
Voltage		230		
Amps	Full Load (230)	4.1	4.1	6.0
Filter[1]	Type	DISPOSABLE OR PERMANENT		
	Size	22 x 20 x 1	22 x 20 x 1	24 x 20 x 1
	Permanent Type Kit	1PF0603BK	1PF0603BK	1PF0604BK
Shipping / Operating Weight (lbs.) - H Models		187/176	190/179	203/192

1. Field Supplied.
2. Model 60D uses external filter.

TABLE 8: Conversion Table

kW & MBH Conversions - for Total Power Input Requirement					
FOR	208V	OPERATION MULTIPLY	240V	TABULATED kW & MBH BY	0.751
	230V		240V		0.918

TABLE 9: Electrical Data - Cooling Only (60 Hz)

Models	**Total Motor Amps**		**Minimum Circuit Ampacity**		**Max. O.C.P.[1] Amps/Type**	**Minimum Wire Size A.W.G.**
	60 Hertz		**60 Hertz**			
	208V	**230V**	**208V**	**230V**		
18B	2.8	2.8	3.5	3.5	15	14
24B	2.8	2.8	3.5	3.5	15	14
30B	2.8	2.8	3.5	3.5	15	14
36C	2.8	2.8	3.5	3.5	15	14
42D	4.1	4.1	5.2	5.2	15	14
48D	4.1	4.1	5.2	5.2	15	14
60D	6.0	6.0	7.5	7.5	15	14

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

TABLE 10: Electrical Data - 208/230-1-60

Models	Heater Models*	Max. Static	Min. Speed Tap	Total Heat[1]				kW Staging					
				kW		MBH		W1 Only		W2 Only		W1 + W2	
				208V	230V	208V	230V	208V	230V	208V	230V	208V	230V
18B	4HK*6500206	0.5	Med-Low/#4	1.9	2.5	6.4	8.5	1.9	2.5	1.9	2.5	1.9	2.5
	4HK*6500506	0.5	Med-Low/#4	3.6	4.8	12.3	16.4	3.6	4.8	3.6	4.8	3.6	4.8
	4HK*6500806	0.5	Med-High/#2	5.6	7.5	19.2	25.6	2.8	3.75	5.6	7.5	5.6	7.5
24B	4HK*6500206	0.5	Med-Low/#4	1.9	2.5	6.4	8.5	1.9	2.5	1.9	2.5	1.9	2.5
	4HK*6500506	0.5	Med-Low/#4	3.6	4.8	12.3	16.4	3.6	4.8	3.6	4.8	3.6	4.8
	4HK*6500806	0.5	Med-High/#2	5.6	7.5	19.2	25.6	2.8	3.75	5.6	7.5	5.6	7.5
	4HK*6501006	0.5	Med-High/#2	7.2	9.6	24.6	32.8	3.6	4.8	7.2	9.6	7.2	9.6
	4HK16501306	0.5	Med-High/#2	9.8	13	33.3	44.4	3.3	4.3	6.5	8.7	9.8	13
30B	4HK*6500506	0.5	Med-Low/#4	3.6	4.8	12.3	16.4	3.6	4.8	3.6	4.8	3.6	4.8
	4HK*6500806	0.5	Med-High/#2	5.6	7.5	19.2	25.6	2.8	3.75	5.6	7.5	5.6	7.5
	4HK*6501006	0.5	Med-High/#2	7.2	9.6	24.6	32.8	3.6	4.8	7.2	9.6	7.2	9.6
	4HK16501306	0.5	Med-High/#2	9.8	13	33.3	44.4	3.3	4.3	6.5	8.7	9.8	13
	4HK165N1506	0.5	High/#1	10.8	14.4	36.9	49.1	3.6	4.8	7.2	9.6	10.8	14.4
36C	4HK*6500506	0.5	Med-High/#2	3.6	4.8	12.3	16.4	3.6	4.8	3.6	4.8	3.6	4.8
	4HK*6500806	0.5	High/#1	5.6	7.5	19.2	25.6	2.8	3.75	5.6	7.5	5.6	7.5
	4HK*6501006	0.5	High/#1	7.2	9.6	24.6	32.8	3.6	4.8	7.2	9.6	7.2	9.6
	4HK16501306	0.5	High/#1	9.8	13	33.3	44.4	3.3	4.3	6.5	8.7	9.8	13.0
	4HK16501506	0.5	High/#1	10.8	14.4	36.9	49.1	3.6	4.8	7.2	9.6	10.8	14.4
42D	4HK*6500506	0.5	High/#1	3.6	4.8	12.3	16.4	3.6	4.8	3.6	4.8	3.6	4.8
	4HK*6500806	0.5	High/#1	5.6	7.5	19.2	25.6	2.8	3.75	2.8	7.5	5.6	7.5
	4HK*6501006	0.5	High/#1	7.2	9.6	24.6	32.8	3.6	4.8	7.2	9.6	7.2	9.6
	4HK16501306	0.5	High/#1	9.8	13	33.3	44.4	3.3	4.3	6.5	8.7	9.8	13.0
	4HK16501506	0.5	High/#1	10.8	14.4	36.9	49.1	3.6	4.8	7.2	9.6	10.8	14.4
48D	4HK*6500506	0.5	Med/#3	3.6	4.8	12.3	16.4	3.6	4.8	3.6	4.8	3.6	4.8
	4HK*6500806	0.5	Med/#3	5.6	7.5	19.2	25.6	2.8	3.75	2.8	7.5	5.6	7.5
	4HK*6501006	0.5	Med-High/#2	7.2	9.6	24.6	32.8	3.6	4.8	7.2	9.6	7.2	9.6
	4HK16501306	0.5	Med-High/#2	9.8	13	33.3	44.4	3.3	4.3	6.5	8.7	9.8	13.0
	4HK16501506	0.5	Med High/#2	10.8	14.4	36.9	49.1	3.6	4.8	7.2	9.6	10.8	14.4
	4HK16501806	0.5	High/#1	13.2	17.6	45.1	60.1	3.3	4.4	6.6	8.8	13.2	17.6
	4HK16502006	0.5	High/#1	14.4	19.2	49.2	65.5	3.6	4.8	7.2	9.6	14.4	19.2
60D	4HK*6500506	0.5	Med-Low/#4	3.6	4.8	12.3	16.4	3.6	4.8	3.6	4.8	3.6	4.8
	4HK*6500806	0.5	Med-Low/#4	5.6	7.5	19.2	25.6	2.8	3.75	2.8	7.5	5.6	7.5
	4HK*6501006	0.5	Med/#3	7.2	9.6	24.6	32.8	3.6	4.8	7.2	9.6	7.2	9.6
	4HK16501306	0.5	Med/#3	9.8	13	33.3	44.4	3.3	4.3	6.5	8.7	9.8	13.0
	4HK16501506	0.5	Med/#3	10.8	14.4	36.9	49.1	3.6	4.8	7.2	9.6	10.8	14.4
	4HK16501806	0.5	Med-High/#2	13.2	17.6	45.1	60.1	3.3	4.4	6.6	8.8	13.2	17.6
	4HK16502006	0.5	Med-High/#2	14.4	19.2	49.2	65.5	3.6	4.8	7.2	9.6	14.4	19.2
	4HK16502506	0.5	High/#1	18	24	61.5	81.9	3.6	4.8	10.8	14.4	18	24.0

1. See conversion Table 8.
* May be 0 (no breaker) or 1 (with breaker).

TABLE 11: Electrical Data - (For **Single Source** Power Supply) - Copper Wire - 208/230-1-60

Models	Heater Models*	Heater Amps 240V	Field Wiring					
			Min. Circuit Ampacity		Max. O.C.P.[1] Amps/Type		75°C Wire Size - AWG	
			208V	230V	208V	230V	208V	230V
18B	4HK*6500206	10.4	14.8	16.5	15	20	12	12
	4HK*6500506	20.0	25.2	28.5	30	30	10	10
	4HK*6500806	31.3	37.4	42.6	40	45	8	8
24B	4HK*6500206	10.4	14.8	16.5	15	20	12	12
	4HK*6500506	20.0	25.2	28.5	30	30	10	10
	4HK*6500806	31.3	37.4	42.6	40	45	8	8
	4HK*6501006	40.0	46.8	53.5	50	60	8	6
	4HK16501306	54.2	62.2	71.3	70	80	4	2
30B	4HK*6500506	20.0	25.2	28.5	30	30	10	10
	4HK*6500806	31.3	37.4	42.6	40	45	8	8
	4HK*6501006	40.0	46.8	53.5	50	60	8	6
	4HK16501306	54.2	62.1	71.3	70	80	4	3
	4HK165N1506	60.0	68.5	78.6	70	80	4	3
36C	4HK*6500506	20.0	25.2	28.5	30	30	10	10
	4HK*6500806	31.3	37.4	42.6	40	45	8	8
	4HK*6501006	40.0	46.8	53.5	50	60	8	6
	4HK16501306	54.2	62.4	71.2	70	80	4	2
	4HK16501506	60.0	68.5	78.5	70	80	4	3
42D	4HK*6500506	20.0	26.8	30.1	30	35	8	8
	4HK*6500806	31.3	39.0	44.2	40	45	8	8
	4HK*6501006	40.0	48.4	55.1	50	60	6	6
	4HK16501306	54.2	64	72.8	70	80	4	2
	4HK16501506	60.0	70.1	80.1	80	90	3	3
48D	4HK*6500506	20.0	26.8	30.1	30	35	10	10
	4HK*6500806	31.3	39.0	44.2	40	45	8	8
	4HK*6501006	40.0	48.4	55.1	50	60	8	6
	4HK16501306	54.2	64	72.8	70	80	4	2
	4HK16501506	60.0	70.1	80.1	80	90	3	3
	4HK16501806	73.3	84.5	96.7	90	100	3	3
	4HK16502006	80.0	91.8	105.1	100	110	3	2
60D	4HK*6500506	20.0	29.2	32.5	30	35	8	8
	4HK*6500806	31.3	41.1	46.6	45	50	8	8
	4HK*6501006	40.0	50.8	57.5	60	60	6	6
	4HK16501306	54.2	66.4	75.2	70	80	4	2
	4HK16501506	60.0	72.5	82.5	80	90	3	3
	4HK16501806	73.3	86.9	99.1	90	110	3	2
	4HK16502006	80.0	94.2	107.5	100	125	3	1
	4HK16502506	100.0	115.8	132.5	125	150	1	1/0

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

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

TABLE 12: Electrical Data - (For **Multi-Source** Power Supply) - Copper Wire - 208/230-1-60

Models	Heater Models	Min. Circuit Ampacity			Max. O.C.P.[1] 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
24B	4HK16501306	42.7/48.6	19.5/22.5	–	45/50	20/25	–	8/8	10/10	–
30B	4HK16501306	42.6/48.7	19.5/22.5	–	45/50	20/25	–	8/8	10/10	–
	4HK165N1506	46.8/53.6	21.7/25.0	–	50/60	25/25	–	8/6	10/10	–
36C	4HK16501306	40.8/47.1	21.6/24.1	–	50/50	30/30	–	6/6	12/10	–
	4HK16501506	46.9/53.5	21.7/25.0	–	50/60	25/25	–	8/6	10/10	–
42D	4HK16501306	41.6/47.9	22.4/25.0	–	50/50	30/30	–	6/6	12/10	–
	4HK16501506	48.5/55.2	21.7/25.0	–	50/60	25/25	–	8/6	10/10	–
48D	4HK16501306	41.6/47.9	22.4/25.0	–	50/50	30/30	–	6/6	12/10	–
	4HK16501506	48.5/55.2	21.7/25.0	–	50/60	25/25	–	8/6	10/10	–
	4HK16501806	44.9/51.0	39.8/45.8	–	45/60	40/50	–	8/6	8/8	–
	4HK16502006	48.5/55.2	43.4/50.0	–	50/60	45/50	–	8/6	8/8	–
60D	4HK16501306	42.9/49.1	23.6/26.2	–	50/50	30/30	–	6/6	12/10	–
	4HK16501506	51.5/58.0	21.7/25.0	–	60/60	25/25	–	8/6	10/10	–
	4HK16501806	47.5/54.0	39.8/45.8	–	50/60	1	–	6/6	8/6	–
	4HK16502006	51.5/58.0	43.4/50.0	–	60/60	45/50	–	6/6	8/6	–
	4HK16502506	51.5/58.0	43.4/50.0	21.68/25.00	60/60	45/50	25/25	6/6	8/6	10/10

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

TABLE 13: Electrical Data - 208/230-3-60

Models	Heat Kit - Three Phase	Max. Static	Min. Speed Tap	Total Heat[1]				kW Staging					
				kW		MBH		W1 Only		W2 Only		W1 + W2	
				208V	230V	208V	230V	208V	230V	208V	230V	208V	230V
24B	4HK06501025	0.5	Med-High/#2	7.2	9.6	24.6	32.8	7.2	9.6	7.2	9.6	7.2	9.6
30B	4HK06501025	0.5	Med-High/#2	7.2	9.6	24.6	32.8	7.2	9.6	7.2	9.6	7.2	9.6
	4HK065N1525	0.5	High/#1	10.8	14.4	36.9	49.1	10.8	14.4	10.8	14.4	10.8	14.4
36C	4HK06501025	0.5	High/#1	7.2	9.6	24.6	32.8	7.2	9.6	7.2	9.6	7.2	9.6
	4HK06501525	0.5	High/#1	10.8	14.4	36.9	49.1	10.8	14.4	10.8	14.4	10.8	14.4
42D	4HK06501025	0.5	High/#1	7.2	9.6	24.6	32.8	7.2	9.6	7.2	9.6	7.2	9.6
	4HK06501525	0.5	High/#1	10.8	14.4	36.9	49.1	10.8	14.4	10.8	14.4	10.8	14.4
48D	4HK06501025	0.5	Med-High/#2	7.2	9.6	24.6	32.8	7.2	9.6	7.2	9.6	7.2	9.6
	4HK06501525	0.5	Med-High/#2	10.8	14.4	36.9	49.1	10.8	14.4	10.8	14.4	10.8	14.4
	4HK06501825	0.5	High/#1	12.9	17.2	44.7	58.7	12.9	17.2	12.9	17.2	12.9	17.2
60D	4HK06501025	0.5	Med/#3	7.2	9.6	24.6	32.8	7.2	9.6	7.2	9.6	7.2	9.6
	4HK06501525	0.5	Med/#3	10.8	14.4	36.9	49.1	10.8	14.4	10.8	14.4	10.8	14.4
	4HK16501825	0.5	Med-High/#2	12.9	17.2	44.7	58.7	12.9	17.2	12.9	17.2	12.9	17.2
	4HK16502525	0.5	High/#1	18	24	61.4	81.4	9	12	18	24	18	24

1. See conversion Table 8.

TABLE 14: Electrical Data - (For **Single Source** Power Supply) - Copper Wire - 208/230-3-60

Models	Heat Kit - Three Phase [1]	Heater Amps 240V	Field Wiring					
			Min. Circuit Ampacity		Max. O.C.P.[2] Amps/Type		75°C Wire Size - AWG	
			208V	230V	208V	230V	208V	230V
24B	4HK06501025	23.1	28.9	32.9	30	35	10	8
	4HK16501306	54.2	62.2	71.3	70	80	4	2
30B	4HK06501025	23.1	27.8	31.6	30	35	10	8
	4HK16501306	54.2	62.2	71.3	70	80	4	2
	4HK065N1525	34.7	41.0	46.9	45	50	8	8
36C	4HK06501025	23.1	26.9	30.6	30	35	10	8
	4HK16501306	54.2	62.4	71.2	70	80	4	2
	4HK06501525	34.7	39.4	45.1	40	50	8	8
42D	4HK06501025	23.1	30.2	34.0	35	35	10	8
	4HK16501306	54.2	64.0	72.8	70	80	4	2
	4HK06501525	34.7	42.7	48.5	45	50	8	8
48D	4HK06501025	23.1	30.2	34.0	35	35	10	8
	4HK16501306	54.2	64.0	72.8	70	80	4	2
	4HK06501525	34.7	42.7	48.5	45	50	8	8
	4HK06501825	41.4	48.8	56.9	50	60	8	6
60D	4HK06501025	23.1	35.3	39.1	40	40	8	8
	4HK16501306	54.2	66.4	75.2	70	80	4	2
	4HK06501525	34.7	45.0	53.6	45	60	8	6

1. Heaters are 3 phase
2. O.C.P. = Over Current Protection device, must be HACR type Circuit Breaker or Time Delay fuse.

TABLE 15: Electrical Data - (For **Multi-Source** Power Supply) - Copper Wire - 208/230-3-60

Models	Heat Kit - Three Phase[1]	Minimum Circuit Ampacity			Max. O.C.P.[2] Amps/Type			75°C Wire Size - AWG		
		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
60D	4HK16501825	32.5/36.0	22.4/25.9	–	35/40	25/30	–	8/8	10/10	–
	4HK16502525	41.5/46.0	25.0/28.9	–	45/50	35/40	–	8/8	8/8	–

1. Heaters are 3 phase
2. O.C.P. = Over Current Protection device, must be HACR type Circuit Breaker or Time Delay fuse.

TABLE 16: Air Flow Data - 60 Hz Models - 208 Volt

Models	Blower Motor Speed	208 Volt																			
		CFM[1] @ External Static Pressure - IWC										m^3/min @ External Static Pressure - Pascal									
		0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	0.025	0.050	0.075	0.100	0.125	0.150	0.175	0.200	0.225	0.250
18B†	High/#1	1056	1032	1014	988	969	944	919	862	785	696	29.9	29.2	28.7	28.0	27.4	26.7	26.0	24.4	22.2	19.7
	Med-High/#2	858	842	816	799	767	746	714	703	674	539	24.3	23.8	23.1	22.6	21.7	21.1	20.2	19.9	19.1	15.3
	Med/#3	674	643	624	589	572	546	506	479	431	227	19.1	182.	17.7	16.7	16.2	15.5	14.3	13.6	12.2	6.4
	Med-High/#4	617	582	547	532	490	467	412	360	306	220	17.5	16.5	15.5	15.0	13.9	13.2	11.7	10.2	8.7	6.2
	Low/#5	586	487	448	422	373	306	274	220	190	171	16.6	13.8	12.7	11.9	10.6	8.7	7.7	6.2	5.4	4.8
24B†	High/#1	1060	1031	994	962	926	889	844	768	726	675	30.0	29.2	28.1	27.2	26.2	25.2	23.9	21.7	20.5	19.1
	Med-High/#2	854	814	781	738	691	615	575	520	479	440	24.2	23.1	22.1	20.9	19.6	17.4	16.3	14.7	13.6	12.5
	Med/#3	679	593	533	462	423	370	319	297	228	197	19.2	16.8	15.1	13.1	12.0	10.5	9.0	8.4	6.4	5.6
	Med-Low/#4	648	509	442	380	311	293	224	183	151	125	18.3	14.4	12.5	10.8	8.8	8.3	6.3	5.2	4.3	3.5
	Low/#5	624	432	296	255	197	143	102	N/A	N/A	N/A	17.7	12.2	8.4	7.2	5.6	4.0	2.9	N/A	N/A	N/A
30B	High/#1	1081	1045	1015	979	941	906	852	784	737	691	30.6	29.6	28.8	27.7	26.6	25.6	24.1	22.2	20.9	19.6
	Med-High/#2	860	828	784	747	683	619	570	526	480	453	24.3	23.5	22.2	21.2	19.3	17.5	16.1	14.9	13.6	12.8
	Med/#3	692	600	528	464	427	371	324	297	222	188	19.6	17.0	14.9	13.2	12.1	10.5	9.2	8.4	6.3	5.3
	Med-Low/#4	665	507	441	381	322	299	223	182	161	125	18.8	14.4	12.5	10.8	9.1	8.5	6.3	5.1	4.6	3.5
	Low/#5	644	455	294	262	198	143	105	N/A	N/A	N/A	18.2	12.9	8.3	7.4	5.6	4.0	3.0	N/A	N/A	N/A
36C	High/#1	1245	1213	1172	1138	1106	1058	1011	943	852	794	35.3	34.3	33.2	32.2	31.3	30.0	28.6	26.7	24.1	22.5
	Med-High/#2	1053	1012	977	928	889	824	742	682	651	581	29.8	28.6	27.7	26.3	25.2	23.3	21.0	19.3	18.4	16.4
	Med/#3	873	765	720	620	562	502	462	425	382	332	24.7	21.7	20.4	17.6	15.9	14.2	13.1	12.0	10.8	9.4
	Med-Low/#4	783	589	248	198	165	104	N/A	N/A	N/A	N/A	22.2	16.7	7.0	5.6	4.7	2.9	N/A	N/A	N/A	N/A
	Low/#5	715	431	127	N/A	N/A	N/A	N/A	N/A	N/A	N/A	20.2	12.2	3.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A
42D	High/#1	1450	1412	1372	1338	1299	1255	1214	1170	1112	1058	41.0	40.0	38.9	37.9	36.8	35.5	34.4	33.1	31.5	29.9
	Med-High/#2	1251	1204	1171	1137	1086	1044	998	939	857	765	35.4	34.1	33.1	32.2	30.7	29.6	28.2	26.6	24.3	21.7
	Med/#3	1055	1017	969	929	866	817	732	653	590	537	29.9	28.8	27.4	26.3	24.5	23.1	20.7	18.5	16.7	15.2
	Med-Low/#4	900	732	428	357	299	262	212	167	139	41	25.5	20.7	12.1	10.1	8.5	7.4	6.0	4.7	3.9	1.2
	Low/#5	846	665	253	N/A	N/A	N/A	N/A	N/A	N/A	N/A	23.9	18.8	7.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
48D	High/#1	1680	1647	1609	1570	1527	1489	1442	1407	1360	1295	47.6	46.6	45.6	44.5	43.2	42.1	40.8	39.8	38.5	36.7
	Med-High/#2	1474	1437	1400	1354	1315	1284	1239	1198	1152	1103	41.7	40.7	39.6	38.3	37.2	36.4	35.1	33.9	32.6	31.2
	Med/#3	1299	1259	1214	1181	1133	1096	1051	994	936	819	36.8	35.7	34.4	33.4	32.1	31.0	29.8	28.1	26.5	23.2
	Med-Low/#4	1135	1081	1034	982	940	894	816	709	671	604	32.1	30.6	29.3	27.8	26.6	25.3	23.1	20.1	19.0	17.1
	Low/#5	1009	873	813	758	651	592	514	485	433	400	28.6	24.7	23.0	21.5	18.4	16.8	14.5	13.7	12.3	11.3
60D	High/#1	1918	1886	1852	1815	1783	1747	1712	1675	1631	1581	54.3	53.4	52.4	51.4	50.5	49.5	48.5	47.4	46.2	44.8
	Med-High/#2	1675	1640	1605	1566	1533	1500	1463	1422	1372	1342	47.4	46.4	45.4	44.3	43.4	42.5	41.4	40.3	38.8	38.0
	Med/#3	1463	1432	1393	1352	1315	1279	1245	1189	1148	1095	41.4	40.5	39.4	38.3	37.2	36.2	35.3	33.7	32.5	31.0
	Med-Low/#4	1255	1181	1140	1100	1054	1004	948	869	798	759	35.5	33.4	32.3	31.1	29.8	28.4	26.8	24.6	22.6	21.5
	Low/#5	1124	1093	1049	996	952	897	819	754	689	631	31.8	30.9	29.7	28.2	27.0	25.4	23.2	21.3	19.5	17.9

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. Dry coil conditions only, tested without filters.

† Speed temp High #1 not recommended for the unit.

Air handler units are UL Listed up to 0.5" w.c. external static pressure, including air filter, wet coil, and largest kW size heater, unless otherwise noted.

TABLE 17: Air Flow Data - 60 Hz Models - 230 Volt

Models	Blower Motor Speed	230 Volt																			
		CFM[1] @ External Static Pressure - IWC										m^3/min @ External Static Pressure - Pascal									
		0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	.003	.005	.008	.010	.013	.015	.018	.020	.023	.025
18B†	High/#1	1067	1042	1009	983	952	923	886	838	790	716	30.2	29.5	28.5	27.8	26.9	26.1	25.1	23.7	22.4	20.3
	Med-High/#2	871	856	829	812	785	762	737	725	700	652	24.6	24.2	23.5	23.0	22.2	21.6	20.9	20.5	19.8	18.4
	Med/#3	687	656	636	599	572	556	519	496	451	426	19.5	18.6	18.0	17.0	16.2	15.7	14.7	14.0	12.8	12.0
	Med-Low/#4	618	584	547	534	498	480	433	410	334	221	17.5	16.5	15.5	15.1	14.1	13.6	12.3	11.6	9.5	6.3
	Low/#5	574	486	444	422	374	317	277	223	216	192	16.3	13.7	12.6	11.9	10.6	9.0	7.8	6.3	6.1	5.4
24B†	High/#1	1022	994	970	945	920	889	845	800	747	683	28.9	28.1	27.5	26.7	26.0	25.2	23.9	22.6	21.1	19.3
	Med-High/#2	817	794	767	727	682	636	588	538	509	475	23.1	22.5	21.7	20.6	19.3	18.0	16.6	15.2	14.4	13.4
	Med/#3	620	598	537	486	440	388	368	307	289	N/A	17.6	16.9	15.2	13.8	12.5	11.0	10.4	8.7	8.2	N/A
	Med-Low/#4	629	510	451	393	362	265	265	209	196	146	17.8	14.4	12.8	11.1	10.2	7.5	7.5	5.9	5.6	4.1
	Low/#5	572	394	310	279	207	181	154	120	N/A	N/A	16.2	11.2	8.8	7.9	5.9	5.1	4.4	3.4	N/A	N/A
30B	High/#1	1057	1026	1002	973	944	891	853	780	752	674	29.9	29.1	28.4	27.6	26.7	25.2	24.1	22.1	21.3	19.1
	Med-High/#2	841	811	783	737	678	626	593	535	519	477	23.8	23.0	22.2	20.9	19.2	17.7	16.8	15.2	14.7	13.5
	Med/#3	653	613	513	473	443	393	261	303	N/A	N/A	18.5	17.4	14.5	13.4	12.5	11.1	7.4	8.6	N/A	N/A
	Med-Low/#4	628	507	449	399	361	315	220	227	199	176	17.8	14.4	12.7	11.3	10.2	8.9	6.2	6.4	5.6	5.0
	Low/#5	622	440	321	280	203	178	163	121	N/A	N/A	17.6	12.5	9.1	7.9	5.8	5.0	4.6	3.4	N/A	N/A
36C	High/#1	1263	1235	1200	1158	1105	1078	1030	983	882	805	35.8	35.0	34.0	32.8	31.3	30.5	29.2	27.8	25.0	22.8
	Med-High/#2	1059	1019	982	938	892	829	753	692	646	600	30.0	28.8	27.8	26.5	25.3	23.5	21.3	19.6	18.3	17.0
	Med/#3	904	784	726	612	545	506	480	428	376	340	25.6	22.2	20.6	17.3	15.4	14.3	13.6	12.1	10.6	9.6
	Med-Low/#4	800	654	228	189	167	107	N/A	N/A	N/A	N/A	22.6	18.5	6.5	5.3	4.7	3.0	N/A	N/A	N/A	N/A
	Low/#5	747	557	166	N/A	N/A	N/A	N/A	N/A	N/A	N/A	21.1	15.8	4.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A
42D	High/#1	1441	1407	1364	1329	1295	1255	1214	1175	1135	1085	40.8	39.8	38.6	37.6	36.7	35.5	34.4	33.3	32.1	30.7
	Med-High/#2	1238	1199	1151	1118	1080	1030	992	949	863	778	35.1	33.9	32.6	31.7	30.6	29.2	28.1	26.9	24.4	22.0
	Med/#3	1051	1008	948	908	863	799	714	669	595	565	29.8	28.5	26.8	25.7	24.4	22.6	20.2	18.9	16.8	16.0
	Med-Low/#4	927	761	418	342	311	228	217	187	136	N/A	26.2	21.5	11.8	9.7	8.8	6.5	6.1	5.3	3.8	N/A
	Low/#5	887	687	259	N/A	N/A	N/A	N/A	N/A	N/A	N/A	25.1	19.4	7.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A
48D	High/#1	1731	1688	1645	1604	1560	1518	1479	1441	1380	1283	49.0	47.8	46.6	45.4	44.2	43.0	41.9	40.8	39.1	36.3
	Med-High/#2	1501	1458	1415	1380	1337	1295	1257	1218	1156	1105	42.5	41.3	40.1	39.1	37.9	36.7	35.6	34.5	32.7	31.3
	Med/#3	1314	1273	1224	1180	1141	1088	1045	992	999	913	37.2	36.0	34.7	33.4	32.3	30.8	29.6	28.1	28.3	25.9
	Med-Low/#4	1151	1090	1057	1008	971	921	860	767	705	632	32.6	30.9	29.9	28.5	27.5	26.1	24.3	21.7	20.0	17.9
	Low/#5	1010	894	834	770	715	620	535	515	470	441	28.6	25.3	23.6	21.8	20.2	17.6	15.1	14.6	13.3	12.5
60D	High/#1	1908	1881	1848	1816	1781	1746	1718	1684	1638	1566	54.0	53.3	52.3	51.4	50.4	49.4	48.6	47.7	46.4	44.3
	Med-High/#2	1666	1636	1608	1570	1534	1503	1468	1436	1398	1362	47.2	46.3	45.5	44.5	43.4	42.6	41.6	40.7	39.6	38.6
	Med/#3	1448	1428	1393	1345	1313	1279	1241	1115	1161	1110	41.0	40.4	39.4	38.1	37.2	36.2	35.1	31.6	32.9	31.4
	Med-Low/#4	1210	1172	1134	1077	1051	1001	956	895	795	759	34.3	33.2	32.1	30.5	29.8	28.3	27.1	25.3	22.5	21.5
	Low/#5	1122	1082	1040	992	943	890	832	751	704	655	31.8	30.6	29.4	28.1	26.7	25.2	23.6	21.3	19.9	18.5

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. Dry coil conditions only, tested without filters.

† Speed temp High #1 not recommended for the unit.

Air handler units are UL Listed up to 0.5" w.c. external static pressure, including air filter, wet coil, and largest kW size heater, unless otherwise noted.

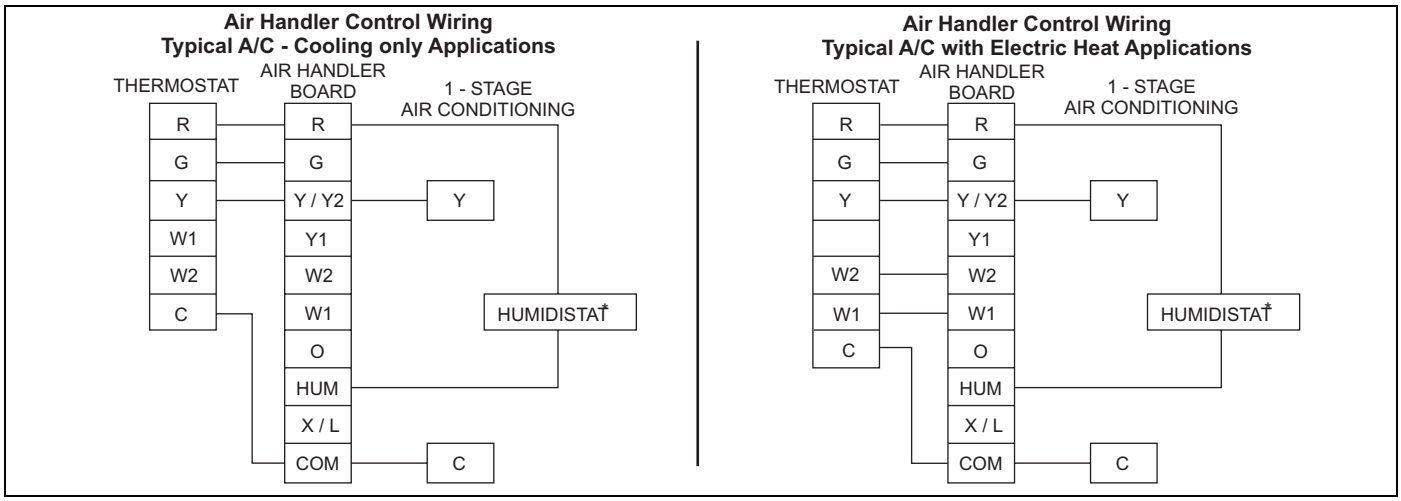


FIGURE 14: Cooling Models with Electric Heat Wiring

* Optional dehumidification humidistat switch contacts open on humidity rise.

Notes:

1. 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. 2. Move HUM STAT Jumper on AH Control Board to YES position if Humidistat is used.
3. 3. MODE Jumper on AH control board should be set to A/C for air conditioners.

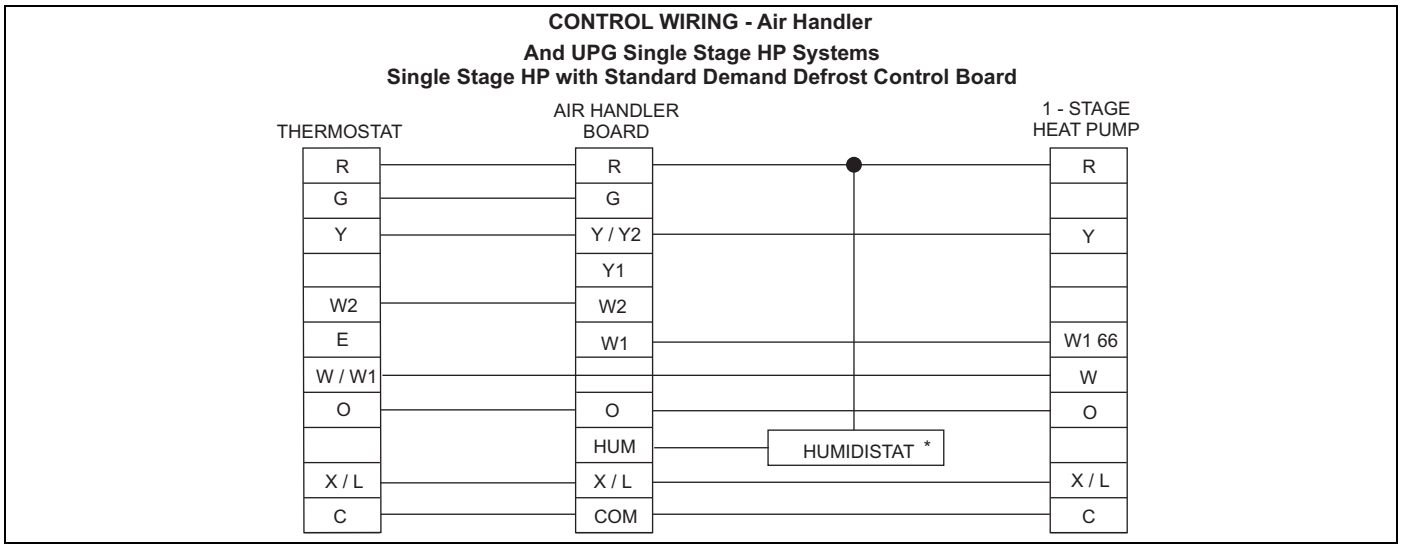


FIGURE 15: Single-Stage Heat Pump Wiring

* Optional dehumidification humidistat switch contacts open on rise.

Notes:

1. 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. 2. Move HUM STAT Jumper on AH Control Board to YES position if Humidistat is used.
3. 3. MODE Jumper on AH control board should be set to HP for heat pumps.
4. 4. To change quantity of heat during HP defrost cycle - Reverse connections at W1 & W2 on Air Handler Control Board.

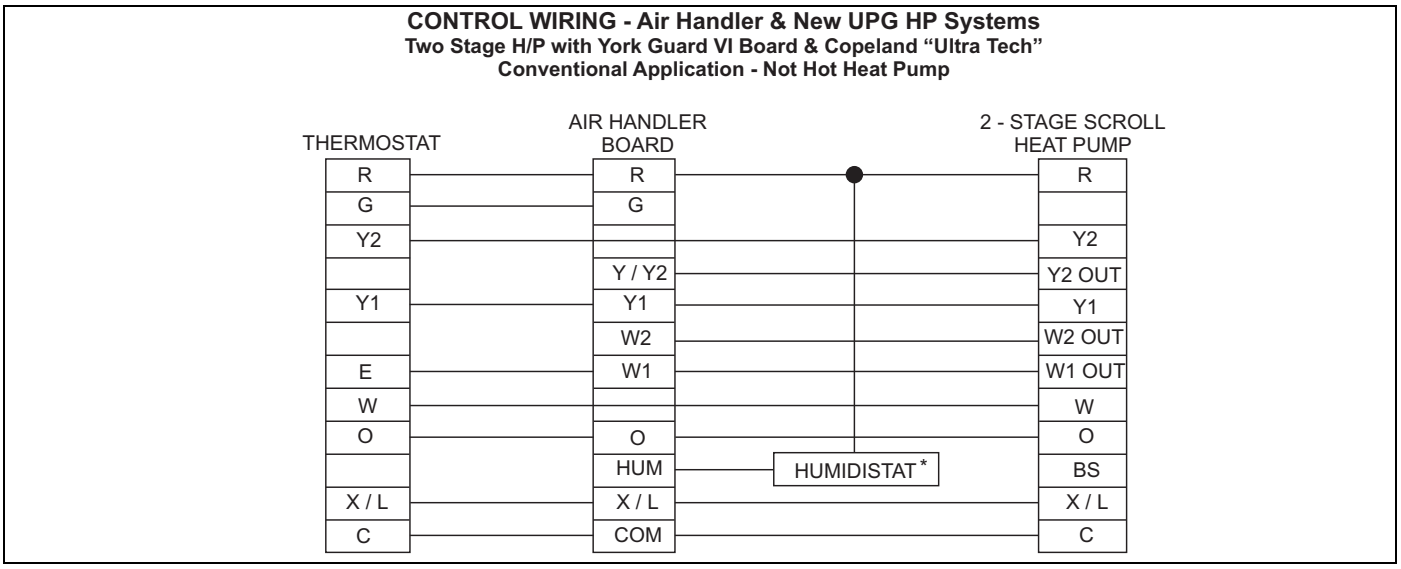


FIGURE 16: Two-Stage Heat Pump Wiring

* Optional dehumidification humidistat switch contacts open on rise.

Notes:

1. "Y/Y2" Terminal on air handler control board must be connected for full CFM and applications requiring 60 second blower off delay for SEER enhancement.
2. Remove humidistat jumper on air handler control board.
3. For heat pump applications - set MODE jumper on air handler control board to the HP position.
4. To change quantity of heat during HP defrost cycle - reverse connections at W1 and W2 on air handler control board.

SECTION X: 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 seven parts water). 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.

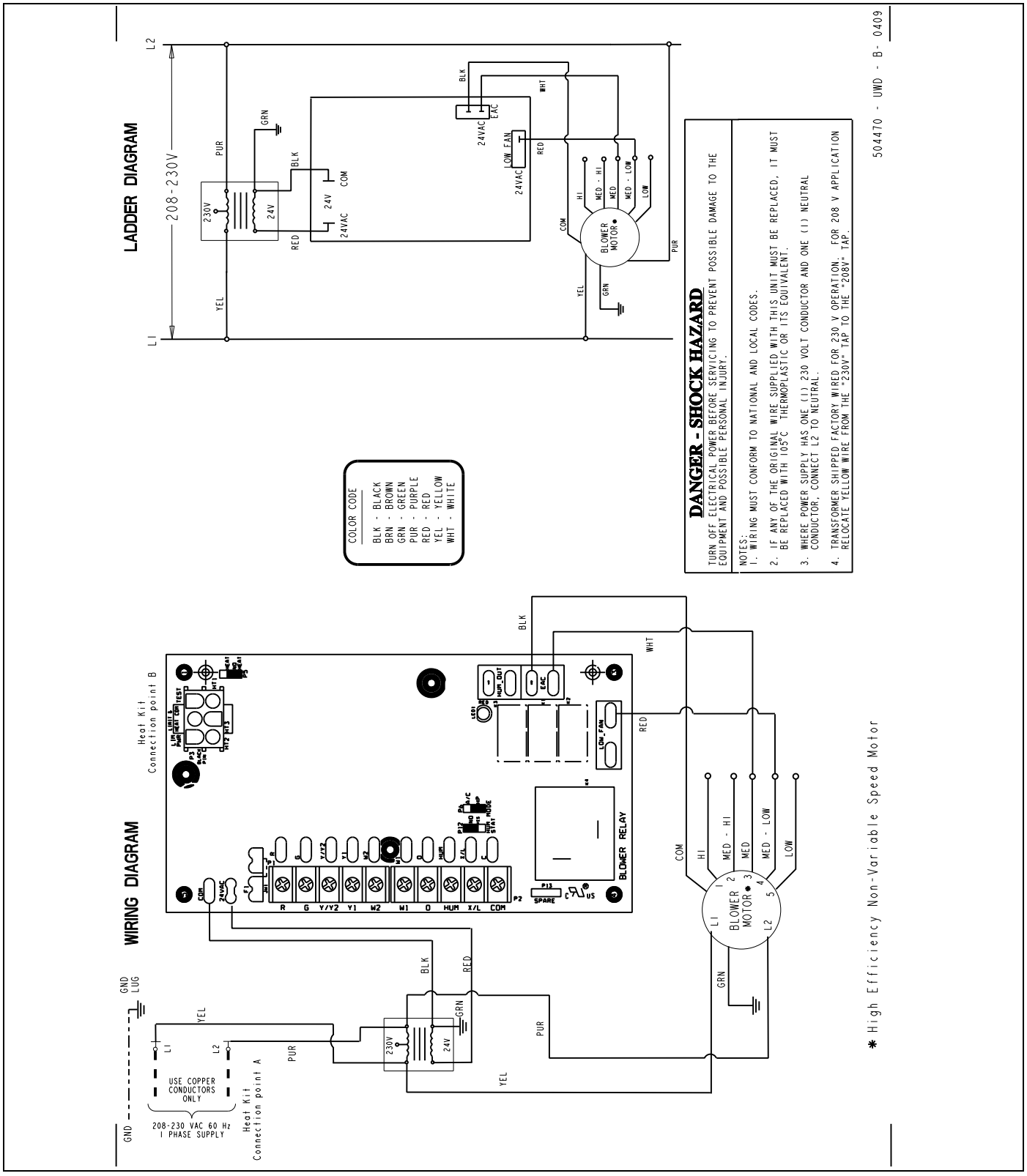


FIGURE 17: Wiring Diagram

503992-UIM-D-1010
Supersedes: 503992-UIM-C-0810

Johnson Controls Unitary Products
5005 York Drive
Norman, OK 73069