

INSTALLATION MANUAL

Premium Variable Speed ECM Single Piece Multi-position Air Handlers

Models: JHVV Series



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Section I: General

The single piece air handler series provides the flexibility for installation in any position. This unit may be used for upflow, downflow, horizontal right, or horizontal left applications.

These units may be located in a closet, utility room, attic, crawl space, or basement. These versatile models may be used for cooling or heat pump operation with or without electric heat.

Top or side power and control wiring, color coded leads for control wiring, and electric heaters all combine to make the installation easy and minimize installation cost.

Electric heat kits are available as field installed accessories. Single-phase kits are available from 2.5 kW to 25 kW and 208/230 V three-phase kits are available from 10 kW to 25 kW.

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

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.

⚠ WARNING

The air handler area must not be used as a broom closet or for any other storage purposes, as a fire hazard may be created. Never store items such as the following on, near, or in contact with the furnace.

1. Spray or aerosol cans, rags, brooms, dust mops, vacuum cleaners or other cleaning tools.
2. Soap powders, bleaches, waxes or other Cleaning compounds; plastic items or containers; gasoline, kerosene, cigarette lighter fluid, dry cleaning fluids or other volatile fluid.
3. Paint thinners and other painting compounds.
4. Paper bags, boxes or other paper products.

Never operate the air handler with the blower door removed. To do so could result in serious personal injury and/or equipment damage.

⚠ WARNING

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

Children should be supervised to ensure that they do not play with the appliance.

⚠ WARNING

Improper installation, adjustment, alteration, or maintenance may create a condition where the operation of the product could cause personal 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.

NOTICE

To ensure a correct match for this indoor product, refer to the current *Tabular Data Sheet* for the outdoor equipment selected for the system application. If the indoor product model is not listed in the *Tabular Data Sheet* included with the outdoor unit, to access the current version of the *Tabular Data Sheet*, go to the *Residential Equipment & Supplies* section of the Offering Catalog at www.simplygettingthejobdone.com or scan the QR code provided on the outdoor unit rating plate.

Safety requirements

1. Failure to carefully read and follow all instructions in this manual can result in air handler malfunction, death, personal injury, or property damage.
2. Always install this air handler in accordance with all national and local building and safety codes and requirements, local plumbing or wastewater codes, and other applicable codes.
3. Only install this air handler in a location and position specified in the *Unit installation*.
4. Do not use the air handler for temporary heating of buildings or structures under construction.
5. Always install the air handler to operate within the air handler's intended maximum outlet air temperature.
6. Clearance from combustible material is provided under *Clearances in Unit installation*.
7. The unit rating plate displays the air handler model number. The unit dimensions for the supply air plenum are provided in **Figure 3** and **Table 1**. Always install the plenum according to the instructions.

⚠ CAUTION

Do not lift the air handler by the cabinet braces. The cabinet braces could become disengaged from the cabinet causing the air handler to fall, potentially causing injury or damaging property. See **Figure 1** for the location of the cabinet braces. Lift the air handler by tightly gripping the casing.

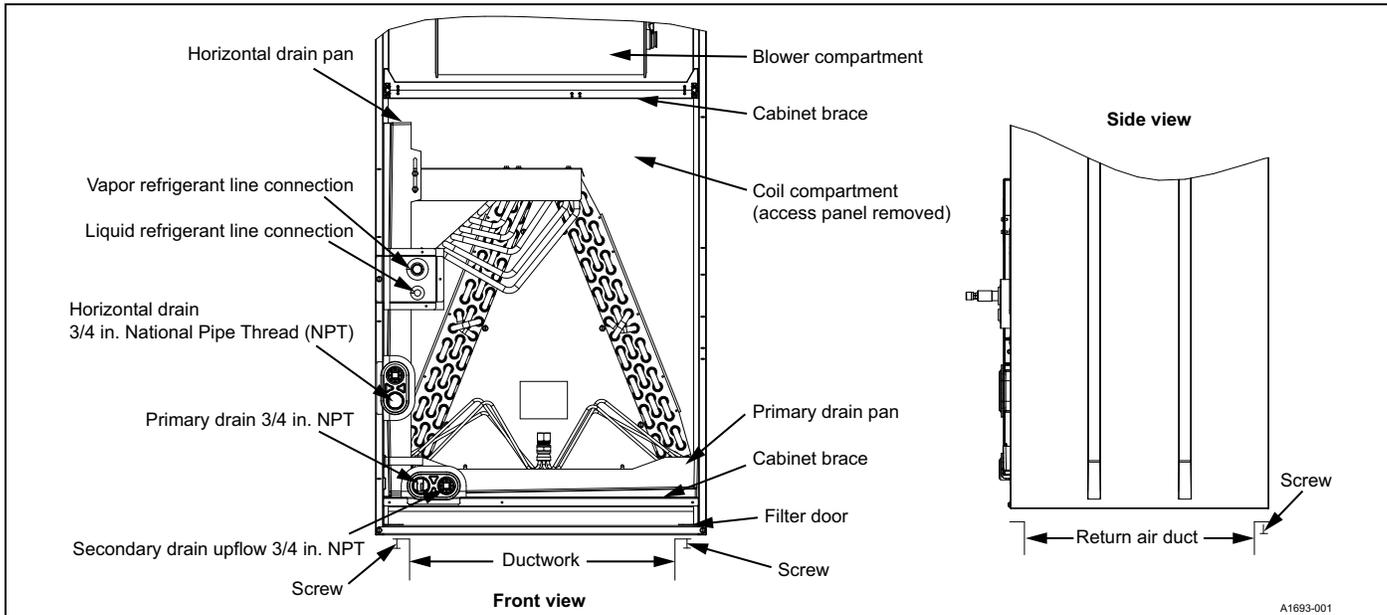


Figure 1: Return air duct attachment and component location

8. Ensure to maintain clearances for servicing and allow access to the electric heaters and blower.
9. Verify the unit rating plate and power supply to ensure that the electrical characteristics match.
10. When attaching ductwork with screws, carefully fasten the screws and keep them within 5/8 in. of the sides and back of the air handler.
11. Install the air handler such that the electrical components are protected from water.
12. Installing and servicing heating and cooling equipment can be hazardous due to the electrical components. Only trained and licensed personnel must install, repair, or service heating and cooling equipment. Unlicensed service personnel can perform basic maintenance functions such as cleaning and replacing the air filters. When working on heating and cooling equipment, the precautions in the manuals and on the labels attached to the unit and other safety precautions must be observed as applicable.

⚠ CAUTION

These air handlers must be transported and handled in an upright, upflow position. Failure to do so may result in unit damage and personal injury. Configuration conversions must be done at the site of installation.

13. 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.
14. These models are not CSA listed or approved for installation into a HUD-approved modular home or a manufactured (mobile) home.

Inspection

Upon receiving the air handler, check to ensure it is still under pressure. See **Figure 2**. Inspect the air handler, including the coil, for possible damage during transit. If damage is evident, note the extent of the damage on the carrier's freight bill. A separate request for inspection by the carrier's agent must be made in writing. Consult the local distributor for more information. Check the drain pan for cracks or breakage. Before installation, check the unit for screws or bolts loosened in transit. There are no internal shipping or spacer brackets that need removing.

You must verify that all accessories, such as heater kits and coils, are available. Complete installation of these accessories or field conversion of the unit before setting the unit in place or connecting any wiring, ductwork, or piping. C60H models are shipped with a horizontal baffle plate. Remove and retain this plate for horizontal right application. Discard for all other applications.

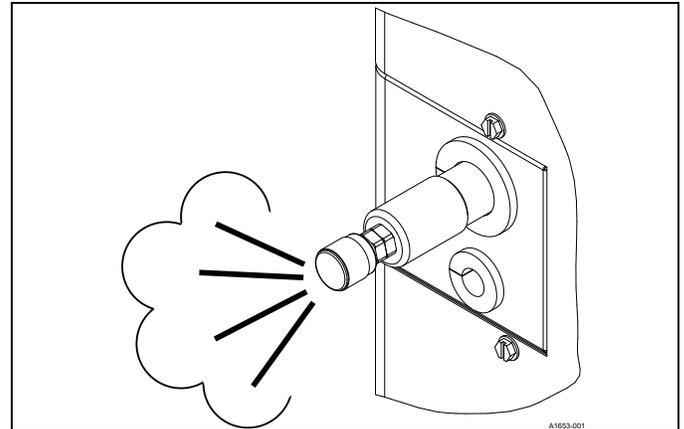


Figure 2: Pressure check

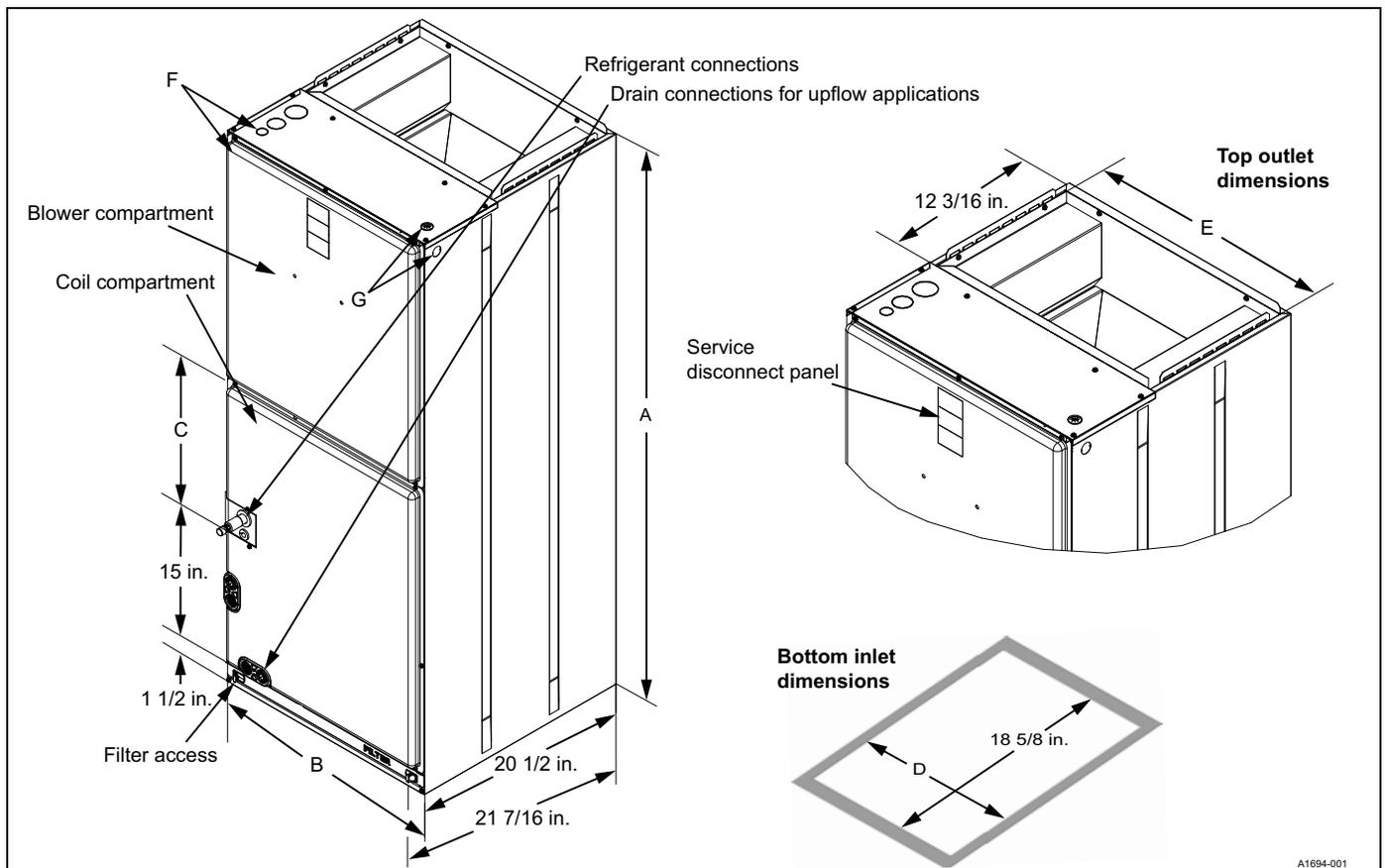


Figure 3: Dimensions and duct connection dimensions

Table 1: Dimensions¹

Models	Dimensions					Wiring knockouts ²		Refrigerant connections line size	
	A	B	C	D	E	F	G	Liquid (in.)	Vapor (in.)
	Height (in.)	Width (in.)	Opening widths (in.)			Power (in.)	Control (in.)		
JHVVB24D	49 5/8	17 1/2	10	16 1/2	16 1/2	7/8 (1/2) 1 3/8 (1) 1 23/32 (1 1/4)	7/8 (1/2)	3/8	3/4
JHVVB36D	49 5/8	17 1/2	10	16 1/2	16 1/2				
JHVVC36D	51	21	11 1/2	20	20				
JHVVC48H	63	21	23 1/2	20	20			7/8	
JHVVD48H	63	24 1/2	23 1/2	23 1/2	23 1/2				
JHVVC60H	63	21	23 1/2	20	20				
JHVVD60H	63	24 1/2	23 1/2	23 1/2	23 1/2				

1. All dimensions are in inches.

2. Actual size (conduit size).

Section III: Unit installation

NOTICE

Avoid handling aluminum coil components after handling the copper refrigeration piping or other tubing without first cleaning hands.

Unit sizing

- The size of the unit must be based on an acceptable heat loss or gain calculation for the structure. Use Air Conditioning Contractors of America (ACCA) Manual J or another approved method.
- Only connect the air handler to a duct system that has an external static pressure within the allowable range.
- Airflow must be within the minimum and maximum limits approved for electric heat, indoor coils, and outdoor units.

Entering air temperature limits			
Wet bulb temperature (°F)		Dry bulb temperature (°F)	
Minimum	Maximum	Minimum	Maximum
57	72	65	95

- 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 is also handled by one or more ducts sealed to the air handler casing and terminating in the space to be cooled or heated.
- Refer to the unit rating plate for the air handler model number and then see the dimensions page of this manual for supply air plenum dimensions. The plenum must be installed according to the instructions.
- The installer must check available supply power and verify that it is within the normal operating voltage range for the unit. The acceptable voltage range for these units is as follows:

Air handler voltage	Normal operating ¹ voltage range
208/230-1-60	187 V to 253 V

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

Clearances

It is essential to provide the following clearances:

- Refrigerant piping and connections - minimum 12 in.
- Maintenance and servicing access - minimum 36 in. from the front of the unit for blower motor or coil replacement
- Condensate drain lines routed to clear filter and panel access

- Filter removal - minimum 36 in.
- The supply air ductwork connected to this unit is designed for 1 in. clearance for the first 18 in. of combustible materials if an electric heat kit accessory is installed.
- 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 the owner's or dealer's installation plans. If location has not been decided, consider the following in choosing a suitable location:

- Select a location with adequate structural support, space for service access, and clearance for air return and supply duct connections.
- Do not use hanging brackets to wall mount this single piece air handler unit.
- Normal operating sound levels may be objectionable if the air handler is placed directly over some rooms such as bedrooms or a study.
- Select a location that permits installation of the condensate line to an open drain or outdoors, allowing condensate to drain away from the structure.

NOTICE

The primary and secondary drain line must be trapped to allow proper drainage of condensate water. The secondary drain line must be piped to a location that gives the occupant a visual warning that the primary drain is clogged. If the secondary drain line is not used, it must be capped.

- When installing an indoor coil in an attic or above a finished ceiling, an auxiliary drain pan must be provided under the air handler as is specified by most local building codes.
- A sufficient electrical supply must be available.
- If locating the unit in an area of high humidity, such as an unconditioned garage or attic, nuisance sweating of the casing may occur. On these installations, completely seal the unit duct connections and other openings, and use a wrap of 2 in. fiberglass insulation with vinyl vapor barrier.

Air handler configuration

These air handler units are supplied ready to install in an upflow or horizontal left position. See **Figure 4**. If the unit requires either downflow or horizontal right airflow configurations, the unit must have the coil assembly repositioned. See *Downflow or horizontal right conversion*.

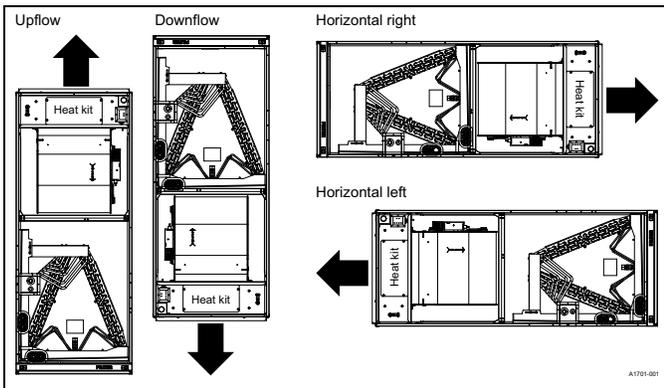


Figure 4: Typical installation

Downflow or horizontal right conversion

NOTICE

Convert the air handler to the required orientation before installation. You must convert before brazing the refrigerant connections to the coil.

1. Remove the coil access panel.
2. Slide the coil and drain pan assembly out of the air handler.
3. Turn the air handler cabinet upside down (downflow position).

4. If installing the unit in a horizontal right position, C60H models require installation of a horizontal baffle plate shipped with the unit. The horizontal baffle plate must be secured to the coil delta plates. See **Installing a horizontal baffle plate**.

5. Slide the coil back into the cabinet.

6. Install the coil access panel. Conversion is now complete.

Installing a horizontal baffle plate

1. With the coil removed from the air handling unit and laying on its horizontal drain pan, locate the pre-drilled holes in the front and rear coil delta plates.

2. Insert the horizontal baffle plate into the end of the coil. Insert one end of the horizontal baffle plate into the top side of the primary drain pan as shown in **Figure 5**.

Note: Figure 5 shows the air handling unit in the horizontal left hand position so that the horizontal baffle plate can be seen. However, the horizontal baffle plate is for horizontal right hand applications only.

3. Secure the horizontal baffle plate in place with two screws, one in the front delta plate and one in the rear delta plate. See **Figure 5**.

Horizontal left applications (all models)

Air handling units are supplied ready to install in a horizontal left position. A horizontal drain pan is factory-installed. If you require horizontal right application, see *Downflow or horizontal right conversion* before proceeding.

See *Refrigerant line connection* and *Condensate drain connections* for further installation instructions.

Positioning the unit in horizontal applications

Set the unit so that it is sloped 1/4 in. towards the drain line connection.

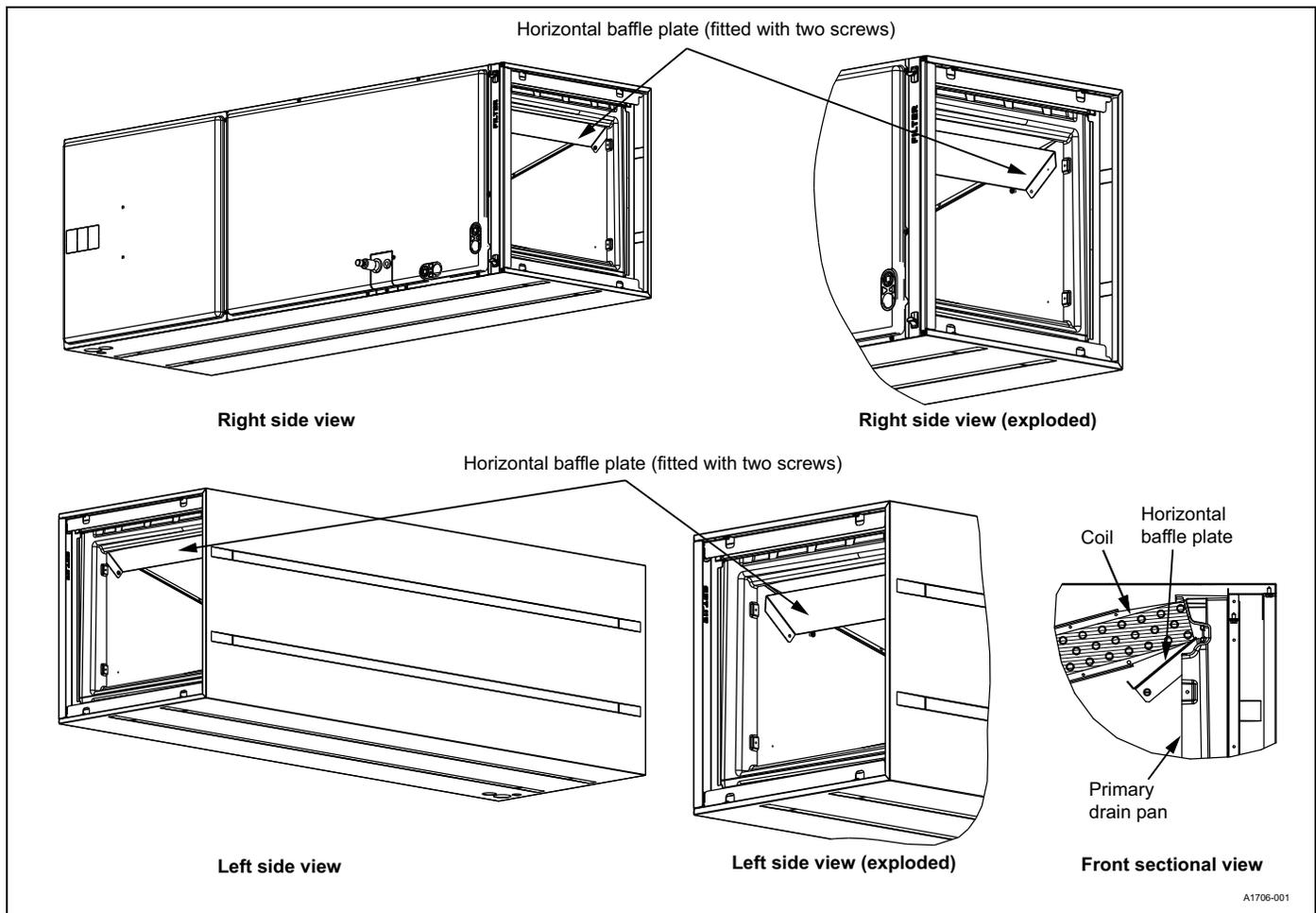


Figure 5: Horizontal baffle plate installation

Section IV: Ductwork and connections

Air supply and return may be handled in one of several ways best suited to the installation. Upflow, horizontal or downflow applications may be used.

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

When installing a central air return grille in or near the living space, design the ductwork so that the grille is not in direct line with the opening in the unit. One or two elbows and acoustical duct liner ensure a quieter system. For operation where the return air duct is short or where sound may be a problem, use acoustical duct liner inside the duct. Use flexible duct connectors to minimize the transmission of vibration and noise into the conditioned space.

⚠ WARNING

Do not bring in return air from a location which could introduce hazardous substances into the airflow.
Use 1/2 in. screws to connect ductwork to the cabinet. If pilot holes are drilled, drill only through the field duct and the unit flange.

Insulation of ductwork is imperative where it runs through an unheated space during the heating season or through an uncooled space during the cooling season. Use a vapor barrier to prevent absorption of moisture from the surrounding air into the insulation.

Use a transition to match unit opening to correctly size the supply air duct. Suspend all ducts using flexible hangers and never fasten directly to the structure.

⚠ CAUTION

This unit is not designed for non-ducted (freeblow) applications. Do not operate without ductwork attached to the unit.
Never operate the equipment without filters.

Ductwork must be fabricated and installed in accordance with local and national codes. This includes the standards of the National Fire Protection Association for Installation of Air-Conditioning and Ventilating Systems, NFPA No. 90B. If using electric heat, non-flammable material must be used. Duct systems must be designed in accordance with ACCA Manual D.

Horizontal suspension

These air handlers may be suspended in horizontal applications. Use angle steel support brackets with minimum 3/8 in. threaded rods, supporting the unit from the bottom. Attach the threaded rods at the locations shown in **Figure 6**, leaving enough clearance between the door and the rod so that doors can be easily removed for service.

⚠ CAUTION

Do not lift the air handler by the cabinet brace. The cabinet brace is held in place by the coil channel. The cabinet brace could become disengaged from the cabinet causing the air handler to fall, potentially causing injury or damaging property. See **Figure 1** for the location of the cabinet braces.

NOTICE

When assembling the support structure, size to provide clearance for access door removal.

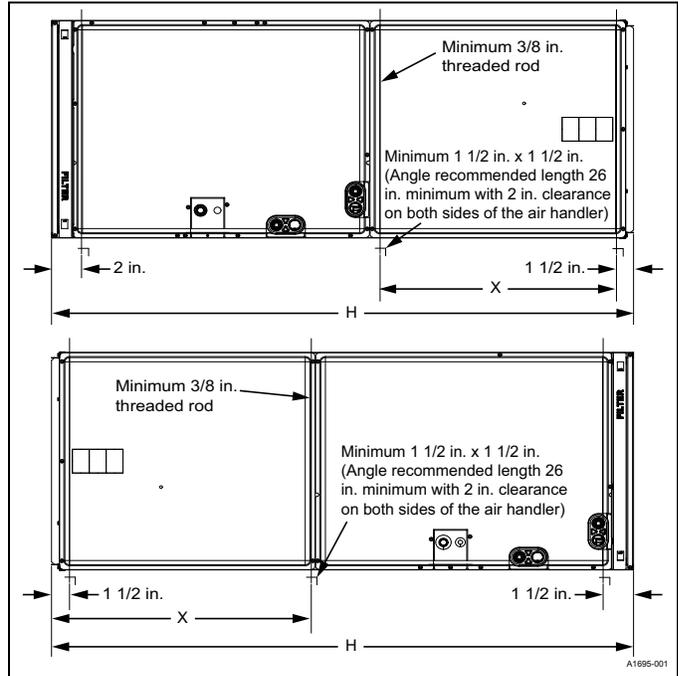


Figure 6: Suspension support locations for horizontal applications

Table 2: Horizontal suspension dimensions

Air handler cabinet size	H (in.)	X (in.)
B24D, B36D	49 5/8	21 3/4
C36D	51	
C48H, D48H, C60H, D60H	63	

Duct flanges

Duct flanges are integrated into the casing. Fold the flanges into position and use screws to anchor the flanges.

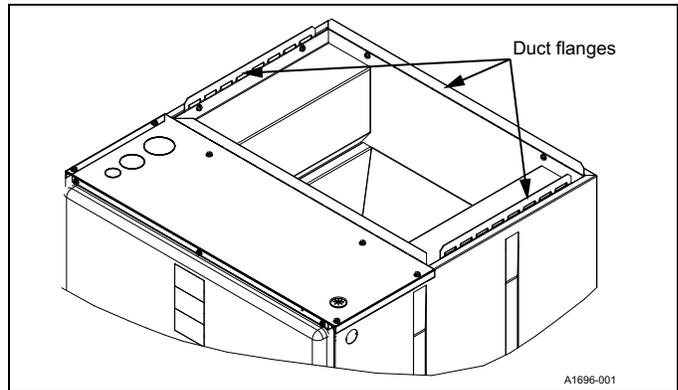


Figure 7: Duct attachment

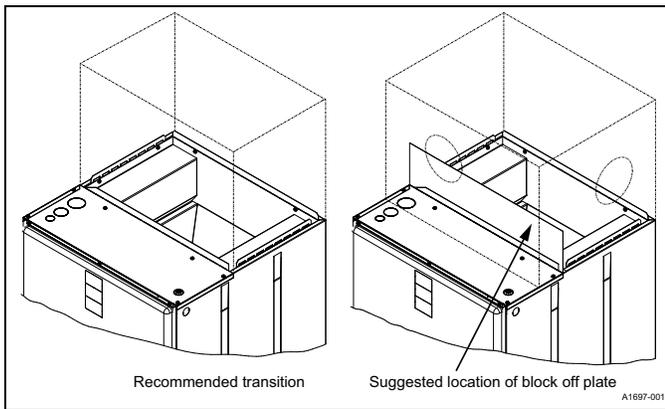


Figure 8: Ductwork transition

Unit connections

There are several ways to handle the supply and return air duct connections. The location and sizing of the connections depends on the situation and the method best suited to the installation. Upflow, horizontal or downflow applications may be used.

Use a transition to match unit opening to correctly size the supply air duct. See **Table 1** for air handler unit inlet and outlet dimensions.

⚠ CAUTION

Use 1/2 in. screws to connect ductwork to the unit. Longer screws may pierce the drain pan and cause leakage. If drilling pilot holes, drill only through the field duct and the unit bottom duct flange.

Ductwork that is not designed to match the supply air opening can cause turbulence inside the plenum. This turbulence can change the airflow patterns across the electric heater limit switch/switches. If the factory suggested transition cannot be fabricated, attach a block-off plate (approximately 8 in. high and running the full width of the plenum) to the supply opening. See **Figure 8**. The use of this block-off plate enables better air circulation across the limit switches.

Air filters

⚠ CAUTION

Never operate the equipment without filters.

Return air filters are required and must be field-supplied. Filtration can be accomplished external to the unit or the integral filter rack may be used. A 1 in. filter access rack is built into the unit. Remove the filter access cover and install the correct size filter. Use a standard 1 in. permanent or throw away filter. See **Table 11** for filter sizes.

Section V: Coil metering devices

⚠ CAUTION

Coil under pressure

Verify that pressure has been released by depressing the schrader valve core.

This unit is supplied with a factory installed Electronic Expansion Valve (EEV). The EEV, the temperature sensor, and the pressure transducer are factory wired to the control board.

NOTICE

To prevent moisture and contaminants from entering the system, the coil should not be open to atmosphere for extended periods of time. If the coil cannot be brazed into the refrigeration system during a routine installation period, 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 from the air. For a longer term delay, use plugs or caps. There is no need to purge the coil if this procedure is followed.

Section VI: Refrigerant line connection

⚠ CAUTION

The coil is under inert gas pressure. Relieve pressure from the coil by depressing the Schrader valve core at the end of the suction manifold stub-out.

⚠ CAUTION

Dry nitrogen must 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 must 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.

NOTICE

Avoid handling aluminum coil components after handling the copper refrigeration piping or other tubing without first cleaning hands.

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, furnace flue, or filter.

1. Make suction and liquid line connections outside of the cabinet. Leave the tubing connection panel attached to the cabinet. Remove the coil access panel for brazing. The lines are expanded to receive the field refrigeration piping tubes for most outdoor unit matches.
2. Remove the grommets where the tubes exit the cabinet to prevent burning them during brazing. In some units, the grommets may be shipped as loose parts with the unit. See **Figure 9**.
3. Cut the end of the suction tube using a tube cutter. Place the tube cutter as close as possible to the end of the tube to allow as much depth as possible for the connection and brazing of the suction line. To ensure the suction line fits into the connection, deburr the stub out (including inner pressure protrusion from cutting).
4. Remove the liquid line copper cap that is soft soldered onto the outside of the 3/8 in. stub protruding from the front of the coil cabinet tubing panel:
 - a. Screw a sheet metal screw into the center of the cap.
 - b. Apply a small amount of heat to the cap while pulling on the screw using slip joint pliers.

Important:

The EEV in this unit is shipped in the closed position to protect the valve during transportation.

Before brazing, connect and apply line power to the field wiring terminals of the air handling unit and ensure the board is powered for 60 s. This ensures the EEV control board cycles the valve to an open position. This allows nitrogen to flow through the system during brazing.

NOTICE

If power cannot be applied to the EEV control board prior to brazing refrigeration piping, a tool is available to manually operate the EEV. An EEV manual operating tool can be purchased from Source 1 as part number S1-02649686000. Six revolutions of the tool opens the valve fully.

5. Insert the liquid and suction lines into the coil connections at the coil cabinet tubing panel.
6. Wrap a water-soaked rag around the coil connection tubes inside the cabinet to avoid transferring excess heat to the coil, EEV, and temperature sensor.
7. Purge the refrigerant lines with dry nitrogen during brazing.

NOTICE

All indoor coil connections are copper-to-copper and must be brazed with a phosphorous-copper alloy material such as Silfos-5 or equivalent. Do not use soft solder.

8. Braze the suction and liquid lines, and allow the joints to cool.
9. Secure the sensing bulb and equalizer line capillary tubes with nylon cable ties to prevent leaks from tubes rubbing.
10. If using a piston, install a Schrader valve core into the suction header and reinstall the cap.
11. Re-attach the grommets to the lines carefully to prevent air leakage. In some units, the grommets may be shipped as loose parts with the unit. See **Figure 9**.
12. Refer to the outdoor unit *Installation Manual* and complete evacuation, a leak check, and charging instructions. Check all field brazed joints and metering device connections.
13. Attach the coil access panel to the cabinet.
14. Ensure the lines are sound isolated by using appropriate hangers or strapping.

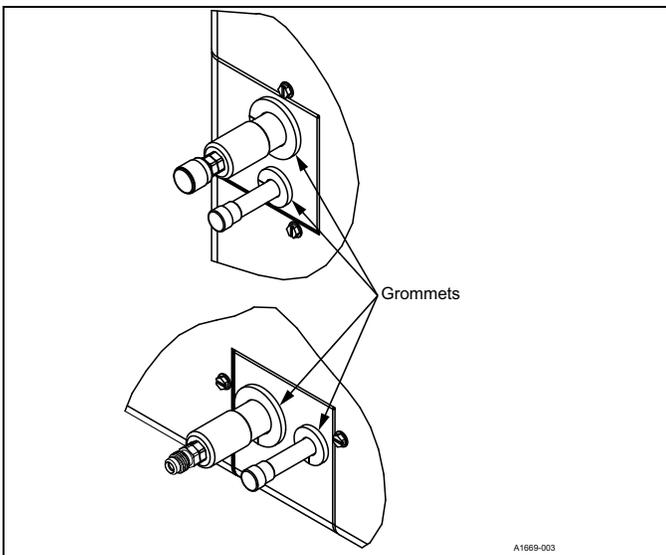


Figure 9: Grommets

Section VII: Condensate drain connections

Adhere to the following:

- Pitch all drain lines 1/4 in./ft away from the unit drain pan and make sure that the drain lines are no smaller than the coil drain connection.
- Route the drain line so that it does not impede access to the coil, air handling system, or filter and is not exposed to freezing temperatures.

- Instruct the homeowner that the indoor coil drain pan must be inspected and cleaned regularly to prevent odors and ensure proper drainage.
- Install the air handling unit pitched slightly toward the drain end.
- Note that you can remove drain plugs using a standard 3/8 in. drive socket ratchet.
- If the coil has a secondary drain, pipe it to a location that gives the occupant a visual warning that the primary drain is clogged. If a secondary drain is not used, you must plug the secondary drain.

CAUTION

Avoid double trapping.

CAUTION

Threaded drain connections must be hand tightened, plus no more than one turn.

CAUTION

Do not use PTFE tape, pipe thread compound, or other sealants. Use of a sealant can cause damage and premature failure of the drain pan.

Section VIII: 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.

Use only 8HK heater kits, as listed on the air handler name plate and in these instructions. Use data from **Table 13** to **Table 22** for information on the required minimum motor speed tap to use for heating operation and the maximum over-current protection device required as listed for combination of air handler and heater kit.

For all applications, the kits can be installed without modification.

NOTICE

In some horizontal applications, the service disconnects on the electric heat kits must be rotated 180° so the up position of the disconnect is the ON position. This service disconnect orientation change is required by UL 60335-2-40 (in reference to all circuit breakers).

Section IX: Line power connections

WARNING

Before obtaining access to terminals, all supply circuits must be disconnected.

WARNING

A fused disconnect switch must be field provided for the unit to be in compliance with UL 60335-2-40 Clause 7.12.2.

Power can be brought into the unit through the supply air end of the unit (top left when unit is vertical) or the left side panel. Use the hole appropriate to the unit's orientation in each installation to bring the conduit from the disconnect. The power lead conduit must be terminated at the electrical control box. See **Table 18** to **Table 22** and the latest edition of the National Electric Code, or in Canada the Canadian electrical Code, and local codes to determine correct wire sizing. To minimize air leakage, seal the wiring entry point on the outside of the unit.

All electrical connections to air handlers must be made with copper conductors. **Direct connection of aluminum wiring to air handlers is not approved.**

If aluminum conductors are present, all applicable local and national codes must be followed when converting from aluminum to copper conductors prior to connection to the air handler. The chosen conductor and connections must all meet or exceed the amperage rating of the overcurrent protector (service disconnect or fuse) in the circuit.

Existing aluminum wire within the structure must be sized correctly for the application according to the National Electric Code and local codes. Use caution when sizing aluminum rather than copper conductors, as aluminum conductors are rated for less current than copper conductors of the same size.

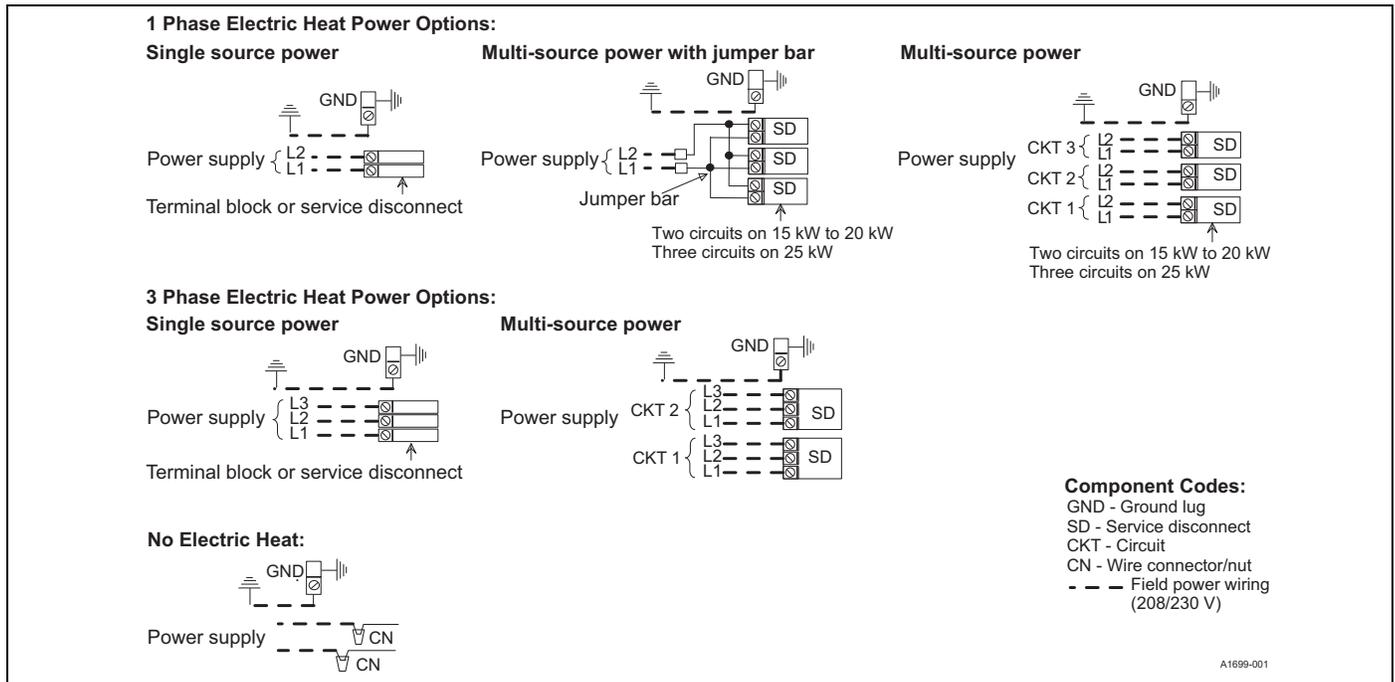


Figure 10: Line power connections

Section X: Low voltage control connections

The 24 V power supply is provided by an internally wired low voltage transformer that is standard on all models. If connecting the unit to a 208 V power supply, the low voltage transformer must be rewired to the 208 V tap. See the **Wiring diagrams**.

Field supplied low voltage wiring can exit the unit through the top right (when the unit is vertical upflow) or the right side panel. See **Figure 3**.

Remove the knockout and pierce the 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 in. 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. Connect the field wiring at the pigtails supplied with the air handler. See **Figure 13** and **Figure 14** for low voltage system wiring.

NOTICE

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

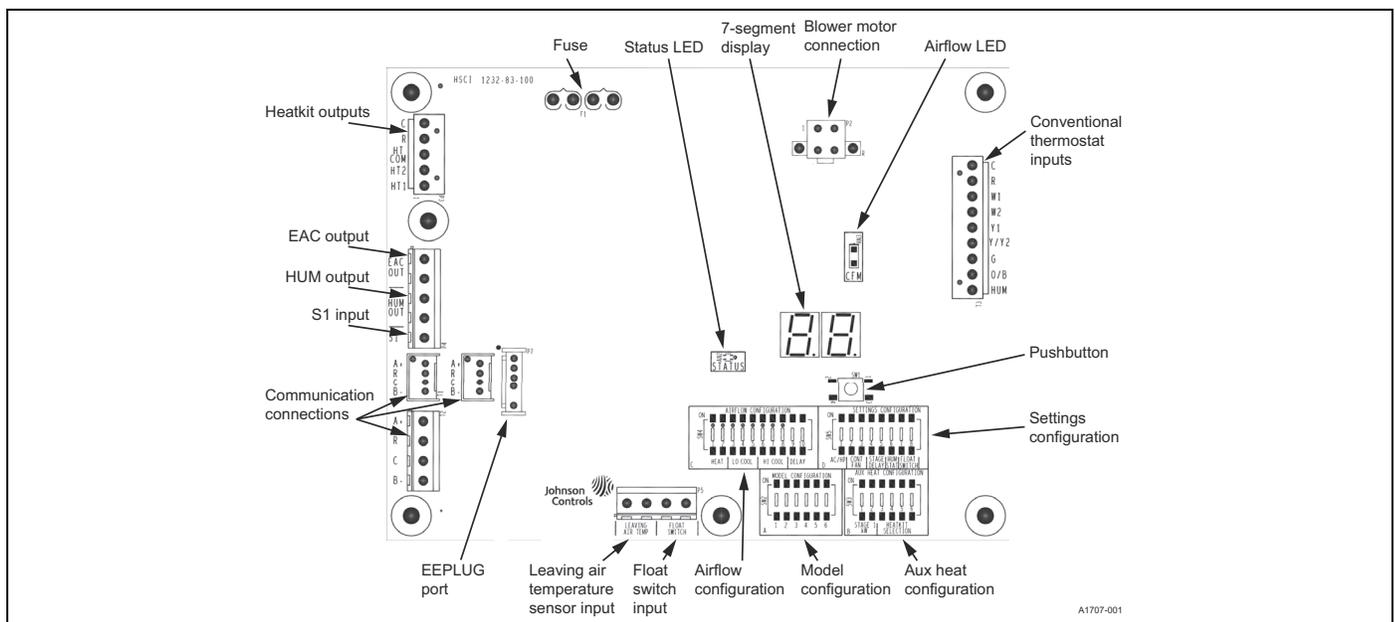


Figure 11: Control board

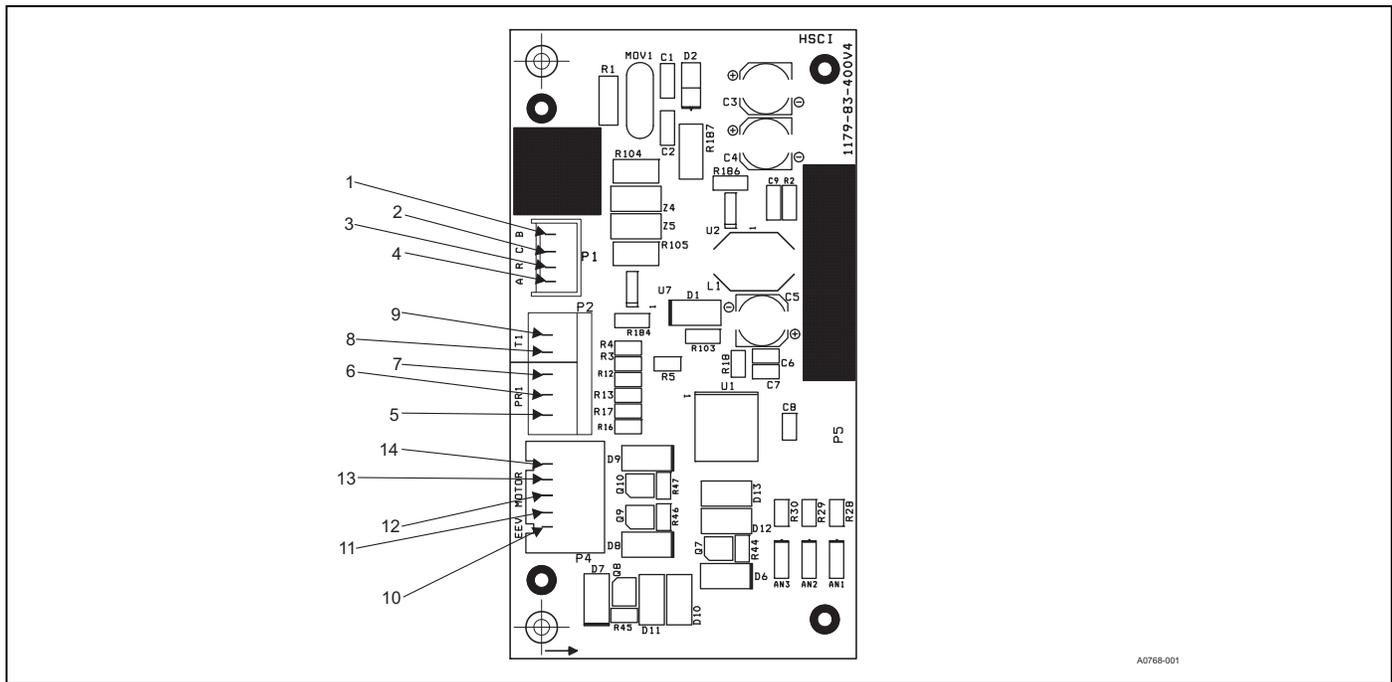


Figure 12: EEV connectors

Table 3: EEV Connectors

Item	Input	Description	Connector use	Connection
1	B-	RS 485 inverted input	Communication signals	Pin 1
2	C	24 VAC system common		Pin 2
3	R	24 VAC system power		Pin 3
4	A+	RS 485 input		Pin 4
5	PR1	5V VCC pressure transducer	Indoor pressure transducer	Pin 1
6	PR1	0.5 V – 4.5 V pressure transducer signal		Pin 2
7	PR1	Common pressure transducer		Pin 3
8	T1	10k temperature sensor common	Indoor temperature sensor	Pin 4
9	T1	Temperature sensor input		Pin 5
10	EEV	EEV phase A	EEV motor control	Pin 1
11	EEV	EEV phase B		Pin 2
12	EEV	EEV phase C		Pin 3
13	EEV	EEV phase D		Pin 4
14	EEV	EEV 12VDC		Pin 5

NOTICE

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

It is possible to vary the amount of electric heat turned on during the defrost cycle of a heat pump. Standard wiring only brings on the first stage of electric heat during defrost. See *Heat output* and **Table 8** for additional information on heat during the defrost cycle.

Table 4: Low voltage connections

Wire	Colors	Signals	Comment
R	Red	24 VAC power (fused)	
G	Green	Continuous fan operation	Fan speed, adjust at CONT FAN dip switch (SW5)
Y/Y2	Yellow	Second or full stage compressor operation	
Y1	Yellow and Black	First stage compressor operation	Not used with outdoor units having single-stage compressors.
W2	Brown	Second stage heat operation	
W1	White	First stage heat operation	
O/B	Orange	Reversing valve operation	
EAC	Field-supplied wiring	Electric air cleaner	Located on P4 connector. There is 24 VAC output during indoor blower operation to energize a pilot duty relay for an electronic air cleaner.
HUM	Purple	Humidity switch input	
C (COM)	Blue	24 VAC common	
S1	Field-supplied wiring	Reduce airflow and set S1 functionality	Used only with outdoor units with an S1 out.

Note: JHVV models are paired with fully communicating outdoor sections and are to be controlled using a communicating room thermostat wired into the control boards ARCB connection. The conventional thermostat inputs can be used for temporary unit operation if necessary.

Control wiring using communicating controls

The communicating system consists of several intelligent communicating components, including the communicating thermostat control (touch-screen wall thermostat), variable speed air handler, air conditioner or heat pump, that continually communicate with each other using a four-wire connection called the A-R-C-B bus. Commands, operating conditions, and other data pass continually between components over the A-R-C-B bus. See **Figure 13**. The result is a new level of comfort, versatility, and simplicity.

In order to use this air handler in full communications (COMM) mode, it is essential to install it with the matching touch-screen communicating control (wall thermostat) and an outdoor variable capacity conditioner or heat pump with a fully communicating control.

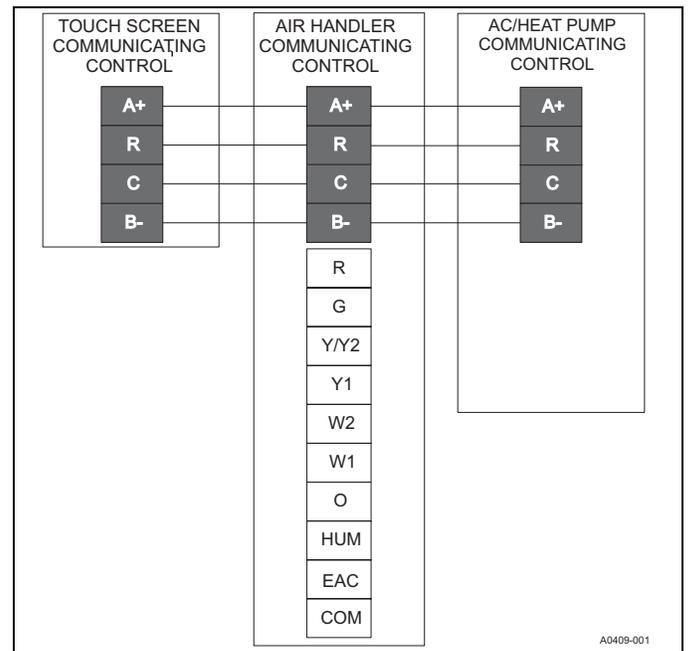
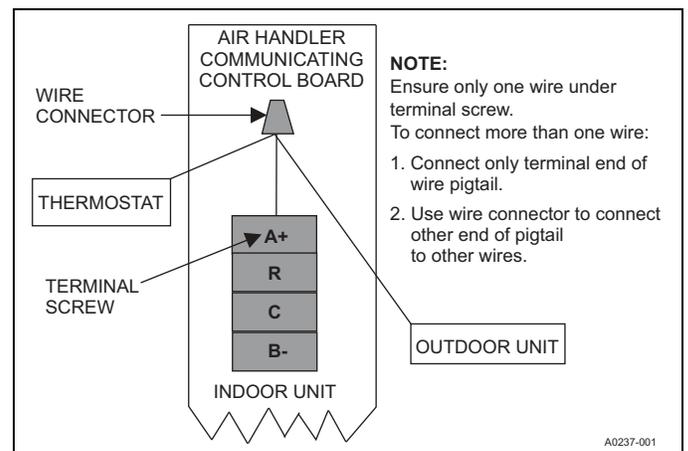
Use the wiring diagram in **Figure 13** to connect the air handler control, touch-screen communicating control (wall thermostat), and communicating outdoor unit. Ensure all of the A+ terminals are connected together, all of the B- terminals are connected together, all of the C terminals are connected together, and all of the R terminals are connected together. See **Figure 13** and **Figure 14**. When using a fully communicating system, remove the low voltage signal connector from the control board at the T3 connection and leave the low voltage wiring in place for future use. Use the four small screw terminals (ARCB connection) on the terminal block on the end of the air handler control.

CAUTION

If connecting any field-supplied wiring to the control board, such as when using the communicating control, float switch, or leaving air temperature switch, you must route the additional wires through the hole at the lower right of the control box.

Do not add any additional holes to the control box. After attaching the additional wires to the board, it is essential to plug the remaining hole around the wires with the sealant putty supplied or with a suitable waterproof sealant. **Failure to seal this hole may allow moisture to enter the control box and damage the control board.**

Important: Do not place more than one wire under any single communication terminal screw (there are four communication terminal screws). If more than one wire must be connected to a terminal screw, attach only the terminal end of a one wire pigtail no longer than 6 in. and use a wire connector to connect the other end of the pigtail to the other wires. Failure to do this may result in nuisance communication error faults. See **Figure 14**.

**Figure 13:** Air handler with communicating AC or HP**Figure 14:** Multi-wire terminal connection

Float switch input

An optional switch may be connected to the FLOAT SWITCH INPUT terminals on the control board. **This feature is only functional when used with the communicating control.** It is intended for use with a water overflow switch. To enable this feature, see dip switches 7 and 8 in switch bank SW5. An OFF/OFF (0, 0) position ignores this input. If using a normally closed switch, set these switches in the OFF/ON (0, 1) position. If using a normally open switch, set these switches in the ON/OFF (1, 0) position. At the room thermostat system settings menu, the FLOAT SWITCH setting must be changed from its default (disabled) setting. If using a normally closed switch, choose Enabled (Open). If using a normally open switch, choose Enabled (Closed).

When finished installing condensate overflow detection and on a regular basis after installation, test the detection equipment to ensure correct operation.

▲ CAUTION

Failure to test condensate overflow detection equipment could lead to equipment failure and damage.

Pushbutton operation

Table 5: Pushbutton operation

Duration of connections (s)	Control behavior with no thermostat signals present	Control behavior with thermostat signals present
< 2	Display operational mode (MODEL CONFIG) (5 s) and heat kit configuration (5 s)	Display CFM sent to the indoor blower (5 s)
2 to 6	Display current/stored fault codes if present Note: If a fault condition is active, the control continues to display the active fault. It does not display stored faults until the active fault is cleared.	Bypass ASCD (Reduce timer to zero immediately).
	Clear active faults except fault codes 01, 02, 03, and 04.	Clear active faults except fault codes 01, 02, 03, and 04.
> 6	Set model configuration, but only if the model configuration error fault is currently active and the fault condition is not presently active.	Bypass ASCD (reduce the timer to zero immediately).
	Set heat kit configuration, but only if the heat kit configuration error fault is currently active and the fault condition is not presently active.	
	Set S1 configuration, but only if 24 V is applied to the S1 terminal and a fault condition is not presently active.	
	The below action only occurs if the above faults (model config. or heat kit config.) are not active when the pushbutton is held for > 6 s.	
	Clear fault storage. If there is an active fault present, hold the pushbutton twice: once to clear the active fault and once to clear fault storage.	
	Disable S1 functionality, but only if no voltage is applied to the S1 terminal and a fault condition is not presently active.	
> 10	The display toggles between the control software version (5 s) and the tabular/model data software version (5 s).	If an active fault is present, continue to energize the 7-segment displays with the active fault codes.

Status and fault codes

The control includes an LED that displays status and as well as two 7-segment displays to display fault codes. These codes are shown in Table 6. The control displays the fault codes until power is removed from the control or the fault condition is no longer present.

See Table 5 for the control behavior when the pushbutton is pressed.

HUMIDISTAT switch

The HUMIDISTAT switch configures the control to monitor the humidity switch input. With the switch in the OFF position, the control ignores the HUM input. With the switch in the ON position, the control monitors the HUM input to control the blower speed for dehumidification during cooling operation. For conventionally wired systems, an open-on-rise humidistat is wired between air handler board R and HUM input to utilize this feature. The HUM input is strictly for dehumidification during cooling operation and has no control over the HUM OUT humidifier connections. To enable this feature for communicating systems, choose *dehumidify with equipment* in the service menu dehumidification setting.

Airflow and comfort setting switches

See **Airflow and comfort setting selection.**

AC/HP switch

The AC/HP switch configures the control to operate correctly with an air conditioner (ON position) or heat pump (OFF position). With the switch in the ON position, the control will treat any Y call as a cooling call only. With the switch in the OFF position, a Y call is treated as a heat pump.

Table 6: Fault codes

Fault description	Status LED (AN2)	7-Segment Display 1 (DISP1)	7-Segment Display 2 (DISP2)
No power to control	OFF	—	—
Control normal operation – no call for operation (standby mode)	2 s ON/2 s OFF (heartbeat)	—	—
Control normal operation – in ASCD period	0.1 s ON/0.1 s OFF	d	5, 4, 3, 2, 1
Control normal operation – call for fan only and no active fault codes	ON	F	A
Control normal operation – call for first-stage cooling compressor and no active fault codes	ON	C	1
Control normal operation – call for second-stage cooling compressor and no active fault codes	ON	C	2
Max cool – no faults active	ON	C	3
Control normal operation – call for first-stage heating compressor and no active fault codes	ON	H	1
Control normal operation – call for second-stage heating compressor and no active fault codes	ON	H	2
Max heat – no faults active	ON	H	3
Auxiliary heat 1 – call for first-stage auxiliary heating and no active fault codes	ON	A	1
Auxiliary heat 2 – call for second-stage auxiliary heating and no active fault codes	ON	A	2
Stage 1 emergency heat (W without Y) – no faults active	ON	E	1
Stage 2 emergency heat (W without Y) – no faults active	ON	E	2
Float Switch Active – no faults active	ON	f	l
Software update – control board	ON	b	1
Software update – EE plug	ON	b	2
Software version – control board	ON	—	1 to 9
Software version – EE plug	ON	—	1 to 9
Any fault or event code that would prevent the equipment from running	See fault codes	—	—
No fault codes in memory	Two flashes	—	—
Fault code memory cleared	Three flashes	—	—

Table 7: Fault list

Fault/status	Display 1	Display 2	Simplified	Description
Internal control fault	0	A	Control failure	The control failed and must be replaced.
Model configuration changed	0	1	Configuration faults	The dip switches on model configuration do not match the stored model on the control. Hold the push button, with no calls to the control, for 6 s to 9 s, to clear and set the new model. If this error shows, 0 2 also usually show.
Blower match error	0	2		There is a mismatch between the motor and the stored model on the control. A few different things could cause this: <ol style="list-style-type: none"> 1. The motor is not compatible with the selected model. Change the model under model configuration. 2. The motor is not communicating with the control - accompanied by 0 6. Check your wiring, cycle power on the control, and the motor. 3. The model configuration is not set - accompanied by 0 1. Hold the pushbutton for 6 s to 9 s. Ensure there are no calls to the control or the model does not set.
Heat kit configuration error	0	3		There is a mismatch between the heat kit selection dip switches and the stored model on the control. A few different things could cause this: <ol style="list-style-type: none"> 1. The dip switches on heat kit selection do not match the stored heat kit on the control. Hold the pushbutton, with no calls to the control, for 6 s to 9 s, to clear and set the new model. 2. The heat kit selected under heat kit selection does not match the model stored in the control. Check your model configuration and your heat kit configuration.
Heat kit staging configuration changed	0	4		The dip switches on stage 1 kW do not match the stored information on the control. Hold the pushbutton, with no calls to the control, for 6 s to 9 s, to clear and set the new model.
Comm lost with HVAC system master	0	5	Comm lost	The control is no longer communicating with the HVAC system. If the system is conventional, cycle power. If the system is communication, ensure the main thermostat is powered, check the wiring, and check the main thermostat for faults.
Comm lost with motor	0	6	Motor connection lost	The control is no longer communicating with the ClimateTalk blower. Check the wiring between the motor and the control, and check that the motor is getting power.

Continued on next page

Table 7: Fault list (continued)

Fault/status	Display 1	Display 2	Simplified	Description
Low voltage (<19 VAC)	0	7	Low voltage error	The control is experiencing a low voltage condition. It continues with outputs already engaged, but does not engage new outputs. Check for damaged wiring and brown-out conditions.
Low voltage (<16 VAC)	0	8		The control is experiencing a very low voltage condition. The control no longer keeps outputs engaged and shuts down the system. Check for damaged wiring and brown-out conditions. Lower voltage means the control does not turn on.
Leaving air temperature sensor failure (open)	1	3	Leaving air temperature sensor error	The leaving air sensor is open. Check the wiring and check for a damaged sensor.
Leaving air temperature sensor failure (short)	1	4		The leaving air sensor is shorted. Check the wiring and check for a damaged sensor.
Low leaving air temperature in cooling	1	5		The leaving air temperature sensor is reporting lower temperatures that may cause condensate in the ductwork and cause damage to equipment. A few different things could cause this: <ol style="list-style-type: none"> 1. Check for a blockage in the ductwork. 2. Verify that the airflow for the size of the outdoor unit is correct. 3. Verify that the outdoor unit is the correct size for the application. 4. Verify there is nothing obstructing the fan.
High leaving air temperature in heating	1	6		The leaving air temperature sensor is reporting higher temperatures that may cause damage to equipment. A few different things could cause this: <ol style="list-style-type: none"> 1. Check for a blockage in the ductwork. 2. Verify that the airflow for the size of the outdoor unit is correct. 3. Verify that the heat kit is the correct size for the application. 4. Verify there is nothing obstructing the fan.
High leaving Air temperature in heating (heat pump mode)	1	7	Leaving air temperature sensor error	The leaving air temperature sensor is reporting higher temperatures that may cause damage to equipment. A few different things could cause this: <ol style="list-style-type: none"> 1. Check for a blockage in the ductwork. 2. Verify that the airflow for the size of the outdoor unit is correct. 3. Verify that the outdoor unit is the correct size for the application. 4. Verify that the heat kit is the correct size for the application. 5. Verify there is nothing obstructing the fan.
Float switch fault activated	1	8	Float switch fault	The float switch tripped. Check there is not excess water in the drain pan, the drain pan is not clogged, and the float switch is operating correctly.
Call for reversing valve while in air conditioner mode	2	2	Incorrect wiring	The control senses 24 VAC on the O terminal. <ul style="list-style-type: none"> • If the outdoor unit is a non-HMH7 heat pump, make sure the AC/HP switch is correctly set. • If the outdoor unit is an Air Conditioner, check the wiring. • If the outdoor unit is an HMH7 heat pump, ensure that the control is in S1 functionality. See the <i>S1 Functionality</i> section for more information.
Call for cooling and indoor heating at the same time	2	4		The control senses 24 VAC on the Y terminal and the W terminal while in air conditioner mode. <ul style="list-style-type: none"> • If the outdoor unit is a non-HMH7 heat pump, change the AC/HP switch. • If the outdoor unit is an air conditioner, check the wiring to the conventional inputs. • If the outdoor unit is an HMH7 heat pump, ensure that the control is in S1 functionality. See the <i>S1 Functionality</i> section for more information.
Call for reversing valve and heating at the same time	2	5		The control senses 24 VAC on the W terminal and the O terminal in heat pump mode. Check the wiring to the conventional inputs. <ul style="list-style-type: none"> • If the outdoor unit is an HMH7 heat pump, ensure that the control is in S1 functionality. See the <i>S1 Functionality</i> section for more information.
Fan running without a call	3	0	Fan faults	The control senses the motor is moving without command. <ol style="list-style-type: none"> 1. Check the wiring between the motor and the control. 2. Cycle power on both the motor and the control. 3. Verify there is nothing moving the blower besides the motor attached to this air handler control.
Fan failure	3	1		The control senses the motor is not moving with an active demand. <ol style="list-style-type: none"> 1. Check the motor has sufficient power. 2. Check the wiring between the motor and the control. 3. Verify nothing is blocking the blower fan. 4. Cycle power to both the motor and the control.

Continued on next page

Table 7: Fault list (continued)

Fault/status	Display 1	Display 2	Simplified	Description
Fan - high voltage failure	3	2	Fan faults	The control senses the motor is receiving too high voltage. 1. Check the voltage going to the blower motor. 2. Check the wiring of power to the motor. 3. Cycle power to the motor and to the control. 4. Verify nothing is blocking the blower.
Fan - low voltage failure	3	3		The control senses the motor is receiving too low voltage. 1. Check the voltage going to the blower motor. 2. Check the wiring of power to the motor. 3. Cycle power to the motor and to the control.
Fan - high current failure	3	4		The control senses the motor is receiving too high current. 1. Check the power going to the blower motor. 2. Check the wiring of power to the motor. 3. Cycle power to the motor and to the control. 4. Verify nothing is blocking the blower.
Fan - low current failure	3	5		The control senses the motor is receiving too low current. 1. Check the power going to the blower motor. 2. Check the wiring of power to the motor. 3. Cycle power to the motor and to the control.
Fan - high temperature failure	3	6		The control senses the motor's internal temperature is too high. 1. Verify the airflow set on the air handler control is correct for the air handler model, heat kit, and staging. 2. Ensure nothing is blocking the blower. 3. Cycle power on the motor and the control.
Fan - low temperature failure	3	7		The control senses the motor's internal temperature is too low. 1. Verify the airflow set on the air handler control is correct for the air handler model, heat kit, and staging. 2. Ensure nothing is blocking the blower. 3. Cycle power on the motor and the control.
Fan - lost rotor	3	8		The control senses the motor has a lost rotor fault. 1. Ensure nothing is blocking the blower. 2. Cycle power on the motor and the control.
Fan - incomplete parameter	3	9		The control delivers incomplete data to the motor. 1. Check wiring between the control and the motor. 2. Check the EE plug is firmly seated into the control. 3. If the issue persists, cycle power to the control and the motor.
Fan - undesired parameter change	4	0		1. The control delivers a parameter change at the wrong time to the motor. Check wiring between the control and the motor. 2. Check the EE plug is firmly seated into the control. 3. If the issue persists, cycle power to the control and the motor.
Fan - fault limit lockout	4	1		The motor hits the fault limit and no longer runs. 1. Check the fault list on the control and troubleshoot those faults. 2. When these faults have been checked, cycle power to the motor and control.

HUM OUT output

The HUM OUT output drives an external relay or solenoid (24 VAC coil) to control a humidifier. The output energizes when the control has a thermostat call for heating (heat pump or electric heat).

Heat output

The control connects to the heater relays using pins four, five, and six of connector P3. The relay outputs are 24 VAC.

The control energizes the heat relays as shown in **Table 8**.

Table 8: Heat relays

Input	Heat relay output
W1	HT1
W2	HT2
W1 and W2	HT1 and HT2

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 energizes 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 energizes one heating element (HT2). With either configuration, the control energizes two heating elements (HT1 and HT2) when it receives a first and second stage heat input from the thermostat.

Heat kit outputs based on thermostat inputs can be configured differently if required, using the stage 1 kW dip switches located in the SW3 switch bank. With the switches in 00 (OFF, OFF) or 01 (OFF, ON), W1 input = HT1 output. If the switches are in the 10 (ON, OFF) position, W1 input = HT2 output. If the switches are in the 11 (ON, ON) position, W1 input = HT1 and HT2 output. See **Table 15** for switch settings. Change these heat kit staging settings on the communicating room thermostat unless temporarily using a conventional room thermostat.

Wiring related faults

If the control receives a simultaneous call for electric heating and cooling (fault code 24), the control locks out and does not condition.

Section XI: Airflow and comfort setting selection

Model configuration

The six model configuration switches come factory-set in the 0 (OFF) position. The unit model is programmed into the control board at the factory. If the model configuration switches get changed inadvertently from the factory (OFF) position to a different position, you must set the unit model configuration. See Figure XX and change the model configuration switches to the positions matching the air handler model shown on the unit rating plate. Apply power to the equipment and hold the control push button down for 6 s to 9 s. There must be no active thermostat calls while the model configuration is being set or the change does not save.

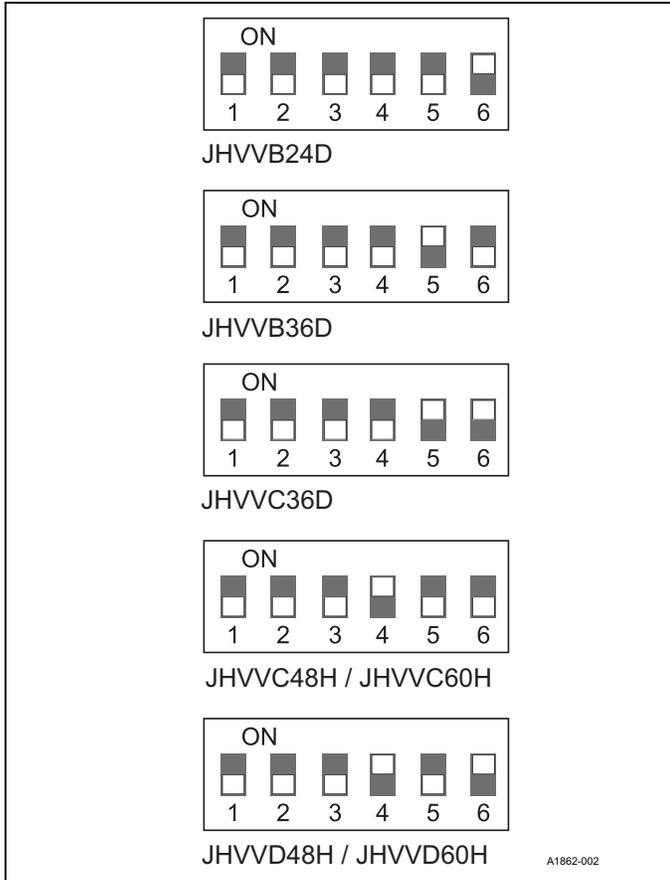


Figure 15: DIP switch settings by model

Airflow selection

When not using communicating functionality, you must set the airflow and comfort setting selection switches correctly at the time of installation for correct system operation. Place switches in the correct locations based on the information shown in Table 23. An example of switch positions is shown below in Figure 16. 0 indicates the OFF position and 1 indicates the ON position. The airflow configuration switches are located in the SW4 switch bank.

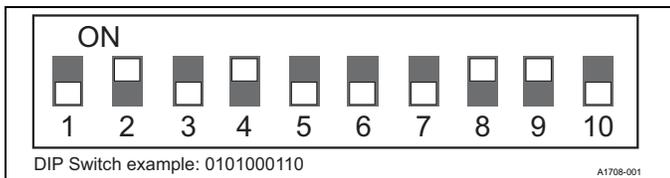


Figure 16: DIP-10

Inputs to the air handler control board pass to the motor, which determines the target CFM to deliver. The following inputs produce the CFM shown in the appropriate table and selected tap settings.

NOTICE

Incorrect airflow and comfort settings may result in decreased system efficiency and performance.

These variable speed air handlers are designed to deliver constant airflow (CFM) regardless of the external static pressure (ESP) in the ductwork.

Therefore, if too many supply registers are closed, a filter becomes clogged, or there is a restriction in the ductwork, the motor automatically operates at a higher speed to compensate for the higher ESP. This may result in a higher operating sound level and motor damage.

Setting cooling or heat pump heating airflow:

Refer to the outdoor unit *Technical Guide* for the appropriate airflow with the matching indoor coil. See Table 23 for the possible high speed cooling and heat pump heating airflow selections.

Find the appropriate system airflow in Table 23 for the installed air handler model and outdoor unit. LOW COOL and HIGH COOL each have three switch positions to set.

Set LOW COOL on switches 3, 4, and 5 on the SW4 switch bank. Set HIGH COOL on switches 6, 7, and 8 on the SW4 switch bank. The control is factory set for HP applications. For AC applications, change the AC/HP dip switch located in the SW5 switch bank to the 1 (ON) position.

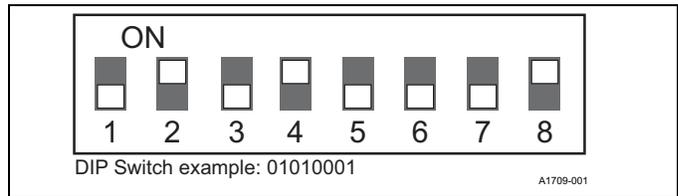


Figure 17: DIP-8

Setting continuous fan airflow:

The CONT FAN switches can be adjusted to increase airflow during a fan-only call. See Table 9, which shows values as a percentage of maximum airflow.

Table 9: Continuous fan switches

CONT FAN	% of maximum airflow
00	40
01	60
10	80
11	100

Setting electric heat kit airflow:

The blower speed required for first and second stage electric heat is different from cooling or heat pump heating. See Table 13 and Table 14 for minimum required airflow based on the installed heat-kit accessory and its switch positions. Each heat-kit selection has six different switch positions to set.

The first two switch settings are switches 1 and 2, listed as HEAT in the airflow configuration SW4 switch bank. The next four switch settings are switches 3, 4, 5, and 6, listed as HEATKIT SELECTION in the aux heat configuration SW3 switch bank. See Figure 27 for the location of these switches. Change the switch positions according to the unit model and accessory heat kit installed, where 0 = OFF and 1 = ON.

Blower ramp-up/ramp-down:

To minimize the sound made by the blower when it speeds up or slows down, the blower slowly ramps up or down from one speed to another. Changes in blower speed during AC or heat pump heating can take up to 30 s. Changes in blower speed during electric resistance heating can take up to 15 s.

Comfort settings

Table 10: Comfort setting selection

Delay tap	Comfort setting
A = 00	Normal
B = 01	Humid
C = 10	Dry
D = 11	Temperate

Normal

The normal setting provides a ramp-up from zero airflow to full capacity and a ramp-down from full capacity back to zero airflow.

Humid

The humid setting is best suited for installations where the humidity is frequently very high during cooling season. On a call for cooling, the blower ramps up to 50% of full capacity and stays there for 2 min, then ramps up

to 82% of full capacity and stays there for 5 min, and then ramps up to full capacity, where it stays until the wall thermostat setpoint is reached.

Dry

The dry setting is best suited to locations where excessive humidity is not generally a problem, where the summer months are usually dry. On a call for cooling the motor ramps up to full capacity and stays there until the thermostat setpoint is reached. At the end of the cooling cycle, the blower ramps down to 50% of full capacity, where it stays for 60 s, then ramps down to zero.

Temperate

The temperate setting is best suited for most locations, where neither excessive humidity nor extremely dry conditions are the norm. On a call for cooling, the motor ramps up to 63% of full capacity and stays there for 90 s, then ramps up to full capacity. At the end of the cooling cycle, the motor ramps down to 63% of full capacity and stays there for 30 s, then ramps down to zero.

Section XII: Unit data

Table 11: Physical and electrical data - cooling only

Models	B24D	B36D	C36D	C48H	D48H	C60H	D60H	
Blower - diameter x width (in.)	11 x 8	11 x 8	11 x 10	11 x 10	11 x 11	11 x 10	11 x 11	
Motor	HP	1/3 HP	1/2 HP	1/2 HP	1 HP	3/4 HP	1 HP	3/4 HP
	Nominal RPM	1050	1050	1050	1050	1050	1050	1050
Voltage (V)	208/230	208/230	208/230	208/230	208/230	208/230	208/230	
Full load amps at 230 V (A)	2.6	3.8	3.8	7.0	5.4	7.0	5.4	
Filter ¹	Type	Disposable or cleanable						
	Size (in.)	16 x 20 x 1	16 x 20 x 1	20 x 20 x 1	20 x 20 x 1	23 x 20 x 1	20 x 20 x 1	23 x 20 x 1
Shipping/operating weight (lb)	110/102	110/102	126/116	157/145	162/150	157/145	162/150	

1. Field-supplied

Table 12: Electrical data - cooling only

Models	Motor FLA ¹	Minimum circuit ampacity (A)	MOP ²
B24D	2.6	3.3	15
B36D/C36D	3.8	4.8	15
C48H/C60H	5.4	6.8	15
D48H/D60H	7	8.8	15

1. FLA = Full Load Amps

2. MOP = Maximum Overcurrent Protection device; must be HACR type circuit breaker or time delay fuse. Refer to the latest edition of the National Electric Code or in Canada the Canadian electrical Code and local codes to determine correct wire sizing.

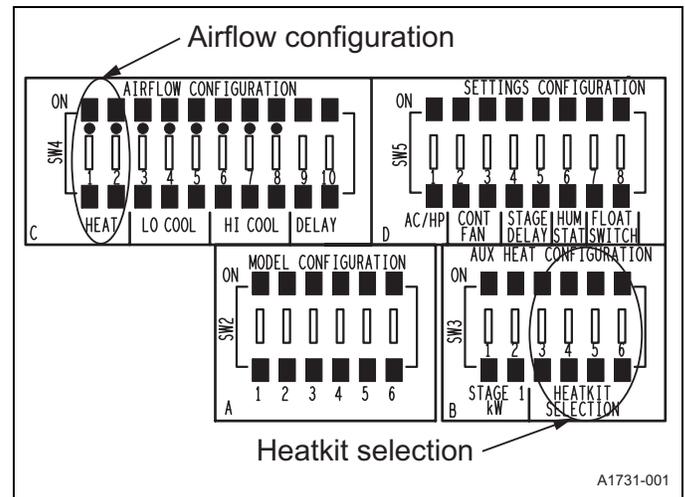


Figure 18: Variable speed board dip switch locations - heat kit

Table 13: Electrical heat: minimum fan CFM for single-phase heat kits

Heater kit models ^{1,2}	Nominal kW at 240 V	Airflow configuration heat dip switch setting*	Aux heat configuration heat kit selection dip switch setting	Air handler models (CFM ³)						
				B24D	B36D	C36D	C48H	D48H	C60H	D60H
8HK(0,1)6500206	2.4	00	0001	650	625	825	825	825	825	825
8HK(0,1)6500506	4.8	00	0010	650	650	825	825	825	825	825
8HK(0,1)6500806	7.7	00	0011	800	750	1100	1100	1150	1100	1150
8HK(0,1)6501006	9.6	00	0100	—	750	1100	1100	1325	1100	1325
8HK(1,2)6501506	14.4	00	0101	—	650, 975	825, 1100	825, 1100	825, 1575	825, 1100	825, 1575

Continued on next page

Table 13: Electrical heat: minimum fan CFM for single-phase heat kits (continued)

Heater kit models ^{1,2}	Nominal kW at 240 V	Airflow configuration heat dip switch setting*	Aux heat configuration heat kit selection dip switch setting	Air handler models (CFM ³)						
				B24D	B36D	C36D	C48H	D48H	C60H	D60H
8HK(1,2)6502006	19.2	00	0110	—	—	1100, 1300	1100, 1300	1325, 1575	1100, 1300	1325, 1575
8HK(1,2)6502506	24	00	0111	—	—	—	—	1325, 1650	—	1325, 1650

1. (0,1) - 0 = no service disconnect or 1 = with service disconnect.

2. (1,2) - 1 = with service disconnect, no breaker jumper bar or 2 = with service disconnect and breaker jumper bar.

3. For minimum fan CFM, if there are two values present, the first value is low-stage CFM (W1) and the second value is full-stage CFM (W1+W2). If higher kW/CFM is needed for low-stage, see **Table 15** and the heat output section of this manual.

* To increase airflow by approximately 20%, adjust the HEAT switches 1 and 2, located in the airflow configuration SW4 switch bank, from 00 to 01.

Table 14: Electrical heat: minimum fan CFM for three-phase heat kits

Heater kit models ^{1,2}	Nominal kW at 240 V	Airflow configuration heat dip switch setting*	Aux heat configuration heat kit selection dip switch setting	Air handler models (CFM ³)					
				B36D	C36D	C48H	D48H	C60H	D60H
8HK06501025	9.6	00	1000	1150	1150	1150	1500	1150	1500
8HK06501525	14.4	00	1001	1150	1150	1150	1575	1150	1575
8HK16502025	19.2	00	1010	1150, 1150	1150, 1300	1150, 1300	1500, 1575	1150, 1300	1500, 1575
8HK16502525	24	00	1011	—	—	—	1575, 1650	—	1575, 1650

1. (0,1) - 0 = no service disconnect or 1 = with service disconnect.

2. (1,2) - 1 = with service disconnect, no breaker jumper bar or 2 = with service disconnect and breaker jumper bar.

3. For minimum fan CFM, if there are two values present, the first value is low-stage CFM (W1) and the second value is full-stage CFM (W1+W2). If higher kW/CFM is needed for low-stage, see **Table 15** and the heat output section of this manual.

* To increase airflow by approximately 20%, adjust the HEAT switches 1 and 2, located in the airflow configuration SW4 switch bank, from 00 to 01.

Table 15: Aux heat configuration - stage 1 kW dip switch settings

W1 = W1	00, 01
W1 = W2	10
W1 = W1 + W2	11

Table 16: Application factors - rated CFM versus actual CFM

% of rated airflow (CFM)	80	90	100	110	120
Capacity factor	0.96	0.98	1.00	1.02	1.03

Table 17: kW and MBH conversions - for total power input requirement

For a power distribution voltage that is different from the provided nominal voltage, multiply the kW and MBH data from **Table 18** by the conversion factor in the following table.

Distribution power (V)	Nominal voltage (V)	Conversion factor
208	240	0.75
220	240	0.84
230	240	0.92

Table 18: Electric heat performance data: 208/230-1-60 and 208/230-3-60

Heater models ^{1,2}		Nominal kW at 240 V	Total heat ³				kW staging			
			kW		MBH		W1 only		W1 and W2	
			208 V	230 V	208 V	230 V	208 V	230 V	208 V	230 V
Single-phase	8HK(0,1)6500206	2.4	1.8	2.2	6.2	7.5	1.8	2.2	1.8	2.2
	8HK(0,1)6500506	4.8	3.6	4.4	12.3	15	3.6	4.4	3.6	4.4
	8HK(0,1)6500806	7.7	5.8	7.1	19.7	24.1	5.8	7.1	5.8	7.1
	8HK(0,1)6501006	9.6	7.2	8.8	24.6	30.1	7.2	8.8	7.2	8.8
	8HK(1,2)6501506	14.4	10.8	13.2	36.9	45.1	3.6	4.4	10.8	13.2
	8HK(1,2)6502006	19.2	14.4	17.6	49.2	60.2	7.2	8.8	14.4	17.6
	8HK(1,2)6502506	24	18	22	61.5	75.2	7.2	8.8	18	22

Continued on next page

Table 18: Electric heat performance data: 208/230-1-60 and 208/230-3-60 (continued)

Heater models ^{1,2}		Nominal kW at 240 V	Total heat ³				kW staging			
			kW		MBH		W1 only		W1 and W2	
			208 V	230 V	208 V	230 V	208 V	230 V	208 V	230 V
Three-phase	8HK06501025	9.6	7.2	8.8	24.6	30.1	7.2	8.8	7.2	8.8
	8HK06501525	14.4	10.8	13.2	36.9	45.1	10.8	13.2	10.8	13.2
	8HK16502025	19.2	14.4	17.6	49.2	60.2	7.2	8.8	14.4	17.6
	8HK16502525	24	18	22	61.5	75.2	9	11	18	22

1. (0,1) - 0 = no service disconnect or 1 = with service disconnect.

2. (1,2) - 1 = with service disconnect, no breaker jumper bar or 2 = with service disconnect and breaker jumper bar.

3. For different power distributions, see **Table 17**.

Table 19: Electrical data for single source power supply: 208/230-1-60

Air handler models	Heater models ^{1,2}	Heater amps (A) at 240 V	Field wiring			
			Minimum circuit ampacity (A)		MOP ³ (A)	
			208 V	230 V	208 V	230 V
B24D	8HK(0,1)6500206	10	14.1	15.2	15	20
	8HK(0,1)6500506	20	24.9	27.2	25	30
	8HK(0,1)6500806	32	38.1	41.8	40	45
	8HK(0,1)6501006	40	46.5	51.1	50	60
	8HK(1,2)6501506	60	68.2	75.0	70	80
B36D	8HK(0,1)6500206	10	15.6	16.7	20	20
	8HK(0,1)6500506	20	26.4	28.7	30	30
	8HK(0,1)6500806	32	39.6	43.3	40	45
	8HK(0,1)6501006	40	48.0	52.6	50	60
	8HK(1,2)6501506	60	69.7	76.5	70	80
	8HK(1,2)6502006	80	91.3	100.4	100	110
C36D	8HK(0,1)6500206	10	15.6	16.7	20	20
	8HK(0,1)6500506	20	26.4	28.7	30	30
	8HK(0,1)6500806	32	39.6	43.3	40	45
	8HK(0,1)6501006	40	48.0	52.6	50	60
	8HK(1,2)6501506	60	69.7	76.5	70	80
	8HK(1,2)6502006	80	91.3	100.4	100	110
C48H	8HK(0,1)6500206	10	19.6	20.7	20	25
	8HK(0,1)6500506	20	30.4	32.7	35	35
	8HK(0,1)6500806	32	43.6	47.3	45	50
	8HK(0,1)6501006	40	52.0	56.6	60	60
	8HK(1,2)6501506	60	73.7	80.5	80	90
	8HK(1,2)6502006	80	95.3	104.4	100	110
C60H	8HK(0,1)6500206	10	19.6	20.7	20	25
	8HK(0,1)6500506	20	30.4	32.7	35	35
	8HK(0,1)6500806	32	43.6	47.3	45	50
	8HK(0,1)6501006	40	52.0	56.6	60	60
	8HK(1,2)6501506	60	73.7	80.5	80	90
	8HK(1,2)6502006	80	95.3	104.4	100	110
D60H	8HK(0,1)6500206	10	17.6	18.7	20	20
	8HK(0,1)6500506	20	28.4	30.7	30	35
	8HK(0,1)6500806	32	41.6	45.3	45	50
	8HK(0,1)6501006	40	50.0	54.6	60	60
	8HK(1,2)6501506	60	71.7	78.5	80	80
	8HK(1,2)6502006	80	93.3	102.4	100	110
	8HK(1,2)6502506	100	114.9	126.3	125	150

1. (0,1) - 0 = no service disconnect or 1 = with service disconnect.

2. (1,2) - 1 = with service disconnect, no breaker jumper bar or 2 = with service disconnect and breaker jumper bar.

3. MOP = Maximum Overcurrent Protection device; must be HACR type circuit breaker or time delay fuse. Refer to the latest edition of the National Electric Code or in Canada the Canadian electrical Code and local codes to determine correct wire sizing.

Table 20: Electrical data for multi-source power supply: 208/230-1-60

Air handlers models	Heater models ¹	Heater amps (A) at 240 V	Minimum circuit ampacity (A)						MOP ² (A)					
			208 V			230 V			208 V			230 V		
			Circuit						Circuit					
			First ³	Second	Third	First ³	Second	Third	First ³	Second	Third	First ³	Second	Third
B36D	8HK16501506	60	26.2	43.5	—	28.4	48.1	—	30	45	—	30	50	—
C36D	8HK16501506	60	26.2	43.5	—	28.4	48.1	—	30	45	—	30	50	—
	8HK16502006	80	48.0	43.3	—	52.6	47.8	—	50	45	—	60	50	—
C48H	8HK16501506	60	30.2	43.5	—	32.4	48.1	—	35	45	—	35	50	—
	8HK16502006	80	52.0	43.3	—	56.6	47.8	—	60	45	—	60	50	—
D48H	8HK16501506	60	28.2	43.5	—	30.4	48.1	—	30	45	—	35	50	—
	8HK16502006	80	50.0	43.3	—	54.6	47.8	—	60	45	—	60	50	—
	8HK16502506	100	50.0	43.3	21.6	54.6	47.8	23.9	60	45	25	60	50	25
C60H	8HK16501506	60	30.2	43.5	—	32.4	48.1	—	35	45	—	35	50	—
	8HK16502006	80	52.0	43.3	—	56.6	47.8	—	60	45	—	60	50	—
D60H	8HK16501506	60	28.2	43.5	—	30.4	48.1	—	30	45	—	35	50	—
	8HK16502006	80	50.0	43.3	—	54.6	47.8	—	60	45	—	60	50	—
	8HK16502506	100	50.0	43.3	21.6	54.6	47.8	23.9	60	45	25	60	50	25

1. 8HK1 = with service disconnect, no breaker jumper bar

2. MOP = Maximum Overcurrent Protection device; must be HACR type circuit breaker or time delay fuse. The first circuit includes blower motor amps. Refer to the latest edition of the National Electric Code or in Canada the Canadian electrical Code and local codes to determine correct wire sizing.

Table 21: Electrical data for single source power supply: 208/230-3-60

Air handler models	Heater models ¹	Heater amps (A) at 240 V	Field wiring			
			Minimum circuit ampacity (A)		MOP ² (A)	
			208 V	230 V	208 V	230 V
B36D	8HK06501025	23.1	29.7	32.4	30	35
	8HK06501525	34.6	42.2	46.2	45	50
C36D	8HK06501025	23.1	29.7	32.4	30	35
	8HK06501525	34.6	42.2	46.2	45	50
	8HK06502025	46.2	54.7	60.0	60	60
C48H	8HK06501025	23.1	33.7	36.4	35	40
	8HK06501525	34.6	46.2	50.2	50	60
	8HK06502025	46.2	58.7	64.0	60	70
D48H	8HK06501025	23.1	31.7	34.4	35	35
	8HK06501525	34.6	44.2	48.2	45	50
	8HK06502025	46.2	56.7	62.0	60	70
	8HK06502525	57.7	69.2	75.8	70	80
C60H	8HK06501025	23.1	33.7	36.4	35	40
	8HK06501525	34.6	46.2	50.2	50	60
	8HK06502025	46.2	58.7	64.0	60	70
D60H	8HK06501025	23.1	31.7	34.4	35	35
	8HK06501525	34.6	44.2	48.2	45	50
	8HK06502025	46.2	56.7	62.0	60	70
	8HK06502525	57.7	69.2	75.8	70	80

1. 0 = no service disconnect or 1 = with service disconnect. The 20 kW and 25 kW heater models (8HK16502025 and 8HK16502525) come with service disconnects standard. Single source power MCA and MOP requirements are given here only for reference if used with field installed single point power modification.

2. MOP = Maximum overcurrent protection device; must be HACR type circuit breaker or time delay fuse. The first circuit includes blower motor amps. Refer to the latest edition of the National Electric Code or in Canada the Canadian electrical Code and local codes to determine correct wire sizing.

Table 22: Electrical data for multi-source power supply: 208/230-3-60

Air handlers models	Heater models ¹	Heater amps (A) at 240V	Minimum circuit ampacity (A)				MOP ² (A)			
			208V		230V		208V		230V	
			Circuit				Circuit			
			First ²	Second	First ²	Second	First ²	Second	First ²	Second
C36D	8HK16502025	46.2	29.7	25.0	32.4	27.6	30	25	35	30
C48H	8HK16502025	46.2	33.7	25.0	36.4	27.6	35	25	40	30

Table 22: Electrical data for multi-source power supply: 208/230-3-60 (continued)

Air handlers models	Heater models ¹	Heater amps (A) at 240V	Minimum circuit ampacity (A)				MOP ² (A)			
			208V		230V		208V		230V	
			Circuit				Circuit			
			First ²	Second	First ²	Second	First ²	Second	First ²	Second
D48H	8HK16502025	46.2	31.7	25.0	34.4	27.6	35	25	35	30
	8HK16502525	57.7	38.0	31.2	41.3	34.5	40	35	45	35
C60H	8HK16502025	46.2	33.7	25.0	36.4	27.6	35	25	40	30
D60H	8HK16502025	46.2	31.7	25.0	34.4	27.6	35	25	35	30
	8HK16502525	57.7	38.0	31.2	41.3	34.5	40	35	45	35

1. The 20kW and 25kW heater models (8HK06502025 and 8HK06502525) come with service disconnects standard.

2. MOP = Maximum overcurrent protection device; must be HACR type circuit breaker or time delay fuse. The first circuit includes blower motor amps. Refer to the latest edition of the National Electric Code or in Canada the Canadian electrical Code and local codes to determine correct wire sizing.

Table 23: Temporary repair mode cooling airflow data (CFM)

Cool tap	Unit	B24D	B36D	C36D	C48H	D48H	C60H	D60H
		High						
000	CFM	400	525	400	400	425	400	425
	W	83	93	82	78	80	78	80
001	CFM	550	675	550	725	725	725	725
	W	101	131	96	137	130	137	130
010	CFM	725	875	825	1100	1100	1100	1100
	W	145	189	143	232	204	232	204
011	CFM	900	1125	1100	1475	1475	1475	1475
	W	216	298	217	399	328	399	328
100	CFM	N/A	1350	1350	1800	1825	1800	1825
	W	N/A	461	337	647	533	647	533

Notes:

- Air handler units have been tested to UL 60335-2-40 / CSA 22.2 No. 236 standards up to 0.6 in. W.C. external static pressure.
- Dry coil conditions only, tested without filters.
- For optimal performance, external static pressures of 0.2 in. W.C. to 0.5 in. W.C. are recommended. Heating applications tested at 0.5 in. W.C. external static pressure. Above 0.5 in. W.C., CFM is reduced by 2% per 0.1 in. increase in static.
- Low speed cooling used only with two stage outdoor units. Speed is preset to 65% of high speed.
- Dehumidification speed is 85% of jumper selected cool tap.
- Any compressor operation uses HI COOL and LO COOL DIP switches. Indoor heating operates off the heat kit selection and the HEAT DIP switches.
- At some settings, low cool and/or low heat airflow may be lower than what is required to operate an airflow switch on certain models of electronic air cleaners. Consult the instructions for the electronic air cleaner for further details.
- Airflow (CFM) indicator light (LED2) flashes once for every 100 CFM (for example, 12 flashes is 1200 CFM) - blinks are approximate $\pm 10\%$ of actual CFM.

Section XIII: Maintenance

Inspect filters at least once per month, and clean or replace them when they become dirty. The frequency of cleaning depends upon the hours of operation and the local atmospheric conditions. Clean filters keep unit efficiency high.

Coil cleaning**CAUTION**

Ensure adequate precautions are taken to protect electrical components from liquid.

If cleaning the coil is necessary, clean with water only.

As an alternative to water, Evap-Green by Nu-Calgon is the only pH neutral coil cleaner approved for use when it is correctly diluted.

Ensure to thoroughly rinse the cleaned coils after using Evap-Green.

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, shut off the unit immediately and clean the condensate pan and drains to insure a free flowing primary drain.

Section XIV: Air system adjustment

To check the cubic feet per minute (CFM), measure the external duct static using a manometer and static pressure tips. To prepare coil for static pressure measurements, run only the fan to ensure a dry coil.

NOTICE

See **Table 23** for air handling unit airflow data (CFM).

Drill two holes, one 12 in. away from the air handler in the supply air duct and one 12 in. away from the air handler in the return air duct (before any elbows in the ductwork). If the internal filter rack is utilized, the return air static pressure reading **must be taken** after the filter but before the indoor coil. Insert the pressure tips and energize the blower motor. See **Table 23** to determine the airflow and make the necessary adjustments to keep the CFM within the airflow limitations of the coil.

External duct static

Measure the supply air static pressure. Record this positive number. Measure the return air static pressure. Record this negative number. Treat the negative number as a positive, and add the two numbers together to determine the total external system static pressure. If a filter rack is installed on the return air end of the air handler or indoor coil sec-

tion, make sure to measure the return air duct static between the filter and the indoor coil.

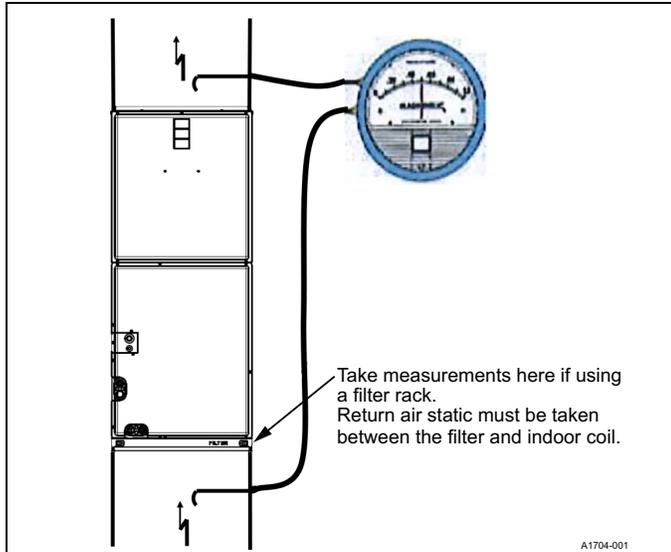


Figure 19: Duct static measurements

Section XV: Installation verification

Before and during the completion of the installation procedures, verify all tasks are accomplished as indicated in this installation manual.

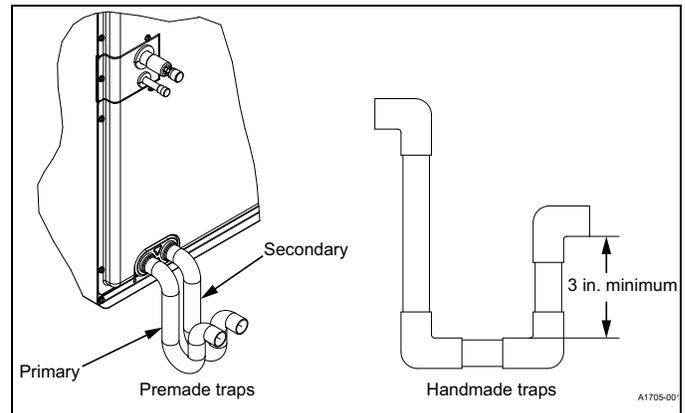


Figure 20: Drain traps

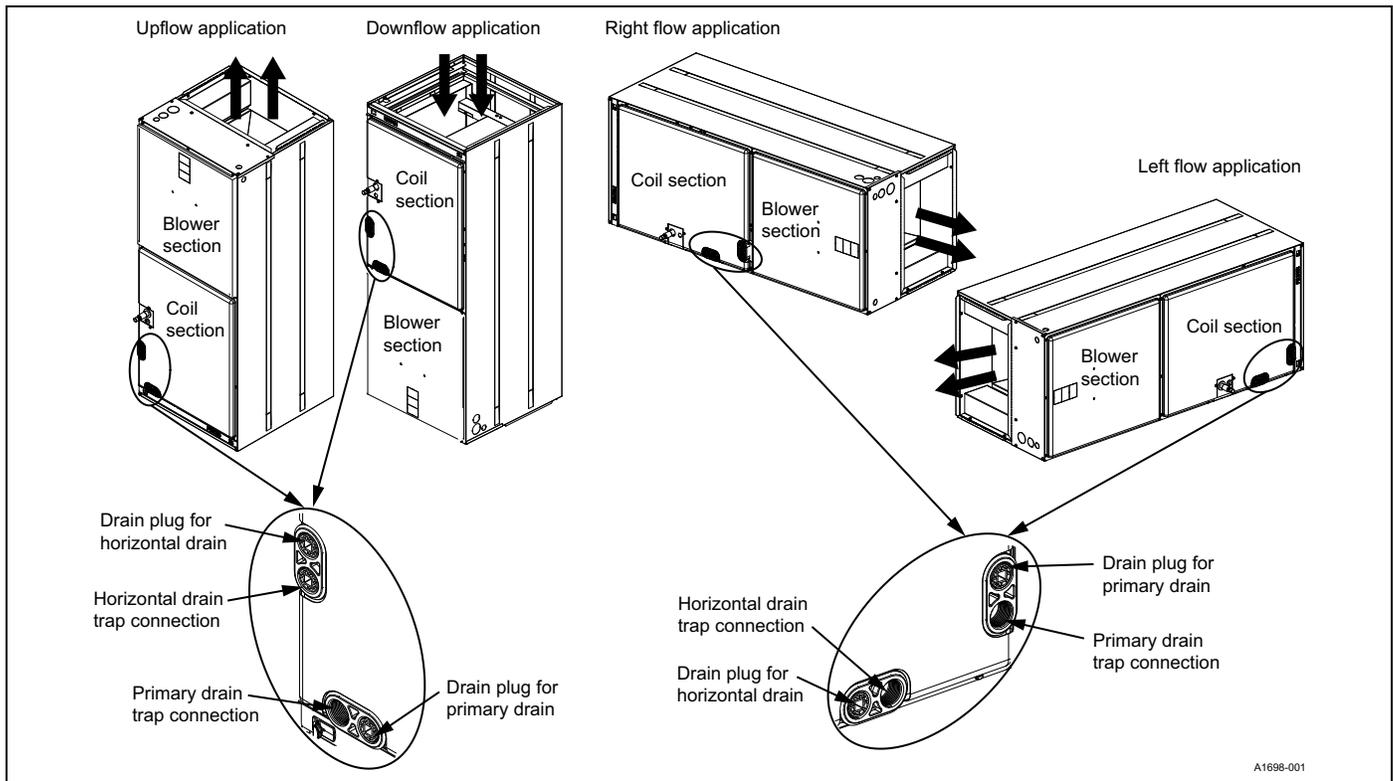


Figure 21: Location of coil trapped and plugged drain connections

Section XVI: Wiring diagrams

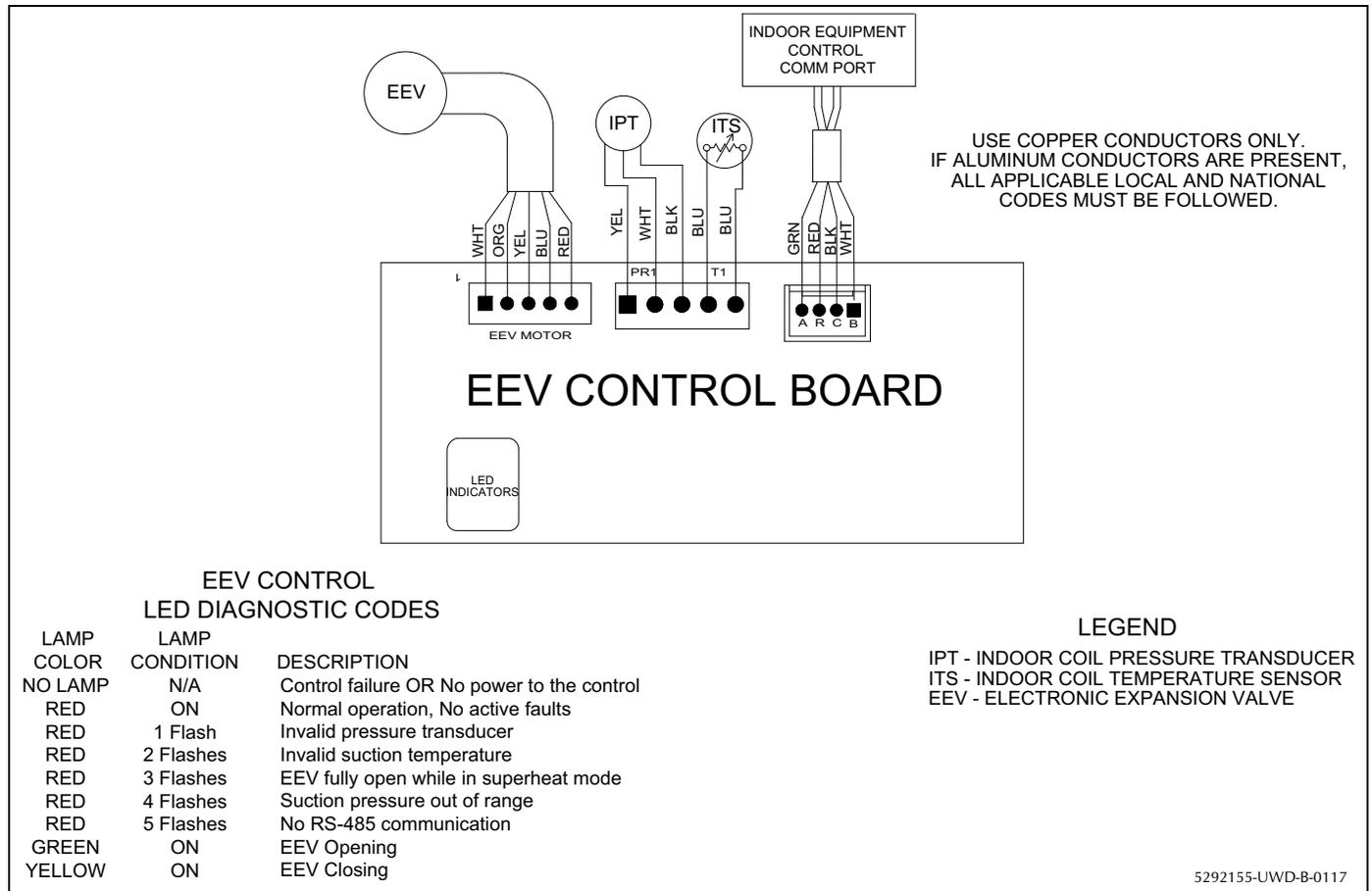


Figure 22: Wiring diagram - EEV

WHEN INSTALLING HEATER KIT, BE SURE THE BLOWER SPEED IS SET TO THE SPEED SPECIFIED FOR THE AIR HANDLER/HEATER KIT COMBINATION ON THIS UNIT'S INSTALLATION INSTRUCTIONS.

SEE INSTALLATION INSTRUCTIONS FOR PROPER LOW VOLTAGE FIELD WIRING CONNECTIONS.

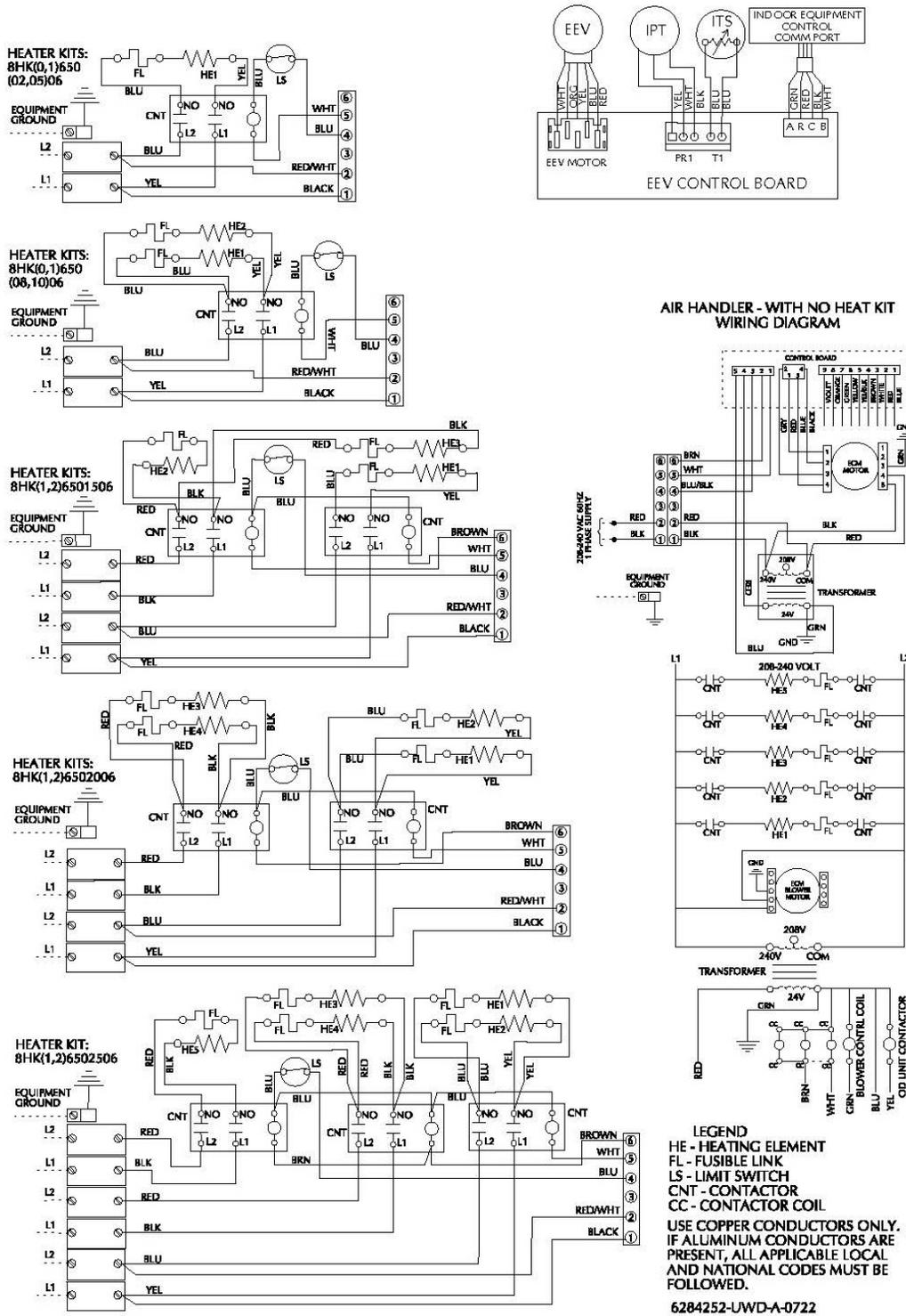


Figure 23: Wiring diagram

Section XVII: Start-up sheet

Start-up Sheet

Residential Air Handler with Electric Heat

Correct start-up is critical to customer comfort and equipment longevity

Start-up date Company name Start-up technician **Owner information**Name Address Daytime phone
City State or province Zip or postal code **Equipment data**Unit model number Unit serial number **General information** (check all that apply) New construction Upflow Horizontal Left
 Retrofit Downflow Horizontal Right**Unit location and connections** (check all that apply) Unit is level Duct connections are complete : Supply Return
 Condensate drain is connected correctly (refer to installation manual) Condensate trap is primed with water**Filters** Filters installed Number of filters Filter size **Electrical connections and inspection** (complete all that apply) 208 VAC 230 VAC 460 VAC
 Wires and electrical connections inspected Transformer wired correctly for primary supply voltage Ground connected
Line voltage measured (VAC) Low voltage value between R and C at control board (VAC)
 Thermostat wiring is complete Thermostat cycle rate or heat anticipator adjusted to Installation Manual specifications**Airflow setup**

Blower type and set-up	Variable speed ECM (circle 0 or 1)	Heat	0 / 1	0 / 1		
		Low cool	0 / 1	0 / 1	0 / 1	
		High cool	0 / 1	0 / 1	0 / 1	
		Delay	0 / 1	0 / 1		
		Stage 1 kW	0 / 1	0 / 1		
		Heat kit selection	0 / 1	0 / 1	0 / 1	0 / 1
Standard ECM	HP heating/cooling	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
	Electric heat speed	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
	Continuous fan speed	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5

Supply static (in. W.C.) Supply air dry bulb temperature Outside air dry bulb temperature
Return static (in. W.C.) Return air dry bulb temperature Return air wet bulb temperature
Total external static pressure Temperature drop Supply air wet bulb temperature **Other switches** (check all that apply)HUMIDISTAT YES NO AC/HP AC HP CONT FAN 40% 60% 80% 100%

Continued on next page

Electric heat (complete all that apply)

Electric heat kit:	Model number	<input type="text"/>	Serial number	<input type="text"/>	Rated kW	<input type="text"/>	
Number of elements	Measured amperage (A)	Heater 1	<input type="text"/>	Heater 2	<input type="text"/>	Heater 3	<input type="text"/>
		Heater 4	<input type="text"/>	Heater 5	<input type="text"/>	Heater 6	<input type="text"/>
	Measured voltage (V)	Heater 1	<input type="text"/>	Heater 2	<input type="text"/>	Heater 3	<input type="text"/>
		Heater 4	<input type="text"/>	Heater 5	<input type="text"/>	Heater 6	<input type="text"/>
Heating return air dry bulb temperature	<input type="text"/>	Heating supply air dry bulb temperature	<input type="text"/>	Air temperature rise	<input type="text"/>		

Job site clean-up

Job site has been cleaned, and indoor and outdoor debris removed from job site.

Tools have been removed from unit.

All panels have been installed.

Unit operation and cycle test (complete all that apply)

Operate the unit through continuous fan cycles from the thermostat, noting and correcting any problems.

Operate the unit through cooling cycles from the thermostat, noting and correcting any problems.

Operate the unit through mechanical heating cycles from the thermostat, noting and correcting any problems.

Operate the unit through emergency heating cycles from the thermostat, noting and correcting any problems.

Owner education

Provide the owner with the owner's manual.

Explain operation of system to the owner.

Explain thermostat use and programming (if applicable) to the owner.

Explain the importance of regular filter replacement and equipment maintenance.

Comments and additional job details