

# AVPTC\*\*14\*\*

## AIR HANDLERS

### INSTALLATION & OPERATING INSTRUCTIONS

© 2018 Goodman Manufacturing Company, L.P.  
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[www.goodmanmfg.com](http://www.goodmanmfg.com) - or - [www.amana-hac.com](http://www.amana-hac.com)  
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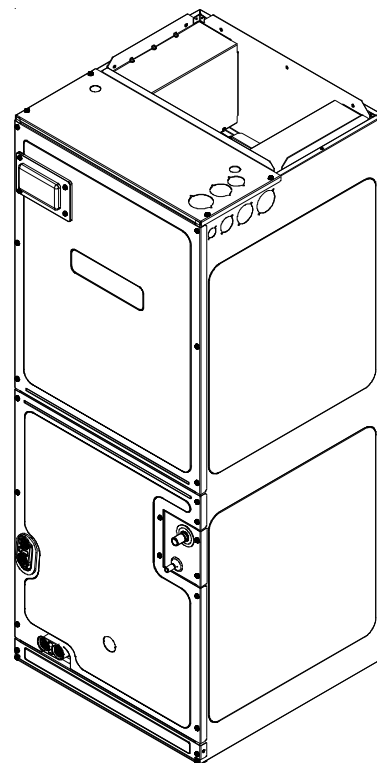
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## WARNING

ONLY PERSONNEL THAT HAVE BEEN TRAINED TO INSTALL, ADJUST, SERVICE OR REPAIR (HEREINAFTER, "SERVICE") THE EQUIPMENT SPECIFIED IN THIS MANUAL SHOULD SERVICE THE EQUIPMENT. THE MANUFACTURER WILL NOT BE RESPONSIBLE FOR ANY INJURY OR PROPERTY DAMAGE ARISING FROM IMPROPER SERVICE OR SERVICE PROCEDURES. IF YOU SERVICE THIS UNIT, YOU ASSUME RESPONSIBILITY FOR ANY INJURY OR PROPERTY DAMAGE WHICH MAY RESULT. IN ADDITION, IN JURISDICTIONS THAT REQUIRE ONE OR MORE LICENSES TO SERVICE THE EQUIPMENT SPECIFIED IN THIS MANUAL, ONLY LICENSED PERSONNEL SHOULD SERVICE THE EQUIPMENT. IMPROPER INSTALLATION, ADJUSTMENT, SERVICING OR REPAIR OF THE EQUIPMENT SPECIFIED IN THIS MANUAL, OR ATTEMPTING TO INSTALL, ADJUST, SERVICE OR REPAIR THE EQUIPMENT SPECIFIED IN THIS MANUAL WITHOUT PROPER TRAINING MAY RESULT IN PRODUCT DAMAGE, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.



**RECOGNIZE THIS SYMBOL AS A  
SAFETY PRECAUTION.**

## ATTENTION INSTALLING PERSONNEL

Prior to installation, thoroughly familiarize yourself with this Installation Manual. Observe all safety warnings. During installation or repair, caution is to be observed. It is your responsibility to install the product safely and to educate the customer on its safe use.



## 1 Important Safety Instructions

The following symbols and labels are used throughout this manual to indicate immediate or potential safety hazards. It is the owner's and installer's responsibility to read and comply with all safety information and instructions accompanying these symbols. Failure to heed safety information increases the risk of personal injury, property damage, and/or product damage.

### WARNING

To prevent the risk of property damage, personal injury, or death, do not store combustible materials or use gasoline or other flammable liquids or vapors in the vicinity of this unit.

### WARNING

This product is factory-shipped for use with 208/240/1/60 electrical power supply. **DO NOT** reconfigure this air handler to operate with any other power supply.

### WARNING

To avoid property damage, personal injury or death due to electrical shock, this unit **MUST** have an uninterrupted, unbroken electrical ground. The electrical ground circuit may consist of an appropriately sized electrical wire connecting the ground lug in the unit control box to the building electrical service panel. Other methods of grounding are permitted if performed in accordance with the National Electric Code (NEC)/American National Standards Institute (ANSI)/National Fire Protection Association (NFPA) 70 and local/state codes. In Canada, electrical grounding is to be in accordance with the Canadian Electric Code (CSA) C22.1.

### CAUTION

When installing or servicing this equipment, safety clothing, including hand and eye protection, is strongly recommended. If installing in an area that has special safety requirements (hard hats, etc.), observe these requirements.


### WARNING

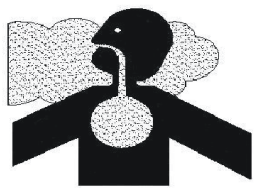
Do not connect to or use any device that is not design-certified by the manufacturer for use with this unit. Serious property damage, personal injury, reduced unit performance and/or hazardous conditions may result from the use of such non-approved devices.

### WARNING

**HIGH VOLTAGE!**  
Disconnect ALL power before servicing.  
Multiple power sources may be present.  
Failure to do so may cause property damage, personal injury or death.



**DANGER**  
**PELIGRO**



**CARBON MONOXIDE POISONING HAZARD**

Special Warning for Installation of Furnace or Air Handling Units in Enclosed Areas such as Garages, Utility Rooms or Parking Areas

Carbon monoxide producing devices (such as an automobile, space heater, gas water heater, etc.) should not be operated in enclosed areas such as unventilated garages, utility rooms or parking areas because of the danger of carbon monoxide (CO) poisoning resulting from the exhaust emissions. If a furnace or air handler is installed in an enclosed area such as a garage, utility room or parking area and a carbon monoxide producing device is operated therein, there must be adequate, direct outside ventilation.

This ventilation is necessary to avoid the danger of CO poisoning which can occur if a carbon monoxide producing device continues to operate in the enclosed area. Carbon monoxide emissions can be (re)circulated throughout the structure if the furnace or air handler is operating in any mode.

CO can cause serious illness including permanent brain damage or death. B10259-216

**RIESGO DE INTOXICACIÓN POR MONÓXIDO DE CARBONO**

Advertencia especial para la instalación de calentadores ó manejadoras de aire en áreas cerradas como estacionamientos ó cuartos de servicio.

Los equipos ó aparatos que producen monóxido de carbono (tal como automóvil, calentador de gas, calentador de agua por medio de gas, etc) no deben ser operados en áreas cerradas debido al riesgo de envenenamiento por monóxido de carbono (CO) que resulta de las emisiones de gases de combustión. Si el equipo ó aparato se opera en dichas áreas, debe existir una adecuada ventilación directa al exterior.

Esta ventilación es necesaria para evitar el peligro de envenenamiento por CO, que puede ocurrir si un dispositivo que produce monóxido de carbono sigue operando en el lugar cerrado.

Las emisiones de monóxido de carbono pueden circular a través del aparato cuando se opera en cualquier modo.

El monóxido de carbono puede causar enfermedades severas como daño cerebral permanente ó muerte. B10259-216

**RISQUE D'EMPOISONNEMENT AU MONOXYDE DE CARBONE**

Avertissement special au sujet de l'installation d'appareils de chauffage ou de traitement d'air dans des endroits clos, tels les garages, les locaux d'entretien et les stationnements.

Évitez de mettre en marche les appareils produisant du monoxyde de carbone (tels que les automobile, les appareils de chauffage autonome, etc.) dans des endroits non ventilés tels que les d'empoisonnement au monoxyde de carbone. Si vous devez faire fonctionner ces appareils dans un endroit clos, assurez-vous qu'il y ait une ventilation directe provenant de l'exterieur.

Cette ventilation est nécessaire pour éviter le danger d'intoxication au CO pouvant survenir si un appareil produisant du monoxyde de carbone continue de fonctionner au sein de la zone confinée.

Les émissions de monoxyde de carbone peuvent être recirculées dans les endroits clos, si l'appareil de chauffage ou de traitement d'air sont en marche.

Le monoxyde de carbone peut causer des maladies graves telles que des dommages permanents au cerveau et même la mort. B10259-216

## 2 Shipping Inspection

Always transport the unit upright; laying the unit on its side or top during transit may cause equipment damage. The installer should inspect the product upon receipt for shipping damage and subsequent investigation is the responsibility of the carrier. The installer must verify the model number, specifications, electrical characteristics, and accessories are correct prior to installation. The distributor or manufacturer will not accept claims from dealers for transportation damage or installation of incorrectly shipped units.

### 2.1 Parts

Also inspect the unit to verify all required components are present and intact. Report any missing components immediately to Goodman or to the distributor. Use only factory authorized replacement parts (see Section 5). Make sure to include the full product model number and serial number when reporting and/or obtaining service parts.

### 2.2 Handling

Use caution when transporting/carrying the unit. Do not move unit using shipping straps. Do not carry unit with hooks or sharp objects. The preferred method of carrying the unit after arrival at the job site is to carry via a two-wheel hand truck from the back or sides or via hand by carrying at the cabinet corners.

## 3 Codes & Regulations

This product is designed and manufactured to comply with applicable national codes. Installation in accordance with such codes and/or prevailing local codes/regulations is the responsibility of the installer. The manufacturer assumes no responsibility for equipment installed in violation of any codes or regulations.

**The United States Environmental Protection Agency (EPA) has issued various regulations regarding the introduction and disposal of refrigerants. Failure to follow these regulations may harm the environment and can lead to the imposition of substantial fines.** Should you have any questions please contact the local office of the EPA and/or refer to EPA's website [www.epa.gov](http://www.epa.gov).

## 4 Replacement Parts

When reporting shortages or damages, or ordering repair parts, give the complete product model and serial numbers as stamped on the product. Replacement parts for this product are available through your contractor or local distributor. For the location of your nearest distributor consult the white business pages, the yellow page section of the local telephone book or contact:

HOMEOWNER SUPPORT  
GOODMAN MANUFACTURING COMPANY, L.P.  
19001 KERMIER ROAD,  
WALLER, TX 77484  
(877) 254-4729

## 5 Pre-Installation Considerations

### 5.1 Preparation

Keep this document with the unit. Carefully read all instructions for the installation prior to installing product. Make sure each step or procedure is understood and any special considerations are taken into account before starting installation. Assemble all tools, hardware and supplies needed to complete the installation. Some items may need to be purchased locally. Make sure everything needed to install the product is on hand before starting.

### 5.2 System Matches

The entire system (combination of indoor and outdoor sections) must be manufacturer approved and Air-Conditioning, Heating, and Refrigeration Institute (AHRI) listed. **NOTE:** Installation of unmatched systems is not permitted. Damage or repairs due to installation of unmatched systems is not covered under the warranty.

### 5.3 Interconnecting Tubing

Give special consideration to minimize the length of refrigerant tubing when installing air handlers. Refer to Remote Cooling/Heat Pump Service Manual RS6200006, and TP-107 Long Line Set Application R-410A for tubing guidelines. If possible, allow adequate length of tubing such that the coil may be removed (for inspection or cleaning services) from the cabinet without disconnecting the tubing.

### 5.4 Clearances

The unit clearance from a combustible surface may be 0". However, service clearance must take precedence. A minimum of 24" in front of the unit for service clearance is required. Additional clearance on one side or top will be required for electrical wiring connections. Consult all appropriate regulatory codes prior to determining final clearances. When installing this unit in an area that may become wet (such as crawl spaces), elevate the unit with a sturdy, non-porous material. In installations that may lead to physical damage (i.e. a garage) it is advised to install a protective barrier to prevent such damage. Always install units such that a positive slope in condensate line (1/4" per foot) is allowed.

### 5.5 Horizontal Applications

If installed above a finished living space, a secondary drain pan (as required by many building codes), must be installed under the entire unit and its condensate drain line must be routed to a location such that the user will see the condensate discharge.

## 6 Installation Location

**NOTE:** These air handlers are designed for *indoor installation only*.

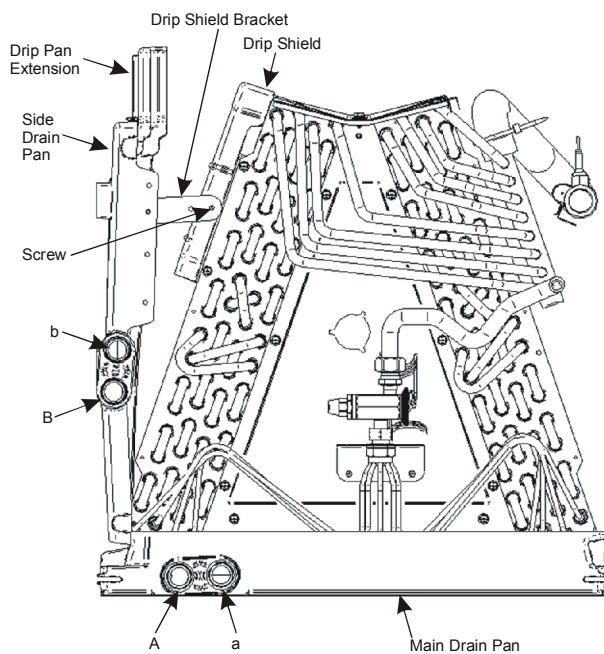
The AVPTC\*\*14\*\* product line may be installed in one of the upflow, downflow, horizontal left or horizontal right orientations as shown in Figures 2, 3, 4 and 5. The unit may be installed in upflow or horizontal left orientation as shipped (refer to specific sections for more information).

Minor field modifications are necessary to convert to downflow or horizontal right as indicated in below sections.

### 6.1 Upflow Installation

No field modifications are mandatory; however, to obtain maximum efficiency, the horizontal drip shield, side drain pan and drain pan extension can be removed.

Side Drain Pan and Extension Removal: Refer to Figure 1, remove the two (2) screws that secure the drip shield support brackets to the condensate collectors (front and back). Un-snap the side drain pan from the main drain pan using a screw driver or any small lever. The side drain pan, drip shield brackets and the drain pan extension may now be removed. From Figure 1, drain port labeled (A) is the primary drain for this application and condensate drain line must be attached to this drain port. Drain port (a) is for the secondary drain line (if used).



SIDE DRAIN PAN REMOVAL

Figure 1

### 6.2 Horizontal Left Installation

No field modifications are permissible for this application.

The bottom right drain connection is the primary drain for this application and condensate drain line must be attached to this drain connection. The top connection of the three drain connections on the drain pan must remain plugged for this application. The bottom left drain connection is for the secondary drain line (if used).

In applications where the air handler is installed in the horizontal left position, and the return air environment see humidity levels above 65% relative humidity coupled with total external static levels above 0.5" e.s.p., a condensate kit is available for field application. Kit nomenclature can be found in Table 1.

CMK0008 Condensate Kit	CMK0009 Condensate Kit	CMK0010 Condensate Kit	CMK0012 Condensate Kit	CMK0013 Condensate Kit	CMK0014 Condensate Kit
AVPTC25B14	AVPTC29B14	AVPTC31C14	AVPTC49D14	AVPTC33C14	AVPTC49C14
	AVPTC37B14	AVPTC37C14	AVPTC61D14	AVPTC39C14	
		AVPTC37D14			
		AVPTC59C14			
		AVPTC59D14			

CONDENSATE KIT

TABLE 1

### 6.3 Downflow/Horizontal Right Installation

**IMPORTANT NOTE:** In the downflow application, to prevent coil pan "sweating", a downflow kit (DFK) is available through your local Goodman distributor. The DFK is not supplied with the air handler and is required by Goodman on all downflow installations. See Table 2 for the correct DFK and follow the instructions provided for installation.

MODEL LIST FOR DOWNFLOW KITS

DFK-B Downflow Kit	DFK-C Downflow Kit	DFK-D Downflow Kit
AVPTC25B14**	AVPTC31C14**	AVPTC37D14**
AVPTC29B14**	AVPTC37C14**	AVPTC49D14**
AVPTC35B14**	AVPTC59C14**	AVPTC59D14**
AVPTC37B14**	AVPTC33C14**	AVPTC61D14**
	AVPTC39C14**	
	AVPTC49C14**	

DOWNFLOW KIT

TABLE 2

Refer to Figure 6 and 7 for the location of the components referenced in the following steps.

1. Before inverting the air handler, remove blower access panel and coil access panel. The coil access panel and tubing panel may remain screwed together during this procedure. Remove and retain the seven (7) screws securing the coil access panel to the cabinet and the six (6) screws securing the blower access panel to the cabinet.
2. Slide the coil assembly out using the drain pan to pull the assembly from the cabinet.

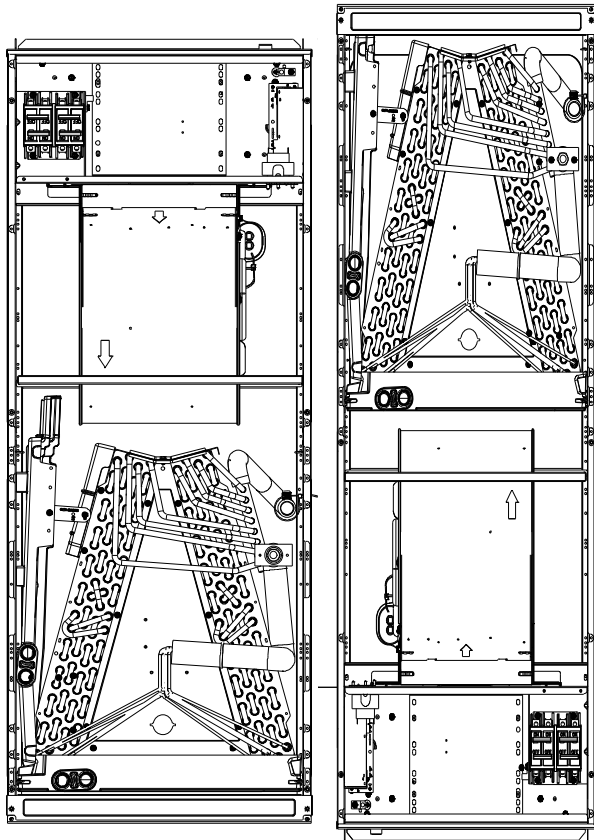
**NOTE: DO NOT USE MANIFOLDS OR FLOWRATOR TO PULL THE COIL ASSEMBLY OUT. FAILURE TO DO SO MAY RESULT IN BRAZE JOINT DAMAGE AND LEAKS.**

3. Removal of the center support is required on units with 21" wide cabinet. Remove and retain the two (2) screws that secure the center support to the cabinet. Remove the center support.
4. Using the drain pan to hold the coil assembly, slide the coil assembly back into the cabinet on the downflow brackets as shown in Figure 8.
5. Re-install the center support (if removed) using the two (2) screws removed in Step 4.
6. Re-install the access panels removed in Step 1 as shown



in Figure 9.

7. The bottom left drain connection is the primary drain for this application and condensate drain line must be attached to this drain connection. The top connection of the three drain connections on the drain pan must remain plugged for this application. The bottom left drain connection is for the secondary drain line (if used).



UPFLOW

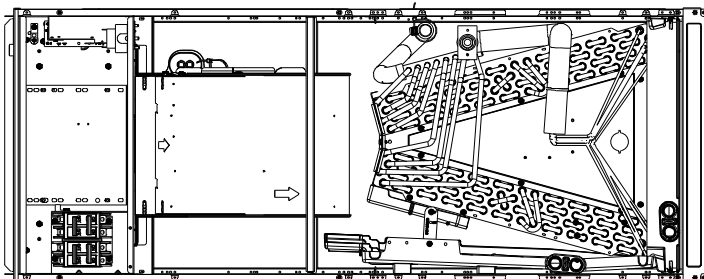
Figure 2

DOWFLOW

Figure 3

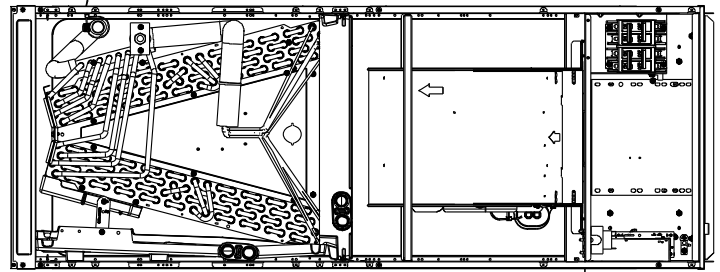
**NOTE:** If removing only the coil access panel from the unit, the filter access panel must be removed first. Failure to do so may result in panel damage.

Do not install the air handler in a location that violates the instructions provided with the condenser. If the unit is located in an unconditioned area with high ambient temperature and/or high humidity, the air handler may be subject to nuisance sweating of the casing. On these installations, a wrap of 2" fiberglass insulation with a vapor barrier is recommended.



HORIZONTAL LEFT

Figure 4



HORIZONTAL RIGHT

Figure 5

## 7 Refrigerant Lines

**NOTE:** Refrigerant tubing must be routed to allow adequate access for servicing and maintenance of the unit.

### 7.1 Tubing Size

For the correct tubing size, follow the specification for the condenser/heat pump.

### 7.2 Tubing Preparation

All cut ends are to be round, burr free, and clean. Failure to follow this practice increases the chances for refrigerant leaks. The suction line is spun closed and requires tubing cutters to remove the closed end.

**NOTE:** To prevent possible damage to the tubing joints, do not handle coil assembly with manifold or flowrator tubes. Always use clean gloves when handling coil assemblies.

**NOTE:** The use of a heat shield is strongly recommended when brazing to avoid burning the serial plate or the finish of the unit. Heat trap or wet rags must be used to protect heat sensitive components such as service valves and TXV valves sensing bulb.

## ! WARNING

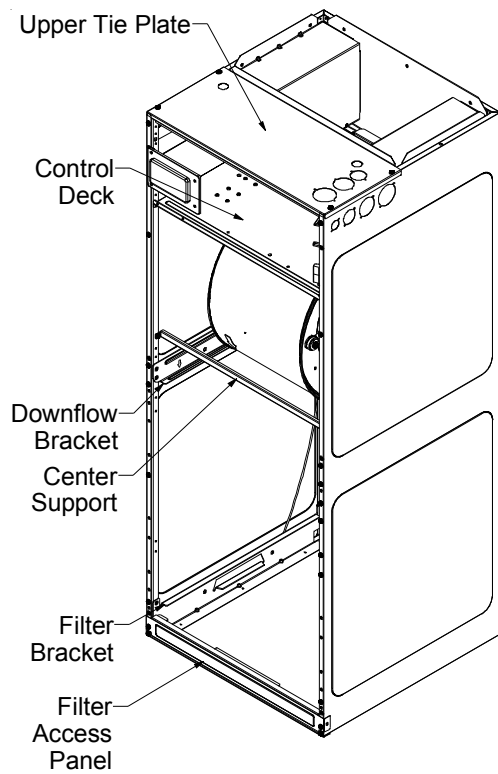
This product is factory-shipped with R410A and dry nitrogen mixture gas under pressure. Use appropriate service tools and follow these instructions to prevent injury.

## ! WARNING

A quenching cloth is strongly recommended to prevent scorching or marring of the equipment finish when brazing close to the painted surfaces. Use brazing alloy of 5% minimum silver content.

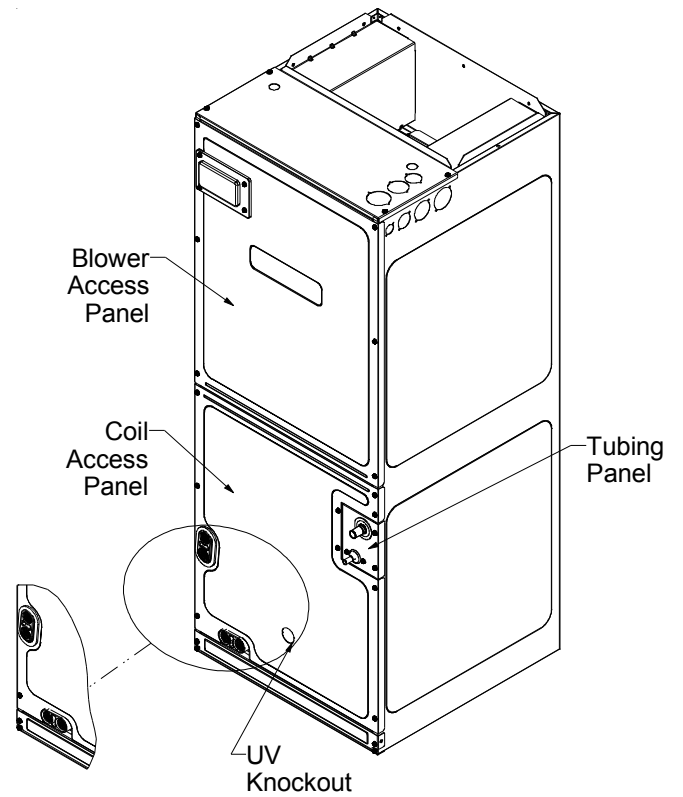
## ! CAUTION

Applying too much heat to any tube can melt the tube. Torch heat required to braze tubes of various sizes must be proportional to the size of the tube. Service personnel must use the appropriate heat level for the size of the tube being brazed.



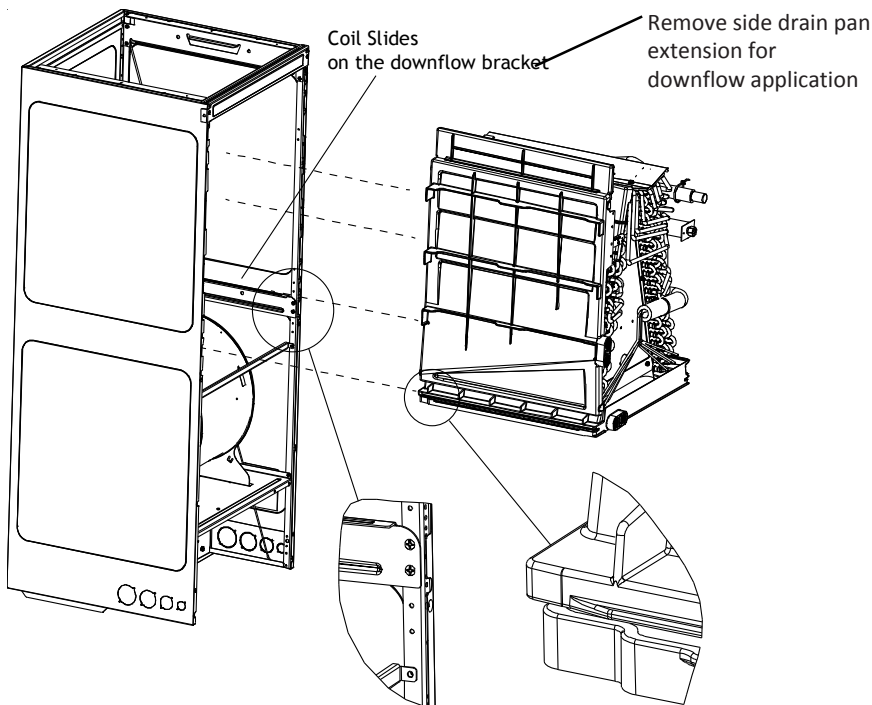
INTERNAL PART TERMINOLOGY

Figure 6



EXTERNAL PART TERMINOLOGY

Figure 7

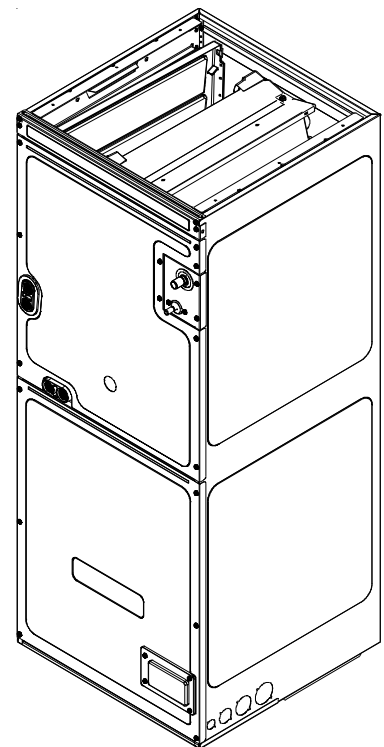


**IMPORTANT NOTE:**

Ensure coil slides on the rails along the groove provided on the drain pan side walls. Failure to do so will result in improper condensate drainage.

COIL INSTALLATION FOR DOWNFLOW

Figure 8



ACCESS PANEL CONFIGURAATION  
FOR DOWNFLOW  
OR HORIZONTAL RIGHT

Figure 9

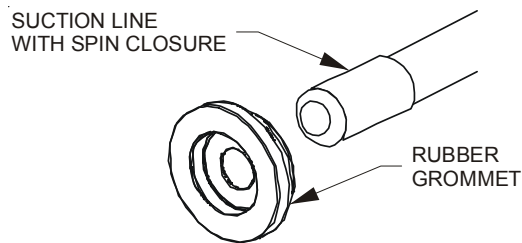
### 7.3 Tubing Connections for TXV Models

TXV models come with factory installed TXV with the bulb pre-installed on the vapor tube.

1. Remove refrigerant tubing panel or coil (lower) access panel.
2. Remove access valve fitting cap and depress the valve stem in access fitting to release pressure. No pressure indicates possible leak.
3. Replace the refrigerant tubing panel.
4. Remove the spin closure on both the liquid and suction tubes using a tubing cutter.
5. Insert liquid line set into liquid tube expansion and slide grommet about 18" away from braze joint.
6. Insert suction line set into suction tube expansion and slide insulation and grommet about 18" away from braze joint.
7. Braze joints. Quench all brazed joints with water or a wet rag upon completion of brazing.

**NOTE:** The sensing bulb must be permanently located. A heat shield, heat trap, or wet rag must be used during brazing to prevent damage to the TXV valve.

8. Replace access panels, suction line grommet, insulation and all screws.



Suction Line Grommet

Figure 11

### 7.4 Thermal Expansion Valve System Adjustment

Run the system at Cooling for 10 minutes until refrigerant pressures stabilize. Use the following guidelines and methods to check unit operation and ensure that the refrigerant charge is within limits. Charge the unit on low stage.

1. Purge gauge lines. Connect service gauge manifold to base-valve service ports.
2. Temporarily install a thermometer on the liquid line at the liquid line service valve and 4-6" from the compressor on the suction line. Ensure the thermometer makes adequate contact and is insulated for best possible readings. Use liquid line temperature to determine subcooling and vapor temperature to determine superheat.

3. Check subcooling and superheat. Systems with TXV application should have a subcooling of 7 to 9°F and superheat of 7 to 9°F

- a. If subcooling and superheat are low, adjust TXV to 7 to 9°F, and then check subcooling.

**NOTE:** To adjust superheat, turn the valve stem clockwise to increase and counter clockwise to decrease.

- b. If subcooling is low and superheat is high, **add** charge to raise subcooling to 7 to 9°F, and then check superheat.

- c. If subcooling and superheat are high, **adjust** TXV valve to 7 to 9° superheat, then check subcooling.

- d. If subcooling is high and superheat is low, **adjust** TXV valve to 7 to 9° superheat and **remove** charge to lower the subcooling to 7 to 9°F.

**NOTE:** Do NOT adjust the charge based on suction pressure unless there is a gross undercharge.

4. Disconnect manifold set, and installation is complete

**NOTE:** Check the Schrader ports for leaks and tighten valve cores if necessary. Install caps finger-tight.

**SUBCOOL FORMULA=**

**SAT. LIQUID LINE TEMP - LIQUID LINE TEMP**

**SUPERHEAT FORMULA=**

**SUCT. LINE TEMP - SAT. SUCT. TEMP**

SATURATED SUCTION PRESSURE TEMPERATURE CHART		
SUCTION PRESSURE	SATURATED SUCTION TEMPERATURE °F	
PSIG	R-22	R-410A
50	26	1
52	28	3
54	29	4
56	31	6
58	32	7
60	34	8
62	35	10
64	37	11
66	38	13
68	40	14
70	41	15
72	42	16
74	44	17
76	45	19
78	46	20
80	48	21
85	50	24
90	53	26
95	56	29
100	59	31
110	64	36
120	69	41
130	73	45
140	78	49
150	83	53
160	86	56
170	90	60

SATURATED LIQUID PRESSURE TEMPERATURE CHART		
LIQUID PRESSURE	SATURATED LIQUID TEMPERATURE °F	
PSIG	R-22	R-410A
200	101	70
210	105	73
220	108	76
225	110	78
235	113	80
245	116	83
255	119	85
265	121	88
275	124	90
285	127	92
295	130	95
305	133	97
325	137	101
355	144	108
375	148	112
405	155	118
415	157	119
425	n/a	121
435	n/a	123
445	n/a	125
475	n/a	130
500	n/a	134
525	n/a	138
550	n/a	142
575	n/a	145
600	n/a	149
625	n/a	152

## 8 Condensate Drain Lines

The coil drain pan has a primary and a secondary drain with 3/4" NPT female connections. The connectors required are 3/4" NPT male, either PVC or metal pipe, and should be hand tightened to a torque of no more than 37 in-lbs. to prevent damage to the drain pan connection. An insertion depth of approximately 3/8" to 1/2" (3-5 turns) should be expected at this torque.

1. Ensure drain pan hole is not obstructed.
2. To prevent potential sweating and dripping on to finished space, it may be necessary to insulate the condensate drain line located inside the building. Use Armaflex® or similar material.

A secondary condensate drain connection has been provided for areas where the building codes require it. Pitch all drain lines a minimum of 1/4" per foot to provide free drainage. Provide required support to the drain line to prevent bowing. If the secondary drain line is required, run the line separately from the primary drain and end it where condensate discharge can be easily seen.

**NOTE:** Water coming from secondary line means the coil primary drain is plugged and needs immediate attention.

## CAUTION

If secondary drain is not installed, the secondary access must be plugged.

Insulate drain lines located inside the building or above a finished living space to prevent sweating. Install a condensate trap to ensure proper drainage.

**NOTE:** When units are installed above ceilings, or in other locations where damage from condensate overflow may occur, it is **MANDATORY** to install a field fabricated auxiliary drain pan under the coil cabinet enclosure.

The installation must include a "P" style trap that is located as close as is practical to the evaporator coil. See **Figure 12** for details of a typical condensate line "P" trap.

**NOTE:** Units operating in high static pressure applications may require a deeper field constructed "P" style trap than is shown in Figure 12 to allow proper drainage and prevent condensate overflow.

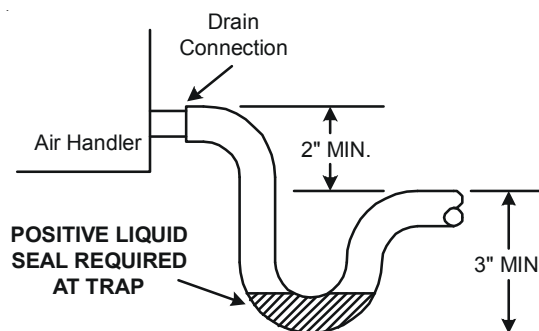


Figure 12

**NOTE:** Trapped lines are required by many local codes. In the absence of any prevailing local codes, please refer to the requirements listed in the Uniform Mechanical Building Code.

A drain trap in a **draw-through** application prevents air from being drawn back through the drain line during fan operation thus preventing condensate from draining, and if connected to a sewer line to prevent sewer gases from being drawn into the air-stream during blower operation.

Use of a condensate removal pump is permitted when necessary. This condensate pump should have provisions for shutting off the control voltage should a blocked drain occur. A trap must be installed between the unit and the condensate pump.

**IMPORTANT NOTE:** The evaporator coil is fabricated with oils that may dissolve styrofoam and certain types of plastics. Therefore, a removal pump or float switch must not contain any of these materials.

**Tip:** Priming the "P" trap may avoid improper draining at the initial installation and at the beginning of the cooling season.



## 9 Ductwork

This air handler is designed for a complete supply and return ductwork system.

To ensure correct system performance, the ductwork is to be sized to accommodate 350-450 CFM per ton of cooling with the static pressure not to exceed 0.5" in w.c. Refer to ACCA Manual D, Manual S and Manual RS for information on duct sizing and application. Flame retardant ductwork is to be used and sealed to the unit in a manner that will prevent leakage.

**NOTE:** A downflow application with electric heat must have an L-shaped sheet metal supply duct without any outlets or registers located directly below the heater.

### 9.1 Return Ductwork

DO NOT LOCATE THE RETURN DUCTWORK IN AN AREA THAT CAN INTRODUCE TOXIC, OR OBJECTIONABLE FUMES/ODORS INTO THE DUCTWORK. The return ductwork is to be connected to the air handler bottom (upflow configuration).

## 10 Return Air Filters

Each installation must include a return air filter. This filtering may be performed at the air handler using the factory filter rails or externally such as a return air filter grille. When using the factory filter rails, a nominal 16x20x1", 20x20x1" or 24x20x1" (actual dimension must be less than 23-1/2"x20") filter can be installed on a B, C and D cabinet respectively (the cabinet size is the seventh letter of the model number).

## 11 Achieving 1.4% and 2.0% Airflow Low Leakage Rate

Ensure all the gaskets remain intact on all surfaces as shipped with the unit. These surfaces are areas between the upper tie plate and coil access panel, blower access and coil access panels, and between the coil access and filter access panels. Ensure upon installation, that the plastic breaker cover is sitting flush on the blower access panel and all access panels are flush with each other and the cabinet. With these requirements satisfied, the unit achieves less than 1.4% airflow leakage @ 0.5 inch wc static pressure and less than 2% airflow leakage @ 1 inch wc static pressure when tested in accordance with ASHRAE Standard 193.

## 12 Electric Heat



### CAUTION

**Do not operate this product without all the ductwork attached.**

Refer to the installation manual provided with the electric heat kit for the correct installation procedure. All electric heat must be field installed. If installing this option, the ONLY heat kits that are permitted to be used are the HKS series. Refer to the air handler unit's Serial and Rating plate or the HKS specification sheets to determine the heat kits compatible with a given air handler. No other accessory heat kit besides the HKS series may be installed in these air handlers.

The heating mode temperature rise is dependent upon the system airflow, the supply voltage, and the heat kit size (kW) selected. Use data provided in Tables 3, 4 and 5 to determine the temperature rise (°F).

CFM	HEAT KIT NOMINAL kW							
	3	5	6	8	10	15	19/20	25
800	12	19	23	31	37	56		
1000	9	15	19	25	30	44		
1200	8	12	15	21	25	37	49	62
1400	7	11	13	18	21	32	42	53
1600	6	9	12	15	19	28	37	46
1800	5	8	10	14	16	25	33	41
2000	5	7	9	12	15	22	30	37

230/1/60 SUPPLY VOLTAGE - TEMP. RISE °F

Table 2

CFM	HEAT KIT NOMINAL kW							
	3	5	6	8	10	15	19/20	25
800	11	18	22	30	35	54		
1000	9	14	18	24	28	42		
1200	7	12	15	20	24	35	47	59
1400	6	10	13	17	20	30	40	51
1600	6	9	11	15	18	27	35	44
1800	5	8	10	13	16	24	31	39
2000	4	7	9	12	14	21	28	35

220/1/60 SUPPLY VOLTAGE - TEMP. RISE °F

Table 3

CFM	HEAT KIT NOMINAL kW							
	3	5	6	8	10	15	19/20	25
800	10	17	21	28	33			
1000	8	13	17	22	27	40		
1200	7	11	14	19	22	33	45	56
1400	6	10	12	16	19	29	38	48
1600	5	8	10	14	17	25	33	42
1800	5	7	9	12	15	22	30	37
2000	4	7	8	11	13	20	27	33

208/1/60 SUPPLY VOLTAGE - TEMP. RISE °F

Table 4

Model	HEATER (kW)								
	3	5	6	8	10	15	19	20	25
AVPTC25B14	550	650	700	800	850	875			
AVPTC29B14	550	650	700	800	875	875			
AVPTC35B14	550	650	700	800	875	1050			
AVPTC37B14	550	650	700	800	875	1050			
AVPTC31C14	600	700	770	880	970	1090	1280		
AVPTC33C14	600	700	750	850	920	950			
AVPTC37C14		700	770	880	970	1090	1280		
AVPTC39C14		700	770	880	970	1090	1280		
AVPTC49C14		800	800	950	1090	1290	1345		
AVPTC59C14		800	800	950	1090	1290	1345		
AVPTC37D14		870	970	1060	1120	1220		1250	
AVPTC49D14		950	1060	1150	1220	1520			
AVPTC59D14		990	1110	1200	1240	1520		1520	
AVPTC61D14		1030	1150	1250	1320	1650		1690	1750

MINIMUM CFM REQUIREMENTS FOR HEATER KITS

Table 5

**NOTE:** For installations not indicated above the following formula is to be used:

$$TR = (kW \times 3412) \times (\text{Voltage Correction}) / (1.08 \times CFM)$$

Where: TR = Temperature Rise  
 kW = Heater Kit Actual kW  
 3412 = Btu per kW  
 VC\* = .96 (230 Supply Volts)  
       = .92 (220 Supply Volts)  
       = .87 (208 Supply Volts)  
 1.08 = Constant  
 CFM = Measured Airflow  
 VC\* (Voltage Correction)

**NOTE:** The Temperature Rise Tables can also be used to estimate the air handler airflow delivery. When using these tables for this purpose set the room thermostat to maximum heat and allow the system to reach steady state conditions. Insert two thermometers, one in the return air and one in the supply air. The temperature rise is the supply air temperature minus the return air temperature. Using the temperature rise calculated, CFM can be estimated from the TR formula above. See Spec Sheets and/or Service Manual for more information.

13 Electrical and Control Wiring

**IMPORTANT:** All routing of electrical wiring must be made through provided electrical knockouts. Do not cut, puncture or alter the cabinet for electrical wiring.

13.1 Building Electrical Service Inspection

This unit is designed for single-phase electrical supply only. DO NOT OPERATE ON A THREE-PHASE POWER SUPPLY. Measure the power supply to the unit. The supply voltage **must** be measured and be in agreement with the unit nameplate power requirements and within the range shown.

Nominal Input	Minimum Voltage	Maximum Voltage
208-240	197	253


ELECTRICAL VOLTAGE  
Table 6

13.2 Wire Sizing


Wire size is important to the operation of your equipment. Use the following check list when selecting the appropriate wire size for your unit.


**CAUTION**

**FIRE HAZARD!**  
To avoid the risk of property damage, personal injury or fire, use only copper conductors.

**WARNING**

**HIGH VOLTAGE!**  
Disconnect ALL power before servicing. Multiple power sources may be present. Failure to do so may cause property damage, personal injury or death.



**WARNING**

**HIGH VOLTAGE!**  
To avoid property damage, personal injury or death due to electrical shock, this unit **MUST** have an uninterrupted, unbroken electrical ground. The electrical ground circuit may consist of an appropriately sized electrical wire connecting the ground lug in the unit control box to the building electrical service panel. Other methods of grounding are permitted if performed in accordance with the National Electric Code (NEC)/American National Standards Institute (ANSI)/National Fire Protection Association (NFPA) 70 and local/state codes. In Canada, electrical grounding is to be in accordance with the Canadian Electric Code (CSA) C22.1.

- Wire used must carry the Minimum Circuit Ampacity (MCA) listed on the unit’s Series and Rating Plate.
- Refer to the NEC (USA) or CSA (Canada) for wire sizing. The unit MCA for the air handler and the optional electric heat kit can be found on the unit Series and Rating Plate.
- Wire must be sized to allow no more than a 2% voltage drop from the building breaker/fuse panel to the unit.
- Wires with different insulation temperature rating have varying ampacities - be sure to check the temperature rating used.

Refer to the latest edition of the National Electric Code or in Canada the Canadian Electric Code when determining the correct wire size.

13.3 Maximum Overcurrent Protection (MOP)

Every installation must include an NEC (USA) or CEC (Canada) approved overcurrent protection device. Also, check with local or state codes for any special regional requirements.

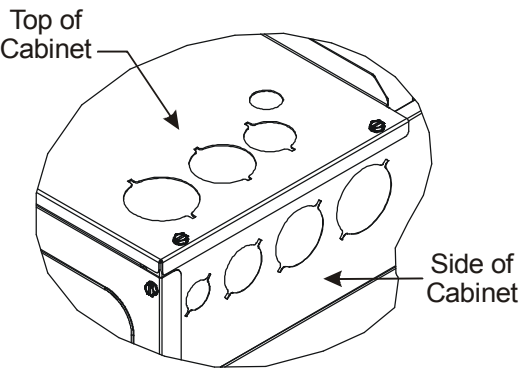
Protection can be in the form of fusing or HACR style circuit breakers. The Series and Rating Plate provides the maximum overcurrent device permissible.

**NOTE:** Fuses or circuit breakers are to be sized larger than the equipment MCA but not to exceed the MOP.

13.4 Electrical Connections – Supply Voltage

**IMPORTANT NOTE: USE COPPER CONDUCTORS ONLY.**

Knockouts are provided on the air handler top panel and sides of the cabinet to allow for the entry of the supply voltage conductors, as shown in Figure 13. If the knockouts on the cabinet sides are used for electrical conduit, an adapter ring must be used in order to meet UL1995 safety requirements. An NEC or CEC approved strain relief is to be used at this entry point. Some codes/municipalities require the supply wire to be enclosed in conduit. Consult your local codes.



KNOCK-OUT FOR ELECTRICAL CONNECTIONS  
Figure 13

#### **13.4.1 Air Handler Only (Non-Heat Kit Models)**

The building supply connects to the stripped black and red wires contained in the air handler electrical compartment cavity. A ground screw is also contained in this area. Attach the Supply wires to the air handler conductors as shown in the unit wiring diagram using appropriately sized solderless connectors or other NEC or CEC approved means.

#### **13.4.2 Air Handler - Non-Circuit Breaker Heat Kits**

A terminal block is provided with the HKS kit to attach the power supply and air handler connections. Follow the HKS Installation Manual and wiring diagram for complete wiring details.

#### **13.4.3 Air Handler With Circuit Breaker Heat Kit**

The air handler has a plastic cover on the upper access panel that will require either one or both sections to be removed to allow the heat kit circuit breaker(s) to be installed. The circuit breakers have lugs for power supply connection. See the HKS Installation Instructions for further details.

### **14 AVPTC Motor Orientation**

If the unit is in the upflow position, there is no need to rotate the motor. If the unit is in the downflow position, loosen motor mount and rotate motor as shown in the *AVPTC Motor Orientation* figure below. Be sure motor is oriented with the female connections on the casing down. If the motor is not oriented with the connections down, water could collect in the motor and may cause premature failure.

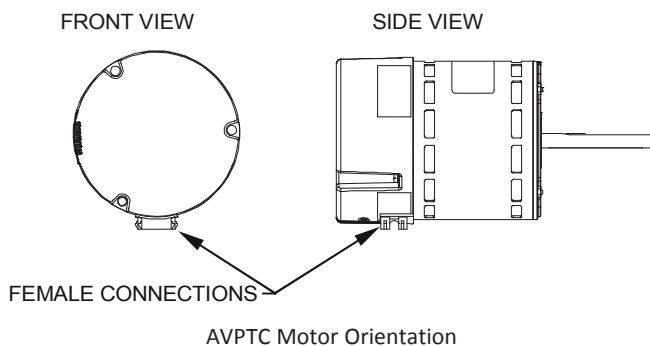


Figure 14

### **15 Cool Cloud HVAC Phone Application**

Actual screens may look different based on the mobile device being used.

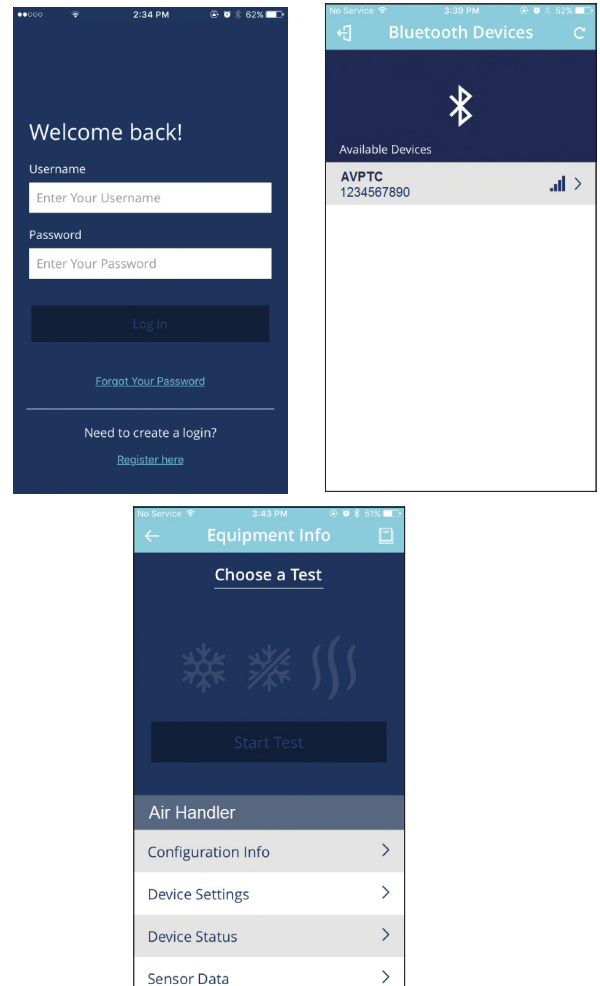


Figure 15

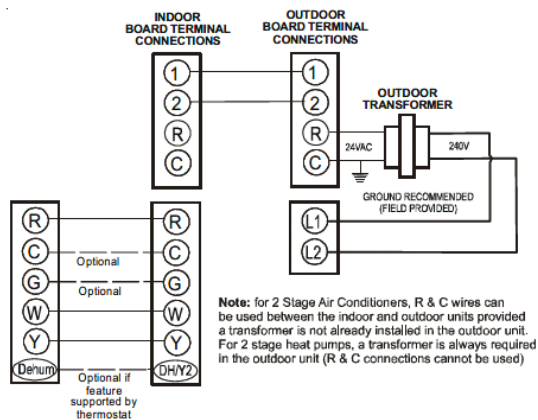
This air handler is Bluetooth ready and functions with the Cool Cloud HVAC phone application designed to improve the contractor's setup / diagnostic experience. Users can see specific model information, review active diagnostic error codes, observe system menu testing of all operational modes (heat / cool / fan) directly from the phone. The phone application is also capable of directly updating the air handler software anytime updates are available. The application will automatically notify the user.

NOTE: The software update may take up to 20 minutes to complete.

## 16 Quick Start Guide for Communicating Outdoor Units

**EXTREMELY IMPORTANT:** For all cooling calls the system only requires a single Y input from the thermostat. For all heating calls (including applications with backup electric heater kits) the system only requires a single W input from the thermostat. Internal algorithms will control all available cooling and heating stages based on these inputs. Any single-stage 24VAC thermostat can be used. For proper operation, the thermostat must be setup to control a single stage AC outdoor unit and to control single stage electric heat operation. The control board does not accommodate an O wire thermostat input (reversing valve signal). If a heat pump is installed, the thermostat should be setup as stated above. Setting the thermostat for the heat pump control or multistage control may result in incorrect performance.

1. Connect all necessary thermostat wires to the thermostat connector on the air handler control as instructed by the applicable wiring diagrams shown in this section.
2. Connect the 1 & 2 wires between the indoor and outdoor unit for communicating operation.  
Note: Verify two stage outdoor units include a 24VAC transformer (for outdoor control board power). Two stage outdoor units may not behave properly without this 24 VAC transformer.



Communicating Two Stage Air Conditioner or Heat Pump

Figure 16

3. Download the Cool Cloud HVAC phone application for charging and to configure /test system.

**NOTE:** When new versions of Bluetooth Communication Software and Air Handler Control Software are available, the phone application notifies the user. Software updates are classified as either optional or mandatory and installed by using the phone application. Ensure all mandatory software updates and install if necessary.

### 16.1 Charging

1. Two-stage outdoor units using the Cool Cloud HVAC application:
  - a. Using the cooling icon after entering the outdoor unit menus, energize the outdoor unit at 100% capacity.
  - b. Charge the outdoor unit as required using the charging information provided with the outdoor equipment.

## 16.2 Electric Heater Kit Testing

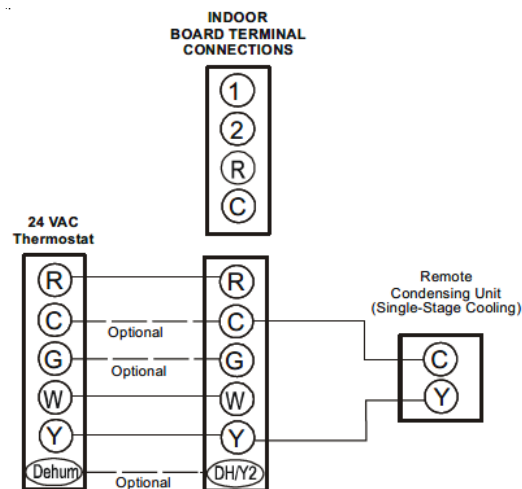
1. Select the electric heat icon after entering the air handler menus in the Cool Cloud HVAC phone application.
2. Select any value less than 50% for low stage operation and any value greater than 50% for high stage operation.
3. Confirm thermostat heating and cooling calls function properly with equipment.

## 17 Quick Start Guide for Non-Communicating Outdoor Units

**EXTREMELY IMPORTANT:** For two stage electric heat kit control the system only needs a single W input. Internal algorithms will control staging automatically based on the single W input. For non-communicating outdoor unit wiring, see instructions below:

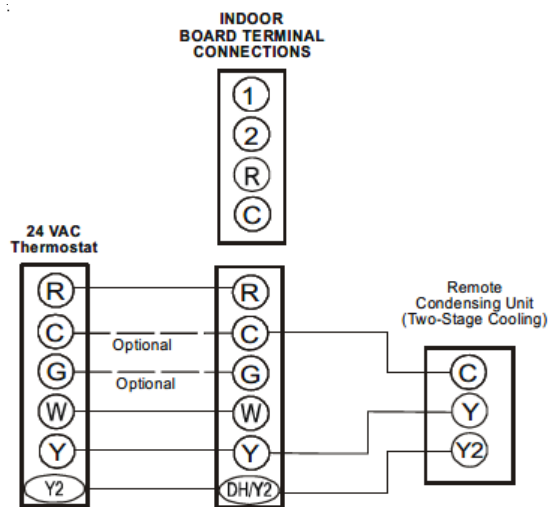
1. Use the wiring diagrams on the next page to connect low voltage thermostat wires.

**NOTE:** When installing the air handler with a non-communicating heat pump, wire directly to the "O" terminal on the non-communicating heat pump. See the following figures.



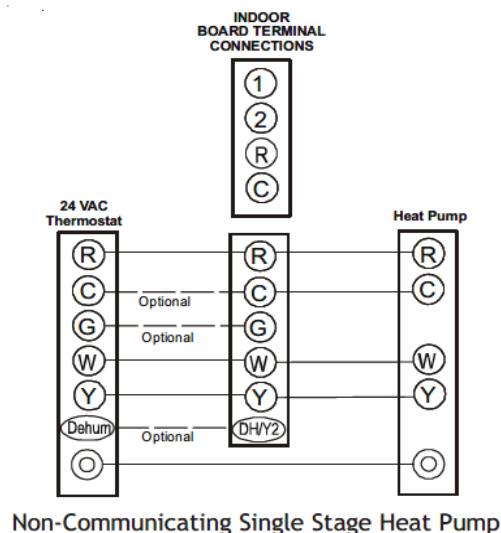
Non-Communicating Single Stage A/C

Figure 17

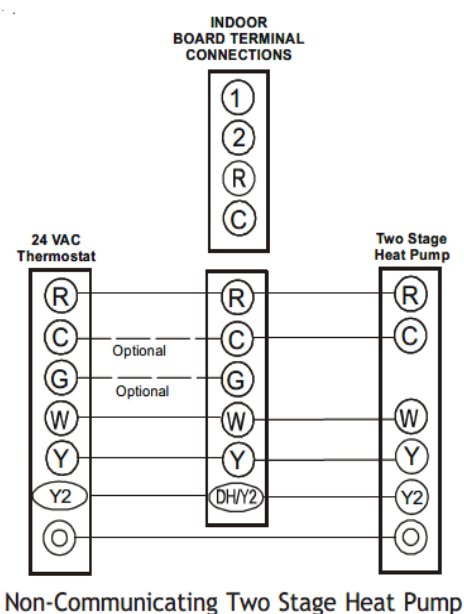


Non-Communicating Two Stage A/C

Figure 18



**Figure 19**



**Figure 20**

2. Download the Cool Cloud HVAC phone application.

Note: When new versions of Bluetooth Communication Software and Air Handler Control Software are available, the phone application notifies the user. Software updates are classified as either optional or mandatory and installed by using the phone application. Ensure all mandatory software updates have been installed. Review notes for optional software updates and install if necessary.

3. Go to the Non-Comm Outdoor Setting Menu (0d5) using the on board push buttons or the Cool Cloud HVAC phone application. Select "IAC" for single stage Air Conditioners, "IHP" for single stage Heat Pumps, "2AC" for two stage Air Conditioners and "2HP" for 2 stage Heat Pumps.

4. Go to the Tonnage Units Menu (E00) and select the tonnage value that corresponds to the desired airflow for the outdoor unit. See the following table.

NOTE: For the two stage non-communicating outdoor units, system will stage airflow automatically for low stage operation.

Tonnage Selection	Airflow	Tonnage Selection	Airflow	Tonnage Selection	Airflow	Tonnage Selection	Airflow
1	400	2.3	920	3.6	1440	4.9	1960
1.1	440	2.4	960	3.7	1480	5	2000
1.2	480	2.5	1000	3.8	1520	5.1	2040
1.3	520	2.6	1040	3.9	1560	5.2	2080
1.4	560	2.7	1080	4	1600	5.3	2120
1.5	600	2.8	1120	4.1	1640	5.4	2160
1.6	640	2.9	1160	4.2	1680	5.5	2200
1.7	680	3	1200	4.3	1720	5.6	2240
1.8	720	3.1	1240	4.4	1760	5.7	2280
1.9	760	3.2	1280	4.5	1800	5.8	2320
2	800	3.3	1320	4.6	1840	5.9	2360
2.1	840	3.4	1360	4.7	1880	6	2400
2.2	880	3.5	1400	4.8	1920		

NOTE: The system will not provide airflows above the max Airflow Value.

Model	MAX CFM
AVPTC25B14 AVPTC29B14 AVPTC35B14 AVPTC37B14	1200
AVPTC33C14	1300
AVPTC31C14 AVPTC37C14 AVPTC39C14	1600
AVPTC37D14 AVPTC49C14	1800
AVPTC49D14 AVPTC59C14	1900
AVPTC59D14 AVPTC61D14	2100

5. Use the Cool Cloud HVAC phone application to configure/test **air handler** operations.

NOTE: The phone application cannot test a non-communicating **outdoor unit**. The thermostat will be required for outdoor unit testing.

### 17.1 Electric Heater Kit Testing

1. Two-stage outdoor units:
  - a. Provide a second stage cooling call from the thermostat and charge accordingly.
2. Single-stage outdoor units:
  - a. Provide a cooling call from the thermostat and charge accordingly.



## 17.2 Electric Heater Kit Testing

1. Select the electric heat icon after entering the air handler menus while using the Cool Cloud phone application.
2. Select any value less than 50% for low stage operation and any value greater than 50% for high stage operation.
3. Confirm thermostat heating and cooling calls function properly for high stage operation.

## 18 Dehumidification

Dehumidification allows the air handler's circulator blower to operate at a reduced speed during a combined thermostat call for cooling and a dehumidification call from the thermostat or humidistat. This lower blower speed increases dehumidification of the conditioned air as it passes through the indoor coil. The control board is equipped with a 24 volt dehumidification input (DH) located on the thermostat wiring connector. The terminal can be configured to enable dehumidification when the input is energized or de-energized. When using an external dehumidistat, connect it between the R and DH terminals. If the humidistat closes on humidity rise or the thermostat energizes this terminal when dehumidification is required, set the control board Dehum Logic Menu (dHL) to "Hi" using the push buttons or Cool Cloud HVAC phone application. If the humidistat opens on humidity or the thermostat de-energizes this terminal when dehumidification is required, set the Dehum Logic Menu to "Lo" using the push buttons or Cool Cloud HVAC phone application.

## 19 Auxiliary Alarm Switch

The control is equipped with a 24VAC Aux Alarm to be used for a condensate switch install (designated by CON-DENSATE IN/OUT on the control). By default, the connected AUX switch is normally closed and opens when the water level in the evaporator coil base pan reaches an undesirable level. The control responds by displaying a "E0F" error code and turning off the outdoor condensing unit. If the AUX switch is detected to be in the closed position for 30 seconds, normal operation resumes and the error message is no longer displayed.

## 20 Start-Up Procedure

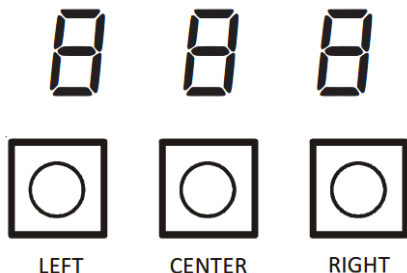


Figure 21

The air handler includes three on-board push buttons allowing users to navigate indoor and outdoor system menus. The Right and Left buttons allow the user to scroll through the main menus and to then scroll through available options within specific menus. The Center button is used to

enter into a main menu and to then permanently select options within those menus.

**NOTE:** After scrolling to the desired option within a menu, that option may be flashing on the 7-segment displays. This indicates the option has not been officially selected. Pressing the Center button two times will select that option. The first press will stop the flashing. The second will make the selection official and return you to the main menu.

## 21 Accessory Control (Humidifiers, Dehumidifiers, Ventilators)

If an external humidifier, dehumidifier or ventilator is installed, it may require airflow from the HVAC system to function properly.

1. Make sure the installed 24VAC thermostat is capable of controlling the accessory or accessories.
2. Connect the appropriate accessory control wires to the accessory devices from the thermostat (see thermostat manual for connection and setup instructions).
3. If the thermostat is capable of providing a continuous fan call (G signal) during accessory operation: Make sure to connect the thermostat G terminal to the G terminal on the indoor unit. Setup thermostat to ensure G signal is energized during accessory operation.

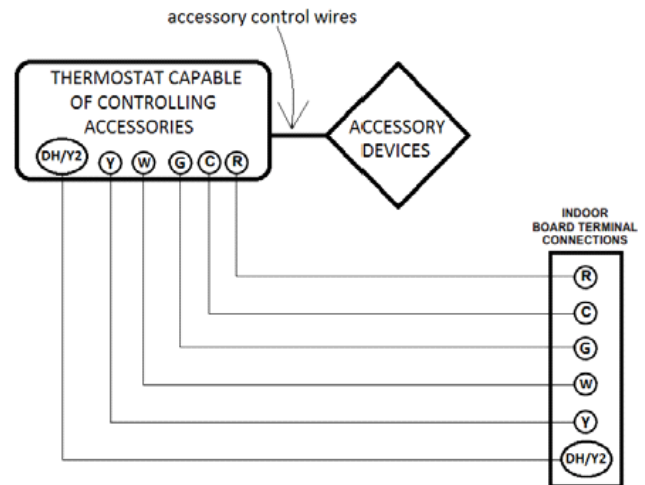


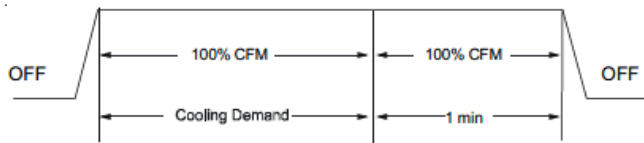
Figure 22

4. Select the appropriate fan only airflow for the accessory using the indoor unit push button menus or the Cool Cloud HVAC phone application.
5. Using the thermostat, independently test each accessory in addition to the independently testing continuous fan mode.

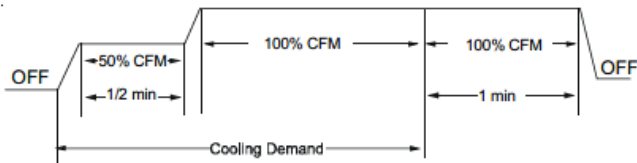
## 22 Ramping Profiles

The variable-speed circulator offers four different ramping profiles. These profiles may be used to enhance cooling performance and increase comfort level. Select the desired ramping profile using the Cool Cloud phone application or the push button menus.

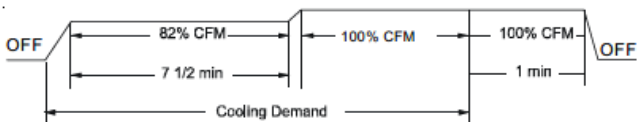
- **Profile A provides only an OFF delay of one (1) minute at 100% of the cooling demand airflow.**



- **Profile B ramps up to full cooling demand airflow by first stepping up to 50% of the full demand for 30 seconds. The motor then ramps to 100% of the required airflow. A one (1) minute OFF delay at 100% of the cooling airflow.**



- **Profile C ramps up to 82% of the full cooling demand airflow and operates there for approximately 7 1/2 minutes. The motor then steps up to the full demand airflow. Profile C also has a one (1) minute 100% OFF delay.**



- **Profile D ramps up to 50% of the demand for 1/2 minute, then ramps to 82% of the full cooling demand airflow and operates there for approximately 7 1/2 minutes. The motor then steps up to the full demand airflow. Profile D has a 1/2 minute at 50% airflow OFF delay.**

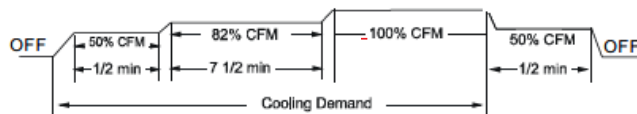


Figure 23

## 23 Electric Air Cleaner Warning

The control is equipped with an Accessory Relay and a pair of 1/4 inch accessory terminals which is normally open, labeled EAC-IN and EAC-OUT (see accessory contacts graphic). The Accessory Relay is configured to close anytime the blower is running. A closed relay means the two terminals will have continuity between them (the control does not energize these contacts). It is recommended to utilize 24VAC with these terminals and limit the current to 1A.

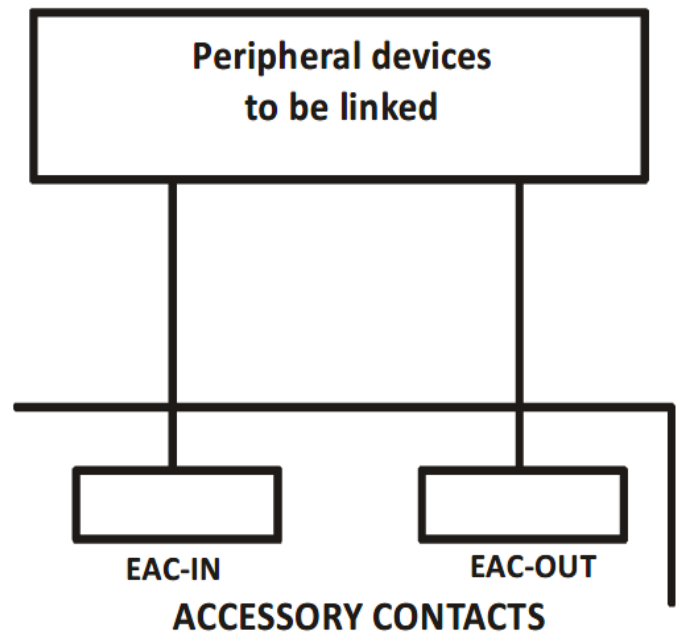


Figure 24

## 24 Start-Up Procedure

- Prior to start-up, ensure that all electrical connections are properly sized and tightened.
- All panels must be in place and secured. For Air Tight application, neoprene gasket must be positioned at prescribed locations to achieve low airflow as stated in section 13.
- Tubing must be leak free.
- Unit should be elevated, trapped and pitched to allow for drainage.
- Low voltage wiring is connected.
- Auxiliary drain is installed when necessary and pitched to allow for drainage.
- Drain pan and drain tubing has been leak checked.
- Return and supply ducts are sealed.
- Unit is elevated when installed in a garage or where flammable vapors may be present.
- Unit is protected from vehicular or other physical damage.
- Return air is not obtained from any areas where there may be objectionable odors, flammable vapors or products of combustion such as carbon monoxide (CO), which may cause serious personal injury or death.

## 25 Regular Maintenance



### WARNING

#### HIGH VOLTAGE!

**Disconnect ALL power before servicing.  
Multiple power sources may be present.  
Failure to do so may cause property damage,  
personal injury or death.**



The only item to be maintained on a regular basis by the user is the circulating air filter(s). Filter should be cleaned or replaced regularly. A certified service technician must perform all other services.

**NOTE:** THESE INSTRUCTIONS ARE SPECIFICALLY FOR AVPTC MODELS. DO **NOT** USE THESE DIAGRAMS FOR ANY OTHER MODELS. SEE SEPARATE INSTALLATION AND OPERATING INSTRUCTIONS FOR ATUF, ARUF, ARPT, ADPF, AND ASPF MODELS.

**NOTICE:** THIS PRODUCT CONTAINS ELECTRONIC COMPONENTS WHICH REQUIRE A DEFINITE GROUND. PROVISIONS ARE MADE FOR CONNECTION OF THE GROUND. A DEDICATED GROUND FROM THE MAIN POWER SUPPLY OR AN EARTH GROUND MUST BE PROVIDED.

## 26 Air Handler Troubleshooting Matrix

Symptoms of Abnormal Operation	Diagnostic / Status LED Codes	Fault Description	Possible Causes	Corrective Actions
No outdoor unit operations	EE1	Communication error with outdoor unit	Improper low voltage wiring between the indoor and outdoor unit Outdoor control board lost power during operation	Locate and correct improper low voltage wiring issue Identify reason outdoor control board lost power during operation
No Air Handler operation	EE5	Open fuse	Short in low voltage wiring	Locate and correct short in low voltage wiring Replace fuse with 3-amp automotive type
No Air Handler operation	EEF	Auxiliary switch (condensate switch) open	High water level in the evaporation coil	Check evaporator drain pan, trap, piping
No Air Handler operation	Ed0	Data not yet on network	No network data	Populate shared data set using memory card
No Air Handler operation	Ed1	Invalid memory card data	Air Handler blower does not contain an appropriate shared data set	Populate correct shared data using memory card
Operation different than expected or no operation	Ed4	Invalid memory card data	Shared data set on memory card has been rejected by integrated control module	Verify shared data set is correct for the specific model. Re-populate data using correct memory card if required
No Air Handler operation	Eb0	Circulator blower motor not running with demand present	Loose or disconnected wiring connection at circulator motor power leads Open circuit in inductor or loose wiring connection at inductor (3/4 Hp and 1Hp models only) Failed circulator blower motor	Tighten or correct wiring connection Verify continuous circuit through inductor. Replace if open or short circuit Check circulator blower motor
No Air Handler operation	Eb1	Integrated control module has lost communications with circulator blower motor	Loose wiring connection at circulator motor control leads Failed circulator blower motor Failed integrated control module	Tighten or correct wiring connection Check circulator blower motor, replace if necessary Check integrated control module, replace if necessary
No Air Handler operation	Eb2	Circulator blower motor horse power in shared data set does not match circulator blower motor horse power	Incorrect circulator blower motor in Air Handler Incorrect shared data set in integrated control module	Verify circulator blower if motor horse power is the same specified for the specific Air Handler model, replace if necessary Verify shared data set is correct for the specific model, re-populate data using correct memory card if required
Air Handler operates at reduced performance  Airflow delivered is less than expected	Eb3	Circulator blower motor is operating in a power, temperature, or speed limiting condition	Blocked filters Restrictive or undersized ductwork High ambient temperatures	Check filters for blockage, clean filters or remove obstruction Check ductwork for blockage, remove obstruction and verify all registers are fully open Verify ductwork is appropriately sized for system and resize/replace as needed

## 26 Air Handler Troubleshooting Matrix (continued)

Symptoms of Abnormal Operation	Diagnostic / Status LED Codes	Fault Description	Possible Causes	Corrective Actions
No Air Handler operation	Eb4	Circulator blower motor senses a loss of rotor control Circulator blower motor senses high current	Abnormal motor loading, sudden change in speed or torque, sudden blockage of air handler air inlet or outlet	Check filters, filter grills/registers, duct system and air handler inlet/outlet for blockages
No Air Handler operation	Eb5	Circulator blower motor fails to start 10 consecutive times	Obstruction in circulator blower housing Seized Circulator blower motor bearings Failed circulator blower motor	Check circulator blower for obstructions Remove and repair/replace wheel/motor if necessary Check circulator blower motor shaft rotation and motor, replace motor if necessary
No Air Handler operation	Eb6	Circulator blower motor shuts down for over or under voltage condition Circulator blower motor shuts down due to over temperature condition on power module	High or low AC line voltage to air handler High ambient temperatures	Check power to air handler Verify line voltage is within the range specified on the rating plate
No Air Handler operation	Eb7	Circulator blower motor does not have enough information to operate properly Motor fails to start 40 consecutive times	Error with integrated control module shared data	Verify control is populated with the correct shared data
Air Handler operates at reduced performance or operates on low stage when high stage is expected	Eb9	Airflow is lower than demanded	Blocked filters or restrictive ductwork Undersized ductwork	Check filters for blockage, clean filters or remove obstruction Check ductwork for blockage, remove obstruction and verify all registers are fully open Verify ductwork is appropriately sized for system, resize/replace ductwork if necessary



## 27 Air Handler Display

LED Display	Menu Description
<i>L6F</i>	View 6 most recent fault codes and Clear Fault Codes if desired (furnace)
<i>Lrn</i>	Restart communications between the indoor and outdoor unit.
<i>Cr</i>	Control Firmware Revision Number
<i>Scr</i>	Control Shared Data Revision Number
<i>F5d</i>	Constant Fan Speed as percent of maximum airflow. Default = 30%
<i>EHe</i>	Electric Heater Kit Wattage (kW)
<i>EFd</i>	Electric Heat Off Delay (seconds)
<i>End</i>	Electric Heat On Delay (seconds)
<i>EeF</i>	Electric Heat Airflow Trim (percentage)
<i>ESe</i>	Percentage of high stage electric heating airflow to run during low stage electric heat operation
<i>CF5</i>	1 = system will try to satisfy the thermostat quickly. 5 (default) = system will try to satisfy the thermostat more slowly.
<i>dHL</i>	Select "Hi" to enable dehumidification when the thermostat DH terminal is energized. Select "Lo" to enable dehumidification when the thermostat DH terminal is de-energized. (default = Hi)
<i>Od5</i>	Select number of stages for the non-communicating outdoor unit. ( <i>1AC</i> for single-stage Air Conditioners, <i>1HP</i> for single stage Heat Pumps, <i>2AC</i> for two stage Air Conditioners or <i>2HP</i> for two stage heat pumps)
<i>ton</i>	Indoor Airflow for non-communicating outdoor units. (values based on 400CFM per ton) (default = 3.0 Ton)
<i>CeF</i>	Cooling Airflow Trim (default 0%)
<i>CRP</i>	Cooling Airflow Profile setting (default = profile D shown as 4)
<i>Cnd</i>	Cooling Airflow On Delay Time (default = 5 seconds)
<i>CFd</i>	Cooling Airflow Off Delay Time. (default = 60 seconds)
<i>CSe</i>	Percentage of high stage cooling airflow to run during low stage operation. (default = 70%)
<i>dHS</i>	Electric heat operation during defrost. 1 = low stage 2 (default) = high stage
<i>HeF</i>	Heat Pump Indoor Airflow Trim (default = 0%)
<i>HFd</i>	Heat Pump Heating Airflow Off Delay Time (default = 60 seconds)
<i>Hnd</i>	Heat Pump Heating Airflow On Delay Time (default = 5 seconds)
<i>HSe</i>	Percentage of high stage heat pump heating airflow to run during low stage operation. (default = 70%)
<i>EHA</i>	When heat pump heating and electric heat are running at the same time, this percentage is used for additional airflow trim
<i>dHE</i>	Enables or disables dehumidification feature in the outdoor unit. (default = Enabled)
<i>CbP</i>	Balance point temperature. The Compressor will not operate below temperature. (Default = 0°F)
<i>EbP</i>	Backup Heat Balance Points
<i>Hdi</i>	Compressor run time between defrost cycles. (default = 30 minutes) (2 stage units)
<i>CdL</i>	Compressor off delay at the beginning and end of a defrost cycle. (default = 30 seconds)

## 27 Air Handler Display (continued)

LED Display	Menu Description
FCL	View 6 most recent fault codes and Clear Fault Codes if desired (outdoor communicating units)
t9t	Menu is enabled if the CF5 menu is set to 6. Select the target time the system will attempt to satisfy the thermostat.
SUP	Menu is enabled if the CF5 menu is set to 6. Select the percentage past the target time when the system will enable electric heat operation during heat mode.
0tt	Menu is enabled if the CF5 is set to 6. (Electric heat will run during the next heat call if the heat pump fails to satisfy the custom target time for this number of consecutive cycles) (default = 20 cycles)
utt	Menu is enabled if the CF5 menu is set to 6. (if the addition of low stage electric heat is able to consecutively satisfy the thermostat under the set target time for this number of cycles, the system will transition to the heat pump for primary heating)
SDP	Menu is enabled if the CF5 menu is set to 6. (this percentage will help determine when switching back to heat pump only operation is appropriate. Default = 20%. If target time = 20 minutes, the addition of low stage electric heat must satisfy the thermostat by less than 16 minutes. (target time - 20% default = 16 minutes).

## 27 Air Handler Display (continued)

LED Display	Description of System Status
<i>I dL</i>	Idle
<i>FA<sub>n</sub></i>	Constant Fan
<i>AC</i>	Compressor Cooling, Single-Stage (non-comm units)
<i>1AC</i>	Compressor Cooling, Low Stage (non-comm units)
<i>2AC</i>	Compressor Cooling, High Stage (non-comm units)
<i>AC 1</i>	Compressor Cooling, Low Stage (comm units)
<i>AC 2</i>	Compressor Cooling, High Stage (comm units)
<i>HP</i>	Compressor Heat, Single-Stage (non-comm. units)
<i>1HP</i>	Compressor Heat, Low Stage (non-comm units)
<i>2HP</i>	Compressor Heat, High Stage (non-comm units)
<i>HP 1</i>	Compressor Heat, Low Stage (Comm Units)
<i>HP 2</i>	Compressor Heat, High Stage (Comm Units)
<i>HE</i>	Electric Heat, Single Stage
<i>HE 1</i>	Electric Heat, Low Stage
<i>HE 2</i>	Electric Heat, High Stage
<i>dFE</i>	Defrost, Single Stage Electric Heat
<i>dF 1</i>	Defrost, Low Stage Electric Heat
<i>dF 2</i>	Defrost, High Stage Electric Heat
<i>dHU</i>	Dehumidification

## Menu Navigation and Selection Instructions

Using Phone Application over Bluetooth Network:

- 1) Connect to the air handler (instructions provided by phone during connection process).
- 2) Select desired settings menu
- 3) Select item that requires adjustment and make necessary selection
- 4) Submit Changes

Using On-Board Push Buttons:

- 1) Use the Right and Left Buttons to scroll between menus
- 2) Use the Center Button to select desired menu when menu code is shown on 7-segment displays
- 3) Use the Left and Right Buttons to scroll through options within the desired menu (the display will flash while scrolling through options for selection)
- 4) Use the Center Button to select the displayed option (when selected the display will stop flashing)
- 5) Use the Center Button to finalize selection and return to the main menu

Profiles	Pre-Run	Short-Run	OFF Delay
1	-----	-----	60 sec/100%
2	-----	30 sec/50%	60 sec/100%
3	-----	7.5 min/82%	60 sec/100%
4	30 sec/50%	7.5 min/82%	60 sec/100%

## Airflow Settings Instructions

- 1) For non-communicating installations, select the type of unit installed in the  $\text{Ud5}$  menu (  $\text{IAC}$  = single-stage air conditioner,  $\text{IHP}$  = single-stage heat pump,  $\text{2AC}$  = 2 stage air conditioner,  $\text{2HP}$  = 2 stage heat pump) Default =  $\text{OFF}$  (no outdoor unit).
- 2) Use the Tonnage Menu ( $\text{Ton}$ ) to select Cooling/Heat Pump Airflow (non-communicating installation). Tonnage selection options and corresponding airflow CFM can be found to the right.  
[Airflow = Tonnage Selection x 400] Default selection is 6.0 tons.
- 3) [Optional] Use the Cooling Trim Menu ( $\text{CTF}$ ) to adjust the cooling airflow from -10% to +10% (2% increments). This applies for 2 stage communicating outdoor units and single or 2 stage non-communicating outdoor units (2 stage non-communicating outdoor units require an equipment relay board to function with this system). For inverter outdoor units use Cooling Trim Factor High, Intermediate and Low menus ( $\text{CTH}$ ,  $\text{CTI}$ , and  $\text{CTL}$ ) for trim adjustment.
- 4) [Optional] Use the Heating Trim Menu ( $\text{HTF}$ ) to adjust the heat pump airflow from -10% to +10% (2% increments). This applies for 2 stage communicating outdoor units and single or 2 stage non-communicating outdoor units (all non-communicating outdoor units require an equipment relay board for the trim option to be available). For inverter outdoor units use Heating Trim Factor High, Intermediate and Low menus ( $\text{HTH}$ ,  $\text{HTI}$ , and  $\text{HTL}$ ) for trim adjustment.
- 5) [Optional] Use the Constant Fan Menu ( $\text{F5d}$ ) to select the percentage of maximum airflow for continuous fan
- 6) [Optional] Use the Cooling Airflow Profile Menu ( $\text{CAP}$ ) to select between 5 cooling airflow profiles. Profile options 1-4 are listed above (option 5 is adjustable). See installation manual for further details

## Tonnage Menu (t o n)

Tonnage Selection	Airflow	Tonnage Selection	Airflow
1.0	400	3.5	1400
1.1	440	3.6	1440
1.2	480	3.7	1480
1.3	520	3.8	1520
1.4	560	3.9	1560
1.5	600	4.0	1600
1.6	640	4.1	1640
1.7	680	4.2	1680
1.8	720	4.3	1720
1.9	760	4.4	1760
2.0	800	4.5	1800
2.1	840	4.6	1840
2.2	880	4.7	1880
2.3	920	4.8	1920
2.4	960	4.9	1960
2.5	1000	5.0	2000
2.6	1040	5.1	2040
2.7	1080	5.2	2080
2.8	1120	5.3	2120
2.9	1160	5.4	2160
3.0	1200	5.5	2200
3.1	1240	5.6	2240
3.2	1280	5.7	2280
3.3	1320	5.8	2320
3.4	1360	5.9	2360
3.5	1400	6.0	2400

## Maximum Airflow Output

AVPTC25B14 AVPTC29B14 AVPTC35B14 AVPTC37B14	AVPTC33C14	AVPTC31C14 AVPTC37C14 AVPTC39C14	AVPTC37D14 AVPTC49C14	AVPTC49D14 AVPTC59C14	AVPTC59D14 AVPTC61D14
1200	1300	1600	1800	1900	2100

\*If airflow is set above the model's maximum value, the output will be the maximum value

## Electric Heat Airflow Table

Htr Kw	AVPTC25B14	AVPTC29B14	AVPTC29B14 AVPTC29B14	AVPTC31C14	AVPTC31C14	AVPTC37C14 AVPTC39C14	AVPTC49C14 AVPTC59C14	AVPTC37D14	AVPTC49D14 ++	AVPTC59D14	AVPTC61D14 ++
3	550	550	550	600	600	NR	NR	NR	NR	NR	NR
5	650	650	650	700	700	700	800	870	950	990	1030
6	700	700	700	770	750	770	800	970	1060	1110	1150
8	800	800	800	880	850	880	950	1060	1150	1200	1250
10	850	875	875	970	920	970	1090	1120	1220	1240	1320
15	875	875	1050	1090	950	1090	1290	1220	1520	1520	1650
19	NR	NR	NR	1280	NR	1280	1345	NR	NR	NR	NR
20	NR	NR	NR	NR	NR	NR	NR	1250	NR	1520	1690
21	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
25	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	1750

Selecting Heater Kit: Use the Electric Heating Wattage Menu ( $\text{EHt}$ ) to select heater kit size. See "Menu Navigation and Selection Instructions" above. Default selection is 0 (No Heat Kit). Select installed heater kit for heater kit operation.

NR - Not Rated

++ For match up with a 3 ton outdoor unit: Airflow for 5kW up to 15kW heater kits shall be set to 1220 CFM by selecting 10 in the Electric Heating Wattage ( $\text{EHt}$ ) menu.

+++ For match up with a 3.5 ton outdoor unit: Heater kit application shall not exceed 20 kW. Airflow for 5kW up to 20kW heater kits shall be set to 1320 CFM by selecting 10 in the Electric Heating Wattage ( $\text{EHt}$ ) menu.



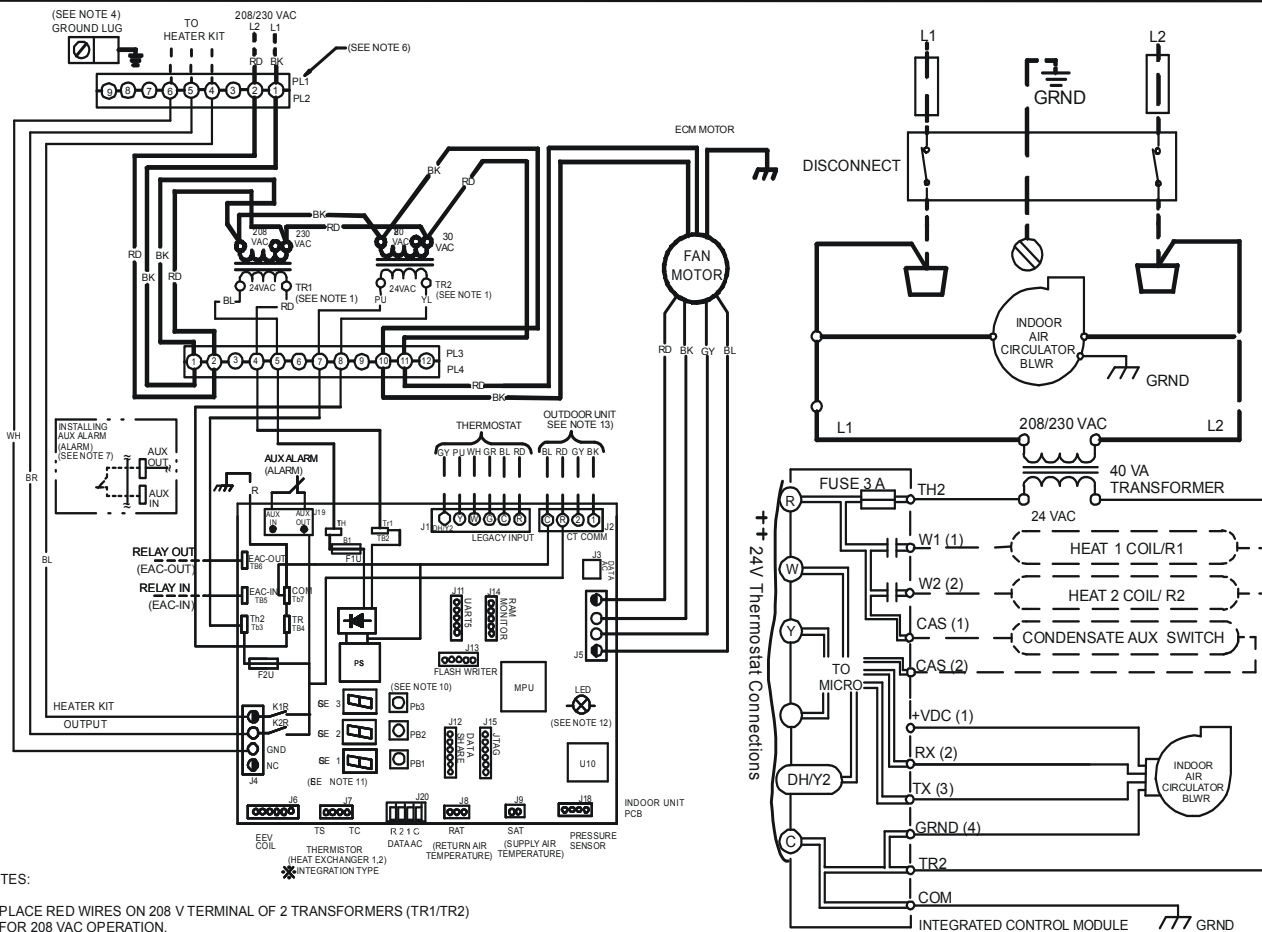
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## 29 Wiring Diagrams



### WARNING

**HIGH VOLTAGE! DISCONNECT ALL POWER BEFORE SERVICING.**  
**MULTIPLE POWER SOURCES MAY BE PRESENT. FAILURE TO DO SO**  
**MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.**



#### NOTES:

1. PLACE RED WIRES ON 208 V TERMINAL OF 2 TRANSFORMERS (TR1/TR2) FOR 208 VAC OPERATION.
2. MANUFACTURER'S SPECIFIED REPLACEMENT PARTS MUST BE USED WHEN SERVICING.
3. IF ANY OF THE ORIGINAL WIRES AS SUPPLIED WITH THIS UNIT MUST BE REPLACED, IT MUST BE REPLACED WITH WIRING MATERIAL HAVING A TEMPERATURE RATING OF AT LEAST 105°C. USE COPPER CONDUCTORS ONLY.
4. UNIT MUST BE PERMANENTLY GROUNDED AND CONFORM TO N.E.C AND LOCAL CODES.
5. DISCARD CONNECTOR PH1 WHEN INSTALLING OPTIONAL HEAT KIT.
6. REMOVE JUMPER TAB AND PUT AUX ALARM SWITCH WHEN INSTALLING AUX ALARM SWITCH.
7. USE N.E.C CLASS 2 WIRE.
8. SEE MANUAL FOR PUSH BUTTON OPERATION.
9. SEE MANUAL FOR 7-SEGMENT DISPLAY DIAGNOSTIC CODES AND MENU CODES.
10. SEE MANUAL FOR LED FUNCTIONALITY.
11. R AND C TERMINALS (USED FOR 24VAC OUTDOOR CONTROL VOLTAGE) ARE OPTIONAL FOR 2 STAGE COMMUNICATING AIR CONDITIONERS. R AND C TERMINALS ARE NOT TO BE USED FOR 2 STAGE COMMUNICATING HEAT PUMP APPLICATIONS.

FOR COMMUNICATING HEAT PUMPS OR IF ONLY TWO THERMOSTAT WIRES ARE AVAILABLE, A SEPARATE TRANSFORMER MUST BE INSTALLED IN THE OUTDOOR UNIT FOR CONTROL BOARD POWER.

1 AND 2 WIRES ARE REQUIRED FOR ALL APPLICATIONS. SEE INSTALLATION MANUAL FOR FULL SYSTEM WIRING EXAMPLES.

#### INTEGRATED CONTROL:

- LOW VOLTAGE —
- LOW VOLTAGE FIELD —
- HIGH VOLTAGE —
- HIGH VOLTAGE FIELD —
- JUNCTION —
- TERMINAL —
- INTERNAL TO —
- RESISTOR —
- OVERCURRENT PROTECT DEVICE —
- PLUG CONNECTION —
- EQUIPMENT GND —
- FIELD GROUND —

#### COLOR CODES:

- BL - BLUE
- RD - RED
- YL - YELLOW
- OR - ORANGE
- BK - BLACK
- GY - GREY
- BR - BROWN
- GR - GREEN
- PU - PURPLE
- WH - WHITE

#### COMPONENT CODES:

- PL1, PL2 — POWER/HEATER CONNECTOR
- TL — THERMAL LIMIT
- TR — TRANSFORMER
- F1U, F2U — FUSE LINK
- PL3, PL4 — TRANSFORMER CONNECTOR



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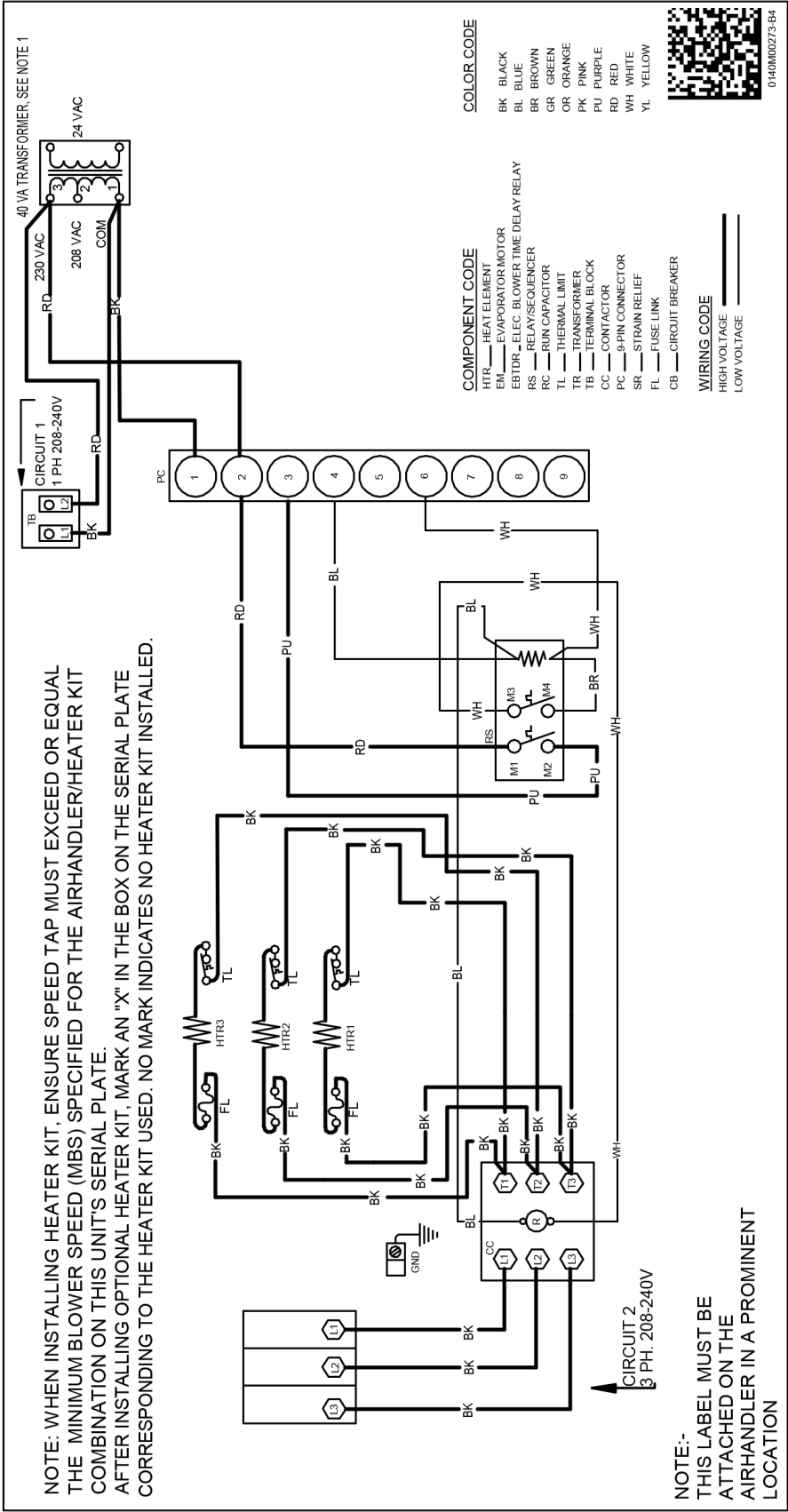
**WARNING**

**HIGH VOLTAGE! DISCONNECT ALL POWER BEFORE SERVICING.**

**MULTIPLE POWER SOURCES MAY BE PRESENT. FAILURE TO DO SO MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.**



3-Phase Heat Kit



Wiring is subject to change. Always refer to the wiring diagram on the unit for the most up-to-date wiring.

# AIR HANDLER

## AIR HANDLER HOMEOWNER'S ROUTINE MAINTENANCE RECOMMENDATIONS

*We strongly recommend a bi-annual maintenance checkup be performed before the heating and cooling seasons begin by a **qualified servicer**.*

### REPLACE OR CLEAN FILTER

**IMPORTANT NOTE:** Never operate unit without a filter installed as dust and lint will build up on internal parts resulting in loss of efficiency, equipment damage and possible fire.

An indoor air filter must be used with your comfort system. A properly maintained filter will keep the indoor coil of your comfort system clean. A dirty coil could cause poor operation and/or severe equipment damage.

Your air filter or filters could be located in your furnace, in a blower unit, or in "filter grilles" in your ceiling or walls. The installer of your air conditioner or heat pump can tell you where your filter(s) are, and how to clean or replace them.

Check your filter(s) at least once a month. When they are dirty, replace or clean as required. Disposable type filters should be replaced. Reusable type filters may be cleaned.

You may want to ask your dealer about high efficiency filters. High efficiency filters are available in both electronic and non-electronic types. These filters can do a better job of catching small airborne particles.

### MOTORS

Indoor and outdoor fan motors are permanently lubricated and do not require additional oiling.

### ALUMINUM INDOOR COIL CLEANING (QUALIFIED SERVICER ONLY)

This unit is equipped with an aluminum tube evaporator coil. The safest way to clean the evaporator coil is to simply flush the coil with water. This cleaning practice remains as the recommended cleaning method for both copper tube and aluminum tube residential evaporator coils.

It has been determined that many coil cleaners and drain pan tablets contain corrosive chemicals that can be harmful to aluminum tube and fin evaporator coils. Even a one-time application of these corrosive chemicals can cause premature aluminum evaporator coil failure. Any cleaners that contain corrosive chemicals including, but not limited to, chlorine and hydroxides, should not be used.

An alternate cleaning method is to use one of the products listed in TP-109\* to clean the coils. The cleaners listed are the only agents deemed safe and approved for use to clean round tube aluminum coils. TP-109 is also available on the web site in Partner Link > Service Toolkit.

NOTE: Ensure coils are rinsed well after use of any chemical cleaners.

### BEFORE YOU CALL YOUR SERVICER

- Check the thermostat to confirm that it is properly set.
- Wait 15 minutes. Some devices in the outdoor unit or in programmable thermostats will prevent compressor operation for awhile, and then reset automatically. Also, some power companies will install devices which shut off air conditioners for several minutes on hot days. If you wait several minutes, the unit may begin operation on its own.
- Check the electrical panel for tripped circuit breakers or failed fuses. Reset the circuit breakers or replace fuses as necessary.
- Check the disconnect switch near the indoor furnace or blower to confirm that it is closed.
- Check for obstructions on the outdoor unit. Confirm that it has not been covered on the sides or the top. Remove any obstruction that can be safely removed. If the unit is covered with dirt or debris, call a qualified servicer to clean it.
- Check for blockage of the indoor air inlets and outlets. Confirm that they are open and have not been blocked by objects (rugs, curtains or furniture).
- Check the filter. If it is dirty, clean or replace it.
- Listen for any unusual noise(s), other than normal operating noise, that might be coming from the outdoor unit. If you hear unusual noise(s) coming from the unit, call a qualified servicer.



### WARNING

#### HIGH VOLTAGE!

DISCONNECT ALL POWER BEFORE SERVICING OR INSTALLING THIS UNIT. MULTIPLE POWER SOURCES MAY BE PRESENT. FAILURE TO DO SO MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.



### CAUTION

TO AVOID THE RISK OF EQUIPMENT DAMAGE OR FIRE, INSTALL THE SAME AMPERAGE BREAKER OR FUSE AS YOU ARE REPLACING. IF THE CIRCUIT BREAKER OR FUSE SHOULD OPEN AGAIN WITHIN THIRTY DAYS, CONTACT A QUALIFIED SERVICER TO CORRECT THE PROBLEM. IF YOU REPEATEDLY RESET THE BREAKER OR REPLACE THE FUSE WITHOUT HAVING THE PROBLEM CORRECTED, YOU RUN THE RISK OF SEVERE EQUIPMENT DAMAGE.

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You can also scan the QR code on the right for the product brand you purchased to be directed to the feedback page.



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#### PRODUCT REGISTRATION

Thank you for your recent purchase. Though not required to get the protection of the standard warranty, registering your product is a relatively short process, and entitles you to additional warranty protection, except that failure by California and Quebec residents to register their product does not diminish their warranty rights.

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