

# AVPEC

## AIR HANDLERS

### INSTALLATION & OPERATING INSTRUCTIONS

© 2016-2018, 2021 Goodman Manufacturing Company, L.P.  
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<b>1 Important Safety Instructions</b> .....	<b>2</b>
<b>2 Shipping Inspection</b> .....	<b>3</b>
2.1 Parts.....	3
2.2 Handling.....	3
<b>3 Codes &amp; Regulations</b> .....	<b>3</b>
<b>4 Replacement Parts</b> .....	<b>3</b>
<b>5 Pre-Installation Considerations</b> .....	<b>3</b>
5.1 Preparation.....	3
5.2 System Matches.....	3
5.3 Interconnecting Tubing.....	3
5.4 Clearances.....	3
5.5 Horizontal Applications.....	4
<b>6 Installation Location</b> .....	<b>4</b>
6.1 Upflow Installation.....	4
6.2 Horizontal Left Installation.....	4
6.3 Downflow/Horizontal Right Installation.....	4
<b>7 Refrigerant Lines</b> .....	<b>7</b>
7.1 Tubing Size.....	7
7.2 Tubing Preparation.....	7
7.3 Tubing Connections.....	7
<b>8 Condensate Drain Lines</b> .....	<b>8</b>
<b>9 Ductwork</b> .....	<b>9</b>
9.1 Return Ductwork.....	9
<b>10 Return Air Filters</b> .....	<b>9</b>
<b>11 Electric Heat</b> .....	<b>9</b>
<b>12 Electrical and Control Wiring</b> .....	<b>11</b>
12.1 Building Electrical Service Inspection.....	11
12.2 Wire Sizing.....	11
12.3 Maximum Overcurrent Protection (MOP).....	11
12.4 Electrical Connections – Supply Voltage.....	12
12.4.1 Air Handler Only (Non-Heat Kit Models).....	12
12.4.2 Air Handler - Non-Circuit Breaker Heat Kits.....	12
12.4.3 Air Handler With Circuit Breaker Heat Kit.....	12
<b>13 Achieving 1.4% &amp; 2% Low Leakage Rate</b> .....	<b>12</b>
<b>14 Miscellaneous Start-Up Checklist</b> .....	<b>12</b>
14.1 Circulator Blower.....	14
14.2 AVPEC Motor Orientation.....	14
<b>15 Troubleshooting</b> .....	<b>15</b>
15.1 Electrostatic Discharge (ESD) Precautions.....	15
<b>16 CoolCloud HVAC Phone Application</b> .....	<b>15</b>
<b>17 Quick Start Guide for Communicating</b>	
<b>Outdoor Units</b> .....	<b>15</b>
17.1 Charging.....	16
<b>18 Electric Heater Kit Testing</b> .....	<b>16</b>
<b>19 Dehumidification</b> .....	<b>16</b>
<b>20 Auxiliary Alarm Switch</b> .....	<b>16</b>
<b>21 Push Buttons</b> .....	<b>16</b>
<b>22 Accessory Control (Humidifiers, Dehumidifiers,</b>	
<b>Ventilators)</b> .....	<b>17</b>
<b>23 Ramping Profiles</b> .....	<b>17</b>
<b>24 Electric Air Cleaning</b> .....	<b>18</b>
<b>25 Max Airflow Table</b> .....	<b>18</b>
<b>26 Air Handler Troubleshooting Matrix</b> .....	<b>19</b>
<b>26 Air Handler Troubleshooting Matrix (Continued)</b> .....	<b>20</b>
<b>27 Air Handler Display</b> .....	<b>21</b>
<b>27 Air Handler Display (Continued)</b> .....	<b>22</b>
<b>27 Air Handler Display (Continued)</b> .....	<b>23</b>
<b>28 Wiring Diagram</b> .....	<b>24</b>
<b>29 Dehumidification Control Options</b> .....	<b>25</b>



### 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.

This device, which was assembled by Goodman Manufacturing Company, L.P., contains a component that is classified as an intentional radiator. This intentional radiator has been certified by the FCC: FCC ID QOQBGM111. And this international radiator has an Industry Canada ID: IC 5123A-BGM111.

This device complies with Part 15 of the FCC’s Rules. Operation of this device is subject to two conditions:

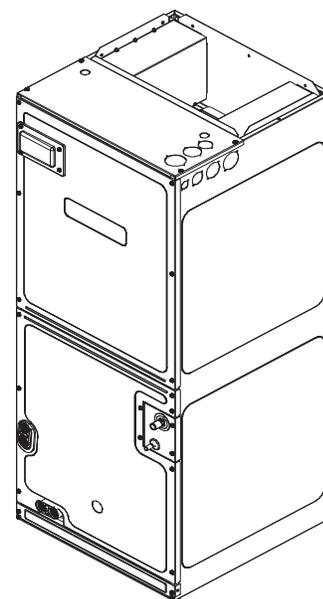
- (1) This device may not cause harmful interference; and
- (2) This device must accept any interference received, including interference that may cause undesirable operation.

And this device meets the applicable Industry Canada technical specifications.

The manufacturer of the intentional radiator (model no. BGM111) is Silicon Laboratories Finland Oy, which can be contacted by calling 617-951-0200. (www.silabs.com)

Goodman Manufacturing Company, L.P. may be contacted by calling 713-861-2500, or at 19001 Kermier Rd., Waller TX 77484.

(www.goodmanMFG.com)



# 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.

**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.

 **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.



 **WARNING**

THIS PRODUCT IS FACTORY-SHIPED FOR USE WITH 208/240/1/60 ELECTRICAL POWER SUPPLY. DO NOT RECONFIGURE THIS AIR HANDLER TO OPERATE WITH ANY OTHER POWER SUPPLY.

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

 **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**

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**

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**

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.

 **WARNING**

FAILURE TO PROPERLY RECONNECT SENSOR WIRES MAY RESULT IN ERROR CODES AND THE UNIT NOT OPERATING.

 **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.

Evitez 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 your local distributor. Use only factory authorized replacement parts (see Section 4). 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, TEXAS 77484  
855-770-5678

## 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 outdoor AIR CONDITIONING OR HEAT PUMP INSTALLATION & SERVICE REFERENCE for line set configuration 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 AVPEC product line may be installed in one of the upflow, downflow, horizontal left or horizontal right orientations as shown in Figures 3, 4, 5 and 6. 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). Unsnap the side drain pan from the bottom 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).

If the side drain pan is removed, the drain port opening in the access panel must be covered by the accessory drain port plug (DPK1) as shown in figure 1.1.

### 6.2 Horizontal Left Installation

**No field modifications are permissible for this application.**

Drain port labeled (B) in Figure 1 is the primary drain for this application and condensate drain line must be attached to this drain port. Drain port (b) 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 the 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 distributor. The DFK is not supplied with the air handler and is required to minimize pan sweating on all downflow installations. See Table 2 for the correct DFK and follow the instructions provided for installation.

Refer to Figure 7 and 8 for the location of the components referenced in the following steps.

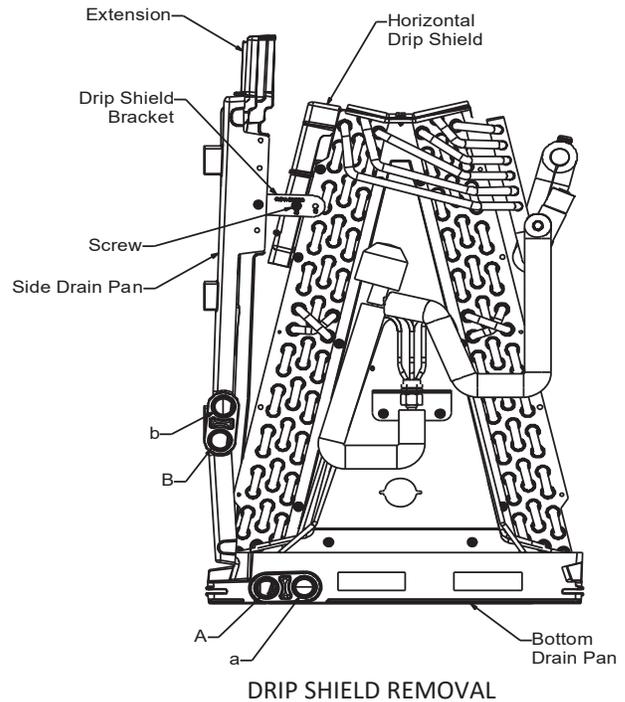


Figure 1

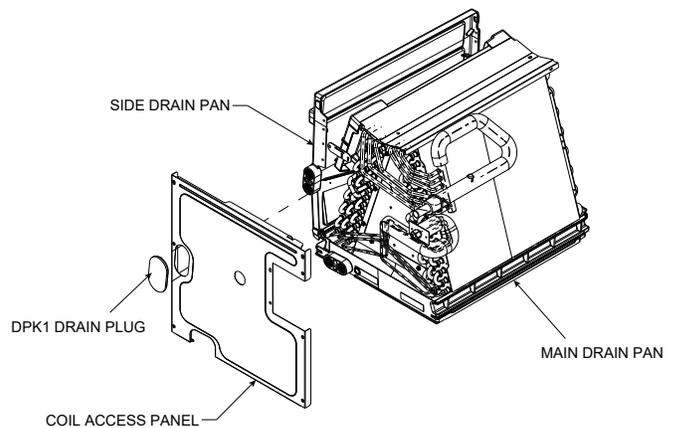


Figure 1-1

CMK0008 Condensate	CMK0009 Condensate	CMK0010 Condensate	CMK0011 Condensate
AVPEC25B14	AVPEC37C14	AVPEC59D14	AVPEC61D14

CONDENSATE KIT

Table 1

DFK-B Downflow Kit	DFK-C Downflow Kit	DFK-D Downflow Kit
AVPEC25B14	AVPEC37C14	AVPEC59D14 AVPEC61D14

DOWNFLOW KIT

Table 2

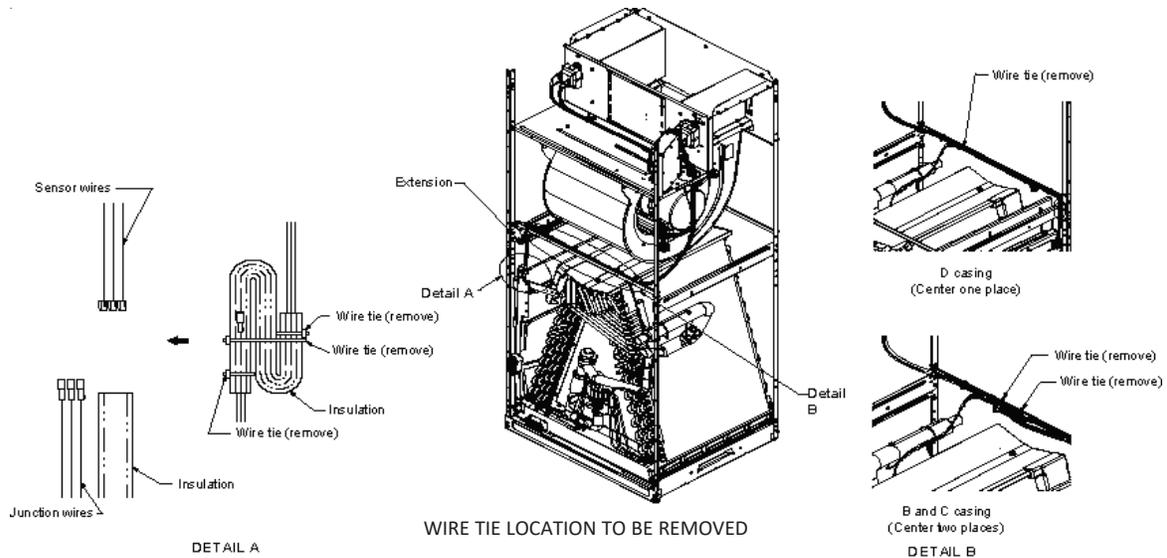
Drain Port Plug		
Kit Number	Description	Application
DPK1	Side Drain Port Plug	All Models

Table 3

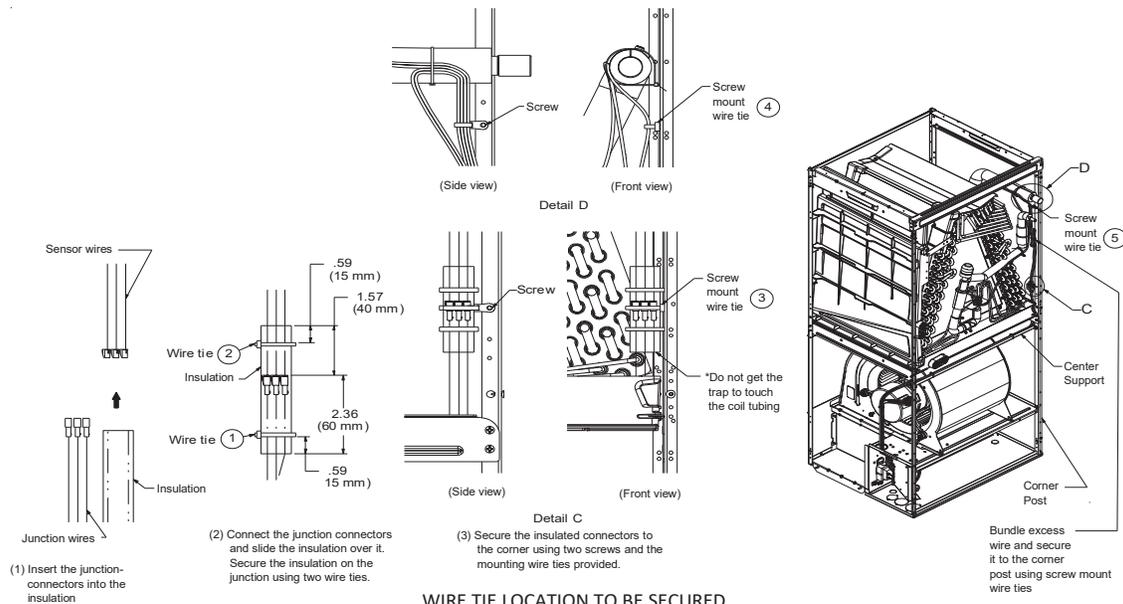
1. Before flipping the air handler, remove blower access panel and coil access panel. The coil access panel and tubing panel may remain screwed together during this procedure. Remove and retain the seven (7) screws securing the coil access panel to the cabinet and the six (6) screws securing the blower access panel to the cabinet.
2. Before removing the coil remove the wire ties holding the sensor wire harness to the center support. Remove the insulation covering the wire connectors and disconnect the wires. Do not cut or damage the insulation covering the junction connectors since it will be required to secure the wires once the change is complete. See Figures 2-1 and 2-2 for wire tie location.

**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.**

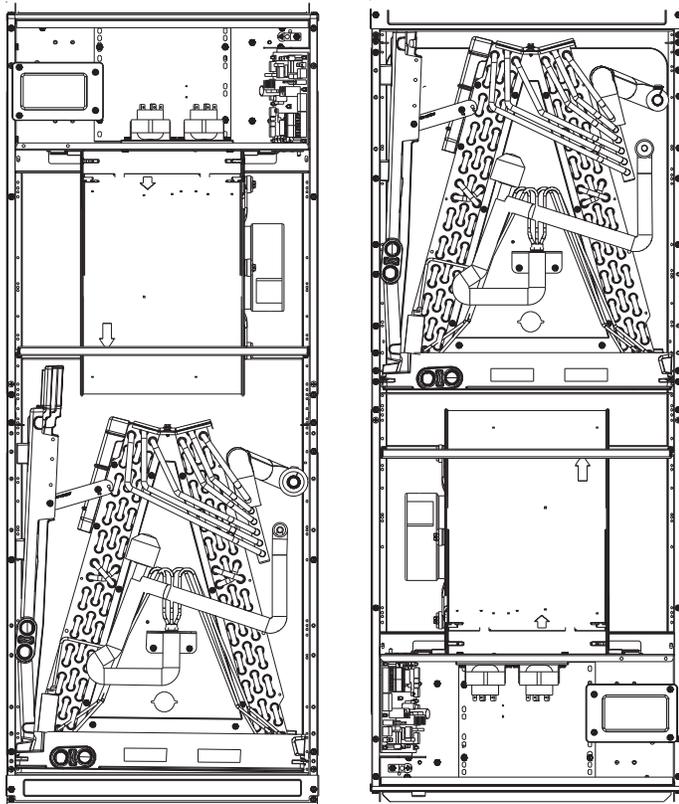
3. Slide the coil assembly out using the bottom drain pan to pull the assembly from the cabinet.
4. For flipping the coil, drain pan extension must be removed for all models except AVPEC61D14. Center support should not be removed while removing the drain pan extension. Side drain pan and horizontal drip shield can be removed for downflow application. The side drain pan and horizontal drip shield cannot be removed for horizontal right.
5. Use the bottom drain pan to hold the coil assembly, slide the coil assembly back into the cabinet on th downflow brackets as shown in Figure 9.



**FIGURE 2-1**

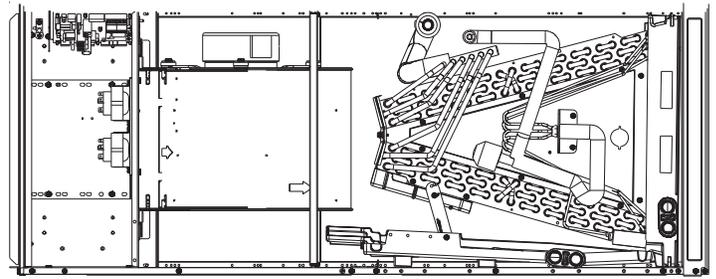


**FIGURE 2-2**



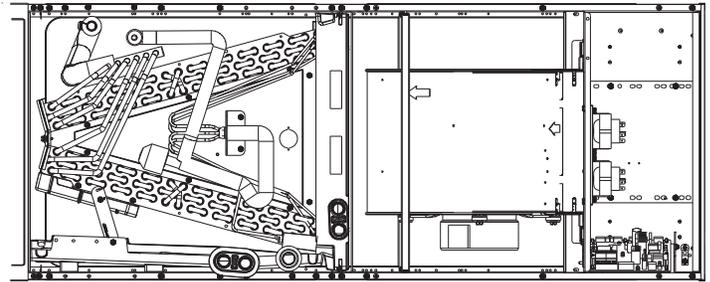
UPFLOW  
FIGURE 3

DOWNFLOW  
FIGURE 4



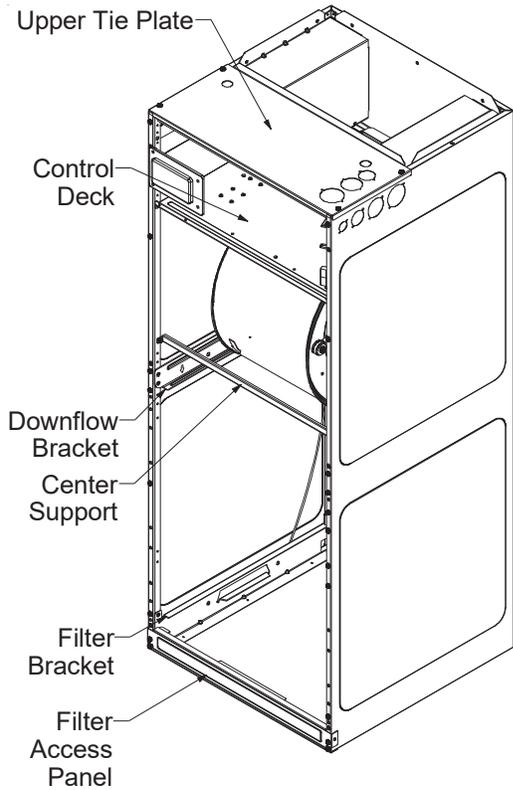
HORIZONTAL LEFT

FIGURE 5



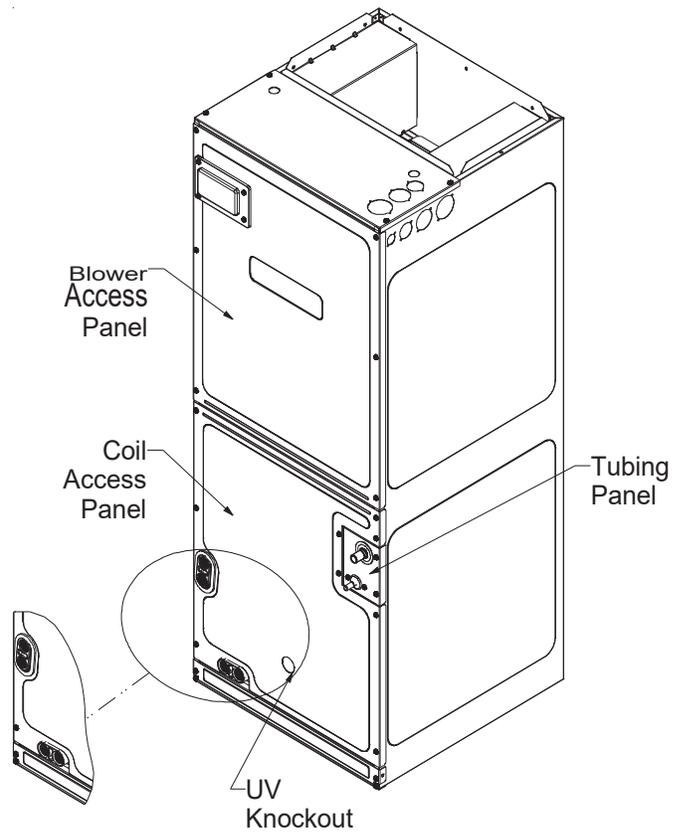
HORIZONTAL RIGHT

FIGURE 6



INTERNAL PART TERMINOLOGY

FIGURE 7



EXTERNAL PART TERMINOLOGY

FIGURE 8

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

6. Reconnect the sensor wires and replace the insulation securing it with wire ties on both sides as shown in Figure 2-2. Then, secure the wire harness to the corner post using the screw mount wire ties provided.
7. Re-install the access panels removed in Step 1 as shown in Figure 10.
8. Two drain ports located at the bottom drain pan (horizontally oriented) are to be used for upflow and downflow applications and the two on the side drain pan (vertically oriented) are to be used when the unit is in horizontal right or left configuration. When the unit is in upflow or downflow configuration, the drain ports located on bottom drain pan must be plugged and vice versa. Drain ports located at lower elevation (closer to the ground) in either configuration must be connected to the main drain line and the higher is for the secondary drain line.

## 7 Refrigerant Lines

**NOTE:** Care should be taken to route refrigerant tubing in a way which allows adequate access for servicing and maintenance of the air handling unit.

 <b>WARNING</b>
<p>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.</p>

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.

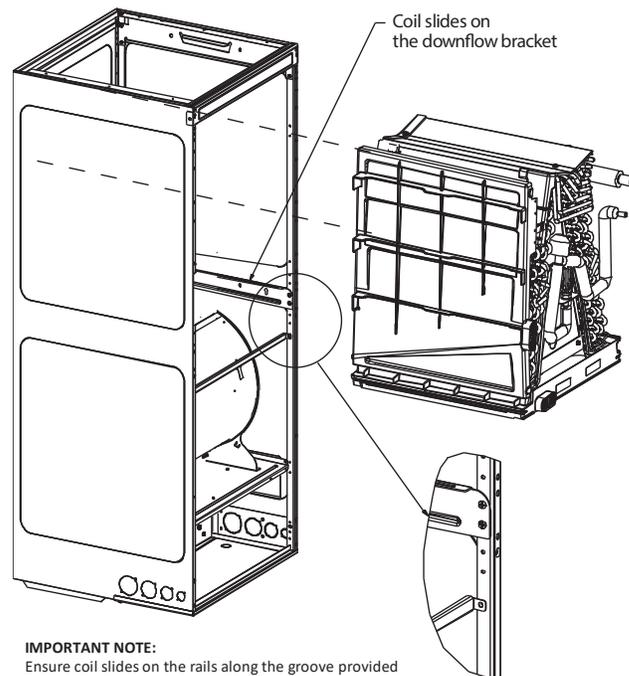
### 7.1 Tubing Size

For the correct tubing size, refer to the outdoor AIR CONDITIONING OR HEAT PUMP INSTALLATION & SERVICE REFERENCE.

### 7.2 Tubing Preparation

 <b>WARNING</b>
<p>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.</p>

 <b>WARNING</b>
<p>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.</p>



**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 9**

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, electronic expansion valve (EEV), thermistors and pressure sensors.

### 7.3 Tubing Connections

AVPEC models come with factory installed electronic expansion valve (EEV) 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.
8. Replace access panels, suction line grommet, insulation and all screws.

**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, electronic expansion valve (EEV), thermistors and pressure sensors.

## 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.

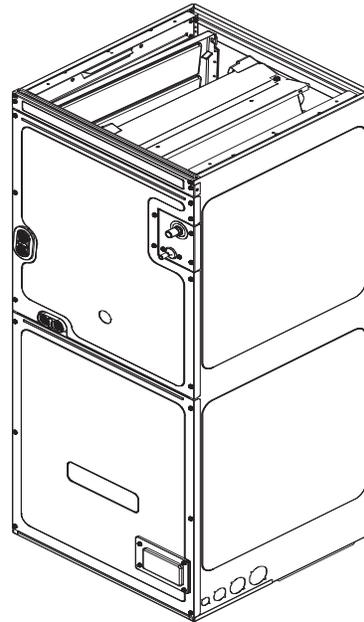
Insulate drain lines located inside the building or above a finished living space to prevent sweating. Install a condensate trap to ensure proper drainage.

**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.

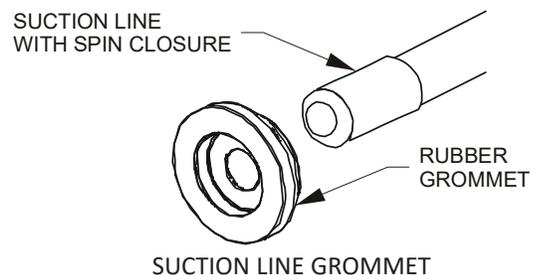
**NOTE:** Units operating in high static pressure applications may require a deeper field constructed "P" style trap than is shown in Figure 12 to allow proper drainage and prevent condensate overflow.

**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.



ACCESS PANEL  
CONFIGURATION FOR  
DOWNFLOW  
OR HORIZONTAL RIGHT

**FIGURE 10**



**FIGURE 11**

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 airstream 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. See Auxiliary Alarm Switch section for more details. 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.

## 9 DUCTWORK

 <b>CAUTION</b>
<p>If secondary drain is not installed, the secondary access must be plugged.</p>

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 (up-flow 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). Washable versions are available through your local distributor.

 <b>CAUTION</b>
<p>Do not operate this product without all the ductwork attached.</p>

## 11 Electric Heat

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.

### NOTE: TRANSFORMER SUB-ASSEMBLY

Before installing the Heat Kit, uninstall the transformer sub-assembly (Figure 13). Make sure to unplug 12-Pin connector before uninstalling the transformer sub-assembly. Follow the Heat Kit Installation Manual to install the Heat Kit. Reconnect the 12-Pin connectors and secure screws while installing the transformer sub-assembly back into the unit (Figure 13) after heater kit installation.

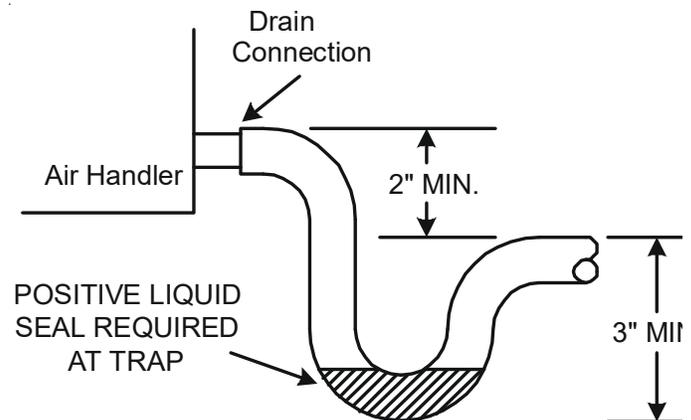


FIGURE 12

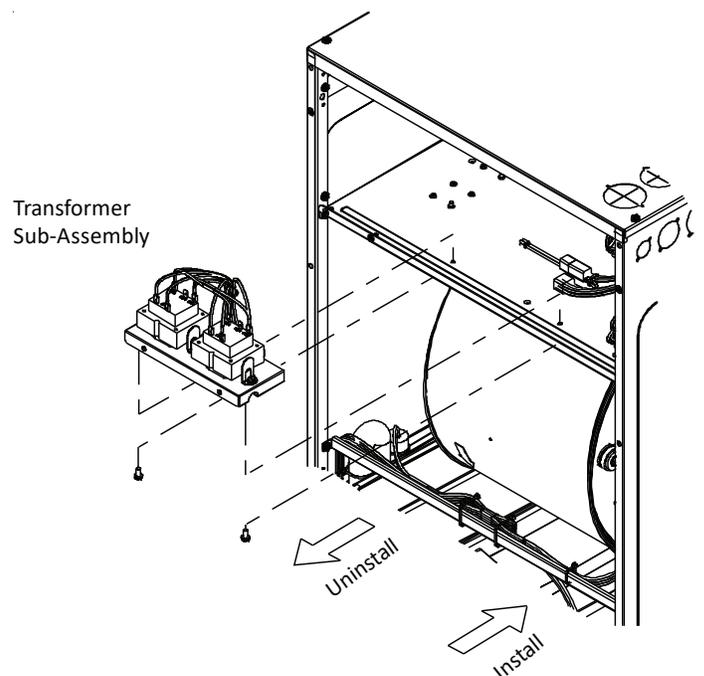


FIGURE 13

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 4, 5 and 6 to determine the temperature rise (°F).

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)

CFM	HEAT KIT NOMINAL KW							
	3	5	6	8	10	15	20	25
800	12	19	24	32	38			
1000	9	15	19	25	30	45		
1200	8	13	16	21	25	38	51	63
1400	7	11	14	18	22	32	43	54
1600	6	9	12	16	19	28	38	47
1800	5	8	11	14	17	25	34	42
2000	5	8	9	13	15	23	30	38

240/1/60 SUPPLY VOLTAGE - TEMP. RISE °F

TABLE 4

CFM	HEAT KIT NOMINAL KW							
	3	5	6	8	10	15	20	25
800	11	18	23	30	36			
1000	9	15	18	24	29	44		
1200	8	12	15	20	24	36	49	61
1400	6	10	13	17	21	31	42	52
1600	6	9	11	15	18	27	36	45
1800	5	8	10	13	16	24	32	40
2000	5	7	9	12	15	22	29	36

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

TABLE 5

CFM	HEAT KIT NOMINAL KW							
	3	5	6	8	10	15	20	25
800	10	16	21	27	33			
1000	8	13	16	22	26	40		
1200	7	11	14	18	22	33	44	55
1400	6	9	12	16	19	28	38	47
1600	5	8	10	14	16	25	33	41
1800	5	7	9	12	15	22	29	37
2000	4	7	8	11	13	20	26	33

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

TABLE 6

Model	Heater (kW)								
	3	5	6	8	10	15	19	20	25
AVPEC25B14	550	650	700	715	875				
AVPEC37C14	850	850	900	100	1120	1220	1250		
AVPEC59D14	990	990	1110	1200	1240	1520		1520	
AVPEC61D14	1030	1030	1150	1250	1320	1650		1690	1715

MINIMUM CFM REQUIRED FOR HEATER KITS

TABLE 7

### Heat Kit Selection

For heat kit selection, see the Specification Sheet for each specific Air Handler.

## 12 Electrical and Control Wiring

IMPORTANT: All routing of electrical wiring must be made through provided electrical knockouts. When removing the electrical knockouts, take care not to damage the PCB. Do not cut, puncture or alter the cabinet for electrical wiring.

!	CAUTION
<b>FIRE HAZARD!</b> To avoid the risk of property damage, personal injury or fire, use only copper conductors.	

!	WARNING
<b>HIGH VOLTAGE!</b> 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.

Other methods of grounding are permitted if performed in accordance with 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.

### 12.1 Building Electrical Service Inspection

This unit is designed for single-phase electrical supply only. **DO NOT OPERATE AIR HANDLER 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 8

### 12.2 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.

- **Wire used must be sized to carry the Minimum Circuit Ampacity (MCA) listed on the equipment's 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.

### 12.3 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.

### 12.4 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.

#### 12.4.1 Air Handler Only (Non-Heat Kit Models)

The power supply connects to the stripped black and red wires contained in the air handler electrical compartment. 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. A ground lug is also provided in the electrical compartment. The ground wire from the power supply must be connected to this ground lug.

#### 12.4.2 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.

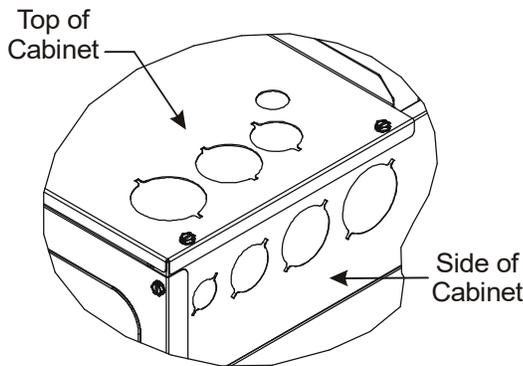
#### 12.4.3 Air Handler With Circuit Breaker Heat Kit

The air handler has a soft plastic cover on the upper access panel and can be removed to allow the heater kit circuit breaker to be installed. The circuit breakers have lugs for power supply connection. See the HKS Installation Instructions for further details.

### 13 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.

**IMPORTANT:** After installing the heater kits, it is very important to seal the gap between the circuit breaker and the cover. Putty paste or gasket can be used to seal the gap so that air leakage can be minimized.



KNOCK-OUT FOR ELECTRICAL CONNECTIONS

FIGURE 14

### 14 Miscellaneous Start-Up Checklist

- Prior to start-up, ensure that all electrical wires are properly sized and all connections are properly tightened.
- All panels must be in place and secured. For Air Tight application, gasket must be positioned at prescribed locations to achieve 2% leakage.
- Tubing must be leak free.
- Condensate line must be trapped and pitched to allow for drainage.
- Auxiliary drain is installed when necessary and pitched to allow for drainage.
- Low voltage wiring is properly connected.
- Unit is protected from vehicular or other physical damage.

- Return air is not obtained from, nor are there any return air duct joints that are unsealed in, 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.

**IMPORTANT NOTE:** If thumb screws are used to access the filter, ensure the washer installed on the screw behind the access panel remains in place after re-installation.

**NOTE:** A removable plug connector is provided with the control to make thermostat wire connections. This plug may be removed, wire connections made to the plug, and replaced. It is strongly recommended that you do not connect multiple wires into a single terminal. Wire nuts are recommended to ensure one wire is used for each terminal. Failure to do so may result in intermittent operation.

#### 14.1 Circulator Blower

This air handler is equipped with a variable speed circulator blower. This blower provides several automatically-adjusted blower speeds. The Specification Sheet applicable to your model provides an airflow table, showing the relationship between airflow (CFM) and external static pressure (E.S.P.).

#### 14.2 AVPEC 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 AVPEC Motor Orientation Figure 16. 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.

### 15 Troubleshooting

#### 15.1 Electrostatic Discharge (ESD) Precautions

**NOTE:** Discharge body's static electricity before touching unit. An electrostatic discharge can adversely affect electrical components.

Use the following precautions during air handler installation and servicing to protect the integrated control module from damage. By putting the air handler, the control, and the person at the same electrostatic potential, these steps will help avoid exposing the integrated control module to electrostatic discharge. This procedure is applicable to both installed and uninstalled (ungrounded) blowers.

1. Disconnect all power to the blower. Do not touch the integrated control module or any wire connected to the control prior to discharging your body's electrostatic charge to ground.

2. Firmly touch a clean, unpainted, metal surface of the air handler blower near the control. Any tools held in a person's hand during grounding will be discharged.
3. Service integrated control module or connecting wiring following the discharge process in step 2. Use caution not to recharge your body with static electricity; (i.e., do not move or shuffle your feet, do not touch ungrounded objects, etc.). If you come in contact with an ungrounded object, repeat step 2 before touching control or wires
4. Discharge your body to ground before removing a new control from its container. Follow steps 1 through 3 if installing the control on a blower. Return any old or new controls to their containers before touching any ungrounded object.

measures:

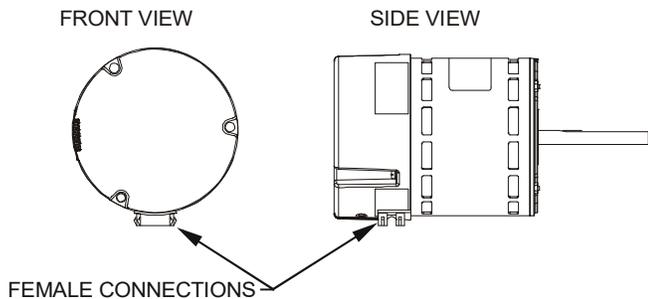
- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/ TV technician for help.

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

DIP Switch Setting	MODEL			
	AVPEC25B14	AVPEC37C14	AVPEC59D14	AVPEC61D14
First Valid Heater Kit	3	3/5	3/5	3/5
Second Valid Heater Kit	5	6	6	6
Third Valid Heater Kit	6	8	8	8
Fourth Valid Heater Kit	8	10	10	10
Fifth Valid Heater Kit	10	15	15	15
Sixth Valid Heater Kit	X	19	20	20
Seventh Valid Heater Kit	X	X	X	25

Heater Kit Options

**Heater Kit Options  
TABLE 9**



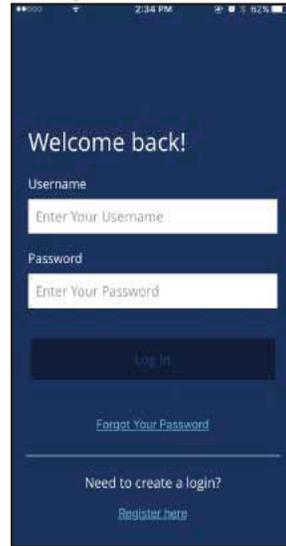
**AVPEC MOTOR ORIENTATION  
FIGURE 15**

## 16 CoolCloud HVAC Phone Application

**NOTE:** This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following

This air handler is Bluetooth ready and functions with the CoolCloud 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.

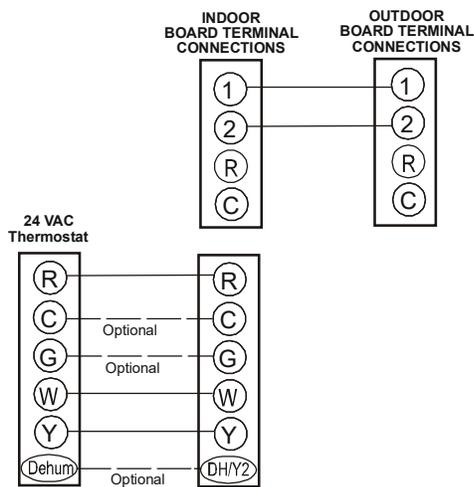


**FIGURE 16**

## 17 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 multi-stage 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.



Communicating Inverter Air Conditioner or Heat Pump

FIGURE 17

3. Download the CoolCloud HVAC phone application for charging and to configure / test system.
4. Confirm thermostat heating and cooling calls function properly with equipment.

**NOTE:** When new version 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. Install all mandatory software updates and optional updates if necessary.

**NOTE:** If an E11 code exists for the inverter system immediately after line voltage is applied (code shown in the CoolCloud HVAC phone application or displayed on the inverter control), the System Verification Test needs to be completed

before any other operation. See the following procedure.

1. Allow the system to remain Idle for 5 minutes.
2. Turn the system verification test on either by using the phone application, or by entering the *5Ut* menu through the furnace push buttons.
3. Wait for the test to complete.

### 17.1 Charging

1. Inverter units using the CoolCloud HVAC phone application or control board push button:
  - a. Inverter units are charged by setting the *[r9]* menu (Charge Mode) to ON through the furnace control board push buttons or through the CoolCloud HVAC phone application.
  - b. The system will remain in charge mode (high speed) for 60 minutes before timing out.
  - c. The installer must manually shut off charge mode once complete

## 18 Electric Heater Kit Testing

1. Select the electric heat icon after entering the air handler menus while using the CoolCloud 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.

## 19 Dehumidification

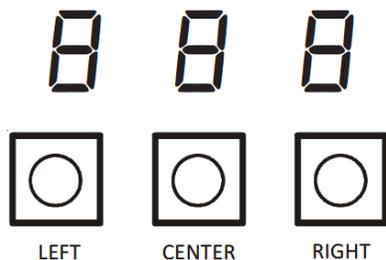
Dehumidification allows the air handler's circulator blower to operate at a reduced speed during a combined thermostat call for cooling and a dehumidification call from the thermostat or humidistat. This lower blower speed increases dehumidification of the conditioned air as it passes through the indoor 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 CoolCloud 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 CoolCloud HVAC phone application.

**NOTE:** Use dehumidification chart in section 29 to properly setup dehumidification based on thermostat selected.

## 20 Auxiliary Alarm Switch

The control is equipped with a 24VAC Aux Alarm to be used for a condensate switch install (designated by CONDENSATE 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 “E dF” 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. See Figure 19 for the connection location.

## 21 Push Buttons



**FIGURE 18**

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.

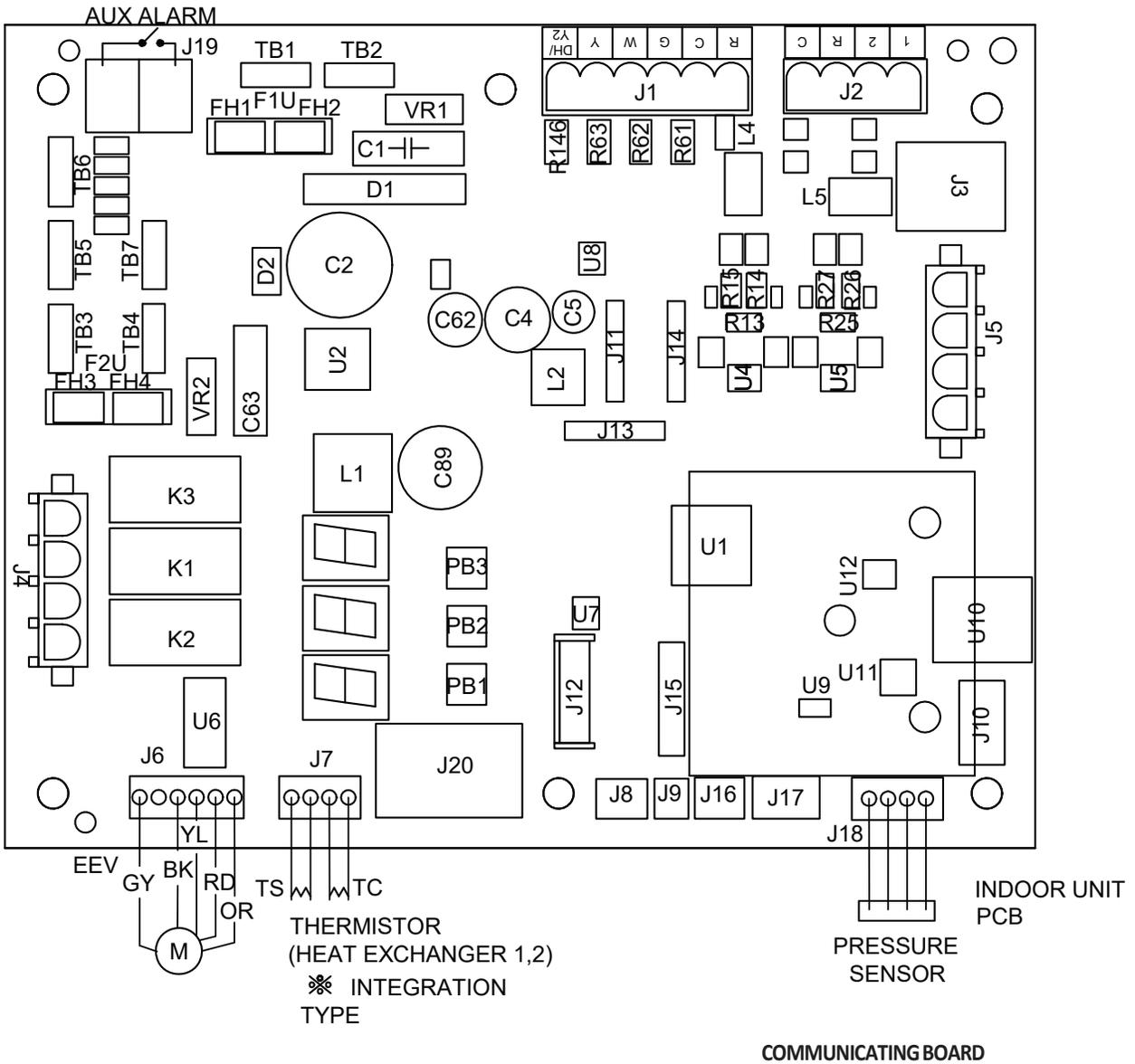


FIGURE 19

## 22 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.

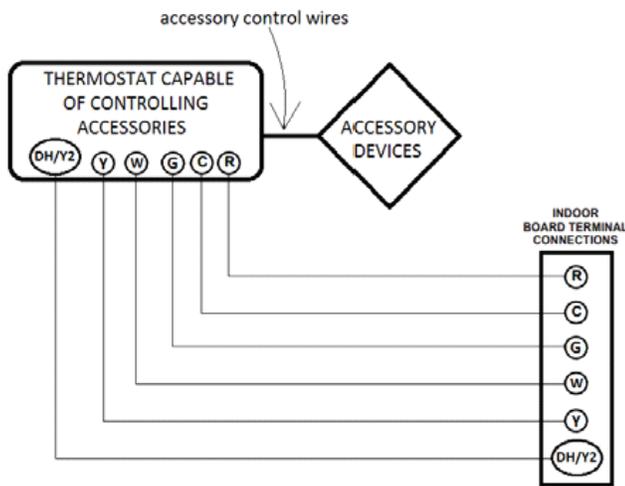


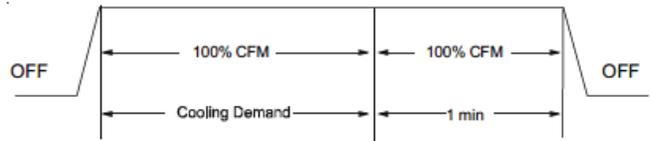
FIGURE 20

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

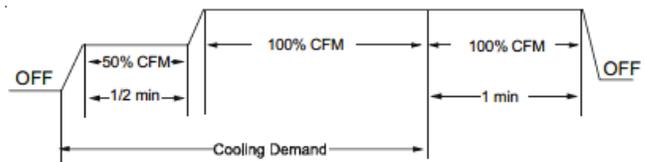
## 23 Ramping Profiles

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 CoolCloud phone application or the push button menus.

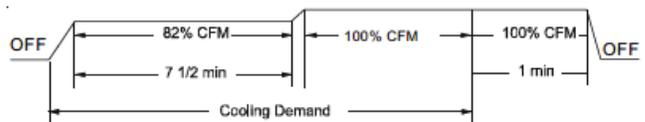
- Profile A provides only an OFF delay of one (1) minute at 100% of the cooling demand airflow.



- 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.

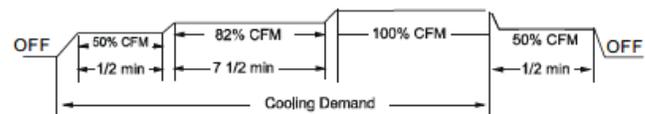


FIGURE 21

## 24 Electric Air Cleaner

The control is equipped with an Accessory Relay and a pair of ¼ inch accessory terminals which is normally open, labeled EAC-IN and EAC-OUT (see accessory contacts graphic). The Accessory Relay is configured to close any-time 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.

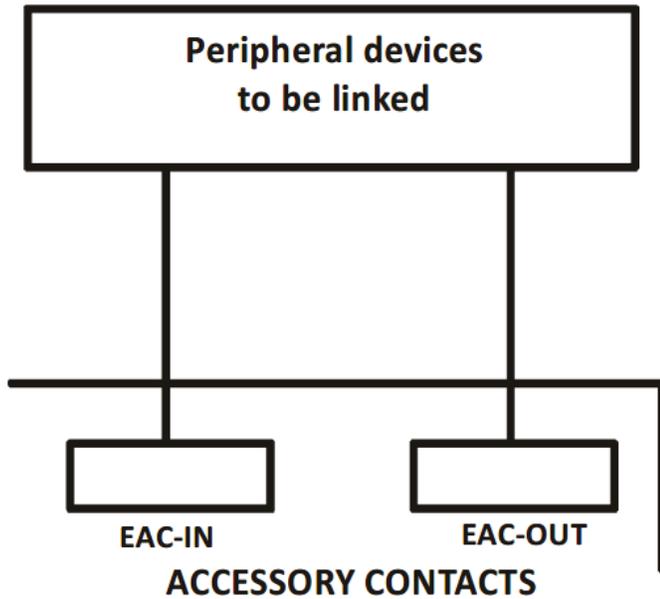


FIGURE 22

### DEHUMIDIFICATION TIPS

For effective dehumidification operation:

- Ensure "Dehum" is ON through the CoolCloud Phone Application.
- Verify the cooling airflow profile is set to "Profile D".
  - By default "Dehum" is ON and the cooling airflow profile is set to "Profile D".
- For additional dehumidification control, airflow settings are field adjustable and can be fine-tuned to a value that is comfortable for the application from a range of +15% to -15%.

## 25 MAX AIRFLOW TABLE

Model	MAX CFM
AVPEC25B14 AVPEC29B14 AVPEC35B14 AVPEC37B14	1200
AVPEC33C14	1300
AVPEC31C14 AVPEC37C14 AVPEC39C14	1600
AVPEC37D14 AVPEC49C14	1800
AVPEC49D14 AVPEC59C14	1900
AVPEC59D14 AVPEC61D14	2100

Table 10

**NOTE:** The System will not provide airflows above the max airflow values.

## 26 AIR HANDLER TROUBLESHOOTING MATRIX

Symptoms of Abnormal Operation	Diagnostic / Status LED Codes	Fault Description	Possible Causes	Corrective Actions
No outdoor unit operations	E <sub>C</sub> 1	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	E <sub>D</sub> 5	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	E <sub>D</sub> F	Auxiliary switch (condensate switch) open	High water level in the evaporation coil	Check evaporator drain pan, trap, piping
No Air Handler operation	E <sub>d</sub> 0	Data not yet on network	No network data	Populate shared data set using memory card
No Air Handler operation	E <sub>d</sub> 1	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	E <sub>d</sub> 4	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	E <sub>b</sub> 0	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 1 Hp 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	E <sub>b</sub> 1	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	E <sub>b</sub> 2	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	E <sub>b</sub> 3	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
Blower Motor Operating in Power	E63	Motor operational parameters exceeded	Power fluctuation	Replace motor
Blower Motor Current Trip or Lost Rotor	E64	Motor will not rotate	Excessive motor current draw	Replace motor
Blower Motor Locked Rotor	E65	Motor will not rotate	Motor not running	Replace motor
Over/Under Voltage Trip	E66	Motor Line Voltage	Line voltage to motor out of range	Verify motor line voltage Replace motor
Incomplete Parameter sent to Motor	E67	Noise on motor communication line	Corrupted data in motor communications	Power cycle system Replace motor
Inadequate Airflow	E69	Less than expected airflow	Blower motor running too slow	Replace motor
ClimateTalk Network Communications	EE1	No ClimateTalk communications	Broken or disconnected ClimateTalk wiring	Check ClimateTalk communications wiring
Coil Temperature Sensor Open	EE6	No coil temperature	Sensor not connected or broken wire	Check if coil sensor is connected Replace coil sensor
Coil Temperature Sensor Shorted	EE7	No coil temperature	Faulty sensor	Replace coil sensor
Suction Temperature Sensor Open	EE8	No suction temperature	Sensor not connected or broken wire	Check if suction sensor is connected. Replace suction sensor
Suction Temperature Sensor Shorted	EE9	No suction temperature	Faulty sensor	Replace Suction sensor
EEV not connected	E70	No EEV communications	EEV not connected, broken wire	Check EEV connection at air handler
Liquid Thermistor Open or Shorted	E73	No coil temperature	Sensor not connected or broken wire	Check coil (liquid) sensor is connected, if no connect, if yes replace
Gas Temperature sensor Open or Shorted	E74	No suction temperature	Sensor not connected or broken wire	Check suction (gas) sensor is connected, if no connect, if yes replace
Pressure Sensor Open or Shorted	E75	No indoor pressure reading	Sensor not connected or broken wire	Check if sensor is connected If connected, replace sensor, may also need to replace air handler board
Indoor Unit - Thermostat communication error (start-up & during operation)	E77	No Display	Incorrect wiring between ID unit and thermostat Thermostat Failure Power interruption (low voltage)	Check for thermostat and indoor unit wiring Verify the input voltage at the ID unit and thermostat Replace control board or thermostat Press "LEARN" button on PCB for more than 5 seconds to reestablish network

## 27 AIR HANDLER DISPLAY

LED Display	Menu Description
L6F	View 6 most recent fault codes and Clear Fault Codes if desired (furnace)
Lrn	Restart communications between the indoor and outdoor unit.
Lr	Control Firmware Revision Number
Sr	Control Shared Data Revision Number
F5d	Constant Fan Speed as percent of maximum airflow. Default = 30%
EHE	Electric Heater Kit Wattage (kW)
EFD	Electric Heat Off Delay (seconds)
END	Electric Heat On Delay (seconds)
Etf	Electric Heat Airflow Trim (percentage)
Est	Percentage of high stage electric heating airflow to run during low stage electric heat operation
LFS	1 = system will try to satisfy the thermostat quickly. 5 (default) = system will try to satisfy the thermostat more slowly.
dHL	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)
ODS	Select number of stages for the non-communicating outdoor unit. (ARC for single-stage Air Conditioners, IHP for single stage Heat Pumps, 2AC for two stage Air Conditioners or 2HP for two stage heat pumps)
ton	Indoor Airflow for non-communicating outdoor units. (values based on 400CFM per ton) (default = 3.0 Ton)
Ltf	Cooling Airflow Trim (default 0%)
LAP	Cooling Airflow Profile setting (default = profile D shown as 4)
END	Cooling Airflow On Delay Time (default = 5 seconds)
LFD	Cooling Airflow Off Delay Time. (default = 60 seconds)
Est	Percentage of high stage cooling airflow to run during low stage operation. (default = 70%)
dHS	Electric heat operation during defrost. 1 = low stage 2 (default) = high stage
Htf	Heat Pump Indoor Airflow Trim (default = 0%)
HFD	Heat Pump Heating Airflow Off Delay Time (default = 60 seconds)
HND	Heat Pump Heating Airflow On Delay Time (default = 5 seconds)
HSt	Percentage of high stage heat pump heating airflow to run during low stage operation. (default = 70%)
EHA	When heat pump heating and electric heat are running at the same time, this percentage is used for additional airflow trim
dHE	Enables or disables dehumidification feature in the outdoor unit. (default = Enabled)
LbP	Balance point temperature. The Compressor will not operate below temperature. (Default = 0°F)
EbP	Backup Heat Balance Points
Hdl	Compressor run time between defrost cycles. (default = 30 minutes) (2 stage units)
LdL	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)
tst	Menu is enabled if the EF5 menu is set to 6. Select the target time the system will attempt to satisfy the thermostat.
SUP	Menu is enabled if the EF5 menu is set to 6. Select the percentage past the target time when the system will enable electric heat operation during heat mode.
Dtt	Menu is enabled if the EF5 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 EF5 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 EF5 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)

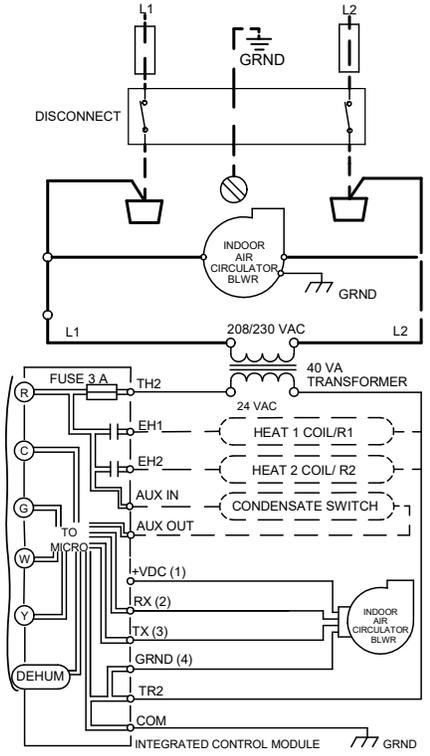
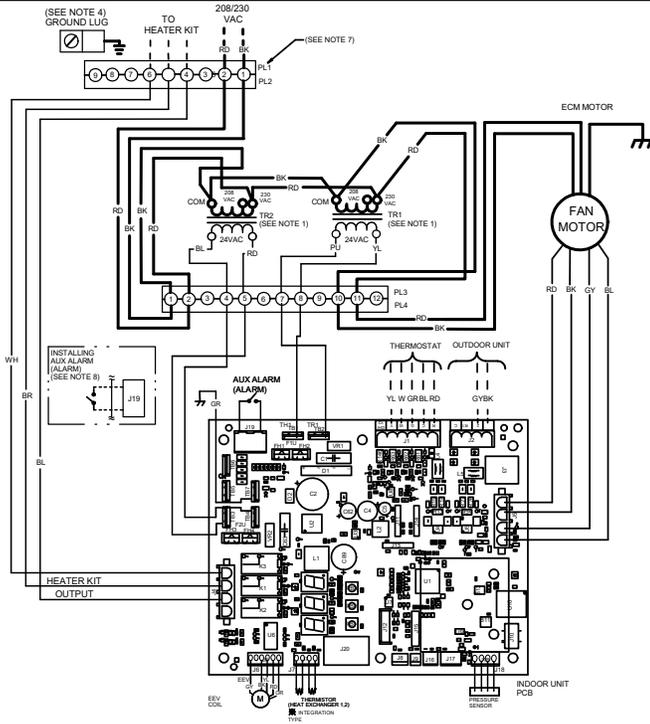
<b>LED Display</b>	<b>Description of System Status</b>
<i>I dL</i>	Idle
<i>FA<sub>n</sub></i>	Constant Fan
<i>AC</i>	Compressor Cooling, Single-Stage (non-comm. units)
<i>1AC</i>	Compressor Cooling, Low Stage (non-comm units)
<i>2AC</i>	Compressor Cooling, High Stage (non-comm units)
<i>AC 1</i>	Compressor 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>1AC</i>	Compressor Heat, Low Stage (non-comm Units)
<i>2AC</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

# 28 WIRING DIAGRAM

**NOTE:** THESE INSTRUCTIONS ARE SPECIFICALLY FOR AVPEC MODELS. DO NOT ATTEMPT TO APPLY THESE DIAGRAMS FOR ANY OTHER MODELS.



**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.



- NOTES:**
1. PLACE RED WIRES ON 208 V TERMINAL OF 2-TRANSFORMER (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 GROUNDING AND CONFORM TO N.E.C AND LOCAL CODES.
  5. TO RECALL THE LAST 6 FAULTS, MOST RECENT TO LEAST RECENT, DEPRESS FAULT RECALL BUTTON FOR MORE THAN 2 SECONDS WHILE IN STANDBY (NO THERMOSTAT INPUTS)
  6. YELLOW STATUS LED PROVIDES NETWORK STATUS. GREEN RX LED INDICATES NETWORK TRAFFIC
  7. DISCARD CONNECTOR PL1 WHEN INSTALLING OPTIONAL HEAT KIT.
  8. REMOVE SHORTING PLATE FROM THE AUX SWITCH TERMINAL WHEN INSTALLING AUX ALARM SWITCH.
  9. USE N.E.C CLASS 2 WIRE.

- INTEGRATED CONTROL:**
- LOW VOLTAGE ———
  - LOW VOLTAGE FIELD - - -
  - HIGH VOLTAGE ———
  - HIGH VOLTAGE FIELD - - -
  - JUNCTION —
  - TERMINAL —
  - INTERNAL TO ———
  - RESISTOR —
  - OVERCURRENT PROT. DEVICE —
  - PLUG CONNECTION —
  - EQUIPMENT GND —
  - FIELD GROUND —

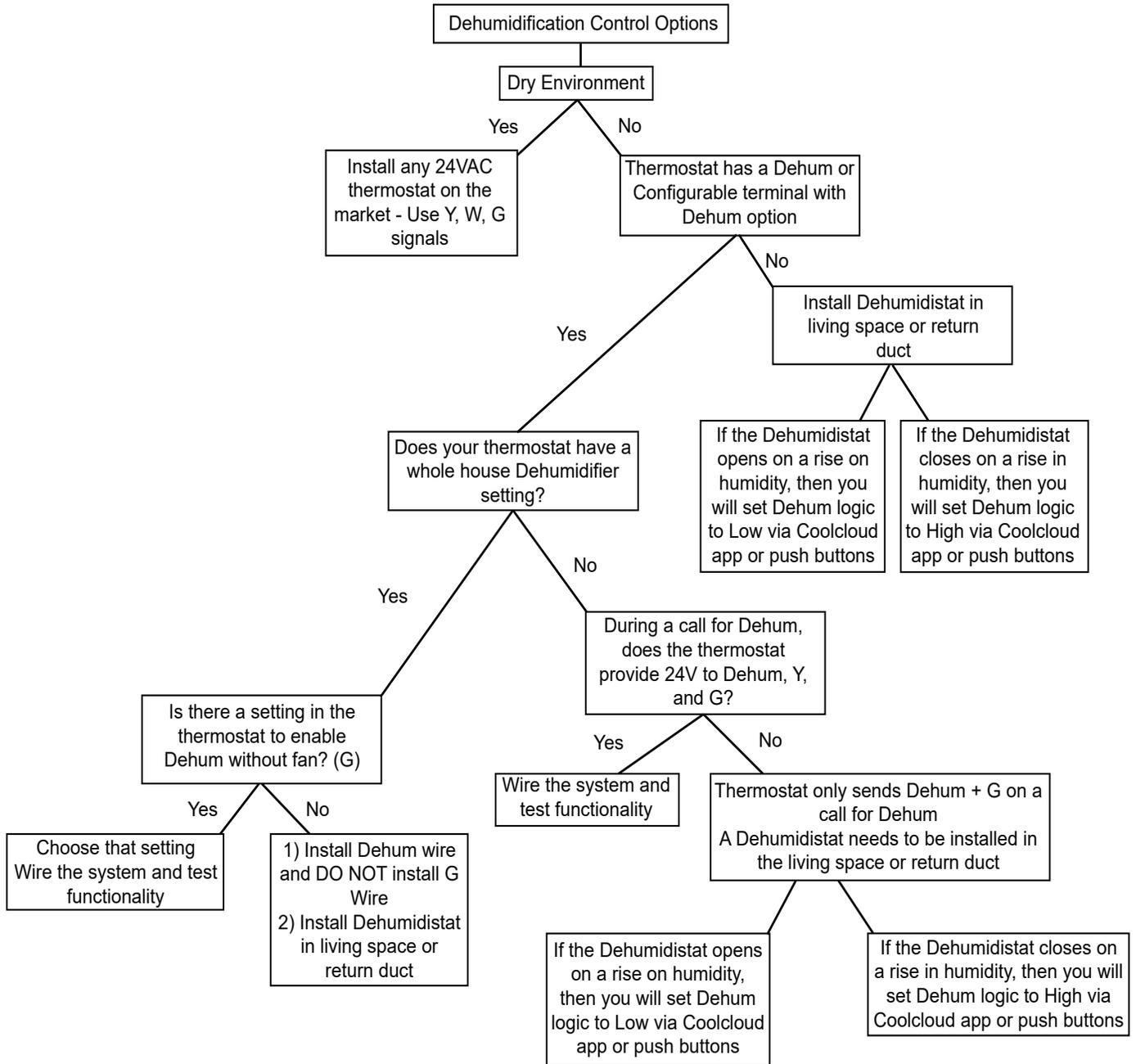
- COLOR CODES:**
- BL - BLUE
  - RD - RED
  - YL - YELLOW
  - OR - ORANGE
  - BK - BLACK
  - GY - GREY
  - BR - BROWN
  - GR - GREEN
  - PU - PURPLE
  - WH - WHITE

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



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## 29 DEHUMIDIFICATION CONTROL OPTIONS



## 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.

 **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.



### 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

 **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.**

- 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.

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**CUSTOMER FEEDBACK**

We are very interested in all product comments.

Please fill out the feedback form on one of the following links:

Goodman® Brand Products: (<http://www.goodmanmfg.com/about/contact-us>).

Amana® Brand Products: (<http://www.amana-hac.com/about-us/contact-us>).

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



GOODMAN® BRAND



AMANA® BRAND

**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.

For Product Registration, please register as follows:

Goodman® Brand products: (<https://www.goodmanmfg.com/product-registration>).

Amana® Brand products: (<http://www.amana-hac.com/product-registration>).

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



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