Installation, Operation, and Maintenance

Variable Refrigerant Flow (VRF) System

Convertible Air Handler: 2–5 Ton

4TVM0024B100N*
4TVM0030B100N*
4TVM0036B100N*
4TVM0042B100N*
4TVM0048B100N*
4TVM0060B100N*

⚠ SAFETY WARNING

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.

March 2017

VRF-SVX038B-EN

Ingersoll Rand

Introduction

Read this manual thoroughly before operating or servicing this unit.

Warnings, Cautions, and Notices

Safety advisories appear throughout this manual as required. Your personal safety and the proper operation of this machine depend upon the strict observance of these precautions.

The three types of advisories are defined as follows:

⚠ WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It could also be used to alert against unsafe practices.
NOTICE	Indicates a situation that could result in equipment or property-damage only accidents.

Important Environmental Concerns

Scientific research has shown that certain man-made chemicals can affect the earth's naturally occurring stratospheric ozone layer when released to the atmosphere. In particular, several of the identified chemicals that may affect the ozone layer are refrigerants that contain Chlorine, Fluorine and Carbon (CFCs) and those containing Hydrogen, Chlorine, Fluorine and Carbon (HCFCs). Not all refrigerants containing these compounds have the same potential impact to the environment. Trane advocates the responsible handling of all refrigerants-including industry replacements for CFCs and HCFCs such as saturated or unsaturated HFCs and HCFCs.

Important Responsible Refrigerant Practices

Trane believes that responsible refrigerant practices are important to the environment, our customers, and the air conditioning industry. All technicians who handle refrigerants must be certified according to local rules. For the USA, the Federal Clean Air Act (Section 608) sets forth the requirements for handling, reclaiming, recovering and recycling of certain refrigerants and the equipment that is used in these service procedures. In addition, some states or municipalities may have additional requirements that must also be adhered to for responsible management of refrigerants. Know the applicable laws and follow them.

⚠ WARNING

Proper Field Wiring and Grounding Required!

Failure to follow code could result in death or serious injury.

All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state/national electrical codes.

⚠ WARNING

Personal Protective Equipment (PPE) Required!

Failure to wear proper PPE for the job being undertaken could result in death or serious injury.

Technicians, in order to protect themselves from potential electrical, mechanical, and chemical hazards, MUST follow precautions in this manual and on the tags, stickers, and labels, as well as the instructions below:

- **Before installing/servicing this unit, technicians MUST put on all PPE required for the work being undertaken (Examples; cut resistant gloves/sleeves, butyl gloves, safety glasses, hard hat/bump cap, fall protection, electrical PPE and arc flash clothing). ALWAYS refer to appropriate Material Safety Data Sheets (MSDS)/Safety Data Sheets (SDS) and OSHA guidelines for proper PPE.**
- **When working with or around hazardous chemicals, ALWAYS refer to the appropriate MSDS/SDS and OSHA/GHS (Global Harmonized System of Classification and Labelling of Chemicals) guidelines for information on allowable personal exposure levels, proper respiratory protection and handling instructions.**
- **If there is a risk of energized electrical contact, arc, or flash, technicians MUST put on all PPE in accordance with OSHA, NFPA 70E, or other country-specific requirements for arc flash protection, PRIOR to servicing the unit. NEVER PERFORM ANY SWITCHING, DISCONNECTING, OR VOLTAGE TESTING WITHOUT PROPER ELECTRICAL PPE AND ARC FLASH CLOTHING. ENSURE ELECTRICAL METERS AND EQUIPMENT ARE PROPERLY RATED FOR INTENDED VOLTAGE.**

⚠ WARNING

Follow EHS Policies!

Failure to follow instructions below could result in death or serious injury.

- **All Ingersoll Rand personnel must follow Ingersoll Rand Environmental, Health and Safety (EHS) policies when performing work such as hot work, electrical, fall protection, lockout/tagout, refrigerant handling, etc. All policies can be found on the BOS site. Where local regulations are more stringent than these policies, those regulations supersede these policies.**
- **Non-Ingersoll Rand personnel should always follow local regulations.**

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Revision History

Revision	Description
B	The digit 14 change to the unit model number represents a firmware revision which enables compatibility between the indoor unit and the second generation outdoor unit (ODU) series (model numbers 4TVH/R****D, 4TVP****C); and the second generation mode control unit (MCU) series model numbers 4MCUTV****A. Additional miscellaneous corrections were made for consistency and accuracy.

Table of Contents

Model Number Description

4	T	V	M	0	0	2	4	B	1	0	0	N	*
1	2	3	4	5	6	7	8	9	10	11	12	13	14

Digit 1 — Refrigerant

4 = R410A

Digit 2 — Brand name

T = Trane

Digit 3 — System type

V = Variable Refrigerant Flow

Digit 4 — Configuration type

M = Convertible air handling unit type

Digit 5 — Reserved for future use

0 = Not currently used

Digit 6, 7, 8 — Nominal capacity (Btu/h x 1,000)

024 = 24,000 Btu/h

030 = 30,000 Btu/h

036 = 36,000 Btu/h

042 = 42,000 Btu/h

048 = 48,000 Btu/h

060 = 60,000 Btu/h

Digit 9 — Major development sequence

A = First development sequence

B = Second development sequence

C = Third development sequence

Digit 10 — Electric power supply characteristics

1 = 208–230/60/1

Digit 11 — Reserved for future use

0 = Not currently used

Digit 12 — Reserved for future use

0 = Not currently used

Digit 13 — Region of sale

N = North America (UL or ETL)

Digit 14 — Minor design sequence

A = First design sequence

B = Second design sequence

C = Third design sequence

D = Fourth design sequence

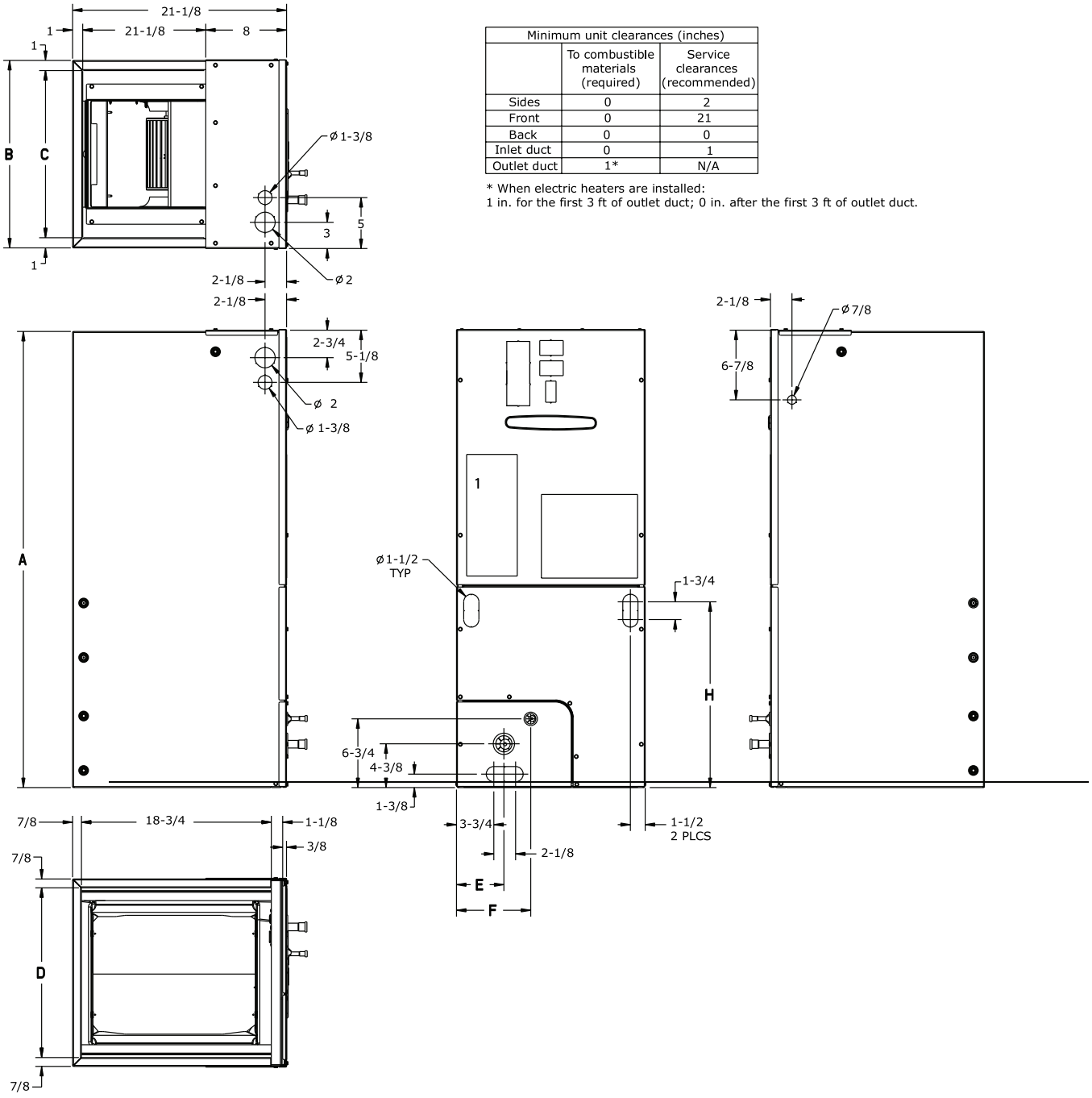
Preparing for Installation

Location Considerations

When deciding on a location for the indoor unit, the following factors must be considered:

- The air inlet and outlet must be unobstructed.
- Choose a flat surface where the structure can bear the weight and vibration of the indoor unit.
- Pre-plan for easy and short routing of the refrigerant tubing and wiring to the outdoor unit.
- The air must circulate freely in the area to be cooled/heated.
- Sufficient clearance must be maintained around the unit.
- Condensate must be managed correctly and safety stored away from the unit.
- The unit should be installed in a way that prevents unauthorized access.
- The unit must not be installed in an area that is damp or could come into contact with water (such as a laundry room).
- The unit must not be exposed to direct sunshine or to other direct heat sources.
- The filter must be able to be removed and cleaned easily.
- The unit should be placed as far as possible from fluorescent lights so the remote control is not subject to interference.
- Care should be taken to prevent harmonics generated by loose or unsupported material in close proximity to a running unit.
- The unit must not be installed in an area that is exposed to salt, machine oil, sulfide gas, or corrosive environmental conditions.

Unit Dimensions



Minimum unit clearances (inches)		
	To combustible materials (required)	Service clearances (recommended)
Sides	0	2
Front	0	21
Back	0	0
Inlet duct	0	1
Outlet duct	1*	N/A

* When electric heaters are installed:
1 in. for the first 3 ft of outlet duct; 0 in. after the first 3 ft of outlet duct.

Air handler model	A	B	C	D	E	F	H	Flow control	Gas line braze
4TVM0024, 30, 36	45	18-1/2	16-1/2	16-3/4	4-5/8	7-3/8	18-3/8	TXV	3/4
4TVM0042, 48, 60	51-1/4	23-1/2	21-1/2	21-3/4	7	9-5/8	24-5/8	TXV	7/8

Note: *All dimensions are in inches.*

Clearances

Note: *Clearances listed in this manual are minimum for system operation. All installations shall comply with codes and standards adopted by the Authority Having Jurisdiction (AHJ).*

Recommended Service Clearances

Provide a minimum of 21 inches in front of the unit for access to the control box, heating elements, blower, and air filters.This access may be provided by a closet door or by locating the appliance so that a wall or partition is not less than 21 inches from the front access panel (refer to Figure 1, p. 9).

Table 1. Recommended service clearances

Back	Sides	Front		Inlet duct
		Alcove	Closet	
0	2	21 in.	6 in.	1

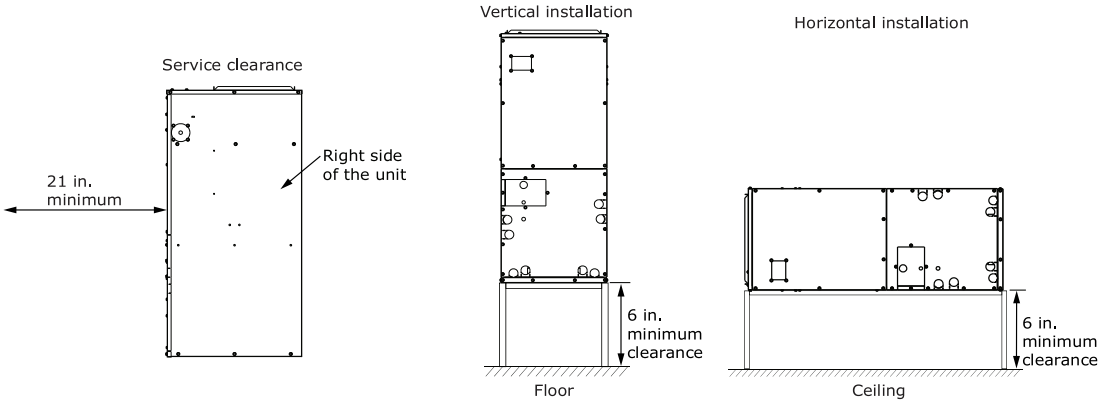
Required Combustible Material Clearances

The unit is approved for 0 in. of clearance from combustible material on any part of the indoor unit exterior casing and the inlet or outlet ducts provided that an electric heater is not being used. When an electric heater is installed in the unit, a minimum clearance of 1 in. is required for the first 3 ft from the supply plenum and supply air duct.

Drainage Slope

Ensure that 6 inches minimum of space exists at the bottom of the unit so that a downward slope of 1:100 is maintained for drain piping. (Refer to Figure 1, p. 9.)

Figure 1. Clearances



Application Options

The unit is shipped from the factory ready to be installed in an upflow or horizontal left (right to left air flow) position. The unit is field convertible to a horizontal right (left to right) air flow position.

Upflow Applications

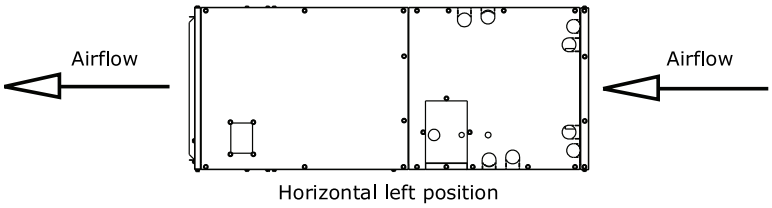
In upflow applications, the discharge outlet is at the top of the unit.

Horizontal Applications

Horizontal left position (right to left)

The unit is shipped ready to be installed without modification in a horizontal left position. Horizontal left means that when the unit is laid on its side and you are facing the unit, the supply air opening is to the left and the return air opening is to the right. (Refer to Figure 2, p. 10.)

Figure 2. Horizontal left position



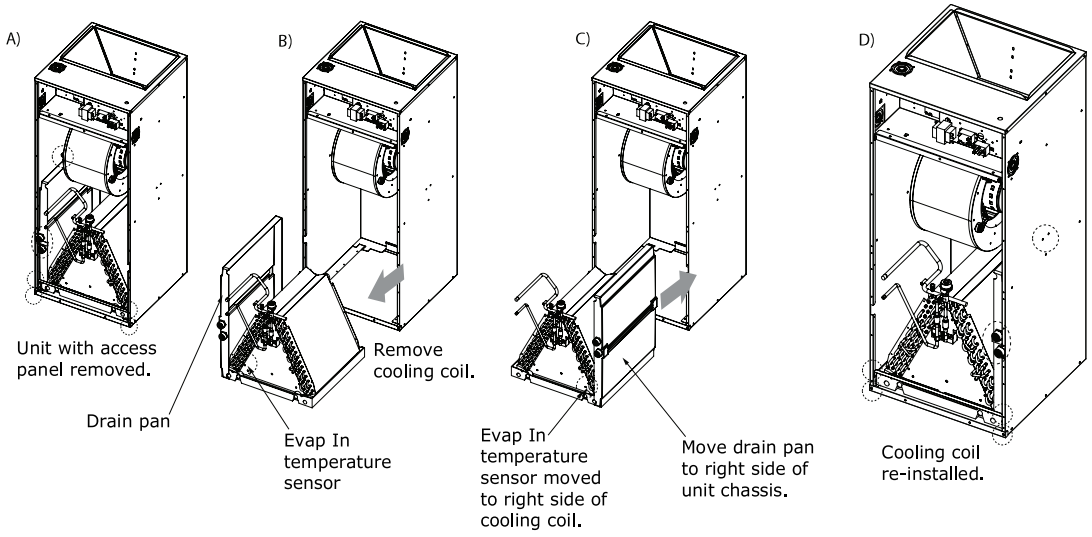
Horizontal right position (left to right)

Horizontal right position means that when the unit is laid on its side and you are facing the unit, the supply air opening is to the right and the return air opening is to the left. To install the unit in a horizontal right position, follow this procedure and refer to Figure 3, p. 10.

Note: *For more detailed instructions, refer to "Coil Conversion Instructions," p. 34.*

1. Remove the unit access panels; see A).
2. Remove the cooling coil after disassembling the coil bracket and plate; see B).
3. Move the condensate drain pan to the right side of the cooling coil and re-insert into the air handler chassis; see C).
4. Move the Evap In temperature sensor to holder of the right side of cooling coil; see C).
5. Re-install the cooling coil; see D).

Figure 3. Modifying unit for horizontal right position



Installation

Review "Installation Considerations" before proceeding with installation.

Note: *If the unit is to be installed in an upflow position, it must comply with the minimum clearance specified in Figure 1, p. 9.*

1. Ensure that openings with a minimum of 200 in^2 have been made for return air to enter the unit.

   Important: *Failure to comply may cause a reduction in the amount of return air available to the blower. Insufficient heating and cooling may result. The reduced air flow may cause the indoor unit to cycle on thermal limits, causing premature heating element failure if an electric heat kit is installed.*

2. Remove the blower and control box access panel. Save the screws.
3. Remove the coil compartment access panel. Save the screws.
4. Place the unit into position by sliding it over the duct opening until the opening I the unit lines up with the opening in the floor.
5. Secure the unit to the floor by drilling two holes through the unit base at the left and right front inside corners of the cabinet. Use two screws to secure the unit to the floor.
6. Use caulk and/or tape to seal between the floor base and the opening on the unit or between the opening on the unit and the duct in the floor.
7. Connect the supply air outlet to a plenum to the top of the unit and secure it with screws. use a non-tape sealant such as mastic or an aerosol sealant to seal duct leakage.
8. If installed in a basement, run supply and return duct work in accordance with local codes.

Return Air Filter

A filter must be used to cover the return air opening. Ensure that it is sealed to prevent air by-passing the filter. Filter location options are shown in Figure 4, p. 12 and Figure 5, p. 12. Minimum filter sizes are shown in Table 2, p. 11.

Table 2. Filter sizes

Standard disposable air filter @300 ft/ min lor less	Pleated air filter @500 ft/min or less
800 CFM = 20 x 20 x 1	800 CFM = 16 x 16 x 1

Figure 4. Options for return air openings and filter locations: upflow position

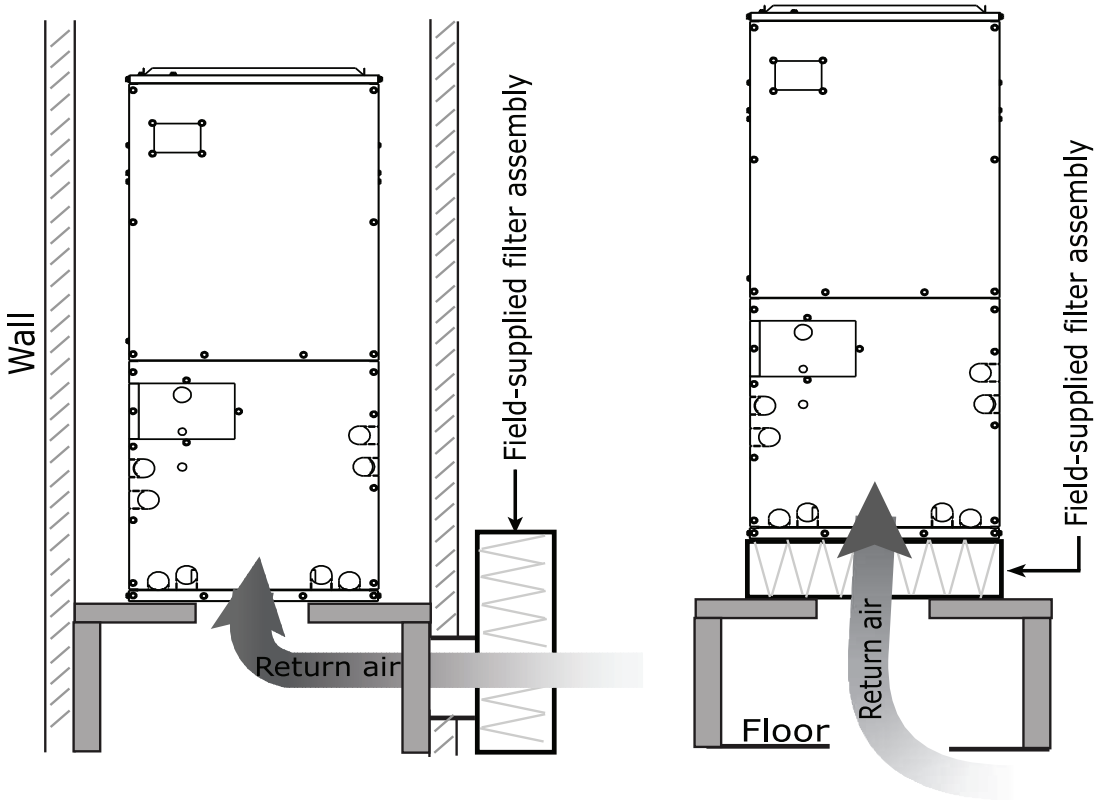
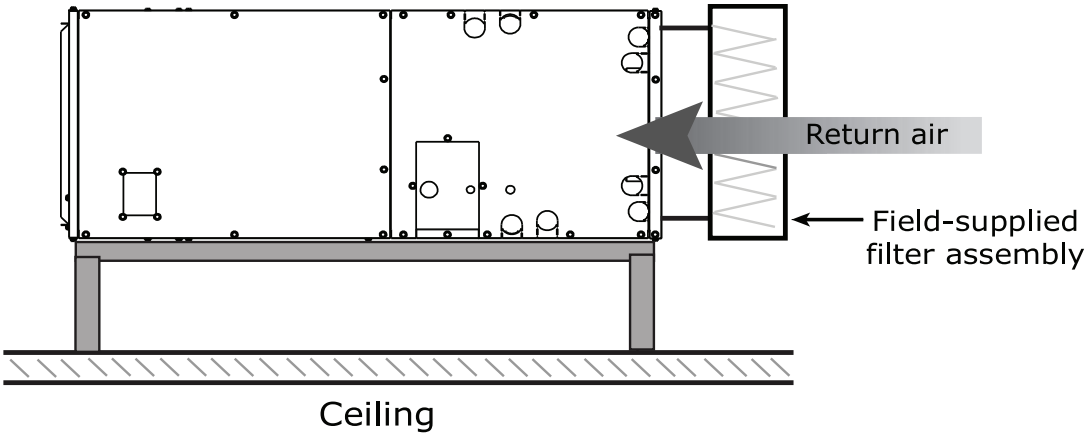


Figure 5. Options for return air openings and filter locations: horizontal position

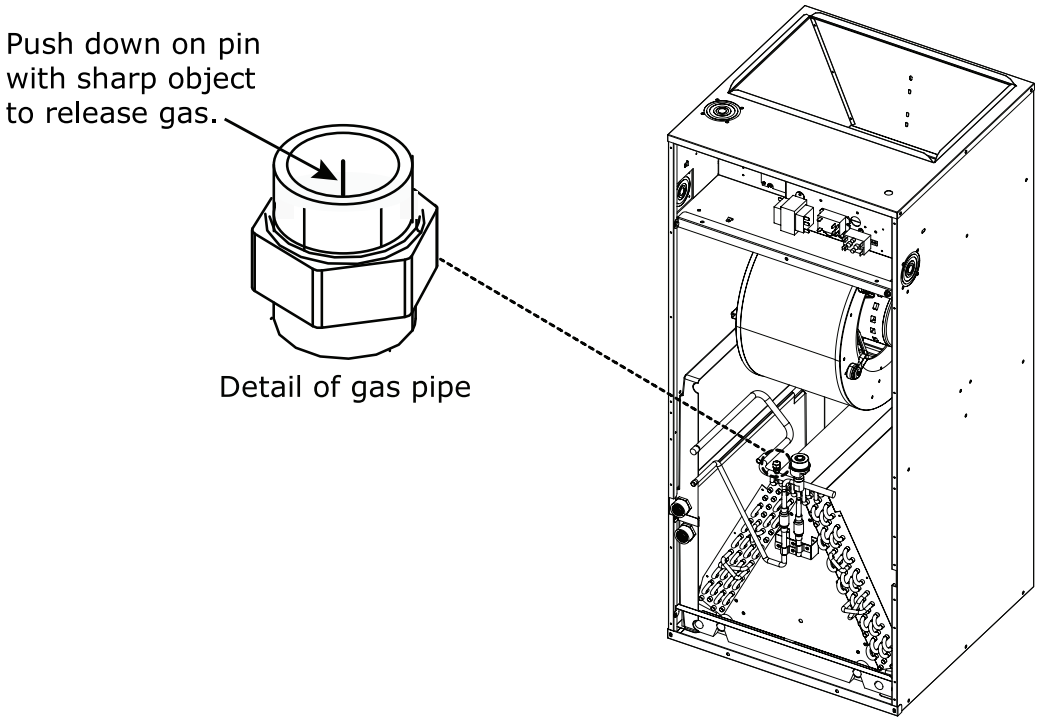


Purging the Unit

The unit is shipped from the factory with a holding charge of nitrogen. All of this gas must be purged from the unit.

1. Remove the cap from the gas pipe.
2. Using a sharp object, push down on the pin in the center of the pipe and release the gas from the unit. Make sure all gas has escaped before connecting the piping.

Note: *o prevent dirt or foreign objects from getting into the pipes during installation, do not remove the cap from the pipe until you are ready to connect the piping.*



Installing Refrigerant Piping

Connect field-supplied piping using flared connections (not supplied) or by brazing. The large unit port is for gas refrigerant; the small one is for liquid refrigerant. Cut or extend field-supplied piping as needed. Use the following procedures.

NOTICE

System Damage!

Failure to follow this procedure could result in system damage.

If brazing is used for connecting pipes, a nitrogen purge is required to prevent the formation of copper oxides inside the piping.

- Before connecting the pipes, make sure they are free of dirt and debris.
- Use insulated, unwelded, degreased, and deoxidized copper pipe (Cu-DHP type according to ISO 1337 or UNI EN 12735-1) suitable for an operating pressure of at least 609.15 psi and a burst pressure of at least 3002.28 psi. Copper pipe for hydro-sanitary applications is unsuitable.
- For sizing and limits (height difference, line length, maximum bends, refrigerant charge, and so on) see the outdoor unit installation manual.
- All refrigerant connections must be accessible for servicing and maintenance.

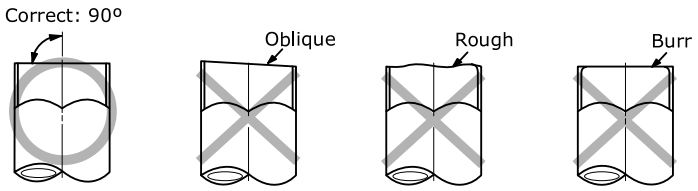
Pipe Cutting

Required tools:

- Pipe cutter
- Reamer
- Pipe holder

1. Using a pipe cutter, cut the pipe so that the cut edge is at 90° to the side of the pipe.
2. Use a reamer to remove all burrs at the cut edge.

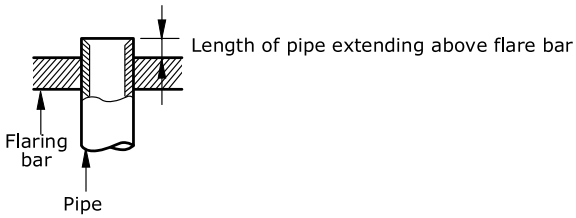
   See examples of correctly and incorrectly cut pipes.

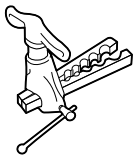
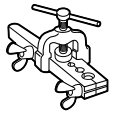


Flared Pipe Connections

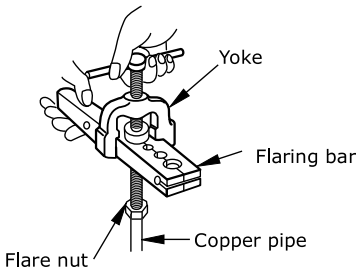
Clutch type and wing nut type flare tools are available for flared pipe connections.

1. Slide the flare nut over the pipe to be flared.
2. Slide the end of the pipe into the hole on the flaring bar that fits the pipe, leaving a length of pipe, determined by tool type (see table), extending above the flaring bar. Clamp it down.

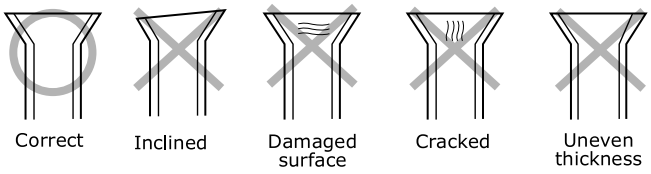


R-410A clutch type	Conventional flare tool	
	Clutch type	Wing nut type
0–0.020 in.	0.04–0.06 in.	0.6–0.08 in.
		

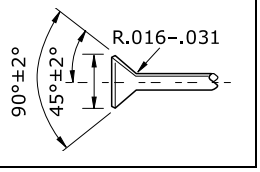
3. Attach the yoke to the flaring bar, centering the conical part over the end of the pipe that is extending above the flaring bar.
4. Tighten the yoke securely to flare the end of the pipe.



5. Remove the pipe. The end of the pipe that you flared should look like the end of a trumpet. See examples of correctly and incorrectly flared pipes.



6. Align the pipes and tighten the flare nuts manually and then with a spanner torque wrench, applying the torque according to pipe dimensions:

Outer diameter in.	Connection torque (ft-lb)	Flare dimension (in.)	Flare shape (in.)
1/4	10.3–13.3 ft·lb	0.34–0.36	
3/8	25.1–31.0 ft·lb	0.50–0.52	
1/2	36.1–45.0 ft·lb	0.64–0.65	
5/8	50.2–60.5 ft·lb	0.76–0.78	

Leak Testing Pipe Connections

⚠ WARNING

Confined Space Hazards!

Failure to follow instructions below could result in death or serious injury.

Do not work in confined spaces where refrigerant or other hazardous, toxic or flammable gas may be leaking. Refrigerant or other gases could displace available oxygen to breathe, causing possible asphyxiation or other serious health risks. Some gases may be flammable and or explosive. If a leak in such spaces is detected, evacuate the area immediately and contact the proper rescue or response authority.

⚠ WARNING

Explosion Hazard!

Failure to follow safe leak test procedures below could result in death or serious injury or equipment or property-only-damage.

Never use an open flame to detect gas leaks. Use a leak test solution for leak testing.

⚠ WARNING

Explosion Hazard!

Failure to follow these instructions could result in death or serious injury or equipment or property-only damage.

Use only dry nitrogen with a pressure regulator for pressurizing unit. Do not use acetylene, oxygen or compressed air or mixtures containing them for pressure testing. Do not use mixtures of a hydrogen containing refrigerant and air above atmospheric pressure for pressure testing as they may become flammable and could result in an explosion. Refrigerant, when used as a trace gas should only be mixed with dry nitrogen for pressurizing units.

⚠ WARNING

Explosion Hazard!

Failure to follow instruction below could result in death or serious injury.

Do not exceed unit nameplate design pressures when leak testing system.

Notes:

- *All required piping pressure tests must be completed in accordance with national and/or local codes.*
- *When leak-testing refrigerant systems, observe all safety precautions.*
- *Leak test only one circuit at a time to minimize system exposure to potentially harmful moisture in the air.*
- *Use R-410A refrigerant gas as a tracer for leak detection and use oil-pumped dry nitrogen to develop required test pressures.*

1. Close liquid line angle valve.
2. Connect R-410A refrigerant cylinder to high side charging port (at condenser or field supplied discharge line access port). Add refrigerant to reach pressure of 12 to 15 psig.
3. Disconnect refrigerant cylinder. Connect dry nitrogen cylinder to high side charging port and increase pressure to 150 psig. Do not exceed high side (discharge) unit nameplate design pressure. Do not subject low side (suction) components to high side pressure.
4. Check all piping joints, valves, etc. for leaks. Recommend using electronic detector capable of measuring 0.1 oz/year leak rate.
5. If a leak is located, use proper procedures to remove the refrigerant/nitrogen mixture, break connections and make repairs. Retest for leaks.
6. Make sure all service valves are open.

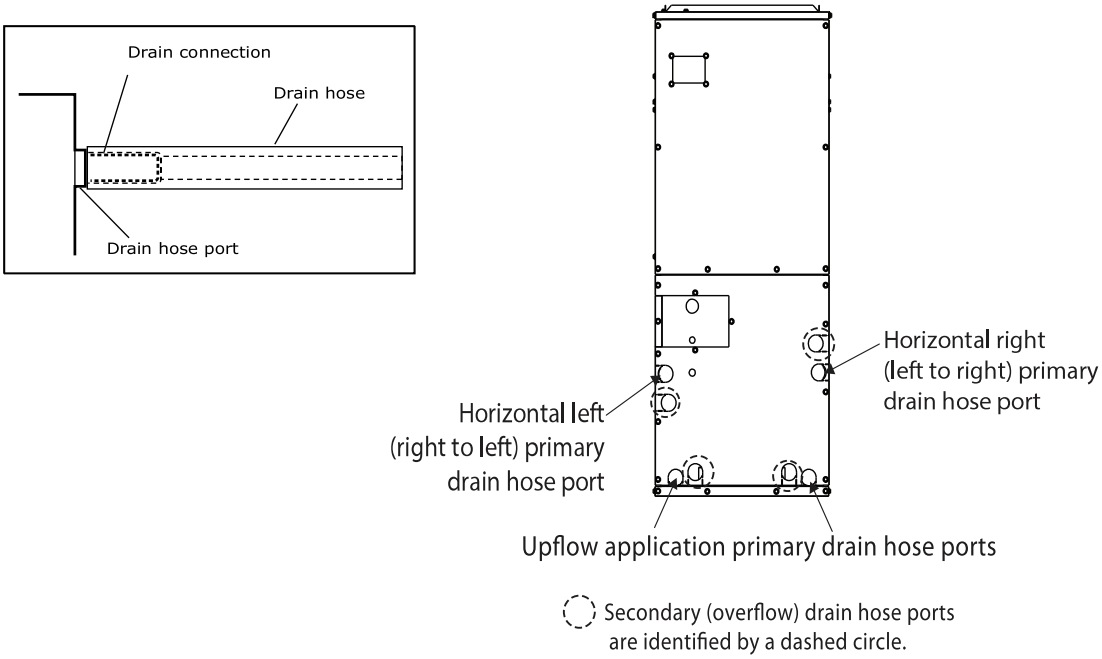
Installing the Drain System

The indoor unit "A" coil drain pan has ¾ in. NPT female connections: two primary and two secondary (left and right sides).The horizontal drain pan has two ¾ in. NPT female (one primary and one secondary) connections.

Figure 6, p. 16 shows the four primary and four secondary (overflow) drain hose port locations. The configuration of the unit will determine which drain hose port location to use.

Important: *In all horizontal applications in which the unit is installed above a finished ceiling and/or living space, a secondary drain pan (field supplied) is recommended to be installed under the unit to avoid damage to the ceiling in the event of condensate overflow.*

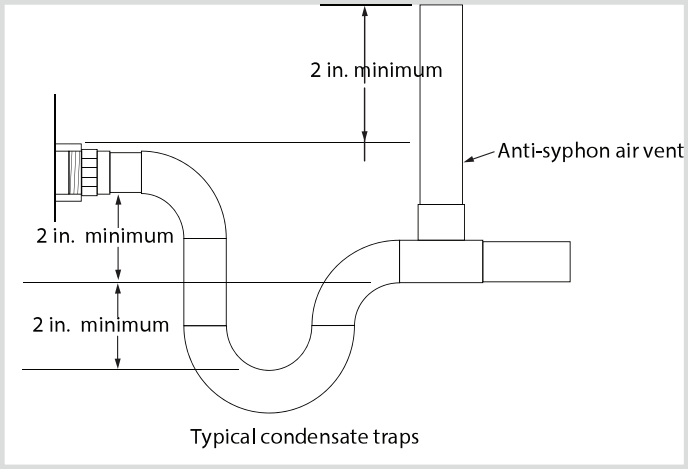
Figure 6. Drain hose port locations



Follow this procedure:

1. Push the supplied drain hose as far as possible over the drain hose port. Do not apply excessive force to the piping on the unit side when connecting the drain hose.
2. Wrap the insulation (supplied) around the drain hose and clamp the connection as tightly as possible until you can see at least 8 holes.
3. Install the drain pipe into the drain hose. Secure it with PVC adhesive and clamps as necessary to ensure a tight fit with no leakage.
4. To prevent condensate from being drawn into the blower, install traps on the primary (main) and secondary (overflow) drain lines. Piping from each fitting should have 2 in. minimum trap and each run in such a manner as to provide enough slope (1:100) for adequate drainage to a visible area. See Figure 7, p. 17.

Figure 7. Trap requirements



Notes:

- *Do not pipe these two fittings together into a common drain.*
- *Prime drain with water before operating the unit by pouring water into the condensate pan.*
- *Cap unused drain piping connections.*

Testing the Drainage

After completing the installation, test the drainage to make sure there are no leaks:

1. Operate the unit in cool mode.
2. Squirt water into the drain pan.
3. Confirm that the water flows out through the drain hose and that no leakage occurs at any of the connections.

Insulation

After determining that there are no leaks in the refrigerant pipes or drainage hose, insulate them as described in the following sections.

Insulating Refrigerant Pipes

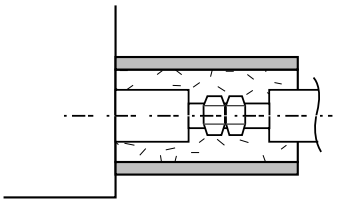
1. Use the table below to select the insulation size according to pipe size.

Pipe	Pipe size (in.)	Insulation, EPDM or NBR (in.)	
		Standard conditions (86°F [30°C], 85%)	High humidity conditions[a] (86°F [30°C], 85%)
Liquid pipe	1/4 – 3/8	3/8	3/8
	1/2 – 2	1/2	1/2
Gas pipe[b]	1/4		3/4
	3/8 – 1	3/4	1
	1-1/8 – 1-3/4		1-1/4
	2	1	1-1/2

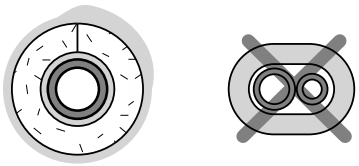
[a] When installing insulation in any of the following environments, use insulation required for high humidity conditions: Buildings with close proximity to bodies of water or hot springs or on the side of a hill in which the building is partly covered by earth; ceilings frequently exposed to moisture such as in restaurants, saunas, swimming pools, and corridors of dormitories or studios near a frequently-used outdoor exit; buildings with no ventilation system.

[b] Internal temperature of gas pipe is higher than 248°F (120°C).

2. Wrap insulation around the entire surface of each pipe, from the indoor unit to the outdoor unit, overlapping insulation to avoid gaps. Clamp insulation tightly to pipe.



- Do not wrap the gas and liquid refrigerant pipes together.



- Avoid compressing the insulation as much as possible.
- Be sure there are no cracks or deformities in the insulation at bends in pipes.
- If necessary double the insulation to prevent condensation from forming in warm or humid areas.
- Cut off excess insulation.

Insulating the Drain System

Insulate (field supplied) the entire surface of the drain pipe that is inside the building, including the connection between the drain hose and drain stub. Clamp tightly.

Wiring the Unit

⚠ WARNING

Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Verify that no power is present with a voltmeter.

NOTICE

Use Copper Conductors Only!

Failure to use copper conductors could result in equipment damage as unit terminals are not designed to accept other types of conductors.

- Make all electrical connections in accordance with electrical codes and ordinances.
- Select the power cable in accordance with relevant local and national regulations.
- Wire size must comply with local and national code.
- Use grade H07RN-F or H05RN-F power cable.
- Connect the power cable into the power cable terminal and fasten it with a clamp.
- Unbalanced power must be maintained within 10% of supply rating among whole indoor units.
- Significantly unbalanced power may shorten the life of the system. If the unbalanced power is greater than 10% of supply rating, the unit will stop and an error code will be generated.
- Connect the power cable to the auxiliary circuit breaker. An all-pole disconnection from the power supply must be incorporated in the field wiring (1/8 in.).
- All wiring must be protected from weather and damage.
- Maintain a distance of 2 in. or more between power and communications cables to prevent interference.
- Maintain a voltage drop of less than 10% between the power source and the unit(s).
- Use an appropriate screwdriver for tightening the terminal screws. A screwdriver with a small head will strip the head and make proper tightening impossible.
- Over-tightening the terminal screws may break them.
- Tightening torque for M4 screws: 0.86–1.06 lbf·ft.
- After making a knockout hole, apply rust-preventive paint to the bare metal around the hole.
- Secure the cable conduit to the outdoor knockout using the proper connector and bushing.

Power Wiring

Connect high-voltage supply wire to each indoor unit as follows. Refer to Figure 8, p. 20 and Figure 9, p. 20.

1. Connect the black supply wire to high-voltage terminals 1(L).
2. Connect the white supply wire to high-voltage terminals 2(N).
3. Connect the green wire to the ground lug, leaving slack in the ground wire to allow service to the unit without disconnecting the ground wire.

Figure 8. Wiring diagram for individual control

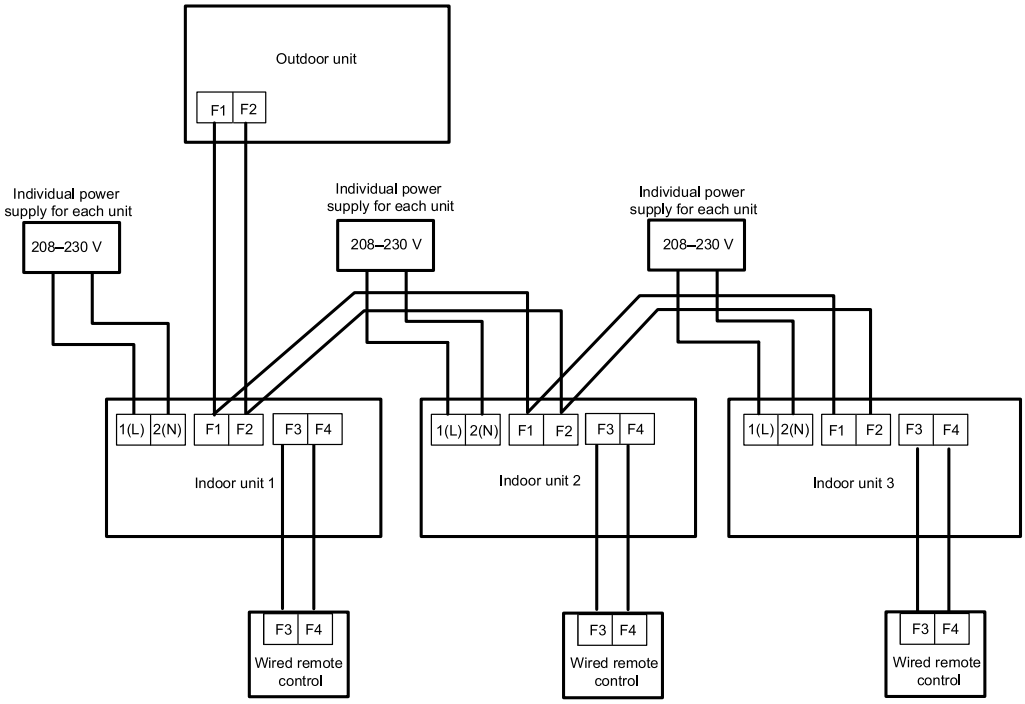
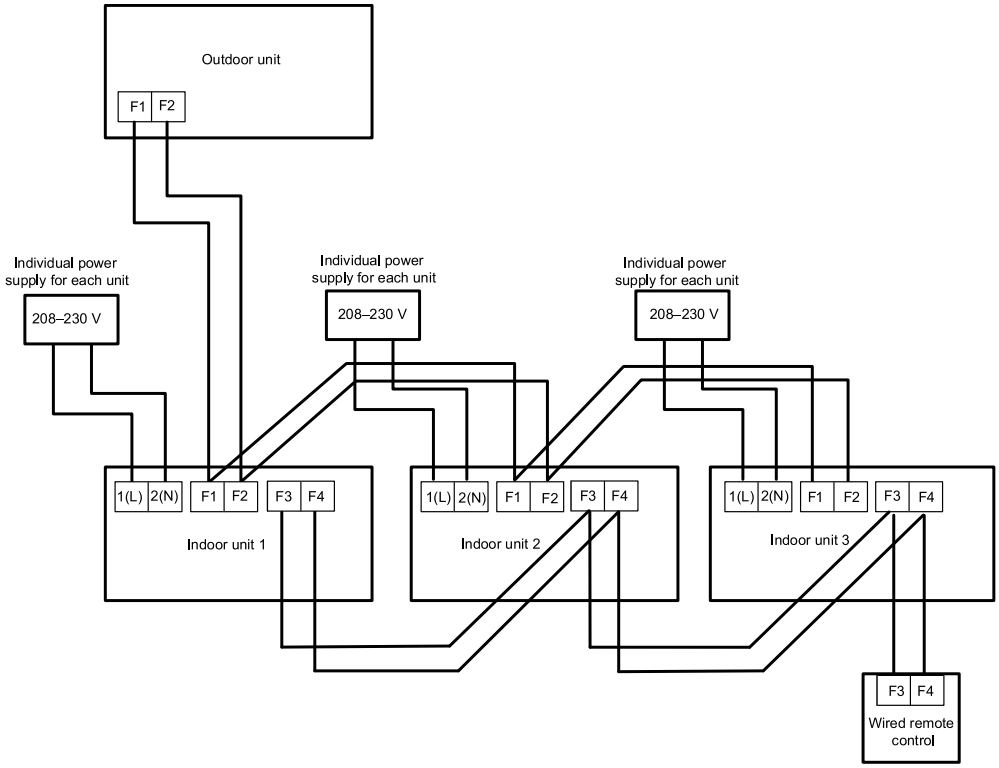


Figure 9. Wiring diagram for group control



Field Wiring

Refer to VRF-SVN075*-EN, which ships with the separate controller (4TVCTRLAHU0001) required for use with the 4TVM 2–5 ton air handling unit.

Figure 10. Field wiring

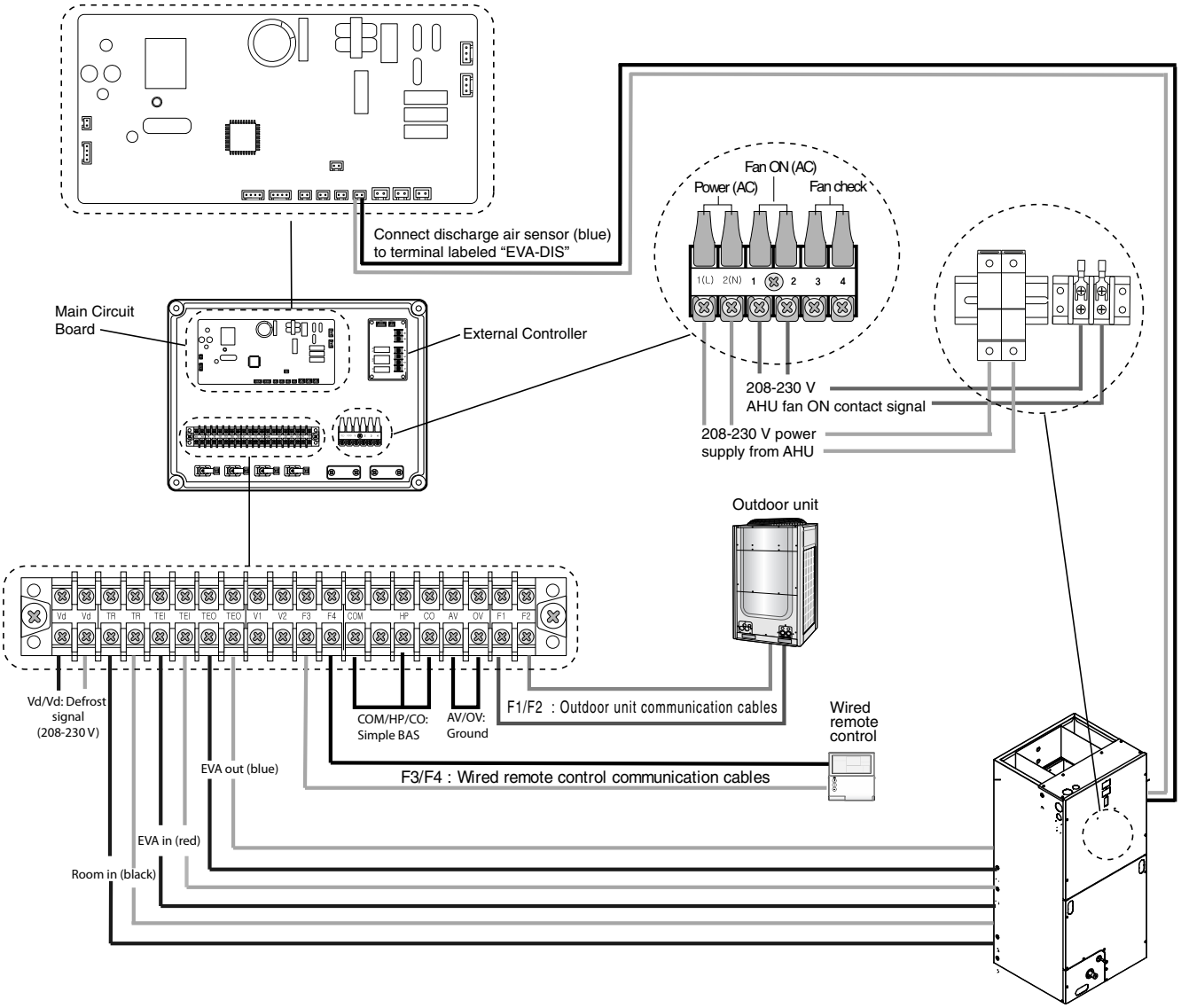


Figure 11. 4TVM unit with AHU kit and no electric heat

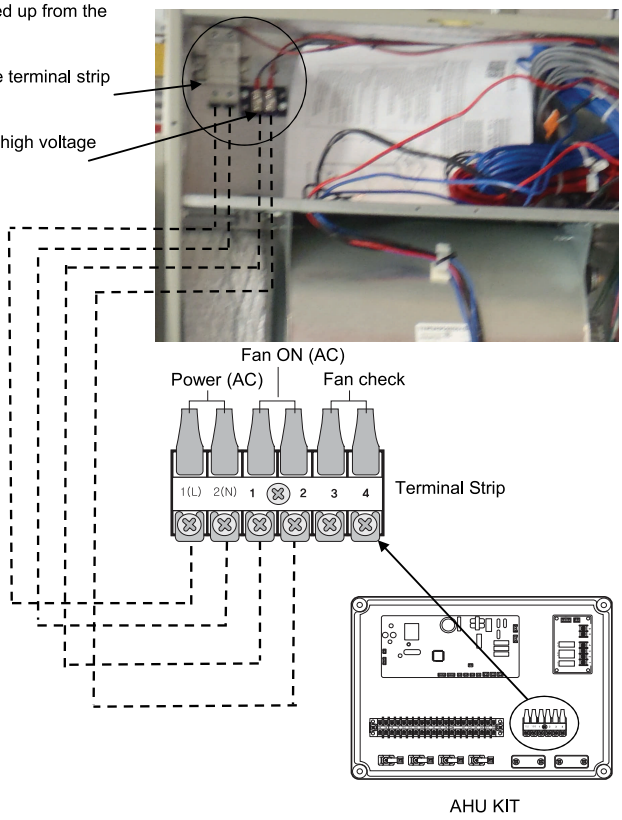
Air handling unit (4TVM) with AHU Kit and no electric heat.

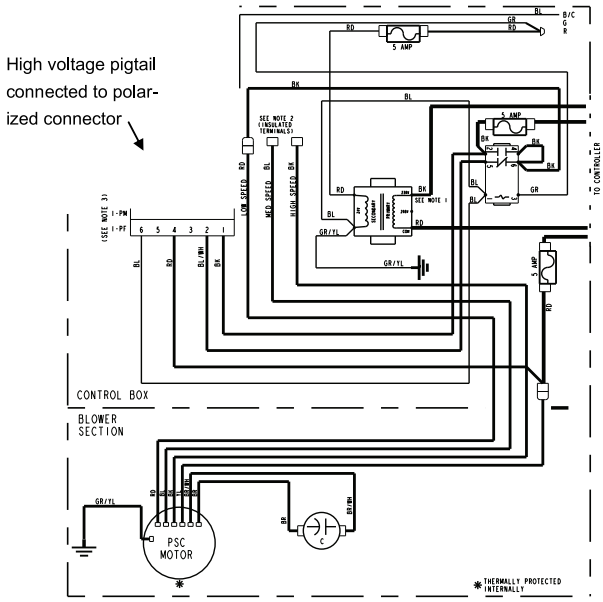
The AHU kit cycles the high voltage to the air handling unit transformer. High voltage is picked up from the factory installed connector block located in the electric heat compartment as shown.

The high voltage from the 4TVM to the AHU kit is fused and connects to 1(L) and 2(N) on the terminal strip located inside the AHU kit. (Power (AC))

Fan ON (AC) terminals 1 and 2 are from the AHU Kit are routed back to the air handling unit high voltage terminal strip with the red and black wires.

Use the high voltage pigtails from the 4TVM air handling unit's polarized connector to supply high voltage power to the air handling unit. Use the electrical tables located on the unit nameplate for the branch circuit electrical power requirements. Tables are printed in this document for convenience.





Wiring schematic from 4TVM0024 - 0048B1

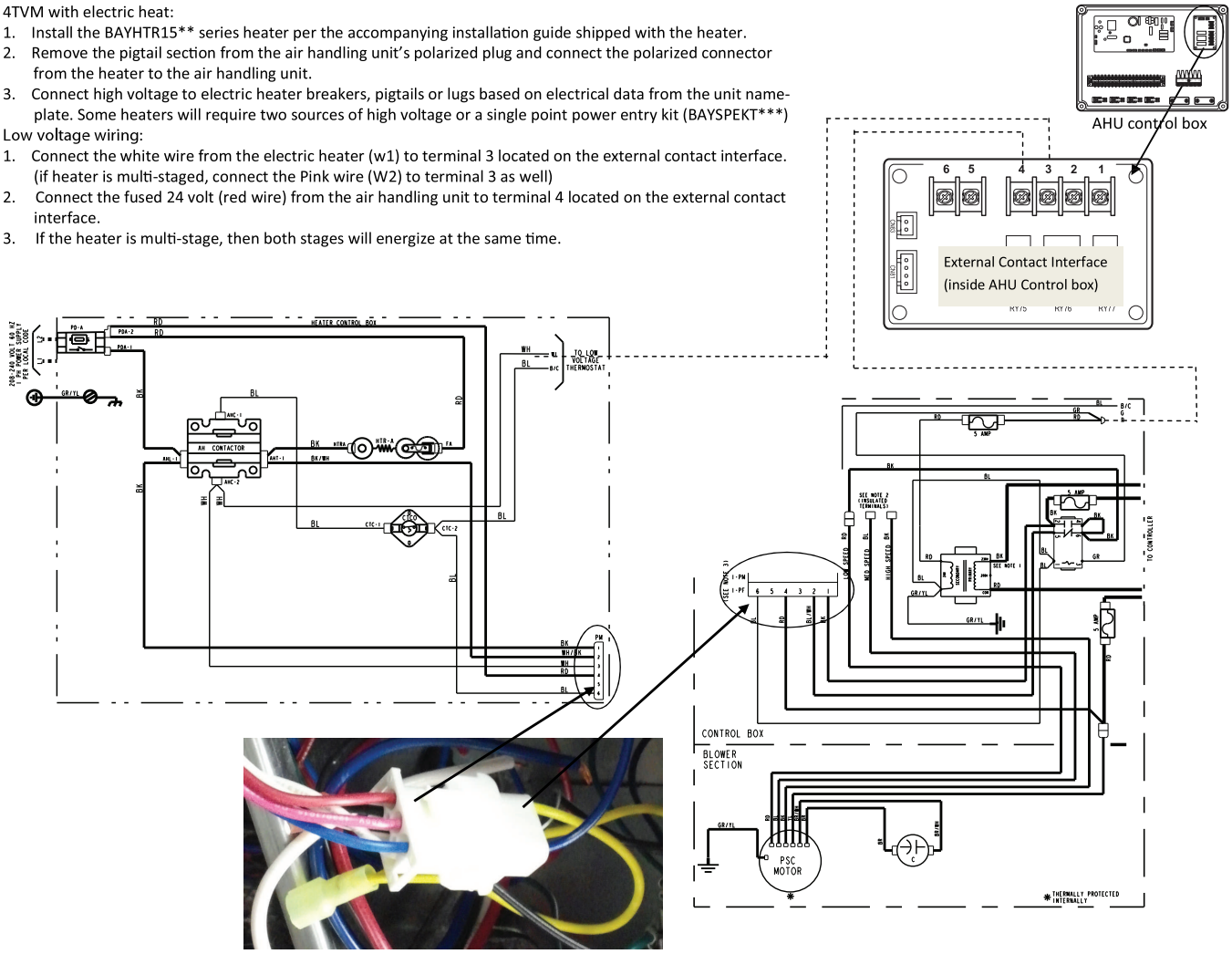
Figure 12. 4TVM with electric heat

4TVM with electric heat:

1. Install the BAYHTR15** series heater per the accompanying installation guide shipped with the heater.
2. Remove the pigtail section from the air handling unit's polarized plug and connect the polarized connector from the heater to the air handling unit.
3. Connect high voltage to electric heater breakers, pigtails or lugs based on electrical data from the unit name-plate. Some heaters will require two sources of high voltage or a single point power entry kit (BAYSPEKT***)

Low voltage wiring:

1. Connect the white wire from the electric heater (w1) to terminal 3 located on the external contact interface. (if heater is multi-staged, connect the Pink wire (W2) to terminal 3 as well)
2. Connect the fused 24 volt (red wire) from the air handling unit to terminal 4 located on the external contact interface.
3. If the heater is multi-stage, then both stages will energize at the same time.



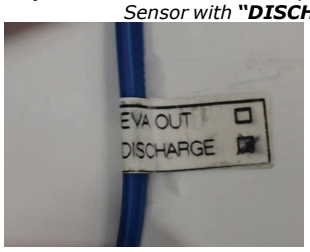
Air Handling Unit Sensor Connections

The 4TVM ships with all sensors connected internally, however, they must be terminated on the AHU Kit.

Sensor list:

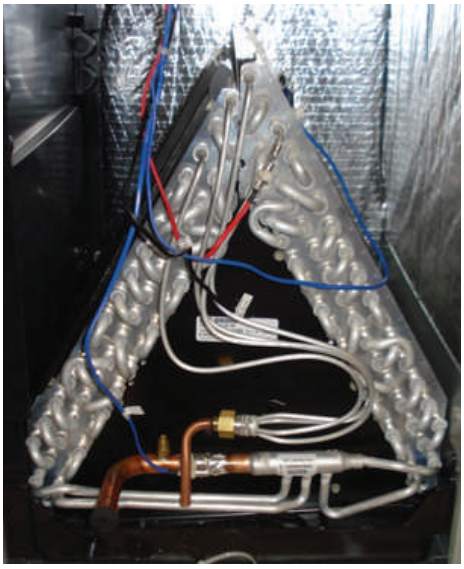
- Discharge Air Sensor – Blue (**"DISCHARGE"** checked on label)
- Return Air Sensor – Black (Room In)
- Evap In Sensor – Red (EVA IN)
- Evap Out Sensor – Blue (**"EVA OUT"** checked on label)

Important: *Do not remove the plug from the blue Discharge Air Sensor with* ***"DISCHARGE"*** *checked on the label.*



Important: *If the red and black sensor wires are shipped connected by plug, the plug must be removed and wires stripped.*

Important: *If the blue Evap Out Sensor ships with a connection plug, the plug must be removed and wires stripped.*

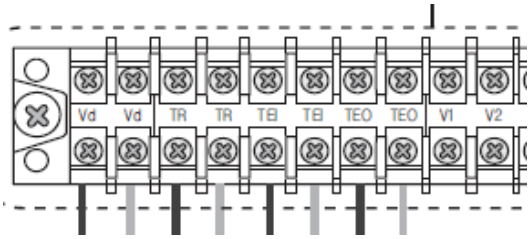


Location of sensors on coil

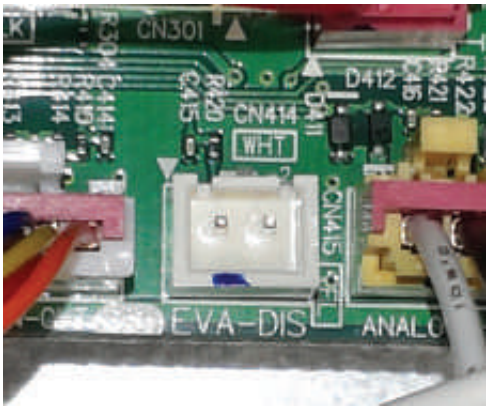
The Black Sensor labeled **"Room In"** connects to terminals **"TR"**.

The Red Sensor labeled **"EVA IN"** connects to terminals **"TB"**.

The Blue Sensor with **"EVA OUT"** checked on the label connects to terminals **TEO**.



The second Blue Sensor with **"DISCHARGE"** checked on the label connects to the main board on the terminal labeled **"EVA-DIS"**. This sensor has a plug on the end of it to connect to the board.



Electrical Data

Figure 13. 4TVM0024B1–0048B1

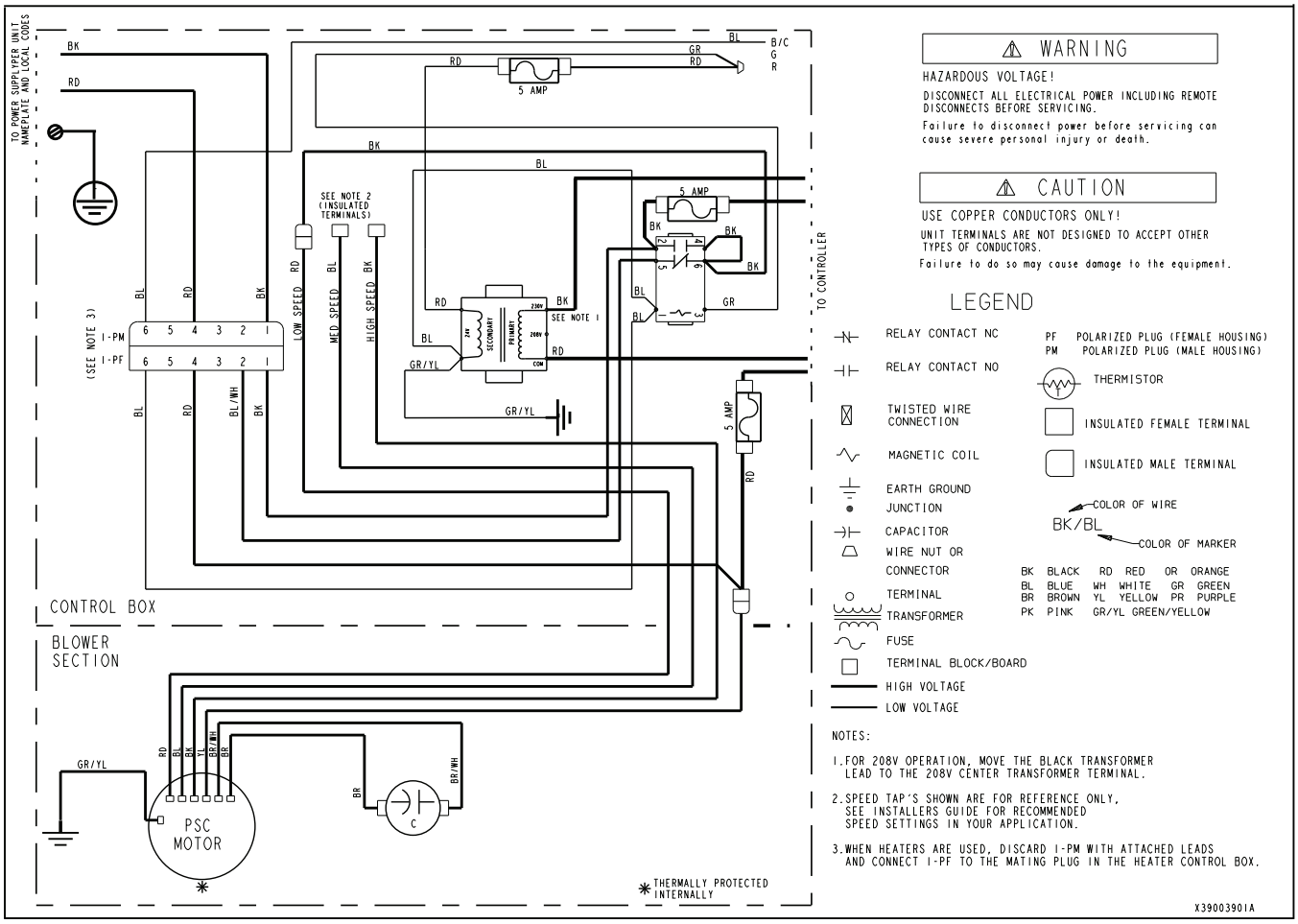
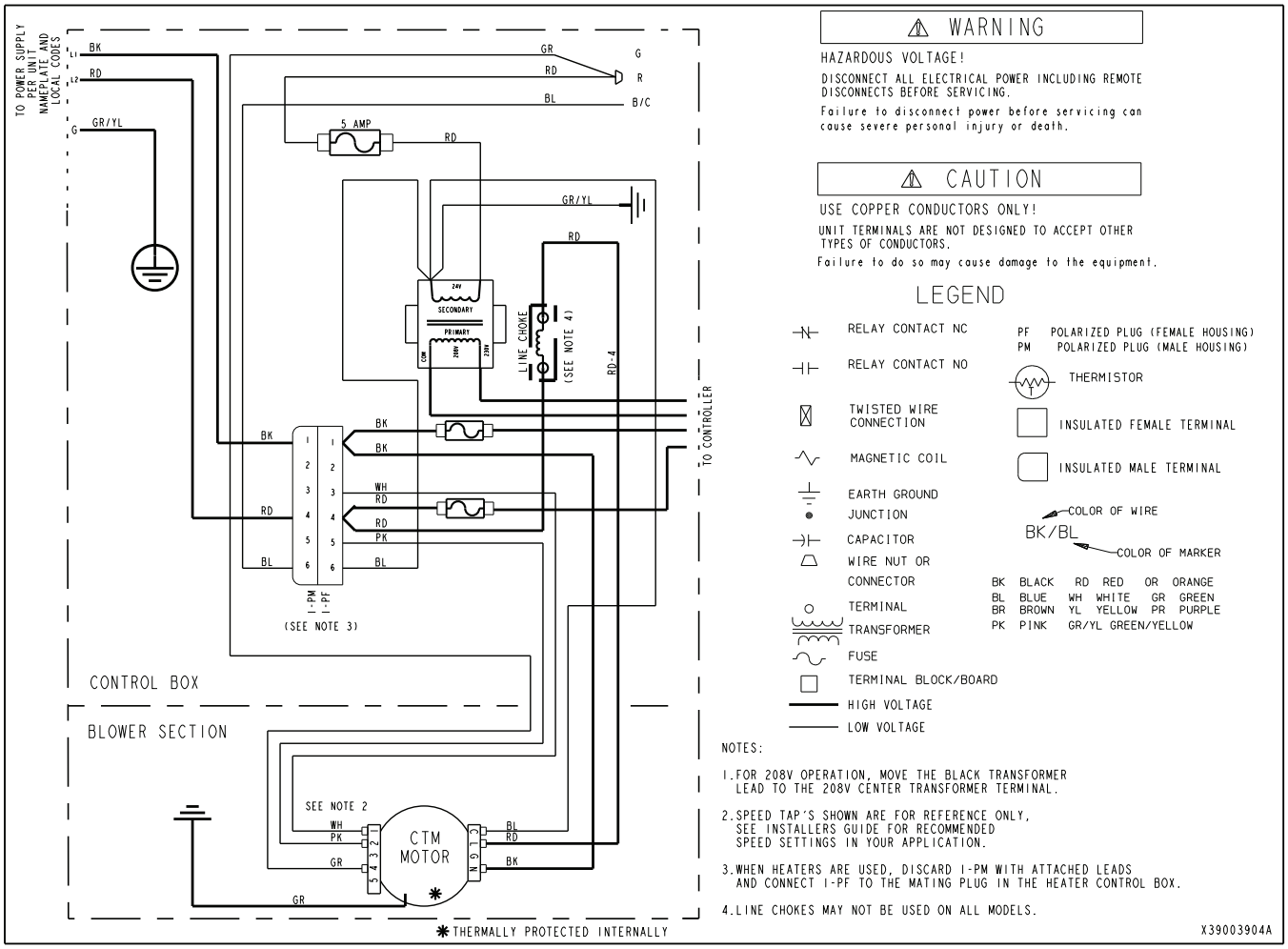


Figure 14. 4TVM0060B1



Performance and Electrical Data

This unit is supplied with a multi-speed motor with a direct-drive blower wheel which can obtain various air flows. The unit is shipped with factor set cooling and heating speed taps. The following performance tables are available for additional speed taps. Disconnect all power to the unit before making any adjustments to the motor speed taps. Be sure to check the air flow and temperature drop across the evaporator coil to ensure sufficient air flow.

Table 3. Air Flow Performance

4TVM0024B1 [a]						
EXTERNAL STATIC (in w.g)	AIRFLOW					
	Speed Taps — 230 VOLTS			Speed Taps — 208 VOLTS		
	High	**Med**	**Low †**	**High**	**Med**	**Low †**
0.1	984	903	719	946	827	612
0.2	948	868	694	910	796	589
0.3	906	828	665	868	760	567
0.4	858	781	630	820	717	543
0.5	802	726	588	764	666	513

Table 3. Air Flow Performance (continued)

4TVM0024B1 [a]						
0.6	735	660	537	697	605	
0.7	651	581		614	532	

1. Values are with wet coil, no filter, and no heaters
2. CFM Correction for dry coil = Add 3%
3. † = Factory setting

[a] For the 4TVM0024B1, the recommended speed tap is medium at 0.4" external static pressure.

Table 4. Electrical Data

4TVM0024B1											
Heater Model No.	No. of Circuits/ Phases	240 Volt					208 Volt				
		Capacity		Heater Amps per Circuit	Minimum Circuit Ampacity	Maximum Overload Protection	Capacity		Heater Amps per Circuit	Minimum Circuit Ampacity	Maximum Overload Protection
		kW	BTUH				kW	BTUH			
No Heater				1.3 *	2	15			1.3 *	2	15
BAYHTR1504BRK BAYHTR1504PDC BAYHTR1504LUG	1/1	3.84	13100	16.0	22	25	2.88	9800	13.8	19	20
BAYHTR1505BRK BAYHTR1505PDC BAYHTR1505LUG	1/1	4.80	16400	20.0	27	30	3.60	12300	17.3	23	25
BAYHTR1508BRK BAYHTR1508PDC BAYHTR1508LUG	1/1	7.68	26200	32.0	42	45	5.76	19700	27.7	36	40
BAYHTR1510BRK BAYHTR1510PDC BAYHTR1510LUG	1/1	9.60	32800	40.0	52	60	7.20	24600	34.6	45	45
BAYHTR3510LUG	1/3	9.60	32800	23.1	30	30	7.20	24600	20.0	26	30

* = Motor Amps
Wiring schematics provided from VRF Select will need to be reviewed for proper wiring and disconnect selection if electric heat is added to the air handler

Table 5. Air Flow Performance

4TVM0030B1 , 4TVM0036B1 [a]						
EXTERNAL STATIC (in w.g)	AIRFLOW					
	Speed Taps — 230 VOLTS			Speed Taps — 208 VOLTS		
	High	**Med**	**Low †**	**High**	**Med**	**Low †**
0.1	1461	1336	979	1406	1173	834
0.2	1404	1291	971	1352	1152	819
0.3	1344	1242	962	1295	1121	810
0.4	1281	1188	944	1234	1081	804
0.5	1214	1130	916	1169	1035	791
0.6	1142	1066	876	1100	981	768
0.7	1066	997		1026	920	732

1. Values are with wet coil, no filter, and no heaters
2. CFM Correction for dry coil = Add 3%
3. † = Factory setting

[a] For 4TVM0036B1, the recommended speed tap is medium at 0.4" external static pressure.

Table 6. Electrical Data

4TVM0030B1, 4TVM0036B1											
Heater Model No.	No. of Circuits/ Phases	240 Volt					208 Volt				
		Capacity		Heater Amps per Circuit	Minimum Circuit Ampacity	Maximum Overload Protection	Capacity		Heater Amps per Circuit	Minimum Circuit Ampacity	Maximum Overload Protection
		kW	BTUH				kW	BTUH			
No Heater				2.5 *	3	15			2.5 *	3	15
BAYHTR1504BRK BAYHTR1504PDC BAYHTR1504LUG	1/1	3.84	13100	16.0	23	25	2.88	9800	13.8	20	20
BAYHTR1505BRK BAYHTR1505PDC BAYHTR1505LUG	1/1	4.8	16400	20.0	28	30	3.6	12300	17.3	25	25
BAYHTR1508BRK BAYHTR1508PDC BAYHTR1508LUG	1/1	7.68	26200	32.0	43	45	5.76	19700	27.7	38	40
BAYHTR1510BRK BAYHTR1510PDC BAYHTR1510LUG	1/1	9.6	32800	40.0	53	60	7.2	24600	34.6	46	50
BAYHTR1515BRK-Circuit 1 [a]	2/1	9.6	32800	40.0	53	60	7.2	24600	34.6	46	50
BAYHTR1515BRK-Circuit 2		4.8	16400	20.0	25	25	3.6	12300	17.3	22	25
BAYHTR1519BRK-Circuit 1	2/1	9.6	32800	40.0	53	60	7.2	24600	34.6	46	50
BAYHTR1519BRK-Circuit 2		9.6	32800	40.0	50	50	7.2	24600	34.6	43	45
BAYHTR3510LUG	1/3	9.6	32800	23.1	32	35	7.2	24600	20.0	28	30
BAYHTR3515LUG	1/3	14.4	49200	34.6	46	50	10.8	36900	30.0	40	40
BAYHTR1515BRK with single circuit power source kit BAYSPEKT201A	1/1	14.4	49200	60.0	83	90	10.8	36900	51.9	73	80
BAYHTR1519BRK with single circuit power source kit BAYSPEKT201A	1/1	19.2	65500	80.0	108	110	14.4	49200	69.2	94	100
* = Motor Amps Wiring schematics provided from VRF Select will need to be reviewed for proper wiring and disconnect selection if electric heat is added to the air handler											

[a] MCA and MOP for circuit 1 contains the motor amps

Table 7. Air Flow Performance

4TVM0042B1, 4TVM0048B1 [a]						
EXTERNAL STATIC (in w.g)	AIRFLOW					
	Speed Taps — 230 VOLTS			Speed Taps — 208 VOLTS		
	High	**Med**	**Low †**	**High**	**Med**	**Low †**
0.1	1959	1704	1344	1786	1465	1154
0.2	1898	1675	1332	1748	1462	1126
0.3	1828	1631	1325	1697	1444	1108
0.4	1750	1574	1310	1633	1410	1095
0.5	1662	1504	1277	1557	1359	1076
0.6	1563	1420	1223	1468	1289	1039
0.7	1452	1321		1365		
1. Values are with wet coil, no filter, and no heaters 2. CFM Correction for dry coil = Add 3% 3. † = Factory setting						

[a] For 4TVM0048B1, the recommended speed tap is medium at 0.4" external static pressure.

Table 8. Electrical Data

4TVM0042B1, 4TVM0048B1											
Heater Model No.	No. of Circuits/ Phases	240 Volt					208 Volt				
		Capacity		Heater Amps per Circuit	Minimum Circuit Ampacity	Maximum Overload Protection	Capacity		Heater Amps per Circuit	Minimum Circuit Ampacity	Maximum Overload Protection
		kW	BTUH				kW	BTUH			
No Heater				2.6 *	3	15			2.6 *	3	15
BAYHTR1504BRK BAYHTR1504PDC BAYHTR1504LUG	1/1	3.84	13100	16.0	23	25	2.88	9800	13.8	21	25
BAYHTR1505BRK BAYHTR1505PDC BAYHTR1505LUG	1/1	4.8	16400	20.0	28	30	3.6	12300	17.3	25	25
BAYHTR1508BRK BAYHTR1508PDC BAYHTR1508LUG	1/1	7.68	26200	32.0	43	45	5.76	19700	27.7	38	40
BAYHTR1510BRK BAYHTR1510PDC BAYHTR1510LUG	1/1	9.6	32800	40.0	53	60	7.2	24600	34.6	47	50
BAYHTR1515BRK-Circuit 1 [a]	2/1	9.6	32800	40.0	53	60	7.2	24600	34.6	47	50
BAYHTR1515BRK-Circuit 2		4.8	16400	20.0	25	25	3.6	12300	17.3	22	25
BAYHTR1520BRK-Circuit 1	2/1	9.6	32800	40.0	53	60	7.2	24600	34.6	47	50
BAYHTR1520BRK-Circuit 2		9.6	32800	40.0	50	50	7.2	24600	34.6	43	45
BAYHTR3510LUG	1/3	9.6	32800	23.1	32	35	7.2	24600	20.0	28	30
BAYHTR3515LUG	1/3	14.4	49200	34.6	46	50	10.8	36900	30.0	40	40
BAYHTR1515BRK with single circuit power source kit BAYSPEKT201A	1/1	14.4	49200	60.0	83	90	10.8	36900	51.9	73	80
BAYHTR1520BRK with single circuit power source kit BAYSPEKT201A	1/1	19.2	65500	80.0	108	110	14.4	49200	69.2	94	100
* = Motor Amps Wiring schematics provided from VRF Select will need to be reviewed for proper wiring and disconnect selection if electric heat is added to the air handler											

[a] MCA and MOP for circuit 1 contains the motor amps.

Table 9. Air Flow Performance

4TVM0060B1			
EXTERNAL STATIC (in w.g)	AIRFLOW		
	Speed Taps — 208 – 230 VOLTS		
	High	**Med †**	**Low**
0.1	1954	1864	1780
0.2	1919	1827	1741
0.3	1885	1791	1704
0.4	1852	1756	1668
0.5	1821	1723	1633
0.6	1790	1691	1599
0.7	1761	1660	1567
1. Values are with wet coil, no filter, and no heaters 2. CFM Correction for dry coil = Add 3% 3. † = Factory Setting 4. Low = Taps 1–3, Med = Tap 4, High = Tap 5			

Table 10. Electrical Data

4TVM0060B1											
Heater Model No.	No. of Circuits/ Phases	240 Volt					208 Volt				
		Capacity		Heater Amps per Circuit	Minimum Circuit Ampacity	Maximum Overload Protection	Capacity		Heater Amps per Circuit	Minimum Circuit Ampacity	Maximum Overload Protection
		kW	BTUH				kW	BTUH			
No Heater				6.3 *	8	15			6.3 *	8	15
BAYHTR1504BRK BAYHTR1504PDC BAYHTR1504LUG	1/1	3.84	13100	16.0	28	30	2.88	9800	13.8	25	25
BAYHTR1505BRK BAYHTR1505PDC BAYHTR1505LUG	1/1	4.8	16400	20.0	33	35	3.6	12300	17.3	30	30
BAYHTR1508BRK BAYHTR1508PDC BAYHTR1508LUG	1/1	7.68	26200	32.0	48	50	5.76	19700	27.7	42	45
BAYHTR1510BRK BAYHTR1510PDC BAYHTR1510LUG	1/1	9.6	32800	40.0	58	60	7.2	24600	34.6	51	60
BAYHTR1515BRK-Circuit 1 [a]	2/1	9.6	32800	40.0	58	60	7.2	24600	34.6	51	60
BAYHTR1515BRK-Circuit 2		4.8	16400	20.0	25	25	3.6	12300	17.3	22	25
BAYHTR1520BRK-Circuit 1	2/1	9.6	32800	40.0	58	60	7.2	24600	34.6	51	60
BAYHTR1520BRK-Circuit 2		9.6	32800	40.0	50	50	7.2	24600	34.6	43	45
BAYHTR3510LUG	1/3	9.6	32800	23.1	36	40	7.2	24600	20.0	32	35
BAYHTR3515LUG	1/3	14.4	49200	34.6	50	50	10.8	36900	30.0	44	45
BAYHTR1515BRK with single circuit power source kit BAYSPEKT201A	1/1	14.4	49200	60.0	83	90	10.8	36900	51.9	73	80
BAYHTR1520BRK with single circuit power source kit BAYSPEKT201A	1/1	19.2	65500	80.0	108	110	14.4	49200	69.2	94	100
* = Motor Amps Wiring schematics provided from VRF Select will need to be reviewed for proper wiring and disconnect selection if electric heat is added to the air handler											

[a] MCA and MOP for circuit 1 contains the motor amps.

Minimum Airflow CFM

4TVM0024B1	
Heater	**Minimum Heat Speed Tap**
BAYHTR1504BRK, BAYHTR1504PDC, BAYHTR1504LUG, BAYHTR1505BRK, BAYHTR1505PDC, BAYHTR1505LUG	Med
BAYHTR1508BRK, BAYHTR1508PDC, BAYHTR1508LUG, BAYHTR1510BRK, BAYHTR1510PDC, BAYHTR1510LUG, BAYHTR3510LUG	Med

4TVM0030B1	
Heater	**Minimum Heat Speed Tap**
BAYHTR1504BRK, BAYHTR1504PDC, BAYHTR1504LUG, BAYHTR1505BRK, BAYHTR1505PDC, BAYHTR1505LUG	Med
BAYHTR1508BRK, BAYHTR1508PDC, BAYHTR1508LUG, BAYHTR1510BRK, BAYHTR1510PDC, BAYHTR1510LUG, BAYHTR3510LUG	Med
BAYHTR1515BRK, BAYHTR3515LUG, BAYHTR1519BRK	Med

4TVM0036B1	
Heater	**Minimum Heat Speed Tap**
BAYHTR1504BRK, BAYHTR1504PDC, BAYHTR1504LUG, BAYHTR1505BRK, BAYHTR1505PDC, BAYHTR1505LUG	Med
BAYHTR1508BRK, BAYHTR1508PDC, BAYHTR1508LUG, BAYHTR1510BRK, BAYHTR1510PDC, BAYHTR1510LUG, BAYHTR3510LUG	Med
BAYHTR1515BRK, BAYHTR3515LUG, BAYHTR1519BRK	Med

4TVM0042B1	
Heater	**Minimum Heat Speed Tap**
BAYHTR1504BRK, BAYHTR1504PDC, BAYHTR1504LUG, BAYHTR1505BRK, BAYHTR1505PDC, BAYHTR1505LUG	Med
BAYHTR1508BRK, BAYHTR1508PDC, BAYHTR1508LUG, BAYHTR1510BRK, BAYHTR1510PDC, BAYHTR1510LUG, BAYHTR3510LUG	Med
BAYHTR1515BRK, BAYHTR3515LUG, BAYHTR1520BRK	Med

4TVM0048B1	
Heater	**Minimum Heat Speed Tap**
BAYHTR1504BRK, BAYHTR1504PDC, BAYHTR1504LUG, BAYHTR1505BRK, BAYHTR1505PDC, BAYHTR1505LUG	Med
BAYHTR1508BRK, BAYHTR1508PDC, BAYHTR1508LUG, BAYHTR1510BRK, BAYHTR1510PDC, BAYHTR1510LUG, BAYHTR3510LUG	Med
BAYHTR1515BRK, BAYHTR3515LUG, BAYHTR1520BRK	Med

4TVM0060B1	
Heater	**Minimum Heat Speed Tap**
BAYHTR1504BRK, BAYHTR1504PDC, BAYHTR1504LUG, BAYHTR1505BRK, BAYHTR1505PDC, BAYHTR1505LUG	Med
BAYHTR1508BRK, BAYHTR1508PDC, BAYHTR1508LUG, BAYHTR1510BRK, BAYHTR1510PDC, BAYHTR1510LUG, BAYHTR3510LUG	Med
BAYHTR1515BRK, BAYHTR3515LUG, BAYHTR1520BRK	Med
Low = Taps 1–3	

4TVM0024B1	
Heater	**Minimum Heat Speed Tap**
BAYHTR1504BRK, BAYHTR1504PDC, BAYHTR1504LUG, BAYHTR1505BRK, BAYHTR1505PDC, BAYHTR1505LUG	Med
BAYHTR1508BRK, BAYHTR1508PDC, BAYHTR1508LUG, BAYHTR1510BRK, BAYHTR1510PDC, BAYHTR1510LUG, BAYHTR3510LUG	Med

4TVM0030B1, 4TVM0036B1	
Heater	**Minimum Heat Speed Tap**
BAYHTR1504BRK, BAYHTR1504PDC, BAYHTR1504LUG, BAYHTR1505BRK, BAYHTR1505PDC, BAYHTR1505LUG	Med
BAYHTR1508BRK, BAYHTR1508PDC, BAYHTR1508LUG, BAYHTR1510BRK, BAYHTR1510PDC, BAYHTR1510LUG, BAYHTR3510LUG	Med
BAYHTR1515BRK, BAYHTR3515LUG, BAYHTR1519BRK	Med

4TVM0042B1, 4TVM0048B1	
Heater	**Minimum Heat Speed Tap**
BAYHTR1504BRK, BAYHTR1504PDC, BAYHTR1504LUG, BAYHTR1505BRK, BAYHTR1505PDC, BAYHTR1505LUG	Med
BAYHTR1508BRK, BAYHTR1508PDC, BAYHTR1508LUG, BAYHTR1510BRK, BAYHTR1510PDC, BAYHTR1510LUG, BAYHTR3510LUG	Med
BAYHTR1515BRK, BAYHTR3515LUG, BAYHTR1520BRK	Med

4TVM0060B1	
Heater	**Minimum Heat Speed Tap**
BAYHTR1504BRK, BAYHTR1504PDC, BAYHTR1504LUG, BAYHTR1505BRK, BAYHTR1505PDC, BAYHTR1505LUG	Med
BAYHTR1508BRK, BAYHTR1508PDC, BAYHTR1508LUG, BAYHTR1510BRK, BAYHTR1510PDC, BAYHTR1510LUG, BAYHTR3510LUG	Med
BAYHTR1515BRK, BAYHTR3515LUG, BAYHTR1520BRK	Med
Low = Taps 1–3	

Heater Pressure Drop Table

Airflow CFM	Number of Racks					Heater Racks	
	1	2	3	4		Heater Model	No. of Racks
	Air Pressure Drop — Inches W.G.					BAYHTR1504	1
1800	0.02	0.04	0.06	0.14		BAYHTR1505	1
1700	0.02	0.04	0.06	0.14		BAYHTR1508	2
1600	0.02	0.04	0.06	0.13		BAYHTR1510	2
1500	0.02	0.04	0.06	0.12		BAYHTR3510	3
1400	0.02	0.04	0.06	0.12		BAYHTR1515	3
1300	0.02	0.04	0.05	0.11		BAYHTR3515	3
1200	0.01	0.04	0.05	0.10		BAYHTR1519	4
1100	0.01	0.03	0.05	0.09		BAYHTR1520	4
1000	0.01	0.03	0.04	0.09		BAYHTR1521	4
900	0.01	0.03	0.04	0.08			
800	0.01	0.03					
700	0.01	0.02					
600	0.01	0.02					

Coil Conversion Instructions

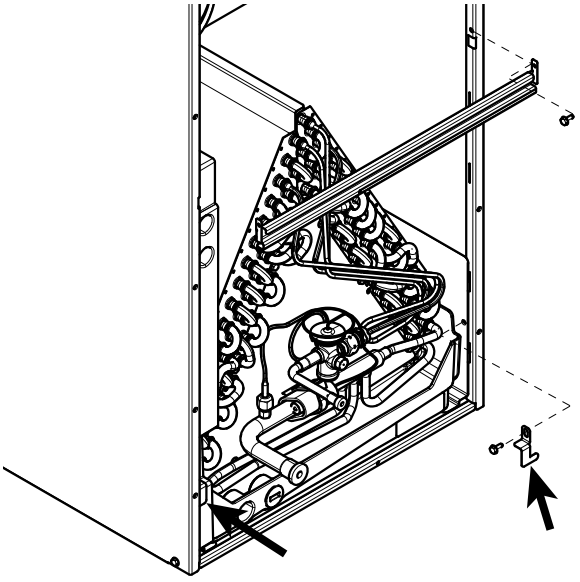
Note: *The 4TVM air handling unit is not approved for use in downflow applications.*

Table 11. Horizontal Right

Follow the conversion steps when installing the air handler in horizontal right configuration.

1. Remove the front panels from the air handler. The coil and line set panel do not need to be separated.
2. Remove the two coil retaining brackets located at the front of the drain pan. Each is held in place by one screw. Save brackets and screws.
3. Remove the two screws holding the center horizontal brace and rotate out of place. Retain parts.

Figure 15.



4. Make note of the horizontal drain pan orientation (up/down).
5. Slide the coil assembly out.
6. Change location of the water diverter bracket by removing the screws on the water diverter bracket that is located on the left side of the coil. Attach the water diverter to the right hand side of the coil using the same screws.

Important: *The coil slabs are different and the mount hole locations will vary. See the illustrations on the following pages that correspond to the unit tonnage to see the correct mounting position of the water diverter bracket.*

Important: *The water diverter brackets are not symmetrical and will vary by tonnage.*

Figure 16. All other models

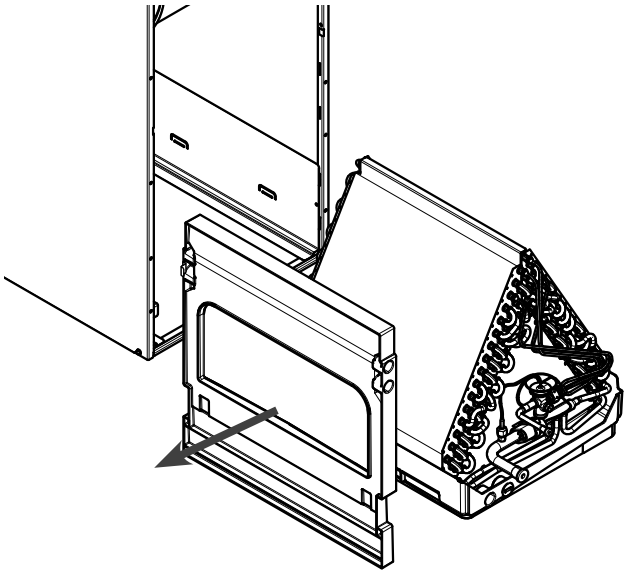


Table 11. Horizontal Right (continued)

Figure 17.

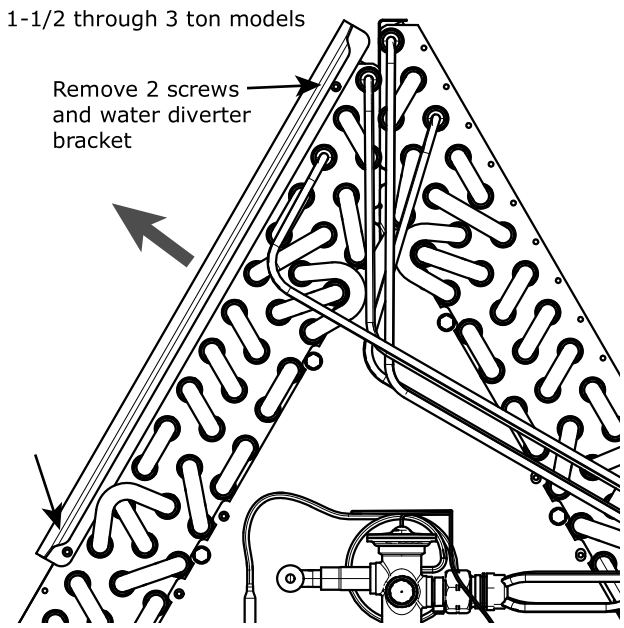


Figure 18.

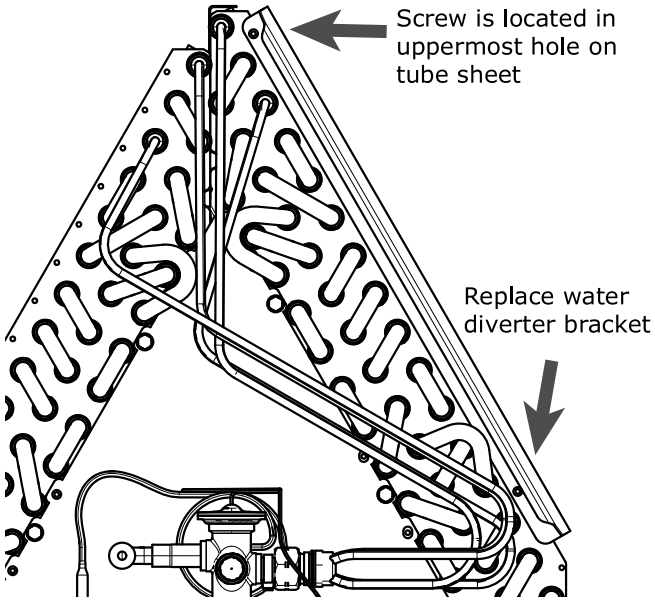


Figure 19.

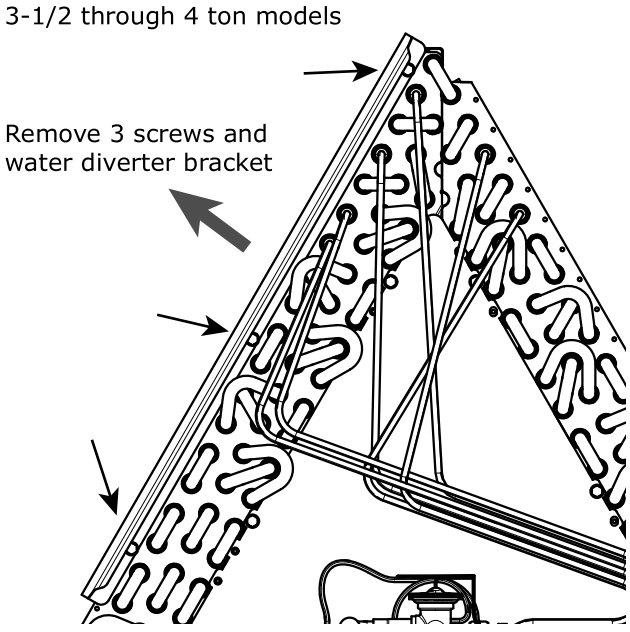


Figure 20.

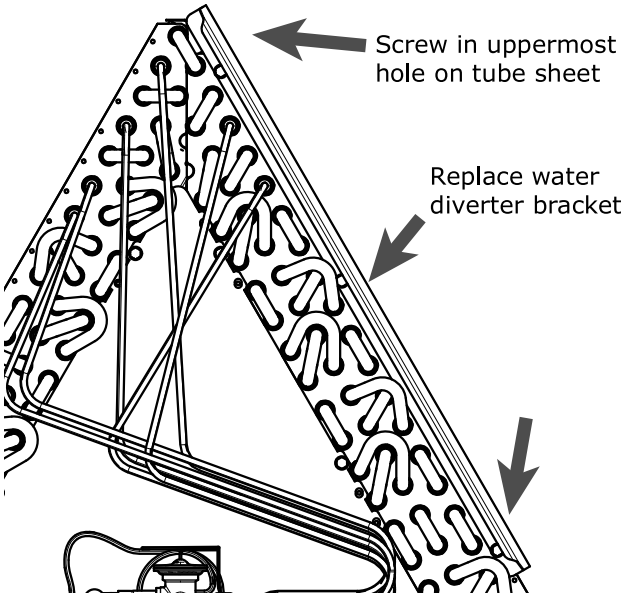


Table 11. Horizontal Right (continued)

Figure 21.

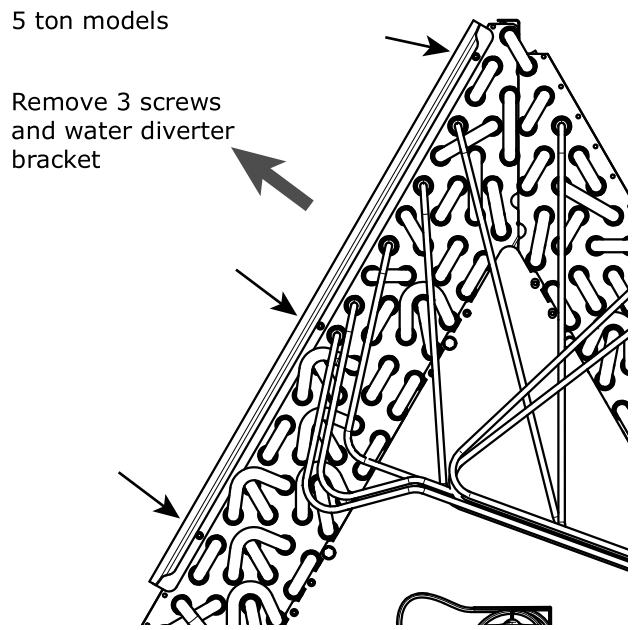
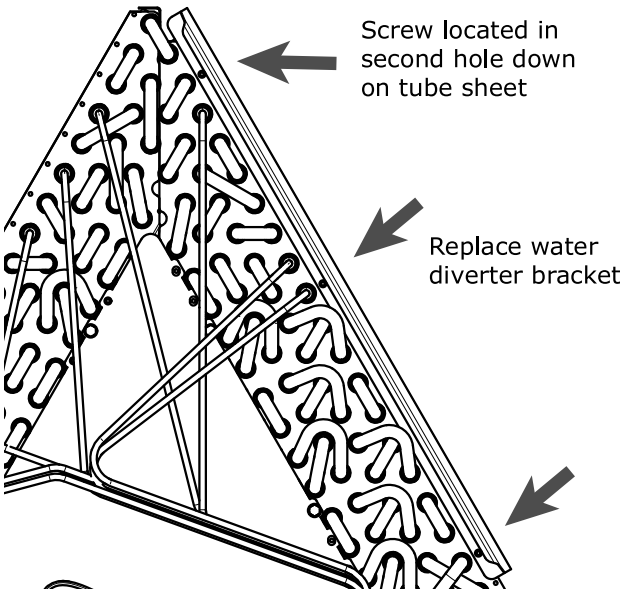


Figure 22.



7. Relocate the horizontal drain pan from the left side of the coil to the right side.
8. Remove the drain pan support bracket. Do not discard. Remove the two drain plugs from the front of the drain pan and insert them in the drains at the rear of the drain pan.

Figure 23. All other models

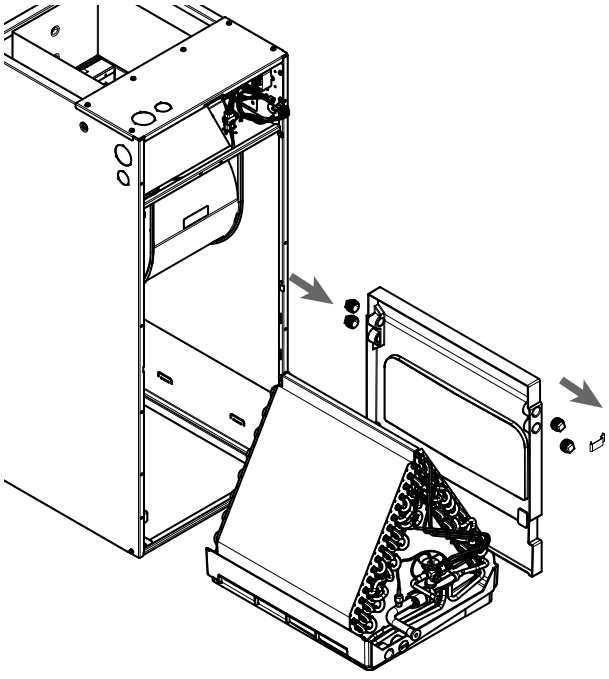
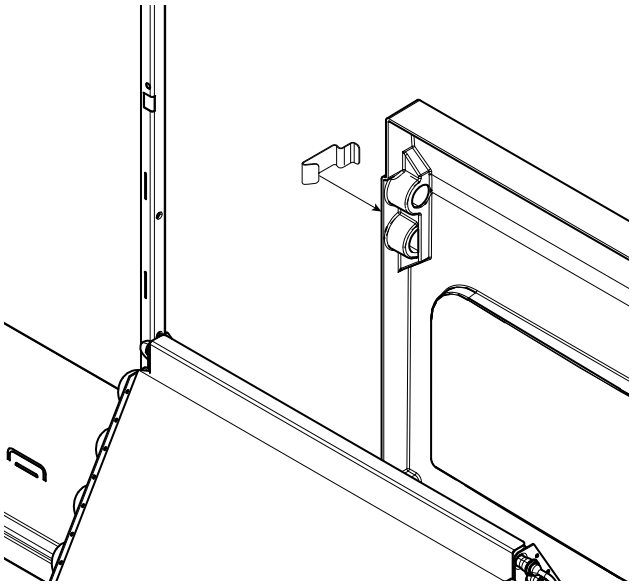
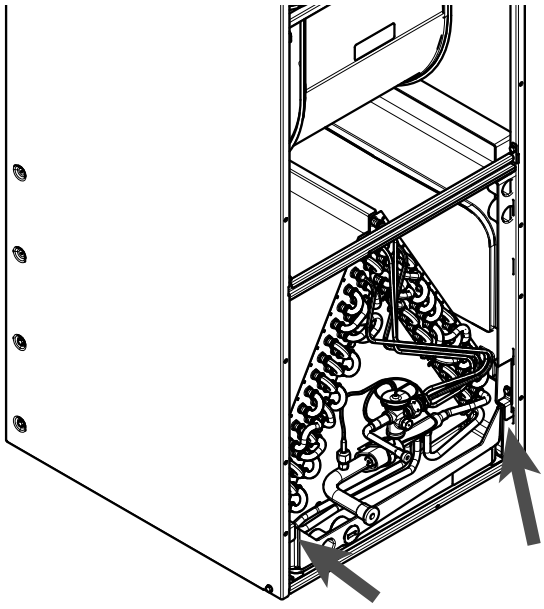


Table 11. Horizontal Right (continued)

9. Reinstall the drain pan support bracket. The bracket should be located between the two drain plugs as shown in	**Figure 24. All other models** 
10. Slide the coil assembly back into the air handler cabinet. 11. Replace the center horizontal brace removed in a previous step. See 12. Replace the two coil retaining brackets removed in a previous step. See 13. Replace the two coil retaining brackets removed in a previous step. 14. Replace all panels.	**Figure 25. All other models** 

Operation

Operating Tips

Cooling	If the outside temperature is much higher than the selected indoor temperature, it may take longer than expected to achieve the desired temperature. Avoid making extreme changes in the temperature setting. This practice wastes energy and does not cool the room faster.
Heating	Because the unit heats the room by removing heat energy from outdoor air, the heating capacity may decrease when outdoor temperatures are extremely low. If the unit provides insufficient heat, use an additional heating source in combination with the unit.
Defrost	When the unit runs in Heat mode, frost may form due to the temperature difference between the unit and the outside air. If this happens: • The unit stops heating. • The unit will operate automatically in Defrost mode for 10 minutes. • The steam produced on the outdoor unit in Defrost mode is safe. No intervention is required; after about 10 minutes, the unit will resume normal operation. The unit will not operate when it starts to defrost.
Fan	The fan may not operate for 3–5 minutes after turning on the unit, to prevents cold air from blowing on occupants while the unit is warming up.
High indoor and outdoor temperature	If both indoor and outdoor temperatures are high and the unit is running in Heat mode, the outdoor unit fan and compressor may stop at times. This is normal; wait until the unit turns on again.
Power failure	A power failure will cause the unit to stop operating. When power returns, the unit will automatically resume operation.
Minimum off timer	If the unit has just been turned on, it will not produce cool/warm air for 3 minutes. This delay mechanism protects the outdoor unit compressor.

Internal Protections

Internal protections operate if an internal fault occurs in the unit.

Type	Description
Cold air dump	The internal fan will be off to prevent a cold air dump when the heat pump is in defrost mode.
Defrost cycle	The internal fan will be off to prevent a cold air dump when the heat pump is in defrost mode.
Anti-short cycle timer	The compressor observes a 3-minute off time when cycling power to the unit or after an outage.

Note: *If the heat pump is operating in Heat mode, a defrost cycle is activated to remove frost from an outdoor unit that may have accumulated at low temperatures. The internal fan is switched off automatically and restarted only after the defrost cycle is completed.*

Operating Ranges

For efficient use, operate the unit within the ranges shown in this table.

Mode	Outdoor temperature	Indoor temperature	Indoor humidity
Cooling	23°F (-5°C) to 118°F (48°C)	64°F (18°C) to 90°F (32°C)	80% or less
Heating	-4°F (-20°C) to 75°F (24°C)	81°F (27°C) or less	—

Note: *The standard temperature for heating is 45°F (7°C). If the outdoor temperature drops to 32°F (0°C) or below, the heating capacity can be reduced depending on the temperature condition. If the indoor cooling temperature is set higher than 90°F (32°C), the unit will not cool to its full capacity.*

Operating Mode for Heat Pump Systems

For heat pump systems, the main indoor unit controls whether the system operates in heating or cooling. If the main indoor unit calls for heating and sub-indoor units calls for cooling, the main indoor unit (and any other sub-indoor units that call for heating) will operate in heating mode, and the sub-indoor units that call for cooling will do nothing.

Maintenance

Cleaning the Exterior

⚠ WARNING

Risk of Fire and Equipment Damage!

Failure to follow instructions below could cause a fire which could result in death, serious injury, and equipment damage.

Do NOT use benzene or other flammable solvents to clean the unit. Wipe the unit with a dry or damp cloth. Use mild soap and water if necessary.

Use a dry or damp cloth to wipe the surface of the unit as needed. If necessary, use mild soap and water on a damp cloth. Use a soft brush to remove dirt from the coil.

Periodic Maintenance Checks

Refer to the schedule given in for proper unit maintenance.

Note: *If the unit will not be used for an extended period of time, operate it in Fan mode for 3–4 hours to thoroughly dry it and then disconnect the power plug. Moisture left in the components can cause odors and internal damage.*

Table 12. Maintenance schedule

Description	Monthly	Every 4 months	Annually	As needed
Replace the air filter.[a]				X
Clean the condensate drain pan.[b]			X	
Thoroughly clean the heat exchanger.			X	
Clean the condensate drain pipe.		X		

[a] The type of filter will indicate the frequency. Replace it more frequently if the area of installation is very dusty.

[b] These operations must always be performed by qualified personnel. For more detailed information, see the installation manual for this unit.

Error Codes

As a protection strategy, the unit will stop operating if an error code is generated. If the unit is turned on before the problem is resolved, the error code will re-appear and the unit will stop operating again.

For interpreting error codes, refer to the list of error codes in the Technician Utilities Tool (TUT) or the Service Manual for VRF Outdoor and Indoor Units (VRF-SVM046*).

Troubleshooting

Refer to the following table for solutions to common problems.

Table 13. Solutions to common problems

Problem	Solution
The unit does not operate immediately after restarting it.	The anti-short cycle timer prevents the unit from operating immediately to keep it from overloading. The unit will start in 3 minutes.
The unit does not operate.	Verify the following: • The main power is properly installed. • There has not been a power failure. • The circuit breaker is switched on/fuses are good.
The temperature does not change.	Verify that the unit is not operating in Fan mode. If it is, select a different mode.
The unit is not producing warm/cool air.	Verify the following: • Temperature setting on remote control is higher/lower than the current temperature. • Air filter is not clogged with dirt. • If the unit has just been turned on, wait 3 minutes for the anti-short cycle timer to expire. • Air flow is unobstructed. • Line size and length is correct and does not exceed factory recommendations. • Operating mode is heat/cool. • If unit is not producing warm air, ensure it is not set to Cool mode. • Remote control is not for a cooling-only unit. • That the unit has not been installed in direct sunlight. If so, hang curtains or shades on windows to filter the sun and increase unit efficiency.
The fan speed does not change.	Verify that Auto or Dry mode is selected. Either of these modes automatically adjust the fan speed.
Timer function does not work.	Press the Power button on the remote control after setting the time.
Odors permeate the room during operation.	Verify the origin of the odor. Operate the unit in Fan mode or open the windows to air out the room.
The unit makes a bubbling sound.	A bubbling sound may be heard when the refrigerant is circulating through the indoor unit during certain system operating conditions, which should normally be of short duration.
Water is dripping from the air flow blades.	If the unit has been running for an extended period of time with the blades fully open, adjust the blades to mid-position to alleviate condensation formation.
The hand-held remote control is not working.	Verify that: • Batteries are not depleted. • Batteries are correctly installed. • Nothing is blocking the remote control sensor. • No strong fluorescent or neon lighting is near the unit, which may interrupt the
The unit does not turn on/off with the wired remote control.	Ensure that the wired remote control is not set for Group Control.
Indicators on the digital display flash.	Press the Power button on the remote control to turn the unit off. Then switch the circuit break off and then on again.

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