



# VRF

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# INSTALLATION INSTRUCTIONS

## VVCA Vertical Air Handler

VRF SYSTEMS -- Air Handler  
507539-05  
11/2018



**THIS MANUAL MUST BE LEFT WITH THE OWNER FOR FUTURE REFERENCE**

### **WARNING**

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life.

Installation and service must be performed by a licensed professional HVAC installer, service agency or the gas supplier.

Failure to follow safety warnings and these instructions exactly could result in property damage, dangerous operation, serious injury, or death.

Any additions, changes, or conversions required in order for the appliance to satisfactorily meet the application needs must be made by a licensed professional HVAC installer (or equivalent) using factory-specified parts.

Do not use this system if any part has been under water. A flood-damaged appliance is extremely dangerous. Immediately call a licensed professional HVAC service technician (or equivalent) to inspect the system and to replace all controls and electrical parts that have been wet, or to replace the system, if deemed necessary.

### **CAUTION**

As with any mechanical equipment, contact with sharp sheet metal edges can result in personal injury. Take care while handling this equipment and wear gloves and protective clothing.

### **General**

The VVCA air handler is designed for indoor installation only. As shipped, the unit is ready for installation in upflow and horizontal-right air discharge applications. Field-configurable for horizontal left-air discharge.

The unit has accessible electrical controls, refrigerant piping connections and an internally mounted expansion valve kit. This unit is also equipped with variable speed blower motor.

Refer to the Product Specification bulletin (EHB) for the proper use of these indoor units with specific heat pumps, heat recovery units, mode switching devices, branch pipes, line sets and controls.

These instructions are intended as a general guide and do not supersede local codes in any way. Consult authorities having jurisdiction before installation.

The air handler is shipped from the factory completely assembled. This unit is provided with flanges for connecting the supply plenum.

### **Shipping and Packing List**

Check the components for shipping damage. If you find any damage, immediately contact the last carrier.

Package 1 of 1 contains the following:

- 1 - Assembled indoor unit
- 2 - Condensate plugs
- 2 - Rubber grommets
- 1 - Water level switch cable
- 1 - 5/8 to 1/2 adapter (VVCA018)
- 1 - 3/8 to 1/4 adapter (VVCA018)
- 1 - Water level switch cable
- 1 - Installation manual

### **IMPORTANT**

The Clean Air Act of 1990 bans the intentional venting of refrigerant (CFCs, HCFCs and HFCs) as of July 1, 1992. Approved methods of recovery, recycling or reclaiming must be followed. Fines and/or incarceration may be levied for noncompliance. These units must be installed as a part of a matched system as specified in the Product Specifications (EHB) bulletin.

## Safety Requirements

### WARNING



**ELECTRICAL SHOCK, FIRE, OR EXPLOSION HAZZARD.**

Do not touch the unit or the controller if your hands are wet.

DO NOT spray water on the indoor unit for any reason.

Do not replace a fuse with a fuse of a different rating.

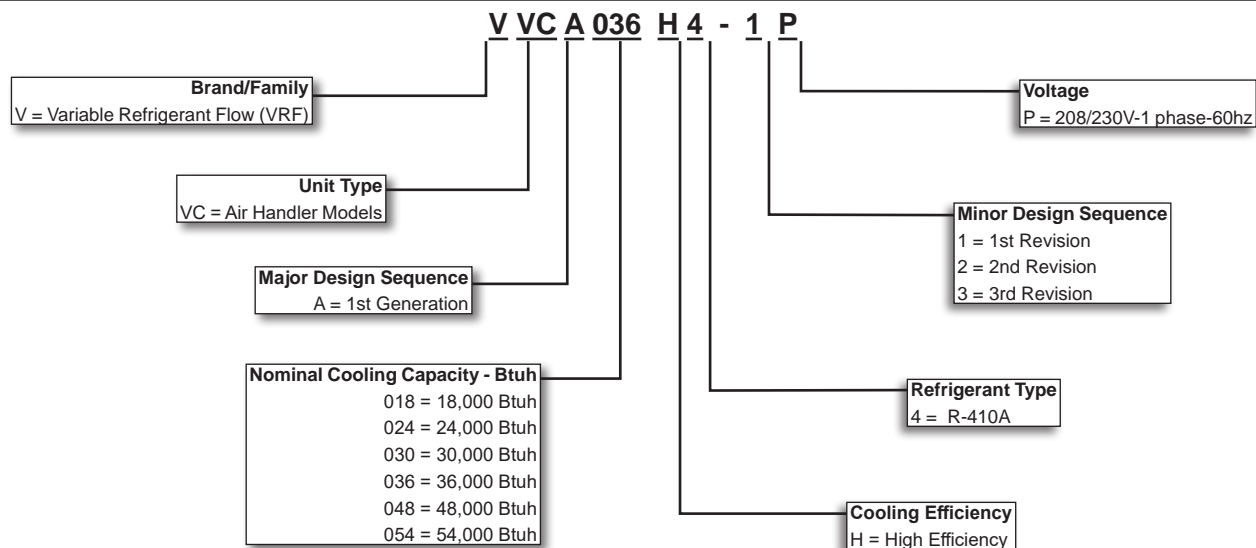
Do not use a jumper wire to replace a fuse. Do not insert your hands, tools or any other item into the air intake or air outlet at either the indoor or outdoor unit.

Do not allow children to operate the system.

### CAUTION

To ensure proper system performance and reliability, Lennox does not recommend operation of VRF systems during any phase of construction. Construction debris, low temperatures, harmful vapors, and operation of the unit with misplaced filters can damage the units. Failure to follow these guidelines will result in the warranty being voided.

## Model Number Identification



**Note** - Only Lennox VRF indoor units will work with Lennox VRF outdoor units and associated mechanical equipment. Lennox Mini Split indoor units are similar in appearance but must not be connected to a Lennox VRF refrigerant circuit. Please refer to model numbers to confirm compatibility. Model numbers for Lennox VRF units start with a "V" and model numbers for Lennox Mini-Splits start with a "M".

## System Piping

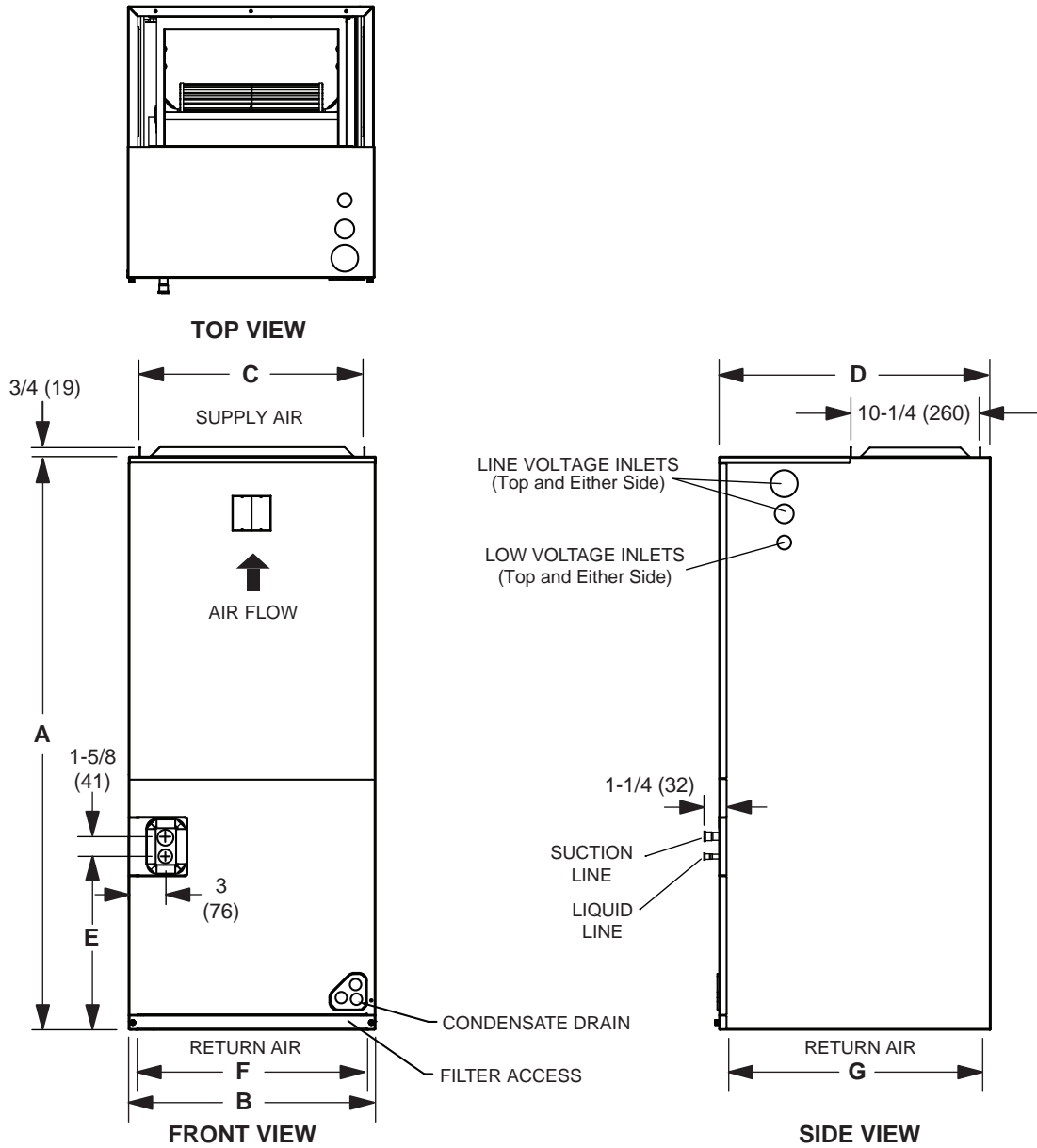
### CAUTION

VRF system piping is customized for each installation. The LVSS (Lennox VRF Selection Software) piping report is an engineered design that must be followed. The piping diagram or diagrams included within the LVSS report have been prepared based on the information provided to the Lennox VRF applications department.

When the indicated lengths change from the figures stated within the report, it is imperative that prior to the commencement of the refrigerant pipe work installation, Lennox VRF applications department are informed of these proposed changes. Upon receipt of this new information the Lennox VRF applications department will confirm any changes that may be applicable to this installation. If changes are required, a new piping diagram will be produced and will supersede all other previously provided documents.

Failure to provide this information regarding changes to the original design may lead to insufficient capacity, equipment failure, warranty being made void and the refusal to commission the system.

**Dimensions - inches (mm) Upflow Position Shown**



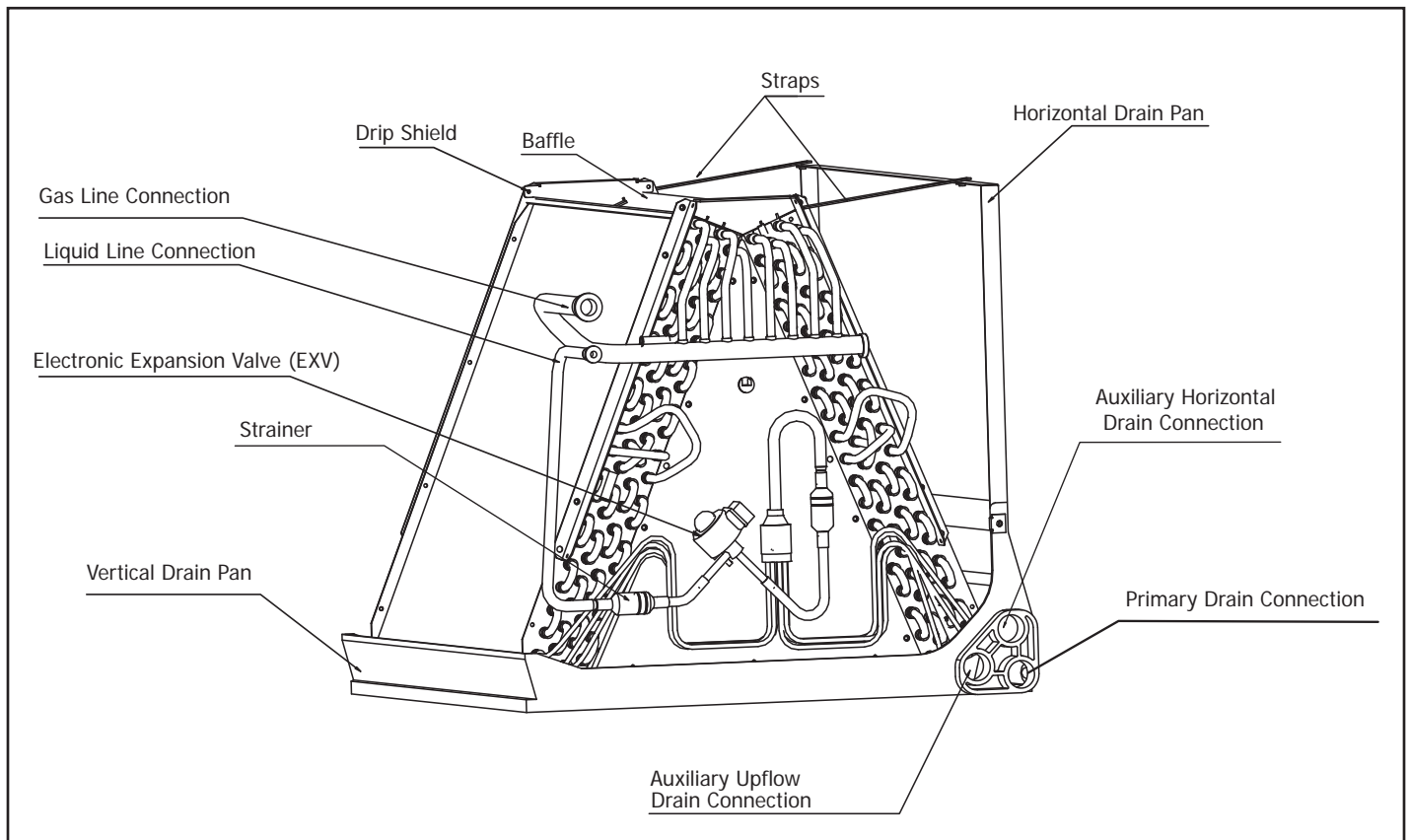
Dimension	018-030		036-054	
	in.	mm	in.	mm
A	45-3/4	1162	53-3/4	1365
B	19-3/4	502	22	560
C	17-7/8	454	19-1/2	495
D	21-5/8	549	24	610
E	13-3/4	349	19-1/2	495
F	18-1/2	470	20-3/8	518
G	20-3/4	527	22-3/4	578

## Clearances

Model No.	18-36	48-54
Cabinet	0 inch (0 mm)	0 inch (0 mm)
To Plenum	0 inch (0 mm)	0 inch (0 mm)
To Outlet Duct within 3 feet (914 mm)	0 inch (0 mm)	0 inch (0 mm)
Service / Maintenance	See Note #1	

<sup>1</sup> Front service access - 24 inches (610 mm) minimum.

## Parts Identification



## Indoor Unit Placement

In addition to clearances, the following items should be considered:

### WARNING

Use the provided and specified components when installing equipment. Failure to do so may result in unit falling, water leaking or electrical shocks, causing personal injury or equipment or property damage.

Check stability of wall, floor, or ceiling and unit support. If support is not capable of carrying weight of the unit, unit may fall causing personal injury or equipment damage.

Consider the possibility of earthquakes in your area when installing the equipment. If the unit is not correctly secured, it may fall, causing personal injury or equipment damage.

Safely dispose of packing materials, which include nails, wood and other sharp objects, as well as plastic wrapping. Children playing with plastic wrap or bags risk the danger of suffocation.

### WARNING

Excessive Weight Hazard - Use two or more people when moving and installing the unit. Failure to do so can result in back or other type of injury.

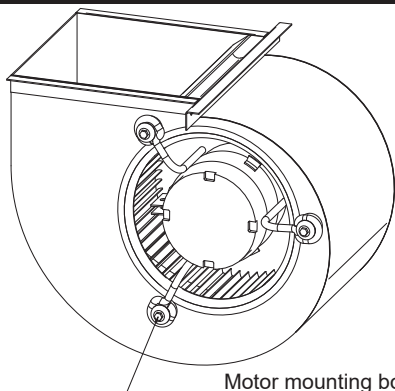
### WARNING



Danger of explosion.  
Keep flammable materials and vapors, such as gasoline, away from air handler.  
Place air handler so that heating elements are at least 18 inches (46 cm) above the floor for a garage installation.  
Failure to follow these instructions can result in death, explosion, or fire.

### CAUTION

Make sure the blower motor support is tight (3-motor mount bolts) then check to see if wheel is secured to motor shaft before operating unit.



### IMPORTANT

This unit is approved for installation clearance to combustible material as stated on the unit rating plate. Accessibility and service clearances must take precedence over combustible material clearances.

Excessive condensation may occur if the unit is installed in a warm, humid place. When the unit is installed in an unconditioned space, apply sealant around electrical wires, refrigerant piping and condensate lines at the point where they enter the cabinet.

Apply sealant on the inside of the cabinet at the point where the electrical wires exit through the conduit opening.

Sealing the cabinet in this way prevents warm, moist, unconditioned air from entering the cabinet. Warm, moist air in the cabinet forms condensate on the cooler control box and electrical controls.

The air handler must be installed so that free access is allowed to the coil/filter compartment and blower/control compartment.

### AVOID

Do not install the unit in the following locations:

- Areas exposed to petrochemicals or petrochemical products
- Areas exposed to salt or other corrosive materials or caustic gasses
- Areas exposed to extreme voltage variations (such as factories)
- Tightly enclosed areas that may impede service of the unit
- Areas exposed to fossil fuels (such as oil or gas in kitchens)
- Areas exposed to strong electromagnetic forces
- Areas exposed to acids or alkaline detergents (laundry rooms)

### DO:

- Locate the unit so that it is not exposed to direct sunlight
- Ensure the structural wall, floor, or ceiling can support the weight of the unit.
- Select a location where condensate line will have the shortest run to a suitable drain per local codes.
- Allow sufficient space around unit for proper operation and maintenance
- Install unit a minimum of 3 feet away from any antenna, power cord (line) radio, telephone, security system, or intercom. Electrical interference and radio frequencies from any of these sources may affect operation
- Be sure to instruct customers how to properly operate the unit (especially maintenance of air filter, and operation procedure) by having them carry out operations themselves while looking at the manual provided with the controller.

## Installation

It is important to locate the unit where it can be accessed for service in the future. Refer to unit dimensions on Page 3 for exact locations of suspension brackets, return air and supply air openings.

- Make sure that the structural ceiling is able to support the weight of the indoor unit. It may be necessary to add extra support.
- Install suspension rods in the structural ceiling in a suitable location.
- If the structural ceiling is constructed of concrete, install anchors to accept four  $\frac{3}{8}$ " threaded rods to suspend the indoor unit. If the structural ceiling includes wooden joists, use angle iron or Unistrut channel fixed securely in place to accept the  $\frac{3}{8}$ " threaded rods. See figure 1.

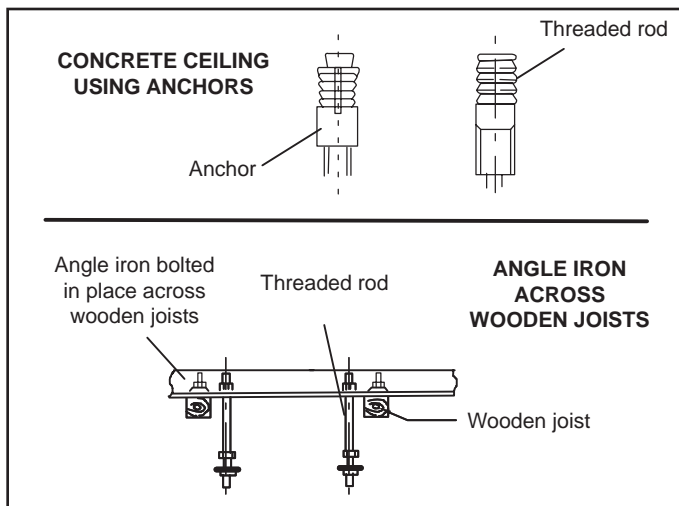


Figure 1. Locate Threaded Rods

- Use either a mechanical lifting device or a minimum of two people to raise the unit.
- If necessary, install a field-provided isolation grommet to prevent transmission of vibration from unit to structural ceiling.
- If the unit is being installed in an application that includes a sheet rock (plasterboard) ceiling, it is recommended to install an access panel in a suitable location to allow final connection of the refrigerant piping, condensate line and electrical connections.
- This will also allow access for future maintenance.
- For ease of installation, it is best to make any necessary coil configuration changes before setting the air handler in place.

**NOTE** - When the unit is installed in horizontal applications, a secondary drain pan is recommended. Refer to local codes. Adequate support must be provided to ensure cabinet integrity. Ensure that there is adequate room to remove service and access panels if installing in the horizontal position.

## Upflow Application

1. The air handler must be supported on the bottom only and set on a suitable base or a field-supplied support frame. Securely attach the air handler to the floor or support frame.
2. If installing a unit in an vertical application, remove the horizontal drain pan.
3. Place the unit in the desired location and properly slope the unit, see page 11. Connect the return and supply air plenums as required using sheet metal screws.
4. Determine knockouts required for drain line connections.
5. With access door removed, remove drain line opening to install drain lines.
6. If the unit is intended to be used with an "open" return air path, ensure there is at least 14" of clearance below the unit.

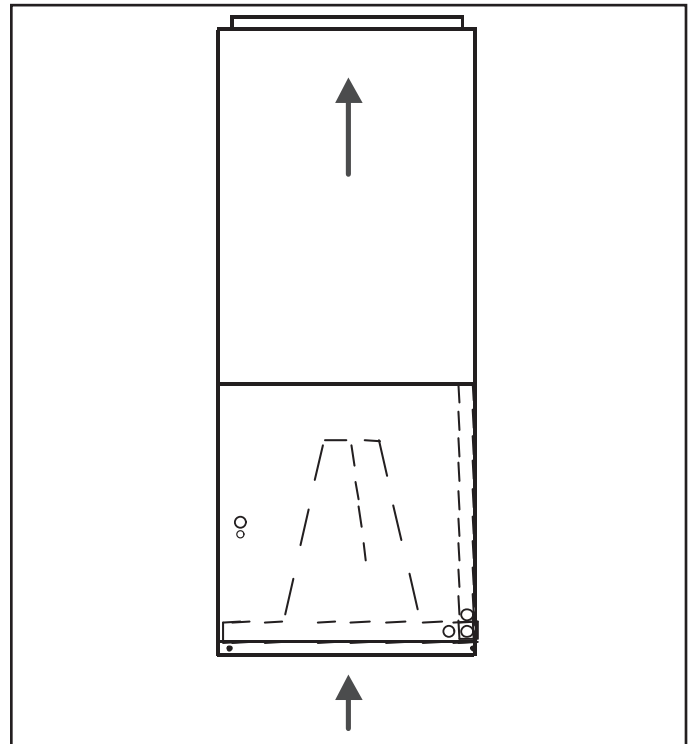


Figure 2. Upflow Configuration



## Horizontal Application

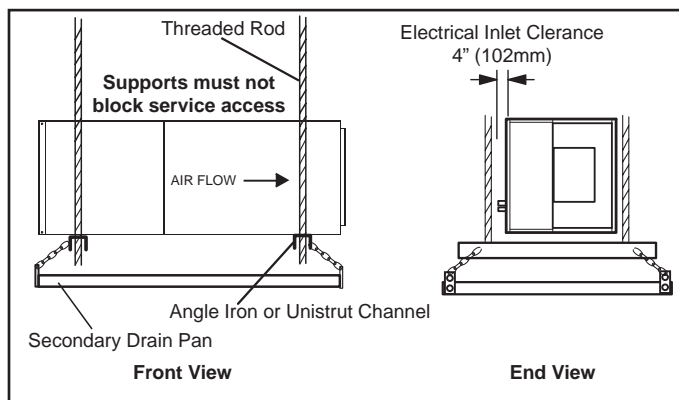
1. Determine knockouts required for drain line connections.
2. With access door removed, remove drain line opening to install drain lines.
3. Set unit so that it is sloped toward the end of the unit with the drain pan (see figure 12).
4. A typical horizontal configuration is shown in figure 3.
5. If the unit is suspended, the entire length of the cabinet must be supported. If you use threaded rod, use a piece of angle iron or Unistrut channel attached to the unit (either above or below) to support the length of the cabinet. Use field-supplied 3/8 threaded nylon-lock nuts and bolts **no longer than 1/2 inch** to avoid damaging the coil or filter. Use sheet metal screws to connect the return and supply air plenums as required.

**! IMPORTANT**

When removing the coil, there is a possibility of equipment damage and personal injury. Be careful when removing the coil assemble from a unit installed horizontal. The coil may tip into the drain pan once it is clear of the cabinet. Support the coil when removing it.

**! IMPORTANT**

The horizontal drain pan is not required in vertical upflow air discharge installations. It must be removed to provide the best efficiency and air flow.



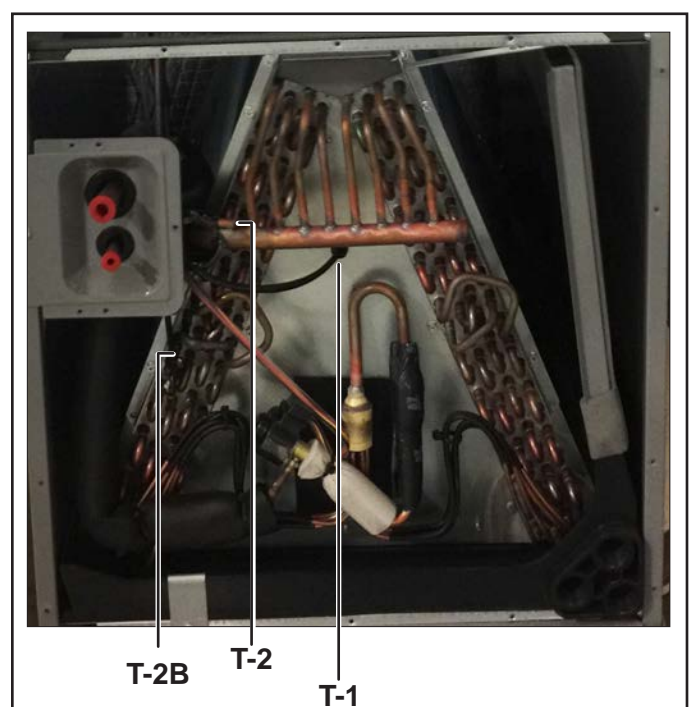
**Figure 3. Suspending Horizontal Unit**

## Horizontal-Left Conversion

1. Remove the coil section panel and the blower section panel.
2. Remove the T-2 and T-2B sensors from the sleeves. The sensors look similar; label the sensors so that they can be reinstalled to the proper locations. T-2 Sensor black cable, no overlay. T-2B Sensor clear overlay on black cable.

**Table 1. Coil Sensor Identification**

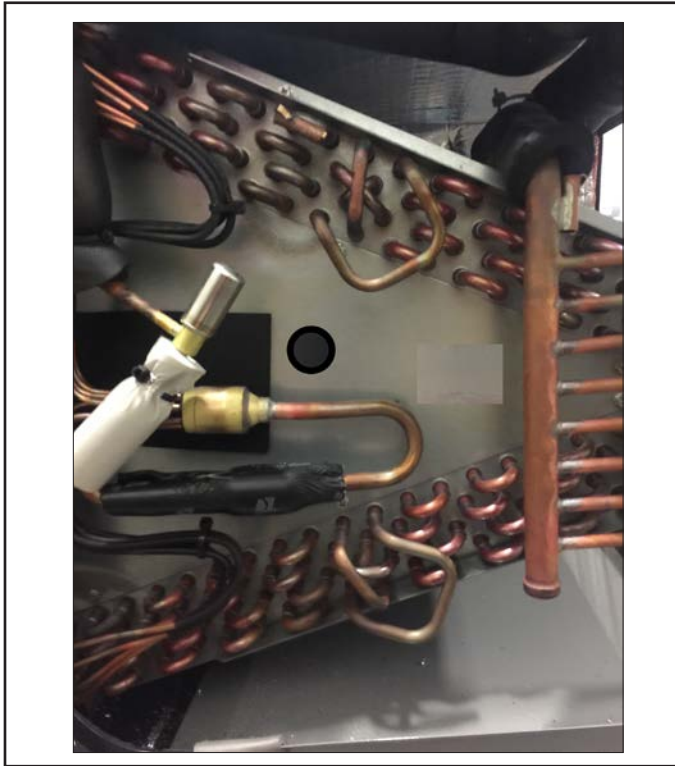
Sensor	Description
T1	Return Air (room) Sensor
T2	Middle of Coil Sensor
T2B	Leaving Coil (outlet) Sensor



**Figure 4. T1, T-2 and T2B Factory Installed Sensor Locations (Vertical Upflow and Horizontal-Right Configuration Shown)**

3. Remove the EXV motor from the EXV body.
4. Remove the T1 sensor from the factory-provided hole in the coil housing. The sensor will not be positioned back inside of coil housing.
5. Slide the coil assembly out of the cabinet. Place coil on sturdy surface.

6. Use a 1" hole cutter bit to create a wiring passthrough in the coil housing front panel.
7. Clean all of the burrs from the newly cut hole. Insert a grommet into the hole.
8. Seal the factory-provided T-1 outlet hole with UL listed foil tape.



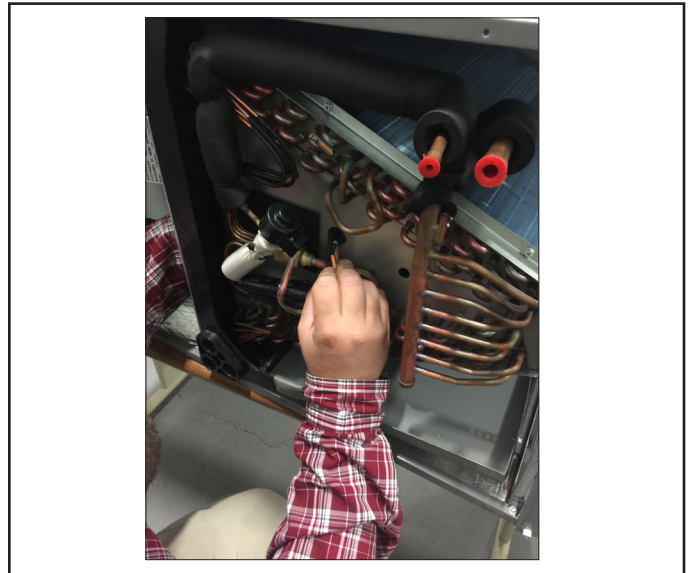
**Figure 5. Coil Assembly Field-Modified with Wiring Cable Passthrough**

9. Position cabinet in the horizontal-left orientation on a sturdy work surface.



**Figure 6. Position Cabinet in Horizontal Left Orientation**

10. Rotate Coil 180° and re-insert into coil compartment so that the bottom (underside) of coil faces blower.



**Figure 7. Coil Rotated 180°**

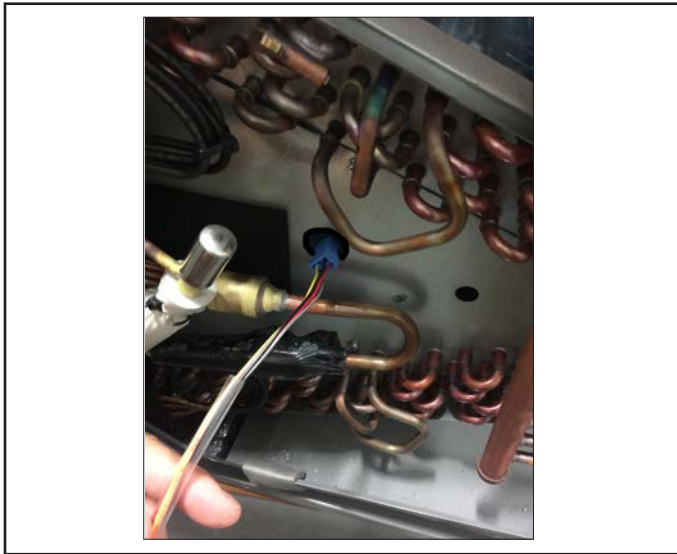
11. Disconnect the sensor wiring harness in the control box (blue plug) and prepare to reroute it to allow for connection to the sensors in their new locations.



**Figure 8. Disconnect Wiring Harness**

12. Release the wiring harness clips and ties. Carefully remove the wiring harness.
13. Insert the wiring harness plug into the hole you cut into the coil front plate.
14. Reinstall the EXV motor.
15. Route wiring harness through coil, past the blower and into the electrical box. Do not pinch or bind wires.





**Figure 9. Route Wiring Harness Through Coil and Into Electrical Compartment**

16. Relocate T-1 Sensor to be downstream of the coil to sense room air temperature.



**Figure 10. Relocate T-1 Sensor**

17. Secure T-1 sensor to “top of coil” brace.
18. Re-secure the wiring harness using clips and wire ties. Do not pinch or bind wires.
19. Reconnect the T2 and T2B sensors.
20. Reconnect the wire harness plug inside of electrical control box.
21. Turn the coil compartment cover 180° and reattach to the unit cabinet.
22. Reattach the blower compartment panel.

## Refrigerant Piping Connections

### **! WARNING**

Refrigerant leaks are unlikely; however, if a refrigerant leak occurs, open a door or windows to dilute the refrigerant in the room. Turn off the unit and all other appliances that may cause a spark. Call a licensed professional HVAC technician (or equivalent) to repair the leak.

Use only R410A refrigerant to charge this system. Use of other refrigerant or gas will damage the equipment. Do not allow air or other contaminants to enter system during installation of refrigerant piping. Contaminants will result in lower system capacity and abnormally high operating pressures and may result in system failure or explosion.

Insulate all refrigerant piping.

Refrigerant pipes may be very hot during unit operation. Do not allow contact between wiring and bare copper pipes.

After refrigerant piping connections have been completed, check the system for leaks per commissioning instructions.

### **! IMPORTANT**

The compressor in the unit this air handler is matched with contains PVE oil (Polyvinyl ether). PVE oil is formulated for hydrofluorocarbon (HFC) refrigerants, such as R410A, which this system contains. While it may have some miscibility properties with mineral-based oil and POE oil (Polyolester), it is not recommended to mix PVE oil with any other type of refrigerant oil.

Field piping consists of two copper lines connected to the indoor unit. Table 2 lists the connection sizes at the indoor unit. Both lines must be individually insulated.

**Table 2. Refrigerant Piping Connections**

Size (Btuh)	Liquid Line	Vapor Line
VVCA018-054	3/8"	5/8"

### **! IMPORTANT**

Always use two wrenches when tightening flare nuts to avoid twisting refrigerant piping. DO NOT over-tighten flare nuts.

### **! IMPORTANT**

Flared connections should always be accessible and must be insulated to prevent condensation.

### **! IMPORTANT**

Support ALL piping within 12 in. (305 mm) of any mechanical fitting such as a flared connection.

## Brazing Refrigerant Lines

Refrigerant lines must be connected by a qualified technician in accordance with established procedures.

### WARNING



Danger of fire. Bleeding the refrigerant charge from only the high side may result in pressurization of the low side shell and suction tubing. Application of a brazing torch to a pressurized system may result in ignition of the refrigerant and oil mixture. Check the high and low pressures before applying heat.

### CAUTION

Brazing alloys and flux contain materials which are hazardous to your health.

Avoid breathing vapors or fumes from brazing operations. Perform operations only in well-ventilated areas.

Wear gloves and protective goggles or face shield to protect against burns.

Wash hands with soap and water after handling brazing alloys and flux.

### CAUTION

Purge low pressure nitrogen [1 to 2 psig (6.0 to 12.8 kPA)] through the refrigerant piping during brazing. This will help to prevent oxidation and the introduction of moisture into a system.

To prevent the build-up of high levels of nitrogen when purging be sure it is done in a well ventilated area.

### IMPORTANT

Refrigerant lines must be clean, dry, refrigerant-grade copper lines. Air handler coils should be installed only with specified line sizes for approved system combinations.

Handle refrigerant lines gently during the installation process. Sharp bends or kinks in the lines will cause restrictions.

### IMPORTANT

Only use brazing rods/sticks which are suitable/recommended for air conditioning pipework installations - Do Not Use Soft Solder.

1. The seal on the unit refrigerant piping connections should remain in place until the last possible moment. This will prevent dust or moisture from getting into the refrigerant piping before it is connected.
2. To avoid damaging the rubber grommets in the cabinet while brazing, slide the rubber grommets over the refrigerant lines until they are away from the heat source.
3. Remove rubber plug from both liquid and gas lines or cut pipework tails to suit field installation conditions
4. Connect the liquid and gas lines to the evaporator coil.
5. Place a wet rag against piping plate and around the line connections. **Take care to protect the cabinet and internal components.**
6. Ensure nitrogen is flowing at all times during the brazing process.
7. Braze connections. Allow pipe to cool before removing wet rag.
8. Reinstall the rubber grommets into the refrigerant piping panel.
9. Insulate both pipes individually.

## Sealing the Unit

Seal the unit so that warm air is not allowed into the cabinet. Warm air introduces moisture, which results in water blow-off problems.

This is especially important when the unit is installed in an unconditioned area.

If installed in an unconditioned space, sealant should be applied around the electrical wires, refrigerant tubing, and condensate lines where they enter the cabinet.

### WARNING

There must be an air-tight seal between the bottom of the air handler and the return air plenum. Use fiberglass sealing strips, caulking, or equivalent sealing method between the plenum and the air handler cabinet to ensure a tight seal. Return air must not be drawn from a room where this air handler or any gas-fueled appliance (i.e. water heater) or carbon monoxide-producing device (i.e. wood fireplace) is installed.

## Condensate Piping Connections

The air handler is provided with 3/4" NPT condensate drain connections.

### ! CAUTION

Make sure that drain piping is properly routed and insulated in order to prevent both leaks and condensation. Follow these instructions exactly to ensure proper drainage and unit operation.

### ! IMPORTANT

Drain should have a slope of at least 1/4 inch per foot and should be approved corrosion-resistant pipe. You must confirm operation of every drain and pump in the system as part of the commissioning procedure.

### ! IMPORTANT

A field-fabricated secondary drain pan, with a drain pipe to the outside of the building, is required in all installations over a finished living space or any area that may be damaged by overflow from the main drain pan.

1. Install properly sized, field-provided connection fittings and connect primary drain line to the main drain pan connection (3/4" I.D.).  
**NOTE** - When installing drain line connection fittings to the drain pan, hand tighten the fitting and use a thread sealant. Over-tightening the fittings can split connections on the drain pan.
2. If the secondary drain line is to be used, remove the plug or the knockout and route the drain line so that water draining from the outlet will be easily noticed by the user. Refer to local codes for drain trap requirements on the secondary drain line.
3. Check again to ensure drain ports and drain pan are free of all debris.
4. Plug and check any unused drain pan openings for tightness to prevent water leaks or seepage from the drain pan.
5. Install a 3" trap in the main (primary) drain lines as close to the unit as practical (see figure 11). Make sure the top of the trap is below the connection to the drain pan to allow complete drainage of the pan.  
**NOTE** - Horizontal runs must have an anti-siphon air vent (standpipe) installed ahead of the horizontal run. See figure 11. An extremely long horizontal run may require an oversized drain line to eliminate air traps.  
**NOTE** - Do not operate air handler without a trap in the main (primary) drain. The condensate drain is on the negative pressure side of the blower; therefore, air being pulled through the condensate line will not allow positive drainage without a proper trap.

6. Route the drain line to the outside or to an appropriate drain. Drain lines must be installed so they do not block service access to the front of the air handler. A 24" clearance is required for filter, coil, or blower removal and service access.  
**NOTE** - Check local codes before connecting the drain line to an existing drainage system. Insulate the drain lines where sweating could cause water damage.
7. After the system installation is complete, the condensate drain line must be checked for leaks and proper drainage. If a field-provided condensate pump has been installed, it must be checked to ensure proper operation. This check is part of the commissioning sequence.

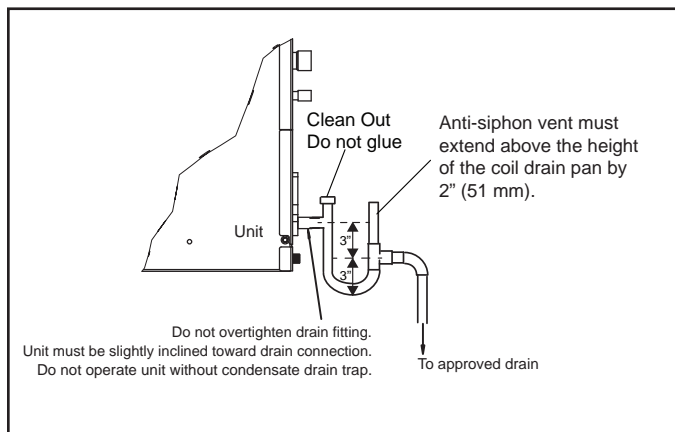


Figure 11. Condensate Drain Trap

### ! IMPORTANT

You must confirm operation of every drain and pump in the system as part of the commissioning procedure.

#### Using an External Water Level Switch

Disconnect the closed circuit loop, CN 5. Connect the water level switch cable accessory to CN 5. See unit wiring diagrams for location of CN 5.

The connection has 5 VDC current, do not supply field voltage.

## Sloping The Unit

Make sure the unit is sloped (similar to the slope shown in figure 12) (horizontal or vertical) so that the drain pan will empty completely without water standing in the pan.

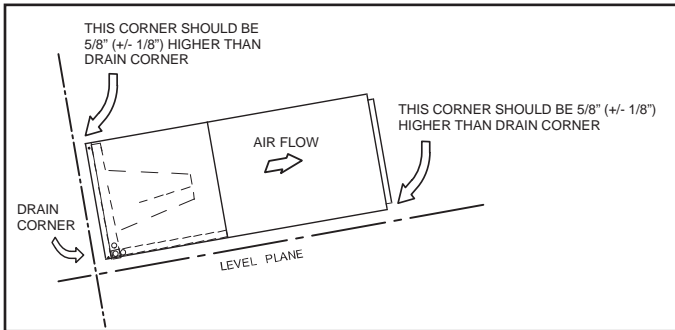


Figure 12. Sloping the Unit

## Duct System

The air handler is provided with flanges for the connection of the supply plenum.

Supply and return duct system must be adequately sized to meet the system's air requirements and static pressure capabilities. Supply plenum should be the same size as the flanged opening provided around the blower outlet and should extend at least 3 ft. from the air handler before turning or branching off plenum into duct runs. The plenum forms an extension of the blower housing and minimizes air expansion losses from the blower.

Field installed duct must comply with the National Fire Protection Association NFPA 90A, NFPA 90B and any applicable local ordinance.

## WARNING

Do not, under any circumstances, connect return duct to any other heat producing device such as fireplace insert, stove, etc. Unauthorized use of such of devices may result in fire, carbon monoxide poisoning, explosion, personal injury or property damage.

## IMPORTANT

If an elbow is included in the plenum close to the unit, it must not be smaller than the dimensions of the supply duct flange on the unit.

The front glange on the return duct if connected to the blower casing must not be screwed into the area where the power wiring is located. Drills or sharp screw points can damage insulation on wires located inside unit.

Duct system must be designed within the range of external static pressure the unit is designed to operate against. It is important that the system airflow be adequate. Make sure supply and return duct, grills, special filters, accessories, etc. are accounted for in total resistance.

Supply plenum is attached to the 3/4" duct flanges supplied with the unit. Attach flanges around the blower outlet.

Secure the supply and return duct to the unit flanges, using proper fasteners for the type of duct used.

## Installation Guidelines

- Install a field-provided isolation grommet to prevent transmission of vibration from unit to structural ceiling.
- Provide separate support for the weight of the duct system. Duct system must not be supported by the indoor unit.
- Use flexible joints (canvas) at the point where the duct connects to the unit on both ends. Material must meet all local and national code requirements.
- When unit is being installed in a location where even the slightest noise would be a problem (meeting room or other very quiet space), design duct system to avoid transmission of vibration to the structure to the extent possible.

## Installing Duct System

- Connect supply air duct to the flange on top of the air handler. If an isolation connector is used, it must be nonflammable.
- When sizing the return air filter grille, a minimum surface area of 200 sq. in. per ton is recommended.

## Wiring Connections

### WARNING

Isolate the power supply before accessing unit electrical terminals.

Install unit so that unit disconnect is accessible.

Follow all local and national codes, as well as this installation instruction, during installation. Do NOT overload electrical circuit, as this may lead to failure and possible fire.

Use specified wiring and cable to make electrical connections. Clamp cables securely and make sure that connections are tight to avoid strain on wiring. Insecure wiring connections may result in equipment failure and risk of fire.

Wiring must be installed so that all cover plates can be securely closed.

In the U.S.A., wiring must conform with current local codes and the current National Electric Code (NEC). In Canada, wiring must conform with current local codes and the current Canadian Electrical Code (CEC).

Refer to unit nameplate for minimum circuit ampacity and maximum overcurrent protection size.

**NOTE** - 18 GA., 3-conductor, shielded control wire (polarity sensitive). All shields of shielded cable connect to GROUND terminal. This is necessary to ensure proper system communication and operation.

### CAUTION

This unit must be properly grounded and protected by a circuit breaker. The ground wire for the unit must not be connected to a gas or water pipe, a lightning conductor or a telephone ground wire.

Do not connect power wires to the outdoor unit until all other wiring and piping connections have been completed.

Install all wiring at least 3 feet away from televisions, radios or other electronic devices in order to avoid the possibility of interference with the unit operation.

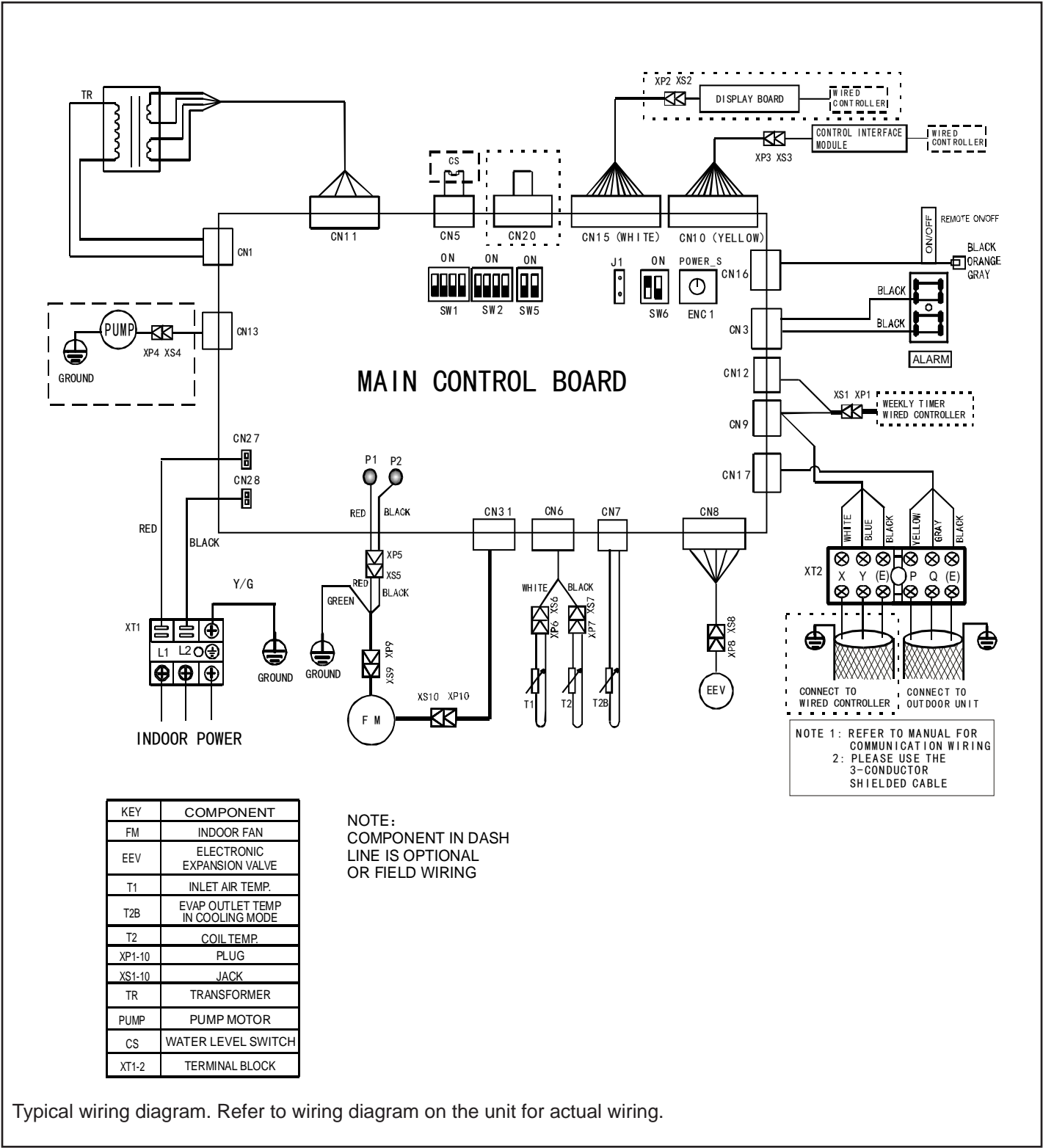
Do not install the unit near a lighting appliance that includes a ballast. The ballast may affect remote control operation.

1. Remove the screws that secure the control box cover. Remove the cover and place it to the side where it will not be damaged.
2. Locate the terminal strip in the control box. Connect the power wiring (sized per NEC/CEC and local codes) and communications cable (**three-core, shielded cable**). Refer to unit nameplate for rated voltage.
3. If the indoor unit is the final unit in a group that is wired in series, install the provided resistor across terminals P and Q.
4. The infra-red receiver / display panel is factory installed and can be repositioned, if necessary. Use optional extension cable kit.

### IMPORTANT

DO NOT adjust DIP switch settings. Settings may only be adjusted by a trained technician as part of the commissioning procedures.





KEY	COMPONENT
FM	INDOOR FAN
EEV	ELECTRONIC EXPANSION VALVE
T1	INLET AIR TEMP.
T2B	EVAP OUTLET TEMP IN COOLING MODE
T2	COIL TEMP.
XP1-10	PLUG
XS1-10	JACK
TR	TRANSFORMER
PUMP	PUMP MOTOR
CS	WATER LEVEL SWITCH
XT1-2	TERMINAL BLOCK

NOTE:  
 COMPONENT IN DASH  
 LINE IS OPTIONAL  
 OR FIELD WIRING

Typical wiring diagram. Refer to wiring diagram on the unit for actual wiring.

Figure 13. VVCA018-054H4-1 Wiring Diagram

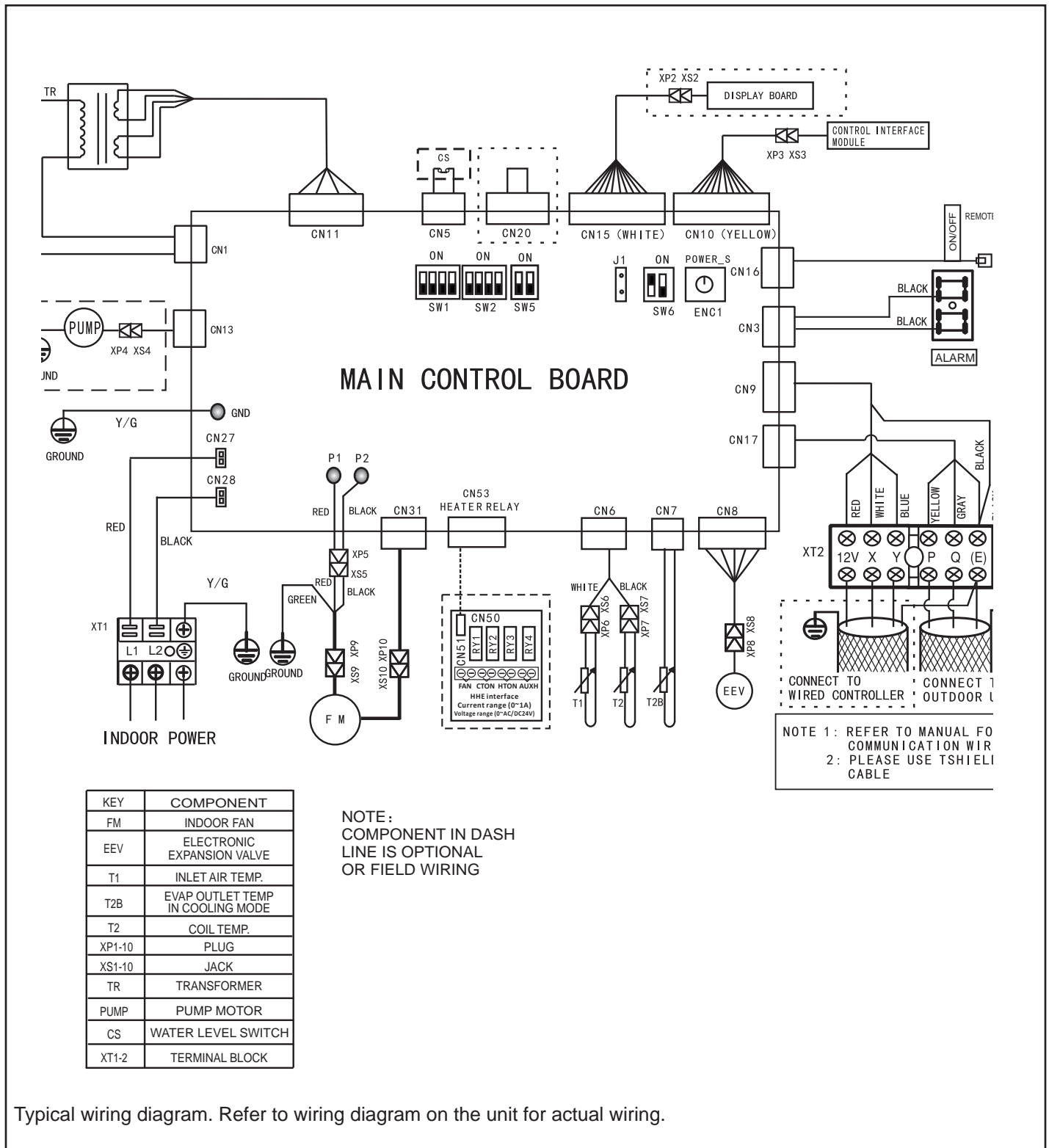
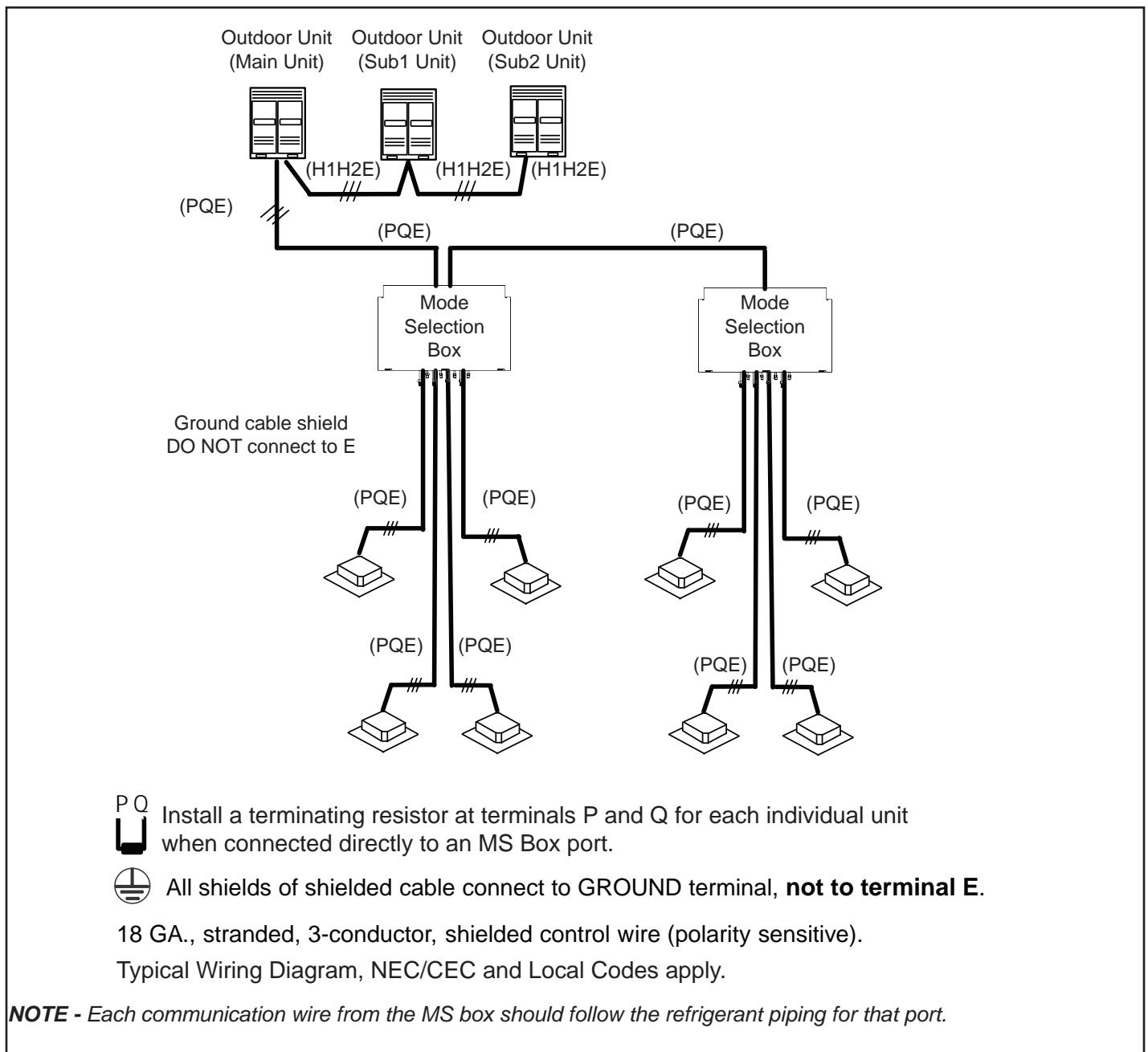


Figure 14. VVCA018-054H4-2 Wiring Diagram





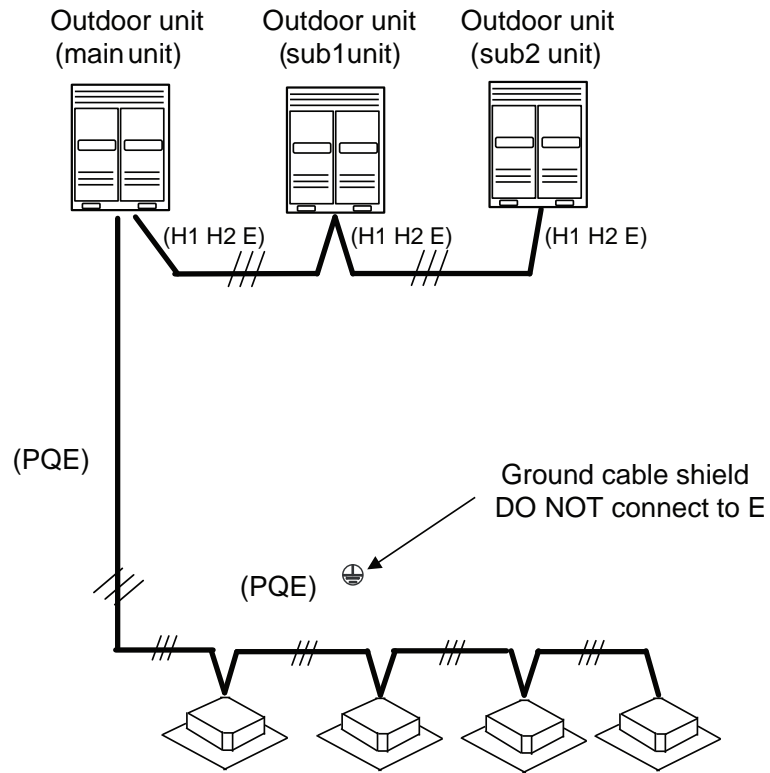
**Figure 16. Typical Communication Wiring Diagram (VRF Heat Recovery System)**


**Tightening torque for the terminal screws**


- Use the correct screwdriver for fighting the terminal screws. If the screwdriver blade is too small, the head of the screw might be damaged, and the screw will not be properly tightened.
- If the terminal screws are over tightened, screws might be damaged.
- Refer to the table below for the tightening torque of the terminal screws.
- After wiring, confirm all connections are correct; Then turn on power supply to the unit.

**Table 3. Terminal Screw Tightening Torque**

	Tightening torque (lb-ft)
Terminal base of remote controller/Signal transmission wire (X2M)	0.58-0.72
Terminal base of power supply (X1M)	0.87-1.06
Grounding terminal (M4)	1.06-1.43



 Install a terminating resistor at the last indoor unit terminals P and Q of the daisy chain.

 All shields of shielded cable connect to GROUND terminal, **not to terminal E**.

18 GA., stranded, 3-conductor, shielded control wire (polarity sensitive).

Typical Wiring Diagram, NEC/CEC and Local Codes apply.

**NOTE** – PQE Communication wiring is daisy-chained from the outdoor unit to each indoor unit in one continuous run.

**Figure 17. Typical Communication Wiring Diagram (VRF Heat Pump System)**



## VVCA018H4

	Description	Input			Blower Motor Full Load Amps	<sup>2</sup> Minimum Circuit Ampacity	<sup>3</sup> Maximum Overcurrent Protection	Blower Speed		
		Volt	kW	<sup>1</sup> Btuh				Low	Medium	High
5 kW	V8EH0050P-1P (13P59)	208	3.8	12,800	3.0	26.8	30	•	•	•
		220	4.2	14,300	3.0	27.8	30	•	•	•
		230	4.6	15,700	3.0	28.8	30	•	•	•
		240	5.0	17,100	3.0	29.8	30	•	•	•
7.5 kW	V8EH0080P-1P (13P63)	208	5.6	19,200	3.0	37.8	<sup>4</sup> 40	<sup>5</sup> - - -	•	•
		220	6.3	21,500	3.0	39.8	<sup>4</sup> 40	<sup>5</sup> - - -	•	•
		230	6.9	23,500	3.0	41.8	45	<sup>5</sup> - - -	•	•
		240	7.5	25,600	3.0	42.8	45	<sup>5</sup> - - -	•	•

## VVCA024H4

	Description	Input			Blower Motor Full Load Amps	<sup>2</sup> Minimum Circuit Ampacity	<sup>3</sup> Maximum Overcurrent Protection	Blower Speed		
		Volt	kW	<sup>1</sup> Btuh				Low	Medium	High
5 kW	V8EH0050P-1P (13P59)	208	3.8	12,800	3.0	26.8	30	•	•	•
		220	4.2	14,300	3.0	27.8	30	•	•	•
		230	4.6	15,700	3.0	28.8	30	•	•	•
		240	5.0	17,100	3.0	29.8	30	•	•	•
7.5 kW	V8EH0080P-1P (13P63)	208	5.6	19,200	3.0	37.8	<sup>4</sup> 40	<sup>5</sup> - - -	•	•
		220	6.3	21,500	3.0	39.8	<sup>4</sup> 40	<sup>5</sup> - - -	•	•
		230	6.9	23,500	3.0	41.8	45	<sup>5</sup> - - -	•	•
		240	7.5	25,600	3.0	42.8	45	<sup>5</sup> - - -	•	•
10 kW	V8EH0100P-1P (13P64)	208	7.5	25,600	3.0	48.8	<sup>4</sup> 50	<sup>5</sup> - - -	•	•
		220	8.4	28,700	3.0	51.8	60	<sup>5</sup> - - -	•	•
		230	9.2	31,400	3.0	53.8	60	<sup>5</sup> - - -	•	•
		240	10.0	34,100	3.0	55.8	60	<sup>5</sup> - - -	•	•

## VVCA030H4

	Description	Input			Blower Motor Full Load Amps	<sup>2</sup> Minimum Circuit Ampacity	<sup>3</sup> Maximum Overcurrent Protection	Blower Speed		
		Volt	kW	<sup>1</sup> Btuh				Low	Medium	High
5 kW	V8EH0050P-1P (13P59)	208	3.8	12,800	3.0	26.8	30	•	•	•
		220	4.2	14,300	3.0	27.8	30	•	•	•
		230	4.6	15,700	3.0	28.8	30	•	•	•
		240	5.0	17,100	3.0	29.8	30	•	•	•
7.5 kW	V8EH0080P-1P (13P63)	208	5.6	19,200	3.0	37.8	<sup>4</sup> 40	<sup>5</sup> - - -	•	•
		220	6.3	21,500	3.0	39.8	45	<sup>5</sup> - - -	•	•
		230	6.9	23,500	3.0	41.8	45	<sup>5</sup> - - -	•	•
		240	7.5	25,600	3.0	42.8	45	<sup>5</sup> - - -	•	•
10 kW	V8EH0100P-1P (13P64)	208	7.5	25,600	3.0	48.8	<sup>4</sup> 50	<sup>5</sup> - - -	•	•
		220	8.4	28,700	3.0	51.8	60	<sup>5</sup> - - -	•	•
		230	9.2	31,400	3.0	53.8	60	<sup>5</sup> - - -	•	•
		240	10.0	34,100	3.0	55.8	60	<sup>5</sup> - - -	•	•

NOTE - Circuit 1 Minimum Circuit Ampacity includes the Blower Motor Full Load Amps.

<sup>1</sup> Electric heater capacity only - does not include additional blower motor heat capacity.

<sup>2</sup> Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements. Use wires suitable for at least 167°F.

<sup>3</sup> HACR type breaker or fuse.

<sup>4</sup> Bold text indicates that the circuit breaker on CB<sup>®</sup> circuit breaker models must be replaced with size noted. See Table on page <OV>.

<sup>5</sup> Do not operate fan on low speed when V8EH Electric Heat Kit is used with VVCA air handler.

VVCA036H4

Description	Input			Blower Motor Full Load Amps	<sup>2</sup> Minimum Circuit Ampacity	<sup>3</sup> Maximum Overcurrent Protection	Blower Speed		
	Volt	kW	<sup>1</sup> Btuh				Low	Medium	High
<b>5 kW</b> V8EH0050P-1P (13P59)	208	3.8	12,800	4.2	28.3	<sup>4</sup> 30	•	•	•
	220	4.2	14,300	4.2	29.3	<sup>4</sup> 30	•	•	•
	230	4.6	15,700	4.2	30.3	35	•	•	•
	240	5.0	17,100	4.2	31.3	35	•	•	•
<b>7.5 kW</b> V8EH0080P-1P (13P63)	208	5.6	19,200	4.2	39.3	<sup>4</sup> 40	•	•	•
	220	6.3	21,500	4.2	41.3	45	•	•	•
	230	6.9	23,500	4.2	42.3	45	•	•	•
	240	7.5	25,600	4.2	44.3	45	•	•	•
<b>10 kW</b> V8EH0100P-1P (13P64)	208	7.5	25,600	4.2	50.3	60	<sup>6</sup> - - -	•	•
	220	8.4	28,700	4.2	53.3	60	<sup>6</sup> - - -	•	•
	230	9.2	31,400	4.2	55.3	60	<sup>6</sup> - - -	•	•
	240	10.0	34,100	4.2	57.3	60	<sup>6</sup> - - -	•	•

VVCA048H4, VVCA054H4

Description	Input			Blower Motor Full Load Amps	<sup>2</sup> Minimum Circuit Ampacity		<sup>3</sup> Maximum Overcurrent Protection		<sup>5</sup> Single Point Power Source		Blower Speed		
	Volt	kW	<sup>1</sup> Btuh		Ckt 1	Ckt 2	Ckt 1	Ckt 2	<sup>2</sup> Minimum Circuit Ampacity	<sup>3</sup> Maximum Overcurrent Protection	Low	Medium	High
<b>5 kW</b> V8EH0050P-1P (13P59)	208	3.8	12,800	4.2	28.3	- - -	<sup>4</sup> 30	- - -	- - -	- - -	•	•	•
	220	4.2	14,300	4.2	29.3	- - -	<sup>4</sup> 30	- - -	- - -	- - -	•	•	•
	230	4.6	15,700	4.2	30.3	- - -	35	- - -	- - -	- - -	•	•	•
	240	5.0	17,100	4.2	31.3	- - -	35	- - -	- - -	- - -	•	•	•
<b>7.5 kW</b> V8EH0080P-1P (13P63)	208	5.6	19,200	4.2	39.3	- - -	<sup>4</sup> 40	- - -	- - -	- - -	•	•	•
	220	6.3	21,500	4.2	41.3	- - -	45	- - -	- - -	- - -	•	•	•
	230	6.9	23,500	4.2	42.3	- - -	45	- - -	- - -	- - -	•	•	•
	240	7.5	25,600	4.2	44.3	- - -	45	- - -	- - -	- - -	•	•	•
<b>10 kW</b> V8EH0100P-1P (13P64)	208	7.5	25,600	4.2	50.3	- - -	60	- - -	- - -	- - -	•	•	•
	220	8.4	28,700	4.2	53.3	- - -	60	- - -	- - -	- - -	•	•	•
	230	9.2	31,400	4.2	55.3	- - -	60	- - -	- - -	- - -	•	•	•
	240	10.0	34,100	4.2	57.3	- - -	60	- - -	- - -	- - -	•	•	•
<b>15 kW</b> V8EH0150P-1P (13P75)	208	11.3	38,400	4.2	50.3	23	60	<sup>4</sup> 25	73.3	80	<sup>6</sup> - - -	•	•
	220	12.6	43,000	4.2	53.3	24	60	<sup>4</sup> 25	77.3	80	<sup>6</sup> - - -	•	•
	230	13.8	47,000	4.2	55.3	25	60	<sup>4</sup> 25	80.3	90	<sup>6</sup> - - -	•	•
	240	15.0	51,000	4.2	57.3	26	60	30	83.3	90	<sup>6</sup> - - -	•	•
<b>20 kW</b> V8EH0200P-1P (13P76)	208	15.0	51,200	4.2	50.3	45	60	<sup>4</sup> 50	95.3	100	<sup>6</sup> - - -	•	•
	220	16.8	57,300	4.2	53.3	48	60	<sup>4</sup> 50	101.3	110	<sup>6</sup> - - -	•	•
	230	18.4	62,700	4.2	55.3	50	60	<sup>4</sup> 50	105.3	110	<sup>6</sup> - - -	•	•
	240	20.0	68,200	4.2	57.3	52	60	60	109.3	110	<sup>6</sup> - - -	•	•

NOTE - Circuit 1 Minimum Circuit Ampacity includes the Blower Motor Full Load Amps.

<sup>1</sup> Electric heater capacity only - does not include additional blower motor heat capacity.

<sup>2</sup> Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements. Use wires suitable for at least 167°F.

<sup>3</sup> HACR type breaker or fuse.

<sup>4</sup> Bold text indicates that the circuit breaker on CB" circuit breaker models must be replaced with size noted. See Table on page <?>.

<sup>5</sup> Single point power source breaker for unit with 15 and 20 kW electric heat is not furnished and must be field provided.

<sup>6</sup> Do not operate fan on low speed when V8EH Electric Heat Kit is used with VVCA air handler.

REPLACEMENT CIRCUIT BREAKERS

Voltage	Description	Catalog No.
208/240V - 1 Phase	25 amp, 2 pole	<b>41K13</b>
	30 amp, 2 pole	<b>17K70</b>
	40 amp, 2 pole	<b>49K14</b>
	50 amp, 2 pole	<b>41K12</b>

## Airflow Performance

Model Number	Nominal Cooling	Motor Speed	CFM	External Static Pressure-Inches W.C.[kPa]							
				0.1[.02]	0.2[.05]	0.3[.07]	0.4[.10]	0.5[.12]	0.6[.15]	0.7[.17]	0.8[.20]
				Watts	Watts	Watts	Watts	Watts	Watts	Watts	Watts
18	1.5 Ton	L	460	33.1	50.2	66.5	86.7	105.2	121	---	---
		M	550	45.2	62.6	85.2	99	122.2	143	---	---
		H	650	60.2	80.2	98.4	118.3	143	164.5	---	---
24	2 Ton	L	600	55.8	76.6	95.9	116.6	135.8	157.2	---	---
		M	730	76.9	99.7	119.8	143.1	164.1	190.4	---	---
		H	800	100.7	119.6	125.1	148.6	172.4	196.3	---	---
30	2.5 Ton	L	750	81.8	104.5	125.2	149.6	173.4	194	254	285
		M	870	115.5	141.3	167.5	192.7	222.7	251.4	311	337
		H	1000	157.3	184.6	216	248.5	278.7	318	386	410
36	3 Ton	L	900	71	94	119.8	144	165	214.8	239.3	269.7
		M	1050	100	125.2	159.1	186.4	208.4	238.7	269	301
		H	1200	129.7	157.8	190.9	222.8	252.2	284.2	309.9	345.4
48	4 Ton	L	1120	117.3	146.9	176.3	204.2	233.2	262.5	290	328.6
		M	1360	171.5	208.7	237.5	272.2	305.3	343.1	386.5	423.7
		H	1650	265.4	307.7	343.4	394.2	428.7	473	528.7	584
54	5 Ton	L	1260	140.4	171.2	205.1	237.9	268.2	297.6	335.6	366.6
		M	1530	237.6	270.4	305.7	346.1	385.8	432.5	467.1	513.3
		H	1800	368.1	421.9	466.7	522.1	573.9	619.4	684.2	700

## Air Filter

### **! WARNING**

Do not operate the system without filters. A portion of the dust entrained in the air may temporarily lodge in the duct runs and at the supply registers. Any circulated dust particles could be heated and charred by contact with the air handler elements.

This residue could soil ceilings, walls, drapes, carpets and other articles in the house.

Soot damage may occur with filters in place, when certain types of candles, oil lamps or standing pilots are burned.

The VVCA air filter is field-provided and installed. Follow these guidelines when selecting and installing the filter.

- External filter or other means of filtration is required.
- Filter application and placement are critical to airflow, which may affect the heating and cooling system performance. Reduced airflow can shorten the life of the system's major components, such as motor, limits, elements, heat relays, evaporator coil or compressor. Consequently, we recommend that the return air duct system have only one filter location. For systems with a return air filter grille or multiple filter grilles, can have a filter installed at each of the return air openings.
- If adding high efficiency filters or electronic air filtration systems, it is very important that the air flow is not reduced. If air flow is reduced the overall performance and efficiency of the unit will be reduced.
- When sizing the return air filter grille, a minimum surface area of 200 sq. in. per ton is recommended.

### **! IMPORTANT**

Do not double filter the return air duct system. Do not filter the supply air duct system. This will change the performance of the unit and reduce airflow.

Model	Filter Size	Width	Depth	Height
18/24/30	18x20 in	18-1/4 in	21-5/8 in	1 in
	457x508 mm	464 mm	549 mm	25.4 mm
36/48/54	20x22 in	20-3/4 in	24 in	1 in
	508x559 mm	527 mm	610 mm	25.4 mm

## Air Filter Removal

1. Remove screws, remove filter cabinet cover.
2. Remove air filter.
3. Clean the air filter using vacuum or water. For heavy accumulations, use soft brush and mild detergent.
4. Dry filter completely before use.

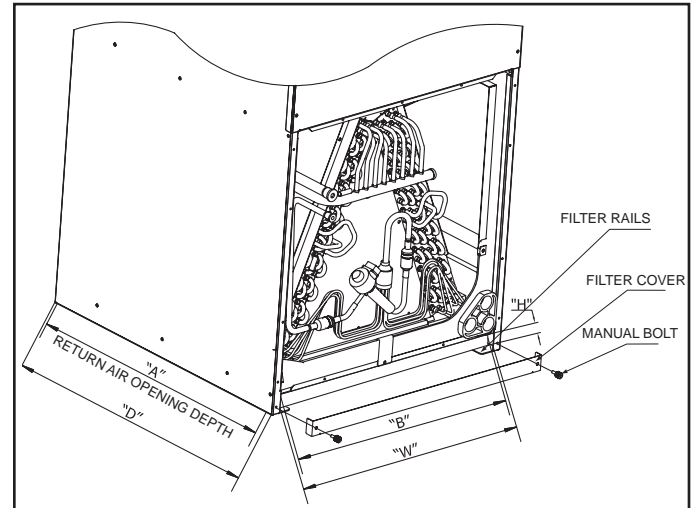


Figure 18. Air Filter Location

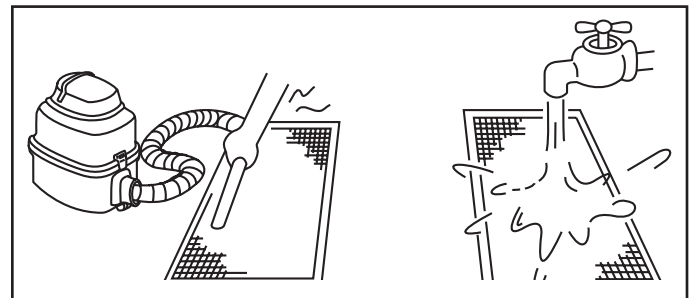


Figure 19. Air Filter Cleaning

## Network Address and Commissioning

After the system has been installed, each indoor unit must be assigned an address as part of the commissioning procedure.

**NOTE** - The indoor unit temperature unit display must be set at the same time as the controller. Indoor units default to display temperatures in °F. To change the indoor unit temperature unit display, press and hold the Manual button on the unit receiver for 5 to 15 seconds until the display changes to show the desired temperature unit.

## Spot Check Instructions

Use the Spot Check Performance tables below and the Manual button on the unit receiver to view diagnostic information about the indoor unit.

**Table 4. Spot Check Performance Identification Table**

No.	Content	Note
0	Normal display	
1	Communication address of IDU	0~63
2	Dial code of IDU capacity	
3	Network address of IDU	0~63
4	The actual setpoint temperature	
5	The actual indoor temperature T1	
6	The actual indoor temperature T1	
7	The middle evaporator temperature T2	
8	The evaporator outlet temperature T2B	
9	Error code	
10	--	

This Spot Check Performance table is located on the unit service panel.

**Table 5. Spot Check Performance Tracking**

	Check	Value	Date	Initials
1	Normal display			
2	Communication address of indoor unit			
3	Dial code of indoor unit capacity			
4	Network address of IDU			
5	The actual setpoint temperature			
6	The actual indoor temperature T1			
7	The actual indoor temperature T1			
8	The middle coil temperature T2			
9	The coil outlet temperature T2B			
10	Error code			

Use the Spot Check Performance Tracking table is located on the unit service panel.

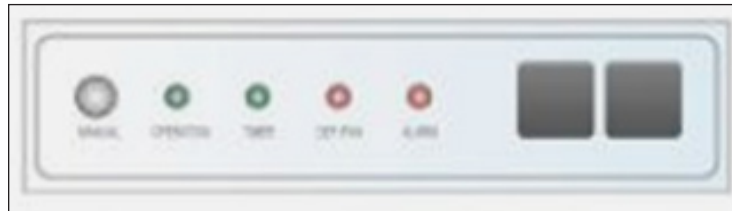
The diagnostic information can also be obtained using the wired remote controller.



## Troubleshooting

The unit is equipped with a receiver that has a digital display that provides an error code.

- Refer to the table below to view the error codes.
  - The error code will replace the temperature setting displayed on the receiver.
  - If more than one error has occurred, the codes will alternate so that all codes are shown.
1. Make note of the code (E1, EE, etc.), then reset the display by pressing the ON/OFF button on the unit controller.
  2. Press the ON/OFF button a second time to reapply power to unit.
  3. If the code is still displayed, disconnect and restore power at the unit disconnect switch or circuit breaker.
  4. If the problem was temporary, the code will not reappear.
  5. If the error code reappears after power has been broken and restored at the disconnect switch or circuit breaker, call VRF Technical Support 1-844-438-8731.



**Table 6. Fault Code Display on Indoor Unit Receiver**

Error Code	Description
E1	Communication error between indoor and outdoor units
E2	Indoor ambient temperature sensor (T1) error
E3	Middle evaporator temperature sensor (T2) error
E4	Evaporator outlet temperature sensor (T2B) error
E6	DC fan motor error
E7	EEPROM error
EE	Water level alarm error
E7	EEPROM error
E0	Mode conflict error
Ed	Outdoor units error
FE	IDU doesn't have address when it is first turned on

**Table 7. Fault Code Display on Controller**

Error Code	Description
F0	Communication error between the indoor unit and the wired controller (may affect other indoor units in the system).
F1	Communication error between the indoor unit and the controller.
F2	Controller EEPROM error.
E1	Communication error between the indoor unit and the outdoor unit.
E2	T1 temperature sensor error.
E3	T2A temperature sensor error.
E4	T2B temperature sensor error.
E5	Outdoor unit error.
E6	Fan motor error.
E7	Indoor unit EEPROM error.
E8	Indoor unit DC motor error.
EE	Condensate pump error.

**Technical Support**

1-844-GET-VRF1

(1-844-438-8731)

vrftechsupport@lennoxind.com

www.LennoxVRF.com

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from the Apple App Store or the Google Play store.

