INSTALLATION INSTRUCTIONS

REAL AHU Control Kit

VRF SYSTEMS
508397-01
06/2023

THIS MANUAL MUST BE LEFT WITH THE OWNER FOR FUTURE REFERENCE

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

⚠ 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.

⚠ WARNING

To prevent serious injury or death:

1. Lock-out/tag-out before performing maintenance.
2. If system power is required (e.g., smoke detector maintenance), disable power to blower, remove fan belt where applicable, and ensure all controllers and thermostats are set to the “OFF” position before performing maintenance.
3. Always keep hands, hair, clothing, jewelry, tools, etc. away from moving parts.

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 V8AHUK02-3T AHU Control Kit
1 - Gas (vapor) Pipe temperature sensor (T2B) and connection wiring harness
4 - ST3.9x25 recessed pan head tapping screws
1 - Temperature sensor mounting socket
1 - Temperature sensor mounting socket clip
1 - Temperature sensor insulation sleeve
1 - Installation and operation manual
2 - Straight pipe/adaptor pipe

⚠ CAUTION

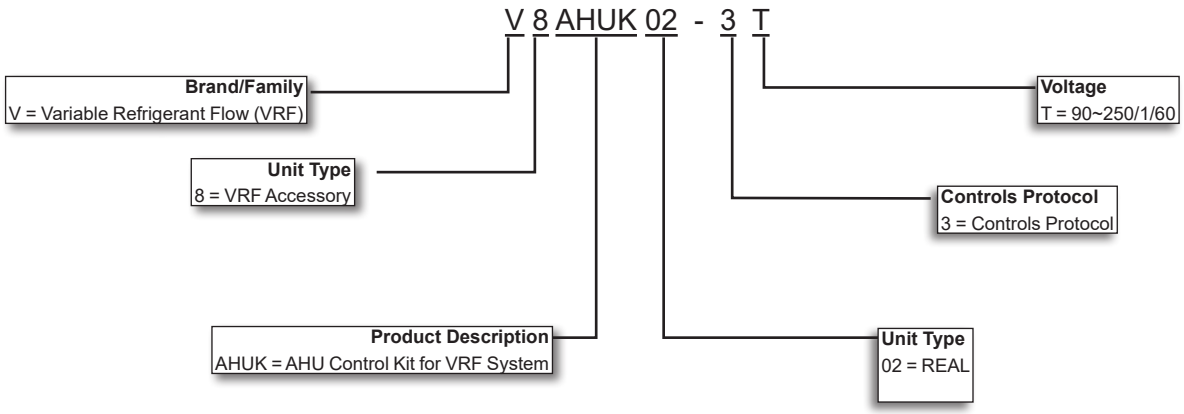
As with any mechanical equipment, contact with sharp sheet metal edges can result in personal injury. Take care while handling this equipment and wear gloves and protective clothing.

To ensure proper system performance and reliability, Lennox does not recommend operation of REAL 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.

⚠ IMPORTANT

The Clean Air Act of 1990 bans the intentional venting of refrigerant (CFC’s and HCFC’s) as of July 1, 1992. Approved methods of recovery, recycling or reclaiming must be followed. Fines and/or incarceration may be levied for non-compliance.

Model Number Identification



NOTE - *Lennox REAL/VRF and Lennox Mini-Split products are similar in appearance to each other. Refer to the unit's model number to determine if the unit is a REAL/VRF (V) or Mini-Split (M) unit. It is not possible to mix the two types of equipment on any system.*

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 Commercial 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 Commercial Applications Department are informed of these proposed changes.

Upon receipt of this new information the Lennox Commercial 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.

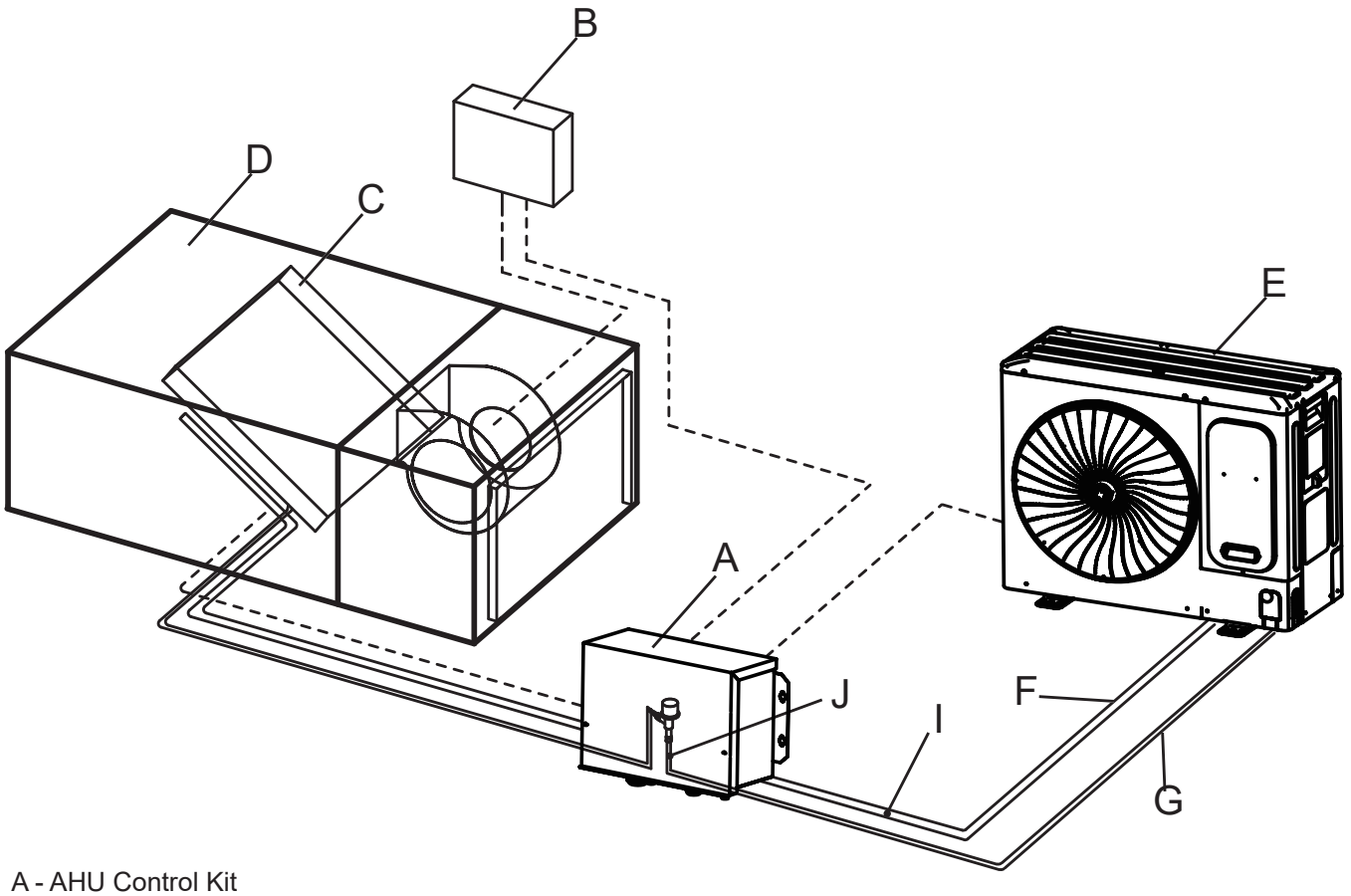
Allowed Outdoor Unit Connections

Table 1. Allowed Outdoor Unit Connections

Heat Pump
VPC018H4M-3P
VPC024H4M-3P
VPC036H4M-3PS
VPC036H4M-3PD
VPC048H4M-3P
VPC060H4M-3P

Application

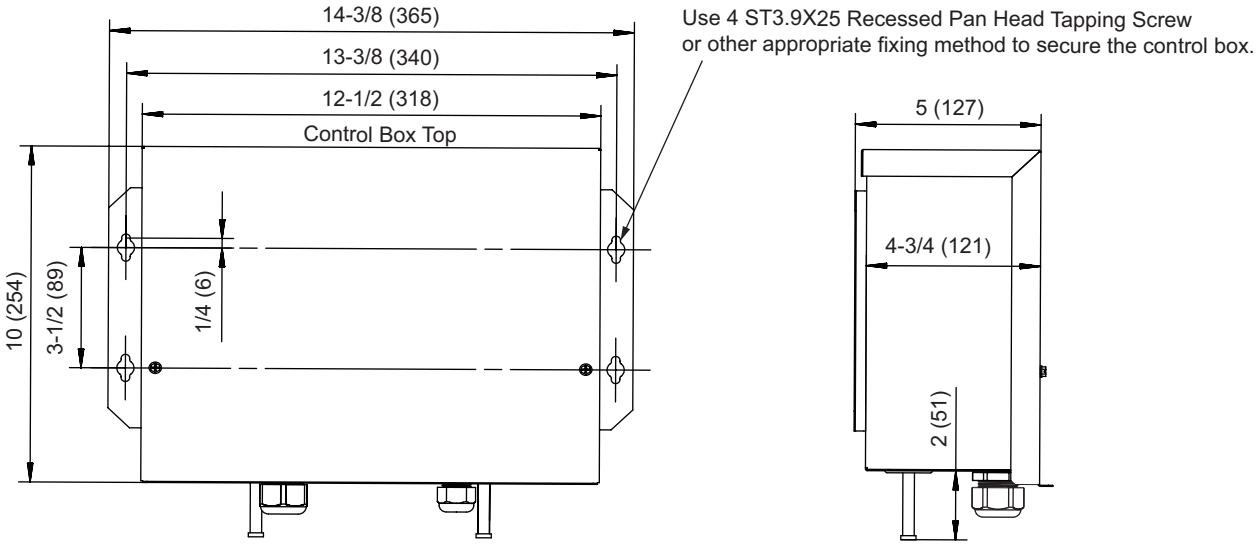
The V8AHUK02-3T AHU Control Kits enables Lennox VPC REAL heat pump outdoor units to operate Lennox non-VRF indoor units and 3rd party non-communicating indoor units (coils, air handler units and furnaces) with 1 to 5 tons capacity of each unit. A typical application layout is shown in Figure 1.



A - AHU Control Kit
B - Air Handler Control Board
C - Air Handler Coil
D - Air Handler Unit
E - Outdoor Unit
F - Gas (Vapor) Pipe
G - Liquid Pipe
H - Electronic Expansion Valve (EXV) Assembly
I - Suction Line Temperature Sensor (T2B) (Field-Installed)
J - Liquid Line Temperature Sensor (T2A) (Factory-Installed)

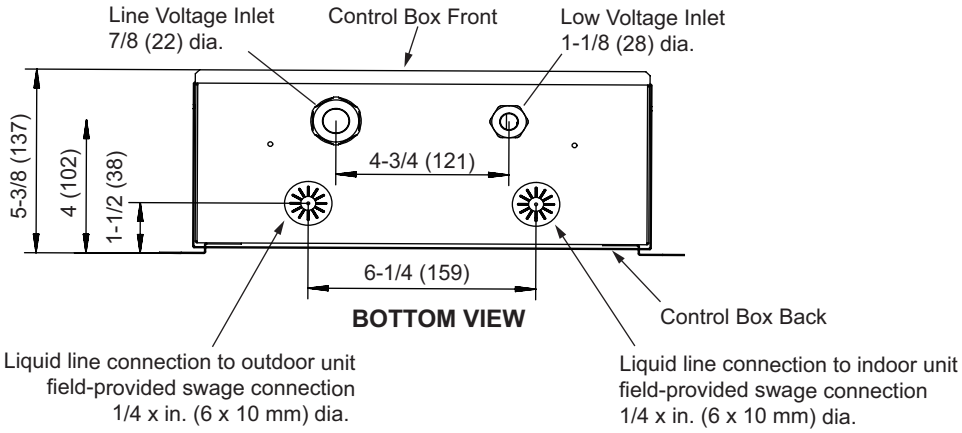
Figure 1. System Components

Unit Dimensions - inches (mm)



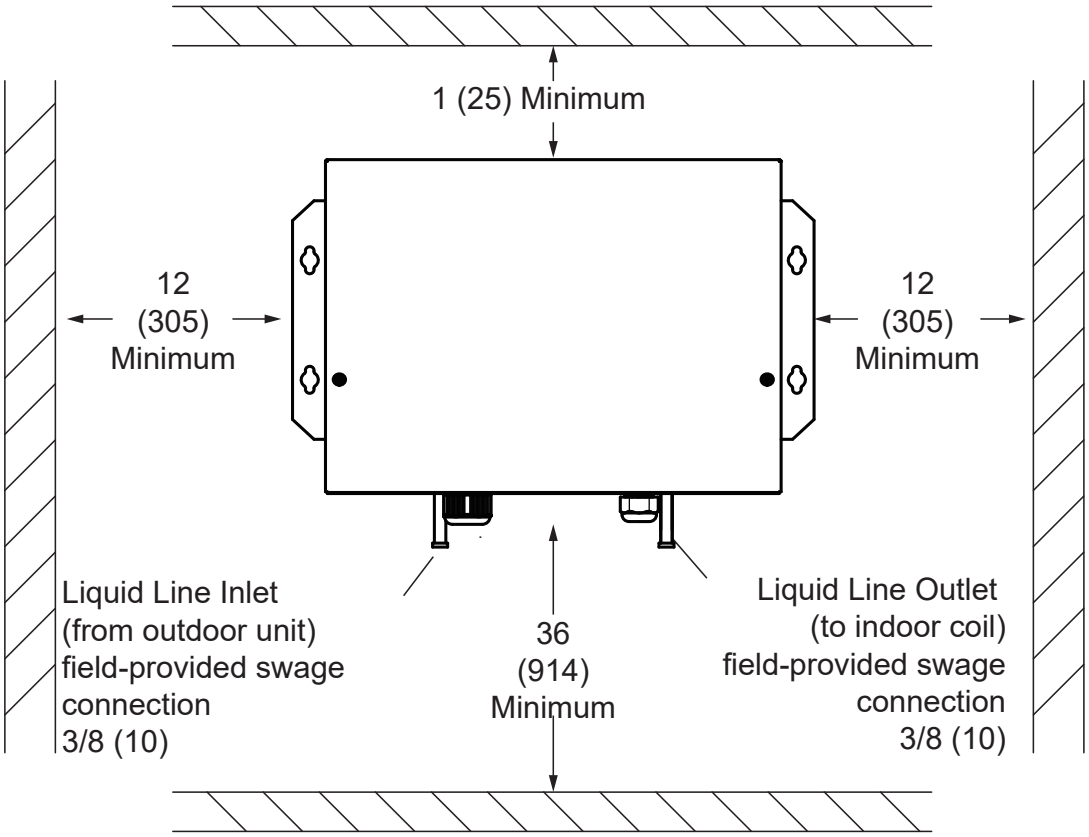
FRONT VIEW

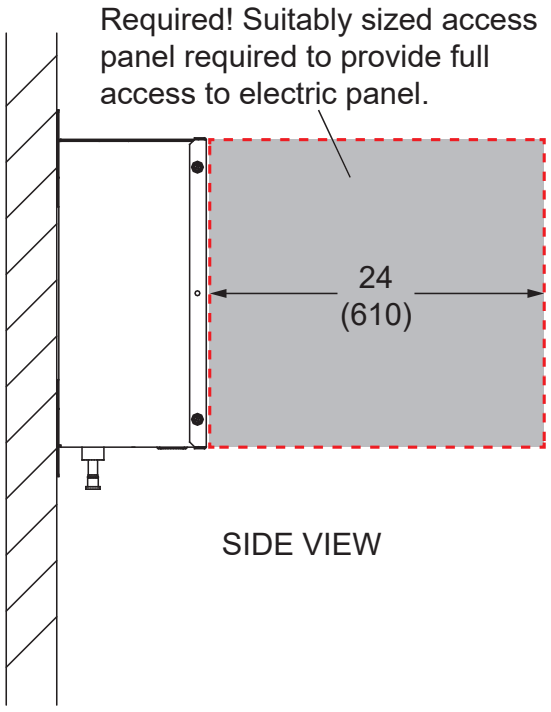
SIDE VIEW



BOTTOM VIEW

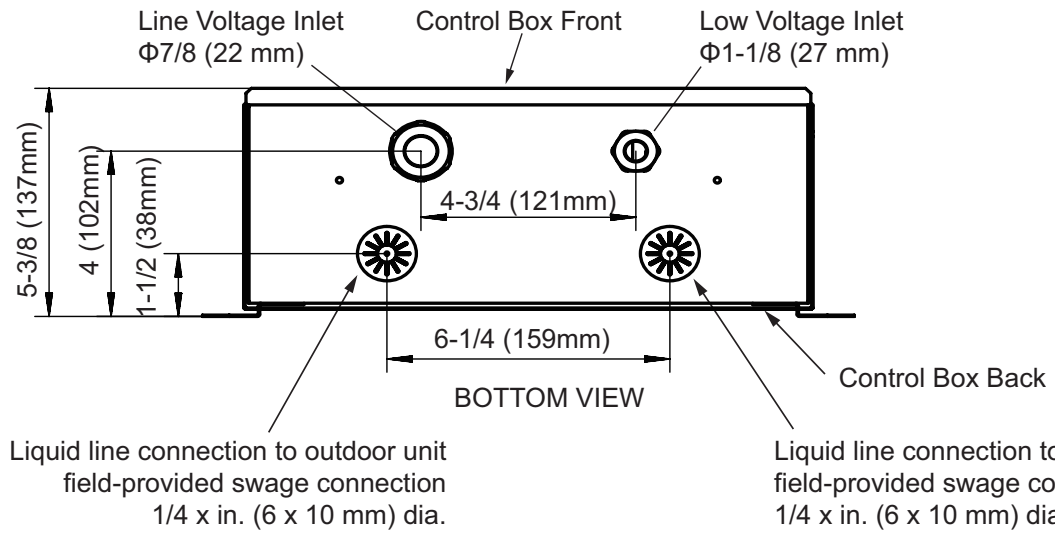
Installation Clearances - inches (mm)





Access panels are a requirement for system commisioning and future preventative maintenance.

Refrigerant Pipe Connections & Electrical Wiring Inlets



NOTE - *High Voltage Cabling and Low Voltage Communication Cabling shall not pass/occupy the same electrical port. All VRF Communication cabling must be 18 AWG shielded/stranded.*

Figure 2. Refrigerant Piping Connections & Electrical Wiring Inlets

Placement

⚠ 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.

⚠ CAUTION

Do not place items which may be damaged by water under or around the indoor unit.

AVOID

Do not install the unit in the following locations:

- Do not install this unit so that it impedes the flow of combustion air or exhaust air.
- Do not run fossil fuel lines though control box enclosure.
- 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).
- Do not install in confined spaces.
- Areas exposed to strong electromagnetic forces.
- Areas exposed to acids or alkaline detergents (laundry rooms).
- Do not affix any other accessories to this box.

DO:

- AHU Control Kit Box is designed for indoor or outdoor installation. NOTE - For outdoor installation, the box must be installed with the inlet/outlet facing downward and against the wall.
- Electronic expansion valve of the kit may be moved out of the box and installed separately close to the coil. See Figures 7, 8, and 9.
- AHU Control Kit Box ambient temperature range is -13°F (-25°C) to 131°F (55°C).
- Locate the AHU Control Kit Box so that it is not exposed to direct sunlight or rain.
- AHU Control Kit Box shall be installed vertically when the electronic expansion valve is inside the box. See Figure 3.
- AHU Control Kit Box can be installed vertically or horizontally when the electronic expansion valve is remotely located. See Figure 4.
- The AHU Control Kit electronic expansion valve should be installed vertically and level. See Figure 5.
- Ensure the structural support for all AHU Control Kit components is sufficient for the weight of the component.
- Allow sufficient space around equipment for proper operation and maintenance.
- Install the control box a minimum of 3 ft. (1 m) 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.
- ST3.9x25 screws are provided for installation; however use an appropriate fastening method for your application.
- If the control box is mounted on the coil enclosure, caution must be taken not to pierce coil. Damage to coil may cause refrigerant leaks.
- The AHU Control Kit can only connect to a R-410A refrigerant system.
- The AHU control box can only connect to Lennox VRF VPC REAL heat pump systems as listed in Table 1.
- Install the connecting pipe only after the indoor and outdoor units have been installed.
- The connecting piping between the control box and the indoor coil should not exceed 16 ft. (5 m).
- The control box should be installed as close to the indoor coil as possible, 12 in. (305 mm) preferred.
- All the images in this manual are for illustrative purpose only; your actual control box may differ slightly.

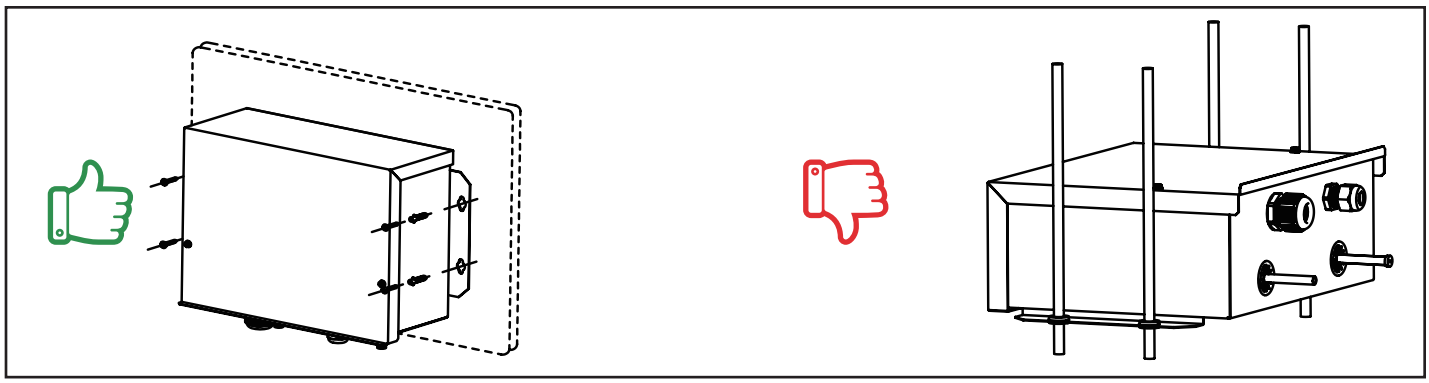


Figure 3. Position the Control Box Vertically when the Electronic Expansion Valve is in the Box

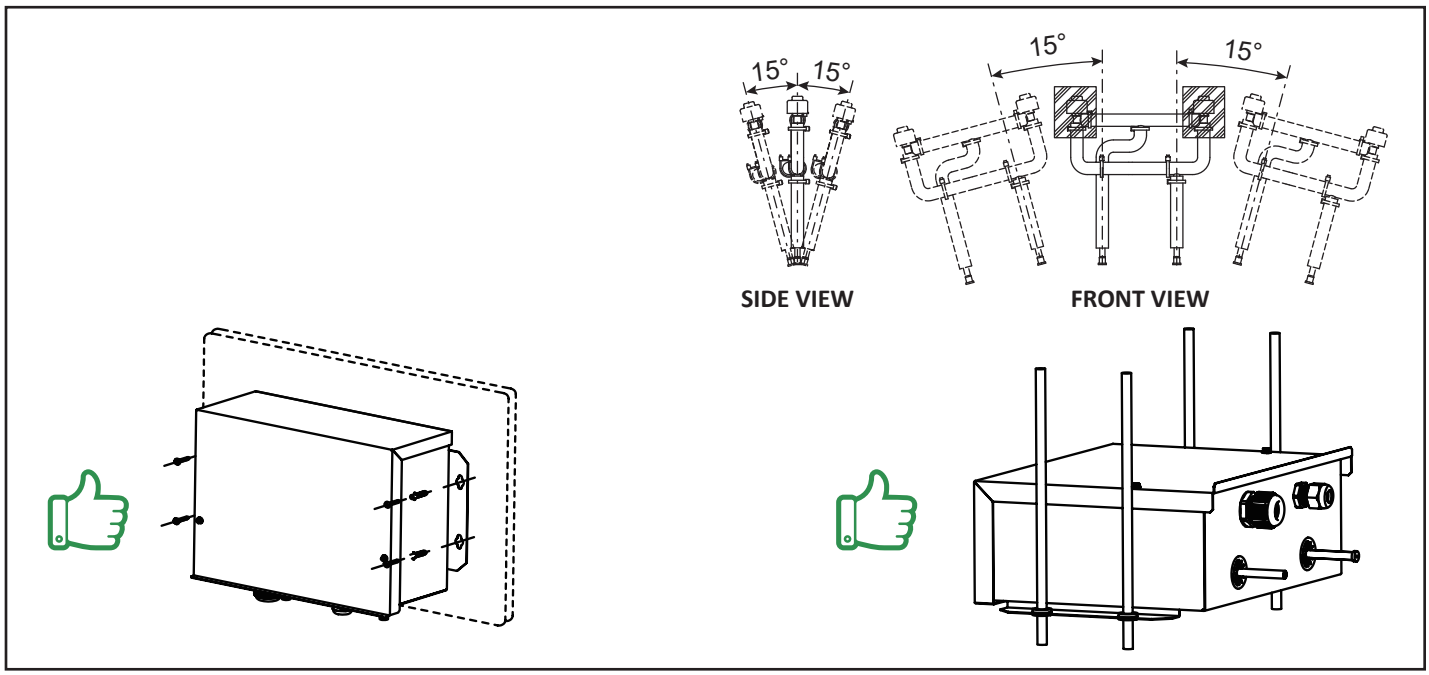
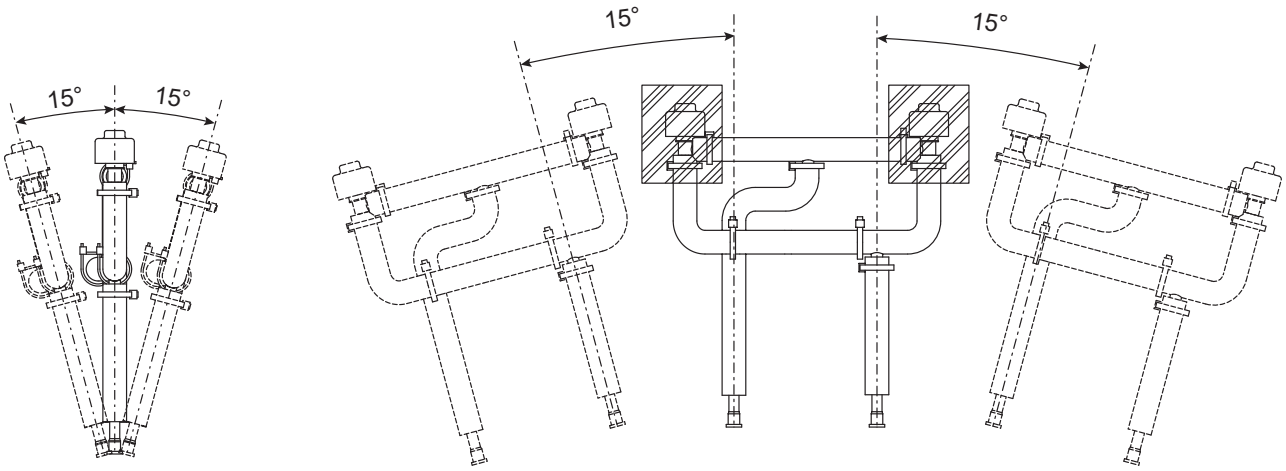


Figure 4. Position the Control Box Vertically or Horizontally when the Electronic Expansion Valve is Out of the Box



FRONT VIEW **FRONT VIEW**

NOTE -

1. The electronic expansion valve is position sensitive in or out side of the factory enclosure.

2. The electronic expansion valve must be mounted in a vertical, upright orientation (+/- 15°) only.

3. Locate the electronic expansion valve near the indoor unit coil so that connective piping does not exceed 16 ft. (5 m).

Figure 5. Position the Electronic Expansion Valve Vertically when the Electronic Expansion Valve is Out of the Box

⚠ 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.

⚠ WARNING

Do not install this unit so that it impedes the flow of combustion air or exhaust air.

Do not run fossil fuel lines through control box enclosure.

Installation Steps

1. Determine best location and set air handler or furnace/coil and outdoor unit.
2. Determine a suitable location to install the control kit box, for example, a vertical wall.
3. Prepare the indoor unit coil for brazing.
4. Run vapor line piping between the outdoor unit and the indoor unit coil.
5. Connect liquid line piping between the outdoor unit and the control box.
6. Connect liquid line piping between the control box and the indoor unit coil.
7. Mount the T2B sensor socket to the vapor pipe at the location shown in Figure 9.
8. Connect the vapor pipe sensor.
9. Connect power wiring to outdoor unit, control box and air handler/furnace.
10. Connect communication wiring between the outdoor unit and the control box using 18 AWG stranded, shielded, two-conductor, polarity sensitive wiring.
11. Connect control wiring between the air handler/furnace control relay and the air handler/furnace control board using 18 AWG stranded, shielded, polarity-sensitive wiring. Follow wiring diagrams in this manual for your air handler/furnace type.
12. Connect control wiring between the control box and a 24V thermostat using standard thermostat thermostat wiring. See Figure 15.
13. Pressure test, evacuate and add additional refrigerant to the system piping.
14. Follow the prescribed system start-up processes.

Refrigerant Piping Connections

Refer to the Calculation and Selection report for all pipe sizes and lengths.

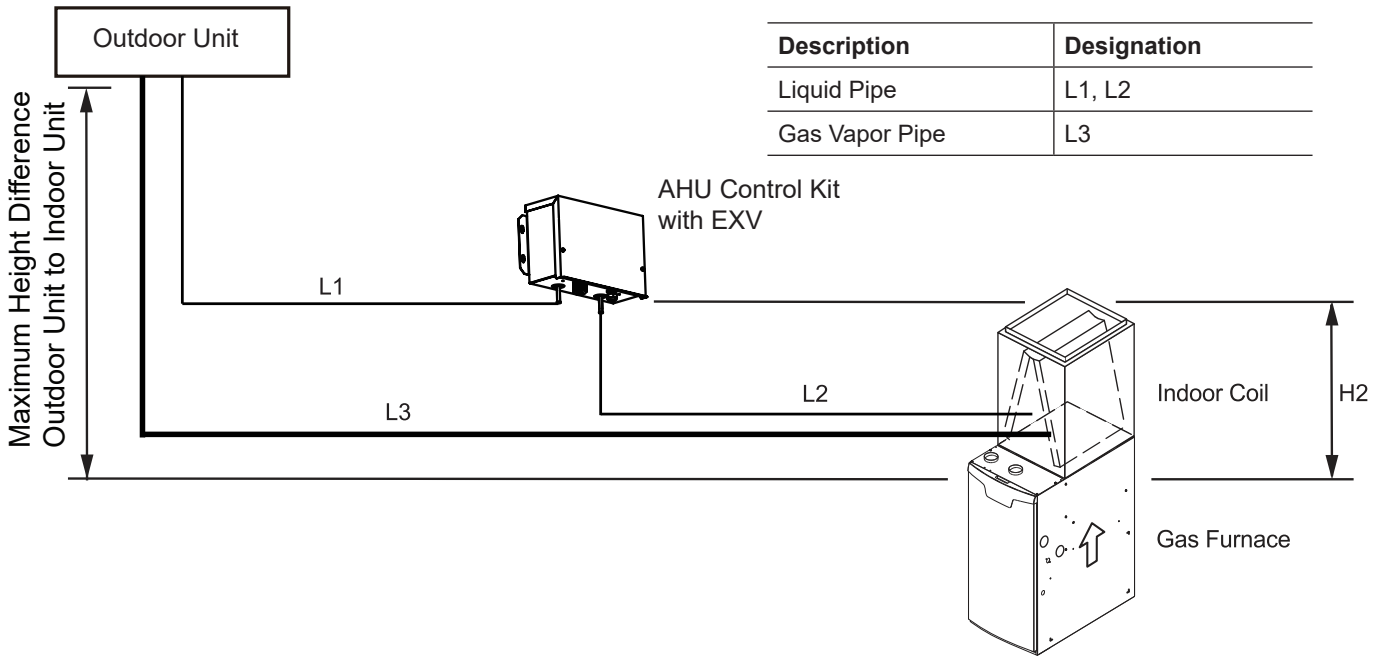
Refer to the outdoor unit manual for outdoor unit piping connections.

The gas (vapor) line is run directly from the outdoor unit to the indoor unit coil.

The liquid line is run from the outdoor unit to the AHU Control Box (or electronic expansion valve if remotely located) and then from the AHU Control Box (or electronic expansion valve if remotely located) to the indoor unit coil.

Piping limitations shall be followed in all applications.

NOTE - *See Refrigerant Pipe Selection Tables in VPC Outdoor Unit Installation Manual to Size Pipes*



Description	Designation
Liquid Pipe	L1, L2
Gas Vapor Pipe	L3

Piping Length			Permitted value	Piping
Piping Length	Maximum piping length	AHU Control Kit to air handler/furnace coil	16 ft. (5 m)	L2
Level Difference	Maximum level difference	AHU Control Kit to air handler/furnace coil	+/- 16 ft. (5 m)	H2
Maximum Height Difference	Indoor Unit to Outdoor Unit Maximum Height Difference	Outdoor Unit Up	≤164 ft. (50 m)	- - -
		Outdoor Unit Down	≤131 ft. (40 m)	- - -
	Indoor Unit to Indoor Unit Maximum Height Difference		≤49 ft. (15 m)	- - -

Figure 6. Typical Refrigerant Piping Diagram

Table 2. Refrigerant Pipe Connection Sizes

Liquid Pipe in. (mm)	Gas (Vapor) Pipe in. (mm)
3/8 (9.5)	See LVSS Report

⚠ CAUTION

Pipe sensor shall not be installed prior to brazing as damage to the sensor can occur due to excessive heat.

⚠ IMPORTANT

The Clean Air Act of 1990 bans the intentional venting of refrigerant (CFC's and HCFC's) as of July 1, 1992. Approved methods of recovery, recycling or reclaiming must be followed. Fines and/or incarceration may be levied for non-compliance.

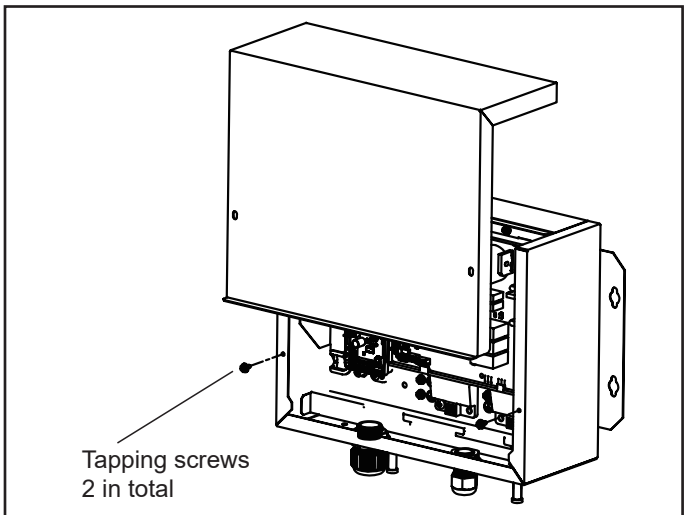
Prepare AHU Control Box if Electronic Expansion Valve is Inside the Box

1. The seal on the 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. Remove plastic caps from liquid line connections.
3. Swage field-provided connective piping, do not swage factory pipe stub.

Install Electronic Expansion Valve Remotely Located

The electronic expansion valve may be removed from the control box and remotely located. Follow these steps to remove the electronic expansion valve from the box.

1. Remove the front cover from the box by removing two screws and plastic washers. See Figure 6.



NOTE - *Electrical components and control board must remain inside the rated factory enclosure.*

Figure 7. Remove Front Cover

2. Remove the two (2) screws securing the electrical control board assembly. See Figure 7.
3. Flip the electrical control board assembly forward 65° to expose the electronic expansion valve. See Figure 7.

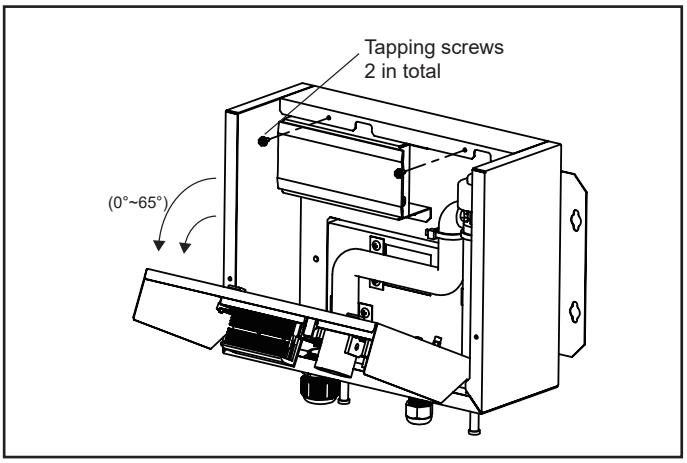


Figure 8. Flip Electrical Control Board Assembly Forward

4. Remove six (6) screws and three (3) brackets that secure the electronic expansion valve in the box. See Figure 8.

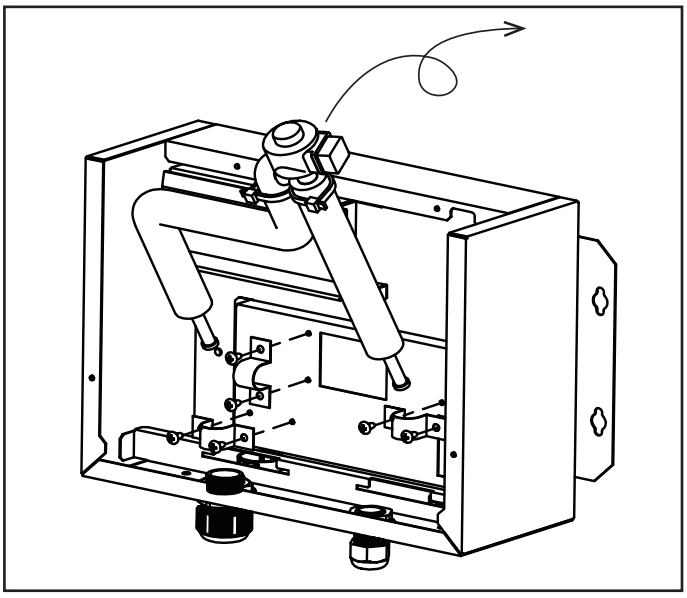


Figure 9. Remove Electronic Expansion Valve

5. Re-install the electrical control board assembly and the front cover on the AHU Control Box.
6. Position the electronic expansion valve in the desired location and use the screws and clamps removed in step 4 to secure the electronic expansion valve in place.

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.

1. Place a wet rag against piping plate and around the line connections. Avoid overheating the control kit cabinet, electronic expansion valve and other internal components **Take care to protect the Control Box cabinet, electronic expansion valve or other internal components.**

⚠ 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.

2. Ensure nitrogen is flowing at all times during the brazing process.
3. Braze connections. Allow pipe to cool before removing wet rag.
4. Insulate both pipes individually.

Connect Gas (Vapor) Pipe (T2B) Sensor

Connect T2B Sensor After Brazing

1. Identify the T2B sensor in the accessory packet.
2. Position the sensor on the gas (vapor) line near the AHU Control Kit box. See Figure 10.
3. Secure the sensor using the provided sleeve and clip.
4. Ensure there is strain relief in the cable. See Figure 11.
5. Ensure maximum contact between the sensor surface and the pipe. See Figure 11.
6. Insulate the sensor using the provided insulation. See Figure 12.
7. Connect the sensor cable to T2B CN83 on the main board.

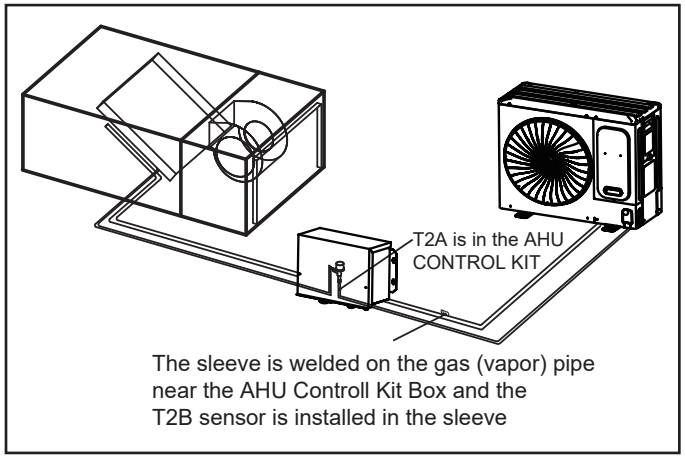


Figure 10. Sensor Location

NOTE - *The kit's T2B sensor must be installed as described above even if the coil has a T2B sensor.*

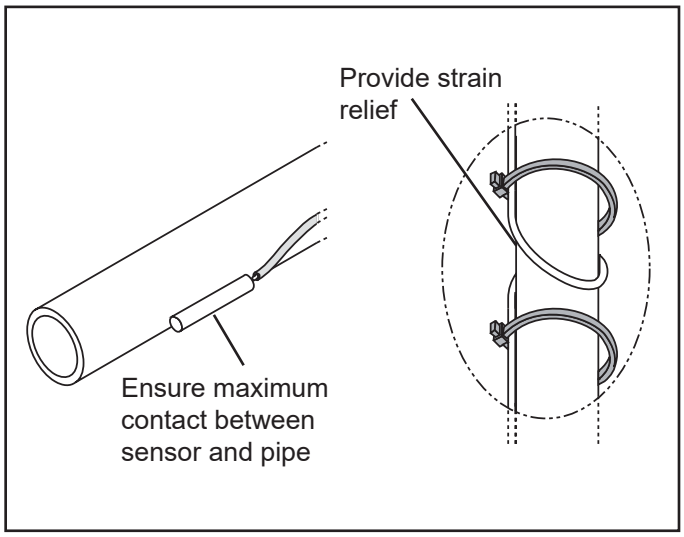


Figure 11. Maximum Contact and Strain Relief

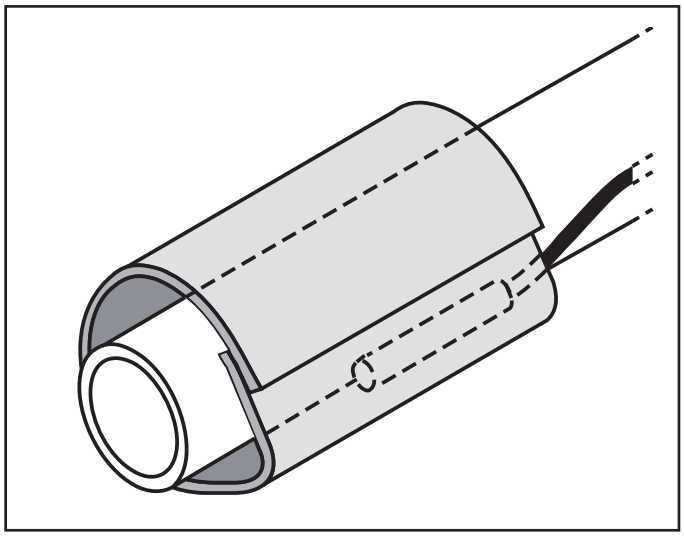


Figure 12. Insulate T2B Sensor

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.
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.

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.

- A dedicated Circuit Breaker and Service Disconnect Switch shall be installed for the indoor equipment. ***NOTE -*** *The outdoor unit should have its own dedicated Circuit Breaker and Service Disconnect.*
- Indoor unit power supply MUST not be taken from the outdoor unit.
- Fit the power supply wiring of each unit with a switch and fuse as shown in the wiring diagram.
- Install an interrupter switch or ground-fault circuit interrupter for the power wiring.
- Make sure the ground resistance is no greater than 100Ω. This value can be as high as 500Ω when using a grounding fault circuit interrupter since the protective ground resistance can be applied.

System Communication and Control Wiring

NOTE - *Two-conductor stranded, shielded, polarity sensitive cable must be used for the communication wiring. This is necessary to* ensure proper system communication and operation.

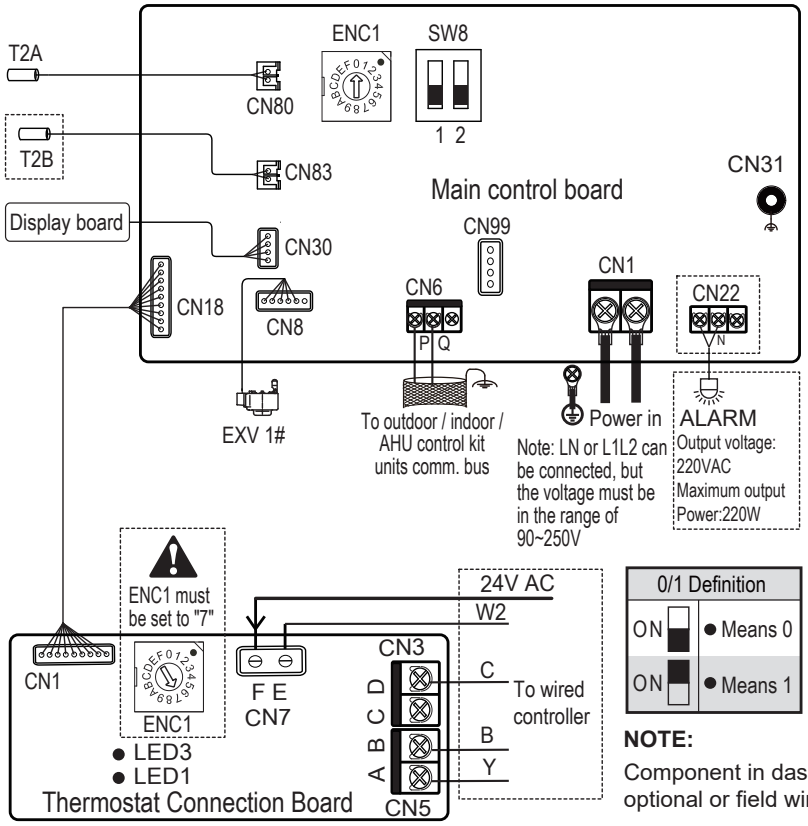
NOTE - *High Voltage Cabling and Low Voltage Communication Cabling shall not pass/occupy the same electrical port.*

System communication wiring is connected to the P and Q terminals. See the Typical System Communication Wiring diagram. See Figure 15.

24V thermostat wiring is connected to the A, B, D, E, and F terminals of the 24V Communication Board. See Figure 16.

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 (two-core, shielded cable). Refer to unit nameplate for rated voltage.

Connect properly sized power wiring and two (system communication) shielded communication and control cables as shown.



Parameter dialing of main control board		
SW8-1	ENC1	Corresponding horsepower/TON
0	4	1.5
0	5	2
0	8	3
0	B	4
0	D	5

Main control board		
Character	Dial Code	Definition
SW8-1		High capacity dial setting selection: SW8-1=0 is no high-order high-order capacity
		High capacity dial setting selection: SW8-2=1 has high capacity
SW8-2		T2B definition setting selection: SW8-2=0 assigns 99 ℃ to T2B
		T2B definition setting selection: SW8-2=1 is T2B equal to T2B sensor detection value

0/1 Definition	
ON	● Means 0
ON	● Means 1

NOTE:

Component in dash line is optional or field wiring.

Thermostat Connection Board						
Port		Type	Function description	Rated voltage	Port	Function description
CN5	A	Active input	Cooling mode dry contact	24V AC	ENC1	The ENC1 of the 24V communication board must be set to "7", otherwise the signal of the temperature controller cannot be received correctly.
	B	Active input	Heating mode dry contact			
CN3	C	Active input	Reserve			
	D	Active input	Common terminal			
CN7	E	Passive signal	Electric auxiliary heat switch signal of defrosting			
	F					

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

Figure 13. AHU Control Box Wiring Diagram

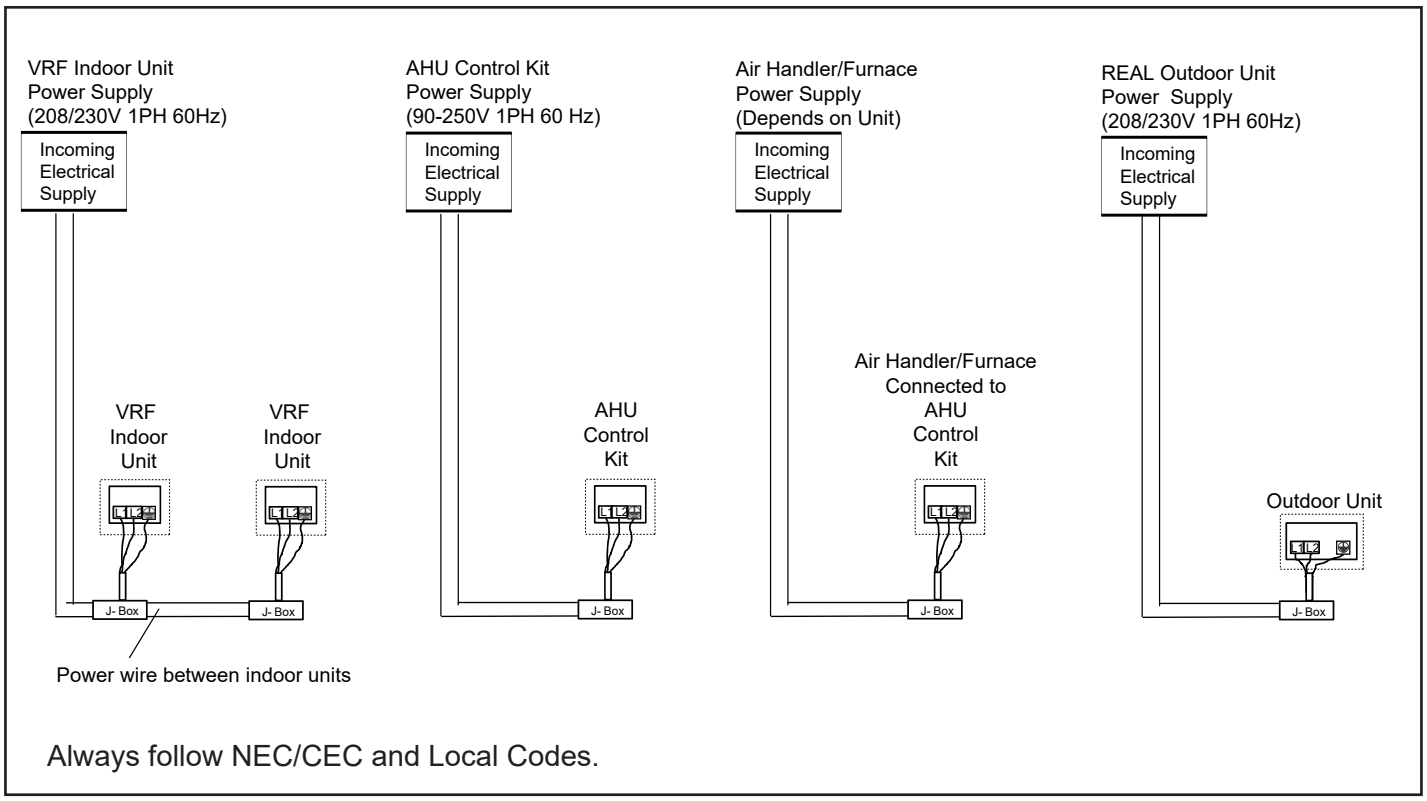


Figure 14. Typical REAL System Power Wiring

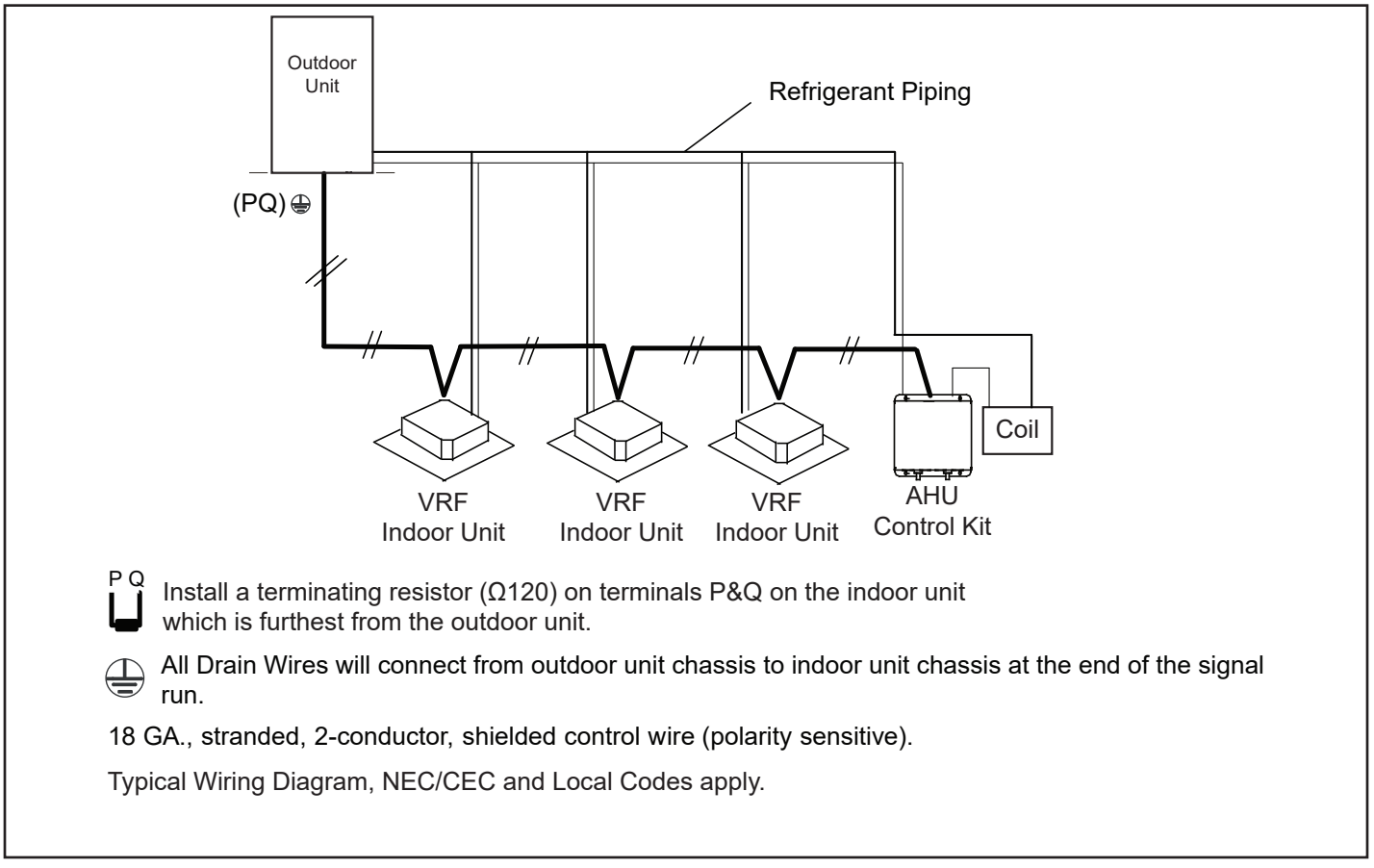
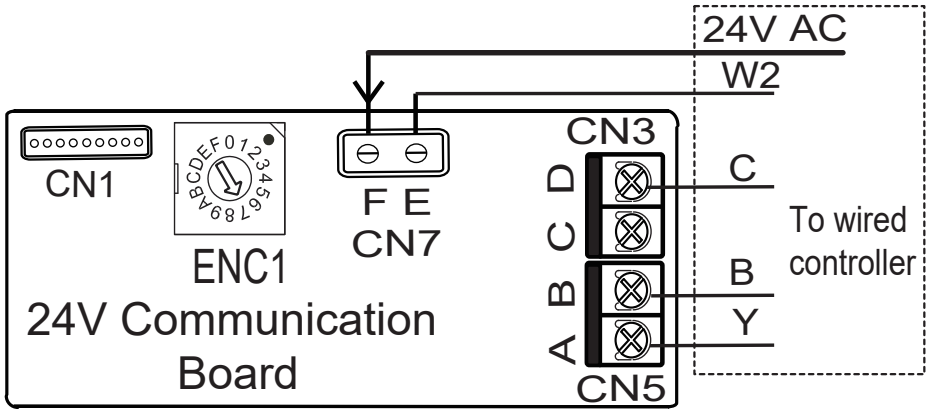


Figure 15. Typical VRF Indoor Unit and AHU Control Kit Communication Wiring



Terminal	Type	Description	Rated Voltage
A	Active Input	Cooling Mode Dry Contact	24 VAC
B		Heating Mode Dry Contact	
C		Reserved	
D		Common	
E	Passive Input	Electric Auxiliary Heat	
F		Defrost	

NOTE - *ENC1 on the Thermostat Connection Board must be set to 7.*

Figure 16. Typical 24V Thermostat Wiring

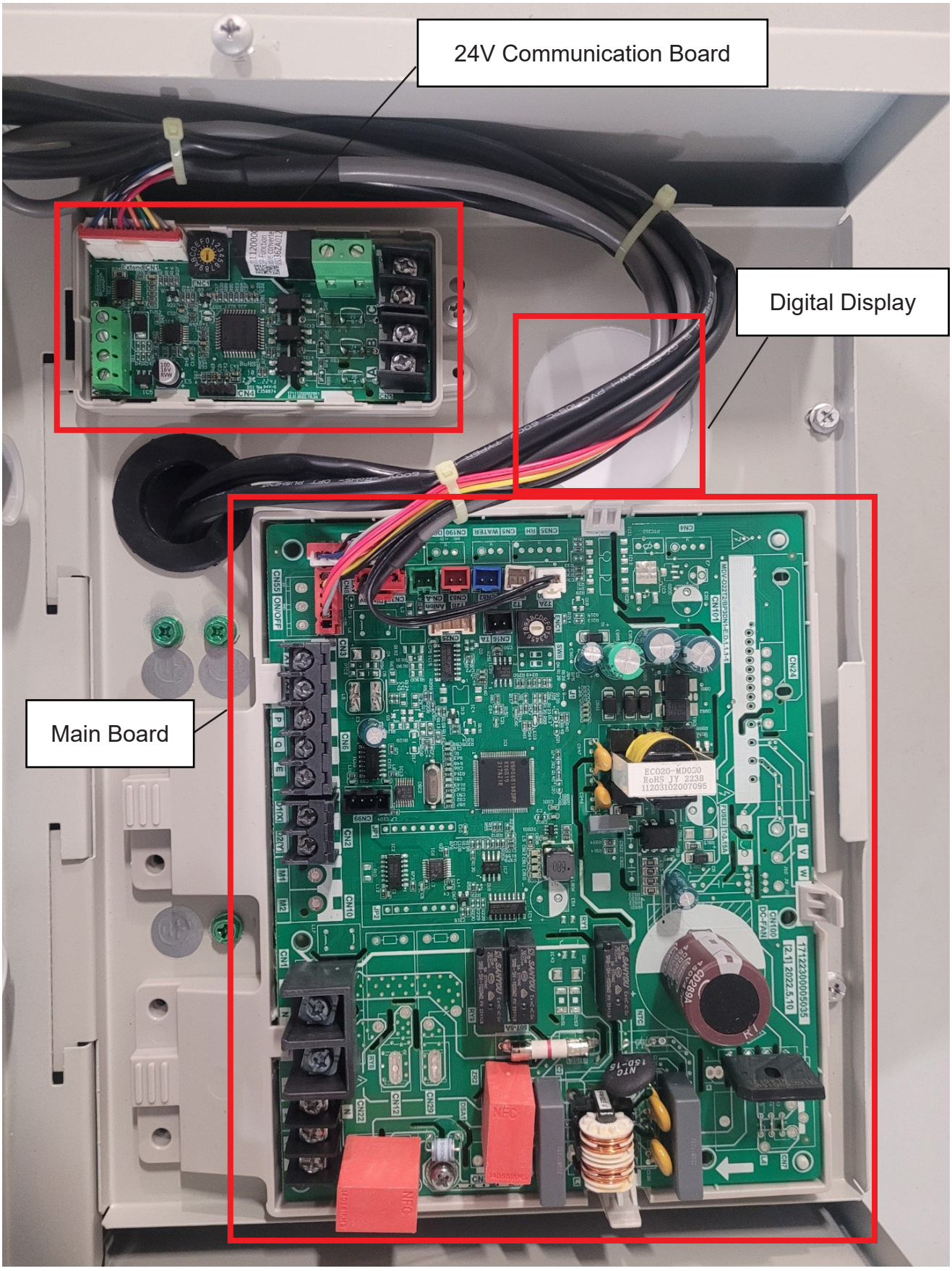


Figure 17. AHU Control Kit Control Boards

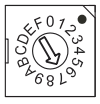
Table 3. Outdoor Unit Compressor Lockout Setpoint Ta

First-Level Menu	Second-Level Menu	Specified Menu Mode	Description	Default
[8]*	[b]	[0]	Compressor lockout temperature	X
		[1]	7°F (-14°C)	
		[2]	10°F (-12°C)	
		[3]	16°F (-9°C)	
		[4]	19°F (-7°C)	
		[5]	25°F (-4°C)	
		[6]	30°F (-1°C)	
		[7]	36°F (2°C)	
		[8]	39°F (4°C)	
		[9]	45°F (7°C)	
		[10]	50°F (10°C)	
		[11]	55°F (13°C)	
		[12]	61°F (16°C)	
		[13]	64°F (18°C)	
		[14]	70°F (21°C)	
		[15]	75°F (24°C)	
		[16]	81°F (27°C)	

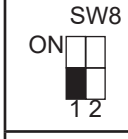
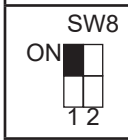
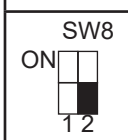
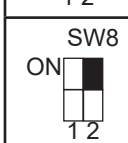
Configure DIP Switches

ENC1 - Indoor Unit Capacity

Use ENC1 on the main board to identify the connected air handler/furnace capacity.

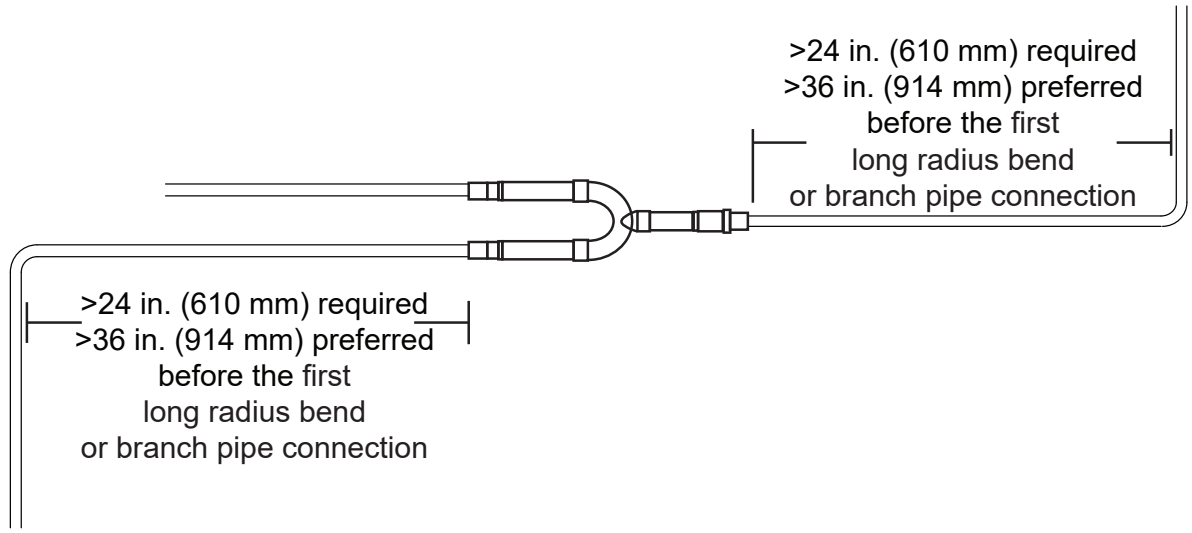
ENC1 	Corresponding Horsepower/Ton
4	1.5
5	2
8	3
B	4
D	5

SW8 - T2B Assignment

	Reserved
	Reserved
	T2B (Assigns 99° to T2B)
	T2B equal to T2B sensor detection value

NOTE - *If coil has a TXV, set SW8-2 to 0. If the coil does not have a TXV, set SW8-2 to 1.*

NOTE - *Dip switch handle location is shown as a solid black box in the tables.*
0 = OFF (down)
1 = ON (up)
NOTE - *Turn off power to the unit before setting the dial/dip switch. The function will be available when the unit is powered on again.*



NOTE - *Reference and adhere to branch pipe kit installation instructions requirements for installation/positioning.*

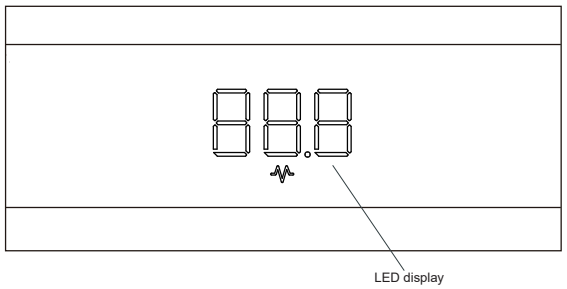
Figure 18. 24 to 36 Inches of Straight Pipe Before and After Branch Pipe Kit

Digital Display

The AHU Control Kit is equipped with a digital display that shows cooling and heating modes during normal operation or any error codes if they occur.. Refer to Table 4 to view the error codes.

The error code will replace the mode of operation setting displayed on the display. If more than one error has occurred, the codes will alternate so that all codes are shown.

Make note of the code (E1, EE, etc.), then reset the display by pressing the ON/OFF button on the unit controller. Press the ON/OFF button a second time to reapply power to unit. If the code is still displayed, disconnect and restore power at the unit disconnect switch or circuit breaker. If the problem was temporary, the code will not reappear. If the error code reappears after power has been broken and restored at the disconnect switch or circuit breaker, call Lennox Commercial Technical Support 1-800-453-6669.



Operational Codes

Code	Description
17.0	Cooling Mode
30.0	Heating Mode
Error Code	Error Code

Figure 19. Receiver/Display

Table 4. Error Codes

Error Code	Description
A0	Emergency stop
Eb	Electronic expansion valve malfunction
FE	No address the first time power is ON
E7	EEPROM failure
E5	T2A (Inlet of evaporator sensor) malfunction
E4	T2B (Vapor line sensor) malfunction
Ed	Outdoor unit malfunction
F7	Duplicate AHU Control Kit address
E1	Communication error between AHU Control Kit and outdoor unit
H4	Communication error between AHU Control Kit and air handler/furnace
E0	Mode conflict
F8	Mode Selection Box malfunction
U4	MS self-inspection error
H4	Communication error between AHU Control Kit and air handler/furnace

NOTE - *Spot Check is not available for* V8AHUK02-3T models.

Network Address and Commissioning

After the system has been installed, the AHU Control Board must be assigned an address as part of the commissioning procedure.

Technical Support

1-800-4LENNOX

(1-800-453-6669)

vrftechsupport@lennoxind.com

www.LennoxCommercial.com

Scan this QR code to download the Lennox VRF & Mini-Splits App from the Apple App Store or the Google Play store.
The app contains technical literature and troubleshooting resources.