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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.

A 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.

A 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 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.

INSTALLATION INSTRUCTIONS AHU Control Kit

VRF SYSTEMS 507905-02 06/2019

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 AHU Control Kit box
- 1 Receiver and digital display
- 1 Receiver connection wiring harness

3 - Temperature sensors (T1, T2, T2B) and connection wiring harnesses

- T1 Room Temp. Sensor
- T2 Mid-Coil Sensor
- T2B Coil Outlet Sensor (cooling mode)
- 6 Plastic zip tie for sensor mounting
- 8 ST3.9x25 mounting screws
- 2 Temperature sensor mounting socket
- 2 Temperature sensor mounting socket clip
- 2 Temperature sensor insulation sleeve
- 1 Installation and operation manual

Application

The V8AHUK01-2P AHU Control Kit enables Lennox Mini-VRF outdoor units to operate and control Lennox Residential indoor coils and furnaces. **Designs with this kit require approval by the Lennox VRF Applications Team prior to installation.**

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 - 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 Components Identification











Placement

A 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.

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.
- Do not run any fossil fuel lines through the AHU Control Box cabinet.
- · Areas exposed to strong electromagnetic forces.
- Areas exposed to acids or alkaline detergents (laundry rooms).
- Do not affix any other accessories (other than the receiver) to this box.

DO:

- Locate the unit so that it is not exposed to direct sunlight.
- Ensure the structural support is sufficient for the weight of the unit.
- Level the unit.
- Allow sufficient space around unit for proper operation and maintenance
- Install unit 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.
- AHU Control Kits are designed for indoor installation only.
- ST3.9x25 screws are provided for installation; however use an appropriate fixing method for your application.
- If the control box is mounted on coil enclosure, caution must be taken not to pierce coil. Damage to coil may cause refrigerant leaks.
- The control box should be installed vertical; the box cannot be installed horizontally.
- The control box can only connect to R-410A refrigerant system.
- The control box can only connect to a Lennox 3 to 5-ton Mini-VRF Heat Pump system.
- The control box cannot connect to a 3-phase Heat Pump or Heat Recovery system.
- Install the connecting pipe only after the indoor and outdoor units have been fixed.
- The connecting piping between the control box and the evaporator coil should not exceed 16 ft. (5 m).
- The control box should be installed as close to the evaporator 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 1. Position the Control Box Vertically

Installation

A 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 though control box enclosure.

Installation Steps

- 1. Determine best location and set furnace, coil and outdoor unit.
- 2. Prepare the indoor unit coil for brazing.
- 3. Run vapor line piping between the outdoor unit and the indoor unit coil.
- 4. Connect liquid line piping between the outdoor unit and the control box.
- 5. Connect liquid line piping between the control box and the indoor unit coil.
- 6. Mount coil sensor sockets to coil at the location shown in Figure 4.
- 7. Connect the coil and return air sensors.
- 8. Connect power wiring to outdoor unit, control box and furnace.
- 9. Mount the receiver and connect the wiring harness to the control box PCB.
- 10. Connect communication wiring between the outdoor unit and the control box using 18 GA stranded, shielded, 3-conductor, polarity sensitive wiring.
- 11. Connect control wiring between the furnace control relay and the furnace PCB using 18 GA stranded, shielded, 4-conductor, polarity-sensitive wiring.
- 12. Connect control wiring between the control box and the V0STAT51P2 controller using 18 GA stranded, shielded, 4-conductor, polarity sensitive wiring.
- 13. Pressure test, evacuate and add additional refrigerant to the system piping.
- 14. Follow the prescribed system start up processes.

Refrigerant Piping Connections

Use the diagram and table below to prepare for the piping installation.

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

The 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 and then from the AHU Control Box to the indoor unit coil.

Piping limitations must be followed in all applications. Contact VRF Technical Support, 1-844-438-8731, with any questions.



Figure 2. Typical Refrigerant Piping Diagram

Combining AHU Control Kit with Other Indoor Units

The AHU Control Kit can be combined with other VRF indoor units on a single Mini-VRF system and multiple AHU Control Kits can be used on a single Mini-VRF system. The following guidelines must be observed.

- All Mini-VRF system piping guidelines must be observed.
- The connection ratio (combined indoor unit capacity compared to outdoor unit capacity) cannot exceed 100%.
- Only the equipment combinations shown in Table 1 are allowed.
- All equipment must be Lennox furnace, coils or air handler units.
- All system designs must be reviewed and approved by the Lennox VRF Applications team.

Table 1. Allowed Combinations

System Tonnage	Outdoor Unit Model	AHU Control Kit	Maximum Capacity Ratio	Indoor Units	
3-ton	VPA036H4M-2P	V8AHUK01-2P	V8AHUK01-2P 100 %		Lennox
4-ton	VPA048H4M-2P			Lennox VRF	Furnaces, Coils
5-ton	VPA060H4M-2P			indoor units	and AHUs



Figure 3. Multiple AHU Control Kits in One System Wiring Example



Figure 4. Multiple AHU Control Kits in One System Piping Example

Prepare to Braze

Prepare Indoor Unit Coil

1. Locate the liquid line assembly in the indoor unit coil accessory bag.



Figure 4. Coil Liquid Line Assembly

- 2. Remove and discard the fixed orifice; it will not be used.
- 3. Remove and retain the Teflon ring; it will be used in the final assembly.
- 4. Braze the two temperature sensor mounting sockets onto the coil at the locations shown in Figure 5. Make sure the socket opening is downward to avoid condensate accumulation.

A CAUTION

Coil sensors 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.

- 5. Braze the liquid line from the AHU control box to the end of the liquid line assembly.
- 6. Reassemble the liquid line assembly, including strainer, and connect to coil. Do not tighten factory nuts without the two screws, indicated below, being attached or the distributor tubes will be damaged.
- 7. Do not use any type of piping compound on threaded fittings.
- 8. After brazing liquid line and vapor lines, affix coil sensors to the sockets on the indoor unit coils with socket clips. Wrap with insulation and secure with zip ties. See Figure 5.



Figure 5. Indoor Unit Coil Component Identification

Prepare AHU Control 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.

Brazing Refrigerant Lines

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



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.

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.

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.

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 teh 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. Place a wet rag against piping plate and around the line connections. Take care to protect the cabinet and internal components.
- 2. Remove Teflon O-ring from the liquid line assembly.
- 3. Ensure nitrogen is flowing at all times during the brazing process.
- 4. Braze connections. Allow pipe to cool before removing wet rag.
- 5. Insulate both pipes individually.

Connect Sensors

Connect Sensors After Brazing

- 1. Identify the T1, T2 and T2B sensors in the accessory packet. See Figure 6.
- 2. Secure the T2 sensor inside of the mounting sleeve at the midpoint of the coil as shown in Figure 4.
- 3. Insulate T2 sensor.
- 4. Secure the T2B sensor inside of the mounting sleeve at the indoor unit coil outlet as shown in Figure 4.
- 5. Insulate T2B sensor.
- 6. Secure the T1 sensor at the furnace return air inlet.



Figure 6. Sensor Identification

Wiring Connections

A 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.

NOTE - Three-conductor shielded cable must be used for the communication wiring. This is necessary to ensure proper system communication and 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.
- Use the optional extension cable kit V0CTRL93P-1 (cat # 14R84) to locate the receiver/display a distance from the control box.

Connect properly sized power wiring and three or fourconductor shielded communication and control cables as shown.



Figure 7. V8AHUK01-2P Connections

NOTE - Connect condensate float switch to CN 5. Do NOT connect to R or Y1/Y2.

- 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 as well.
- 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.



Figure 8. Electrical Control Box Connection Identification

Mount Receiver/Digital Display

Mount the receiver and connect the wiring harness to the AHU Control Box PCB.

- The receiver can be mounted inside of the control box, directly on the AHU Control Box exterior or other external location depending on the application.
- It is recommended that the receiver be mounted on the exterior of the box for service convenience.
- Use field-provided double-sided adhesive tape, or other appropriate fixing method, to mount the receiver.

- Connect the receiver harness to the AHU Control kit PCB CN 15.
- If needed, use optional extension cable kit V0CTRL93P-1 (cat # 14R84) to position the receiver a distance from the AHU Control Box.

Connect to V0STAT51P2 Controller

1. Connect control wiring between the AHU Control Box and the V0STAT51P2 controller using 18 GA stranded, shielded, 4-conductor, polarity sensitive wiring.



Figure 9. Typical Power and Communication Wiring

NOTE - When connecting the AHU Control Kit to a Lennox EL296 furnace, Dipswitch 1 on the furnace PCB must be changed from 0 (OFF) to 1 (ON).

Furnace PCB Thermostat Selection

1-Stage Thermostat

ON

NOTE - Dip switch handle location is shown as a solid black box in the table.

NOTE - Connect condensate float switch to CN 5. Do NOT connect to R or Y1/Y2.

Sequence of Operation

There are 5 modes for the system: Cooling, Heat Pump Heating, Gas Heating, Fan Only and OFF.

Cooling

- Outdoor unit compressor on, reversing valve ON cooling.
- HHE output: FAN=1=24VAC closed, CTON=1=24VAC closed, HTON=0 open, AUXH=0
- **Furnace input:** G=24V Y1=24V indoor fan runs at cooling full speed.

Heat Pump Heating

- Outdoor unit compressor on, reversing valve OFF heating.
- **HHE output:** FAN=1=24VAC closed, CTON=0, HTON=1=24VAC closed, AUXH=0
- **Furnace input:** G=24V Y1=24V ID fan runs at cooling full speed (Furnace runs in Cooling mode, outdoor unit runs in Heat Pump Heating mode).

Gas Heating

- Outdoor unit compressor off.
- HHE output: FAN=1=24VAC closed, CTON=0, HTON=0, AUXH=1=24VAC closed
- **Furnace input:** G=24V W1=24V indoor fan runs at 2 speeds per furnace built-in algorithm (low speed for the 1st 7-1/3 or 12 minutes per dipswitch setting then high speed).

Fan Only

- Outdoor unit compressor off.
- HHE output: FAN=1=24VAC closed, CTON=0, HTON=0, AUXH=0
- Furnace input: G=24V ID fan runs at full speed.

OFF

- Outdoor unit compressor off.
- HHE output: FAN=0, CTON=0, HTON=0, AUXH=0
- Furnace input: G=0

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. **NOTE -** The receiver temperature unit display must be set at the same time as the controller. Receivers default to display temperatures in °F. To change the receiver's 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 AHU Control Box and the indoor unit coil.

No.	Content	Note
0	Normal display	
1	Communication address of indoor unit	0~63
2	Dial code of indoor unit capacity	
3	Network address of indoor unit	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		

Table 2. Spot Check Performance Identification

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

Table 3. 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.
- 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.



Figure 10. Digital Display (Receiver)

Table 4. 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	Indoor unit doesn't have address when it is first turned on

Table 5. 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

Download the app from the Apple App Store or the Google Play store.

