



VRF

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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.

! 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.

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

VCFB Convertible Ceiling / Floor-Mount Indoor Units

VRF SYSTEMS – Ceiling/Floor Indoor Units
507892-01
12/2018

! 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.

General

The VCFB ceiling/floor-mount non-ducted indoor units are matched with an outdoor heat recovery or heat pump unit to create a VRF (variable refrigerant flow) system that uses HFC-410A refrigerant. The units can be suspended from the ceiling in a horizontal position or installed on the wall near the floor in a vertical position.

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.

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
- 4 - Nuts
- 4 - Washers
- 2 - Suspension brackets (ceiling mount)
- 2 - Mounting brackets (wall/floor mount)
- 1 - Resistor
- 1 - Brass flare nut
- 1 - Condensate drain flexible pipe
- 1 - Water level switch cable
- 1 - Installation manual

Safety Requirements

⚠ WARNING

ELECTRICAL SHOCK, FIRE, OR EXPLOSION HAZARD.

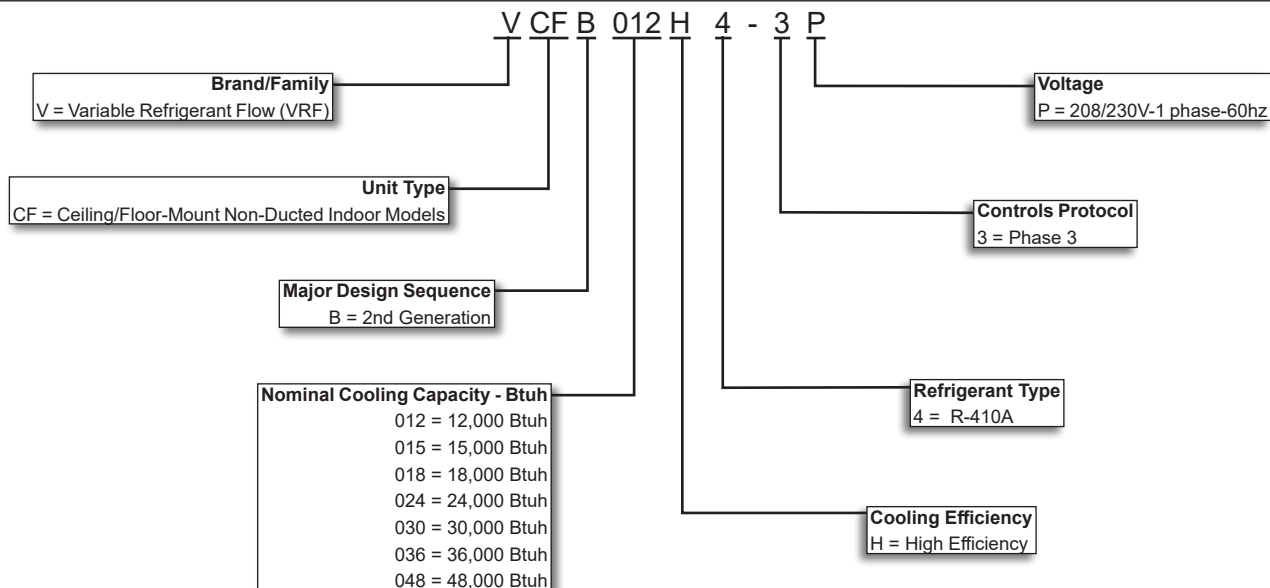
Do not touch the unit or the controller if your hands are wet.

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.

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.

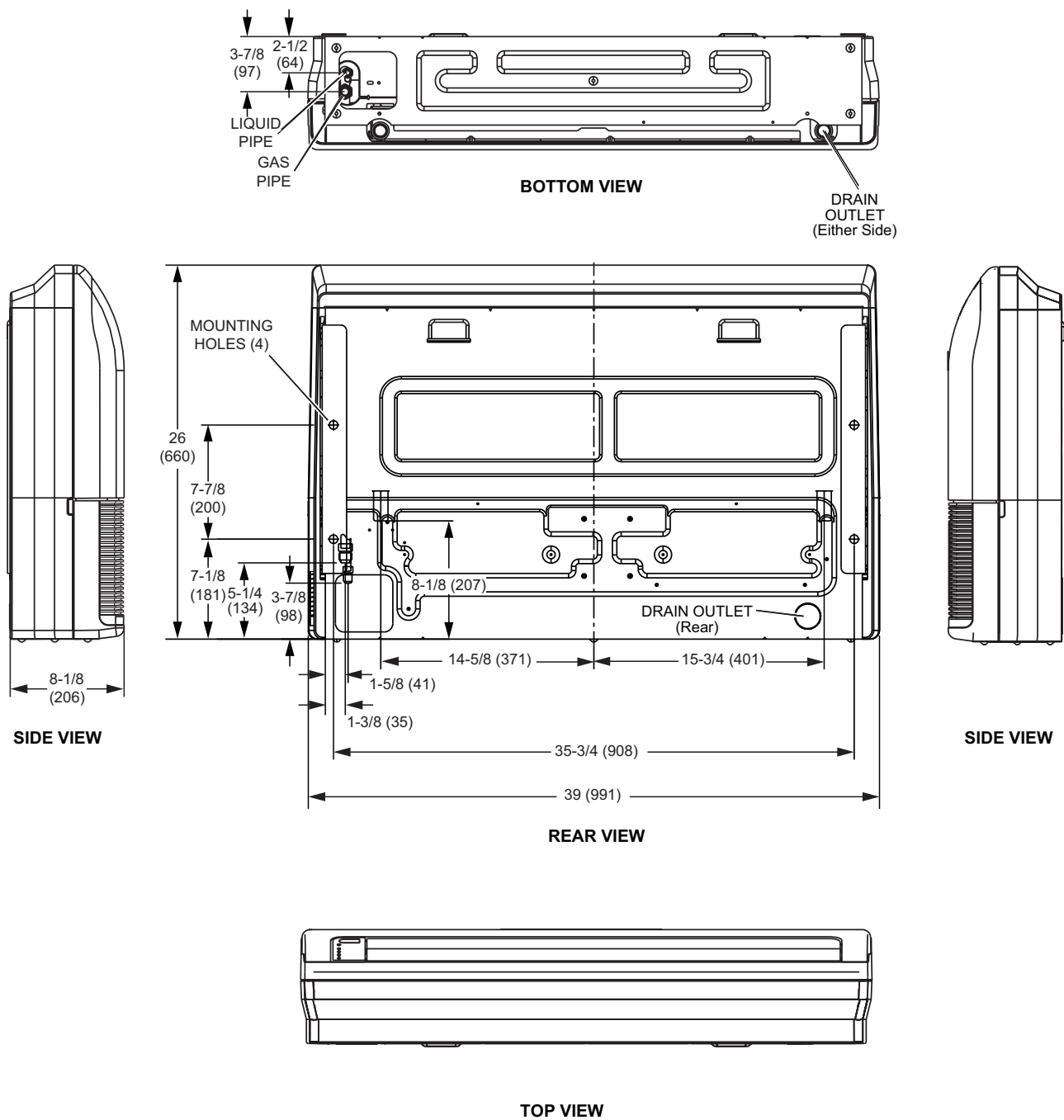
Failure to provide this information regarding changes to the original design may lead to insufficient capacity, equipment failure, warranty being made void and the refusal to commission the system.

⚠ NOTICE

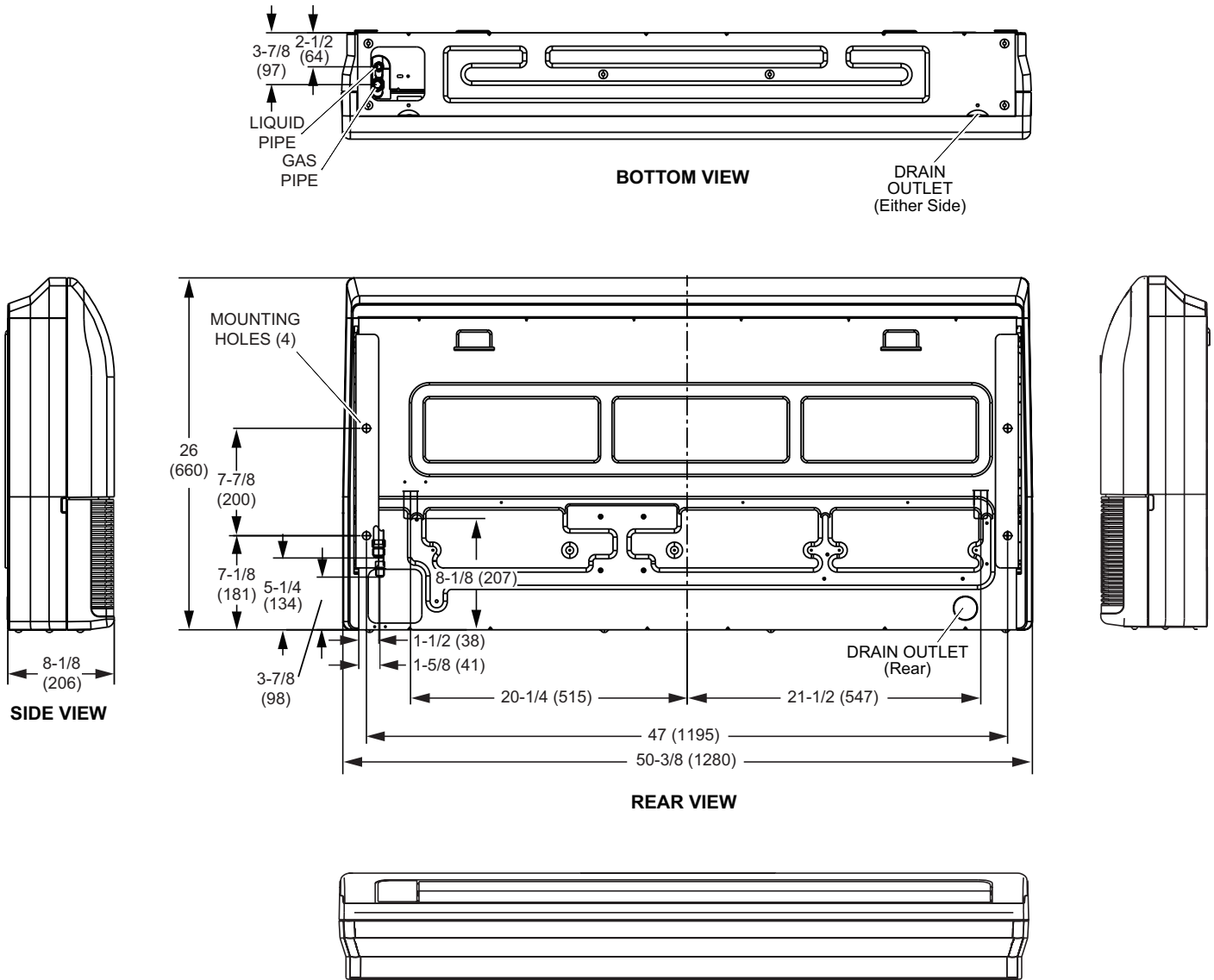
When using a part of a VRF Heat Recovery system, refer to the specific pipe connection details located in the Mode Selection Box installation manual and the detailed drawings of this manual.

Dimensions

VCFB012H4, VCFB015H4, VCFB018H4, VCFB024H4

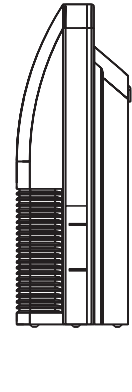
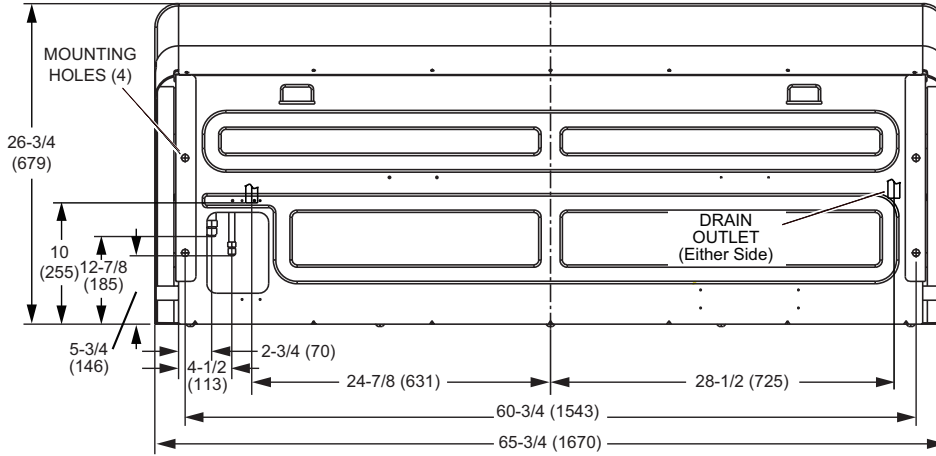
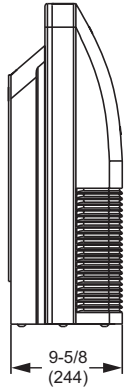
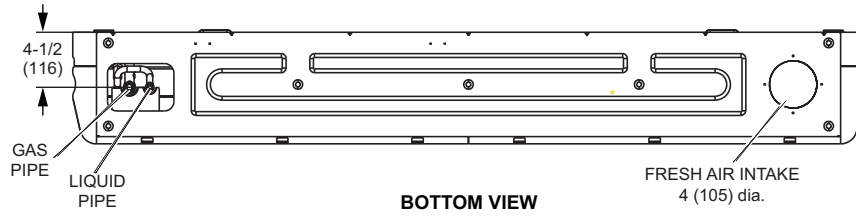


VCFB030



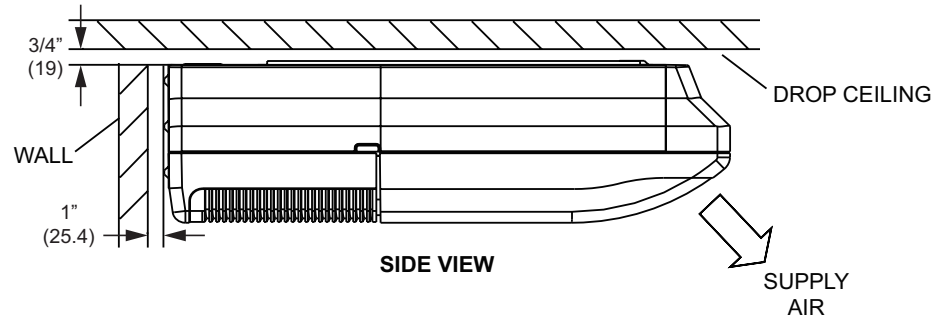
NOTE - Fresh air intake not available on VHIA030 and smaller units.

VCFB036, VCFB048

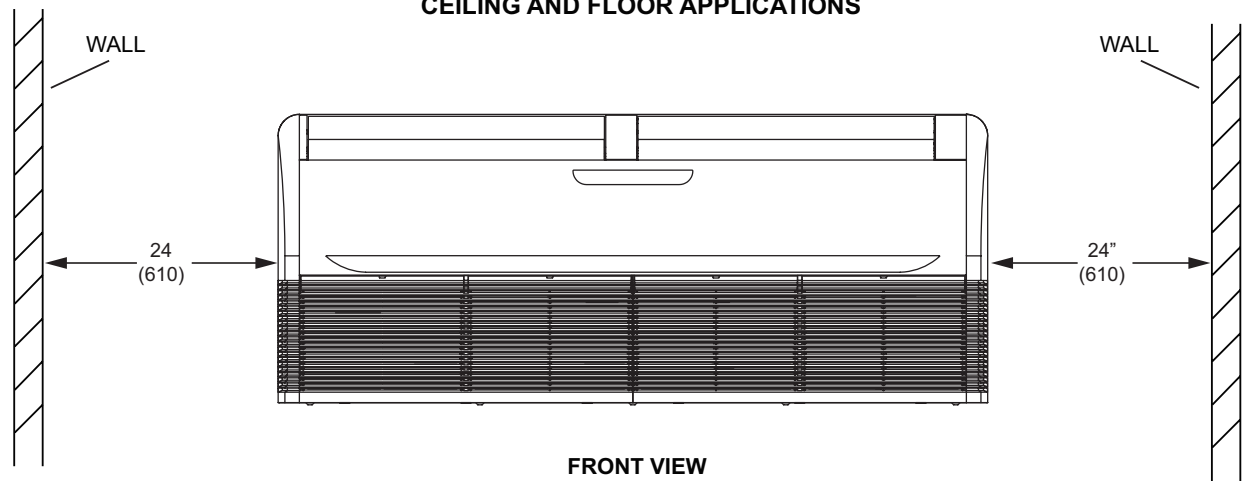


Clearances

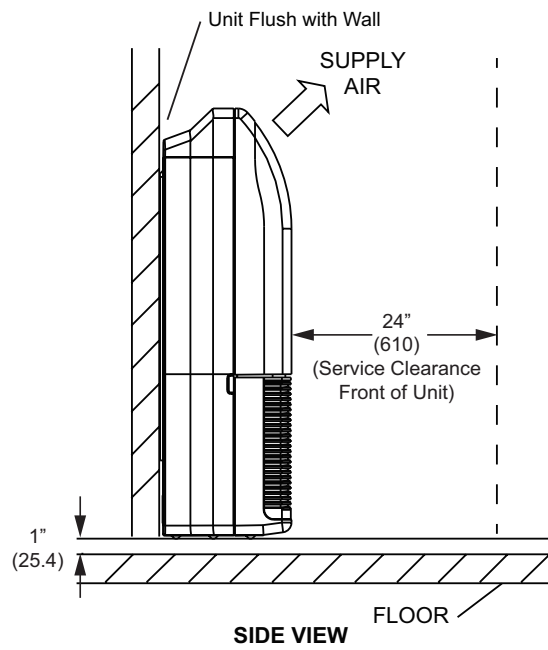
CEILING APPLICATIONS



CEILING AND FLOOR APPLICATIONS



FLOOR APPLICATIONS



Unit 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 suitability of structure to which the unit support mechanism will be fixed to. If structure is not capable of carrying the 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 install the unit in an area where flammable materials are present due to risk of explosion resulting in serious injury or death.

CAUTION

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

The unit should be installed at least 8 feet above the floor (if possible) to ensure maximum performance and comfort, when installed in the horizontal position only.

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
- Locate the indoor unit so that the room can be uniformly cooled. Install unit as high as possible on the ceiling (8 feet above floor, if possible) for best performance (horizontal installation only).
- Ensure the structural wall, floor, or ceiling can support the weight of the unit.

- Select a location where the 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

Floor/Wall Applications

1. Locate a suitable position within the space where maintenance access and supply air will not be restricted or affected by obstacles. The minimum clearances are given on page 6.

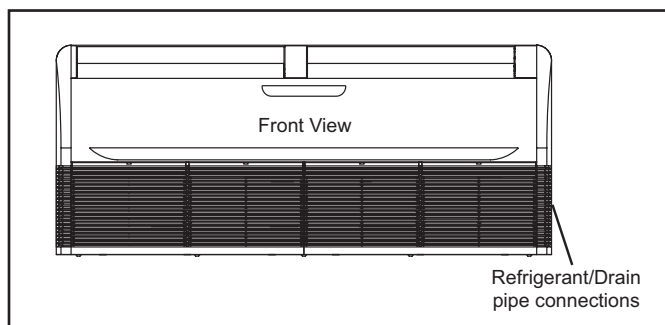


Figure 1. Floor/Wall Applications

2. Locate the VCFB on a wall which is both capable of supporting the unit's weight and which is constructed to enable the unit to fit flush on the wall. An uneven wall may lead to vibration and subsequent unit damage.
3. Use suitable fasteners to secure the two mounting brackets to the wall. See Figures 2 and 3, and the dimension drawings on pages 3, 4 and 5 to ensure proper positioning of the brackets.

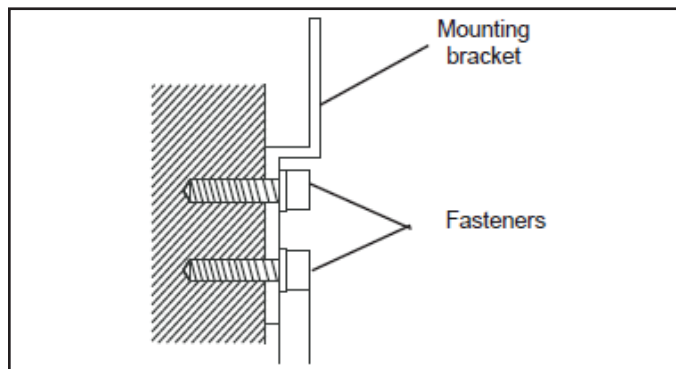


Figure 2. Mounting Brackets

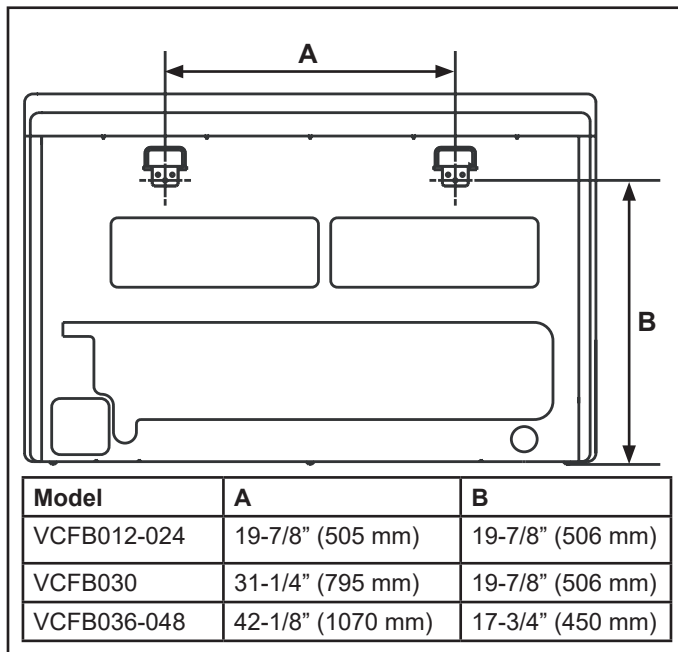


Figure 3. Mounting Bracket Positioning

- The unit should be installed high enough for a gravity drain to function properly. If necessary, a field provided external pump can be installed at the unit. See Figure 1 for pipe connection locations.
- Upon confirming the two brackets are level, correctly spaced and secured to the wall; lift the unit onto the brackets. Confirm the unit is level before continuing.

Ceiling Installation

- Remove the side panel and the grille. See Figure 4. **NOTE** - Do not remove the grille on VCFB036 or VCFB048 models.

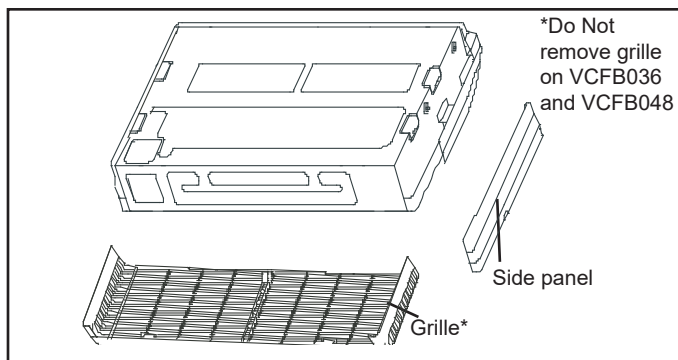


Figure 4. Remove Side Panel and Grille

- Install four factory-provided mounting bolts by screwing them into the provided threaded holes in the unit body. See Figure 7 for mounting bolt installation locations. The bolts should only extend from the body a distance which enables the bracket to engage the bolts and secure the unit.
- Make sure that the structural ceiling is able to support the weight of the unit. It may be necessary to add support.

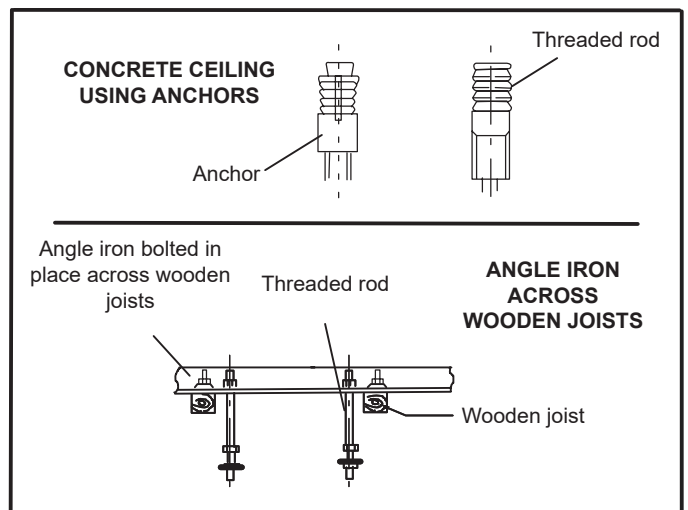


Figure 5. Locate Threaded Rods

- Install suspension rods in the structural ceiling or concrete slab in a suitable location. If the structural ceiling is constructed of concrete, install anchors to accept four suitably sized 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 threaded rods. **NOTE** - Threaded rod (requirement of Lennox warranty program) is the ONLY acceptable method of suspending the unit; do not use chains or straps. See Figure 5.
- Slide one nut and one washer onto each threaded rod. Use electrical tape to keep the washer from falling off. Position the nuts slightly above the final resting place of the suspension brackets.

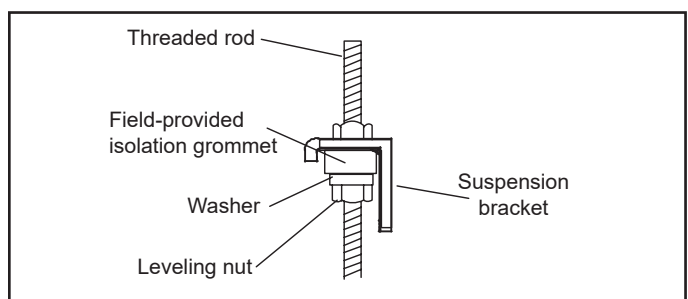


Figure 6. Locate Suspension Bracket on Threaded Rod

- Fix the two long suspension brackets provided in accessory package to the previously installed threaded rods. See Figure 6.
- Slide a washer and then a nut onto each rod below each suspension bracket. Use the leveling nut (beneath suspension brackets) to adjust the bracket to the correct height. Remove the electrical tape holding the upper washers and nuts in place and tighten each

of the four nuts above the brackets down onto the brackets. This will ensure that the unit remains level. See Figure 6.

8. If necessary, install a field-provided isolation grommet to prevent transmission of vibration from unit to structural ceiling.
9. Use either a mechanical lifting device or a minimum of two people to raise the unit.
10. Hang the unit on the suspension brackets by sliding the unit backwards on the bracket.
11. Securely tighten the mounting bolts on both sides. See Figure 9.

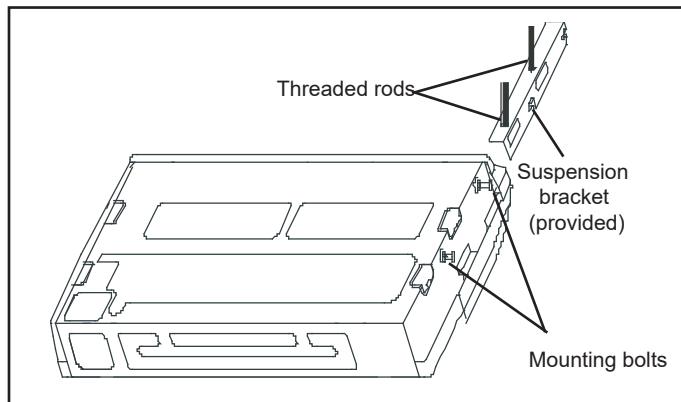


Figure 7. Suspend Unit

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.

Field piping consists of two copper lines connected to the indoor unit. Table 1 lists the connection sizes at the indoor unit. The connections are made using the provided brass flare nuts at the end of the refrigerant piping connections.

Both lines must be individually insulated.

1. The seal on the unit refrigerant piping connections should remain in place until the last possible moment. This will prevent dust or water from getting into the refrigerant piping before it is connected.
2. CAREFULLY adjust refrigerant piping connections to suit the application.
3. Slowly loosen one of the flare nuts to release the factory nitrogen charge.
4. Remove the flare nuts from the connections on the unit and discard the seal from each of the piping connections.
5. Slide the flare nuts onto the ends of the field-provided refrigerant piping before using a suitable flaring tool to flare the end of the copper pipe.

! 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.

- Apply recommended HFC-410A refrigerant lubricant to the outside of the flared refrigerant lines (Figure 8-A).

Table 1. Refrigerant Piping Connections

Size (Btuh)	Liquid Line	Vapor Line
VCFB012 & 015	1/4"	1/2"
VCFB018 - 048	3/8"	5/8"

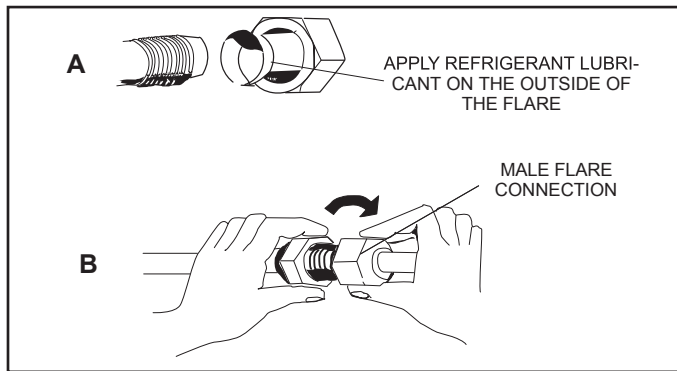


Figure 8. Making Connections at Indoor Unit (Male to Female Connection)

- Align the threaded connections with the flared refrigerant lines. Tighten the flare nuts lightly at first to obtain a smooth match (Figure 8-B).
- Once snug, continue another half-turn on each nut which should create a leak-free joint. A torque wrench may be used to tighten flare nuts using Table 2 recommendations. See Figure 9.

! IMPORTANT

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

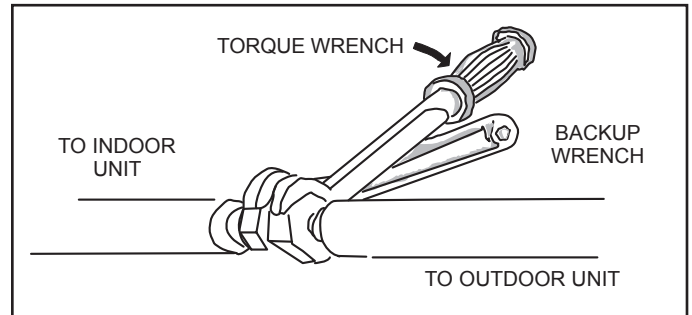


Figure 9. Tighten Flare Nut

Table 2. Flare Nut Torque Recommendations

Outside Diameter	Recommended Torque	No torque wrench available
		Finger tighten and use an appropriately sized wrench to turn an additional:
Inches	U.S.	
1/4"	15 ft.-lb.	1/4 turn
3/8"	26 ft.-lb.	1/2 turn
1/2"	41 ft.-lb.	7/8 turn
5/8"	48 ft.-lb.	1 full turn

- Do not over-tighten a flared joint. Flared connections should always be accessible and must be insulated to prevent condensation.**
- After refrigerant piping has been installed and checked for leaks, apply insulation over all flared connections.

Condensate Piping 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.

1. Make a water-tight connection between the field-provided condensate drain line and the flexible condensate connector (1 inch).
2. Confirm proper slope (not less than 1/4 inch per foot) and routing of condensate lines to ensure moisture is drained away from the indoor unit.
3. Drain should be as short as possible and should not have any droops or kinks that would restrict condensate flow and shall be approved resistant pipe. There must be a 2-inch space between the end of the condensate drain and the final termination point (ground, open drain, etc.) to ensure that the line will drain freely.
4. 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.

⚠ 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.

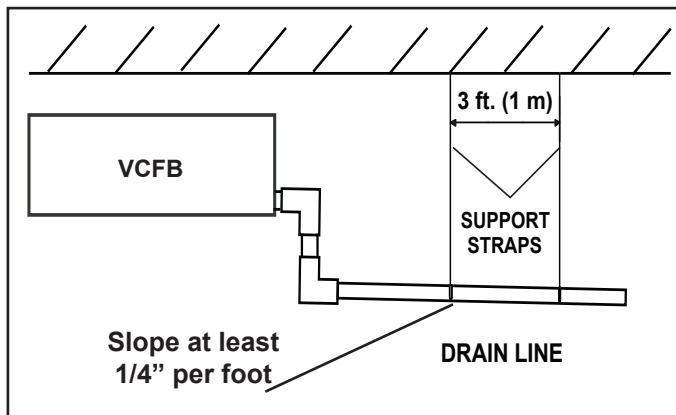


Figure 10. Single Indoor Unit Suspended from Ceiling Using a Properly Sloped Gravity Drain

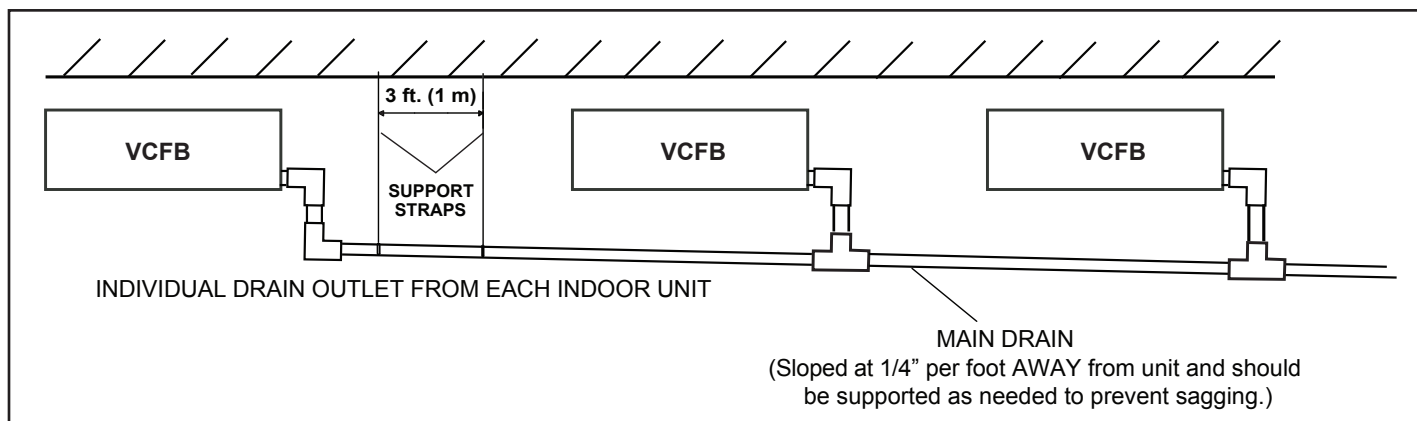


Figure 11. Condensate Drain Multiple Indoor Units Suspended from Ceiling Using a Single Properly Sloped Gravity Drain

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.

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.

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.

CAUTION

A disconnection device having an air gap contact separation in all active conductors should be incorporated in the fixed wiring according to the National Wiring Regulation.

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 - Two-conductor shielded cable must be used for the communication wiring. This is necessary to ensure proper system communication and operation.

- A circuit breaker capable of shutting down the power supply to the entire system must be installed.
- A single switch can be used to supply power to units on the same system. However, branch switches and circuit breakers must be selected carefully.

- Fit the power supply wiring of each unit with a switch and fuse as shown in the wiring diagram.
- Install a wiring interrupter 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.

1. Pull the return air filter grille forward and remove the filters.
2. Remove one screw from each safety strap assembly (one on each side) and remove return air grille.
3. Locate the control box in the center of the unit, below and behind the fan motor.
4. Remove the two screws holding the control box onto the motor mounting bracket, and the screw at each end of the control box holding securing the box to the chassis of the unit. Lower the control box to obtain access to cover.
5. Remove the screws securing the cover and remove cover from control box.
6. Locate the terminal strip in the control box. Connect the power wiring (sized per NEC/CEC and local codes) and communications cable (two-conductor shielded cable) per Figures 12, 13, and 14. Refer to unit nameplate for rated voltage.
7. 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. See Figure 13 and 14.

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

Indoor units and mode selection boxes on the same refrigeration circuit should have a common power supply but must have an independent disconnect switch installed adjacent to each item of equipment for

servicing and maintenance purposes. Indoor unit and mode selection box power supply MUST not be taken from the outdoor unit. Always follow NEC/CEC and Local Codes.

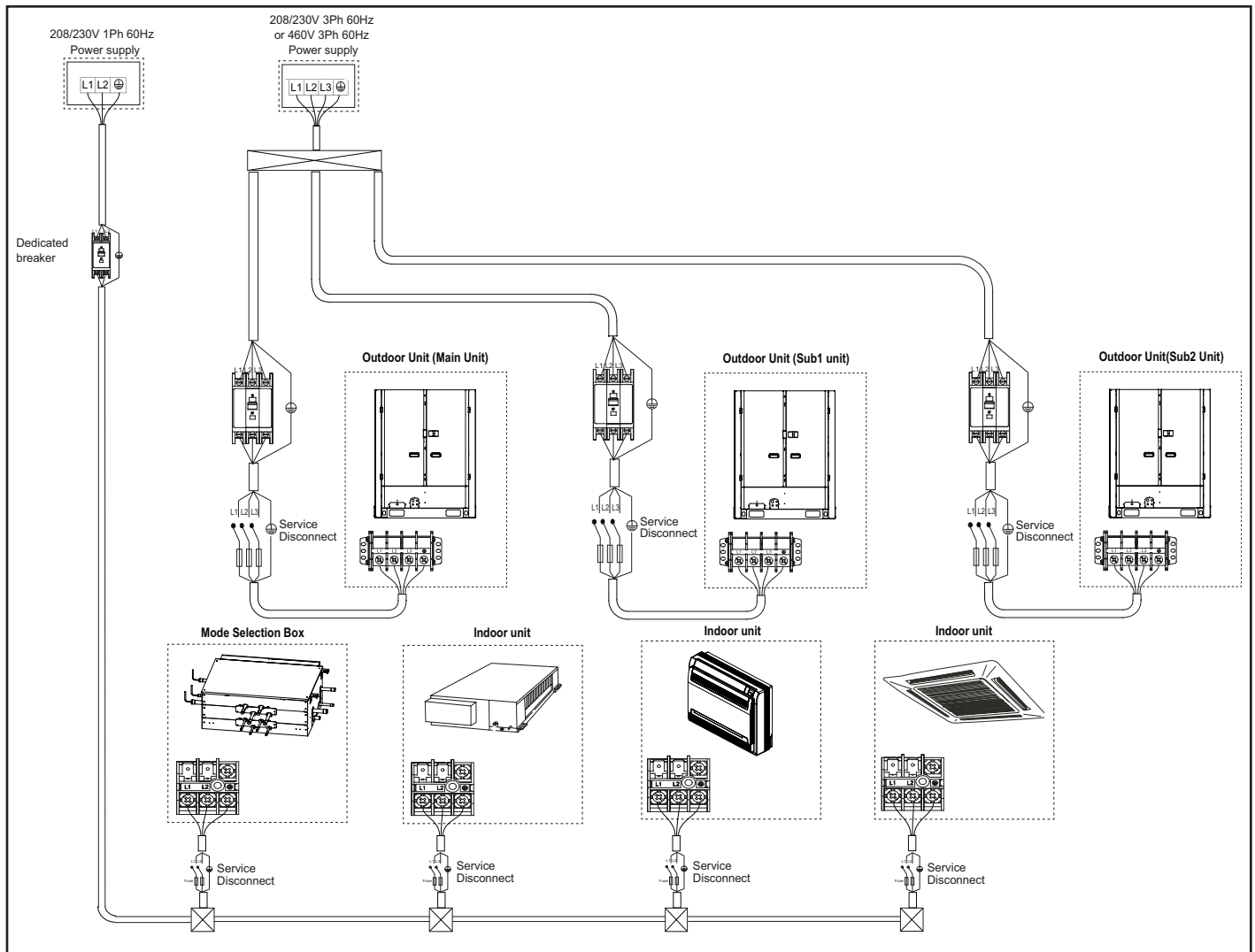


Figure 12. Typical Power Wiring Diagram (VRF Heat Recovery System Shown)

! IMPORTANT

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

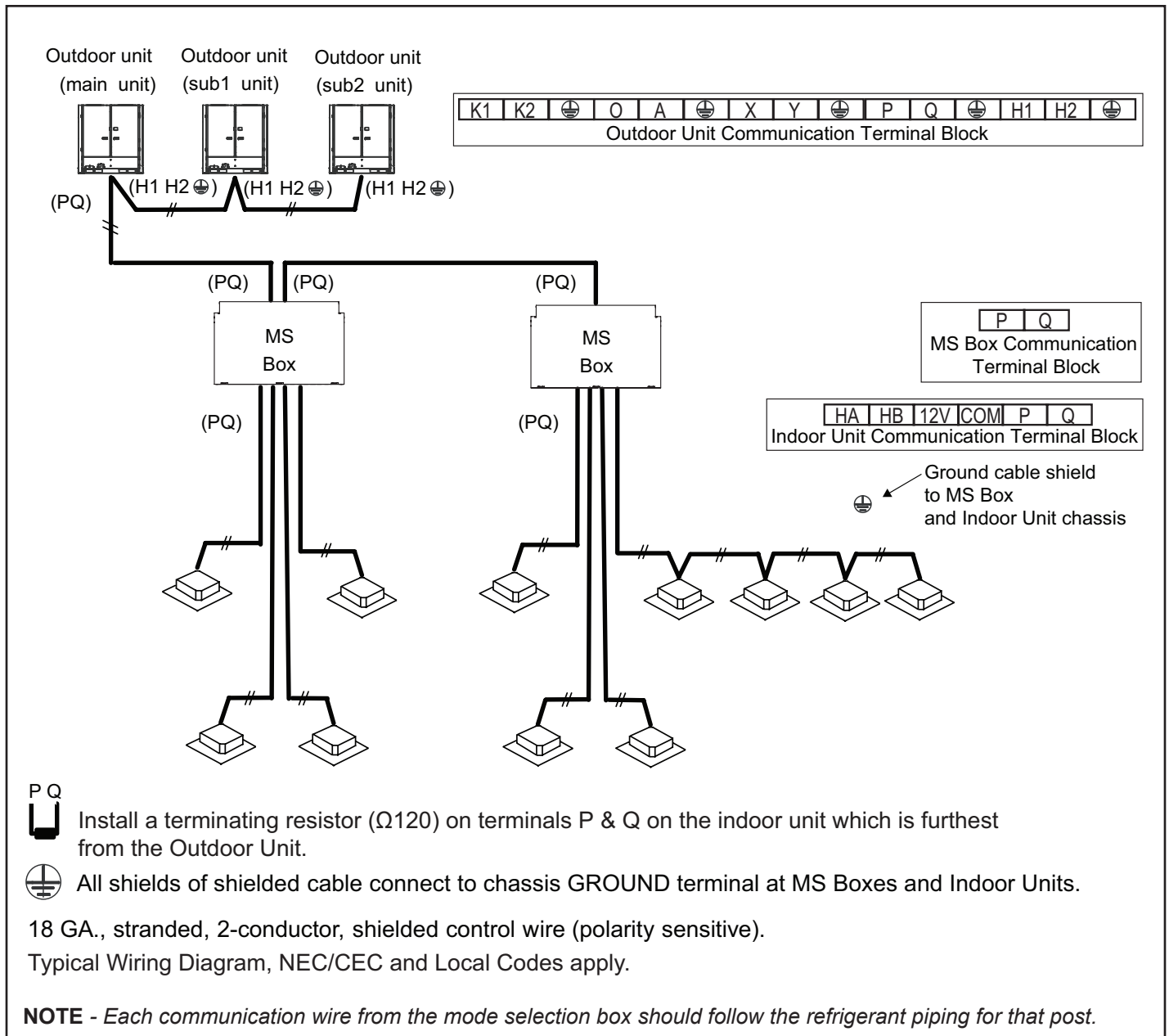


Figure 13. Typical Communication Wiring Diagram (VRF Heat Recovery System)

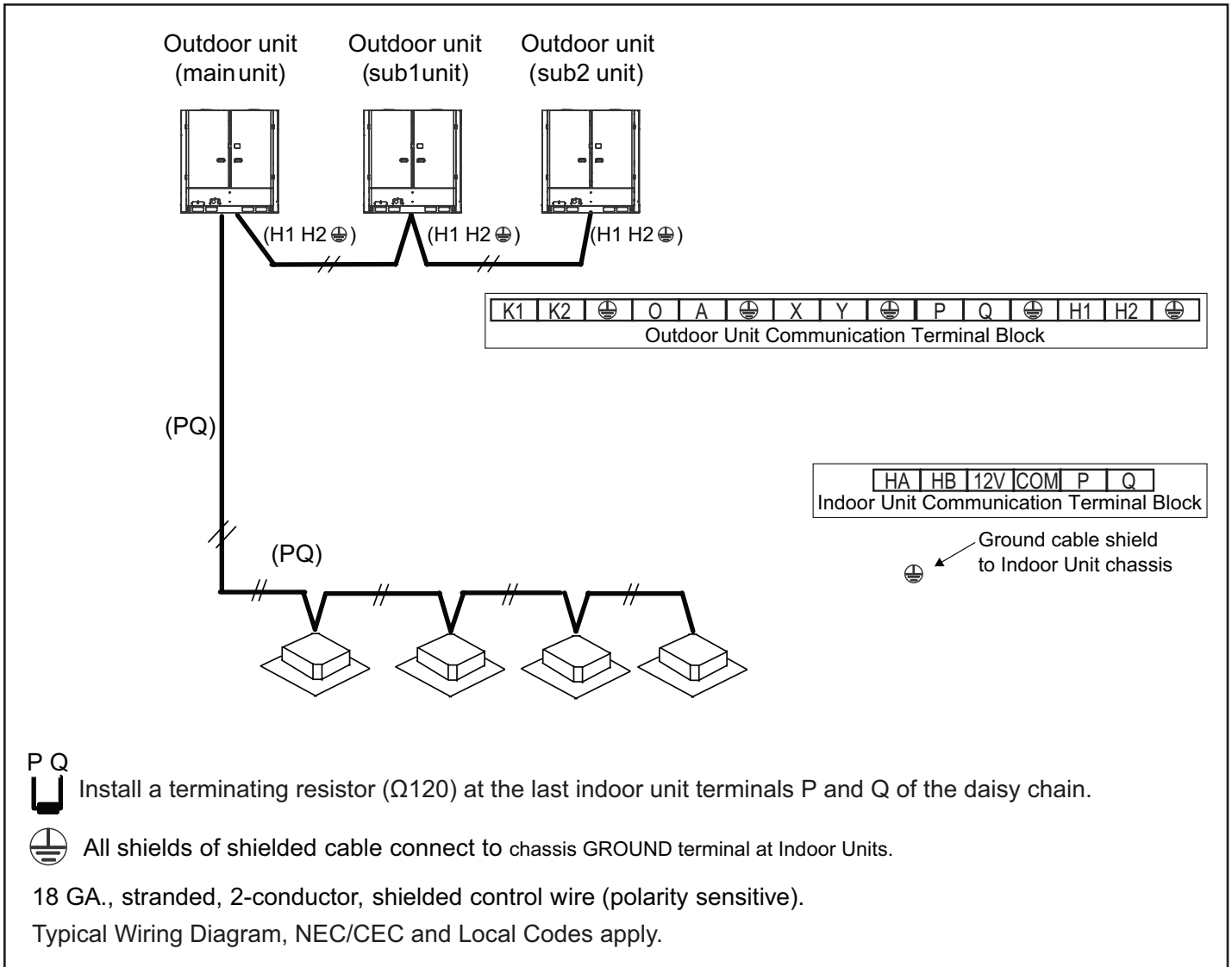


Figure 14. Typical Communication Wiring Diagram (VRF Heat Pump System Shown)

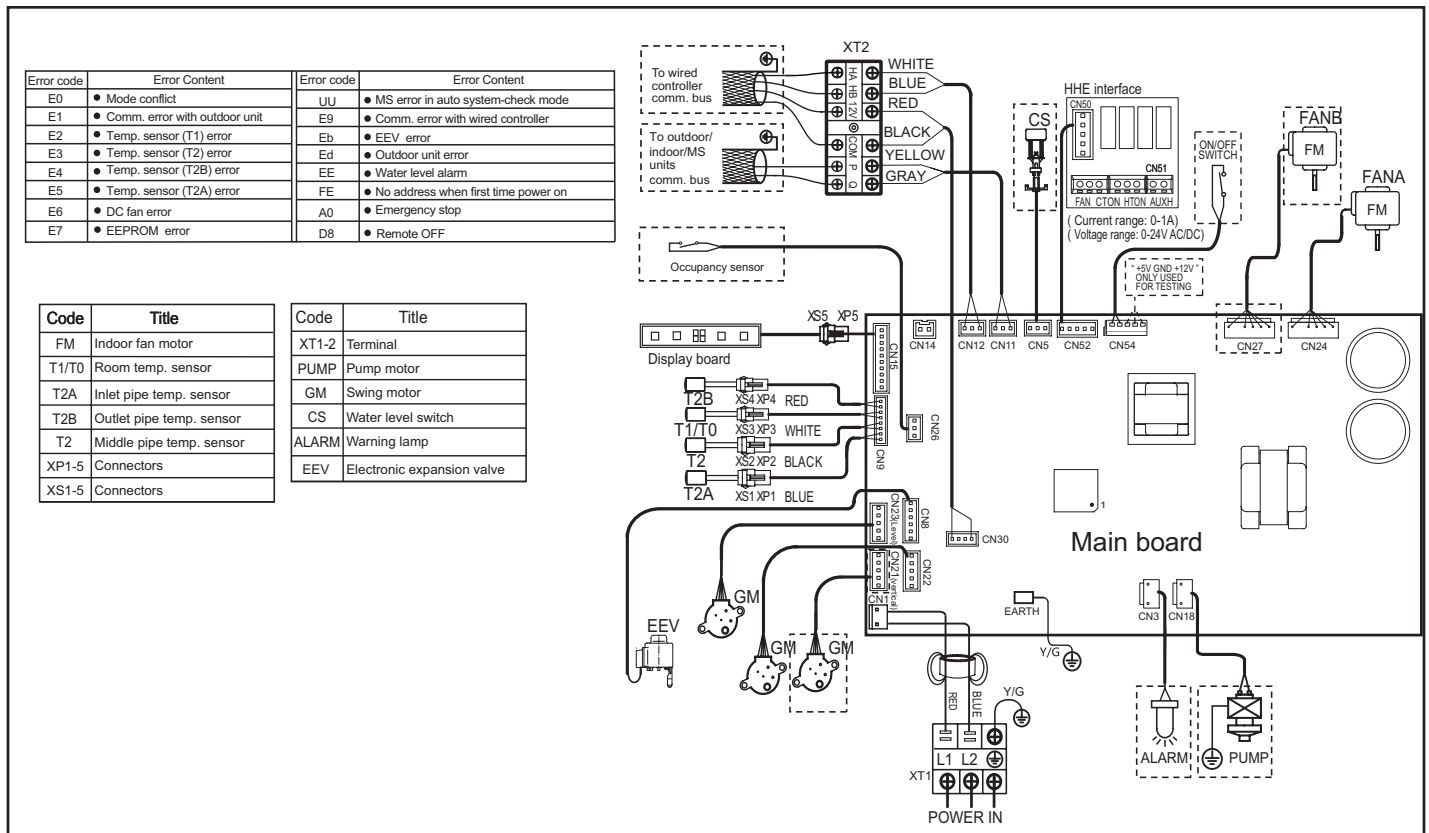


Figure 15. VCFB-3 Typical Wiring Diagram

Outside Air Connection

A limited amount of outside air can be brought into the VCFB036, 048 units [through the 4 inch (105 mm)] fresh air intake to be conditioned and mixed into the supply air.

NOTE - Fresh air must be filtered as the connection is after the VCFB filters. Failure to follow this step will deteriorate the indoor unit coil and cause condensate issues.

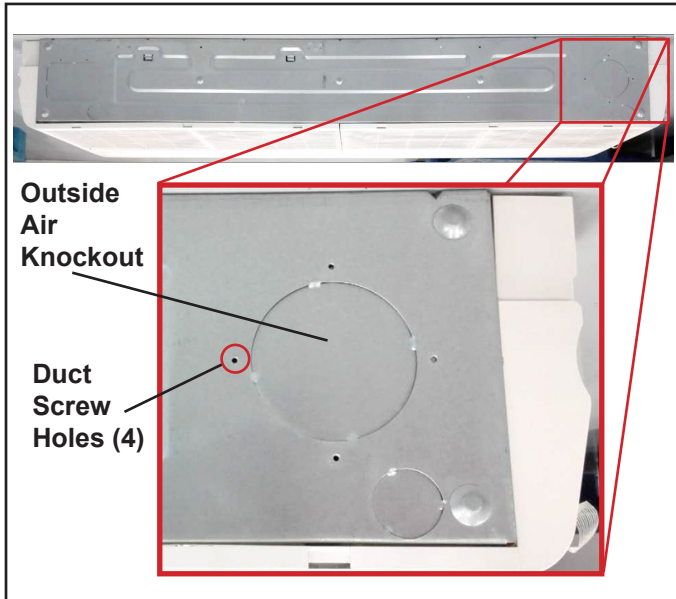


Figure 16. Typical Outside Air Knockout

1. Knock out the outside air supply opening. See Figure 16.
2. Remove any insulation.
3. Connect the outside air duct to cassette body using the four screw holes shown in Figure 16.
4. Relocate the indoor unit's return air sensor to either the controller (electronically) or physically by using the remote sensor accessory.
5. The outside air supply duct length must be 10 feet or less.
6. Flexible duct connection must be used to avoid vibration noise being transmitted into the building.
7. Use a field-supplied booster fan to increase static pressure.

Network Address and Commissioning

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

Spot Check Instructions

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

Table 4. Spot Check Performance Identification Table

No.	Content	Recorded Value/Date
0	Normal display	
1	Communication address of indoor unit	
2	Indoor unit capacity (horsepower)	
3	Network address of indoor unit	
4	The actual setpoint temperature	
5	The actual indoor temperature T1	
6	The middle coil temperature T2	
7	The coil inlet temperature T2A	
8	The coil outlet temperature T2B	
9	The actual superheat temperature	
10	The actual subcool temperature	
11	Error Code	
12	Indoor software version	
13	End (--)	

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

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

Troubleshooting

Digital Display

The indoor 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.

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 VRF Technical Support 1-844-438-8731.

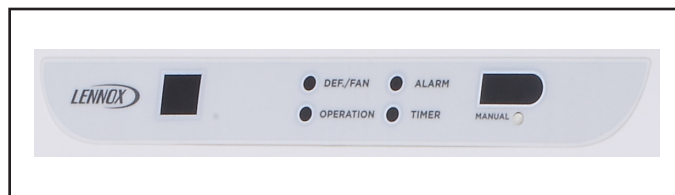


Figure 17. Receiver for VCFB

Table 5. Fault Code Display on Indoor Unit Receiver

Error Code	Description
FE	No address
E0	Mode conflict
E1	Communication error between indoor and main outdoor unit
E2	T1 (Room temperature sensor) malfunction
E3	T2 (Middle of evaporator sensor) malfunction
E4	T2B (Outlet of evaporator sensor) malfunction
E5	T2A (Inlet of evaporator sensor) malfunction
E6	DC fan motor error
E7	EEPROM failure
Eb	EEV malfunction
Ed	Outdoor unit Fault
EE	High Water Alarm
A0	Emergency stop
D8	Remote off
U4	MS self-inspection error
F8	MS error

Table 6. Fault Code Display on Controller

Error Code	Description
F0	Communication/Address error between indoor units and wired controller
F1	Communication/Wiring error between indoor units and wired controller
E2	Controller temperature sensor error

Technical Support

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