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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.

INSTALLATION/OPERATION INSTRUCTIONS

Mini-VRF Heat Pump

VPB***H4-3P
VRF SYSTEMS
OUTDOOR UNITS
507998-01
10/2019

! 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.

! 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.

! 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.

General

The Mini-VRF heat pump outdoor units are matched with up to nine indoor units to create a VRF (variable refrigerant flow) system that uses R-410A refrigerant. Refer to the Product Specification bulletin (EHB) for the proper use of these heat pumps with matching indoor units, header pipes, branch pipes, line sets and controls.

These instructions are intended as a general guide and do not supersede local or national codes in any way. Authorities having jurisdiction should be consulted 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 Mini-VRF heat pump outdoor unit
- 1 - Outdoor unit installation instruction

Safety Requirements

⚠ WARNING

ELECTRICAL SHOCK, FIRE, OR EXPLOSION HAZARD.

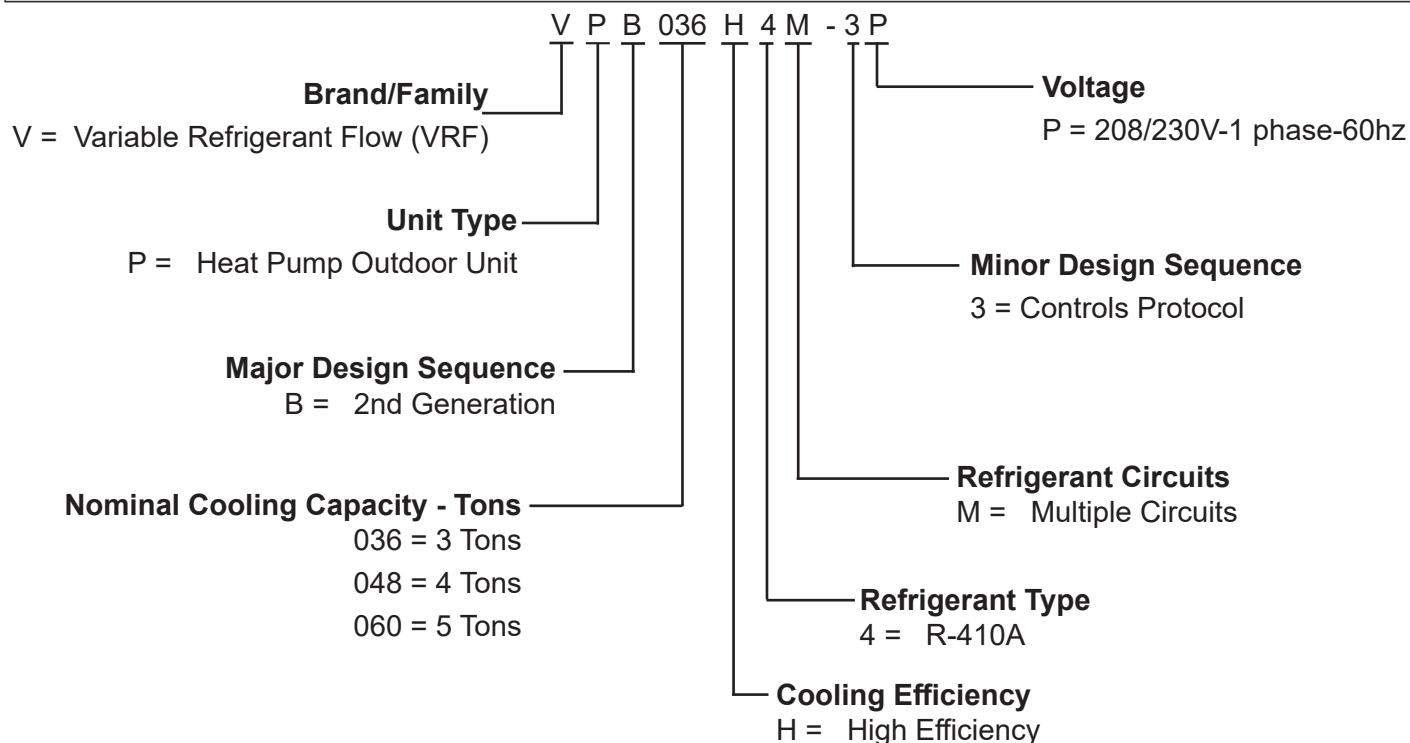
Do not touch the unit or the controller if your hands are wet.

Do not operate appliances with an open flame near the unit.

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 - Lennox 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 VRF (V) or Mini-Split (M) unit. It is not possible to mix the two types of equipment on any system.

System Piping

⚠ CAUTION

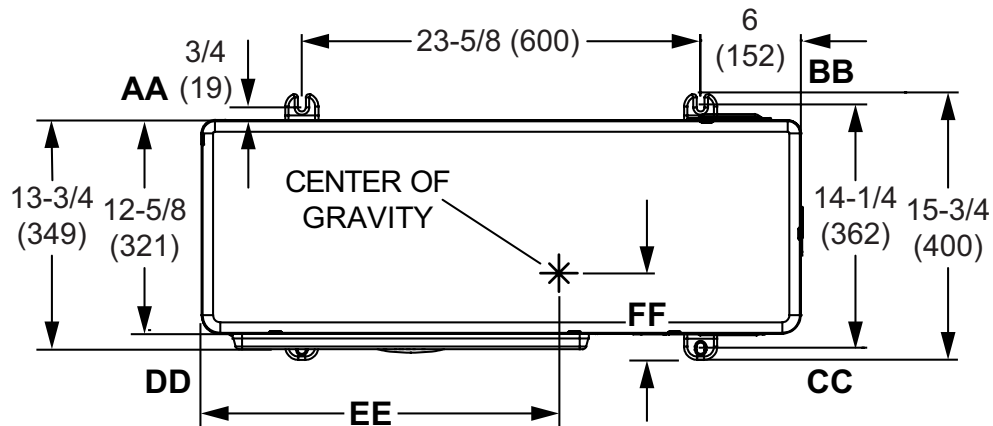
VRF system piping is customized for each installation. The Lennox VRF Selection Software (LVSS) piping report is an engineered design that must be followed. The piping diagram or diagrams included within the LVSS report have been prepared based on the information provided to the Lennox VRF applications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

⚠ CAUTION

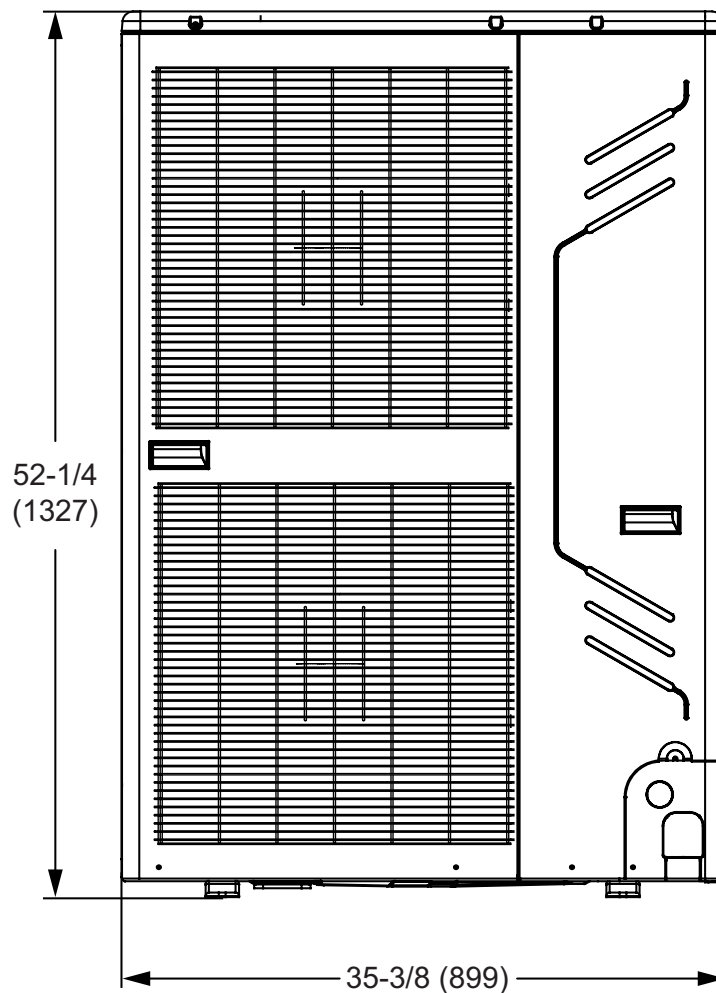
Upon receipt of this new information the Lennox VRF applications department will confirm any changes that may be applicable to this installation. If changes are required, a new piping diagram will be produced and will supersede all other previously provided documents. Failure to provide this information 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)

CORNER WEIGHTS									CENTER OF GRAVITY			
Model No.	AA		BB		CC		DD		EE		FF	
	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg	in.	mm	in.	mm
All Models	40	18	63	29	72	33	45	21	21-5/8	549	7-3/8	187

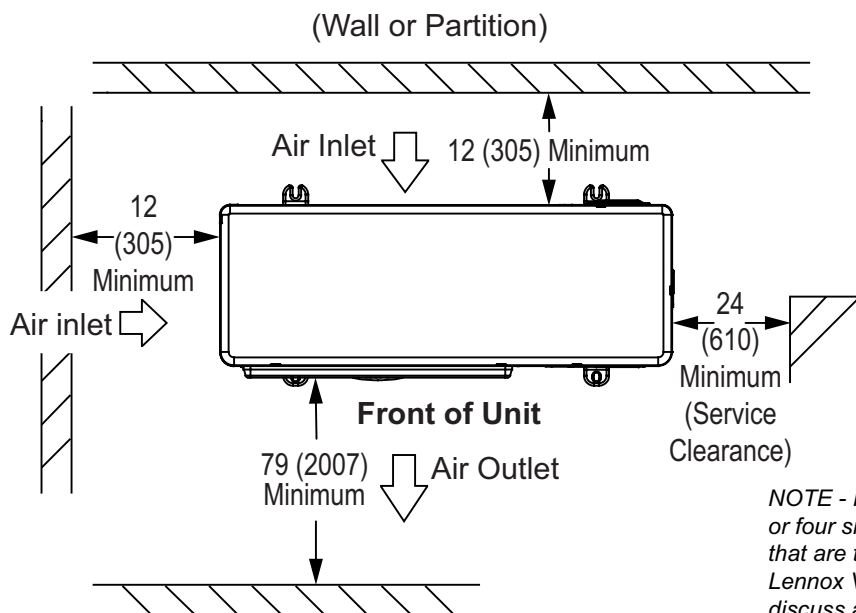


TOP VIEW



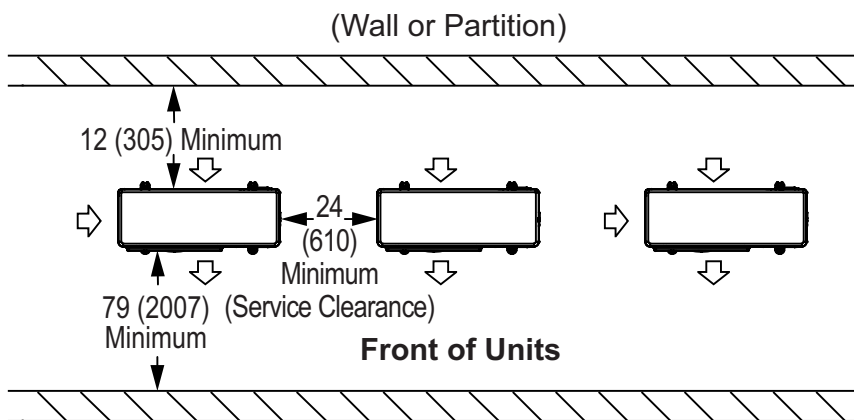
FRONT VIEW

Single Unit Installation

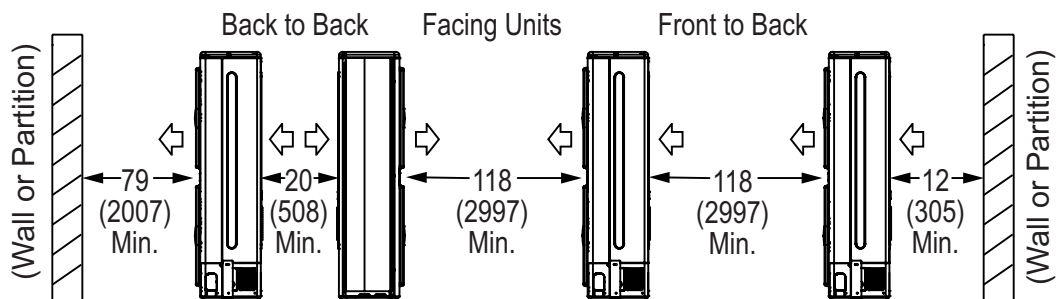


NOTE - 24 in. (610 mm) clearance required on top of unit.

Parallel Units Side by Side



Parallel Units Back to Back, Facing and Front to Back



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 stability of unit support. If support is not capable of carrying weight of the unit, unit 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.

Outdoor Unit Positioning Considerations

In addition to clearances, the following items should be considered when setting the outdoor unit:

- Some local governments have adopted sound ordinances based on the unit's sound level registered from the adjacent property, not from the property where the unit is installed. Install the unit as far as possible from the property line.
- Glass has a very high level of sound transmission. When possible, do not install the unit directly outside a window.
- Avoid installing the unit in areas exposed to extreme voltage variations (such as factories).
- Install unit level.
- Install the unit high enough above the ground or roof to allow adequate drainage of defrost water and prevent ice or snow build-up (required for heat pumps).
- The unit base should be elevated above the depth of average snows. In heavy snow areas, do not locate the unit where drifting will occur.
- When installed in areas where low ambient temperatures exist, locate unit so winter prevailing winds do not blow directly into outdoor unit.
- Locate unit away from overhanging roof lines which would allow water or ice to drop on, or in front of, coil or into unit.
- Allow sufficient space around unit for proper operation and maintenance.
- Install the outdoor 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.

IMPORTANT

Exhaust vents from dryers, water heaters and furnaces should be directed away from the outdoor unit. Prolonged exposure to exhaust gases and the chemicals contained within them may cause condensation to form on the steel cabinet and other metal components of the outdoor unit. This will diminish unit performance and longevity.

Lifting the Unit

- Do not hold the air inlet grille while lifting the unit. This could result in damage to the cabinet.
- Do not touch the fan blades with your hands or other objects while lifting the unit.

Installation

IMPORTANT

Roof Damage!

This system contains both refrigerant and oil. Some rubber roofing material may absorb oil. This will cause the rubber to swell when it comes into contact with oil. The rubber will then bubble and could cause leaks. Protect the roof surface to avoid exposure to refrigerant and oil during service and installation.

Failure to follow this notice could result in damage to roof surface.

Slab or Roof Mounting

Install the unit a minimum of 4 inches (102 mm) above the roof or ground surface to avoid ice build-up around the unit. Locate the unit above a load bearing wall or area of the roof that can adequately support the unit. Consult local codes for rooftop applications.

- Use a field-provided slab or frame as specified in the Product Specifications (EHB) bulletin.
- Install the unit in an upright and level position.
- If the unit coil cannot be installed away from prevailing winter winds, a wind barrier should be constructed. Size barrier at least the same height and width as outdoor unit. Install barrier 12 inches (305 mm) minimum from the sides of the unit in the direction of prevailing winds.

Securing Outdoor Unit to Slab or Frame

- Brackets are provided at the base of the outdoor unit so that it can be secured to a field-provided slab or frame.
- Use lag bolts or equivalent to secure the outdoor unit to the slab or frame. Figure 1.

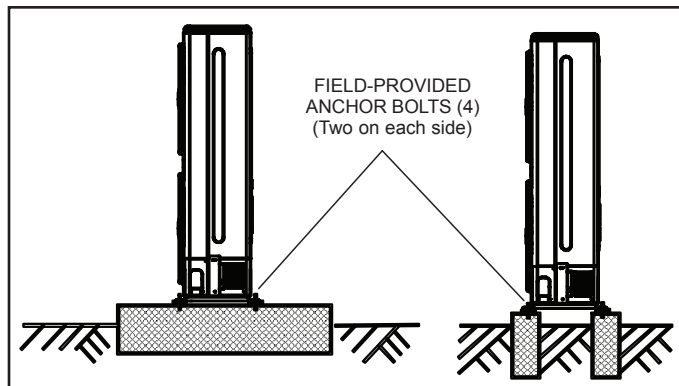


Figure 1. Securing Outdoor Unit to Slab

Securing Outdoor Unit to Wall-Mounted Brackets

- Units can be secured to field-provided wall-mounted brackets as long as the following conditions are met.
- Use lag bolts or equivalent to secure the outdoor unit to the wall-mounted brackets. Figure 2.
- Maintain proper air flow clearances.
NOTE - Minimum rear clearance can be 6 inches (152 mm) when mounted on brackets and with no obstructions on the other three sides.

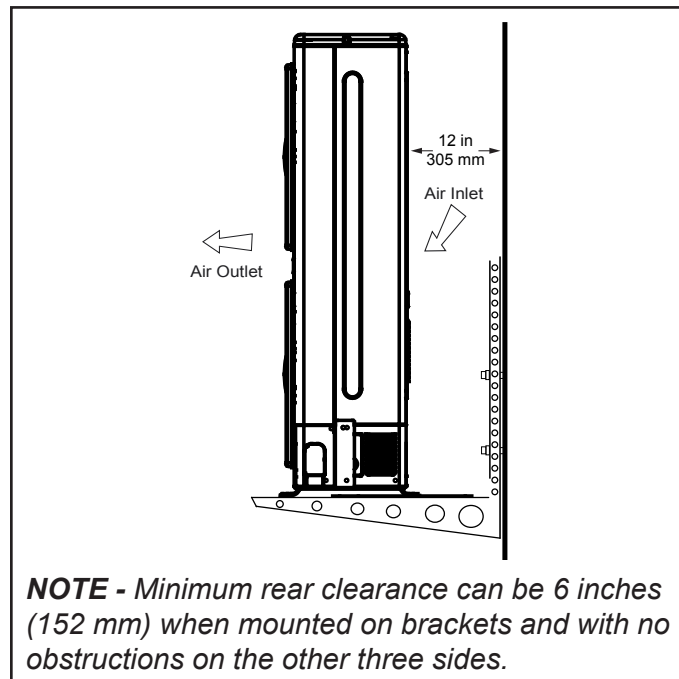


Figure 2. Unit on Wall-Mounted Brackets

Condensate Drains

- The bottom of the outdoor unit is equipped with multiple drain holes to route water away from the unit during a defrost cycle. See figure 3.
- If water produced during the defrost cycle is not drained away from the unit before it re-freezes, the drain may be blocked by ice.
- Protect drain holes to avoid access to the inside of the unit by bugs and other pests.
- Use a field-provided base pan if required for the application.

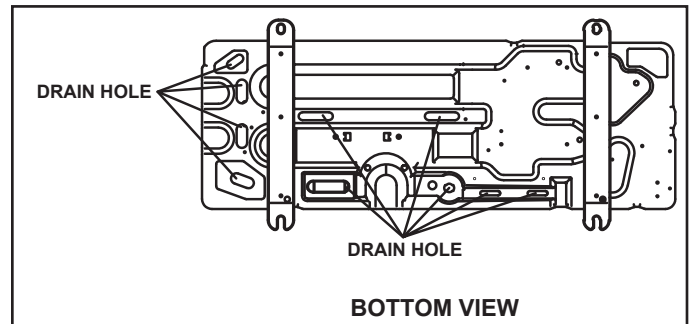


Figure 3. Factory-Provided Drains

Cold Climate Considerations

⚠ CAUTION

When operating the heat pump in a low outdoor ambient temperature, be sure to follow the instructions described below.

- To prevent exposure to wind, install the outdoor unit with its suction side facing the wall.
- Never install the outdoor unit at a site where the suction side may be exposed directly to wind.
- To prevent exposure to wind, install a wind barrier on the air discharge side of the outdoor unit.
- In heavy snowfall areas, select an installation site where the snow will not affect the unit.

Snow and Ice Protection

- Install the unit high enough above the ground or roof to allow adequate drainage of defrost water and prevent ice or snow build-up.
- Carefully consider how to manage defrost water disposal to prevent ice from blocking walkways or creating a safety hazard near the outdoor unit.
- In heavy snow areas, do not locate the unit where drifting will occur. The unit base should be elevated above the depth of average snows. Locate unit away from overhanging roof lines which would allow water or ice to drop on, or in front of, coil or into unit.
- There must be unobstructed air flow around the air inlet and the air outlet.
- The unit must not be installed in areas where a flammable gas leak may occur.

NOTE - VPB***H4-3P units have a factory-installed base pan heater.

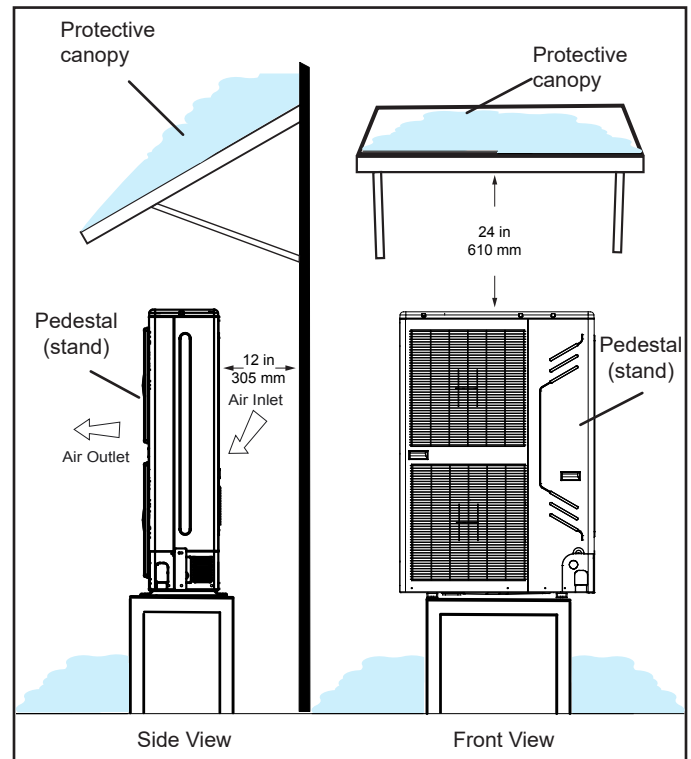


Figure 4. Unit on Pedestal (Stand) Above Snow Line

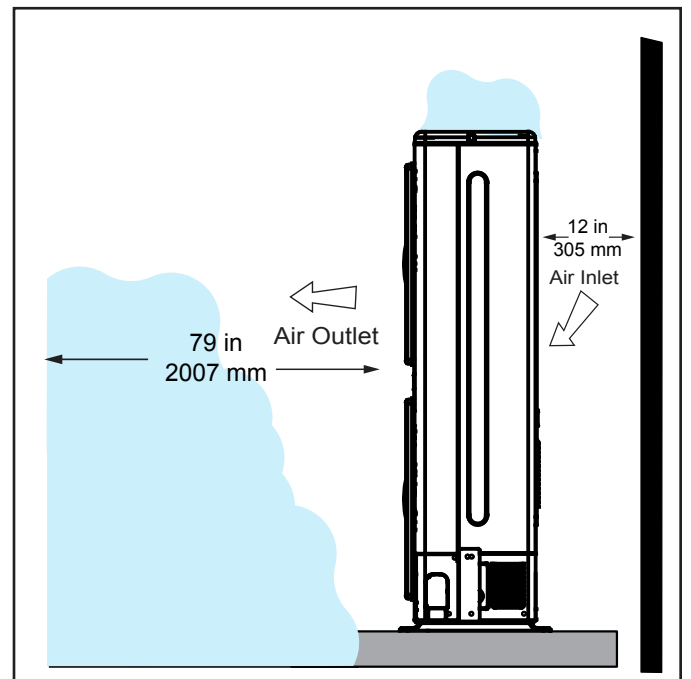


Figure 5. Air Flow Obstructed by Snow

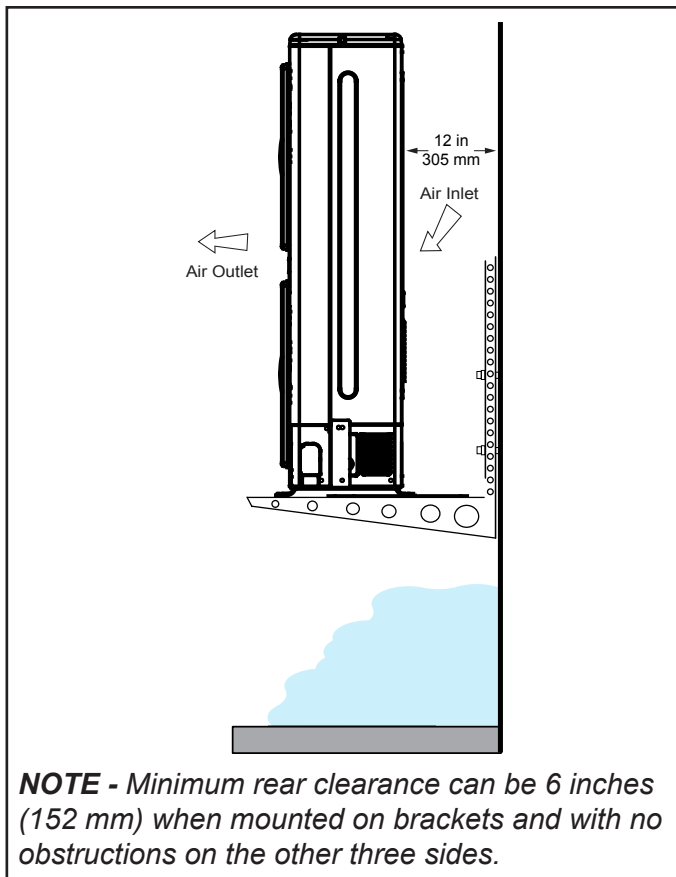


Figure 6. Unit on Brackets Above Snow Line

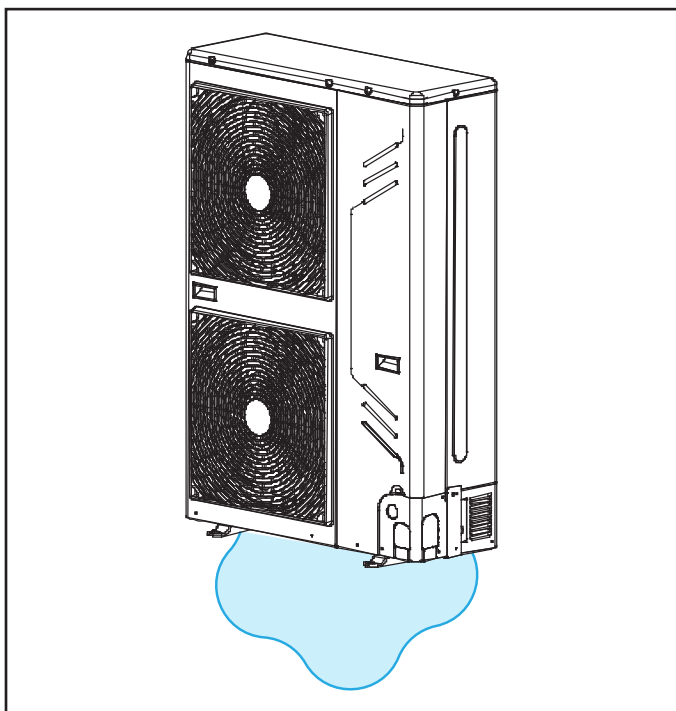


Figure 7. Avoid Defrost Water Ice Hazard

Prevailing Winds Protection

If unit coil cannot be installed away from prevailing winter winds, some method of protecting the coil is required. Minimum clearances from wind barrier must be observed at all times. Common application examples are:

- Construct a wind barrier. Size barrier at least the same height and width as outdoor unit. Install a barrier 12 inches (305 mm) minimum from the sides of the unit in the direction of prevailing winds.
- Install outdoor unit in non-confined space.
- Install outdoor unit in alcove or under roof overhang but not under or directly near a storm gutter.

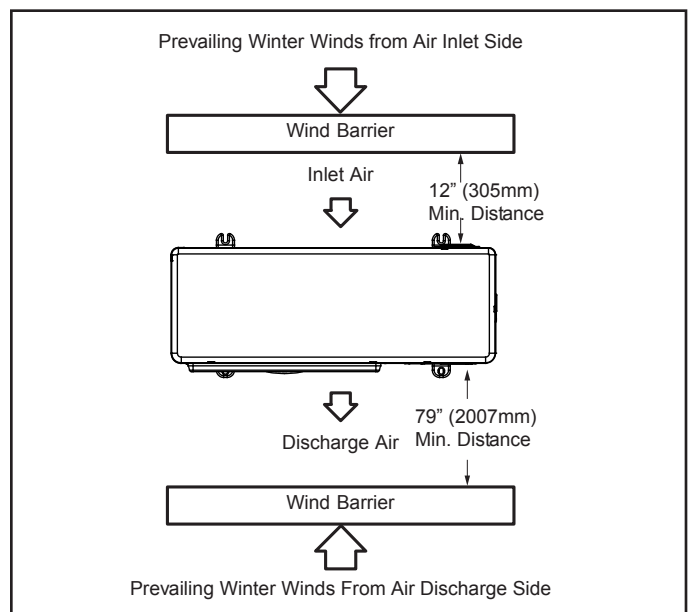


Figure 8. Unit with Wind Barrier

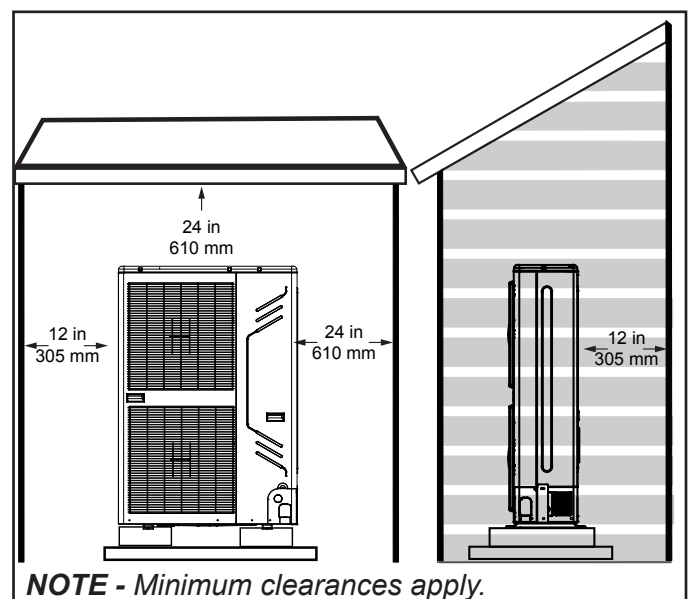


Figure 9. Unit Inside of Mechanical Enclosure

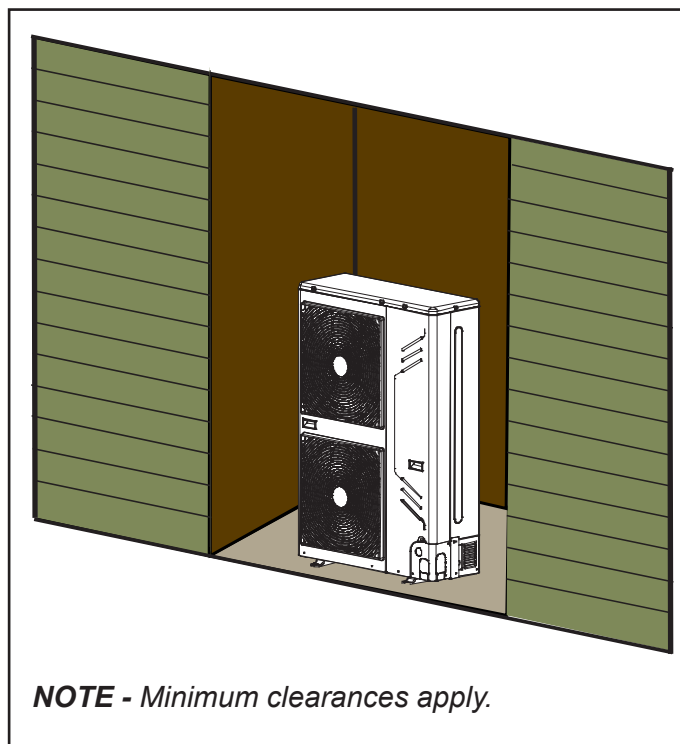


Figure 10. Unit installed in Alcove

Buried Refrigerant Pipe Protection

- **All** refrigerant lines must be insulated regardless of if it is buried.
- In addition to insulating each line of piping, buried lines must rest inside a **sealed, watertight** conduit.
- The conduit must be designed so it cannot collect and retain water.

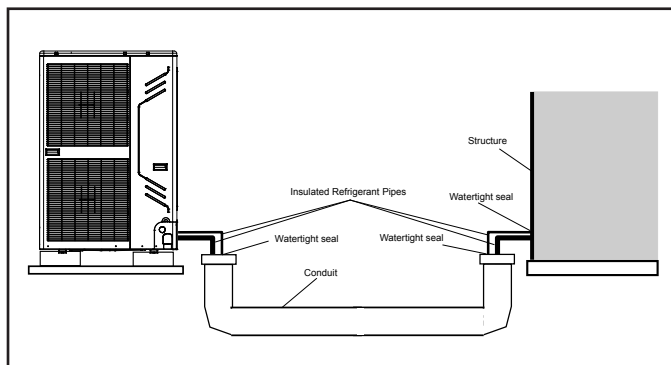


Figure 11. Buried Refrigerant Pipe Protection

Installing the Unit Inside of Building

Mini-VRF outdoor units may be installed indoors if the following guidelines are followed.

- Refer to Figure 12 for critical clearances.
- If field-fabricating ductwork to directly discharge air outdoors, use the dimensions shown in Figure 15 as a guide.
- Include inspection doors in discharge ductwork within 12 inches (305 mm) of the unit.
- Do not restrict access to the unit's electrical service panel.
- Allow enough space between the unit and exterior wall to allow for coil service.
- Provide a drain pan underneath the unit to prevent condensation leaks.
- Contact VRF Applications support for guidance for your application.
email: vrftechsupport@lennoxind.com
phone: 844-GET-VRF1 (844-438-8731)

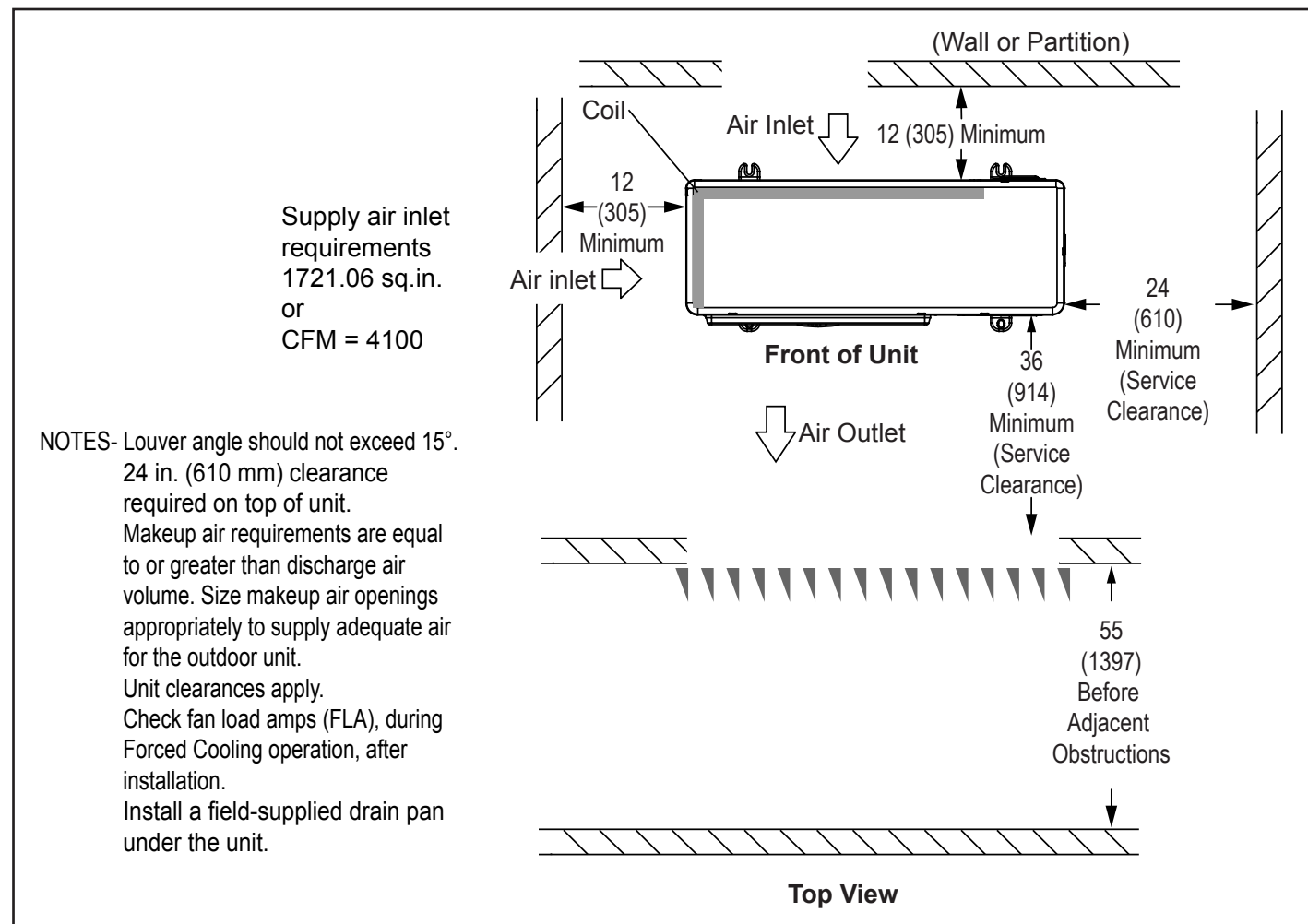


Figure 12. Inside Installation Clearances

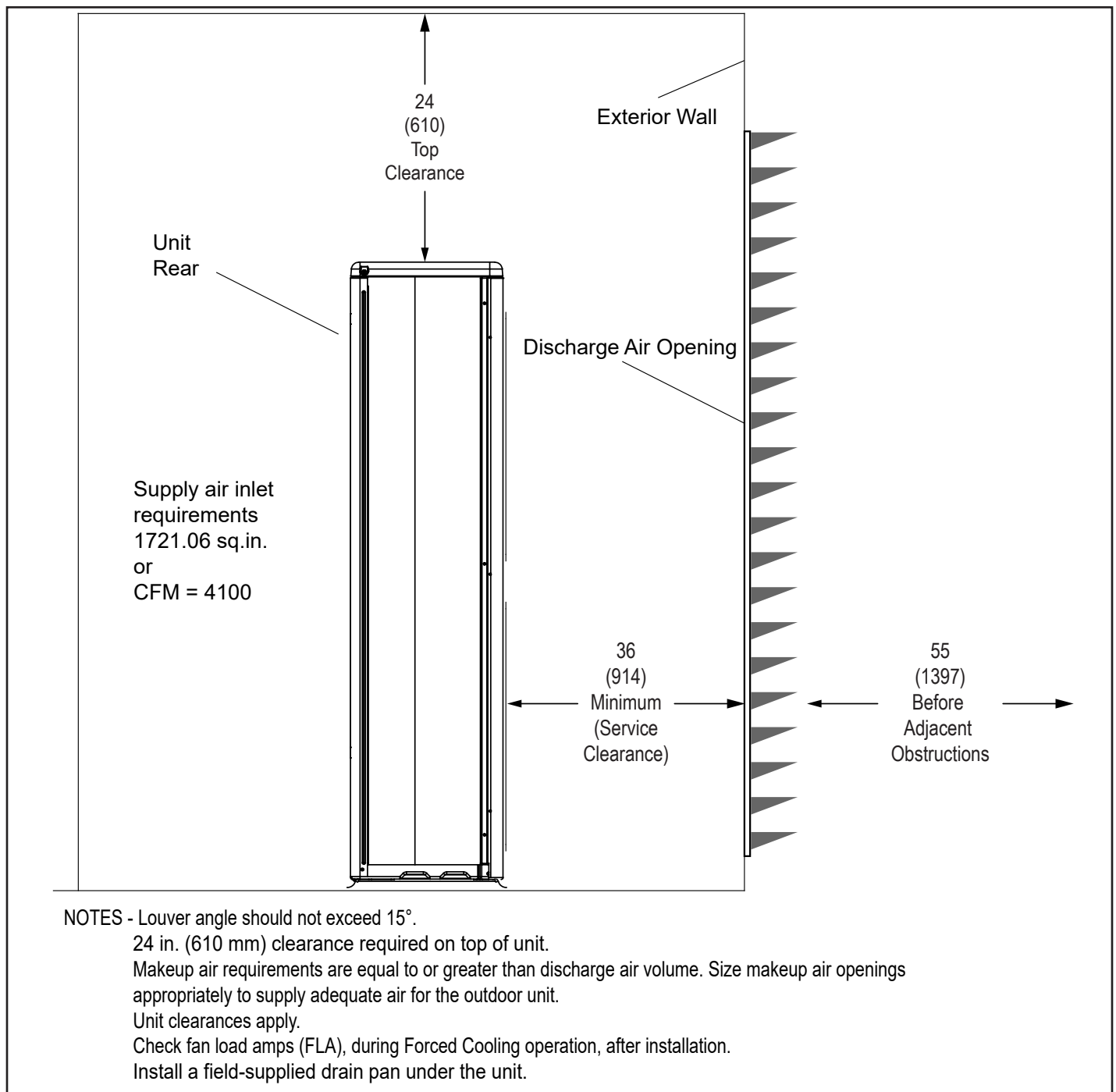


Figure 13. Louvered Discharge Opening Considerations

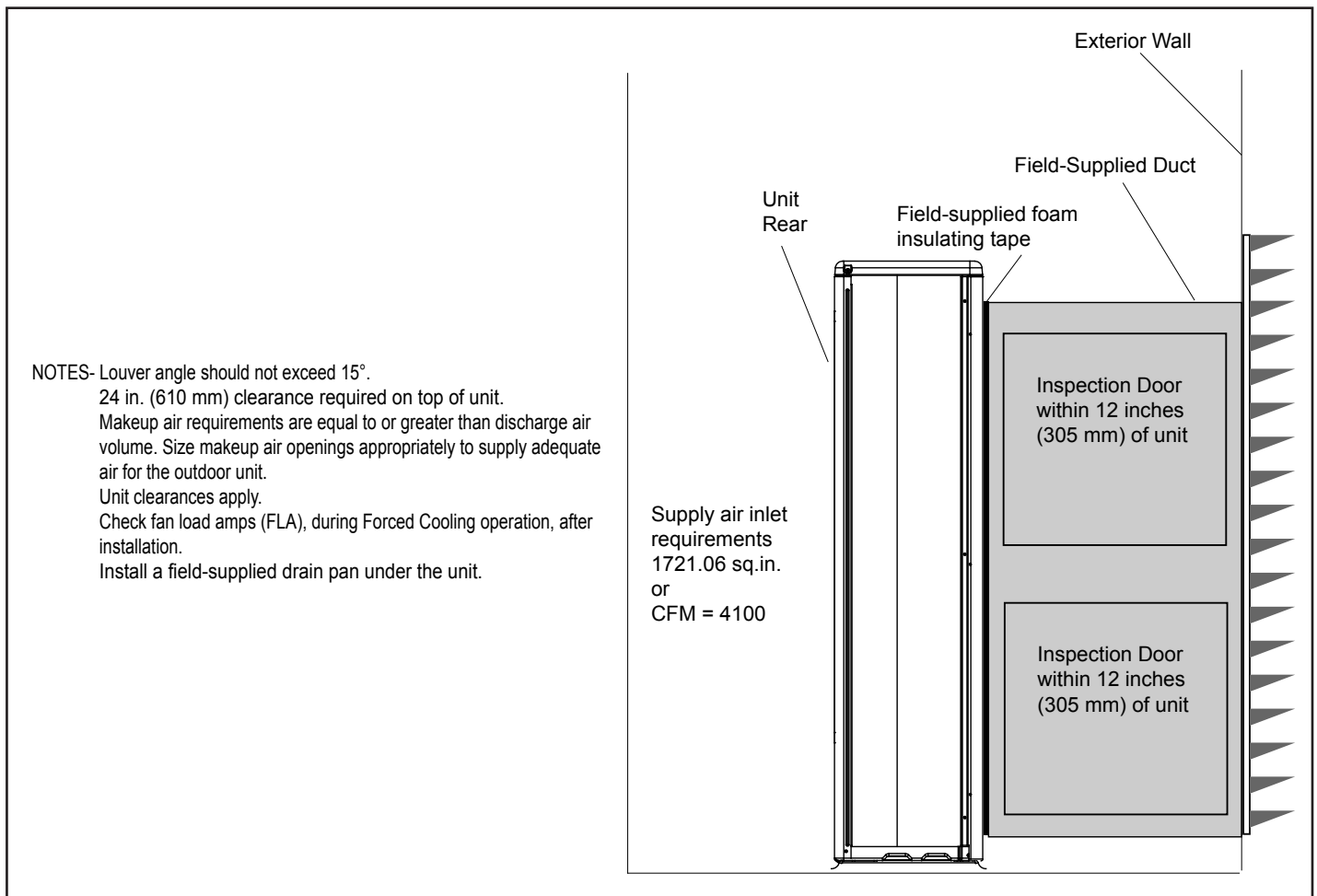


Figure 14. Ducted Discharge Considerations

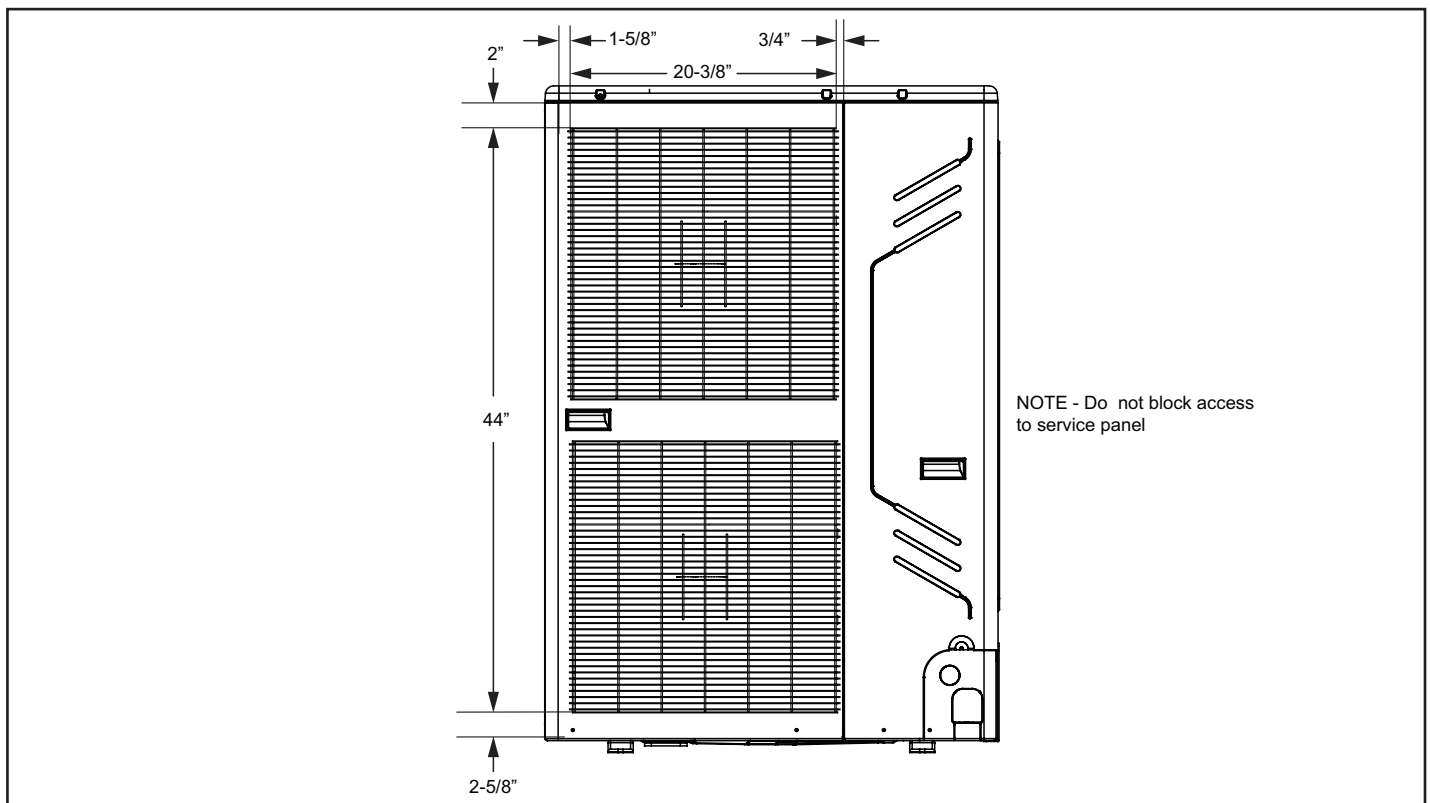


Figure 15. Unit Front Dimensions

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.

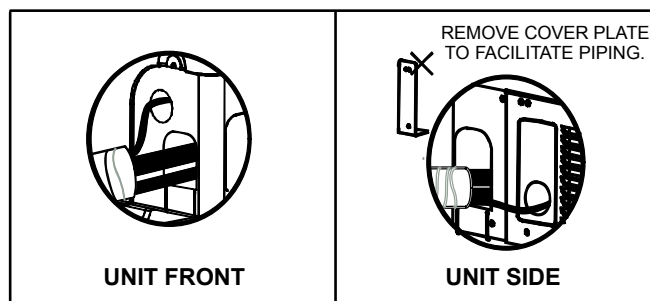


Figure 16. Refrigerant Piping / Wiring Inlets

Table 1 lists the connection sizes at the outdoor unit. The connections are made using the provided brass flare nuts at the end of the refrigerant piping connections. Both liquid and gas (vapor) lines must be individually insulated.

Table 1. Refrigerant Piping Connections

Model	Liquid Line	Gas (Vapor) Line
VPB036H4 VPB048H4 VPB060H4	3/8 in.	3/4 in.

Both liquid and gas (vapor) lines must be individually insulated.

Field piping consists of two field-provided copper refrigerant lines connected to the outdoor unit. These lines carry the liquid and vapor refrigerant to and from the indoor unit(s).

- The three-ton VPB036H4 can provide cooling to as many as five indoor units.
- The four-ton VPB048H4 can serve up to seven indoor units.
- The five-ton VPB060H4 can serve up to nine indoor units.

Refrigerant piping and wiring connections can be brought into the outdoor unit through openings provided in the front and side of the unit. See Figure 16.

When multiple indoor units are served by a single outdoor unit, the refrigerant piping must be connected using either individual branch pipes or four-port header kits. Optional branch pipes V8IDBP01 and V8IDBP02, and header kits V8HDRK04 are ordered separately.

Refer to the instruction manual for detailed installation instructions for each.

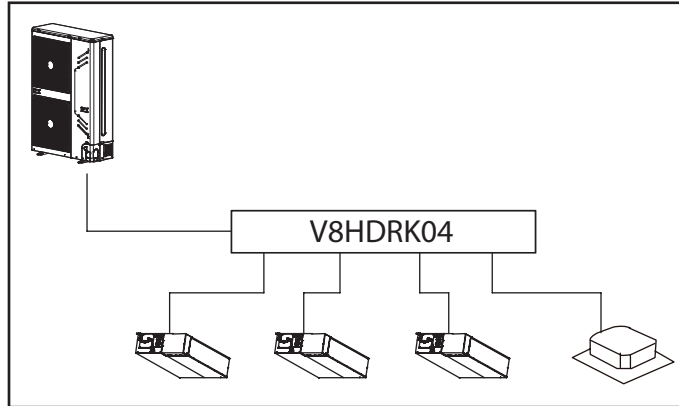


Figure 17. Connection to Header Pipe Kit

The header kits can be used to connect a maximum of four indoor units to the outdoor unit. When the system includes five, six, seven, or eight indoor units, two four-port header kits must be used. When the system includes nine indoor units, two header kits and a branch joint is used.

When using branch pipes to connect multiple indoor units with a single outdoor unit, each indoor unit requires a separate branch pipe to connect both the liquid and gas (vapor) line to the system. Install these optional devices per the installation instructions provided with them. See the piping schematics on the following pages.

Provide 24 to 36 inches of straight pipe before and after each header pipe kit to avoid creating refrigerant turbulence and flash points.

Failure to follow 24 inch minimum guideline can lead to reduced capacity and equipment damage. Support piping on both sides of the header kit.

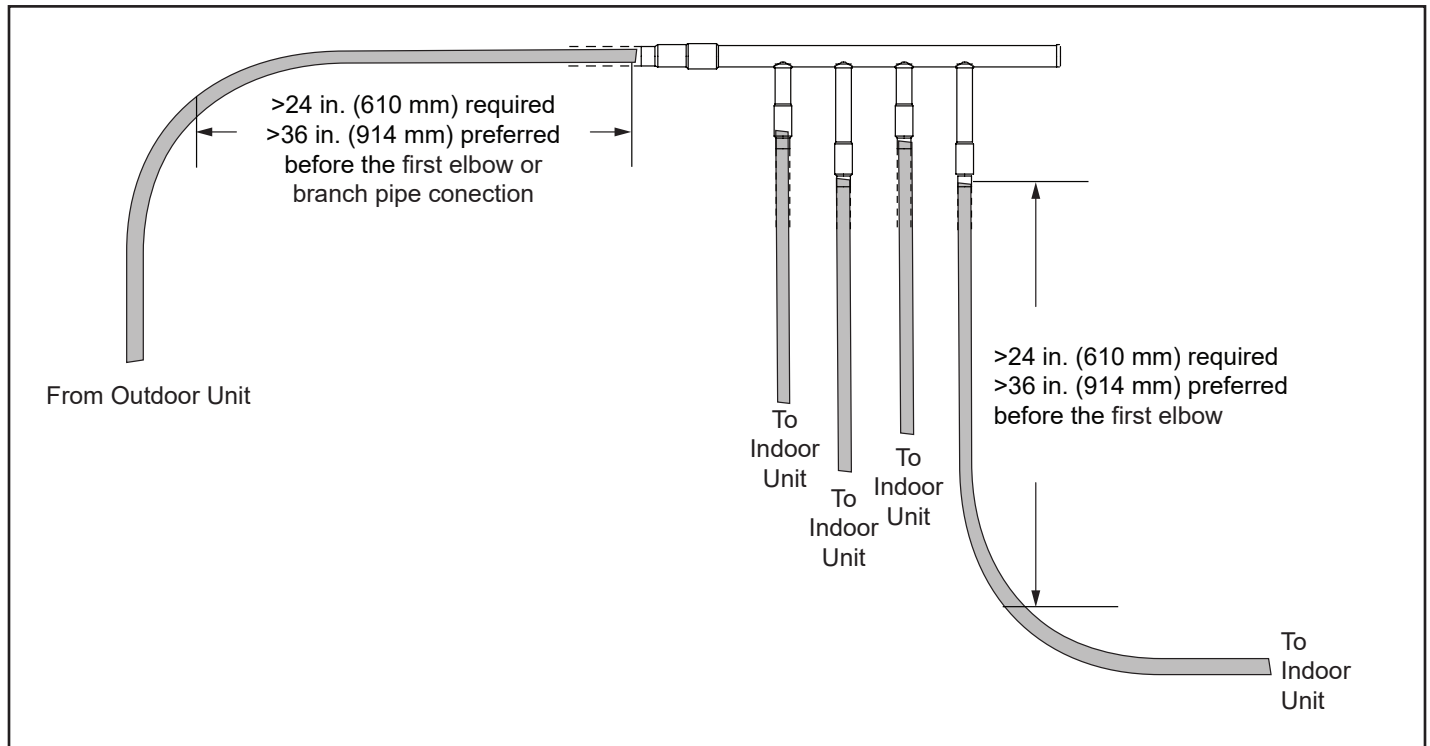


Figure 18. 24 to 36" of Straight Pipe Before and After Header Pipe Kit

NOTE - Always slide a flare nut onto the field-provided refrigerant piping before flaring the lines.

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. Remove the flare nuts from the connections on the unit and discard the seal from each of the piping connections.
3. 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.
4. Apply recommended R-410A refrigerant lubricant to the outside of the flared refrigerant lines (Figure 19-A).

⚠ IMPORTANT

The compressor in this unit contains PVE oil (Polyvinylether). PVE oil is formulated for hydrofluorocarbon (HFC) refrigerants, such as R-410a, 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.

5. Align the threaded connections with the flared refrigerant lines. Tighten the flare nuts lightly at first to obtain a smooth match (Figure 19-B).
6. 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 20. **Do not over-tighten a flared joint. Flared connections should always be accessible and must be insulated to prevent condensation.**

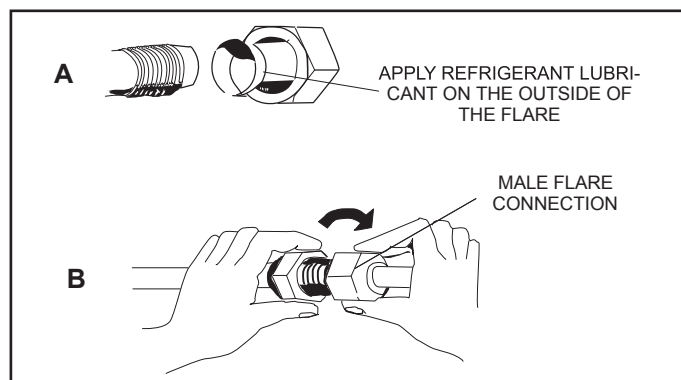


Figure 19. Making Connections (Male to Female Connection)

⚠ IMPORTANT

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

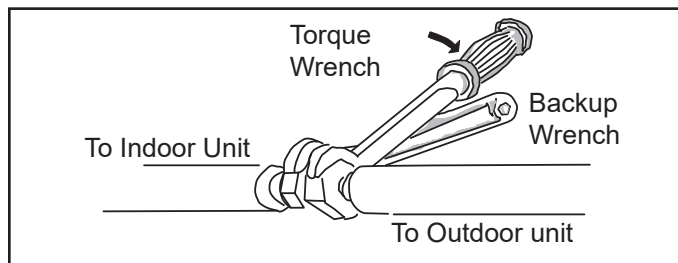


Figure 20. Tighten Flare Nut

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		
3/8"	26 ft.-lb. (35 N-m)	1/2 turn
3/4"	60 ft.-lb. (81 N-m)	1 turn

7. Branch pipe connections may be brazed. It is necessary to purge the pipes with nitrogen during brazing to avoid oxidation which may block the refrigerant piping strainers.
8. After refrigerant piping has been installed and checked for leaks, apply insulation over all flared connections. See Figure 21.

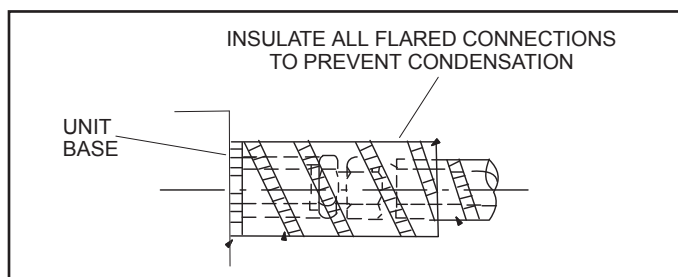
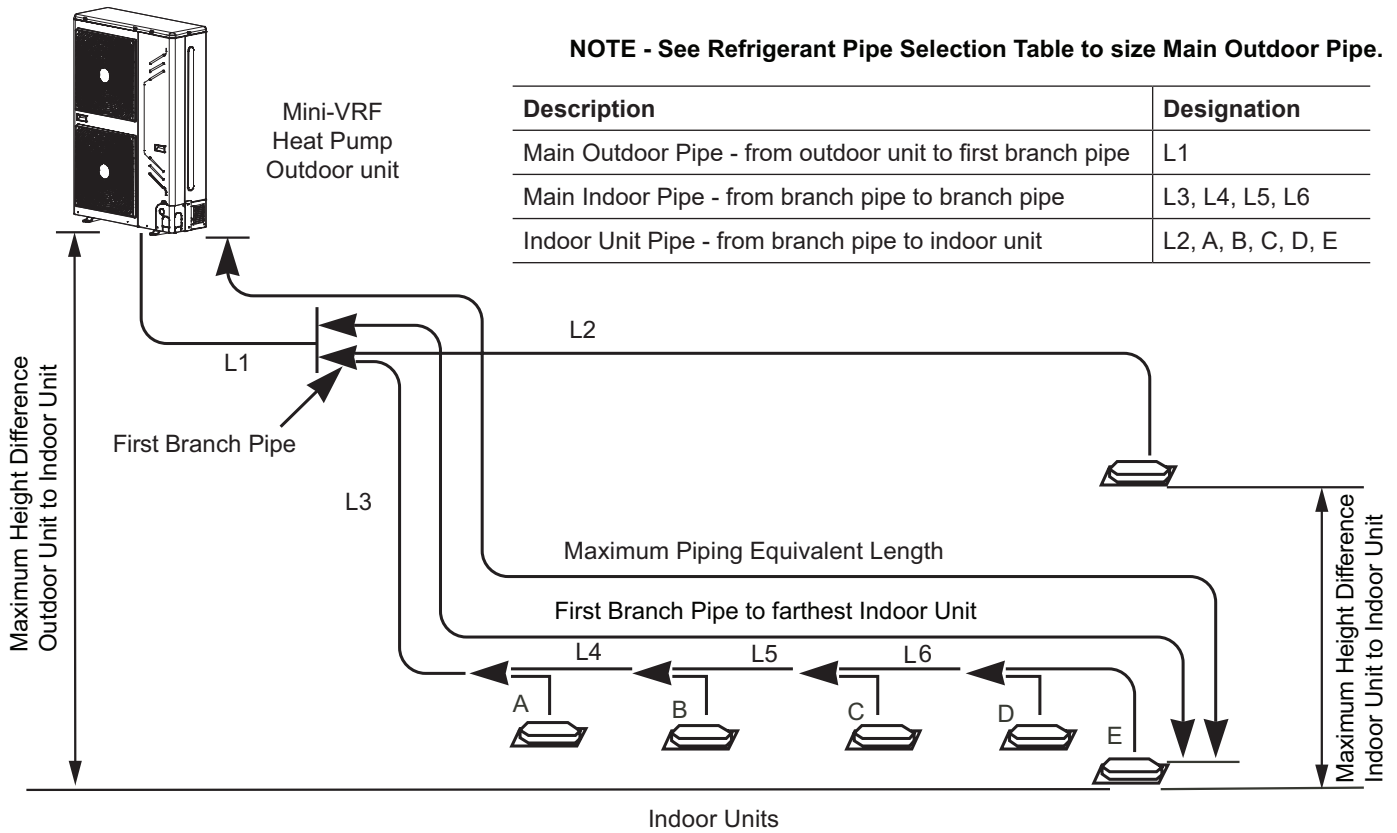


Figure 21. Insulate Flared Connections

Maximum Permitted Refrigerant Pipe Length and Maximum Height Difference - With Branch Pipe

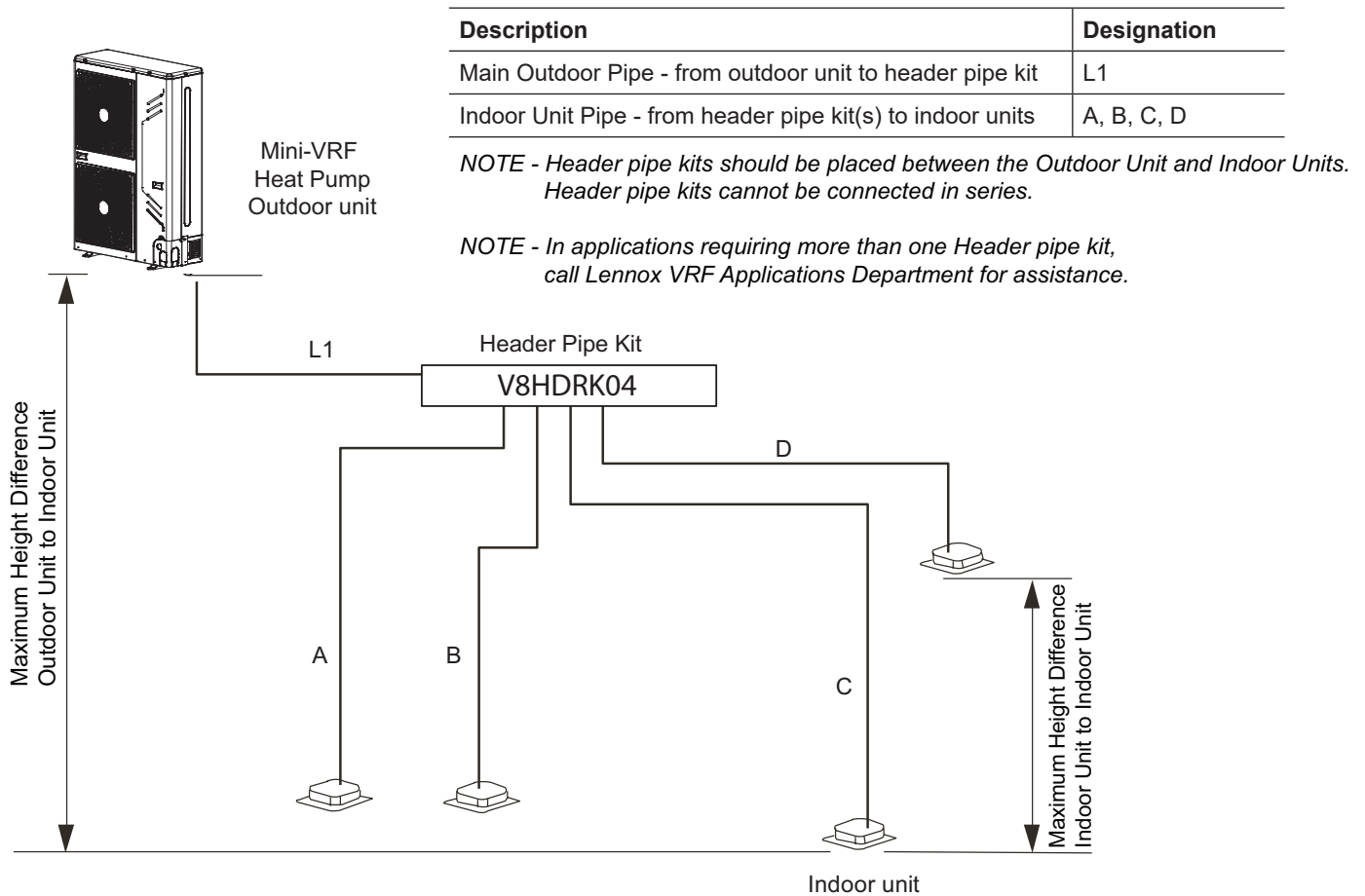


Length and Maximum Height Difference			Maximum Permitted Length	Piping
Pipe Length	Total Piping Length (Actual)		≤492 ft. (150 m)	L1+L2+L3+L4+L5+L6 +A+B+C+D+E
	Maximum Piping Length	Actual Length	≤296 ft. (90 m)	L1+L3+L4+L5+L6+E
		Equivalent Length	≤328 ft. (100 m)	
	Pipe length (from the first line branch pipe to farthest indoor unit)		≤131 ft. (40 m)	L3+L4+L5+L6+E
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)	---

NOTE - Each branch pipe equals 20 in. (508 mm) equivalent straight pipe length.

Maximum Permitted Refrigerant Pipe Length and Maximum Height Difference - With Header Pipe Kit

NOTE - See Refrigerant Pipe Selection Table to size Main Outdoor Pipe.



NOTE - Header pipe kits should be placed between the Outdoor Unit and Indoor Units. Header pipe kits cannot be connected in series.

NOTE - In applications requiring more than one Header pipe kit, call Lennox VRF Applications Department for assistance.

Length and Maximum Height Difference			Maximum Permitted Length	Piping
Pipe Length	Total Piping Length (Actual)		≤492 ft. (150 m)	L1+A+B+C+D
	Maximum Piping Length	Actual Length	≤296 ft. (90 m)	L1+A, L1+B, L1+C, L1+D
		Equivalent Length	≤328 ft. (100 m)	
	Pipe length (from the header pipe kit to each indoor unit)		65.6 ft. (20 m)	A, B, C, D ≤ 65.6 ft. (20 m) each
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)	- - -

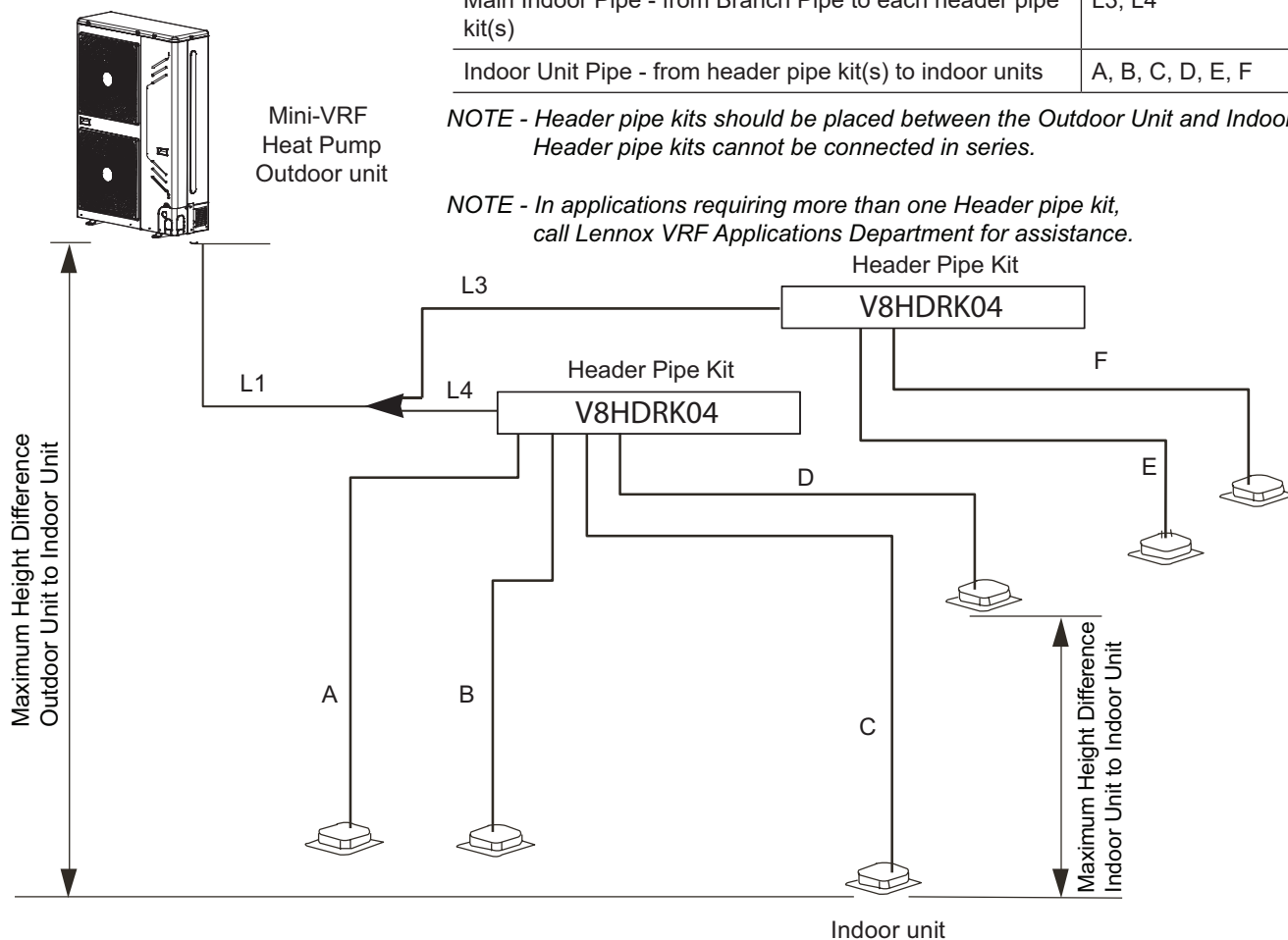
Maximum Permitted Refrigerant Pipe Length and Maximum Height Difference - With Two Header Pipe Kits

NOTE - See Refrigerant Pipe Selection Table to size Main Outdoor Pipe.

Description	Designation
Main Outdoor Pipe - from outdoor unit to first Branch Pipe	L1
Main Indoor Pipe - from Branch Pipe to each header pipe kit(s)	L3, L4
Indoor Unit Pipe - from header pipe kit(s) to indoor units	A, B, C, D, E, F

**NOTE - Header pipe kits should be placed between the Outdoor Unit and Indoor Units.
Header pipe kits cannot be connected in series.**

NOTE - In applications requiring more than one Header pipe kit, call Lennox VRF Applications Department for assistance.



Length and Maximum Height Difference			Maximum Permitted Length	Piping
Pipe Length	Total Piping Length (Actual)		≤492 ft. (150 m)	L1+A+B+C+D+E+F+L3+L4
	Maximum Piping Length	Actual Length	≤296 ft. (90 m)	L1+L4+A, L1+L4+B, L1+L4+C, L1+L4+D, L1+L3+E, L1+L3+F
		Equivalent Length	≤328 ft. (100 m)	
	Pipe length from the first Branch Pipe to each indoor unit.		65.6 ft. (20 m)	L4+A, L4+B, L4+C, L4+D, L3+E, L3+F ≤ 65.6 ft. (20 m) each
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)	---

NOTE - Each branch pipe equals 20 in. (508 mm) equivalent straight pipe length.

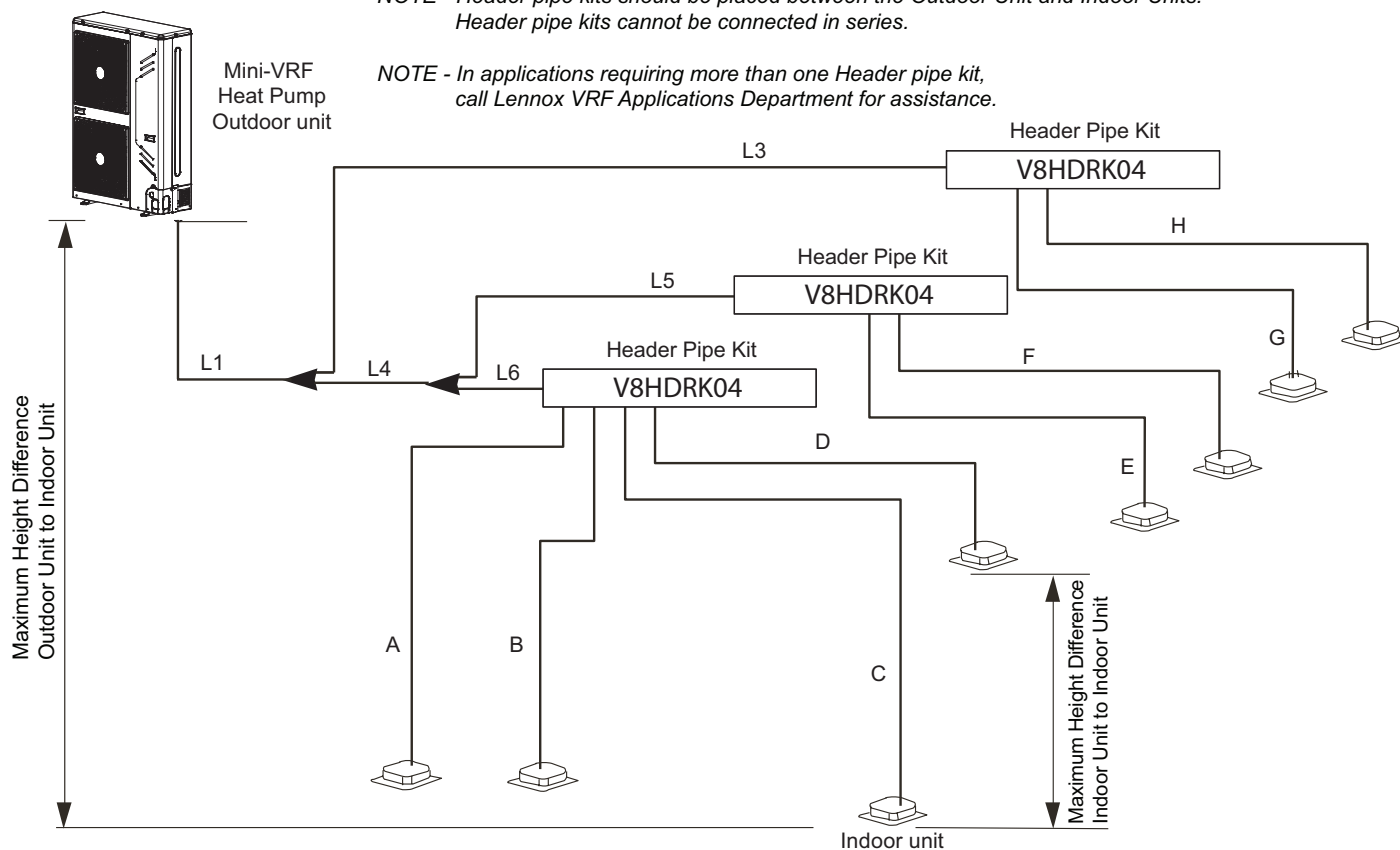
Maximum Permitted Refrigerant Pipe Length and Maximum Height Difference - With Three Header Pipe Kits

NOTE - See Refrigerant Pipe Selection Table to size Main Outdoor Pipe.

Description	Designation
Main Outdoor Pipe - from outdoor unit to first Branch Pipe	L1
Main Indoor Pipe - from Branch Pipe to each header pipe kit(s) or Branch Pipe	L3, L4, L5, L6
Indoor Unit Pipe - from header pipe kit(s) to indoor units	A, B, C, D, E, F, G, H

**NOTE - Header pipe kits should be placed between the Outdoor Unit and Indoor Units.
Header pipe kits cannot be connected in series.**

NOTE - In applications requiring more than one Header pipe kit, call Lennox VRF Applications Department for assistance.



Length and Maximum Height Difference			Maximum Permitted Length	Piping
Pipe Length	Total Piping Length (Actual)		≤492 ft. (150 m)	L1+A+B+C+D+E+F+G+H+L3+L4+L5+L6
	Maximum Piping Length	Actual Length	≤296 ft. (90 m)	L1+L4+L6+A, L1+L4+L6+B, L1+L4+L6+C, L1+L4+L6+D, L1+L4+L5+E, L1+L4+L5+F, L1+L3+H, L1+L3+G
		Equivalent Length	≤328 ft. (100 m)	
	Pipe length from the first Branch Pipe to each indoor unit.		65.6 ft. (20 m)	L4+L6+A, L4+L6+B, L4+L6+C, L4+L6+D, L4+L5+E, L4+L5+F, L3+H, L3+G ≤ 65.6 ft. (20 m) each
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)	---

NOTE - Each branch pipe equals 20 in. (508 mm) equivalent straight pipe length

Refrigerant Pipe Selection

MAIN OUTDOOR UNIT PIPE (L1) DIAMETER AND PIPE LENGTH BASED ON TOTAL CAPACITY

Model No.	Capacity	Liquid Pipe Length	Main Gas Pipe Diameter Required	Main Liquid Pipe Diameter Required	Maximum Number of Indoor Units	Indoor Unit Branch Pipe
VPB036H4	3 Ton	Less than 148 ft. (45 m)	5/8 in.	3/8 in.	5	V8IDBP01
		More than 148 ft. (45 m)	3/4 in.			
VPB048H4	4 Ton	Less than 148 ft. (45 m)	5/8 in.	3/8 in.	7	
		More than 148 ft. (45 m)	3/4 in.			
VPB060H4	5 Ton	Less than 148 ft. (45 m)	3/4 in.	3/8 in.	9	V8IDBP01
		More than 148 ft. (45 m)	7/8 in.			V8IDBP02

NOTES:

Use appropriate reducer/adaptor (not provided) at the outdoor unit pipe connections to meet the piping size requirements.

INDOOR UNIT COMBINATION RATIO

Indoor Units	Combination Ratio	Total Piping Length
Standard indoor units (Except VVCB and VHIB)	45% - 130%	≤ 492 ft.
Standard indoor units (Includes VVCB or VHIB)	45% - 100%	≤ 492 ft.
	100% - 130%	≤ 328 ft.
Contains AHU Control Kit	45% - 100%	≤ 492 ft.
Only VOSB indoor unit	45% - 100%	≤ 492 ft.
VOSB and other types of indoor units	Not allowed	Not allowed

INDOOR MAIN PIPE SELECTION (L3, L4, L5, L6)

Downstream Indoor Unit Capacity (Btu/h)	Gas Pipe Diameter	Liquid Pipe Diameter	Indoor Unit Branch Pipe
A < 56,700	5/8 in.	3/8 in.	V8IDBP01
56,700 < A < 78,500	3/4 in.	3/8 in.	V8IDBP01

INDOOR PIPE SELECTION (L2, A, B, C, D, E, F, G, H)

Indoor Unit Type	Indoor Unit Size	Gas Pipe Diameter	Liquid Pipe Diameter
V22B Compact 360° Cassette	007, 009, 012, 015	1/2 in.	1/4 in.
V33B High Efficiency 360° Cassette	009, 012, 015	1/2 in.	1/4 in.
	018, 024, 030, 036, 048	5/8 in.	3/8 in.
VOWA One-Way Cassette	007, 009, 012, 015	1/2 in.	1/4 in.
	018, 024	5/8 in.	3/8 in.
VCFB Ceiling/Floor Mount Non-Ducted	012, 015	1/2 in.	1/4 in.
	018, 024, 030, 036, 048	5/8 in.	3/8 in.
VHIB Concealed High Static Ducted	012, 015	1/2	1/4
	024, 030, 036, 048, 054	5/8 in.	3/8 in.
	072	7/8 in.	3/8 in.
VOSB Outside Air Unit	036, 048, 054, 072	5/8 in.	3/8 in.
	072	7/8 in.	3/8 in.
VMDB Concealed Medium Static Ducted	007, 009, 012, 015	1/2 in.	1/4 in.
	018, 024, 030, 036, 048	5/8 in.	3/8 in.
VVCB Vertical Air Handler	012	1/2 in.	1/4 in.
	018, 024, 030, 036, 048, 054	5/8 in.	3/8 in.
	060	7/8 in.	3/8 in.
VWMB Wall-Mounted Non-Ducted	007, 009, 012, 015	1/2 in.	1/4 in.
	018, 024, 030	5/8 in.	3/8 in.

NOTES:

If the total capacity of the indoor units is greater than 100% of the capacity of the outdoor unit, individual indoor unit capacities will be reduced.

- 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.
- Flow the pipework with dry (oxygen-free) nitrogen (2.9 psig or 3 CFH) during brazing to avoid oxidation which may block the refrigerant piping.
- Do not use anti-oxidants when brazing.
- Do not use flux when brazing copper-to-copper piping. Use phosphor copper brazing filler alloy (BCuP) which does not require flux. Flux has a harmful effect on refrigerant pipe.
- Use a wet cloth to insulate the shut-off valve during brazing.
- Use dedicated gauges and hoses with R-410A equipment.

Pressure Test

- Follow the pressure test specifications in Table 3 for pressure test.
- Use oxygen-free nitrogen to pressure test to 647 psig and hold for 1 hour.

Evacuate System

- Follow the Lennox pressure test specifications in table 1 and the triple evacuation process described on this page to pressure test and evacuate the system.
- Use a vacuum pump capable of evacuating to lower than 500 Microns (0.5 Torr).
- Do not open any of the outdoor unit shut-off valves (possible max 5 valves). The outdoor unit does not need to be evacuated.
- Evacuate the system to 500 Microns (0.5 Torr), or below, for 4 hours.

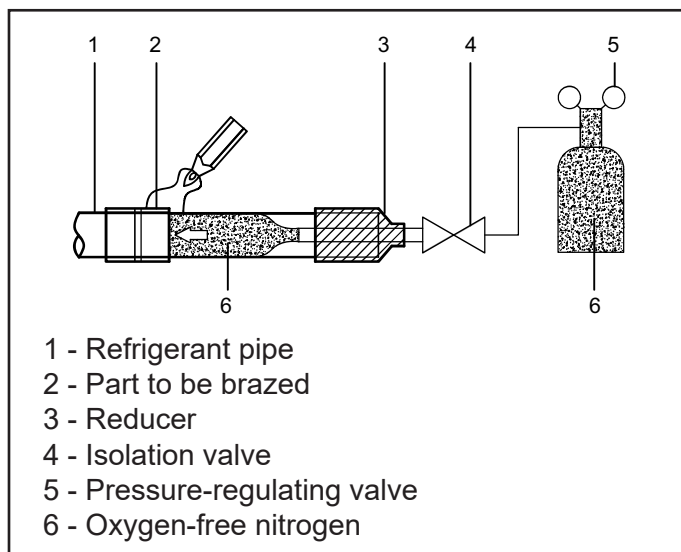


Figure 22. Brazing Best Practices

⚠ IMPORTANT

Use only oxygen-free nitrogen (OFN).

Table 3. Pressure Test Specifications

1	3 bar	44 psig	minimum of 10 minutes
2	15 bar	220 psig	minimum of 10 minutes
3	32 bar	470 psig	minimum of 10 minutes
4	44 bar	647 psig	1 hour. Stress test to prove the integrity of the complete installation.
5	32 bar	470 psig	24 hours. Lower system pressure test, after confirmation No. 4 was successfully completed.

Triple Evacuation Procedure

A Micron or Torr gauge must be used for this procedure.

1. Discharge the oxygen-free nitrogen and evacuate the system to a reading of 8000 Microns (8 Torr) using all service valves.
2. Break the vacuum by allowing nitrogen into the three inter-connecting pipework port connections (low pressure gas pipe, high pressure gas pipe and liquid line pipe) until a positive pressure is achieved.
3. Evacuate the system to a reading of 5000 Microns (5 Torr).
4. Break the vacuum by allowing nitrogen into the three inter-connecting pipework port connections (low pressure gas pipe, high pressure gas pipe and liquid line pipe) until a positive pressure is achieved
5. Evacuate the system to a minimum reading of 500 Microns (0.5 Torr).
6. For a moisture free system, ensure the vacuum is held without movement for a minimum of 4 hours.
7. If pressure loss is detected, carry out steps 2 through 6 until no pressure loss is observed.

Additional Refrigerant Charge

When refrigerant piping connections have been completed, it will be necessary to adjust the system refrigerant charge based on the diameter and length of the liquid line pipe between the outdoor and indoor unit(s).

Table 4 lists the refrigerant piping sizes along with the refrigerant adjustment required per foot of liquid line pipe.

This system is suitable for use with R-410A refrigerant only.

1. Calculate the additional refrigerant charge using the diameter and length of the liquid pipe (only) using Table 4 below.
2. Calculate the additional refrigerant charge for each liquid line branch pipe kit.
3. If the ratio of VMDB **or** V33B Indoor unit capacity exceeds 80% of all indoor units, use Table 5 to determine the additional refrigerant charge to add.
4. Total all calculations.
5. Add the calculated additional refrigerant to the system.

Liquid Line Length Calculation

Calculate additional refrigerant charge using the diameter and length of the liquid pipe.

Table 4. Refrigerant Charge Adjustment

Liquid Line Pipe Size	Additional Refrigerant Per Foot of Pipe Length
1/4 in.	0.015 lb.
3/8 in.	0.040 lb.
1/2 in.	0.080 lb.
5/8 in.	0.120 lb.
3/4 in.	0.181 lb.
7/8 in.	0.255 lb.

Branch Pipe Kit Calculation

Add .22 lbs per EACH liquid line branch pipe for additional charge calculation.

**Table 5. VMDB or V33B Indoor Unit Capacity Ratio over 80% of All Indoor Units
Additional Charge Amount**

Outdoor Unit Module	Pounds (lbs) of additional refrigerant if ratio of VMDB Indoor units exceeds 80% of all indoor units.	Pounds (lbs) of additional refrigerant if ratio of V33B indoor units exceeds 80% of all indoor units.
VPB036H4M-3P	0.88	1.76
VPB048H4M-3P	1.1	2.2
VPB060H4M-3P	1.1	2.2

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.

Do not attempt to repair a damaged power cord.

Do not modify the power cord in any way. Do not attempt to extend the length of the power cord or use an extension cord with this appliance. Do not share the single power outlet with any other appliances.

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, stranded, shielded cable must be used for the communication wiring. This is necessary to ensure proper system communication and operation.

NOTE - The outdoor unit requires a separate circuit breaker and power supply.

1. Select the appropriate electrical inlet into the outdoor unit. Local and national codes apply.
2. Locate the terminal strip in the outdoor unit control box. Connect the power wiring (sized per NEC/CEC and local codes) and communications cable (3-conductor, shielded cable) per Figure 22. Refer to unit nameplate for rated voltage.

IMPORTANT

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

NOTE - Use 18 GA 2-Conductor, Stranded, Shielded Communication Cable

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.

Separate power wiring supplies must be provided for the outdoor unit and indoor unit(s).

Do not cross-connect refrigerant piping or signal wires between VRF systems. Each VRF system must be piped and wired separately.

Each indoor unit must have its own electrical disconnect.

Do not run signal wire and power wire in the same conduit; keep distance between the two conduits per local codes. (Make sure to set address of outdoor unit in case of parallel multi-outdoor units.

Take care when making final power and control cable connections. Cross connection will result in damage to unit's main board.

Only apply power to the system after performing all of the pre-commissioning steps.

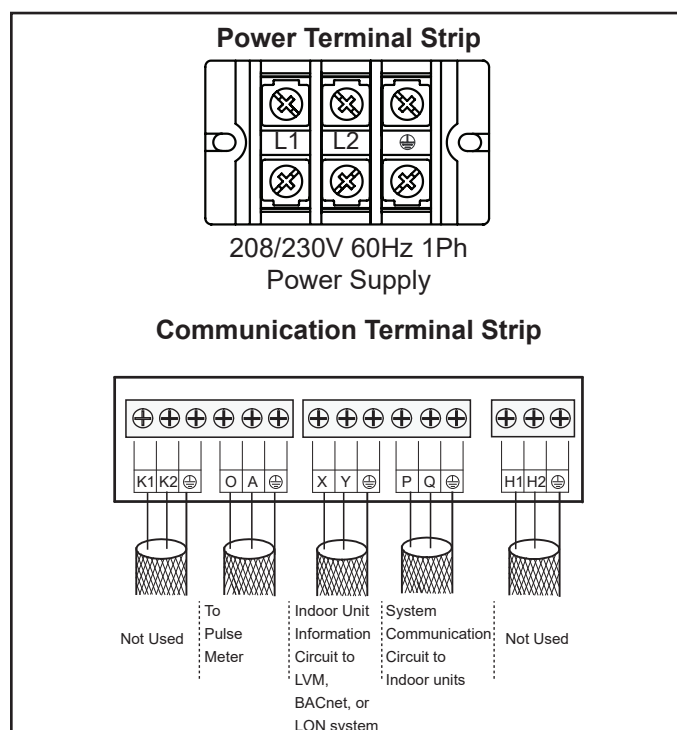


Figure 23. Wiring Terminals

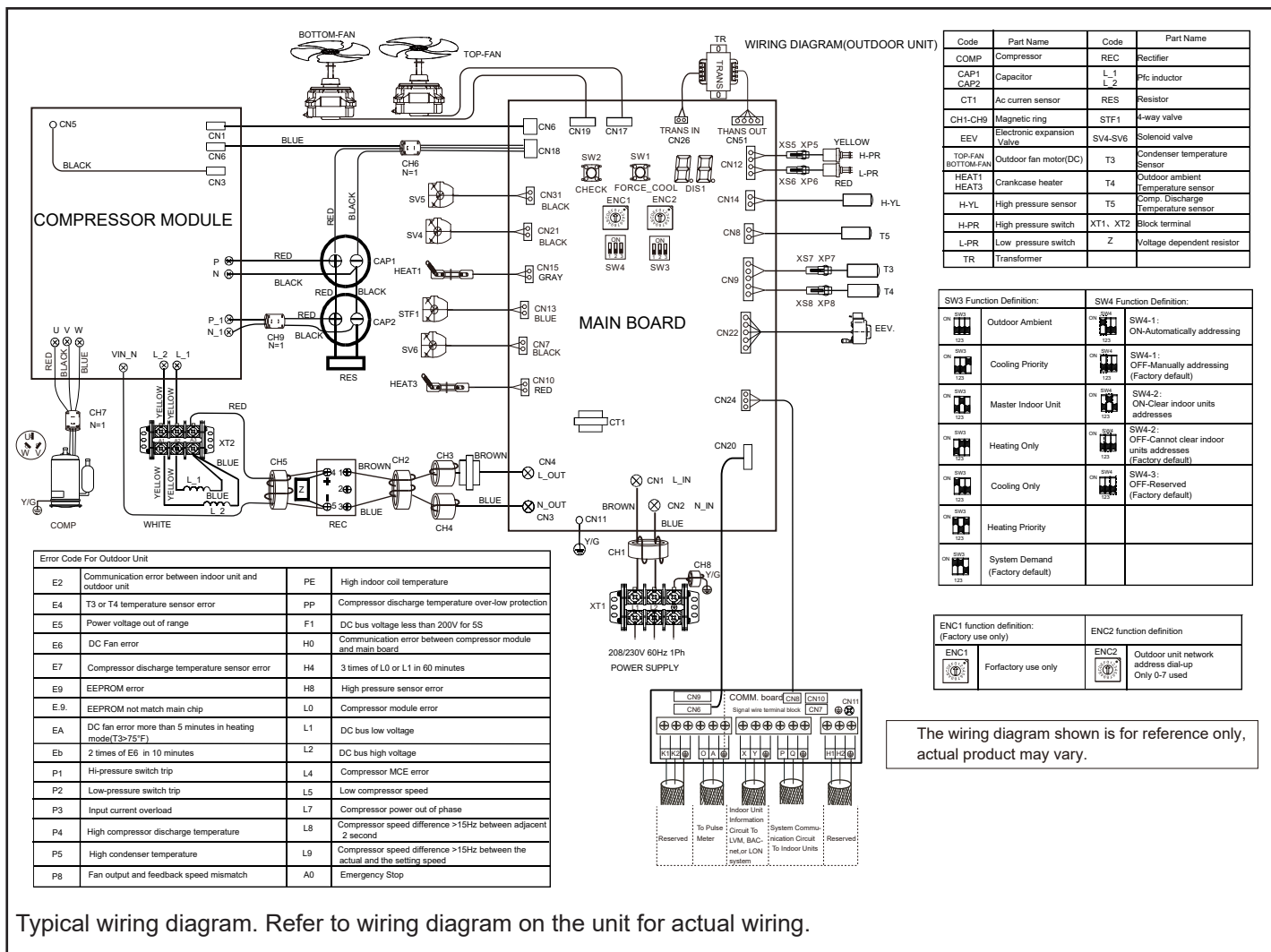


Figure 24. Typical Unit Wiring Diagram

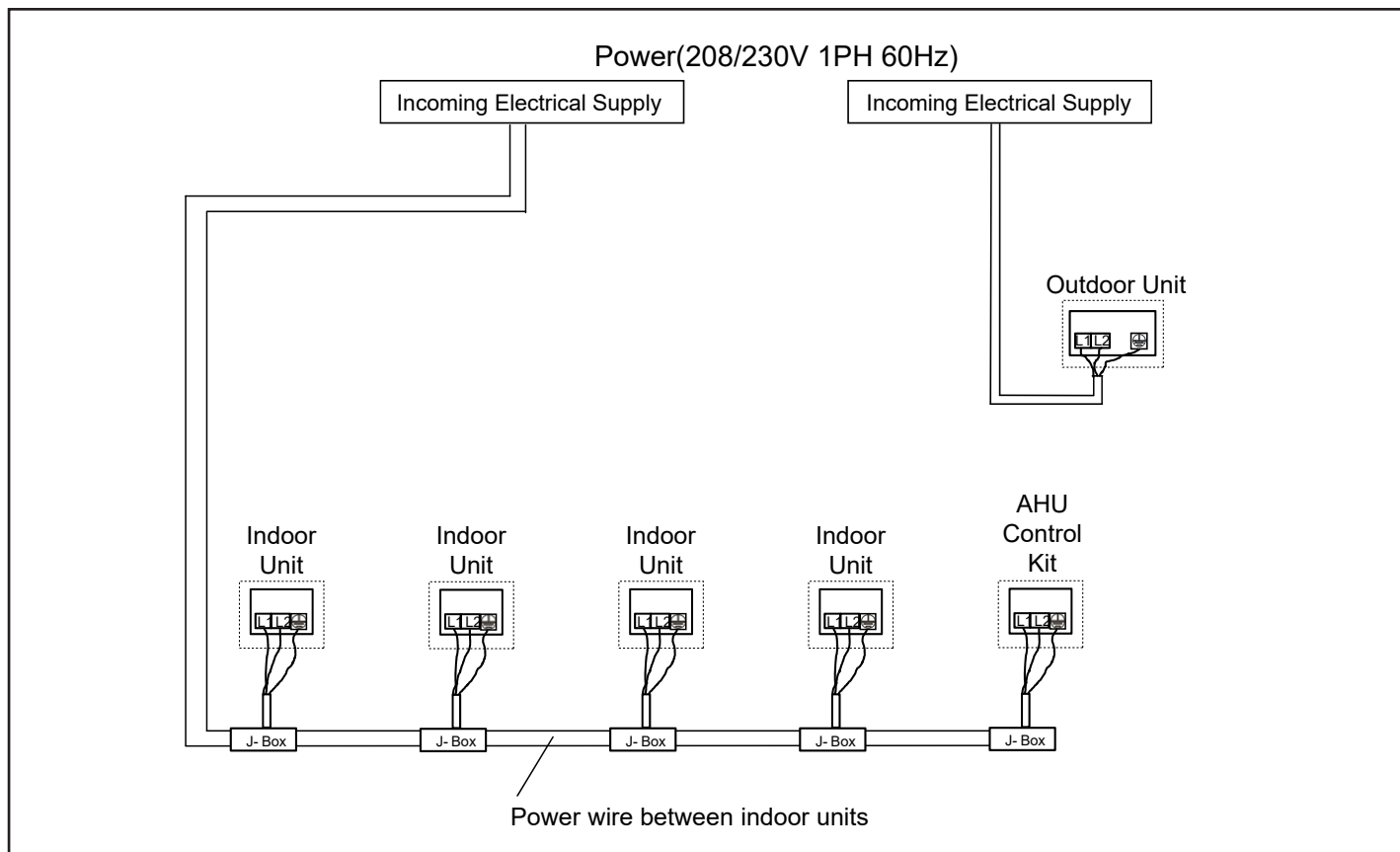


Figure 25. Typical 208/230V Power Wiring

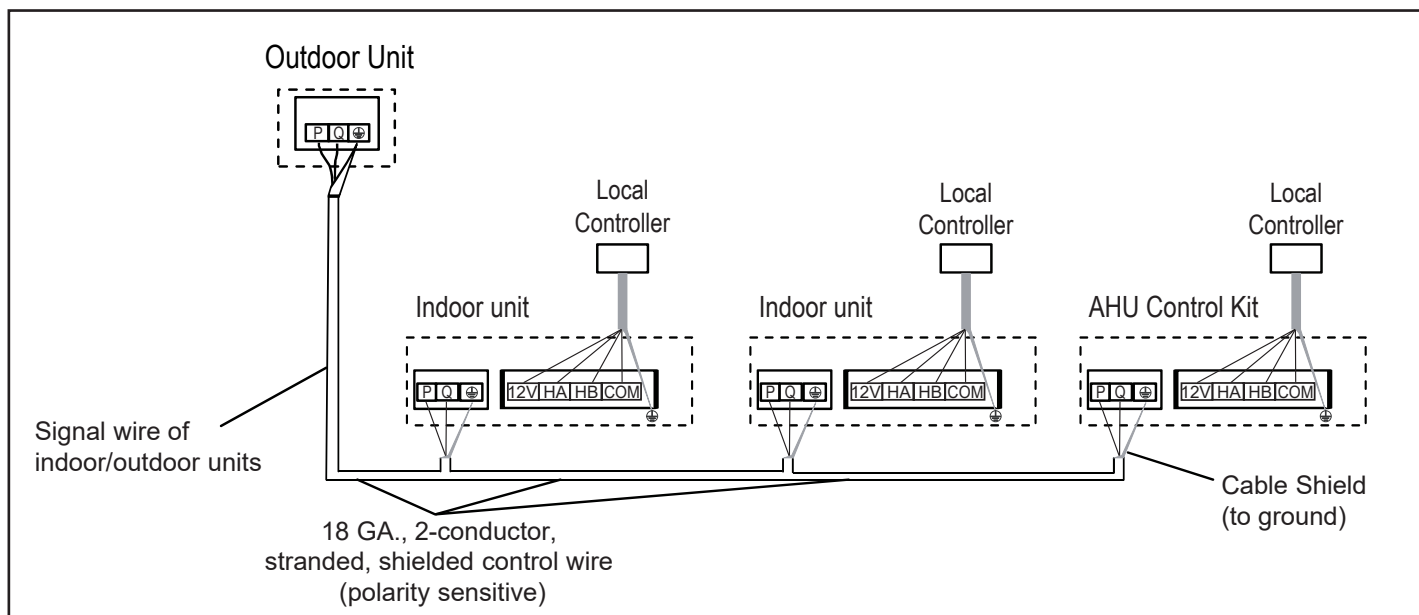
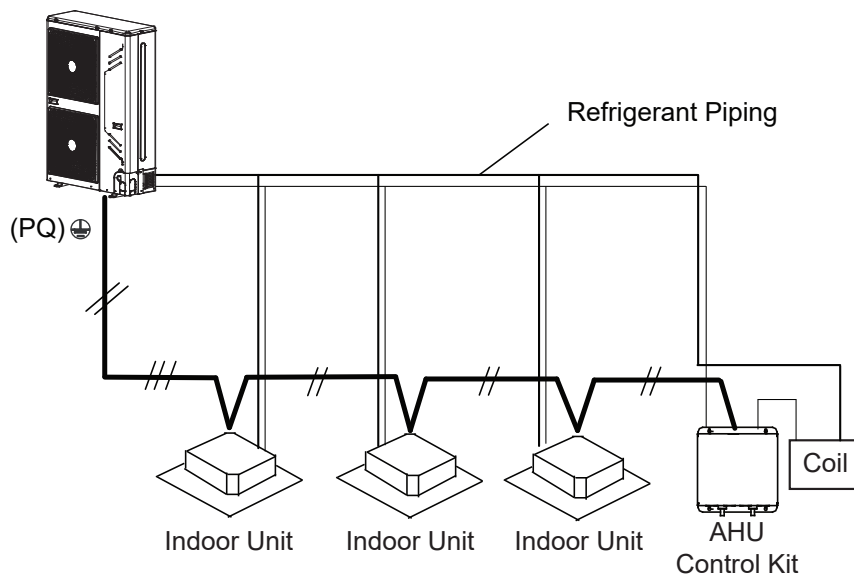


Figure 26. Typical Low-Voltage Field Wiring

Outdoor Unit



Install a terminating resistor ($\Omega 120$) on terminals P&Q on the indoor unit which is furthest from the outdoor unit.



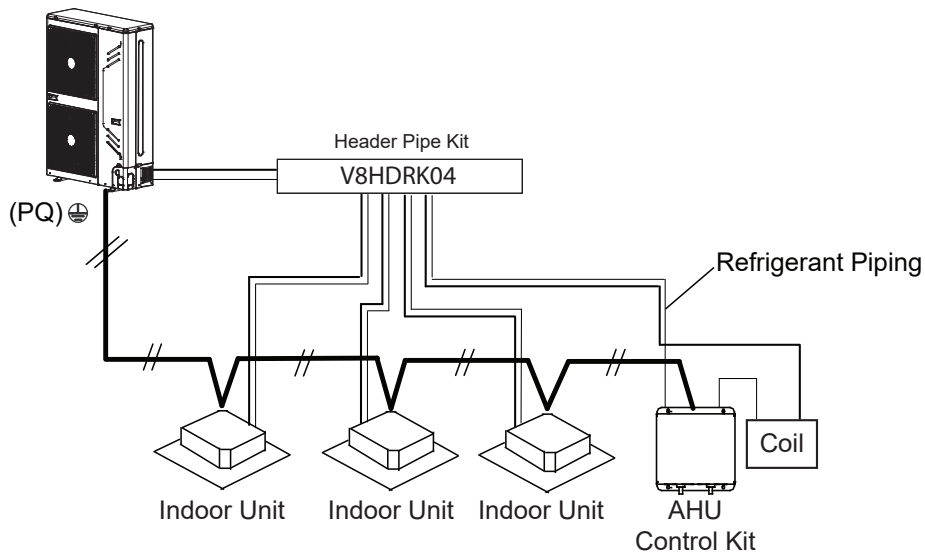
All Drain Wires will connect from outdoor unit chassis to mode selection box chassis at the end of the signal run.

18 GA., stranded, 2-conductor, shielded control wire (polarity sensitive).

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

Figure 27. Typical Communication Wiring

Outdoor Unit



Install a terminating resistor ($\Omega 120$) on terminals P&Q on the indoor unit which is furthest from the outdoor unit.



All Drain Wires will connect from outdoor unit chassis to indoor unit chassis at the end of the signal run.

18 GA., stranded, 2-conductor, shielded control wire (polarity sensitive).

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

Figure 28. Typical Communication Wiring

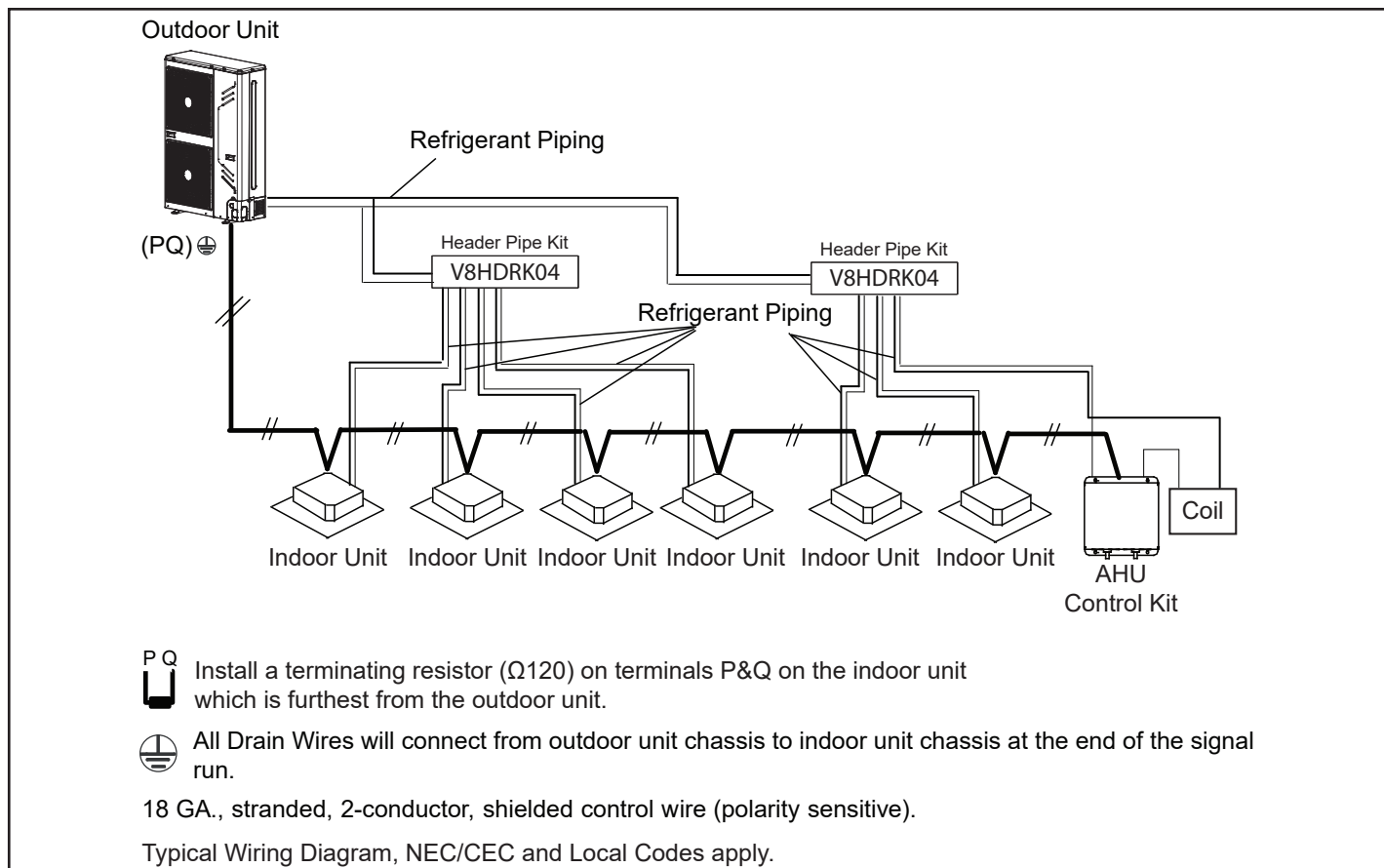


Figure 29. Typical Communication Wiring

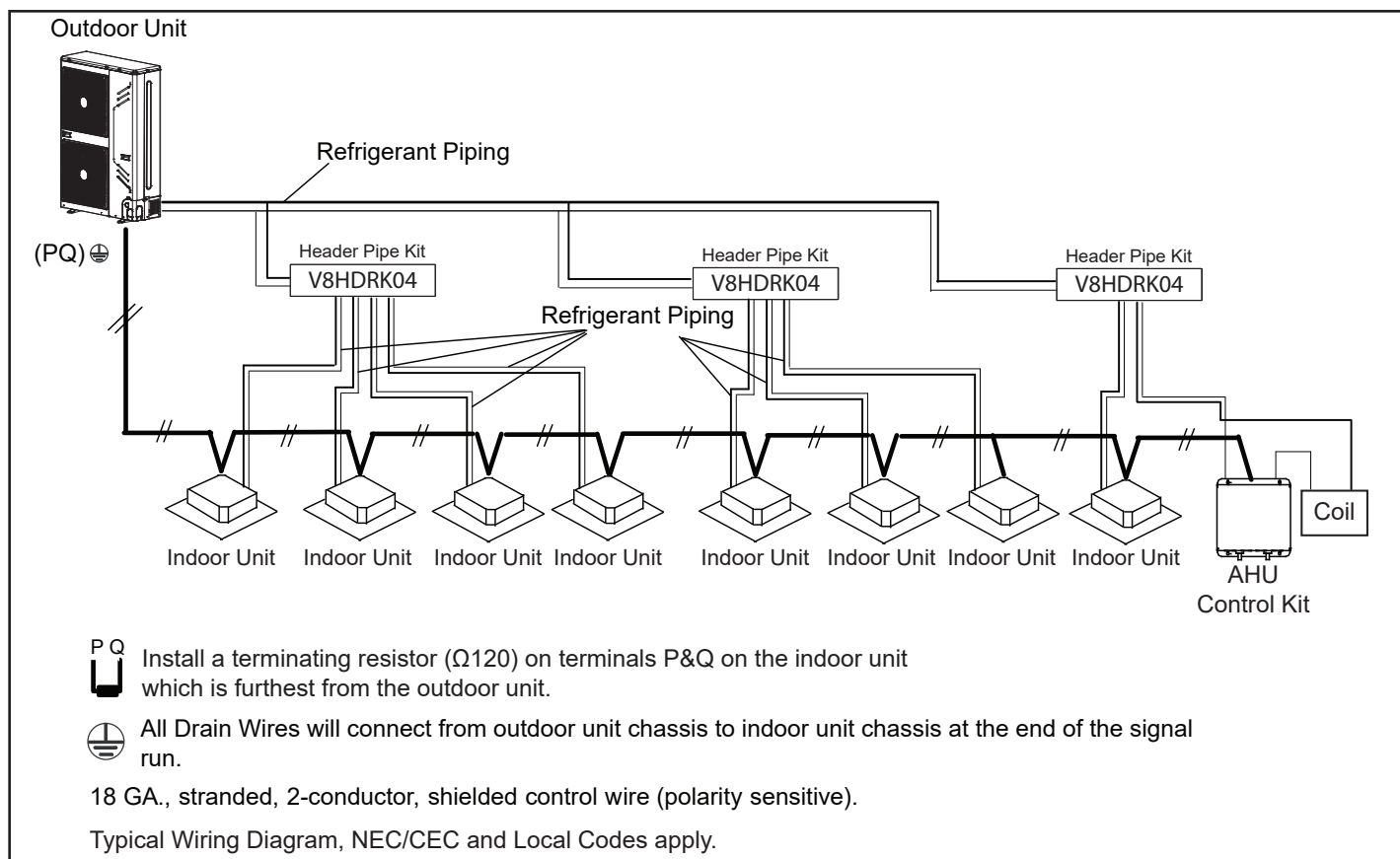


Figure 30. Typical Communication Wiring

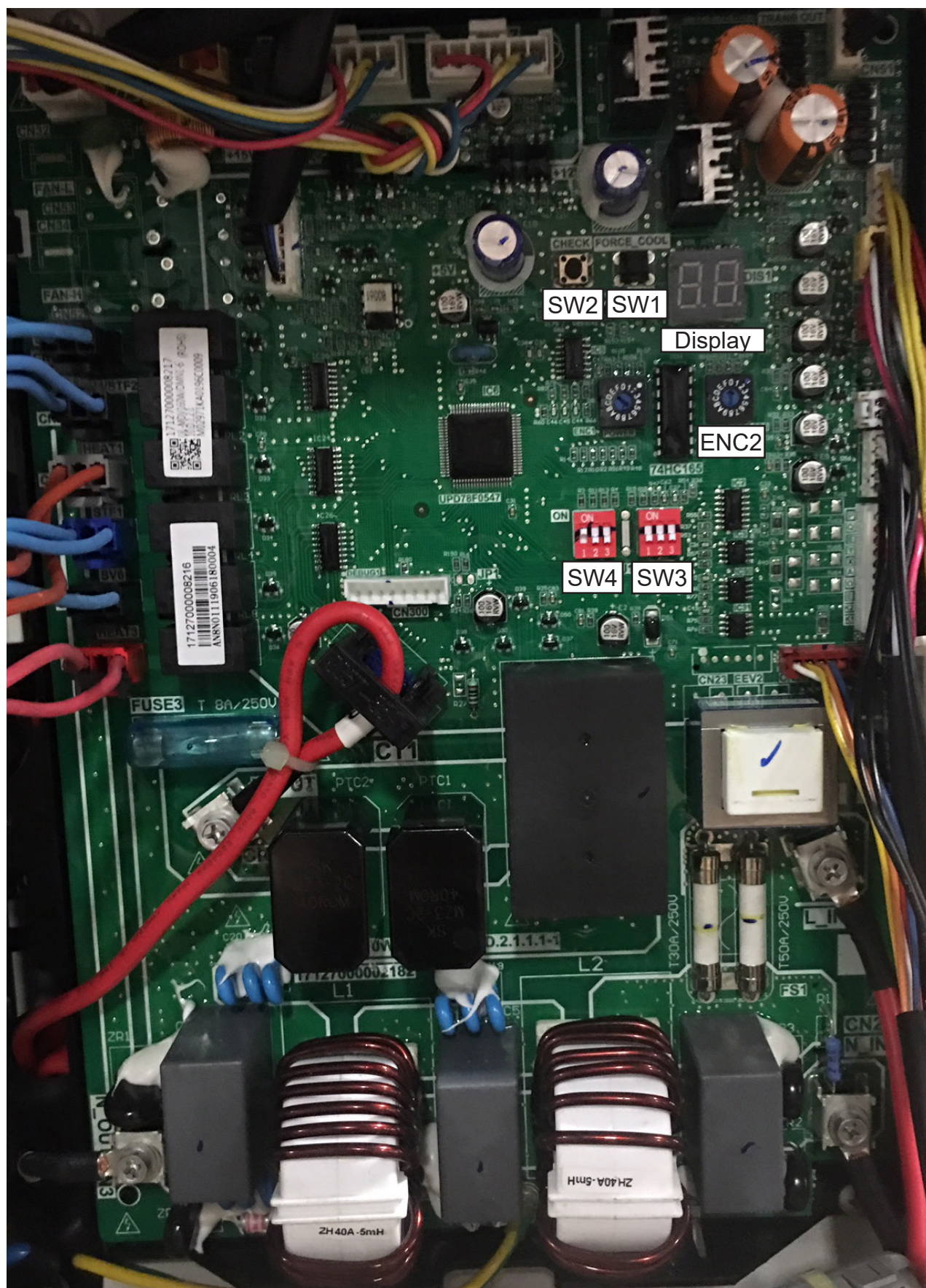



Figure 31. Typical Outdoor Unit Main Board



Network Address and Commissioning

After the system has been installed, the outdoor unit will automatically assign addresses to all connected indoor units. These addresses may be modified using an optional remote control as part of the commissioning procedure.



ENC2 Outdoor Unit Network Address Setting

ENC2 	Outdoor network address assignment -- 0-7
---	---









SW4-1 Indoor Unit Address Configuration

SW4 ON 	SW4-1: ON - Automatic Address
SW4 ON 	SW4-1: OFF - Manual Address (Default factory setting)

SW4-2 Clear Indoor Unit Addresses

SW2 ON 	SW4-2: ON - Clear indoor units addresses (Reset power to clear indoor unit addresses and restore SW4-2 to OFF)
SW4 ON 	SW4-2: OFF - Cannot clear indoor units addresses (Factory default)

SW3 Priority Configuration

SW3 ON 	Outdoor Ambient. Determine mode priority based on outdoor temperature.
SW3 ON 	Cooling Priority.
SW3 ON 	VIP Indoor Unit. If no VIP address is configured, Majority Mode Rules in favor of quantity of indoor units.
SW3 ON 	Heating Only.
SW3 ON 	Cooling Only.
SW3 ON 	Heating Priority.
SW3 ON 	System Demand. Majority Mode Rules per capacity. (Default factory setting)
SW3 ON 	Reserved

Spot Check (Diagnostic Data) SW 2

Press SW 2 CHECK the number of times shown in the No** column to view system data and performance information.

No**.	Parameter description	Parameter value*
0	Normal display	If all indoor units off, it will show the quantity of all indoor units; if the outdoor unit is in time delay, it will show 0; if the outdoor unit is running, it will show compressor speed.
1	Operating mode	(0 - off, 2 - cooling, 3 - heating, 4 - forced cooling)
2	Operating fan speed	1 through 9, 0 - stop
3	The total capacity requirements of the indoor unit	This number is related to indoor capacity (Horsepower) and indoor room temperature and setpoint.
4	The capacity requirement of the revised external unit	This is a number revised by outdoor ambient temperature based on the previous number No. 3
5	T3 (Condenser temperature)	Actual value in C
6	T4 (Outdoor ambient temperature)	Actual value in C
7	T5 (Compressor discharge temperature)	If T5>99, it will only show the front two digits of the actual temperature. For example, it will show "10." when T5 is 105.
8	Reserved	Reserved
9	Opening of EXV	Actual value*8P
10	Unit current	Amps
11	1/10 of DC bus voltage	
12	T2/T2B average temperature T2 - Heat/T2B Cooling	(When system operates cooling, it shows T2B; when system operates heating, it shows T2.) T2 and T2B Average Operating IDU Coil Temp sensor In degrees C
13	Total number of the indoor units	
14	Number of the operating indoor unit	Number of IDUs calling for certain mode
15	Model code	3 - 3 Ton; 4 - 4 Ton; 5 - 5 Ton
16	High pressure	Actual pressure (MPa)*10
17	Saturation temperature of high pressure	Actual value in C
18	Priority mode	0 - Heating priority; 1 - Cooling priority; 2 - First running priority ; 3 - Heating only; 4 - Cooling only
19	Version of the firmware	
20	The last fault or protection code	
21	--	End

* Units of temperature are shown as °C, units of pressure are shown as MPa.

** No refers to number of presses of SW 2 button.

Service & Setup Functions

Forced cooling and manual defrost are service functions that can be performed from the outdoor unit.

Forced Cooling

Press and hold SW 1 FORCE_COOL and hold for 5 seconds.

- Forced Cooling will override and disable all controllers restricting end-user(s) operation, this is to include centralized controllers as well for a period of 60 minutes.
- Compressor frequency, fan speeds, and EXV positions will be elevated and will operate semi-independently from refrigerant pressures and temperatures.
- Cooling and heating capacity demands will not be observed during this period.
- Indoor units are in the cooling mode and fans are ON.

Manual Defrost

Press and hold SW 2 CHECK and SW 1 FORCE_COOL and hold for 5 seconds.

- Manual Defrost will override and disable all controllers restricting end-user(s) operation, this is to include centralized controllers as well for a period of 10 minutes (unless .
- Compressor frequency, fan speeds, and EXV positions will follow automatic defrost logic. See service manual.
- Indoor units are in heating mode and fans are OFF.

Access Service Menu

Press SW 2 CHECK and hold for 5 seconds.

Press SW 1 FORCE_COOL to cycle through the Level 1 menu items. Press SW 2 CHECK to select the current Level 1 menu item.

Press SW 1 FORCE_COOL to cycle through the Level 2 menu items. Press SW 2 CHECK to select the current Level 2 menu item and return to the Level 1 menu.

Service Menu

	Level 1 Menu	Level 2 Menu	Description
1	Cancel LVM Emergency Stop	0	None
		1	Cancel LVM Emergency stop
2	Test Operation	0	None
		1	Forced Cooling Test
		2	Forced Heating Test
3	Auto Priority	0	50F (factory default)
		1	60F
		2	70F
4	Compressor Lockout Temperature	1	None (factory default) Use only if no alternate heat is used.
		2	7F
		3	10F
		4	15F
		5	20F
		6	30F
		7	40F
		8	35F
		9	40F
		10	45F
		11	50F
		12	55F
		13	60F
		14	65F
		15	70F
		16	75F
		17	80F
5	Indoor Unit Temperature Unit	0	°F
		1	°C

Cancel LVM Emergency Stop

An emergency stop command can be sent from the LVM centralized controller to the outdoor unit. Select 1 to cancel the emergency stop command. The outdoor unit will display 0A0 during forced stop.

Test Operation

The system can be forced into cooling or heating mode for performance testing. Select 1 for forced cooling test and select 2 for forced heating test.

Forced Cooling.

- Forced Cooling will override and disable all controllers restricting end-user(s) operation, this is to include centralized controllers as well for a period of 60 minutes.
- Compressor frequency, fan speeds, and EXV positions will be elevated and will operate semi-independently from refrigerant pressures and temperatures.
- Cooling and heating capacity demands will not be observed during this period.
- Indoor units are in the cooling mode and fans are ON.

Forced Heating

- Forced Heating will override and disable all controllers restricting end-user(s) operation, this is to include centralized controllers as well.
- Compressor frequency, fan speeds, and EXV positions will be elevated and will operate semi-independently from refrigerant pressures and temperatures.
- Similar to Forced Cooling Operation, the system will enter cooling mode however the high pressure gas line on heat recovery systems will double as a vapor return. In all cases the Compressor(s) operation will be elevated to higher frequencies.
- Cooling and heating capacity demands will not be observed during this period.

Auto Priority

If the heat pump mode priority setting (SW3) is set to outdoor ambient. Select 1 to make 60° F the outdoor ambient change over temperature and select 2 to make 70° F the outdoor ambient change over temperature.

Compressor Lockout Temperature

If an alternate heat source is used, set the temperature at which the compressor will turn off.

Indoor Unit Temperature Unit

Set the indoor unit temperature unit display for indoor units and controllers. Fahrenheit or Celsius. This can be overwritten by the indoor unit's local controller.

Technical Support

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www.LennoxVRF.com

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

